Bridal Veil Mountain Resort
Expression of Interest

November 2020

BHA
DISTINCTIVE MOUNTAIN RESORT DESIGN

Statement of Limitations: The information included in this report has been compiled by BHA from a variety of sources. The intent of this document is to Illustrate the spatial relationship of existing and proposed development, as well as environmental, economic, and cultural realities. Further, the historic weather information provided is solely to illustrate existing climate conditions. The impacts of climate change on temperature, precipitation, snowfall, and other associated factors as they relate to this project will require ongoing assessment and review as new information and data becomes available. As such, BHA makes no representation or warranty, expressed or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. BHA shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits. Detailed design, survey, architecture, geotechnical assessment, engineering approvals, etc., must be completed prior to construction.

Prepared for:

Bridal Veil Mountain Resort Ltd.
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www.bridalveilmountainresort.ca

Planning by:

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TERRITORY ACKNOWLEDGEMENT

The Proponent Bridal Veil Mountain Resort Ltd. , and the proposed Project, the Bridal Veil Mountain Resort, do hereby acknowledge, that the Proponent and proposed Project, are located in S'ólh Téméxw, the traditional and unceded lands of the Stó:lō people, since time immemorial.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

On behalf of Bridal Veil Mountain Resort Ltd., Brent Harley and Associates Inc. (BHA) is pleased to submit the following Expression of Interest (EOI) to develop an all-season destination mountain resort within the Fraser Valley near Chilliwack, BC.

As proposed, Bridal Veil Mountain Resort would be located in the Upper Fraser Valley, on the highlands immediately south of the Fraser River, extending over Area D and Area E of the Fraser Valley Regional District and the City of Chilliwack (see Figures 1 and 2). A city of 91,800 residents, Chilliwack is located approximately 100 km east of Vancouver on the Trans-Canada Highway. Currently, the local economy is dominated by retail, manufacturing and construction, health, education, and public administration, while tourism is a recognized area of diversification and growth for region's economy[1].

The natural attributes of the mountains south of Chilliwack in general, and of the Chipmunk Creek watershed in particular, combined with the proximity to a large, growing, and undersubscribed recreationalist marketplace in the Fraser Valley makes this a very exciting resort development opportunity.

Working closely with the Bridal Veil Mountain Resort Ltd., BHA has prepared the following EOI to describe the preliminary elements, issues, and parameters influencing the proposed mountain resort. Following the All Season Resort Policy and All Season Resort Guidelines, it is the intent of this document to define both in written and graphic form, the relevant and required aspects to develop Bridal Veil Mountain Resort. Importantly, the vision, analyses, and supporting concepts presented are preliminary and subject to refinement throughout the project review process with full engagement of all local Indigenous communities, and feedback from stakeholders, the Province, and the public. The intent of the EOI review process is to establish the feasibility of the proposed resort and gain approval to proceed to the next stage of the Master Plan approval process.

1.2 THE PROJECT VISION, GOALS AND OBJECTIVES

Bridal Veil Mountain Resort (BVMR) is envisioned as a distinctive all-season mountain resort that provides the local, regional, and destination tourism marketplace with a memorable, engaging, and unique resort experience, within the striking natural beauty of the Fraser Valley.

[1] Chilliwack Economic Partners (2020). Sectors & Industries. Retrieved from: http://businessinchilliwack.com/sectors-and-industries/

Supporting this Vision, the primary goal is to develop an all-season resort that offers world-class outdoor recreation, complemented by a dynamic range of facilities and accommodation that fosters the sustained prosperity of a successful resort-oriented community.

To achieve this goal, the following objectives were established as guiding principles in the creation of the BVMR EOI:

- To develop a new, distinct, and high-quality mountain resort that caters to the residents of the Lower Mainland as well to destination guests from other parts of the Province, Canada, and the rest of the world;
- To mutually develop the BVMR Project, in full partnership with the local Indigenous and First Nations communities in S'ólh Téméxw, as the first such jointly developed four seasons mountain resort in the country;
- To provide year-round tourist attractions that may include skiing and snowsports, golfing, paragliding, mountain biking, hiking, backcountry touring, and interpretive programs;
- To develop a unique mountain resort community that will be grounded upon sustainable community development values[2], prioritizing environmental, social, and cultural well-being;
- To employ unique architectural and design themes in conjunction with high-quality development guidelines to ensure the creation of a unique and special place;
- To develop unique and varied base area villages, incorporating an associated retail core, lodge, hotels, and resort residential accommodations in each;
- To develop associated resort real estate in a resort village context as a means of balancing and complementing the Resort's facilities and attributes;
- To significantly expand the economic, business, and local career employment opportunities, for all Indigenous and non-Indigenous residents within S'ólh Téméxw and the Fraser Valley;"
- To develop an all-season resort and associated community that will complement the community of Chilliwack, and broader Fraser Valley;
- To capitalize upon on the convenient access to the area from the Lower Mainland;
- To complement and benefit from the existing tourism amenities of the Upper Fraser Valley region – Bridal Veil Falls Provincial Park, Harrison Lake & Hot Springs, and Cultus Lake, as well as local championship golf courses;
- To increase the total number of visitors to both the region and the Province;
- To build upon BC's growing reputation as a world-class tourism destination;

[2] "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland, 1987)

- To reduce the negative visual impact of the forestry cutblocks with sightlines of the Resort, while minimizing visual impact of the Resort in the valley;
- To establish the BVMR as a four seasons mountain resort that is the leading example of sustainable community values, environmental sensitivity and responsible development, and reflecting the values of the local and Indigenous communities that surround the Project.

1.3 PLANNING PROCESS

In the Spring of 2002, BHA was retained to complete an analysis of several mountains in proximity to the City of Chilliwack. To assess alpine ski resort development potential, large-scale topographic mapping was analysed, and the ability of the study area to support an alpine ski resort experience was assessed.

Derived from the analyses, preliminary ski terrain characteristics and capability to support the envisioned all-season resort were determined. This ultimately led to the proposed EOI study area being defined as the most capable area in the region to support the type of alpine skiing and resort experience being envisioned.

At this early stage, the Proponent held discussions with local and regional elected representatives, government staff, First Nations, advisory consultants, and investor groups. In support of the EOI, a preliminary environmental survey of the land associated with a separate tramway application was completed by Envirowest Consulting; a preliminary geotechnical hazards assessment was undertaken by Thurber Engineering; an economic feasibility analysis was completed by David Hughes & Associates Ltd.; and a preliminary archaeological survey was completed by Arcas Consulting Archaeologists Ltd. (See Appendix).

An initial EOI was submitted in June of 2004, followed by the submission of a revised EOI in 2006 that addressed earlier concerns expressed by the Ministry of Forests, Lands, Natural Resources Operations and Rural Development (FLNORORD). This revised EOI application was accepted by the Mountain Resorts Branch of FLNRORD, but the project was not pursued for a variety of contextual and project related factors.

This EOI builds upon the vision the 2006 EOI, but the concept has evolved to reflect new realities, accounting for and complementing changes in local land ownership and regional planning, the resort marketplace, climate, and greater knowledge of the proposed site.

2 PRELIMINARY MOUNTAIN RESORT CONTEXT

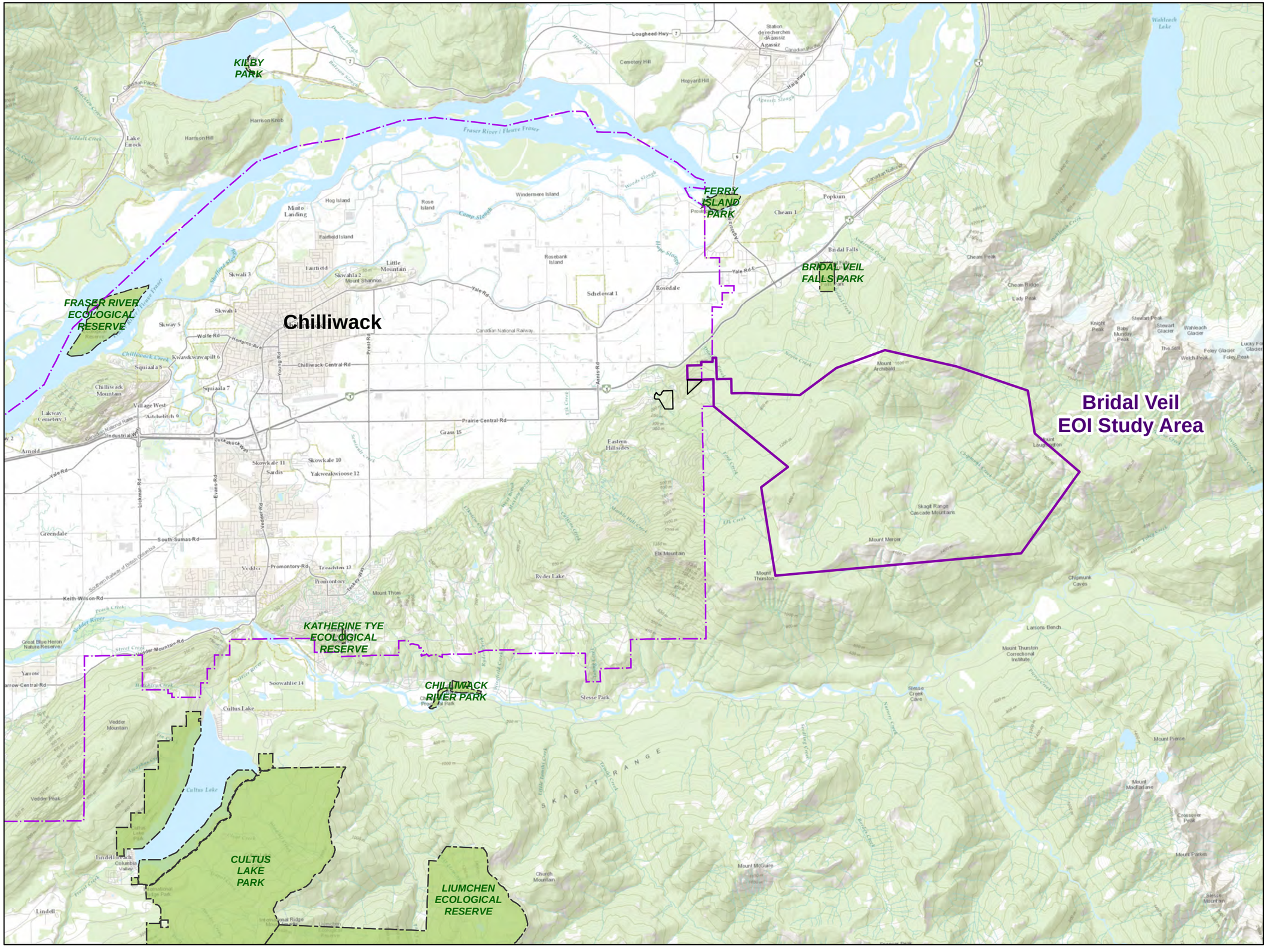
2.1 LOCATION

The BVMR study area is in the Upper Fraser Valley and spans an area of approximately 4,772 hectares (11,792 acres) (Figure 1). Chipmunk Ridge and Mount Archibald border the northern boundary of the study area, while the southern border is loosely defined by both Mount Laughington in the east, and Mount Mercer to the west. The lower western aspects of Lady Peak, and the ridgeline between Mount Mercer and Mount Thurston establish the eastern and western boundaries, respectively.

The valley base and staging area would be in Electoral Area D of the Fraser Valley Regional District and adjacent to the Eastern Hillsides Neighbourhood of the City of Chilliwack, only a few kilometres south of the Trans-Canada Highway (Highway 1). The valley base area village associated with the Resort would be developed adjacent to and in conjunction with other residential and commercial developments in the Eastern Hillsides Neighbourhood.

Bridal Veil Mountain Resort EOI

2020



Legend

- Base Area - Private
- Bridal Veil EOI Study Area
- City of Chilliwack Boundary
- Provincial Parks

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Location Map

Figure 1

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2.2 REGIONAL CONTEXT

With the development of this proposed all-season mountain resort, the Fraser Valley is well-positioned to play a greater role in the regional economy. Development of BVMR will contribute significantly to the existing Upper Fraser Valley tourism corridor between Cultus Lake, Harrison Hot Springs, the Coquihalla Canyon, and Manning Park. Additionally, with drive-by traffic estimated to be approximately nine million travellers per year[3], this all-season resort will be ideally situated to capture a significant share of both the summer and winter highway traffic.

It is the intent of Bridal Veil Mountain Resort Ltd. that the developments within this proposal are consistent and supportive of the goals and objectives of the Official Community Plans of Electoral Areas D and E of Fraser Valley Regional District, the City of Chilliwack 2040 Official Community Plan, and the Eastern Hillsides Comprehensive Area Plan (2012). Further, all efforts will be made to ensure that all developments associated with this project will coincide with the goals, objectives and strategies of the 2004 Regional Growth Strategy as directed by the Fraser Valley Regional District as well as any future Land and Resource Management Plan (LRMP). Finally, the Proponent intends to coordinate the full development of BVMR with local Indigenous and First Nation communities (see Sec. 2.4.1).

2.3 COMMUNITY CONTEXT

The City of Chilliwack has seen its population grow rapidly in the last decade and is projected to surpass 100,000 residents in the next few years. It is anticipated that 40% of new employment opportunities will result from continued economic growth. While retail, construction and manufacturing, health and education, and professional services are currently the dominant employment sectors, tourism has been identified as a key industry by the City[4]. The region's existing tourism attractions, its potential for additional indoor and outdoor visitor experiences, and the area's proximity to the Metro Vancouver population will create opportunities to draw local, regional, international visitors to the City[5].

Electoral Area D (Popkum-Bridal Falls) of the Fraser Valley Regional District lies directly west of the City of Chilliwack with a population of 1,741, of which 1,529 residents are concentrated in the neighbourhoods of Popkum and Bridal Falls. These neighbourhoods offer residents a small number of shops and basic amenities, with specialized services located in the City of Chilliwack. The area strives to offer residents active lifestyles, integrated into the surrounding mountains and forests, supported by high-quality services and a vibrant commercial sector, and with respect for Indigenous communities, their culture and heritage. Among its overarching objectives, the Official Community Plan identifies enhancing and growing its tourism recreation infrastructure while preserving the environment, the water and air, through well-managed development[6].

[3] BC Ministry of Transportation and Infrastructure (2020). Traffic Data Program. Retrieved from http://www.th.gov.bc.ca/trafficdata/
[4] Business in Chilliwack (2020). Community Profile. Retrieved from: http://businessinchilliwack.com/community-profile/
[5] Business in Chilliwack (2020). Sectors & Industries. Retrieved from: http://businessinchilliwack.com/sectors-and-industries/
[6] Fraser Valley Regional District (2020). [Draft] Official Community Plan Popkum – Bridal Falls. Retrieved from: https://www.fvrd.ca/EN/main/services/planning-development/projects-plans/electoral-area-d-ocp-update.html

This proposal represents an opportunity for significant new investment, job training, increased community stability, and diversification of the tourism economy in the region while pursuing sustainable community development and preserving environmental values (see Sec. 4.2). In addition, the resort will significantly expand the economic, business, and local career employment opportunities for all Indigenous and non-Indigenous residents within S'ólh Téméxw and the Fraser Valley. The Resort's development will also include high wage forestry and construction jobs for the community during the construction phases of the project. Over the longer term, BVMR will contribute substantially to the communities' tax base, permitting greater improvements to local infrastructure than would otherwise be available.

2.4 ACCESS

The proposed Bridal Veil Mountain Resort is located approximately 100 km east of the city of Vancouver along the Trans-Canada Highway. Access to the site is a mere 1 km from exit 135 to Bridal Falls and Harrison Hot Springs, and a second access point is only 6 kilometres from the Resort via the Annis Road interchange. Destination guests arriving by air will likely travel to the Chilliwack area via Vancouver (YVR), Abbotsford (YXX) or Seattle (SEA) International Airports. The road access from the Abbotsford International Airport is particularly convenient as it involves a short 35-minute drive (27 km) to the proposed resort area.

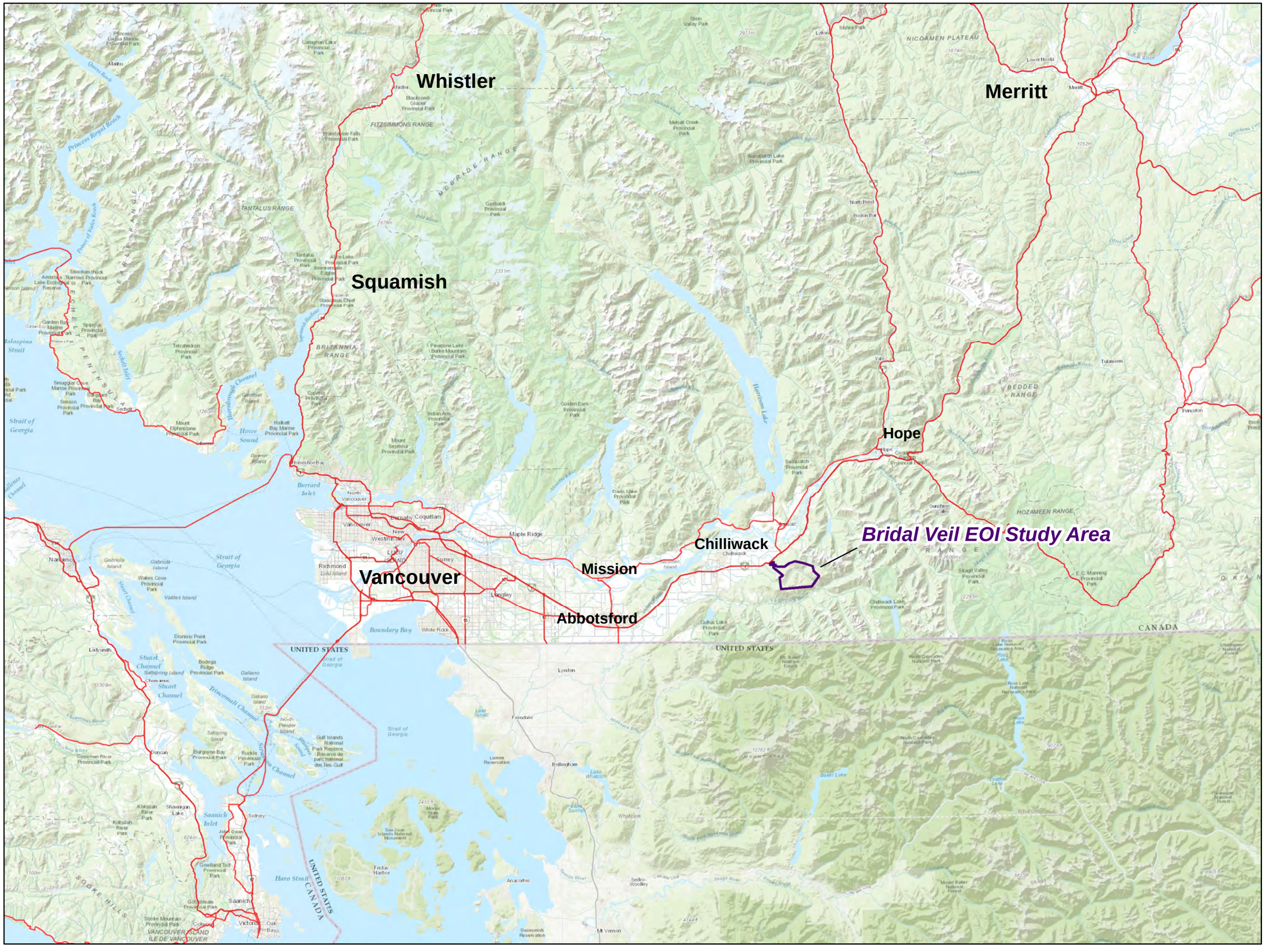
Regional access is further facilitated by domestic air service to Chilliwack Municipal Airport and by abundant regional rental car and private automobile access via the Trans-Canada Highway from the Lower Mainland and the entire Pacific Northwest. The existing regional access infrastructure to the proposed resort area is undoubtedly a strong asset for the envisioned mountain resort.

Local access from the Trans-Canada Highway will be primarily from the existing exits at the Annis Road Interchange and the Bridal Falls - Harrison Hot Springs (Exit 135). From the Trans-Canada Highway, the site can be accessed from the existing Hack-Brown, Nixon, and Allan municipal roads to an access road just east of the Ford Creek crossing. As part of the first phase of development, the Proponent will work with adjacent landowners to improve the access road from Nixon Road to the proposed base area village to meet Ministry of Transportation and Infrastructure and City of Chilliwack requirements. These landowners have already signaled their support for BVMR by agreeing to make a significant investment to complete the City of Chilliwack's process to upgrade this access road.

As envisioned, access from the initial valley base area village development to the mountain's facilities will be provided by a gondola or tram. As the capacity of the mountain amenities (e.g. ski runs) grows it will be supported by the development of a second gondola or tram staged from the same base area village.

Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Main Highways/Transportation Routes

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Regional Context

Figure 2

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2.5 Indigenous and First Nation's Engagement

The Proponent Bridal Veil Mountain Resort Ltd., and the proposed Project, the Bridal Veil Mountain Resort, do hereby acknowledge, that the Proponent and proposed Project, are located in S'ólh Téméxw, the traditional and unceded lands of the Stó:lō people, since time immemorial.

Stó:lō means river, and the Stó:lō are the "*people of the river*." The Stó:lō are the original first peoples, dating back over 10,000 years, to the modern area known today as the Fraser Valley Region of BC. The Stó:lō called their traditional lands S'ólh Téméxw. The Stó:lō always had a diverse and thriving economy based upon trade, founded upon their own cultures, traditions, and systems of government. As members of the larger Indigenous group, the Coast Salish, the Stó:lō traditional language is Halq'eméylem.

Some members of the Proponent have been long-time residents within S'ólh Téméxw. With this strong and deep local Indigenous and First Nations connection, it is the vision and intention of the Proponent to jointly develop the Bridal Veil Mountain Resort, with a full and mutually respectful partnership and ownership participation, with the local Indigenous and First Nations communities in S'ólh Téméxw. This, we believe, would be the first such jointly developed four seasons mountain resort facility in Canada.

It will be a long and challenging journey. It starts with the current times that we all collectively face, and the current COVID pandemic. This will start, with the Proponent firstly understanding and respecting new protocols and communications procedures, that each Indigenous community will be following to protect their people.

The Proponent knows that the long journey ahead will begin with respect, a need to fully understand the local cultural and traditional values of each Indigenous community that we engage with. Engage early. Listen a lot. Being open to respectful dialogue, idea exchanges, and being transparent. The Proponent must also act with honour, learn new values and Indigenous stewardship principles, work collectively on problems that will arise, and implement agreeable and mutually beneficial solutions, resulting, hopefully, in the development a mutually agreeable and respectful consensus between the Proponent and the local Indigenous leaders and communities. The Proponent prioritizes coming to an ideal agreement on how to advance a united vision jointly and respectfully for the development of the Bridal Veil Mountain Resort Project.

The Proponent is developing, and intends to implement, a full Indigenous Engagement process, based upon the preceding foundations of mutual respect. The Proponent recognizes the challenges that the local Indigenous communities have faced, since the time of first contact in S'ólh Téméxw. The principles of Reconciliation are a core value system of the Proponent. The guiding principles of the recently enacted BC Declaration on the Rights of Indigenous Peoples Act, including the Indigenous right to pursue self-determined development, in keeping with Indigenous needs and aspirations, are core values of the Proponent.

The Proponent fully understands that the Province of BC is legally obligated to consult and accommodate First Nations, where required, on land and resource decisions that could impact Indigenous interests, like the BVMR Project in S'ólh Téméxw. The Proponent also acknowledges that the Province may involve the Proponent in the procedural aspects of consultation, and the Proponent will respectively accept such obligations with real honour and do our very best to maintain the honour of the Province.

S'ólh Téméxw has 24 First Nation Communities, two major Indigenous government groups, Stó:lō Nation (11 Bands) and the Stó:lō Tribal Council (7 Bands), and several non-affiliated First Nations Communities. There are active Tribal groups such as the Ts'elxwéyeqw Tribe and the Pil'alt Tribe. In addition, six Stó:lō communities are currently advancing through Treaty, as the Stó:lō Xwexwilmexw Treaty Association. Stó:lō is a complex First Nations political landscape that the Proponent hopes to respectfully navigate.

The estimated Indigenous population in S'ólh Téméxw is 14,000 to 15,000, with a large Métis population. Stó:lō is also well recognized as being a major centre of Indigenous business growth in BC, with both strong Band-owned development corporations and a rapidly growing Indigenous entrepreneurial economy.

As detailed throughout this EOI, the Proponent has a vision of the BVMR Project being developed to the highest environment standards and being a Sustainable Green Community throughout the entire Project. Sustainability, environmental stewardship, and protecting Mother Earth are all strong core Indigenous values. As the Proponent and the Indigenous communities join to advance the detailed Sustainable Community environmental planning, these core environmental values will be critical components of the Master Planning process for BVMR.

Finally, it is also the strong intention of the Proponent, to actively engage and involve all of the local communities, the City of Chilliwack, the Fraser Valley Regional District (FVRD), and all local stakeholders, tourism organizations and all the diverse range of mountain recreational groups and enthusiast; in developing the BVMR, as a leading community supported four season mountain resort in BC.

2.6 Adjacent and Existing Land Uses

2.6.1 Existing Tenures

The study area overlaps with 4 existing tenures and 3 tenure applications that are still undergoing review by FLNRORD (Table 1 & Figure 3). Of these, none are viewed to present a long-term conflict with the proposed Resort. In line with its vision to be an environmentally sensitive development and as supported by traditional and existing knowledge and additional study of the environmental values of the study area, BVMR can adjust its final concept and operations to maintain the values and achieve the objectives of the Watershed Reserve and Environmental Protection Notations. The Commercial Recreation and Special Activities tenures appear to be time limited such that BVMR development will be initiated after the tenure expires in the first case or can accommodate and perhaps enhance the activities being pursued in the second. The remaining tenures are not in conflict with the vision for BVMR and management will work with these tenure holders to ensure neither operation is adversely affected.

Table 1. Existing Tenures Overlapping with the Study Area

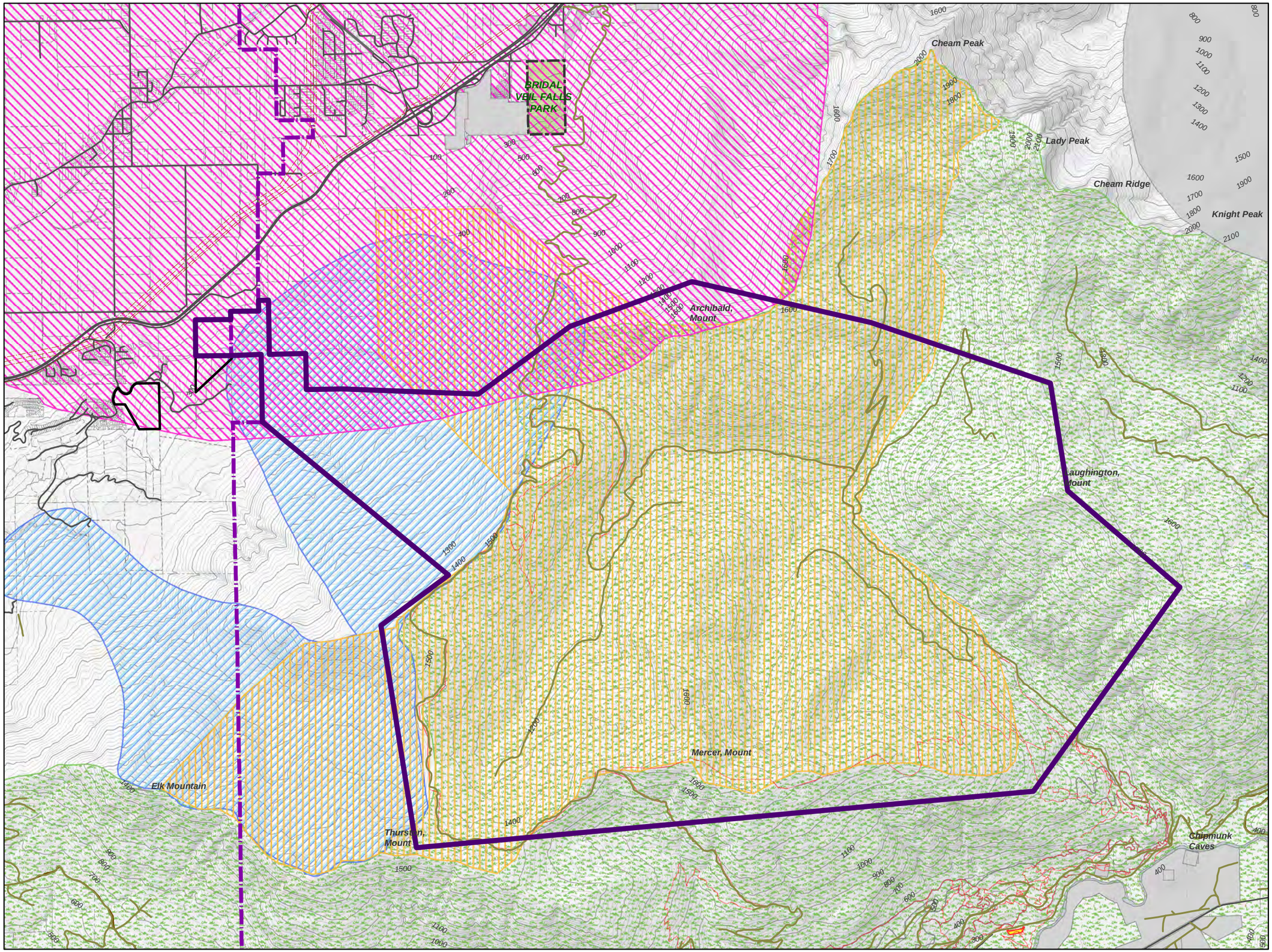
Stage	Tenure Type	Tenure Subtype	Crown Land File Number
Tenure	Notation of Interest	Environmental Protection	2411668
Tenure	Sec. 17 Designated Use Area	Watershed Reserve	0326793
Tenure	License of Occupation	Communication	2409533
Tenure	Temporary License	Commercial Recreation	2412059
Application	License of Occupation	Commercial	2408582
Application	Notation of Interest	Miscellaneous Land Use	2412221
Application	License of Occupation	Special Activities	2412175

2.6.2 Adjacent Land Ownership

Privately owned lands adjacent to the proposed base area are being developed in partnership with Bridal Veil Mountain Resort Ltd. into single and multi-family residential dwellings within the boundaries of the City of Chilliwack. This area has been identified in the City of Chilliwack OCP, specifically in the Eastern Hillsides Comprehensive Area Plan (2012), as an area for growth (Figure 4). To the West, the Falls Golf Course includes an existing 18-hole course, 93 high-end single-family residential units, as well as a variety of proposed related commercial uses. The Bridal Falls Golf Club, a 9-hole course, is situated to the east of the base lands. Other housing developments exist in the area such as Panorama Heights and 62 single-family homes at Ford Creek. The proposed base area also extends in Area D of the FVRD. The area impacted by the proposal includes private land owned by the Proponent and Crown lands. Figure 4 delineates the boundaries between Crown land and privately held lands.

Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Base Area -
- City of Chilliwack Boundary
- Transmission Lines
- Railway
- ParcelMap BC Parcels

Bridal Veil 2020 Tenure

- Non-intersecting Tenures
- Reserve/Notation - Watershed Reserve
- Reserve/Notation - Environmental Protection
- Commercial Recreation - Multiple Use
- Communication Site
- Commercial Recreation - Special Activities
- Reserve/Notation - Misc.
- Provincial Parks
- Lakes/Rivers

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Existing Tenures

Figure 3

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Bridal Veil Mountain Resort EOI

2020

Legend

- Potential Base Area Access Road
- Potential Lift Alignments
- EOI Study Area
- Private Lands
- Proposed Base Area (Crown Lands)
- City of Chilliwack Boundary
- Parcel Boundaries

Parcel Type

- Private Lands
- Municipal Lands

BVMR Private Lands

23 Acres

45 Acres

Proposed Base Area (Crown Lands)

Potential Gondola Alignment

Potential Access Road

BVMR EOI Study Area

Potential Gondola Alignment

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Study Area Parcel Ownership

Figure 4

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Winter View of the Fraser Valley looking West from the Skagit Range
Photo: Tim Gage

2.6.3 Forestry and Mining

Forestry activity has dominated the study area in recent history with approximately 50% of the area having been logged in the last 100 years (Figure 5). This activity has declined within the study area in recent years and the EOI boundary was not found overlap with any Forest Licences or Forest Harvest Authorizations[7], though several Active Forest Service Roads still exist (Table 2).

A preliminary review of mineral titles indicates that there are no mineral tenures within the study area.

Table 2. Forest Tenure (Roads) within the Study Area

Status	Client	ID
Active	District Manager Chilliwack (DCK)	5127 27
Active	District Manager Chilliwack (DCK)	5127 28
Active	District Manager Chilliwack (DCK)	5127 29
Active	District Manager Chilliwack (DCK)	5127 23
Active	District Manager Chilliwack (DCK)	5127 33
Active	District Manager Chilliwack (DCK)	5127 12
Active	District Manager Chilliwack (DCK)	7685 01
Retired	Western Canadian Timber Products Ltd.	R02023 C1
Retired	Western Canadian Timber Products Ltd.	R02023 C2

2.6.4 Public Recreation

The study area overlaps in part or in full with 5 approved recreation trails (Table 3) and several popular but unauthorized trails[8] (Figure 6). Further, the Forest Service Roads created for the forestry activities noted above also provide recreation opportunities. These trails and the study area in general appear to be used primarily in the summer months for hiking, mountain biking, and ATV/ORV use. The study area also overlaps with a recreation area corridor for the Mount Cheam Trail (REC3109), and several recreation sites exist at lower elevations outside the EOI area, adjacent to the Chilliwack River. The Proponent will work with existing users to ensure these experiences are maintained and where possible enhanced by the development the proposed resort (e.g. staging, access).

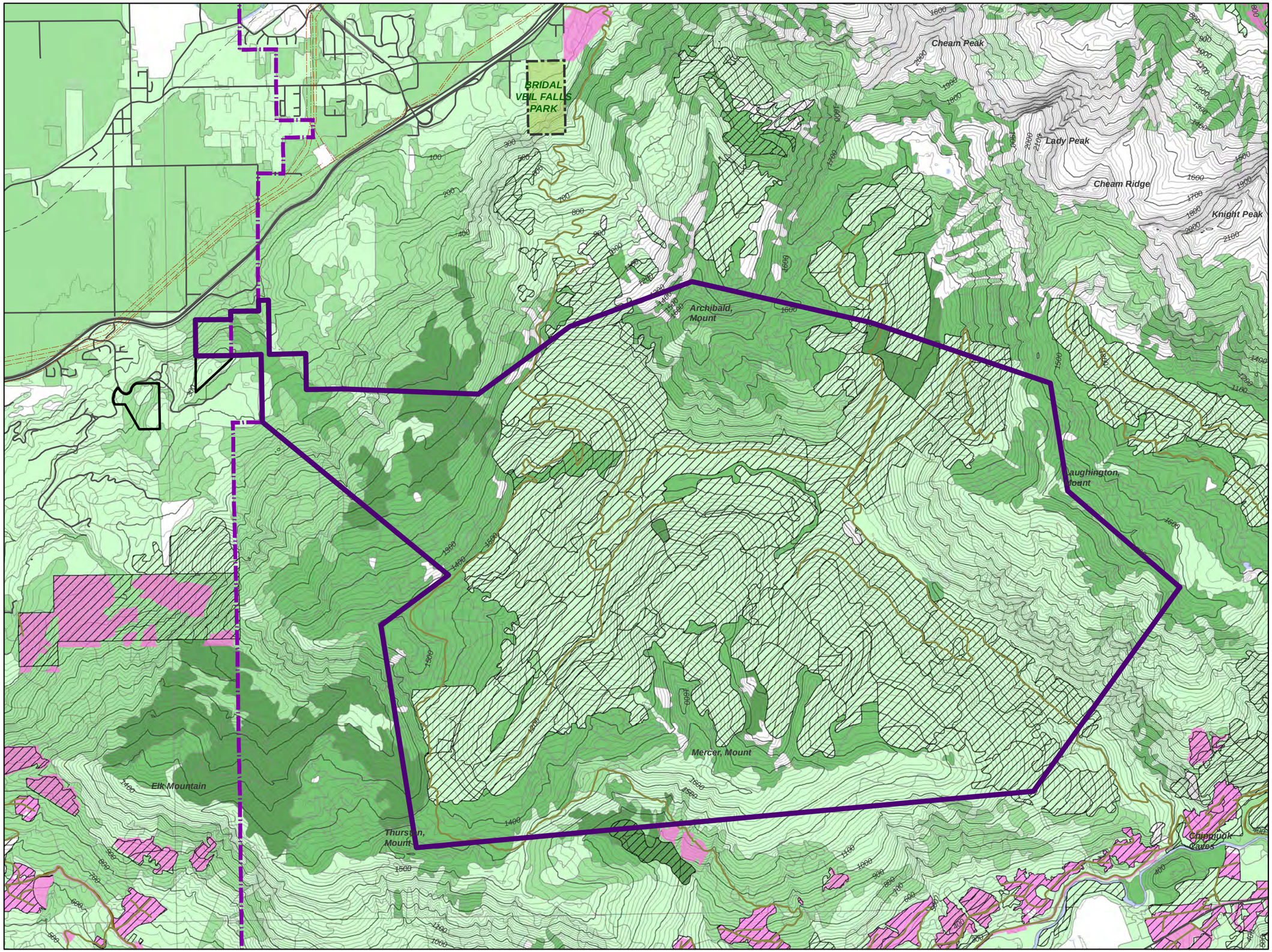
Table 3. Recreation Trails within the Study Area

Trail Name	Rec ID
Mount Mercer Trail	REC3083
Gloria Elk Thurston Trail	REC0358
Chipmunk Creek Trail	REC3087
Mount Cheam Snowmobile	REC241238
Mount Cheam Trail	REC3109

[7] Overlap with retired forest license awarded to 606546 B.C. Ltd. (DBA Dorman Group).
[8] Developed from Strava Heat Map. Available at https://www.strava.com/heatmap#7.00/-120.90000/38.36000/hot/all. Accessed June 23, 2020.

