



MASTER PLAN



Whitewater

S K I R E S O R T

Nelson British Columbia, Canada

Revised May 2010

MASTER PLAN



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Table of Contents

1.0	Introduction	1
1.1	Introduction	1
1.2	The Planning Process	1
1.3	Vision, Goals and Objectives 2010	2
2.0	Existing Ski Area	3
2.1	Existing Facilities	3
3.0	Development Analysis	5
3.1	Introduction	5
3.2	Mountain Terrain Assessment	5
3.2.1	Slope Analysis	5
3.2.2	Elevation Analysis	6
3.2.3	Aspect Analysis	6
4.0	Master Plan Amendments	7
4.1	Introduction	7
4.2	Mountain Plan	9
4.2.1	Ski Lifts	9
4.2.2	Ski Trails and CCC	10
4.2.3	Controlled Recreation Area	16
4.2.4	Avalanche Control	16
4.2.5	Summer Use	16
4.3.1	Base Area Potential	19
4.3.2	Balanced Resort Capacity	19
4.3.3	Space Use	19
4.3.4	Bed Units	22
4.3.5	Base Area Components	22
4.3.6	Village Core	22
4.3.7	Silver Lodge	25
4.3.8	Maintenance Area	26
4.3.9	Resort Residential	26
4.3.10	Employee Housing	26
4.3.11	Parking	28
4.4	Phasing	28
4.5	Environment and Wildlife	31
4.5.1	Existing Master Development Agreement	31
4.5.2	Water Quality	32
4.5.3	Fish Habitat	32
4.5.4	Mountain Caribou	32
4.5.5	Grizzly Bears	34
4.5.6	Wolverine	34
4.5.7	Whitebark Pine	34
4.6	Infrastructure	34
4.7	Access	37
4.8	Development Impact Comparison	37
5.0	Appendices	40
5.1	Environmental Report	40

List of Figures

FIGURE 3-1 SLOPE ANALYSIS	5
FIGURE 3-2 ELEVATION ANALYSIS	6
FIGURE 3-3 ASPECT ANALYSIS	6
FIGURE 4-1 MOUNTAIN PLAN BY SKIER CATEGORY	11
FIGURE 4-2 3D VIEW 1	12
FIGURE 4-3 3D VIEW 2	14
FIGURE 4-4 MOUNTAIN PLAN - ILLUSTRATIVE	15
FIGURE 4-5 CRA CHANGES	17
FIGURE 4-6 BASE AREA SLOPE ANALYSIS	18
FIGURE 4-7 BASE AREA PLAN	23
FIGURE 4-8 VILLAGE CORE PLAN	25
FIGURE 4-9 BASE AREA PHASING PLAN	27
FIGURE 4-10 MOUNTAIN PHASING PLANS	29
FIGURE 4-11 SKI PODS - 2007 MASTER PLAN	38
FIGURE 4-12 SKI PODS - 2010 MASTER PLAN	39

List of Tables

TABLE 1 SKI AREA SLOPE ANALYSIS	5
TABLE 2 SKI AREA ELEVATION ANALYSIS	6
TABLE 3 SKI AREA ASPECT ANALYSIS	6
TABLE 4 SKI LIFTS	9
TABLE 5 SKI TRAILS AND CCC	10
TABLE 6 BASE AREA SLOPE ANALYSIS	18
TABLE 7 WHITEWATER SPACE USE REQUIREMENTS	20



1.0 INTRODUCTION

1.1 Introduction

In 2008, Whitewater was purchased by the Knee Deep Development Corporation. Their goal is to ensure that the powder skiing, backcountry oriented character of Whitewater is preserved while making measured improvements to the offering. The intent is to upgrade the skiing experience with the gradual development of new lifts and trails, the addition of a Village component and the incorporation of resort accommodation. These aspirations are consistent with the current Master Plan as agreed to in the 2007 Master Development Agreement between Whitewater Ski Resort Ltd. and the Province of British Columbia. While the proposed facilities have been rearranged, they are all contained within a slightly reduced Controlled Recreation Area.

Vision Statement

Whitewater will promote the culture and passion of a unique mountain experience.

As such, this is not a new Master Plan but a revision to that Master Plan. The details of these proposed intentions are outlined as follows.

1.2 The Planning Process

In the fall of 2008, Brent Harley and Associates Inc. were retained to assist in the creation of the Master Plan. Subsequently, new topographic mapping of the Whitewater area was acquired, existing facilities were inventoried and an indepth terrain analysis completed. This acted as the basis for a fresh look at the potential of the resort. The planning process was initiated with the establishment of a new Vision, Goals and Objectives for Whitewater. Using this as the foundation, a series of concepts were explored, leading to a preferred concept and ultimately to the proposed plans for the Master Plan.

1.3 Vision, Goals and Objectives 2010

Whitewater has a long standing reputation as a ski area that is renowned for its abundant powder snow, its high quality backcountry touring, its friendly club-like ambiance, and its beautiful mountain setting. The owner's Vision for the Whitewater of the future will see this established culture of adventure and the passion of escaping to the outdoors and the mountains preserved and reinforced with the methodical development of powder skiing oriented lifts and trails, complemented with the creation of a small resort village surrounded by ski to / ski from accommodation.

To achieve this Vision, the following are the key Development Goals and Objectives of Whitewater:

- Respect the natural environment and setting, acknowledging that this is the baseline attraction and currency to Whitewater;
- Ensure that any development on the mountain is designed to provide a low density, powder skiing experience;
- Accommodate backcountry skiing, seeing Whitewater as a staging access and egress point to adventure;
- Embrace extreme skiing;
- Improve the mix of skiing with an emphasis on increasing the amount of developed intermediate and gladed ski terrain;
- Proceed cautiously with a "less is more" approach, staying with fixed grip lift technology;
- Develop formalized lift and trail systems on the Backside, Qua Basin and White Queen terrain;
- Realign and expand the parking lot;
- Gradually establish a village core and a mix of resort residential accommodation and an on-mountain lodge, acting as Whitewater's pre and post skiing focal points;
- Ensure that all building architecture at Whitewater has a "rustic backcountry lodge" ambiance;
- Ensure that Whitewater is developed in a fully sustainable fashion (socially, culturally, environmentally and economically).

2.0 EXISTING SKI AREA

2.1 Existing Facilities

Mountain

Currently, Whitewater operates within a Controlled Recreation Area of 1,314 hectares. Internal to this, there are two chairlifts and one handle tow, servicing 117 hectares of developed ski trails and glades plus another 500 hectares of skiable, naturally gladed terrain. Based on the new mapping, the All Season Resort Policy (ASRP) and the

Existing Numbers:

CRA - 1,314 Ha

CCC - 1,106 skiers

BRC - 1,272 visitors

Policy Guidelines, the Comfortable Carrying Capacity (CCC) of the existing facilities has been calculated to be 1,106 skiers and snowboarders per day. (This is slightly less than the current Master Plan which pegs the CCC 1,305 skiers per day). From this, taking into account Nordic skiers, backcountry skiers and passive guests, the existing Balanced Resort Capacity (BRC) is 1,272 visitors per day.

Base Area

The base area at Whitewater is made up of a Day Lodge, three parking lots and a Maintenance Building.

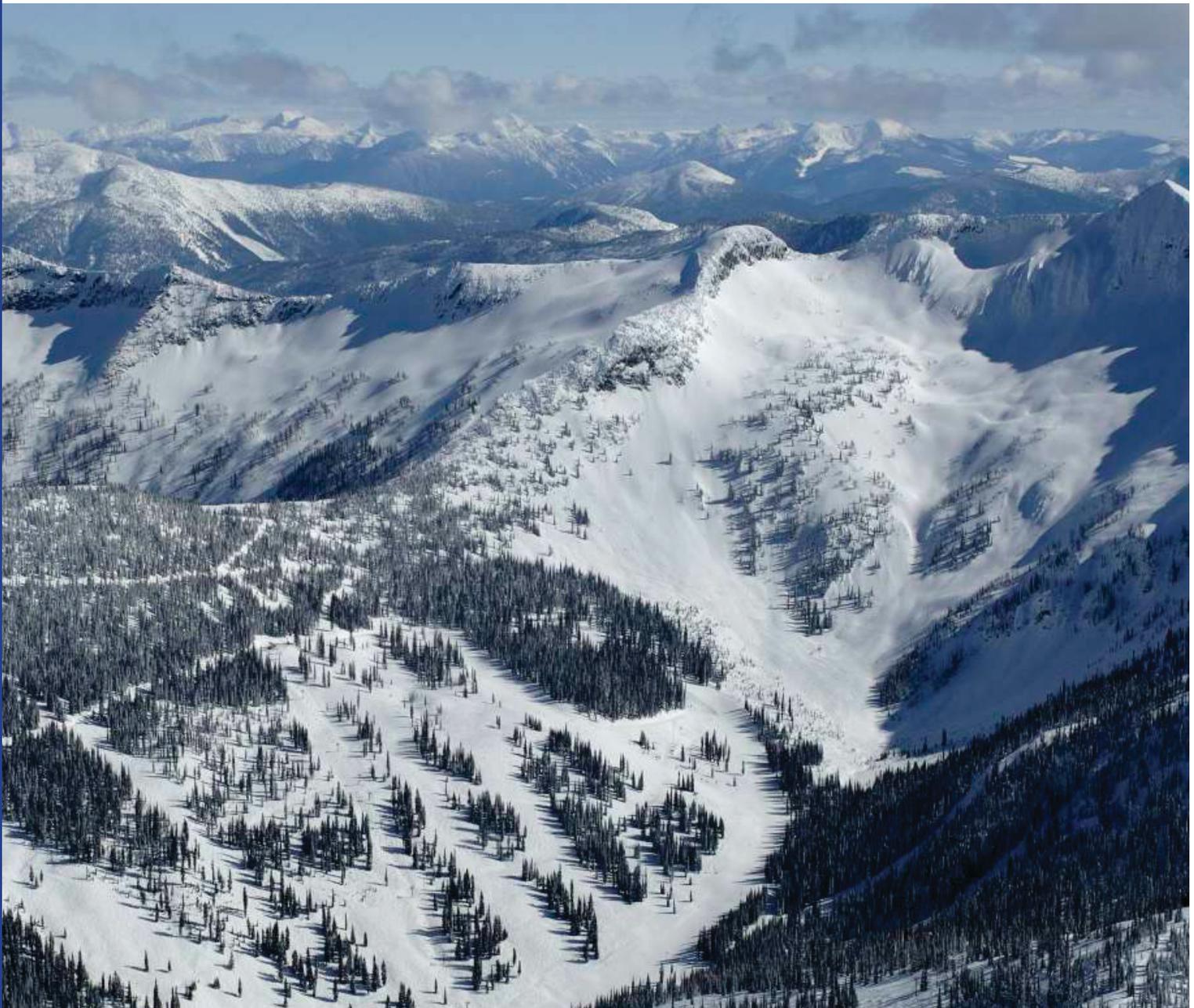
The Day Lodge is about 15,725 sq feet in size. Based on industry standards, this is very close to being the right size of a facility to service the calculated BRC. Key identifiable opportunities for improvements in the future include an increase in built space for washrooms, kitchen, retail, ski school and day care / kids facilities.

The current parking lot capacity is about 500 cars and 5 buses. Based on the BRC, this closely matches the parking requirement totals. However, experience shows that the parking lots in their existing configurations are insufficient on busy days. This may be a function of inefficiencies in the size and layout. The new plan will need to address this.



Bed Units

Utilizing the existing BRC and the ASRP Guidelines bed unit model, Whittewater as it stands should be able to support 1,017 bed units. The existing Master Plan is only calling for the development of 308 bed units at buildout. (It should be noted that this difference is a function of the calculations now being based on the 2005 All Season Resort Guidelines as compared to the 1996 Ski Area Guidelines that would have been used in the creation of the existing Master Plan).



3.0 DEVELOPMENT ANALYSIS

3.1 Introduction

With the new map base, the existing Controlled Recreation Area was re-analysed in an effort to revisit the existing Master Plan. These analyses confirmed the basic findings of the earlier planning exercise.

3.2 Mountain Terrain Assessment

3.2.1 Slope Analysis

The slope analysis (Figure 3-1) divides the topography of the study area into a range of skiable gradients as they relate to the primary skier/snowboarder skill classes. These are as follows:

This analysis illustrates the abundance of Intermediate terrain in the Qua Basin and the Backside areas. In turn, this confirms the opportunity to increase the amount of developed Intermediate skiing at Whitewater, improving the overall ski product offering.

It is also clear that there is significant advanced and expert skiing adjacent to the White Queen summit as well extreme skiing opportunities associated with Ymir Bowl, Prospector Bowl and Trash/Sherpa Ridge.

Colour	Classification	Gradient Criteria
White	Too Flat	0-8%
Green	Beginner	8-25%
Blue	Intermediate	25-45%
Grey	Expert	45-80%
Red	Too Steep	>80%

Table 1 Ski Area Slope Analysis

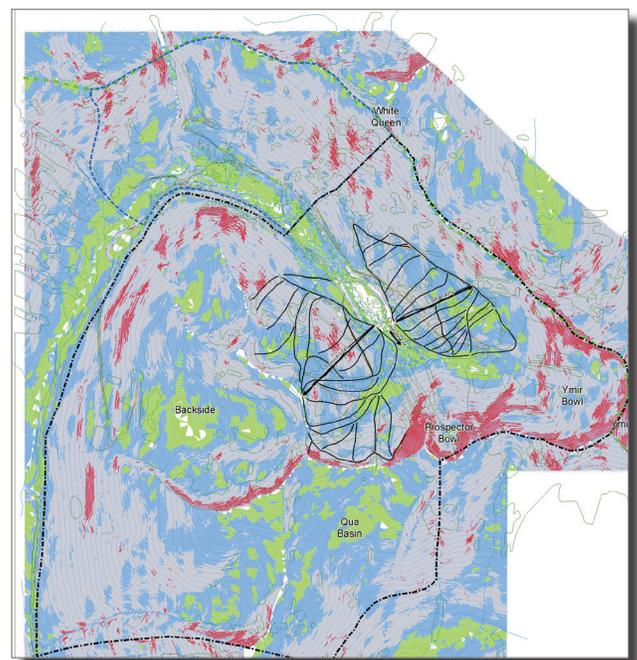


Figure 3-1 Slope Analysis

3.2.2 Elevation Analysis

The Elevation Analysis (Figure 3-2) slices the topographic features of the study area into 50 metre increments. Effectively this analysis illustrates the height and “flow” of the land, again confirming the previously identified potential at Whitewater.

Elevation	
2300 - 2395m	1600 - 1700
2200 - 2300	1500 - 1600
2100 - 2200	1400 - 1500
2000 - 2100	1300 - 1400
1900 - 2000	1200 - 1300
1800 - 1900	1185 - 1200m
1700 - 1800	

Table 2 Ski Area Elevation Analysis

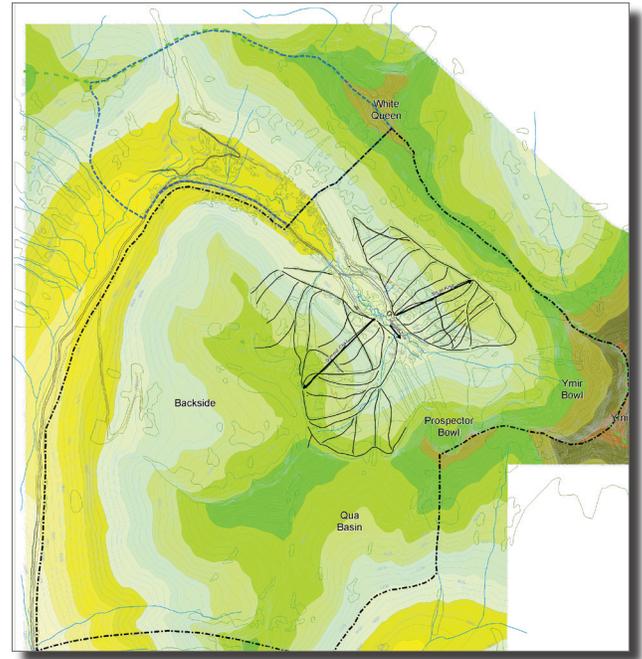


Figure 3-2 Elevation Analysis

3.2.3 Aspect Analysis

The Aspect Analysis (Figure 3-3) 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. This analysis has been utilized in the design of the ski trail alignments and the positioning of the proposed base area facilities at Whitewater.

Aspect	
Flat	South
North	Southwest
Northeast	West
East	Northwest
Southeast	North

Table 3 Ski Area Aspect Analysis

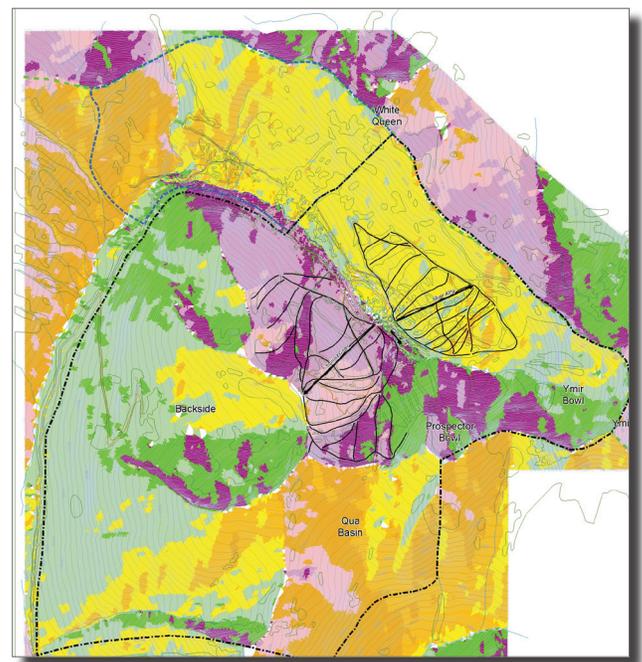


Figure 3-3 Aspect Analysis

4.0 MASTER PLAN AMENDMENTS

4.1 Introduction

After careful review of the current Master Plan in the context of the new Vision, Goals and Objectives, while respecting the existing development and taking into account the environmental and physical realities at Whitewater, the new configuration of the mountain and base area facilities was created. The following were key points of consideration:

1. There is significant untapped opportunity for lift serviced skiing within the CRA on the Backside, Qua Basin and the White Queen terrain;
2. The Backside terrain is of such an expanse and high quality, to service the potential ski trails and glading will require three ski lifts;
3. Access to the Backside 3 terrain would be best served with a short chair lift up to the Trash/Sherpa Ridge, as compared to the currently proposed Powder Keg Chair, a more expensive primary lift out of the base;
4. Lift access to the Ymir Ridge via the potential chair originating from the Qua Basin would add a new dimension to the offering at Whitewater. This would replace the currently proposed chair in the Ymir Bowl;
5. There is significant untapped opportunity for lift serviced skiing within the CRA up to the White Queen ridge on the Silver King terrain;
6. A cat accessed on-mountain Lodge opportunity was identified on the face of the Silver King slopes;
7. Apex Creek runs through the middle of the base area lands. To respect the associated riparian areas, a 30 metre setback from the braided edges of the creek defines a no development zone;
8. The Maintenance Building currently occupies terrain ideally suited for ski in / ski out accommodation. A new location for this facility has been identified outside of the heart of the potential resort development area, but still centrally located with direct snow and road access;
9. There are several benches of terrain in the base area with direct ski in / ski out access that have significant resort accommodation development potential;



10. There is an opportunity to develop a ring road alignment that will enable an operationally more efficient parking configuration and a higher quality entrance and exit experience;
11. There is an opportunity to establish a consolidated core village area that will act as the primary focal point to Whitewater.

All of these design elements were incorporated into the proposed realignment of the lifts, trails and base area development.

4.2 Mountain Plan

4.2.1 Ski Lifts

The addition of new ski lifts and the upgrade of the existing ski lifts will occur in an incremental fashion phased over time. The Mountain Plan (Figure 4-1) illustrates the amended lift and trail layout. The following Table lists the existing and proposed ski lifts:

Table 4 Ski Lifts

Lift Name	Lift Type	Vertical Drop (m)	Slope Length (m)	Hourly Capacity (Theor.)	Uphill CCC	Downhill CCC
Existing Lifts						
Summit Chair	4C	369	903	2,400	745	825
Silver King Chair	4C	252	738	2,400	533	473
Hummer Carpet	C	13	132	600	33	21
Proposed Lifts						
Backside 1	4C	611	1565	2,400	695	550
White Queen	2C	552	1173	1,200	518	421
Sherpa Ridge Lift	2C	110	242	1,200	109	0
Backside 2	4C	352	1522	2,400	712	690
Backside 3	4C	331	1213	2,400	848	1,078
Qua Chair	4C	353	1177	2,400	916	941
Totals					5,109	5,000

4.2.2 Ski Trails and CCC

Currently there are 49 ski trails on 117 hectares of terrain at Whitewater. At buildout the number of ski trails will grow to 144 on a total of 413 hectares. In addition to the developed terrain, the lift and trail configuration will provide access to approximately 700 more hectares of skiable terrain all within the CRA.

Technically, based on the proposed developed trails, the CCC can grow from the existing 1,106 to 5,000 skiers per day at buildout. It should be noted that, while this capacity far surpasses the ability of the base area lands to stage, the proposed ski facilities development will cater to the desired very low density powder skiing product. The following Table summarizes the area and capacities by skier skill class at buildout.

