



# REVELSTOKE ADVENTURE PARK

## TENURE MANAGEMENT PLAN

UPDATED: FEBRUARY 21, 2017

PREVIOUSLY SUBMITTED: AUGUST 2015

ILLECILLEWAET DEVELOPMENT LIMITED PARTNERSHIP





Our File: 4405329

December 28, 2016

Attention: Jason Roe

Illecillewaet Development Limited Partnership  
PO Box 963  
Revelstoke, BC V0E 2S0

Dear Jason Roe:

Enclosed is an executed copy of Licence of Occupation Number 405380

Covering:

(1 of 2 - Extensive Area) That part of the remainder of the Northeast 1/4, Section 32, Township 23, Range 1, W6M, Kootenay District; that part of Section 33, Township 23, Range 1, W6M, Kootenay District; that part of the remainder of the NW 1/4, Section 33, Township 23, Range 1, W6M, Kootenay District, that part of RW over Section 34, Township 23, Range 2, W6M, Kootenay District and parts of Section 33, Township 23, Range 1, W6M, Kootenay District, as shown on Plan 11280 filed in Nelson Land Title Office; together with unsurveyed Crown land in the vicinity of Greeley Creek, Kootenay District, more particularly shown outlined in red and containing 257.2 hectares more or less.

(2 of 2 - 5 Intensive Use Sites) 1) Bungee Centre 0.32 ha +/-; 2) Campground Secondary Intensive Use Site 2.02 ha +/-; 3) Campground Primary Intensive Use Site 0.005 ha +/-; 4) Mid-mountain Intensive Use Site 0.029 ha +/-; 5) Mountain Road (3km x 5m) 1.5 ha, more or less.

The Licence of Occupation is issued in your name for a term of 30 years commencing January 1, 2017 for Summer Adventure Park purposes.

Should you have any questions regarding this matter, please contact me at (250) 420-2169.

Yours truly,

Gena Baker  
Sr. Portfolio Administrator

pc: B.C. Assessment Authority, Kelowna





LICENSE OF OCCUPATION

Summer Adventure Park

MANAGEMENT PLAN

FILE #: 4405329

Date: August 5, 2016

Her Majesty the Queen in Right of British Columbia (the "Province") and Illecilliwaet Development Limited Partnership (the "Licencee") hereby agree that this document is the Management Plan for the purposes of Licence of Occupation # 405380

dated January 1, 2017  
from the Province to the Licencee (the "Licence") and that this document supersedes any earlier Management Plans. The signature of the Province's authorized representative is solely for the purpose of acknowledging the Province's acceptance of this document as the Management Plan for the purposes of the Licence and does not represent a certification by the Province or its signatory of any factual content or acceptance of professional responsibility by the Province's signatory for any advice or analysis contained in this document.

*Christa Lamb*

\_\_\_\_\_  
Authorized Signatory of Ministry of Forests, Lands and Natural Resource Operations

*[Signature]*

\_\_\_\_\_  
Authorized Signature of Tenure Holder



**TENURE MANAGEMENT PLAN FOR**



**REVELSTOKE  
ADVENTURE PARK**

**ADVENTURE TOURISM APPLICATION**

**SUBMITTED FEBRUARY 2017**

**ILLECILLEWAET DEVELOPMENT LIMITED PARTNERSHIP  
P.O BOX 963, REVELSTOKE, BC V0E 2S0  
TELEPHONE: (250) 837-7442  
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ARTISTIC RENDERINGS & PHOTOS BY: ROB BUCHANAN

MAPS & PHOTOS BY: SELKIRK PLANNING & DESIGN

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## EXECUTIVE SUMMARY

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The following adventure tourism management plan describes a one-of-a-kind summer adventure activity centre 10 km outside Revelstoke, BC. This exciting and unique development, Revelstoke Adventure Park (RAP), will enhance Revelstoke's and British Columbia's reputations as a leading outdoor adventure tourism destination.

RAP will be developed in four phases over six years, with future growth driven by the demands and expectations of the market. This management plan emphasizes Phases One through Three of the development and provides a general overview of the later phases. Details and overview information regarding nearly all components of the RAP development are presented herein. As the project progresses, new targets and more detailed design will be developed based on consultant findings, construction targets, and financial decisions.

Nestled on a breathtaking site in the Selkirk Mountains, RAP is to be developed on 63.7 ha of private land owned by Illecillewaet Development Limited Partnership (IDL P) and 257.2 ha of adjoining Crown land, if approved. The majority of Crown land being sought is already within Revelstoke Mountain Resort's (RMR) existing recreation tenure, but is currently not actively used and doesn't see visitors at any time of year. It is essentially a blank canvas waiting to be used to its full advantage.

RAP's location is easily accessible from the Trans-Canada Highway and thus perfectly positioned to capture both thrill-seekers and nature-admirers among the millions of people who pass through Revelstoke each summer season. RAP offers recreational activities spanning all skill levels, from hiking and horseback riding to bungee jumping, rock climbing, ziplines, ropes courses, and mountain biking. There are also several attractions planned that have never been seen before in BC. This unique slate of activities all in one location combined with incredibly easy access on a major national thoroughfare makes RAP a singular offering within Canada.

Revelstoke is well positioned to capture a significant share of the booming Canadian and British Columbian tourism markets, attracting hundreds of thousands of visitors every year looking to explore and experience the surrounding mountains, river, lakes, and lush old-growth forests. RAP is strategically situated to showcase these natural elements as well as connect visitors to the rich local history.

The developers of RAP call Revelstoke home, and thus recognize the importance of preserving the natural beauty of this spectacular region of British Columbia. Both environmental and social impacts have been and will continue to be carefully considered in developing this project. IDLP has been in consultation with environmental professionals to undertake studies on timber, geology, and fish and wildlife habitats in the proposed project area and develop mitigation strategies to retain the integrity of the natural environment. Additionally, consultation with local First Nations has been undertaken, including an archaeological study, and First Nations input will continue to be sought as the project moves forward.

This project also offers an economic boost to the community of Revelstoke. While Revelstoke sees a significant increase in highway traffic during the summer, local hotel data does not reflect a corresponding increase in overnight stays.<sup>1</sup> The Revelstoke Visitor Centre's statistics also show that adventure recreation is the second most popular topic visitors inquire about, after accommodation.<sup>2</sup> The addition of an adventure park with attractions for all ages and abilities will encourage additional overnight stays, and help promote Revelstoke as a destination. This will in turn create economic opportunities for many other Revelstoke businesses.

Beyond increased tourism revenue, the park itself will directly create more than 250 jobs in Revelstoke, from construction and administrative needs to park operations upon opening and into the future.

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<sup>1</sup> "Hotel Promotional Funding 2014," Revelstoke Chamber of Commerce.

<sup>2</sup> "Revelstoke Visitor Centre Network Statistics Program 2011."

## COMPANY OVERVIEW

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Illecillewaet Development Limited Partnership (IDLP) is the holding company of the private land, and Black Tie Properties LP is the management and operational company, both based in Revelstoke, British Columbia. Northlands Properties, the owners of Revelstoke Mountain Resort, are longstanding partners in IDLP. Through this partnership, RMR supports IDLP's access to the Crown land that overlaps their existing tenure.

Black Tie Properties' skilled professionals have experience in the adventure tourism, transportation, and construction industries. Among other qualified professionals, Black Tie's COO, Jason Roe, has worked in the tourism industries in Canada, Europe, New Zealand, and Australia. He developed a passion for adventure tourism after spending four years in the industry in Queenstown, New Zealand, the adventure tourism capital of the world. Jason is also an owner of Revelstoke Connection, a transportation company that provides shuttle service to and from Revelstoke, which has afforded him unique insight into tourism in the area.

The Illecillewaet Development management team possesses the skills and knowledge to develop the Revelstoke Adventure Park and produce a memorable and safe guest experience.



## KEY ACHIEVEMENTS AND LIST OF MAPS

### SUMMARY OF KEY ACHIEVEMENTS

The following table lists approved permits, preliminary studies, and applications in progress to date. Permits and studies are available in the appendices to this document, as indicated in the table below. All reports dated 2014 and 2015 were prepared subsequent to IDLP's 2013 application for Crown land to the Integrated Land Management Bureau.

**TABLE 1. SUMMARY OF APPROVED PERMITS, PRELIMINARY STUDIES, AND APPLICATIONS IN PROGRESS**

APPENDIX	TITLE	DETAILS
EXISTING PERMITS		
A-1	Investigative Use Permit	#404850
A-2	Agricultural Land Commission Non-Farm Use Permit	File #53546
A-3	CP Rail Private Crossing Agreement	File #X-MOUN-119-46-F
A-4	Sand and Gravel Permit	#G-5-302 (Private Land)
PRELIMINARY STUDIES		
B-1	Terrain Stability Assessment - Revised	Adam Muddiman, P.Geo., "Terrain Stability Assessment for Greely Road (Road to Revelstoke Adventure Park), Revelstoke, BC, Revision #3," Onsite Engineering, Salmon Arm, BC, 2015.
B-2	Letter – TSA Correction	Adam Muddiman, P.Geo., "Re: Response to MFLNRO June 27, 2013 letter regarding Application for an Adventure Tourism License of Occupation, 'Revelstoke Adventure Park' near Revelstoke, BC," Onsite Engineering, Salmon Arm, BC, 2013.
B-3	Archaeological Assessment	Ian Cameron, RPCA, "Greely Property Development Preliminary Field Reconnaissance." Splat'sin First Nation, Enderby, BC, 2012.
B-4	Wildlife Overview Assessment	Giles Shearing, "Wildlife Overview Assessment: Revelstoke Adventure Park: Greely, B.C." SEC Shearing Environmental Consultants, Revelstoke, BC, 2014.
B-5	Letter – Potential Known Impacts on the Greely Creek Watershed	Giles Shearing, "Re: Potential Known Impacts of the Revelstoke Adventure Park on the Greely Creek Watershed, B.C." SEC Shearing Environmental Consultants, Revelstoke, BC, 2015.
B-6	Letter – Road Maintenance Plan	Adam Muddiman, P.Geo., "Re: Road Maintenance Plan for proposed road to proposed Revelstoke Adventure Park," Onsite Engineering, Salmon Arm, BC, 2015.
B-7	Geotechnical Report on Bluffs	Onsite Engineering



**TABLE 1. SUMMARY OF APPROVED PERMITS, PRELIMINARY STUDIES, AND APPLICATIONS IN PROGRESS**

APPENDIX	TITLE	DETAILS
APPLICATIONS IN PROGRESS		
N/A	Water Licence Application	Ministry of Forests Lands & Natural Resources Operations
N/A	Commercial Access Permit	Ministry of Transportation and Infrastructure
N/A	Comprehensive Development Zone and Official Community Plan Amendment	Columbia Shuswap Regional District

## OVERVIEW OF MAPS

The following is a list of maps contained within this management plan and a description of their content, size, and phased features.

**TABLE 2. OVERVIEW OF MAPS**

MAP #	TITLE	DESCRIPTION	AREA	FEATURES
Map 1:	Context	Overview of general area and its relationship to Revelstoke.	n/a	<ul style="list-style-type: none"> <li>n/a</li> </ul>
Map 2:	Overview	Overview of extensive area including Crown and private land	321 ha	<ul style="list-style-type: none"> <li>321 ha Total Area</li> <li>257.2 ha Crown land</li> <li>63.6 ha Private land</li> </ul>
Map 3:	Final Build Out & Features	Complete build-out of the Revelstoke Adventure Park.	321 ha	<ul style="list-style-type: none"> <li>Buildings</li> <li>Roads</li> <li>Trails</li> <li>Intensive Use Areas</li> <li>Activities</li> </ul>
Map 4:	Intensive Use Sites & Extensive Use Areas	Boundaries for intensive use sites & extensive use areas	321 ha	<ul style="list-style-type: none"> <li>Intensive use sites</li> <li>Extensive use areas</li> </ul>
Map 5:	Use Area: Greely Meadows	Site plan of development on private land and crown land.	63.7 ha	<ul style="list-style-type: none"> <li>RAP Base Buildings</li> <li>Parking Lot</li> <li>Maintenance Building</li> <li>Helipad &amp; Helicopter Storage</li> <li>RV Park, Campground &amp; Yurts</li> <li>Multi-Use Trail</li> <li>Bike Pump Park</li> <li>Lift Terminals</li> <li>Driving Range</li> <li>Ogo</li> <li>Fishpipe</li> <li>Volleyball Courts</li> <li>Hot pools</li> <li>Volleyball Courts</li> <li>Lake &amp; Wave Garden</li> <li>Horse Stable &amp; Trails</li> </ul>
Map 6:	Extensive Use Area: Tree Top Adventures	Site plan of extensive use area.	15.4 ha	<ul style="list-style-type: none"> <li>Ropes Courses</li> <li>Staging Area</li> <li>Portable Privies</li> <li>Mountain Coaster</li> <li>Chairlift</li> <li>Service Cabin</li> <li>Expansion Area</li> </ul>
Map 7:	Extensive Use Area: Ziplines	Site plan of extensive use area.	34.8 ha	<ul style="list-style-type: none"> <li>Zipline Courses</li> </ul>
Map 8:	Extensive Use Area: Bike Zone	Site plan for extensive use area.	255.3 ha	<ul style="list-style-type: none"> <li>Hiking, Biking, and Horseback-Riding Trails</li> </ul>

**TABLE 2. OVERVIEW OF MAPS**

MAP #	TITLE	DESCRIPTION	AREA	FEATURES
Map 9:	Extensive Use Area: Bungee Centre	Site plan of extensive use area.	4.6 ha	<ul style="list-style-type: none"> <li>• Mountain Lodge</li> <li>• Bungee Jump</li> <li>• Storage Building</li> <li>• Lift Terminal</li> <li>• Helipad</li> <li>• Sky Swing</li> <li>• Rock Climbing Area</li> </ul>
Map 10:	Proposed Trail Map	Trail map showing trails within +/- 10m of centreline	321 ha	<ul style="list-style-type: none"> <li>• Mountain Biking Trails</li> <li>• Kid's Mountain Biking Trails</li> <li>• Hiking Trails</li> <li>• Multi-Use Trails</li> <li>• Horseback Riding Trails</li> <li>• Access Trails</li> </ul>
Map 11:	Construction: Phase 1	Maps showing construction activities in Phase One	321 ha	<ul style="list-style-type: none"> <li>• Temporary RAP Base</li> <li>• Mountain Road</li> <li>• Multi-Use Trails</li> <li>• RV Park &amp; Campground</li> <li>• Ropes Courses</li> <li>• Ziplines</li> <li>• Temporary Bungee Centre</li> <li>• Bungee Jump</li> <li>• Helipads</li> </ul>
Map 12:	Construction: Phase 2	Maps showing construction activities in Phase Two	321 ha	<ul style="list-style-type: none"> <li>• Greely Express Lift</li> <li>• Mountain Coaster</li> </ul>
Map 13:	Construction: Phase 3	Maps showing construction activities in Phase Three	321 ha	<ul style="list-style-type: none"> <li>• Chairlift #2</li> <li>• Mountain Lodge</li> </ul>
Map 14:	Construction: Phase 4	Maps showing construction activities in Phase Four	321 ha	<ul style="list-style-type: none"> <li>• Tree Top Adventures Expansion</li> <li>• Ziplines Expansion</li> <li>• Rock Climbing</li> <li>• Sky Swing</li> </ul>
Map 15:	Creeks	Map showing creeks running through the property	321 ha	<ul style="list-style-type: none"> <li>• Unnamed Creek 1</li> <li>• Unnamed Creek 2</li> </ul>
Map 16:	Water Source Protection	Distance to the Greely watershed.	n/a	
Map 17:	Legal Boundaries	Tenure & Legal Boundaries	n/a	<ul style="list-style-type: none"> <li>• Private Land</li> <li>• Agricultural Land Reserve</li> <li>• Proposed Tenure Area</li> <li>• Revelstoke Mountain Resort Commercial Recreation Tenure</li> </ul>



# ADRENALIN

REVELSTOKE ADVENTURE PARK



## SECTION A: PROJECT OVERVIEW

### A.1 PROJECT AND PURPOSE

Revelstoke Adventure Park (RAP) is a one-of-a-kind three-season adventure activity centre that will enhance Revelstoke's and British Columbia's reputations as a leading outdoor adventure tourism destinations.

Located in the Selkirk Mountains, RAP provides guests the opportunity to connect to nature and the area's history, all while participating in unique and exhilarating activities.

Open yearly from May to October, RAP is a seasonal hub of recreational offerings ranging from beginner to expert, for the faint of heart to the adrenaline junkie — truly something for everyone, spanning all age groups and skill levels. Adventure recreation activities on offer include ziplines, bungee jumping, rock climbing, mountain biking, ropes courses, and brand-new-to-BC options including OGO, a Fishpipe, and a Sky Swing. Sightseeing-focused opportunities include hiking, horseback riding, and a manmade lake for swimming and fishing. This wide range of activities accessible from one central location makes RAP a unique offering in Canada and the world.

In addition to the many recreational offerings, the Greely Express Lift will whisk sightseers and mountain bikers from the base, Greely Meadows, up 1500 m to the Bungee Centre. From here visitors are rewarded with views of the Illecillewaet River, and sightlines down the valley including Mount Revelstoke National Park, the City of Revelstoke, and Albert Peak. RAP is immediately bordered to the north by CP Rail, creating opportunities to share the historical significance of the railway.

RAP is located on 63.7 ha of private land owned by IDLP and 257.2 ha of adjoining Crown land, if approved. The majority of this Crown land, 174.4 ha, is within Revelstoke Mountain Resort's (RMR) existing recreation tenure. The Province has already approved this land for commercial recreation use by RMR, but it is currently not being used for any organized or specific public recreation activities.

#### A.1.1 Market Analysis

Tourism is the third largest sector in the British Columbia economy, after forestry and energy. With \$13.9 billion generated in revenue in 2013, tourism contributed more to GDP than the forestry, agriculture, and fish primary resource industries.<sup>3</sup>

Revelstoke is well positioned to capture a significant share of this market, attracting hundreds of thousands of visitors every year looking to explore and experience the surrounding mountains, river, lakes, and lush old-growth forests teeming with wildlife. RAP is strategically situated to showcase these elements.

The Trans-Canada Highway between Golden and Sicamous, which passes through Revelstoke, accommodates more than 850,000 vehicles during the peak travel months of June, July, and August.<sup>4</sup> This is twice the volume that is experienced during the months of January, February, and March. The highway is also a popular route for tour buses travelling throughout Western Canada. RAP's proximity to Revelstoke and easy access from the Trans-Canada Highway allow it to capitalize on this increase in summer traffic. It also encourages vehicle traffic that may have otherwise just passed through to stay overnight, creating opportunities for other Revelstoke businesses.

<sup>3</sup> "Value of Tourism in British Columbia – A Snapshot of 2013," <http://www.destinationbc.ca/Research/Industry-Performance/Value-of-Tourism.aspx#.VRHrGfnF9HV>. Accessed April 2015.

<sup>4</sup> "BC Ministry of Transportation & Infrastructure Annual Days of Week Summary for 2014 – Craigellachie Site."



## Global Trends

This demand for adventure tourism is reflected globally, with researchers finding the global growth in adventure travel has accelerated at nearly 65% each year since 2009, and that nearly 54% of travelers are planning an adventure activity on their next trip.<sup>5</sup>

There is also a global trend among mountain resorts that remain operational in year-round developing adventure park components. In support of this trend, last year the US Forest Service finalized new policy guidelines pertaining to summer recreation activities and facilities within ski areas that operate in national forests. These revisions saw approved activities expanded to include mountain biking, ziplines, and alpine slides, among others. The changes will increase summer visits to US national forests, thus creating more jobs and boosting the economies of local mountain communities.<sup>6</sup>

### A.1.2 Competitive Analysis

RAP is unique for the region, as such a diverse offering in one location does not currently exist. Whistler is the closest comparable; however, Whistler's activities are independently owned and operated and are spread across the Whistler Valley, spanning 20-25 km.

Sky Trek Adventure Park is a successful, but much smaller-scale, operation located 45 kilometers west of Revelstoke on the Trans-Canada Highway. They offer limited activities, but have seen strong visitor numbers with over 40,000 guests in 2010. Sky Trek's adventure offerings include climbing features, short ziplines, tree top trekking, and children's play areas.

### A.1.3 Economic Impacts

RAP will increase Revelstoke's appeal as a four-season destination and encourage overnight stays during the shoulder season and summer months. Although traffic on the Trans-Canada Highway doubles during the summer months, hotel tax statistics show that the number of overnight visitors in Revelstoke does not increase at a comparative rate.<sup>7</sup> As a community, Revelstoke will benefit from tourists planning longer stays in the area during summer months thanks to increased availability of adventure activities. In addition, RAP plans to host a number of special events each year, such as sporting competitions and concerts, which will attract additional visitors to the area.

RAP will directly create more than 250 jobs in the community. This number reflects only the operational needs of the park and does not include the jobs that will be created during the various construction phases and in the administrative office. Working with RMR, RAP will attract and retain qualified employees by offering employment opportunities during the summer as well.

When considering the total economic impact of RAP, the sum of direct, indirect, and induced effects within the region should be taken into account:

- **Direct Effects:** Increased revenue in hotel, restaurants, and retail outlets resulting in increased payments for wage and salaries, supplies, and services associated with increased business.
- **Indirect Effects:** Increased business for those who provide supplies or services to local tourism businesses.
- **Induced Effects:** Increased household spending directly or indirectly as a result of tourism spending.

5 "2014 Trends in Travel & Tourism," Resonance Consultancy, <http://www.resonanceco.com/blog/20-tourism-meta-trends/>. Accessed April 2015.

6 "U.S. Forest Service Finalizes Policy to Promote Year-Round Recreation on Ski Areas," United States Department of Agriculture, <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2014/04/0062.xml>. Accessed April 2015.

7 "Hotel Promotional Funding 2014," Revelstoke Chamber of Commerce.

### A.1.4 Community Support

The Revelstoke business community has shown overwhelming support for the development of RAP. Included in Appendix E are letters from the City of Revelstoke, the Revelstoke Chamber of Commerce, Tourism Revelstoke, and a local business owner indicating their support.

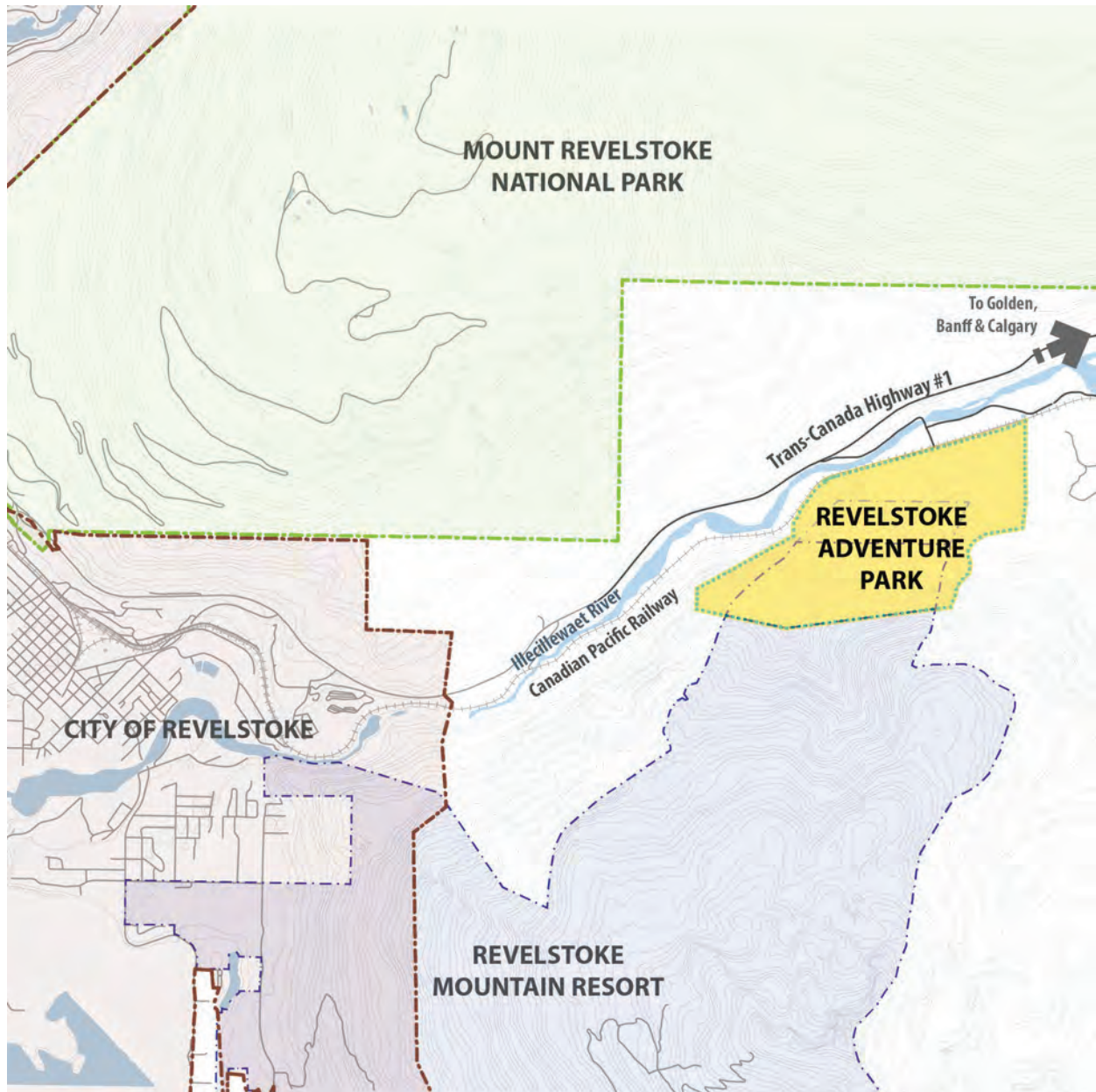


A view of the existing barn



## A.2 LOCATION AND SIZE

RAP is located 10 km east of Revelstoke on the Trans-Canada Highway (see Location Map), within the Columbia Shuswap Regional District (CSRD). The property is nestled in the Selkirk Mountains on the north aspect of Mount Mackenzie. The park is generally bound to the north by the CP Rail, the Illecillewaet River, the Trans-Canada Highway, and the south aspect of the Mount Revelstoke National Park; to the west by Crown land and the City of Revelstoke municipal boundary; to the south by Crown land and the Commercial Recreation Area (CRA) for Revelstoke Mountain Resort (RMR); and to the east by Crown land, residential farm properties, and the Greely Creek Watershed.



**Map 1:** Revelstoke Adventure Park Context - See Appendix F for more information



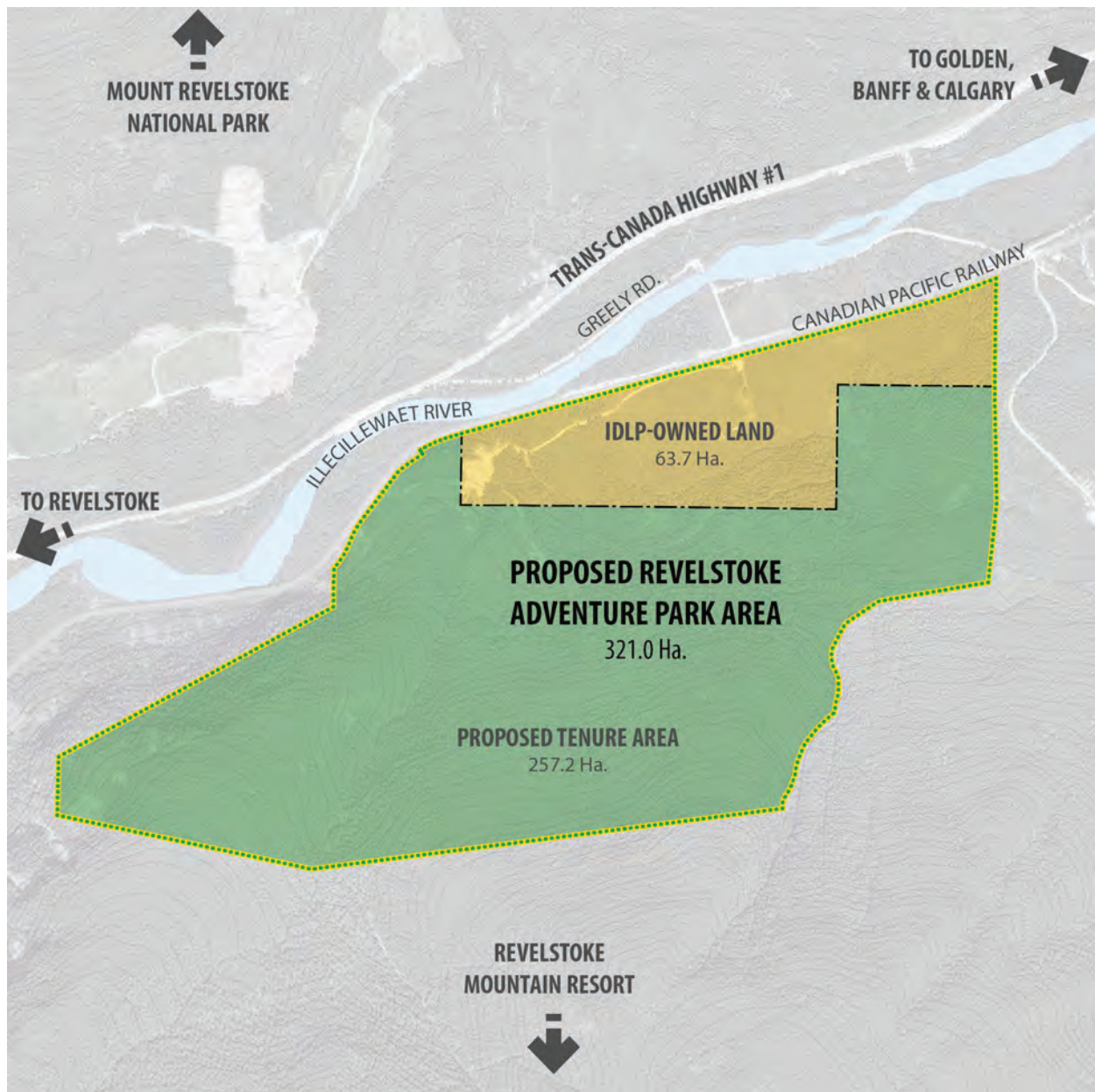




## A.3 OVERVIEW

### A.3.1 Revelstoke Adventure Park Area

The project area covers a total 321.0 ha, 257.2 ha of which is Crown land. Two unnamed creeks, as well as smaller ephemeral and intermittent watercourses, run through the proposed tenure area, and several existing forestry roads weave through the base of the tenure on the private land.



**Map 2:** Overview - Proposed Tenure Area and Private Land - Owned by Illecillewaet Development Limited Partnership - See Appendix F for more information



### A.3.2 Activity Areas

RAP will be developed in four phases over six years, and can be divided into five activity areas: Greely Meadows, Tree Top Adventures, Ziplines, Bike Zone, and the Bungee Centre. These areas are described in greater detail in section A.4.



Figure 1: Greely Meadows



Figure 2: Tree Top Adventures



Figure 3: Ziplines



Figure 4: Bike Zone



Figure 5: Bungee Centre

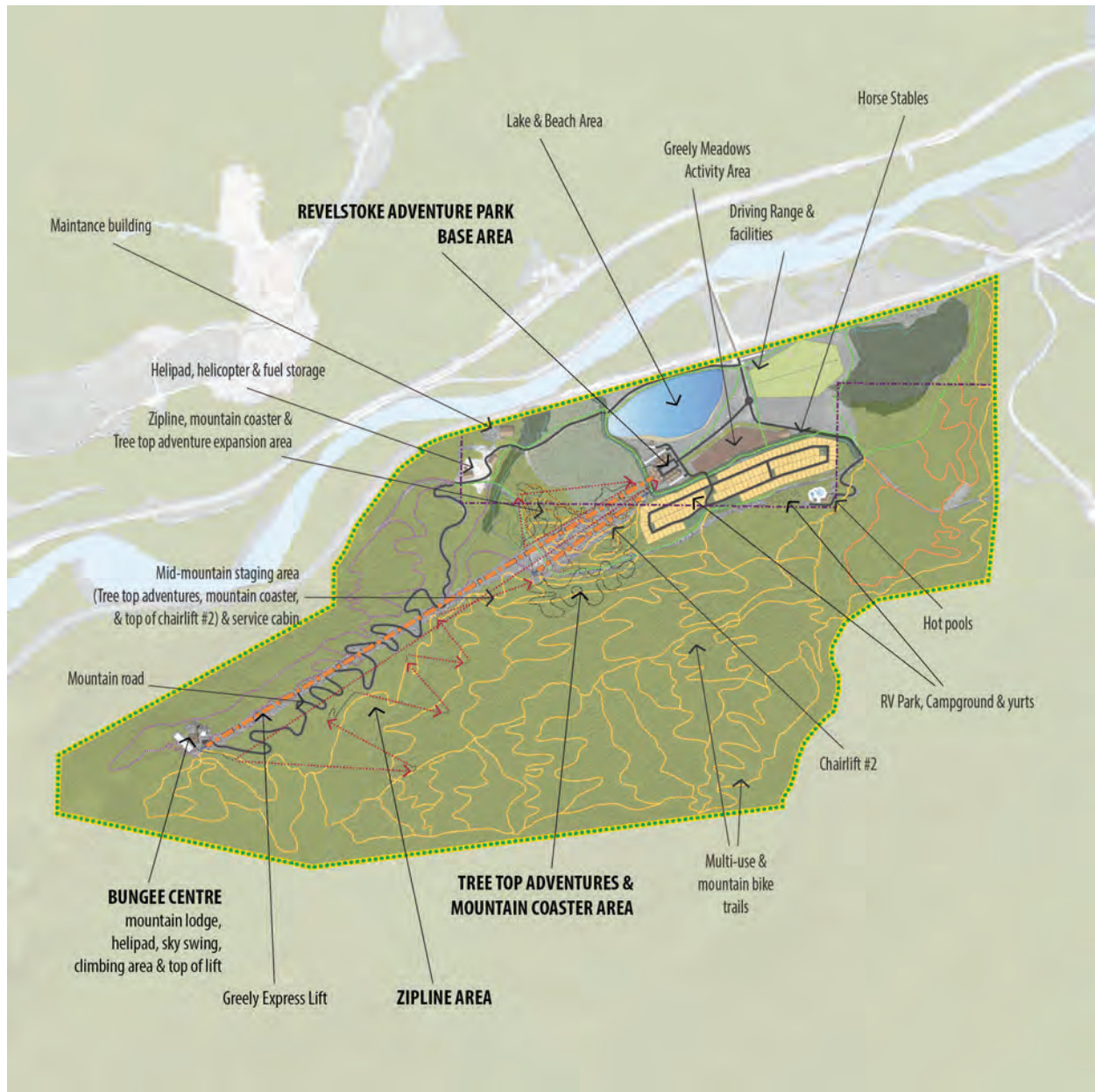
## A.4 MAIN FEATURES

The table and map below outline the main features of the development. Supporting infrastructure such as parking lots and roads are discussed in Section B – Construction Methods.

**TABLE 3. MAIN FEATURES ACCORDING TO AREA AND PHASE**

	PHASE ONE 2016	PHASE TWO 2017	PHASE THREE 2018	PHASE FOUR 2019+
Greely Meadows	<ul style="list-style-type: none"> <li>• Design and Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary RAP base building:               <ul style="list-style-type: none"> <li>◦ Registration Building</li> <li>◦ Bike Rental &amp; Repair shop</li> <li>◦ Food and beverage facility</li> <li>◦ Retail shop</li> </ul> </li> <li>• RV Park, Campground &amp; Yurts</li> <li>• Multi-use Trail</li> <li>• Pump Park</li> <li>• Mountain Shuttle Service</li> </ul>	<ul style="list-style-type: none"> <li>• Permanent Base Building</li> <li>• Gondola/Chairlift</li> <li>• OGO</li> <li>• Fishpipe</li> <li>• Driving Range</li> <li>• Heli Tours</li> <li>• Horseback riding</li> <li>• Sightseeing</li> </ul>	<ul style="list-style-type: none"> <li>• Hot Pools</li> <li>• Lake</li> <li>• Swimming</li> <li>• Fishing</li> <li>• Volleyball</li> </ul>
Tree Top Adventures	<ul style="list-style-type: none"> <li>• Design and Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Ropes Courses</li> </ul>	<ul style="list-style-type: none"> <li>• Mountain Coaster</li> </ul>	<ul style="list-style-type: none"> <li>• Chairlift #2</li> </ul>
Ziplines	<ul style="list-style-type: none"> <li>• Design and Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Valley Zipline</li> <li>• Trail Zipline</li> </ul>		<ul style="list-style-type: none"> <li>• Zipline Expansion</li> </ul>
Bike Zone	<ul style="list-style-type: none"> <li>• Design and Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Downhill Mountain Bike Trails</li> <li>• Hiking Trails</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of Hiking and Biking Trails</li> </ul>	<ul style="list-style-type: none"> <li>• Horseback-Riding Trails</li> </ul>
Bungee Centre	<ul style="list-style-type: none"> <li>• Design and Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Bungee Jump</li> </ul>	<ul style="list-style-type: none"> <li>• Gondola/Chairlift</li> <li>• Sightseeing</li> </ul>	<ul style="list-style-type: none"> <li>• Mountain Lodge</li> <li>• Rock Climbing</li> <li>• Sky Swing</li> </ul>

### A.4.1 Extensive Area: Full Build-Out & Features



**Map 3:** Final Build Out & Features - See Appendix F for more information

## A.5 REVELSTOKE ADVENTURE PARK OPERATIONS

### A.5.1 Phase One (2016)

Phase One is design and construction only, and there will be no guest access.

### A.5.2 Phase Two (2017)

Guests park on private land, then proceed to Greely Meadows to choose and register for their adventure. Activities are carefully explained, then participants sign a liability waiver form and proceed to the appropriate staging area on either private or Crown land.

#### A.5.2.1 Crown Land

Activities offered on Crown land include camping, downhill mountain biking, ziplines, tree top adventures, and bungee jumping, as well as hiking and sightseeing.

#### Camping

Camping will be offered only in the designated RV park and campground, with access controlled from private land. The majority of the RV park and campground is on the private land, with only a portion being on crown land. Approximately 20 yurts, that are located on private land, will also be available for guests.



#### Mountain Biking

Guests purchase trail access tickets, rental bikes and safety equipment from Greely Meadows. All trails begin at the Bungee Centre, with transportation dependent on the phase: During Phase Two, transportation is via RAP's shuttle service on the Mountain Road. During Phase Three, transportation is via the gondola/chairlift starting in Greely Meadows. The lift is designed to carry bicycles.

Once at the Bungee Centre, riders choose a clearly marked trail corresponding with their ability. The network of professionally designed and well-maintained trails vary in level of difficulty from beginner to expert. Once guests return to Greely Meadows, they can board a shuttle and return to the Bungee Centre for another lap.

Mountain bike instructors and guides are available for hire. To ensure guest safety, a patrol team continually monitors all trails.





### Ziplines

Zipline participants meet their guide in Greely Meadows, and are fitted with a full body harness and helmet. All zipline courses begin at the Bungee Centre, and transportation to the Bungee Centre is dependent on the phase, as outlined above in the mountain biking section.

Guides are on hand both to ensure safety and to educate guests on the local flora and fauna and Revelstoke's rich history.

Guests have two zipline experience options: Valley Zip, a 1400-metre-long zipline, beginning at the Bungee Centre and terminating in Greely Meadows, and Trail Zips, multiple ziplines ranging in length from 20 m to 450 m, with access via dedicated trails, separate from the hiking and biking trails. The last zipline terminates at the Tree Top Adventures area, where guests meet the mountain shuttle.



### Ropes Courses

Guests must meet height, age, and safety requirements in order to participate and can choose one of three ropes courses—beginner, intermediate, or advanced—based on difficulty and height from the ground. Guides fit guests with helmets and harnesses, which are attached to a safety system at all times.

Guests and guides take the mountain shuttle to the Tree Top Adventures staging area, where guides provide training on the safety systems and lead guests through a ground course designed to introduce the structures and obstacles they will encounter on the ropes courses. The courses comprise varied structures such as monkey wires, climbing nets, suspended bridges, Tarzan ropes, swings, and ziplines. Guests proceed through the courses independently, with fully trained guides patrolling from the ground to offer assistance quickly and perform rescues if necessary. Each course takes approximately one to two hours to complete. Upon completion, guests return to the main base area.





### Bungee Jump

The bungee jump is accessed via the Bungee Centre, with transportation determined by the phase (as outlined in the mountain biking section). The actual bungee jump is from a platform that extends 30 m beyond the cliff face and provides guests with a 55 m jump.

Before guests jump, guides provide a safety briefing, fit guests with the appropriate safety harness, and attach the bungee cord. Once the guest has jumped and the cord has stopped oscillating, an engineer-designed system pulls the jumper back up to the platform. Guides ensure guests are safely on the platform and then remove the harness. Guests have several exciting options to facilitate their return to Greely Meadows: zipline, mountain bike, or the mountain shuttle during Phase Two and the Greely Express Lift during Phase Three and onward.

### Hiking and Sightseeing

Hiking trails separate from the mountain bike trails will be developed throughout the Crown and private land. In Phase Three, after the gondola/chairlift has been installed, guests can visit the Bungee Centre for sightseeing purposes. A short network of hiking trails enhanced with interpretive signage will allow guests to fully experience the area. Guests will also be able to watch the various activities while enjoying the patio at the Bungee Centre.

## A.5.2.2 Private Land

### Pump Park

The pump park is designed for bikes and contains a series of pump tracks, manmade dirt trails that are built as a circuit of dirt rollers, berms, and jumps that loops back on itself, allowing riders to ride it continuously.

## A.5.3 Phase Three (2018)

### A.5.3.1 Crown Land

#### Mountain Coaster

The Mountain Coaster consists of single-seat, bobsled-like cars on tracks that take guests on an exhilarating downhill adventure through a series of turns and steep descents. The cars can reach speeds of 40 km/h or more, but riders control their own speed with a manual brake.

Guests take the mountain shuttle to the Tree Top Adventures staging area, then follow a well-designed trail to the start of the Mountain Coaster, where they meet their guides. The track terminates in Greely Meadows.

### Greely Express Lift

The Greely Express Lift begins in the heart of the base area at Greely Meadows and climbs 500 m in elevation while extending 1500 m along the mountainside. The ride itself is a thrill for those who prefer a gentler experience and provides a bird's-eye view of the incredible landscape below.

### A.5.3.2 Private Land

#### OGO

Guests ride down a 250-metre-long track in a giant 11-foot-diameter transparent sphere, called an OGO, or Outdoor Gravity Orb. Only one other OGO location currently exists in Canada.

#### Fishpipe

The Fishpipe is a new and unique type of rotating barrel water ride where riders slide further than the longest waterslide in the world. Up to three riders at a time enter the Fishpipe barrel; water is added, then the barrel spins while riders slide in the bottom of the barrel. The speed can be increased or decreased at any time by the ride operators and upon guest request. Currently there are only two other Fishpipe locations in the world.

#### Horseback Riding

Beginning at the horse stables in Greely Meadows, guides lead groups on a one- to two-hour non-technical horseback ride through a network of trails weaving through Crown land and Greely Meadows. All horseback trails are separated from hikers and bikers.

#### Helicopter Tours

Scenic tours commence in Greely Meadows, and either terminate at the helipad near the Bungee Centre or return to Greely Meadows.

## A.5.4 Phase Four (2019+)

### A.5.4.1 Crown Land

#### Mountain Lodge

Accessed via the Greely Express Lift, the Mountain Lodge is a full-service facility adjacent to the bungee jump. With a restaurant, viewing deck overlooking the bungee jump and Greely Meadows, retail shop, function rooms, and washrooms, the Mountain Lodge will likely become a focal point for RAP visitors. The lodge will be capable of hosting events and activities for visitors and locals alike.

#### Chairlift #2

A short chairlift will transport guests from the base of the Mountain Coaster to the top of the Mountain Coaster and Tree Top Adventures area. This will replace the shuttle service.

### Sky Swing

The Sky Swing will be accessed via the gondola/chairlift to the Bungee Centre. It will consist of two 30-metre poles with a swing between them, allowing up to three riders at a time. Riders control their own experience by pulling the rip cord and initiating a 45-metre flight that takes them through a breathtaking pendulum swing, soaring 20 m out over the cliffs at speeds of more than 100 km/hr, offering a spectacular feeling of weightlessness and thrilling views down to the Illecillewaet River 500 m below. Sky Swing guides will ensure that guests are safely and securely fastened within the swing.

### Rock Climbing

The rock climbing course consists custom designed, of bolted climbing routes that will provide a unique outdoor recreational experience for beginners and experts alike, supported with instruction and supervision by park staff. Extending along the cliffs to the east of the bungee jump for an estimated 200 m. The height of these routes ranges from 15 m to 35 m. The area will be divided into a beginner and advanced with two different types of top-rope climbing: Auto belaying and belaying (advanced area only). The climbing capacity will be approximately 25 climbers at a given time.

Top rope is a style of climbing in which a rope, used for the climber's safety, runs from a belayer at the foot of a route through one or more carabineers connected to an anchor system at the top of the route and back down to the climber, attaching to the climber by means of a harness

For beginner routes an auto-belaying device will be used in place of a human belayer. RAP's auto-belays will be the safest models in the industry and use magnetic braking technology to ensure a smooth stop to a climber's fall.

For advanced climbers, they will have the option to work with a partner and belay each other. Belayers must meet a minimum age requirement, and display the necessary competencies to the trained climbing wall staff who are certified climbing guides.

All guests are fitted with safety equipment at the Bungee Centre, and certified climbing guides train guests and direct them through routes designed for beginner to intermediate climbers.

#### A.5.4.2 Private Land

##### Lake

The creation of an 5.5 ha engineered and ministry of environment approved reservoir will allow for swimming and water-based activities such as paddle-boarding, canoeing, and fishing. An opportunity exists to work with a new technology provider to install a wave generator that creates a consistently perfect surf wave ideal for surfers, body boarders and kayakers.

##### Hot Pools

Located above the campground and surrounded by forest, a collection of hot and cold pools are offered for guests to relax and rejuvenate.



### Other Private Land Activities

Other activities to take place on private land include:

- A driving range
- Multi-purpose trails
- A mini golf course
- Beach volleyball courts
- A picnic area





## A.6 EXTENSIVE USE AREAS & INTENSIVE USE SITES



**Map 4:** Intensive Use Sites & Extensive Use Areas - See Appendix F for more information

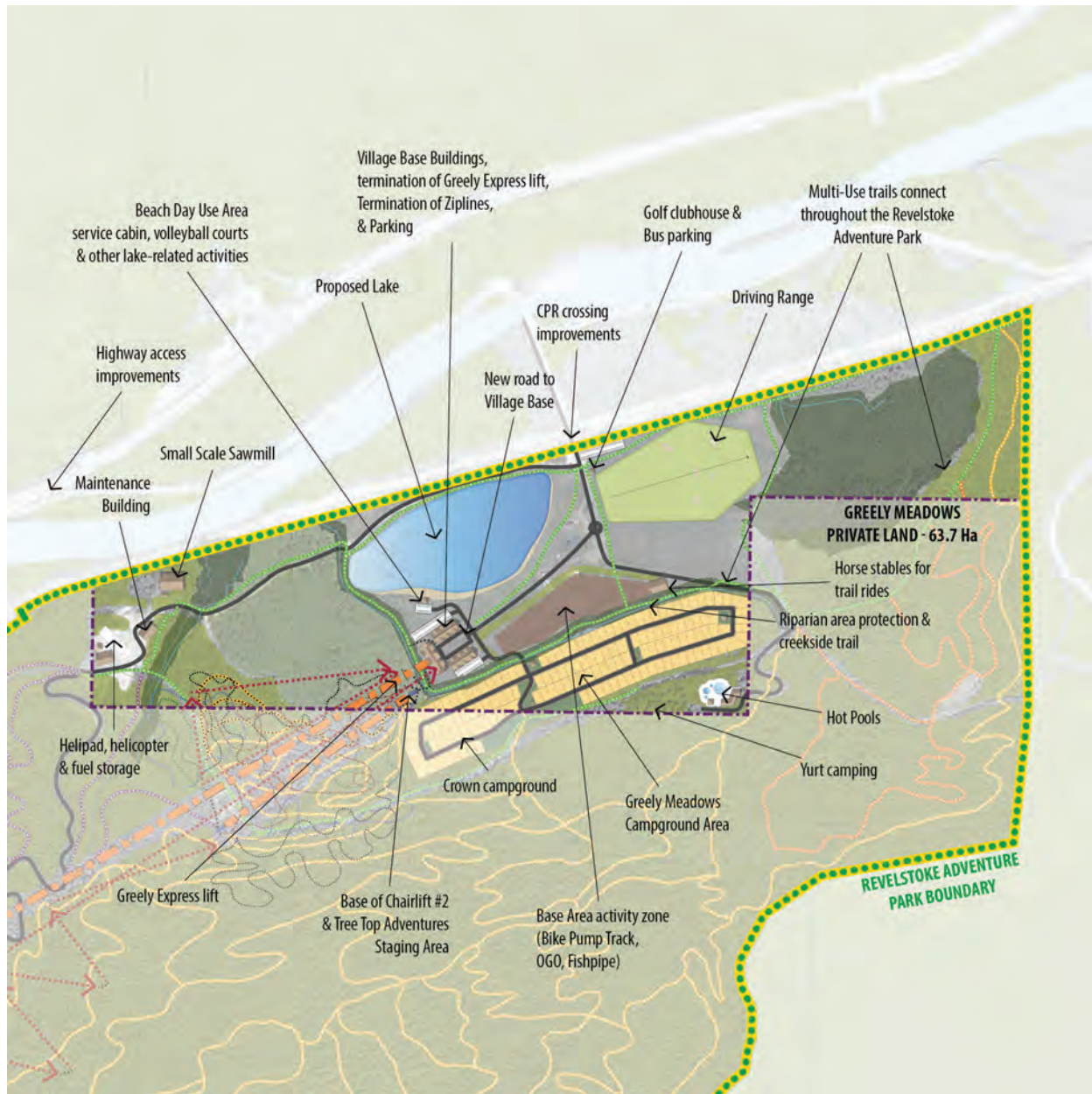
### A.6.1 Greely Meadows

Greely Meadows is the base of operations for RAP and is located on 63.7 ha of private land and 2.0 ha of Crown land. Activity in Greely Meadows is focused in two areas: the main base area and the RV park and campground.

#### A.6.1.1 Main Base Area - Private Land

The main base area encompasses approximately 1.9 ha of private land. Here, guests will register for all activities and proceed to the appropriate activity area.





Map 5: Greely Meadows: Private Land - See Appendix F for more information

#### A.6.1.2 RV Park, Campground & Yurts

A state-of-the-art campground will be developed over 9.5 ha. Each of the 150 sites will be 15 m by 25m, fully serviced, and able to accommodate a variety of sizes of RVs. Of these sites, 112 will be fully on private land and 38 will be either partially or fully on Crown land; creating a secondary intensive use site of 20,223m<sup>2</sup>. As indicated in B.2.2.4, there will also be pit toilets in the secondary intensive use site. In addition to the sites, 20 yurts will be installed on the private land.

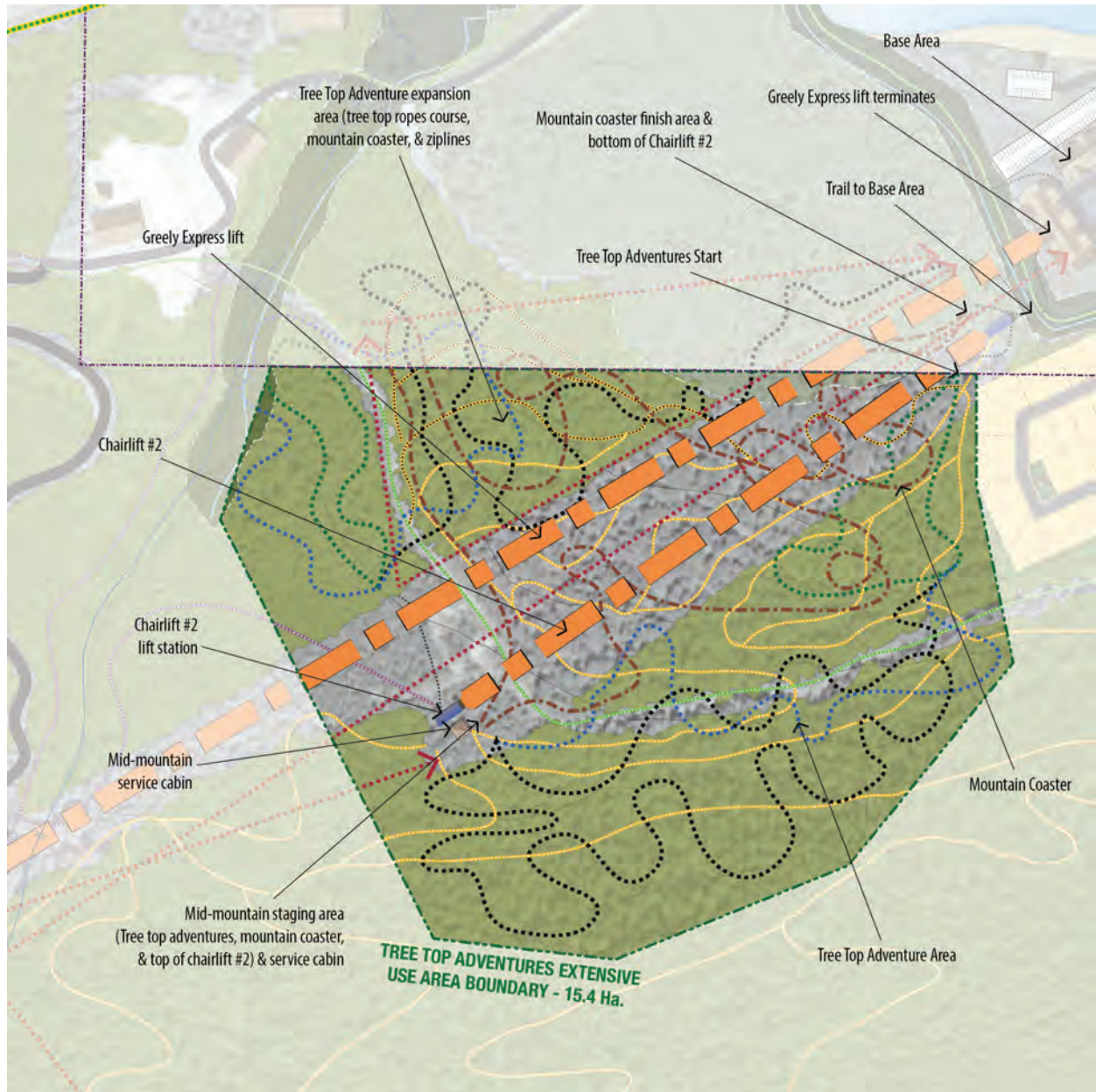
These facilities will be developed and built with as little environmental impact as possible, not only to minimize detrimental effects but also to maximize enjoyment of the natural environment for RAP's guests.

## A.6.2 Mountain Operations

### A.6.2.1 Tree Top Adventures

The Tree Top Adventures area is an extensive use area of approximately 15.4 ha at the base of the main slope on the first bench of Mount Mackenzie. The activities and facilities/services in this area are accessed via the Mountain Road.

Within Tree Top Adventure, a small intensive use site of 290 m<sup>2</sup> has been designated for a mid-mountain staging area consisting of a chair lift terminal and service cabin.