Bridal Veil Mountain Resort EOI

2020



Legend

- Logged

Projected Age of Dominant Tree Species

- 0 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- Forest Harvest Authorizations
- Base Area - Private
- Bridal Veil EOI Study Area
- City of Chilliwack Boundary
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Forestry and Mining Interests

Figure 5

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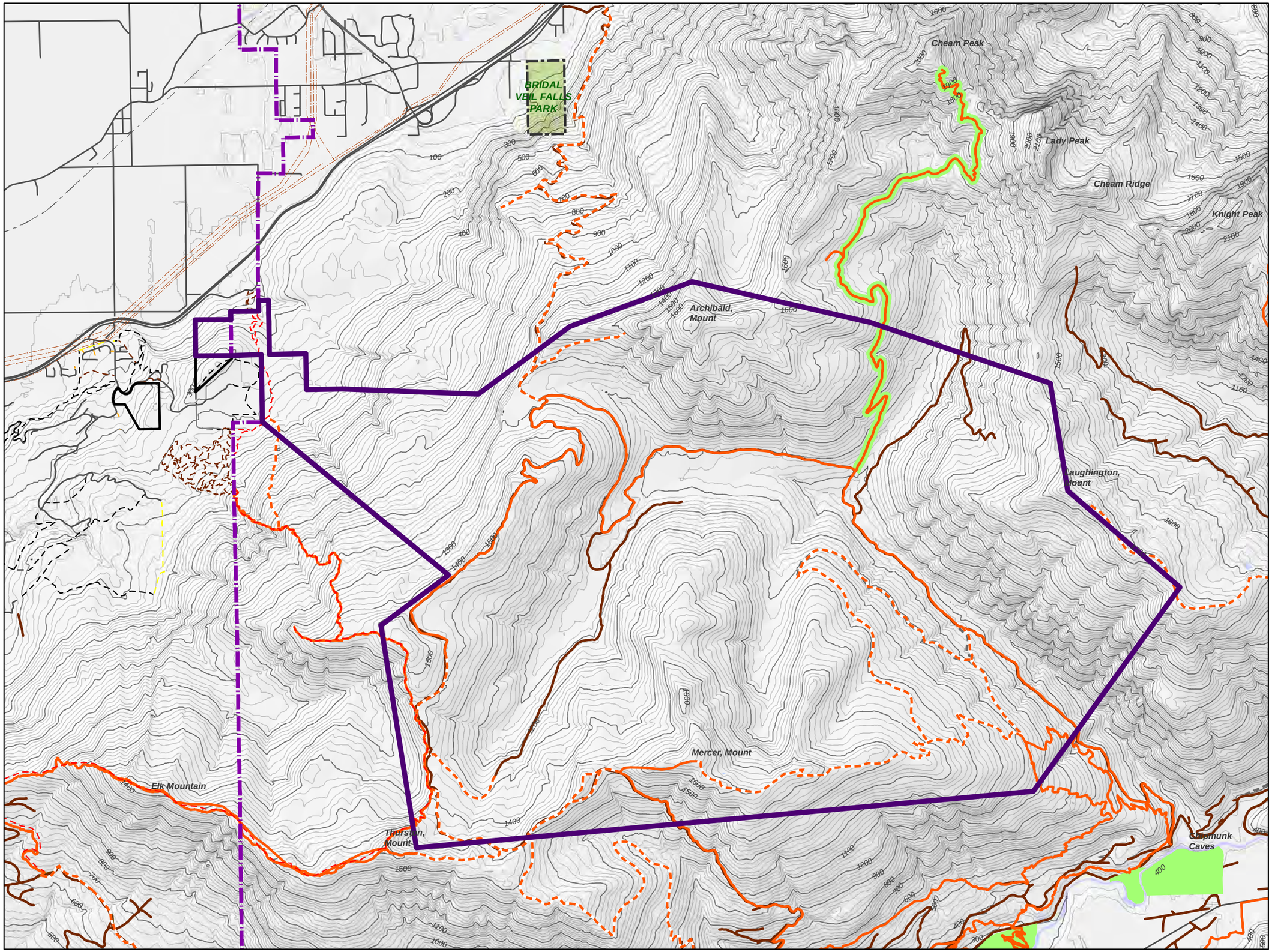
Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Bridal Veil Strava Trails June 2020
- Authorized Recreation Trail
- Authorized Recreation Area
- Base Area - Private
- City of Chilliwack Boundary
- Transmission Lines
- Railway
- Provincial Parks
- Lakes/Rivers

City of Chilliwack Existing Trails

Trail Type

- CONCEPTUAL
- NON-CITY TRAIL
- PLANNED
- ROAD
- TRAIL
- WALKWAY

Forest Tenure Road

- Active FSR
- Retired FSR

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Recreation Values

Figure 6

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3 PRELIMINARY SITE INVENTORY AND ANALYSIS

3.1 INTRODUCTION

BHA completed an analysis of the mountain terrain in the Chilliwack area to assess the development potential for the creation of an all-season mountain resort. Ultimately, the area roughly defined by the upper reaches of the Chipmunk Creek watershed was selected as the most desirable development site. The BVMR study area was delineated to encompass not only the best recreation opportunities, and to ensure that an adequate buffer could be established to guarantee high visual quality, environmental protection, and resort ambience.

The study area was analysed in terms of slope, elevation, aspect, and fall line to gain an understanding of the mountain development potential of the Chipmunk Creek drainage. The key information came from a series of spatial analyses that were performed using B.C. Government TRIM mapping, at a scale of 1:10,000 with a 20 metre contour interval. The spatial analysis, combined with available climatic data and site knowledge gained from a series of site visits, culminated in an understanding of the study area's capability to physically support mountain recreation activities.

The associated valley base area and staging lands have also been analyzed for their potential to support the on-mountain activities and provide a related residential and commercial space, and financial anchor for the mountain resort development. The proposed valley village sits on both Crown land and lands privately owned by Bridal Veil Mountain Resort Ltd. within the City of Chilliwack and Area D of the FVRD.

3.2 MOUNTAIN DEVELOPMENT POTENTIAL

3.2.1 Ski Slope Analysis

The Slope Analysis (Figure 7) divides the topography of the study area into a range of skiable gradients as they relate to each of the primary skier/snowboarder[9] skill classes. These are as follows:

Table 4. Mountain Resort Slope Analysis Criteria

Colour	Gradient Criteria	Characteristics
White	0-8%	Too flat to ski, ideal for base area development, cross country ski trails
Green	8-25%	Ideal for Beginner skiers
Blue	25-45%	Ideal for Intermediate skiers
Grey	45-80%	Ideal for Advanced and Expert skiers
Red	80+	Extreme Skiing / Areas of Considerable Hazard

The result delineates the general character of the land, illustrating that the study area has a good to excellent mix of terrain, predominated by intermediate and expert oriented slopes. From this, it is clear that there is significant potential to establish alpine skiing on the lands in consideration.

3.2.2 Mountain Bike Slope Analysis

Similar to the Ski Slope Analysis, the Mountain Bike Slope Analysis involves colour coding the topographic features of the study area (Figure 8). However, classification is based on suitability for trail construction rather than rider skill class. Table 5 defines these gradients in terms of their desirability for the creation of mountain bike trail development.

Table 5. Mountain Bike Slope Classification

Type of Terrain	Gradient Criteria	Characteristics
Flat	0 - 5%	Try to avoid. Drainage will be an issue.
Preferred	5 - 25%	Best range for skill parks, trail hubs, trail intersections, climbing turns and all levels of trail development.
Possible	25 - 40%	Maximum preferred grade for switchbacks.
Generally Avoid	40 - 55%	Switchbacks require retaining structures.
Avoid	55% +	Too steep for Mountain Bike use.

Slopes between 5% and 25% (light yellow) and 25% to 40% (dark yellow) have significant mountain bike trail development potential. The light red (40-55%) and dark red (55+%) coloured slopes represent terrain that is considered too steep for development. However, in some cases these lands can still be utilized for mountain bike trail development. For example, long benched traverses may be used to link trails, or these areas can be used for expert only features that act as unique or iconic attractions.

[9] For simplicity, any future reference to skiing or skiers includes snowboarding and snowboarders.

Bridal Veil Mountain Resort EOI

2020

Legend

- Bridal Veil EOI Study Area
- Base Area Private Lands
- City of Chilliwack Boundary
- Provincial Parks

Planning for:

Bridal Veil Mountain Resort Ltd.
103 - 20316 56th Ave
Langley, B.C.
V3A 3Y7

Planning by:

Brent Harley and Associates Inc.
4-1005 Alpha Lake Road,
Whistler, B.C.
Canada. V8E 0H5
Tel: 604 932 7002
www.brentharley.com

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Study Area
Ski Slope Analysis

Figure 7

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Bridal Veil Mountain Resort EOI

2020

Legend

- Bridal Veil EOI Study Area
- Base Area Private
- City of Chilliwack Boundary
- Recreation/Trails
- Provincial Parks
- Lakes/Rivers

Planning for:

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Study Area Mountain Bike Slope Analysis

Figure 8

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3.2.3 Elevation Analysis

The Elevation Analysis (Figure 9) slices the topographic features of the study area into 100 metre increments. Effectively this analysis illustrates the height and "flow" of the land.

The primary valley running in a northeast / southwest orientation is the Fraser Valley. From the valley floor at 100 metres elevation, the terrain rises to 1,690 metres at the summit of Mt. Mercer. The Chipmunk Creek watershed largely defines the areas of interest for lift-serviced ski resort development. Directly tied to this are three prominent mountains; Mt. Mercer with a summit elevation of 1,698 m, Mt. Thurston at 1,620 m, and Mt. Archibald at 1,729 m.

As a point of comparison, these summit elevations are higher than most ski resorts in the region, with the exception of Manning Park Resort and Whistler/Blackcomb (Table 6). Further, the lowest skiable terrain sits at 1,000 m elevation, supporting a consistent early and late season snowpack.

Table 6. Resort Area Elevation and Skiable Vertical Analysis

Resort	Summit Elevation (m)	Lowest Skiable Terrain (m)
Mount Archibald	1,729	1,004
Mount Mercer	1,698	
Mt. Seymour Resort	1,260	920
Cypress Mountain Resort	1,448	910
Grouse Mountain Resort	1,250	881
Sasquatch Mountain Resort	1,317	980
Mt. Baker Ski Resort	1,551	1,067
Mt. Washington Alpine Resort	1,590	1,083
Manning Park Resort	1,790	1,353
Blackcomb Mountain	2,182	652
Whistler Mountain	2,284	675

3.2.4 Aspect Analysis

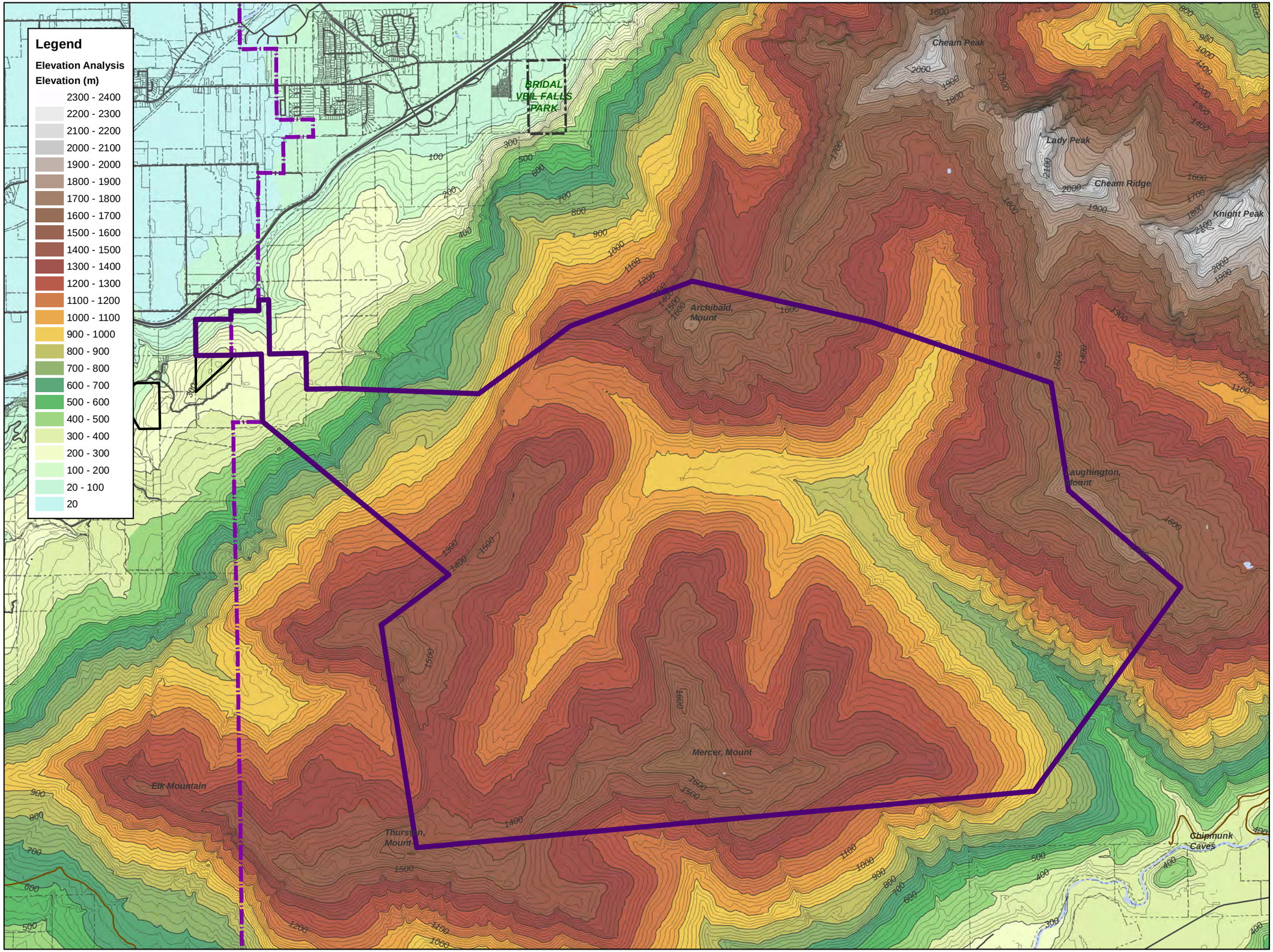
The Aspect Analysis (Figure 10) involves colour coding the topographic features of the study area to illustrate the orientation and geographical exposure with respect to the eight points of the compass. Receiving reduced direct sunlight, northern exposures have better snow retention. These slopes are best for ski trail development but are undesirable for base area or residential development. Southern exposures are less desirable for skiing terrain, as they have reduced snow retention capabilities and a greater probability of solar burn out. Conversely, because these slopes receive partial or full sun exposure, they are more desirable for base area or residential development.

Ski trails that have a high degree of solar exposure can have the solar burn out minimised through careful design including detailed grading (e.g. angling trails away from direct exposure), reduced trail width (e.g. maximizing shade from edge vegetation) and erosion control (e.g. directing melt waters away from the trails).

The Chipmunk Creek watershed has orientations that will enable the development of a good mix of ski trails. There is no one dominant orientation such that skiers will be able to move through the Resort to find their desired snow conditions throughout the day. Early morning laps on eastern facing slopes can be followed by late day cruising runs on western facing slopes. And north facing slopes are more likely to maintain steady conditions throughout the day and retain greater snowpack into the spring. On south facing slopes, a combination of techniques noted above can be used to minimize snow loss and ensure a viable ski product.

Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Base Area Private Lands
- City of Chilliwack Boundary
- Provincial Parks

Planning for:
Bridal Veil Mountain Resort Ltd.
103 - 20316 56th Ave
Langley, B.C.
V3A 3Y7

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Study Area Elevation Analysis

Figure 9

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Bridal Veil Mountain Resort EOI

2020

Legend

Aspect Analysis

Aspect

- Flat
- North
- Northeast
- East
- Southeast
- South
- Southwest
- West
- Northwest
- North

Legend

- Bridal Veil EOI Study Area
- Base Area Private Lands
- City of Chilliwack Boundary
- Provincial Parks

BRIDAL VEIL FALLS PARK

Cheam Peak

Lady Peak

Cheam Ridge

Knight Peak

Archibald, Mount

Laughington, Mount

Mercer, Mount

Elk Mountain

Thurston, Mount

Chipmunk Caves

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Study Area Aspect Analysis

Figure 10

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3.2.5 Fall-Line Analysis

A Fall Line Analysis was completed to assist in the identification of contiguous skiable areas (Figure 11). Effectively, a fall line analysis identifies potential routes that will allow for the natural flow of skiers from the mountain heights of land to the valley bottoms in a consistent fashion. This consistency of fall line provides the best recreational skiing experience while causing the least amount of environmental disruption during trail construction.

The analysis confirms the potential to define planning units (ski terrain pods) critical to the successful development of an alpine skiing experience. Further, the analysis indicates that there is potential to create these pods on all the slopes of the EOI study area, highlighting the significant recreation potential of the study area.

3.2.6 Base Area Slope Analysis

The Base Area Slope Analysis of the base lands study area is illustrated in Figure 12. The slopes of the lands were categorized based on the physical capability to support specific types of development. The grey areas represent areas with a slope of less than 5%. Generally, this land is ideal for all types of built development (e.g. base lodge/village development, high, medium, and low density residential, parking lots, settlement ponds, golf courses, etc.). However, it is important to note that these same areas because they are flat, limit the ski to/ski from qualities. In addition, these lands can have issues with drainage and be environmentally sensitive, adding to development challenges.

Lands with slopes between 5% and 10% (yellow) have significant development potential. With some minimal grading, these lands can all be tied together into a contiguous development opportunity.

The light green coloured slopes represent areas with terrain greater than 10% but less than 20% slope. These lands may be utilized for built development but are subject to more difficult access issues. While they are generally too steep for base area staging capabilities and high-density development, they are still conducive to medium and low-density residential development as well as limited golf course considerations.

Slopes between 20% and 30% gradients (dark green) are lands where medium-density development becomes more challenging. The keys to such development are vehicular access and the establishment of enough off-street parking in an economically viable fashion. Low-density single family and duplex type development may be applied to these lands with greater ease than the multi-family, medium-density models. The benefits of development on these slopes usually include ski to/ski from capabilities, unrestricted views, and good solar access.

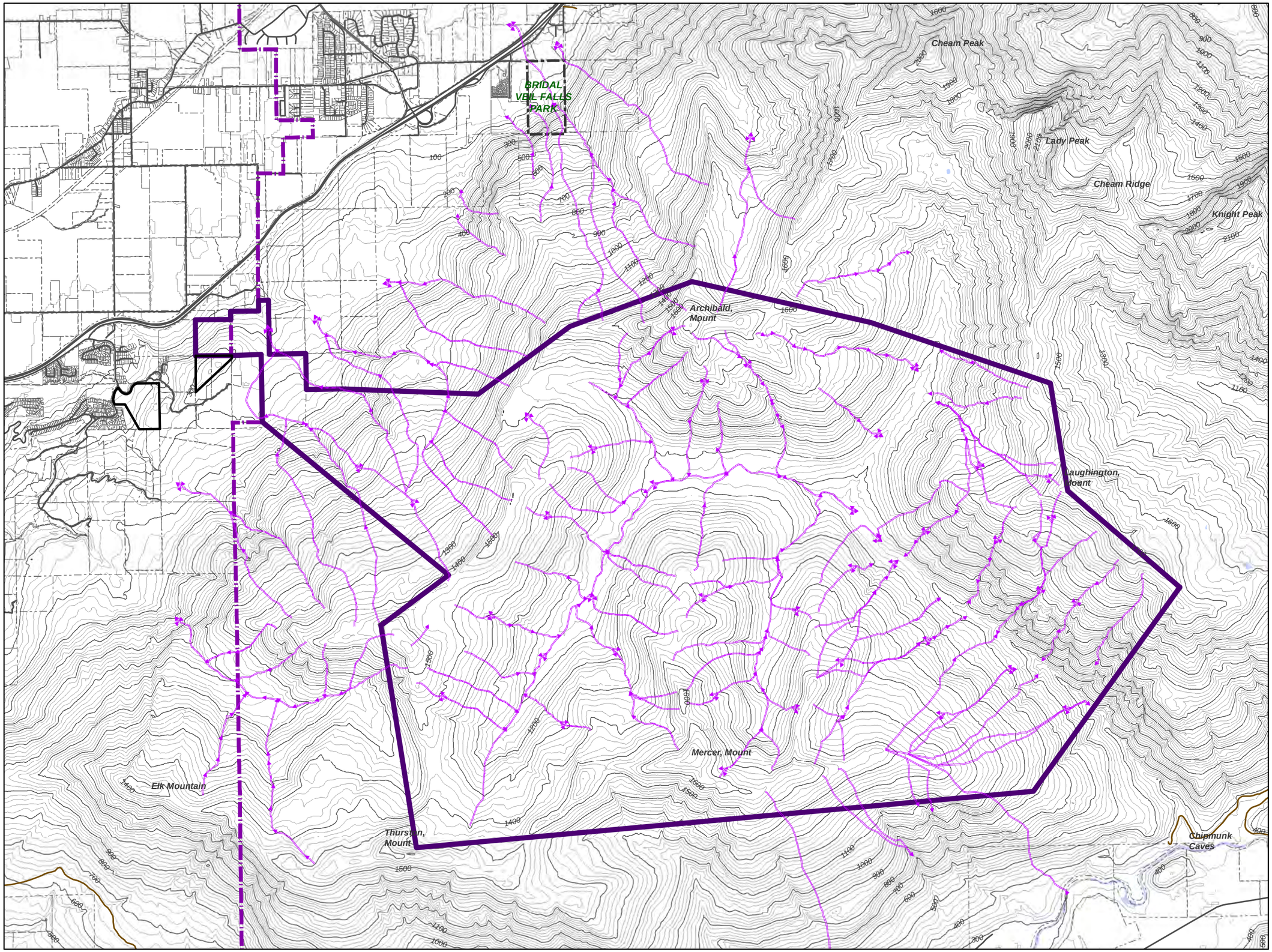
The purple colour represents areas with slopes between 30% and 40%. This generally represents the upper limit for low-density development without incurring access and development expenses that exceed economic viability. The challenges of developing on these slopes are often offset by the benefits of scenic views and excellent solar access.

Finally, red coloured areas represent slopes greater than 40%. These areas should largely be avoided due to the difficulties of access and the expense of building unless special circumstances prevail.

Examining the EOI study area, in the valley, the site identified for the valley base area has slope gradients suitable for high- and low-density development and is adjacent to land suitable to all types of developments. This gives support to the chosen base area village location and its ability to accommodate the envisioned base amenities. At higher elevations, there are pockets of suitable base area land along the east side of the north ridge emanating from Mt. Thurston, as well as large pockets of suitable lands along the bottom of Mount Archibald's south facing slopes. Those areas along ridgeline indicate the clear potential to locate the upper terminals of the proposed gondolas or trams while the gradients and orientation of slopes beneath Mount Archibald would be well-suited to on-mountain facilities (e.g. lodge). This potential will be explored and vetted during the Master Planning process.

Bridal Veil Mountain Resort EOI

2020



Legend

- Fall Line
- Bridal Veil EOI Study Area
- Base Area Private Lands
- Base Area Crown Lands
- City of Chilliwack Boundary
- Provincial Parks

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Study Area
Fall-Line Analysis

Figure 11

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Bridal Veil Mountain Resort EOI

2020

Legend

Base Slope Analysis

Slope Categories

- Suitable for All Construction Types
- Acceptable for High Density
- Maximum for High Density
- Acceptable for Low Density
- Maximum for Low Density
- Not Suitable

Legend

- Bridal Veil EOI Study Area
- Base Area Private
- City of Chilliwack Boundary
- Provincial Parks

BRIDAL VEIL FALLS PARK

Cheam Peak

Lady Peak

Cheam Ridge

Knight Peak

Archibald, Mount

Laughington, Mount

Elk Mountain

Thurston, Mount

Mercer, Mount

Chipmunk Caves

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Study Area
Base Slope Analysis

Figure 12

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3.2.7 Climatic Assessment

BHA assessed historic and projected climatic conditions in the study area by deriving temperature and snowfall data from historic (1970 – 2018) and future (2025, 2055, 2085) weather projections using the ClimateBC program[10] for a representative site within the ski area (49.001, -121.052, 1,354 m.a.s.l). Future climatic variables were assessed for high and moderate scenarios developed by the UN International Panel on Climate Change. This data is supported by historic weather records from two snow stations[11] located in proximity to the study area with similar site characteristics. Greater detail on the methods, results, and conclusions can be found in Appendix 1.

Historic

BHA established that average daily winter temperatures (December to February) range from -6.3ºC to -0.4ºC, while average daily temperatures in the summer (July to September) range from 8.7ºC to 15.6ºC. These temperatures indicate that currently the Study Area has excellent temperatures for winter season activities (i.e. cold temperatures create light, 'champagne' snow) and relatively cool summer temperatures conducive to strenuous outdoor recreation (e.g. hiking, mountain biking). Aligned with historic temperatures, annual snowfall in the Study Area averages 7.7 m and has not fallen below 4 m in the last 10 years. This is further supported by snow depth records that show that upper elevations in the region average a 4 m snowpack annually with a snow line that sits at or below the lowest skiable terrain identified (1,004 m) from December to April. This suggests the Study Area currently has an operating season of 130 days or more.

Projected

Average annual temperature is projected to increase by 1.2ºC to 1.8ºC by 2055, with the greatest change realized in the summer and notable increases in February through April, when winter season operations are reliant on continued snowfall. Following these temperature changes, average annual snowfall is expected to decline between 17% – 30% by 2055, or equal to a low snow year historically. For the November to March period, monthly snowfall will decline by 4% – 74%, with early season snowfall relatively unchanged but late winter and early spring snowfall declining significantly. These projected changes emphasize the need for climate change adaptation techniques and technology, such as gladed skiing and an appropriately scaled snowmaking system, to be developed as climatic conditions shift from their current conducive state to more challenging temperature and precipitation regimes.

[10] University of British Columbia (2020). *ClimateBC*. Retrieved from http://climatebc.ca/
[11] Wahleach Lake (49.22, -121.58, 1,480 m.a.s.l.) and Chilliwack River (49.02, -121.01, 1,680 m.a.s.l.)

3.2.8 Avalanche Hazard and Control

The lands within the study area overlap with an Avalanche Terrain Exposure Scale area and are part of Avalanche Canada's South Coast Inland forecasting area. No data on avalanche terrain type or susceptibility is publicly available but it is believed that the study area is not overly prone to avalanches. The majority of the study area terrain exists below treeline and away from peaks with substantial above treeline alpine terrain. However, pending the approval of this Expression of Interest, further analysis would need to be undertaken, incorporated into the mountain planning on all affected slopes, and be operationalized through an Avalanche Management Plan.

3.2.9 Terrain Capacity Analysis

Based on the physical analysis of the study area, BHA calculated the potential skiers-at-one-time for BVMR. That is, the number of guests who could comfortably use a resort's ski terrain at a given moment in time.

To complete this calculation, BHA determined skiable area using the ski slope analysis to exclude un-skiable terrain (i.e. grades >80% and <8%) and assuming approximately 35% of the remaining terrain will be developed into ski trails. This calculation indicates that BVMR can develop approximately 680 ha of ski terrain from the 4,772 ha study area. BHA then completed a coarse estimation of the distribution of the remaining ski terrain (ha) by skier skill class (i.e. beginner, intermediate, advanced) which was then multiplied by the low skier densities listed in the All Season Resort Guidelines. Resulting from this preliminary high-level assessment, at full buildout BVMR has a potential skiers-at-one-time of approximately 11,000 skiers. While this does not rival Whistler/Blackcomb this potential indicates that BVMR would be comparable to larger mountain resorts in the Okanagan (e.g. Sun Peaks, Silver Star) with greater access to the large market of the Lower Mainland.

Also, of note, the physical characteristics of the study area offer the potential to develop ski runs with lift-serviced vertical that ranges between 500 and 700 metres (1,640 to 2,300 ft.). Long runs that offer considerable vertical are a sought after by the skier marketplace and the potential at BVMR is greater than all other mountain resorts easily accessible from the Lower Mainland, with the exception of Whistler/Blackcomb.

Table 7. Lift Serviced Vertical of Lower Mainland Mountain Resorts

Resort Mountain	Lift Serviced Vertical	
	Meters (m)	Feet (ft)
Bridal Veil Mountain Resort*	**700**	**2,296**
Mt. Seymour Resort	340	1,016
Cypress Mountain Resort	535	1,755
Grouse Mountain Resort	384	1,260
Sasquatch Mountain Resort	366	1,201
Mt. Baker Ski Resort	432	1,417
Mt. Washington Alpine Resort	457	1,500
Manning Park Resort	505	1,657
Blackcomb Mountain	1,530	5,020
Whistler Mountain	1,610	5,280

*Based on preliminary analysis

3.3 EXISTING ENVIRONMENTAL CONDITIONS

Preliminary environmental surveys were undertaken by Envirowest consulting for the proposed base area village and lower terminal of the first gondola (Appendix 4), but not the entire study area. Preliminary environmental conditions for the study area itself were extrapolated from the Envirowest report, the Archaeological Impact Assessment Report (Appendix 5), and complemented by review of publicly available data in June 2020 (iMap BC, BC Conservation Data Centre, BC Species & Ecosystem Explorer) (Figure 13). The analysis presented below is preliminary, and apart from the Arcas and Envirowest reports, limited to a desktop analysis based on publicly available data. Should the Expression of Interest be accepted, an environmental review of the EOI study area will be undertaken by qualified professionals in adherence with the All Season Resort Policy review process, with the benefit of local traditional policies of the local Indigenous communities.

3.3.1 Soils and Vegetation

The EOI study area is located in the Coast and Mountain Ecoprovince within the Pacific Ranges Ecoregion in the Eastern Pacific Ranges Ecosection. Further, the study area contains the following Biogeoclimatic zones:

- Alpine Tundra (ATunp)
- Coast Western Hemlock – Moist Submaritime (CWHds1)
- Engelman Spruce – Subalpine Fir – Dry Cold (ESSFdc2)
- Engelman Spruce – Subalpine Fir – Warm Moist (ESSFmw)
- Coastal Western Hemlock – Very Wet Maritime – Montane (CWHvm2)

The study area is primarily second growth forest punctuated with significant visible impacts from relatively recent timber harvesting activities. Immature mountain hemlock, sub-alpine firs, fireweed, trailing blueberry and shrubs dominate the cutblocks. The study area overlaps with 13 legal Old Growth Management Areas and mature vegetation, where present, consists of Mountain Hemlock and sub-alpine firs (Arcas, 2003).

The surficial geology consists of a variety of sedimentary, volcanic, granitic, and metamorphic rocks. Bedrock protrudes to the surface but is covered in some places by a thin layer (< 2 metres) of colluvial, glacial and eolian sediment (Arcas, 2003).

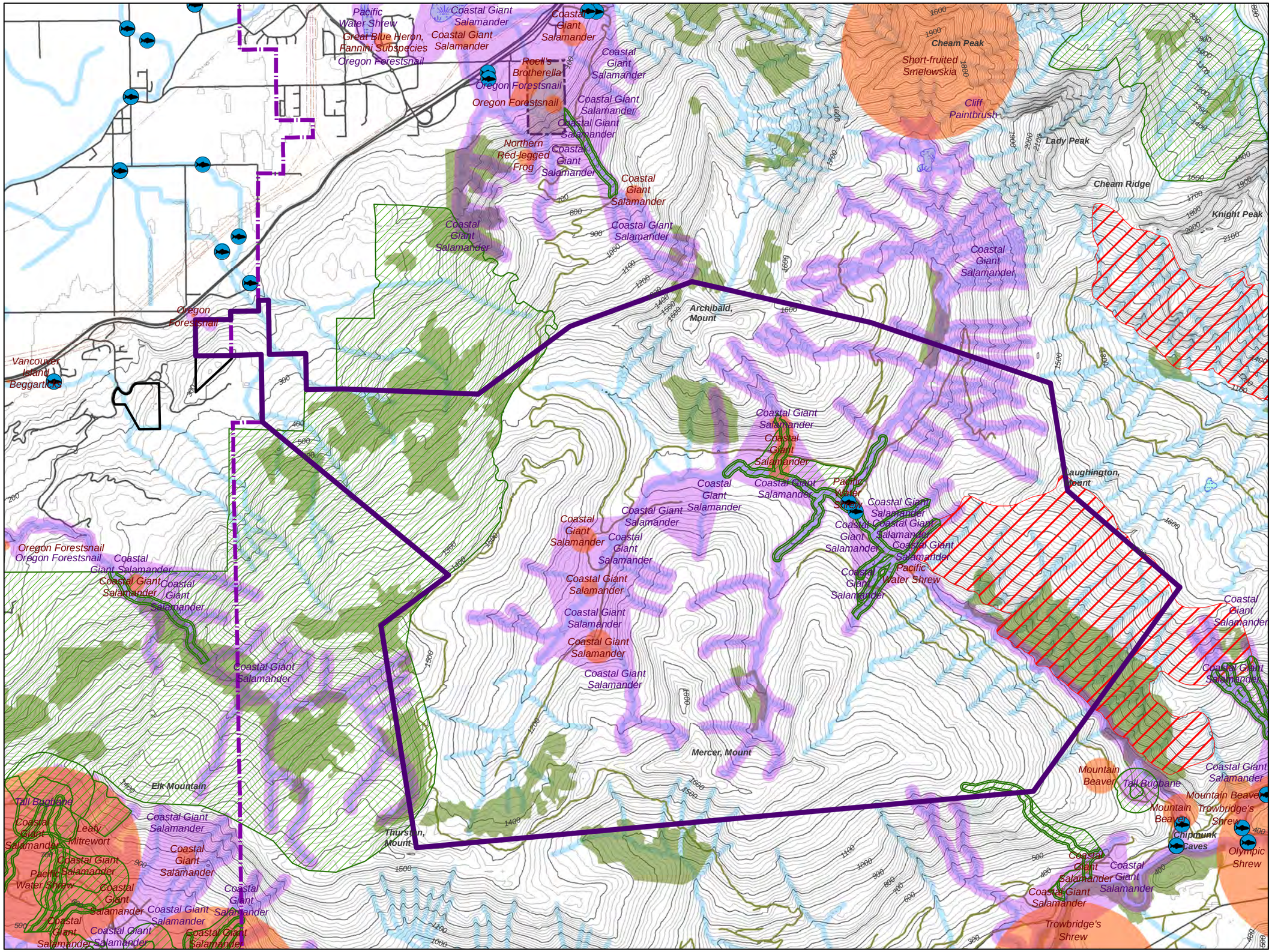
3.3.2 Wildlife and Fisheries

Chipmunk Creek, the primary watershed in the study area, initiates at the flanks of Mt. Mercer, Mt. Archibald and Mt. Laughington and builds as it flows to the east before bending to meet the Chilliwack River.

Rainbow Trout have been observed in Upper Chipmunk Creek while Lower Chipmunk Creek has identified populations of Rainbow Trout, Bull Trout, Coho Salmon, Dolly Varden and Steelhead. Dolly Varden is blue listed provincially, and as such will require a sensitive development approach during construction and operation, respecting riparian setbacks and stormwater requirements around Chipmunk Creek (see Figure 13). This is consistent with the recommendations put forth by Envirowest (Appendix 4).

Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Base Area -
- City of Chilliwack Boundary
- Fish Observation
- Wildlife Habitat
- Ungulate Winter Range
- Species At Risk - Occurences
- Species At Risk - Critical Habitat
- Old Growth Management Areas
- Transmission Lines
- Railway
- Provincial Parks
- Riparian Buffer (30m)
- Lakes/Rivers/Streams

Planning for:

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Environmental Values

Figure 13

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Preliminary review of publicly available Species At-Risk datasets through the BC Conservations Data Centre found 3 occurrences of Provincially listed species within the EOI study area (Table 8). A further search of the BC Species and Ecosystem Explorer produced a composite list of all other Red (Extirpated, Endangered or Threatened) and Blue (Special Concern) species that have the potential to occur in the EOI study area based on region and biogeoclimatic zone (Appendix 2). In addition to these species, Northern Goshawk (Red listed) has been observed approximately 1.5 km southwest of the EOI study area.