Table 5 Ski Trails and CCC

Capacity by Category								
Pod Name	Area (Ha)	Beginner	Novice	Low Interm.	Intermediate	Advanced	Expert	Downhill CCC
Summit Chair	94	16	76	54	315	298	66	825
Silver King Chair	37	0	116	43	135	179	0	473
Hummer Carpet	1	21	0	0	0	0	0	21
Backside 1	70	0	0	84	502	202	80	868
White Queen	35	16	0	0	80	206	119	421
Sherpa Ridge Lift	52	0	0	159	282	269	0	710
Backside 2	38	51	0	78	74	218	52	473
Backside 3	16	0	128	75	0	65	0	268
Qua Chair	70	19	0	137	540	220	24	941
Totals	413	123	320	630	1,928	1,657	241	5,000

Key Numbers:

Existing CCC - 1,106 skiers

Proposed CCC - 5,000 skiers

Figure 4-1 Mountain Plan by Skier Category

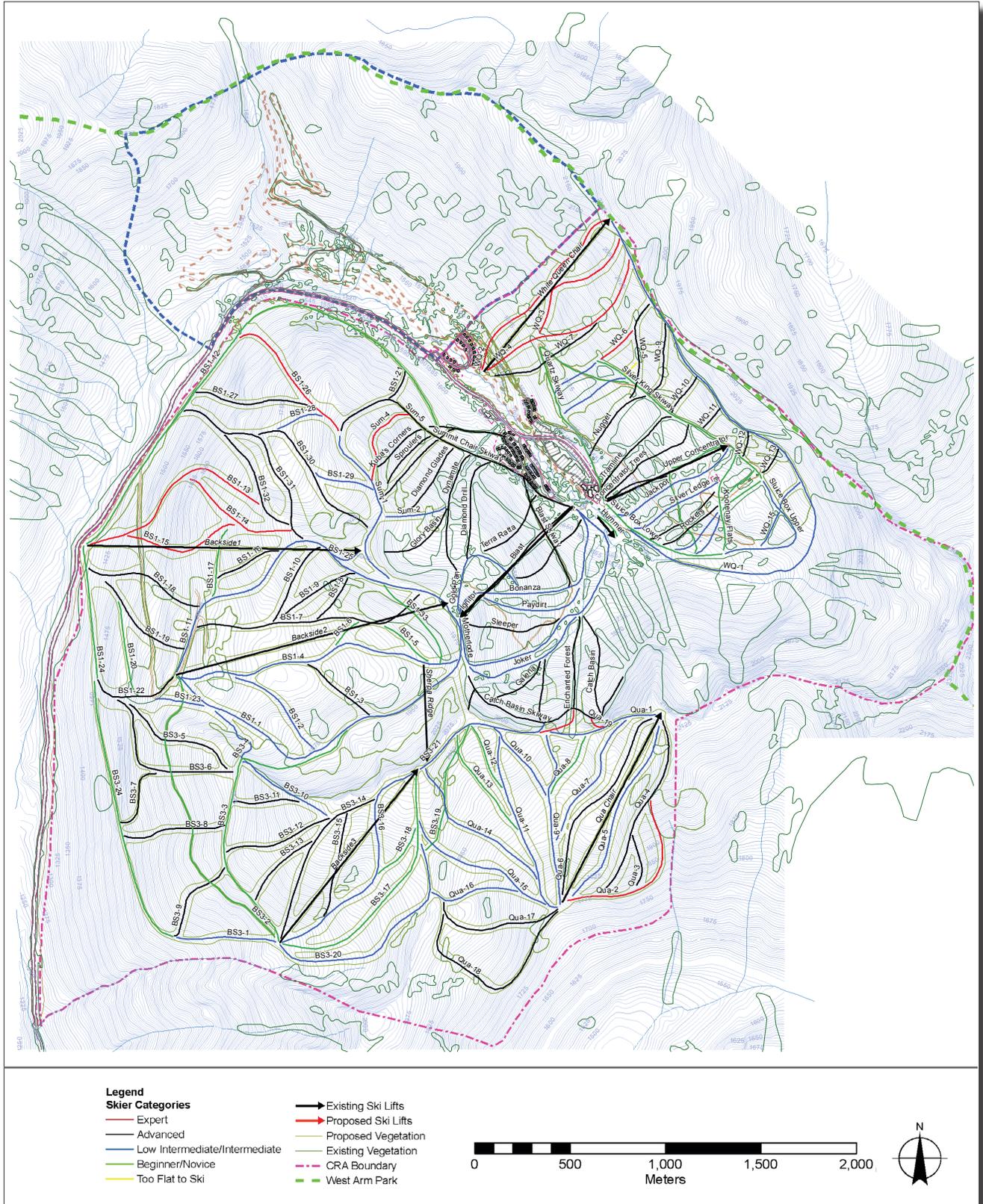
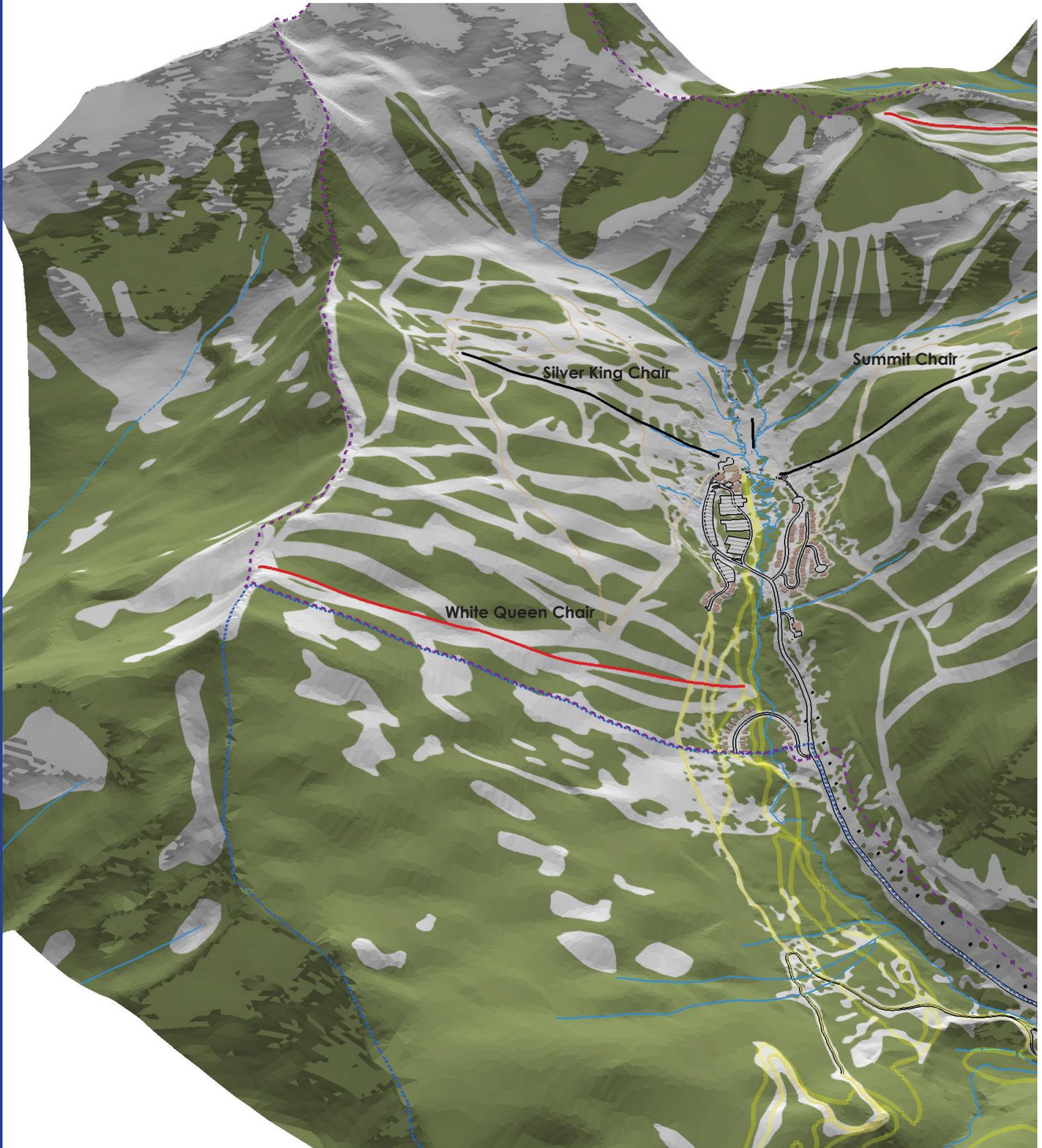


Figure 4-2 3D View 1



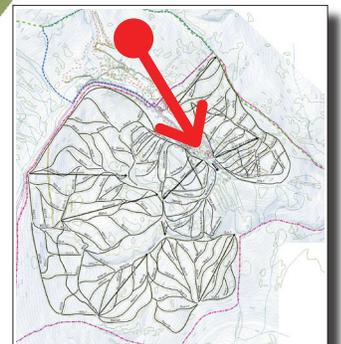
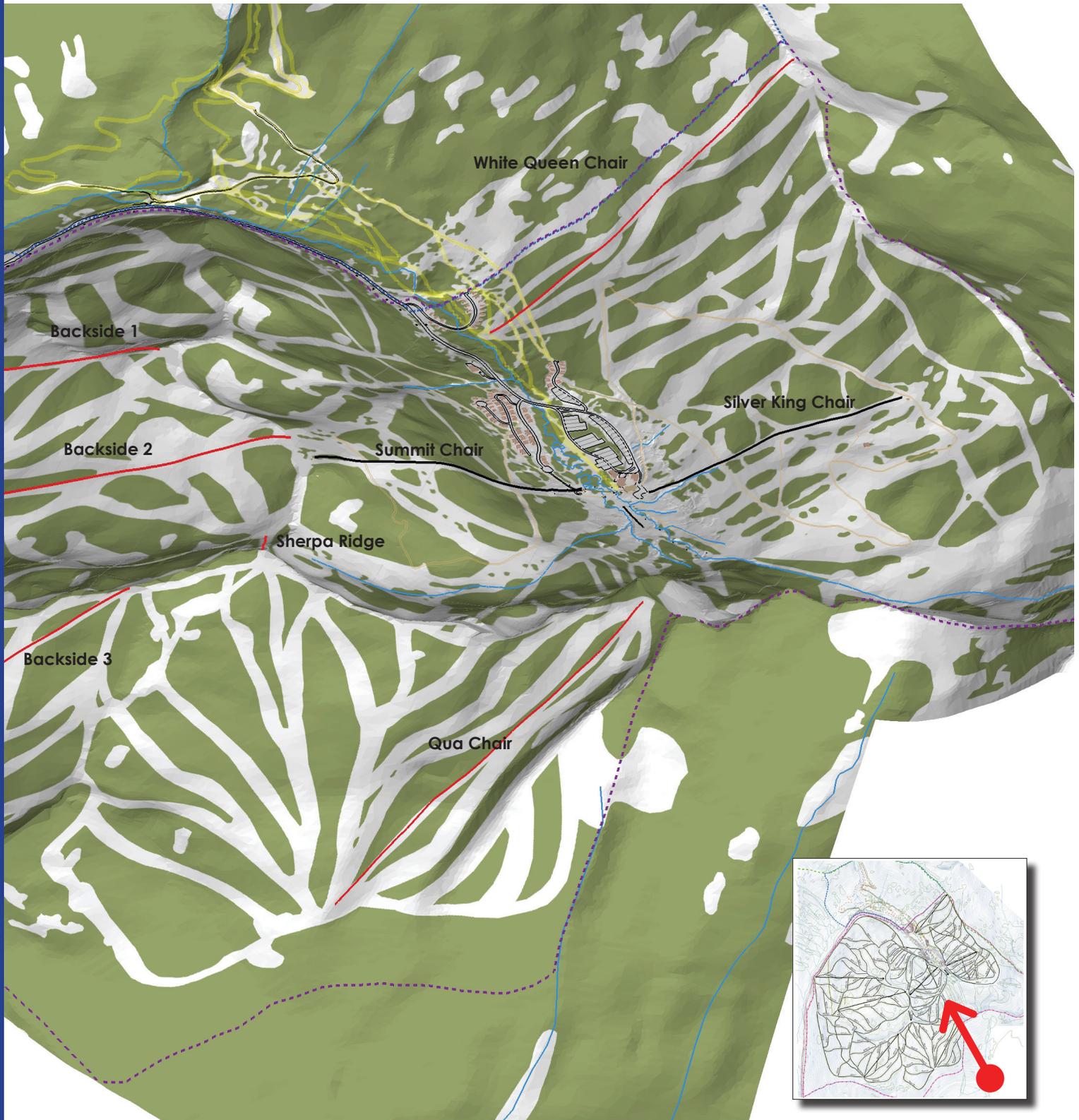


Figure 4-3 3D View 2



4.2.3 Controlled Recreation Area

The alignment of the proposed Backside 1 Chair and the associated return trails would be best served with an adjustment to the CRA boundary. As illustrated in Figure 4-5, this would increase the area of the CRA by 6.0 hectares. In addition, in order to gain access to the proposed single family development adjacent to the Nordic ski trails and the License of Occupation area, the CRA boundary will need to be expanded, increasing the area by another 0.513 hectares.

In exchange, a 23.6 hectare portion of the eastern border is proposed to be removed. This results in a net reduction of the CRA of 16.6 hectares, lessening the total CRA down to 1,297.4 hectares from the current area of 1,314 hectares.

4.2.4 Avalanche Control

Whitewater has a long history mitigating avalanche hazards and the area is renowned for its eminently skiable avalanche terrain. The area has a formal procedure that follows the Canadian Avalanche Association professional guidelines with respect to avalanche safety policy. The expanded terrain does not present any insurmountable or significant change to Whitewater's current avalanche safety plan.

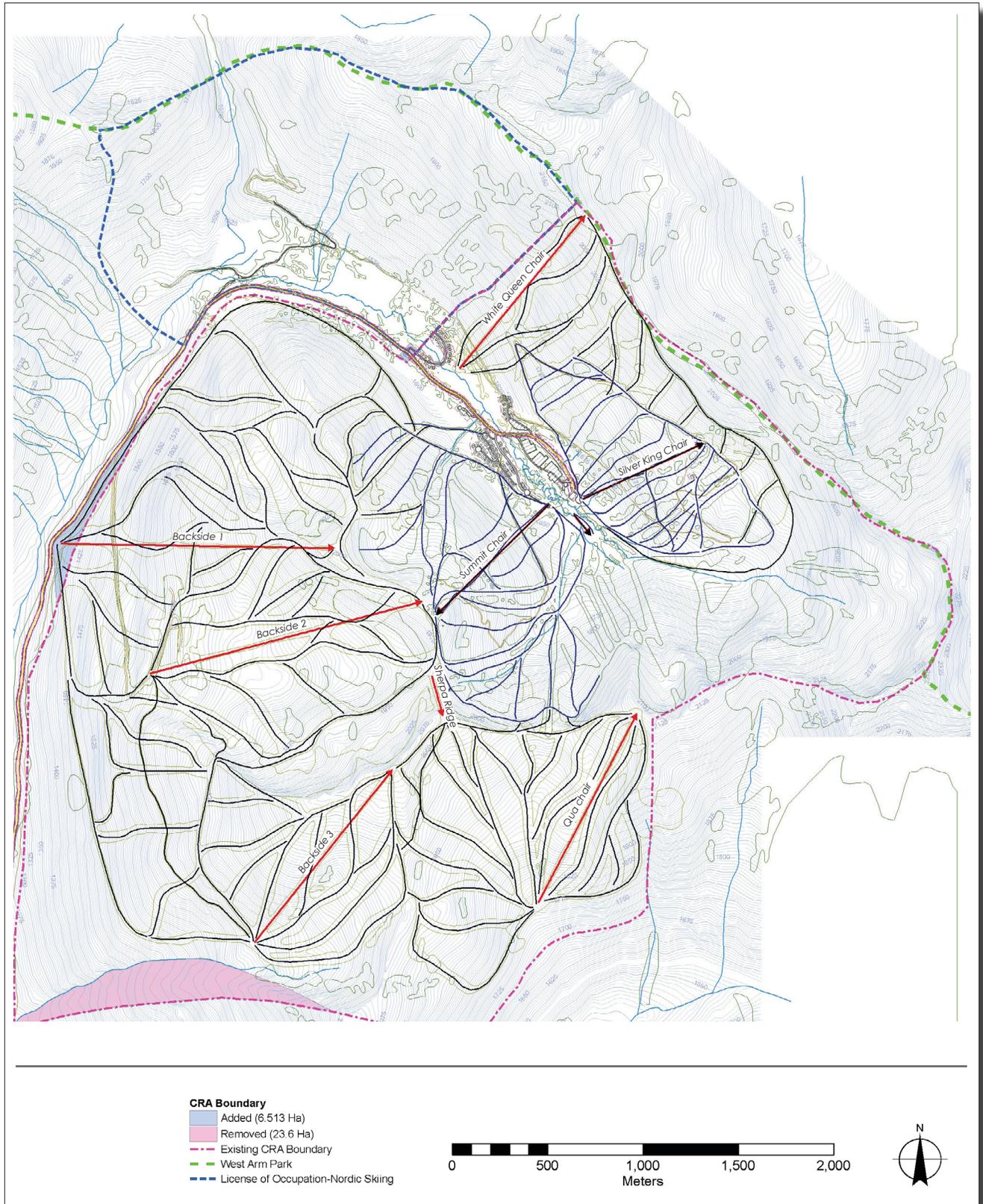
A site specific avalanche risk assessment conducted by Chris Stethem and Associates of Canmore, Alberta, determined there was no significant threat or hazard to the access road or Backside #1 lift terminus or towers as a result of run cutting in this area.

The base area resort residential development is not affected in any way by avalanche risk.

4.2.5 Summer Use

In terms of expanded all-season use, Whitewater is already a popular summer hiking venue. It is anticipated that with the establishment of overnight accommodation, there will be increases in summer activities in the future. It should be noted that because of the fact that the area is dominated by steep terrain, the potential for

Figure 4-5 CRA Changes



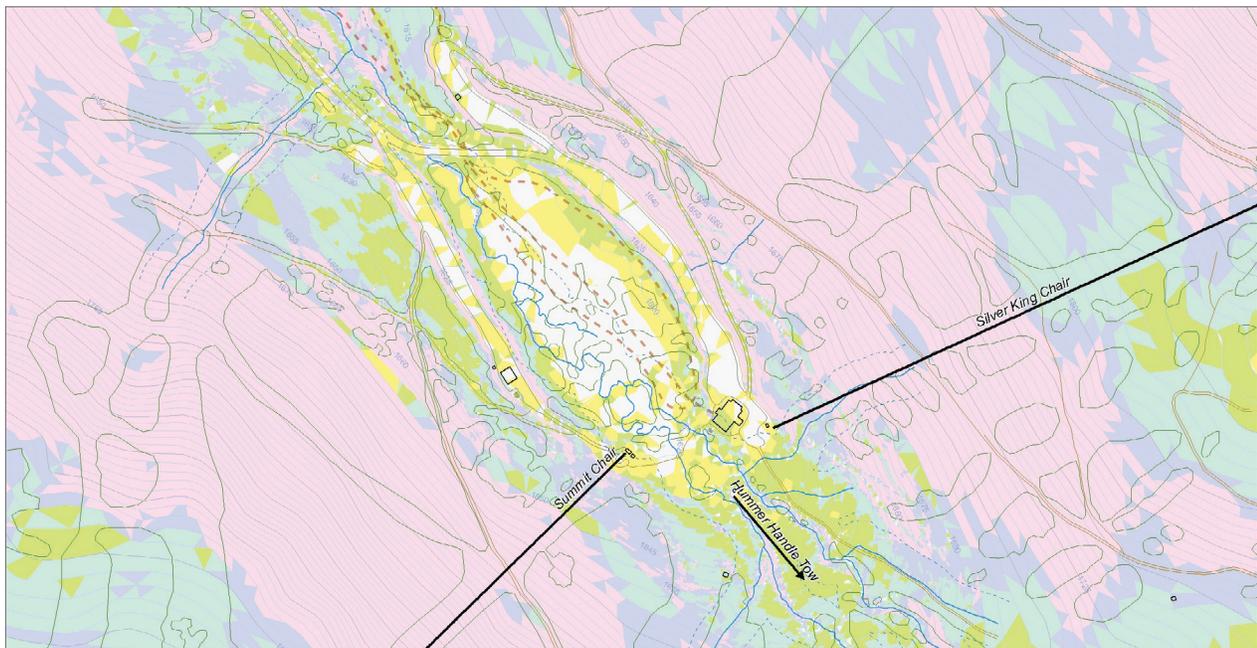
large scale use is very limited. (There is no potential of establishing a golf course; lift-serviced mountain biking is largely negated by the fact that the terrain is dominated by gradients beyond the capability of the majority of the downhill mountain biking marketplace; there is only limited cross-country mountain biking potential).

4.3 Base Area Plan

Colour	Gradient Criteria	Characteristics
White	0-5%	Capable of accommodating all types of base area development with limited grading. Typically identifying parking potential as well as lands that may be wet and environmentally sensitive to development.
Yellow	5-10%	
Green	10-20%	Lands that will require some grading to accommodate development. Upper limits to base area/village development.
Cyan	20-30%	Upper limits to multifamily development with grading.
Blue	30-40%	Upper limits to conventional single-family development.
Pink	>40%	Generally too steep for development. However, dependent on reasonable access and geotechnical considerations, some development possible .

Table 6 Base Area Slope Analysis

Figure 4-6 Base Area Slope Analysis



4.3.1 Base Area Potential

The base area lands are very tight. Relatively steep slopes edge the valley, with the braided Apex Creek running through the middle of it. Taking into account the potential development benches and respecting a riparian setback of 30 metres from the high water mark of Apex Creek, there is little developable land for Whitewater to use for the desired Village Core and accommodation. See Figure 4-6 Base Area Slope Analysis.

4.3.2 Balanced Resort Capacity

The Balanced Resort Capacity (BRC) at buildout is 5,720 people per day. This takes into account Nordic skiers, backcountry skiers and passive guests.

4.3.3 Space Use

Based on the BRC, Whitewater would need to establish 72,700 square feet of built space by buildout to provide for the needs of 5,720 people per day. Initially, the development capability of the base area lands will be a key determining factor in the practical capacity of Whitewater. The reality is that there are insufficient developable lands in the base area to match and accommodate the capacity and potential of mountain facilities development without compromising Whitewater's character. As such, the size and scale of the base area facilities of the Village Core have been planned to complement the development capability of the land. On review, this coincides with a BRC of 2,500 people per day. Ultimately, as Whitewater surpasses this number and moves toward buildout potential of their ski terrain, the base area facilities shortfall will be addressed with the development of on-mountain facilities.