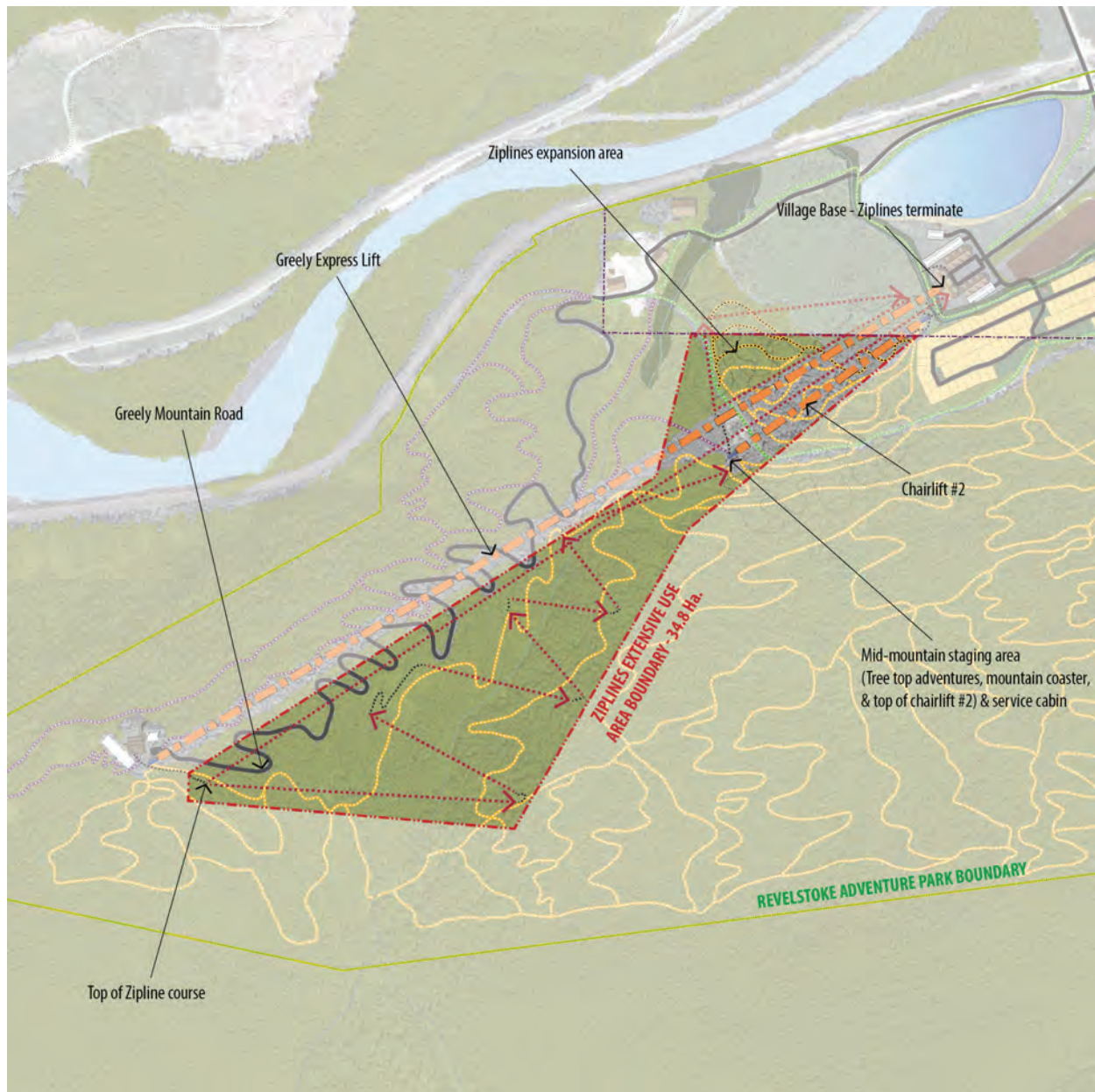


**Map 6:** Extensive Use Area: Tree Top Adventures - See Appendix F for more information



### A.6.2.2 Ziplines

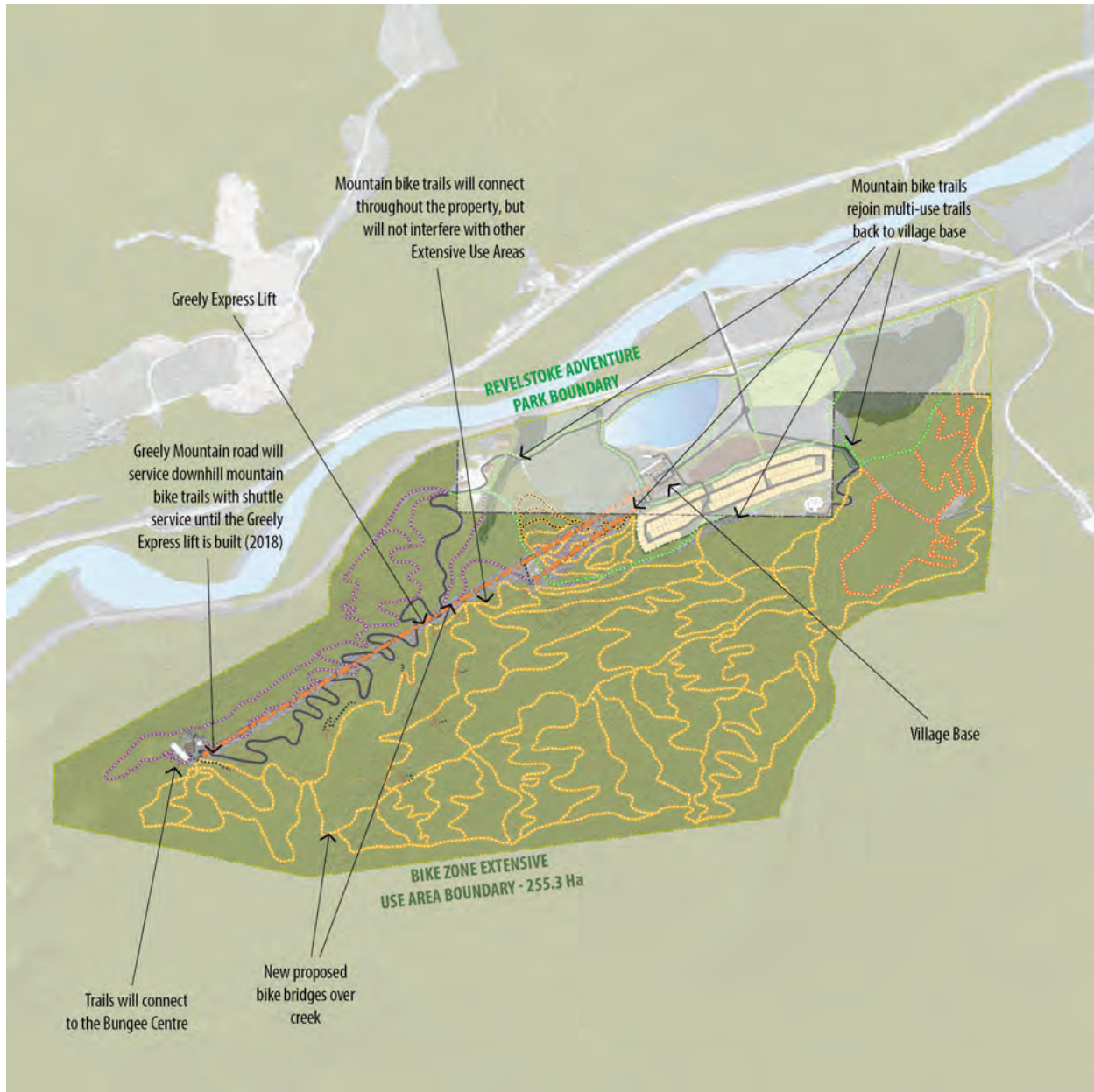
Overlapping with the Tree Top Adventures, and the Bike Zone, the Zipline courses are contained within an extensive use area of approximately 34.8 ha.



**Map 7:** Extensive Use Area: Ziplines - See Appendix F for more information

### A.6.2.3 Mountain Bike Zone

The Bike Zone encompasses all land in the proposed tenure area. There will be multiple biking, hiking, and horseback-riding trails throughout the area that will overlap with the Bungee Centre, Tree Top Adventures, and Zipline areas. It measures 255.3 ha.

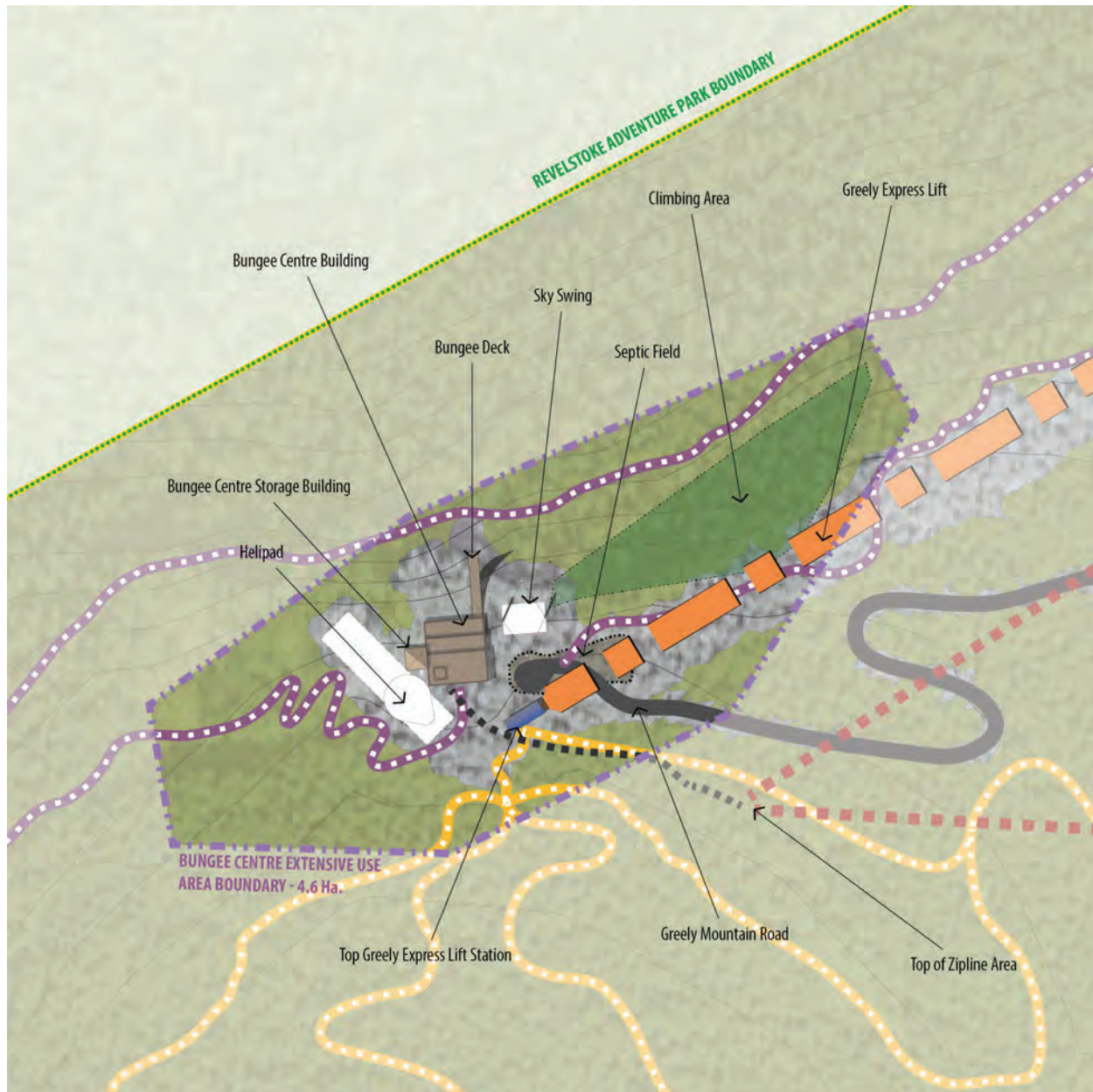


**Map 8:** Extensive Use Area: Mountain Bike Zone - See Appendix F for more information



#### A.6.2.4 The Bungee Centre

The Bungee Centre site covers an area of 4.6 ha, with 3,203 m<sup>2</sup> designated as a Primary intensive use site. It is the highest point of the tenure area, located on top of the bluffs at an elevation of 940 m. The activities and facilities/services in this area are initially accessed via the Mountain Road and, in future phasing, by the Greely Express Lift.



**Map 9:** Extensive Use Area: Bungee Centre - See Appendix F for more information



## A.7 ESTIMATED LEVEL OF USE AND SEASONS OF USE

**TABLE 4. LEVEL OF USE AT EXTENSIVE USE SITES**

USE AREA	INTENDED USE	PERIOD OF USE	FREQUENCY OF USE	TYPE OF IMPROVEMENTS	NUMBER OF BED UNITS
Greely Meadows – Campground	<ul style="list-style-type: none"> <li>• Camping</li> </ul>	May-Oct	Daily	<ul style="list-style-type: none"> <li>• 38 Campsites</li> <li>• Pit toilets</li> </ul>	None
Tree Top Adventures	<ul style="list-style-type: none"> <li>• Ropes Courses</li> <li>• Mountain Coaster</li> <li>• Chair lift</li> </ul>	May-Oct	Daily	<ul style="list-style-type: none"> <li>• Ropes Courses</li> <li>• Mountain Coaster</li> <li>• Staging Area</li> <li>• Service Cabin</li> <li>• Chair lift</li> </ul>	None
Zipline Area	<ul style="list-style-type: none"> <li>• Ziplining</li> </ul>	May-Oct	Daily	<ul style="list-style-type: none"> <li>• Zipline Courses</li> </ul>	None
Bike Zone	<ul style="list-style-type: none"> <li>• Mountain Biking</li> <li>• Hiking</li> <li>• Horseback Riding</li> </ul>	May-Oct	Daily	<ul style="list-style-type: none"> <li>• Trails</li> </ul>	None
Bungee Centre	<ul style="list-style-type: none"> <li>• Bungee Jump</li> <li>• Mountain Lodge</li> <li>• Sky Swing</li> <li>• Rock Climbing</li> <li>• Sightseeing</li> </ul>	May-Oct	Daily	<ul style="list-style-type: none"> <li>• Bungee Jump Platform</li> <li>• Storage Building</li> <li>• Helipad</li> <li>• Chairlift/Gondola terminal</li> <li>• Sky Swing</li> <li>• Temporary Facilities</li> <li>• Mountain Lodge</li> </ul>	None

**TABLE 5. LEVEL OF ACTIVITY**

ACTIVITY REPORT				CLIENT DAYS					
USE AREA	TYPE OF ACTIVITY	PERIOD OF USE	EXISTING/ PROPOSED USE	2017	2018	2019	2020	EST. FULL CAPACITY	YEAR FULL CAPACITY REACHED
Greely Meadows – Campground	Camping	May-Oct	2017	2,500	3,750	7,500	10,000	10,000	2020
Tree Top Adventures	Ropes Courses	May-Oct	2017	2,250	12,750	15,000	18,000	18,000	2020
	Mountain Coaster	May-Oct	2018	–	6,400	12,000	18,000	18,000	2020
Zipline Area	Ziplining	May-Oct	2017	3,500	8,000	10,500	10,500	10,500	2019
Bike Zone	Mountain Biking	May-Oct	2017	3,750	7,500	7,500	7,500	7,500	2018
	Horse Riding	May-Oct	2018	–	250	500	750	750	2018
	Hiking	May-Oct	2017	900	3,600	4,500	4,500	4,500	2019
Bungee Centre	Bungee Jumping	May-Oct	2017	2,500	8,000	9,000	9,000	9,000	2019
	Sky Swing	May-Oct	2019	–	–	10,800	16,200	16,200	2020
	Helicopter Tours	May-Oct	2018	–	500	500	500	500	2018
	Hiking	May-Oct	2017	900	3,600	4,500	4,500	4,500	2019
	Rock Climbing	May-Oct	2019	–	–	1,500	3,000	3,000	2020
	Sightseeing	May-Oct	2018	–	2,500	7,000	15,000	15,000	2020

## A.8 ACCESS PLANS

### A.8.1 Trans-Canada Highway

To access RAP, guests travel east from Revelstoke on the Trans-Canada Highway to Greely Road. At the recommendation of the BC Ministry of Transportation and Infrastructure, an application for a commercial access permit has been submitted. As part of the application process, the Ministry requested a traffic impact assessment. Professional engineers at EYH Consultants conducted the assessment, and a study was prepared in accordance with the terms of reference established in conjunction with the Ministry. The study is available for review, and was updated in November 2015.

RAP will adhere to the recommendations contained in this report, including:

1. A westbound left turn be installed before 2018. The left turn lane should be designed in consultation with the Ministry for requirements and standards.
2. Appropriate information signage should be provided for the RAP access.
3. RAP administration should continuously monitor traffic at the study intersection and implement traffic management strategies to shift peak arrival and departure traffic to shouldering hours.

EYH Consultants have concluded that, with the implementation of the above recommendations, RAP can proceed.

The Ministry has accepted IDLP's designed criteria for the left-hand turn lane, and the next step will be to submit a proposed design. IDLP will continue to work with the Ministry on the commercial access permit requirements, and the commercial access permit will be obtained.

As additions to the traffic impact assessment, the Ministry also requested a collision review and a review of queue lengths at the bridge on Greely Road over the Illecillewaet River.

There were no significant findings in the collision review.

The Ministry did not raise any concerns with the single-lane access bridge over the Illecillewaet River but did request the review be conducted to demonstrate that the single-lane operation would be acceptable. EYH has completed this analysis and concluded that "the current arrangement for the bridge is sufficient to accommodate the traffic generated by the proposed Revelstoke Adventure Park."

### A.8.2 CP Rail Crossing

After turning onto Greely Road, guests take a bridge over the Illecillewaet River, then drive over the CP Rail crossing and proceed to Greely Meadows. IDLP has a private crossing agreement with CP Rail (see Appendix A-3), which enables...

*"...the Applicant, its invitees, employees, contractors, servants and agents to obtain ingress to and egress from the property owned or occupied by the Application for the purpose of accessing the Applicant's commercial business Operations situated on the Applicant's lands."*

After discussions with CP Rail, it has been determined that this crossing should remain private, but that IDLP will implement control measures. The implementation of control measures for the crossing will be phased, as outlined below.

### Phase One

The existing access gates will be used to control all access to and from the property during this construction phase. They will be unlocked only during business hours. Approvals will be obtained from CP Rail to upgrade and level the crossing.

### Phases Two and Three

With CP Rail's approval, the crossing will be upgraded to a concrete crossing with elevations on both sides of the tracks. The access gates will continue to control access, with the gates being locked during non-business hours. During hours of construction and operations, a trained employee will flag traffic and ensure safe crossings.

### Phase Four

The crossing will be upgraded to a fully controlled private crossing with a grade crossing signal with flashing lights and gates. The final phase will be similar to the Canoe Mill crossing at 8160 Trans-Canada Highway, Canoe, BC (mile marker 56.5), pictured below.



### A.8.3 Parking

Once on private property, parking is available for personal vehicles and tour buses in Greely Meadows. While the park's activities take place on both Crown and private land, all vehicle and ground-level access to all areas and activities is centralized and controlled through Greely Meadows (private land).



## SECTION B: CONSTRUCTION METHODS

### B.1 DETAILED CONSTRUCTION SCHEDULE

**TABLE 6. GREELY CONSTRUCTION SCHEDULE**

MAP	IMPROVEMENT	DETAILS	PRE-APPROVAL	PHASE ONE	PHASE TWO	PHASE THREE	PHASE FOUR
			2015	2016	2017	2018	2019-2022
BIKE ZONE							
Map 8:	Mountain Road	Watercourse permitting on creeks					
		Final geotech/engineering					
		Clearing and road construction					
		Maintenance					
	Trails: Mountain Biking, Horseback Riding, and Hiking	Trail layout and design					
		Trail construction					
	Greely Express Chairlift / Gondola	Engineer design and layout					
		Site preparation, including cutting and clearing lifeline					
		Professional installation and construction of lift terminals and towers					
GREELY MEADOWS – CROWN LAND							
Map 5:	Campground and RV Park	Design and layout					
		Land clearing					
TREE TOP ADVENTURES							
Map 6:	Ropes Courses	Design and layout of ropes courses and Mountain Coaster					
		Land clearing and professional installation of ropes courses					
	Mountain Coaster	Land clearing and professional installation					
	Chairlift #2	Land clearing and professional installation					
	Expansion of Tree Top Adventures	Potential expansion of area; land clearing and installation of additional ropes courses features					
ZIPLINES							
Map 7:		Professional design and mapping of proposed routes					
		Professional installation					
	Expansion of Zipline Routes	Potential future expansion of ziplines					

**TABLE 6. GREELY CONSTRUCTION SCHEDULE**

MAP	IMPROVEMENT	DETAILS	PRE- APPROVAL	PHASE ONE	PHASE TWO	PHASE THREE	PHASE FOUR
			2015	2016	2017	2018	2019- 2022
BUNGEE CENTRE							
Map 9:	Bungee Jump	Geotech/engineering					
		Engineer design and professional installation					
	Storage Building	Construction and installation of storage building					
	Helipad	Clearing for helipad					
	Temporary Bungee Centre	Portable privies, temporary F&B outlet, and information booth					
		Mountain Lodge	Building and deck design, layout, and engineering				
			Building construction				
	Sky Swing	Professional installation					
Rock Climbing	Design and installation of climbing routes						
GREELY MEADOWS – PRIVATE LAND							
Map 5:		BC Hydro electrical utility services installation					
		Watercourse permitting on creeks and wetlands					
	RV Park	Layout, design, and construction					
	Temporary RAP Base	Layout, design, and construction					
	Permanent RAP Base Structure	Layout and design					
		Construction					
	Lake	Layout, design, and permitting					
		Construction					
	Pump Park	Construction					
	Helipad	Clearing for helipad					
	Driving Range	25 stalls					
	CP Rail Crossing	Crossing upgrades					
		Installation of crossing signal					
	OGO	Professional installation					
	Fishpipe	Professional installation					
	Hot Pools	Clearing and professional installation					
	Highway Access	Improvements					
	Volleyball Courts	4 Sand courts					
	Horseback Riding	Construction of stables					

## B.2 PROPOSED IMPROVEMENTS

The following sections outline proposed improvements to Crown land. This section also outlines any preliminary studies that have been completed. In May 2014, IDLP was granted Investigative Use Permit #404850 (see Appendix A-1). This permit allows IDLP to conduct research and investigative work on the proposed tenure area for RAP.

### B.2.1 Pre-Approval Phase (2015)

#### B.2.1.1 Extensive Use Area

Shearing Environmental Consultants (SEC) have been retained to begin mapping water courses.

### B.2.2 Phase One (2016)

#### B.2.2.1 Mountain Road

The Mountain Road is a 3-kilometre-long road to be constructed from the edge of Greely Meadows (private land) to the Bungee Centre. Drop-off and parking areas at the Tree Top Adventures area and the Bungee Centre will also be constructed.

#### Preliminary Work

A terrain stability assessment (TSA) was completed by professional geoscientist Adam Muddiman of On-site Engineering (see Appendix B-1). After consultation with Kurt Hutmeyer at the FLNR Revelstoke Office, the report was revised in February 2016. This report, which will be followed, provides specific road construction guidelines, including construction supervision by a professional engineer or geoscientist.

The TSA contains a preliminary geometric road layout that was completed by Azimuth Forestry and Mapping Solutions.

Of note, an earlier version of the TSA completed by Onsite Engineering incorrectly named an unnamed creek as Greely Creek. Greely Creek is actually located about 2.6 km to the east. See Appendix B-2 for a letter from Onsite clarifying the misnaming. This letter also reiterates that Table 1 in the TSA provides road construction recommendations for the areas where a risk of landslide exists, and that if implemented are expected to result in a low likelihood of the initiation of a landslide.

#### Construction

An engineer will be on site for the construction of the road and will sign off on all areas of concern. This will ensure the road is built to the engineers' standards as noted in the TSA.

Construction will begin immediately after appropriate approvals have been received. Timber removal is required; specific amounts will be determined upon engineer's assessment. All construction will follow the guidelines indicated in the Forest Road Engineering Guidebook published by the BC Ministry of Forests, Lands, and Natural Resource Operations.

Following construction of the road, a professional engineer's assurance statement will be obtained.

## Maintenance

Appendix B-6 contains a road maintenance plan prepared by Onsite Engineering. The maintenance plan is intended to meet the requirements of the BC Forest and Range Practices Act including Section 79 of the Forest Planning and Practices Regulations.

The maintenance plan will come into effect after road construction is completed. As outlined in the document, “the general intent of the road maintenance plan is to provide guidelines to maintain the road in a usable manner adequate for the desired use that will be safe for road users and will not have significant detrimental environmental impacts.”

### B.2.2.2 Trail Construction

A variety of trails are to be constructed for mountain biking, horseback riding, and hiking.

- **Mountain Bike Trails:** A network of professionally designed trails will be constructed, starting at the Bungee Centre and proceeding down the mountain to the registration building in Greely Meadows. Mountain bike trails will be built following the guidelines established by the International Mountain Biking Association (IMBA).
- **Hiking Trails:** A network of trails, separated from bikes and horses, will be constructed to allow for recreational hiking and to access various activities throughout the tenure area and private land.
- **Horseback-Riding Trails:** Making use of the existing forestry road, a series of looping trails designated specifically for horseback riding will be constructed.



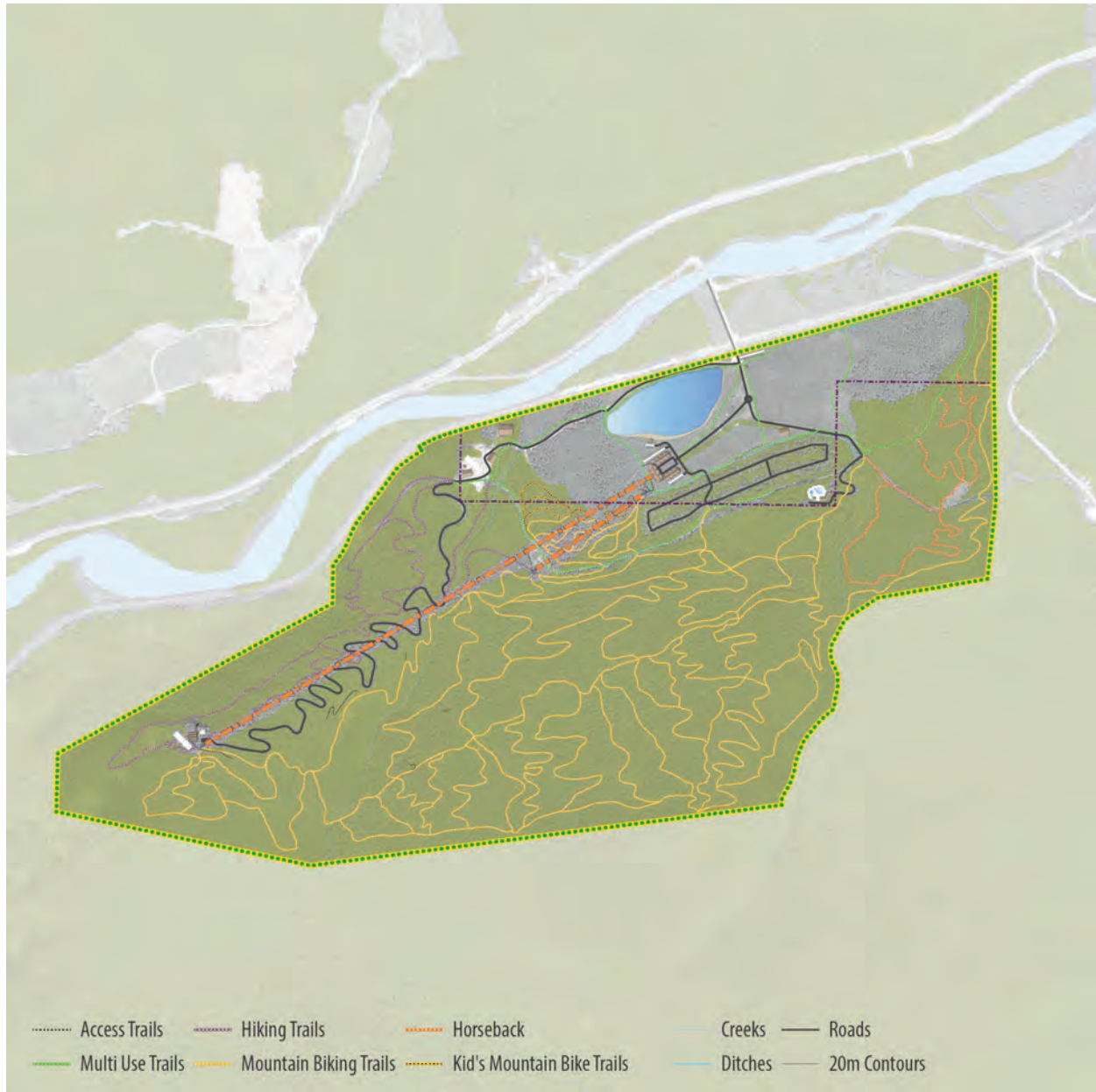
Downhill Mountain Biking - Image source: <https://goo.gl/185sQQ>



### Preliminary Work

Mountain bike park design consultants Gravity Logic were engaged to conduct a study on the Crown land to assess potential trail locations and develop a preliminary trail plan which outlines trail design and construction methods and operations.

The Proposed Trail Map highlights the proposed mountain bike, hiking and horseback riding trails (+/- 10m of centre line). Trails will be built be phased and built over a number of years.



**Map 10:** Proposed Trail Map - See Appendix F for more information

Trail design will include emergency access points, some of which may be accessible by 4wd ambulance.

## Construction

Thorough planning by professionals will ensure trails are designed and ultimately built in a way that makes use of existing natural features, and minimizes tree removal and soil erosion. Local, experienced trail builders, who are knowledgeable on trail building best management practices, will be engaged for trail construction. The principles outlined in the following publications will be incorporated:

- British Columbia Ministry of Forests – Recreational Manual (Chapter 10 – Recreation Trail Management)
- Whistler Trail Standards – Environmental & Technical Trail Features
- International Mountain Bike Canada (IMBA) Publications:
  - Bike Parks - IMBA's Guide to New School Trails
  - Managing Mountain Biking Book
  - Trail Solutions: IMBA's Guide to Building Sweet Singletrack

Timber and brush removal will be required, and the principles outlined in sections; and C.1 Environmental Plan will apply to all trail construction. This will include continuing to work with a QEP to ensure any wildlife habitats are identified and protected.

## Trail Lengths

<b>TABLE 7. TRAIL TYPES &amp; LENGTHS</b>			
TRAIL TYPE	CROWN LAND (M <sup>2</sup> )	CREEK CROSSING (CROWN LAND ONLY)	PRIVATE LAND (M <sup>2</sup> )
Mountain Bike	27,939.4	4	379.1
Kid's Mountain Bike	705.4	0	281.8
Hiking	5,063.2	1	69.7
Multi Use	1,587.7	1	4,304.7
Horseback	2,866.2	3	37.2
Access Trail	547.8	0	249.2
<b>Total</b>	<b>38,709.7</b>	<b>9</b>	<b>5,321.7</b>
<b>** Please note this is full build-out</b>			

## Trail Widths

- Mountain Biking trails: will be unsurfaced, single track trails, of varying difficulty(see below for more details). Using the standards outlined in "Whistler Trail Standards – Environmental & Technical Trail Features"; widths will vary from 1.6 m to 1.0 m (single track) with 30 – 50 cm width tread on native soil. The width will vary based on the difficulty of the trail (the more difficult the trail, the narrower).
- Hiking trails: will be unsurfaced and of varying difficulties and grades. The guidelines provided in "British Columbia Ministry of Forests – Recreational Manual (Chapter 10 – Recreation Trail Management)" will apply to hiking trail construction. Please refer to "Table 8. Hiking Trail Widths" on page 32.

**TABLE 8. HIKING TRAIL WIDTHS**

TRAIL TYPE	USES	TRAIL WIDTH	GRADE
Type I	<ul style="list-style-type: none"> <li>• High standard, short walks</li> <li>• 5 - 30 minute duration</li> <li>• Steady two-way traffic</li> </ul>	2.0m	≤ 8% maximum ≤ 5% average
Type II	<ul style="list-style-type: none"> <li>• Walking trails</li> <li>• Minutes to 2 hours duration</li> <li>• 1 - 6 km</li> </ul>	1.25m	≤ 10% maximum ≤ 5-8% average
Type III	<ul style="list-style-type: none"> <li>• Single file, hiking trails</li> <li>• 1 -7 hour day use, overnight and multi-day</li> <li>• 3 - 20 km or more</li> </ul>	0.75m	≤ 10-12%

- Horseback riding trails: minimum trail width of 2 m, with the preferred width being 3 m.
- Multi-use trails: these are designed to be double track trails used by hikers and bikers, and will have a minimum trail width of 5m (as per Whistler Trail Standards).

### Stream Crossings

Watercourses will be avoided when possible, however as per the trail layout certain trails will cross streams. When crossing a stream is necessary, watercourses will be spanned with bridges. Bridges would be built using a combination of treated and untreated wood. Galvanized fasteners will be used throughout. They will be professionally engineered and designed to have minimal impact on the riparian area.

Wet and/or boggy areas will be crossed, if necessary, using a combination of raised mineral soil causeways, ditching, and/or raised wooden boardwalks. In watercourses where seasonal flow is expected, but permanent water is not present culverts (min 30cm) or bridges (site specific) will be used. In any areas where water is not expected, but possible, culverts (min 15cm) will be used.

As outlined in Section B.3.4 Works In and About Streams the regulations outlined in Section 9 of the provincial Water Act will be adhered to and a QEP will be retained to ensure compliance.

### Mountain Bike Trails

The bulk of mountain bike trails will be built over a period of 5 years, and will range in difficulty.

Mountain bike trails require different design principles than hiking trails, therefore experienced mountain bike trail designers and builders will be retained to establish a trail network based off the preliminary plans. This will ensure mountain bike trails are built in a professional and sustainable manner. The trails will be built following the construction guidelines, and best management practices prescribed by IMBA.

Trails will be built using the design principles for “flow trails.” IMBA describes flow trails as taking “mountain bikers on a terrain-induced roller coaster experience, with little pedaling and braking necessary. This style of trail typically contains features like banked turns, rolling terrain, various types of jumps, and consistent and predictable surfaces.” The goal with this type of construction is to create a sustainable trail with minimal impact by limiting large scale excavation or importation of outside materials.

Some trails will require the use of machines, and other trails may have some “Technical Trail Features” (TTF) built into them. TTFs will be professionally designed, and will be designed so they are appropriate to the trails level of difficulty. The final design and placement of TTFs have not been completed, when they are finalized they will be submitted to the Crown for approval prior to construction.

The trail building technics that have been prescribed by our consultants Gravity Logics include:

- Downhill trails are insloped (the bench of the trail is canted back towards the hill). This forces water to run to the inside of the trail bench and into frequently placed culverts. The water flows into a small sediment trap and only flows through the culvert if the volume exceeds the ability of the sump to naturally drain. The added retention time created by the sump allows sediment to fall out of suspension. When sediment fills the sump, it can be removed and used to maintain the trail surface. Sumps are generally cleaned as part of regular trail maintenance on an as-needed basis. Aggressively insloped turns (berms) allow riders to maintain their speed without the need for aggressive braking and the erosional effects associated with it.
- Frequent grade reversals are another key component to minimize erosion; they minimize the volume and velocity of water captured by any individual trail segment.
- All trails will be designed to avoid the unnecessary removal of trees.
- Trails corridors will be grubbed (cleared of organic materials) in order for the trail surface to consist solely of quality mineral soil. Grubbed organics may be used to re-vegetate off-trail disturbed areas.

As outlined above, for any work in and around water courses the regulations outlined in Section 9 of the provincial Water Act will be adhered to and a QEP will be retained to ensure compliance.

### Maintenance

All trails will be well maintained to reduce user injury and trail erosion. Maintenance of all trails will consist of:

- Spot maintenance to address immediate issues such as fallen trees, holes, or trail collapse.
- Safety maintenance to address sections of the bike trails that may be causing an abnormal amount of injuries.
- Routine maintenance, which may involve closing trails for a day or more at a time to ensure trail quality and safety.
- Overhaul: Every few years a trail may require a partial or total overhaul.

#### **B.2.2.3 Greely Express Lift**

A 1500-metre-long chairlift or gondola, depending upon availability, will connect Greely Meadows to the Bungee Centre. The “Greely Express Lift” will be designed to transport guests as well as mountain bikes. Construction will begin in Phase Two, and the lift will be operational in Phase Three.

The lift will be professionally designed, engineered, and installed. Timber removal will be required along the lift line and at the bases. A maintenance plan will be determined by the lift supplier/installer.

Clearing of the lift line and lift terminal locations at the Bungee Centre and Greely Meadows will begin in Phase One.

#### **B.2.2.4 Greely Meadows – RV Park & Campground**

Clearing and timber removal will be required on the 2.0 ha of the RV park and campground that is on crown land. Thirty-eight campsites will be created, a ring road and 2 blocks of pit toilets will be constructed. The pit toilets, similar to those found in BC Provincial Parks, will be constructed within IHA guidelines. The main washroom facilities, that include an IHA-approved septic system, will be constructed on private land.

#### **B.2.2.5 Tree Top Adventures**

The 15.4-hectare Tree Top Adventures area consists of the ropes courses and the Mountain Coaster, and is connected to Greely Meadows via the Mountain Road. These activities will be constructed in two phases.



### Construction – Staging Area

- Timber removal will be required to create a drop-off/pick-up area.
- Portable privies will be provided (to be emptied per supplier's specifications).
- A small service cabin will be designed and built to be a "rest-stop" for participants between activities. This cabin will sell prepared food and beverage. The gross maximum floor area of the cabin will be 100 m<sup>2</sup> and is not serviced with water.

### Construction – Ropes Courses

- A series of courses, of varying levels of difficulty, will be constructed above ground.
- Courses are engineer-designed and professionally constructed using environmentally sensitive methods to avoid harming the trees and surrounding natural environment.
- Courses are constructed using either standing timber (arborist- and engineer-approved) or installed poles. Some timber removal will be required.
- Courses are constructed using a variety of different materials such as rope ladders, log bridges, rope swings, and ziplines.

#### B.2.2.6 Ziplines

Beginning at the Bungee Centre, the zipline route will consist of several ziplines, crossing the stream channel and descending to Greely Meadows. The platform locations will be on the ridge tops on either side of the water and well outside the designated stream setbacks.

Some timber removal will be required to cut walking pathways between platforms and for zipline corridors to allow for the safe passage of guests. The engineer-designed platforms for the ziplines will be supported by concrete footings anchored into the ground.

#### B.2.2.7 Bungee Centre

The proposed Bungee Centre site is 4.6 ha, and is situated on the north side of Mount Mackenzie. The Bungee Centre, which will act as the staging area for all mountain activities, will be a phased development.

Phase One will consist of temporary structures, with the exception of the permanent bungee platform and helipad, and will include:

- A drop-off/pick-up and parking area
- Portable privies (to be emptied per supplier's specifications)
- Gazebos to be used as a staging area for guests
- Bungee platform – engineer-designed and extends beyond the cliff face
- Helipad for sightseeing and emergency response

### Preliminary Work

Onsite Engineering was engaged to conduct a geotechnical assessment of the proposed Bungee Centre site. This report addresses geotechnical conditions at the proposed site and along the bedrock bluff immediately downslope of the lodge site.

The report, included in Appendix B–7 contains construction recommendations for the building based on their findings.

It states that from an initial planning perspective, the bungee platform may be feasible and the rock present at the site is competent and appears suitable for rock anchor and foundation placement.

The report also indicates that no upslope hazards such as landslides or hydrogeomorphic events are foreseeable. It identifies some risk of minor rock fall on the face of the bluff, and therefore recommends a 25 m setback from the bluff edge for all structures and development.

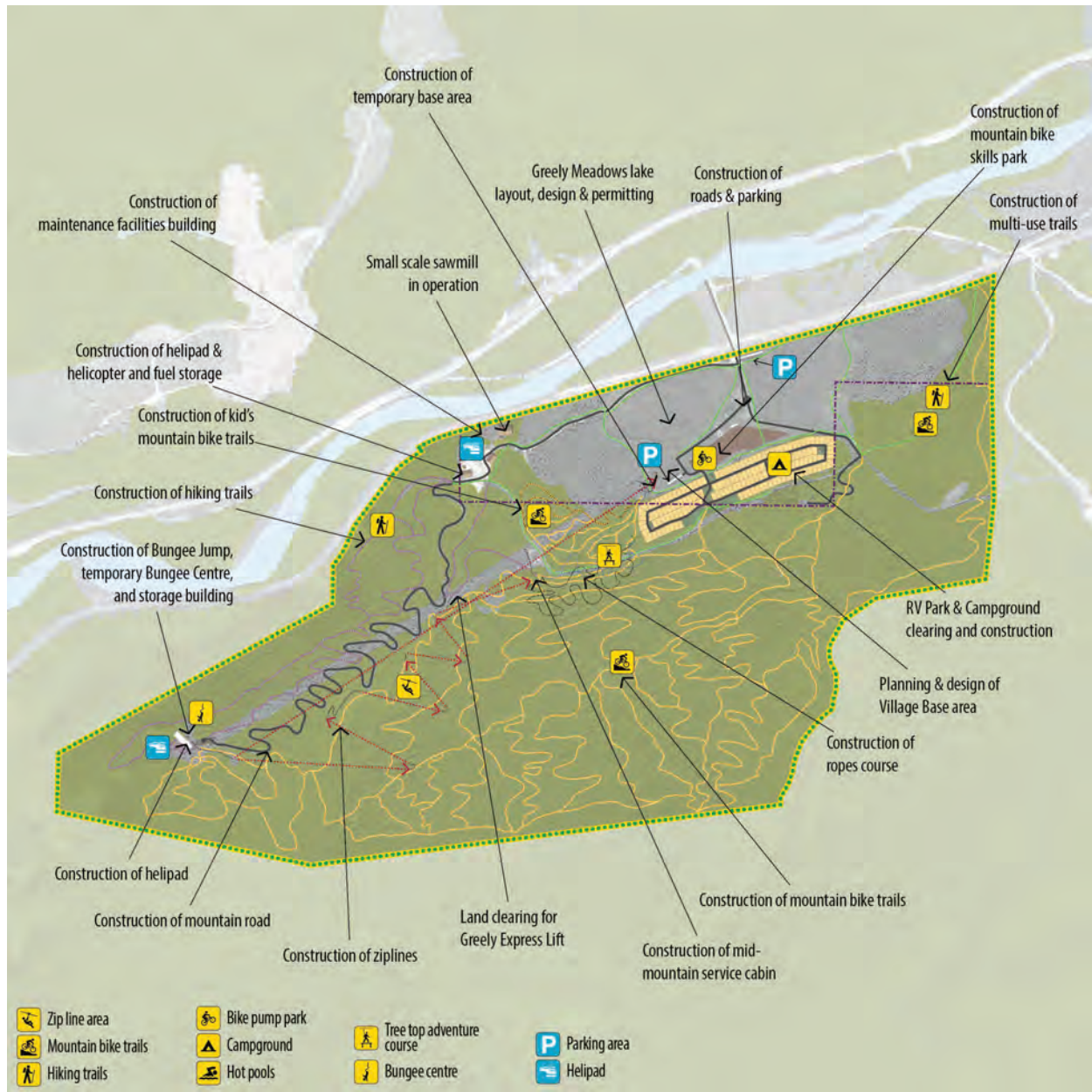
As outlined in the report, these are initial observations and a more detailed geotechnical assessment will be required once the final building plans are completed and the exact location of the structure is established. Further works would then include deep drilling at the site and a detailed assessment of bedrock conditions at the bungee jump location. A geological engineer with experience in such structures will be retained at that time.

### Construction

- Brush removal and some timber removal will be required to clear staging and parking area.
- Temporary gazebo structures and portable privies will be installed.
- A helipad will be constructed; the appropriate permits will be obtained.



Bungee Jumping - Image source: <https://goo.gl/tXmHdi>



**Map 11:** Construction Phases: Phase 1 - See Appendix F for more information

## B.2.3 Phase Two (2017)

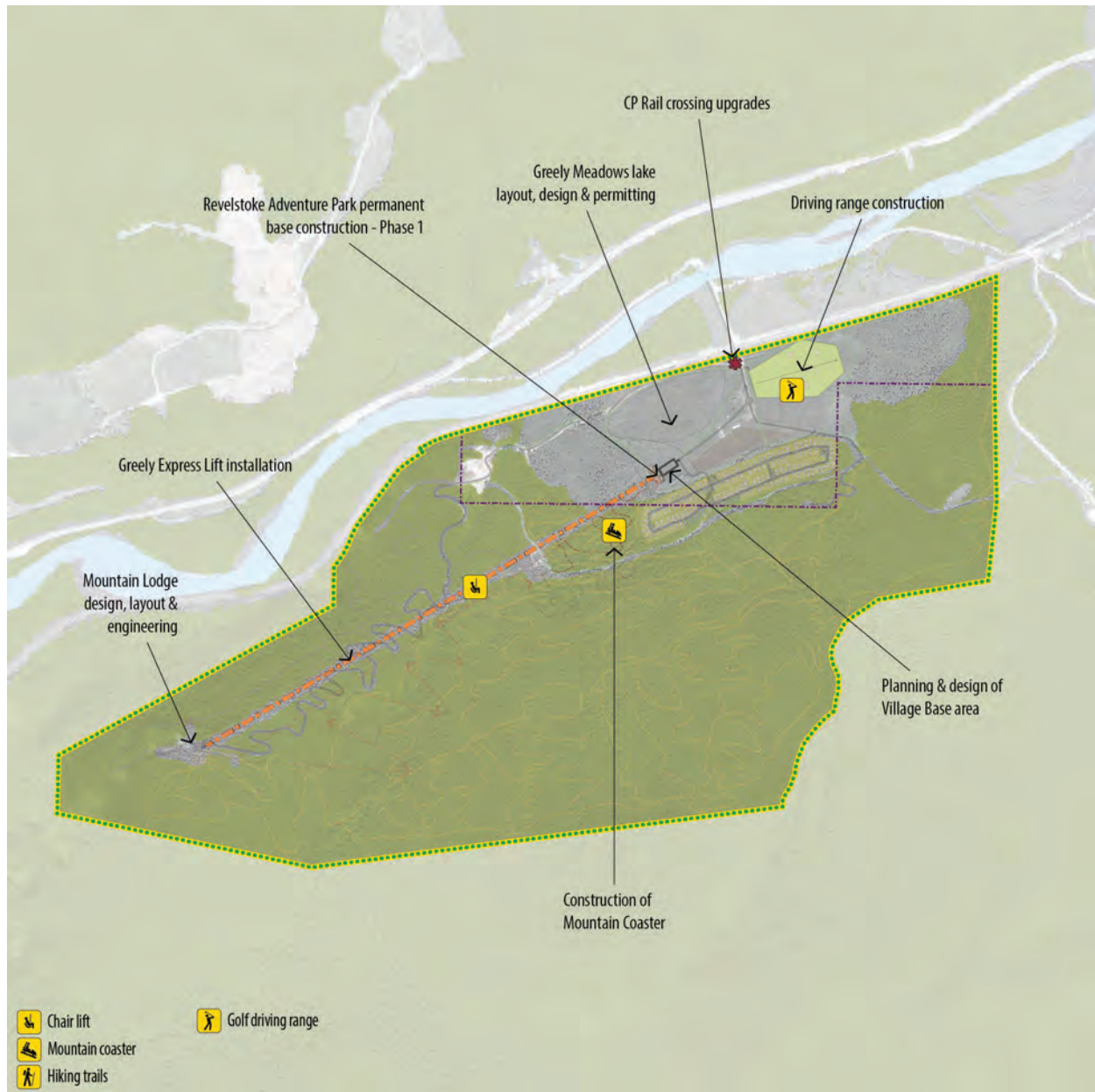
### B.2.3.1 Greely Express Lift

Lift installation will begin in Phase Two, with the lift becoming operational in Phase Three.

### B.2.3.2 Tree Top Adventures – Mountain Coaster

The Mountain Coaster route will be professionally designed and installed. Some timber removal will be required. A maintenance plan will be determined by the supplier/installer.





**Map 12:** Construction Phases: Phase 2 - See Appendix F for more information

## B.2.4 Phase Three (2018)

### B.2.4.1 Tree Top Adventures – Chairlift

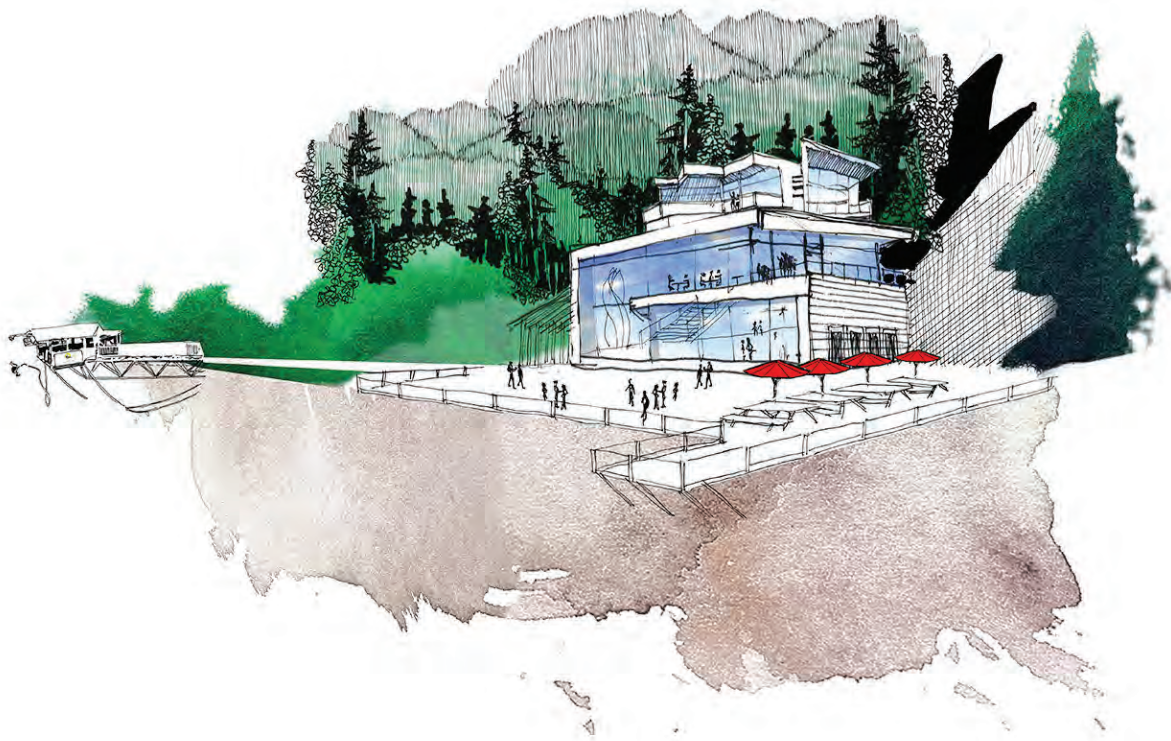
A 240-metre-long chairlift is to be installed. It will be designed to transport guests from the base of the Tree Top Adventures area to the top of the ropes courses as well as to the Mountain Coaster. The lift will be professionally designed, engineered, and installed. Timber removal will be required along the lift line and at the bases. A maintenance plan will be determined by the lift supplier/installer.

#### **B.2.4.2 Bungee Centre – Mountain Lodge**

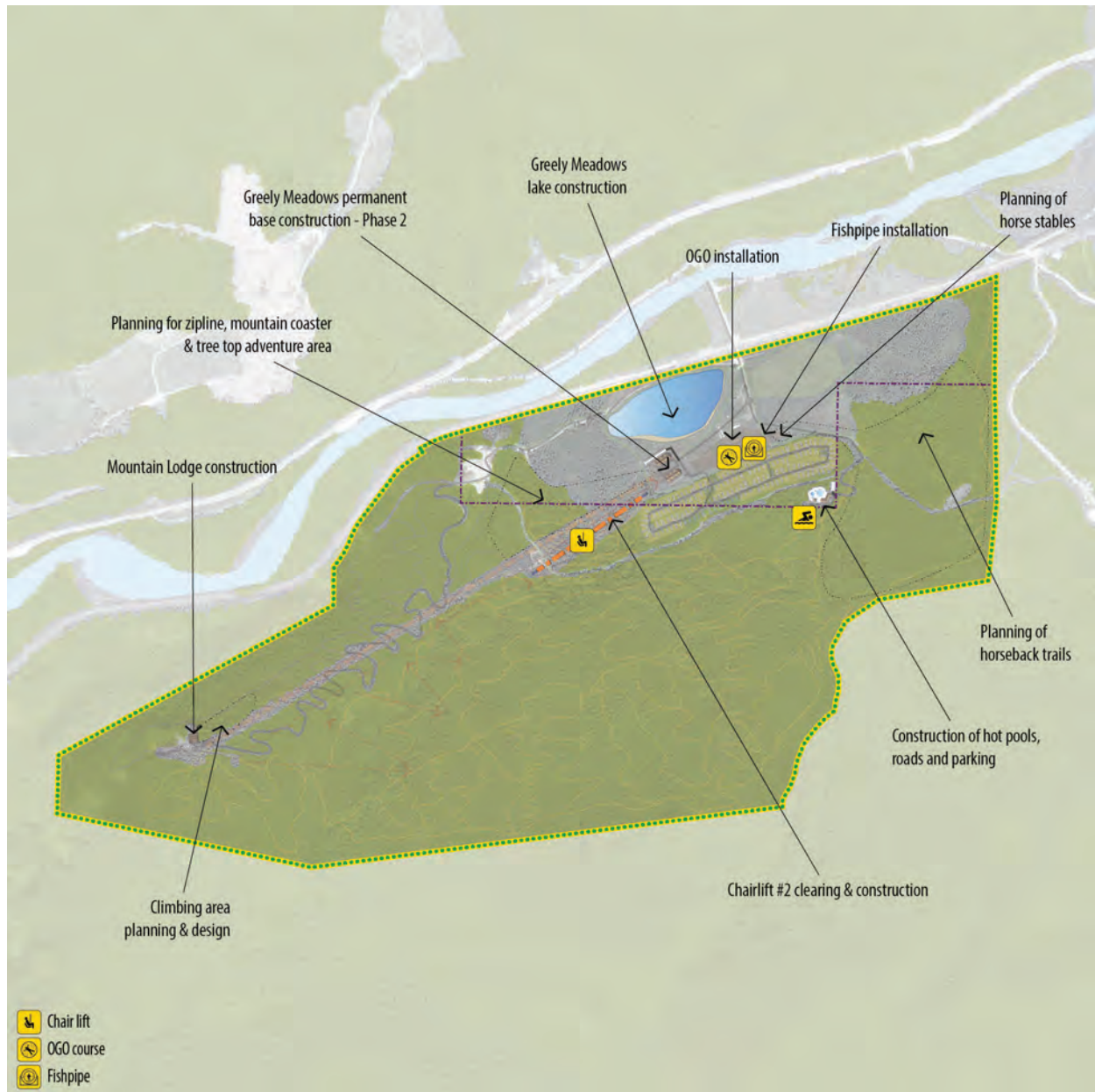
Phase Three will see construction begin on a permanent Bungee Centre; a 450-square-metre full-service mountain lodge with a viewing deck, restaurant, retail shop, function rooms, and washrooms. The building is to be designed based on principles of organic architecture to reflect its natural surroundings.

A detailed construction plan for the Bungee Centre will be available prior to construction after the necessary research, design, and planning has been completed. The highest standards of sustainable construction will be used to minimize the environmental impact of the building. Locally sourced supplies will be used when possible, including timber removed from the development.

Site preparation for the building site and all load-bearing surfaces will include the removal of all organic materials.



Concept Drawing of the Bungee Centre Mountain Lodge



**Map 13:** Construction Phases: Phase 3 - See Appendix F for more information

## B.2.5 Phase Four (2019+)

### B.2.5.1 Tree Top Adventures & Ziplines – Expansion

Based on market demand and suitability of terrain, tree top adventures and ziplines will be expanded to include additional routes.



### **B.2.5.2 Bungee Centre – Rock Climbing**

Further geotechnical studies will be performed by an engineering professional to assess the suitability of this area for rock climbing.