Table 8. Species At-Risk Occurrences within the Study Area

Common Name	Scientific Name	Status
Coastal Giant Salamander	*Dicamptodon tenebrosus*	Imperiled/Vulnerable (S2S3)
Pacific Water Shrew	*Sorex bendirii*	Imperiled (S2)
Tall Bugbane*	*Actaea elata var. elata*	Critically Imperiled/Imperiled (S1S2)

* "Succession has resulted in a thick growth of shrubs and alder that appears to have overgrown *Actaea elata* at this site."[12]

Beyond wildlife observations, the EOI study area overlaps with several Federally identified Critical Wildlife Habitat areas for the Coastal Giant Salamander, as well as Provincially designated Wildlife Habitat Areas[13]. Finally, the east the EOI study area overlaps with approved an Ungulate Winter Range for Mountain Goat (*Oreamnos americanus*) which although widespread across BC, is a species of interest for the Provincial government due to recent population trends[14].

The regulations and recommendations detailed in the recovery plans for all at-risk species observed in the EOI study area will guide the development and refinement of the concept.

[12] B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 10300, tall bugbane. B.C. Ministry of Environment. Available: http://maps.gov.bc.ca/ess/hm/cdc, (accessed Jun 23, 2020).
[13] Wildlife Habitat Areas 2-501, 2-580, and 2-581.
[14] B.C. Conservation Data Centre. 2015. Conservation Status Report: *Oreamnos americanus*. B.C. Minist. of Environment. Available: http://a100.gov.bc.ca/pub/eswp/ (accessed Jun 23, 2020).

3.3.3 Visual Sensitivity and Impact

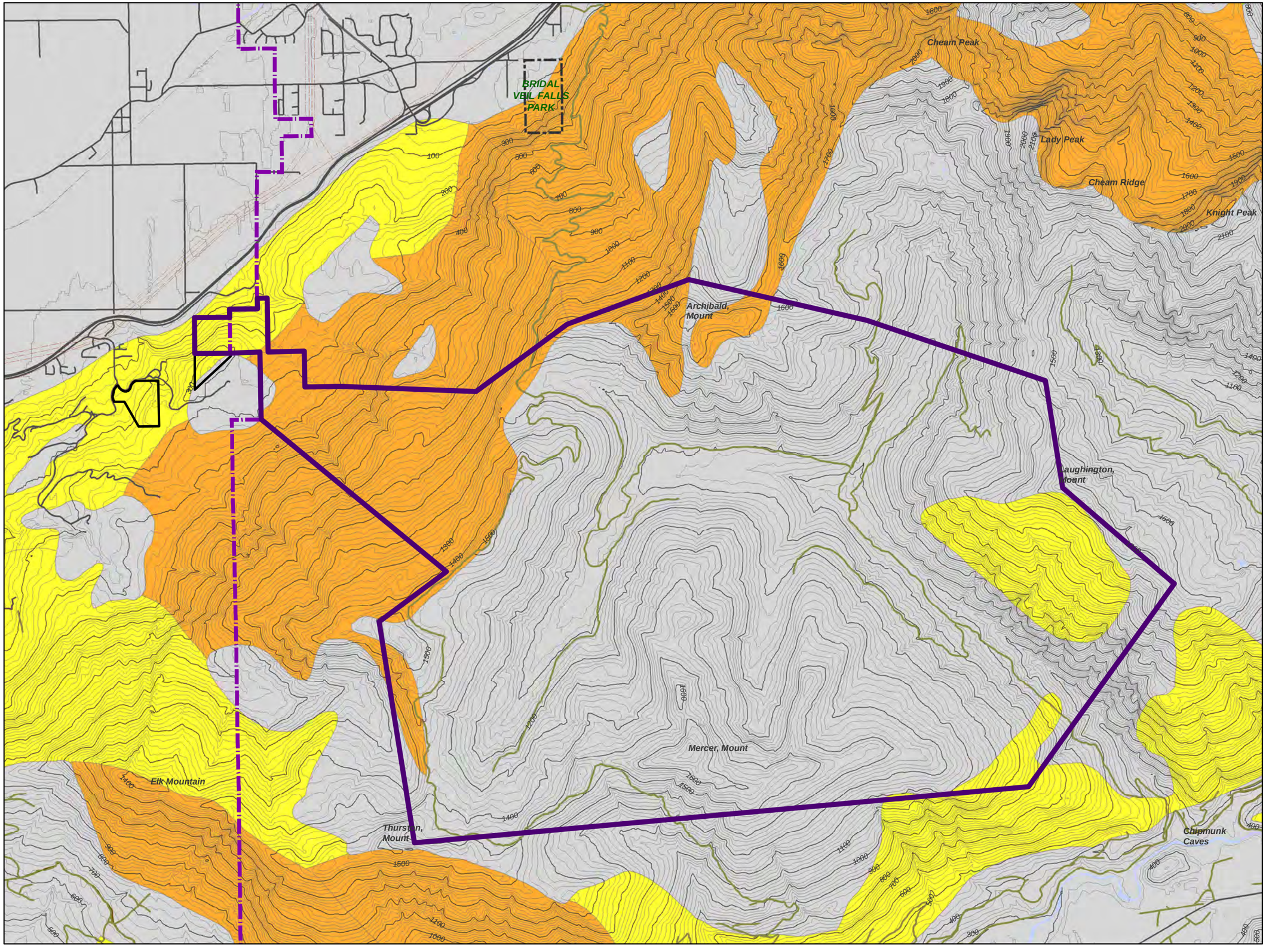
Preliminary investigation of the study area has identified several scenic and natural resource considerations. The visual sensitivity analysis indicates that much of the development of the mountain resort will take place in a visually exclusive valley, Chipmunk Creek drainage, with limited visual impact to the Fraser Valley. The only noticeable elements of the project from the Fraser Valley will be the proposed gondolas rising from the base area to the ridgeline (Figure 14).

Within the EOI, existing forestry cutblocks in the study area will be incorporated into the design of ski trails and ski facilities to improve the visual quality of the study area. Views from the surrounding area will be maintained by directing ski trail development away from sightlines. The proposed resort will look to improve connections to other scenic resources in the vicinity such as Bridal Veil Falls Provincial Park and the adjoining Chilliwack River Valley recreational area by exploring the options to create hiking and mountain bike trail connections utilizing existing mountain and forestry roadways.

A more detailed analysis of the Resort's impact on scenic and natural resources will be assessed in the Master Plan stage so mitigation methods can be developed and integrated into the plan.

Bridal Veil Mountain Resort EOI

2020



Legend

- Bridal Veil EOI Study Area
- Base Area - Private
- Base Area - Crown
- City of Chilliwack Boundary

Visual Sensitivity Class

- 1 - Very High
- 2 - High
- 3 - Moderate
- 4 - Low
- 5 - Very Low
- Unclassified Area

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Visual Quality and Impact

Figure 14

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3.3.4 Applicable Legislation

Under the Environmental Assessment Act Reviewable Projects Regulation (2019), new mountain resort developments are reviewable projects if there is construction of 2,000 bed units or if base area developments that occur on more than 600 hectares[15]. The number of units proposed for Crown land at the full buildout of BVMR will likely exceed the bed unit threshold. As such, as currently envisioned, it is believed that this project would qualify for consideration under Environmental Assessment Act. Should the Expression of Interest be accepted, the Proponent will submit the Master Plan to the Environmental Assessment Office for their review and ruling as to whether assessment is needed.

3.3.5 Water and Air Quality

The effects of the mountain resort development on water and air quality will be investigated further during the concept and master planning stages. The Chipmunk Creek drainage is the main watershed within the study area and specific protection plans will be developed in the Master Plan stage. The base area lands will be developed with a goal to create post development stormwater conditions equal to pre-development, reducing net flow from the lands to near zero, by incorporating the recommendations of Stormwater Planning: A Guidebook for British Columbia[16]. Specific recommendations of the Eastern Hillsides Comprehensive Area Plan (2012) and the Popkum Bridal Falls Official Community Plan (2018) will be incorporated into those base area lands within the City of Chilliwack and Fraser Valley Regional District, respectively.

3.3.6 Summary of Existing Environmental Conditions

The Proponent's environmental vision is clear and determined: to fully integrate local Indigenous traditional and land stewardship values, to preserve the existing environmental values of the region, to mitigate any negative impacts on the environment, and improve the visual quality of forestry cut blocks, while preserving important Indigenous cultural values. To this, the Proponent has committed to creating a community that adheres to sustainable community development principles (See Section 4 for further details). Moving forward, and building upon Envirowest's preliminary environmental overview and the updated review of Provincial and Federal data, ongoing discussions with First Nations and the Provincial government will inform more detailed environmental and archaeological assessments of the study area should BVMR progress in the Master Planning review process. A qualified environmental consultant will be engaged as part of the Master Planning process to provide a baseline environmental survey identifying more detailed environmental constraints and opportunities. Environmental constraints will guide the development of ski trails and facilities in a sensitive way to protect watercourses, identified environmentally sensitive areas, and any species at risk.

[15] Environmental Assessment Act Reviewable Project Regulations, SBC 2019, s. 16. Retrieved from http://www.bclaws.ca/civix/document/id/complete/statreg/243_2019. Accessed June 23, 2020.
[16] Stephens, K. A., Reid, D., & Graham, P. (2002). Stormwater Planning: A Guidebook for British Columbia. Retrieved from http://a100.gov.bc.ca/pub/eirs/lookupDocument.do?fromStatic=true&repository=EPD&documentId=5420

3.4 OPPORTUNITIES AND CONSTRAINTS ANALYSIS

The pros and cons associated with the proposed development as they relate to the potential of the study area are illustrated on Figure 15. This analysis will guide all future design, planning, and development efforts, identifying areas where unique opportunities should be incorporated into the development concept and where constraints, such as environmental considerations, should be given special attention. The opportunities and constraints of the study area will be developed in more detail during the Master Planning process.

Based on the analyses to date, the EOI study area has considerable potential as an all-season resort and through the envisioned Bridal Veil Mountain Resort, the Proponent has a tremendous opportunity to create a unique, four season resort in the Fraser Valley.

Bridal Veil Mountain Resort EOI

2020

Legend

- Wildlife Habitat
- Species At Risk - Critical Habitat
- Watershed Reserve
- Potential Gondola Alignments
- Bridal Veil EOI Study Area
- Potential Gondola Upper Terminal Areas
- 2412059 Temporary License Area

Existing Base Area Private Lands

Label

- Base Area -
- City of Chilliwack Boundary
- Recreation/Trails
- Transmission Lines
- Railway
- Provincial Parks
- Lakes/Rivers

Planning for:

Bridal Veil Mountain Resort Ltd.
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Opportunities and Constraints

Figure 15

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4 BRIDAL VEIL MOUNTAIN RESORT DEVELOPMENT CONCEPT

4.1 MOUNTAIN CONCEPT

In terms of terrain and physical capability, much of the land within the study area is well suited to alpine ski resort development (Figures 16 & 17). The various mountains exhibit consistency of terrain, a reliable snowpack, a variety of ski terrain orientations, and good fall-line skiing opportunities. Of equal importance, the terrain in the proposed mountain resort can achieve the project goals and objectives, as outlined in Section 1.3.

Snowshoeing, cross-country (Nordic) skiing, tubing, skating, backcountry touring and even the possibility of snowmobiling are potential winter tourism opportunities that could be developed and staged from the top terminus of the gondolas. The relatively flat lands have the potential to support a large, accessible, multi-purpose trail network. It is notable that Bridal Veil Mountain Resort will be able to provide alpine cross-country skiing at elevations higher than the Nordic facilities for the 2010 Winter Olympic Games in Whistler. This would provide a longer season and deeper snowpack than most of its competitors.

During the summer, BVMR has the potential to support a wide range of activities. Cross country ski trails will double as hiking and mountain biking trails, ski pods could double as lift-serviced downhill mountain biking terrain, and the opportunity to create a unique, environmentally sensitive alpine golf experience will be explored. The Resort will also capitalize on the Trans-Canada Highway traffic and other tourist amenities in the region such as Bridal Veil Falls Provincial Park, Harrison Hot Springs, Cultus Lake, and neighbouring golf courses, bringing a large number of ‘sightseeing’ visitors in the summer months.

There is a significant opportunity to establish a development that will evoke the feeling described below:

> *“Upon reaching the summit, guests will be welcomed by the natural beauty of the Chipmunk Creek drainage, captivated by sweeping views of the surrounding peaks on one side, and the Fraser Valley on the other. The mountain area will seem a world away from the valley below, completely detached, yet only a short scenic gondola ride apart.”*

4.2 BASE AREA VILLAGE CONCEPT

As envisioned, BVMR will have two unique villages: a Valley Village and an Alpine Village. Each with their own special character and ambience, building on the intrinsic successes of other resorts from around the world without attempting to duplicate their design, appearance, or sense of place. By offering two distinct villages, BVMR will cater to an increasingly diversified market.

The valley base area lands are separated from the alpine study area by approximately 2 kilometres over an elevation gain of between 900 to 1,200 metres. The base area lands are either privately held by Bridal Veil Mountain Resort Ltd. (68 ac) or are Crown land. They are located on a relatively flat bench overlooking the Fraser Valley and the Trans-Canada Highway, in close proximity to existing infrastructure of the City of Chilliwack.

The valley village base area will complement residential developments in the immediate vicinity by providing commercial and retail focal points to the Eastern Hillsides community. This will add to the year round offering of the Resort and contribute to its development potential, financial viability, and sustained success.

The separation of the easily accessed and developed base area lands in the valley from the mountain terrain and associated alpine facilities will require a creative approach to create a cohesive and integrated guest experience. This will be achieved through a variety of linkages such as trams and/or gondolas, appropriately scaled village roads within the base area, and a multi-use trail network. The emotional connections between the valley base area and the mountain will be achieved by applying carefully crafted ambience, design, and character elements.

A final point: The Proponent understands that they are not just proposing to construct a resort but create a community. In keeping with the Proponent's vision, the community will fully embrace Indigenous cultural, traditional and land planning values, while fully committing to adopting sustainable community development principles to collectively guide the planning, design, and construction processes. This could include 100% clean, renewable energy sources, green building design principles, green utilities infrastructure (e.g. water, sewer), infrastructure for electric vehicles, zero single-use plastics, local food systems, and alignment with the Province's Clean BC Climate Plan. While the concept will continue to be refined with Indigenous and community feedback, these principles will form the core of any resort concept that is put forward.

4.2.1 Valley Village Concept

The Valley Village will be built around the lower terminals of the proposed gondolas. As envisioned, this village will reflect a Westcoast Rainforest architectural style using natural materials, building styles, with strong influences of local Indigenous tradition, culture, and building styles, with both combined to reflect the character unique to the Pacific Northwest. Residential developments in the immediate vicinity will be themed in the same character. The architectural style and development massing will encourage intimacy between the village, the residential developments, and its natural setting. Commercial space in the Valley Village will feature Indigenous cultural facilities and Indigenous businesses, coupled with unique boutique shops and services, and will be developed in balance with the estimated recent visitor and mountain capacity (Figure 16.).

The upper terminal of the northern gondola will host on-mountain ski services and reflect the same architectural character as the Valley Village[17]. As envisioned, it will also incorporate Indigenous building styles and reflect the character of the Pacific Northwest, and will be complemented with a restaurant and observation lookout, designed to serve the needs of mountain resort guests on a year-round basis. In the winter it will act as the primary on mountain staging point for skiing as well as provide a resting, meeting, and eating spot. In the summer, the upper terminal of the northern gondola will be a destination restaurant, event, and sightseeing attraction, acting as the starting point to a variety of activities that may include hiking, mountain biking, Indigenous cultural tours, paragliding, interpretive programs, and concerts, among others. A day use parking area will be located adjacent to the initial base area village, designed to be unobtrusive and out of view.

[17] Of note, the upper terminal of the gondola and associated services and amenities are distinct from the Alpine Village (Sec. 4.2.2). Though these two areas may be connected, the upper terminal is intended to act as a standalone staging area, not reliant on the development of the Alpine Village to support the proposed on-mountain activities.

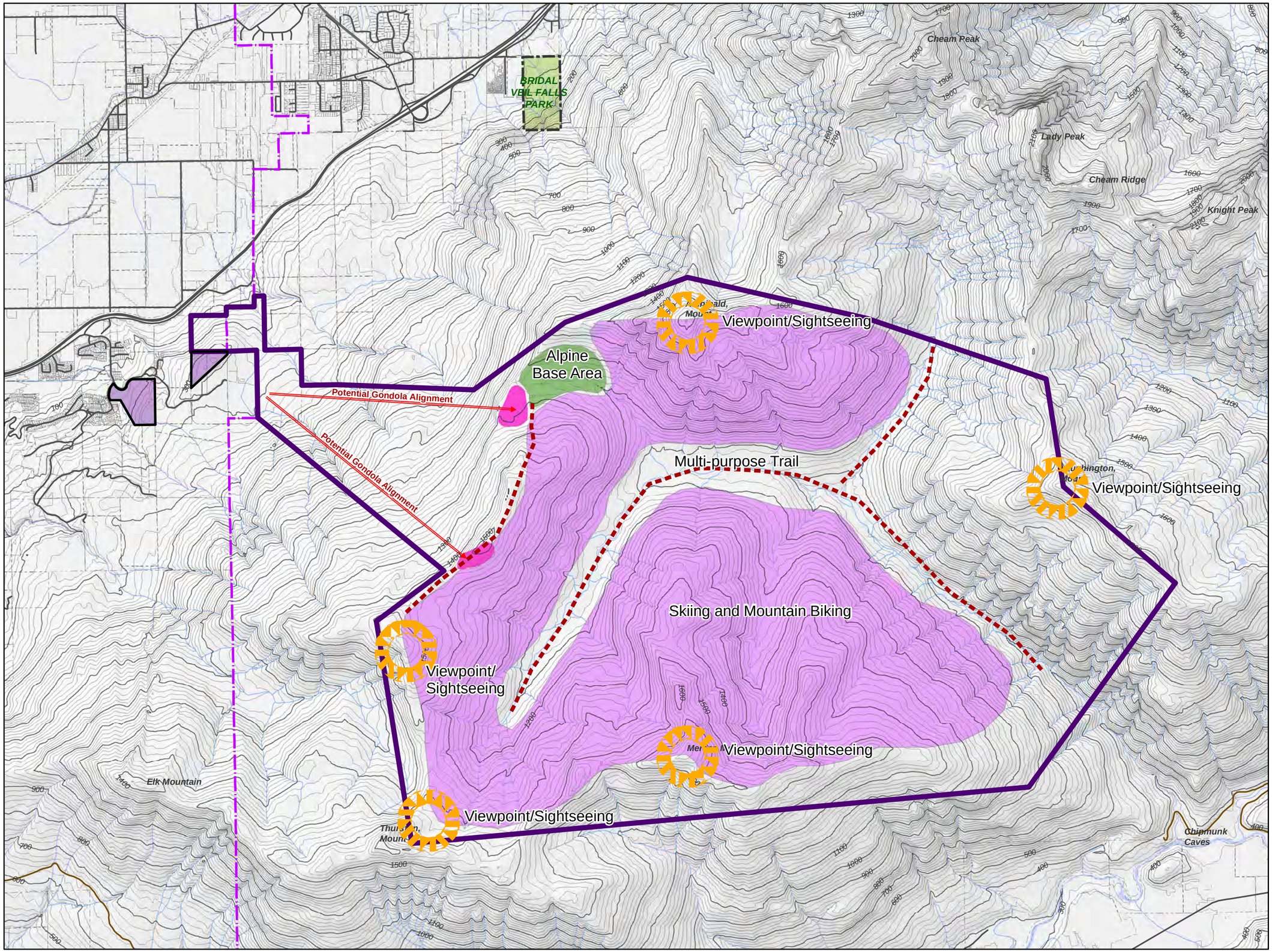
4.2.2 Alpine Village Concept

At an elevation of 1,200 metres, the Alpine Village will be the second Bridal Veil base area. It will be designed as pedestrian-oriented, mountaintop alpine playground – a haven for recreationalists and tourists searching for a different type of vacation escape. Conceptually, the Alpine Village will be comprised of a relatively small amount of on-mountain accommodation and related commercial space, such as restaurants and retail shops, ultimately determined by the Comfortable Carrying Capacity[18] of the ski area. The structures will complement and build upon the amenities offered at the upper terminal of the gondola that rises from the Valley Village. This development will enable BVMR to further diversify its offerings with the creation a unique mountaintop alpine village found nowhere else in North America. Done right, the ambience and experience will be truly special. In a larger context it will be an opportunity for British Columbia to expand the range of destination mountain resorts on offer. While planning is very conceptual at this time, it is anticipated that this Alpine Village will contain a variety of highly specialized hotels, multifamily units, restaurants, and retail that is largely over-snow and lift serviced, not so very different than Avoriaz, France, Murren and Wengen, Switzerland, but at a much smaller scale. Its isolated location will require a high degree of self-sufficiency, guided by sustainable community development principles and encouraging the establishment of advanced technologies that will showcase the best possible approach to sustainable, low-impact alpine development.

[18] The optimum number of guests who can use a resort's facilities each day while guaranteeing a positive guest experience and maintaining the landscape's environmental integrity (ASRG, 2009)

Bridal Veil Mountain Resort EOI

2020



Legend

Mountain Development Potential

- Potential Alpine Base
- Potential Skiing/MTB
- Potential Gondola Upper Terminal Areas
- Bridal Veil EOI Study Area
- Base Area -
- Base Area -
- City of Chilliwack Boundary
- Provincial Parks
- Lakes/Rivers

Planning for:

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Planning by:

BHA

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Mountain and Village Development Potential

Figure 16

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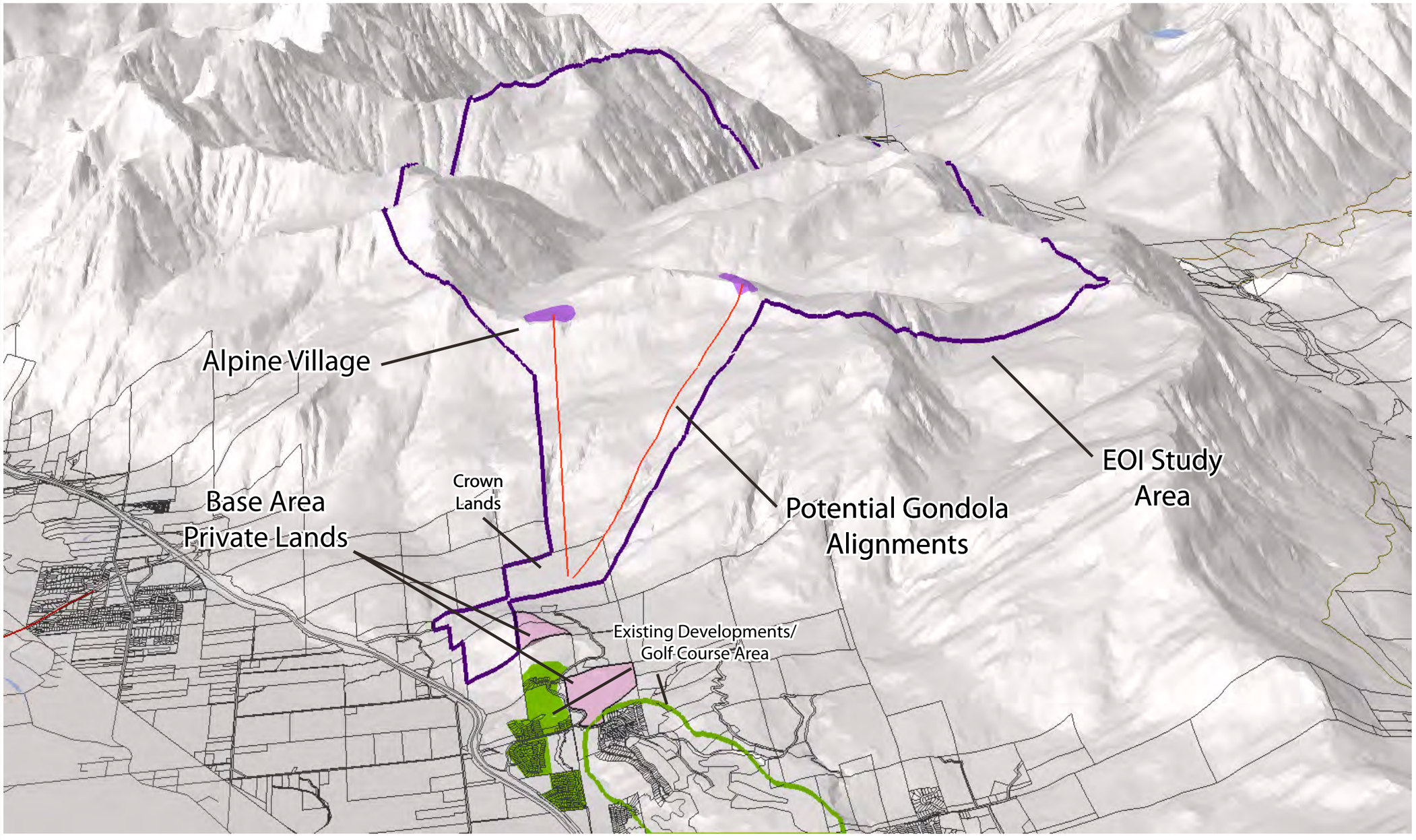
Bridal Veil Mountain Resort EOI

2020



Legend

- Base Area - Private Lands
- Potential Lifts
- Potential Gondola Upper Terminal Areas
- Bridal Veil EOI Study Area
- The Falls Golf Course Area
- Existing Neighbourhoods

Planning for:

Bridal Veil Mountain Resort Ltd.
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Study Area
3D View

Figure 17

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4.3 PRELIMINARY SERVICING CONCEPTS

As noted in Sec. 4.2, the Proponent is committed to developing the Valley Village following sustainable community development principles, which include adopting green infrastructure practices for power, potable water, and wastewater treatment. However, connections to existing municipal infrastructure will likely be necessary to supplement infrastructure onsite.

As proposed, the Valley Village would be connected to municipal infrastructure located in the Eastern Hillsides neighbourhood in the City of Chilliwack. It is proposed that water be supplied from a municipal water system reservoir near the intersection of Nixon Road and Hack-Brown Road and piped to a reservoir to be located adjacent to the Valley Village. Wastewater would be carried away and treated by City of Chilliwack sewage treatment infrastructure. This capacity increase is already contemplated in the OCP and related to other residential developments in the immediate area.

As envisioned, on-mountain facilities, such as the restaurant / lookout of the first gondola and the Alpine Village, will also incorporate the latest in sustainable technologies and environmental design techniques with the goal of becoming self-sufficient. Grey water will be recycled, and composting toilets will be used where feasible to lower wastewater amounts. Sewage will be piped down to City of Chilliwack sewage treatment facilities. Augmenting renewable power use with onsite generation (e.g. photovoltaic cells) and environmental design standards that orient buildings toward the sun to maximize solar heating effects in the winter, and lower air-conditioning use in the summer, will lower overall energy requirements. Electrical utility will be connected along a gondola right-of-way. A potable water concept for all mountaintop facilities will be developed in the Master Plan, utilizing a well and pump delivery system or a method of transportation from the Valley Village base area.

4.4 PHASED DEVELOPMENT

Bridal Veil Mountain Resort is a very "phaseable" project. The proposed on-mountain recreation activities can be divided into sections that will enable a well-balanced skiing product in each phase. Equally, the Valley and Alpine Villages are planned to break into complementary segments to provide the staging requirements of the associated mountain facilities. This is critical to the long-term potential success of the Resort, in that each phase of development needs to be a complete project, not one waiting for the elements in future phases to bring it into balance.

While detailed planning will be required to fully determine the exact size and scale of development, at this preliminary stage, it appears that the site will enable each phase to be established in a sustainable and well-balanced fashion.

A Special Note on COVID-19

The ongoing COVID-19 pandemic has changed how we work, visit with friends, and recreate outdoors. The ski resort industry in Canada has responded to this challenge by developing a comprehensive suite of operational procedures in collaboration with local health authorities and adhering to Provincial health regulations to minimize risk and maintain guest health. At this time, the Canada West Ski Areas Association is finalizing its approach for the 2020/21 season and it should be available for review during the public comment period[19].

The process through which BVMR engages with the community and solicits feedback on this Expression of Interest from Indigenous communities, the public, stakeholders, and government will account for the realities of COVID-19. Virtual open houses, interactive web-based displays and maps, recorded presentations, and social media have all been used successfully to reach out to the community for their insights, questions, and suggestions[20]. We also recognize that some do not have reliable access to these mediums and we will look to offer presentations to small groups, when and where it is deemed acceptable by local health authorities and applying all precautionary measures. We appreciate that this is an uncertain time, but we remain committed to hearing from everyone who would like to participate in the EOI review process.

[19] As an example of what these protocols could look like, the reader is directed to the 'Ski Well, Be Well' program developed by the National Ski Areas Association (USA): https://nsaa.org/skiwellbewell

[20] It should be noted that the Mountain Resorts Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development will administer the formal public review period and collect formal submissions. BVMR will endeavour to contribute to the success of this process but all formal submissions are collected and reviewed by MRB independent of BVMR. For information on this process: https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resort-development/applying-to-develop-a-resort

5 PRELIMINARY MARKET COMMENTARY

Bridal Veil Mountain Resort has seven primary target markets:

1. Recreational Enthusiasts – domestic, American, and international markets (primarily Europe and Asia) form the basis of this group. This group will be drawn to BVMR by skiing, mountain-biking, paragliding, and sightseeing.
2. Existing Tourists – those currently visiting existing attractions within the area (or en route past the area). This market is estimated to total 1.5 million people per year.
3. Drive-by Traffic – over nine million people pass by the study area along the Trans-Canada Highway each year.
4. The Business Sector – the Resort will provide excellent amenities in an ideal location for conventions and business meetings.
5. The Local Market – drawing from Abbotsford, Chilliwack, and the Fraser Valley East
6. The Regional Market – over 2.8 million people within the Metro Vancouver/Fraser Valley Regional District, and an addition 4.5 million people within 3 hours, including the growing population in the Okanagan and Washington State.
7. The International Market – Based on the quality of development put in place it is anticipated that the international market will take notice over time. This in combination with British Columbia's strong reputation in the destination resort sector will ensure a growing international market.
8. Cultural Tourism - With a significant local Indigenous ownership involvement, the local Indigenous and First Nations cultural, traditional, and commercial operations throughout the resort, will strongly appeal to the rapidly growing cultural tourism markets.

Strategies to target these markets will be addressed in future planning stages to reflect the specifics of the Master Plan.

5.1 WINTER RECREATION MARKET POTENTIAL

Growth in the Canadian skier market has been concentrated in British Columbia. The province is the fastest growing region in the country and offers the highest-quality mountain terrain, snow quantity, and snow quality. The Provincial government is committed to the continued development and success of the tourism industry, ensuring BC ski resorts continue to realize strong visitation and overall growth, even in the face of challenging international economic and tourism climates.

In 2017/18 British Columbia recorded over 6 million skier visits. BVMR's success with destination tourists is inherently tied to the BC ski product and international reputation.

However, recognizing that the Resort industry will have to "satisfy an increasingly fragmenting and demanding marketplace with a widely diverse range of customers." (David Hughes and Associates, 2005) the proposed BVMR has been designed to cater to a diverse guest marketplace, extending beyond traditional ski area guests to encompass as yet unengaged groups and communities.

In analyzing the skier marketplace, David Hughes and Associates found that skier visits initiated from the Fraser Valley do not reflect the potential of the local market. When comparing the Fraser Valley Region to other local skier markets throughout Canada, there is evidence of significant room for growth in the local market. David Hughes and Associates has calculated and compared a range of local skier visits to population ratios (Table 9) and concluded that the Fraser Valley has very low skier visits per capita. Simply stated, the higher the ratio, the more a region supports "local" alpine skiing and boarding, while the lower the ratio the greater the potential number of untapped skier visits. As such, it is clear that the Fraser Valley has a very low number of skier visits per capita. From this David Hughes and Associates concluded that the supply of skiing capacity in the region is insufficient to match the potential demand.

Table 9. Annual Skier Visits per Resident

Region	Existing Ratios
Canada	0.508
USA	0.186
Washington State	0.316
Alberta	0.596
British Columbia	0.928
Greater Seattle	0.723
Calgary	1.661
Metro Vancouver West	0.612
Fraser Valley / Metro Vancouver East	0.236

If the Vancouver ratio is applied to the Fraser Valley population, there is the potential to produce 670,000 annual skier visits locally, as compared to the current amount 225,000. At the other end of the spectrum, if the Calgary ratio is applied to the Fraser Valley, there is the potential to increase local skier visits to over 1.5 million annually. It is safe to assume that with the addition of the diverse mountain resort facilities proposed for BVMR, in skier visits originating in the Fraser Valley are likely to increase.

As planned, Bridal Veil will draw on an existing regional tourism market of 2.8 million people in the Metro Vancouver Region, a total of 7.3 million people within a three hour radius that includes Seattle, Washington, and a variety of significant short haul domestic and long haul international markets. The direct association of the domestic market, the ease of access to Vancouver and Seattle, and the proximity to two international airports are considerable and unique strengths for this proposed mountain resort.

The proposed BVMR would also cater to a niche destination market by providing a unique experience through the improvements contemplated with the two uniquely themed villages. Preliminary market analysis by David Hughes and Associates has identified growth potential in all the identified BVMR markets (Appendix 3).

Regional ski resorts that would compete with BVMR are the North Shore Mountains (Grouse Mountain Resort, Mt. Seymour Resort, Cypress Mountain Resort), Mt. Baker Ski Resort, Sasquatch Mountain Resort, Manning Park Resort, and Mt. Washington Alpine Resort. Sasquatch Mountain Resort and Manning Park Resort are both local resorts situated within the regional market area. The addition of BVMR would undoubtedly realign the distribution of regional mountain resort visitation, but, as noted above, it is anticipated that with the introduction of a significant well-balanced resort, more interest would be generated in the Fraser Valley region increasing the number of skiers in the region to the benefit of the existing resorts and the region as a whole.

5.2 YEAR-ROUND MARKET POTENTIAL

The proposed location for BVMR within an existing summer tourism destination area, as well as the direct association with the nine million highway travellers who pass within a few kilometres of the proposed base area, would ensure that BVMR would realize strong four-season visitation rates.

Summer amenities would attract a variety of users from similar markets as the winter offerings. However, these visits would likely be from different guests than those who use the Resort in the winter. Mountain bike parks at Whistler and other resorts have seen explosive visitation growth in recent years and BVMR would offer similar but distinct experiences, closer to major markets and scaled appropriately to suit BVMR's natural setting. Hiking and sightseeing also continue to be major draws, with BVMR's location near Hwy 1 and its ability to offer expansive views over the mountain peaks and valley below would ensure that it would be significant draw. Finally, golfing continues to be popular with participants in the baby boomer population, and BVMR's valley base village sits sandwiched between two championship courses. If current trends at other resorts continue, summer visitor days should equal winter visitor numbers at a number of major resorts in British Columbia, and BVMR would likely experience a similar trend.

5.3 ESTIMATED NUMBER OF ANNUAL SKIER VISITS

Based on David Hughes and Associates market analysis, the local Fraser Valley Region has the potential to provide 670,000 annual skier visits. This figure is in isolation of the Vancouver and other regional markets. Regional and destination markets will increase as the Resort is developed and it receives greater exposure to those markets. At this time, it difficult to estimate expected skier visits within any precision or accuracy, however it can be said that skier visits will be predominantly local during the first years of operation, expanding to the larger regional and destination markets as development occurs. Preliminary calculations based on the existing vision suggest that there is the potential for approximately 750,000 – 1,250,000 annual skier visits at full resort buildout.

6 MANAGEMENT AND OWNERSHIP STRUCTURE

(Updated August 2021)

Bridal Veil Mountain Resort Ltd. is a collaboration between Robert Wilson, Jeff Wilson, and Mike Lalonde, local businessmen passionate about outdoor recreation and tourism.

Robert Wilson
President, Bridal Veil Mountain Resort

Robert Wilson is a B.C. entrepreneur with more than 40 years of experience successfully developing projects from concept to commercial success. In addition to co-founding Bridal Veil Mountain Resort, Robert serves as a financial advisor to the $250-million Hope Auto Mall development and is a Board Member for Blackburn Developments, which is developing a residential property with Aquilini Investment Group on Chilliwack's Eastern Hillside. For a decade, he was also Chairman of the company that owned and operated The Falls golf course.

For years, Robert was an industry leader in the IT sector. He served as president of London-based Mercator Systems, which advised golf resorts, international sports federations, health clubs, governments, and football clubs (like the EPL's Tottenham Hot Spurs) on how to integrate technology into their business operations. He also created the world's first Networked Micro Computer-based banking system, before taking that technology to Telos Financial Systems, and eventually engineering the sale of Telos to EDS, the world's largest data processing company at the time.