As illustrated in Table 7, the total amount of built space planned for the Village equals 36,806 square feet. This is divided by service and function categories consistent with industry standards and distributed in the various base area buildings. The location of these functions are discussed and illustrated in the following sections, designed to best meet the needs and expectations of Whitewater's visitors, both in a day visitor and destination capacity. Further, the close proximity of Whitewater to the excellent, destination oriented facilities in Nelson (only a 20 minute drive) will play an ongoing role in determining the need and type of built space to be established at the resort.

Whitewater Space Use Requirements				
Proposed Capacities	Alpine CCC =	2185	Day	Commercial
	BRC =	2500	Lodge	Building
Proposed Size by Building (Sq Ft)			15,723	6,100
Service/Function	Existing Space	Required Space		
Restaurants and Related Facilities				
Restaurant*	5,026	10,615	5,050	400
Kitchen/Scramble*	958	4,246	2,000	175
Bar/Lounge	765	807	800	0
Circulation / Walls / Waste	538	783	330	200
Subtotal	7,287	16,452	8,180	775
Retail and Rental				
Equip Rental/Repair	1,270	2,023	2,023	0
Retail Sales*	322	4,384	1,480	1,000
Circ./Wall/Waste	75	320	100	95
Subtotal	1,667	6,727	3,603	1,095
Skier Services				
Washrooms	538	4,306	1,800	1,706
Ski Patrol/First Aid	581	776	0	776
Ski School	323	1,176	0	1,176
Public Lockers	2,497	1,176	475	150
Day Care/Nursery	430	2,517	1,450	0
Ticket Sales	215	235	0	0
Other	797	0	0	0
Circ./Wall/Waste	140	509	0	150
Subtotal	5,521	10,695	3,725	3,958
Operations / Storage				
Administration	538	1,317	0	0
Employee Lockers	215	353	0	0
Storage	215	153	0	0
Mechanical / Furnace	215	847	215	175
Circ./Wall/Waste	65	267	0	100
Subtotal	1,248	2,937	215	275
Total Built Space (Sq. Ft)	15,723	36,810	15,723	6,103
*Destination Component Added				

Table 7 Whitewater Space Use Requirements

Whitewater Space Use Requirements Continued						
Proposed Capacities				Silver		
	Hotel	Hostel	Kyosk	Lodge	Maintenance	Totals
Proposed Size by Building (Sq Ft)	7,855	4,455	390	1,420	860	36,803
Service/Function						
Restaurants and Related Facilities						
Restaurant*	2,970	1,420	0	800	0	-25
Kitchen/Scramble*	1,190	570	0	320	0	-9
Bar/Lounge	0	0	0	0	0	7
Circulation / Walls / Waste	250	0	0	0	0	3
Subtotal	4,410	1,990	0	1,120	0	16,475
Retail and Rental						
Equip Rental/Repair	0	0	0	0	0	-0
Retail Sales*	1,000	900	0	0	0	4
Circ./Wall/Waste	75	50	0	0	0	0
Subtotal	1,075	950	0	0	0	6,723
Skier Services						
Washrooms	300	300	0	200	0	-0
Ski Patrol/First Aid	0	0	0	0	0	0
Ski School	0	0	0	0	0	-0
Public Lockers	150	400	0	0	0	1
Day Care/Nursery	1,065	0	0	0	0	2
Ticket Sales	0	0	235	0	0	0
Other	0	0	0	0	0	0
Circ./Wall/Waste	150	200	0	0	0	9
Subtotal	1,665	900	235	200	0	10,683
Operations / Storage						
Administration	410	390	155	0	360	2
Employee Lockers	0	0	0	0	350	3
Storage	0	0	0	0	150	3
Mechanical / Furnace	175	175	0	100	0	7
Circ./Wall/Waste	120	50	0	0	0	-3
Subtotal	705	615	155	100	860	2,925
Total Built Space (Sq. Ft)	7,855	4,455	390	1,420	860	36,806
*Destination Component Added						

4.3.4 Bed Units

Once Whitewater establishes a BRC of 5,720, based on the Bed Unit Model of the All Season Resort Guidelines, the resort could technically earn 4,576 bed units.

Based on the existing BRC of 1,272, Whitewater has already earned 1,017 bed units.

Based on the base area driven BRC of 2,500, Whitewater will have earned 2,000 bed units.

As with the development of the base area facilities in the Village Core being restricted by the physical realities of the land, only 694 bed units can be established on site in a fashion that is consistent with the desired character and ambience of Whitewater.

4.3.5 Base Area Components

The proposed base area facilities include a Village Core, a mix of resort residential units, the on-mountain Silver Lodge and a maintenance area. See Figure 4-7 Base Area Plan. The layout is dependent upon an efficient realignment of the access road and parking lots.

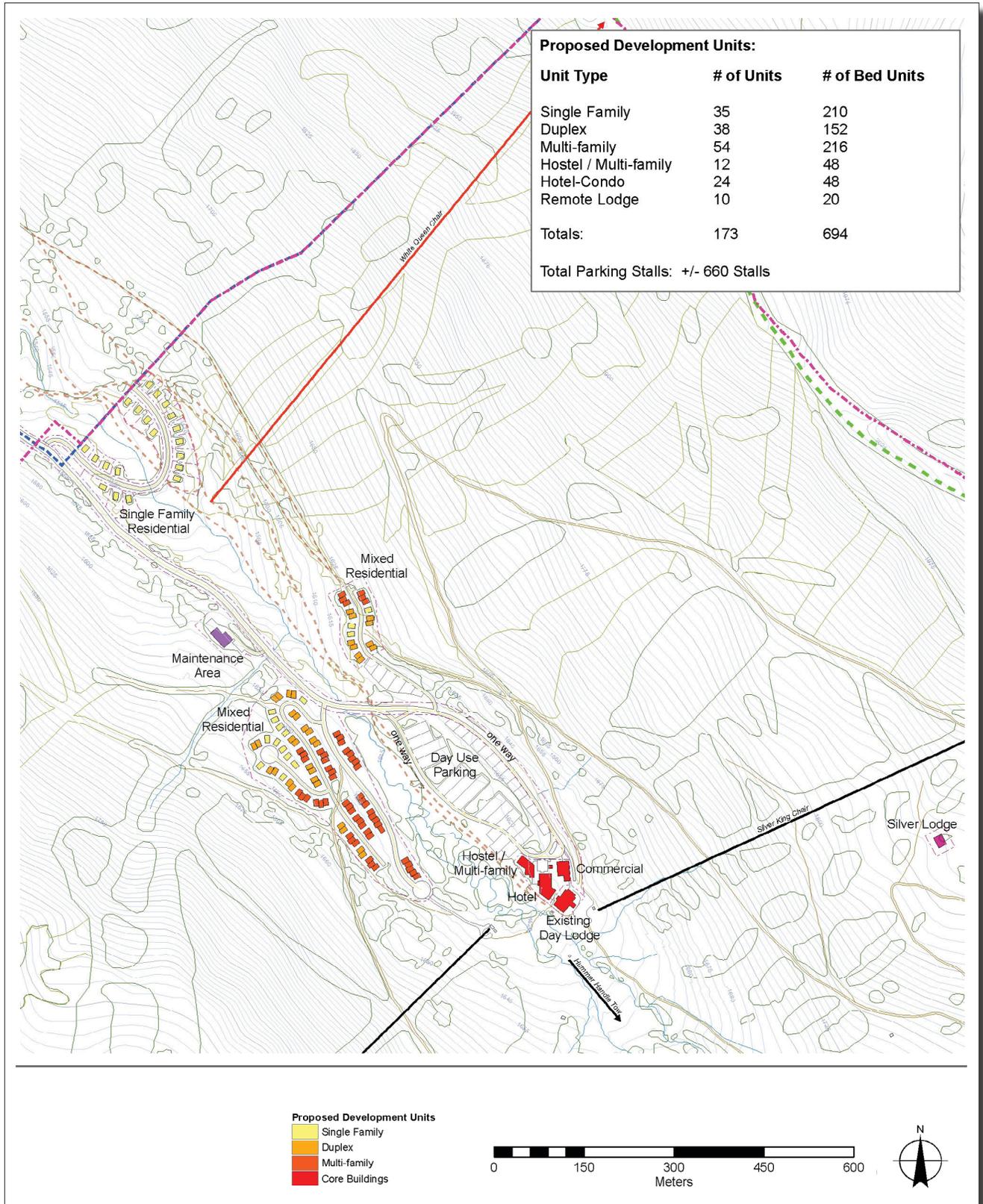
4.3.6 Village Core

The proposed building footprints in the Village Core defines the basic built space development potential. In total this area is proposed to contain approximately 34,500 square feet of built space. This equates to the majority of space use requirements to cater to a BRC of about 2,500 guests per day. As illustrated in Figure 4-8, the Village Core is made up of five buildings: the existing Day Lodge, the Commercial Building, the Hotel, the Hostel and the Kyosk. The development of these buildings will define a pedestrian oriented plaza that will act as a central meeting and gathering place for the patrons and guests of Whitewater.

Day Lodge

The existing Day Lodge will be renovated by buildout to accommodate space for a restaurant, pub, retail, rental, repair shop, day care, washrooms and lockers. The proposed legal boundaries, as illustrated on the plan, will be formally established to define a Crown land Lease for the Day Lodge. This area will be directly connected to a dedicated road access.

Figure 4-7 Base Area Plan



Commercial Building

The Commercial Building will be a three story structure housing retail, tickets, ski school, skier services, coffee shop bistro, ski patrol and administration. The ski patrol will have direct road access for emergencies. The coffee shop bistro will be developed with a southern orientation enabling outdoor seating on sunny days. In the third floor, three penthouse units have been planned as special lodge suites, which will eventually become staff accommodation. This will be contained within a legal boundary that will enable the resort to apply to purchase the lands via a Crown land grant.

Hotel

The Hotel is envisioned to be three stories, developed as a “mountain lodge”. As planned, this will house a mix of commercial facilities including specialty retail and restaurant/bar on the plaza level and two floors of condo hotel room accommodation above. As with the Commercial Building, the Hotel will be contained within a legal boundary that will enable the resort to apply to purchase the lands via a Crown land grant.



Hostel

The Hostel will also be developed in a lodge style but more oriented to cater to an affordable and communal accommodation product. The plaza level will have a cafeteria style dining facility for guests at the hostel and resort visitors. The upper two floors will likely be dormitory style accommodation units and may include additional suites to meet employee housing requirements. This building will be contained within a legal boundary that will enable the resort to apply to purchase the lands via a Crown land grant.

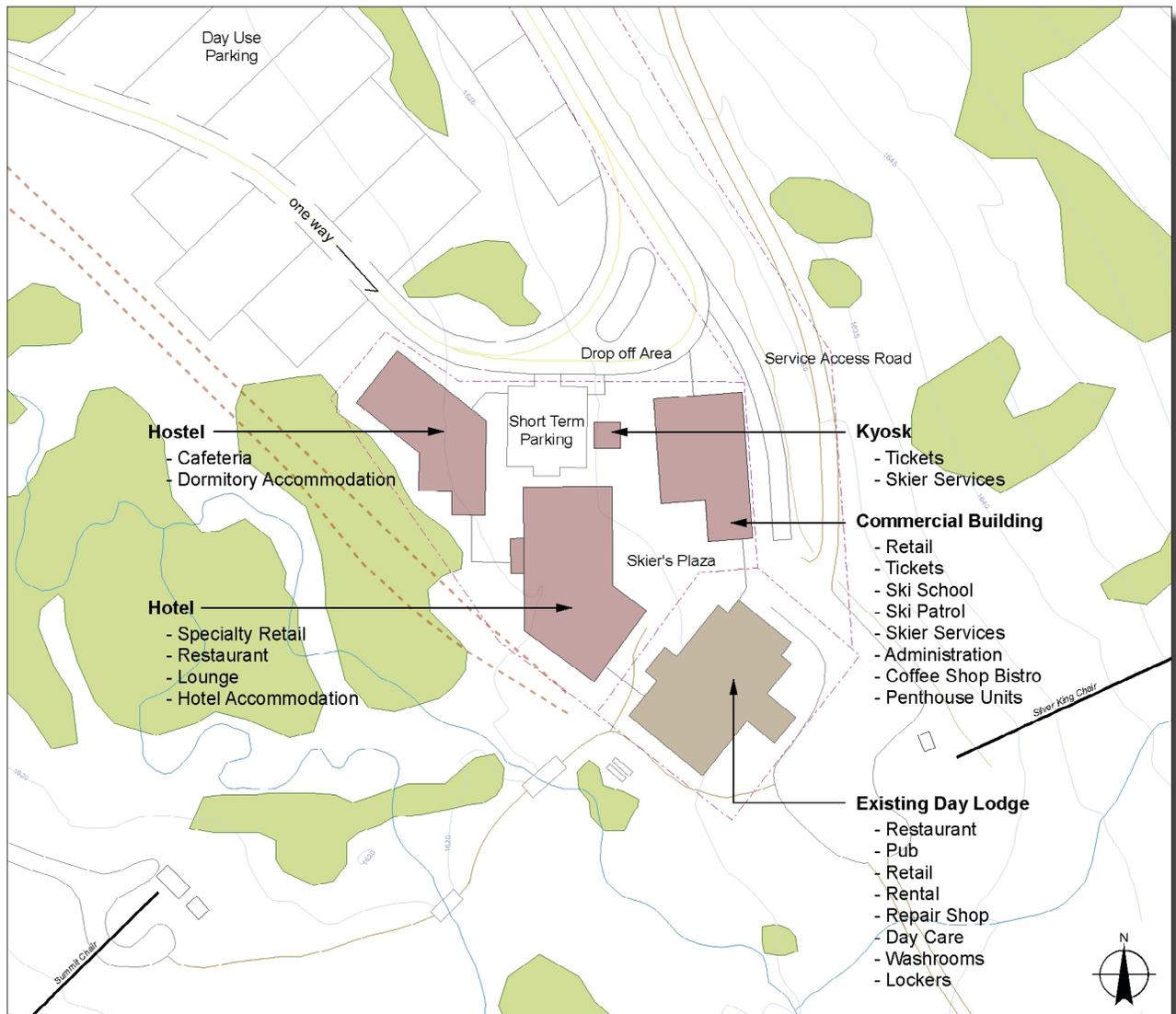
Kyosk

The entrance Kyosk is located adjacent to short term parking, positioned to be highly visible to all guests as they are either dropped off or are walking from the parking lots. It is designed to house tickets and guest services.

4.3.7 Silver Lodge

On the face of the Silver King ski terrain, a flat bench provides the ideal opportunity for the development of a 'unique to Whitewater' on-mountain lodge. Access to the 'Silver Lodge' would be by snowcat or on skis. The facility could be operated as a hotel or as a retreat oriented facility. This site offers a spectacular setting with great views and solar access. The lodge would be developed on a Crown land Lease.

Figure 4-8 Village Core Plan



4.3.8 Maintenance Area

The Maintenance Area is proposed to be moved down valley to a location that will be less visible and less of an operational impact on the residential lands. This will enable the development of the current maintenance lands into a well integrated resort residential area with direct association to the Core and the skiing. The new Maintenance Area will be centrally located with direct snow and road access.

4.3.9 Resort Residential

Based on the physical development potential of the land, a variety of different accommodation unit types are proposed for development at Whitewater. As illustrated in Figures 4-7 and 4-9, the units are located directly adjacent to the ski slopes with ski to / ski from access.

At buildout, Whitewater would include 35 single family units (210 bed units), 38 duplex units (152 bed units), 54 multifamily/townhouse units (216 bed units) 12 hostel units (48 bed units) 24 hotel units (48 bed units) and 10 on-mountain lodge units (20 bed units).

The single family, duplex and townhouse units have been positioned in such a way as to enable application for Crown land grants to facilitate development.

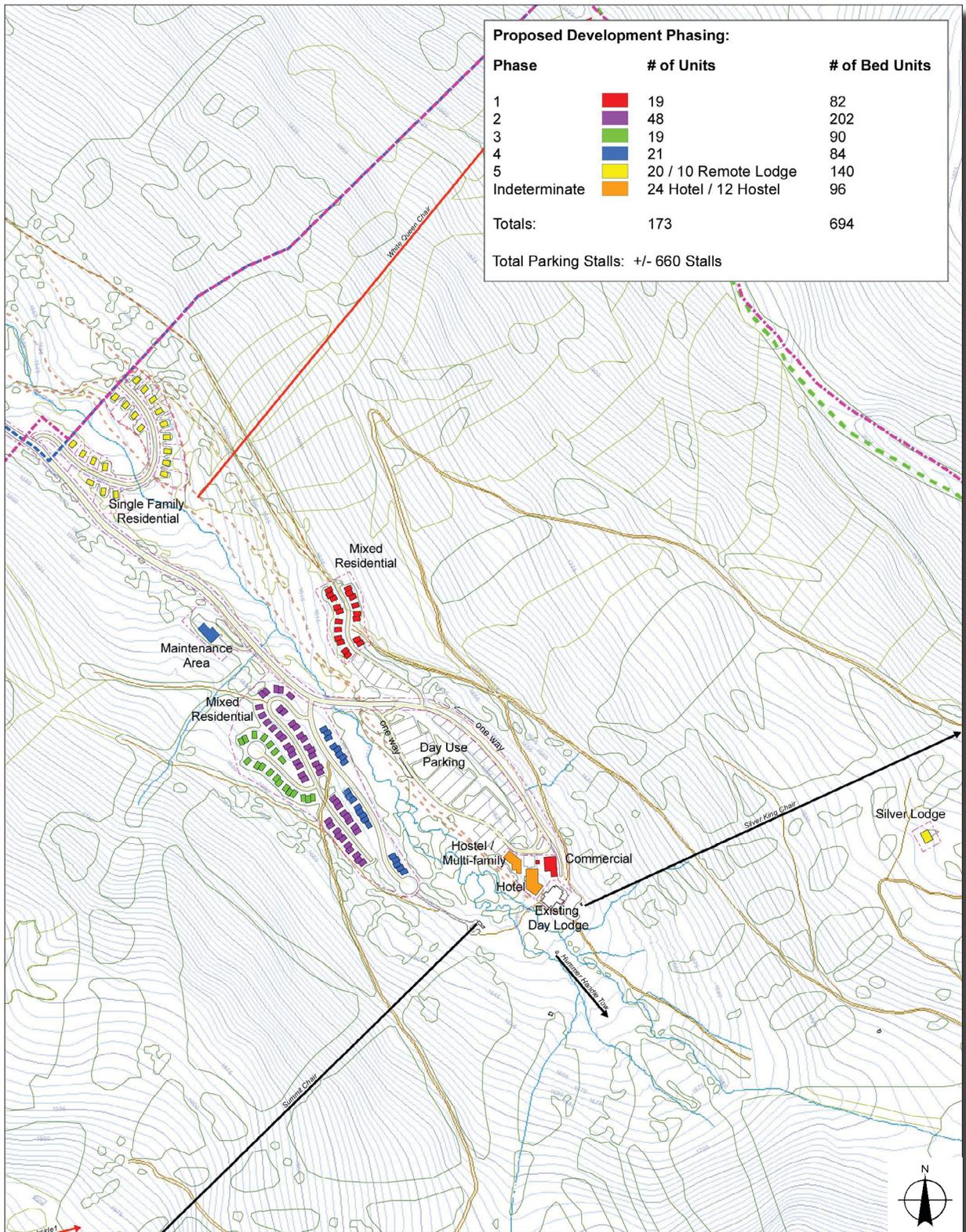
Remaining true to the desired quality and character envisioned for the resort, all resort residential will be architecturally tied to a mountain lodge vernacular.

A total of 694 bed units are proposed for development.

4.3.10 Employee Housing

Whitewater recognises the need to consider employee housing in the long term planning of the resort. Over time, it is anticipated that between 5% and 10% of the staff will live at the base of the mountain. To address their employee housing needs as the resort develops on a phase by phase basis, Whitewater will:

Figure 4-9 Base Area Phasing Plan



- Work cooperatively with the Nelson Committee on Homelessness to understand the local housing market and pressures;
- Work with the City of Nelson to explore rental housing options throughout the community;
- Be involved in the Regional District's Official Community Plan process and will strive to look for opportunities to ensure long term housing availability and affordability;
- Work within the OCP process to explore the feasibility of appropriate zoning which will support employee housing options;
- Ensure that rental rates for employee housing are in line with affordable rates experienced in the City of Nelson;
- Provide a fair wage;
- Encourage local hiring;
- Allocate between 5% to 10% of the bed units on the mountain in each phase of development for employee housing. This will be in the form of small rental suites in the family units or apartments above the Guest Services Building.

4.3.11 Parking

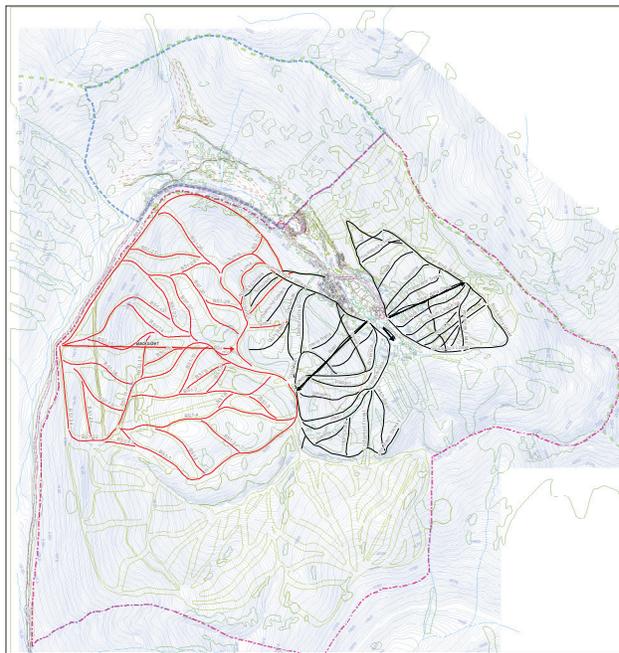
The access road and parking lots will be realigned to create a one way loop road. The objective of this is to utilize the lands in an environmentally sensitive fashion while improving traffic flow efficiency and to maximize capacities.