The rock climbing wall's maximum height is 50 feet, and covers a total surface area of approximately 5000 square feet. Working with experienced and professional climbing wall designers, various climbing routes will be designed, and climbing holds and bolts will be professionally installed. The climbing wall area will be divided into beginner and advanced, and will make use of an auto-belay system and a traditional belay system as described in section A.5.4.1 Crown Land.

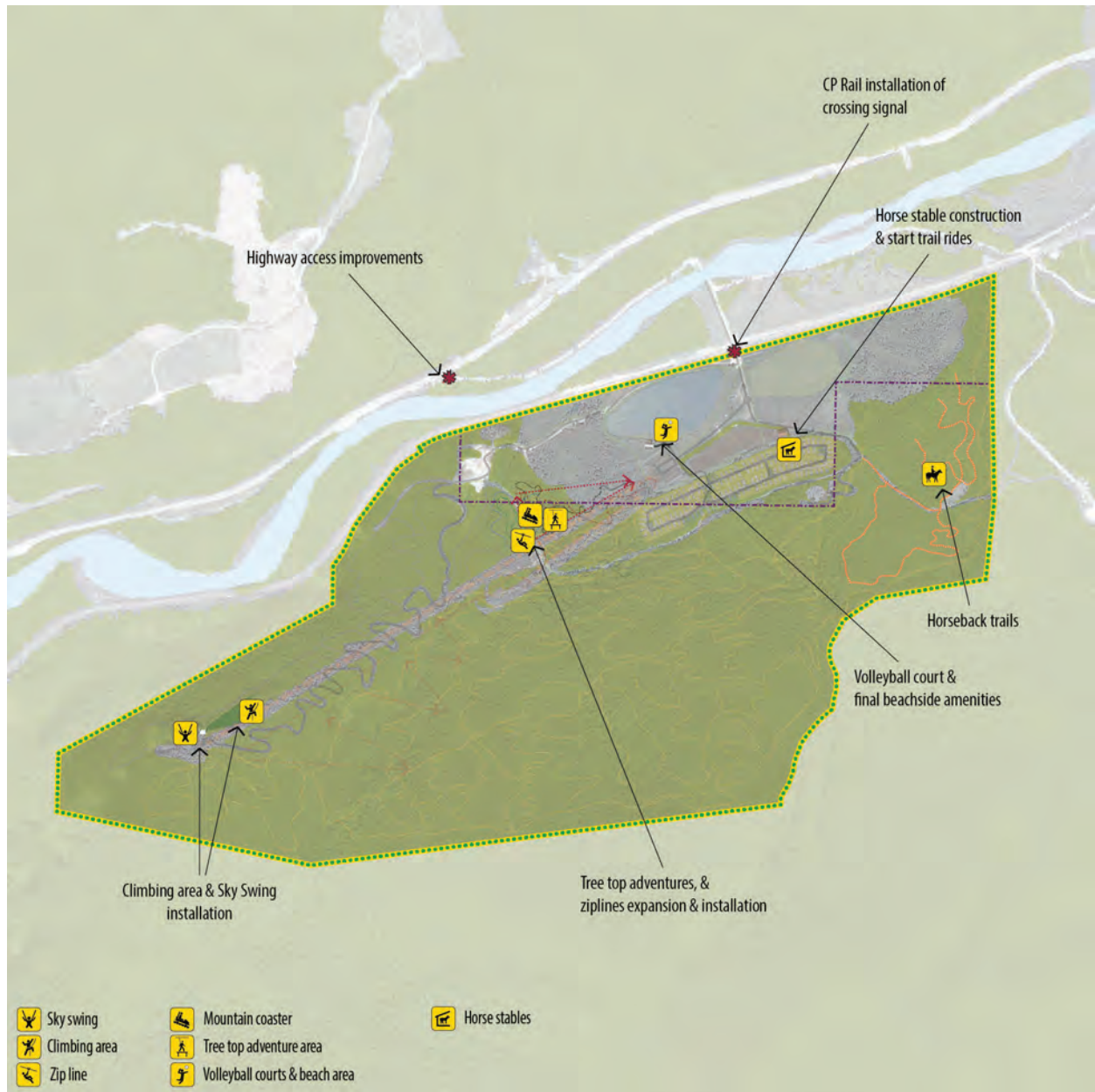
### **B.2.5.3 Bungee Centre – Sky Swing**

Phase Four also includes installation of the Sky Swing, which consists of two 30-metre poles with a swing between them. The Sky Swing will be professionally designed and installed.



photo: <http://www.rtw4strong.com/wp-content/uploads/2011/10/skycoaster.jpg>





**Map 14:** Construction Phases: Phase 4 - See Appendix F for more information

## B.3 GENERAL CONSTRUCTION POLICIES

All onsite construction will follow best management practices presented in “Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.”<sup>8</sup> IDLP will work closely with qualified environmental professionals (QEPs) to ensure that these guidelines are integrated early into development plans. QEPs will also provide onsite monitoring to ensure compliance.

Pertinent sections of “Develop with Care 2014” that will be adhered to include:

- **Section 3** – Site Development and Management
- **Section 4** – Environmentally Valuable Resources
- **Section 5.2** – Kootenay Boundary Region
- **Appendices A-F**

### B.3.1 Timber Removal

Timber removal, in varying quantities, will be required throughout the tenure area. The intent is to retain the natural landscape to the greatest extent possible for both ecological and aesthetic values. Prior to any tree cutting or brush cutting the appropriate permits and authorizations under the Forest Act will be obtained.

### B.3.2 Wildlife Act

The Provincial Wildlife Act is important legislation to ensure wildlife are free to carry out activities important to their life cycle. Specific sections of the Wildlife Act pertain to development processes, including:

#### Section 10: Attempts to Capture Wildlife

*Except as authorized by this Act, the regulations or a permit, a person who attempts to capture wildlife commits an offence.*

Employees and visitors to RAP will be instructed not to attempt to capture wildlife and that doing so will result in reporting to the Report All Poachers and Polluters (RAPP) hotline.

#### Section 33.1: Attracting Dangerous Wildlife

##### **33.1 (1)** A person must not

*(a) intentionally feed or attempt to feed dangerous wildlife, or*

*(b) provide, leave or place an attractant in, on or about any land or premises with the intent of attracting dangerous wildlife.*

*(2) A person must not leave or place an attractant in, on or about any land or premises where there are or where there are likely to be people, in a manner in which the attractant could*

*(a) attract dangerous wildlife to the land or premises, and*

*(b) be accessible to dangerous wildlife.*

*(3) Subject to subsections (5) and (6), a person who contravenes subsection (1) or (2) commits an offence.*

See Section C.1.3, Wildlife Habitat, for information on how RAP intends to reduce and eliminate wildlife attractants for bears and other dangerous wildlife.

### Section 34: Birds, Nests and Eggs

**34** *A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys*

*(a) a bird or its egg,*

*(b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or*

*(c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.*

Prior to any land development between March 1 and August 15 (e.g., clearing vegetation, grubbing soil, removing old buildings), IDLP will retain a QEP to ensure that active bird nesting and/or fledging will not be negatively impacted by the development activity.

### Section 37: Transportation of Wildlife

**37** *A person who ships or transports in British Columbia, or engages another person to ship or transport in British Columbia, wildlife or fish or parts of them, except as provided by regulation, commits an offence.*

All employees and visitors to RAP will be made aware of their obligation not to capture and/or transport wildlife without a permit. All suspicious activities will be reported to the RAPP hotline.

## B.3.3 Riparian Area Regulation

All work performed adjacent to or planned for within the Riparian Assessment Area (RAA) will do so in compliance with the provincial Riparian Areas Regulation (RAR). Further, Columbia Shuswap Regional District (CSRD) Electoral Area B Official Community Plan requires that land developers obtain a RAR Development Permit for development within the RAA and/or designation of the Streamside Protection and Enhancement Area. A RAR assessment for Greely Meadows (base of operations) will commence in the summer of 2015.

### B.3.4 Works In and About Streams

Adhering to the regulations outlined in Section 9 of the provincial Water Act, pertaining to changes in and about a stream, Notification or Application for Approval will be submitted as required. The BC Ministry of Environment's "Standards and Best Practices for Instream Works" will be used as a guide, and a QEP will be retained to ensure compliance with permitting and monitoring.

Fish presence /absence surveys will be conducted by a QEP in the summer of 2016. The results of the survey will determine the restrictions and the appropriate regulations that will apply to development around the watercourses.

### B.3.5 Wildfire Prevention and Response

IDLP engaged Spark Solutions and Wildland Professional Solutions to develop a number of reports and plans to be used by IDLP to prevent and respond to wildfires. The following reports have been prepared and are available for review:

- "Wildfire Prevention and Response System"
- "Wildfire Threat Analysis and Mitigation Report"
- "Revelstoke Adventure Park Recommended Wildfire Development Guidelines"

"Wildfire Prevention and Response System" is designed to be a fire preparedness reference to all staff and contractors working in the tenure. It outlines prevention, preparation, and fire suppression methods.

The "Wildfire Threat Analysis and Mitigation Report" uses the standards presented in "Wildland Urban Interface Wildfire Threat Assessment in British Columbia" to assess the wildfire threat at RAP. Wildfire threat exists throughout the property at varying levels, but several factors combine to reduce the overall risk: the area's infrequent history of wildfires, the fact that the property is north-facing (and thus retains moisture), and the composition of the forest (Interior Cedar Hemlock, which has low burn probability).

Based on the relevant findings, wildfire threat mitigation strategies are provided within the report. It contains general threat mitigation strategies and offers other recommendations specific to RAP. Suggestions include continuing to participate with the City of Revelstoke and Area Community Wildland Fire Protection Committee, and to consider working with the City of Revelstoke and RMR to construct a firebreak.

"Revelstoke Adventure Park Recommended Wildfire Development Guidelines" describes the preliminary recommended wildland-urban interface fire development guidelines that should be considered in the planning and development of RAP.

The guidelines are specifically focused on mitigating the general wildfire threat to the facilities and the individual values at risk within the development. Each guideline topic is addressed by providing an overview of the wildfire risk and is followed by appropriate recommendations to reduce RAP's wildfire risk and increase public and first responder safety.



## B.4 UTILITIES

### B.4.1 Power, Electrical, and Telecommunications

RAP has been given the appropriate approvals for power from both CP Rail and BC Hydro. Local contractor Canyon Electric installed the transformers and switches this spring (2016). RAP hopes to provide its own power in the future via a small hydroelectric turbine.

The electrical services design and layout for the campground have not yet been finalized, however all power lines will be buried. A final plan will be submitted for approval prior to construction.

The electrical services design and layout for the Bungee center has not yet been finalized, however there are two options for providing power:

1. Power will be come up from base (private land), with cable buried in the road.
2. Possibility to establish an agreement with RMR where power is obtained, via buried cable, from the base of the ripper chair down (no formal discussions have occurred to-date).

A final plan will be submitted for approval prior to construction.

### B.4.2 Source of Water

IDLP has an existing agreement for water consumption with the City of Revelstoke to access their treated water. The existing agreement is for agricultural purposes, and IDLP is continuing to work with city officials and the engineering department to alter the existing agreement to allow for commercial use. Currently Golder Associates are providing the City with the necessary engineering data and documents to facilitate the amendment.

As an alternative, there is one unnamed creek that runs through the development area. IDLP intends to collect hydrometric data on the unnamed creek. A Water Licence Application has been submitted to Front-Counter BC to obtain rights to access this stream/creek for commercial purposes. Upon approval of the water licence application, IDLP will comply with IHA regulations and the Drinking Water Protection Act:

- A drinking water source assessment will be conducted and submitted to IHA.
- Upon source approval, an application for a Water Supply System Approval will be submitted to IHA to obtain a Waterworks construction permit for supplying water for both the base area and Bungee Centre.
- Once the construction permit is issued IDLP will work with the IHA to obtain an Operating permit.

Once the source is finalized, IDLP will provide an update to the IHA, and an authorized person will prepare any reports that are required by the IHA during the development phase of the water system.

Regardless of the water supply, we will comply with the Drinking Water Protection Act and Regulations, and the BC Health Act.

### **B.4.3 Sewage Disposal**

Early phasing will see the installation of portable privies at the Bungee Centre and the Tree Top Adventures area. Arrangements will be made with a provincially licensed sewage disposal facility.

When the Bungee Centre mountain lodge is to be built, a sewage disposal system that is in compliance with the Sewerage System Regulation will be built. An authorized person will be retained to design and oversee the construction of an IHA-approved septic. An authorized person will prepare any reports that are required by IHA during the development phase of the sewage system.

### **B.4.4 Recycling and Refuse Disposal**

Guests will be able to dispose of their refuse and recycling in bear-proof bins at the Tree Top Adventures area and Bungee Centre and various locations on the private land. Bins will be emptied every day, and their contents will be stored in a secure, bear-proof storage area on private property. A contract with a local waste removal company will be established to ensure waste is removed from the property on a regular basis.



## SECTION C: ENVIRONMENTAL & SOCIAL MANAGEMENT

### C.1 ENVIRONMENTAL PLAN

#### C.1.1 Land Impact Mitigation

This section discusses land impacts associated with cutting of vegetation, soil disturbance, and management of pesticides and herbicides, as well as visual impacts and archaeological sites. Environmental best management practices for reducing land impacts are presented in detail in the Wildlife Assessment report prepared by Shearing Environmental Consultants, included in Appendix B–4, specifically ways to protect wildlife trees and important wildlife features (e.g., animal licks, wildlife corridors, burrows and dens).

##### C.1.1.1 Cutting of Vegetation

Cutting vegetation is required on Crown land. A cleared right-of-way of approximately 200 ft will be required for the Greely Express Lift route. This route passes through seral and old growth forest. The planned Tree Top Adventures chairlift will also require an approximately 200-foot right-of-way. Chairlift right-of-ways are required to ensure trees are far enough from the lifts to avoid contact in the event of blowdown.

Vegetation will also be removed to facilitate approximately 3 km of new roadways as discussed in Section B.2.2.1. Roads are single lane and compacted gravel.

IDLP's intent is to retain the natural landscape and integrate the natural environment into RAP's design. Timber and brush removal will be required, but it will be performed in such a way as to reduce its visual impact. Removal of brush will also be required to reduce fire fuel.

Prior to cutting vegetation during the nesting window (see Table 5 in Appendix B–4, for species-specific table for least-risk windows), a QEP will be retained to determine the presence and absence of nesting and/or fledging birds by means of bird nesting surveys. An appropriate buffer based on recommendations from the QEP will be placed around active nests, and forest stands without active nesting will be permitted to be cut.

IDLP plans to use, when possible, the trees felled during clearing for onsite construction (e.g., the Bungee Centre and buildings in Greely Meadows).

##### C.1.1.2 Soil Disturbance

The Province's "Wildlife Guidelines for Backcountry Tourism/Commercial Recreation in British Columbia" presents environmental best management practices that IDLP will follow in support of retaining soil diversity outside of infrastructure footprints, right-of-ways, and trails. These include the mitigation strategies listed below to minimize soil compaction and minimize erosion:

- Use existing roads and trails
- Avoid traveling on existing roads and trails that are showing signs of erosion
- Avoid widening existing trails
- Use rock and gravel on trails where possible
- Avoid the placement of trails on steep grades, in areas with soft soil substrates and where trails follow drainage corridors



- Place trails on rock where possible
- Avoid trails that encourage off-trail use (pick the best route for walking or biking)
- Place signs telling user groups to stay on the trail for the protection of soil and vegetation
- Minimize campfire areas and contain within designated fire pits
- Limit motorized vehicular access on roads and trails
- Ensure that trails and roads that cross waterways have protected abutments to prevent erosion and degradation of the crossing feature and surrounding environment

### C.1.1.3 Management of Pesticides and Herbicides

Best management practices listed in Section 8: Pollution, Prevention and Management of the Province's "Environmental Best Management Practices for Urban and Rural Land Development" will be adhered to during construction and maintenance.

An Integrated Pest Management (IPM) plan will be developed, prior to construction commencing, in co-operation with the Columbia Shuswap Invasive Species Society<sup>9</sup> (CSISS) based in Revelstoke to address the following:

1. Planning and managing ecosystems to prevent organisms from becoming pests. This will include measures such as:
  - a. Liaising with CSISS to determine priority invasive plant species within the tenure area.
  - b. Carrying out regular surveys and record the locations of invasive plants in your operating area.
  - c. Inspecting and cleaning vehicles, and other equipment used on the site, before entering or leaving an area you know is affected by invasive species. This includes parts such as tires, undercarriage and trailers.
  - d. Re-vegetating disturbed areas with regionally appropriate (e.g. native), non-invasive, non-persistent seed mixtures or plants as soon as possible (within one year). This would include the disturbed roadside to mountain road, any cleared landings and helipad. Reducing unnecessary soil disturbance during road, landing, trail construction and site preparation.
  - e. Ensuring that fill material used is from a source that is free from invasive plants. Previously excavated soil will not be reused unless it's been treated appropriately.
  - f. Use prevention measures that encompass all activities or operations that could potentially introduce or spread invasive plants into your operating area.
2. Identifying potential pest problems by:
  - a. Training staff to identify noxious weeds and creatures.
  - b. Developing an staff reporting process where staff complete a report, which includes noting location and taking photos, if they identify any known or unknown species. If an unknown plant or creature is identified CSISS or Invasive Species Council of BC will be contacted for confirmation.
  - c. Based on consultation with CSISS, signage for visitors can be posted to ask for them to report sightings of specific species to RAP staff.
3. Monitoring populations of pests and beneficial organisms, pest damage, and environmental conditions.
4. Using injury thresholds in making treatment decisions.
5. Reducing pest populations to acceptable levels using strategies that may include a combination of biological, physical, cultural, mechanical, behavioural, and chemical controls.
6. Evaluating the effectiveness of treatments.

<sup>9</sup> <http://columbiashuswapinvasives.org>



## Treatment Methods

The most likely treatment methods will be; mechanical and chemical. Mechanical treatment of invasive plants includes all the physical methods to treat invasive plants, such as handpulling, digging, tilling, chainsawing, and weed whacking. This is the only method that will be used in Riparian areas.

Mechanical and manual weed removal will be the preferred option to reduce the use of pesticides. In the event that pesticides are required, a QEP will be consulted and the following mitigation strategies will be used:

1. Ensure all pesticide applications adhere to the requirements of the Province's Integrated Pest Control Act and Regulations.
2. Consult and inform all parties who may be affected by the pest control activities.
3. Read and follow all label directions.
4. Hire licensed and certified applicators when required legally and if unsure of the effectiveness or impacts of the pesticides.

### C.1.1.4 Visual Impacts

Visual impacts are not anticipated as a result of nominal tree clearing. The Bungee Centre will be designed to blend with its natural surroundings and limit its visual impact. Lighting will be designed to direct light where and when it is needed rather than toward the sky, decreasing its impact on wildlife.

### C.1.1.5 Construction Methods and Materials

Key methods and materials to be used in the construction of RAP include:

- Best management practices for all areas of construction.
- LEED standards for buildings when possible.
- Reusing timber and other material from the site whenever feasible.
- Using local BC materials whenever possible.

### C.1.1.6 Archaeological Sites

A Preliminary Field Reconnaissance (PFR) was conducted by the Splat sin First Nation to assess if there are any potential archaeological sites in the proposed development area or if any further archaeological field studies are required. The proposed tenure area was deemed to have "low archaeological potential" and "no further archaeological work is recommended."

One "high potential zone" along the Illecillewaet River is identified within the study; however, this falls outside RAP's proposed development area.

See Appendix B-3, "Archaeological Assessment," for a full copy of the PFR.

## C.1.2 Aquatic Impact Mitigation

This section presents an overview of aquatic resources sustained within the Crown land this application pertains to, an overview description of fish habitat, a description of the adjacent Greely Creek Watershed, and a description of the City of Revelstoke water main that traverses land owned by IDLP.

Drainage from Crown land upslope of private land is generally conveyed by means of two perennial unnamed creeks, Unnamed Creek One and Unnamed Creek Two. See Map 15:.

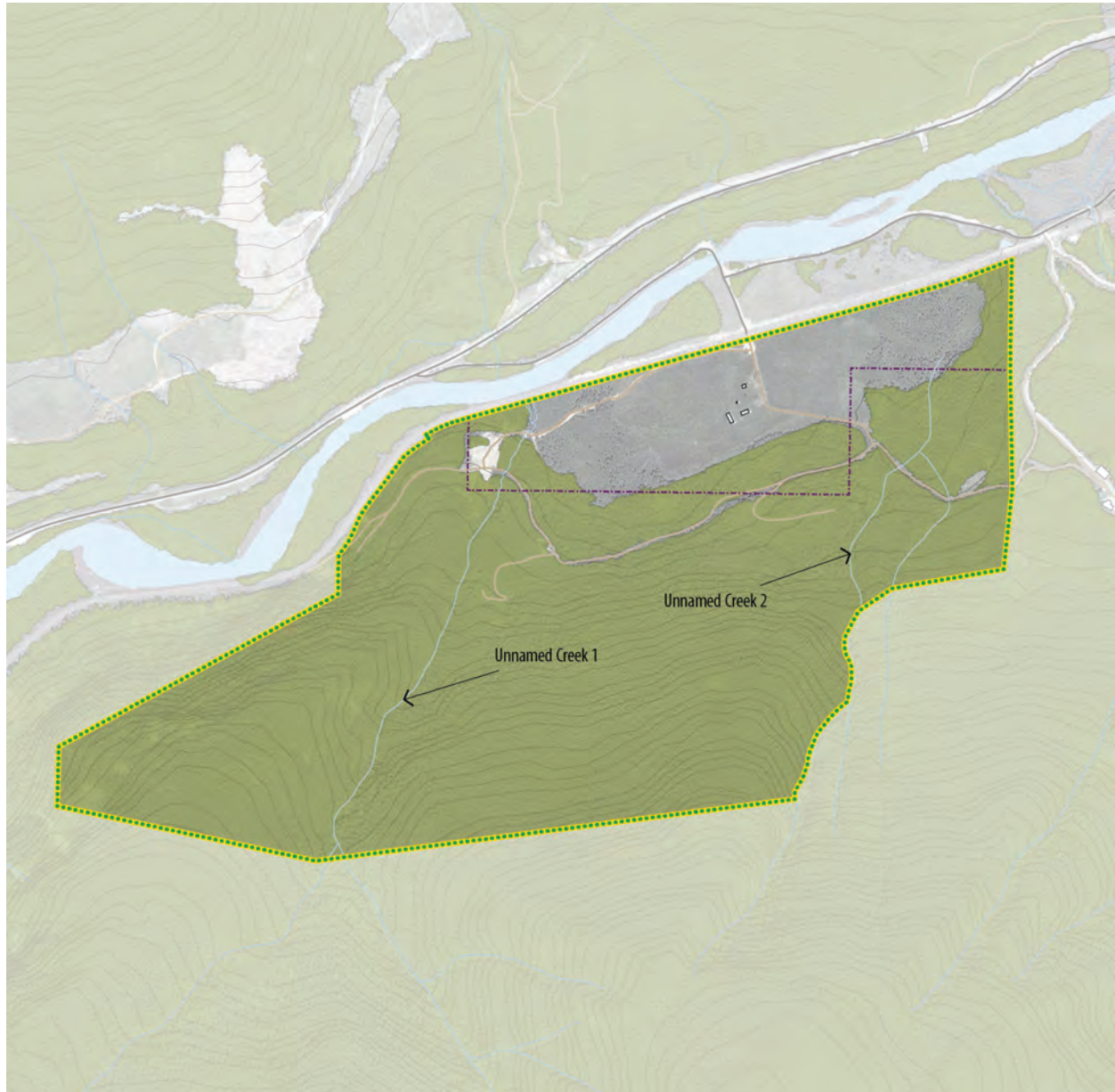
### **C.1.2.1 Unnamed Creek One**

Unnamed Creek One (UC1) is located on the west side of the mountain slope. A RAR assessment was undertaken for an approximately 500 m section of the lower reach of UC1 (referred to as Creek 5 in Azimuth 2012), from the confluence with the Illecillewaet River upstream beyond an existing road crossing (see Site Plan from Azimuth 2012). UC1 was found to have significant flow contained within a well-defined channel, and no barriers to fish passage were found. During onsite investigations, SEC found that UC1 steepened significantly upstream of the initial RAR assessment area from 2012; however, fish presence/absence surveys have not yet occurred to determine whether or not the upstream reach on the mountainside is fish-bearing.

Numerous components of the proposed development require regulatory approval for work in and around UC1, including the Ziplines, mountain bike trail crossings, tree felling associated with the Greely Express Lift right-of-way, and mountain road construction. IDLP has retained SEC to begin mapping biophysical attributes of UC1 to better understand development constraints. The Streamside Protection and Enhancement Area (SPEA) will be determined for the entire reach of UC1 on both sides of the creek within the Crown land tenure, and Section 9 Water Act submissions will be prepared for all creek crossings.

### **C.1.2.2 Unnamed Creek Two**

Unnamed Creek One (UC2) is located on the east side of the mountain slope closer to the Greely Creek Watershed boundary. UC2 originates as two separate channels and flows through an old growth forest stand. The confluence of both channels occurs within Crown land before flowing approximately 1 km downstream to a roadside ditch contained on private property that eventually flows into the Illecillewaet River. The Riparian Areas Regulation (RAR) report by Azimuth Forestry, 2012 (available for review), did not find any barriers to fish passage and classified UC2 (referred to as Creek 3 in Azimuth 2012) fish bearing. Large-scale recreational development is not planned for the riparian corridor around UC2. A natural cliff-band immediately west of UC2 ensures that construction of trails near the riparian area is not possible. A RAR assessment is not anticipated for UC2. Upon determination of final trail alignment, Section 9 Water Act submissions will be prepared detailing proposed construction and the biophysical attributes of the crossing location.



**Map 15:** Creeks - See Appendix F for more information

### C.1.2.3 Other Watercourses

Within the Crown land tenure are numerous small ephemeral and intermittent drainage features, some connecting to UC1 and UC2 and others that flow downslope through surface and subsurface drainage paths. The mountain slope comprises fractured rock that keeps the mountainside well drained but prevents the formation of well-defined channels for smaller drainage features. These features will be mapped prior to final trail layout and appropriate permitting undertaken prior to starting construction.

#### Fish Presence

Azimuth 2012 found that fish presence beyond a culvert connecting the subject property's watercourses with the Illecillewaet River would not preclude fish from entering the property. IDLP has retained SEC

to conduct fish presence/absence surveys on all perennial watercourses to determine if they currently support fish.

All activities within the vicinity of the stream will follow guidelines outlined in the BC Ministry of Environment's "A Users' Guide to Working In and Around Water" and "Standards and Best Practices for In-stream Works."

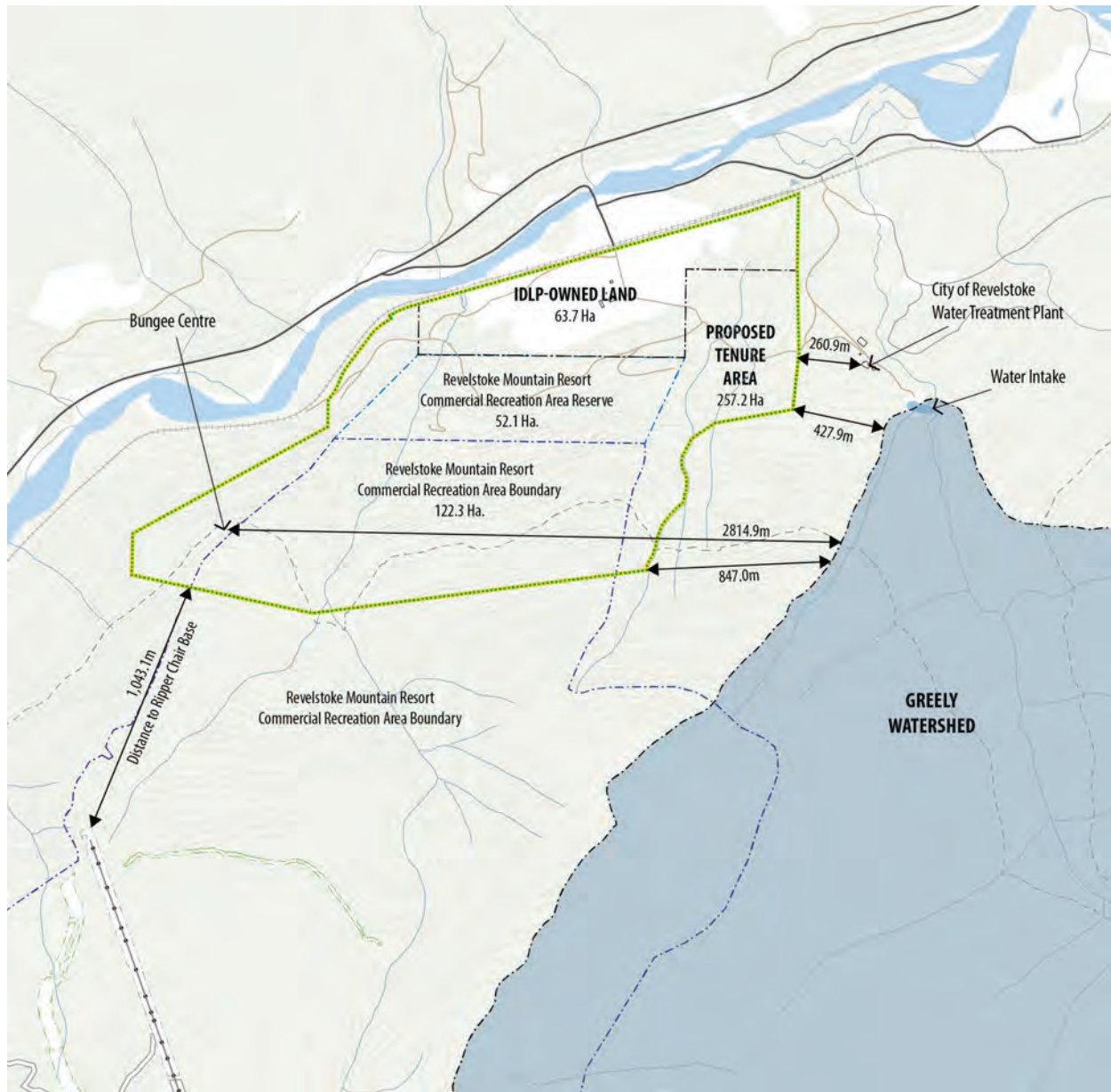
### Greely Creek Watershed

IDLP retained SEC to study the potential impact of RAP on the Greely Creek Watershed. SEC prepared a report (Appendix B-5) detailing the findings. SEC concluded that "all recreation activities proposed for RAP are to occur within encompassing lands (i.e., private land and Crown tenure land held by the proponent) and therefore do not pose an intrinsic risk to the watershed."

SEC found two potential risks to the watershed attributed to RAP: the risk of wildfire and human access. The report presents ways to mitigate both risks such that they are deemed insignificant, including developing a wildfire strategy, which is now complete and available upon request, and a plan to retain existing natural buffers, along with other impact mitigation strategies. The full details of SEC's conclusions and recommendations can be found in their letter included in Appendix B-5.

IDLP has also conducted site visits with both IHA and the City of Revelstoke's Director of Engineering and Development Services to discuss ways to ensure that the development does not infringe upon the watershed. See Map 16: (opposite).





**Map 16:** Watersource Protection: Distances Between Revelstoke Adventure Park and the City of Revelstoke Water Source - See Appendix F for more information

#### C.1.2.4 City of Revelstoke Water Main

The City of Revelstoke has a water main that runs through the property and is protected by existing right-of-ways (ROW Plans 35 and 36). The City of Revelstoke's Director of Engineering and Development Services did not have any concerns during a site visit. The City has asked that IDLP share their construction plans with the City prior to commencing any work to ensure there are no risks.

#### C.1.2.5 Mitigation Strategies

While the area's geography and topography act as a natural barrier to protect the watershed, the following mitigation strategies will be implemented:

- **Participate in City of Revelstoke water source protection planning:** Contact has been made with the City's Environmental Sustainability Coordinator, and IDLP has requested to be involved in the process.
- **Wildfire study:** IDLP commissioned a number of wildfire reports and studies, which are outlined in Section B.3.5 of this document.
- **Water main:** Prior to any construction, the City of Revelstoke's engineering department will be contacted with detailed plans to ensure there is no risk to the water main.
- **Trail design:** Trails will be designed to guide the general public away from the watershed boundary. Natural features of the land and built features, with SEC's input on the environmental impact, will be used to create barriers if necessary.
- **Signage:** The park boundary will be well marked and signage posted to notify visitors that they are in the vicinity of the watershed and must obey the boundary.
- **Disposal of sewage and public sanitation:** During initial phases a provincially licensed disposal company will be engaged to empty all portable sanitation units. Permanent public facilities will be built per phasing at Greely Meadows and the Bungee Centre. These will have an IHA-approved septic system.
- **Drinking Water:** An approved water source will be identified and a water system operating permit will be obtained.

IDLP is committed to working with IHA, CSRD, and the City of Revelstoke to ensure the ongoing protection of the Greely Creek Watershed. The existing natural features combined with the mitigation strategies mentioned above and ongoing work with SEC will ensure its protection.

### C.1.3 Wildlife Habitat

At the request of the Ktunaxa Nation Council, IDLP retained SEC in the fall of 2013 to conduct a wildlife overview assessment of the proposed project area, both privately owned land and most specifically, tenure being sought on Crown land. SEC prepared a lengthy report detailing findings; see Appendix B-4 for this report.

As referenced in SEC's report, the property sustains wildlife habitat and there is a likelihood of occurrence with regionally significant species (RSS) and species of management concern (SMC). However, SEC concludes:

*With adequate preplanning and integration and implementation of impact avoidance mitigation strategies, impacts to wildlife associated with RAP can be avoided and/or reduced.*

SEC also states:

*Careful planning and construction will ensure that the project footprint is well integrated into the landscape and therefore avoids or reduces impacts to wildlife and their habitats.*

By continuing to work with a QEP, IDLP will engage in "careful planning and construction" through every phase of the development.

IDLP acknowledges that their guests' experience relates directly to their experience within the natural environment. Working closely with QEPs and environmental regulators, IDLP intends to integrate this project with the integrity and value of the natural environment.

#### *Wildlife Guidelines for Backcountry Tourism/Commercial Recreation in BC*

Working with a QEP, IDLP will ensure that the Province's "Wildlife Guidelines for Backcountry Tourism/Commercial Recreation in BC" are incorporated into RAP operation plans. The guidelines associated with the following activities in forest and freshwater ecosystems will be followed:

- Aerial-based recreation
- Motorized recreation (snow-free)
- Non-motorized recreation (snow-free)
- Boating

The relevant desired behaviours will be followed, and indicators will be monitored and measured. Actions to be taken include:

- Fuel will be stored on private land and stored according to current legislation.
- All waste and recycling will be packed out and stored in bear-proof storage areas on private land.
- No off-leash dogs will be allowed.
- All staff will be trained regarding safety and best practices related to interactions with wildlife.
- Signage will be posted to ensure guests:
  - Stay on established trails
  - Record all wildlife encounters, as well as actions taken and responses of animals involved
  - Do not harass wildlife
  - Do not feed wildlife
  - Do not handle wildlife

A Bear Aware Program will be implemented to reduce human/bear conflicts with non-natural food attractants. This program, which includes feedback from the Revelstoke Bear Aware Community Coordinator, is outlined in Table 9 on the following page.



Photo: NPS Photo / Daniel A. Leifheit - <https://goo.gl/7uyk6W>



**TABLE 9. REVELSTOKE ADVENTURE PARK BEAR AWARE PROGRAM****OBJECTIVE:**

Develop and implement a Bear Aware Program to reduce bear/human conflicts associated with non-natural food attractants. The following mitigation strategies will be implemented:

**BASE AREA, CAMPGROUND AND BUNGEE CENTRE:**

- All outdoor trashcans and recycling bins are bear proof and have removable plastic liners to contain odours. Plastic liners are changed at every pick-up to eliminate odours.
- Trashcans and recycling bins will be emptied daily (or more if necessary) into dumpsters. Pick-up will be scheduled to prevent overflow, and to ensure no trash is left overnight. Bags will be loaded into a vehicle that will proceed directly to the dumpster station.
- Dumpsters will be stored in a dumpster station area that is fenced with bear resistant fencing that will be maintained and repaired by maintenance staff. The fencing will be un-climbable (no exterior horizontal bars, minimum of 8 ft tall and steel) or electrical fencing will be considered,
- Dumpsters will be emptied on a regularly scheduled basis, or more frequently if necessary, by a local waste management company.
- Excess food, and grease barrels from food and beverage outlets will be stored in a bear proof storage area or inside a lockable building.
- All staff will be trained to ensure the park remains litter-free.
- Campers and campground staff will be instructed to ensure no wildlife attractants are ever left unattended at any of the camp sites.

**RECREATIONAL TRAILS:**

- There will be no trashcans on recreational trails, only at the base area, and Bungee Centre.
- The "Pack in-Pack Out" policy will be enforced.
- No overnight camping on trails is permitted
- Signage to be posted reminding visitors they are in bear country, with notices posted when a bear is reported in the area.
- Signage will also outline appropriate conduct; create noise, stay on trails, pack all food and garbage out
- Hikers are encouraged to travel in groups of 4 or more; this will be enforced if grizzlies have been sighted.
- If there is an increase in grizzly bear use on trails the trail may be temporarily closed.
- Pets must be on leash.
- Trails will be well marked and fenced where appropriate to avoid off-trail use.

**GENERAL:**

- Bear Info Centre at base and at Bungee Centre.
- Fruit trees will not be planted
- Employee training will include a bear aware section; managing attractants, what to do in an emergency, general info, how to use bear spray.
- Fuel and other petroleum products will be securely stored.
- Employees who are deemed to be at risk will carry bear spray, and be trained on how to use it.
- Encourage visitors and staff to report bear and wildlife sightings.
- Bear Aware Program will be evaluated at on a weekly basis at safety meetings.



### **C.1.4 Incorporating Findings from the Wildlife Overview Assessment**

SEC (2014) identified a number of listed species with the potential to occur on the property. Although none of the identified species were observed during previous field visits, the potential for species occurrences exist. SEC (2014) divided the property into 15 habitat polygons within eight habitat types. During phased project planning (e.g., by Gravity Logic for final trail alignment), components of the project that occur in individual habitat polygons will be reviewed as part of the design phase by a QEP. The QEP will be asked to conduct updated plant, fish and wildlife assessments (seasonally timed as required) relevant to the development footprint as required by legislation, and in accordance with environmental best management practices (EBMPs), listed in Section 3 of SEC (2014) and EBMPs current at the time of project planning and implementation for which IDLP is committed to follow. IDLP will adhere to pertinent legislation including the Wildlife Act, Fish Protection Act, Water Act, Weed Control Act, Environmental Management Act, Fisheries Act, Species at Risk Act. EBMPs will be followed throughout the lifetime of the project, including RAP construction, operation and maintenance.

In 2013, SEC was asked to determine a baseline overview of biophysical attributes of the property. A QEP will be retained to ensure that wildlife habitats, wildlife corridors and wildlife trees will be protected in accordance with legislation, and in accordance with EBMPs, listed in Section 3 of SEC (2014) and EBMPs current at the time of project planning and implementation.

From SEC (2014), IDLP has become aware of greater land constraints, most specifically regarding wetland habitat and habitat that could be used by listed species. IDLP is committed, both by corporate principal and where applicable, legislation, to ensure adequate protection.

## C.2 SOCIO-COMMUNITY PLAN

### C.2.1 Land Use

#### C.2.1.1 Agricultural Land Reserve

A portion 47.3 ha of the private land, and 9.9 ha of the Crown land (Map 17:) are within the Agricultural Land Reserve (ALR). Land use within the ALR is regulated by the Agricultural Land Commission (ALC).

In September 2014 the ALC approved IDLP's application for non-farm-use for the purpose of developing a "comprehensive resort commercial destination." The ALC granted the approval stating the property has marginal agricultural capability and limited agricultural suitability. Please see Appendix A-2 for a copy of the ALC's resolution.

#### C.2.1.2 Zoning

The development lies within the Columbia Shuswap Regional District (CSRD) – Electoral Area B. As per the Official Community Plan (OCP) the area is designated "Rural Resource" and is zoned "Rural Holding."

An application for an OCP amendment and rezoning was submitted in February 2016 to the CSRD that would allow for the uses outlined in this management plan. The application would see the area amended to "Resort Commercial," and it would also result in the creation of a "Comprehensive Development" zone.

#### C.2.1.3 Commercial Recreation Tenure Overlap

The application area lies within the Commercial Recreation Area (CRA) held by Revelstoke Mountain Resort Limited Partnership (RMR).

Map 17: highlights the proposed overlap. The overlap and the proposed RAP development have been discussed in detail with RMR. RMR has not yet developed this area and it is not currently used by guests of RMR. RMR has indicated that they do not believe RAP's operation will affect their current operation. Please see Appendix D for the Adventure Tourism Operator Input Form (ATOIF) they completed.

In addition to RMR's support, Terry Pratt (Senior Manager, Major Projects, MFLNRO Mountain Resort Branch) has also indicated that the Mountain Resort Branch gives conditional support for the proposal subject to a number of conditions, all of which IDLP agrees to. Please see Appendix D for a copy of the Mountain Resort Branch's Referral Response, updated as of June 2015.

There will be no winter activities and no permanent winter bed units on crown land.

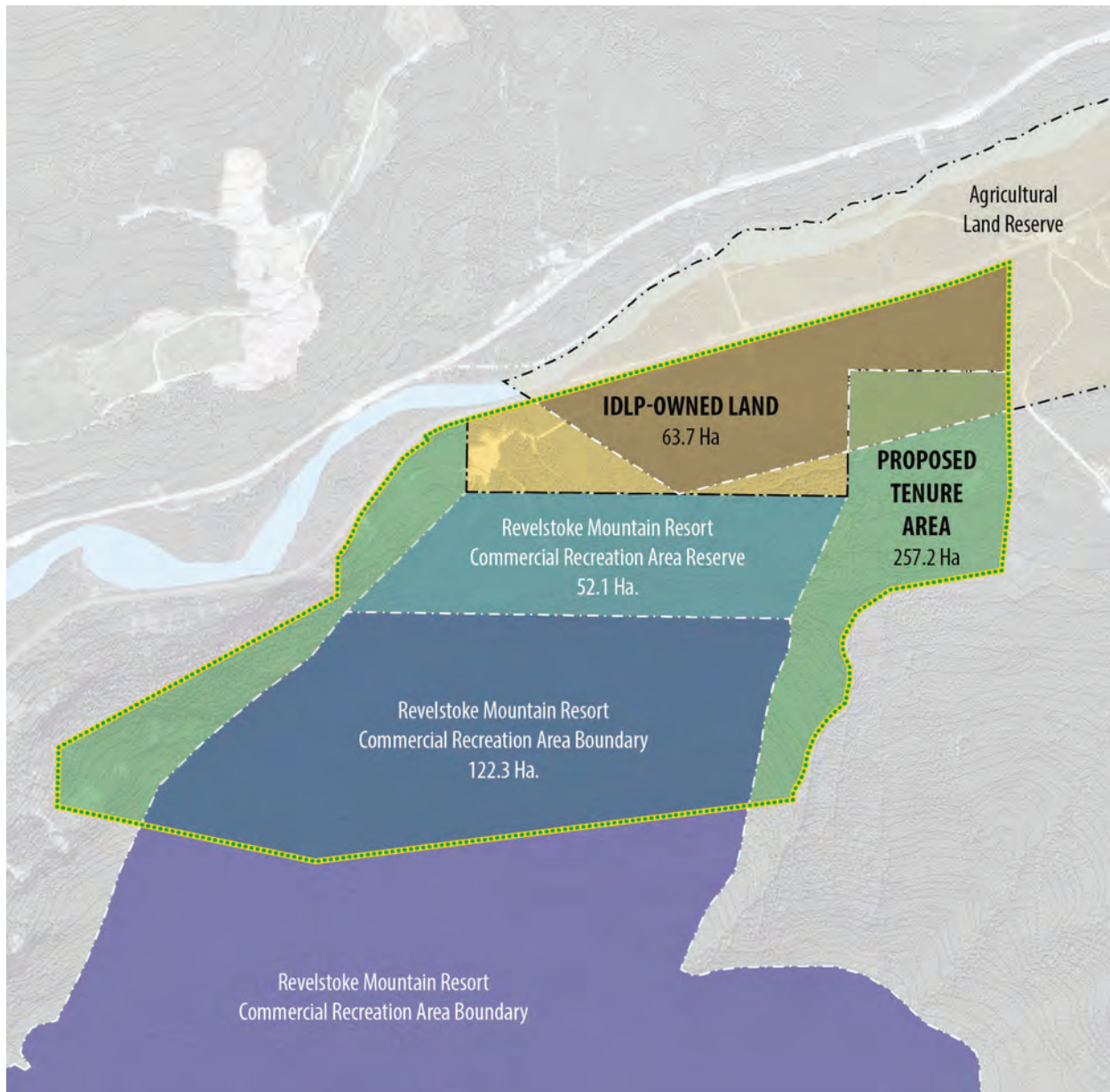
#### C.2.1.4 Mineral Tenure

After a review of the Integrated Land and Resource Registry (ILRR) website in April 2015, it appears that there are no mineral licences for the application area.

#### C.2.1.5 Timber Tenure and Forest Use

The proposed tenure area lies within Downie Timber's operating area.

IDLP acknowledges that other resource tenures may overlap the proposed area and that coordinating access and activities with other tenure holders may be required.



**Map 17:** Revelstoke Adventure Park Legal Boundaries - Tenure Overlap & Agricultural Land Reserve - See Appendix F for more information

## C.2.2 Socio-Community Conditions

The subject property currently has no services.

### C.2.2.1 Water Supply

As described in Section “B.4.2 Source of Water” on page 45, IDLP has applied for a water licence and we will work the IHA to establish a new drinking water source. Alternatively, we are also working with the City of Revelstoke to alter our existing agreement with the City. Please see section B.4.2 for full details.

Once the source is finalized, IDLP will provide an update to the IHA, and an authorized person will prepare any reports that are required by the IHA during the development phase of the water system.

Regardless of the water supply, we will comply with the Drinking Water Protection Act and Regulations, and the BC Health Act.

### **C.2.2.2 Fire Protection**

In January 2016, a meeting was held with Chief Kenn Mount from the CSRD Fire Department. Chief Mount has indicated that a fire service agreement will need to be established for RAP. The CSRD has suggested that the process to establish the service agreement will begin once the crown tenure is approved.

Revelstoke Fire Chief, Rob Girard, has been in contact with Chief Mount, and has indicated that the Revelstoke Fire Department will become involved once IDLP moves forward with the service extension agreement.

The procedure for responding to a forest fire is outlined in “Wildfire Prevention and Response System” prepared by Spark Solutions (available upon request). As outlined in this document, all forest fires will be reported to the Ministry of Forests, Lands and Natural Resource Operations Wildfire Management Branch, Southeast Fire Centre.

In addition, IDLP has and will continue to participate in the Revelstoke Community Wildland Fire Protection Committee.

### **C.2.2.3 Emergency Services**

RAP will employ trained first aid attendants, who will be the first to respond to any medical emergencies at the park. As part of the medical emergency response plan, procedures will be established with IHA, BC Emergency Health Services (BCEHS), Queen Victoria Hospital in Revelstoke, and the local medical clinic.

Contact has been made with Kirk Pitaoulis, the recently appointed BCEHS Unit Chief for Revelstoke, and he has indicated that we can begin discussing BCEHS and their services next spring. IDLP will continue to work with Revelstoke’s emergency services throughout the development of RAP.

### **C.2.3 Crime Prevention**

Staff Sergeant Kurt Grabinsky, of the Revelstoke RCMP Detachment, has been updated regarding Ministry of Transportation’s left-turn lane requirements, and has stated that he is “confident that RAP will be working with both the RCMP and the Ministry to seek the best solution.”

In addition, IDLP will work the Revelstoke RCMP to ensure public safety and minimize theft at RAP. The local RCMP have offered to work with RAP to implement the principles of Crime Prevention Through Environmental Design (CPTED).

Appendix C contains a letter from Staff Sergeant Grabinsky that outlines the RCMP’s willingness to work with RAP, and his confidence that this relationship will continue as the project progresses.

### **C.2.4 Public Health**

RAP will ensure compliance with:

- BC Drinking Water Protection Act and Regulations
- BC Sewerage System Regulation
- BC Health Act



During the development phase, an authorized person will prepare any reports that are required by IHA to establish the water and sewage system.

Food service establishments, on Crown or private land, will comply with the Food Premises Regulation and obtain a food service establishment operating permit.

RAP will be a leader in public safety not only in the design of its facilities but also in operations. We will hold the highest standards for public health.

### C.2.5 First Nations

IDLP reviewed the BC Ministry of Aboriginal Relations and Reconciliation's "Guide to Involving Proponents When Consulting First Nations." As suggested, Ian Wiles, First Nations Relations Advisor for the Kootenay Boundary Region was contacted. Mr. Wiles provided the following list of bands whose territories overlap the proposed tenure area:

- Adams Lake Indian Band
- Ktunaxa First Nation
- Little Shuswap Indian Band
- Lower Similkameen Indian Band
- Neskonlith Indian Band
- Okanagan Indian Band
- Okanagan Nation Alliance
- Penticton Indian Band
- Shuswap Indian Band
- Splatins First Nation
- Upper Nicola Band

IDLP maintains a log of all contact with various First Nations since 2012. The First Nations listed above also received a copy of IDLP's original 2013 Crown land application and investigative permit as part of a package from FrontCounter BC. Most recently, a letter was sent to the First Nations listed above describing IDLP's intent to reapply for a Crown land tenure and the proposed development. This letter, requesting IDLP's intent to reapply for a Crown land tenure and the proposed development. This letter, requesting that the groups contact IDLP with any concerns or requests and affords opportunities to meet with IDLP for more information. The following are key outcomes of IDLP's communication with First Nations:

- **2012:** In 2012 a Memorandum of Understanding (MOU), (available upon request), was drafted with the Splatins First Nation; however, this agreement has not yet been finalized. The MOU sets out how the Splatins and Black Tie Properties LP will work together to ensure the Splatins's title, rights, values, and principles are reflected in both forest and recreational activities for mutual benefit and to advance opportunities.
- **2012:** As described in Section C.1.1.6, an archaeological study was conducted on the property and the proposed tenure area was deemed to have "low archaeological potential."
- **2013:** During the referral process for IDLP's application in January 2013, the Ktunaxa Nation requested a wildlife study be completed. After conversations with Dora Gunn from the Ktunaxa Nation, the study was completed by SEC.





REVELSTOKE  
ADVENTURE PARK

# APPENDICES







# **APPENDIX A:**

## **EXISTING PERMITS**



# **APPENDIX A-1:**

**Investigative Use Permit**



Our File: 4405329

May 16, 2014

Illecillewaet Development Limited Partnership  
PO Box 963  
Revelstoke, British Columbia V0E 2S0

Dear Jason Roe:

Enclosed is an originally executed copy of Investigative Use Permit Number 404850 covering that part of the remainder of the Northeast 1/4, Section 32, Township 23, Range 1, W6M, Kootenay District; that part of Section 33, Township 23, Range 1, W6M, Kootenay District; that part of the remainder of the NW 1/4, Section 33, Township 23, Range 1, W6M, Kootenay District, that part of RW over Section 34, Township 23, Range 2, W6M, Kootenay District and parts of Section 33, Township 23, Range 1, W6M, Kootenay District, as shown on Plan 11280 filed in Nelson Land Title Office; together with unsurveyed Crown land in the vicinity of Greeley Creek, Kootenay District, more particularly shown on the Legal Description Schedule and containing 284.0 hectares more or less.

The Investigative Use Permit is issued in your name for a term of 2 years commencing April 1, 2014 for research and assessment purposes.

Should you have any questions regarding this matter, please contact me at (250) 420-2182.

Yours truly,

Nicole Higham  
Portfolio Administrator

pc: B.C. Assessment Authority, Kelowna



# **APPENDIX A-2:**

**Agricultural Land Commission Non-Farm Use Permit**



**Agricultural Land Commission**  
133-4940 Canada Way  
Burnaby, British Columbia V5G 4K6  
Tel: 604 660-7000  
Fax: 604 660-7033  
www.alc.gov.bc.ca

September 4, 2014

ALC File: 53546 (Non-farm Use)  
ALC File: 53547 (Subdivision)

R.G. (Bob) Holtby  
2533 Copper Ridge Drive  
West Kelowna, B.C. V4T 2X5

Dear Mr. Holtby:

**Re: Application #53546 for Non-farm Use in the Agricultural Land Reserve (ALR)  
Application #53547 for Subdivision in the Agricultural Land Reserve (ALR)**

The Agricultural Land Commission (the "Commission") has combined both of these applications under one set of minutes with a separate resolution for each proposal. Please find attached the Minutes of Resolutions #254/2014 & #255/2014 as it relates to applications #53546 and #53547 respectively. As agent, it is your responsibility to notify your client(s) accordingly. The Commission has also attached a sketch plan depicting the decision.

As it relates to application #53547, please send two (2) copies of the final survey plan to this office. The Commission will then authorize the Registrar of Land Titles to accept registration of the plan.

Further correspondence with respect to this application is to be directed to Ron Wallace (Ron.Wallace@gov.bc.ca).

Yours truly,

PROVINCIAL AGRICULTURAL LAND COMMISSION

Per:

A handwritten signature in black ink, appearing to read "Colin J. Fry", is written over a horizontal line.

Colin J. Fry, Chief Tribunal Officer

Enclosure: Minutes of Resolution #254/2014 & #255/2014

cc: Columbia-Shuswap Regional District (File: LC2487B)

53546 & 53547 d1



## MINUTES OF THE PROVINCIAL AGRICULTURAL LAND COMMISSION

A meeting was held by the Provincial Agricultural Land Commission on May 28, 2014 at the offices of the Commission located at #133 – 4940 Canada Way, Burnaby, B.C. as it relates to the Applications #53546 and #53547.

### COMMISSION MEMBERS PRESENT:

Richard Bullock	Chair
Jennifer Dyson	Vice-Chair
Gordon Gillette	Vice-Chair
Bert Miles	Commissioner
Jim Johnson	Commissioner
Jerry Thibeault	Commissioner
Lucille Dempsey	Commissioner

### COMMISSION STAFF PRESENT:

Ron Wallace	Planner
Colin Fry	Chief Tribunal Officer

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**PROPOSAL** (Submitted pursuant to sections 20(3) and 21(2) of the *Agricultural Land Commission Act*)

The proposal is both to:

- (Submitted pursuant to sections 20(3) of the ALC Act; ALC Application 53546)  
To develop the subject properties into a comprehensive resort commercial destination as outlined in the application proposal. The land proposed for Non-farm use lies south of the railway tracks and totals approximately 47 ha of the six privately owned properties. The Crown land under application would use approximately 9.9 ha of ALR for Non-farm use.
- (Submitted pursuant to sections 21(2) of the ALC Act; ALC Application 53547)  
The proposal is to subdivide 21 new lots on the portion of the properties lying south of the Illecillewaet River and north of the CPR main line. The new lots are proposed to be ~1.0 ha and to be used as rural residential hobby farms.

A report entitled *An Opinion on an Application for Non-farm Use* (the "Agrologist Report") was submitted by R.G. (Bob) Holtby, P.Ag. for the applicant dated June 29, 2013. This report provided an overview of the application and an opinion on its impact to agriculture.