An avid badminton player, Robert is President of the Lower Mainland Badminton Association and has co-chaired international badminton tournaments in Canada. He also owned a 27,000-sq.ft., multi-sport facility in Orlando, Florida, which hosted the Yonex USA International Badminton Tournament for several years.

Jeff Wilson
Executive Vice-President, Bridal Veil Mountain Resort

Jeff is a respected leader with extensive experience in the hospitality, construction, government, and transportation sectors. As a skilled negotiator and an expert in conflict resolution and relationship building, he understands that a combined effort from multiple stakeholders is needed to move projects forward and has a well-earned reputation for bringing industry and stakeholders together to achieve extraordinary goals. For more than 30 years, Jeff has been a proud resident of the Eastern Fraser Valley, where he lives with his wife and three children.

Mike Lalonde
Founding Financial Partner, Bridal Veil Mountain Resort

Mike Lalonde is a B.C. entrepreneur with more than 20 years of experience successfully founding, developing, and growing construction businesses in various sectors. He is currently the President of Blue Pine Enterprises Ltd., Clearview Demolition Ltd, and Westpro Landscaping Ltd. Blue Pine is one of the largest landscape construction firms in Canada, Clearview is one of the largest demolition firms in Western Canada, and Westpro has experienced rapid growth since it was founded in 2019. Collectively, the three companies employ 250 people and have worked on nearly 10,000 construction projects valued at approximately $500 million.

In addition to Mike's companies being named among the 100 fastest-growing companies in B.C. for several years, he is also the winner of a BC Business Entrepreneur of the Year award. Mike joined the BVMR team based on his passion for business, real estate, and entrepreneurship***.***

Qualified Professionals

To realize the vision for BVMR, the BVMR management team has retained the services of leading professional firms that specialize in all-season resort planning, design, and construction.

Brent Harley and Associates Inc. (BHA) was selected to complete all mountain resort planning. BHA provides consulting services in resort master planning, recreational facility planning, village planning, resort residential planning, and management planning. BHA employs a diversified mix of experienced professionals with backgrounds in planning, landscape architecture, business administration, and environmental studies. Collectively, the BHA staff has project experience throughout Canada, the United States, Australia, New Zealand, Japan, China, and Korea.

Other professional firms that have been engaged with this project to date have included:

- DPI Development Partners Inc.
- Garaventa Canada Ltd.
- Vis-Sat Data Systems Inc.
- David Hughes and Associates
- Envirowest Environmental Consulting
- Arcas Consulting Archaeologists Ltd.
- Sno.Matic Inc.
- Doppelmayr Lifts Ltd.
- Golder Associates Ltd.
- Almar Construction
- Wedler Engineering
- Thurbur Engineering Ltd.

Moving forward, the Proponent and the local Indigenous communities will jointly collaborate to identify and retain qualified professionals and ensure that quality, diligence, and professionalism remain at a high level.

7 FINANCIAL CAPABILITIES

The development of BVMR will be financed through the capital fundraising capacity of Bridal Veil Mountain Resort Ltd. and the development of the privately held base lands. Their development of 68 acres (28 ha) of private base area lands will provide significant revenue streams and funds necessary to complete the Master Plan review process and construction of the proposed resort. Notably, given separate developments already underway by outside parties within the Eastern Hillsides Neighbourhood, the development of this private land, and resulting revenue stream, can be realized regardless of whether the Resort is approved.

The management team has the experience and knowledge to engage qualified professional consultants to carry out financial, environmental, and social planning studies required during the subsequent stages of the Resort review and development process. In addition, the management team has demonstrated experience with projects of this size and have the capability and vision to see this project through a detailed, widely inclusive, master-planning process.

8 APPENDICES

8.1 Appendix 1 Climatic Assessment

Historic Climate

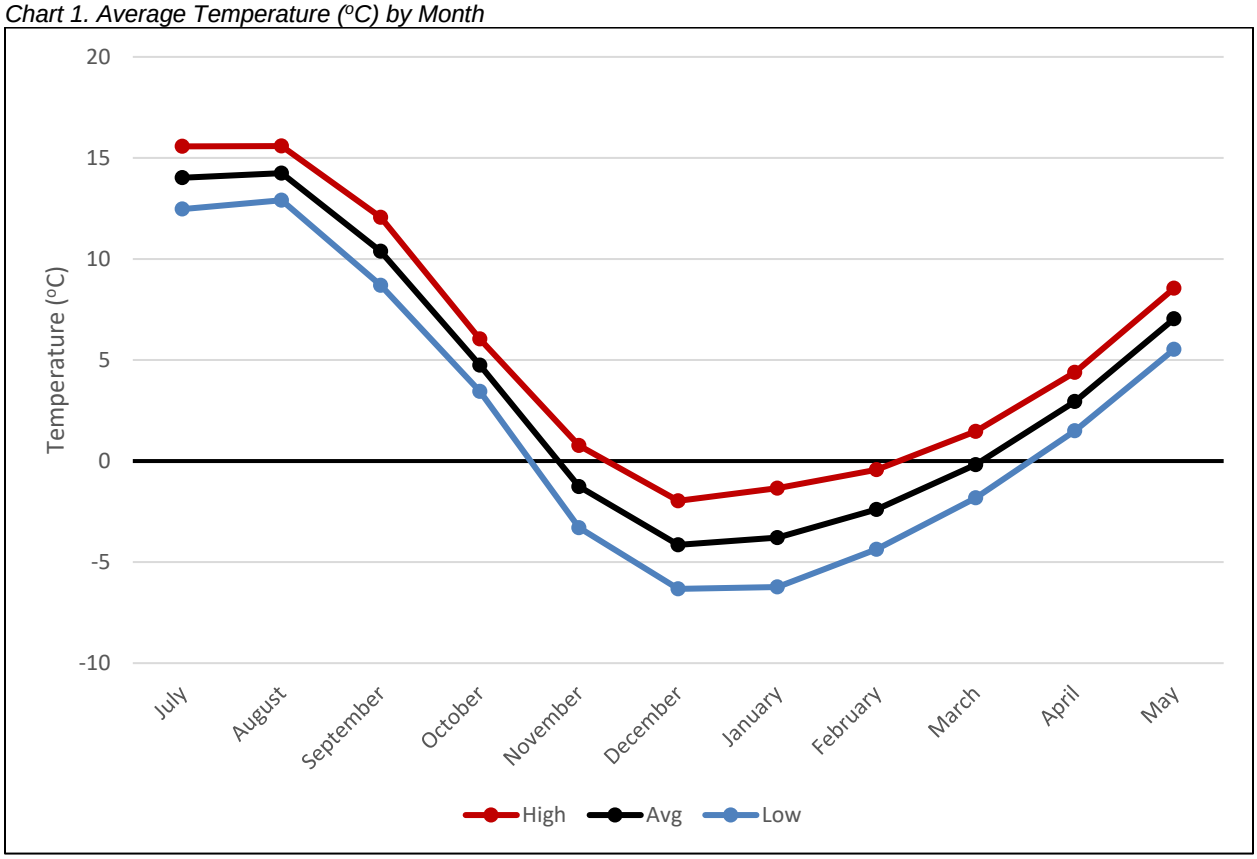
To assess historic weather patterns within the Study Area and their implication for all-season recreation, BHA derived average monthly temperature and snowfall data from historic weather projections (1970 – 2018) using the ClimateBC program[21] for a representative site within the ski area (49.001, -121.052, 1,354 m.a.s.l). The historic range of temperature and snowfall ('High' and 'Low') in the EOI were calculated as 1 standard deviation from the mean and delineate the range in which 68% of historic average snowfall and temperature has occurred. These projected averages are supported by historic weather records from two snow stations located in proximity to the Study area and with similar site characteristics.

[21] University of British Columbia (2020). ClimateBC. Retrieved from http://climatebc.ca/

Historic Temperature

BHA determined that the EOI has a mean annual temperature of 4.3ºC with seasonal averages ranging from -4.2ºC in the winter to 14.4ºC in the summer (Chart 1). Daily winter temperatures (December to February) range from -6.3ºC to -0.4ºC, while daily temperatures in the summer (July to September) range from 8.7ºC to 15.6ºC. Winter temperatures are cooler than those found at resorts closer to the Pacific Ocean, contributing to a relatively longer ski season. Conversely, summer temperatures are significantly cooler than those found in the valley suggesting the Study area is an ideal location for summer outdoor recreation.

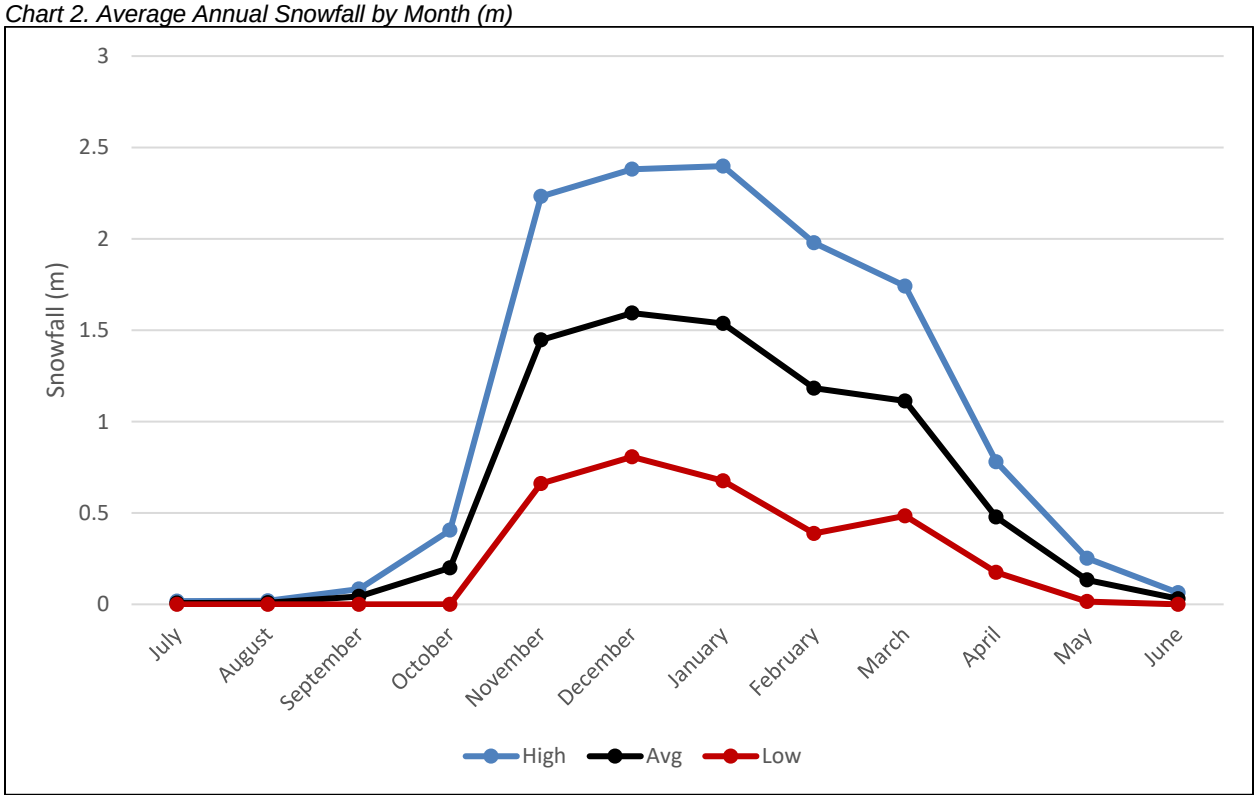
Chart 1. Average Temperature (ºC) by Month



Historic Snowfall

Snowfall in the Study area is pronounced in the early season with 40% of snow falling in November and December (Chart 2). Total annual snowfall averages 7.7m while the average monthly snowfall November through March is 1.4 m, with December being the snowiest month with 1.6 m on average. This can vary as indicated by the Low and High data series, though it should be noted that average annual snowfall in the Study Area has never fallen below 4m and has reached 15m in a few years.

Chart 2. Average Annual Snowfall by Month (m)

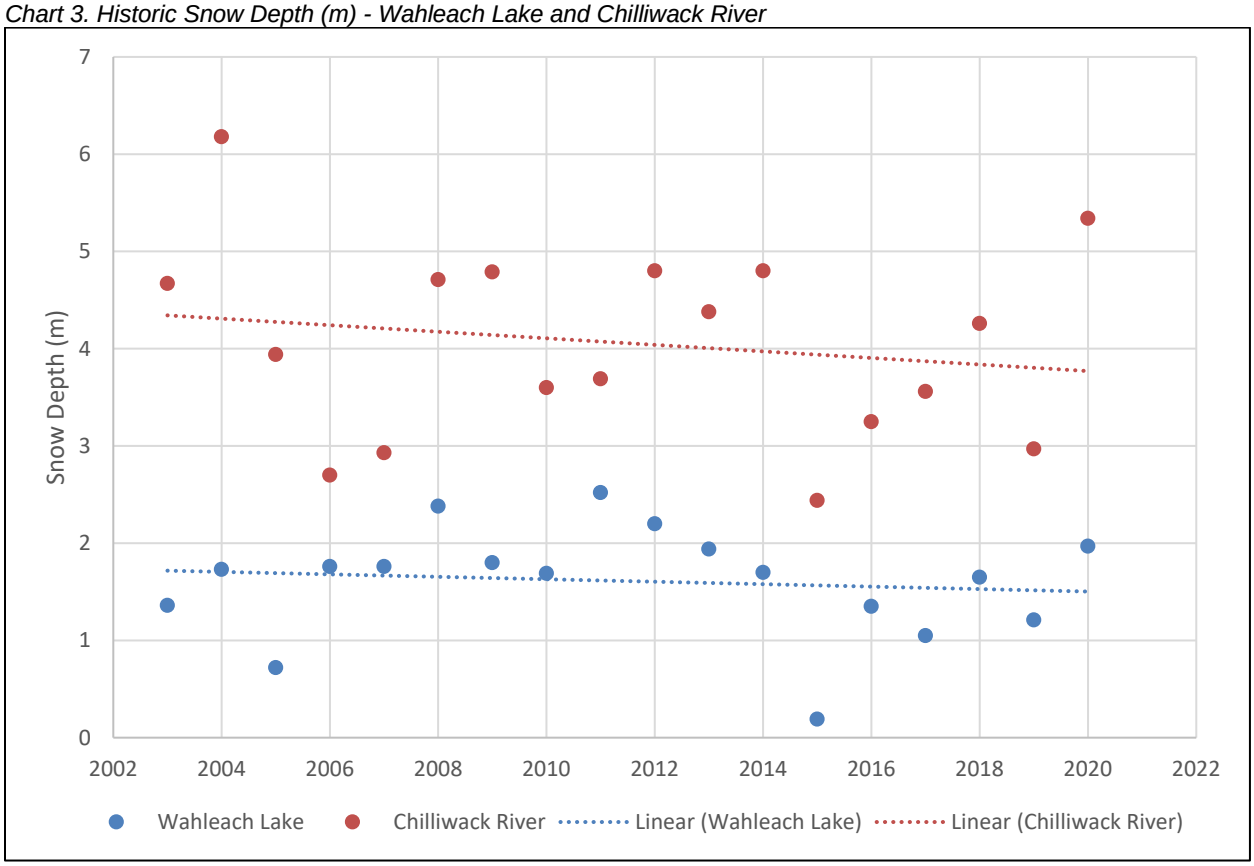


Historic Snowpack

To complement snowfall records, BHA assembled historic snow depth data from records hosted by the Aquarius Web Portal[22] for the Wahleach Lake (49.22, -121.58, 1,480 m.a.s.l.) and Chilliwack River (49.02, -121.01, 1,680 m.a.s.l.) snow stations for the 2003 to 2020 period. The records align with the projected data for the area and suggest the Study area has a strong winter snowpack to support a range of winter recreation activities.

[22] Aquatic Informatics (2020). Aquarius Web Portal. Accessible at http://aqrt.nrs.gov.bc.ca/.

Chart 3. Historic Snow Depth (m) - Wahleach Lake and Chilliwack River



Historically, the Chilliwack River has had an average maximum snow depth of 4 m while the lower Wahleach Lake site has an average of 1.6m (Chart 3). Taking the maximum snow depth recorded in a given year provides a better indication of seasonal snowfall as opposed to an average which may be disproportionately influenced by a late start or early end to the winter season (an unseasonable year).

Monthly breakdown of average snow depth indicates that even when accounting for unseasonable winter conditions the region can rely on a strong snow depth (Chart 4). The variation seen between the two sites results from their difference in elevation and topographic features (e.g. rainshadow effect). Regardless, even at the lower snow station snow depth exceeds 40cm (industry accepted minimum snow depth for operation with summer grooming) from early December to late May.

Finally, records from the Wahleach Lake snow station indicate the snow line has remained at or below the lowest skiable terrain identified in the Study Area (1,004m) from December to April suggesting an operating season of 130 days or more (Chart 5).

Chart 4. Historic Average Snow Depth (m) by Month – Wahleach Lake and Chilliwack River

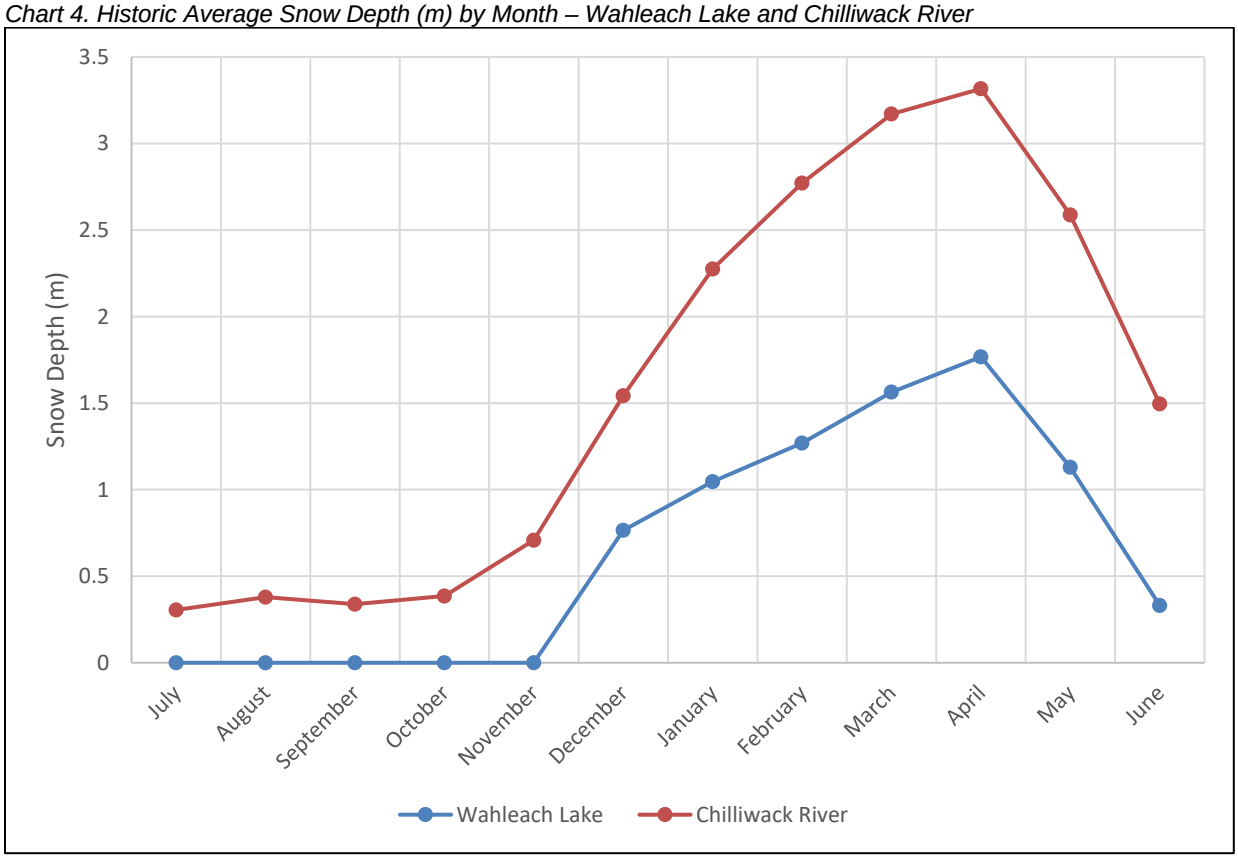
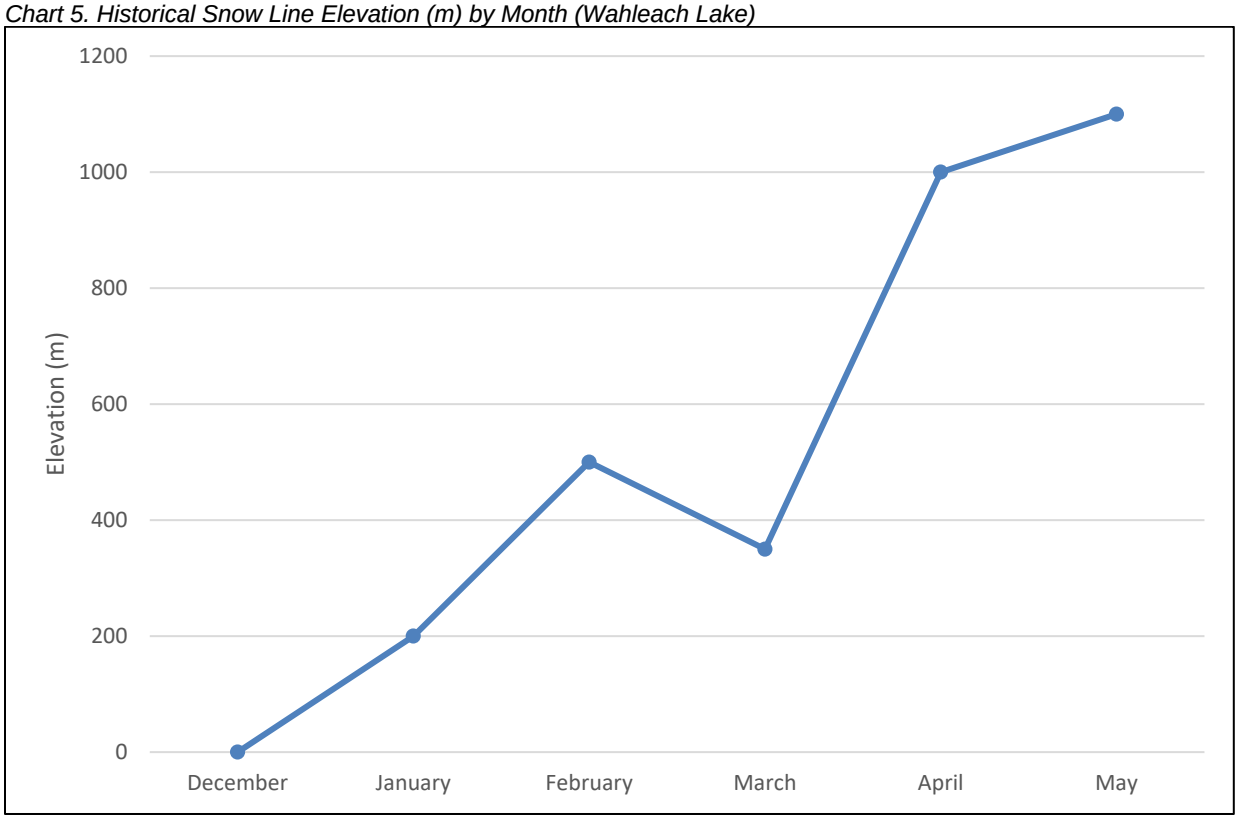


Chart 5. Historical Snow Line Elevation (m) by Month (Wahleach Lake)



Projected Climate Change

Despite strong historic temperature, snowfall, and snow depth records, the growing influence of climate change will present a challenge to the proposed BVMR. Changes to temperature and precipitation regimes will alter the timing and amount of annual snowfall, influencing the length of season and the quality of the guest experience. An understanding of the potential challenges and opportunities posed by climate change, and the broad implications to the Study area, have informed the EOI and will continue to shape the refinement of the Resort concept.

To assess future climate change within the Study area and its potential impacts, projections were collected for Mean Annual Temperature, Mean Monthly Temperature, Mean Annual Snowfall, and Mean Monthly Snowfall to 2085 using the ClimateBC program. Projections were based on two future climate scenarios, or Representative Concentration Pathways (RCP). Representative Concentration Pathways are greenhouse gas concentration scenarios that capture a range of possible greenhouse gas emissions trajectories. They were developed as part of the International Panel on Climate Change's Fifth Assessment Report (IPCC AR5) and are intended to help with climate change modelling and projections. There are four RCPs: 2.6, 4.5, 6, and 8.5. These values refer to the projected radiative forcing (i.e. heat gained from the sun minus heat lost to space) in the year 2100 relative to pre-industrial levels. For instance, the RCP4.5 scenario equates to 4.5W/m^2 greater than pre-industrial levels in 2100. Recent analysis indicates that radiative forcing has increased from 2.16W/m^2 in 1990 to 3.03W/m^2 in 2016[23]. As such, the RCP2.6 scenario is unlikely to be realistic. For this analysis, the RCP4.5 and RCP8.5 were chosen as they provide a realistic range of climate change projections as detailed in the IPCC AR5.

The charts presented below represent the average of fifteen climate change models calculated by the ClimateBC program. Taking the average of multiple climate change projections, or the ensemble mean, helps to account for model uncertainty, in turn lending confidence to model projections. Projections were made for the same representative site used for the review of historic weather and climate (49.001, -121.052, 1,354 m.a.s.l).

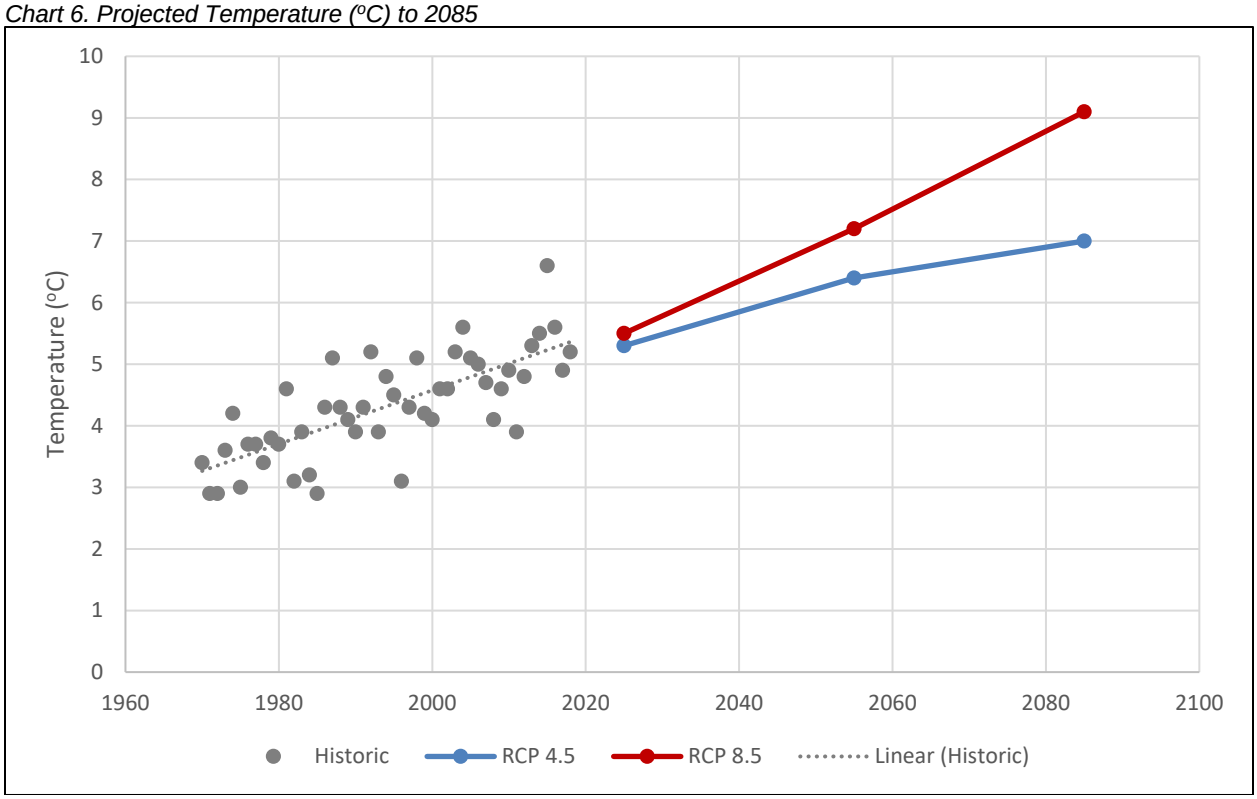
Of note, the projections included are made at 30-year intervals extending to 2085. However, decisions regarding the development and management of the proposed resort must take place on much shorter timescales, reflecting dynamic changes in the ski and recreationalist industry and guest marketplace. Thus, additional planning and the development of a resort Master Plan must address the existing realities at the proposed resort site but also allow for the flexibility to adapt to climate trends that will be realized over the span of decades.

[23] Butler, J. H. & Montzka, S. A. (2017). THE NOAA ANNUAL GREENHOUSE GAS INDEX (AGGI). Retrieved from: https://www.esrl.noaa.gov/gmd/aggi/aggi.html

Projected Temperature

As projected, the average temperature in the Study area is projected to increase regardless of the scenario that is realized. In the RCP 4.5 scenario mean annual temperature is projected to increase by approximately 1.8ºC by 2085. In contrast, the RCP 8.5 scenario projects that mean annual temperature will increase by approximately 3.9ºC by 2085.

Chart 6. Projected Temperature (ºC) to 2085



Review by month indicates that temperature changes will not be uniform throughout the year. Under the RCP 4.5 scenario (Chart 7), monthly temperatures will increase between 2.0ºC and 3.4ºC with the greatest change in the summer and smallest change in the fall. Notably, the months of February, March, and April will see an average increase of 3.1ºC by 2085. These months are critical to ski area operation and temperatures will likely impact snowfall (see *Projected Snowfall*).

The RCP 8.5 scenario illustrates the same pattern only the projected temperature increases are greater than seen in the RCP 4.5 scenario. Monthly temperatures are projected to increase between 3.9 and 6.2ºC with the greatest change in the summer, least change in the fall, and notable increases in temperature February through April (avg. 4.8ºC) by 2085.

Chart 7. Projected Temperature (°C) by Month to 2085 – RCP 4.5 Scenario

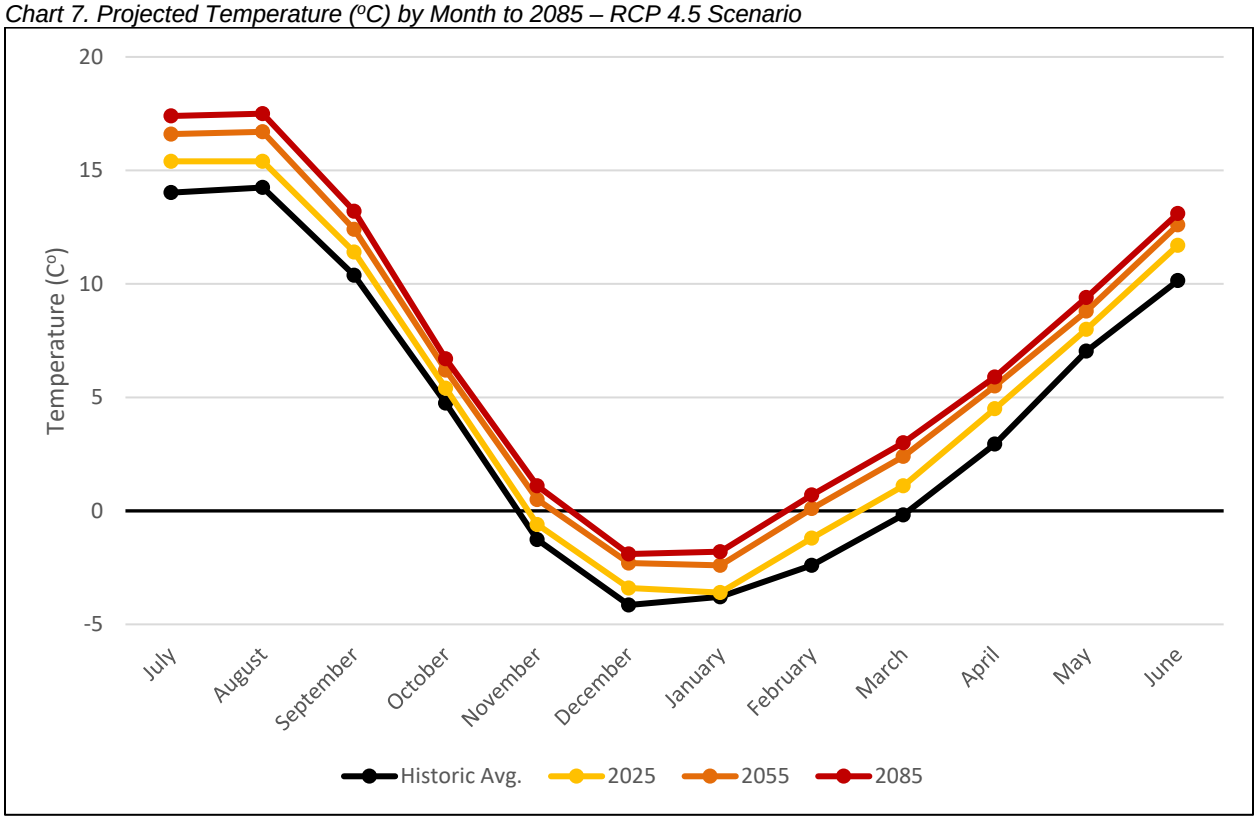
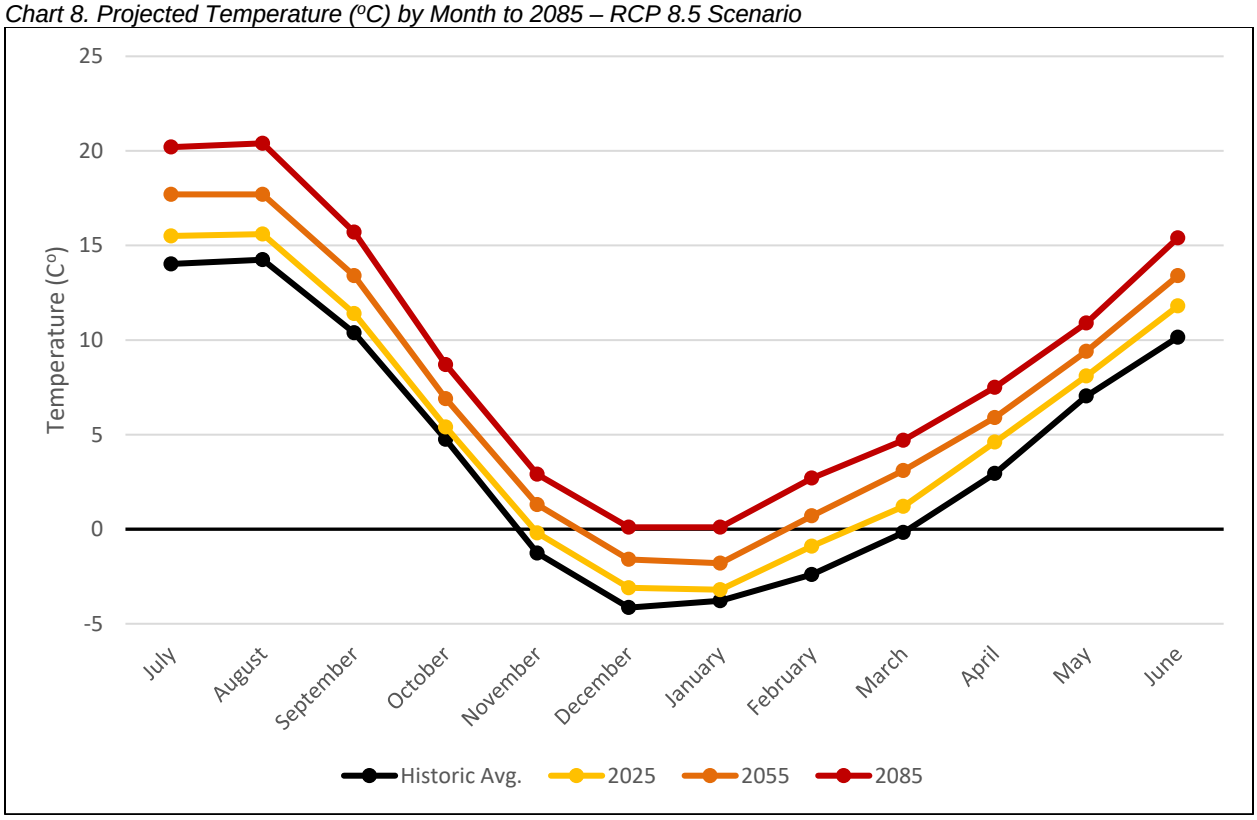


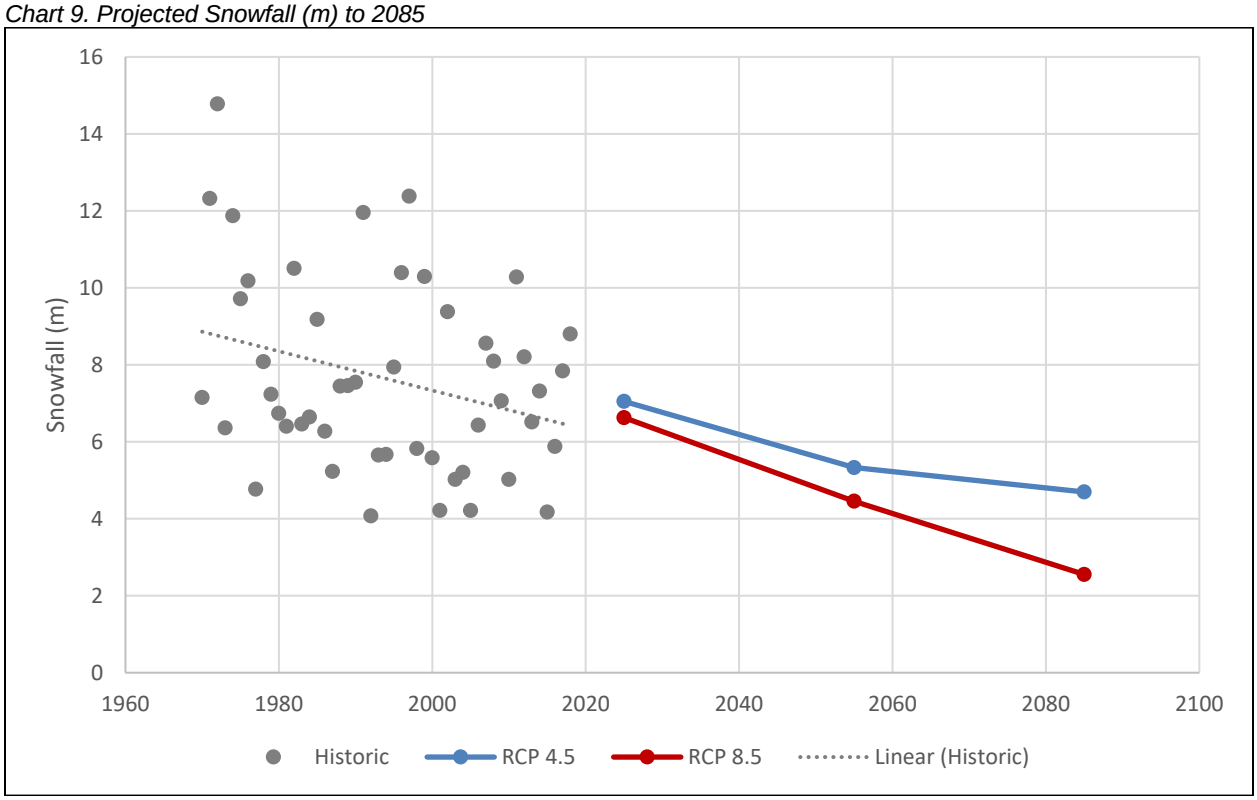
Chart 8. Projected Temperature (°C) by Month to 2085 – RCP 8.5 Scenario



Projected Snowfall

Snowfall in the Study area is projected to decrease in both the RCP 4.5 and RCP 8.5 scenarios (Chart 9). The projections for RCP 4.5 and RCP 8.5 to 2055 suggest an average annual snowfall of 5.3m and 4.5m, respectively, similar to what has been see in recent low snow years. The RCP8.5 scenario projects that this downward trend will continue after 2055 while the RCP4.5 scenario indicates that snowfall levels will experience a more modest decline after 2055. Projections indicate that average annual snowfall will be 4.7m and 2.6m for RCP 4.5 and RCP 8.5, respectively.