At buildout, the day use parking lots will be able hold 660 cars and 7 buses. In addition, parking will be established at each of the resort residential units. In total this equates to a BRC of about 2,500 visitors per day.

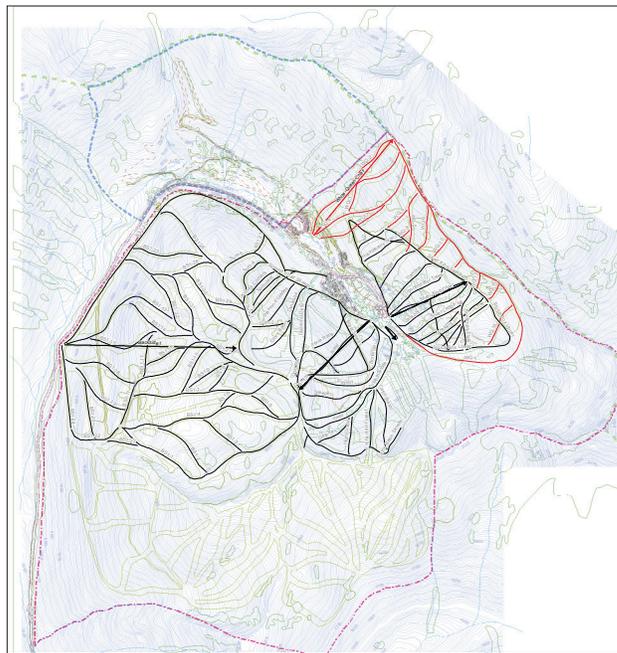
4.4 Phasing

The gradual development of Whitewater is envisioned to occur over four or more phases. See Figure 4-10. Each phase is self contained effectively being able to function as a finished resort product with both the mountain and the base area development complementing each other. Subsequent development will be driven by demand from the skier marketplace.

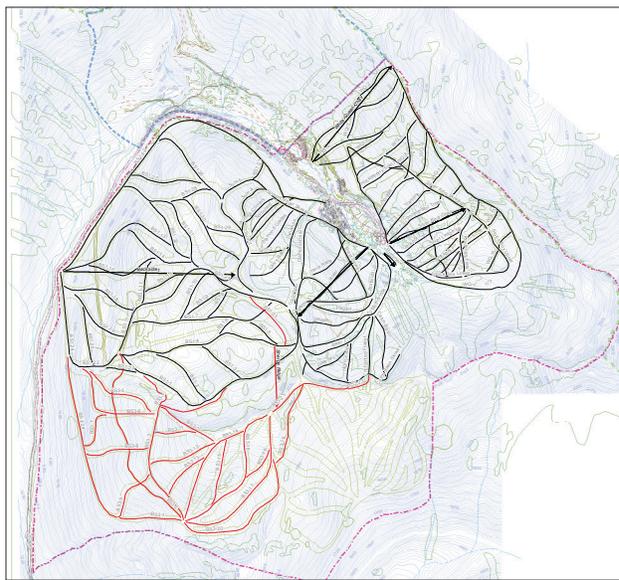
Figure 4-10 Mountain Phasing Plans



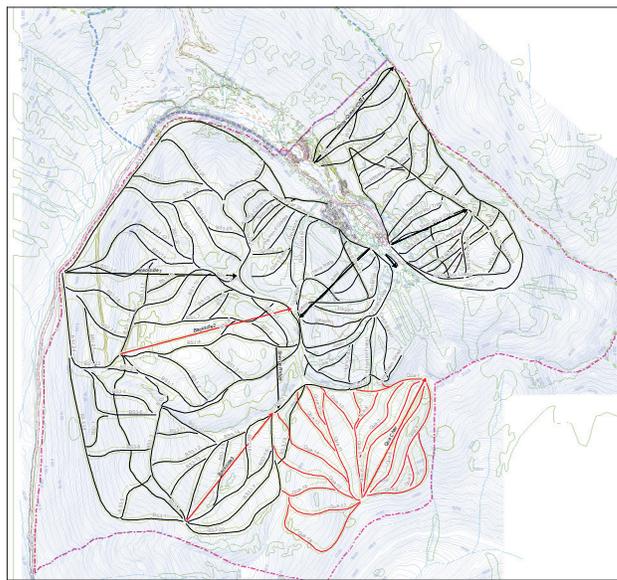
Phase 1



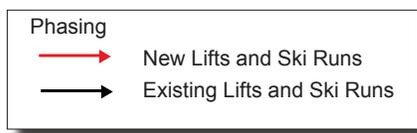
Phase 2

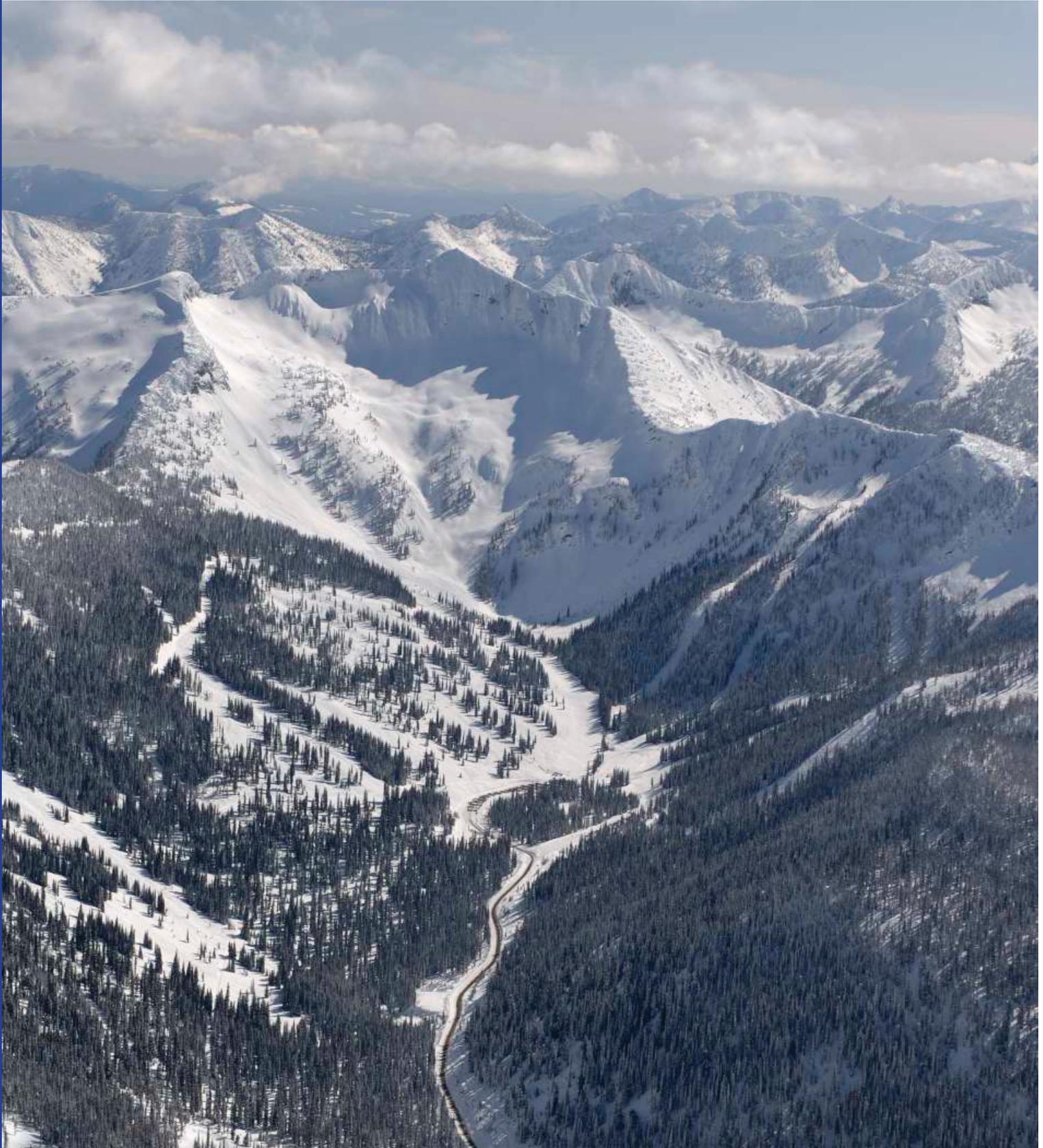


Phase 3



Phase 4





4.5 Environment and Wildlife

4.5.1 Existing Master Development Agreement

An Environmental Review was completed by Cascade Environmental Resource Consultants in 2002. (See Appendix 1) and provides an excellent overview of the existing conditions on the mountain and a baseline for future studies and development. Current environmental conditions, ecosystems and plant species, wildlife and wildlife habitat, as well as environmental constraints and recommendations were covered. The proposed development within this Master Plan is consistent with the already approved development area defined in the 2007 Whitewater Master Development Agreement.

In terms of base area development, because this Master Plan is proposing an increase in the density of the resort residential development in the base area (694 bed units as compared to the originally proposed 308 bed units), a detailed environmental review of the base area lands will be embarked upon prior to development. This will include addressing any previously identified issues in the base area lands. Areas of concern that were raised by the agency and public review process included:

- Water Quality;
- Fish Habitat;
- Mountain Caribou;
- Grizzly Bears
- Wolverine
- Whitebark Pine.



4.5.2 Water Quality

Whitewater recognises the importance of maintaining the water quality and quantity of Apex Creek, which is a tributary of the Salmo, Pend-Oreille and Columbia Rivers. In order to ensure that the values of Apex Creek are preserved, Whitewater has commissioned a water assessment of the proposed water supply to determine the environmental effects on Apex Creek. The assessment will be comprised of:

- Developing a Water Budget for Apex Creek;
- Determining the suitability of Groundwater resource – quantity and quality;
- Establish minimum instream flows necessary to meet the needs of downstream biota and determine if the resort water usage will impact the minimum instream flow needs;
- Environmental Impact Assessment of the new and expanded sewage treatment facility.

4.5.3 Fish Habitat

To minimize the impact on fish habitat in general and the Eastern Brook Trout habitat, present in the upper reaches of Apex Creek, specifically, Whitewater is committed to adhering to a 30 metre setback from the braided edges of Apex Creek. Whitewater will continue to work with the Ministry of Environment and local Hydrogeologist's and Biologist's as required, to preserve this habitat and ensure that stream crossings are built utilizing the stream crossing guidelines and with the appropriate approvals in place. In addition to silt fencing and various other measures to eliminate sediment impacts, the resort is exploring environmentally sensitive (low impact) building techniques to reduce ground disturbance.

4.5.4 Mountain Caribou

Concerns with the Red Listed, declining Mountain Caribou numbers were addressed in 2003 during the formulation of the existing Master Plan. Specifically, major consideration was given to the Caribou through the withdrawal of a planned lift extension into the base of the Qua drainage and a reduction of the proposed CRA. This Master Plan proposes a further voluntary reduction of the CRA in the same area, thus expanding the area for Caribou.

In December 2008, to assist in the Mountain Caribou recovery strategy, the Ministry of Environment (MOE) established a legal order, UWR U04_012, under the authority of sections 9(2) and 12(1) of the Government Actions Regulation (BC Reg 582/2004) (GAR). This legal order was issued over top of the existing approved Land Act agreements for the ski area and was only realized recently during this Master Plan review process.

Whitewater recognizes the value of the land in the Qua basin for late winter and early spring Caribou habitat and shares the Province's goal of ensuring the future recovery of the local Mountain Caribou herd. After careful consideration of the values, meeting with representatives of MOE and the Ministry of Tourism, Culture and the Arts (MTCA), as well as members of the public, Whitewater has submitted a request to amend the GAR to exclude the majority of the CRA and Nordic Licence area, not including the area within the Qua basin. The Qua basin will remain as part of the Whitewater CRA under the approved Master Development Agreement, but it will be subject to requirements of the GAR with respect to future development.

This decision will allow for continued exploration of the impact of potential development into the Qua basin, as proposed in Whitewater's Master Plan. If Whitewater considers moving forward with development in this area, we will then have more information available on which to base our discussions with MOE and MTCA. Whitewater is working with Mr. Guy Woods, a respected wildlife biologist as well as other agencies and stakeholders concerned with the future of the local Caribou herd, to ensure that the process of excluding any future development from the GAR is a fair process and balances the needs of the Caribou, Environment and the Resort.



4.5.5 Grizzly Bears

Grizzly Bears are a blue-listed species and they have been observed in the Whitewater CRA.

Acknowledging that with even minimal increases of summer activity, there will be increases in human/bear encounters, these will be mitigated through the application of bear proof containers, public education, signage and trail or area closures to ensure critical habitat avoidance, should the need arise. Whitewater is also committed to following the Wildlife Guidelines for Backcountry Tourism/Commercial recreation and adhering to best management practices.

4.5.6 Wolverine

As per the Environmental Review in Appendix 1, the wolverine is also a blue-listed species that generally occupies wilderness or backcountry areas that have little human activity or development. Due to the human presence, the probability of wolverine occurring in the Whitewater resort area is considered low.

4.5.7 Whitebark Pine

The resort has been advised of the importance of Whitebark pine (*Pinus albicaulis*) and the potential presence of this blue-listed species within the CRA. Whitebark pine provides large nutrient-rich seeds which are prized by grizzly bears, Clark's nutcrackers, and dozens of other animals. This species is succumbing to the non-native disease, white pine blister rust, and the steady decline has been accelerated with the recent mountain pine beetle epidemic. Whitewater will work with the Whitebark Pine Ecosystem Foundation and MTCA to identify and avoid harvesting and/or damage to Whitebark Pine within the CRA wherever possible. The resort will also educate employees and guests on Whitebark pine conservation measures.

4.6 Infrastructure

Detailed infrastructure planning for water, sewer, power and telephone will be completed consistent with the plans defined in the existing Master Plan, adjusted to site specific changes that are proposed in this document.

Fortis has advised that as the development progresses the power supply will need to be upgraded. At present there is sufficient power available at the bottom of the access road to supply the entire future residential development with one medium sized upgrade. Efforts to improve the efficiency of every building will extend the power requirements. Further, Whitewater will investigate the feasibility of geo-thermal and propane as heat sources.

The existing water supply is sourced on the surface. Plans for the expanded development include wells to source ground water, which will necessitate the construction of two 200,000 litre storage tanks, one for daily use and the other will serve as a fire reservoir. At this time the existing water treatment will be upgraded to the 4-3-2-1-0 provincial standard. In order to establish baseline values, Whitewater has initiated water volume studies and water quality analysis in the upper reaches of Apex Creek. This will allow for the verification that negative impacts to the habitat, biota and fish numbers does not happen and ensure that over time pre-established limits are substantiated and no impacts from the new effluent dispersion field are experienced.

Suitable and sufficient terrain totalling 4.5 hectares has been identified in an adjacent LOC to accommodate the expanded sewage treatment requirements. Ward Engineering of Nelson, BC calculated the area will easily accommodate the maximum daily flows of 309 cubic metres . Whitewater must still meet with the Ministry of the Environment to confirm the suitability of this area as well as complete an Environmental Impact Statement with reference to the adjacent water course and develop an operations and maintenance plan. Disposal will meet federal and provincial standards and will involve primary (septic tanks), secondary (treatment plant) and tertiary (septic field) systems.

The mountain is 22 kilometres from Nelson and the ambulance response time is usually 20 minutes. An expansion to the winter mountain safety department and first aid facility is planned in the new skier services building to handle the anticipated increase in numbers. All year round staff are required to have basic first aid training, this policy will be adhered to in the future and should be adequate to service the future safety needs of the resort. Further, when the Fire reserve is constructed the resort will establish a volunteer fire department and train all full time staff accordingly.



Garbage disposal will be a component of the maintenance agreement lot owners will have with the resort. Whitewater recognizes the necessity to establish a comprehensive Waste Management Plan at the outset of any development. This has the potential to eliminate or, at the very least, substantially reduce the possibility of Bear/Human interaction. The Waste Management Plan will address all species at risk of negative human impacts where possible. Projections of annual residential waste volumes approach 800m³ and resort commercial waste volumes approach 1900 cubic metres as well projections for recycling volumes approach 1750 cubic metres for the entire resort. An onsite facility will house the disposal and recycling programs and handling will be managed by an independent contractor. The Regional District of Central Kootenay (RDCK) is aware of the increased volumes and is planning accordingly.

4.7 Access

The ten kilometre access road rises 730 metres from the valley floor. Like the base of the ski area, the upper reaches of the road are subject to an excessive amount of snow, in the order of 12 to 13 metres. On occasion heavy snow build up can become problematic, especially when the road banks exceed 5 metres in height. Whitewater has recognized that this could potentially restrict vehicle access. Whitewater will work with the road contractor in an effort to limit the size of the snow banks along the road. Further, Whitewater will conduct a Traffic Impact Analysis (TIS) at the junction of the area access road and Highway #6, to assess the impact of increased traffic turning off the highway and another TIS of the turn around and parking alternatives at the base of Backside Lift #1. The present Whitewater shuttle service offered to employees and public could be expanded with increased demand. Whitewater views mass public transit to and from the hill as a positive step towards reducing the areas carbon footprint.

4.8 Development Impact Comparison

As illustrated in Figures 4-11 and 4-12 the proposed skiing facilities development in the Revised Master Plan is contained within a slightly smaller CRA and utilizes the same basic terrain as in the approved Master Plan. Internally, the primary difference between the approved Master Plan and the Revised Master Plan is in the way the ski lifts are aligned and thus the way the skiing is accessed.

Figure 4-11 Ski Pods - 2007 Master Plan

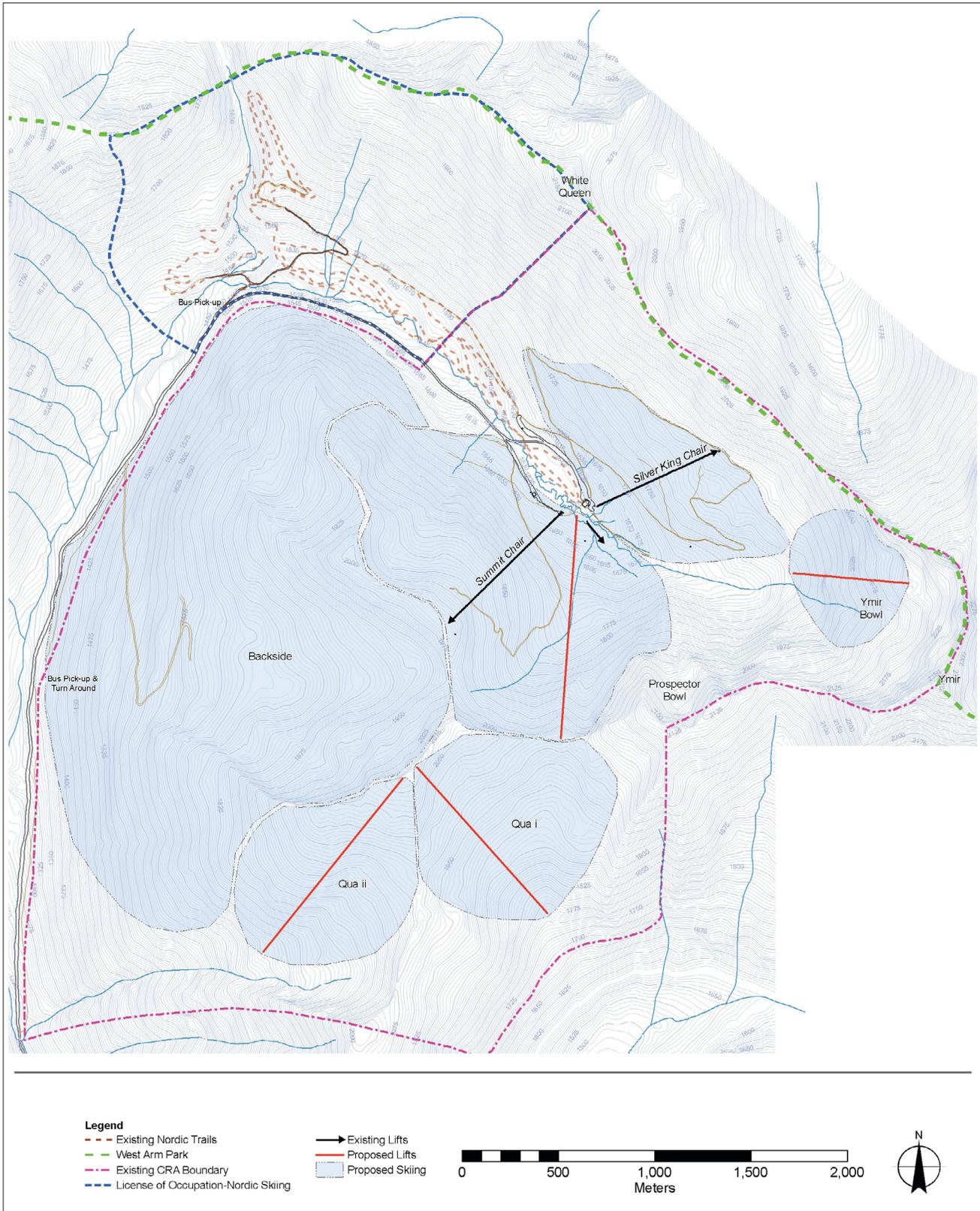


Figure 4-12 Ski Pods - 2010 Master Plan



5.0 APPENDICES

5.1 Environmental Report



**Environmental Review
Whitewater Resort Plan for Expansion and
Improvement**

Prepared for:

**Whitewater Ski & Winter Resort
P.O. Box 60
Nelson, BC
V1L 5P7**



Prepared by:

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD.