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### PROPERTY INFORMATION:

#### Parcel One

**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 016-775-988



Legal Subdivision 4, Section 3, Township 24, Range 1, West of the 6<sup>th</sup> Meridian, Kootenay District, Except Parts Included in RW Plans 633A and 15088 and Plan NEP22512

**Location:** Revelstoke

**Size:** 14.6 ha (14.6 ha in the ALR)

**Parcel Two**

**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 016-777-751  
That Part of Legal Subdivision 3, Section 3, Township 24, Range 1, West of the 6<sup>th</sup> Meridian, Kootenay District, Which Lies West of a Line Parallel to and 5 Chains Distant from the Westerly Boundary, Except Parts Included in RW Plans 63AA and 15088

**Location:** Revelstoke

**Size:** 3.6 ha (3.6 ha in the ALR)

**Parcel Three**

**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 018-522-475  
That Part of the Southeast ¼ Section 4, Township 24, Range 1, West of the 6<sup>th</sup> Meridian, Kootenay District, Which Lies to the South of the Left Bank of the Illecillewaet River, Except (1) Part Included in RW DD 12340, (2) Part Included in RW Plan 633A, and (3) Part Included in Plans 15089 and NEP22512

**Location:** Revelstoke

**Size:** 16.1 ha (16.1 ha in the ALR)

**Parcel Four**

**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 016-777-883  
That Part of Fractional, Legal Subdivision 14, Section 33, Township 23, Range 1, West of the 6<sup>th</sup> Meridian, Kootenay District, Which Lies South of the Illecillewaet River, Except Parts Included in RW Plans 633A and RW 35

**Location:** Revelstoke

**Size:** 12.1 ha (1.8 ha in the ALR)

**Parcel Five**



**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 016-777-891  
Legal Subdivision 15, Section 33, Township 23, Range 1, West of the 6<sup>th</sup> Meridian,  
Kootenay District, Except Parts Included in RW Plans 633A and RW 35

**Location:** Revelstoke

**Size:** 15.91 ha (13.3 ha in the ALR)

**Parcel Six**

**Owner:** Illecillewaet Developments Inc.

**Legal:** PID: 016-777-905  
Legal Subdivision 16 Section 33, Township 23, Range 1, West of the 6<sup>th</sup> Meridian,  
Kootenay District, Except Parts Included in Plan RW 36

**Location:** Revelstoke

**Size:** 16.3 ha (12.7 ha in the ALR)

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**SITE INSPECTION**

A site inspection was conducted on May 8, 2014 at the subject property. Those in attendance included the Commissioners Miles and Johnson, ALC staff Ron Wallace, applicants Jason Roe and Cara Armstrong and agent Bob Holtby.

It was noted the subject land is located approximately 8 km east of the City of Revelstoke and is accessed from the Trans-Canada Highway by Greely Road, which crosses the Illecillewaet River and the CPR main line which runs east/west. The subject properties are part of a narrow valley between large mountains to the south and to the north.

The portion of the subject land south of the railway line is relatively large and flat (and was noted to have been previously used for forage crops associated with a beef cattle operation). However the land has limited agricultural potential due mostly to the lack of adequate sunlight caused by shading from the adjacent mountains to the south.

It was indicated by the applicant that the proposed development of the 'adventure park facility' would be for uses not requiring significant building infrastructure on the ALR portion of the land, and that should the non-farm use development be scaled back, agricultural use could easily be re-established on the land.

The area proposed for subdivision is located between the Illecillewaet River and the CPR main line. Leoffer Road intersects with Greely Road just south of the bridge and provides access to the proposed lots east of Greely Road. The proposed 4 lots to the west of Greely Road would be accessed from the newly dedicated road adjacent to the CPR right-of-way.



Section 14(2) of the *Agricultural Land Commission Act* provides that a member of the Commission who was not present at a meeting to determine an application or other matter may vote on the application or matter only if a summary of the meeting is given to the member before the vote. Commissioners Miles and Johnson gave a verbal summary of the site inspection and provided a *Site Inspection Report* to all Commission members recorded above.

---

#### **LEGISLATIVE CONTEXT FOR COMMISSION CONSIDERATION**

Section 6 (Purposes of the commission) of the *Agricultural Land Commission Act* states:

6 The following are the purposes of the commission:

- (a) to preserve agricultural land;
  - (b) to encourage farming on agricultural land in collaboration with other communities of interest; and
  - (c) to encourage local governments, first nations, the government and its agents to enable and accommodate farm use of agricultural land and uses compatible with agriculture in their plans, bylaws and policies.
- 

#### **COMMISSION CONSIDERATION**

After considering the information the Commission concluded as follows:

1. In-assessing agricultural capability, the Commission refers in part to agricultural capability mapping and ratings. The ratings are interpreted using the Canada Land Inventory (CLI), 'Soil Capability Classification for Agriculture' system.

The improved agricultural capability ratings identified on Canadian Land Inventory (CLI) map sheet 82M/1 for the subject property are Class 3, Class 5 and Class 7 (4:3M-5PM-7IW) and (7:7TP - 3:5PM).

Class 3 - land is capable of producing a fairly wide range of crops under good management practices. Soil and/or climate limitations are somewhat restrictive.

Class 5 - land is capable of production of cultivated perennial forage crops and specially adapted crops. Soil and/or climate conditions severely limit capability.

Class 7 - land has no capability for soil bound agriculture.

The limiting subclasses associated with this parcel of land are M (moisture deficiency), P (stoniness), I (inundation), W (excess water) and T (topographic limitations).

- With regard to the Agrologist Report provided by Bob Holtby, P.Ag., he too determined that the agricultural capability of the subject lands would be limited "given the shading from the mountains to the south of the parcel."

#### **Conclusion:**

The subject property has marginal agricultural capability.



2. In addition to the subject site's limited agricultural capability, the Commission noted that its location – approximately 8 km east of the City of Revelstoke and amid a mountainous area – is relatively isolated from other significant agricultural enterprises and away from any large population centre. As such the Commission believes the subject site's suitability for agricultural is also limited.

**Conclusion:**

The subject property has limited agricultural suitability.

**IT WAS**

**MOVED BY: Commissioner Johnson**

**SECONDED BY: Commissioner Thibeault**

THAT the proposal for subdivision and to develop a comprehensive resort commercial destination be approved.

AND THAT the approval is subject to:

1. The subdivision be in substantial compliance with the plan submitted with the application;
2. The commercial resort development be in substantial compliance with the plan submitted with the application;
3. The subdivision plan (for application #53547) must be completed within three (3) years from the date of the letter communicating this decision; and
4. The development of the proposed resort commercial facility (for application #53546) must be commenced within three (3) years from the date of the letter communicating this decision.

AND FINALLY THAT this decision does not relieve the owner or occupier of the responsibility to comply with applicable Acts, regulations, bylaws of the local government, and decisions and orders of any person or body having jurisdiction over the land under an enactment.

**CARRIED**

**Resolutions #254/2014 & #255/2014**

# **APPENDIX A-3:**

**CP Private Crossing Agreement**



**CANADIAN PACIFIC RAILWAY COMPANY  
AGREEMENT FOR PRIVATE CROSSING**

**THIS AGREEMENT** made in triplicate this 1<sup>st</sup> day of June, 2011

**BETWEEN:**

**CANADIAN PACIFIC RAILWAY COMPANY**  
(the "Railway Company")

**AND:**

**ILLECILLEWAET DEVELOPMENT CORP. LP**  
**BOX 963**  
**REVELSTOKE, BC V0E 2S0**  
(the "Applicant")

**WHEREAS:**

- A.** the Railway Company owns and operates a railway system, including but not limited to rails, ties, tracks, roadbeds, railway facilities, and freight and passenger trains (the "Railway System") on lands owned by the Railway Company (the "Lands");
- B.** the Applicant has applied to the Railway Company for permission to construct, maintain and use a private crossing over and upon the Railway System and the Lands at Mile 119.46 of the Railway Company's Mountain Subdivision (the "Private Crossing"); and
- C.** the Railway Company is prepared to grant the Private Crossing subject to the terms and conditions contained in this agreement.

**THIS AGREEMENT WITNESSES THAT** in consideration of the fees, covenants, agreements and conditions to be paid, observed and performed pursuant to this agreement, the parties agree as follows:

**ARTICLE 1 - GRANT OF PRIVATE CROSSING**

- 1.1** Subject to the conditions and limitations provided in this agreement, and subject to and in accordance with all laws, bylaws, regulations and orders of the Canadian Transportation Agency or other authority having jurisdiction, now made or which may be made after the date of this agreement in reference thereto, the Railway Company grants to the Applicant permission to use the Private Crossing for pedestrians and vehicular traffic over the Railway System and the Lands for the Term to enable the Applicant, its invitees, employees, contractors, servants and agents to obtain ingress to and egress from the property owned or occupied by the Applicant (the "Applicant's Lands") for the purpose of accessing the Applicant's commercial business Operations (the "Purpose") situated on the Applicant's lands.
- 1.2** The Applicant covenants and agrees to use the Private Crossing solely for the Purpose and for no other purpose whatsoever.
- 1.3** The right to use the Private Crossing granted pursuant to paragraph 1.1 shall be so exercised as not to injure or cause to be injured, or interfere in any way with the Railway Company's use or operation of the Railway System and the Lands.



- 1.4 The right to use the Private Crossing granted pursuant to paragraph 1.1 shall be subject to the right of the Railway Company or any of its officers, employees, agents, contractors, invitees and licensees to pass and repass, with or without vehicles and equipment, upon the Private Crossing. Without limiting the generality of the above right, the Applicant acknowledges and agrees that the Railway Company shall be entitled to use and occupy the Private Crossing in common with the Applicant to the extent which the Railway Company may, in its sole and absolute discretion, deem necessary.

## ARTICLE 2 - TERM

- 2.1 This agreement shall continue and be in force for a period of One (1) year effective on and from 1<sup>st</sup> day of June, 2011, and from year to year after that.
- 2.2 In this agreement "Term" means the initial term of the agreement and any renewal of it pursuant to paragraph 2.1.
- 2.3 Either party may terminate this agreement at any time upon giving the other party thirty (30) days written notice of that termination.
- 2.4 The Railway Company may terminate this agreement at any time without notice if the Applicant fails to observe or perform any of the covenants or agreements in this agreement to be observed or performed by the Applicant.

## ARTICLE 3 - CROSSING FEE

- 3.1 In consideration of the permission granted by the Railway to use the Private Crossing, the Applicant shall pay to the Railway Company the sum of **One Thousand Dollars per annum** in advance, on the 1<sup>st</sup> day of June in each year of the Term (the "Crossing Fee"); provided that the Railway Company may at any time and from time to time review the Crossing Fee payable by the Applicant and may, in its sole discretion, adjust the Crossing Fee payable for the next ensuing year of the Term upon giving 90 days written notice to the Applicant prior to the commencement of the next ensuing year of the Term.
- 3.2 The Applicant shall pay to the Railway Company any value added, sales, goods and services, or similar tax which may be imposed on the Crossing Fee pursuant to any federal or provincial legislation which is or may be enacted.

## ARTICLE 4 - COVENANTS OF THE APPLICANT

The Applicant covenants with the Railway Company that it shall:

- 4.1 not do, suffer or permit any act or neglect which may in any manner, directly or indirectly, cause injury or damage to the Private Crossing, the Railway System, or to the Lands;
- 4.2 not do or permit anything to be done which may result in any policy of insurance on all or part of the Private Crossing becoming void or voidable;
- 4.3 observe and fully comply with all laws, bylaws, regulations and orders in force, or which come into force during the Term of this agreement in the use of the Private Crossing;
- 4.4 not permit waste or refuse to accumulate upon the Private Crossing;
- 4.5 notify the Railway Company immediately of any damages, nuisances, malfunctions or obstructions occasioned in the Private Crossing;



- 4.6 notify the Railway Company immediately if there is any change in the use of the Applicants Lands, the Purpose, the nature or extent of operations on the Applicants Land, or any substantial change in the frequency of use of the Private Crossing;
- 4.7 in the event that suit shall be brought for the recovery of any amount due under the provisions of the agreement or because of the breach of any other covenants contained in this agreement on the part of the Applicant to be kept or performed and a breach shall be established, promptly upon demand, pay to the Railway Company all expenses incurred therefore, including all reasonable solicitor's fees and expenses;
- 4.8 keep securely closed and locked the gate or gates at the right of way fences of the Railway Company at the Private Crossing (the "Gates") except at such times as they are required to be open to allow the Applicant, its invitees, employees, contractors, servants and agents to use the Private Crossing;
- 4.9 make no claim or demand against the Railway Company or any of its employees for any injury, including injury resulting in death, loss or damage to property sustained by the Applicant, its invitees, employees, contractors, servants, agents and licensees or by any other person or corporation, which claim or demand is based upon, arises out of or is connected with this agreement or anything done or maintained or not done or maintained as required under this agreement and waives as against the Railway Company and its employees all such claims or demands;

This waiver shall apply notwithstanding that such claims, demands, injuries, death, loss, or damages are caused or contributed to by the Railway Company or its employees.

- 4.10 Indemnify and save harmless the Railway Company, its invitees, employees, contractors, servants, agents and licensees from and against any and all loss, damage and claims, including without limitation
- (a) claims under workers' compensation legislation;
  - (b) demands, awards, judgments, actions and proceedings by whomsoever made, brought or executed in respect of loss or damage to, or destruction of property or personal injury, including death;
  - (c) loss of, damage to, or destruction of property, including the Railway Company's property; and
  - (d) all fines, expenses, costs and losses (including loss of income), suffered, incurred or sustained by the Railway Company

arising out of or connected with this agreement or anything done or maintained under this agreement or anything not done or maintained as required under this agreement whether or not such loss, damage or claim is contributed to or caused by the negligence of, or any act or omission of, the Railway Company, its employees, agents, contractors, representatives, or anyone for whose acts the Railway Company may be liable.

- 4.11 The covenants contained in paragraphs 4.9 and 4.10 shall survive the expiry or earlier termination of this agreement.



## ARTICLE 5 - INSURANCE

- 5.1 The Applicant shall during the Term of this agreement, at its cost and expense, take out and keep in full force and effect a Comprehensive General Liability Insurance policy with an inclusive limit of not less than **FIVE MILLION DOLLARS (\$5,000,000.00)** or any other increased amount as the Railway Company may reasonably require from time to time, in respect of bodily injury, including injury resulting in death, and property damage; and shall obtain and maintain during the Term of this Agreement, Automobile public liability insurance in an amount not less than **TWO MILLION DOLLARS (\$2,000,000.00)** covering the ownership, use and operation of any motor vehicles which use the Private Road Crossing, and the policies shall specifically, by their wording or by endorsement:
- (a) extend to cover all liabilities assumed by the Applicant under this agreement;
  - (b) provide that 30 days' prior written notice shall be given to the Railway Company by the insurer in the event the policy is materially altered or cancelled.
- 5.2 The insurance policy taken out by the Applicant under paragraph 5.1 shall be issued by an insurer acceptable to the Railway Company and in a form satisfactory to the Railway Company, and the Applicant shall furnish the Railway Company with a copy of the insurance policy or a certificate of insurance evidencing all the coverage stipulated in paragraph 5.1.
- 5.3 The Applicant covenants that the amount of insurance coverage required to be acquired by it under the provisions of this agreement will not be construed and shall in no manner limit or restrict the liability of the Applicant.
- 5.4 The Applicant agrees that in the event that the insurance policy taken out by it under paragraph 5.1 is allowed to lapse during the term of this agreement or any renewal of it the Railway Company may, at its option:
- (a) take out the insurance policy at the expense of the Applicant and the Applicant will immediately pay to the Railway Company as additional fees any amount the Railway Company has expended in acquiring the insurance policy; or
  - (b) terminate this agreement immediately without any notice being given to the Applicant by the Railway Company.

## ARTICLE 6 - CONSTRUCTION USE AND MAINTENANCE

- 6.1 All construction and maintenance work on the Private Crossing shall be carried out by the Railway Company.
- 6.2 All costs and expenses incurred by the Railway Company in connection with the construction, maintenance and use of the Private Crossing shall be borne by the Applicant, including without limitation the cost of placing and maintaining such crossing protection as the Railway Company, in its sole and absolute discretion, deems necessary from time to time. Such crossing protection may include, but is not limited to, Gates, automatic crossing protection devices such as automatic gates, lights, bells, warning signs and a flagperson. A "flagperson" shall be an employee of the Railway Company employed to flag trains or vehicular traffic.



- 6.3 The Applicant shall pay to the Railway Company those costs and expenses incurred by the Railway Company as noted in paragraph 6.2 above, immediately upon receipt of certified accounts from them on the basis of cost plus labour overheads, material handling costs and equipment rentals as may from time to time be applicable and as set by the Schedule "A" Directives published by the Canadian Transportation Agency and its successors.
- 6.4 Upon the expiration or earlier termination of this agreement, without expense to the Railway Company, remove the Gates and fence across the openings with fences of the same style and character as the existing right of way fences of the Railway Company in the immediate vicinity and restore the Railway Company's Lands to a condition satisfactory to the Railway Company; provided that the Railway Company may, at its option, perform such work at the risk and expense of the Applicant and in either case the conditions embodied in paragraphs 4.9 and 4.10 and Article 5 will remain applicable and effective until such time as all work to be performed by or at the risk and expense of the Applicant as provided for in this paragraph has been carried out to the entire satisfaction of the Railway Company.

#### **ARTICLE 7 - INTEREST ON LATE PAYMENTS**

- 7.1 Each and every payment of monies accruing due under the provisions of this agreement by the Applicant to the Railway Company, will bear interest at the rate of two percent (2%) per month compounded monthly, equivalent to an effective annual rate of Twenty-Six point Eight percent (26.8%) from the date when it becomes payable under the terms of this agreement until it is paid, and the interest will accrue and be payable without the necessity of any demand for it being made.

#### **ARTICLE 8 - WAIVERS**

- 8.1 The failure of the Railway Company to insist upon strict performance of any covenant or condition contained in this agreement or to exercise any right or option under this agreement will not be construed or operate as a waiver or relinquishment for the future of that covenant, condition, right or option and no waiver shall be inferred from or implied by anything done or omitted by the Railway Company.

#### **ARTICLE 9 - GENERAL PROVISIONS**

- 9.1 Time is of the essence of this agreement.
- 9.2 The captions and article numbers appearing in the agreement are inserted for convenience only and do not affect the interpretation of it.
- 9.3 Wherever the singular or the masculine is used in this agreement it will be construed to mean the plural, or feminine, or the body politic or corporate, where the circumstances require.
- 9.4 This agreement is to enure to the benefit of, and is binding upon, the parties and their respective successors and permitted assigns.
- 9.5 If any provision in this agreement is for any reason held to be invalid, illegal or unenforceable in any respect, it is to be considered severable from this agreement, and the remaining provisions of this agreement will remain in full force and be binding upon the parties.
- 9.6 This agreement is to be governed by and in accordance with the laws of British Columbia.
- 9.7 This agreement may not be modified or amended except in writing signed by the parties.



- 9.8 The entire agreement between the parties is contained in this agreement, and no representations or warranties have been made by the Railway Company other than those expressed in this agreement, and no representations or warranties shall be binding upon the Railway Company unless made in writing and signed by the parties.
- 9.9 The right to use the Private Crossing granted pursuant to paragraph 1.1 are conferred upon the Applicant personally and shall not be assigned or transferred either in whole or in part to any person or corporation without the Applicant obtaining the prior written consent of the Railway Company, which consent may arbitrarily be withheld.
- 9.10 Any notice, demand or request which may be, or is required, to be given under this agreement will be sufficiently given or made if delivered or faxed to the party to whom it is given or made or if mailed, by prepaid registered mail, addressed as follows:

(a) if to the Railway Company addressed to:

**CANADIAN PACIFIC RAILWAY  
REAL ESTATE**  
Gulf Canada Square  
Suite 500 - 401 9<sup>th</sup> Avenue SW  
Calgary, AB T2P 4Z4  
Facsimile: (403) 319-3727

(b) if to the Applicant addressed to:

**ILLECILLEWAET DEVELOPMENT  
CORP LP**  
Box 963  
400 MacKenzie Avenue  
Revelstoke, BC V0E 2S0  
Attention: Jason Roe  
Phone: ~~488~~ 814-7264  
**250**

or at such other address as the parties may from time to time give notice in writing and any notice, demand or request so mailed will be deemed to have been given or made on the third business day following the day of mailing of the notice, demand or request, or if faxed or delivered will be deemed to have been given on the date of faxing or delivery.

**IN WITNESS OF WHICH** the parties have executed this agreement with effect as of the date first above written.

**CANADIAN PACIFIC RAILWAY COMPANY**

\_\_\_\_\_  
Authorized Signatory

**ILLECILLEWAET DEVELOPMENT CORP. LP**

\_\_\_\_\_  
Authorized Signatory

\_\_\_\_\_  
Witness

# **APPENDIX A-4:**

**Sand and Gravel Permit**

PROVINCE OF BRITISH COLUMBIA  
MINISTRY OF ENERGY AND MINES

**SAND AND GRAVEL PERMIT**  
**APPROVING WORK SYSTEM AND RECLAMATION PROGRAM**  
(Issued pursuant to Section 10 of the **Mines Act** R.S.B.C. 1996, C.293)

Permit: **G-5-302**

Mine No.: **1630511**

Issued to: **Illecillewaet Development Corp.**  
**PO Box 963**  
**Revelstoke BC V0E 2S0**

for work located at the following property:

**Greely Farms Pit**  
**LS 14, Sec.33, T 23, Rg1, W6M**

This approval and permit is subject to the appended conditions.

Issued this 9th day of January in the year 2012.

  
\_\_\_\_\_  
**Al Hoffman, P.Eng**  
**Chief Inspector of Mines**



# **APPENDIX B:**

## **PRELIMINARY STUDIES**



# **APPENDIX B-1:**

**TERRAIN STABILITY ASSESSMENT - REVISED**



**Terrain Stability Assessment**

for

**Greely Road (Road to Revelstoke  
Adventure Park),  
Revelstoke, BC**

**Revision #3**

Prepared for:

**Black Tie Properties LP**  
Box 963  
Revelstoke, BC  
V0E 2S0

Interior Operations

#330 42<sup>nd</sup> Street SW  
PO Box 2012  
Salmon Arm BC V1E 4R1  
Tel: 250-832-3366  
Fax 1-888-273-0209

February 16, 2016  
File: 1145-2

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## 1.0 Introduction and Proposed Development<sup>1</sup>

This report presents the results of a terrain stability assessment (TSA) completed by Onsite Engineering Ltd. (OEL) for the proposed road to the Revelstoke Adventure Park (RAP) located about 7km due east of Revelstoke, BC. The road commences from a private land parcel near the bottom of the Illecillewaet River, then climbs a broad ridge on the south side of the Illecillewaet River valley to the lodge site. See Figure 1 for a location map.

The road is proposed to be approximately 3km in length and is to provide access to a recreation site located approximately 500m above the valley floor. Vehicles travelling on the road are expected to be limited to pick-ups, passenger vans and up to 5 ton trucks. The TSA was completed at the request of Jason Roe of Black Tie Properties LP (Black Tie). Road layout was completed by Azimuth Forestry and Mapping Solutions (Azimuth).

It must be noted that the previous edition of this report (Titled Terrain Stability Report for Greely Road) indicated that Greely Creek was considered an element at risk from this road. This is not correct. Greely creek is located more than 2km to the east and outside of any potential impact by the proposed road.

## 2.0 Rationale for the TSA

Requirements detailed in the Forest Planning and Practices Regulation state that an authorized person who carries out a primary forest activity must ensure that the primary forest activity does not cause a landslide that has a material adverse effect in relation to one or more of the subjects listed in section 149 (1) (i.e. objectives set by government) of the Forest and Range Practices Act. A primary forest activity is defined in the regulation as:

- i) timber harvesting;
- ii) silviculture treatments;
- iii) road construction, maintenance and deactivation.**

In completion of the layout for this development, layout personnel identified sections of the planned road construction that has indicators of potential instability, primarily associated with steep terrain.

The objectives of this TSA are to:

- i) Characterize the existing landslide hazard (terrain and terrain stability conditions) in areas within, adjacent to or connected to the development area;
- ii) Evaluate the potential or existing effects of the development on the terrain stability potential;
- iii) Determine the landslide hazard and potential effects of the development on the identified elements at risk (i.e. the resources); and
- iv) Recommend site-specific actions to reduce and/or manage the landslide hazard and risk resulting from the development.

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<sup>1</sup> Forest *development* consists of aspects of forest management, existing and proposed, related to Planning and Operations.



### 3.0 Limitations of the TSA

This TSA has been prepared in accordance with generally accepted geotechnical practises in the British Columbia forest industry and in general conformance with the “Guideline for Professional Services in the Forest Sector – Terrain Stability Assessments”<sup>2</sup>. General observations are made on the existing slope gradients, shape, morphology and the general stability. Information on the subsurface soil, groundwater and bedrock conditions are gathered from hand-dug test holes, bedrock outcrops, root balls of fallen trees and the cutslopes on the existing roads in the surrounding area. A comparative-observational approach has been used to provide rationale for conclusions and recommendations. This approach relies on the examination of historical air photographs, field review of past forestry practices and the proposed development area, and professional judgment and experience to assess the likely response of the terrain to the proposed operations, based on past the past response of similar terrain to previous forest developments.

The reader should be aware that the classification and identification of the type and condition of the geological units present are judgmental in nature. Variations (even over short distances) are inherent and are a function of natural processes. OEL does not represent or warrant that the conditions listed in the report are exact and the user should recognise that variations may exist. If sub-surface conditions are found to be significantly different than those identified, the conclusions and recommendations contained in this report should be reviewed by OEL, with amendments made as needed.

This report does not imply that a landslide will not occur following the proposed development. An estimate on the likelihood (or probability) of occurrence of a specific hazardous landslide (i.e. the  $P(H)$ ) is given in relation to the proposed activities. The partial risk (i.e. the  $P(HA)$ ) to the adjacent resources from the specific hazardous landslide has been assessed using methods described in the “Landslide Hazard and Risk Case Studies in the Forest Sector” document. Partial risk is the product of the probability of occurrence of a specific hazardous landslide (i.e. the  $P(H)$ ) and the probability of that landslide reaching or otherwise affecting the site occupied by a specific element (i.e. the  $P(S:H)$ ). **Further explanation of the partial risk assessment, a matrix and a sample partial risk calculation are included in Appendix A.**

Elements included in the partial risk analysis are those indicated on the mapping and materials provided by the client or coordinating registered professional for the proposed development. Known elements potentially at risk from a landslide initiating from within or downslope of the proposed development include:

- 1) Timber and soil resources downslope of the development. These resources are typically affected by any landslide event with the area impacted directly related to the magnitude of the slide. For this reason, timber and soil resources are often not used in the risk analysis.
- 2) Access along road infrastructure associated with the development. This would likely take the form of a road prism failure were either the cut or the fill slope underwent failure.
- 3) Water quality in the un-named creek to the east. The areas where the road is adjacent to this creek are indicated in Section 6.1 below. The creek is a tributary to the Illecillewaet River with

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<sup>2</sup> APEGBC/ABCPF 2010.

the confluence located approximately 200m downstream from the start of the road. The creek is located in a deep, steep sided draw on the upper slopes that moderate downslope to a broad, moderate slope draw. The road is located about 50m from the creek on the lower slopes and 100 to 150m upslope on the upper slopes. No signs of existing instability were noted on the draw sidewalls. A slide with a magnitude exceeding 1000m<sup>3</sup> would be required to impact the creek.

- 4) **Impact to the CP Rail tracks** located 500 to 600m downslope to the west of the road. While the proposed road generally remains on a ridge above these steep slopes, with the terrain generally trending away from the slope that leads down to the tracks, parts of the road are located near the slope crest. For this reason, we include the railway as a downslope element at risk.

**A landslide reaching the railway is considered unacceptable in all cases.** Not only could such a landslide result in considerable property damage to the tracks themselves, stopping time for a train may be such that a collision with the slide debris could take place, or, a slide could directly impact the train if it took place while the tracks were in use in this location. In these latter two scenarios, there would also be the potential for loss of life to train operators. A further discussion of the risk analysis as it pertains the railway is included in Section 6.6 below. The areas where the road is proposed near the slope crest are indicated in the risk assessment in Table 6.1 below.

Areas where the above elements at risk are considered are indicated in Table 6.1 below. Additional elements may exist. **It is the responsibility of the client or the coordinating registered professional to review our assessment of landslide likelihood, runout and magnitude and determine if any additional elements may be impacted.**

The analysis of partial risk presented in this report considers the incremental increase in the likelihood of landslides as a result of the proposed operations. The terrain upslope and downslope of this development contains areas that exceed 60%. Natural landslides and rockfall events may initiate on this terrain regardless of the proposed harvesting. The intent of the recommendations presented in this assessment is to provide development recommendations that will result in a low likelihood of an incremental increase in the landslide likelihood on the terrain within and downslope of the development, following the proposed operations.

Where recommendations are given to reduce the likelihood of landslide occurrence and/or mitigate the risk, the residual rating (where given) applies only if the recommendations from this report are followed. The acceptance of these recommendations by Black Tie indicates a willingness to manage the risks to the downslope and/or downstream resources (*i.e.* the elements at risk) associated with the occurrence of the specific hazardous landslide.

## 4.0 Background Data and Fieldwork

The following information was reviewed as part of the assessment:

- 1) 1:5,000 scale contour map of the area with the proposed road alignment
- 2) Preliminary road design completed by Azimuth Forestry and Mapping Solutions
- 3) Images obtained from Google Earth, [www.google.com](http://www.google.com), copyright Province of BC. 2011

- 4) Land Management Handbook 56 – “Landslide Risk Case Studies in Forest Development Planning and Operations,” published by the BC Ministry of Forests Forest Science Program, 2004.
- 5) “Guidelines for Terrain Stability Assessments in the Forest Sector,” published by APEGBC, 2003.
- 6) BC Digital Geology mapping - compilations of the geology of B.C. at 1:250,000, 1992-96. Obtained from the GSB website (<http://www.em.gov.bc.ca/geology>).

Fieldwork was completed on May 15, 2012 by Adam Muddiman, P.Geo of OEL, accompanied by Ryan Williams of Azimuth. Field work involved a foot traverse of the proposed road location. Observations of the local geomorphology, drainage and soil conditions with respect to the proposed development were collected.

## 5.0 General Site Description

### Physiographic and Hydrologic Description

The proposed development is located in the lower Illecillewaet River valley between the Monashee Mountains and the Selkirk Mountains physiographic regions of BC. These regions are characterized by rugged terrain with high relief, sharp glaciated peaks and deeply incised glacial valleys (Holland 1976)<sup>3</sup>. The local relief ranges from approximately 500m asl at the valley bottom to a maximum elevation of 2200m asl at the alpine peaks above. The terrain is somewhat broken with hanging valleys and steep to very steep slopes truncated by broad gentle to moderate benches.

Locally, the proposed development lies on a broad ridge on the south side of the Illecillewaet River, adjacent to a small unnamed tributary to the Illecillewaet directly to the southeast. The Greely Creek watershed is located a further, approximately 2.5km to the east, beyond the unnamed tributary. The road climbs from the valley bottom at approximately 550m asl to a maximum elevation of 950m asl in the mid-slope position. To the west of the ridge, the terrain consists of steep to very steep bedrock controlled slopes that drop towards the Illecillewaet. The unnamed creek directly east of the road is located in a deep narrow gully with steep sidewalls and empties directly into the Illecillewaet approximately 300m north of the start of the proposed road. The headwaters of the creek are located directly south of the development at the height of land. The catchment area for the watershed is relatively small, resulting in relatively low seasonal flows; however, due to the mountainous nature of the watershed and the potential for heavy rainfall and subsequent runoff, the creeks in this area are expected to be “flashy” and experience short periods of very high flows. See Figure 2 for a GoogleEarth image of the terrain.

Slope gradients on the ridge are somewhat broken with gradients of 20 to 50% on the lower slopes transitioning to 60 to 70% part way up, then 20 to 40% at the upper reaches of the road location. Surficial material consists mainly of thick till deposits consisting of a sand-gravel-cobble mixture with trace to some silt and, likely, numerous boulder sized clasts. The surface is further overlain by numerous boulders and blocks deposited over much of the terrain. Occasional bedrock outcrops were found on the hillside, but none substantial enough to provide a source for the numerous surface

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<sup>3</sup> Holland, S.S., Landforms of British Columbia, A physiographic Outline, Bulletin 48, 1976; BC Department of Mines and Resources. Victoria, B.C.

boulders, indicating the rocks are likely glacial deposits that were deposited during glacial retreat.

Bedrock is mapped as Devonian orthogneiss metamorphic rocks. Bedrock outcrops confirmed this mapping and outcrops were found to be massive and strong. The blocks and boulders were also found to be massive and strong gneiss.

No streams or seepage areas were found in the proposed road location. This is likely due to a combination of the well drained soils present, the location of the road on a broad ridge that sheds water to the east and west, and the relatively small watershed area directly upslope. The majority of the runoff from the mountainside would flow to the unnamed creek to the southeast, located well below the proposed road. Timber mainly consists of Douglas Fir trees with little undergrowth, further indicating a relatively dry site.

### Existing Development and Previous Logging

The proposed road commences at an existing gravel pit and traverses a mostly undeveloped hillside. The lower slopes were logged more than 30 years previous and the logged areas has substantially regenerated. An existing communication tower is located on a broad bench near the end of the road that was likely installed using helicopters.

The base of a chair lift at Revelstoke Mountain Resort is located approximately 1.5km south (upslope) and ski runs accessed by the lift are located further south and southeast. The topography is such that drainage from the ski runs will mainly be directed to the unnamed Creek, or to Greely Creek further to the east, and will not flow to the proposed road location.

## **6.0 Discussion, Results and Recommendations**

As noted, the road to the RAP extends from an existing gravel pit and climbs a broad ridge to an upper broken plateau area. In many cases, road grades are 15 to 18% and a number of switchbacks (12 to 15) with 12 to 15m radiuses have been laid out to allow the road to stay on the broad as it climbs the hillside to reach an up broken plateau area. While the majority of the road lies on 35 to 55% slopes, the terrain immediately to the east and west drops away steeply. To the east, the ridge gradually rolls over to the 60 to 70% slopes of a deeply incised draw.

To the west, much of the terrain rolls over onto vertical bedrock bluffs that range in height from 5 to 20m. The bluffs are composed of massive, extremely strong orthogneiss with widely spaced fractures on the order of 2-5m spacing. The fracture orientation appears to be random and does not follow a specific bedding plane or jointing pattern. The observed lithology matches bedrock mapping of the area and numerous boulders scattered downslope, as well as along the road alignment, also consist of similar orthogneiss. Downslope of the bedrock bluffs, the terrain is steep with gradients exceeding 70% leading down to the valley bottom where the CP Rail tracks are located. While small scale rockfall deposits consisting of single detachments rolling up to 30 to 40m from the base of the cliffs was prevalent downslope of the bluffs, no landslide scarps could be found on the steep terrain downslope during either field work or air photo review.

The surficial material throughout the area typically consists of sand and gravel with trace to some silt and variable volumes sub-angular cobble and boulder sized clasts. Numerous surface boulder deposits



are also present throughout the area. The surficial material is well to rapidly drained, and no signs of seepage emergence or stream channels were found. The general ridge top location of the proposed alignment, the well drained surficial materials, and likely shallow bedrock result in all drainage being shed to either side. The only moisture likely to be added to the site will be from runoff following heavy rain storm events and spring snow melt.

General recommendations for road construction are listed below, and the following Table 6.1 contains specific site descriptions for segments along the road, a partial risk analysis, and construction recommendations for the assessed sections of the proposed road. Road stations referenced in the table correlate with the P-Line traverse stations recorded in the field by Azimuth traverse crews. See Figure 3 for a plan view of the road with key road stations marked. See Appendix A for a description of the partial risk assessment and definition of terms used in Table 6.1.

## **6.1 Anticipated Soil and Bedrock Conditions**

Observations made during the fieldwork for the TSA suggest that the following subsurface conditions should be encountered during road construction:

- 1) The majority of the road excavation will occur within a blanket of variable thickness (1-3m deep) deposits of medium dense to dense sand, gravel and cobbles with trace to some silt. Boulder sized clasts are also expected to be encountered during excavation. These materials are generally well drained.
- 2) A substantial amount boulders and blocks are located at the surface along most of the road location. The rock is strong intact gneiss and is acceptable for use in road fills. While many of the rocks can be moved by an excavator, some will require drill and blast to move.
- 3) The local bedrock, where encountered, was found to be intact, massive and strong. Most outcrops are expected to require drill and blast at depth.

If adverse sub-surface conditions that differ from those described above or detailed in Table 6.1 are encountered in the cutslope excavation, the road crew should notify Black Tie personnel so that sufficient detail can be collected and forwarded to OEL. Upon review of the information the excavation recommendations contained in Section 6.3 may be amended.

## **6.2 Seepage Conditions**

Surficial materials within the study area appear to be generally well drained. Indicators of significant subsurface seepage were not found; however, seepage emergence from fresh cuts may occur during road construction on the slope to bench transitions and within headwall and draw areas.

## **6.3 Cutslope Excavation Recommendations**

Unless otherwise noted in Table 6.1, the till materials expected to be encountered during construction should generally be excavated at a slope angle of 1H:1V. Cutslopes may ravel or slough at this angle and require seasonal maintenance of the ditchlines.

If minor seepage is encountered in the excavation, the cutslope angle may have to be reduced. If considerable seepage (i.e. a spring) is encountered in the excavation and/or slumping of the exposed soils occurs during construction, road building activities at these locations should cease and OEL should be contacted for further direction.

The overall design cutslope in bedrock should be no steeper than 1H:2V in strong, intact rock. This is a design angle, the actual bedrock cutslope could be steeper in isolated areas depending on natural joints or fractures in the rock and how the rock breaks. During excavation the road crews must do visual inspections and check scale the bluffs after every blast (using the excavation equipment). Construction inspections by OEL are only required if the road crew notes the formation of new open fractures, or the formation of detached blocks that cannot be scaled down. During road construction, workers must not pass directly between the cutslope face and the excavation equipment and no equipment should be working above the crest of the cutslope while workers or other equipment are located below.

## **6.4 Road Prism Recommendations**

Much of this road can be built with conventional cut and fill construction techniques; however, construction on moderately steep to steep gradient terrain (i.e. >60%) will generally require full bench cut with some areas of  $\frac{3}{4}$  bench. Where this type of construction is prescribed, the excess material will need to be endhauled from the site. In addition to areas of full bench and  $\frac{3}{4}$  bench cut, engineered fill is expected to be required for construction in some locations, particularly on switchbacks that have been located on greater than 50% gradient slopes. Typically engineered fill consists of either a rock fill or a geotextile reinforced fill (GRS). The following are guidelines for these construction techniques:

### **$\frac{3}{4}$ Bench Cut Construction**

- Road construction technique used primarily on moderately steep gradient terrain (i.e. 55 to 65%) where the majority of the road running surface is located on a bench cut into the hillside and minimal fill (i.e.  $\frac{1}{4}$  of the bench) is used on the outside edge of the road. The sideslope limit for this technique is dependent on the drainage characteristics and friction angle of the expected underlying surficial materials.
- Excess excavated material is to be endhauled away from the site. The fillslope is constructed of placed and keyed-in coarse angular rock (see below). The material must be placed on an excavated, blasted or natural bench at least 2m wide. The bench must be founded in bedrock or competent (undisturbed) mineral soils. If natural benches are not present and excavation or blasting of a bench is not achievable the road prism should be shifted into a full bench cut.

### **Full Bench Construction**

- Road building technique generally used on steep slopes (i.e. >65%) whereby the entire road running surface is located on a bench cut into the hillside. All excavated material is generally endhauled away from the site to an approved waste area. Endhauling may include a cat-push. Although some spillage of material is generally tolerable, excavated material is not to be wasted downslope of the road unless specified by the project engineer or geoscientist.

## Endhauling

- Endhaul is any transportation of surplus excavated material away from the road construction site to an embankment area (used in road fill on a different portion of the road) or waste area (i.e. spoil site).
- Waste areas should be located in areas with gentle to moderate gradient slopes, outside of riparian management areas, and located so that natural drainage patterns are not altered. Fill slope angles on waste site is dependent on the type of material. In general, the design fill slope angle of the waste site for a particular material is less than the design fill slope angle for that same material in the road prism. This is a result of the material being end dumped and not placed. Placed or constructed fill slopes on waste site may have the same design angle as the road prism.

## Rock Fill

- Construction of rock fill entails the placement of angular boulders for road fill. Rock is to be placed (not sidecast) and keyed into the hillside starting from an excavated or natural bench at the toe of the fill.
- Rock is to consist of either ripped or blasted boulders or angular boulders uncovered during excavation. Rock fill placed in this manner can be placed at slope angles of 1.25H to 1V (85%).
- **Fill construction in this manner requires daily on-site monitoring from a P. Eng, P. Geo their designate during construction**

## Geotextile Reinforced Soil (GRS)

- Construction of a GRS wall requires placement and compaction of aggregate with woven geotextile placed between compacted lifts during construction.
- The toe of the GRS wall must be founded on an excavated, blasted or natural bench. The bench is to be at least 2m wide and is to be out sloped slightly to allow water to drain.
- Drains should be installed at the bottom of the wall to allow positive drainage away from the wall.
- Aggregate for the GRS wall is to consist of a 3" minus sand and gravel mixture with less than 15% silt. It is anticipated that the local surficial material along this road will be suitable for construction of the wall.
- Aggregate is to be placed and compacted using 1000lb vibratory plate compactor, a vibratory drum roller or equivalent.
- A design for the wall should be completed prior to construction.
- **GRS wall construction requires daily on-site monitoring from the design engineer or his designate during construction**

Road subgrade material should not be placed on water-softened or saturated slopes (i.e. slopes where considerable seepage and/or significant hydrophilic plants are present). All water softened material should be excavated to expose the compact till materials and/or bedrock. Unsuitable material will have to be spoiled in lower slope areas and not incorporated into the structural road prism.

### 6.4.1 Additional Considerations for Engineered Fill Sections

Specific portions of the road, typically related to switchbacks on moderately steep terrain, where noted

as likely requiring engineered fill. These locations are indicated in Table 6.1 below. Where engineered fill is indicated, a detailed design completed by a professional engineer (P.Eng) with experience in road construction, slope stability and retaining wall design is required. The design will require a detailed topographic survey of the road section is required using a total station or instrument with similar accuracy. Fill retention options and specific drainage measures can be identified during the design process.

The geometric road design should incorporate the detailed design prior to finalization and the commencement of road construction. Construction of these sections should be supervised by a professional engineer or geoscientist with experience in resource road construction.

## 6.5 Road Drainage Recommendations

No streams or NCDs were crossed by the road layout, however, runoff from snowmelt and following heavy rain storms should be expected. The majority of ditchlines along this road can be directed off the end of switchbacks; however, cross-drain culverts should be installed where the road crosses dry draws. Additional cross drain culverts may be required if seepage is uncovered during construction to reduce the potential for drainage concentration by the road.

## 6.6 Discussion of Risk Analysis for CPR Railway

As indicated in Section 3.0 above, the CPR railway tracks downslope of the development was considered as an element at risk. **A landslide reaching the railway is considered unacceptable in all cases.** Not only could such a landslide result in considerable property damage to the tracks themselves, stopping time for a train may be such that a collision with the slide debris could take place, or, a slide could directly impact the train if it took place while the tracks were in use in this location. In these latter two scenarios, there would also be the potential for loss of life to train operators. As we are completing a partial risk assessment, we assume any impacts to the railway tracks would have the potential to cause maximum damage. Please refer to Appendix A for a further description of these terms and the partial risk process.

The terrain between the proposed road location and the tracks extends for 500 to 600m downslope, and is steep and bedrock controlled, exhibiting a substantial number very strong orthogneiss outcrops. Surficial material overlying the bedrock is well drained and occurs in relatively thin (<1m) deposits. No stream channels or obvious areas of groundwater seepage emergence could be found. No signs of any existing instability were noted on the hillside downslope of the road, other than small scale rockfall consisting of single rolling rocks from existing bluffs. In order for a landslide initiating from the road to runout as far as the tracks, it is estimated that the event would require a magnitude exceeding 8000m<sup>3</sup>, as the slide would need to runout between 300 and 600m to reach the tracks. Landslide events of this magnitude typically require either a large scale, deep seated instability or substantial volumes of water to initiate, and runout the required distance. A smaller event (i.e. <1000m<sup>3</sup>) initiating lower on the slope could also impact the tracks in a gentle-over-steep type failure whereby water from upslope is redirected onto the steeper terrain downslope where it could saturate soils, reduce soil strength and result in a landslide. This type of slide mechanism typically requires large scale moisture inputs to be redirected upslope.



The road is located on a well drained dry ridge and does not cross any surface streams or areas of groundwater water seepage emergence where it is located upslope of the tracks. The only anticipated moisture inputs would be from runoff from rainfall and snowmelt, which can be substantial, but likely not of sufficient volume to initiate a landslide of the magnitude required to reach the railway tracks.

Impact to the tracks from natural rockfall events is considered possible due to the numerous bluffs on the hillside. Scattered deposits of rock talus can be seen on the mid to upper slopes with clasts generally coming to rest on the moderately steep slopes. The upslope road location is not expected to significantly increase the rockfall hazard due to the competent nature of the orthogneiss and the location of the road back from the slope; however, care will be needed during construction and blasting processes to ensure boulders are not dislodged.

The likelihood of a road related landslide on these slopes following the implementation of the construction recommendations in this report is considered low (i.e. the  $P(H)$ =low); further, should a landslide take place, the likelihood that it would be of sufficient magnitude to runout to the railway tracks downslope is also considered low (i.e. the  $P(S:H)$ =low). Therefore estimated risk to the railway from a road related landslide is considered very low (i.e. the  $P(HA)$ =very low). The estimated probabilities for these terms are indicated in Appendix A. The estimated probability for a landslide to occur and be of sufficient magnitude to impact the railway tracks is  $<1:10,000$ .

A secondary event that has been considered related to the railway tracks is the potential for a hydrogeomorphic event in the unnamed creek to the east of the road extending to the railway. This creek originates in steep alpine terrain before flowing across a broad gentle fan at the bottom of the valley as it leads to its confluence with the Illecillewaet River. The channel gradient where the creek is located downslope of the road is between 20 and 27% (11-15°) and a gradient of 10 to 20% (5-11°) for the lower 400m of the channel where it crosses a large fan. Channel substrate consisted mainly of small angular boulders and cobbles with some gravel and sand. No signs of debris levees or large debris deposits that would indicate a recent debris flow or debris flood could be seen. In order for a road related hydrogeomorphic event to take place, a landslide with sufficient magnitude to block the creek for some time before blowing out would be required; likely on the order of 1000m<sup>3</sup>. A landslide of this magnitude would require a substantial volume of water for initiation.

As indicated above, the road is located on a well drained dry ridge and does not cross any surface streams or areas of groundwater water seepage emergence where it is located upslope of the tracks. The only anticipated moisture inputs would be from runoff from rainfall and snowmelt, which can be substantial, but likely not of sufficient volume to initiate a landslide of the magnitude required to reach the railway tracks.

The likelihood of a road related landslide on these slopes following the implementation of the construction recommendations in this report is considered low (i.e. the  $P(H)$ =low); further, should a landslide take place, the likelihood that it would be of sufficient magnitude to runout to the creek downslope and cause a major blockage is also considered low (i.e. the  $P(S:H)$ =low). Therefore estimated risk that a road related landslide that would initiate a debris flow or debris flood that could impact the railway is considered very low (i.e. the  $P(HA)$ =very low). The estimated probabilities for these terms are indicated in Appendix A. The estimated probability for a landslide to occur and be of sufficient magnitude to impact the railway tracks is  $<1:10,000$ .

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations												
Road Section		Terrain Characteristics			Landslide Likelihood P(H) and Description	Elements at Risk and P(S:H) <sup>5</sup>	Partial Risk P(HA) <sup>7</sup>	Road Construction Recommendations			Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>8</sup>	Construction Recommendations and Design Cut and Fill Angles		
0+000	0+644	Start TSA at existing gravel pit at end of temporary road.  The road alignment traverses variable, benchy terrain with slope gradients ranging from 15% to short pitches of 50 to 60% that terminate at gentle terrain.  Surficial material is well drained and consists of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface and boulders will likely be uncovered during excavation.	>3m	well	Low: Small (<500m <sup>3</sup> ) fill slope failure with runoff to moderate gradient timbered terrain downslope  n/a	n/a	½	0	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> Cut: 100% in native till materials 200% in bedrock. Fill: 67% for placed local surficial materials	Low	n/a	
0+644	0+713	Start off gentle bench onto 70% planar slopes.  Surficial material is well drained and consists of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface and boulders will likely be uncovered during excavation.	1.5m	Well	High: Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope.  Loss of access along road at slide location and potential to runoff to a downslope portion of the road. <b>Moderate</b>	High	Full	100	<ul style="list-style-type: none"><li>Full bench cut construction required excess material is to be endhauled from the site. Suitable waste sites are located between 0+000 and 0+644.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: n/a	Low	Low	
0+713	0+806	Alignment wraps around the end of a prominent ridge. Slope gradients are 45-55%  Surficial material is well drained and consists of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface and boulders will likely be uncovered during excavation.	1.5m	well	Low: Small (<500m <sup>3</sup> ) fill slope failure with runoff to moderate gradient timbered terrain downslope  n/a	n/a	½	0	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials	Low	n/a	

<sup>4</sup> P(H) Probability of occurrence of a specific hazardous landslide following conventional sidecast road construction in this section. Quantitative terms (i.e. low, moderate and high) are defined in Appendix A

<sup>5</sup> P(S:H) The probability that there will be a spatial effect, given that a specific hazardous landslide occurs, i.e. the probability that the landslide will impact the specific element at risk. Quantitative terms (i.e. low, moderate and high) are defined in Appendix A

<sup>6</sup> P(HA) = P(S:H) x P(H) = The probability of occurrence of a specific hazardous landslide and the probability of it reaching or otherwise affecting the site occupied by a specific element. Quantitative terms (i.e. low, moderate and high) are defined in Appendix A

<sup>7</sup> Road stations are referenced as P-Line stations from the digital Roadeng survey notes which may or may not represent marked field locations

<sup>8</sup> Refers to the approximate percentage of the total cut volume that will require endhauling off site.

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

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Road Section		Terrain Characteristics			Landslide Likelihood P(H) and Description	Elements at Risk and P(S:H) <sup>3</sup>	Partial Risk P(HA) <sup>1</sup>	Road Construction Recommendations			Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk		
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>8</sup>	Construction Recommendations and Design Cut and Fill Angles				
		Switchback location around a relic dry draw with slope gradients of 35 to 50%.  No signs of a stream channel or stream flow were noted in the draw, but it likely carries seasonal runoff.  Low bedrock bluffs are located directly upslope of the switchback location and bedrock should be expected within 2m of the surface. Bedrock is massive and strong granitic gneiss.  Overlying surficial material is well drained and consists of compact to dense sand and gravel with trace to some silt. Numerous boulders and blocks at the surface.	1m	Well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>  Runout to railway tracks at toe of slope to west. <b>Low</b>	<b>High</b>  <b>Moderate</b>	½ to Full  50	<ul style="list-style-type: none"><li>A switch back in this location (i.e. on 50% slopes) will require construction of a substantial fill for first approximately 10m along the road on the downhill leg.</li><li>Due to the low radius of the switch back (i.e. ~12m), the road will need to be shifted into full bench cut on the uphill side.</li><li>Excavation of the cut for this section is expected to encounter competent bedrock. Drill and blast may be required for bedrock excavation.</li><li>Install 500mm diameter cross drain culverts in the natural draw to ensure drainage during runoff conditions.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill 400% for GRS retained fill	Low	Low	Very Low		
	0+845	20 to 30% planar slopes directly upslope of 85% sidewall of creek gully to southeast.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface	1.5m	Well	<b>Low:</b> Small (<500m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope.	n/a	n/a	½	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials	Low	n/a			
	0+942	Switchback location. 20% gradient slopes on lower leg and 50% on upper leg  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface	2m	Well	<b>Moderate:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>  Runout to Unnamed Creek to east. <b>Low</b>	<b>Moderate</b>  <b>Low</b>	½	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li><li>Fill through upper leg of switchback may need to be oversteepened. Should this be the case, an engineered rock fill will be most suitable</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill	Low	Low	Very Low		
	0+997	60 to 75% gradient planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	Well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>	<b>High</b>	¾ to full	<ul style="list-style-type: none"><li>¾ to full bench cut techniques required.</li><li>Where ¾ bench cut is employed, the fill should be constructed of keyed in rock.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill	Low	Low	Low		

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations												
Road Section		Terrain Characteristics			Landslide Likelihood (PH) <sup>1</sup> and Description	Elements at Risk and P(S:H) <sup>3</sup>	Partial Risk P(HA) <sup>7</sup>	Road Construction Recommendations			Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>9</sup>	Construction Recommendations and Design Cut and Fill Angles		
1+121	1+175	Switchback location on 55 to 60% planar slopes.	2m	Well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runoff to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>	<b>High</b>	Full Bench and Engineered fill	0	<ul style="list-style-type: none"><li>The switchback in this location on greater than 55% slopes will require construction of a substantial fill for approximately 20m along the road on the downhill leg. Design of a GRS retaining wall is recommended for construction of the fill.</li><li>Due to the low radius of the switch back (i.e. ~12m), either the fill on the upper leg will need to be oversteepened, or the road will need to be shifted into full bench cut. Oversteepened fill can be achieved by construction of an engineered rock fill.</li><li>A detailed topographic survey of the switchback site using a total station or instrument with similar accuracy must be completed, followed by a detailed design completed by a professional engineer (P Eng) with experience in road construction and retaining wall design. Fill retention options can be identified during the design process.</li><li>Construction should be supervised by a professional engineer or geoscientist with experience in resource road construction.</li></ul>	Low	Very Low
1+175	1+249	60 to 75% gradient planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runoff to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>	<b>High</b>	¾ to full	75-100	<ul style="list-style-type: none"><li>¾ to full bench cut techniques required.</li><li>Where ¾ bench cut is employed, the fill can be constructed of keyed in rock.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill 2 00% for GRS retained fill	Low	Low



**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Road Section		Terrain Characteristics			Landslide Likelihood P(H) <sup>1</sup> and Description	Elements at Risk and P(S:H) <sup>2</sup>	Partial Risk P(HA) <sup>3</sup>	Road Construction Recommendations			Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk
Start Δ <sup>1</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>4</sup>	Construction Recommendations and Design Cut and Fill Angles		
1+249	1+285	Switchback location on 45% planar slopes.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	well	<b>Moderate:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runoff to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>  Runout to Unnamed Creek to east. <b>Low</b>	<b>Moderate</b>  <b>Low</b>	1/2	0	<ul style="list-style-type: none"> <li>Conventional cut and fill techniques can be employed for construction of the switchback, however, due to the 45% slopes, a substantial fill will need to be constructed. Rock fill may be utilized to oversteepen fill slopes.</li> <li>Due to the low radius of the switch back (i.e. ~12m), either the fill on the upper leg will need to be oversteepened, or the road will need to be shifted into full bench cut. Oversteepened fill can be achieved by construction of an engineered rock fill.</li> <li>A detailed topographic survey of the switchback site using a total station or instrument with similar accuracy must be completed, followed by a detailed design completed by a professional engineer (P.Eng) with experience in road construction and retaining wall design. Fill retention options can be identified during the design process.</li> <li>Construction should be supervised by a professional engineer or geoscientist with experience in resource road construction.</li> </ul> Cut: 100% in native till materials Fill: 200% in bedrock 67% for placed local surficial materials 85% for engineered rock fill	Low	Low
1+285	1+436	65-75% planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope failure with runoff to timbered terrain downslope. Potential to runoff to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>	<b>High</b>	3/4 to full	75-100	<ul style="list-style-type: none"> <li>3/4 to full bench cut techniques required.</li> <li>Where 3/4 bench cut is employed, the fill should be constructed of keyed in rock.</li> </ul> Cut: 100% in native till materials Fill: 200% in bedrock 67% for placed local surficial materials 85% for engineered rock fill		Low

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations												
Road Section		Terrain Characteristics			Landslide Likelihood P(H) <sup>1</sup> and Description	Elements at Risk and P(S:H) <sup>3</sup>	Partial Risk P(HA) <sup>2</sup>	Road Construction Recommendations			Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>9</sup>	Construction Recommendations and Design Cut and Fill Angles		
1+436	~1+485	Switchback on 55 to 60% planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	Well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runout to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>  Runout to railway tracks at toe of slope to west. <b>Low</b>	<b>High</b>  <b>Moderate</b>	Engineered fill  <b>0</b>		<ul style="list-style-type: none"><li>A switchback in this location (i.e. on 50% slopes) will require construction of a substantial fill for approximately 20m along the road on the downhill leg. In order to construct the fill, a GRS retaining wall is recommended. Alternately, an engineered rock fill placed at 1.25H : 1V could be utilized. A design for these two options should be completed to aid in the determination of the most appropriate option.</li><li>Due to the low radius of the switch back (i.e. ~12m), either the fill on the upper leg will need to be oversteepened, or the road will need to be shifted into full bench cut. Oversteepened fill can be achieved by construction of an engineered rock fill.</li><li>Total station or instrument with similar accuracy must be completed, followed by a detailed design completed by a professional engineer (P.Eng) with experience in road construction and retaining wall design. Fill retention options can be identified during the design process.</li><li>Construction should be supervised by a professional engineer or geoscientist with experience in resource road construction.</li></ul> <p>Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill 400% for GRS retained fill</p>	<b>Low</b>  <b>Very Low</b>	
1+485	1+530	60-65% planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	well	<b>High:</b> Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runout to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and a portion of road downslope. <b>Moderate</b>	<b>High</b>	¾	<b>50-75</b>	<ul style="list-style-type: none"><li>¾ to full bench cut techniques required.</li><li>Where ¾ bench cut is employed, the fill should be constructed of keyed in rock.</li></ul> <p>Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill</p>	<b>Low</b>	<b>Low</b>
1+530	1+632	45 to 55% planar slopes  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	well	<b>Low:</b> Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runout to timbered terrain downslope.	n/a	n/a	½	<b>0</b>	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> <p>Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials</p>	<b>Low</b>	n/a

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations													
Road Section		Terrain Characteristics			Landslide Likelihood P(H) <sup>1</sup> and Description	Elements at Risk and P(S:H) <sup>3</sup>	Partial Risk P(HA) <sup>2</sup>	Bench	Endhaul (%) <sup>4</sup>	Road Construction Recommendations		Residual Hazard P(H)	Residual Risk (PHA) to defined elements at risk
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage						Construction Recommendations and Design Cut and Fill Angles			
1+632 Δ126 1+694		Switchback on 50% planar slopes in a dry rocky draw.  The height of land is less than 100m upslope of the road location, so the draw likely sees minimal drainage.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	Well	High: Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runoff to timbered terrain downslope. Potential to runout to a portion of the road downslope.  Moderate	Loss of access along road at slide location and a portion of road downslope. Moderate  Runout to Unnamed Creek to east. Low	High	Engineered fill	0	<ul style="list-style-type: none"><li>A switchback in this location (i.e. on 50% slopes) will require construction of a substantial fill for approximately 20m along the road on the downhill leg. In order to construct the fill, a GRS retaining wall is recommended. Alternately, an engineered rock fill placed at 1.25H : 1V could be utilized. A design for these two options should be completed to aid in the determination of the most appropriate option.</li><li>Due to the low radius of the switch back (i.e. ~12m), either the fill on the upper leg will need to be oversteepened, or the road will need to be shifted into full bench cut. Oversteepened fill can be achieved by construction of an engineered rock fill.</li><li>A detailed topographic survey of the switchback site using a total station or instrument with similar accuracy must be completed, followed by a detailed design completed by a professional engineer (P.Eng) with experience in road construction and retaining wall design. Fill retention options can be identified during the design process.</li><li>Construction should be supervised by a professional engineer or geoscientist with experience in resource road construction.</li></ul>	Low	Low	
	Δ126 1+694	1+730	45-50% planar slopes  Well drained surficial material consisting of compact to dense sand and gravel and trace to some silt. Numerous boulders are located at the surface.	2m	Well	Low: Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runoff to timbered terrain downslope.	n/a	n/a	½	0	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill 400% for GRS retained fill	Low	n/a
1+730 Δ132 1+803		Slope gradients are 75% downslope of road location and 45 to 50% upslope on planar to slightly benched slopes.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	Well	High: Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runoff to timbered terrain downslope. Potential to runout to a portion of the road downslope.	Loss of access along road at slide location and downslope. Moderate	High	¾ to full	75	<ul style="list-style-type: none"><li>¾ to full bench cut techniques required.</li><li>Where ¾ bench cut is employed, the fill should be constructed of keyed in rock.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill	Low	Low	
Δ132 1+803	Δ138 1+870	35 to 50% gradient terrain. Switchback starting at 1+841 is on 35 to 40% slopes.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders are located at the surface.	2m	Well	Low: Small (<1000m <sup>3</sup> ) fill slope or cutslope failure with runoff to timbered terrain downslope.	n/a	n/a	½	0	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li></ul> Cut: 100% in native till materials 200% in bedrock Fill: 67% for placed local surficial materials 85% for engineered rock fill	Low	n/a	

**Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations**

Table 6.1: Road to RAP - Summary of Observations, Risk Analysis, and Construction Recommendations												
Road Section		Terrain Characteristics			Landslide Likelihood P(H) <sup>1</sup> and Description	Elements at Risk and P(S:H) <sup>2</sup>	Partial Risk P(HA) <sup>3</sup>	Road Construction Recommendations			Residual Risk (PHA) to defined elements at risk	
Start Δ <sup>7</sup>	End Δ	Surficial Materials and Slope Morphology	Est. depth to bedrock	Drainage				Bench	Endhaul (%) <sup>4</sup>	Construction Recommendations and Design Cut and Fill Angles		
A138 1+870	2+894 (PoT)	25 to 40% slopes. Switch back locations on less than 40% terrain.  Well drained surficial material consisting of compact to dense sand and gravel with trace to some silt. Numerous boulders and blocks are located at the surface.	2m	Well	Low: Small (<1000m <sup>3</sup> ) fill slope or cusp slope failure with runoff to timbered terrain downslope.	n/a	n/a	½	0	<ul style="list-style-type: none"><li>Conventional cut and fill road construction.</li><li>Cut: 100% in native till materials</li><li>200% in bedrock</li><li>Fill: 67% for placed local surficial materials</li></ul>	Low	n/a



## 7.0 Closure

This report contains information relating to the terrain stability following the proposed harvesting and/or road building activities. Should the proposed development change and/or the soil/bedrock conditions encountered differ from those outlined in this report, Onsite should be contacted so that the recommendations contained in this report can be reviewed.