Chart 9. Projected Snowfall (m) to 2085



When viewed by month, projections for both scenarios indicate that in the short-term (2025) the study area will see an increase in snowfall in December and January with decreased snowfall in February and March. However, from 2055 onward the projections suggest snowfall will decline from historic averages, with the RCP 4.5 scenario staying relatively stable November through January but with notable decline February through April. The RCP 8.5 scenario suggests snowfall will decline significantly across all months after 2025, with a 50% to 90% decline in snowfall November to April.

Chart 10. Project Snowfall (m) by Month – RCP 4.5 Scenario

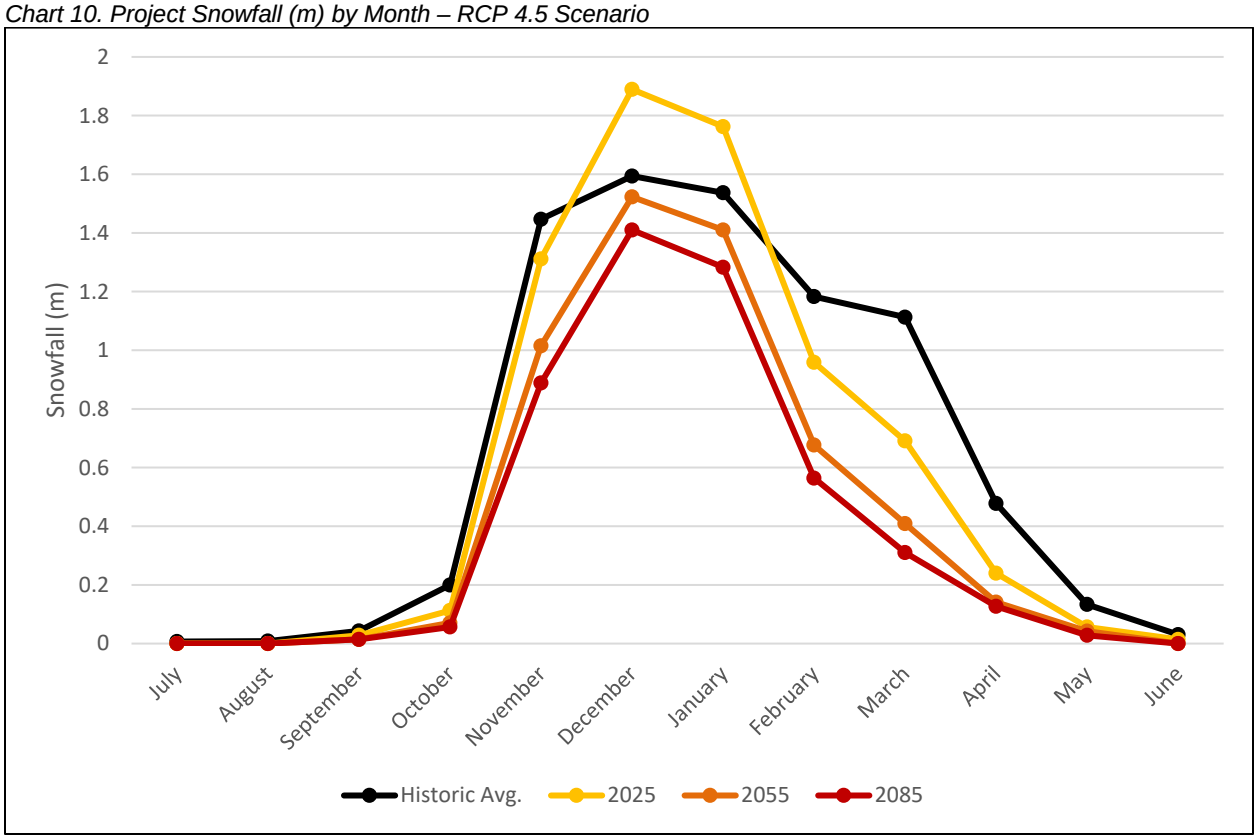
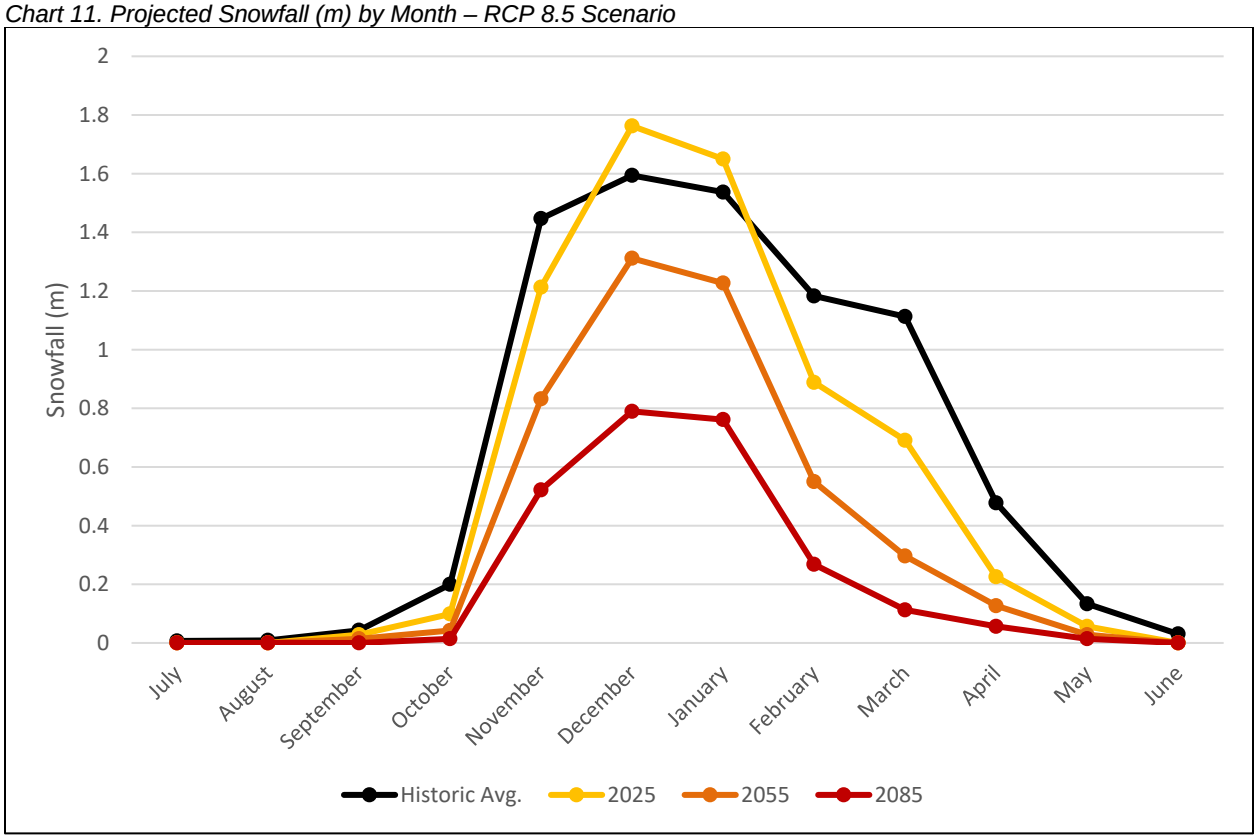


Chart 11. Projected Snowfall (m) by Month – RCP 8.5 Scenario



Regardless of which scenarios is realized, the shifts in temperature and snowfall illustrated in the projections for the study area stress that a range of mitigation and adaptation strategies will be needed to promote the viability of the Resort into the future. For example, a comprehensive snowmaking system and advanced ski run design techniques can be used to mitigate the effects of warming temperatures in the coming decades, while the addition of summer and shoulder season recreational offerings will allow the proposed resort to adapt to its changing setting, maintaining a high-quality, outdoor recreation experience. As the resort concept is developed and refined with input from additional site studies and feedback from First Nations, stakeholder, the Province, and the public, the Proponent will develop and detail these mitigation and adaptation strategies.

8.2 Appendix 2 Red and Blue Listed Species with Potential to Occur

English Name	Scientific Name	Name Category	Provincial Status
Tall Bugbane	*Actaea elata var. elata*	Vascular Plant	S1S2
Western Pond Turtle	*Actinemys marmorata*	Vertebrate Animal	SX
Oregon Forestsnail	*Allogona townsendiana*	Invertebrate Animal	S2
Great Blue Heron, Fannini Subspecies	*Ardea herodias fannini*	Vertebrate Animal	S2S3B, S4N
Vivid Dancer	*Argia vivida*	Invertebrate Animal	S2S3
Short-Eared Owl	*Asio flammeus*	Vertebrate Animal	S3B, S2N
Vancouver Island Beggarticks	*Bidens amplissima*	Vascular Plant	S3
Marbled Murrelet	*Brachyramphus marmoratus*	Vertebrate Animal	S3B, S3N
Roell's Brotherella	*Brotherella roellii*	Nonvascular Plant	S1S2
Mountain Sucker	*Catostomus platyrhynchus*	Vertebrate Animal	S3?
Salish Sucker	*Catostomus sp. 4*	Vertebrate Animal	S2
Phantom Orchid	*Cephalanthera austiniae*	Vascular Plant	S2
Painted Turtle - Pacific Coast Population	*Chrysemys picta pop. 1*	Vertebrate Animal	S1S2
Olive-Sided Flycatcher	*Contopus cooperi*	Vertebrate Animal	S3S4B
Coastrange Sculpin, Cultus Population	*Cottus aleuticus pop. 1*	Vertebrate Animal	S1S2
Puget Oregonian	*Cryptomastix devia*	Invertebrate Animal	SX
Black Swift	*Cypseloides niger*	Vertebrate Animal	S2S3B
Monarch	*Danaus plexippus*	Invertebrate Animal	S1?B
Coastal Giant Salamander	*Dicamptodon tenebrosus*	Vertebrate Animal	S2S3
Banded Cord-Moss	*Entosthodon fascicularis*	Nonvascular Plant	S2S3
Dun Skipper	*Euphyes vestris*	Invertebrate Animal	S2S3
Silver Hair Moss	*Fabronia pusilla*	Nonvascular Plant	SH
Peregrine Falcon, Anatum Subspecies	*Falco peregrinus anatum*	Vertebrate Animal	S2?
Wolverine, Luscus Subspecies	*Gulo gulo luscus*	Vertebrate Animal	S3
Barn Swallow	*Hirundo rustica*	Vertebrate Animal	S3S4B
Yellow-Breasted Chat	*Icteria virens*	Vertebrate Animal	S2B
Western Screech-Owl, Kennicottii Subspecies	*Megascops kennicottii kennicottii*	Vertebrate Animal	S2S3
Cryptic Paw	*Nephroma occultum*	Fungus	S3
Cutthroat Trout, Lewisi Subspecies	*Oncorhynchus clarkii lewisi*	Vertebrate Animal	S2S3
Band-Tailed Pigeon	*Patagioenas fasciata*	Vertebrate Animal	S3S4
Whitebark Pine	*Pinus albicaulis*	Vascular Plant	S2S3
Gopher Snake, Catenifer Subspecies	*Pituophis catenifer catenifer*	Vertebrate Animal	SX
Sonora Skipper	*Polites sonora*	Invertebrate Animal	S3
Northern Red-Legged Frog	*Rana aurora*	Vertebrate Animal	S3
Oregon Spotted Frog	*Rana pretiosa*	Vertebrate Animal	S1
Nooksack Dace	*Rhinichthys cataractae - Chehalis lineage*	Vertebrate Animal	S1

Bull Trout - South Coast Population	*Salvelinus confluentus pop. 28*	Vertebrate Animal	S2S3
Townsend's Mole	*Scapanus townsendii*	Vertebrate Animal	S1
Pacific Water Shrew	*Sorex bendirii*	Vertebrate Animal	S2?
Spotted Owl	*Strix occidentalis*	Vertebrate Animal	S1
Barn Owl	*Tyto alba*	Vertebrate Animal	S2?
Grizzly Bear	*Ursus arctos*	Vertebrate Animal	S3?

Retrieved from BC Species and Ecosystem Explorer
Search Criteria: Fraser Valley Regional District, Coastal Western Hemlock and Engelmann Spruce Subalpine Fir Biogeoclimatic Zones.
Retrieved from http://a100.gov.bc.ca/pub/eswp/. Accessed June 23, 2020.

8.3 Appendix 3 Preliminary Market Review – David Hughes and Associates

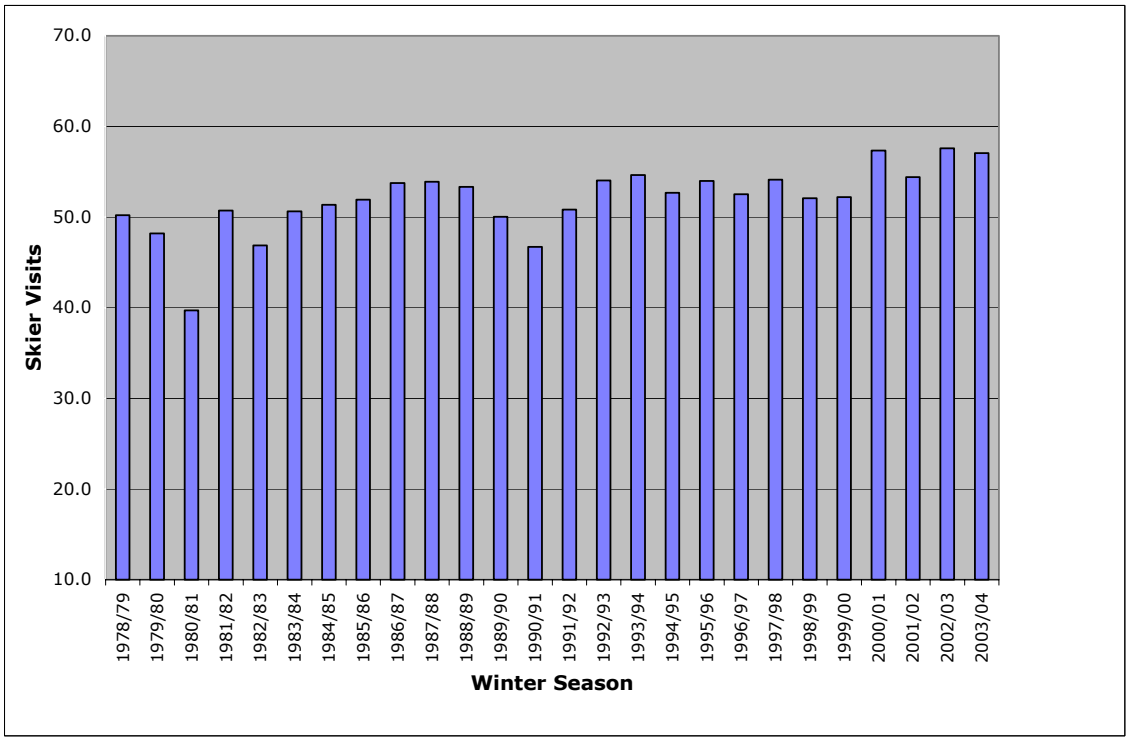
I

Winter Alpine Skiing and Snowboarding Market Potential

A. North American ski industry trends

The North American skier/snowboard market has become relatively mature and stable, but significant shifts are taking place within the industry. The following exhibits display skier-snowboard visits. Exhibit 1shows total visits for American ski areas.

Exhibit 1
American skier visits (millions)



Source: Kottke National End of Season Survey 2003/04 Final Report

For the American market as a whole, there has been little growth over the last ten years. Escalation of lift prices, equipment, the cost of ski holidays, and a reduction in the number of ski areas in the eastern and Midwest regions of the United States has hindered growth.

Skier visits include all visits utilizing the lifts during the ski season (skier, snowboarder and foot passenger visits are not separately distinguished). The various regions of the American market have experienced significant volatility in skier visit volumes because of varying weather and snow accumulation amounts from year to year. The eastern and Midwest regions and some Pacific areas have been particularly prone to large weather-related swings in annual skier visit volumes. The larger resorts that are predominantly in the Rockies and Lake Tahoe area are also subject to weather fluctuations but the swings are generally not as large.

Extraneous factors to the industry including air travel costs and inconvenience, terrorism and health scares, and America's international unpopularity (Iraq war and international tensions) have also contributed to this lack of total growth for the American industry. Despite these market and industry problems, the ski industry has not experienced the decline that was predicted in the late 1990's. The industry has found ways to keep the baby boomers skiing (skiers are more active than the general population), attract the younger generation and the sport is making inroads with the non-white sectors of North American society.

The advent of detachable quad chairs along with substantially more snowmaking and superior grooming has enabled ski areas to comfortably handle larger volumes while improving the skiing experience for a broader range of skiers (particularly for beginner and older skiers). These technological changes have also been accompanied by extensive resort development at a number of the leading ski areas. As a result, there has been a net transfer of skiers to the areas and regions that provide a more consistent and higher quality experience. The large more developed regions and resorts have generally experienced reasonably good growth at the expense of less developed areas. The largest 22% of the American ski areas accounted for 65.9% of the total American skier visits.[1]

The Rocky Mountain and selected areas in the Pacific and Northeast regions have been the main benefactor of the shifts in ski area business. Many ski areas in these two regions contain substantially larger terrain, more alpine environments, more consistent snow and heavier investment in on-mountain and resort facilities.

Over the last two decades, a number of the Rocky Mountain resorts have grown to the 1,000,000-skier visit level. Colorado, Lake Tahoe and Utah ski areas have also benefited from having a number of good ski resorts relatively close to each other. Washington State ski areas have not experienced growth like a number of other western states.

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[1] *Kottke National End of Season Survey 2003/04*

Nearly all Washington areas are on Forest Service lands and the practice of the Forest Service in this region is to not allow resort development and the building of overnight accommodation. Washington State skier visits have ranged from a high of 2,151,544 to a low of 1,399,869 for the period 1994/95 to 2003/04. Total visits for 2003/04 were 1,860,180, a relatively good year.

Exhibit 2 illustrates the historic growth or lack of growth for the American ski regions.

Exhibit 2
US skier visits by region

YR.	USA	Pacific	Rockies	Midwest	Southeast	Northeast
03/04	57,067,320	11,945,750	18,868,323	7,773,218	5,588,292	12,891,738
02/03	57,593,611	10,912,819	18,728,294	8,128,526	5,832,703	13,991,269
01/02	54,410.802	12,126.135	18,123,401	6,979,935	4,993,753	12,187,577
00/01	57,337,114	11,277,590	19,323,540	7,580,361	5,458,264	13,697,359
99/00	52,198,398	10,451,127	18,109,291	6,421,761	5,191,255	12,024.964
98/99	52,089,107	11,083,714	18,439,840	6,004,792	4,261,266	12,299,495
97/98	54,122,398	11,169,249	19,191,410	6,706,958	4,343,244	12,711,537
96/97	52,519,912	9,841,438	18,904,015	7,136,894	4,230,889	12,406,676
95/96	53,983,048	9,033,528	18,147,559	7,283,985	5,693,266	13,824,710
94/95	52,677,000	11,346,000	18,412,000	6,907,000	4,746,000	11,265,000
93/94	54,637,000	10,244,000	17,503,000	7,364,000	5,808,000	13,718,000
92/93	54,032,000	10,575,000	18,602,000	6,978,000	4,660,000	13,217,000
91/92	50,835,000	9,936,000	17,687,000	6,535,000	4,425,000	12,252,000
90/91	46,722,000	8,115,000	16,706,000	6,486,000	4,257,000	11,157,000
89/90	50,020,000	9,311,000	16,048,000	6,915,000	4,447,000	13,299,000
88/89	53,335,000	11,556,000	16,601,000	7,013,000	5,424,000	12,741,000
87/88	53,908,000	10,255,000	16,564,000	6,783,000	5,885,000	14,421,000
86/87	53,749,000	9,564,000	16,680,000	6,944,000	5,816,000	14,745,000
85/86	51,921,000	9,797,000	16,869,000	7,201,000	5,218,000	12,836,000
84/85	51,354,000	11,352,000	17,626,000	6,899,000	4,394,000	11,083,000
83/84	50,630,000	9,606,000	16,801,000	6,961,000	5,175,000	12,087,000
82/83	46,861,000	12,061,000	14,808,000	6,213,000	4,256,000	9,523,000
81/82	50,718,000	11,004,000	15,337,000	7,846,000	5,064,000	11,467,000
80/81	39,700,000	8,401,000	10,486,000	7,688,000	4,172,000	8,953,000

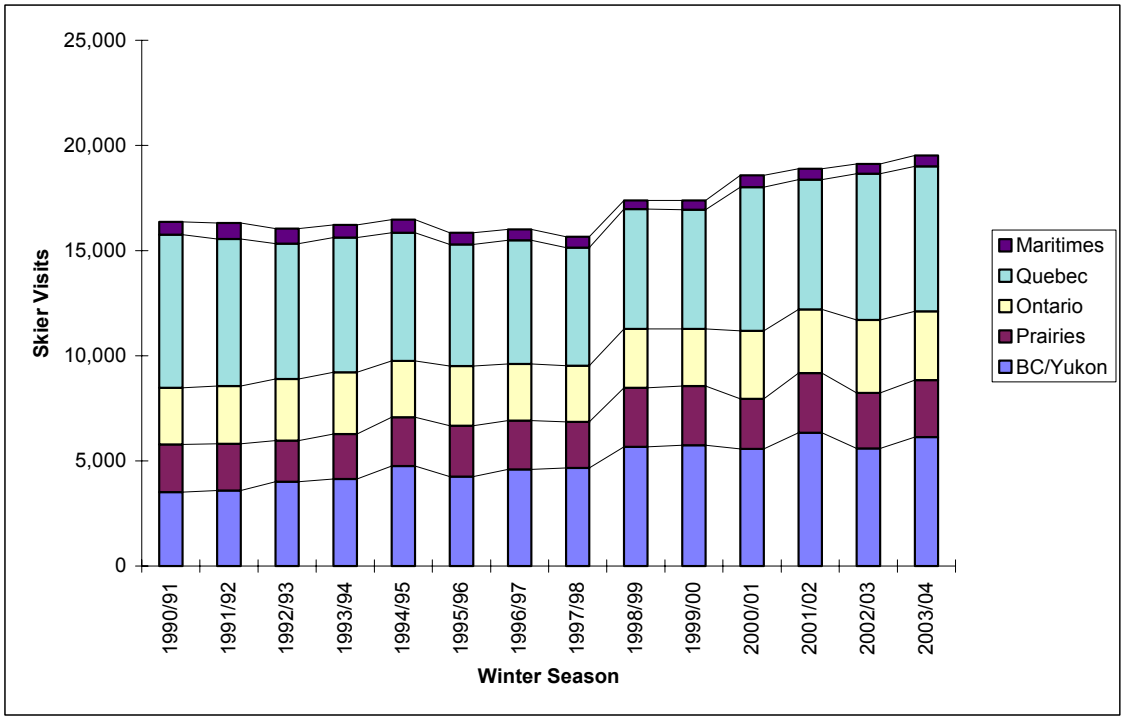
Source: Kottke National End of Season Survey 2003/04 Final Report

B. Canadian ski industry trends

The overall Canadian market, like the American market, has produced modest growth. Exhibit 3 presents skier visit totals for Canada's respective regions. British Columbia ski areas have been almost exclusively responsible for Canadian market growth as illustrated by the bottom bar on each year's column.

British Columbia has several advantages over Quebec, the current largest skier visit region. Additional analysis of skier survey results reveals that the British Columbia market is a younger market than Quebec's. BC is also the fastest growing region and it has the best mountain terrain, snow quality and quantity. Expansion of the Okanagan and Kootenay ski areas and more emphasis on the destination market should enable BC to eventually pass Quebec as the leading generator of skier visits.

Exhibit 3
Canadian skier visits (-ooo-)



Source: Canadian Ski Council "Facts & Stats 2004"

1. Market size

Although a reasonable understanding of market size can be obtained by examining skier visit numbers, a more thorough analysis requires examination of a number of other variables. One of these variables is the total number of potential and active skiers/snowboarders. Canada as a whole has more skiers per capita than the United States mainly due to its colder winter climate. The Canadian Ski Council estimates that over 15.3% (4,162,000) of Canadians 12 years of age and over alpine ski, snowboard and/or cross-country ski. Close to 3.318 million people are alpine participants. By contrast the National Sporting Goods Association in the United States estimates there are close to 13.0 million skiers and boarders. Although Canada's population is about one-tenth of the United States, Canada's active skier percentage of its population is significantly larger than the American active skier percentage is of its total population.

2. Current industry trends are mixed

The ski industry has undergone a substantial amount of change in both philosophy and the level of service it offers. For much of its history, the ski industry saw itself as being in the uphill transportation business. During the 1970's, however, attitudes changed and skiing became more of a recreation outlet rather than purely a sport. Correspondingly, customers and the industry recognized that operators were also in the downhill transportation business. That is, ski operators started spending a lot of effort and money on assisting the skier in getting down the hill. Snowmaking, careful trail design and snow grooming became major thrusts of the industry.

During the 1980's, major resorts developed and the skiing became an activity and a vacation experience as well as a recreation activity. New competition to ski areas came from any location or activity that attracted the leisure entertainment dollar.

To go along with the high degree of technology that has become commonplace with many ski area operators is the advancement in ski equipment design. Improved comfort in boots, safer bindings and the new shaped or parabolic skis are all helping a greater cross-section of the general population to take up skiing. As a result, it takes less time and effort to learn how to ski and consequently skiing is now available to the less-than-athletic as well as the older skier.

A further factor that is increasing participation is snowboarding. This new wave is extremely popular with the young and boarders are now estimated to be 30.6%[1] of the American market up from only 10% in the early 1990's. The percentage of

[1] *Kottke National End of Season Survey 2003/04 Final Report*

snowboarders is higher in ski areas that have a younger clientele. Boarders are expected to make up 36.0% of the American alpine market in 5 years time. The percentage of boarders is a little higher in Canada. The Canadian Ski Council has estimated boarders to be 33.9% of total alpine riders in 2003/04. Boarders are estimated to make up 36.5% of the BC alpine domestic participants. British Columbia then has a greater percentage of this faster growing segment of the industry.

The negative side to these changes, however, is also important. Skiing has become expensive. The cost of lifts, equipment, lessons and resort vacations has jumped dramatically. Skiing is in danger of becoming elitist. The industry can no longer depend strictly on the sport and recreation side. The general population is aging and the cost of transportation, lodging, etc. means the industry needs middle-aged skiers who have a greater ability to pay. Fortunately, the new thrusts of snowboarding and new ski designs are allowing participants to learn quickly and experience more terrain and types of skiing/riding than many skiers thought possible 20 years ago.

Future growth in alpine skiing and boarding is going to require the industry to focus on a number of issues including:

- relationship between price and value
- redevelopment of existing product on the mountain and at the base
- commitment to consistency (snowmaking and grooming are important to keep people skiing and riding as they get older)
- target and niche markets especially for smaller ski areas
- need to regenerate the emotional or passion side of the sport/activity
- ensuring adequate training slopes and opportunities (local “feeder” hills) exist
- cater to women’s needs as they are key in deciding/influencing vacation decisions

There is a danger that all the high technology can make the industry approach to marketing too rational or solely based on tangible benefits. Skiing and its accompanying mountain/country lifestyle is also an emotional experience. Ski areas must satisfy an increasingly fragmenting and demanding marketplace with a widely diverse range of customers. Ski and resort industry designers and operators will need to provide more specialized facilities and services and address how to assimilate these customers together on the slopes and in the facilities they share. In

addition, it is important to recognize that the ability to attract a broader cross-section of future customers will be based on product availability, affordability and convenience. The product will be compared more to other readily available entertainment options outside of skiing and not other competing ski resorts.[1]

C. The BC and regional ski markets are strong

Of even greater relevance to BC is the British Columbia and Alberta position in the total Canadian market. The Canadian Ski Council estimates[2] the total alpine skier/boarder population in British Columbia was 653,000 in 2003. A similar analysis estimates that there were 413,000 Alberta alpine skiers/boarders in 2003. Therefore, the BC and Alberta market is about 1,066,000 skier/boarders at the present time. BC and Alberta's populations have generally grown faster than the rest of Canada over the last decade and consequently, internal population growth should provide a good base for the BC ski areas.

The demand for downhill skiing has steadily grown over the last two decades as shown on Exhibit 4. Growth slowed a little for the recessions during the early 1980's and 1990's, but weather has been a much more important variable in explaining skier visit fluctuations. British Columbia attracted 31.4% of the total Canadian skier visits in 2003/04 as compared to BC's 19.7% share of the Canadian skier/boarder population. This comparison clearly attests to BC's ability to draw skiers from the rest of Canada and from outside Canada. With BC's population growing faster than the rest of Canada and with BC resorts' success in attracting skier visits from outside of the Province, BC total skiers should continue to grow. Boarders are estimated to make up 36.5% of the BC alpine domestic participants. British Columbia then has a greater percentage of this portion of the industry than the Canadian average. This faster growth segment should help BC to experience higher growth than most of North America into the future.

The high growth rate in BC ski areas can be attributed to several factors including the strong success of the Province's resort areas including Whistler, Okanagan areas and recent developments in the East Kootenays. The success of BC ski areas is a combination of increasing market recognition of British Columbia's skiing potential, the capital investment in ski resorts and general population growth. The growth at Mt. Washington on Vancouver Island also attests to the latent demand amongst the local population. This area caters almost exclusively to Vancouver Island residents, and as the ski area has expanded its facilities it has experienced strong growth.

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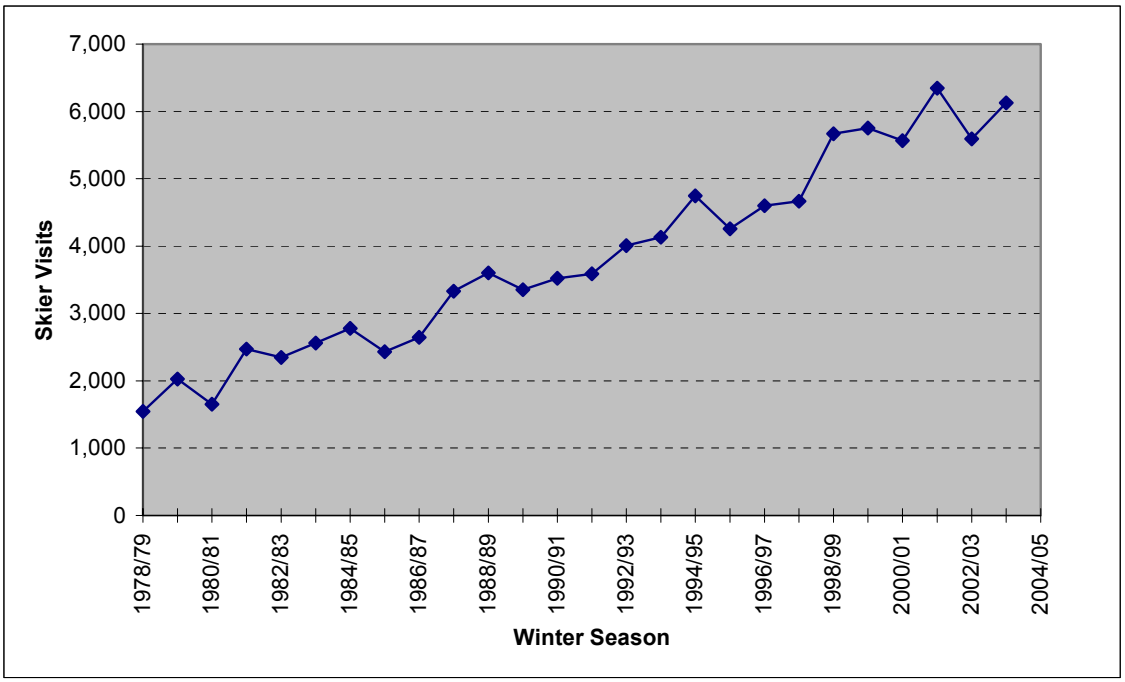
[1] *Bill Jensen, President Fibreboard Resort Group - Ski Area Management, March 1996*

[2] *Canadian Ski Council's Facts and Stats 2004*

Recent resort improvements and greater American and European knowledge of BC's ski product and value have combined to produce an estimated 6 million skier visits over two of the last three seasons. The downturn in recent years and the expected downturn this season has been mainly caused by very low snowfall. BC skier visit growth should also experience positive impetus from the buildup to the Olympics. More international focus will be on BC and the increased spotlight on the alpine sports and the alpine environment should also encourage more residents to try skiing.

Exhibit 4
History of British Columbia skier market (-ooo-)



Source: CWSAA

1. The local ski markets for Vancouver and Calgary are growing

The dominant ski area in British Columbia has been Whistler/Blackcomb, which has exhibited strong growth since the construction of the Whistler Village in 1979-1980. There has been strong growth in local, regional and destination skier markets. Superior on-mountain and resort facilities, excellent terrain, better quality snow and good snowmaking have all contributed to Whistler's success. Growth at Whistler/Blackcomb is now slowing as this area is reaching maturity and nearing the Municipal's allowable unit buildout. If the Resort Municipality stops accommodation expansion as the Resort's Community Sustainable Plan calls for,

skier visit growth will slow, as the Resort's accommodation supply becomes a constraining factor. This restriction in supply at Whistler provides an opportunity for other ski areas.

Similarly constraints to growth exist in Alberta. Federal and Alberta Parks' restrictions on growth and particularly accommodation expansion will become a constraint to the established ski areas in Alberta. The Calgary demand pressure, however, effectively has been transferred to British Columbia. Demand from Calgary has significantly helped the growth of the BC Rockies and Interior regions.