**#3 - 1005 Alpha Lake Road
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File # 189/01/01

December 2002



Table of Contents

STATEMENT OF LIMITATIONS	1
1.0 INTRODUCTION.....	2
1.1 Project Scope and Methodology	2
1.2 The Project Team	5
2.0 EXISTING ENVIRONMENTAL CONDITIONS	5
2.1 Climate.....	5
2.2 Geology	6
2.3 Geomorphology and Surficial Materials.....	9
2.4 Hydrology.....	9
2.4.1 Drainage Patterns and Runoff	9
2.5 Pedologic Soils	10
2.5.1 Lithic and Colluvial Soils.....	10
2.5.2 Soils on Tills and Glaciofluvial Deposits	10
2.6 Ecology	10
2.6.1 Biogeoclimatic Ecosystem Classification.....	10
2.6.2 Rare and Endangered Plant Species and Plant Associations.....	12
2.7 Wildlife and Wildlife Habitat	17
2.7.1 Ungulates	19
2.7.2 Wide-ranging Carnivores.....	20
2.7.3 Cavity Nesters	22
2.7.4 Raptors.....	23
2.7.5 Reptiles and Amphibians.....	25
2.7.6 Rare and Endangered Wildlife Species.....	26
2.7.7 Other Wildlife Species	29
2.8 Fisheries and Aquatic Habitat.....	29
3.0 ENVIRONMENTAL CONSTRAINTS AND RECOMMENDATIONS.....	30
3.1 Climate.....	30
3.2 Geology	30
3.3 Geomorphology	30
3.4 Pedologic Soils	30
3.5 Aquatic Habitat	31

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3.6 Ecology	31
3.7 Wildlife	32
3.8 Fisheries	34
3.9 Plan for Expansion and Improvement.....	35
3.10 Community Watershed Issues	36
4.0 REFERENCES.....	37
5.0 APPENDICES	40
Appendix 1 List of Common and Scientific Names of Animals and Plants	41
Appendix 2 List of Potential Wildlife Species, Based on Habitat Capability	44

List of Tables

Table 1: Red and blue-listed vascular plant species.....	15
Table 2: Red and blue-listed vascular plant species.....	16
Table 3: Rare Natural Plant Communities.....	17
Table 4: Wide-ranging carnivores known to occur	20
Table 5: Cavity nesters known to occur	23
Table 6: Summary of habitat requirements of raptors.....	24
Table 7: Reptiles and Amphibians known to occur in the ICHmw and ESSFwc.....	26
Table 8: Red and blue-listed wildlife species known to occur.....	27

List of Maps

Map 1 Location Map of Study Area.....	3
Map 2 Study Area Map	7
Map 3 Existing Environmental Conditions.....	14

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STATEMENT OF LIMITATIONS

This Document was prepared by **Cascade Environmental Resource Group Ltd.** for the account of Whitewater Ski Resort Ltd.

Should this report contain an error or omission then the liability, if any, of Cascade Environmental Resource Group Ltd. should be limited to the fee received by Cascade Environmental Resource Group Ltd. for the preparation of this Document. Recommendations contained in this report reflect Cascade Environmental Resource Group Ltd.'s judgment in light of information available at the time of study. The accuracy of information provided to Cascade Environmental Resource Group Ltd. is not guaranteed.

Neither all nor part of the contents of this report should be used by any party, other than the client, without the express written consent of Cascade Environmental Resource Group Ltd. This report was prepared for the client for the client's own information and may not be used or relied upon by any other person unless that person is specifically named by Cascade Environmental Resource Group Ltd. as a beneficiary of the report, in which case the report may be used by the additional beneficiary Cascade Environmental Resource Group Ltd. has named. If such consent is granted, a surcharge may be rendered. The client agrees to maintain the confidentiality of the report and reasonably protect the report from distribution to any other person. If the client directly or indirectly causes the report to be distributed to any other person, the client shall indemnify, defend and hold Cascade Environmental Resource Group Ltd. harmless if any third party brings a claim against Cascade Environmental Resource Group Ltd. relating to the report.

This Document should not be construed to be:

- ◇ A Phase 1 - Environmental Site Assessment;
- ◇ A Stage 1 – Preliminary Site Investigation (as per the Contaminated Sites Regulations of the Waste Mgt. Act); nor shall it be construed to be
- ◇ An Environmental Impact Assessment.

Moptops on
Qua Ridge



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1.0 INTRODUCTION

Cascade Environmental Resource Group Ltd. (CERG) was retained by Whitewater Ski Resort Ltd. to conduct an Environmental Review of the resort including its existing Controlled Recreation Area (CRA) and its proposed expanded CRA as per the Plan for Expansion and Improvement (Whitewater, 2002). The primary objective of conducting the review is to identify environmental issues arising from mountain resort development and operation.

In the Plan for the Expansion and Improvement of Whitewater Ski Resort Ltd. (Whitewater, 2002), a series of planning objectives are outlined as follows:

- ◇ Low trail density and utilization standards
- ◇ Ensure that, once implemented, resultant plans offer guests a well-balanced resort experience
- ◇ Find and incorporate more beginner and intermediate skiing facilities
- ◇ Develop backcountry adventure opportunities
- ◇ Acquire tenure to adjacent land
- ◇ Establish “ski to/ski from” and “direct amenity” residential developments
- ◇ Preserve natural features and minimize environmental impacts while integrating proposed development plans.

The Whitewater Revised Resort Management Plan (the Management Plan) proposes to meet these objectives through several phases including constructing 4 new lifts (Powder Keg, Qua I, Qua II, and Ymir Chairs) and developing 3 new areas of skiable terrain (Qua I, Qua II, and Ymir Bowl).

1.1 PROJECT SCOPE AND METHODOLOGY

The environmental review consisted of collecting both existing information from available sources and environmental data from field investigations, which pertains to the development of the Whitewater Resort (the Resort). As part of that process, a detailed review of the following documents was conducted:

- ◇ Plan for the Expansion and Improvement of Whitewater Ski Resort Ltd. 2002
- ◇ Guidelines for Environmental Good Practices for Ski Areas (Canada West Ski Areas Assoc. 1992)
- ◇ Topographic and thematic resource maps (1:50,000 scale).
- ◇ A Conceptual Plant for Whitewater (Loftus, 1979)
- ◇ The Whitewater Project (Loftus, 1977)

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Map 1 Location Map of Study Area

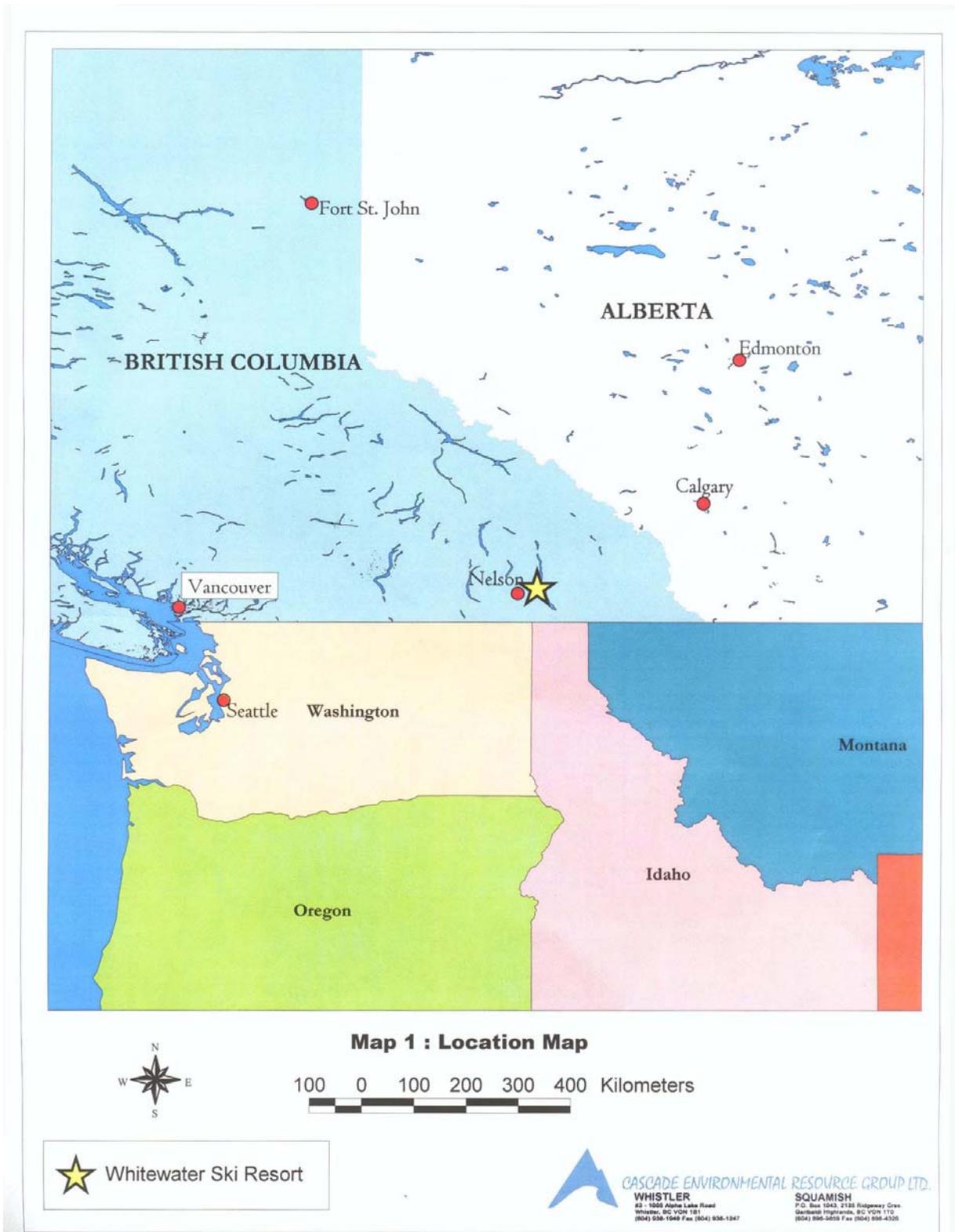
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1.2 The Project Team

The study team, consisted of project coordinator Dave Williamson, BES, CERG Principal, aquatic ecologist Mike Nelson, R.P.Bio., CERG Principal, forest ecologist Sandor Gyurkovics, B.S.F., wildlife ecologists Andrew Preston, B.Sc., and Catherine Conroy B.Sc., and G.I.S. Specialist Chris McDougall, B.Sc. Cascade Environmental has established expertise in planning for resource-based tourism at both the operational and strategic levels, specializing in management planning, mapping and conflict resolution for resorts and commercial recreation operators. Other related expertise includes environmental planning and management for ski area terrain, golf courses and various backcountry operators, visual landscape design, and parks and recreation area planning.

2.0 EXISTING ENVIRONMENTAL CONDITIONS

Whitewater Resort is an existing ski resort, located 21 km southeast of the City of Nelson, in south central BC (Figure 1). The resort operates within 967.5 ha of leased Crown lands (Controlled Recreation Area), and a privately held base lodge site owned by Whitewater Ski Resort Ltd.

The Plan for Expansion and Improvement (Whitewater, 2002) identifies potential ski and base development expansion areas. The Plan for Expansion and Improvement includes three or four new ski lifts, depending on the chosen development option, which will expand into three new areas and add 463 ha of terrain, bring the total area to 1430.5 ha. These areas are described as Ymir Bowl, Qua I and Qua II. Except for Qua I and Qua II, which will offer a significant intermediate component, the expansion areas lie within terrain commonly accessed by Whitewater skiers. In addition to the lift serviced skiing terrain development, there will be a cross-country skiing component developed for the resort. The cross-country skiing trails will be located within a recently harvested shelterwood cutblock.

Existing development includes two chair lifts and one handle tow, accessing 105.9 ha of skiable terrain. The base development is located at the foot of the lifts at approximately 1600 m elevation. At build-out, the Plan for Expansion and Improvement proposes a total of 7 ski lifts, including the 3 existing lifts.

A base area plan has also been developed as part of the overall Plan for Expansion and Improvement, and will encircle a preserved riparian wetland on Apex Creek. The base area development will include improved facilities, expanded parking, a lodge-type hotel and two town home developments. The reader is referred to the Whitewater Plan for Expansion and Improvement (Whitewater, 2002) for more details on the resort development.

2.1 CLIMATE

The study area is located in the Northern Columbia Mountains Ecoregion of the Southern Interior Mountain Ecoprovince and includes the Interior Cedar - Hemlock (ICH) biogeoclimatic zone at elevations to approximately 1600m and the Engelmann Spruce – Subalpine Fir

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(ESSF) biogeoclimatic zone above the ICH zone from 1600 to 1900m (Meidinger and Pojar 1991). There is a smaller amount of Alpine Tundra (ATunp) above the ESSF.

Data collected from the South Slovan climate station (nearest climate station – at approximately 450m elevation) shows a mean annual temperature of 7.9°C and a mean annual rainfall of 680mm. The mean annual snowfall is 173.2cm and total precipitation for the year measures 853.2mm. The month with the highest amount of precipitation, primarily in the form of snowfall, is December (105.9 mm-water equivalent), with the lowest monthly precipitation, 49.4mm, occurring in August as rainfall. Snow depth steadily increases on the mountain from December to early March or April, and snowmelt generally continues through June or July (Canadian Climate Normals, 1971-2000).

Conditions at Whitewater vary to some degree from those recorded at the South Slovan climate station due to topography and elevation. Whitewater receives an average of 1250cm of snow annually, with peak snowpack depth often occurring in April (Whitewater, 2002).

2.2 GEOLOGY

The geology of the Nelson area is characterized by volcanic and sedimentary rocks from the Late Paleozoic (250-300 million years) and Early Mesozoic (180-200 million years) periods, and are intruded by a series of local plutons:

- ◇ Nelson monzonite (170? million years)
- ◇ Trail pluton (150? million years)
- ◇ Small Cenozoic intrusions (50 million years).

Geological Survey of Canada mapping at a scale of 1:1,000,000 identifies the rock of the study area as the Nelson Plutonic formation, generally composed of porphyritic granite and rich in feldspar. Some of the formation is metamorphosed sedimentary rock. Although resistant to water erosion, this formation is subject to mass wasting through exfoliation (shattering) (Loftus *et al.*, 1977). The majority of the study area is comprised of the Nelson Batholith Group (**mJn_K**) of the Middle Jurassic period. Smaller areas in the north and south portions of the study area (southwest slopes of White Queen Mountain, southeast slopes of Evening Ridge, and portions of the southern slopes of Qua Ridge at the south boundary) are of the Ymir Group (**IJY_K**) of the Jurassic-Triassic era and are composed of argillite, slate, quartzite, and paragneiss. These areas are more susceptible to erosion than other granitic bedrock types within the project boundaries.

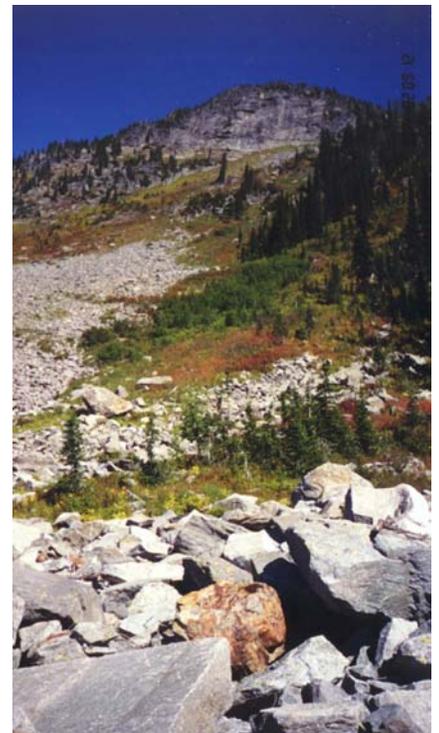


Photo 1 Ymir Mountain

Areas within the existing CRA have a history of mining. Two sites are currently recorded for the Apex Creek basin, near the study area. The Hummingbird prospect yielded silver, gold, lead, zinc and copper. The Bluebird showing yielded silver, gold and lead (Minfile, 1992).

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Map 2 Study Area Map

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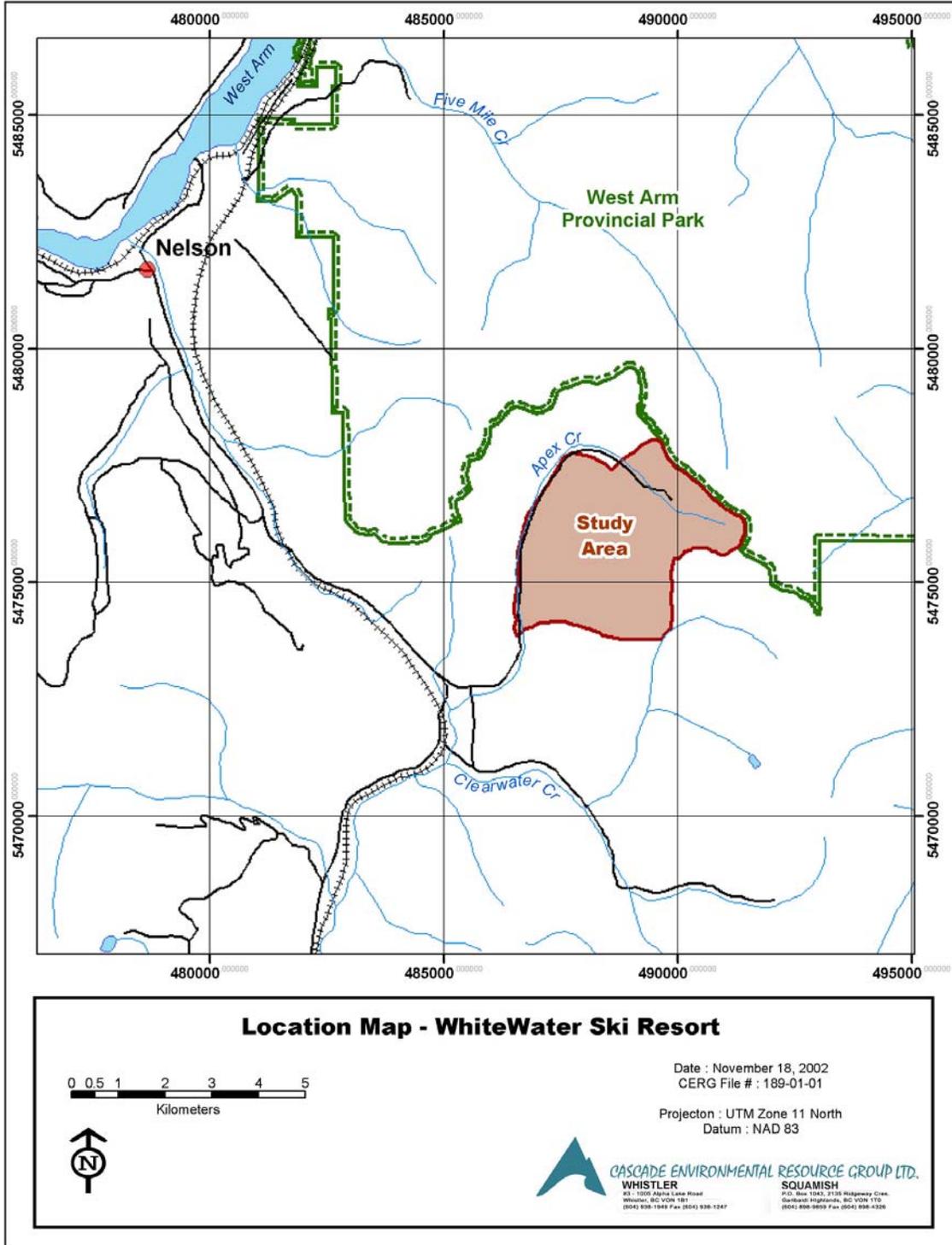
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Environmental Review - Whitewater Ski & Winter Resort Plan for Expansion and Improvement
 Prepared for Whitewater Ski Resort Ltd.



File #: 189/01/01

December 18, 2002



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2.3 GEOMORPHOLOGY AND SURFICIAL MATERIALS

Information pertaining to geomorphology was extracted from field observation, air photo interpretation, and mapping of quaternary geology (Little, 1982) and soils (Jungen, 1980).

Geomorphology of the study area varies depending on slope position. Bedrock dominated montane environments are more common on upper slope and ridge top positions above treeline, especially on Mt. Ymir and White Queen Mountain. These conditions exist but are less prevalent around Qua Ridge. Geomorphological activity includes processes of weathering and mass wasting such as rock fall on steep rocky slopes resulting in accumulation of colluvial deposits. Field observations gathered in the fall of 2002 showed that slopes over 60% tended to consist of bedrock or talus.

Colluvial deposits are common on mid-slopes below bedrock-dominated environments, and are the result of landslides and mass wasting of fractured bedrock. These areas are easily identified by an abundance of angular coarse fragments, such as is common on talus slopes within the study area.

Lower slopes are characterized by glacial basal till deposits. Road cuts around the day lodge and along the main access road provide visual evidence of glacio-fluvial deposition within the Apex Creek area, and in lower slope and valley bottom positions.

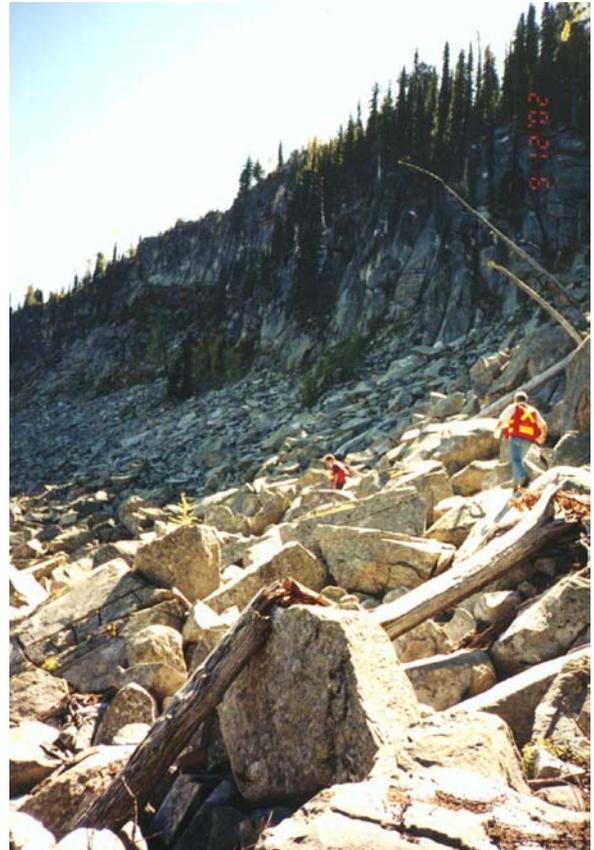


Photo 2 Talus Slope north of Powder Keg Ridge

2.4 HYDROLOGY

2.4.1 Drainage Patterns and Runoff

The watersheds delineated within the study area include the Apex and Qua Creek drainages. The majority of drainages located within the development drain into the Apex Creek, which converges with the Salmo River that ultimately drains into the Columbia River. The southeast corner of the subject site drains below Qua and Powder Keg ridge into Qua Creek and Clearwater Creek before converging with the Salmo River.