Factual data and interpretation contained within this report were prepared specifically for Black Tie Properties LP with whom Onsite has entered into a contract. No other party may rely upon this report without the express written permission of Onsite.

Sincerely,

Onsite Engineering Ltd.

Prepared by:



Adam Muddiman, P.Geo  
Project Geoscientist

Reviewed by:

Rod Williams, P.Geo, Eng.L  
Reviewing Engineering Geologist



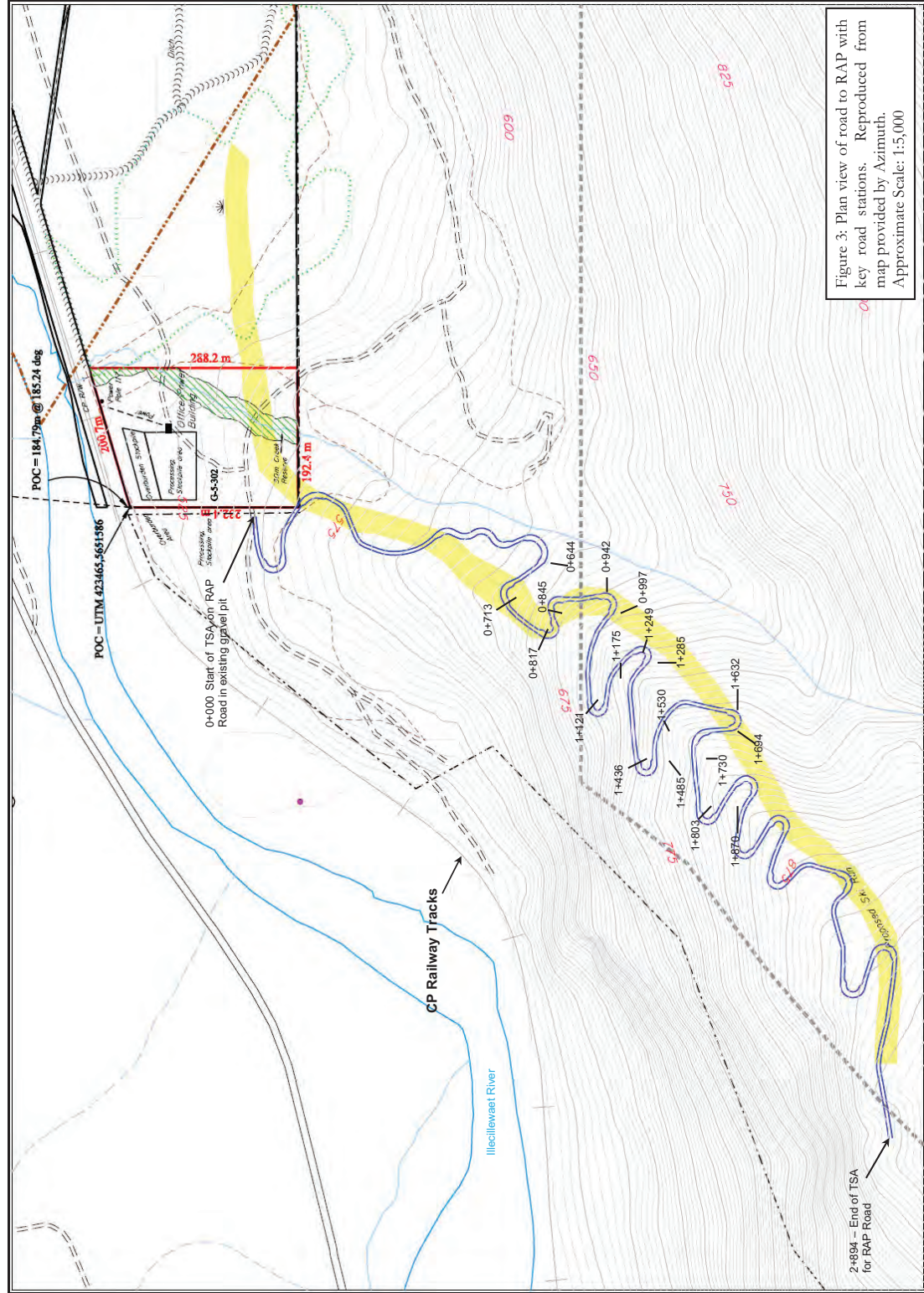
Figure 1: Location Overview Map (not to scale)





Figure 2: Google image of road location (approximate scale: 1:10,000). Note that the road remains on a broad ridge bounded by an unnamed creek to the east and steep bedrock controlled slope to the west







## APPENDIX A

### RISK ASSESSMENT METHODOLOGY

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Risk analysis is a process by which the possibility of an injury or loss is quantified through the determination of the likelihood of an adverse event occurring and the estimation of the probability of a given element being impacted by the said event. The general formula for this statement is as follows:

$$\text{Risk} = \text{Probability of Occurrence} \times \text{Consequence} = (P) \times (C)$$

In practice in the forest sector, the probability of occurrence refers to the likelihood of a specific landslide occurring and the consequence refers to the likelihood of an element at risk being impacted by the landslide and to the extent of the impact (*i.e.* the damage to the element). Terrain Stability Assessments (TSA) typically involve an estimation of the likelihood of a given forest development being impacted by, or increasing the likelihood of a landslide. This process is used to develop an estimation of the Specific Value of Risk (R(SV)), that is an estimation of *the worth of loss or damage to a specific element, excluding human life, resulting from a specific hazardous affecting landslide*<sup>1</sup>. The formula for specific value of risk is shown below:

$$R(SV) = P(H) \times P(S:H) \times P(T:S) \times V(L:T) \times E$$

Where

- P(H) = the probability of occurrence of a specific hazardous landslide.
- P(S:H) = the probability that a specific landslide will impact an element at a given location.  
This is the spatial impact of a landslide.
- P(T:S) = the probability that the element at risk will occupy the hazardous location given that a spatial impact occurs. This is the temporal impact of a landslide.
- V(L:T) = the probability of loss or damage to an element given that the element is impacted by a landslide. This is the vulnerability of an element.
- E = the direct and indirect worth of an element.

This specific value of risk assessment can then be utilized by the terrain stability professional performing the TSA and various stakeholders in a given development to develop a risk management strategy.

For a typical risk analysis in the forest sector, the vulnerability and worth of an element is generally not considered in detail. The temporal impact of a landslide is also typically not considered in detail since the majority of potential elements at risk due to forest development are stationary and have a P(T:S) = 1. In other words the element at risk cannot move and will therefore always be impacted by a landslide reaching that location. The analysis is limited to the consideration of the likelihood of a specific landslide initiating and the likelihood of that landslide reaching or otherwise impacting an element of concern (*i.e.* forest road infrastructure, fish bearing habitat, etc). This type of analysis is termed a partial risk analysis (P(HA)). Rather than utilizing all of the terms in the specific value of risk formula, the partial risk analysis does not contain the vulnerability or worth terms. The partial risk formula is given below:

$$P(HA) = P(H) \times P(S:H) \times P(T:S) \text{ Where } P(T:S) \text{ typically equals } 1$$

With P(T:S) equivalent to 1 the partial risk analysis simplifies into an analysis of the likelihood of a specific hazardous landslide occurring, an estimation of the landslide magnitude and runoff.

The likelihood of the particular element being impacted (*i.e.* the P(S:H) is also estimated by the terrain

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<sup>1</sup> BC Ministry of Forests. (2004). *Landslide Risk Case Studies in Forest Development Planning and Operations*. Victoria: Crown Publications.

## APPENDIX A RISK ASSESSMENT METHODOLOGY

professional conducting the assessment provided they are familiar with conditions downslope of any proposed forest operations.

The partial risk analysis completed for this project was done using qualitative means and the ratings used in this analysis are defined in Tables 1 to 3 below.

**Table 1: Qualitative and quantitative descriptors for landslide likelihood (P(H))**

Landslide Likelihood P(H)	Qualitative Descriptor	Quantitative Descriptor	
		Annual Probability P(H) <sub>a</sub>	20 Year Probability P(H) <sub>20</sub>
<b>Very High</b>	A landslide <b>is imminent</b>	> 1/10 (>1/20)	> 0.88 (>.64)
<b>High</b>	A landslide <b>is probable</b> over the lifespan of the proposed development.	1/20 to 1/100	0.64 to 0.18
<b>Moderate</b>	A landslide <b>is not likely, but possible</b> over the lifespan of the proposed development.	1/100 to 1/500	0.18 to 0.04
<b>Low</b>	The likelihood of a landslide <b>is remote</b> , over the lifespan of the proposed development.	1/500 to 1/2500	0.04 to 0.01
<b>Very Low</b>	The likelihood of a landslide <b>is very remote</b> over the lifespan of the proposed development	< 1/2500	< 0.01

\*Note that the lifespan of the proposed development is different for roads and for cutblocks. A cutblock lifespan is typically estimated at 20 years or until the time that a second growth stand is developed. A road lifespan is dependent on temporary or permanent status. The lifespan of a temporary road is estimated at 5 years while a permanent road lifespan is estimated at 25 years.

**Table 2: Qualitative and quantitative descriptors for spatial probability (P(S:H))**

Likelihood of a Spatial Impact P(S:H)	Qualitative Descriptor	Quantitative Descriptor (Probability)
<b>Very High</b>	It is <b>certain</b> that a landslide will impact an element at risk	> 0.8
<b>High</b>	It is <b>probable</b> that a landslide will impact an element at risk	0.8 to 0.5
<b>Moderate</b>	It is <b>possible</b> that a landslide will impact an element at risk	0.5 to 0.3
<b>Low</b>	It is <b>unlikely</b> that a landslide will impact an element at risk	0.3 to 0.1
<b>Very Low</b>	It is <b>very unlikely</b> that a landslide will impact an element at risk	< 0.1

## APPENDIX A RISK ASSESSMENT METHODOLOGY

**Table 3: Qualitative Risk Matrix for Partial Risk (from LMH 56 ref)**

P(HA), probability (likelihood) of occurrence of a specific hazardous landslide and it reaching or otherwise affecting the site occupied by a specific element; i.e. $P(HA) = P(H) \times P(S:H)$		P(S:H) Probability (likelihood) that the landslide will reach or otherwise affect the site occupied by a specific element, given that the landslide occurs		
		High	Moderate	Low
P(H), annual probability (likelihood) of occurrence of a specific hazardous landslide	<b>Very High</b>	<i>Very High</i>	<i>Very High</i>	<i>High</i>
	<b>High</b>	<i>Very High</i>	<i>High</i>	<i>Moderate</i>
	<b>Moderate</b>	<i>High</i>	<i>Moderate</i>	<i>Low</i>
	<b>Low</b>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
	<b>Very Low</b>	<i>Low</i>	<i>Very Low</i>	<i>Very Low</i>

**Example:**

The following is an example of a risk analysis in order to illustrate the relationship between P(H), P(S:H), P(T:S), and P(HA).

- 1.The terrain stability professional determines that a section of steep terrain contained within a cutblock is estimated to have a **Moderate** likelihood of a post harvest landslide up to 1000m<sup>3</sup> in size and 0.10ha in aerial extend (i.e the P(H)= Moderate).
- 2.The section of terrain is located 100m upslope of a fish bearing creek and the terrain is generally moderately steep down into the creek. The terrain stability professional estimates that there is a **High** likelihood that the landslide will reach the fish bearing creek if it occurs (i.e. the P(S:H)=High).
- 3.Since the creek is stationary it will always occupy the runout path of the landslide and the P(T:S)=1.
- 4.Using the Qualitative Risk Matrix a **P(H)=Moderate** and a **P(S:H) x P(T:S)=High** yields a **P(HA) = High**.

This indicates that there is a high partial risk to fish bearing habitat in the S2 creek due to the proposed development. However, the degree of damage that the landslide could do to the stream or the impact on fish habitat (i.e. the vulnerability) has not been evaluated by the terrain professional. An estimation of Vulnerability would most likely require the input of other specialists. It is up to the licensee to determine the landslide consequence (vulnerability and worth), complete the specific risk analysis, determine if that risk is acceptable, and decide whether to proceed with any development based on that risk assessment.

# **APPENDIX B-2:**

**LETTER - TSA CORRECTION**



July 24, 2013

Jason Row  
Illecillewaet Development Corporation Limited Partnership  
P.O. box 963  
Revelstoke, BC  
V0E 2S0

**Re: Response to MFLNRO June 27, 2013 letter regarding Application for an Adventure Tourism License of Occupation, “Revelstoke Adventure Park” near Revelstoke, BC.**

This letter presents our response to the above noted letter from the MFLNRO indicating that the application license of Occupation for purposes of an adventure park submitted by Illecillewaet Development Corporation Limited Partnership has been disallowed, in part, due to the implied high risk expected to be posed by the proposed Greely Road.

At the request of Black Tie Properties LP, Onsite Engineering Ltd. (OEL) completed a terrain stability assessment for the Greely Road which is proposed to provide access to the proposed “Revelstoke Adventure Park” in the Greely Creek area approximately 7km east of Revelstoke, BC. The results of this assessment were presented in the report titled: “Terrain Stability Assessment for Greely Road,” dated June 7, 2012.

The June 27 letter from the MFLNRO indicates that part of the reason the application has been disallowed is because our terrain report indicates areas with high risk to both the CP rail tracks and Greely Creek, as well as the proposed road itself having a high risk of failure.

With respect to Greely Creek, it must be noted that there is a mistake in the report where the unnamed creek to the southeast of the proposed road is indicated as being Greely Creek. This is not correct. Greely Creek is located about 2.5km east of the proposed road and well outside of any risk posed by the road. Where the July 7, 2012 TSA report refers to “Greely Creek,” it should read “unnamed creek.” We apologize for this confusion. A revised report with this corrected and labeled “Revision 1” will be submitted.

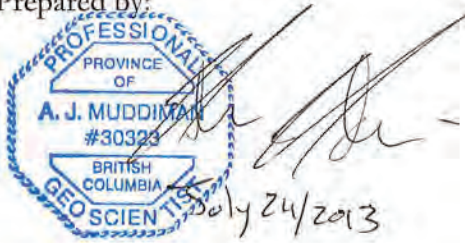
While our TSA report does indicate that there is potential for risk to certain elements such as the unnamed creek and the railway tracks, the report provides prescriptions to mitigate these risks. There are a number of areas where the likelihood of landslide is indicated as high if standard cut and fill road construction techniques are utilized. In each of these locations, road construction recommendations are provided in Table 1 that, if implemented successfully, are expected to result in a low likelihood of the initiation of a landslide.

The TSA report also indicates that construction supervision and confirmation of successful implementation of construction recommendations by a P.Eng, P.Geo or approved representative is

required for potential high risk sections. The client has indicated that we, or another professional engineering company, will be employed to provide this supervision.

We trust that this report satisfies your present requirements. Should you have any questions or comments, please contact our office at your convenience.

Sincerely,  
Onsite Engineering Ltd.  
Prepared by:



Adam Muddiman, P. Geo  
Project Engineering Geologist

# **APPENDIX B-3:**

## **ARCHAEOLOGICAL ASSESSMENT**



# Splatsin

PO Box 460, Enderby, BC V0E 1V0

Telephone: (250) 838-6496 \* Fax: (250) 838-2131

## Preliminary Field Reconnaissance

### Project Information

**Project:** Greely Property Development Preliminary Field Reconnaissance

**Proponent:** Black Tie Properties LP

**Proponent Contact:** Bill Black (250) 837-7969

**First Nations:** Splatsin

**First Nations' Contacts:** Splatsin: Cory Lee (250) 838-6496.

**Trim Map Reference:** 82M/010

**NTS:** 82M/01

**Location:** Illecillewaet River valley, Revelstoke, B.C.

**Report Author:** Ian Cameron, RPCA

**Report Date:** 30 November 2012

### Study Objectives

The objectives of the PFR described in this report were: (1) to assess the potential for archaeological sites including forest utilized sites comprised of CMTs within the proposed development area, and (2) to identify the need and appropriate scope of further archaeological field studies. The current PFR is not intended to identify areas in which no physical remains of past human activities can be found, such as berry picking sites and fishing locations, as the identification of these types of sites are more appropriately addressed in a Traditional Use Study (TUS).

### Methodology

**PFR/AOA Source:** (1) Published and unpublished ethnographic and archaeological literature sources; (2) data on previously recorded sites as stored in the Provincial Heritage Resource Inventory accessed via the Remote Access to Archaeological Data (RAAD); (3) TRIM and NTS (1:50,000) maps.

**Assessment:** For this assessment, information was derived from a background literature review, and a TRIM-based topographic map (82M.010) obtained via RAAD. Based on the review of these documents, recommendations are made regarding the need for further archaeological work in respect of this project.

**Survey Crew:** Ian Cameron (Field Director, Ursus), Gerry Narcisse (Splatsin).

**Survey Date:** July 17, 2012

**Traverse Type:** Judgmental

**Traverse Width:** 40-60 m

**Forest District:** Selkirk



## Greely Property Development PFR

**Field Survey Methodology Description:** The field survey consisted of a two person field crew traversing the project area. Ground surfaces were examined for the presence of artifacts, cultural materials, and other evidence of past human settlement and land use. Tree throws were also examined visually for such evidence. Standing trees, fallen logs and stumps were examined for the presence of cultural modification. Bedrock exposures and boulders were inspected for pictographs and petroglyphs as well as for the possible presence of seams of flakable lithic raw materials. Landforms, vegetation, aspect, and sources of potable water were noted in the field. See Figure 2 for location of survey traverses.

### Recorded Site Information

No archaeological sites are located within the proposed project area. No previously recorded archaeological sites are located within a five kilometre radius of the project area.

### Development

The project area consists of the Greely property and surrounding Crown land which is located by the confluence of Greely Creek and the Illecillewaet River, 12 km east of Revelstoke, B.C. The proposed project area has an area of approximately 120 hectares (Figure 1).

### Field Survey Results & Assessment of Archaeological Potential

The terrain at this location was steep to level with a northern aspect. Disturbance by land clearing, logging, farming, railway construction, road construction was observed throughout the project area. Quarrying activities were observed in the southwest quadrant. A large section of the Greely property consists of cleared farm fields.

The southern side of the project area is fairly steep with slopes ranging from 20 to 70%. Forest cover in this area consists primarily of Douglas fir with little undergrowth (though blueberry and thimbleberry was observed in patches). The terrain was highly disturbed by quarrying activities, logging and road building (Figure 5). Archaeological potential was determined to be low along the south side of the project area due to its predominantly steep ground (Figure 6), high level of disturbance, young age of the tree stand and lack of landscape features commonly associated with archaeological sites.

In the northern side of the project area, a high potential zone was identified along the southern river terrace by the south shore of the Illecillewaet River. Greely Creek runs into the Illecillewaet River, west of this high potential area. The high potential area consists of one large level bench with several smaller level terrace edges nearby. The area which should be inspected under a Section 14 Heritage Inspection Permit is approximately 1000 m x 150 m and has a northwestern aspect. Tree cover at this location consists of western redcedar, western hemlock, cottonwood and birch. Ground cover consists of Saskatoon berry, cow parsnip, huckleberry, thimbleberry, devil's club, twisted stalk and alder. See Figure 1 for the location of the high archaeological potential area.

No archaeological sites were identified during the field assessment of the project area. As the forest is predominantly immature, there is low potential for the presence of protected culturally modified tree sites.

### Recommendation

For the high archaeological potential zone located in the northeast part of the project area, it is recommended that an archaeological impact assessment with subsurface testing take place at the level benches and terraces by the Illecillewaet River and wetland near the east side of the project area (Figures 1 to 3). The rest of the project area is considered to have low archaeological potential and no further archaeological work is recommended outside of the area of archaeological potential indicated in Figure 1.

## Greely Property Development PFR

### Site Protection

Archaeological sites that pre-date 1846 are automatically protected under the *Heritage Conservation Act (HCA)* whether public or private land. Sites that are of an unknown age that have a likely probability of dating to prior to 1846 (i.e., lithic scatters) as well as aboriginal pictographs, petroglyphs, and burials which are considered to have historical or archaeological value are also automatically protected. Sites that are protected under the *HCA* may not be altered, damaged, moved, excavated in, or desecrated in any way without a permit issued under Section 12 or 14 of the *HCA*.

### Note

The preliminary field reconnaissance is concerned with potential impacts to archaeological resources by the development of the Greely Property, south of the Illecillewaet River, east of Revelstoke. It does not address potential impacts to traditional use sites by this development. It is not the intent of this report to document First Nations' interest in the land. The study was conducted without prejudice to First Nations' treaty negotiations, Aboriginal rights, or Aboriginal title.

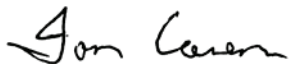
The possibility that any unidentified sites may be identified within the proposed development is considered to be low. However, in the event that any archaeological remains not identified during the preliminary field reconnaissance are identified, it is recommended that:

- The proponent should halt all activities in the immediate vicinity of the previously unidentified site and promptly inform the Archaeology Branch, Ursus, and the appropriate First Nations of the location of the previously unidentified site and the nature of the disturbance. Management recommendations regarding emergency impact mitigation will then be determined in consultation with the Archaeology Branch and the appropriate First Nations.

For more information on this review of archaeological potential, please contact the report authors.



Cory Lee, Title and Rights Project Manager, Splatsin



Ian Cameron, MSc, RPCA

2012 November 30

Date

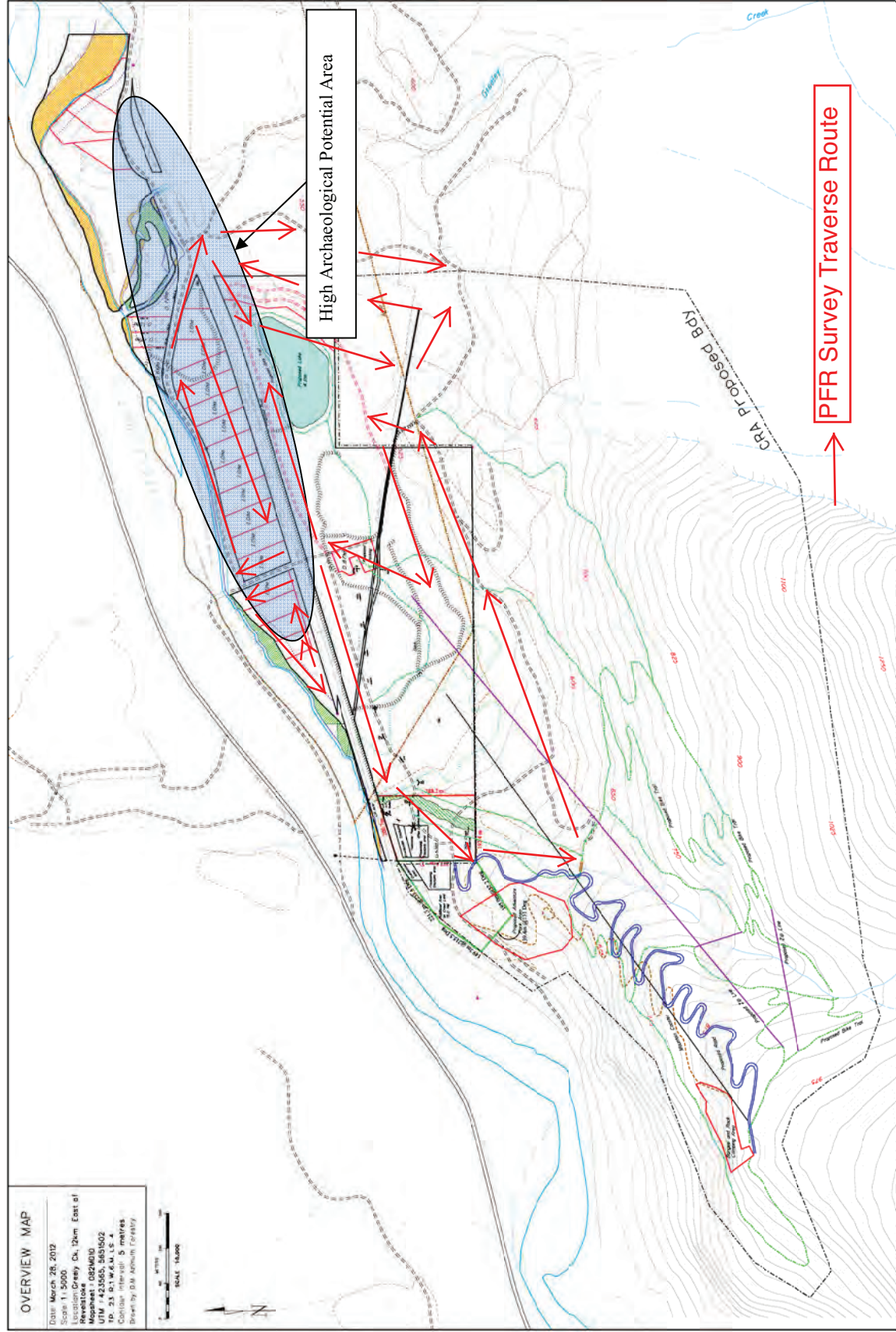


Figure 1. Greely Property Development Plan, and high archaeological potential area.



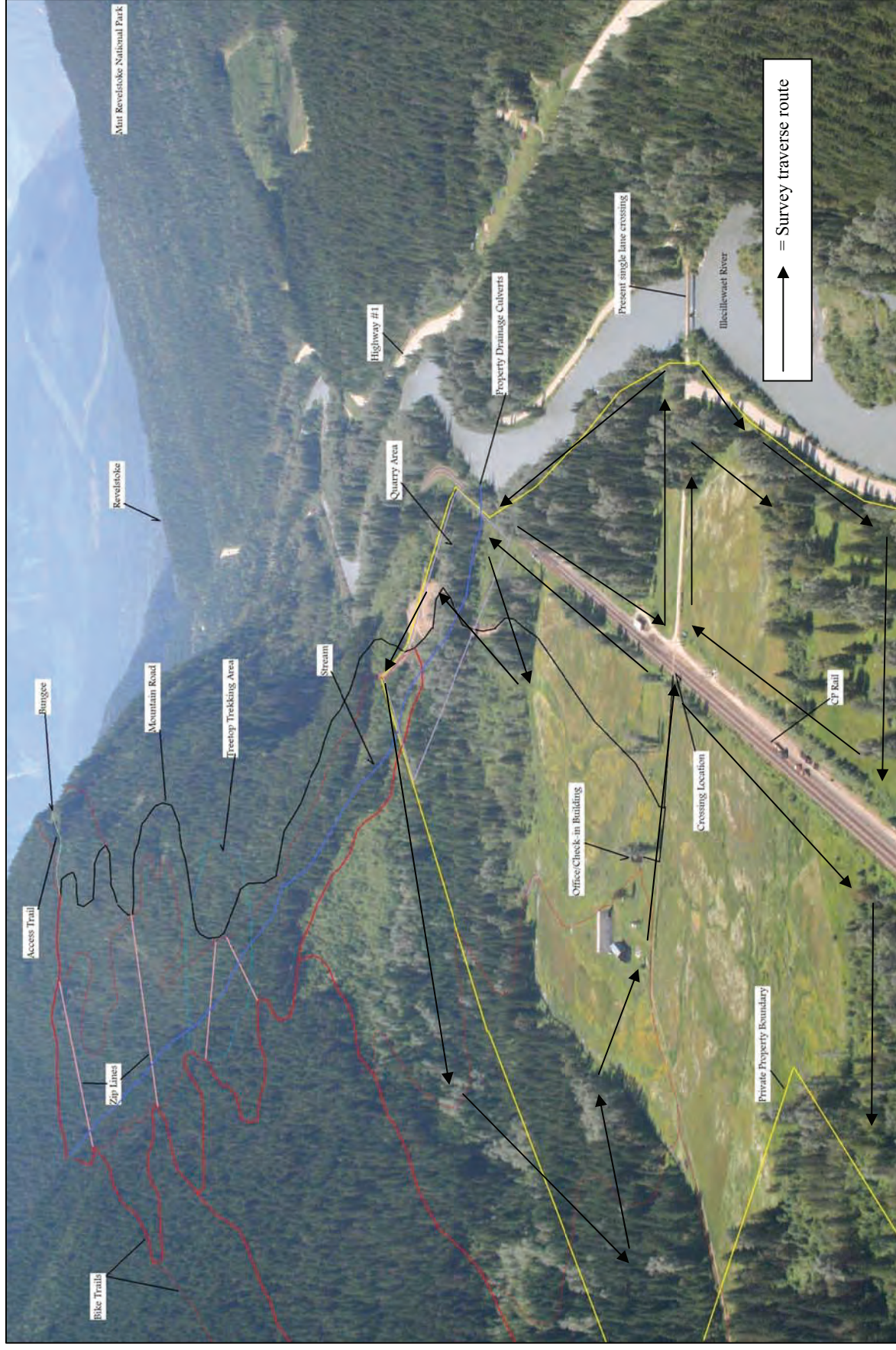


Figure 2. View west of Greely Development Property, and survey traverse route.





Figure 3. View northwest of high archaeological potential area and south terrace of Illecillewaet River.



Figure 4. View north from railway of high archaeological potential area and south terrace of Illecillewaet River.





Figure 5. View south of gravel quarry in southwest quadrant of project area.



Figure 6. View northeast of proposed zipline corridor in southwest quadrant of project area.

# **APPENDIX B-4:**

## **WILDLIFE OVERVIEW ASSESSMENT**



# **WILDLIFE OVERVIEW ASSESSMENT**

**Revelstoke Adventure Park:  
Greely, B.C.  
SEC Project No. 007-02**

**April 7, 2014**

**Revision 1: July 13, 2016**

**SUBMITTED TO:**

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## **Acronyms**

CDC	Conservation Data Centre
CP	Canadian Pacific
CSRD	Columbia Shuswap Regional District
DSF	Dry Seral Forest
MRNP	Mount Revelstoke National Park
MW	Marsh Wetland
OGF	Old Growth Forest
PTA	Proposed Tenure Area
RAP	Revelstoke Adventure Park
RSS	Regionally significant species
SARA	Species at Risk Act
SCH	South Columbia Herd (of Mountain Caribou)
SMC	Species of Management Concern
SW	Swamp Wetland
TCH	Trans-Canada Highway
WSF	Wet Seral Forest

## Executive Summary

Illecillewaet Development Limited Partnership (Proponent) intends to develop the proposed Revelstoke Adventure Park (RAP), a summer recreation and activity centre in Greely, B.C. The footprint of the RAP includes private land and Crown land (hereafter referred to as the Property). An application seeking tenure rights to a 282-hectare parcel of Crown land adjacent to the private land is in progress (hereafter referred to as the Proposed Tenure Area (PTA)). The centre of operations and the area of greatest development for the RAP would be on private land between the PTA and the Illecillewaet River, land owned by the Proponent. Lands within the PTA would be used for recreational activities (e.g., mountain biking, zip-lining, hiking, tree-top walking, wildlife viewing, etc.).

The Property is found within the Interior-Cedar Hemlock biogeodimatic zone and is generally comprised of old growth forest, wet and dry seral forests, swamp and marsh wetlands, and agricultural lands. The Property sustains wildlife habitat and there is a likelihood of occurrence of numerous regionally significant species (RSS) and species of management concern (SMC), including grizzly bear (*Ursus arctos*), wolverine (*Gulo gulo*), little brown bat (*Myotis lucifugus*), northern bat (*Myotis septentrionalis*), western toad (*Anaxyrus boreas*), Lewis's woodpecker (*Melanerpes lewis*) and lark sparrow (*Chondestes grammacus*); full species lists are detailed in this report.

In September and October 2013, SEC Shearing Environmental Consultants (SEC) conducted five days of field assessments at the Property. The objective of the field assessments was to observe wildlife species (i.e., birds, mammals and herptiles) and to determine the likelihood of wildlife occurrence within identified habitat types. Habitat types were determined based on plant occurrences and biogeophysical properties. The Property was divided up into 12 unique habitat polygons. This report includes a summary of the biophysical characteristics sustained within each habitat polygon, wildlife species observed and that have a likelihood of occurrence on the Property, wildlife features (e.g., snags, burrows) and dominant vegetation, including remarks on potentially rare plant species. Species accounts of RSS and wildlife SMC likely to occur on the Property are presented. A species account of Harlequin ducks (*Histrionicus histrionicus*) is presented to address potential impacts from proposed river rafting operations on the Illecillewaet River, an activity included in the RAP.

Impact avoidance and mitigation strategies are presented to reduce and/or limit impacts to wildlife. The RAP is currently in preliminary design stage. With adequate preplanning and integration and implementation of impact avoidance and mitigation strategies, impacts to wildlife associated with the RAP can be avoided and/or reduced.

SEC has been retained by the Proponent to assist with future environmental assessments required for later phases of the project (e.g., Riparian Areas Regulations, Water Act permits, Wildlife Act permits).

## **Acknowledgments**

SEC would like to thank Angela Korsa (Field Technician), John Woods (Revelstoke biologist), Ian Brown (Parks Canada), Cory Legebokow (Provincial habitat biologist), Marlene Machmer (Pandion Ecological Research), Dora Gunn (Ktunaxa Nation Council), Verena Blasy (Revelstoke botanist), Brad Rota (local trapper), and Katrina Stipec (Conservation Data Centre) for providing valuable insights into this Wildlife Overview Assessment.



## 1.0 Introduction

Illecillewaet Development Limited Partnership (Proponent) seeks to develop the proposed Revelstoke Adventure Park (RAP), a summer recreation and activity centre. The footprint of the RAP includes private land and Crown land (hereafter referred to as the Property). An application seeking tenure rights to a 282-hectare parcel of Crown land adjacent to the private land is in progress (hereafter referred to as the Proposed Tenure Area (PTA)). The first submission to Front Counter BC was sent July 22, 2013<sup>1</sup> and focused primarily on the business offerings.

The centre of operations for the RAP would be on private land between the proposed tenure area (PTA) and the Illecillewaet River, land owned by the Proponent. Lands in the PTA would be used for recreational activities (e.g., mountain biking, zip-lining, hiking, tree-top walking, wildlife viewing, etc.). All recreational offerings are listed in Table 1.

Table 1 Listing of Recreational Activities at the Revelstoke Adventure Park		
PHASE ONE (Year 1)	Mountain Biking Trails	Mountain Bike Rental and Repair Shop
	Hiking Trails	Mountain Shuttle Service
	Zip Lines	Equipment Facility
	Bungee Jump	Retail Shop
	Tree Top Adventures	
PHASE TWO (Years 2 - 5)	Mountain Coaster	Fishing
	Rock Climbing	Swimming
	Sky Swing	Driving Range
	First Nations Cultural Centre	Beach Volleyball
	Ogo Park	Pump Park
	Sightseeing	Full-Service Mountain Lodge
	Horseback Riding	Chairlifts
	Fishpipe	RV Park and Campground
	Rafting	

First Nations with territorial claim that includes the Proposed Tenure Area (PTA) were solicited for comments by the province. Comments were received seeking additional information on the potential impacts to wildlife and their habitats associated with the RAP<sup>2</sup>. SEC Shearing Environmental Consultants (SEC) was retained by the Proponent to assess the Property and to prepare an wildlife overview assessment (Assessment) of wildlife attributes sustained within and adjacent to the Property, specifically potential wildlife species, habitat types and habitat features of management concern or regional significance, and to propose impact mitigation strategies for avoiding and/or reducing impacts to wildlife and their habitats. The assessment primarily focuses only lands within the Property, depicted on the Location Map (Appendix A).

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<sup>1</sup> Illecillewaet Development LP. 2013. *Revelstoke Adventure Park: Management Plan*. Illecillewaet Development LP, Revelstoke, B.C.

<sup>2</sup> Gunn, D. 2013. *Revelstoke Adventure Park*. Ktunaxa Nation Council – Lands and Resource Agency, Cranbrook, B.C.

However, comment is also provided on select species identified by First Nations as species of concern that fall outside of the Property (e.g., Harlequin Ducks, Mountain Caribou, etc.).

The assessment is based on information gathering (i.e., a literature review and discussions with local and regional wildlife specialists and stakeholders) and 5 days of field assessments (i.e., September 20, 27 and 28 and October 4 and 5, 2013). The report presents the findings of the assessment.

## 1.1 Background

Wildlife abundance and diversity has decreased significantly over the past 50 years since completion of the TransCanada through Roger's Pass in 1962. A reduction in wildlife has occurred as a result of vehicle and train collisions, fragmented migration corridors, land development, increased recreational pressures, hunting, forestry, mining and increased competition for food, along with diverging predator/prey interactions (e.g., wolf predation on caribou over moose). A notable example is the decline of the South Columbia herd (SCH) of Mountain Caribou. For each of the 4 subpopulations within the Columbia Forest District, a 57% decline was observed between 1997 and 2002<sup>3</sup>. Only 7 individuals within the SCH were observed in 2011 compared with 120 in the early 1990s<sup>4</sup>. Future land development, including the RAP, must endeavor to balance economic development with ecological sensitivities. A regional decrease in wildlife abundance and diversity makes protection of current wildlife populations critical.

In 2009, Revelstoke Mountain Resort, located on Mount Mackenzie, applied to the Mountain Resorts Branch to extend their Controlled Recreation Area (CRA) to include lands adjacent to the Greely Watershed. This extension was approved and includes a major component of PTA that would be utilized by the RAP; two additional areas to the east and west of the existing CRA are proposed (see Location Map, Attachment A).

## 1.2 Project Setting

The Property is located approximately 10 km east of the City of Revelstoke (see Location Map, Attachment A). The Property is within the municipal boundaries of the Columbia Shuswap Regional District (CSRD). It is generally bound to the north by the Canadian Pacific (CP) railway tracks, the Illecillewaet River, the Trans-Canada Highway (TCH) and the north slope of Mount Revelstoke National Park (MRNP), to the west by crown land and the City of Revelstoke municipal boundary, to the south by crown land and the CRA for Revelstoke Mountain Resort and crown land and the Greely Creek Watershed to the east.

The Property is located on the south slope of Mount Mackenzie within the Illecillewaet River Basin, part of the Selkirk Mountain range. The Property is within the Interior Cedar-Hemlock

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<sup>3</sup> **Furk, K. and J. Flaa. 2009.** *Population Census of Caribou in the North Columbia Mountains – Columbia South Populations*. Parks Canada, Revelstoke, B.C.  
[http://www.env.gov.bc.ca/wildlife/wsi/reports/4231\\_WSI\\_4231\\_RPT7.PDF](http://www.env.gov.bc.ca/wildlife/wsi/reports/4231_WSI_4231_RPT7.PDF).

<sup>4</sup> **Parks Canada. 2013.** *Mount Revelstoke and Glacier National Parks: Research and Monitoring Summary 2007-2011: Five Years in the Field*. Parks Canada, Revelstoke, B.C.

(ICH) biogeoclimatic zone, sub-zone wk1 (Wells Grey Wet Cool)<sup>56</sup>. The Illecillewaet River and associated riparian lands, in addition to the south valley aspect of Mount Revelstoke National Park is within the ICH subzone mw3 (i.e., Thompson Moist Warm). The area is considered an inland temperate rainforest with average annual precipitation averaging 950 mm.

Soils are generally comprised of humo-ferric podzols, part of the Argonaut soil association in the valley bottom (i.e., rapid draining fluvial material with unrestricted rooting depth to 150 cm), the Kuskanax and Kirbyville associations between 600-900 m (i.e., rapid draining fluvioglacial material with unrestricted rooting depth to 150 cm) and the Blaylock association from 900 to 1300 m (i.e., well draining colluvium over bedrock with unrestricted rooting depth to 120 cm)<sup>7</sup>.

The biophysical characteristics of the delineated habitat polygons are presented in Section 2.4. Species accounts for regionally important species and species at risk are presented in Sections 2.1, 2.2, 2.3 and for rare plants in 2.5.

### 1.3 Assessment Objective

The objective for the wildlife assessment was developed to address objectives stated in the letter from the Front Counter British Columbia (B.C.) to Illecillewaet Development LP (Mr. J. Roe) dated June 27, 2013 regarding the “Application for an Adventure Tourism Licence of Occupation “Revelstoke Adventure Park” Near Revelstoke, B.C.” (letter). From the letter, SEC prepared the following Wildlife Assessment objective:

*Conduct an overview assessment of the listed and regionally significant species, wildlife habitats and wildlife features (e.g. wildlife trees) on the Property and present measures for avoiding, mitigating and/or compensating for impacts resulting from proposed land development.*

The objective of this wildlife overview assessment is therefore achieved by assessing the general biophysical attributes of the Property through field visits and determining the likelihood of occurrence, either through onsite observation or office-based research, of species, habitats and unique habitat features (e.g., wildlife trees) of regional significance or management concern that may occur on the Property (Section 2.0) and the presentation of impact mitigation strategies (Section 3.0).

### 1.4 Methodology

The assessment is based on a literature review and discussions with local, regional and provincial wildlife specialists and stakeholders. Google Earth® air photos were used to identify survey sites for 5 days of reconnaissance field assessments and to delineate habitat polygons. The 2 components of the methodology include: information gathering (Section 1.4.1) and the field assessment (Section 1.4.2), detailed below.

---

<sup>5</sup> **MFLNRO. 2011.** Biogeoclimatic Zones of British Columbia Map. Victoria, B.C.

<sup>6</sup> **Province of BC. 2013.** IMapbc. Search layers: biogeoclimatic cartography layers. Accessed online: <http://webmaps.gov.bc.ca/imfx/imf.jsp?site=imapbc>

<sup>7</sup> **DeDominicis, S. 1996.** *Environmental Overview Greely Creek Watershed*. Agra Earth and Environmental, Revelstoke, B.C.

#### 1.4.1 Information Gathering

Information gathering included a review of pertinent literature and mapping resources and discussions with local, regional and provincial habitat and wildlife specialists, including Parks Canada, the Ministry of Forests, Lands and Natural Resource Operations, the Conservation Data Centre, the Ktunaxa Nation Council, local biologists and a registered holder of the trap-line for the Greely area.

The information gathering exercise was undertaken to determine the species and habitat types that may be encountered prior to conducting the field assessments in September and October 2013. The following online sources were consulted:

- The Conservation Data Centre online map. A 10 km radius was used to evaluate potential ecosystems and SMC occurring within or adjacent to the PTA.
- The provincial Ecosystems Explorer website was consulted for information on local occurrences of SMC.
- Biogeoclimatic zones were taken from ImapBC.

Biophysical inventories of habitats and wildlife species are generally lacking in the Revelstoke area, specifically within and immediately adjacent to the Property. Observations detailed in reports from Mount Revelstoke National Park and Agra Environmental were used in the absence of existing inventories of the Property.

#### 1.4.2 Field Assessments

As part of the assessment, two SEC staff conducted site surveys September 20, 27 and 28 and October 4 and 5, 2013. Field surveys September 20, 27 and October 4 occurred from approximately 09:30 hours to 17:00 hours. Field surveys September 28 and October 5 occurred from approximately 08:00 hours to 15:00 hours. In total, 5 days and 36.5 hours were spent surveying the Property; lands within the PTA were the primary focus of field assessments.

Surveying involved traversing large areas of the site with a high precision Garmin handheld GPS (maximum 3 meter resolution). At points of interest, GPS waypoints and 1 or more photographs were taken along with detailed notes. A Canon digital SLR was used for taking photographs.

Wildlife species of interest included the following taxonomic groups:

- Birds
- Mammals
- Herptiles (reptiles and amphibians)

In addition, dominant and/or conspicuous plant species were recorded to assist with identification of wildlife habitats. Section 2.5 presents a summary of 2 rare plant species that may occur on the Property.

Observations of biophysical attributes (e.g., vegetation type, terrain) were made for each habitat type. Habitat types were divided into the following categories for the purpose of this assessment:

- Forests



- Old Growth Forest
  - Dry Seral Forest
  - Wet Seral Forest
- Wetlands
  - Marsh Wetland
  - Swamp Wetland
- Agricultural Lands
- Rock Quarry
- Cliffs (i.e., slopes greater than 80°)

The locations of wildlife species and wildlife features observed during the assessment were record using the GPS. Where possible, photographs were taken. An effort was made to locate and record all wildlife species and wildlife features found during the field assessment. An effort was made to locate the following wildlife features:

- Wildlife trees / snags (e.g. dead snags used by woodpeckers, bats, etc.)
- Mammal burrows and dens
- A mineral lick or wallow
- Animal movement corridors

## 2.0 Results

The following sections present the results of the Assessment, including:

Section	Category
2.1	Birds
2.2	Mammals
2.3	Herptiles
2.4	Habitat types
2.5	Rare plants

### 2.1 Birds

From 2008 to 2012, 173 breeding bird species (191 birds in total) were recorded in the Revelstoke area<sup>8</sup>. Of the 173 breeding species identified in the Revelstoke area, 29 were identified as either regionally rare or rare in B.C. Table 1 presents breeding bird records for the Revelstoke area, their current level of provincial and federal designation as species of concern management and a list of the species likely to use lands within the proposed Revelstoke Adventure Park at time during breeding. This list does not include migrants that visit the Revelstoke area but do not breed (e.g., white pelican (*Pelecanus erythrorhynchos*)).

**Table 2. List of provincially or regionally rare breeding birds in the Revelstoke area observed between 2008 and 2012 and their provincial and federal protection status (Data Source: BC Bird Breeding Atlas) and their likelihood of occurrence on the Revelstoke Adventure Park property. November 20, 2013.**

ID	Common Name	Species Name	BC Status	COSEWIC / SARA Status	BCBRA Status	Likelihood of Occurrence at RAP
LASP	Lark Sparrow	<i>Chondestes grammacus</i>	Red <sup>3</sup>	-	† <sup>10</sup>	Y
PRFA	Prairie Falcon	<i>Falco mexicanus</i>	Red <sup>3</sup>	NAR <sup>6</sup>	† <sup>10</sup>	N
SWHA	Swainson's Hawk	<i>Buteo swainsoni</i>	Red <sup>3</sup>	-	† <sup>10</sup>	Y
LEWO	Lewis's Woodpecker	<i>Melanerpes lewis</i>	Red <sup>3</sup>	T / T <sup>8</sup>	† <sup>10</sup>	Y
OSFL	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Blue <sup>2</sup>	T / T <sup>8</sup>	† <sup>10</sup>	Y
BOBO	Bobolink	<i>Dolichonyx oryzivorus</i>	Blue <sup>2</sup>	T <sup>8</sup>	† <sup>10</sup>	N
RNPL	Red-necked Phalarope	<i>Phalaropus lobatus</i>	Blue <sup>2</sup>	C <sup>4</sup>	† <sup>10</sup>	N
SEOW	Short-eared Owl	<i>Asio flammeus</i>	Blue <sup>2</sup>	SC <sup>7</sup>	† <sup>10</sup>	Y
RUBL	Rusty Blackbird	<i>Euphagus carolinus</i>	Blue <sup>2</sup>	SC / SC <sup>7</sup>	† <sup>10</sup>	Y

<sup>8</sup> BC Bird Breeding Atlas. 2013. Species List for Region #27. BC Bird Breeding Atlas, Victoria, B.C. Accessed online: [www.birdatlas.bc.ca](http://www.birdatlas.bc.ca)

Table 1. cont.						
ID	Common Name	Species Name	BC Status	COSEWIC / SARA Status	BCBRA Status	Likelihood of Occurrence at RAP
SUSC	Surf Scoter	<i>Melanitta perspicillata</i>	Blue <sup>2</sup>	-	‡ <sup>9</sup>	N
AMBI	American Bittern	<i>Botaurus lentiginosus</i>	Blue <sup>2</sup>	-	† <sup>10</sup>	N
GBHE	Great Blue Heron	<i>Ardea herodias herodias</i>	Blue <sup>2</sup>	-	‡ <sup>9</sup>	Y
BWHA	Broad-winged Hawk	<i>Buteo platypterus</i>	Blue <sup>2</sup>	-	† <sup>10</sup>	Y
AMAV	American Avocet	<i>Recurvirostra americana</i>	Blue <sup>2</sup>	-	† <sup>10</sup>	N
HADU	Harlequin Duck	<i>Histrionicus histrionicus</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
TUVU	Turkey Vulture	<i>Cathartes aura</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
MODO	Mourning Dove	<i>Zenaida macroura</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
NHOW	Northern Hawk Owl	<i>Surnia ulula</i>	Yellow <sup>1</sup>	NAR <sup>6</sup>	‡ <sup>9</sup>	Y
GGOW	Great Gray Owl	<i>Strix nebulosa</i>	Yellow <sup>1</sup>	NAR <sup>6</sup>	‡ <sup>9</sup>	Y
LEOW	Long-eared Owl	<i>Asio otus</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
BOOW	Boreal Owl	<i>Aegolius funereus</i>	Yellow <sup>1</sup>	NAR <sup>6</sup>	‡ <sup>9</sup>	Y
BLSW	Black Swift	<i>Cypseloides niger</i>	Yellow <sup>1</sup>	C <sup>4</sup>	‡ <sup>9</sup>	Y
WEKI	Western Kingbird	<i>Tyrannus verticalis</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
ROWR	Rock Wren	<i>Salpinctes obsoletus</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
MAWR	Marsh Wren	<i>Cistothorus palustris</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
TEWA	Tennessee Warbler	<i>Oreothlypis peregrina</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
BKPW	Blackpoll Warbler	<i>Dendroica striata</i>	Yellow <sup>1</sup>	-	‡ <sup>9</sup>	Y
BUOR	Bullock's Oriole	<i>Icterus bullockii</i>	Yellow <sup>1</sup>		‡ <sup>9</sup>	Y
ECDO	Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	N/A <sup>5</sup>	N/A <sup>5</sup>	† <sup>10</sup>	Y

<sup>1</sup> Includes species that are secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.

<sup>2</sup> Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

<sup>3</sup> Includes any indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

<sup>4</sup> C = CANDIDATE: A species that is on the short-list for upcoming assessment.

<sup>5</sup> N/A = No information available.

<sup>6</sup> NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.

<sup>7</sup> SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

<sup>8</sup> T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed.

<sup>9</sup> A rare species regionally.

<sup>10</sup> A rare species in B.C.