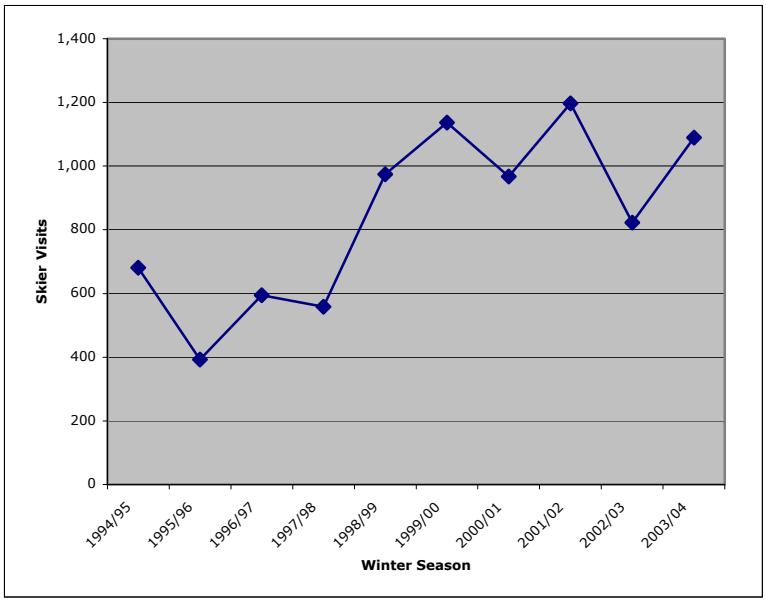
Small areas generate interest in skiing and act as "feeder areas" by providing easily accessible and affordable areas to learn how to ski. As a result, the Canada West Ski Area members (CWSAA) have implemented a policy to adopt and help a smaller ski area. This policy should help sustain many of the feeder areas.

D. Regional skier market for the Lower Mainland

1. Competition

Ski areas in the Lower Mainland or Southwest BC experience varying market demand from year to year because of the dramatic swings in snowfall. Presented in Exhibit 5 is a graph of the skier visit statistics for the Lower Mainland ski areas.

Exhibit 5
Lower Mainland Ski Areas (-000-)



Source: CWSSA

The ski areas represented here include: Grouse Mountain, Cypress Mountain, Mt. Seymour, Hemlock Valley, Manning Park and Mt. Baker. The latter area is in the United States, but approximately 50 percent of its customers are Canadian and most of them are from the Fraser Valley region.

The significant rise in visits in good snow years supports the contention that there is a significant amount of latent demand in the Lower Mainland and the Fraser Valley.

The market growth at Whistler-Blackcomb, one of the strongest witnessed in North America, supports the assertion that there is strong potential growth in the Lower Mainland. Growth has resulted from the destination, regional and local segments. Whistler's skier visits have risen from 372,000 in 1980/81, when Blackcomb opened, to the 2,000,000 plus level that has been reached for the last six years. There has also been significant growth in skiers from the Greater Vancouver area and many have purchased real estate units. Whistler, in turn, has generated interest in alpine activities and the local mountains, Sun Peaks and the Okanagan ski areas have benefited.

Exhibit 6 presents preliminary critical ski area variables comparing Chipmunk Ridge with the local areas. Chipmunk Ridge would have the highest ski area elevation and the greatest vertical drop of the Lower Mainland-Fraser valley ski areas. Manning Park on the divide of the Cascade Mountains is a little higher, but it is a further 11/2 hours east. It is a much smaller ski area and does not have the variety of terrain that Chipmunk Ridge could have.

Exhibit 6
Competition to Chipmunk Ridge

	Peak Ski Elevation	Bottom Ski Elevation	Vertical Drop	# of Trails Day/Night	% Snowmaking	Cross Country
Hemlock Valley	4500'	3300'	1200'	34 / 0	0	Little
Mt. Baker	5050'	3550'	1500'	38 / 0	0	No
Manning Park	5868'	4480'	1417'	20 / 0	0	30 Km
Cypress Mountain	4750'	2995'	1755'	25 / 11	0	30 Km
Grouse Mountain	4100'	2840'	1260'	25 / 13	75%	S shoeing
Mount Seymour	4158'	3036'	1122'	24 / 9	0	S shoeing
Chipmunk Ridge	5617'	2674'	2385'			In plan

Source: Brent Harley and Associates & White Book of Ski Areas 2004

The vertical drops presented in Exhibit 6 are not necessarily equal to the vertical distance between the area's high and low ski elevation points. Chipmunk Ridge greatest continuous vertical drop, for example, is for a phase 3 ski pod. The phase 1 high point would be 5148' and the greatest vertical drop in this phase would be 2087'.

The primary competitors for the proposed Chipmunk Ridge are Hemlock Valley and Mt. Baker. The proposed Chipmunk Ridge area would be larger, have higher top elevations and more vertical. Chipmunk Ridge would also be much easier to get to being directly off the Trans Canada Highway. Both Hemlock and Mt. Baker have longer and considerably more difficult access roads. Chipmunk Ridge mountain resort would have a residential and resort base that would provide a local built-in market. Further, the Chipmunk Ridge mountain resort would be accessed via a gondola from a low elevation, which again would make access that much easier. The easy access and base development would make Chipmunk Ridge more akin to a Grouse Mountain type of resort.

A potential new resort development in the Juliet Creek mountain valley is proposed as a four seasons resort. It is located another 11/2 to 2 hours east and is at the top of the Coquihalla Highway. This resort development would be focused more on the regional market and could have significant destination market appeal. Given this emphasis, this resort may compete more with Sun Peaks and the Okanagan resorts.

2. Demand considerations and market positioning

The North Shore Mountains (Grouse Mountain, Cypress Mountain and Mt. Seymour) are better located to service the western end of the Lower Mainland. All of these areas cater to a local market with only a little regional market appeal.

Chipmunk Ridge is more likely to be positioned between the local areas and a new resort at Juliet Creek. Chipmunk Ridge should have better terrain and more consistent snow than most other southwest ski areas. Chipmunk Ridge would be well located to attract eastern Lower Mainland and the Fraser Valley markets and the area has much better access than the other Fraser Valley ski areas. With the right development, Chipmunk Ridge could also have considerable regional market appeal.

Skier visits do not reflect the potential size of the local market. The local ski areas are relatively low and, with exception of Grouse, have minimal snowmaking. As a result, they are subject to wide swings in volume. A comparison of other regions' skier visits to their population produces some interesting findings.

a) Lower Mainland East skier visit ratio to population is low

A number of jurisdictions' skier visits from their local market were compared to the jurisdictions' population figures. Skier visits were obtained from CWSAA, the Canadian Ski Council Survey and the American Kottke Survey. Destination or international skier visits were deducted from total skier visits to arrive at local visits. A sample of local market skier visits to population ratios were calculated and are presented here:

• Canada	16,283,000/32,078,000	= .508
• USA	53,985,382/290,891,000	= .186
• Washington State	1,860,180/5,894,100	= .316
• Alberta	1,921,300/3,223,400	= .596
• BC	3,916,800/4,220,000	= .928
• Greater Seattle	1,274,159/1,761,411	= .723
• Calgary	1,580,110/951,395	= 1.661
• GVRD West	860,000/1,405,777	= .612
• Fraser Valley-GVRD East	225,500/954,475	= .236

Skier visits are from the region's ski areas and are for the skier visits that are estimated to be from the local area. The higher the ratio, the more a region is supporting "local" alpine skiing and boarding. Canada as might be expected with more winter and a higher number of skiers per capita has a higher skier visits to population ratio than the United States. Interestingly, Seattle has a higher ratio than Vancouver, and this may be because of Vancouver's proximity to Whistler. If the Greater Vancouver Regional district (GVRD) is

compared to the local mountains and the local component of the Whistler visits, the ratio rises to .690.

The telling ratios are the Fraser Valley with the eastern GVRD and Calgary. The Fraser Valley and areas in the GVRD east of the Fraser and Pitt Rivers have very low skier visits. This is not necessarily a reflection of low demand, but rather an indication the area does not have sufficient local supply. Calgary, on the other hand, has a high ratio that provides a guide to what could be supported in the Lower Mainland and the Fraser Valley. Calgary skiers have 12 significant ski areas to patronize. The Calgary visits are the accumulated totals of these ski areas' visits derived from Calgary residents.

b) Vancouver has a significant number of skiers

The Canadian Ski Council surveys have determined that Greater Vancouver had 286,000 skiers in 2003. This number is less than Calgary at 159,000 on a per capita basis, but still provides an indication that there could be room for growth in the Vancouver Fraser valley region. Greater Vancouver number of skiers to population is higher than most other major population centres in Canada. Given the region's mountain setting and with the coming of the Olympics, it is safe to assume the region could generate more local skier visits if the appropriate supply is available.

c) Potential local visits

The Fraser Valley is one of the fastest growing regions in the Province. It also has a younger population with many young families. If the right new supply is added, it is reasonable to assume that this region should match Vancouver and Seattle propensity to participate in skiing or boarding as a minimum. The Calgary ratio provides some preliminary guidance on what the upper limit in local skier visits could be.

If a local skier visit to population ratio for the Fraser Valley is assumed to be like Vancouver and Seattle, the eastern GVRD - Fraser Valley region could potentially support about 670,000 local skier visits in a relatively normal year. This volume level is an increase of 444,500 skier visits over the 2003/04 level of 225,500 skier visits experienced by the three local areas. If a new well designed and operated ski area is added to the market, this volume level could be reached in a number of years.

Using the Calgary ratio, a preliminary estimate of 1,585,000 local skier visits is the upper end the market could potentially absorb. This volume level would require a strong market acceptance by one or more new supply additions and a significant increase in the propensity to ski. These volume calculations provide some guidance on the potential size of the market given

the appropriate expansion. These volumes are not based on large population growth. The Fraser Valley will most likely experience strong population growth, which could make the market potential even higher.

c) There is sufficient market potential for Chipmunk Ridge to proceed to detailed site and market analysis

Chipmunk Ridge could offer an attractive local and regionally focused resort and alpine ski area. The resort's appeal should come from:

- quality skiing product with good blend of beginner, intermediate and advance terrain
- higher elevations to protect against the cyclical warm spells the Lower Mainland is subject to
- much greater number of ski acres and ski pods to face all directions (aspects)
- easy access for a growing and large market area
- small well-designed resort and residential village that provides important activity, restaurant and entertainment amenities without being too large
- good alpine terrain that also encourages cross-country and other winter and summer recreation

II

Other Market Potential

A. Other winter recreation

A preliminary review of the Chipmunk amphitheatre-shaped basin indicates that the Chipmunk Ridge could also host other winter and summer activities. Tubing, snowshoeing and cross-country skiing should all be possible on the ridge near the gondola top station. Tubing and snowshoeing have become popular on the local area mountains, adding activities and attractions for different generation groups.

Cross-country is popular in British Columbia and the Lower Mainland and visitors to ski areas are increasingly participating in both alpine and cross-country skiing. Paid skier visits to Southwest Mainland BC cross-country ski areas totaled 120,300 in 2003/04. The lion's share belonged to Hollyburn Ridge at Cypress, but Whistler and Manning Park are putting more emphasis on tracked cross-country trails. Mt. Washington on Vancouver Island has made a large investment in their cross-country facilities and they are hoping to become one of the Olympic training areas. Interior mountains are also adding or expanding their cross-country trails including Sun Peaks, Silver Star, Big White, Fernie and Kimberley. Several other mountain resorts are considering similar investments.

The Chipmunk Ridge is relatively flat on top and it can be used to connect the horseshoe from Mount Archibald to Mount Thurston and possibly over to Mount Mercer. If trails can be constructed connecting the three mountain areas, Chipmunk Ridge could have trails similar in length to Hollyburn and Manning Park. A distinct advantage Chipmunk Ridge would have is that its cross-country trails would be on a ridge (but still below tree line) that is higher than trails on Hollyburn, Whistler or the new Callaghan Valley Olympic trails.

B. Summer recreation

The same Chipmunk Ridge area should be well suited for summer recreation. The cross-country trails would serve as hiking and mountain trails in the summer. In addition, the downhill ski pods could serve as downhill mountain biking areas with the lifts providing uphill access.

Grouse Mountain Resort in North Vancouver now receives 60% of its annual visitor total, which should reach 1,200,000 visits this year, from summer visitors. Their summer business has been larger than their winter business for many years. It focuses on tourists to Vancouver and recreation activities for Greater Vancouver residents including the famous "Grouse Grind" hike. Grouse Mountain has recently upgraded its top terminal station and offers improved food and beverage facilities and a number of visitor attractions and activities. Similarly, the Whistler Resort now has almost as many summer visitor days in the six summer months as they do in the six winter months.

Many visitors to the mountain resort areas in the summer are not winter skiers or active recreationalists. Visitors are often older and engage in less active pastimes such as golfing, walking, shopping and relaxing in mountain resort villages or towns. The summer visitor profile is more characteristic of the summer tourist than the active winter recreation participant. If current trends continue, summer visit totals at a number of the mountain resort areas should match winter visit totals.

The top terminal of the gondola to Chipmunk Ridge will provide excellent views and could develop into the Fraser Valley's Grouse Mountain tourist and activity centre. The Resort's close proximity to tourist attractions in the area including Minter Gardens and its good access off the Trans-Canada Highway should help expedite the growth in summer visitor volumes.

8.4 Appendix 4 Preliminary Environmental Survey – Envirowest Consulting

RESORTS WEST BASE DEVELOPMENT
VILLAGE BASE, TRAM, AND UPPER TERMINAL

ENVIRONMENTAL OVERVIEW

RESORTS WEST, BC
12473 – 71A AVENUE
SURREY, BC
V3W 0T9

February 6, 2003

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envirowest

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Report Citation **Sickmuller, R.W. 2003.** Resorts West Base Development – Village Base, Tram, and Upper Terminal. Environmental Overview. *Prepared for* Resorts West BC, Surrey, BC. *Prepared by* Envirowest Consultants Limited, Burnaby, BC. 34 p. + mapsheets.

1.0 INTRODUCTION

Resorts West B.C. (the Proponent) is proposing to develop a resort village within the Eastern Hillsides area of the City of Chilliwack. The Proponent has recently applied for approval for the development of a 125 person tram extending from the village base to the ridge overlooking the Fraser River valley south of the proposed village.

ECL Envirowest Consultants Limited (Envirowest) has been retained by the proponent to complete an environmental overview of lands within the proposed village and tram development proposals. A significant component of the project is the development of an environmental baseline. The objective of the environmental baseline is to identify and document ecological attributes sustained within the study area, and to describe the attributes with respect to the proposed project. Study objectives of this project include the collection and review of existing data sources and reference materials, and the collection of field data pertaining to vegetation, and fish and wildlife resources within the immediate environs of the study area. The primary goal of the study is to provide recommendations for the mitigation of potentially adverse effects associated with the project to the identified ecosystem elements.

2.0 STUDY AREA

The village study area encompasses approximately 197 acres of privately owned properties and approximately 60 acres of municipal property to be acquired by the Proponent accessed from Allan Road east of its intersection with Nixon Road. The majority of the village study area is located within the City of Chilliwack. The eastern portion of the village study area is, however, located within the Regional District of Fraser - Cheam.
Civic addresses and legal descriptions and of the properties located within the village study area available at the time of reporting are as follows:

- Civic Address: 51750 Allan Road, Chilliwack (Gaukel)
  Legal Description: Parcel Identifier 010-102-451 East Half of the South East Quarter Section 27 Township 2 Range 29 West of the 6th Meridian New Westminster District, Except: Firstly: Part Subdivided by Plan 42558, and Secondly; Parcel A (Reference Plan LMP 36688)

- Civic Address: 52300 Allan Road, Chilliwack (Werk)
  Legal Description: Parcel Identifier 002-466-376 Parcel "A" (J85536E) of the South West Quarter of Section 26 Township 2 Range 29 West of the 6th Meridian, New Westminster District

- Civic Address: 51415 Allan Road, Rosedale, B.C. (McDaniel)
  Legal Description: Parcel Identifier 004-090-781 North Half of the West Half of the South East Quarter Section 27 Township 2 Range 29 west of the 6th Meridian except: Firstly: Part on Plan 54423 Secondly: Part on Plan 57157, New Westminster District

- Civic Address: 51552 Allan Road, Rosedale, B.C. (Sturt-Smith)
  Legal Description: Parcel Identifier 000-702-501 South Half South East Quarter Section 27 Township 2 Range 29 West of the 6th Meridian Except: Firstly: Part Subdivided by Plan 54922 Secondly: Part Red on Bylaw Plan 54423, New Westminster District

- Civic Address: 51520 Allan Road, Rosedale, B.C. (Chilliwack Community Forest)
  Legal Description: Not available at time of reporting

- Civic Address: Not available at time of reporting (Ward)
  Legal Description: Not available at time of reporting

The tram is to extend approximately 2,800 metres from the village base located within the Chilliwack Community Forest property southwest to the Upper Terminal located at the crest of the Chipmunk Creek ridge overlooking the Fraser Valley. The Upper Terminal would encompass approximately 10 acres, and is to include a restaurant. Figure 1 depicts the general locations of the Village Base, the tram right-of-way, and the Upper Terminal as described by the Proponent at the time of reporting.

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The Village Base area is to be accessed from the Trans Canada Highway at the Annis Road intersection. Vehicles exiting the highway at this intersection continue eastward along Hack Brown Road to Nixon Road, south along Nixon Road to Allan Road, and generally southeast along Allan Road into the study area. Existing roads to the Village base are generally single lane and gravel surfaced, with the exception of the paved Hack Brown Road. Details of potential road improvements from the Trans Canada Highway to the Village Base have not been prescribed or developed at the time of reporting.

Existing land use within the study area is rural residential, with the exception of those lands currently owned by the City of Chilliwack. Agricultural use within the study area is limited, and is restricted to livestock (cattle and sheep) production within 52300 Allan Road.

3.0 STUDY METHODOLOGY

3.1 Data Collection and Organization

Background information on fish and wildlife resources was collected through online searches of the Fisheries Inventory Summary System (FISS)[1] database, correspondence with the Conservation Data Centre at the Ministry of Sustainable Resource Management, review of recently (2000) updated Forest Cover Map 92H.012 prepared by the Ministry of Forests, and review of stereographic aerial photographs prepared in 1991 and 2000. Published wildlife information was also obtained from reports prepared by Envirowest on behalf of the City of Chilliwack in 1994[2] and 2001[3], and through discussion with the Chilliwack Field Naturalists Club (pers. comm. Dennis Knopp)[4].

Prestratification of the study area was undertaken prior to commencement of the reconnaissance field survey. The Forest Cover Map and aerial photographs were utilized to delineate watercourses, vegetation communities, and access routes within the study area

3.2 Field Survey

The reconnaissance field survey of the study area was undertaken by Mr. Rolf Sickmuller, R.P.Bio. of Envirowest on November 18, 2002. The primary objective of the reconnaissance survey was to document biophysical attributes of the Village study area. A field reconnaissance survey of the tram alignment was not completed.

3.2.1 Fish Sampling

Four watercourses are located within or in close proximity to the study area. The watercourses include Ford Creek, an unnamed creek (a.k.a "Allan Creek") extending through the western portion of the study area, Dunville Creek, and Nevin Creek. Reaches of Ford Creek, Allan Creek, and a tributary to Dunville Creek are located within the study area; Nevin Creek is located northeast of the study area.

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[1] **Fisheries Inventory Summary System. 2002.** Fisheries Data Warehouse. Ministry of Sustainable Resource Management. www.bcfisheries.gov.bc.ca

[2] **ECL Envirowest Consultants Limited. 1994.** Environmental Overview of the Eastern Hillsides Study Area, Chilliwack, B.C. Consultant report prepared for Urban Systems Limited, Richmond, B.C. on behalf of the City of Chilliwack. 31 pp + appendices.

[3] **ECL Envirowest Consultants Limited. 2001.** Eastern Hillsides Development Area, Chilliwack. Environmetnal Overview of the Proposed Road B Alignment. Consultant report prepared for UMA Engineering Ltd., Burnaby B.C. on behalf of the City of Chilliwack. 14 pp + mapsheets.

[4] **Knopp, D.** Chilliwack Field Naturalists Club. December 24, 2002.

A limited fish sampling program of Dunville Creek was undertaken during the field survey; insufficient flows within reaches of Allan Creek extending through the western portion of the study area and Nevin Creek precluded fish sampling. Fish sampling within the section of Ford Creek located within the study area was not undertaken.

The sampling program utilized Gee-type minnow traps baited with salmon roe and allowed to soak for a period of eight (8) hours. A single minnow trap was placed in Dunville Creek immediately downstream of the Hack Brown Road culvert crossing (MT 01), and a pair of minnow traps were installed within the unnamed tributary to Dunville Creek approximately 860 metres (MT 02) and 780 metres (MT 03) upstream of the confluence of the tributary with the creek. Locations of the minnow trap sampling sites are depicted by Figure 2.

Captured fish species were identified in the field according to Pollard *et.al.*[5] and confirmed in the office according to Scott and Crossman[6].

[5] **Pollard, W.R., G.F. Hartman, C. Groot, and P. Edgell. 1997.** Field Identification of Coastal Juvenile Salmonids. Prepared by Fisheries and Oceans Canada and MacMillan Bloedel Ltd. 32 pp.

[6] **Scott, W.B. and E.J. Crossman. 1990.** Freshwater Fishes of Canada. Fishereis Research Board of Canada. Bulletin 184. Ottawa, ON.

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3.2.3 Vegetation

A reconnaissance survey of vegetation was undertaken within all properties encompassed by the proposed village development. Species within the tree, shrub, herb and moss layers were identified in the field according to Pojar and MacKinnon[7]. Voucher specimens were collected for in-house confirmation according to Hitchcock *et. al.*[8] and Lawton[9].

3.2.4 Wildlife

A reconnaissance level inventory of wildlife utilization was also completed during the field survey of November 18, 2002. Evidence of wildlife utilization within the study area included direct observations of wildlife, tracks, game trails, scat, and browsed and/or scraped vegetation. Observed wildlife were identified according to Burt and Grossenheider[10], and Peterson[11]; tracks were identified according to Murie[12].

The application of direct and incidental observations to the assessment of wildlife capability of the area is limited by the time of year (early winter) during which the observations were made, providing only a qualitative "snap-shot" measure of wildlife species and diversity.

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[7] **Pojar, J., and A. MacKinnon (eds.). 1994.** Plants of Coastal British Columbia. B.C. Ministry of Forests. Victoria, B.C. 504 pp.

[8] **Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1969.** Vascular Plants of the Pacific Northwest, Volumes 1 to 5. University of Washington Press, Seattle and London.

[9] **Lawton, E. 1971.** Moss Flora of the Pacific Northwest. The Hattori Botanical Laboratory, Nichinan, Miyazaki, Japan.

[10] **Burt, W.H., and R.P. Grossenheider. 1980.** A Field Guide to the Mammals of North America North of Mexico. Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA.

[11] **Peterson, R.T., and V.M. Peterson. 1990.** A Field Guide to Western Birds. Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA.

[12] **Murie, O. J. 1974.** A Field Guide to Animal Tracks. Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA.

4.0 EXISTING ENVIRONMENTAL CONDITIONS

4.1 Climate

The study area is located within the west-coast maritime temperate climatic zone, generally characterized by cool wet winters and warm dry summers. Winters are dominated by the westerly movement of large-scale, moisture laden fronts from the Pacific Ocean. This pattern is occasionally broken by intrusions of cold, dry Continental Arctic air extending from the interior towards the coast. The summer months are characterized by warm, mild weather with periodic precipitation. Frontal activity is less common in these months.

4.2 Topography

The study area is located on the lower northwest facing slope of the Skagit Range of the Cascade Mountains overlooking the Fraser River valley. The north facing slope of this range commences from the Fraser River valley floor at approximately 20 metres geodetic to approximately 1500 metres geodetic at the southern horizon (Chipmunk Creek ridge).

Topography within the study area includes a moderately flat bench (less than 5 percent slope) extending generally eastward along the east portion of Allan Road towards Dunville Creek. Conversely, moderately steep slopes (approximately 45 percent slope) are located within the north west portion of the study area. A narrow ridge extends generally to the northeast along the northern boundary of the study area; the crest of which is located at approximately 340 metres geodetic.

4.3 Drainage

The study area is drained generally to the northwest. Watercourses with reaches located within the Village Study Area include Ford Creek, Allan Creek extending generally northwest to Hack Brown Road within the western portion of the study area, and two unnamed tributaries to Dunville Creek located within the eastern portion of the study area. Overview descriptions of watercourses are provided below.

4.3.1 Ford Creek

Ford Creek (Watershed Code 100-074100-59019-22463) is identified as a 1st order tributary of Elk Creek, the confluence of which is located immediately south of the Trans Canada Highway west of the Annis Road intersection. Headwaters of Ford Creek are located within the north facing slope of the Skagit Mountains at an approximate elevation of 1,020 metres (above mean sea level). The watercourse extends approximately 4 kilometres generally towards the northwest to the Fraser River floodplain (elevation 20 metres above mean sea level) prior to continuing 2 kilometres westward within an excavated channel aligned parallel with the highway to Elk Creek. Reaches of the watercourse located generally within the north facing slope and more specifically within the south-west corner of the Chilliwack Community Forest property are contained within a well-defined ravine with moderately

steep slopes.

4.3.2 Allan Creek

The headwater of Allan Creek is located in the southeast corner of 51552 Allan Road and is separated from the Chilliwack Forest property by an old skid road. The watercourse extends approximately 300 metres to the northwest within a small, well defined gulley comprising an average top of slope width and depth of 15 metres and 5 metres, respectively, to and along the south shoulder of Allan Road. Post 1991 removal of forest from this property extended down the gulley slopes; early successional regrowth within this property is predominated by red alder (*Alnus rubra*) and salmonberry (*Rubus spectabilis*). Intermittent flows were observed within the gulley at the time of assessment, most notably along the south shoulder of Allan Road. The flows were conveyed under Allan Road via a 600 mm diameter Corrugated Steel Pipe (CSP) culvert at the driveway entrance to 51552 Allan Road; flows were discharged from this culvert over a 1.2 metre drop to sections of the creek aligned parallel with the east shoulder of Allan Road. This section of the creek was defined along its west perimeter by the fill slope associated with Allan Road, and along its east perimeter by the southwest terminus of the ridge extending across the north boundary of the study area. Flows were absent from the section of creek extending from the referenced 600mm diameter CSP culvert to the driveway crossing of 51215 Allan Road, a function of steep channel gradient (approximately 18 percent) and coarse channel substrates. Vegetation established along the east slope is predominated by a well established deciduous canopy including red alder and broadleaved maple (*Acer macrophyllum*) with occasional conifers including western redcedar (*Thuja plicata*). The driveway crossing to 51215 Allan Road comprises a 150mm diameter CSP culvert; ephemeral flows conveyed through this culvert continue generally northwest beyond the study area and over a steep slope exceeding 30 percent. The creek continues an additional 800 metres northwest beyond the study area to the intersection of Allan Road with Hack Brown Road, and approximately 250 metres along the south shoulder of Hack Brown Road prior to continuing northward under Hack Brown Road and the Trans Canada Highway into excavated drainage channels within the Fraser River Valley lowlands. The drainage channels discharge waters to the Hope Slough which is eventually confluent with the Fraser River north of the Chilliwack town centre.

4.3.3 Dunville Creek

Dunville Creek (Watershed Code 100-074100-68900) is identified as a 3rd order watercourse at its confluence with Hope Slough immediately west of Schelowat Indian Reserve No.1 west of Rosedale. The creek extends approximately 6.5 kilometres from its headwater tributaries located within the north facing slope of the Skagit Range of the Northern Cascade Mountains, and drains a catchment area of approximately 19 square kilometres[13].

Two unnamed tributaries to Dunville Creek drain the eastern portion of the study area. The larger of the two tributaries extends from its headwaters located south of the study area generally northward as a 2nd order watercourse through 52300 Allan Road, and is confluent

[13] **Schubert, N.D. 1982.** A Bio-Physical Survey of Thirty Lower Fraser Valley Streams. Canadian Manuscript Report of Fisheries and Aquatic Sciences 1644; 130 p.

with Dunville Creek approximately 750 metres upstream (i.e. south) of Hack Brown Road. Channel gradient decreases from approximately 35 percent to 3 percent as the watercourse enters and flows through the southern portion of the property to the driveway access within the property. Flows conveyed by the steeper channel sections were contained within a well defined channel comprising an average bank-full width and depth of 1.25 metres and 0.5 metres; instream substrates included fines and fractured shale of assorted dimensions. Flows conveyed by the low gradient sections were also confined within a well defined channel comprising an average bank-full width and depth of 2.5 metres and 0.45 metres, respectively. Instream substrates were predominated by fines with occasional fractured shale.

Saturated soils and standing waters encompassing approximately 1.56 hectares were encountered immediately west of the tributary and south of the driveway access to 52300 Allan Road. The saturated area extends generally northward and westward to the respective boundaries of this property; waters within is area are directed to the unnamed tributary along the south perimeter of the driveway. This area is subjected to fluctuating water levels within the unnamed tributary and collects seepage flows emitted from adjacent slopes along its west margin. The area is overgrown by a red alder and occasional western redcedar. Flood tolerant shrub and herb layer species are established under this canopy, including salmonberry, creeping buttercup (*Ranunculus repens*), skunk cabbage (*Lysichiton americanum*), twinberry (*Lonicera involucrata*), and horsetail (*Equisetum* spp.). This area is identified as a Riverine Swamp as defined by the Canadian Wetland Classification System[14].

Flows conveyed by the tributary are directed under the driveway by a 900mm diameter CSP culvert and continues generally northeast through pasture to the northeast corner of the property. Several seeps extend westward to the tributary through the pasture; these seeps are characterized as depressions within the pasture, and sustain dense growths of soft rush *(Juncus effusus*) and creeping buttercup. Flows were absent from the seeps, although standing water was prevalent within these features. Mixed forest is well established north and east of the study area, and includes red alder, broadleaved maple, western redcedar, western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and Sitka spruce (*Picea sitchensis*). Understory species include salmonberry, vine maple (*Acer circinatum*), red elderberry (*Sambucus racemosa*), Sword fern (*Polystichum munitum*), Youth-on-Age (*Tolmiea menziesii*), spiny woodfern (*Dryopteris expansa*), and bracken (*Pteridium aquilinium*).

The second tributary comprises a 1st order watercourse and is located in the northeast corner of the study area and 52300 Allan Road. This tributary is confluent with the above described 2nd order tributary approximately 800 metres upstream (i.e. south) of Hack Brown Road.

The 1st order tributary is physically separated from the pasture to the south by a moderately steep ridge sustaining a well developed deciduous canopy. Very limited flows were observed within this tributary at the time of assessment.

[14] **National Wetland Working Group. 1997.** The Canadian Wetland Classification System. Second Edition. B.G. Warner and C.D.A. Rubec (Eds.). Wetlands Research Centre, Waterloo, ON. 68 p.

4.4 Vegetation

The Biogeoclimatic Ecosystem Classification (BEC) system is widely used by resource managers as it provides a biological and ecological framework for ecosystem management and a basis for rating the values of resources, or highlighting sensitivities in the landscape. In the hierarchy of the classification system, biogeoclimatic zones and subzones are useful for describing provincial and regional forest status and significance over broad geographical areas. At a finer scale, site series units reflect the variation in site conditions within each subzone, or subzone variant.

The Village Base study area is located within the dry maritime subzone of the Coastal Western Hemlock biogeoclimatic area (CWHdm) of British Columbia. The tram alignment, however, extends through the following four (4) biogeoclimatic areas:

- the CWHdm extending upslope along the tram right-of-way to elevation 800 metres above mean sea level;
- the montane variant of the very wet maritime subzone of the Coastal Western Hemlock biogeoclimatic area (CWHvm2) located generally between elevations 800 metres to 1,240 metres above mean sea level;
- the southern variant of the of the moist submaritime subzone of the Coastal Western Hemlock biogeocliimatic area (CWHms1) located generally between elevations 1,240 metres to 1,400 metres above mean sea level; and
- the leeward variant of the moist maritime subzone of the Mountain Hemlock biogeoclimatic subzone (MHmm2) located at the Upper Terminal at elevation 1,450 metres above mean sea level.

The Coastal Western Hemlock (CWH) biogeoclimatic zone extends generally from sea level to middle elevations (900 metres and 1050 metres on windward and leeward slopes respectively in the south and mid-coast, and 300 metres in the north) west of the coastal mountains along the British Columbia coastline northward into Alaska and southward into Washington State. The CWH biogeoclimatic zone is typified by a cool mesothermal climate generally comprising cool summers and mild winters.

Dominant canopy species within the dry maritime subzone are Douglas-fir, western redcedar, and western hemlock. Conspicuous understorey species include salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), step moss (*Hylocomium splendens*), lanky moss (*Rhytidiadelphus loreus*), Oregon beaked moss (*Kindbergia oregana*), and flat moss (*Plagiothecium undulatum*). Less conspicuous understorey species include dull Oregon-grape (*Mahonia nervosa*), vine maple, bracken, and sword fern; salmonberry is often dominant in early-seral communities, and at water receiving and water collecting sites.

Climate within the montane variant of the very wet maritime subzone of the CWH is generally wet and humid, with cool short summers and cool winters with substantial snowfall. Cooler temperatures and persistent snowpack result in a shorter growing season. Dominant canopy species on zonal sites include western hemlock and amabilis fir (*Abies*

amabilis); less prevalent canopy species include western redcedar, mountain hemlock (*Tsuga mertensiana*), and Yellow cedar (*Chamaecyparis nootkatensis*). Prevalent understorey species include Alaskan blueberry (*Vaccinium alaskaense*), five-leaved bramble (*Rubus pedatus*), step moss, lanky moss, and pipecleaner moss (*Rhytidiopsis robusta*).

The southern variant of the moist maritime subzone of the CWH is located within the climatic transition between the coast and the interior. Climate is generally characterized by moist, cool winters and cool, dry summers. Heavy snowfall and persistent snowpack in the upper elevations are common. Predominant canopy species within zonal forests include western hemlock, Douglas-fir, western redcedar, and amabilis fir. Alaskan blueberry, step moss, pipecleaner moss, and red-stemmed feather moss (*Pleurozium schreberi*) are common understorey species; less common understorey species include black huckleberry (*Vaccinium membranaceum*), oval-leaved blueberry *(V. ovalifolium*), falsebox (*Paxistima myrsinitis*), bunchberry (*Cornus canadensis*), queen's cup (*Clintonia uniflora*), five-leaved bramble, and one-sided wintergreen (*Orthilia secunda*).

The Mountain Hemlock zone occurs above the CWH zone primarily on the Coast Mountains of the mainland and the Insular Mountains of Vancouver Island and the Queen Charlotte Islands. The zone occupies elevations between 900 metres and 1800 metres in the south; lower and higher elevation ranges are associated with leeward and windward slopes, respectively. Cool summers and long, cool, wet winters with heavy and persistent snow cover are characteristic of this zone. The leeward variant of the moist maritime subzone of the MH zone is also located within the climatic transition between the coast and the interior. Dominant canopy species of zonal forests include amabilis fir and mountain hemlock; western hemlock and subalpine fir (*Abies lasiocarpa*) are less common. Understorey species are generally dominated by Alaskan blueberry, black huckleberry, oval-leaved blueberry, five-leaved bramble, pipe cleaner moss, and red-stemmed feathermoss.

Forests generally located within the Village Base study area have been logged at least once over the last century, and in areas completely removed 51552 Allan Road or replaced with pasture (western portion of 51215 and 52300 Allan Road). Remaining forest cover comprises a predominantly deciduous canopy, with the exception of forest located within the Chilliwack property; this forest is predominated by a coniferous canopy with occasional deciduous trees.

Conspicuous canopy species representing the deciduous forest include red alder and broadleaved maple; less conspicuous deciduous species include western white birch (*Betula papyrifera*), bitter cherry (*Prunus emarginata*), and black cottonwood (*Populus trichocarpa*). Occasional Douglas-fir, western hemlock, western redcedar and Sitka spruce are established within the predominantly deciduous forest. Shrub layer vegetation within this forest assemblage is generally well developed, both in terms of areal coverage and species composition, and include species that sustain a rapid growth phase in the early spring prior to leaf formation by the deciduous canopy and resulting reduction of light availability to the understory. Salmonberry is the most conspicuous shrub layer species; less conspicuous species include vine maple and red elderberry. Snowberry (*Symphoricarpos*

albus), thimbleberry (*Rubus parviflorus*), oregon grape, and Oceanspray (*Holodiscus discolor*) were established within the well drained soils along the ridge extending along the north perimeter of the Ward Property. Twinberry, Pacific ninebark (*Physocarpus capitatus*), willow (*Salix* spp.) and red-osier dogwood (*Cornus stolonifera*) were occasional within areas with more saturated soils and within the riparian corridors of the watercourses.

Selective removal of deciduous trees within the southern portion of the Ward Property has resulted in a coniferous canopy predominated by western redcedar; mature western hemlock are less conspicuous although relatively abundant, and western white birch and Sitka spruce are infrequent. The selective clearing has also resulted in impact to the majority of the shrub layer within this property, in particular throughout the western portion. Remaining shrub layer species observed within the eastern portion of the property include vine maple, salmonberry, red elderberry, and evergreen blackberry (*Rubus laciniatus*).