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2.5 PEDOLOGIC SOILS

Preliminary soils information was acquired from National Soil Database mapping.

2.5.1 Lithic and Colluvial Soils

Lithic and colluvial soil are prevalent on peaks, ridge tops and upper slopes of White Queen Mountain, Mt. Ymir, and Qua Ridge. These areas are dominated by well to moderately well drained Humo-Ferric Podzols. The soils have a parent material of moderately coarse to very coarse textured colluvium over bedrock and bedrock outcroppings. These soil types are found on very steeply sloping ground within the subject site.

2.5.2 Soils on Tills and Glaciofluvial Deposits

These soil types occupy the mid and lower slopes of Qua Ridge, Mt. Ymir, White Queen Mountain, and Evening Ridge. It is dominated by well to rapidly drained Humo-Ferric Podzols, with an imperfectly drained seepage phase. The soils have a parent material of gravelly, medium and moderately coarse textured basal till, morainal and glaciofluvial deposits.

The west slope of Qua Ridge, specifically limited to the southwest corner of the development area between the access road and the proposed Qua II chairlift, is dominated by Dystric-Brunisols. These well to rapidly drained soils have a parent material of morainal and colluvial deposits, and glaciofluvial deposits on lower slope and valley bottom positions.

2.6 ECOLOGY

Three levels of ecosystem classification exist in British Columbia. From broadest to most detailed, these include ecoregion units, biogeoclimatic units and ecosystem units (Resource Inventory Committee, 1995). On the broad ecoregion classification scale, the Whitewater resort and expansion lands lie within the Northern Columbia Mountains Ecoregion of the Southern Interior Mountain Ecoprovince.

2.6.1 Biogeoclimatic Ecosystem Classification

According to the Biogeoclimatic Ecosystem Classification system (1:250,000 scale), the existing development area and proposed expansion lands are classified within the Columbia – Shuswap Moist Warm Interior Cedar-Hemlock (ICHmw2) and the Selkirk Wet Cold Engelmann Spruce – Subalpine Fir (ESSFwc4) biogeoclimatic variants, and the Alpine Tundra Biogeoclimatic zone. Forest Region level biogeoclimatic digital mapping (1:20,000 scale) was also utilized in the analysis. Interpretations of biogeoclimatic zone delineation were derived by incorporating both sources of information and are presented on Map 3 of Existing Environmental Conditions.

The ICHmw2 generally occurs between 500 m and 1,450m elevation in valley bottoms and lower to mid slopes, although provincial mapping for the Whitewater area shows this variant at 1800m elevation in some locations. Colluvial soils occur on the steep, upper slopes, while fluvial soils are found on the lower and level slopes. Mid slopes are home to a mix of morainal and glaciofluvial soils. Climax zonal sites support western redcedar and western hemlock forest stands. Mixed seral stands of Douglas-fir, hybrid white spruce, western larch, western

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hemlock and western red cedar, are common. Typical understory species are falsebox and black huckleberry. Common herbaceous species are twinflower, prince's pine, queen's cup and one-leaved foamflower. Forest inventory mapping (1:20,000) indicates that much of the area supports 140 to 230 year old forest in undisturbed areas. Past logging and disturbance has left regenerating stands of hybrid white spruce and subalpine fir, with some Douglas-fir and lodgepole pine on warmer slopes, ranging in age from 30 to 100 years old. Some selection logging has occurred on the southern slopes of White Queen Mountain.

The ESSFwc4 ranges from 1,450 m to approximately 1,950 m in elevation. Surficial materials are morainal and colluvial on lower to upper slopes and fluvial or organic on level and depressed sites (Braumandl and Curran, 1992). Typical forest stands in the ESSFwc4 are dominated by Englemann spruce and subalpine fir, with a minor component of lodgepole pine. Characteristically white-flowered rhododendron, black huckleberry and gooseberry dominate the low shrub stratum. Herbs include oak fern, one-leaved foamflower, Sitka valerian, and five-leaved bramble. Forest inventory mapping (1:20,000) indicates that stands of subalpine fir Engelmann or hybrid white spruce ranging from 120 to 140 years old occur near the head of the valley in the valley bottom and on the slopes surrounding Apex Creek. Forest stands higher up on slopes within the study area are similar in species composition, but range in age from approximately 230 to 290 years old.



Photo 3 ESSFwc4 biogeoclimatic subzone

Classified as Natural Disturbance Type 2, the ICHmw2 and ESSFwc4 are ecosystems with infrequent stand-initiating events. Wildfires are of moderate size (20 ha to 1,000 ha) and occur with a mean interval of 200 years (BC Ministry of Environment and BC Ministry of Forests, 1995).

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The Alpine Tundra Biogeoclimatic zone occurs above the dominant treeline. The regionally mapped ATunp subzone was re-classified as ESSFwcp by the authors in an effort to more accurately reflect conditions observed during the site investigations. Observed conditions yielded forested cover in addition to Krummholtzed vegetation, shrubs, herbs, grasses, mosses and lichens. The ATunp classification was reserved for the upper slopes of Ymir Mountain. This zone is considered unproductive and is therefore sensitive to disturbance where vegetation exists. Much of this zone is typically void of vegetation and is dominated by permanent, snowpack, glaciers, and exposed bedrock.



Photo 4 ESSFwcp on Powder Keg / Qua Ridge

2.6.2 Rare and Endangered Plant Species and Plant Associations

The CDC assigns a “listed” designation to plant species and plant communities that require special management attention. “Red” listed species are defined as endangered or threatened; “Blue” listed species are defined as vulnerable, and are of concern due to their sensitivity to human activities or natural events. All of the vascular plant species currently tracked by the CDC in the Kootenay Lake Forest District (KLFD) are listed below in Table 1.

The CDC also tracks specific occurrences of red or blue-listed plant species. Occurrence records for the KLFD show two species that may occur within the project area. The nature of the CDC tracking methods is such that the actual locations of the subject species are mapped with a substantial buffer, depending on the ranking and nature of the occurrence (e.g. individual species or plant community). Details of the occurrence records relating to the project area are outlined below in Table 2. The Blue Listed *Carex* species was recorded within the bounds of the ski area (Ymir Mountain) according to the CDC records, but was not observed during the cursory site visit for this report. The Red Listed *Monardella* species was

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recorded in Nelson; however, the buffer area added on CDC mapping extends slightly into the project area.

In addition to individual plant species, the CDC also tracks rare natural plant communities, which are assemblages of plant species that exist together within specific ecological and climatic bounds. Plant communities found within the KLFD are listed in Table 3, however it should be noted that the CDC tracking list is incomplete due to a lack of data. Significant gaps exist in wetland, alpine, and grassland communities.

The *Abies lasiocarpa* / *Vaccinium membranaceum* / *Xerophyllum tenax* plant community may exist in the ESSFwc4 biogeoclimatic variant within Whitewater's development area, but was not identified during the site visit. The plant community must exist specifically in a disclimax successional stage and in an old forest structural stage, implying a perpetual stagnated climax state limited by a natural disturbance regime (i.e. it does not reach climatic climax) with a minimum age of 250 years. There are some polygons on the provincial forest cover mapping identifying stands up to an estimated 289 years old on the south and west slopes of White Queen Mountain. Some of these areas were previously developed by the ski hill, and are therefore no longer a concern for preservation. Other old forest stands are located away from future development zones, except perhaps for the cross-country trails, although it would appear that these trails would likely be situated downslope of the potential area of concern on White Queen Mountain.

According to provincial forest cover mapping, other areas within the proposed development are nearing the old forest age requirements which could possibly lead to the identification of threatened plant communities that are on the brink of meeting the aforementioned criteria. However, past human disturbance from mining, forestry, and ski hill development in much of the valley may limit the possibility of forest stands existing in a disclimax state, and therefore limit the likelihood of encountering this Blue Listed plant community. Further investigation regarding the existence of specific plant communities within the project area may be required as development proceeds (please see constraints and recommendations section for further discussion).

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Map 3 Existing Environmental Conditions

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Table 1: Red and blue-listed vascular plant species within the Kootenay Lake Forest District that are currently tracked by the Conservation Data Centre.

SCIENTIFIC NAME	COMMON NAME	PROVINCIAL LIST
Red-listed		
<i>Anemone piperi</i>	Piper's anemone	RED
<i>Bidens vulgate</i>	tall beggarticks	RED
<i>Calamagrostis montanensis</i>	plains reedgrass	RED
<i>Carex adusta</i>	lesser brown sedge	RED
<i>Carex lenticularis</i> var. <i>lenticularis</i>	lakeshore sedge	RED
<i>Downingia elegans</i>	common downingia	RED
<i>Elymus virginicus</i> var. <i>submuticus</i>	beardless wildrye	RED
<i>Glycyrrhiza lepidota</i>	wild licorice	RED
<i>Idahoia scapigera</i>	Scalepod	RED
<i>Juncus confuses</i>	Colorado rush	RED
<i>Lupinus arbustus</i> ssp. <i>pseudoparviflorus</i>	Montana lupine	RED
<i>Melica bulbosa</i> var. <i>bulbosa</i>	Oniongrass	RED
<i>Monardella odoratissima</i> ssp. <i>odoratissima</i>	Monardella	RED
<i>Senecio hydrophiloides</i>	sweet-marsh butterweed	RED
<i>Senecio hydrophilus</i>	alkali-marsh butterweed	RED
<i>Sphenopholis obtusata</i>	prairie wedgegrass	RED
<i>Thermopsis rhombifolia</i>	prairie golden bean	RED
<i>Thermopsis rhombifolia</i>	prairie golden bean	RED
<i>Wolffia borealis</i>	northern water-meal	RED
Blue-listed		
<i>Acorus americanus</i>	American sweet-flag	BLUE
<i>Anemone Canadensis</i>	Canada anemone	BLUE
<i>Artemisia ludoviciana</i> var. <i>incompta</i>	western mugwort	BLUE
<i>Callitriche heterophylla</i> ssp. <i>heterophylla</i>	two-edged water-starwort	BLUE
<i>Carex amplifolia</i>	bigleaf sedge	BLUE
<i>Carex comosa</i>	bearded sedge	BLUE
<i>Carex heleonastes</i>	Hudson Bay sedge	BLUE
<i>Carex saximontana</i>	Rocky Mountain sedge	BLUE
<i>Carex scoparia</i>	pointed broom sedge	BLUE
<i>Carex scopulorum</i> var. <i>bracteosa</i>	Holm's Rocky Mountain sedge	BLUE
<i>Carex tenera</i>	tender sedge	BLUE
<i>Carex vulpinoidea</i>	fox sedge	BLUE
<i>Cheilanthes gracillima</i>	lace fern	BLUE
<i>Clarkia pulchella</i>	pink fairies	BLUE
<i>Crassula aquatica</i>	Pigmyweed	BLUE
<i>Delphinium bicolor</i> ssp. <i>bicolor</i>	Montana larkspur	BLUE
<i>Dryopteris cristata</i>	crested wood fern	BLUE
<i>Elodea nuttallii</i>	Nuttall's waterweed	BLUE
<i>Epilobium halleanum</i>	Hall's willowherb	BLUE
<i>Epipactis gigantean</i>	giant helleborine	BLUE

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<i>Helenium autumnale</i> var. <i>grandiflorum</i>	mountain sneezeweed	BLUE
<i>Heterocodon rariflorum</i>	Heterocodon	BLUE
<i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	western St. John's-wort	BLUE
<i>Impatiens aurella</i>	orange touch-me-not	BLUE
<i>Impatiens ecalcarata</i>	spurless touch-me-not	BLUE
<i>Juncus regelii</i>	Regel's rush	BLUE
<i>Lewisia triphylla</i>	three-leaved lewisia	BLUE
<i>Ligusticum verticillatum</i>	Verticillate-umbel lovage	BLUE
<i>Linanthus septentrionalis</i>	northern linanthus	BLUE
<i>Megalodonta beckii</i> var. <i>beckii</i>	water marigold	BLUE
<i>Melica smithii</i>	Smith's melic	BLUE
<i>Mertensia paniculata</i> var. <i>borealis</i>	tall bluebells	BLUE
<i>Muhlenbergia glomerata</i>	marsh muhly	BLUE
<i>Myriophyllum ussuriense</i>	Ussurian water-milfoil	BLUE
<i>Oxytropis campestris</i> var. <i>columbiana</i>	Columbia River locoweed	BLUE
<i>Platanthera dilatata</i> var. <i>albiflora</i>	fragrant white rein orchid	BLUE
<i>Polygonum polygaloides</i> ssp. <i>kelloggii</i>	Kellogg's knotweed	BLUE
<i>Scrophularia lanceolata</i>	lance-leaved figwort	BLUE
<i>Stellaria obtuse</i>	blunt-sepaed starwort	BLUE
<i>Thalictrum dasycarpum</i>	purple meadowrue	BLUE

(Source: BC Ministry of Sustainable Resource Management, 2002)

Table 2: Red and blue-listed vascular plant species with known occurrences in the Kootenay Lake Forest District that are currently tracked by the Conservation Data Centre.

SCIENTIFIC NAME	COMMON NAME	PROVINCIAL LIST	OCCURRENCE LOCATION
<i>Carex tenera</i>	Tender sedge	BLUE	Ymir Mountain: above ski area, south aspect scree slopes (terrestrial montane)
<i>Monardella odoratissima</i> ssp. <i>Odoratissima</i>	Monardella	RED	Nelson (terrestrial montane)

(Source: BC Ministry of Sustainable Resource Management, 2002)

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Table 3: Rare Natural Plant Communities that are currently tracked by the Conservation Data Centre Kootenay Lake Forest District.

SCIENTIFIC NAME	COMMON NAME	BIOGEOCLIMATIC ECOSYSTEM CLASSIFICATION	PROVINCIAL LIST
<i>Abies lasiocarpa</i> / <i>Vaccinium</i>	Subalpine fir / black huckleberry /	ESSFwc1/00	Blue
<i>Membranaceum</i> / <i>Xerophyllum</i>	bear grass	ESSFwc4/00	
<i>Tenax</i>			
<i>Pseudotsuga menziesii</i> / <i>Mahonia aquifolium</i> /	Douglas-fir / tall Oregon-grape / parsley fern	ICHdw/02	Red
<i>Cryptogramma</i>			

(Source: BC Ministry of Sustainable Resource Management, 2002)

2.7 WILDLIFE AND WILDLIFE HABITAT

This section identifies specific wildlife species or groups of wildlife species known to occur within the Interior Cedar Hemlock (ICHmw) and Engelmann Spruce Subalpine Fir (ESSFwc) forests of southern British Columbia (Stevens, 1995). Wildlife species were considered confirmed in the area either through inventory information, or if observed or verified by resource contacts, or, based on present suitability, if the species could reasonably be expected to utilize habitats of the Whitewater Ski area. A complete list of wildlife species that could potentially occur within the Whitewater operational boundary area lands, based on capability, is provided in Appendix II. The species/species groups with the highest likelihood of occurrence within the project study area are identified and discussed below.

Three broad ecosystem classifications that make up the Whitewater ski area include the Interior Cedar Hemlock, moist-warm variant (ICHmw), Engelmann Spruce-Subalpine Fir, wet-cool variant (ESSFmw) and the Alpine Tundra ecosystems found on the highest elevations of the subject area. In addition to the natural ecosystems found throughout the ski area there exists anthropogenic sites such as the base facilities and ski runs which create open spaces, increase edge, unique vegetation assemblages and creates habitat favouring early seral and open/edge habitats.

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Photo 5 Ski run forest edge habitat.

The Interior Cedar-Hemlock biogeoclimatic zone is limited to the lower elevations of the subject site (<1650m) including the Whitewater base facilities, access road and lower slopes of the Backside (of Qua Ridge). The ICH biogeoclimatic zone is known for its relatively long growing season and highly productive forests. As a result, the ICH is regarded as having one of the highest species diversity in the province after the two coastal zones (CWH & CDF). A total of 376 wildlife species made up of 8 amphibians, 7 reptiles, 293 birds and 68 mammals inhabit the ICH zone either year round or on a seasonal basis (Stevens 1995). The ICHmw subzone that is found throughout the study area contains only the portion of the total 376 wildlife species that have adapted to the mw subzone of the ICH.

The Engelmann Spruce-Subalpine Fir biogeoclimatic zone is the most common forested ecosystem found within the Whitewater Ski Area. The ESSF is generally found throughout the site above 1650m and below 2200m. The ESSF biogeoclimatic zone is generally characterized by its cold, moist and snowy continental climate (Pojar and Meidinger 1991). The ESSF zone has a total of 203 wildlife species comprised of 5 amphibians, 4 reptiles, 126 birds and 68 mammals (Stevens 1995). The ESSFwc subzone that is found throughout the study area contains only the portion of the total 203 wildlife species that have adapted to the wet cold subzone of the ESSF.

The Alpine Tundra biogeoclimatic zone is restricted to the highest portions of the study area generally found above elevations of 2200m. This zone is characterized by cold, windy and

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short, cold growing seasons. The AT zone is regarded as having the harshest climate of all the zones, resulting in a low wildlife species diversity and density (Pojar and Meidinger 1991). The AT zone has 125 known wildlife species comprised of 1 amphibian, 88 birds, and 36 mammals. This total, as the preceding lists, include a provincial wide inventory. The expected assemblage of wildlife species occurring in the subject site will be limited to those species pertinent to AT found above the ESSF zones and endemic to the Whitewater area.

2.7.1 Ungulates

Seasonal distribution data from Stevens (1995), for the ICHmw and ESSFwc subzones, shows six ungulate species to be common in these forested ecosystems. Ungulate species that are known to utilize forest within the ESSFwc, ICHmw and AT ecosystems in the province of BC include mule deer, mountain goat, mountain caribou, white tailed deer, moose and elk. Within the subject area, white-tailed deer and elk are not anticipated to occur due to the lack of early seral forests, open areas and due to the general wet-forest types and elevation. The lands located to the west and south of Kootenay Lake are considered as providing poor winter range (pers comm. Guy Woods) and as a result ungulates are expected to occur primarily during the summer months with limited use of the subject area during the winter months. Under the Kootenay/ Boundary Land Use Plan the ski area is listed as having mountain caribou priority 2 (with one being the highest). The Southern Selkirk mountain caribou population was last listed as having a resident population of 35 animals (The Mountain Caribou Technical Advisory Committee 2002). The majority of animal activity within the Southern Selkirk population is noted to occur in the southern extent of the range within 15 km of the US/Canada border, however the Kutetl and Qua Creek drainages located south and southeast of the ski area are regarded as providing suitable caribou habitat (pers comm. Guy Woods). Snowpack in higher elevation habitats, such as those found in the project area, severely limit mobility and availability of food for ungulates (Canada Land Inventory, 1969). Resident ungulate populations wintering in the area are assumed to migrate to lower elevation forests.



Photo 6 Mule deer tracks near base area

Both mule deer and white-tailed deer are listed as occupying the subject area. Although there is overlap in their distribution, mule deer tend to make greater use of the high elevation habitats (e.g., subalpine/alpine). During the site visit, mule deer sign was identified in the vicinity of the base facilities as well as on Qua Ridge.

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2.7.2 Wide-ranging Carnivores

Ten wide-ranging carnivore species are likely to occur on or adjacent to the project area (Stevens, 1995), with two species, grizzly bear and wolverine, provincially blue-listed.

Table 4: Wide-ranging carnivores known to occur in the ICHmw and ESSFwc biogeoclimatic zones.

SPECIES	SEASONAL DISTRIBUTION ¹		CONFIRMED (ON OR ADJACENT TO PROJECT AREA)
	ICHmw	ESSFwc	
Black bear	Y	Y	*
Bobcat	Y	Y	
Cougar	Y	Y	
Coyote	Y	Y	*
Ermine	Y		
Grizzly bear ²	Y	SAW	*
Lynx	Y	Y	
Marten	Y	Y	
Striped skunk	Y		
Wolverine spp. <i>luscus</i> ²	Y	y	

Species and seasonal distribution data are from Stevens (1995).

¹ y - yearlong; p - spring; s - summer; a - autumn; w - winter

(uppercase - common, very common, abundant, lowercase - rare, scarce, uncommon, scattered, and sporadic)

² Grizzly bear and wolverine are provincially blue-listed species

2.7.2.1 Black Bear

The occurrence of black bears within the Whitewater study area lands and adjacent area has been confirmed through sign and discussions with Whitewater employees. In the spring, black bears seek out newly emergent grasses, sedges, and other green vegetation, along with carrion in the form of winterkill (i.e., ungulates). Cambium feeding on conifers also occurs in spring and early summer (Poelker and Hartwell, 1973). Herbaceous material, which dominates the spring-summer diet, is fairly widely available along Apex Creek, seepage areas and in disturbed sites such as the roads and ski runs. Berries (black huckleberry, black gooseberry), which are predominate in the summer and fall diet, are widespread and relatively abundant in the open forests and disturbed sites on the study area lands. Forbs become important in late spring while berries dominate the summer and fall diet. Black bears require forest cover for breeding and travel. Bear scat was observed along the banks of Apex Creek below the base facility.