Species accounts are presented for individual bird species listed either as provincially *endangered* (i.e., red listed) or federally *threatened* or *endangered*. In addition, an account of Harlequin duck is presented as it was identified in the First Nations comment as a species of interest as a result of proposed river rafting operations on the Illecillewaet River.



## 2.1.1 Lark Sparrow (*Chondestes grammacus*)

### 2.1.1.1 Current Status

Lark Sparrow is provincially listed as *endangered* (red listed); there is currently no federal protection designation. Lark sparrow is known to occur in the ICH and within CSRD, and is considered a seasonal resident and breeder specifically around Revelstoke<sup>9</sup>. Possible breeding occurrences in the Revelstoke area (shown in orange) are depicted on the BC Bird Breeding Atlas (BBBA) map; Figure 1.

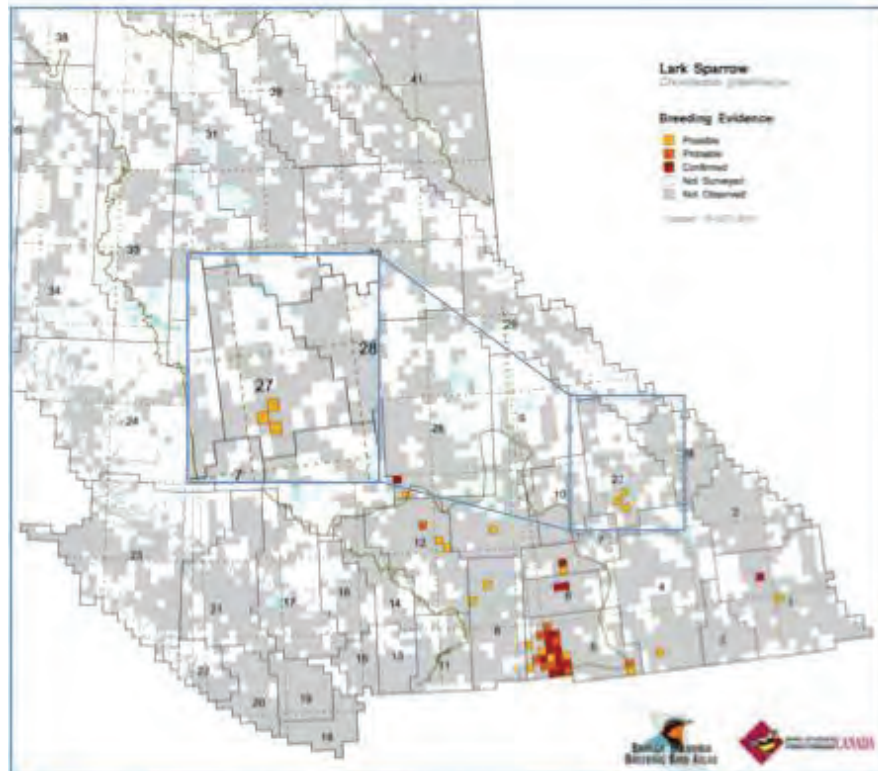


Figure 1. BC Bird Breeding Atlas map depicting 2008-2012 occurrences of Lark Sparrow. Inset map shows Lark Sparrow breeding occurrences in the Revelstoke area.

### 2.1.1.2 Habitat

Lark Sparrows are known to breed in various habitat types found on the Property, including open meadows with scattered bushes and trees; old and cultivated fields; shrub thickets; woodland edges, riparian areas and brushy and overgrazed pastures<sup>9</sup>. Nests are typically found on the ground or within 4 m of the ground in woody vegetation.<sup>9</sup>

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<sup>9</sup> Ministry of Environment. 2013. BC Conservation Data Centre: Species Summary: *Chondestes grammacus*: Lark Sparrow. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

#### **2.1.1.3 Potential Impacts**

Potential impacts include loss of preferred habitat for breeding and foraging and potential destruction of nests, eggs and chicks resulting from land clearing. Impact mitigation strategies for avoiding and reducing impacts to birds including Lark Sparrows are presented in Section 3.1.

## 2.1.2 Swainson's Hawk (*Falco mexicanus*)

### 2.1.2.1 Current Status

Swainson's Hawk is provincially listed *endangered* (red listed); there is currently no federal protection designation. Swainson's Hawk is known to occur in the ICH and within the CSRD, and is considered a transient around Revelstoke<sup>10</sup>. Possible breeding occurrences in the Revelstoke area (shown in orange) are depicted on the BBBA map; Figure 2.

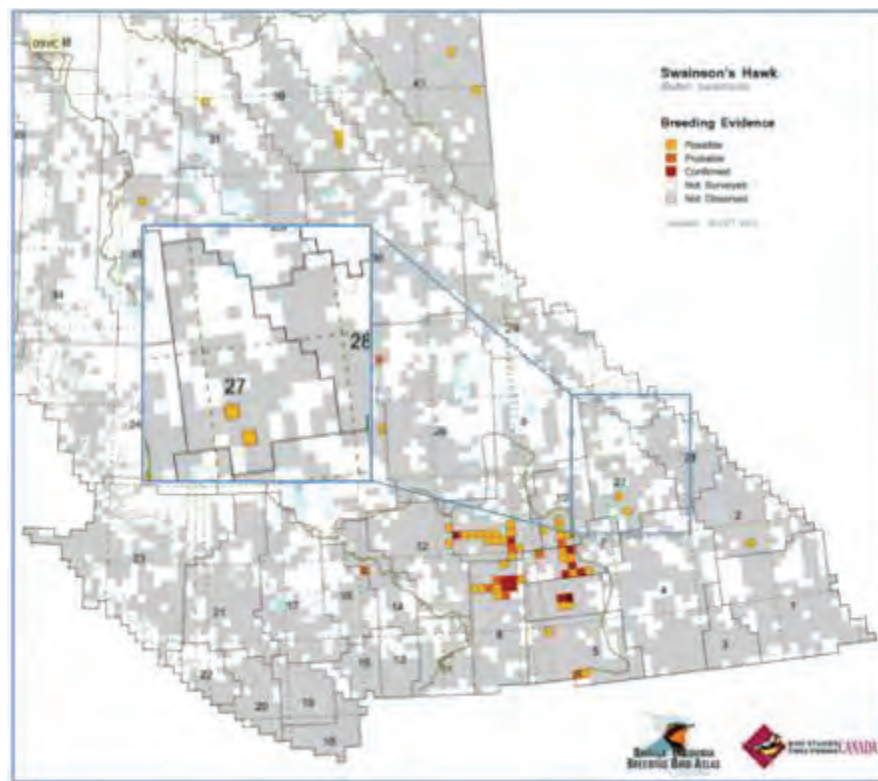


Figure 2. BC Bird Breeding Atlas map depicting 2008 to 2012 occurrences of Swainson's Hawk. Inset map shows Swainson's Hawk breeding occurrences in the Revelstoke area.

### 2.1.2.2 Habitat

Swainson's Hawk utilizes open habitat typically in mountainous areas, plains or prairies. Nest sites include holes or well-sheltered ledges on rocky cliffs or at sites with overhanging protection from direct sunlight. Swainson's Hawk may also use the old nests of eagles, hawks and ravens. Dry land wheat fields may be used in the winter for foraging. Generally, large land areas with low vegetation such as agricultural fields characterize utilized habitats. Forested habitat use by Canadian migrants is possible but rare<sup>10</sup>.

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<sup>10</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Falco mexicanus: Prairie Falcon.* B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

#### **2.1.2.3 Potential Impacts**

Potential impacts include loss of breeding and foraging habitat, potential destruction of nests, eggs and chicks resulting from land clearing. Impact mitigation strategies for avoiding and reducing impacts to birds including Lark Sparrows are presented in Section 3.1.



### 2.1.3 Lewis's Woodpecker (*Melanerpes lewis*)

#### 2.1.3.1 Current Status

Lewis's Woodpecker is provincially listed *endangered* (red listed) and is listed *threatened* by COSEWIC and under Schedule 1 of the federal Species at Risk Act (SARA). Lewis's Woodpecker is known to occur in the ICH is considered a seasonal resident and confirmed breeder within the CSRD<sup>11</sup>. Breeding occurrences in the Revelstoke area are not documented as depicted on the BBBA map; Figure 3. Lewis's Woodpecker is well documented in the South Columbia Mountains, Kootenay Basin, and Okanagan and was observed once between 2008 and 2013 in Region 2; although breeding was not confirmed<sup>11</sup>.

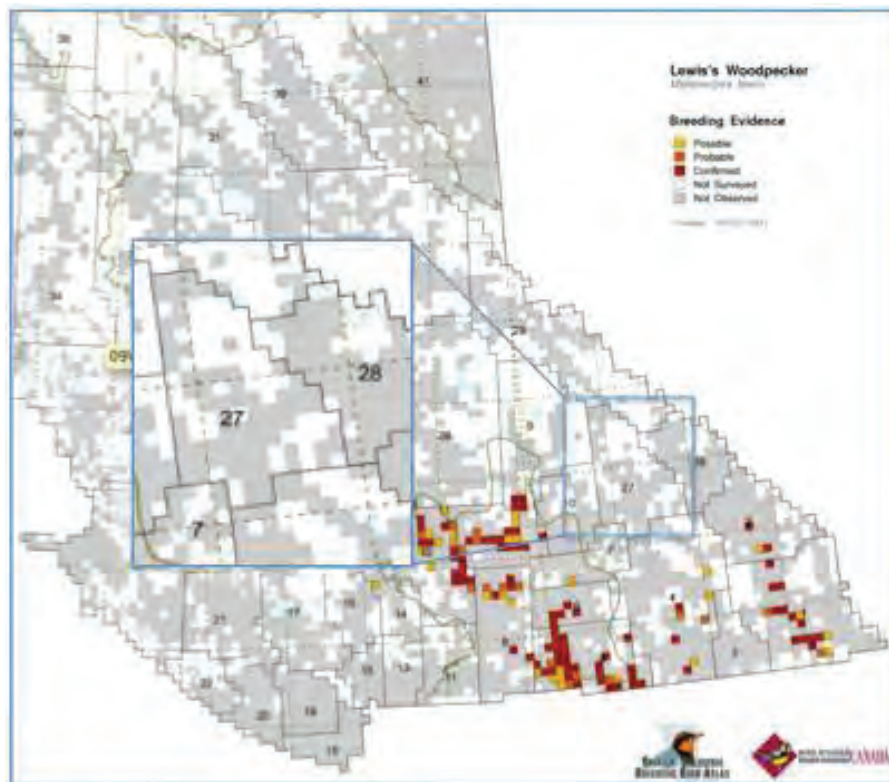


Figure 3. BC Bird Breeding Atlas map depicting occurrences of Lewis's Woodpecker. Inset map shows Lewis's Woodpecker breeding occurrences in the Revelstoke area.

#### 2.1.3.2 Habitat

Two (2) of three distinct breeding habitats types used in British Columbia are found on the Property: 1) open areas with scattered trees, and 2) riparian forests adjacent to open areas. Lewis's woodpecker unlike other woodpeckers uses abandoned and used nest holes or natural cavities 1 to 52 m above ground. Breeding normally occurs late in the breeding season, typically June, with nestlings fledging into late July. A mated pair may use the same nest site for multiple years<sup>11</sup>.

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<sup>11</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Melanerpes lewis: Lewis's Woodpecker.* B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

#### **2.1.3.3 Potential Impacts**

Potential impacts include loss of breeding and foraging habitat, including snags, and potential destruction of nests, eggs and chicks resulting from land clearing.

Impact mitigation strategies for avoiding and reducing impacts to birds including Lewis's Woodpecker are presented in Section 3.1.

## 2.1.4 Olive-sided Flycatcher (*Contopus cooperi*)

### 2.1.4.1 Current Status

Olive-sided Flycatcher is a provincially listed species of *special concern* (blue listed) and is listed *threatened* by COSEWIC and under Schedule 1 of the federal SARA. Olive-sided Flycatcher to occur in the ICH is considered a seasonal resident and confirmed breeder within the CSRD<sup>12</sup>. There are *possible*, *probable* and *confirmed* breeding occurrences in the Revelstoke area are depicted on the BBBA map; Figure 4.

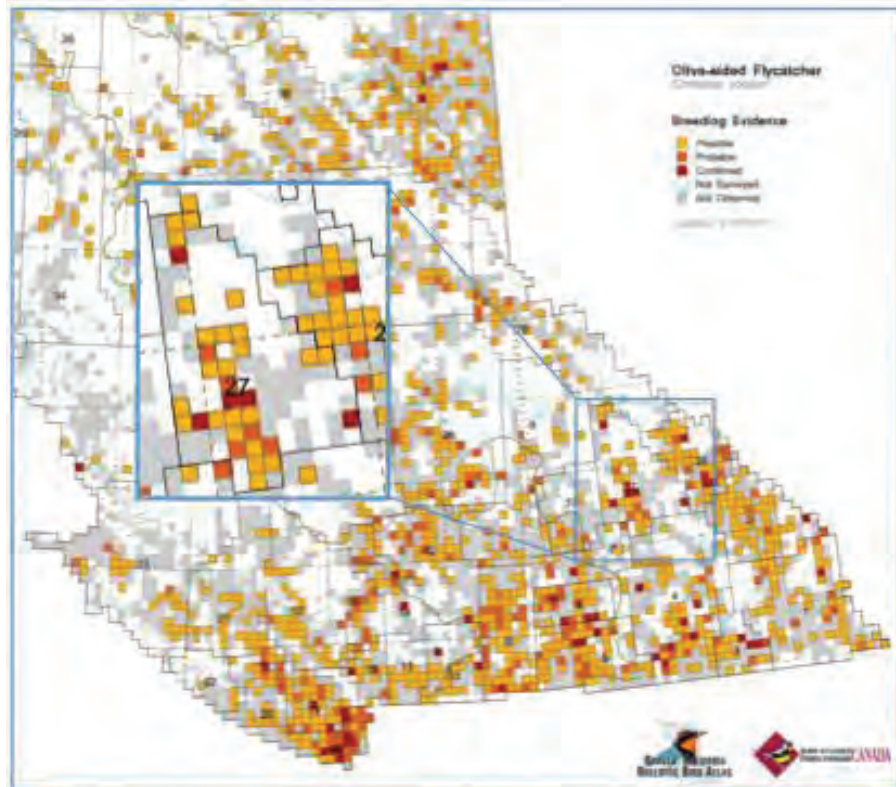


Figure 4. BC Bird Breeding Atlas map depicting occurrences of Olive-sided Flycatcher. Inset map shows Olive-sided Flycatcher breeding occurrences in the Revelstoke area.

### 2.1.4.2 Habitat

Olive-sided flycatchers are known to breed in habitats found on the Property, including mixed coniferous-deciduous forest, forested wetlands, and along the forested edges of lakes, ponds, and streams. Snags are found in most breeding sites and are used as singing and feeding perches. Nests usually occur on the horizontal limbs of conifers from 2 to 15 m above ground<sup>10</sup>.

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<sup>12</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Contopus cooperi: Olive-sided Flycatcher.* B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

#### **2.1.4.3 Potential Impacts**

Potential impacts include loss of breeding and foraging habitat and potential destruction of nests, eggs and chicks resulting from land clearing. Impact mitigation strategies for avoiding and reducing impacts to birds including Oliver-side Flycatchers are presented in Section 3.1.



## 2.1.5 Harlequin Duck (*Histrionicus histrionicus*)

### 2.1.5.1 Current Status

Harlequin Duck is provincially listed *apparently secure and not at risk of extinction* (Yellow listed) and is not listed by COSEWIC. Harlequin Duck is known to occur in the ICH is considered a seasonal resident and confirmed breeder within the CSRD<sup>13</sup>. Breeding occurrences in the Revelstoke area (shown in orange) are depicted on the BBBA map; Figure 5.

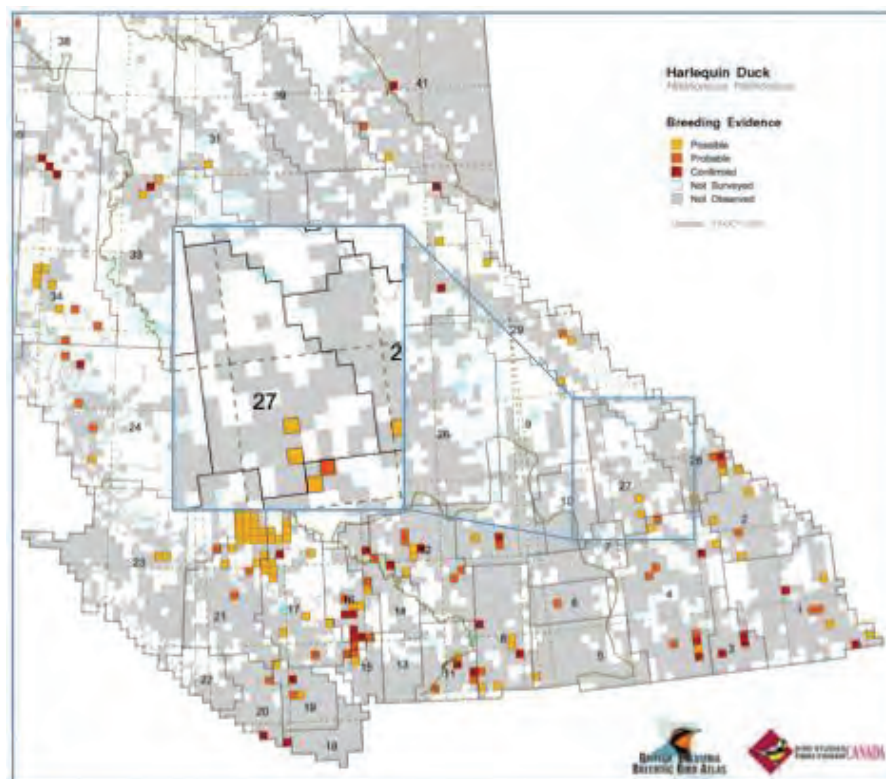


Figure 5. BC Bird Breeding Atlas map depicting occurrences of Harlequin Duck. Inset map shows Harlequin Duck breeding occurrences in the Revelstoke area.

### 2.1.5.2 Habitat

During breeding, Harlequin ducks nest on the islands or bars of fast moving rivers and mountain streams<sup>11</sup>. Eddies and calm water areas behind boulders and wood debris are used for loafing and cover. Riparian cover is generally greater than 50 percent. Harlequin duck nests are generally found within 30 m of water in a hollow under bushes or the interstitial space between boulders. The same nest site can be used for multiple years. During breeding, Harlequin ducks tend to stay close to their nest site. They can be difficult to spot during surveys.

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<sup>13</sup>Ministry of Environment. 2013. BC Conservation Data Centre: Species Summary: *Histrionicus histrionicus*: Harlequin Duck . B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

#### 2.1.5.3 Potential Impacts

The Proponent intends to offer river rafting on the Illecillewaet River as part of the RAP. SEC had a discussion with a current river rafting operator about occurrences of Harlequin Duck in the section of river currently used and in which the Proponent proposes to operate. The current operator, who runs up to 2 trips daily from June until August, did not recall any records of Harlequin Duck on the river (pers. comm. D. Koerber, Apex Rafting, Oct. 2013), with common mergansers (*Mergus merganser*) being the most commonly viewed species with occasional occurrences of wood duck (*Aix sponsa*).

Potential impacts within the current rafting tenure are not anticipated. Potential impacts therefore may result if river rafting operations are expanded to sections of the river not currently used in which there are occurrences of Harlequin Ducks.

Impact mitigation strategies for avoiding and reducing impacts to birds including Harlequin Ducks are presented in Section 3.1.

## 2.2 Mammals

The Revelstoke area has a broad array of mammal species. Detailed inventories of mammal species have been most frequent in MRNP and the “Revelstoke Reach” of Upper Arrow Lake (i.e., from Revelstoke to 12 Mile (16 km south of Revelstoke)). An environmental overview report for the Greely Watershed was prepared in 1996 by Agra Environmental. In this report is a detailed list of potential mammal species within the Greely Watershed. It is assumed that these same species could likely occur on the Property. Potential mammal species on the Property were also derived from Parks Canada’s Biotics Web Explorer for MRNP.

<b>Table 3. Mammalian species that occur in the ICH within the Revelstoke Area, a classification of provincial and federal species protection designation and the likelihood of occurrence at the Property. November 20, 2013. (Source: Biotics Web Explorer for Mount Revelstoke National Park and Agra 1996).</b>				
<b>Common Name</b>	<b>Species Name</b>	<b>BC Status</b>	<b>COSEWIC / SARA Status</b>	<b>Likelihood of Occurrence at RAP</b>
Mountain caribou	<i>Rangifer tarandus</i> pop. 1	Red <sup>3</sup>	T <sup>6</sup> / T <sup>6</sup>	N
Wolverine	<i>Gulo gulo luscus</i>	Red <sup>3</sup>	SC <sup>5</sup>	Y
American Badger	<i>Taxidea taxus</i>	Red <sup>3</sup>	E <sup>7</sup>	N
Northern myotis	<i>Myotis septentrionalis</i>	Blue <sup>2</sup>	E <sup>7</sup>	Y
Grizzly bear	<i>Ursus arctos</i> pop. 2	Blue <sup>2</sup>	SC <sup>5</sup>	Y
Fisher	<i>Martes pennant</i>	Blue <sup>2</sup>	-	Y
Red-tailed chipmunk	<i>simulans</i>	Blue <sup>2</sup>	-	Y
Mountain beaver	<i>Aplodontia rufa</i>	-	SC <sup>5</sup> / SC <sup>5</sup>	Y
Little brown myotis	<i>Myotis lucifugus</i>	Yellow <sup>1</sup>	E <sup>7</sup>	Y
Long legged myotis	<i>Myotis volans</i>	Yellow <sup>1</sup>	-	Y
Long-eared myotis	<i>Myotis evotis</i>	Yellow <sup>1</sup>	-	Y
California myotis	<i>Myotis californicus</i>	Yellow <sup>1</sup>	-	Y
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Yellow <sup>1</sup>	-	Y
Hoary bat	<i>Lasiurus cinereus</i>	Yellow <sup>1</sup>	-	Y
Snowshoe hare	<i>Lepus americanus</i>	Yellow <sup>1</sup>	-	N
North American Deer mouse	<i>Peromyscus maniculatus</i>	Yellow <sup>1</sup>	-	N
Red squirrel	<i>Tamiasciurus hudsonicus</i>	Yellow <sup>1</sup>	-	Y
Columbian Ground Squirrel	<i>Urocitellus columbianus</i>	Yellow <sup>1</sup>	-	Y
Coyote	<i>Canis latrans</i>	Yellow <sup>1</sup>	-	Y
Pacific Marten	<i>Martes caurina</i>	Yellow <sup>1</sup>	-	N
Mule Deer	<i>Odocoileus hemionus</i>	Yellow <sup>1</sup>	-	N
White-tailed deer	<i>Odocoileus virginianus</i>	Yellow <sup>1</sup>	-	Y
Moose	<i>Alces alces</i>	Yellow <sup>1</sup>	-	Y
Elk	<i>Cervus elaphus</i>	Yellow <sup>1</sup>	-	Y
Black bear	<i>Ursus americanus</i>	Yellow <sup>1</sup>	NAR <sup>4</sup>	Y
Northern Red-backed Vole	<i>Myodes rutilus</i>	Yellow <sup>1</sup>	-	Y
Cougar	<i>Puma concolor</i>	Yellow <sup>1</sup>	-	Y
Northern Gray Wolf	<i>Canis lupus</i>	Yellow <sup>1</sup>	NAR <sup>4</sup>	Y
Hoary marmot	<i>Marmota caligata</i>	Yellow <sup>1</sup>	-	Y
Common Muskrat	<i>Ondatra zibethicus</i>	Yellow <sup>1</sup>	-	Y

Table 2. cont.				
Common Name	Species Name	BC Status	COSEWIC / SARA Status	Likelihood of Occurrence at RAP
American Beaver	<i>Castor canadensis</i>	Yellow <sup>1</sup>	-	Y
golden-mantled ground squirrel	<i>Callospermophilus lateralis</i>	Yellow <sup>1</sup>	-	Y
North American Porcupine	<i>Erethizon dorsata</i>	Yellow <sup>1</sup>	-	Y
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Yellow <sup>1</sup>	-	Y
Mountain Goat	<i>Oreamnos americanus</i>	Yellow <sup>1</sup>	-	N
Canada lynx	<i>Lynx canadensis</i>	Yellow <sup>1</sup>	NAR <sup>4</sup>	Y
Striped skunk	<i>Mephitis mephitis</i>	Yellow <sup>1</sup>	-	Y
Western heather vole	<i>Phenacomys intermedius</i>	Yellow <sup>1</sup>	-	Y
Long-tailed Vole	<i>Microtus longicaudus</i>	Yellow <sup>1</sup>	-	Y
Meadow Vole	<i>Microtus pennsylvanicus</i>	Yellow <sup>1</sup>	-	Y
North American Water Vole	<i>Microtus richardsoni</i>	Yellow <sup>1</sup>	-	Y
Ermine	<i>Mustela erminea</i>	Yellow <sup>1</sup>	-	Y
Long-tailed weasel	<i>Mustela frenata</i>	Yellow <sup>1</sup>	-	Y
Least weasel	<i>Mustela nivalis</i>	Yellow <sup>1</sup>	-	Y
Yellow-pined chipmunk	<i>Neotamias amoenus</i>	Yellow <sup>1</sup>	-	Y
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	Yellow <sup>1</sup>	-	Y
American Mink	<i>Neovison vison</i>	Yellow <sup>1</sup>	-	Y
American Pika	<i>Ochotona princeps</i>	Yellow <sup>1</sup>	-	Y
Western Jumping Mouse	<i>Zapus princeps</i>	Yellow <sup>1</sup>	-	Y
Masked Shrew	<i>Sorex cinereus</i>	Yellow <sup>1</sup>	-	Y
Dusky Shrew	<i>Sorex monticolus</i>	Yellow <sup>1</sup>	-	Y
American Water Shrew	<i>Sorex palustris</i>	Yellow <sup>1</sup>	-	Y
Vagrant Shrew	<i>Sorex vagrans</i>	Yellow <sup>1</sup>	-	Y
Northern bog Lemming	<i>Synaptomys borealis</i>	Yellow <sup>1</sup>	-	Y

<sup>1</sup> Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.

<sup>2</sup> Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

<sup>3</sup> Includes any indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

<sup>4</sup> NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.

<sup>5</sup> SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

<sup>6</sup> T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed.

<sup>7</sup> E = ENDANGERED: A species facing imminent extirpation or extinction.

Individual species accounts are presented for mammal species listed either as provincially *endangered* (i.e., red listed) or federally *threatened* or *endangered* that are likely to occur on the Property. Accounts of Mountain Caribou and Grizzly Bear are also included due to their regional significance.



## 2.2.1 Mountain Caribou (*Rangifer tarandus*)

### 2.2.1.1 Current Status

There are only 7 mountain caribou remaining in the Columbia South Herd (CSH)<sup>14</sup>. Mountain Caribou are provincially listed *Endangered* (red listed) and federally listed *Threatened* (SARA, Schedule 1).

### 2.2.1.2 Habitat

Woodland caribou of the CSH, part of the Southern Mountain Population have two annual migrations between high mountain elevation and valley bottom. In early winter, low elevation habitat is used, including the use of ICH forest ecosystem type found on the Property<sup>15</sup>. Into late winter, CSH migrate to and use subalpine forests dominated by Subalpine Fir (*Abies lasiocarpa*) with access to arboreal lichen. In Spring, CSH returns to lower elevation habitat, including ICH, to forage on emerging vegetation. In summer, CSH returns to higher elevation sites dominated by Subalpine Fir and Engelmann Spruce (*Picea engelmannii*). Home ranges vary from less than 100 to greater than 800 kilometers (km<sup>2</sup>)<sup>14</sup>.

### 2.2.1.3 Potential Impacts

Current range for the Columbia South Herd is defined by the Section 16 Land Act Map Reserves<sup>16</sup> on lands north of the TCH. The current range for CSH does not include the Property. The latest amendment to the Map Reserves occurred April 2013 and is considered valid until 2018.

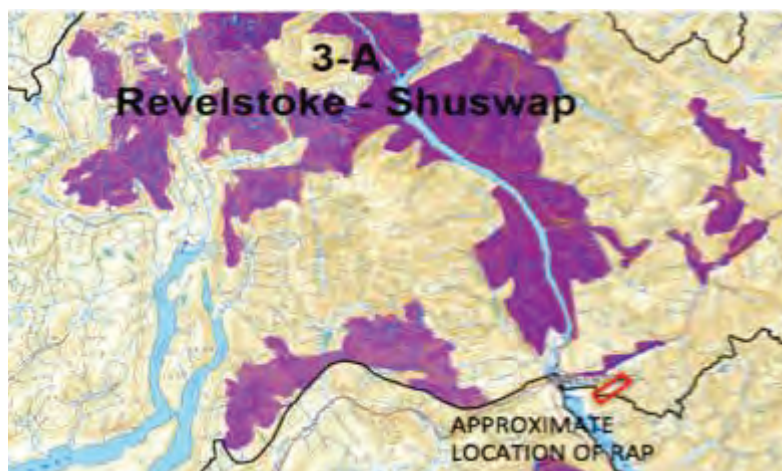


Figure 6 Revelstoke-Shuswap Planning Unit 3A. Map of Protected Mountain Caribou Range and the Approximate Location of the proposed Revelstoke Adventure Park (in bold red box).

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<sup>14</sup> **Parks Canada. 2013.** *Mount Revelstoke and Glacier National Parks: Research and Monitoring Summary 2007-2011: Five Years in the Field.* Parks Canada, Revelstoke, B.C.

<sup>15</sup> **BC Conservation Data Centre. 2013.** BC Conservation Data Centre: Species Summary *Rangifer tarandus* pop. 1 Caribou (Southern Mountain Population). Conservation Data Centre, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=16822>

<sup>16</sup> **Ministry of Environment. 2013.** *Mountain Caribou Recovery: Planning Unit 3A Map.* Ministry of Environment, Victoria, B.C. Accessed online: [http://www.env.gov.bc.ca/wld/speciesconservation/mc/pdf\\_maps/mc\\_section16\\_revelstoke-shuswap20090220.pdf](http://www.env.gov.bc.ca/wld/speciesconservation/mc/pdf_maps/mc_section16_revelstoke-shuswap20090220.pdf)

Given extremely low CSH population numbers, use of the Property is very unlikely. In the event of population augmentation as part of a recovery strategy (e.g., as is being done with the Columbia North Herd although not currently planned for the CSH), lands within the RAP could be later considered part of an expanded spring and early winter range. However, significant fragmentation of their migration corridor by the TCH, the Illedillewaet River and private lands that bind the northern edge of the PTA, make use of the RAP by an augmented CSH challenging at best. Given the seasonality of the RAP (i.e., late May to October), it is likely that the RAP would not affect use of ICH habitat by an augmented CSH.

## 2.2.2 Wolverine (*Gulo gulo sub. luscus*)

### Current Status

Wolverine of the subspecies *luscus* are provincially and federally (COSEWIC) listed *Special Concern*. The occurrence of wolverine in the CSRD is certain, with a classification of predicted or probable in the Revelstoke area<sup>17</sup>. Wolverines have been observed in the Greely Watershed adjacent to the RAP by a local trapper (pers. comm. B. Rota, Oct. 2013) and in Mount Revelstoke National Park. In 2012, Parks Canada commenced a study to better understand the seasonal movement of wolverines; preliminary finds are not currently available.

#### 2.2.2.1 Habitat

Regionally, the wolverine commonly spends its summers in the sub-alpine and winters down in the ICH<sup>18, 19</sup>. Krebs and Lewis (1999) observed that the presence of “carriion from avalanche-killed ungulates, other predator kills, and the presence of nutritionally stressed moose and goats...” explain the extensive use of the ICH during winter<sup>19</sup>. A 1999 study found that wolverine females in the Columbia Mountains den in the Engelmann Spruce-Sub Alpine Fir Ecoregion<sup>17</sup>, outside of the ICH.

Regionally, male home ranges have been found to be approximately 1,000 km<sup>2</sup> compared with females at 300 km<sup>2</sup> FN. Home range boundaries are generally defined by terrain features such as ravines and anthropogenic habitat fragments such as reservoirs and highways<sup>18</sup>. Wolverines have been known to cross the Trans-Canada Highway between Revelstoke and Rogers Pass, including one record of vehicle-caused mortality<sup>18</sup>.

#### 2.2.2.2 Potential Impacts

Potential impacts to wolverines include human caused mortality resulting from hunting, transportation and human-wildlife conflict (e.g., garbage attractants and human / food conditioning). Other potential impacts to wolverines include the loss of migration corridors and undeveloped refuge to back-country use, snowmobiling and logging.

Use of lands within the RAP will occur from May to October. The seasonality of recreational activities in the ICH from this project will likely not result in significant impacts to wolverines. Wolverines will still be able to migrate and take refuge on the Property during winter and spring. In summer, wolverines are known to migrate upslope to higher terrain<sup>18</sup>. Impact mitigation strategies for avoiding and reducing impacts to mammals including wolverines are presented in Section 3.2.

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<sup>17</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Gulo gulo: Wolverine*. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

<sup>18</sup> **Van Tighem, K.J. and L.W. Gyug. 1984.** *Ecological Land Classification of Mount Revelstoke and Glacier National Parks, British Columbia: Vol. II: Wildlife Resources*. Environment Canada. Produced by the Canadian Wildlife Service, Edmonton, AB.

<sup>19</sup> **Krebs, J.A. and D. Lewis. 1999.** *Wolverine Ecology and Habitat Use in the North Columbia Mountains: Progress Report*. Columbia Basin Fish and Wildlife Compensation Program, Nelson, B.C. Accessed online: <http://www.env.gov.bc.ca/wld/documents/ca08krebs.pdf>

### 2.2.3 Northern Myotis (*Myotis septentrionalis*)

### 2.2.3.1 Current Status

Northern myotis (a.k.a. northern long-eared myotis) is provincially listed *Special Concern* (Blue Listed) and federally listed *Endangered* by COSEWIC<sup>20</sup>. Northern myotis is known to occur in the CSRD with specific occurrences in the Revelstoke area<sup>20</sup>. Figure 8 shows known locations of northern myotis in the Revelstoke area.

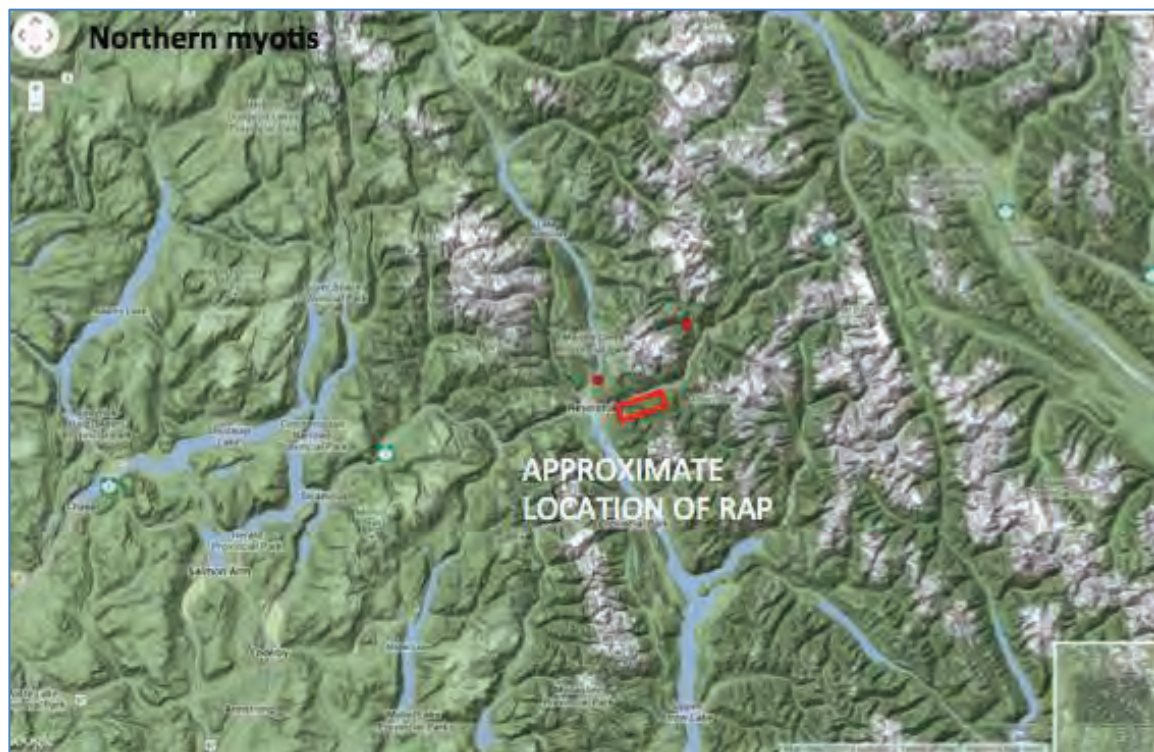


Figure 7. BC Ecosystems Explorer map depicting occurrences of Northern myotis (*Myotis septentrionalis*) in the Revelstoke area (red dots) and the approximate location of the proposed Revelstoke Adventure Park (bold red box).

### 2.2.3.2 Habitat

Northern myotis makes use of wet and dry coniferous forests and riparian forests including the ICH Ecoregion<sup>20</sup>. Caves, mines, quarry tunnels and human structures (e.g., cabins, barns) are common hibernaculum. Use of the cave-of-origin (high philopatry) throughout a lifetime is common for northern myotis. Common daytime roosting sites include crevices, hollows, under loose bark on trees or in a variety of small spaces associated with buildings and other structures, possibly including barns on the property. In northern regions like Revelstoke, hibernation occurs from early fall into spring<sup>20</sup>.

Foraging typically occurs after sunset in forested habitats, above and below the canopy. Foraging also occurs over water and clearings but was found to be more common on treed

<sup>20</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Myotis septentrionalis: Northern Myotis.* B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>



hillsides<sup>19</sup>. In MRNP, northern myotis has been observed in Giant Cedar's boardwalk and in low elevation sites in the park<sup>21</sup>.

#### 2.2.3.3 Potential Impacts

During field assessments, steep terrain was traversed in sections of the PTA that may be suitable habitat for northern myotis. Large interstitial crevices between boulders on steep slopes were found. Although caves were not found, their occurrence is possible. There is a large barn on the agricultural section of the property that may be suitable hibernaculum.

Potential impacts to northern myotis include disturbance to suitable hibernaculum and the hillslopes and meadows this species depends on for foraging. Impact mitigation strategies for avoiding and reducing impacts to mammals including northern myotis are presented in Section 3.2.

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<sup>21</sup> Van Tighem, K.J. and L.W. Gyug. 1984. *Ecological Land Classification of Mount Revelstoke and Glacier National Parks, British Columbia: Vol. II: Wildlife Resources*. Environment Canada. Produced by the Canadian Wildlife Service, Edmonton, AB.

## 2.2.4 Little Brown Myotis (*Myotis lucifugus*)

### 2.2.4.1 Current Status

Little brown myotis bats are provincially listed as *Secure* (Yellow Listed) and federally listed as *Endangered* by COSEWIC. Little brown myotis is known to occur in the Columbia Shuswap Regional District with specific occurrences in the Revelstoke area<sup>22</sup>

### 2.2.4.2 Habitat

Little brown myotis uses caves, tunnels, hollow trees and human-made structures (e.g., cabins, barns) as hibernaculum. Foraging generally occurs in woodlands near water. A narrow range of microclimate must be well suited for raising young, which is thought to limit abundance and distribution. Little brown myotis generally hibernates from early fall to early spring<sup>20</sup>.

Little brown myotis forages over water or along water margins (e.g., lakes and streams). They are most active during the first 2-3 hours after sunset and often have a secondary forage after midnight. In MRNP, little brown myotis has been observed at pools in the ICH Ecoregion<sup>23</sup>.

### 2.2.4.3 Potential Impacts

During field assessments, steep terrain was traversed in sections of the PTA that may be suitable habitat for little brown myotis. Large interstitial crevices between boulders on steep slopes were found. Although caves were not found, their occurrence is possible.

Potential impacts to northern myotis include disturbance to suitable hibernaculum and the hillslopes and riparian habitats this species depends on for foraging. Impact mitigation strategies for avoiding and reducing impacts to mammals including little brown myotis are presented in Section 3.2.

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<sup>22</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Myotis lucifugus: Little Brown Myotis*. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

<sup>23</sup> **Van Tighem, K.J. and L.W. Gyug. 1984.** *Ecological Land Classification of Mount Revelstoke and Glacier National Parks, British Columbia: Vol. II: Wildlife Resources*. Environment Canada. Produced by the Canadian Wildlife Service, Edmonton, AB.

## 2.2.5 Grizzly Bear (*Ursus arctos*)

### 2.2.5.1 Current Status

Grizzly bears are provincially and federally (COSEWIC) listed *Special Concern*. Grizzly bears are well known to occur in the Columbia Shuswap Regional District, with numerous occurrences in and around Revelstoke<sup>24</sup>.

### 2.2.5.2 Habitat

Grizzly bears are likely to utilize all habitat types found in the Property. After winter hibernation, grizzly bears in MRNP are known to use south-facing avalanche slopes and valley bottom forests for foraging in spring.<sup>25</sup> As berries become more abundant in summer, grizzly bears in MRNP were found to move into the subalpine and alpine meadows to forage. Hibernation can occur in dens at various elevations (pers. comm. J. Woods, Sept. 2013) in a “cave, crevice, hollow tree, hollow dug under rock, or similar site”<sup>22</sup>. Home ranges vary from less than 25 km<sup>2</sup> to 2000 km<sup>2</sup>.

### 2.2.5.3 Potential Impacts

Potential impacts to grizzly bear include disturbance to suitable foraging and resting habitat and human disturbance during operation of the RAP that may cause temporary displacement or access to important foraging areas and migration corridors. Impact mitigation strategies for avoiding and reducing impacts to mammals including grizzly bear are presented in Section 3.2.

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<sup>24</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Ursus arctos: Grizzly Bear*. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

<sup>25</sup> **Van Tighem, K.J. and L.W. Gyug. 1984.** *Ecological Land Classification of Mount Revelstoke and Glacier National Parks, British Columbia: Vol II: Wildlife Resources*. Environment Canada. Produced by the Canadian Wildlife Service, Edmonton, AB.

## 2.3 Herptiles

Table 1 outlines the potential herptiles (i.e., amphibians and reptiles) that may occur in the Property. The list of species in Table 3 was derived from Parks Canada's Biotics Web listings for MRNP and discussions with local wildlife specialists.

<b>Table 4. List of herptiles in the Revelstoke area, their provincial and federal protection status and their likelihood of occurrence on the Revelstoke Adventure Park Property. November 20, 2013.</b>				
<b>Common Name</b>	<b>Species Name</b>	<b>BC Status</b>	<b>COSEWIC / SARA Status</b>	<b>Likelihood of Occurrence at RAP</b>
Western Toad	<i>Anaxyrus boreas</i>	Blue <sup>2</sup>	SC <sup>5</sup>	Y
Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>	Yellow <sup>1</sup>	SC <sup>5</sup>	Y
Northern Alligator Lizard	<i>Elgaria coerulea</i>	Yellow <sup>1</sup>	NAR <sup>3</sup>	Y
Terrestrial Garter Snake	<i>Thamnophis elegans</i>	Yellow <sup>1</sup>	-	Y
Common Garter Snake	<i>Thamnophis sirtalis</i>	Yellow <sup>1</sup>	-	Y
Long-toed Salamander	<i>Ambystoma macrodactylum</i>	Yellow <sup>1</sup>	NAR <sup>3</sup>	Y
Boreal Toad	<i>Anaxyrus boreas boreas</i>	-	-	Y
Northern Pacific Chorus Frog	<i>Pseudacris regilla</i>	Yellow <sup>1</sup>	-	Y
Columbia Spotted Frog	<i>Rana luteiventris</i>	Yellow <sup>1</sup>	NAR <sup>3</sup>	Y

<sup>1</sup>. Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.

<sup>2</sup>. Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

<sup>4</sup>. NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.

<sup>5</sup>. SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

Individual species accounts are presented for herptile species listed federally as SMC.



### 2.3.1 Western Toad (*Anaxyrus boreas*)

#### 2.3.1.1 Current Status

Western toad is a provincially and federally (COSEWIC and SARA Schedule 1) listed *Special Concern*. Western toad is known to occur in the ICH within the CSRD, and is considered native to the Revelstoke area<sup>26</sup>. Occurrences of Lark Sparrow on the Property have not been confirmed.

#### 2.3.1.2 Habitat

Western Toads breed in water and then migrate onto land to overwinter. They travel up to 2 km from breeding sites. Western toad may utilize many of the habitats found on the Property, including shallow and calm water sites in temporary and permanent pools, wetlands, and roadside ditches and their associated riparian areas. Hibernacula are found in upland sites from breeding pools and are generally characterized by loose soil and burrows, although fallen trees have also been used for cover<sup>24</sup>.

#### 2.3.1.3 Potential Impacts

Although surveying this species can be very difficult and time consuming, it is important surveying be undertaken in suspected habitats to avoid potential impacts.

Potential impacts to Western Toad include loss of breeding and overwintering habitat resulting from land clearing. Increased vehicle and recreationalist traffic also possess a potential impact to migrating western toads. Impact mitigation strategies for avoiding and reducing impacts to herptiles, including Western Toad are presented in Section 3.3.

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<sup>26</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: Anaxyrus boreas: Western Toad*. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

### 2.3.2 Coeur d'Alene Salamander (*Plethodon idahoensis*)

#### 2.3.2.1 Current Status

Coeur d'Alene Salamander is a provincially listed *secure* (Yellow listed) and federally listed *special concern* by COSEWIC and under Schedule 1 by the SARA. Coeur d'Alene Salamander is known to occur in the ICH within the CSRD, and is considered native to the Revelstoke area<sup>27</sup>. Occurrences of Coeur d'Alene Salamander on the Property have not been confirmed.

#### 2.3.2.2 Habitat

Coeur d'Alene salamanders use 3 major habitat types in B.C., all of which are found on the Property, including waterfall spray zones and edges of streams, seepages, waterfalls and in streams. They are normally found within coniferous forests. They are nocturnal, and hide during the day. Interstitial crevices are used in the day during periods of temperature fluctuations that exceed their tolerance range and for overwintering.

#### 2.3.2.3 Potential Impacts

Although surveying this species can be very difficult and time consuming, it is important surveying be undertaken in suspected habitats to avoid potential impacts.

Potential impacts to Coeur d'Alene salamander include loss of breeding and overwintering habitat resulting from land disturbance. Impact mitigation strategies for avoiding and reducing impacts to herptiles, including Coeur d'Alene salamanders, are presented in Section 3.3.

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<sup>27</sup> **Ministry of Environment. 2013.** *BC Conservation Data Centre: Species Summary: **Plethodon idahoensis**: Coeur d'Alene salamander.* B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://a100.gov.bc.ca/pub/eswp/>

## 2.4 Habitat Accounts

This section presents a summary of biophysical attributes sustained within 15 habitat polygons within 8 identified habitat types. Habitat types consisted of old growth forest, dry and wet seral forest, marsh and swamp wetlands, agricultural lands, a quarry and a steep cliff band that was not surveyed. Conspicuous and dominant plant species for each habitat type is described. A full list of plant species observed during field assessments is found in Appendix E, Table 7. All wildlife observations are presented for each habitat type. Photographs referenced in the proceeding section are found in Appendix C. A list of all wildlife observations is found in Appendix D.



**Figure 8 Google Earth image of private and proposed Crown Tenure land within the footprint of the proposed Revelstoke Adventure Park. Colored polygons represent.**

Impact mitigation strategies for avoiding and reducing impacts to wildlife and their habitats are presented in Section 3.0, including strategies specific to land development in Section 3.4.

#### 2.4.1 Old Growth Forest (OGF)



**Figure 9. View South of Old Growth Forest polygon (green) within the proposed Revelstoke Adventure Park proposed tenure area. Red lines depict the proposed tenure area.**

Old growth forest (OGF) is an ecosystem component of lands within the Property. OGF lands are divided into 3 sections for descriptive purposes: OGF-East, OGF-Centre and OGF-West (Figure 10).

In general, land use activities proposed for OGF lands include mountain biking, zip-lines, bungee-jumping, hiking, wildlife viewing and associated amenities (e.g., washrooms and outbuildings in OGF-West). A chairlift is proposed to bring visitors from the valley bottom at approximately 500 m above sea level (ASL) to approximately 1000 m ASL. A new 2.8 km access road would be constructed in OGF-West to allow for construction access during assembly of the chairlift and staff-only vehicle serving during operation.

Forests in the Interior of BC are considered old growth if trees are greater than 120 years old<sup>28</sup>. In the ICH old growth forest stands of the PTA, western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) are commonly found with diameter breast-heights (DBH) of approximately 0.3 to 2 meters. Trees found with less frequency include Douglas fir (*Pseudotsuga menziesii* var. *glauca*), black spruce (*Picea mariana*) and western white pine (*Pinus monticola*).

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<sup>28</sup> **Ministry of Forests, Lands and Natural Resource Operations. 2003.** British Columbia's Forests, a Geographical Snapshot. Victoria, B.C. Accessed online at: <http://www.for.gov.bc.ca/hfd/pubs/docs/mr/mr112/page14.htm>



Trees in OGF generally fill the canopy ceiling, allowing marginal amounts of sunlight to penetrate the forest floor. The amount of forest floor vegetation therefore varies with the availability of sunlight (i.e., for photosynthesis). In certain areas, the forest floor consists predominately of decomposing wood (Photograph 1). Where light percolates through the canopy, vegetation on the forest floor consists predominately of mosses, lichens and low growing herbaceous plants, including conspicuous species such as rattlesnake plantain (*Goodyera oblongifolia*), falsebox (*Paxistim myrsinites*), oak fern (*Gymnocarpium dryopteris*), and spiny wood fern (*Dryopteris expansa*) (Photograph 2). In a few locations, fallen trees had opened the canopy allowing for growth of western yew (*Taxus brevifolia*), Devil's club (*Oplopanax horridus*), and lady fern (*Athyrium filix-femina* spp. *cyclosorum*).

Trees in the OGF are well spaced, which allowed for easy navigating and traversing during the field assessment. In general, tree roots in the OGF perched and morphed around boulders and significant tree fall was observed (Photographs 3, 4 and 5), indicating shallow soil layers. The poor growing medium for such large trees creates tree stands subject to windthrow.

Numerous small perennial and ephemeral streams flow through topographical depressions throughout the OGF. Additional plant species unique to these corridors included western maidenhair fern (*Adiantum aleuticum* var. *aleuticum*) and lady fern.

Two (2) major ravines cut through the PTA within the OGF (e.g. see Photograph 6). The largest western red cedar and western hemlock were found within these ravines. Additional plant species found within the ravines included devil's club, red elderberry (*Sambucus racemosa*), maidenhair fern, and horsetail (*Equisetum* spp.).

#### 2.4.1.1 OGF–East

OGF-East includes OGF east of an Unnamed Ravine East (URE). OGF-East is generally bound by the PTA boundary to the east and south, URE to the west and Dry Seral Forest 1 (DSF1; see Figure 9) to the north. An approximately 100 ft. cliff band is found immediately east of URE.

During the assessment, the only wildlife species seen was a Hairy Woodpecker (*Picoides villosus*). A burrow network belonging to an unidentified species (Photograph 7) and two wildlife trees snags were observed (Photograph 8).

#### 2.4.1.2 OGF–Centre

OGF-Centre comprises OGF between 2 major ravines, URE and Unnamed Ravine West (URW) (Photograph 6). OGF-Centre is generally bound by steep 200-300 ft. cliffs to the east (Photograph 9) (that convey runoff to URE), the PTA boundary to the south, URW to the west and approximately 300 ft. of steep terrain (> 50 % slope) to the north, before transitioning to wet and dry seral forest further north. The forest is comprised of dense canopy with smaller diameter trees on upland sites and larger diameter trees towards the two unnamed ravines. Proposed land use in OGF-Centre includes zip-lining and downhill mountain biking.

During the assessment, no wildlife species were observed. Wildlife attributes observed included deer droppings (Photograph 10), tracks, and snags / wildlife trees.

#### 2.4.1.3 OGF – West

OGF – West is generally bound by URW to the east, the PTA boundary to the south, cliffs to the west and dry seral forest to the north. Proposed land uses for this area mountain biking, zip-lines, bungee jumping and hiking and wildlife viewing and associated amenities (e.g., washrooms and outbuildings). An approximately 1 km long access road would allow for construction access and staff-only vehicle serving during operation.

OGF-West is characterized by steep terrain lacking flat terraces. The forest floor in OF-West consists of shallow soil and moss layers over large boulder complexes. Low growing shrubs, ground cover and shed vegetative parts (e.g., branches, trees, cones) comprised the forest floor.

Western red cedar and western hemlock range from large within the unnamed creek west (i.e., > 1 m DBH; Photograph 6) to small on steeper upland sites away from the ravine (i.e., <0.5 m DBH (Photograph 12). Smaller trees with an enclosed canopy dominate the footprint of the proposed access road that was flagged and walked during the field assessment.

During the field assessment, wildlife species in OGF-Centre were not observed. Wildlife attributes observed included moose and bear droppings, evidence of bear foraging (Photograph 11), small den spaces, burrow networks and snags.

#### 2.4.2 Dry Seral Forest (DSF)



**Figure 10. View South of Dry Seral Forest polygons within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.**

Dry Seral Forests (DSF) represents an intermediate stage of ecological succession known as secondary succession, where younger plants are found growing after disturbance (e.g., logging, wildfire). DSF are differentiated from Wet Seral Forests (WSF) because they lack plants suited to wet conditions (e.g., skunk cabbage). On the Property, DSF are generally located downslope of OGF. Logging access to upslope OGF was likely limited by a steep cliff band that is found at the transition between DSF and OGF and extending into the OGF (Photograph 14).

In this forest type, historical logging is evident by the presence of large stumps, primarily western red cedar. In some areas, signs of more recent logging are evident by the presence of smaller trees that were felled (Photograph 13). Access roads in various conditions are found throughout the DSF; some are drivable and others are not (i.e., rather in a successional state being reclaimed by emergent vegetation). Roadside ditches along the access roads act to collect water flowing off upland sites.

DSF is characterized by a mix of later successional tree assemblages within land historical logged (primarily for western red cedar), including western red cedar, western hemlock, Douglas fir, western yew, and large black cottonwoods (*Populus trichocarpa*) and younger tree assemblages dominated by black cottonwood saplings, paper birch (*Betula papyrifera* var. *communtata*), willow (*Salix* spp.). The shrub layer is dominated by red osier dogwood (*Cornus stolonifera*), red elderberry, thimbleberry (*Rubus parviflorus*), and Douglas maple (*Acer douglasii*). Groundcover is predominantly lady fern, spiny wood fern, falsebox, and various moss species.

#### 2.4.2.1 DSF1

DSF1 is generally bound by the PTA boundary to the east, OGF-East and OGF-Centre to the south, WSF1 to the west and north (Figure 11). Proposed land use in this area includes horseback riding and mountain biking.

Dominant tree species included including western redcedar, western hemlock, Douglas fir, and occasional western yew. Shrub layer species included red-osier dogwood, red raspberry (*Rubus idaeus* ssp. *strigosus*), thimbleberry, beaked hazelnut (*Corylus cornuta*), red elderberry, black gooseberry (*Ribes lacustre*), snowberry (*Symphoricarpos albus*), and prickly rose (*Rosa acicularis* ssp. *sayi*). Non-native shrubs found near old road margins included Canadian thistle (*Cirsium arvense*), Canadian goldenrod (*Solidago canadensis*) and great burdock (*Arctium lappa*). Groundcover species included spiny wood fern, bracken fern (*Pteridium aquilinum*), wild ginger (*Asarum caudatum*), American vetch (*Vicia americana*), large leaved avens (*Geum macrophyllum*), falsebox, bunchberry (*Cornus canadensis*), rattlesnake plantain, false-Salomon's seal (*Mainanthemum caremosum* ssp. *amplexicaule*), lungwort (*Lobaria pulmonaria*), false-hair capmoss (*Timmia austriaca*), step moss (*Hylocomium splendens*), and common horsetail (*Equisetum arvense*). Non-native groundcover species included red clover (*Trifolium pretense*), creeping buttercup (*Ranunculus repens*) and orange hawkweed (*Hieracium aurantiacum*).