A well established canopy is absent from 51552 Allan Road, a result of recent (post 1991) land clearing. The resulting early seral vegetation community established since the land clearing is predominated by red alder saplings; less conspicuous sapling stage tree species include black cottonwood, broad leaved maple, cascara (*Rhamnus purshiana*), and western hemlock. Remaining mature tree species scattered within the southwest corner of the property included red alder, broadleaved maple, Sitka spruce, and western redcedar. Dense understory vegetation established within the recently cleared areas of the property was predominated by salmonberry; less conspicuous species include thimbleberry, snowberry, red elderberry, black raspberry (*Rubus leucodermis*), and beaked hazelnut (*Corylus cornuta*). Conspicuous ground layer species included Sword fern, bracken fern, and creeping buttercup. Steeper terrain located in the northwest corner of this property supported a more established canopy predominated by conifers with Douglas-fir being the most conspicuous species. Other less conspicuous species noted in this assemblage included western redcedar, western hemlock, and broadleaved maple.

Douglas-fir and western hemlock are the most conspicuous species comprising the predominantly coniferous and well established canopy generally exceeding 101 years in age within the Chilliwack Community Forest. Less conspicuous species comprising the canopy include western redcedar, Sitka spruce, and broadleaved maple. Very limited and selective removal of canopy species has occurred recently (i.e. post 1991), as depicted by figures 1 and 2; the affected areas are located in very close proximity to an existing gravel access road. Shrub layer vegetation is relatively poorly established under the undisturbed canopy, a function of dense crown closure ranging between 46 percent and 65 percent; shrub species scattered under the canopy included salmonberry, red elderberry, Devils' club (*Oplopanax horridus*), red huckleberry, and vine maple. Poor light conditions resulting from the dense canopy has, however, resulted in a well developed ground layer community predominated by Sword fern. Less well established ground layer species include bracken fern, spiny wood fern, false lily-of-the-valley (*Maianthemum dilatatum*), and Pacific bleeding heart (*Dicentra formosa*).

4.5 Fish Utilization

A review of the Fisheries Inventory Summary System (FISS) records of drainages located within and in close proximity to the study area was undertaken. The FISS records prepared for Ford Creek, Dunville Creek, and Nevin Creek document salmonid utilization primarily within reaches of the watercourses extending through the Fraser River floodplain; FISS records are not available for Allan Creek.

Fish species documented by FISS to utilize Ford Creek include chum salmon (*Oncorhynchus keta*), coho salmon (*O. kisutch*), cutthroat trout (*O. clarki*), northern pikeminnow (*Ptychocheilus oregonensis*), sculpin (*Cotus* spp.), stickleback (*Gasterosteus* spp.), and Lamprey (*Lampetra* spp.). Coho and chum salmon spawn in the low gradient reach of Ford Creek extending through the Fraser River floodplain.

Fish species documented by the FISS records to utilize Dunville Creek include coho salmon, chum salmon, cutthroat trout, sculpin, stickleback, sucker (*Catostomus* spp), Lamprey; rainbow trout (*O. mykiss*) were stocked in the creek in 1945/46. Utilization of the creek by coho salmon and cutthroat trout as documented by the FISS records is restricted to reaches extending northward from the Trans Canada Highway.

The fish sampling undertaken during the field reconnaissance survey captured coastal cutthroat trout (*O. clarki clarki*) (n = 2) with forklengths of 122 millimetres (mm) and 125mm immediately downstream of the Hack Brown Road culvert crossing (MT 01). An additional six (6) coastal cutthroat trout with forklengths of 110mm, 115mm, 125mm, 117mm, 118mm, and 48mm were captured in the unnamed tributary immediately upstream of the culvert crossing to 52300 Allan Road. Fish were not captured at sample location MT 03.

4.5 Wildlife Utilization

Wildlife utilization of a study area may determined by a combination of field surveys and review of the capability and suitability of habitat to support wildlife. Habitat capability may be defined as the potential of an area, regardless of its present condition, to support a specific species under optimal conditions. Conversely, habitat suitability may be defined as the ability of an area to support wildlife under current habitat conditions. Significant sampling effort would be required to ensure that all wildlife species within a study area are identified, and as such wildlife managers typically review the suitability of habitats to sustain wildlife based on an evaluation of habitat units as described in the B.C. Ministry of Forests Biogeoclimatic Ecosystem Classification (BEC) and site reviews.

Two classification systems are used in conjunction to describe wildlife utilization within British Columbia, specifically the Ecoregion Classification System and the BEC system. The Ecoregion Classification System is used to differentiate wildlife utilization within physiographically distinct units sustaining similar BEC components, and as such complements the BEC system. The BEC system is the primary classification process to

describe wildlife utilization based on climatic and vegetative variables.
The Village Base and tram line are located within the Maritime wildlife subzone group of the CWH zone, whereas the Upper Terminal is located at the northern perimeter of the leeward maritime wildlife subzone of the MH zone.

The Village Base is also located within the Fraser Lowland (FRL) ecosection of the Lower Mainland ecoregion of the Georgia Depression ecoprovince as defined by the Ecoregion Classification System. The tram line extends from the FRL ecosection (i.e. the Village Base) through the Northwest Cascade (NWR) ecosection of the Cascade Range ecoregion and into the Eastern Pacific Range (EPR) ecosection (i.e. the Upper Terminal) of the Pacific Range ecoregion. Both the Cascade Range and Pacific Range ecoregions are located within the Coast and Mountains ecoprovince.

A total of 438 wildlife species have been documented to utilize the Maritime wildlife subzone group of the CWH zone, of which 14 taxa are amphibians, 6 taxa are reptiles, 311 taxa are birds, and 107 taxa are mammals. 163 wildlife taxa utilize the Leeward Maritime wildlife subzone group of the MH zone, of which 5 taxa are amphibians, 103 taxa are birds, and 55 taxa are mammals; reptiles are absent from this wildlife subzone group.

Direct observation of wildlife and or wildlife utilization was limited to the proposed Village Base area investigated during the field reconnaissance survey. Direct observations of bird species included Stellar's jay (*Cyanocitta stelleri*) within the eastern portion of 52300 Allan Road; pileated woodpecker (*Dryocopus pileatus*) within the Chilliwack Community Forest; black-capped chickadee (*Parus atricapillus*), varied thrush (*Ixoreus naevius*), golden-crowned kinglet (*Regulus satrapa*) and ruffed grouse (*Bonasa umbellus*) within 51552 Allan Road; and American robin (*Turdus migratorius*) within 51215 Allan Road. Direct observations of mammals included tracks of Columbian black-tailed deer (*Odocoileus hemionus columbianus*) and Coyote (*Canis latrans*) scat. Black bear (*Ursus americanus*) have been previously observed within the study area by the current resident (pers. comm. McDaniel)[15].

[15] **McDaniel.** 51215 Allan Road. November 18, 2002.

6.0 SPECIES OF MANAGEMENT CONCERN

A detailed inventory of plant and wildlife species, conducted during all seasons of the year, was beyond the scope of this study. Accordingly, a compilation of species of management concern has been completed by comparing site conditions with the habitat requirements of indigenous species, subspecies, variety, or geographically defined populations of wild fauna and flora at risk for the Fraser Lowland (FRL) and Northwestern Cascade Range (NWC) ecosections identified within the Chilliwack Forest District. The Chilliwack Forest District encompasses 1,358,501 hectares, and is bordered to the west by Bowen Island, to the east by Manning Park, to the north by Boston Bar, and to the south by the international border. The FRL is identified as the Fraser River delta, estuary, lowlands and associated uplands[16]. The NWC encompasses approximately 362 square kilometres of rugged mountains immediately southeast of the FRL. The west perimeter of the NWC is defined by the EPR, and the south boundary is defined by the international border. The northern ridge of the Chipmunk Creek catchment area (i.e. in the vicinity of the Upper Terminal) defines the boundary of the NWC with the FRL.

Two management lists were reviewed to achieve this compilation, specifically the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) list, and the species status lists developed by the British Columbia Conservation Data Centre (CDC) of the Ministry of Sustainable Resource Management.

Four (4) COSEWIC risk categories are considered in the species compilation. **Extirpated** species are those species that no longer exist in the wild in Canada, but occur elsewhere. **Endangered** species are those species facing imminent extirpation or extinction. **Threatened** species are those species that are likely to become endangered if limiting factors are not reversed. **Special Concern** species are those species that are of special concern because of characteristics that make them particularly sensitive to human activities or human events[17].

Two (2) ranked criteria used by the CDC are considered in this species compilation, specifically the red- and blue-lists. **Red-listed** species are candidates for legal designation as threatened or endangered. Threatened species include indigenous wildlife species likely to become endangered in British Columbia if factors affecting their vulnerability are not reversed. Endangered species include indigenous wildlife that are threatened with imminent extinction or extirpation throughout all or a significant portion of their provincial range[18]. **Blue-listed** species are considered to be

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[16] **Demarchi, D.A. 1996.** An Introduction to the Ecoregions of British Columbia. http://srmwww.gov.bc.ca/rib/wis/eco/bcecode.html. B.C. Ministry of Sustainable Resource Management, Victoria, B.C.

[17] **COSEWIC, 2001.** Canadian Species at Risk, November 2001. Committee on the Status of Endangered Wildlife in Canada. COSEWIC Secretariat, ON., Canada. 32p.

[18] **Conservation Data Centre, 2000.** Glossary of Conservation Data Centre Terms, April 2000. http://srmwww.gov.bc.ca/cdc. British Columbia Conservation Data Centre, Ministry of Sustainable Resource Management, Victoria, B.C.

vulnerable or sensitive, and could become candidates for the red-list. Vulnerable species include indigenous wildlife that is particularly at risk within British Columbia due to low or possibly declining populations[18].

The compilation of species potentially occurring within the two study area is provided. The compilation of species utilizes information organized according to the BEC system and Ecoregion Classification System, and is presented in the absence of detailed species inventory data for the study areas.

6.1 Plants

6.1.1 Vascular Plants

Three (3) COSEWIC listed species have been documented to occur within the Chilliwack Forest District, specifically Vancouver Island beggarticks (*Bidens amplissima*)(Special Concern), phantom orchid (*Cephalanthera austiniae*)(Threatened), and tall bugbane (*Cimicifuga elata*)(Endangered). The Vancouver Island Beggarticks is a shade intolerant wetland species generally limited to a very narrow habitat band around pond, lake or stream margins, and areas where annual or seasonal water level fluctuations are normal. This plant may potentially occur along sections of the unnamed tributary to Dunville Creek extending through pasture. The Phantom Orchid is most often established within the humus layer of moist to mesic coniferous forests sustaining little or no ground cover. Accordingly, this plant may occur within the coniferous forest established on the northwest facing slope of the Skagit Range. Tall bugbane is restricted to eight recently verified sites in the Chilliwack River valley[19]. Mature (70 to 150 year old) moist mixed western redcedar❍western hemlock❍broadleaved maple, Douglas-fir❍broadleaved maple, and or deciduous stands appear to provide the most suitable habitat for growth of this plant. Accordingly, this plant may potentially occur within the forest encompassed by the Chilliwack Community Forest, as deciduous trees comprise a component of this canopy. It is, however, unlikely to occur within the coniferous forest extending upslope along the tram line.

The CDC tracking list identifies 111 red- and blue-listed vascular plant species occurring within the Chilliwack Forest District. Conditions characterized within and in close proximity to the Village Base and tram line corridor are not suitable for all listed species. Site conditions may, however, suit the habitat requirements of the following listed species.

Red-listed species potentially occurring within proximity to the Village Base and tram line corridor include Carolina meadow-foxtail (*Alopecurus carolinianus*),, riverbank anemone (*Anemone virginiana var. cylindroidea*), cut-leaved water-parsnip (*Berula erecta*), cliff paintbrush (*Castilleja rupicola*); phantom orchid, tall bugbane, rough bedstraw (*Galium mexinanum ssp. asperulum*), Nuttal's sunflower (*Helianthes nuttallii var. nuttallii*), streambank lupine (*Lupinus rivularis*), slender muhly (*Muhlenbergia filliformis*), blue

[19] **Penny, J.L., and G.W. Douglas. 1999.** Status of Tall Bugbane, *Cimicifuga elata* (Ranunculaceae), in Canada. Canadian Field Naturalist. 113(3): 461 - 465.

vervain (*Verbena hastata var. scabra*), and pink water speedwell (*Veronica catenata*). **Blue-listed** species potentially occurring within proximity to the Village Base and tram line corridor include alpine anemone (*Anemone drummondii var. drummondii*), western dogbane (*Apocynum x floribundum*), Vancouver Island beggarticks, yellow marsh-marigold (*Caltha palustris* var. *palustris*), pointed broom sedge (*Carex scoparia*), fox sedge (*C. vulpinoidea*), lace fern (*Cheilanthes gracillima*), Cascade parsley fern (*Cryptogramma cascadensis*), field dodder (*Cuscuta pentagona*), purple-leaved willowherb (*Epilobium ciliatum* ssp. *watsonii*), purple-leaved willowherb (*E. ciliatum* ssp. *watsonii*), small-fruited willowherb (*E. leptocarpum*), western mannagrass (*Glyceria occidentalis*), mountain sneezeweed (*Helenium autumnale* var. *grandiflorum*), Pacific waterleaf (*Hydrophyllum tenuipes*), large Canadian St. John's-wort (*Hypericum majus*), western St. John's-wort (*H. scouleri* ssp. *nortoniae*), pointed rush (*Juncus oxymeris*), rice cutgrass (*Leersia oryzoides*), flowering quillwort (*Lilaea scilloides*), Smith's melic (*Melica smithii*), leafy mitrewort (*Mitella caulescens*), woodland penstemon (*Nothochelone nemorosa*), nodding semaphoregrass (*Pleuropogon refractus*), dotted smartweed (*Polygonum punctatum*), and western pearlwort (*Sagina decumbens* ssp. *occidentalis*).

The CDC has not identified any rare plant occurrences within the immediate vicinity of the Village Base or the tram line. Rare plant occurrences have, however, been identified by the CDC to occur within the Chipmunk Creek Valley, specifically tall bugbane. The CDC does, however, note that this species record dates to 1989, and a follow-up visit in 1997 failed to locate this species following clear cutting of the forest.

6.1.2 Bryophytes

Five (5) COSEWIC listed species have been documented to occur within the Chilliwack Forest District, specifically poor pocket moss (*Fissidens pauperculus*)(Endangered), Haller's apple moss (*Bartramia halleriana*)(Threatened), rigid apple moss (*B. stricta*)(Endangered), margined streamside moss (*Scouleria marginata*)(Endangered), and silver hair moss (*Fabronia pursilla*)(Endangered). Although poor pocket moss exhibits existing and/or historic distribution range within the FRL, only a single Canadian population occurs in a Douglas-fir and western hemlock forest in the City of North Vancouver. Haller's apple moss and rigid apple moss are restricted to mountainous regions and Vancouver Island, respectively (Canadian Wildlife Service, 2001). Although botanical and distribution information is not provided by the Canadian Wildlife Service for both margined streamside moss and silver hair moss at the time of reporting, these two species may occur within the environs of the Village Base and /or tram line.

The CDC identifies 86 red-listed and 279 blue-listed species within the province of British Columbia. Listed bryophyte species for individual forest districts are not provided by the CDC; as such, listed species are compared with rare and endangered mosses found within the Georgia Depression Ecoprovince (Ryan, 1996). A total of 12 species appear in both sources.

Red-listed species include *Bryum violaceum*, *Discelium nudum*, *Fabronia pusilla*, *Fissidens pauperculus*, *Micromitrium tenerum*, *Orthotrichum tenellum*, *Physcomitrium immersum*,

Pseudephemerum nitidum, and *Tortella humilis*.

Blue-listed species include *Byrum gemmiparum*, *Callicladium haldanianum*, and *Rhizomnium punctatum*.

The CDC does not identify rare bryophyte occurrences within the environs of the Village Base, tram line, or Upper Terminal.

6.1.3 Lichens

Two (2) COSEWIC listed species have been documented to occur within the Chilliwack Forest District, specifically oldgrowth specklebelly (*Pseudocyphellaria rainierensis*)(Special Concern) and cryptic paw (*Nephroma occultum*)(Special Concern).

Oldgrowth specklebelly is generally restricted to old growth forest at low to moderate elevations of the CWH, and establishes most frequently on conifers. Although only a single confirmed site is located within the upper Chilliwack valley, this species may by established within the mature forest extending upslope from the Village Base to the ridge crest. Cryptic paw is also restricted to humid old growth forest at lower elevations in mountainous regions, including the Chilliwack River valley. This species may also be established within the forest extending upslope from the Village Base to the ridge crest.

Lichens are not included in the CDC database.

6.2 Invertebrates

6.2.1 Lepidopterans

COSEWIC identifies a total of six (6) lepidopteran species at risk within the province of British Columbia, of which only the Monarch (*Danaus plexippus*) is found in the Chilliwack Forest District. The species migrates south on an annual basis commencing generally in August and continuing into mid-October. The initial development stages (egg, larva, and pupa) occur generally from June to September, and are heavily reliant on the availability of Milkweed (*Asclepias* spp). It is expected that occasional visitation to the Village Base area by adults of this species may occur during the summer months.

Provincial **red-listed** species potentially utilizing habitats located within and/or in close proximity to the Village Base and/or tram line include Johnson's Hairstreak (*Loranthomitoura johnsoni*) and Indra swallowtail (*Papillo indra*).

Blue-listed species potentially occurring within or in close proximity to the Village Base area and tram line include common woodnymph (*Cercyonis pegala incana*), Hoffman's checkerspot (*Charidryas hoffmanni*), western sulphur (*Colies occidentalis*), Propertius duskywing (*Erynnis propertius*), and great arctic (*Oeneis nevadensis*).

The CDC has not identified any rare lepidopteran occurrences within the immediate vicinity of the Village Base, tram line, or Upper Terminal.

6.2.2 Dragonflies and Damselflies

Dragonflies and damselflies are not included in the COSEWIC species at risk database. The CDC, however, identifies one (1) **red-listed** and eight (8) **blue-listed** species occurring within the Chilliwack Forest District.

Red-listed species potentially occurring within and or in close proximity to the Village Base area is the Grappletail (*Octogomphus specularis*).

Blue-listed species potentially occurring within and or in closes proximity to the Village Base area include the black-tipped Darner (*Aeshna tuberculifera*), Nez Perce Dancer *(Argia emma*), Beaverpond Baskettail (*Epitheca canis*), western Pondhawk (*Erythemis collocata*), western river Cruiser (*Macromia magnifica*), blue Dasher (*Pachydiplax longipennis*), yellow-legged Meadowhawk (*Sympetrum vicinum*), and black Petaltail (*Tanypteryx hageni*). The western Pondhawk is, however, considered by Ramsay and Cannings[20] to be rarer than previously thought, thereby changing its rank from a **blue-listed** to a **red-listed** species. This change is not reflected in the CDC database.

The CDC has not identified any rare dragonfly and damselfly occurrences within the immediate vicinity of the Village Base, tram line, or Upper Terminal.

6.2.3 Molluscs

A total of three (3) mollusc species are identified by COSEWIC as endangered or of special concern. The Hotwater Physa (*Physella wrighti*)(Special Concern) is found only in Alpha Stream in Liard River Hotsprings Park, and the Columbia oyster (*Ostrea conchaphilia*) inhabits coastal waters. Accordingly, these species are not expected to occur within the Village Base area or the tram line. The Oregon forest snail (*Allogona townsendiana*)(Endangered) utilizes deciduous and/or mixed canopy forest in the lower Fraser Valley, and may potentially occur within the Village Base area.

Molluscs are not included in the CDC database.

6.3 Vertebrates

6.3.1 Birds

A total of 6 bird species occurring within the Chilliwack Forest District are identified by

[20] **Ramsay, L.R. and S.G. Cannings. 2000.** Dragonflies at Risk in British Columbia. Pp 89 - 92 in L.M. Darling, ed. 2000. Proc. Conf. on the Biologist and Manage. Species and Habitats at Risk, Kamloops, B.C., 15 - 19 Feb., 1999. Vol. 1; B.C. Ministry of Environment, Lands and Parks, Victoria.

COSEWIC as either Special Concern, Threatened, or Endangered. The species include Northern spotted owl (*Strix occidentalis caurina*) (Endangered), Anatum Peregrine Falcon (*Falco peregrinus anatum*) (Threatened), Marbled Murrelet (*Brachyramphus marmoratus*) (Threatened), Barn owl (*Tyto alba*) (Special Concern), Pacific blue heron (*Ardea herodias fannini*) (Special Concern), and short eared owl (*Asio flammeus*) (Special Concern).

The Northern spotted owl primarily utilizes coniferous dominated late successional or old growth forest with an uneven and multilayered canopy that permits the bird to fly within and beneath it. Spotted owls have not, however, been detected to utilize forests younger than 120 years in the wetter maritime regions[21]. Forest cover extending upslope of the Village Base to the ridge crest generally exceeds 120 years, and as such may potentially by utilized by this species. The anatum peregrine falcon typically nests on ledges of vertical cliffs; other nesting sites include buildings and/or abandoned quarries. The species prefers to utilize habitats that support numbers of shorebirds, waterfowl, and other small to medium sized birds. Cliffs are absent from the immediate environs of the Village Base and tram line alignment, and those located on the surrounding mountain peaks would likely not be considered by this species as desirable nesting locations. Occasional visitation by non breeding adults and juveniles to the study areas summer months may occur. The Marbled murrelet occur in marine waters and coastal lakes located generally within 75 km of the shoreline, including Harrison Lake and Cultus Lake. Nests are generally located in the branches of mature conifers of old growth forests. Utilization of the forest established along the north facing slope of the Skagit Range and in proximity to the Village Base and tram line by this species is unlikely, as both Cultus Lake and Harrison Lake are located at least 15 kilometres distant from the study area. The Barn owl prefers open country typically associated with agriculture, but may also frequent open grassland, riparian meadows, and residential areas. Habitat utilization by this species is heavily influenced by the availability of voles (*Microtus townsendii*), its favorite food item. The majority of nests are located in man-made structures (e.g. barns). Although this species potentially frequents the agricultural landscape north of the Trans Canada Highway, it is unlikely that the pasture located within the Village Base would provide sufficient prey items for this species. The Pacific great blue heron can be expected to occasionally utilize the Village Base area as forage habitat. Habitat preferences by the short eared owl include wide open countryside including but not limited to grasslands, marshes, swamps, and fallow fields. As such, occasional short term forage visitation of the Village Base area by the owl is anticipated, although extended stays in the area are not considered likely.

The CDC identifies 19 listed bird species within the Chilliwack Forest District, including those species identified by COSEWIC. Conditions characterized within and in close proximity to the Village Base and tram line corridor are not suitable for all listed species. Site conditions may, however, suit the habitat requirements of the following listed species.

Red-listed species potentially utilizing habitats located within and/or in close proximity to

[21] **Blackburn, I.R. 1991.** Unpublished Report, British Columbia Ministry of Water, Land and Air Protection, Wildlife Branch, Surrey, B.C.

the Village Base and/or tram line include the anatum peregrine falcon, Lewis' Woodpecker (*Melanerpes lewis* Georgia Depression population), western bluebird (*Sialia mexicana* Georgia Depression population), and the Northern spotted owl.
Blue-listed species potentially utilizing habitats located within and/or in close proximity to the Village Base and/or tram line include the Pacific great blue heron, short eared owl, band-tailed pigeon (Columba fasciata), and Williamson's sapsucker (*Sphyrapicus thyroideus thyroideus*).

The CDC has not identified any rare bird occurrences within the immediate vicinity of the Village Base, tram line, or Upper Terminal. A historic Pacific great blue heron nesting colony north of the Trans Canada Highway and east of Highway 9 is noted by the CDC; the colony was, however, abandoned in 1997 following removal of the nesting trees[22].

6.3.2 Reptiles

Reptiles occurring in British Columbia and identified by COSEWIC as either Special Concern, Threatened, or Endangered are not documented to occur within the Chilliwack Forest District. Species historically occurring in the forest district, specifically western pond turtle (*Clemmys marmorata*) and Pacific gopher snake (*Pituophis cantifer cantifer*), are considered extirpated.

The CDC identifies two (2) **red-listed** species within the Chilliwack Forest District, specifically the western pond turtle and the Gopher snake. These species are considered by the province to be extirpated from the forest district[23].

A single **blue-listed** species is identified by the CDC to occur within the Chilliwack Forest District, specifically painted turtle (*Chrysemys picta*). This species prefers lowlands with sluggish rivers with oxbows, sloughs, ponds, lakes and marshes. As such, utilization of the drainages located within and in proximity to the Village Base and/or the tram line alignment is not expected.

Rare reptile occurrences within and in proximity to the Village Base, tram line, or Upper Terminal are not identified in the CDC database.

[22] **Moul, I.E. 1998.** The location and status of heron colonies around the Strait of Georgia: Region 2, Lower Fraser Valley, Sunshine Coast and the Powell River Area. Unpublished Contract Report , B.C. Ministry of Environment, Lands and Parks, Nanaimo, B.C. 146p.

[23] **Cannings, S.G., L.R. Ramsay, D.F. Fraser, and M.A. Fraker. 1999.** Rare amphibian, reptiles, and mammals of British Columbia. Wildlife Branch and Resource Inventory Branch, B.C. Ministry of Environment, Lands and Parks, Victoria, B.C. 199p.

6.3.3 Amphibians

A total of six (6) amphibian species occurring within the Chilliwack Forest District are identified by COSEWIC as either Special Concern, Threatened, or Endangered. The species include the Oregon spotted frog (*Rana pretiosa*)(Endangered), Pacific giant salamander (*Dicamptodon tenebrosus*)(Threatened), Coast tailed frog (*Ascaphus truei*)(Special Concern), northern red-legged frog (*Rana aurora*)(Special Concern), and western toad (*Bufo boreas*)(Special Concern).

Current information indicates that the Oregon spotted frog occurs at only three sites in the FRL. Habitats utilized by the Oregon spotted frog include open herb dominated and hydrologically stable wetlands. Aquatic habitats within the environs of the Village Base and tram line would likely not be utilized by this species, as the topography precludes establishment of suitable habitat. The Pacific giant salamander occupy small to mid-sized watercourses (juveniles) and adjacent recently logged to old growth stage forests (adults). This species has been found to occur in two unnamed creeks draining the western portion of the Eastern Hillsides area, Calkins Creek, and Brownlee Brook[2]. It is anticipated that this species may utilize aquatic resources located within and in the immediate environs of the Village Base, the tram line alignment, and the Upper Terminal. The Coast tailed frog also occupies aquatic and terrestrial habitats similar to the Pacific giant salamander, although the species tends to disappear from logged and/or disturbed areas. Previous studies of the Eastern Hillsides area[2] indicate utilization of Ford Creek upstream of the Nixon Road Allan Road intersection. As such, utilization of aquatic resources within and in the immediate environs of the Village Base and tram line is anticipated. The northern red-legged frog breeds in 0.5 metre to 2 metre deep water associated with cool, well shaded ponds or lakes. Froglets and adults tend to occupy riparian corridors within very close proximity to streams during the drier months; increased movement by adults away from the streams generally only occurs during the wetter months. The northern red-legged frog is not expected to utilize aquatic resources within or in the immediate environs of the Village Base or tram line, primarily a function of the absence of suitable breeding habitat. The western toad occupies a variety of forested, brush, and mountain meadow habitats; breeding typically occurs in oligotrophic and fishless shallow lakes and/or ponds. The western toad may potentially utilize aquatic habitat within the Village Base area, specifically the less steep channel sections of the unnamed tributary to Dunville Creek.

The CDC identifies two (2) **red-listed** species occurring within the Chilliwack Forest District, specifically the Pacific giant salamander and the Oregon spotted frog.
Two (2) **blue-listed** species identified by the CDC also occur within the Chilliwack Forest District, specifically Coast tailed frog and red-legged frog.

Rare amphibians are not documented by the CDC database to occur within and or in the immediate vicinities of the Village Base, tram line, or Upper Terminal. Rare amphibians are, however, documented by the CDC to occur within Chipmunk Creek, Bridal Falls Creek, and unnamed watercourses draining Elk Mountain.

6.3.4 Fish

Fish occurring in the Chilliwack Forest District and identified by COSEWIC as either Special Concern, Threatened, or Endangered include the Green sturgeon (*Acipenser medirostris*)(Special Concern), White sturgeon (*A. transmontanus*)(Special Concern), Salish sucker (*Catostomus* sp.4)(Endangered), Cultus Lake sculpin (*Cottus* sp.2)(Threatened), and Nooksack dace (*Rhinichthys* sp.4)(Endangered). These species are not, however, expected to occur within the drainages located within and in close proximity to the Village Base and tram line.

Red-listed species identified by the CDC and occurring within the Chilliwack Forest District include the Green sturgeon, white sturgeon, salish sucker, Cultus Lake sculpin, Nooksack dace, and Pygmy longfin smelt (*Spirinchus* sp.1). These species are not expected to utilize the drainages within and in the immediate vicinity of the Village Base and tram line.

Blue-listed species identified by the CDC to occur in the Chilliwack Forest District include Mountain Sucker (*Catostomus platyrhynchus*), brassy minnow (*Hybognathus hankinsoni*), Cutthroat trout *clarki* subspecies, Bull trout (*Salvelinus confluentus*), Dolly Varden (*S. malma*), and Eulachon (*Thaleichthys pacificus*). Coastal cutthroat trout were captured during the reconnaissance survey within the unnamed tributary to Dunville Creek; this species is also expected to utilize Ford Creek. Bull trout and or Dolly Varden may also utilize reaches of Dunville and Ford creeks extending through and or located within close proximity to the Village Base and tram line.

Rare fish occurrences are not documented by the CDC database within and/or in the immediate vicinities of the Village Base, tram line, or Upper Terminal.

6.3.5 Mammals

Six (6) COSEWIC listed terrestrial mammal species have been documented to occur within the Chilliwack Forest District, specifically Mountain beaver (*Aplodontia rufa rufa* and *A. rufa rainieri*)(Special Concern), wolverine (*Gulo gulo luscus*) western population (Special Concern), Keen's long-eared myotis (*Myotis keenii*)(Special Concern), Townsend's Mole (*Scapanus townsendii*)(Threatened), Pacific water shrew (*Sorex bendirii*), and Grizzly bear (*Ursus arctos*)(Special Concern). Species potentially utilizing habitats within and in close proximity to the Village Base, tram line, and Upper Terminal include Mountain Beaver *rufa* sub-species, Keen's long eared myotis, and Pacific water shrew. Occasional visits to the Upper Terminal area by Grizzly bear may occur; however, this species and wolverine do not generally visit areas frequently affected by human activities (e.g. hunting, resource extraction, roads, recreation etc). Grizzly bear have, however, been sighted on the slopes of Cheam Peak (pers. comm. Bill Jex)[24]. The Village Base, tram line, and Upper Terminal are

[24] **Jex, B.** Ministry of Water Land and Air Protection. November 2002.

located adjacent to the west perimeter of the North Cascades Grizzly Bear Population Unit (NCGBPU), Fraser Valley South Sub-Unit. The proposed development is not located within the "spine" units of the NCGBPU. The "spine" units potentially sustain sufficient habitats for the implementation of the Grizzly Bear recovery program established in 1997. Townsend's mole are not expected to occur within the Village Base, tram line of Upper Terminal areas; this species is restricted to low lying agricultural land in the vicinity of Abbotsford.

Red-listed terrestrial mammal species identified by the CDC to occur within the Chilliwack Forest District and potentially utilizing habitats within and in close proximity to the Village Base, the tram line, and/or the Upper Terminal include Mountain beaver *rufa* subspecies, Snowshoe hare (*Lepus americanus washingtonii*), long-tailed weasel (*Mustela frenata altifrontalis*), Keen's long-eared myotis, and Pacific water shrew.

Blue-listed terrestrial mammal species identified by the CDC to occur within the Chilliwack Forest District and potentially utilizing habitats within and in close proximity to the Village Base, the tram line, and/or the Upper Terminal include Townsend's big-eared bat (*Corynorhinus townsendii*), Trowbridge's shrew (*Sorex trowbridgii*), Cascade mantled ground squirrel (*Spermophilus saturatus*), and Grizzly bear.

Rare mammal occurrences are not documented by the CDC database within and or in the immediate environs of the Village Base, tram line, or Upper Terminal.

7.0 ECOLOGICAL SENSITIVITY

The landscape within and in close proximity to the Village Base, tram line, and Upper Terminal areas has been influenced by anthropogenic activities. The most obvious and persistent anthropogenic activity is the removal of established forest cover, a function of historic and current logging practices and existing agricultural and rural residential land uses. All forested areas located in the environs of the Village Base have been previously logged, and sustain a patchwork of vegetation assemblages ranging from early seral to mature successional stages. Mature coniferous forest is well established on the north facing slope extending from the Village Base to Upper Terminal, whereas patchwork forest cover is again evident south of the ridge crest within the Chipmunk Creek catchment area, a function of recent logging.

The mature coniferous forest is fragmented within the confines of the Village Base, but more continuous on the north facing slope of the Skagit Range. This assemblage generally consists of mature trees comprising with a structurally variable canopy, in particular along ridges and cliff edges. The canopy intercepts significant snowfall during the winter months; shallower snow along the ground, in particular along the ecotone of the mature forest with adjacent habitats would likely provide increased forage opportunities during the winter months for large ungulates such as Columbian black-tailed deer. The development of a fruit-bearing shrub layer within the assemblage away from the ecotone is typically limited by the canopy, and would likely result in a less frequent utilization by large ungulates as a winter forage area. Thermal cover provided by the mature forest would likely be utilized by ungulates during summer and winter months. The development of snags within this assemblage suggests limited utilization by primary and secondary cavity nesting bird species, for example northern flicker (*Colaptes auratus*), red-breasted sapsucker (*Sphyrapicus ruber*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*P. villosus*), and pileated woodpecker (*Dryocopus pileatus*). In unmanaged stands, coarse woody debris is typically recruited to the forest floor by the fall of either dead or living trees. Tree fall is typically a result of natural catastrophic events such as windthrow and snowslides, of disease. The production of coarse woody debris within this assemblage is expected to be limited, suggesting that this assemblage is located within a relatively sheltered environment and not susceptible to windthrow. Natural mortality and decay of the mature trees would, however, create openings within the canopy, likely resulting in an increase of windthrow incidents and increased development of coarse woody debris on the forest floor. The natural decay of coarse woody debris provides a number of functions, including nutrient recycling, and creation of wildlife habitat. Colonization of fallen logs by invertebrates provides a food resource for insectivorous birds.

The development of deciduous woodland is generally associated with areas impacted by historic and recent anthropogenic influences. Anthropogenic intrusions into a landscape predominated by coniferous tree species typified mature coniferous forest assemblage has resulted in the accelerated establishment of deciduous trees, for example black cottonwood, broad leaved maple, and red alder. These species, in particular red alder, are typically associated with a disturbed landscape. Understorey vegetation comprises primarily of salmonberry and sword fern, both of which are opportunistic species associated with anthropogenic disturbance. Large ungulates such as mule deer may likely utilize these linear corridors for movement between forest and/or riparian assemblages, a function of the relatively obstruction free (i.e. sparse shrub cover) nature of these corridors. The

eventual decay of the more mature deciduous trees (e.g. cottonwood) may also result in increased utilization of this assemblage by small primary cavity bird species.

Wetlands and the wetland ❍ riparian mixed forest ecotone provide the greatest diversity of plant species. Wildlife utilization of wetland habitat is likely significant, in particular during the spring, summer, and autumn months. The growth of new emergent and shrub vegetation following snow melt, and the development of fruits during the late summer and early autumn months, would provide large ungulates and omnivores with an abundance of food items. Larval development and emergence of insect species would provide a rich food resource for insectivorous passerines and amphibians. Wetlands and their associated riparian habitats provide natural linkages through an otherwise homogenous landscape, and would likely be utilized by wildlife species as movement corridors.

The riparian mixed forest is located immediately adjacent to a watercourse or wetland, and includes vegetation that requires soil conditions more moist than normally found within the surrounding landscape. Relatively moist soil conditions associated with the riparian forest allow for the establishment of a greater range of plant species, thereby providing a greater diversity of food items for resident and transient wildlife. Wildlife use of riparian assemblages is generally greater than other habitat types, as this habitat provides wildlife with a food, cover, and water source. Riparian assemblages also provide greater stratification of vegetation. The diversity of plant species provides greater diversity of feeding and nesting opportunities, especially for birds and bats. The increased presence of deciduous trees provides greater nesting and feeding opportunities for smaller primary cavity nesting species. The paucity of snags within the riparian mixed forest would, however, indicate limited utilization of this assemblage by larger primary and secondary cavity nesting bird species. The microclimate of the riparian mixed forest is also more diverse than the adjacent coniferous forest, a result of increased humidity, transpiration, shading and air movement; these variables in turn provide for enhanced quality of the adjacent waterbody. Cover afforded by the riparian forest assemblage is also likely utilized by large ungulates, for example deer, as a movement corridor during annual migrations from higher altitude summer ranges to the lower altitude winter ranges of the Fraser River valley.