2.7.2.2 Grizzly Bear

Grizzly bear sign was observed on the south-facing slope of Ymir Bowl at an approximate elevation of 1850m. Grizzly most often avoids developed areas, however the seasonal operation of Whitewater coincides with grizzly bear winter denning months and therefore results in few human/bear encounters. Highly omnivorous, the grizzly bear feeds on a wide

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variety of plants and animals. However, plant-based foods such as grasses, sedges, roots of sweet-vetch (*Hedysarum spp.*) and fruits, make up a large portion of their diet (A. Forsyth, 1985). Grizzlies will also take advantage of any source of animal matter (i.e., ants, wasps, ground squirrels, fawns, calves and carrion). Bedding sites are often found in rugged terrain and dense shrub cover near food concentrations. Dens are generally excavated at high elevation into steep slopes in areas of deep snowpack and relatively slow snowmelt

2.7.2.3 Bobcat

Bobcat breed in forested areas and utilize caves, crevices, under logs, or secluded rocky, brushy areas as den sites. Foraging takes place in forested, wetland, and agricultural habitats. Small mammals, birds, reptiles and occasionally deer are their primary prey (Stevens and Lofts, 1988).

2.7.2.4 Cougar

Cougars are found most commonly found in remote, wooded, rocky places, usually near an abundant supply of deer (Eider and Pattie 2001). Cougar denning sites are generally located either in caves, under rock ledges, or in cavities protected by roots or windfall. Foraging takes place in forested areas with a preference for rocky, semi-open areas near deer habitat. Cougar generally prefer more secluded and open habitat than found throughout the subject site. The lands to the south and west of Kootenay Lake are considered to provide poor winter range for ungulates and results in a lower density of cougars (pers comm.). Cougar denning sites are generally located either in caves, under rock ledges, or in cavities protected by roots or windfall. Foraging takes place in forested areas with a preference for rocky, semi-open areas near deer habitat.

2.7.2.5 Coyote

The abundance of small mammals and gallinaceous birds present throughout the study area results in a bountiful prey base for coyote. This species is quite adaptive and opportunistic, and is expected to occur throughout the study area. Coyote tracks were observed in the valley bottom in closed vicinity to the base facilities.

2.7.2.6 Ermine

Ermine are found in a wide range of habitats (A. Forsyth, 1985) and may be present in vegetative or rocky cover habitats within the study area or where mice, shrew, pikas and other small prey are abundant.

2.7.2.7 Lynx

Lynx have been identified as a potential species occurring in the high elevation habitats on or adjacent to the project area. This species inhabits dense climax forest. Den sites are often hidden in a simple crevice or hollow log. Snowshoe hare, its preferred prey, appears to be relatively abundant in the area.

2.7.2.8 Marten

Marten are generally associated with late-successional stands of conifers, particularly those with high volume of coarse woody debris (CWD), which provides escape sites, access to subnivean areas for foraging in the winter, and protective thermal environments. Winter cover

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is considered the single most important factor in determining habitat selection by marten. Voles, mice, hares, and squirrel dominate their diet in winter. Logs, trees, rocks, and snags account for the greatest number of reported natal den sites. Marten are adversely affected by logging that may remove canopy cover and CWD (Buskirk and Ruggiero, 1994).

2.7.2.9 Striped Skunk

This species may be associated with lower elevations habitat at the resort base and ski areas.

2.7.2.10 Wolverine

Because of the human presence, probability of wolverine occurring in the Whitewater study area lands is considered low (G.Woods, pers. comm.). To be expanded.

2.7.3 Cavity Nesters

Cavity nesters occur throughout the study area where forest cover is found. The ICH biogeoclimatic zone has the highest number of wildlife tree users of all zones in the Nelson Forest Region (Steeger and Machmer, 1993). Table 5 lists species of cavity nesting birds that have been recorded in the ICHmw and ESSFwc zones

Machmer *et. al.* (1995) states that woodpeckers, chickadees, nuthatches and creepers used at least seven tree species for nesting in the ICH, but they preferred paper birch and trembling aspen. Of the 1,041 trees sampled, only 7% were paper birch and 2% trembling aspen; however, they accounted for 30% and 53% respectively, of the trees used for nesting. Relatively large trees (20 - 50 cm dbh and 5 - 20 m height) with heart rot and broken tops or trunk were selected for nesting. The study also found that the highest proportion of trees with nests was found in the mixed riparian stand. Douglas-fir and western larch were the most commonly used conifers. Woodpeckers prefer live defective trees and hard snags while trees in more advanced stages of decay are preferred by weak excavators (i.e., Black-capped Chickadee – Steeger, pers. comm.). High use by cavity nesters was also reported in trees with defects such as heart and rot root, broken tops and insect damage (Steeger and Machmer, 1995; Machmer 1997).

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Table 5: Cavity nesters known to occur in the ICHmw and ESSFwc, relevant to the project area

SPECIES	SEASONAL DISTRIBUTION ¹		CONFIRMED (ON OR ADJACENT TO PROJECT AREA)
	ICHmw	ESSFwc	
American Kestrel	SwM	sm	
Barred Owl	Y		
Black-capped Chickadee	Y		*
Boreal Chickadee	Aw	y	
Boreal Owl	P	y	
Brown Creeper	Y	y	*
Chestnut-backed Chickadee	Y		*
Downy Woodpecker	SwM	y	*
European Starling	Y	sm	
Great Horned Owl	Y	y	
Hairy Woodpecker subspp.	Y	ps	*
Lewis' Woodpecker	Sm		
Mountain Bluebird	Sm	ps	*
Mountain Chickadee	Y	y	*
Northern Flicker	Y		*
Northern Hawk Owl	Saw		*
Northern Pygmy Owl	Y		*
Northern Saw-whet Owl	Y		
Pileated Woodpecker	Y	ps	*
Red-breasted Nuthatch	Y	y	*
Red-naped Sapsucker	Psa		*
Three-toed Woodpecker	Y	y	*
Vaux's Swift	Psa		*
Western Bluebird	Sm		
Winter Wren	Y	y	

Species and seasonal distribution data from Stevens (1995). Species confirmed by G. Nichol (pers. comm.).

¹ y - yearlong; p - spring; s - summer; a - autumn; w - winter
 uppercase - common, very common, abundant
 lowercase - rare, scarce, uncommon, scattered, and sporadic

2.7.4 Raptors

Thirteen species of raptors that are recorded in the ICHmw and ESSFwc zones (Stevens, 1995). A pair of red-tailed hawks were identified during the field visits.

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Table 6: Summary of habitat requirements of raptors that are likely to occur in the Whitewater study area.

SPECIES	BREEDING HABITAT	NEST DESCRIPTION	DIET	FORAGING HABITAT	CONFIRMED
Hawks, Eagles					
Sharp-shinned Hawk	coniferous and mixed forests	stick nest in tree	small birds	forested and semi-open areas	
Cooper's Hawk	pure or mixed coniferous/deciduous forests or semi-open woodlands	stick nest in tree	small birds	woodlands	
Northern Goshawk ssp. <i>atricapillus</i> ¹	mature coniferous and deciduous forests and mixed woodlands	stick nest in tree	small birds and mammals	woodlands	
Red-tailed Hawk	open to semi-open country	stick nest in tree	Small mammals	open to semi-open country	
Golden Eagle	open mountainous and hilly country	stick nest on cliff ledges and in trees	Small mammals	open areas away from disturbance	
Falcons					
American Kestrel	semi-open to open country	woodpecker or natural cavity	Small vertebrates	open to semi-open country	
Merlin	coniferous or deciduous woodlands, adjacent to open areas	stick nests in trees or occasionally woodpecker cavity	Small mammals and birds	variable	
Owls					
Great Horned Owl	various areas with trees	stick nest in trees or cavities	Small vertebrates	variable	
Northern Hawk Owl	open coniferous and deciduous forests	tree cavities or top of broken - off tree trunk	Small mammals	forest edges and openings	
Northern Pygmy-Owl	mixed coniferous forests	woodpecker cavity	Small mammals	forest edges	
Barred Owl	coniferous and mixed forests usually near water	tree cavities or top of broken - off tree trunk	Small mammals	semi-forested areas	
Boreal Owl	deciduous and mixed forests	woodpecker and natural cavities	Small mammals	older forests	
Northern Saw-whet Owl	mature coniferous and mixed forests	woodpecker and natural cavities	Small mammals and insects	forest openings and edges	

Data compiled from Campbell *et. al.* (1990) and Ehrlich (1988).

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Most raptors listed in Table 6 breed in coniferous, deciduous or mixed forested or semi-forested areas, and require structural attributes associated with late-successional forests. The American kestrel and majority of owl species use either old woodpecker or natural cavities for nesting. Hawks, eagles and merlin nest on platforms made of sticks. Small mammals and birds and large insects are the primary food sources during the breeding season. Most species forage near forest edges or in openings (Campbell *et. al.*, 1990 and Ehrlich, 1988).

The Northern Goshawk, found in the Nelson Forest Region, is recognized as 'identified wildlife' under the Forest Practices Code. It is considered a species of conservation concern because it is associated with habitats that are becoming rare, and it is a species for which BC has a global responsibility because adjacent jurisdictions have listed the Northern Goshawk as a 'species at risk'.

2.7.5 Reptiles and Amphibians

Most amphibians require ponds, small lakes or sloughs for breeding sites and the majority of their life cycle. Some amphibian species will roam farther a field after breeding season but most often remain tied to permanent, slow moving water bodies. Water features found during the site visit were limited Apex Creek, seepage areas, and small-perched wetland. Apex creek provide less than ideal habitat for most amphibian species as is to torrent, however many wetland features with standing pools were associated with Apex Creek, most commonly occurring between the day lodge and parking lot #3. These permanent standing pools provide breeding opportunities.

Western skink, northern alligator lizard and garter snakes occur in a variety of woodland and forest habitats. The skink and lizard are found under the bark and inside rotten coarse woody debris and under rocks (Stebbins, 1996). Long-toed salamanders, western toads, and Pacific treefrogs breed in temporary pools or slow streams in forested areas (Leonard *et. al.*, 1993). During the site visit, western toad, and spotted frog were positively identified in ponds adjacent to Apex Creek. Reptiles and amphibians that are likely to occur in the project area are listed in Table 7. The Rubber boa is a provincially blue-listed species.

Photo 7 Spotted Frog captured at Apex Creek



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Table 7: Reptiles and Amphibians known to occur in the ICHmw and ESSFwc

SPECIES	SEASONAL DISTRIBUTION ¹		CONFIRMED
	ICHmw	ESSFwc	
Reptiles			
Western skink	Y		
Northern alligator lizard	Y	Y	
Rubber boa	Y		
Western Terrestrial garter snake	Y		
Common garter snake	Y		
Amphibians			
Long-toed salamander	Y	Y	
Western toad	Y	Y	*
Spotted Frog	Y	Y	*
Pacific treefrog	Y	Y	

Species and distributions are taken from Stevens (1995).

¹ y - yearlong; p - spring; s - summer; a - autumn; w - winter; m - migratory
 uppercase - common, very common, abundant
 lowercase - rare, scarce, uncommon, scattered, and sporadic

2.7.6 Rare and Endangered Wildlife Species

Table 8 lists the red and blue-listed species known to occur in the ICHmw and ESSFwc, and AT relative to the project area. Species of concern in British Columbia have a provincial status designation, which is summarized on BC Environment's red or blue list. The red list includes indigenous species or subspecies considered to be Endangered or Threatened. Endangered species are facing imminent extirpation/extinction whereas Threatened taxa are likely to become endangered if limiting factors are not reversed. The blue list includes taxa considered to be vulnerable because of characteristics that make them particularly sensitive to human activities or natural events (B.C. Environment, 1999). Although they are at risk, they are not considered Endangered or Threatened. Potential occurrences based on the Conservation Data Centre Tracking for the Kootenay Lake Forest District List (B.C. Environment, 1999) are outlined below. Three of these species (Lewis' woodpecker, grizzly bear, and wolverine) have also been identified by COSEWIC as species of special concern (COSEWIC 1999). COSEWIC defines a species of "special concern" as one that is vulnerable because of characteristics that make it particularly sensitive to human activities or natural events.

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Table 8: Red and blue-listed wildlife species known to occur in the ICHmw, AT and ESSFwc, relevant to the Whitewater study area

COMMON NAME	SEASONAL DISTRIBUTION ¹		STATUS		CONFIRMED (on or adjacent to study area)
	ICHmw	ESSFwc	BC	COSEWIC	
Amphibians					
Leopard frog	y		Red	Endangered	
Reptiles					
Rubber boa	y		Blue		
Birds					
Lewis' Woodpecker ²	sm		Blue	Special Concern	
Mammals					
Red-tailed Chipmunk, <i>simulans</i> subspecies	Y	Y	Red	N/A	
Grizzly Bear	y	SAW	Blue	Special Concern	*
Northern long-eared myotis		S			
Townsend's big-eared bat	y				
Caribou	sW	Y	Blue	Threatened	
Fisher	y	Y	Blue	N/A	
Wolverine, <i>luscus</i> subspecies	Y	Y	Blue	Special Concern	

Species and distribution are taken from Stevens (1995). Status data from the COSEWIC web site and CDC.

¹ y - yearlong; p - spring; s - summer; a - autumn; w - winter (uppercase - common, very common, abundant - lowercase - rare, scarce, uncommon, scattered, and sporadic)

The blue-listed rubber boa lives in dry and riparian forests, often in close proximity to lakes or streams (Stevens 1995). Breeding habitat consists of rocky openings adjacent to forested areas (R. St. Claire, pers. comm.). Hibernation sites include talus, under bark, beneath rocks, rodent burrows, rock fissures, stumps or decaying CWD (Orchard 1988). Although the lower elevations of the study area lands are within the known distribution of the rubber boa, it is unlikely that it occurs in the area due to lack of suitable habitat.

The most common breeding habitats for the blue-listed Lewis' woodpecker are riparian black cottonwood stands adjacent to open areas; open, mature ponderosa pine forests; and recently logged or burned coniferous forests with wildlife trees (snags). Suitable breeding habitat is generally restricted to lower mountain slopes and valley bottoms in the southern interior of BC (COSEWIC 1999). The wet, conifer dominated forests of the Whitewater ski area provide less than ideal habitat for this woodpecker species.

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The red-tailed chipmunk is a provincially red-listed species. It is an inhabitant of a variety of low- and mid-elevation coniferous forest in the ICH and ESSF biogeoclimatic zones. Although found in dense forests, it is most prevalent in forest openings or forest edges where shrubby undergrowth is abundant (Cannings et. al., 1999). This species' diet consists of seeds and fruit of various trees and shrubs, the leaves and flowers of various forbs, and possibly fungi. Nesting occurs in shrubs or trees (on limbs or in cavities), under ground, under log piles, or in crevices among boulders (CDC, 1998). Due to the lack of inventory and habitat information for the red-tailed chipmunk, it is hard to assess the impact that the proposed plan for Expansion and Improvement will have on this red-listed species. Potentially, logging may be a long-term threat if abundant coarse woody debris, a critical habitat component, is removed (Cannings et. al., 1999).

Grizzly bears have been observed in the existing Whitewater and proposed expansion areas. Highly omnivorous, the blue-listed grizzly bear feeds on a wide variety of plants and animals. However, plant-based foods such as grasses, sedges, roots of sweet-vetch (*Hedysarum spp.*) and fruits, make up a large portion of their diet (A. Forsyth, 1985). Grizzlies will also take advantage of any source of animal matter (i.e., ants, wasps, ground squirrels, fawns, calves and carrion). Bedding sites are often found in rugged terrain and dense shrub cover near food concentrations. Dens are generally excavated at high elevation, usually above 2,100 m in areas with deep and relatively slow melting snowpacks. South facing avalanche tracks provide important foraging habitat in spring as they provide early forage to emerging grizzly bears. The south-facing slopes of White Queen Mountain and sites with low crown closure (and potentially abundant berry production) may provide such suitable foraging habitat for grizzlies. Unlike wolverine, grizzly bear appear to have lost their traditional human "avoidance" type behavior and "wilderness" association. Along with this change of behavior, and the habitat and sightings of grizzly bear within the study area, there is a potential for human/bear encounters, particularly during the spring through fall season. To date, the Whitewater ski area has operated exclusively during the winter months when bears are occupying their winter dens and has therefore resulted in few human/bear encounters.



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Photo 8 Grizzly Bear excavation site Ymir Bowl

The blue-listed wolverine generally occupies wilderness or backcountry areas that have little human activity or development. The wolverine is listed as inhabiting the ESSFwc forested ecosystem on a yearly basis however it is considered rare and uncommon. The wolverine more commonly occurs within the ICHmw on a yearly basis (Stephens 1995). However, because of the human presence, probability of wolverine occurring in the Whitewater study area lands is considered low (G.Woods, pers. comm.).

The red-listed caribou (mountain ecotype) has not been observed in the Whitewater ski area. The south Selkirk population was last estimated at 35 animals with most activity occurring within the southern portion of their range. The lack of animal presence in the northern portion does not exclude the animal's potential presence from the area however, and Qua Creek and Kutettle drainages have been cited as important habitat (per. comm. Guy Woods).

2.7.7 Other Wildlife Species

Numerous small mammal species were observed throughout the subject property during the field visits. The most abundant diurnal species observed during the site visit include the American pika, hoary marmot and red squirrels and ground squirrels. Other wildlife species that potentially occur in the project area include bats, shrews, and several species of rodents. A comprehensive list of wildlife species that may occur in the vicinity of the study area lands, based on habitat capability only without consideration of current habitat suitability, is provided in Appendix II. Other bird species present in the area include warblers, vireos, thrushes, kinglets, corvids, swallows, finches, flycatchers, grouse, and hummingbirds.

2.8 FISHERIES AND AQUATIC HABITAT

Apex Creek is the main drainage identified within the Whitewater operating area. Apex Creek is a second order creek with a total stream length of 10.63km. Within the study site Apex creek has an approximate stream length of 8.2km with an average gradient of 10%. According to the Fisheries Data Warehouse, Apex Creek contains rainbow trout, cutthroat/rainbow trout hybrid, westslope cutthroat trout and brook trout. Rainbow trout occur as a wild indigenous stock, while the other three species occur as a result of stocking programs taking place between 1926 and 1956. According to the Forest Practices Code Fish Stream Identification Guidebook (1998) streams with a gradient <20% are assumed to be fish bearing until an adequate fish inventory is conducted to confirm fish presence. Fish have been observed at the base facility at Whitewater (per. comm.).



Photo 9 Apex Creek near base facility

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3.0 ENVIRONMENTAL CONSTRAINTS AND RECOMMENDATIONS

3.1 CLIMATE

The only potential constraints represented by climatic conditions in the study area relate to the availability and seasonality of snow cover on skiable terrain.

Climate constraints imposed on wildlife relate to difficulty of travel over deep snow and reduced food supply due to climate changes with increasing elevation. These constraints are discussed in the wildlife component of this section.

3.2 GEOLOGY

Constraints relating to geological conditions may arise from past mining activity and the risks posed by the presence of abandoned adits and potential for acid rock drainage. This potential condition is the result of past use of the land and does not directly relate to ski resort development or operation other than consideration in land utilization decisions.

Other constraints relating to geology pertain to steepness and presence of bedrock outcroppings. These constraints are not considered significant as they relate to skiing. Planning for more intensive developments within the operating area like ski lifts or auxiliary buildings, would investigate geotechnical issues at a site specific level of detail.

3.3 GEOMORPHOLOGY

On the upper slopes within the subject site, thin soils should be considered to be moderately constraining since losses of soil cover due to erosion will be difficult to replace. Best practices of ski run development as outlined in the Canada West Ski Areas Association's Guidelines for Environmental Good Practices for Ski Areas should be sufficient to prevent potential soil losses (CWSAA, 1992).

3.4 PEDOLOGIC SOILS

Seepage phases of all soils types are considered constraining to development, but in particular the soil associations with basal till parent materials are of concern. As a result wet areas should be avoided. No other specific constraints are identified concerning pedologic soils. Preservation of native soils should be a goal for run and trail development. Steep slopes are potential sources of erosion and soils disturbance on steep slopes should be avoided. Where disturbance is unavoidable, exposed soils should be aggressively revegetated. Trail design should attempt to work with the existing contours. Re-grading efforts can result in loss of the organic horizons, reducing productivity of the soils. For this reason, use of excavator hoes is preferred over caterpillar type machines.

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Photo 10 Apex Creek

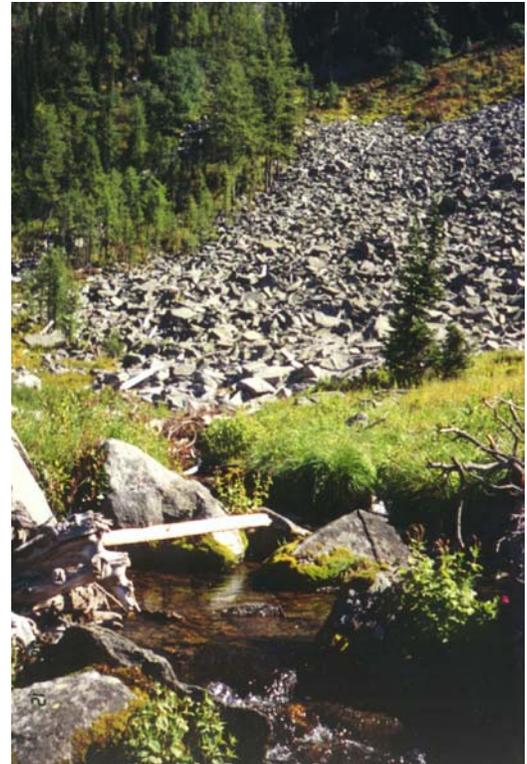
3.5 AQUATIC HABITAT

Apex Creek and its associated tributaries and riparian vegetation should be considered as environmentally sensitive areas. These habitats are increasingly important for maintenance of downstream water quality and fisheries values within the system and should therefore be protected with adequate streamside buffers.