During the assessment, Crow (*Corvus brachyrhynchos*) and Stellar's Jay (*Cyanocitta stelleri*) were observed. Wildlife attributes observed during the field assessment included moose droppings, evidence of bear foraging, burrow networks, animal tracks, and snags / wildlife trees.

#### 2.4.2.2 DSF2

DSF2 is generally bound by WSF1 to the east, OGF-Centre and OGF-West to the south, cliffs to the west and railway tracks to the north (Figure 11). Proposed land use in this area includes mountain biking, hiking, treetop adventures and part of the access road into OGF-West.

Dominant tree species included including western red cedar, western hemlock, Douglas fir, and occasional western yew. Shrub layer species included red-osier dogwood, red raspberry, thimbleberry, beaked hazelnut, red elderberry, black gooseberry, snowberry, and wild strawberry (*Fragaria virginiana*). Non-native shrubs found near old road margins included Canadian thistle, Canadian goldenrod and great burdock. Groundcover species included spiny wood fern, wild ginger, American vetch, large leaved avens, falsebox, bunchberry, rattlesnake plantain, false-Salomon's seal, lungwort, false-hair capmoss, step moss and common horsetail. Non-native groundcover species included red clover, creeping buttercup and orange hawkweed.

During the assessment, Black-capped chickadee (*Poecile atricapillus*), American crow and common raven (*Corvus corax*) were observed. Wildlife observations during the field visit included moose and coyote droppings, evidence of bear foraging, burrow networks, animal trails and snags / wildlife trees.



### 2.4.3 Wet Seral Forest (WSF)



**Figure 11. View South of Wet Seral Forest polygon within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.**

West Seral Forests (WSF) is differentiated from DSF by the presence of perennial streams and springs and the presence of plants that thrive in moist soils. The WSF is found at lower elevations than DSF and conveys groundwater flow day-lighting (i.e., from upslope areas with high porosity) through small channels into wetlands and road-side ditches downstream. The shrub layer is significantly denser than in DSF and OGF found on the Property (Photographs 15 and 16). Proposed land use in WSF includes mountain biking, hiking and restricted vehicle use on existing access roads.

Evidence of historical logging is apparent by large western red cedar stumps, many budding tree saplings. Trees are younger than those found in the OGF and included western red cedar, western hemlock and Douglas fir. Canopy closure ranges from closed to open (Photograph 15). The shrub layer included red elderberry, beaked hazelnut, red-osier dogwood, and devil's club. Groundcover plants tolerant to moist soils included horsetail, skunk cabbage (*Lysichiton americanus*), bracken fern, maidenhair fern, spicy conehead (*Conocephalum salebrosum*) liverwort and various mosses (Photograph 16).

#### 2.4.3.1 WSF1

WSF1 is generally bound by dry-land sites to the east (DSF1) and south (OGFC, DSF2), DSF2 and a rock quarry to the west, and private agricultural land to the north (i.e., lands included in the RAP). Proposed land use includes mountain biking, hiking and restricted vehicle use on existing roads.

During the assessment, Ruffed grouse, Steller's jay and red squirrel (*Sciurus vulgaris*) were observed. Wildlife observations during the field visit included moose and bear droppings, inactive dens with openings smaller and larger than 0.5m, animal trails and snags / wildlife trees.

#### 2.4.4 Marsh Wetland (MW)



**Figure 12. View south of Marsh Wetland polygons (orange) within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.**

Marsh wetlands (MWs) were identified in 3 locations throughout the Property. All three wetlands are considered marshes by formal classification (i.e., soil subsurface saturated due to presence of standing or slowly moving water characterized by emerging vegetation predominately reeds, rushes, cattails and sedges)<sup>29</sup>.

Wetlands in BC are regarded as critically important ecosystems for a wide range of wetland dependent wildlife<sup>30</sup>. Locally, wetland habitat loss resulted from formation of the Columbia River reservoirs and wetlands continue to face land-use pressures from development and infrastructure projects.

##### 2.4.4.1 MW1

MW1 is generally bound by Swamp Wetland (SW) 1 to the east, agricultural lands and WSF1 to the south, agricultural lands to the west and CP railway tracks to the north (Photograph 17). Proposed land use is unspecified at this time. There are no current plans for land development in MW1.

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<sup>29</sup> **Bond et al. 1992.** *Wetland Evaluation Guide: Final Report Of The Wetlands Are Not Wastelands Project. Issues Paper No. 1992-1.* North Americans Wetlands Conservation Council, Ottawa, ON. Accessed online: [http://www.env.gov.bc.ca/wld/documents/WEG\\_Oct2002\\_s.pdf](http://www.env.gov.bc.ca/wld/documents/WEG_Oct2002_s.pdf)

<sup>30</sup> **Ministry of Environment. 2013.** *Wetlands in B.C.* Victoria, B.C. Accessed online: <http://www.env.gov.bc.ca/wld/wetlands.html>

Dominant wetland vegetation included common horsetail, scouring rush (*E. hyemale* ssp. *affine*) and skunk cabbage. Common grasses include non-native species including common timothy (*Phleum pratense*) and orchard grass (*Dactylis glomerata*) among others.

Wildlife and wildlife attributes were not observed during field assessments.

#### 2.4.4.2 MW2

MW2 is immediately bound by SW2. MW2 is generally bound by WSF1 to the east, south and west and agricultural lands to the north. There are no current plans for land development in MW2.

A field of unidentified rush over 5ft in height dominates wetland vegetation (Photographs 18 and 19). Other less dominant vegetation that proliferated the WM2 margins included common horsetail, scouring rush and skunk cabbage, soft-stemmed bulrush (*Schoenoplectus tabernaemontani*) and cattail (*Typha latifolia*).

Wildlife and wildlife attributes were not observed during field assessments.

#### 2.4.4.3 MW3

MW3 is immediately bound by SW2. MW3 is generally bound by agricultural lands to the east, WSF1 to the south and the CP railway tracks and Illecillewaet River to the north (Photograph 20). Proposed land use in MW3 may include mountain bike trails but is currently unspecified.

Dominant wetland vegetation included common horsetail, scouring rush and skunk cabbage. Other dominant vegetation included paper birch, black hawthorne (*Crataegus douglasii*) pink spirea (*Spiraea douglasii* ssp. *menziesii*), stinging nettle (*Urtica dioica* ssp. *gracilis*), red-osier dogwood, and thimbleberry. Non-native plants included Canadian goldenrod, great burdock, curled dock, common timothy and orchard grass.

Wildlife observations during the field assessment included moose droppings and snags / wildlife trees.



#### 2.4.5 Swamp Wetland (SW)



Figure 13. View south of Swamp Wetland polygons (white) within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.

Swamp wetlands (SW) were identified in 2 locations throughout the Property. Both SW are considered swamps by formal classification (i.e., soil subsurface saturated due to presence of standing or slowly moving water characterized by deciduous and coniferous forest or tall shrub thickets; commonly found in temperate areas in Canada)<sup>31</sup>.

##### 2.4.5.1 SW1

SW1 is generally bound by crown land and the Greely Watershed to the east, WSF1 to the south, MW1 and agricultural land to the west, and the CP railway tracks and Illecillewaet River to the north (Photographs 21 and 22). Proposed land use includes a constructed pond and RV park. There is some flexibility with the final placement of amenities within SW1 (pers. comm. J. Roe, Oct. 2013).

Dominant wetland vegetation included common horsetail, scouring rush, skunk cabbage, small-flowered bulrush (*Scirpus microcarpus*), cow parsnip (*Heracleum maximum*) and common duckweed (*Lemna minor*). Other dominant vegetation included western redcedar, western hemlock, interior Douglas fir, black cottonwood, mountain alder (*Alnus incana* ssp. *tenuifolia*), trembling aspen (*Populus tremuloides*), pink spirea, stinging nettle, red-osier dogwood, thimbleberry, beaked hazelnut, snowberry, wild strawberry, prickly rose, Douglas maple,

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<sup>31</sup> Bond et al. 1992. *Wetland Evaluation Guide: Final Report Of The Wetlands Are Not Wastelands Project. Issues Paper No. 1992-1*. North Americans Wetlands Conservation Council, Ottawa, ON. Accessed online: [http://www.env.gov.bc.ca/wld/documents/WEG\\_Oct2002\\_s.pdf](http://www.env.gov.bc.ca/wld/documents/WEG_Oct2002_s.pdf)

baneberry, false-Salmon's seal and large leaved avens. Non-native plant species included meadow and creeping buttercup, orange hawkweed, common timothy, orchard grass, curled dock, great burdock, and Canadian thistle.

Wildlife observations during the field assessment included moose dropping and tracks, animal trails, and snags / wildlife trees. Ruffed grouse and American crow were also observed.

#### 2.4.5.2 SW2

Swamp wetland 2 is generally bound by WSF1 and agricultural lands to the east, WSF1 to the south and west and an access road (immediately north), the CP railway tracks and the Illecillewaet River to the north (Photographs 23 and 24). MW2 and MW3 are found within SW2. Proposed land use includes base operations for lift-access mountain biking at the eastern margin of SW2 and mountain biking and hiking trails.

Dominant wetland vegetation included common horsetail, scouring rush, skunk cabbage and small-flowered bulrush. Other dominant vegetation included western redcedar, western hemlock, interior Douglas fir, black cottonwood, paper birch, mountain alder, trembling aspen, pink spirea, stinging nettle, red-osier dogwood, thimbleberry, beaked hazelnut, snowberry, wild strawberry, Douglas maple, baneberry, false-Salmon's seal and large leaved avens. Non-native plant species included creeping buttercup, orange hawkweed, common timothy, orchard grass, curled dock, great burdock, and Canadian thistle.

Wildlife observations during the field assessment included moose dropping and tracks, animal trails, and snags / wildlife trees. Song Sparrow (*Melospiza melodia*), crow and raven were also observed.

#### 2.4.6 Agricultural Lands



Figure 14. View south of Agricultural polygon (yellow) within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.

The agricultural lands (A1) are generally bound by MW1, SW1 and the Greely Watershed to the east, WSF1 to the south, SW2 to the west and the CP railway tracks, additional agricultural and the Illecillewaet River to the north. Proposed land use includes the majority of supporting infrastructure for the RAP, including:

- Office and café
- Repair & Rental Shop
- Storage and Maintenance shed
- Stocked Lake and picnic area
- RV Park, including yurts (temporary/portable accommodation)
- Upgraded existing access road
- One ha gravel parking lot to accommodate 300 vehicles
- Hiking, biking and horse riding trails
- Driving Range
- Beach Volley Ball
- Horse stables
- Adventure Park Rides including: Water Ogo, Fish Pipe.
- Pump Park
- Chair Lift Terminal
- Mini put
- Spa and hot pools

This land is currently within the Agricultural Land Reserve. An application for Non-farm use has been submitted for review (pers. comm. C. Armstrong, Oct. 2013; Holtby, 2013<sup>32</sup>).

The wildlife assessment did not include the majority of agricultural lands, except for the conspicuous landscape feature that is MW1.

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<sup>32</sup> **B. Holtby. 2013.** *An Opinion on an Application for Non-Farm Use. Prepared by* Regency Consultants Limited, Westbank, B.C. *Prepared for* Illecillewaet Development LP.



#### 2.4.7 Quarry



**Figure 15. View south of quarry polygon (purple) within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.**

The quarry is bounded by WSF to the east, DSF and OGF to the north, DSF and the cliffs to the west and DSF, the CP railway and the Illecillewaet River to the north. The quarry is shown in Photograph 25.

The rock quarry is currently active. Provincial Mines Act Permit for Sand and Gravel extraction occurs under G-5-302, Approval No. 11-1630511-1214, dated January 9, 2012.

The quarry is believed to have limited wildlife value because of the high level of disturbance and existing vehicle and equipment use.

#### 2.4.8 Cliffs



**Figure 16. View south of cliff polygon (blue) within the proposed Revelstoke Adventure Park. Red lines depict the proposed tenure area.**

The cliffs are bounded by OGF and DSF to the east, OGF to the south, additional cliffs not within the PTA to the west and the CP railway and the Illecillewaet River to the north. The cliffs are shown in Photograph 26.

Field assessments did not include the cliffs due to the steepness of the terrain. Wildlife species that may use these cliffs include bats, numerous breeding, and foraging bird species, and amphibians.

## 2.5 Plant Species at Risk

Two (2) plant species designated at risk are known to occur in the Revelstoke area and may occur on the Property, including Sutherland's larkspur (*Delphinium sutherlandii*) and late goldenrod (*Solidago gigantea*) (pers. comm. K Stipek, CDC, Sept. 2013). These species were not observed during the assessment; however, the Proponent should be aware of the possibility these may occur on the Property and that measures to protect (i.e., avoid or in worst case, transplant) these species would be required should they be found.



**Figure 17.** Sutherland's larkspur (*Delphinium sutherlandii*) (left) and late goldenrod (*Solidago gigantea*) (right) are known to occur in Revelstoke area and may occur on the Revelstoke Adventure Park lands. Photos from R-L: J. Bertoia & F. Lomer, E-Flora BC.

### 3.0 Impact Mitigation

The quality of the experience for the RAP visitor is likely related directly to the natural ascetic of retained wildlife habitats. This is a sentiment shared by the Proponent (pers. comm. J. Roe, Oct. 2013). The Property is fortunate to sustain characteristic examples of many of the important habitats found within the ICH. Careful planning and construction will ensure that the project footprint is well integrated into the landscape and therefore avoids or reduces impacts to wildlife and their habitats. This section presents impact mitigation strategies that describe the Proponents legal obligations for wildlife protection and lists of recommended best management practices taken directly or derived from existing protection standards. Implementation of these strategies (legal requirements and best management practices) will significantly avoid and / or reduce wildlife impacts.

The proceeding sections describe impact mitigation strategies for birds, mammals, herptiles and for land development.

#### 3.1 Impact Mitigation Strategies for Birds

The following sections summarize legislative requirements and best management practices for the protection of birds on the Property. The Proponent is required to adhere to all provincial and federal laws pertaining to bird protection during land development. The following is a summary of applicable legislation for the protection of birds.

##### 3.1.1 Legislation

Legislation, including the provincial Wildlife Act and the federal Migratory Birds Convention Act, exist to protect birds. Bird species including Lewis's Woodpecker and Olive-sided Flycatcher listed in Section 2.1 of this report are provided additional protection under the auspices of the federal SARA.

##### 3.1.1.1 Wildlife Act

Section 34 of the provincial Wildlife Act states:

"A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys

- (a) a bird or its egg,
- (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
- (c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg."

##### 3.1.1.2 Migratory Birds Convention Act

The Migratory Birds Convention Act protects migratory birds and their eggs from hunting, trafficking and commercialization and enacts a permitting scheme for these activities.

A list of all protected bird species can be found here:

<http://ec.gc.ca/nature/default.asp?lang=En&n=9AAA86EC-1>

##### 3.1.1.3 Species at Risk Act

Bird species listed on Schedule 1 of the SARA, and their habitats are provided protection under federal law.



Section 32 of the SARA states:

“No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.”

Section 33 of the SARA states:

“No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.”

### 3.1.2 Best Management Practices

Best management practices have been developed to ensure compliance with applicable laws and to meet or exceed environmental regulator expectation regarding the protection of birds and the habitat upon which they rely.

As a result of unconfirmed occurrences on the Property of bird species discussed in Section 2.1, specific best management practices for protection of these species are not presented. Species-specific BMPs should be developed in the event that one or more of these species is confirmed on the Property.

- Regional bird breeding can commence as early as February for some species and occur as late as early September for other species. The Proponent must therefore adhere to land clearing activities outside of the least risk window (Table 4) or retain a biologist to conduct breeding bird surveys of proposed clearing areas to confirm the presence/absence of active nests before any clearing is undertaken. Should any be identified measures shall be put in place to protect active nests and breeding birds until birds have fledged (e.g., establish nest buffer zones).

**Table 5. Least risk windows for land clearing activities that may be harmful to birds and/or their eggs and nest.**

Species	Least Risk Window
Raptors (eagles, hawks, falcons & owls)	Aug 15 – Jan 30
Goshawk	Aug 30 – Mar 15
Hérons	Aug 15 – Jan 30
Other Birds	Aug 1 – Mar 31

The following applicable BMPs are taken from the Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia<sup>33</sup> and are applicable to both raptor and non-raptor bird species. In the event that human conflicts with raptors or breeding birds are

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<sup>33</sup> **Demarchi, M.W and M. D. Bently. 2013.** *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia: A companion document to Develop with Care 2012.* Province of British Columbia, Victoria, B.C. Accessed online:  
[http://www.env.gov.bc.ca/wld/documents/bmp/raptor\\_conservation\\_guidelines\\_2013.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf)

anticipated or exist, the aforementioned guidelines are to be consulted in conjunction with a qualified environmental consultant.

- Where possible, retain groups of trees rather than isolated single trees to provide an interlocking canopy.
- Maximize retention of woodlots, shelterbelts, hedgerows, brushy thickets, and old-field habitat.
- Preserve riparian areas including large trees (living and dead).
- Maintain natural shoreline vegetation adjacent to the wetlands, streams and rivers.
- Where possible, retain undisturbed grasslands, old fields, pastures, and natural forest openings.
- Where a species at risk has a Recovery Plan or if a qualified raptor professional provides advice, use their recommended minimum buffer distances.
- Maintain a minimum buffer of undisturbed vegetation around nest sites. An additional “quiet buffer” should be provided before and during breeding seasons. See guidelines for more information on appropriate buffers.
- Protect both existing and potential nest sites, including veteran recruit trees and trees with natural cavities.
- Protect raptor roosting/perching sites and foraging areas
- Protect any trees, cliffs, or other specific sites that raptors regularly use for roosting, perching, or feeding.
- Protect good foraging sites including shorelines, wetlands, shrubby areas, old fields, hedgerows, and riparian areas.
- Avoid disturbance of sensitive habitats during and after development
- Locate new trails, buildings, and roads away from raptor nesting, roosting, and foraging areas.
- Keep machinery, people, and pets away from nesting, brood rearing, roosting, and foraging areas.
- Manage, restore, or enhance raptor habitat and features
- Use selective pruning of mature trees (outside of the breeding season, under the guidance of a raptor specialist) to make them more attractive to Bald Eagles, Red-tailed Hawks, and other raptors.
- Provide artificial perches such as poles and platforms if natural perches have been damaged or lost.
- Restore habitats where natural vegetation has been removed or altered, preferably by using native plants.

### 3.2 Impact Mitigation Strategies for Mammals

The following sections summarize legislative requirements and best management practices for the protection of mammals on the Property.

#### 3.2.1 Legislation

Legislation exists to protect mammals and their habitat, including the provincial Wildlife Act. Specifically, Northern myotis, little brown myotis listed in Section 2.2 of this report are provided additional protection under the auspices of the federal SARA.

##### 3.2.1.1 Wildlife Act

Section 33.1 of the Wildlife Act states:

“A person must not

(a) intentionally feed or attempt to feed dangerous wildlife, or  
(b) provide, leave or place an attractant in, on or about any land or premises with the intent of attracting dangerous wildlife.

(2) A person must not leave or place an attractant in, on or about any land or premises where there are or where there are likely to be people, in a manner in which the attractant could

(a) attract dangerous wildlife to the land or premises, and

(b) be accessible to dangerous wildlife.

(3) Subject to subsections (5) and (6), a person who contravenes subsection (1) or (2) commits an offence.”

##### 3.2.1.2 Species at Risk Act

Mammal species and their habitat listed on Schedule 1 are provided protection under the SARA.

Section 32 of the SARA states:

“No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.”

Section 33 of the SARA states:

“No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.”

#### 3.2.2 Best Management Practices

Best management practices have been developed to ensure compliance with applicable laws and to meet or exceed environmental regulator expectation regarding the protection of mammals and the habitat upon which they depend<sup>3435</sup>.

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<sup>34</sup> **Ministry of Water, Land and Air Protection. 2004.** *Environmental Best Management Practices for Urban and Rural Land Development: Section 6: Special Wildlife and Species at Risk*. Ministry of Water, Land and Air Protection, Ecosystems Standards and Planning Biodiversity Branch, Victoria, B.C. Accessed online:

[http://www.env.gov.bc.ca/wld/documents/bmp/urban\\_ebmp/EBMP%20PDF%205.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/EBMP%20PDF%205.pdf)

<sup>35</sup> **Ministry of Environment. 2012.** *Develop with Care 2012: Environmental Guidelines for Urban and Rural Land Development in British Columbia*. B.C. Ministry of Environment, Victoria, B.C. Accessed online: <http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2012/index.html>

- Retain important wetland habitat for foraging by bears, moose and other wildlife species.
- Retain all habitat components where possible.
- Limit land clearing and development on steep slopes considered suitable hibernaculum for bats.
- Retain a qualified environmental consultant to prepare a human-wildlife conflict avoidance plan for avoiding and reducing impacts to large mammals including grizzly bear, including plans for eliminating wildlife attractants such as garbage.
- A qualified environmental consultant should be retained to assist with reviewing the proposed trail layout to minimize impacts to important wildlife habitat and attributes (e.g. wildlife trees, burrows).
- Identify and retain wildlife travel corridors
- Design buffers around important habitat to reduce human-related impacts.
- Schedule construction activities to reduce impacts to sensitive mammals periods such as breeding, rutting and hibernation.
- Require that visitor's dogs be off leash or in designated areas to reduce abuse and harm to mammals and other wildlife.
- Maintain to the greatest degree possible the hydraulic integrity of the site to ensure watercourses used by wildlife are retained.
- Reduce premature land clearing that creates conditions for invasive species.
- Report all observations of mammals of management concern to your local provincial habitat biologist.



### 3.3 Impact Mitigation Strategies for Herptiles

The following sections summarize legislative requirements and best management practices for the protection of herptiles on the Property.

#### 3.3.1 Legislation

The federal SARA provides protection for species at risk including Western Toad and Coeur d'Alene Salamander and their critical habitats. The provincial Wildlife Act plays an important but limited role in protection of herptiles.

##### 3.3.1.1 Wildlife Act

Although the Wildlife Act does not include habitat protection for non-listed herptiles, it prevents their collection and handling.

##### 3.3.1.2 Species at Risk Act

Herptile species and their habitat listed on Schedule 1 are provided protection under the SARA.

Section 32 of the SARA states:

"No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species."

Section 33 of the SARA states:

"No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada."

#### 3.3.2 Best Management Practices

Best management practices have been developed to ensure compliance with applicable laws and to meet or exceed environmental regulator expectation regarding the protection of herptiles and the habitat upon which they depend. The following applicable BMPs were derived from the Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia<sup>36</sup>.

- Identify all critical habitats within and adjacent to the development area by conducting herptile surveys within lands scheduled for development.
- Because most amphibians and reptiles use more than one habitat type during their life cycle, it is necessary to conduct surveys during all seasonal periods when species expected to be found in the area are active, and to conduct several site visits during each season to ensure that all species are detected and their habitat use is fully described. Surveys during the breeding and seasonal movement periods should be emphasized.

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<sup>36</sup> **Ministry of Water, Land and Air Protection. 2004. *Environmental Best Management Practices for Amphibians and Reptiles in British Columbia*.** Ministry of Water, Land and Air Protection, Ecosystems Standards and Planning Biodiversity Branch, Victoria, B.C. Accessed online: [http://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP\\_complete.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP_complete.pdf)

- Examples of critical habitats include talus slopes, hibernacula, nest sites, and foraging areas for reptiles, aquatic breeding sites for amphibians, and movement corridors for both reptiles and amphibians.
- Special care must be taken to ensure that all species and habitat types important for amphibians and reptiles are surveyed adequately. Several species of amphibians and reptiles are secretive and require specialized inventory techniques. For example, Coeur d'Alene Salamander that is found in talus, seepage slopes and caves, and attention to these special habitat features, however small in area, is crucial.
- All surveys must comply with provincial Resource Inventory Standards Committee (RISC) methods.
- Where ponds, marshes or streams are present adjacent to the development, documentation of hydroperiods (patterns of drying and filling), flow volumes and peak flows are important as baseline information.
- Try to locate developments and roads away from key habitats for amphibians and reptiles, such as wetlands, streams, and nesting and denning sites (e.g., upland coniferous forests).
- Maintain buffers of undisturbed native vegetation around and adjacent to key amphibian and reptile habitats and discourage high human access to these areas.
- Provide suitable landscape linkages to allow movements of animals between important seasonal habitats; riparian management areas, parks, and greenways can connect habitats.
- Minimize road kill of animals migrating between seasonal habitats by locating roads and infrastructure away from these areas; consider special road-crossing structures where this is unavoidable.
- Encourage RAP visitors to take an interest in protecting these species by providing interpretive materials such as signs and brochures.
- Preserve wetlands, ponds, pools, and streams – however small or ephemeral; these small areas can be very important for amphibians.
- Protect shallow water areas and their vegetation from trampling and other disturbance; these areas serve as breeding habitat and cover for many amphibians.
- Avoid altering natural patterns of flooding and drying of wetlands; temporary wetlands often have few predators and are important for amphibians.
- Maintain sufficient terrestrial habitat or access to terrestrial habitat for amphibians to complete all life history phases.
- Maintain moist forested habitat with abundant coarse woody debris along streams (at minimum 30 m wide on both banks).
- Take special care to avoid siltation of stream habitats during construction.
- Avoid altering stream-flow patterns, and maintain small pools within streams (pocket or step pools) and abundant in-stream cover.
- Avoid removing downed logs and bark, especially large diameter pieces; downed wood in various stages of decay provides shelter and egg-laying sites.
- With habitat suitable for Coeur d'Alene salamander, preserve seepages, riparian splash zones, caves, talus, and other moist, rocky sites.
- Route new roads away from nesting areas and migration routes to avoid disturbance and road mortality; fencing can be used to direct turtles away from existing roads.

- Diversity of habitats, including both temporary and permanent wetlands and adjacent upland habitats. Temporary wetlands that have an annual pattern of drying and filling provide a valuable and diminishing resource for amphibians and reptiles. Many species of amphibians rely on temporary wetlands that are free of large aquatic predators and contain abundant food.
- Amphibians and reptiles need undisturbed natural vegetation adjacent to wetland areas for foraging and to complete life-history stages.
- Buffer zones serve to protect the water quality of wetlands by filtering out pollutants and sediments. The recommended widths of buffer zones as determined by best available science vary considerably according to the species present. A buffer zone of at least 30 m is recommended.
- Maintain natural hydrology of wetlands and streams, so that these habitats continue to provide suitable conditions for semi-aquatic species over the long term.
- Retain natural vegetation whenever possible; the maintenance of natural ecosystem processes will promote high species diversity of amphibians and reptiles.
- In upland habitats, avoid compaction and disturbance of the ground including soil, litter layer, and coarse woody debris; avoid removing natural vegetation and mowing grassy areas adjacent to wetlands.
- Avoid fragmentation of habitats by roads and wide trails; where habitats are already fragmented, provide habitat continuity that allows for movements of animals. If the development area lies adjacent to green spaces or parks, ensure that connectivity is maintained by setting aside undisturbed habitat for travel routes to these areas. If a stream flows through the area, maintain a buffer zone of undisturbed vegetation, so that a travel corridor is maintained.
- Movement corridors must be of sufficient width and contain habitat attributes that are attractive to amphibians and reptiles.
- Permanent mitigation measures include tunnel systems, other crossing structures, and relocations of breeding sites. Recommendations for effective amphibian and reptile tunnel and fencing systems adjacent to roads include the following:
  - Consider tunnels / culverts in areas where roads fragment migratory corridors used by herptiles (e.g., western toad)
  - Run-off from roads may contain surfactants, road salts, petrochemicals, metals, and other compounds from automotive exhaust.
  - Insecticides or herbicides, which are often used on golf courses, parks, road-sides, right-of-ways, and residential lawns and gardens.
  - Faulty sewage systems and excessive use of fertilizers, both of which contribute to nitrogen pollution of water bodies.
- Locate roads, parking lots, bicycle paths and hiking trails away from sensitive amphibian and reptile habitats, such as breeding ponds, nesting sites, basking areas, denning sites, talus slopes, rock outcrops, and foraging areas.
- Keep focal areas of human activity away from amphibian and reptile habitats to minimize the risk of contact and harassment.
- Keep hiking trails narrow to allow amphibians and reptiles and other wildlife to cross them easily. Trails should be maintained to prevent erosion and widening by overuse.

- Design trail systems so that people are encouraged to stay on the designated trails (e.g., via board walks, chiptrails, fencing, and plantings) and offer viewing positions from a distance (e.g., platforms).
- Keep bicycles, trail bikes, and ATVs away from sensitive areas.
- Post signs near access points to educate the public about the consequences of damaging habitats and disturbing amphibians and reptiles.
- Limit access and density of free-roaming pets; educate RAP visitors about the need to keep pets away from critical wildlife areas.
- Avoid damage to habitats and accidental mortality of animals due to activities of construction personnel and machinery.
- Avoid pollution, contamination, erosion, unnecessary vegetation removal, and soil compaction.
- Have an emergency response plan in place to contain and clean up accidental spills safely and quickly.
- Use temporary fencing to limit access to sensitive habitats.
- Avoid construction activities during periods when amphibians and reptiles are congregated for breeding, nesting, or seasonal migrations; migrations could involve movements of snakes near hibernacula and mating areas in the spring and autumn, migrations of juvenile frogs, toads, and salamanders to foraging habitats in late summer, or movements of turtles to terrestrial nesting sites.



### 3.4 Impact Mitigation Strategies for Land Development

The following section summarizes legislative requirements and best management practices for the development of land and the protection of important habitat and habitat features on the Property.

#### 3.4.1 Legislation

The Proponent has the obligation to adhere to all legal requirements for land development, including laws pertaining to the protection of wildlife and their habitat, including the provincial Wildlife Act, the federal Migratory Birds Convention Act, and the federal SARA. The provincial Riparian Areas Regulation, will also assist in the protection of wildlife and their habitats, specifically streams and wetlands.

#### 3.4.2 Best Management Practices

Best management practices have been developed to ensure compliance with applicable laws and to meet or exceed environmental regulator expectation regarding the protection of habitat types upon which a myriad of wildlife species depend.

##### 3.4.2.1 Wildlife Trees

Wildlife trees on the Property are a critical component of the various ecosystems that exist. It's known that over 80 species of bird, mammals, reptiles and amphibians use wildlife trees (e.g., hallow trees (both living and dead), snags, fallen logs) for a component of their life-cycle<sup>37</sup>. Wildlife trees are found in all forest stands on the Property although seemingly not in great densities. This makes protection of these features important to the health of their respective ecosystems.

The following best management practices were derived from the Best Management Practices for Hazard Tree and Non-Hazard Tree Limbing, Topping or Removal<sup>38</sup>

- Tree topping, limbing and removal may be required to facilitate zip-line installation and mountain bike trail construction among other land clearing. In this case, provisions of the provincial Best Management Practices for Tree Topping, Limbing and Removal in Riparian Areas should be adhered to and monitored by a qualified environmental consultant.
- Limit vegetation clearing for access to and within the work area to the area required to work safely.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for wildlife species and their habitat.

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<sup>37</sup> Bull, E. L., C. G. Parks, and T. T. Torgersen. 1997. *Trees and logs important to wildlife in the Interior Columbia River Basin*. General technical report, PNW-GTR-391. Portland, Oregon: USDA Forest Service, Pacific Northwest Research Station. Accessed online:  
[http://www.fs.fed.us/pnw/publications/pnw\\_gtr391/pnw\\_gtr391a.pdf](http://www.fs.fed.us/pnw/publications/pnw_gtr391/pnw_gtr391a.pdf)

<sup>38</sup> Ministry of Environment. 2006. *Best Management Practices For Hazard Tree And Non-Hazard Tree Limbing, Topping Or Removal*. Ministry of Environment, Victoria, B.C. Accessed online:  
[http://www.env.gov.bc.ca/wld/documents/bmp/BMPTreeRemoval\\_WorkingDraft.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/BMPTreeRemoval_WorkingDraft.pdf)

- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young (e.g. owls nest in winter/early spring, some species nest more than once a season so nests may be occupied in late summer. Also some owls and other bird species may use nest cavities in winter for thermal protection).
- Section 34(b) of the Wildlife Act protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, and herons year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season for these species.
- If you are proposing to limb, top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests or other wildlife species. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist certified in assessing danger trees.
- These assessment results should be retained for your records.
- Where topping the tree or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree, leaving as much trunk height as is reasonable to maintain safety. Stubs favored by cavity nesting birds may be created by cutting trees at 3 to 5 meters above the ground. For further information on human safety issues associated with stub wildlife trees, contact the Workers Compensation Board of BC.
- Where hazard tree(s) must be removed from a riparian area bordering a water body that supports fish and/or wildlife habitat, then tree replacement criteria should be applied. For information on replacement tree criteria required by Provincial and Federal agencies see the following website:  
<http://www.env.gov.bc.ca/wld/documents/bmp/treereplcrit.pdf>
- Plant native trees, shrubs and herbaceous plants ecologically suited to the site conditions (i.e., suited to the biogeodimatic subzone and site series) to revegetate the site and replace impacted riparian vegetation.
- Retain large woody debris and the stubs of large diameter trees onsite where it is safe to do so. These are important for preserving wildlife populations.
- Tree trunks may be left on the ground as wildlife habitat.
- Where required, small branches and limbs may be removed offsite to reduce fire hazard.
- Trees should be limbed, topped or felled to avoid falling in a stream, lake or wetland area where accumulations of fine materials and branches may block flows.
- Trees may be felled across or into a waterbody only where no other method of tree removal is possible because of safety reasons (e.g., to protect fallers, buildings etc.).
- Removal of felled trees should be completed in a manner that does not damage riparian vegetation or bank or bed areas of streams, lakes or wetlands. Alternatives to falling whole trees include falling trees in sections and/or crane-assisted removals.
- All equipment used for vegetation removal and management should comply with best practices to prevent the discharge of deleterious substances into waterbodies. Monitoring of riparian areas should be completed on a regular basis so that hazard trees

can be identified and managed during reduced risk timing windows for breeding birds and least risk to fish habitat (instream least risk windows).

- Complete removal of non-hazard tree(s) from riparian areas bordering waterbodies that support fish habitat may result in a HADD of fish habitat. To avoid contravention of the Fisheries Act, prior to removal, you should consider engaging the services of a qualified professional to develop mitigation strategies to ensure a HADD of fish habitat will not occur as a result of proposed non-hazard tree removals.

Wildlife features in addition to wildlife trees include the following:

- Nests of a bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), a great blue heron (*Ardea Herodias*) or nest belonging to a species at risk bird
- Mammal burrows and dens
- A significant mineral lick or wallow
- Animal movement corridors

Of these, burrow and inactive or potential dens sites as well as animal movement corridors were observed. In the event that mineral licks and/or wallows and the nests of bird species listed are found during land development, in addition to confirmed wildlife attributes, the following mitigation strategies apply:

- All wildlife features are to be retained to the greatest extent possible.
- Where wildlife features cannot be retained (e.g., burrow within the alignment of a proposed access road), impacts are to be assessed and documented by a qualified environmental consultant in consultation with the local provincial habitat biologist.
- Nests are protected in accordance with the provincial Wildlife Act. Additional BMPs for protection of birds are found in Section 3.1.

#### 3.4.2.2 Wildlife Management for Commercial Recreation

Recreational offerings on the Property include snow-free non-motorized recreation (i.e., hiking, mountain-biking, horse-back riding, camping or other mechanized or non-mechanized recreational activity in the backcountry that occurs during the snow-free season) as defined by the Wildlife Guidelines for Backcountry Tourism and Commercial Recreation in British Columbia<sup>39</sup>. BMPs for this land use classification pertaining to land development and wildlife include the following:

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<sup>39</sup> **Province of B.C. 2006.** *Wildlife Guidelines for Backcountry Tourism and Commercial Recreation in British Columbia*. Province of B.C., Victoria, B.C. Accessed online:  
[http://www.env.gov.bc.ca/wld/twg/documents/wildlife\\_guidelines\\_recreation\\_may06\\_v2.pdf](http://www.env.gov.bc.ca/wld/twg/documents/wildlife_guidelines_recreation_may06_v2.pdf)

Table 6. Best management practices for Soil compaction and erosion, bank erosion and siltation from the provincial Wildlife Guidelines for Backcountry Tourism/Commercial Recreation Guidelines for British Columbia.

Concern: Soil compaction and erosion			
Results	Desired Behaviours	Indicators	Limits
<ul style="list-style-type: none"> <li>Minimize soil compaction off established trails.</li> <li>Minimize erosion associated with trails.</li> </ul>	<ul style="list-style-type: none"> <li>Use existing roads and trails where they exist.</li> <li>Avoid travelling on existing trails that show evidence of erosion.</li> <li>Avoid widening existing trails.</li> <li>Use rock and gravel trails where possible.</li> <li>Avoid poorly placed trails (e.g., steep grades with soft substrates).</li> <li>Where no trails exist, travel on rock or other durable surfaces or disperse use and avoid areas where impacts are evident.</li> <li>Avoid off-trail muddy conditions.</li> <li>Obey all signs and area closures.</li> <li>Use designated campsites and/or existing intensive-use sites where they exist, or use rock or durable surfaces for camping.</li> <li>Minimize campfires and use only established fire rings.</li> </ul>	<ul style="list-style-type: none"> <li>Existing path widths.</li> <li>Trail braiding.</li> <li>Evidence of erosion associated with existing trails.</li> </ul>	<ul style="list-style-type: none"> <li>No net increase in trail density caused by non-motorized activities.</li> <li>No net increase in existing trail widths caused by non-motorized activities.</li> <li>No erosion near waterways or in sensitive sites caused by non-motorized activities.</li> </ul>
Concern: Bank erosion and siltation			
Results	Desired Behaviours	Indicators	Limits
<ul style="list-style-type: none"> <li>Protect living and non-living substrates.</li> <li>Minimize bank erosion.</li> </ul>	<ul style="list-style-type: none"> <li>Use existing bridges and structures to cross streams, or cross at right angles away from spawning areas where the substrate is particle size is cobble or larger or bedrock.</li> <li>Avoid existing trails that parallel streams and those that show evidence of erosion.</li> </ul>	<ul style="list-style-type: none"> <li>Trail use near waterways.</li> <li>Evidence of siltation near crossings.</li> </ul>	<ul style="list-style-type: none"> <li>No net increase in trails near waterways or waterway crossings caused by non-motorized activities.</li> <li>No evidence of persistent siltation near or downstream of crossings caused by non-motorized activities.</li> </ul>



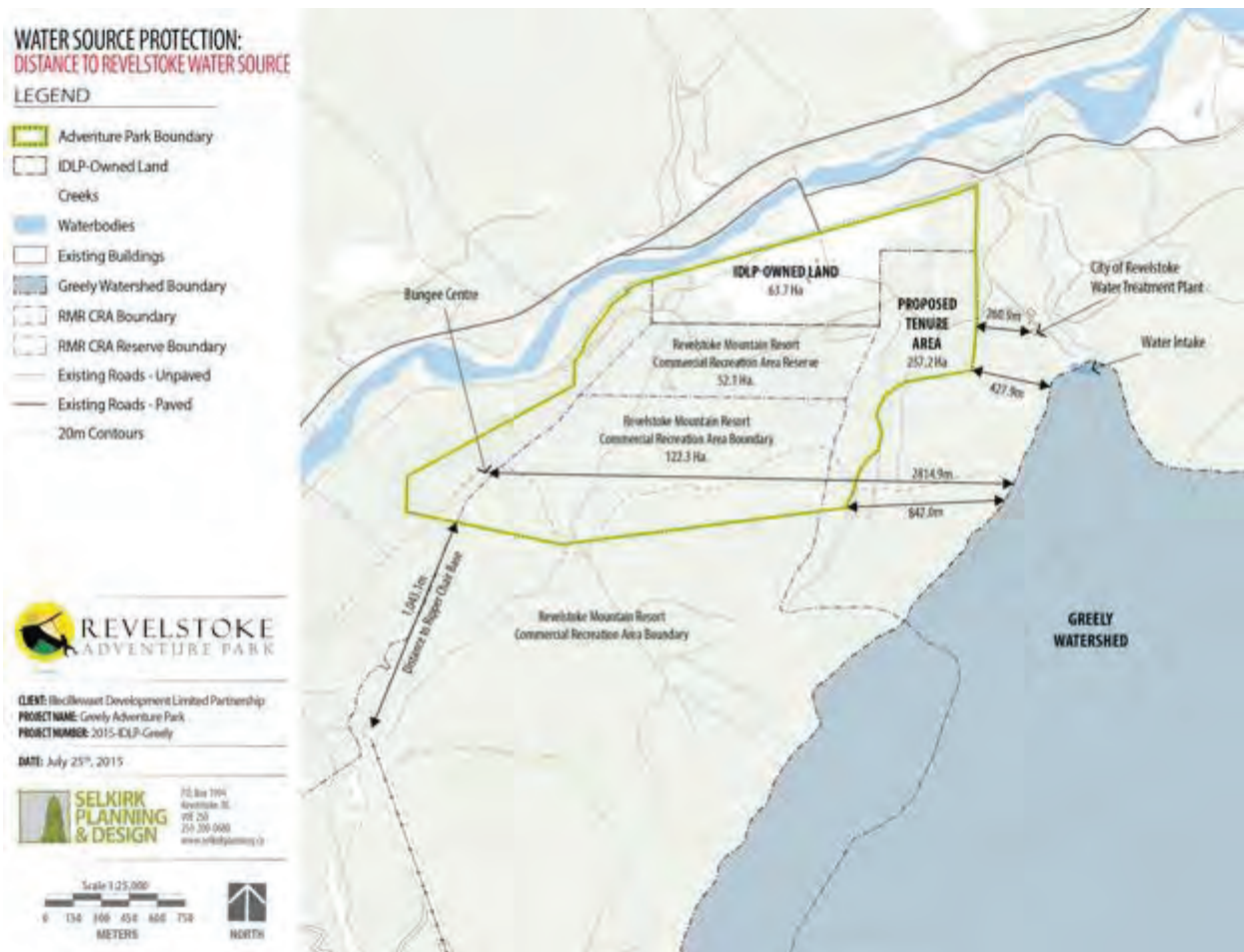
### **3.5 Future Studies**

Additional wildlife assessments and inventories may be required once land development plans are finalized. It is recommended that once the Proponent prepares a final plan and begins surveying and layout that a qualified environmental consultant is retained to review wildlife features within the land use footprint during planning and construction to assist in assess and avoiding and mitigating potential wildlife conflicts.

## ATTACHMENT A: LOCATION MAPS

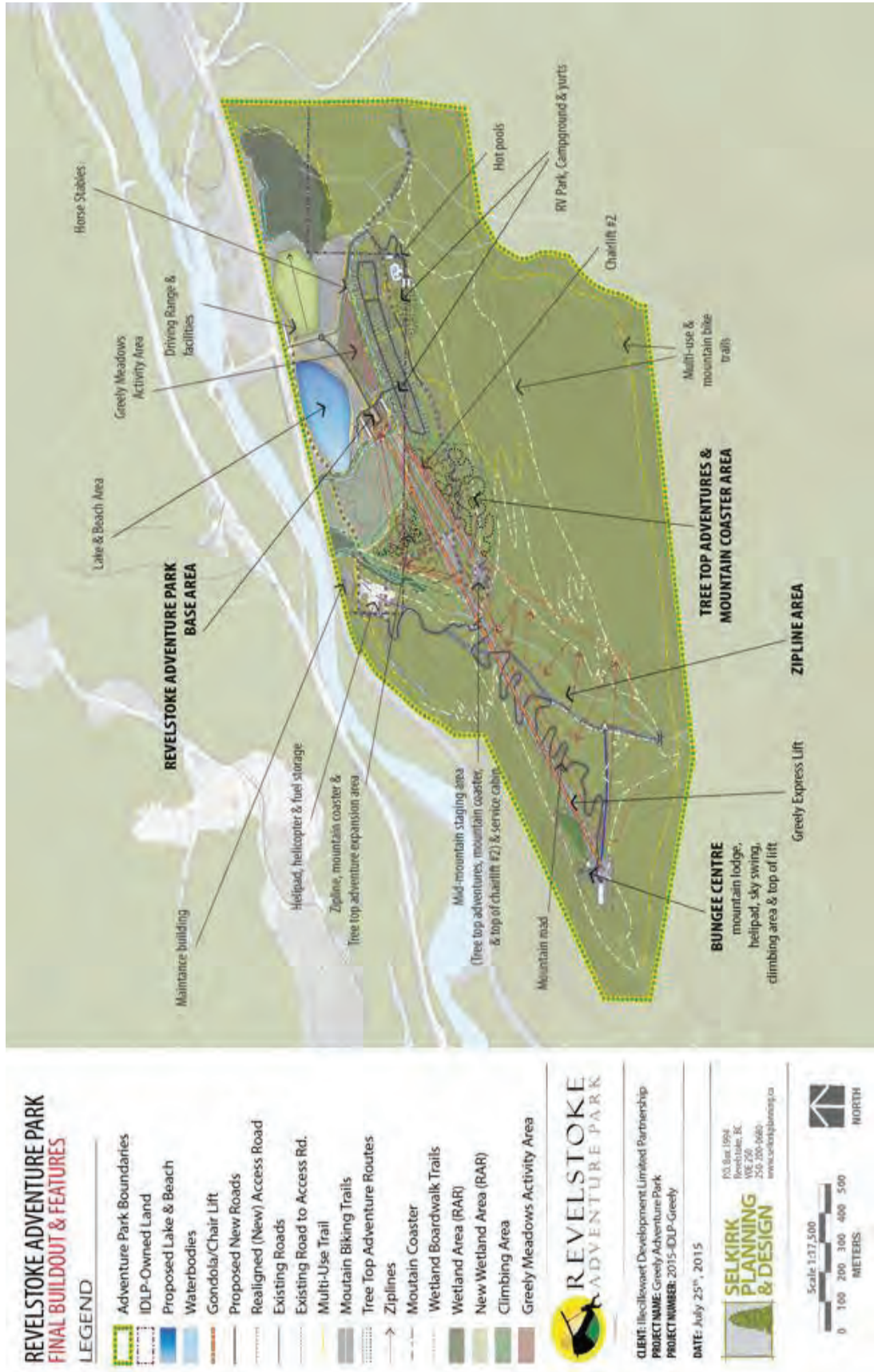


Overview of Proposed Tenure Area of  
Revelstoke Adventure Park (Inset map oriented South/North).



View Southeast at Revelstoke Mountain Resort Controlled Recreation Area near Revelstoke, B.C. The Revelstoke Adventure Park additions to the current RMR CRA include only those rectangular areas identified on the map.

ATTACHMENT B: PROPOSED REVELSTOKE ADVENTURE PARK, GREELY, B.C.





## ATTACHMENT C: PHOTOGRAPHS



Photograph 1. Looking north in OGF-East at barren understory (October 5, 2013).



Photograph 2. Looking east in OGF-West at vegetated understory (September 20, 2013).





**Photograph 3. Looking east at wind-throw fallen trees in OGF-Centre (September 27, 2013).**



**Photograph 4. Looking north in OFG-Centre at wind-throw fallen trees (September 28, 2013).**





**Photograph 5. Looking northeast at wind-throw fallen trees in OFG-Centre near Unnamed Ravine West (September 20, 2013).**



**Photograph 6. Looking south at Unnamed Ravine West (September 20, 2013).**





**Photograph 7. Looking at a burrow network in OGF-East (September 27, 2013).**



**Photograph 8. Looking west at wildlife tree in OGF-East (September 27, 2013)**





Photograph 9. Looking southwest towards cliffs in OFG-Centre (September 27, 2013).



Photograph 10. Looking at deer dropping in OFG-Centre (September 27, 2013).





Photograph 11. Looking at evidence of bear foraging in OGF-West (September 20, 2013).



Photograph 12. Looking northeast at forest stand in OGF-West (in alignment of proposed access road to the chair-lift top) (September 20, 2013).





**Photograph 13. Looking west at previously cut saplings within DSF1 (September 27, 2013).**



**Photograph 14. Looking west towards transitional boundary between OGF and DSF (September 27, 2013).**





**Photograph 15. Looking west in WSF1 (October 4, 2013).**



**Photograph 16. Looking northwest at skunk cabbage in WSF1 (October 5, 2013).**

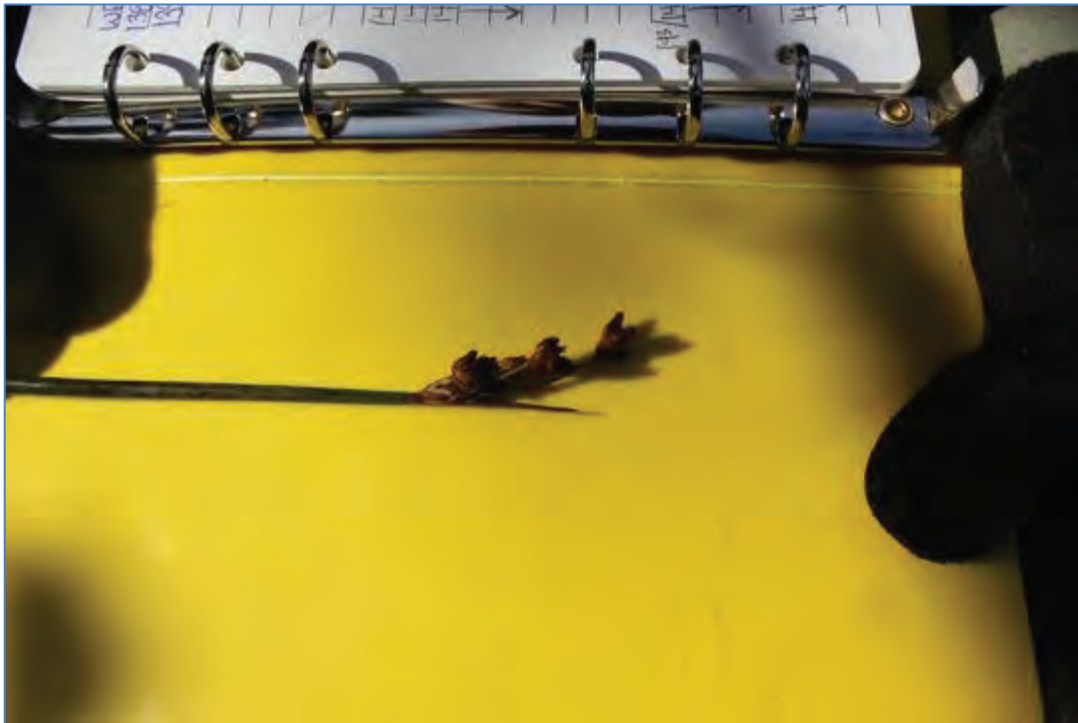




**Photograph 17. Looking south towards MW1 (October 5, 2013).**



**Photograph 18. Looking northeast at unidentified rush in MW2 (October 4, 2013).**



**Photograph 19. Looking at seed head of unidentified rush from MW2 (October 4, 2013).**



**Photograph 20. Looking northeast at MW3 (October 4, 2013).**





Photograph 21. Looking south at SW1 (October 5, 2013)



Photograph 22. Looking east at SW1 (October 5, 2013).



Photograph 23. Looking south at SW2 (September 20, 2013).



Photograph 24. Looking at skunk cabbage in SW2 (September 20, 2013).





Photograph 25. Looking northeast towards the Quarry (October 4, 2013).



Photograph 26. Looking at cliffs in proposed tenure area (September 20, 2013).