Fisheries resource values attributed to Ford Creek and the Dunville Creek tributaries are the most significant in the Village Base area and tram line, and as such warrant the greatest level of protection during development of the areas. Less significant fisheries resource values are associated with "Allan" Creek, a result of ephemeral flows associated with steep channel gradients permeable substrates. All waterbodies located within and adjacent to the study area are, however, identified as fish habitat by the Federal *Fisheries Act*. Works proposed within and/or immediately adjacent to these waterbodies would require the approval of Fisheries and Oceans Canada.

8.0 GUIDELINES AND RECOMMENDATIONS FOR DEVELOPMENT

A number of recommendations for the development of the Village Base, the tram line, and the Upper Terminal are presented below for consideration during the design phase of the project. The overriding objective of the recommendations is to provide protection of significant environmental features identified within the Village Base, tram line, and Upper Terminal Areas, and integrating less significant environmental features into the land use plan. A guiding principle is the development of a land use plan that fosters environmental awareness and quality as lifestyle elements.

8.1 Watercourses and Fish Habitat

The most significant environmental features identified in the study area include permanent watercourses, specifically Ford Creek, the unnamed tributaries of Dunville Creek, and the riverine swamp adjacent to an unnamed Dunville Creek tributary. Less significant environmental features include the ephemeral Allan Creek.

The following recommendations are provided to ensure that potentially adverse impacts to watercourses and fish habitat are mitigated to the greatest practical extent during the design phase of the project:

Recommendation 1: Watercourse and Riverine Swamp Protection

All watercourses and riverine swamp documented herein must be preserved and protected from adverse impacts associated with land development. This can be accomplished by dedication of the watercourses and appropriate setbacks as parkland and/or environmental preserves. Alternatively, these areas can be protected by registration of restrictive covenants over private property.

Recommendation 2: Establishing Watercourse Setbacks

Setbacks should en established in accordance with the minimum leavestrip requirements for mountainside watercourses as described in the Residential Development Scenario 2000 Final Report[25] *and summarized as follows:*

- *where slope distance from watercourse to top of bank or ravine slope is less than 50 metres, the leavestrip shall encompass the ravine and extend 30 metres horizontally landward from the top of bank or ravine slope;*
- *where slope distance from watercourse to top of bank or ravine slope is greater than 50 metres, the leavestrip shall encompass the ravine and extend 10 metres horizontally landward of the top of bank or ravine slope;*
- *where red-listed or blue-listed species utilize or potentially utilize the watercourse and riparian corridor, the leavestrip shall extend to 50 metres horizontally landward from the top of bank or ravine slope where the slope*

[25] **UMA Engineering Ltd. 2001.** City of Chilliwack Eastern Hillsides Residential Development Scenario 2000, Final Report. Prepared for the City of Chilliwack, Engineering Department. 39 pp. + appendices.

distance from the watercourse to top of bank or ravine slope is less than 50 metres; and

- *where red-listed or blue-listed species utilize or potentially utilize the watercourse and riparian corridor, the leavestrip shall extend to 20 metres horizontally landward from the top of bank or ravine slope where the slope distance from the watercourse to top of bank or ravine slope is greater than 50 metres.*

The top of bank or ravine slope is defined as the first break in slope where the grade is flatter than 3 horizontal to 1 vertical (i.e. less than 33 percent) and extending upslope for a minimum distance of 15 metres.

Figure 3 depicts 100 metre total width riparian setbacks along Ford Creek and the unnamed tributary to Dunville Creek, and a 60 metre total width riparian setback along Allan Creek. It should be noted that the setbacks depicted by this figure are approximate, and are provided without the benefit of detailed topographic field surveys.

Recommendation 3: Protection of Watercourse Setbacks

In order to preclude encroachment into the prescribed watercourse setback areas during the construction phase(s) of the project, the landward perimeter of the watercourse setbacks should be delineated with a high visibility fence (e.g. snow fence). Permanent protection of the setbacks can be achieved by the construction of a physical barrier (e.g. post and rail fence) along the landward perimeter.

Recommendation 4: Trails within Watercourse Setbacks

Trails may be permitted within the setback areas; these trails should not exceed 1.5 metres in width, and be constructed of permeable but non-erodible materials. If constructed, trails should be aligned parallel with and along the outside perimeters of the setback areas. Crossings by trails over watercourses should be limited to proposed and/or established road crossings.

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Recommendation 5: Stormwater Management

Development of a stormwater management plan must be undertaken to maintain hydrological conditions within a range that prevents the degradation of watercourses and fish/wildlife habitats. Best management strategies including but not limited to the following should be investigated and/or implemented :

- *discharge of roof leaders to in ground splash pads or above ground rain barrels to decrease the runoff rate during peak rain events and promote infiltration where practical to the groundwater reservoir;*
- *utilize infiltration trenches and vegetated swales along constructed and/or upgraded roads to reduce runoff rates and promote infiltration to the ground water reservoir;*
- *limit disturbance to existing vegetation and soils located outside of the construction footprints to the greatest practical;*
- *utilize fully- and/or semi-permeable materials for driveways, patios, walkways, maintenance roads, etc.;*
- *incorporate stormwater treatment features to facilitate removal of pollutants and detention of flows including but not limited to:*
  - *biofiltration wetlands incorporated within wet detention ponds; and*
  - *mechanical oil water separators located at the outlets of underground storm sewers.; and*
  - *rooftop detention.*

Recommendation 6: Watercourse Crossings

New crossings of watercourses should be limited to the greatest extent practical. All proposed crossings (bikeways, trails, roads, etc) should incorporate environmental design standards as described in the Land Development Guidelines for the Protection of Aquatic Habitat[26]*. Improved and/or new crossings should incorporate features to facilitate movement of terrestrial and aquatic species through the transportation corridor, and should be implemented in such a manner as to mitigate potential design and or construction impacts to the greatest extent practical.*

Recommendation 7: Fish Habitat Enhancement

[26] **Chilibeck, B., G. Chislett, and G. Norris. 1993.** Land Development Guidelines for the Protection of Aquatic Habitat. Co-published by the Habitat Management Division of Fisheries and Oceans Canada and the Integral Management Branch of the Ministry of Environment, Lands and Parks. 128 pp.

Enhancement opportunities that may be prescribed during the design phase of the project should be undertaken in conjunction with any works proposed within and/or adjacent to the watercourses and/or setback areas. Details of any proposed enhancement opportunities should be provided by an accredited environmental consultant/biologist.

8.2 Wildlife and Vegetation

Vegetation and physiographic attributes associated with riparian corridors and the riverine swamp afford the greatest diversity of potential wildlife utilization within the Village Base area. As such, the retention of wildlife movement corridors contiguous with riparian, wetland, and mature forest communities located within and in proximity to the study area is recommended. The wildlife movement corridors would include the setback areas recommended along watercourses extending through the study area. Where unavoidable impacts to the leave strip/wildlife movement corridors are anticipated to occur, the following additional recommendations are provided:

Recommendation 8: Roads

Proposed road construction within and or parallel with a wildlife movement corridor should not be considered.

Recommendation 9: Road Crossings

Proposed road crossings of wildlife movement corridors should be constructed perpendicular through the corridor, be minimized in width to the greatest extent practical, and facilitate easy access over or under the road with the intent to reduce wildlife mortalities to the greatest extent practical.

Recommendation 10: Retention of Vegetation

Vegetation adjacent to proposed road crossings should be retained in its original state, and if disturbed, should be re-established as close as possible to the road to provide additional cover for wildlife species. Vegetation not located within the wildlife movement corridors should also be retained to the greatest extent practical to provide diversity of vegetation communities within the study area.

Recommendation 11: Nest Protection

Land clearing should be avoided to the greatest extent practical during the period extending from April 1 to July 31 to minimize adverse impacts to breeding and/or nesting birds; in the event that land clearing activities are to occur during this time period, a detailed survey of the prescribed clearing area should be undertaken by an accredited environmental consultant/biologist to locate occupied nests for protection.

8.3 Land Development - General

In addition to the more specific recommendations provided above, land development in general should be conducted in a responsible manner. Implementation of sediment and erosion control measures during the construction phase is perhaps the most critical aspect of any land development project.

Recommendation 12: Sediment and Erosion Control Plans

Detailed sediment and erosion control plans including engineering drawings should be developed and for all phases of the project. The plans should incorporate the general provisions outlined in the Land Development Guidelines for the Protection of Aquatic Habitat, as well as provision generated specifically to suit site conditions and construction.

Recommendation 13: Environmental Monitoring/Inspection

Development activities located within and or in close proximity to watercourse setbacks and or wildlife movement corridors should be monitored and or inspected by an accredited environmental consultant/biologist on a frequent basis. Works located outside of these areas may be monitored and / or inspected on a less frequent basis.

8.5 Appendix 5 Preliminary Archaeological Survey – Arcas 2003

Arcas File No: 03400

July 28, 2003

Resorts West BC
12473 - 71A Avenue
Surrey, B.C. V3W 0T9

Dear Mr. Norm Gaukel:

Re: Archaeological Impact Assessment
Proposed Tram Development, Rosedale, B.C.

Introduction

This letter report presents the result of an archaeological impact assessment (AIA) that Arcas Consulting Archaeologists Ltd. carried out for Resorts West BC, for a proposed tram development, located 3.5 km south-southeast of Rosedale, in the central Fraser Valley, southwestern B.C. (Figure 1). The AIA was undertaken, at the request of Norm Gaukel (proponent, Resorts West BC) to identify and evaluate any archaeological sites within the development locations, assess any impacts to archaeological sites, and identify the need and appropriate scope of further archaeological field studies for the proposed development. The Tram development project is located within the traditional asserted territory of the Cheam Indian Band, the Skwah First Nation and the Stó:lō Nation, within the Chilliwack Forest District. The AIA was carried out under Stó:lō Nation Heritage Investigation Permit #2003-12 issued by the Stó:lō Nation and Heritage Inspection Permit 2003-149, issued by the Archaeology and Registry Services Branch pursuant to Section 14 of the *Heritage Conservation Act* (RSBC 1996, Chap. 187).

Objectives

Archaeological sites in British Columbia are protected by the *Heritage Conservation Act* (RSBC 1996, Chap.187), which is administered by the Archaeology and Registry Services Branch (Ministry of Sustainable Resource Management). Sites are protected whether located on public or private lands. Archaeological sites are protected if they have been designated as "Provincial heritage sites" in accordance with section 9 of the *Heritage Conservation Act* (*Act*), or through automatic protection pursuant to section 13 by virtue of particular historic or archaeological values. The kinds of sites protected under section 13 include:

- archaeological sites occupied or used before AD 1846;
- aboriginal rock art or burial places;
- ship or aircraft wrecks, and
- archaeological sites of unknown age, with a reasonable possibility of having been occupied or used before AD 1846.

Protected archaeological sites may not be altered (that is, changed in any manner) without a Permit issued pursuant to section 12 or section 14 of the *Act*.

The work undertaken for this project consisted of an archaeological impact assessment (AIA) as defined in the *British Columbia Archaeological Impact Assessment Guidelines* (1998), issued by the Archaeology and Registry Services Branch. In accordance with these guidelines, the purpose of the AIA was to:

- identify and evaluate the significance of any archaeological sites located on the development properties;
- identify and evaluate possible impacts by the proposed development on archaeological sites; and
- recommend appropriate impact management measures where necessary.

The Resorts West BC Tram Development

The project is to take place within forested and subalpine settings of the proposed tram development, located 12.4 km east of the city of Chilliwack, 3.5 km south-southeast of the community of Rosedale, and 6.0 km southwest of Bridal Veil Falls, B.C. in the Fraser Valley (see Figure 1). This assessment is taking place at the request of the proponent, Resorts West BC, of Surrey, B.C.

The developer intends to build a large capacity aerial tramway from a terminal base at 320 m asl, obliquely (southeast), up the side of the forested mountain slope to 1450 m asl (Figure 2). The proposed tram development application is the preliminary stage in the creation of a multi-recreational, all-season resort community surrounding the Base Terminal with proposed long term development of the Chipmunk Creek watershed as a new ski resort. The Stó:lō Nation Heritage Investigation Permit #2003-12 and Heritage Inspection Permit 2003-149 pertain to the AIA of the tram development only. The development project consists of three development locations: the Base Terminal, the Tram right-of-way, and the Upper Terminal.

The Tram Base Terminal is located within two properties defined as: 51642 Allan Road consisting of 0.830 acres, (Parcel A (Reference Plan LMP36688), East ½ of South East Quarter of Section 27, Township 2, Range 29,West of the Sixth Meridian, New Westminster Land District), currently a utility lot for road purposes and 51475 Ruddock Road consisting of 160 acres (Section 22, Township 2, Range 29, New Westminster District, Part NE ¼, Meriden W6 Except Plan 62231 (Ruddock Road) currently serving as a Community Forest. The Base Terminal location consists of approximately 13 hectares (360 m x 360 m) within these two lots at approximately 320 m asl. The Tram right-of-way is approximately 3.2 km in length with a proposed width of 70 m (22.4 hectares) and rises approximately 1130 m in elevation over its length. The Tram right-of-way is situated on Crown Land and lift station towers will be constructed on intermediate ridge crests till the Upper Terminal is reached on the divide between the Chipmunk drainage and Fraser Valley. The Tram Upper Terminal located at 1450 m asl, consists of approximately 4 hectares (200 m x 200 m), situated on unsurveyed Crown Land.

Biophysical Setting

The Resorts West Tram Development is located within the Northwestern Cascade Ranges ecosection. The Base Terminal is situated within the Dry Maritime Coastal Western Hemlock biogeoclimate subzone (CWHdm). The Tram right-of-way connecting the Base and Upper Terminal location ascends from this zone and traverses across the Montane Variant of the Very Wet Maritime Coastal Western Hemlock subzone (CWHvm2) and through the moist submaritime Coastal Western Hemlock subzone (CWHms1) to reach the Upper Terminal. The Upper Terminal is situated within the Leeward Variant of the Moist Maritime Mountain Hemlock (MHmm2) biogeoclimatic subzone (ECL Envirowest Consultants Limited 2002).

The surficial geology consists of Pre-Tertiary Mesozoic and Upper Paleozoic bedrock which includes sedimentary, volcanic, granitic, and metamorphic rocks. Where bedrock is not exposed at the surface it is overlain by thin deposits, normally less than 2 m thick, of glacial, colluvial, and eolian sediments (Armstrong 1980). Generally the rocks in the study area are variably metamorphosed and may include weak clay shales, siltstone and sandstone, volcanic rocks and strong limestones with the rocks foliated, folded and faulted (Monger 1989; Thurber 2002).

The Base Terminal is situated on a moderately steep slope with a north aspect. The development location is punctuated with small relatively level areas and back by a steep slope. Tree species identified within the Base Terminal development location consist of western red cedar, western hemlock, Douglas-fir, and red alder with a moderately open understory consisting of vine maple, mountain ash, salmonberry, Devil's Club, stinging nettle, sword fern, salal, trailing blackberry, thistle, and various mosses. Locations examined during the AIA indicate that the area had been previously logged and selected locations are currently being logged under the Community Forest harvesting development program. A small drainage with flowing water was identified along the western portion of the development area. The sub-strata, as observed in numerous ground exposures, consists of a silty sand mixed with angular pebbles and cobbles of slate or shale rock. The Base Terminal is accessed by existing roads to the Community Forest.

The Upper Terminal location is situated on a moderately steep slope with a southeast aspect and has been clearcut logged within the last 15 years. Access to the cutblock is via existing logging roads from the Chilliwack River valley ascending the Chipmunk Creek drainage. The original access to the cutblock was via a logging spur which enters the block from the northeast bisecting the eastern portion of the block. A landing is located at the end of the logging spur. A narrow road situated near the crest of the slope, forms the northwestern boundary of the cutblock with a narrow strip of remnant forest forming the ridge crest. From the ridge crest the slope drops very steeply to the Fraser Valley; to the southeast of the ridge crest the Upper Terminal will be situated on a moderate to steep slope. Where present (bordering the existing clearcut and along the ridge crest) tree species consist of mountain hemlock and subalpine fir. The understory is relatively open with Alaskan blueberries, twisted stalk, five-leafed bramble and various mosses present. Immature second growth mountain hemlock and subalpine fir dominates the existing clearcut with fireweed, trailing blackberry, wild strawberry and shrubs present. The sub-strata, as observed in numerous ground exposures (due to previous timber harvesting and road construction), consists of a silty sand mixed with angular pebbles and cobbles of slate or shale rock. One small outcrop of bedrock was identified along the ridge crest approximately

30 m south of the proposed Upper Terminal location. No water source or drainage was observed.

Archaeological Sites

An archaeological site is a location that contains physical evidence of past human activity, and which can be studied by archaeological methods of investigation, including site survey, excavation, and data analysis (Archaeology Branch 1998). In British Columbia, most archaeological sites are attributable to pre-Contact settlement and land use by First Nations' people, though locations of Euro-Canadian or Asian-Canadian settlement pre-dating 1940 are recorded as historic archaeological sites in some circumstances. Records of archaeological sites in B.C. are maintained by Archaeology & Recreation Inventory (Archaeology & Registry Services Branch).

Archaeological sites are numbered according to the Borden Site Designation Scheme used throughout Canada (Borden 1952). This scheme is based on the maps of the National Toporaphic System and uses latitude and longitude to pinpoint the location of a site. The four alternating upper and lower case letters (e.g., DhRk) designate a unique block measuring 10 minutes of latitude by 10 minutes of longitude. Sites are numbered sequentially within a block, based (usually) on their date of discovery; therefore, DhRk-018 would be the eighteenth site recorded in block "DhRk".

Archaeological Site Types

Each part of the province exhibits a distinctive suite of archaeological site types peculiar to that region. Typical sites that are (or were) present in the Tram development locality can be defined as follows:

- **Villages**. Typically comprised of one or more circular to sub-rectangular depressions, the remains of semi-subterranean pithouses or plank-houses. Village sites frequently include smaller pits used for food preparation and storage, burials, and the remains of activities undertaken outside the houses, including deposits of ash and other rubbish removed from the houses, butchered animal bones, and the waste products of stone tool manufacture. Signify recurrent use of a location as a semi-permanent village by a particular community. Village sites are usually found in environmental settings characterized by good solar exposure, protection from winter winds, and proximity to potable water, though secluded locations without the other attributes were often selected as defensible positions.
- **Seasonal Camps**. Similar kinds of archaeological materials, without the house-pits, are also found at seasonal camps. Most seasonal camps will be comprised of scatters of stone artifacts, representing transitory occupation of riparian or inland environmental settings, oriented toward the exploitation of particular resources. Camps repeatedly occupied for centuries will often exhibit deposits of anthropogenic sediments, containing stone artifacts, animal bones, ash, fire-altered rocks, and charcoal. Seasonal camps near major watercourses will be found in the same settings that villages occur, but in landward settings usually have an unobstructed view of potential game routes.
- **Burial Places**. Locations where Aboriginal people interred their dead, most commonly near village sites, but also more generally throughout the landscape for individuals who expired away from the villages. In the central and eastern Fraser Valley, some communities buried their dead in complex earthen mounds that often covered a complex stone substructure or simpler cairn.
- **Forest Utilization Sites**: These sites consist of culturally-modified trees (CMTs), which are trees

intentionally altered by First Nations people as part of their traditional use of the forest. Examples include trees with scars from bark stripping or plank removal, stumps and felled logs, trees tested for soundness, trees chopped for pitch, and trees de-limbed for firewood (Archaeology Branch 2001; Stryd 1997). The long history of agricultural land use in the Rosedale locality signifies that there is little chance of finding CMTs here.

- **Ceremonial/Spiritual Sites**: The *Stó:lō Nation Heritage Policy* (Stó:lō Nation 2003) identifies a class of sites that may or may not contain physical evidence of past land use, but are nevertheless of considerable importance to contemporary communities. In Stó:lō territory, they include (i) **Transformer sites**, which are "stone people" (e.g., prominent boulders) or places associated with the actions of the Transformer, *XeXá:ls*; (ii) **spirited places**, or those which are inhabited by spirits; (iii) **ceremonial sites**, places or locations which are important to past and present Stó:lō ceremonial life, and; (iv) **cultural resource sites**, or places where materials used for Stó:lō ceremonials or spiritual activities are collected.
- **Trails**. Overland routes used to provide access between communities or to resource-procurement areas. Many exist as well-worn paths on the landscape, but the presence of older trails may also be inferred by linear distributions of other kinds of archaeological sites.
- **Historic Sites**. Post-Contact remains, including artifacts, structures, and features associated with Euro-Canadian or Asian-Canadian settlement and land use. In the Tram develop locality, most likely to be associated timber harvesting.

Summary of Regional Cultural History

The Fraser Valley is situated within the Northwest Coast Culture Area, which encompasses the west coast of North America from southeastern Alaska to southern Oregon. The pre-Contact (that is, the period prior to the presence and/or influence of European people in this region) sequence for this part of the Northwest Coast is based on a large number of excavated sites in the Fraser Delta - Burrard Inlet area, adjoining counties of Washington state, the east coast of Vancouver Island between Comox and Victoria, the Gulf and San Juan Islands, and in the Fraser River valley between New Westminster and Yale. Knut Fladmark (1986) provides a generalized summary of pre-Contact archaeology in British Columbia. Ames and Maschner (1999), Matson and Coupland (1995), and Mitchell (1990) cover the prehistory of the Northwest Coast culture area, including the Fraser Valley and Fraser Canyon.

Archaeological research has uncovered evidence for about 9000 years of human occupation in the southern Strait of Georgia - Fraser Valley region. This evidence has been organized into a sequence of archaeological periods, known as "culture types." Each culture type is marked by distinctive artifact styles and technologies, as well as inferred economic, social, and other cultural (= archaeological) traits. The archaeological periods of this region, from oldest to youngest, are named Old Cordilleran (9000-5500/4500 BP), Charles (5500/4500-3300 BP), Locarno Beach (3300-2400 BP), Marpole (2400-1000 BP) and Gulf of Georgia (1000-200 BP) culture types. These terms primarily refer to coastal cultures, whose relationship to those of the eastern Fraser Valley is somewhat unclear. A localized sequence has been developed for the Fraser Canyon (e.g., Mitchell 1990), and most archaeologists agree that sites in the eastern Fraser Valley exhibit a mix of coastal and interior characteristics.

Site Inventories in the Fraser Valley

The first archaeological sites recorded in the Fraser River valley were identified by University of British Columbia (UBC) archaeologists in the late 1940s and early 1950s. At least three substantial site surveys were carried out by UBC students in the 1950s and early 1960s; other surveys have been completed in more recent years, including a survey of agricultural lands in the Rosedale locality by avocational archaeologist Ken Pugh in 1993. Additional sites were also recorded as part of large- and small-scale impact assessments carried out for government agencies or corporate developers (e.g., Schaepe and Bush 2001, Stó:lō Nation/Antiquus 1999). Lastly, the Stó:lō Nation has sponsored several years of overviews (e.g., Stó:lō Nation 2001) and site surveys throughout the traditional territories of its member Bands. All these surveys have resulted in the identification and recording of several hundred archaeological sites throughout the Fraser River valley, most of pre-Contact attribution.

Ethnographic Background Information Summary

It is important to note that not all aspects of traditional First Nations' cultures are recorded in the anthropological and ethnohistoric literature. Additional knowledge of traditional culture and lifeways still exists in many contemporary First Nations communities. Furthermore, aboriginal societies underwent significant changes as a result of their contact with Europeans, and some cultural aspects reported in the literature may not accurately reflect that culture prior to contact.

The proposed Tram development is within the traditional territory of the Stó:lō Nation, who represent several Halkomelem-speaking communities in the Fraser Valley. The Stó:lō speak the "Upriver" dialect of the Halkomelem (*Halq'eméylem*) language, one of the Coast Salish language family (Duff 1952) The development is also within the territory of the Cheam Indian Band and Skwah First Nation; these communities are also Halkomelem-speaking communities independent of the Stó:lō Nation.

Suttles (1990) provides a recent general summary of Coast Salish culture. Suttles (1987), Barnett (1955), Duff (1952), and Hill-Tout (1978) represent additional sources that are frequently cited. Oliver Wells (1987) conducted avocational ethnographic research among the Chilliwack and their neighbours for many years. More recently, the Stó:lō Nation has sponsored ethnographic research within their traditional territory, including traditional use studies (e.g., Myles 1995; Carlson 1997), and publication of an atlas of traditional places and resources (Carlson 2001).

Traditional Coast Salish culture was characterized by a semi-sedentary lifestyle dependent upon fishing, gathering, and hunting for subsistence. The society was slightly stratified and three classes of people were usually present; a large upper class, a smaller lower class, and a very small class of slaves. The primary socio-economic unit of Coast Salish society was the house group, each consisting of one or more extended families occupying a single house. Residence was usually with the man's family ("patrilocal") while descent was reckoned bilaterally. Each house group owned its house, rights to resource procurement sites, and ritual property including ancestral names, legends, songs and dances. Rights to these properties were acquired through inheritance and were normally held by the most important members of the household.

Coast Salish villages were usually comprised of one or more houses. Leadership was provided by a "council" of *siyam*, made up of the most respected family heads in the village. The prestige of the *siyam* was based on inherited social position and demonstrated abilities of leadership, as well as good manners, ancestry, spiritual power, and wealth. Each village was linked through ties of marriage and kinship with other villages to form a widespread inter-village network without distinct boundaries. Marriages arranged between socially equal families in different villages helped to establish a co-operative system for resource procurement, including shared access to specific resource locations and shared labour.

Traditional population and settlement were contingent upon the availability and distribution of seasonal resources. The most important of these resources would have included: (1) salmon and eulachon runs in the Fraser River and tributary streams and river; (2) resident fish, particularly sturgeon, in the rivers, lakes, and sloughs, (3) waterfowl, including ducks, geese, and swans in sloughs and wetlands; (4) wide-ranging game animals such as deer, elk, mountain goats, and bears; (5) small game and fur-bearing mammals, including beaver, muskrat, otters, and mink, from aquatic settings along sloughs and in wetlands, and; (6) plant resources, including (i) red and yellow cedar trees for timber and bark, and other coniferous trees for firewood and medicinal purposes, (ii) chokecherries, huckleberries, and blueberries, among others, (iii) aquatic plants such as cranberries and wapato, which were used for food, and cat-tails, used for mat-weaving, and (iv) medicinal and root crops in forested and alpine montane environments. Turner (1975, 1979) provides detailed descriptions of the traditional uses of plants by First Nations peoples in this region.

Archaeological Site Potential Assessment

A meeting with Dave Schaepe, Archaeologist with the Department of Aboriginal Rights and Title, Stó:lō Nation, was held on January 27, 2003 at the Stó:lō Nation offices in Chilliwack. The proposed development project was discussed and archaeological policy and procedures for a Stó:lō Nation Heritage Investigation Permit were outlined. Information presented in an archaeological overview assessment (AOA) of the Chilliwack Forest District was examined. A review of known and potential archaeological resources in the southern portion of the Chilliwack Forest District was prepared by Golder Associates Ltd in co-operation with the Stó:lō Nation for the Ministry of Forests in 1999. The Golder review identified selected locations within the proposed development area with moderate potential for habitation sites. The Golder review was subsequentially revised by Dave Schaepe and Sonny (Albert) McHalsie (2001) on to 1:20,000 TRIM map sheets as the Ministry of Forests Special Management Zones as defined by Stó:lō Nation.

A review of the earlier Golder model indicated areas of potential for archaeological sites at both the lower and Upper Terminal locations. A review of the Special Management Zones 1:225,000 map for the study area indicated that no villages had yet been identified at or near the Base Terminal, Tram Way, or Upper Terminal. Villages were identified along the Fraser River northwards from the Base Terminal location. Documented trails along the Fraser River were also identified north of the Base Terminal and a documented trail, providing access to Elk Mountain, was identified some distance to the southwest of the Base Terminal. The crest of the

ridge (divide between the Fraser Valley and Chipmunk Creek drainage) was identified as an extrapolated trail and would pass through the proposed Upper Tram Terminal.

In addition, McHalsie (2001) has identified several named land features in association with the Mt. Cheam locality. These include *Lhílheqey* (contemporary name Mt. Cheam) who was a woman transformed into a mountain peak, *Séyewòt* (*Lhílheqey's* oldest daughter; transformed into the small mountain peak located in front of *Lhílheqey)*, *Óyewot* (*Lhílheqey's* second daughter who was transformed into a small mountain peak located beside *Séyewòt)* and *Xomó:th'iya* (*Lhílheqey's* youngest daughter transformed into the small mountain peak southwest of *Lhílheqey*) whose tears form the waterfall in Anderson Creek (McHalsie 2001:152). Further to the southeast is *Sqwemá:y* another transformed mountain peak (contemporary name – Lady Peak) which indicates knowledge of upland localities.

Prior to the field survey, the archaeological potential within the proposed development areas were evaluated. The evaluation process included a search of the Provincial Heritage Register Database (PHRD) to determine if any archaeological sites had been recorded previously in the development areas. A review of regional archaeological, ethnographic and paleoenvironmental literature was also undertaken. Forest cover maps, topographic maps, development plans, aerial photographs, and First Nations' input were also reviewed.

Using these resources, assessment of archaeological potential, including potential for forest utilization sites, was based on a consideration of several variables, including:

- proximity to known archaeological sites and traditional use sites;
- proximity to traditional resource areas (e.g. fisheries, plant collection locations, hunting grounds);
- proximity to alpine/mountain ridge settings;
- proximity to trails and transportation routes;
- terrain attributes (e.g., degree of slope, exposure/aspect, elevation, distance to potable water, prominent landforms, relic drainages);
- forest stand characteristics and industrial logging history; and
- biogeoclimatic information.

This information, together with available historic, ethnographic, and traditional use data, was compiled to create an inductive model based on awareness that certain biophysical variables favourably influenced traditional land use practises known to result in the formation of archaeological sites.

The development areas were categorized as lands rated as having moderate archaeological potential (Base Terminal), lands with high archaeological potential (Upper Terminal) both of which require further archaeological investigations. Those lands assessed as having low archaeological potential, (e.g. Tram Right-of-way) did not require further action. The assessment of potential continued during the field surveys, focusing on observations about proximity to water, wildlife values, potential fish and plant resources, soil drainage quality, degree of slope, aspect, and forest cover type.

A search of the Provincial Heritage Register Database of archaeological sites revealed that no archaeological sites are located in the immediate vicinity of the proposed Base and Upper

Terminal development locations. However, previously identified archaeological sites are located within several kilometers of the Base Terminal development location. No known sites have been identified at or near the Upper Terminal locality; however, sites have been identified in similar subalpine settings further to the east near Mount Cheam.

Based upon the information provided by the archaeological site potential assessment, it was determined that an AIA was the appropriate course of action. The AIA would be undertaken for the proposed base and Upper Terminal in order to identify, evaluate, and assess impacts to any archaeological sites in the development area.

Archaeological Impact Assessment Procedures

The archaeological impact assessment was comprised of a number of research components, including liaison, archaeological potential assessment, field survey and report. As no archaeological sites were identified site recording, site significance evaluation, and assessment of project impacts were not undertaken. The methods for each component are discussed below.

Communication With First Nations

The assessment was carried out under Stó:lō Nation Heritage Investigation Permit #2003-12 issued by the Stó:lō Nation and Heritage Inspection Permit 2003-149, issued by the Archaeology and Registry Services Branch pursuant to Section 14 of the *Heritage Conservation Act* (RSBC 1996, Chap. 187). Prior to the fieldwork, representatives of Archaeological Permitting Section (Archaeology and Registry Services Branch), the Stó:lō Nation, the Skwah First Nation, and the Cheam Indian Band were contacted by telephone and/or email. These individuals were informed about the nature and scope of the project, and scheduling for the fieldwork.

A member of the Stó:lō Nation and Cheam Indian Band communities participated in the fieldwork. These individuals had considerable prior experience in the identification and documentation of archaeological sites.

Upon completion of the fieldwork, the results of the assessment were communicated to the Stó:lō Nation community, the Skwah First Nation, Cheam Indian Band and they also received copies of this permit report, as well as the Archaeological Permitting Section.

Archaeological Impact Assessment Field Survey

The archaeological impact assessment was conducted on July 9 and 10, 2003 by D. Geordie Howe (Arcas Consulting Archeologists Ltd.), Dennis Leon (Stó:lō Nation), and Chemaine Douglas (Cheam Indian Band). Those locations assessed having moderate and high potential for habitation (based upon the project AOA) and some lands assessed as having low archaeological potential were examined (Figure 3).

The low, moderate and high potential locations were examined on foot with the crewmembers working approximately 5-15 m apart subject to terrain and visibility constraints. Visibility in the forest (for the Base Terminal and remnant forest adjacent to the Upper Terminal) ranged from 10 – 20 m depending on understory development. The survey involved the

inspection of standing and fallen trees for cultural modification, that is, modification resulting from traditional use by First Nations people.

In addition, the ground surface and natural exposures such as root throws and cutbanks were examined for artifacts, butchered animal bones, charcoal, and other evidence of past human activity. Bedrock outcrops and boulders observed during the AIA of the development area and mainline were also examined for rock art, consisting of either pictographs (rock paintings) or petroglyphs (rock carvings) or as shelter (rockshelter/cave). Some shovel testing was undertaken is selected locations; however, it should be noted that shovel testing was not considered necessary as numerous natural exposures and exposures resulting from recent historic logging activities were common. Shovel testing was undertaken in spatially limited areas to determine the nature of several small mounds identified in the Base Terminal development locations. Locations suitable for buried archaeological deposits were not observed during the AIA of the Upper Terminal development location.

Base Terminal

Survey coverage for the AIA consisted of a traverse of the boundaries of the Base Terminal location and selected traverses across the development location utilizing existing skid roads. The development property was not delineated by flagging or similar identification in the field and survey coverage was established based upon information provided during an in-field visit by the proponent and by using a Garmin GPS 12 XL hand-held unit. As the development location was not marked in the field the actual survey coverage included the Base Terminal location and a 100 m to 150 m buffer beyond the estimated boundaries of the site.

Upper Terminal

Based upon information provided during an in-field visit by the proponent, the proposed Upper Terminal development location will be situated within an existing clearcut. Selected traverses were undertaken across the existing clearcut, along existing logging roads within the proposed development location and section of the remnant forest between the upper logging road and the ridge crest.

Archaeological Impact Assessment Results

No archaeological sites (archaeological sites which predated 1846 and which are automatically protected under the *Heritage Conservation Act*) and no cultural heritage sites (non-protected archaeological sites) were identified within the examined areas of proposed Base Terminal and Upper Terminal development locations. As both development locations were small in area survey coverage for both locations was extensive.

Base Terminal

Several small mounds were identified near a small drainage channel. Shovel testing indicated that these mounds consisted of similar material to the surrounding parent material. The mounds were assessed as non-cultural resulting from sediment slumping and/or root throws. A recent water-well consisting of a concrete cistern and plastic drainage hose were observed in the

southwestern portion of the surveyed area. Evidence of earlier industrial logging (cut stumps and springboard notches) and recent logging activities associated with harvesting of the community forest were observed. A log frame structure planned as a community forest interpretive center is currently under construction adjacent to a recently constructed landing/parking area. No archaeological sites and cultural heritage sites including culturally modified trees (CMTs) were identified within the examined areas of proposed Base Terminal development location.

Upper Terminal

One small mountain hemlock tree with an bend in its lower trunk and a small low overhang in a bedrock outcrop, which could provide some shelter, were identified section within the remnant forest along the ridge crest. No evidence was observed suggesting that the bent hemlock tree was cultural in origin and no evidence was identified indicating use of the low overhang as a rockshelter. No archaeological sites and cultural heritage sites including culturally modified trees (CMTs) were identified within the examined areas of proposed Upper Terminal development location.

Conclusion and Final Remarks

The potential for finding as-yet-unidentified archaeological sites, including CMTs, within the proposed development locations, is considered to be low. Providing that the proposed boundaries of the Base and Upper Terminals are not significantly altered, we recommend that no further archaeological work be undertaken.

Users of the report should be aware that even the most thorough investigation may fail to reveal all archaeological remains, including protected sites under the BC *Heritage Conservation Act*, that exist on a property. All users of this report should be aware that: (1) archaeological remains in BC may be protected from disturbance, intentional or inadvertent, by the *Heritage Conservation Act* (BC) and Section 51 of the *Forest Practices Code Act* (RSBC 1995); (2) in the event that archaeological remains are encountered, all ground disturbance in the immediate vicinity must be suspended at once; (3) it is the individual's responsibility to inform Resorts West BC, the Archaeology and Registry Services Branch, the Cheam Indian Band, the Skwah First Nation and the Stó:lō Nation, of the location and type of archaeological remains and the nature of the disturbance as soon as possible; and (4) the *Heritage Conservation Act* (BC) allows for heavy fines and imprisonment for failing to comply with these requirements.

I trust that this letter report has provided you with the information you require. Please do not hesitate to call me if you have any questions or if you require any additional information. We will send a copy of this report to the Cheam Indian Band, the Skwah First Nation and the Stó:lō Nation. Thank you for the opportunity to conduct this study.

Sincerely,

Arcas Consulting Archeologists Ltd.
Per:

D. Geordie Howe, B.A., RPCA
Archaeologist

cc. Chief and Council, Cheam Indian Band
Chief and Council, Skwah First Nation
Dave Schaepe, Archaeologist, Department of Aboriginal Rights and Title, Stó:lō Nation

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