3.6 ECOLOGY

Mature and Old Forest

The Forest Practices Code Biodiversity Guidebook (1995) sets out mature and old forest targets at the Landscape Unit planning level. The proposed Whitewater study area is located within Landscape Unit K09 within the Kootenay Lake Forest District. At present, management of 'mature and old' seral stages within this landscape unit is not within the mandate of the Kootenay-Boundary Higher Level Plan, indicating that targets have been met for this area (MSRM, 2002). Refer to the wildlife sections of this report for further recommendations regarding mature and old forest management within the study area.



Rare and Endangered Plant Species and Communities

There are 59 plants within the KLFD listed as threatened or endangered by the Conservation Data Centre (BC Ministry of Sustainable Resource Management). There is an occurrence record of one species *Carex tenera*, a Blue Listed sedge species, within the bounds of the Whitewater development, specifically on a south facing talus slope in Ymir Bowl. The exact location of the occurrence is not known.

The proposed development in Ymir Bowl will include the construction of a lower and upper lift station and clearing for the lift line and lift stations as required. No road construction is planned to access either the upper or the lower lift station. Land clearing required for the development in Ymir bowl, however limited, could potentially affect *Carex tenera*. A site specific survey of development areas in Ymir Bowl should be conducted during the growing season (to facilitate plant identification) as proposed locations of lift stations and towers are planned. Development of this area should not proceed until the presence or absence of this species is confirmed within the areas of planned development, and the affects of skier, snowmobile, and snowcat traffic are investigated. The nature of the development in Ymir Bowl is limited to lift line clearing, and no run cutting will be required due to the fact that the area is mostly open talus slopes. Individual tree and tree-island clearing may be desirable for

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safety reasons, and should only proceed once the principles of management for *Carex tenera* are defined.

Occurrence mapping from the CDC also shows *Monardella odoratissima* ssp. *Odoratissima*, a Red Listed species, as potentially occurring within the project area; however, the likelihood of an occurrence is low. Further study into the habitat requirements of this lesser known species is required. The occurrence was recorded in Nelson, but the mapped buffer for potential occurrences extends to the edge of the Whitewater development. A presence/absence survey of areas involving extensive clearing that fall within the habitat requirements for this species should be conducted at the development planning stages.

The CDC has also identified a Blue Listed plant community (Subalpine fir/black huckleberry/bear grass) that may exist in the ESSFwc4 biogeoclimatic variant, which is the prevalent variant within the bounds of the Whitewater development. If it does exist within areas identified for development, run cutting, road construction, base facility expansion, and increased human access to areas in and around Whitewater may disturb this threatened plant association. As with Blue Listed plants, threatened plant communities will also require special management. The presence or absence of this plant community in future development areas should be confirmed through site specific survey at the development planning stage, prior to construction.

3.7 WILDLIFE

From a wildlife perspective, there do not appear to be major impacts anticipated with future developments provided that recommended mitigation measures are effectively planned and implemented. Consideration should be given to retention of old growth forest attributes, wildlife tree retention, riparian “best management” practices, and retention of habitat connectivity with adjacent areas. Coordinated planning efforts with Ministries of Forests and Water, Land and Air Protection would be appropriate in this respect. As Whitewater operations occur primarily during the winter months, little conflict occurs with such sensitive species as grizzly bear. If future developments are intended to allow for summer usage species such as the grizzly bear will become a greater issue.

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Mature and Old Forest

Mature and old forest stands occur throughout the subject site and provide important habitat to old forest obligate wildlife species. Such forests can also provide habitat connectivity and movement corridors between seasonal habitats. Old forests are highly structured and provide many important attributes such as standing snags in various stages of decomposition important to cavity nesters and forage, downed woody debris, which provides ideal small mammal cover and ambush hunters. Mature forests have a high level of canopy interception and provide areas of easy movement, thermal cover and forage during periods of cold weather and heavy snowfall.

Riparian Areas

Riparian areas are associated with Apex Creek and include the tributaries as well the wetland adjoining wetland features. Riparian ecosystems are used to a disproportionately greater degree by wildlife than any other habitat type, but generally make up a relatively small proportion of the overall landscape. Riparian areas are thus considered to play a key role in supporting wildlife species and habitat diversity. However, these ecosystems are also extremely sensitive to human induced disturbances and developments.

Wetlands

A few wetland features were identified along Apex Creek, the largest of which is found downstream between the daylodge and parking lot three. Additional wetland features are found along Apex Creek at the toe slopes of Ymir Bowl. These sites are characterized by their standing water, saturated soils, and an associated assemblage of hydrophilic vegetation. Salix sp., Sitka alder, dogwood, grass, sedges and rushes make up the vegetation found in these receiving areas and provide high quality, succulent forage. Higher insect populations, good nesting opportunities, high quality forage and amphibian breeding opportunities are associated with these areas. These wet units function similarly to riparian areas in such a way as to provide habitat to a disproportionately greater degree of wildlife but generally make up a small portion of the overall landscape. Wetlands should be considered as environmentally sensitive areas and be retained wherever possible.



Photo 11 Apex Creek Wetland near base facility

Wildlife Trees

Wildlife trees, whether in riparian areas or forests ecosystems, provide critical habitat for a number of species (Vonhof and Gwilliam 1999; Steeger and Machmer 1995, Machmer et. al., 1995). Among the wildlife species known to occur in the ICHmw and ESSFwc zones

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(Appendix 1), 40 are wildlife tree users. Loose bark (i.e., bat roosts, Brown Creeper nest sites), natural or excavated cavities, (i.e., marten dens, Pileated Woodpecker nests and roost cavities), insect infestation (i.e., woodpecker feeding), perching sites (i.e., raptors for hunting), and open nest sites (i.e., hawks) are some examples of wildlife tree attributes and uses. Most important is that it can take up to 150 years for a tree to develop the attributes needed to function as effective wildlife tree habitat. However, this critical habitat is continuing to be impacted by resource developments and management activities, particularly forest harvesting. Additional removal of wildlife trees will ultimately result in loss of species diversity throughout the overall area.

Human/Wildlife Interactions

Information attained and reported herein would indicate that human/wildlife interactions during the winter operating period should not generally be a major issue. However, the potential for human/wildlife conflicts (i.e., bear/human conflicts and wildlife displacement) does exist for the spring through fall seasons.

Wildlife Corridors and Habitat Connectivity

Habitat connectivity plays an important role in linking small habitat fragments into a larger functional unit that meets habitat needs. The major terrestrial function of corridors is to facilitate the movement of common small mammals, amphibians and reptiles. On a landscape scale, habitat connectivity and wildlife travel corridors are important in maintaining ecological functions such as migration and gene flow in and out of animal populations. On a smaller scale, corridors facilitate the movement of animals within the site, while providing small-scale habitat functions (cover & forage) for mammals, amphibians, reptiles, and invertebrates. They are particularly beneficial along riparian corridors, where they provide both aquatic and terrestrial connectivity. As land-clearing activity is minimal within the Whitewater ski area, mostly related with ski run cutting and the base facilities, fragmentation on the landscape scale is not a major concern at this time.

3.8 FISHERIES

In the absence of fish inventory, fish presence should be assumed in streams with an average gradient of less than 20 percent (Fish Stream Identification Guidebook, 1998). This generally is restricted to the Apex Creek, downstream from the base facilities. Potential impacts to fish populations and habitat resulting from development activities may include direct loss of habitat, stream sedimentation resulting from road and ski run development activities, increased run-off from exposed soils and timber harvesting falling, skidding and yarding activities. Additional operational impacts may be associated with stormwater run-off from impervious surfaces such as parking lots and roads.

To protect fish habitat and water quality within the Whitewater study area from construction or operational activities, Riparian Management Areas should be established as specified in the Riparian Management Area Guidebook (1995), the Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et. al., 1992) or the newly enacted Streamside Protection Regulation of the Fish Protection Act (this new regulation is not currently in effect within the Kootenay Boundary Regional District, in which Whitewater is located). Under the act, buffers would normally be 30 m from the top of bank of a permanent watercourse, and 15

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m from the top of bank of a non-permanent watercourse. Future ski run layout and lift lines should avoid surface drainages and riparian areas.

3.9 PLAN FOR EXPANSION AND IMPROVEMENT

Retention of 'Mature and Old' Seral Stage

Targets for mature and old seral stages are currently being met within Landscape Unit K09, but forest inventories may change with management over time and retention targets for these seral stages may not be met in the future. Any proposed developments involving significant land clearing in 'Mature and old' growth stands should proceed with input from the BC Ministry of Forests regarding retention targets for this landscape unit.

Road Layout and Drainage Management

Future road development and improvement may impact local drainage patterns, especially in and around Apex Creek (please see aquatics and hydrology sections for further information on Apex Creek). Glaciofluvial deposits in the valley floor, where road development is most likely, are erodible and pose a sedimentation hazard to Apex Creek. Road design should proceed in such a manner that the potential for erosion and the impacts on local drainage patterns are minimized. Soil erosion hazard should be field verified at the time of run/road layout to determine site-specific conditions and appropriate measures to mitigate sediment delivery. Bio-engineering and re-vegetation efforts on exposed erodible may reduce the potential for adverse runoff effects.

Revegetation

Best practices for ski trail/run and road construction require aggressive revegetation immediately following ground disturbance (CWSAA, 1992). This may include interim revegetation of soil stockpiles or disturbed ground during extended periods of construction. In addition, fall seeding and mulching programs or winter over-snow seeding may be necessary to ensure revegetation of disturbed soils occurs as soon as possible in the spring. Best practices dictate that budgets for all ski run/trail developments and projects involving ground disturbance include revegetation in the same calendar year. Disturbed soils not re-vegetated during the construction period should be covered with a plastic membrane and/or protected with collection ditches and sediment settling ponds in conformance with the Development Guidelines for the Protection of Aquatic Habitat (Chilibeck, 1993).



Photo 12 Bonanza Ski Run, graded and revegetated (summer groomed) according to CWSAA Best Practices

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3.10 COMMUNITY WATERSHED ISSUES

The presence of a domestic water-supply intake on Apex Creek upstream of the Whitewater day lodge is an issue that should be addressed during all phases of development. If the intake at Apex Creek is properly managed and the design for development remains responsive to regulations and best practices for environmental protection, then the potential for negative impacts arising from the types of development and activities proposed in the Plan for Expansion and Improvement will be minimal. It should be noted that water quality is protected under the Water Act regardless of the type of activity involved. In addition, the domestic watershed solely services the Whitewater ski area, implying that protection of this resource is likely a high priority and in the best interests of Whitewater Ski and Winter Resort.

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5.0 APPENDICES

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APPENDIX 1 LIST OF COMMON AND SCIENTIFIC NAMES OF ANIMALS AND PLANTS

PLANTS

Black huckleberry.....	<i>Vaccinium membranaceum</i>
Devil's club.....	<i>Oplopanax horridus</i>
Douglas-fir.....	<i>Pseudotsuga menziesii</i>
Englemann spruce.....	<i>Picea engelmannii</i>
Falsebox.....	<i>Pachistima myrsinites</i>
Feathermoss.....	<i>Pleurozium schreberi</i>
Five-leaved bramble.....	<i>Rubus pedatus</i>
Gooseberry.....	<i>Ribes lacustre</i>
Hybrid white spruce.....	<i>Picea glauca x engelmannii</i>
Lady fern.....	<i>Athyrium filix-femina</i>
Lodgepole pine.....	<i>Pinus contorta</i>
Oak fern.....	<i>Gymnocarpium dryopteris</i>
One-leaved foamflower.....	<i>Tiarella unifoliata</i>
Paper birch.....	<i>Betula papyrifera</i>
Ponderosa pine.....	<i>Pinus ponderosa</i>
Prince's pine.....	<i>Chimaphila unbellata</i>
Queen's cup.....	<i>Clintonia uniflora</i>
Red-osier dogwood.....	<i>Cornus stolonifera</i>
Saskatoon.....	<i>Amelanchier alnifolia</i>
Sedge.....	<i>Carex</i>
Sitka valerian.....	<i>Valeriana sitchensis</i>
Subalpine fir.....	<i>Abies lasiocarpa</i>
Trembling aspen.....	<i>Populus tremuloides</i>
Twinflower.....	<i>Linnaea borealis</i>
Utah honeysuckle.....	<i>Lonicera utahensis</i>
Western hemlock.....	<i>Tsuga heterophylla</i>
Western larch.....	<i>Larix occidentalis</i>
Western redcedar.....	<i>Thuja plicata</i>
White-flowered rhododendron.....	<i>Rhododendron albiflorum</i>
Woodrush.....	<i>Luzula sp.</i>

AMPHIBIANS

Long-toed salamander.....	<i>Ambystoma macrodactylum</i>
Pacific treefrog.....	<i>Hyla regilla</i>
Western toad.....	<i>Bufo boreas</i>

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REPTILES

Common garter snake.....	<i>Thamnophis sirtalis</i>
Northern Alligator lizard.....	<i>Gerrhonotus coeruleus</i>
Rubber boa	<i>Charina bottae</i>
Western skink	<i>Eumeces skiltonianus</i>
Western Terrestrial garter snake.....	<i>Thamnophis elegans</i>

BIRDS

American Kestrel.....	<i>Falco sparverius</i>
Barred Owl	<i>Strix varia</i>
Black-capped Chickadee	<i>Poecile atricapillus</i>
Boreal Chickadee.....	<i>Poecile hudsonicus</i>
Boreal Owl.....	<i>Aegolius funereus</i>
Brown Creeper.....	<i>Certhia americana</i>
Chestnut-backed Chickadee	<i>Poecile rufescens</i>
Cooper's Hawk.....	<i>Accipiter cooperii</i>
Downy Woodpecker	<i>Picoides pubescens</i>
European Starling	<i>Sturnus vulgaris</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Great Horned Owl	<i>Bubo virginianus</i>
Hairy Woodpecker.....	<i>Picoides villosus</i>
Lewis' Woodpecker	<i>Melanerpes lewis</i>
Merlin	<i>Falco columbarius</i>
Mountain Bluebird	<i>Sialia currucoides</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Northern Flicker.....	<i>Colaptes auratus</i>
Northern Goshawk subspp. <i>atricapillus</i>	<i>Accipiter gentilis atricapillus</i>
Northern Hawk Owl.....	<i>Surnia ulula</i>
Northern Pygmy Owl.....	<i>Glaucidium gnoma</i>
Northern Saw-whet Owl	<i>Aegolius acadicus</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Red-napped Sapsucker	<i>Sphyrapicus nuchalis</i>
Red-tailed Hawk.....	<i>Buteo jamaicensis</i>
Sharp-shinned Hawk.....	<i>Accipiter striatus</i>
Three-toed Woodpecker	<i>Picoides tridactylus</i>
Vaux's Swift.....	<i>Chaetura vauxi</i>
Western Bluebird.....	<i>Sialia mexicana</i>
Winter Wren	<i>Troglodytes troglodytes</i>

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MAMMALS

Black bear	<i>Ursus americanus</i>
Bobcat	<i>Lynx rufus</i>
Cougar	<i>Felis concolor</i>
Coyote	<i>Canis latrans</i>
Ermine	<i>Mustela erminea</i>
Elk subsp. <i>nelsoni</i>	<i>Cervus elaphus</i> subsp. <i>nelsoni</i>
Grizzly bear	<i>Ursus arctos</i>
Lynx	<i>Lynx canadensis</i>
Marten	<i>Martes americana</i>
Moose	<i>Alces alces</i>
Mule Deer subsp. <i>hemionus</i>	<i>Odocoileus hemionus hemionus</i>
Raccoon	<i>Erethizon dorsatum</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Red-tailed Chipmunk subsp. <i>simulans</i>	<i>Tamias reficaudus simulans</i>
Snowshoe hare	<i>Lepus americanus</i>
Striped skunk	<i>Mephitis mephitis</i>
White-tailed Deer	<i>Odocoileus virginianus</i>
Wolverine ssp. <i>luscus</i>	<i>Gulo gulo</i> ssp. <i>luscus</i>

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**APPENDIX 2 LIST OF POTENTIAL WILDLIFE SPECIES, BASED ON HABITAT CAPABILITY
 (That May Occur in the Whitewater Study Area)**

Common Name	Status	ICHmw	ESSFwc
Amphibians			
Long-toed salamander		Y	Y
Western toad		Y	Y
Pacific treefrog		Y	
Reptiles			
Western skink		y	
Northern alligator lizard		y	y
Rubber boa	Blue	y	
Western Terrestrial garter snake		Y	o
Common garter snake		Y	o
Birds			
Canada goose		SwM	s
Turkey vulture		ps	
Sharp-shinned hawk		swM	sM
Cooper's hawk		sm	sm
Northern goshawk subsp.	Identified wildlife	y	y
Red-tailed hawk		SwM	sm
Golden eagle		y	sm
American kestrel		SwM	sm
Merlin		y	sm
Spruce grouse		y	y
Blue grouse		y	y
Ruffed grouse		Y	
Killdeer		swM	
Rock dove		Y	
Great horned owl		y	y
Northern pygmy owl		y	
Barred owl		y	
Great gray owl		w	
Short-eared owl	Blue	wM	
Northern saw-whet owl		y	
Vaux's swift		PSa	
Black-chinned hummingbird		ps	
Anna's hummingbird		pw	
Calliope hummingbird		PS	
Rufous hummingbird		PSa	PS
Red-naped sapsucker		PSa	
Downy woodpecker		SwM	y

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SQUAMISH OFFICE

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 Garibaldi Highlands, BC V0N 1T0
 Phone (604) 898-9859 Fax (604) 898-4326



Common Name	Status	ICHmw	ESSFwc
Hairy woodpecker subsp.		y	ps
Three-toed woodpecker		y	y
Black-backed woodpecker		y	y
Lewis' woodpecker	Blue	sm	
Northern flicker		Y	
Pileated woodpecker		y	ps
Willow flycatcher		ps	
Hammond's flycatcher		sm	ps
Dusky flycatcher		ps	
Western flycatcher complex		sm	
Horned lark		y	sa
Tree swallow		PSa	ps
Violet-green swallow		Psa	s
Northern rough-winged swallow		PSa	s
Barn swallow		SM	s
Gray jay		y	y
Steller's jay subsp.		y	y
Clark's nutcracker		psAW	y
American crow		Y	sm
Common raven		Y	y
Black-capped chickadee		y	
Mountain chickadee		y	y
Boreal chickadee		aw	y
Chestnut-backed chickadee		Y	
Red-breasted nuthatch		y	y
Brown creeper		y	y
Winter wren		Y	y
American dipper		y	mw
Golden-crowned kinglet		Y	y
Ruby-crowned kinglet		y	y
Western bluebird		sm	
Mountain bluebird		sm	ps
Townsend's solitaire		y	sa
Swainson's thrush		sm	
Hermit thrush		sm	s
American robin		SMw	sm
Varied thrush		psAW	sm
Bohemian waxwing		psAW	y
Cedar waxwing		PSaw	
Northern shrike		mw	a
European starling		SMw	sm
Solitary vireo		sm	

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Common Name	Status	ICHmw	ESSFwc
Warbling vireo		sm	
Red-eyed vireo		sm	
Orange-crowned warbler		sm	sa
Nashville warbler		sm	
Yellow warbler		sm	
Yellow-rumped warbler		sm	sa
Townsend's warbler		sm	sa
MacGillivray's warbler		sm	sa
Western tanager		sm	
Black-headed grosbeak		sm	
Rufous-sided towhee		y	
Chipping sparrow		Psa	s
Song sparrow		y	s
White-crowned sparrow		sM	s
Dark-eyed junco		sMw	sm
Snow bunting		mw	mw
Brown-headed cowbird		psa	
Rosy finch		mw	y
Pine grosbeak subsp.		y	sm
Purple finch		y	
Cassin's finch		y	
Red crossbill		Y	y
White-winged crossbill		y	y
Common redpoll		MW	mw
Hoary redpoll			mw
Pine siskin		Y	Y
American goldfinch		pSAw	
Evening grosbeak		psAW	sm
Mammals			
Common shrew		Y	Y
Pygmy shrew			y
Dusky shrew		Y	Y
Water shrew		y	y
Vagrant shrew			Y
Big brown bat		Y	
Silver-haired bat		Y	S
Hoary bat		s	S
California myotis		S	S
Western long-eared myotis		s	S
Little brown myotis		Y	S
Long-legged myotis		S	S
Yuma myotis		S	

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Common Name	Status	ICHmw	ESSFwc
Snowshoe hare subsp.		Yy	Yy
Common pika		Y	Y
Southern red-backed vole subsp.		Y	Y
Long-tailed vole		Y	Y
Meadow vole		Y	Y
Heather vole		y	y
Bushy-tailed woodrat		Y	Y
Deer mouse		Y	Y
Porcupine		Y	Y
Northern pocket gopher subsp.		Y	Y
House mouse		Y	
Northern flying squirrel		Y	Y
Hoary marmot		Y	
Yellow-bellied marmot		Y	
Woodchuck		Y	
Columbia ground squirrel		Y	
Golden-mantled ground squirrel		Y	Y
Yellow-pine chipmunk			
Least chipmunk		Y	
Least chipmunk subsp.		Y	Y
Least Chipmunk subsp. selkiri		Y	Y
Red-tailed chipmunk subsp. simulans	Red	Y	Y
Red squirrel		Y	Y
Meadow jumping mouse subsp.		Y	Y
Western jumping mouse		Y	Y
Coyote		Y	Y
Cougar		Y	Y
Lynx		Y	Y
Bobcat		Y	Y
Wolverine subsp. luscus	Blue	Y	y
Marten		Y	Y
Striped skunk		Y	
Ermine subsp.		Y	
Long-tailed weasel subsp.		Y	Y
Least weasel		y	
Mink		Y	Y
Raccoon		Y	
Black bear subsp.		Y	Y
Grizzly bear	Blue	y	SAW
Mountain goat		Y	Y
Moose		Y	pSAw
Elk subsp. nelsoni		Sy	SA

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File #: 189/01/01

December 12, 2002

48

Common Name	Status	ICHmw	ESSFwc
Mule deer subsp. hemionus		Sw	SA
White-tailed deer		S	PSA

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