## ATTACHMENT D: OBSERVED WILDLIFE SPECIES AND FEATURES

Table 7. Wildlife attributes and wildlife observed at the proposed Revelstoke Adventure Park during field visits September 20 to October 5, 2013.												
	Polygons											
	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1
Wildlife Attributes Observed												
Snags / Wildlife Trees	X	X	X	X	X	X			X	X	X	
Moose droppings	X	X	X	X	X							
Moose tracks						X			X	X	X	
Moose laydown										X	X	
Bear droppings			X			X						
Bear tracks												
Bear foraging	X	X	X	X	X							
Coyote droppings					X							
Deer track		X										
Dens > 0.5m dia. opening			X		X	X						
Dens < 0.5m dia. opening	X					X						
Burrow network	X		X	X	X							
Animal trail	X	X	X	X	X	X				X	X	
Wildlife Observed												
Song Sparrow											X	
Ruffed Grouse				X		X				X		
Hairy Woodpecker	X											
Black Capped Chickadee	X				X							
Crow	X	X	X	X	X					X	X	
Raven				X	X						X	
Steller's Jay			X			X						
Red Squirrel	X	X				X						
Black Slug				X								

## ATTACHMENT E: PLANT SURVEY TABLE

Table 8. List of plant species found on the proposed Revelstoke Adventure Park property during field visits September 20 to October 5, 2013.															
				POLYGONS											
Common Name	Species Name	BC Status	COSEWIC / SARA Status	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1
TREES															
Western Redcedar	<i>Thuja plicata</i>	Yellow	-	X	X	X	X	X	X	-	-	-	X	X	-
Western Hemlock	<i>Tsuga heterophylla</i>	Yellow	-	X	X	X	X	X	X	-	-	-	X	X	-
Interior Douglas Fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Yellow	-	X	X	X	X	X	X	-	-	-	X	X	-
Western Yew	<i>Taxus brevifolia</i>	Yellow	-	X	X	X	X	X	-	-	-	-	-	-	-
Black Spruce	<i>Picea mariana</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-
Paper Birch	<i>Betula papyrifera</i> var. <i>commutata</i>	Yellow	-	X	X	X	X	X	X	-	-	X	-	X	-
Black Cottonwood	<i>Populus trichocarpa</i>	Yellow	-	-	-	-	X	X	-	-	-	-	X	X	-
Mountain Alder	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-
Western Mountain Ash	<i>Sorbus scopulina</i>	Yellow	-	-	-	-	-	-	X	-	-	-	-	-	-
Trembling Aspen	<i>Populus tremuloides</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-
Willow spp.	<i>Salix</i> spp.	Yellow	-	-	-	-	-	-	-	-	-	-	-	-	-
SHRUBS															
Pink Spirea	<i>Spiraea douglasii</i> ssp. <i>menziesii</i>	Yellow	-	-	-	-	X	X	X	-	-	X	X	X	-
Stinging Nettle	<i>Urtica dioica</i> ssp. <i>gracilis</i>	Yellow	-	-	-	-	-	-	X	-	-	X	X	X	-
Red-osier Dogwood	<i>Cornus stolonifera</i>	Yellow	-	X	X	X	X	X	X	-	-	X	X	X	-
Thimbleberry	<i>Rubus parviflorus</i> var. <i>parviflorus</i>	Yellow	-	X	-	X	X	X	X	X	-	X	X	X	X

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				POLYGONS														
Common Name	Species Name	BC Status	COSEWIC / SARA Status	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1			
Red Raspberry	<i>Rubus idaeus</i> ssp. <i>strigosus</i>	Yellow	-	-	-	-	X	X	-	-	-	-	-	-	-			
Beaked Hazelnut	<i>Corylus cornuta</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-			
Red Elderberry	<i>Sambucus racemosa</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-			
Black Gooseberry	<i>Ribes lacustre</i>	Yellow	-	X	X	X	X	X	-	-	-	-	-	-	-			
Snowberry	<i>Symphoricarpos albus</i>	Yellow	-		X		X	X	X	-	-	-	X	X	-			
Devil's Club	<i>Oplopanax horridus</i>	Yellow	-	X	X	X	X	X	X	-	-	-	-	-	-			
Wild strawberry	<i>Fragaria virginiana</i>	Yellow	-	-	-	-		X	-	-	-	-	-	-	-			
Prickly Rose	<i>Rosa acicularis</i> ssp. <i>sayi</i>	Yellow	-	-	X	-	X	-	-	-	-	-	X	-	-			
Black Hawthorne	<i>Crataegus douglasii</i>	Yellow	-	-	-	-	-	-	-	-	-	X	X	X	-			
Tall Oregon Grape	<i>Mahonia aquifolium</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-			
Douglas Maple	<i>Acer glabrum</i> var. <i>douglasii</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-			
Red Huckleberry	<i>Vaccinium parvifolium</i>	Yellow	-	-	X	-	-	X	-	-	-	-	-	-	-			
Baneberry	<i>Actaea rubra</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-			
Canadian Thistle	<i>Cirsium arvense</i>	Exotic	-	-	-	-	X	X	X	-	-	-	X	X	-			
Canadian Goldenrod	<i>Solidago canadensis</i>	Exotic	-	-	-	-	X	X	X	X	-	X	X		-			
Great burdock	<i>Arctium lappa</i>	Exotic	-	-	-	-	X	X	X	X	-	X	X	X	-			
Curled Dock	<i>Rumex crispus</i>	Exotic	-	-	-	-	-	-	X	X	-	X	X	-	X			
FERNS																		
Oak Fern	<i>Gymnocarpium dryopteris</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-			



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				POLYGONS											
Common Name	Species Name	BC Status	COSEWIC / SARA Status	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1
Spiny Wood Fern	<i>Dryopteris expansa</i>	Yellow	-	X	X	X	X	X	-	-	-	-	-	-	-
Lady Fern	<i>Athyrium filix-femina</i> spp. <i>cyclosorum</i>	Yellow	-	X	X	X	-	-	X	-	-	-	X	X	X
Western Licorice Fern	<i>Polypodium hesperium</i> or <i>P. vulgare</i> var. <i>columbianum</i>	Yellow	-	-	X	-	-	-	-	-	-	-	-	-	-
Western Maidenhair Fern	<i>Adiantum aleuticum</i> var. <i>aleuticum</i>	Yellow	-	X	X	X	-	-	X	-	-	-	-	-	-
Bracken Fern	<i>Pteridium aquilinum</i>	Yellow	-	X	X	X	X	-	X	-	-	-	X	X	-
GROUND COVER, MOSES, LICHENS & GRASSES															
Witches Hair	<i>Alecroria</i> sp.	Blue/Yellow	-	X	X	X	X	-	X	-	-	-	-	-	-
Wild Ginger	<i>Asarum caudatum</i>	Yellow	-	X	-	X	X	-	-	-	-	-	-	-	-
Spicy Conehead	<i>Conocephalum salebrosum</i>	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Dwarf Red Raspberry	<i>Rubus pubescens</i> var. <i>pubescens</i>	Yellow	-	-	X	-	-	-	X	-	-	-	-	-	-
Step moss	<i>Hylocomium splendens</i>	Yellow	-	X	X	X	X	X	X	-	-	-	-	-	-
American Vetch	<i>Vicia americana</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-
False-Salomon's Seal	<i>Mainantherum racemosum</i> ssp. <i>amplexicaule</i>	Yellow	-	X	X	X	X	X	X	-	-	-	X	X	-
Rattlesnake-Plantain	<i>Goodyera oblongifolia</i>	Yellow	-	X	X	X	X	X	-	-	-	-	-	-	-
Lungwort	<i>Lobaria pulmonaria</i>	Yellow	-	X	X	X	X	X	X	-	-	-	-	-	-

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				POLYGONS											
Common Name	Species Name	BC Status	COSEWIC / SARA Status	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1
False-hair capmoss	<i>Timmia austriaca</i>	Yellow	-	X	X	X	X	X	-	-	-	-	-	-	-
Falsebox	<i>Paxistima myrsinites</i>	Yellow	-	X	X	X	X	X	X	-	-	-	-	-	-
Freckle or Silver-edge Pelt	<i>Peltigera aphthosa</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-
One-leaved Foam Flower	<i>Tiarella unifoliata</i>	Yellow	-	X	X	X	-	-	X	-	-	-	-	-	-
Pink Wintergreen	<i>Pyrola asarifolia</i>	Yellow	-	-	-	X	-	-	-	-	-	-	-	-	-
Field Mint	<i>Mentha arvensis</i>	Yellow	-	-	-	-	-	-	-	-	-	-	X	-	-
Sweet-Scented Bedstraw	<i>Galium triflorum</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-
Large-leaved Avens	<i>Geum macrophyllum</i>	Yellow	-	-	-	-	X	X	X	-	-	-	X	X	-
Bunchberry	<i>Cornus canadensis</i>	Yellow	-	X	X	X	X	X	X	-	-	-	-	-	-
Stiff Clubmoss	<i>Lycopodium annotinum</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-
Ground-cedar	<i>Diphasiastrum complanatum</i>	Yellow	-	X	X	X	-	-	-	-	-	-	-	-	-
Red Clover	<i>Trifolium pratense</i>	Exotic	-	-	-	-	X	X	X	-	-	-	-	-	-
Common timothy	<i>Phleum pratense</i>	Exotic	-	-	-	-	-	-	-	X	-	X	X	-	X
Orchard Grass	<i>Dactylis glomerata</i>	Exotic	-	-	-	-	-	-	-	X	-	X	X	-	X
Meadow Buttercup	<i>Ranunculus acris</i>	Exotic	-	-	-	-	-	-	X	-	-	-	X	-	-
Creeping Buttercup	<i>Ranunculus repens</i>	Exotic	-	-	-	-	X	X	X	-	-	-	X	X	-
Orange Hawkweed	<i>Hieracium aurantiacum</i>	Exotic	-	-	-	-	X	X	X	-	-	-	X	X	-
WETLAND PLANTS															
Common horsetail	<i>Equisetum arvense</i>	Yellow	-	X	X	X	X	X	X	X	X	X	X	X	-
Scouringrush	<i>Equisetum hyemale</i> ssp. <i>affine</i>	Yellow	-	-	-	-	-	-	X	X	X	X	X	X	X

Revelstoke Adventure Park, Greely, B.C.  
Wildlife Overview Assessment  
April 7, 2014

				POLYGONS											
Common Name	Species Name	BC Status	COSEWIC / SARA Status	OGF. E	OGF. C	OGF. W	DSF1	DSF2	WSF1	MW1	MW2	MW3	SW1	SW2	A1
Skunk Cabbage	<i>Lysichiton americanus</i>	Yellow	-	X	-	X	-	-	X	X	X	X	X	X	-
Small flowered bulrush	<i>Scirpus microcarpus</i>	Yellow	-	-	-	-	-	-	-	-	-	-	X	X	X
Soft-stemmed bulrush	<i>Schoenoplectus tabernaemontani</i>	Yellow	-	-	-	-	-	-	-	-	-	-	-	X	-
Common Cattail	<i>Typha latifolia</i>	Yellow	-	-	-	-	-	-	-	-	X	-	-	-	-
Cow Parsnip	<i>Heracleum maximum</i>	Yellow	-	-	-	-	-	-	-	-	-	-	X	-	-
Common Duckweed	<i>Lemna minor</i>	Yellow	-	-	-	-	-	-	-	-	-	-	X	-	-

# **APPENDIX B-5:**

**LETTER - POTENTIAL KNOWN IMPACTS ON THE GREELY CREEK WATERSHED**



April 1, 2014

Mr. Jason Roe  
Illecillewaet Development LP  
PO Box 963  
Revelstoke, B.C. V0E 2S0

Dear Sir,

**RE: POTENTIAL KNOWN IMPACTS OF THE REVELSTOKE ADVENTURE PARK ON THE GREELY CREEK  
WATERSHED, B.C. – REVISION JULY 15, 2016**

In fall 2013, two SEC staff spent 5 days traversing the Revelstoke Adventure (RAP) property (i.e., September 20, 27 and 28 and October 4 and 5, 2013). The fieldwork was in support of an overview assessment of wildlife resources sustained within the RAP property. At the same time, observations of the proximity of the RAP to the Greely Creek Watershed (watershed) were made. As such, the fall assessment included exploring the eastern RAP boundary that is in proximity to the watershed boundary from which site-specific remarks in this letter are founded.

I generally conclude that all recreation activates proposed for the RAP are to occur within encompassing lands (i.e., private land and crown tenure land held by the proponent) and therefore do not pose an intrinsic risk to the watershed. However, potential cross-boundary risks to the watershed (i.e., including but not limited to wildfires and unintentional recreational access) from the RAP do exist and require the creation of RAP specific watershed impact mitigation strategies. To ensure the RAP does not impact the watershed, further discussions with the City of Revelstoke (City), the Columbia Shuswap Regional District (CSRD), the Interior Health Authority (IHA), and the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) are required to determine a suite of watershed impact mitigation strategies that are agreeable to all parties.

This letter provides background information on the current risks to the watershed, potential risks to the watershed from the RAP, a discussion on wildfire and controlled recreation access, and conclusions.

**Background**

In April 2013, Golder Associates (Golder) drafted a report to the City on the watershed, the main potable water source for the City<sup>1</sup>. The report was required for the City's *Permit to Operate* (permit). The permit is required under the auspice of the provincial Drinking Water Protection Act. The permit allows the City to operate the water treatment facility. The report was completed using the British Columbia (BC) Comprehensive Drinking Water Source-to-Tap Assessment Guidelines<sup>1</sup>.

The Golder report identified numerous risks to the watershed. These risks are not inherent to potential impacts from the RAP, rather they relate to activities within the watershed boundary. Risks are summarized in Table 1.

---

<sup>1</sup> Cahill, G., P. Amison, R. Atkins and J. Foley. 2013. *Drinking Water Source-To-Tap Assessment: City of Revelstoke Greeley Creek Watershed Source Protection Plan*. Prepared by Golder Associated Ltd. Prepared for the City of Revelstoke. Report No. 1214930116-001-R-RevC (draft).

Table 1. Natural and anthropogenic risks to the Greely Creek Watershed (Watershed Code #360.003). Adapted from Cahill et al. 2013.	
Risk Rating	Risk
Very High Risk	Mass movements
High Risk	Stream channel instability, climate change Other recreation (snowmobiling, hiking, mountain biking, ATVs, motorcycling and camping)
Moderate Risk	Wildfire, wildlife, and avalanches Placer and mineral mining
Low Risk	Windthrow, forest insects and disease, forestry, ski recreation Roads and infrastructure and hydroelectric power generation

Of the risks identified in Table 1, the most likely cross-boundary risks that could result from adjacent property use and land development, including the RAP, includes wildfire and unintentional recreational access.

The Golder report states that the proposed RAP could “result in increased access to the [Watershed Assessment Area (WAA; the outer perimeter of which defines the watershed protection boundary)] and bordering areas by the public and increased risk for human-initiated wildfires.” The report also noted that the RAP is downstream of the water intake and outside of the WAA. Maps depicting the location of the watershed in proximity to the RAP are included as attachments in this letter.

Specifically, the eastern boundary of the proposed Crown Tenure area for the RAP (in application) is 291 meters (m) from the City water treatment plant, 516 m from the Greely Creek Intake and 323 m from the nearest point to the watershed boundary. I understand that recreational offerings along eastern RAP boundary will not extend right to the boundary. Further, a buffer along the eastern RAP boundary will be used to prevent cross-boundary impacts. The core recreational area for the RAP, including building amenities, parking areas and chairlifts for mountain biking are approximately 1.5 to 2 kilometers away from and downslope of the eastern watershed boundary.

Following the Golder report, the City is now responsible for completing additional modules required for completion of the Source-to-Tap Assessment, including plans for treatment and distribution, operations and maintenance, and finance and governance (i.e., modules 3 through 6); this work is ongoing<sup>2</sup>. It would be advantageous for you as the proponent to engage the City concurrently with their completion of the Source-to-Tap Assessment.

During the fall 2013 assessment, SEC observed water flowing from the Greely Creek Water Treatment Plant access road onto the RAP property (Photograph 1). Water was flowing out from fill material placed to elevate the paved section of the access road. SEC inspected upstream (up and down and across the road; Photograph 2) and found no water source. It is theorized that water may be coming from a leak in a municipal water distribution pipe. Water flowing onto the RAP property has formed a stream that flows into and contributes to a wetland located at the northeast corner of the RAP property. During discussions with the City, further exploration of this occurrence is recommended.

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<sup>2</sup> Pers. comm. P. Brittin, City of Revelstoke March 17, 2014.



**Photograph 1. View east towards water flowing out of the Greely Creek Water Treatment Plant Road (October 5, 2013).**



**Photograph 2. View southeast upstream of water flowing out of the Greely Creek Water Treatment Plant Road (October 5, 2013).**

## Wildfire Protection

The Golder report states that various stakeholders (including the RAP proponents) should consider developing a wildfire protection plan that includes fuel reduction. The report also states that a:

“Fire Smart assessment indicated that the City of Revelstoke Water Treatment facility is considered a low hazard area for wildfires and fuel hazards in the area did not merit fuel management due to the amount of soil moisture, the young open deciduous stand of trees adjacent to the water treatment plant and the lack of ladder fuels in the older forests, which is of a self-pruning type.”<sup>1</sup>

SEC previously recommended that an independent fire protection specialist skilled in wildfire assessment and prevention be contracted to assess and assist with implementation of wildfire protection measures, including the east RAP boundary and the remainder of the RAP lands. SEC understands that Mr. Simon Hunt of Spark Solutions has been contracted. Fire prevention mitigation strategies should be developed in consultation with the City and Columbia Shuswap Regional District (CSRD) staff. The Ministry of Forests could also be consulted (e.g., potential fire smart demonstration area).

The following wildfire protection measures were taken from Section 11 of the Community Watershed Guidebook (CWG) developed by the provincial Ministry of Forests<sup>3</sup>. This list is not exclusive and is included only to assist with future planning discussions:

### Personnel

- Before beginning fire control actions, all suppression personnel should know they are operating within a community watershed and be aware of the special fire control measures required.

### Fire guards and fire breaks

- To minimize the potential for sediment erosion into streams, locate excavated fireguards as much as possible away from areas of known surface erosion or terrain stability hazards.

### Heavy and motorized equipment

- If possible, restrict heavy equipment in sensitive soil areas identified on the community watershed map.
- Locate stream crossings to minimize streambed disturbance and siltation. Where feasible, install stream-crossing structures. Avoid repeated fording of heavy equipment through streams.

### Chemicals

- If circumstances permit, avoid using fire-fighting chemicals.
- Avoid aerial application of fire fighting chemicals within 30 m and ground application within 15 m of any streamside, riparian or lakeshore management area.
- Locate all large-scale mixing operations in community watersheds at approved sites.
- Locate large-scale mixing operations a minimum of 60 m from the nearest natural water source, and use containment berms or structures capable of retaining 110 per cent of mixed fire fighting chemicals.
- Make a spill prevention and response plan for all large-scale mixing operations. Personnel operating the mixing unit should be knowledgeable in procedures for preventing and responding to spills.
- Make every reasonable effort to recover spilled chemicals and remove them from the site or use them on the fire line.

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<sup>3</sup> **Ministry of Forests. 2006.** *Community Watershed Guidebook*. Ministry of Forests, Victoria, B.C. Accessed online <http://www.for.gov.bc.ca/TASB/LEGSREGS/FPC/FPCGUIDE/WATRSHEd/Watertoc.htm>



- Collect residual quantities of mixed chemicals from the mix and dip tanks, wash water from pumps, hoses, tanks and berms, and any spilled chemicals, and dispose of them safely.

### **Controlled Recreation Access**

The Golder report states that existing and future recreational activities within the watershed pose a risk to watershed protection, including snowmobiling, hiking, mountain biking, ATVs, motorcycling, camping, heli-skiing, cat-skiing and downhill (backcountry) skiing. These activities have a high-risk rating for watershed impacts (see Table 1).

All recreation activities proposed for the RAP are to occur within encompassing lands (i.e., private land and crown tenure land held by the proponent) and therefore do not pose an intrinsic risk to the watershed. A potential risk is that a recreationalist from the RAP may wander into the watershed due to the proximity of the RAP to the watershed. Natural barriers are found along much of the RAP east boundary, including forested wetland and steep terrain. Roads that previously connected the RAP and the water treatment facility access road have undergone secondary succession. Here, seral vegetative assemblages provide a natural barrier to vehicular and human traffic. A natural barrier maintained is an excellent way to prevent wandering RAP visitors from entering the watershed.

The CWG recommends a 70 m stream setback (Riparian Management Area) and to exclude recreational activities from within 1 km upstream of a source water intake; both of which are achieved by current configuration of the RAP. Additionally, the CWG guidelines for reducing impacts caused by recreation in the watershed should be considered during in-depth planning with regulators and stakeholders.

The CWG strategies are intended to provide guidance in developing land within a watershed and therefore not all guidelines will directly apply to this project. However, these strategies will be useful for future regulator and stakeholder discussions.

### **Conclusions**

- The RAP is a seasonal operation (May to October); therefore winter related impacts to the watershed of any kind are not anticipated.
- There are currently other ways for recreationalist to access the watershed. During proponent lead negotiations with regulators and stakeholders, it should be discussed what other user groups, including the City, are planning to do to limit recreation in the watershed.
- Cross-boundary risks identified during the RAP operating season (May to October) include wildfire and unintentional recreational access. The scope of SEC services did not include the identification of risks to the watershed from the RAP; therefore it is possible others exist. Additional watershed risks not yet identified will likely be recognized during discussions with regulators and stakeholders (i.e., in development of the RAP watershed impact mitigation strategies).
- All recreation activities proposed for the RAP are to occur within encompassing lands (i.e., private land and crown tenure land held by the proponent) and therefore do not pose an intrinsic risk to the watershed.
- Logging activities have occurred within the watershed as close as 150 meters (m) from the water intake. Heli-skiing has occurred in the upper part of the watershed. Both land use activities have been known to have directly impacted drinking water to date.

April 1, 2014

---

- Have Spark Solutions (Mr. Simon Hunt) undertake a wildfire assessment and develop fire prevention mitigation strategies for the RAP eastern boundary and to assist with implementation of wildfire protection measures as required.
  - Discuss with the City the issue of treated water possibly being discharging onto the RAP property.
  - Without implementation of mitigation strategies, the RAP may pose an increased risk of wildfires and human traffic within the vicinity of the watershed, including the watershed itself.
  - In conjunction with SEC, the City, CSRD, IHA and MFLNRO staff, develop a list of watershed protection mitigation strategies aimed at reducing the risk of impacts from the RAP on the Greely Creek Watershed.
  - Based on field observations, there are many suitable natural buffers along the RAP eastern boundary that could significantly reduce human and vehicular access (e.g., dense forested wetlands, steep slopes). In some instances, previously constructed trails and roadways are now characterized by seral overburden, the maintenance of which may act as a natural barrier and preclude cross-boundary watershed impacts.
- 

Thank you for your attention. Please contact me if you have any questions or comments regarding this letter.

Sincerely,

*Sent electronically*

Giles Shearing, M.Sc. Candidate, B.Sc., ASCT  
Principal and Lead Consultant  
SEC Shearing Environmental Consultants

Attachments

## ATTACHMENTS

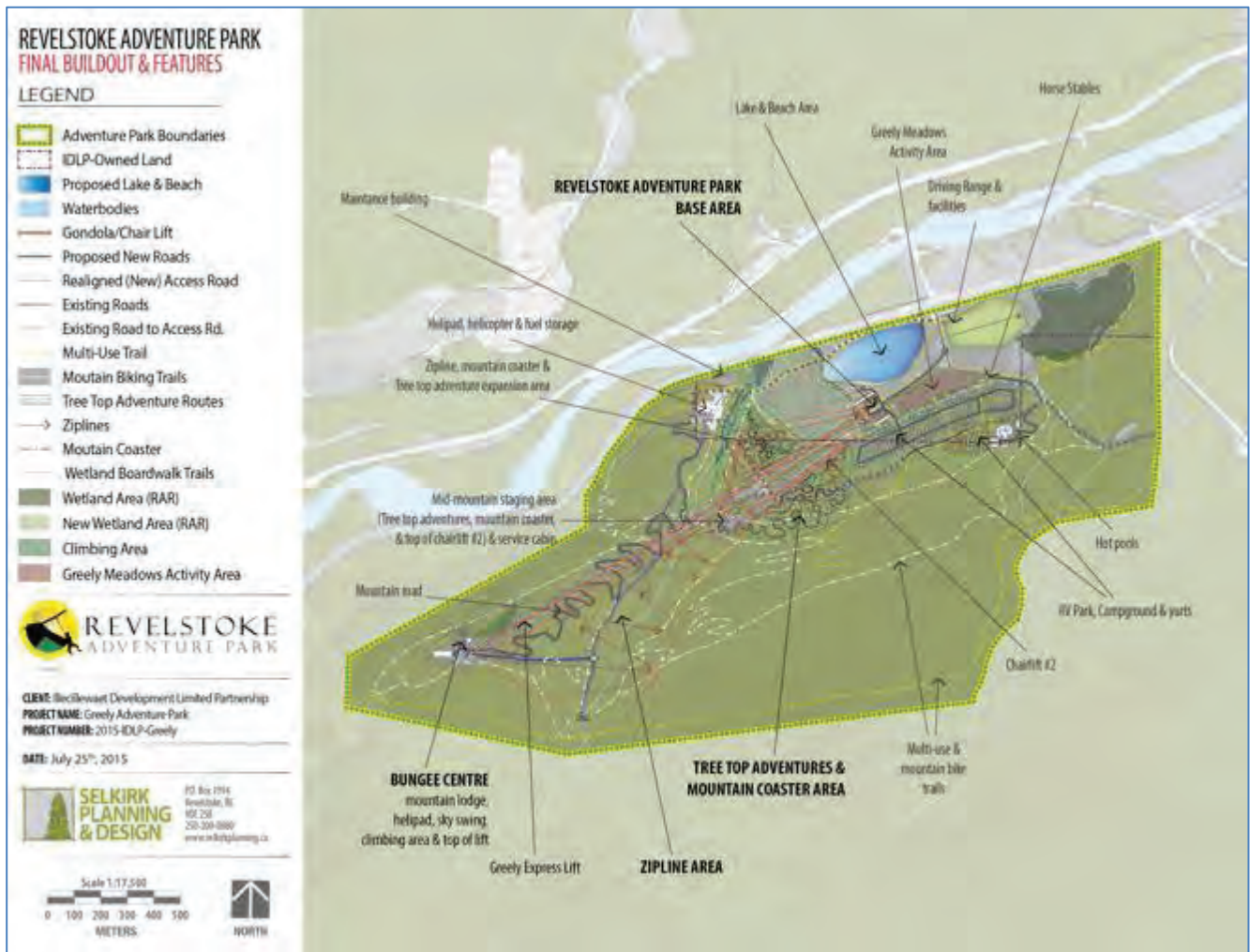


Figure 1. Revelstoke Adventure Park Map depicting proximity to the Greely Creek Watershed.

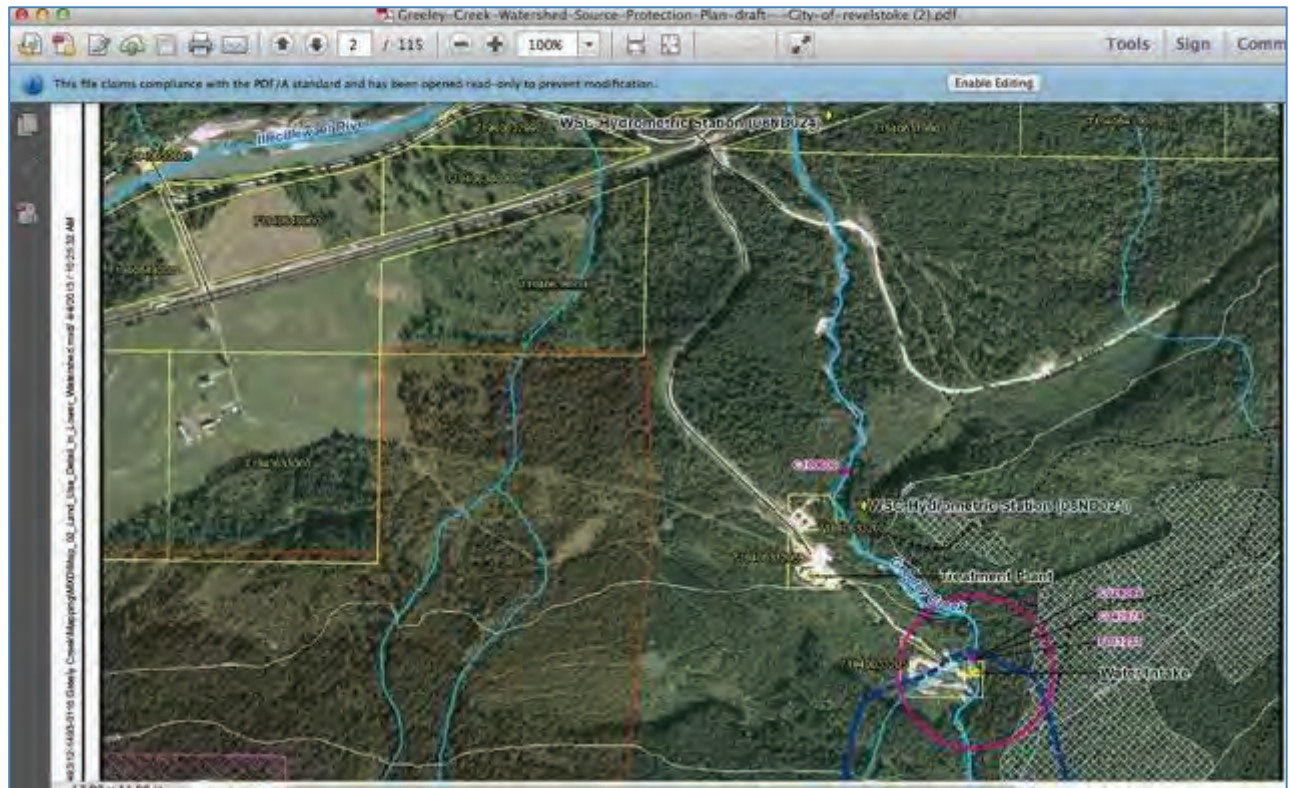


Figure 2. The Greely Creek Watershed Water Intake and Water Treatment Facility in proximity to the Revelstoke Adventure Park Proposed Tenure Area (orange hatch). From Cahill et al. 2013.



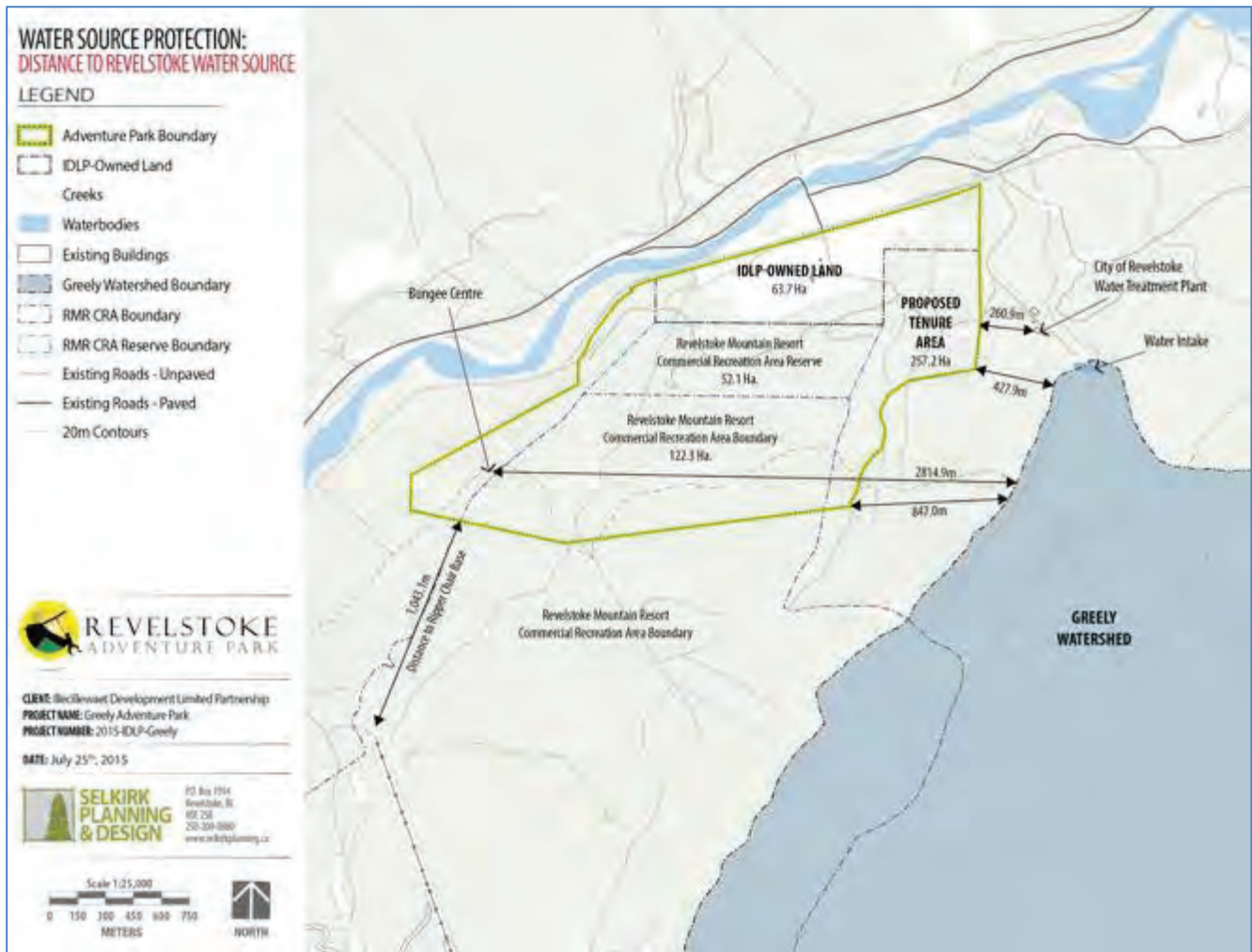


Figure 3. Overview looking south towards the Greely Creek Watershed (red line), the Revelstoke Mountain Resort Controlled Recreation Area (green line) and the Revelstoke Adventure Park (pink line).

# **APPENDIX B-6:**

**LETTER - ROAD MAINTENANCE PLAN**

April 16, 2015

Jason Roe  
Black Tie Properties LP  
Box 963  
Revelstoke, BC  
V0E 2S0

Sent by email to: [jroe@blktie.ca](mailto:jroe@blktie.ca)

**Re: Road Maintenance Plan for proposed road to proposed Revelstoke Adventure Park**

**Introduction**

The purpose of this letter is to outline a general road maintenance plan for the proposed road to the Revelstoke Adventure Park (RAP) located approximately 10km northeast of Revelstoke, BC. The road is proposed to be approximately 3km in length, and commences from private land owned by Black Tie Properties LP adjacent to the Greely Road, before continuing onto crown land as it climbs towards a proposed lodge site about 500m above the valley floor.

The maintenance plan is intended to meet the requirements of the BC Forest and Range Practices Act, including Section 79 of the Forest Planning and Practices Regulation. This document outlines a maintenance plan that will be implemented after construction is completed. The road maintenance should be considered an initial plan based on the assumed finished road parameters (listed below) and the requirements of the Forest and Range Practices Act. The general intent of the road maintenance plan is to provide guidelines to maintain the road in a usable manner adequate for the desired use that will be safe for road users and will not have significant detrimental environmental impact.

**General Road Description**

The alignment includes multiple switchbacks as well as relatively steep road grades (10-17%) as it climbs a broad dry ridge between an unnamed creek to the east and steep rocky terrain that lead down to the Illicietweat River to the west. See Figure 1 for a map.

The projected road location has been flagged in the field and both a GPS traverse and a Level 2 hand traverse has been completed on the alignment, but no clearing or earthworks have taken place. A geometric road design has been completed by Azimuth Forestry and Mapping Solutions in 2012 based on the hand traverse and a Terrain Stability Report was completed by OEL in April 2015 titled: "Terrain Stability Assessment for Road to Revelstoke Adventure Park, Revelstoke, BC, Revision #2." These documents outline the proposed construction parameters for a stable road prism and the TSA further provides recommendations for road maintenance that are intended to reduce the likelihood of a road related landslide.

Road construction will adhere to guidelines indicated in the 2013 Forest Road Engineering Manual issued by the Ministry of Forests Lands and Natural Resource Operations. Road construction is expected to include mainly conventional cut and fill techniques with occasional areas of full bench or  $\frac{3}{4}$  bench. Further, at least 3 of the switchbacks are expected to require engineered fill. Road construction is addressed in the design and the TSA.

### **Construction and Use Assumptions**

The following parameters are assumed for road construction and use:

1. The road will be constructed with typical standards for forest mainline road construction. The guidelines indicated in the TSA report and geometric road design indicated above will be followed during construction.
2. An Operations Manager (or similar position) employed by the RAP will oversee and control road use.
3. General maintenance will be by the RAP personnel and equipment; however, outside professional consultants and/or contractors will be utilized when specific issues related to the road structure, stability or user safety arise.
4. The road will be a permanent access structure that will be in use as long as the Revelestoke Adventure Park (RAP) is operating. Should operations at the RAP cease, the road will be deactivated. Comments on deactivation are provided below.
5. The road is planned as a private use road to only be used by personnel associated with the construction, maintenance and operation of the (RAP). The road will be gated at its commencement point on private land owned by the RAP and access will be controlled by RAP personnel.
6. Regular traffic will mainly be limited to pick-ups, vans and 5 ton trucks. During operation of the lodge, this traffic will take place multiple times daily. Gravel trucks, transport trucks and low bed trucks will also use the road during lodge construction and at isolated times during certain construction projects and operation of the lodge.
7. Any road users who are not employees of the RAP will either be approved by the Operations manager or accompanied by RAP personnel.
8. The road will be radio controlled. Kilometer signs will be posted to allow for the road to be radio controlled. Black Tie will obtain permission to use a designated road frequency for the road.
9. Road width is intended to be 5m with widening at switchbacks and pullouts
10. Road will have multiple switchbacks and grades will average 10 to 12% with some pitches that reach 17%
11. Surfacing will be high fines aggregate, the source of which will be determined during the construction phase.
12. No fish streams or other major crossings are crossed by the road
13. A speed limit will be posted based on the winding nature of the road and will be strictly adhered to. Due to the current grades and road width, a speed limit of 20 to 30km/hr is anticipated; however, this will be determined during road permit application.



## Risk Analysis

A partial risk analysis for the road is provided in the OEL TSA report indicated above. Known elements potentially at risk from a landslide initiating from within or downslope of the proposed development include:

- 1) Timber and soil resources downslope of the development. These resources are typically affected by any landslide event with the area impacted directly related to the magnitude of the slide. For this reason, timber and soil resources are often not used in the risk analysis.
- 2) Access along road infrastructure associated with the development. This would likely take the form of a road prism failure were either the cut or the fill slope underwent failure.
- 3) Water quality in the un-named creek to the east. The areas where the road is adjacent to this creek are indicated in the TSA. The creek is a tributary to the Illecillewaet River with the confluence located approximately 200m downstream from the start of the road. The creek is located in a deep, steep sided draw on the upper slopes that moderate downslope to a broad, moderately sloped draw. The road is located about 50m from the creek on the lower slopes and 100 to 150m from the creek on the upper slopes. No signs of existing instability were noted on the draw sidewalls. A slide with a magnitude exceeding 1000m<sup>3</sup> would be required to impact the creek.
- 4) CP Rail tracks located 500 to 600m downslope to the west of parts of the road. These areas are indicated in the TSA. The terrain between the proposed road location and the tracks is steep and rocky. No signs of any existing instability, other than small scale rockfall from existing bluffs, were noted on the hillside downslope of the road. In order for a landslide to runout as far as the tracks, it would require an event with a magnitude exceeding 8000m<sup>3</sup>. Landslide events of this magnitude typically require either a large scale, deep seated instability or substantial volumes of water to initiate, and runout the required distance.

The TSA provides recommendations that are intended to minimize the risk that the road will impact any of these elements. Successful implementation of the recommendations are expected to result in a low likelihood that road construction and use will impact these elements.

## Road Inspection and Maintenance Frequency

The road will see daily use by pick-up and passenger van traffic as well as infrequent industrial use. Road users will be predominantly employees of the RAP, and these employees will be instructed and trained to review the road on an ongoing basis, reporting any deficiencies to the RAP Operations Manager (or equivalent) so that mitigation measures can be implemented quickly.

Regular maintenance will be scheduled performed as needed. Typical issues that will be identified include:

- Road surface conditions (i.e. presence of potholes, washboard, rutting etc.) and subsequent grading requirements
- Dust control requirements

- Signage condition
- Ditchline function
- Snow removal
- Winter road surface snow and ice conditions (i.e. is sand or salt required at slippery sections)
- Any other major issues with the road, including failures and ongoing deterioration that can be noticed by regular road users

Regular scheduled maintenance inspections will also take place at a frequency determined once the road is in use (likely monthly). These inspections will be documented in an inspection report and kept on record. The purpose of these inspections will be to identify any ongoing issues or major deficiencies with the road and establish measures for repair or upgrade. In addition to the factors indicated above, the following issues will be monitored:

- Stability of the road prism including, but not limited to: presence of tension cracks and/or fill settlement, cut sloughing and ditch and culvert function
- Inspection of major structures along the road. Construction of this road is expected to require the construction of fill retaining structures at three of the switchbacks as well as some possible cutslope buttressing. These structures will be monitored for their structural integrity. Specific monitoring of these structures may be required by the design engineer and this monitoring would be incorporated into road construction plans as well as ongoing maintenance inspections.
- Inspection of all drainage structures (culverts) to ensure adequate function.
- Inspection of general drainage conditions. A small unnamed creek is located to the east of the road, and measures to ensure runoff from the road is not causing sedimentation in this creek will need to be implemented and maintained.
- Requirements for extra surfacing

Note that where stability issues or structural issues with the road prism, or on the downslope terrain are identified during any inspection, a professional engineer or geoscientist will be employed to review the identified issues and prepare mitigation prescriptions.

An inspection report template/checklist will be prepared and utilized for these inspections. This document will be based on the sample forest service road maintenance inspection schedule provided in the MFLRO Road Engineering Manual.

RAP will assign the responsibility of reviewing and implementing the inspection reports to the Operations Manager (or similar position) in a timely manner. All reports will be kept on file in order to track maintenance works and provide reference for planning future works.

## **Deactivation**

As indicated above, the road is expected to be a permanent access structure to be in place as long as the RAP lodge is operating. Should this operation cease, the road will be deactivated and the hillside rehabilitated. A professional engineer or geoscientist will be consulted to aid in determining the required level of deactivation (i.e. temporary, semi-permanent or permanent), prepare the

deactivation prescription, supervise deactivation works and confirm deactivation works are completed adequately.

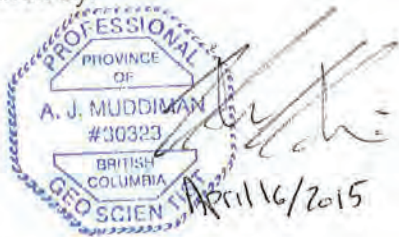
The deactivation level will reflect the length of anticipated down time. This will need to be assessed at the time of deactivation through consultation of the qualified registered professional and representatives of the government approving authority.

### **Closure**

We trust this plan meets your requirements at this time. If you have any further questions or comments, please contact the undersigned at your convenience.

Sincerely

Onsite Engineering Ltd.  
Prepared by:

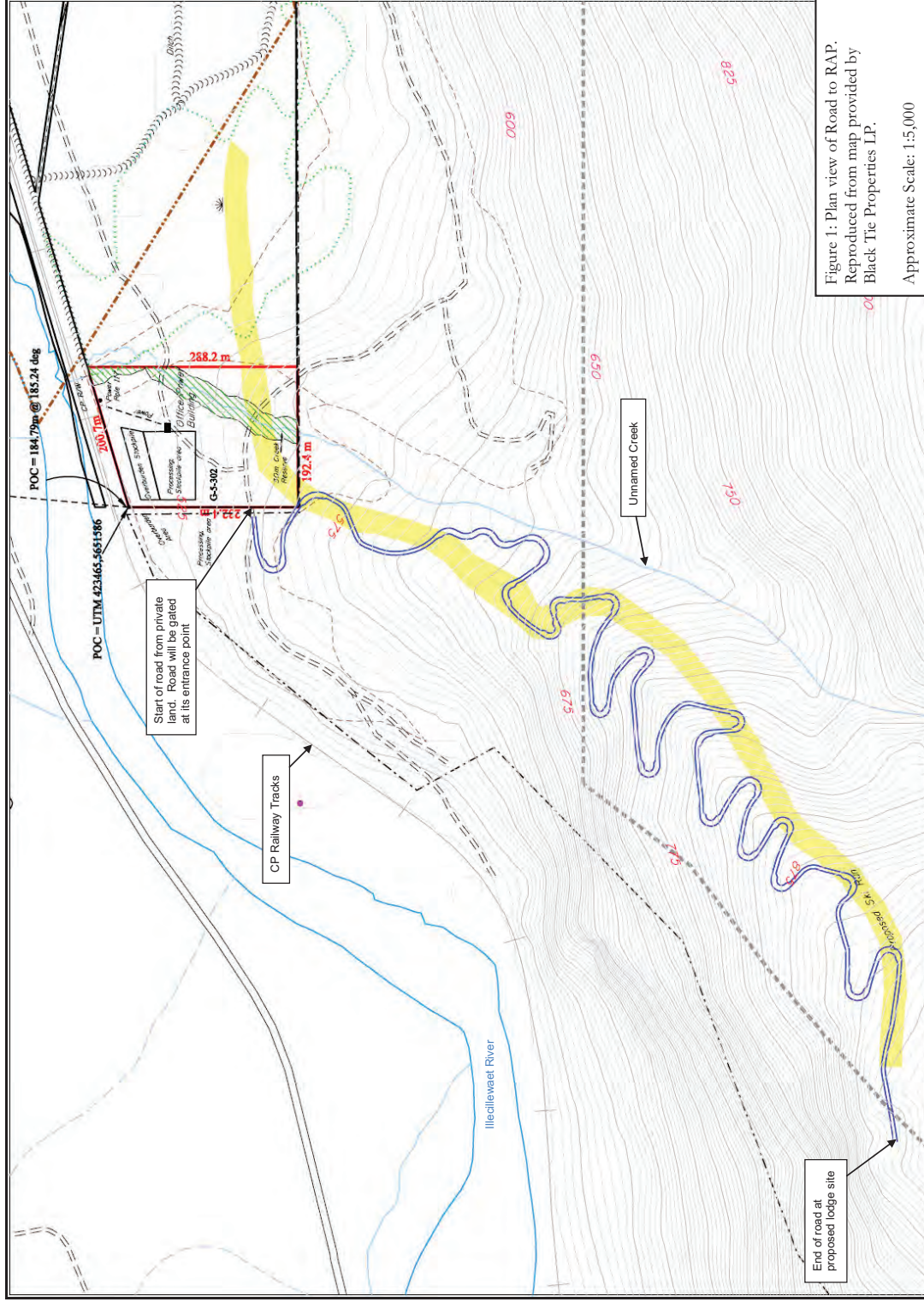


Adam Muddiman, P. Geo  
Project Engineering Geologist

Encl:

Figure 1: Copy of Site plan







# **APPENDIX B-7:**

**GEOTECHNICAL REPORT ON BLUFFS**

**Geotechnical Investigation**

**Greely Adventure Park – Proposed Lodge  
Site/Bungee Centre  
Revelstoke, BC**

Prepared for:

**Black Tie Properties LP**  
Box 963  
Revelstoke, BC  
V0E 2S0

Salmon Arm Office

#330 42nd Street SW  
PO Box 2012  
Salmon Arm BC V1E 4R1  
Tel: 250-832-3366  
Fax: 1-888-273-0209

August 7, 2015  
File: 1145-2

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## 1.0 Introduction

At the request of Mr. Jason Roe of Black Tie Properties LP (Black Tie), Onsite Engineering Ltd. (OEL) was retained to carry out a geotechnical assessment of the proposed day lodge and bungee centre site of the Greely Adventure Park. It is our understanding that the proposed structure is to be an approximately 5000sqft wood frame building with conventional strip and pad type footings; however, further structures may be constructed in the future, including a bungee jump platform and viewing deck. The site is located in the Greely Creek area on the south side of the Illecillewaet River approximately 7km east of Revelstoke, BC.

The purpose of this assessment is to describe general geotechnical conditions at the site, provide guidance for foundation construction, and to provide a preliminary estimate of no build setback lines from the bedrock bluff downslope of the lodge site.

### 1.1 Scope of Assessment

This report provides a description of the soil, rock and groundwater conditions present at the time of the field inspection and general guidelines for foundation construction at the site.

### 1.2 Limitations

This report has been prepared in accordance with generally accepted geotechnical practises. No other warranty, expressed or implied, is made. General observations are made on the existing slope gradients, shape, morphology and the general stability. Information on the subsurface soil, groundwater and bedrock conditions was initially gathered from hand excavated test pits at the proposed lodge site. No deep machine excavated test pitting or drilling was conducted.

The classification and identification of the type and condition of the geological units present are judgemental in nature. Variations (even over short distances) are inherent and are a function of natural processes. OEL does not represent or warrant that the conditions listed in the report are exact and the user should recognise that variations may exist. Sub-surface conditions other than those identified may be encountered, requiring a review of the recommendations contained in this report, with amendments made as needed. It is the responsibility of Black Tie to contact OEL when conditions differ.

## 2.0 Office and Field Review

Prior to and following the field assessment the following materials were reviewed:

- Orthophoto Imagery © Province of B.C, retrieved from [www.earth.google.com](http://www.earth.google.com). The date of this imagery is estimated 2004 photography.
- BC Digital Geology mapping retrieved from <http://maps.gov.bc.ca/ess/sv/imapbc/>
- Extensive Area Map at a scale of 1:5000 provided by Black Tie.
- Intensive Use Map – Site Layout #2 at a scale of 1:1000 provided by Black Tie.
- Report titled “Terrain Stability Assessment for Greely Road”. Report prepared by Onsite Engineering Ltd. for Black Tie Properties LP and dated June 7, 2012.

Fieldwork was completed by Adam Muddiman, P.Geo. and Ryan Williams, GIT of OEL. Fieldwork involved a foot traverse of the proposed lodge site and the base of the bedrock bluffs downslope of the lodge site. Observations of local geomorphology, drainage, and soil conditions were collected with respect to the proposed development. Information was also gleaned from hand dug test pits at the site.



### 3.0 General Site Information

The proposed development area is located in the Illecillewaet River valley in the Selkirk Mountains physiographic region of BC. The region is characterized by rugged terrain with high relief, sharp glaciated peaks and deeply incised glacial valleys (Holland 1976)<sup>1</sup>. The local relief in the area ranges from 510m asl at the valley bottom to a maximum elevation of 2459m asl at the peak of Mount Mackenzie to the south.

The proposed day lodge site is situated at approximately 925m asl on the north flank of Mount MacKenzie at the crest of a broad, bedrock controlled ridge which runs from the valley bottom to the mid slopes of the mountainside. Terrain on the east side of the ridge slopes away at 40 to 60% into a broad, deep valley of an unnamed drainage, while terrain to the west breaks over into very steep bedrock bluffs for 20 to 30m followed by 70 to 90% planar colluvial. The proposed lodge site is situated 30 to 50m back from the break to the very steep, bedrock bluffs to the west. Terrain upslope of the lodge site moving south up the ridge consists of irregular, benchy slopes with gradients of 20-45%.

Bedrock in the area is mapped as Devonian orthogneiss of an unnamed group. Bedrock observed in the bluffs downslope of the lodge site consists of massive, extremely strong orthogneiss with widely spaced fractures on the order of 2-5m spacing. The fracture orientation appears to be random and does not follow a specific bedding plane or jointing pattern. The observed lithology matches bedrock mapping of the area and numerous boulders scattered throughout the study area also consist of similar orthogneiss.

The proposed day lodge is part of the larger Greely Adventure Park development. This adventure park development, while still in its planning phase, is understood to consist of numerous different components including a 2.9km proposed road accessing the lodge site. A TSA report concerning the proposed road has been authored by OEL and the reader is referred to this previous report for further detail.

It is also our understanding that a bungee jump platform and viewing deck may be constructed in the general vicinity of the lodge site and will consist of a structure protruding out over top of the bedrock bluffs. No detailed building plans concerning the bungee jump platform were supplied to OEL and it appears that these works are in the initial planning stage. This bungee jump platform is discussed below.

This report addresses geotechnical conditions at the proposed lodge site and along the bedrock bluff immediately downslope of the lodge site. This report does not address geotechnical conditions or terrain stability of any of the other components of the Greely Adventure Park.

At the time of the field assessment an access road to the site had been laid out and was in preliminary design stage, but had not been constructed, and the exact day lodge design had not been finalized. As a result excavator access was not possible to the proposed lodge site and the determination of geotechnical conditions utilized observations of landforms in the area and excavation of shallow hand dug test pits.

### 4.0 Geotechnical Site Assessment

The following is a general assessment based on hand dug test pits and visual inspection of landforms, surficial material and bedrock outcrops. Foundation construction and drainage recommendations are general geotechnical requirements typically required for construction. Detailed construction plans were not available at the time of the assessment and it is our understanding that final lodge plans have not yet been formulated. A more detailed geotechnical assessment will be required once the final building plans are completed, and of the exact location of the structure is established. The recommendations contained in this report may be amended at this time.

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<sup>1</sup> Holland, S.S., Landforms of British Columbia, A physiographic outline, Bulletin, 1976; BC Department of Mines and Resources. Victoria, B.C.

Terrain at the proposed lodge site features irregular, benchy slopes with gradients of 10-15% on benches and up to 55% on the short escarpments separating benches. The proposed lodge site is situated on one of these bench features and is backed by a 15m long slope with 45 to 55% gradients. Slopes below the lodge site break over abruptly into a vertical to slightly overhung 20-30m tall bedrock bluff. Hand dug test pits were excavated at the top of the short slope backing the lodge site, at the centre of the bench where the lodge is proposed to be situated, and at the edge of the bench. The location of these test pits was recorded with a handheld GPS unit. The accuracy of these measurements is estimated on the order of  $\pm 5\text{m}$ .

The surficial materials encountered in the hand dug test pits consisted of the following:

Test Pit 1 (WP 831-UTM 422608mE, 5650548mN):

0 – 0.05m – Organics.

0.05 – 0.8m – Brown loose to compact silty sand with some gravel, numerous subangular cobble to boulder sized clasts (40-50% of the material).

0.8 – 1.1m – Grey compact to dense sand with some silt and some gravel, numerous cobble to boulder sized clasts (30-50% of the material).

Test Pit 2 (WP 830-UTM 422606mE, 5650529mN):

0 – 0.2m – Silty sand with some gravel, numerous cobble to boulder sized clasts. Well drained with abundant root penetration.

0.2 – 0.8m – Compact to dense gravelly sand with trace to some silt. Numerous cobble to boulder sized clasts (20-30% of the material).

Test Pit 3 (WP 832-UTM 422614mE, 5650571mN):

0 – 0.2m – Silty sand with some gravel, numerous cobble to boulder sized clasts. Well drained with abundant root penetration.

0.2 – 0.8m – Compact to dense gravelly sand with trace to some silt. Numerous cobble to boulder sized clasts (20-30% of the material).

All three pits exhibit generally similar soil conditions with weathered till bordering on colluvium overlying unweathered till bordering on colluvium. No subsurface water, mottling or other signs of previous subsurface water flows were noted in any of the pits. In general the soils are well drained and are compact, transitioning to dense at depth. Bedrock was not encountered in any of the test pits; however, it was apparent at the break to the bluffs approximately 30m downslope from Test Pit 3 that bedrock could be encountered in deeper excavations. By observing the general morphology of the site and by projecting the elevation of the bedrock observed at the start of the bluffs upslope, it is estimated that the depth to bedrock is on the order of 2-3m at Test Pit 3, and more than 3m at Tests Pit 1 and 2. Note that these are estimates only and if depth to rock is considered to be a determining factor for lodge construction than deep test pitting using an excavator should be performed.

At first glance the sedimentary profile described above is consistent with a colluvium type material deposited by mass wasting associated with large bedrock failures. These types of events tend to produce deep deposits of unstratified, coarse grained, unsorted, angular materials which is broadly consistent with what was observed in the field. However, a review of orthophoto imagery of the site reveals that there are not any bedrock outcrops of sufficient size upslope to produce such a deposit. As a result, the most probable deposition mechanism is considered to be glacial action.

It is possible that a small mountain glacier was present originating in the north bowl of Mount Mackenzie and flowing down through the large draw to the east of the study site during the last glacial maximum. The study site could have been located at the distal edge of this glacier resulting in deposition of deep marginal moraine deposits. The relatively short transport distance from the north bowl of Mount Mackenzie to the deposition site could explain the coarse, angular nature of the sediments present.

As was mentioned above, no groundwater flows were observed in any of the three test pits and no surface flows were apparent in the study area. Groundwater flows are not expected to be encountered at depth during foundation excavation efforts due to the location of the study area on a broad ridge, a terrain feature which promotes divergent drainage patterns.

The loose to compact gravelly sand with trace to some silt material found in the base of each of the test pits is suitable for foundation placement. In its undisturbed state this material has an estimated bearing capacity of up to 100kPa; however, if the excavated surface is compacted via multiple passes of a 1000lb vibrating plate compactor or a vibratory steel drum roller an estimated bearing capacity of up to 150kPa can be developed.

Although bedrock is expected at some depth across much of the proposed building site, the lack of deep test pits make it difficult to confirm this expectation. As a result rock mass properties are given below in the event bedrock is encountered during foundation excavation and if foundations are then founded on this rock. As was described above, bedrock in the area consists of massive, extremely strong orthogneiss with widely spaced fractures on the order of 2-5m. Reliable rock mass properties concerning this lithology can be gleaned from the chapter on Rock Mass Classification in the text by Evert Hoek – Practical Rock Engineering and from the software program RocLab also developed by Evert Hoek. The values given below were obtained from this and other referenced sources and are estimates only. No rock core drilling or testing was completed at this site.

1. The UCS strength of the intact and competent orthogneiss present at the site is estimated at 175MPa using the Hack-Huisman method<sup>2</sup>. The rock has wide spaced fractures and appears to be competent at surface.
2. The allowable bearing capacity is estimated at 40 MPa<sup>3</sup>. This value includes a factor of safety of 3 (WSD).
3. The unit weight of the orthogneiss is estimated at 28.5kN/m<sup>3</sup>.
4. The rock mass is jointed and fractured to some extent and shouldn't be treated as a monolith for anchor design. The cone apex angle used in design should be 60 degrees<sup>4</sup>.
5. Shear friction is estimated at 20 MPa.
6. The friction angle ( $\phi$ ) of the orthogneiss is estimated to be 45 degrees.

## 5.0 Construction Recommendations

### 5.1 Site Preparation for Building Foundations

Site preparation should include removal of all organic materials from the building site and all other load bearing surfaces. The final excavation surface is to extend to the native loose to compact gravelly sand with trace to some silt material described above. It is also possible that orthogneiss bedrock may be encountered depending on the depth of excavations.

If the excavated surface extends into the gravelly sand with trace to some silt material then the floor of the excavation is to be made as level as possible and then compacted via multiple passes of a 1000lb vibrating plate compactor or a vibratory steel drum roller to develop a bearing capacity of up to 150kPa. The floor of the excavation should then be overlain by a 0.3m deep of leveling fill of crush and compacted. Foundations may be placed upon this leveled surface.

If the foundation excavations extend to bedrock then the exposed bedrock surface is to have all weathered or loose rock removed to expose a surface of intact competent rock. Foundations can then be cast directly onto this rock surface or place on a thin layer of leveling crush.

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<sup>2</sup> Hack and Huisman, 2002. Estimating the intact rock strength by simple means. Engineering Geology for Developing Countries – proceeding of the 9<sup>th</sup> Congress of the International Association for Engineering Geology and the Environment. Durban, South Africa. 16-20, September 2002.

<sup>3</sup> Equation 9.1. In the 4th Edition of the Canadian Foundation Engineering Manual

<sup>4</sup> Xanthakos, P.P. Ground Anchors and Anchored Structures (pp 213) 1991 John Wiley and Sons

**Note that due to the uncertainty surrounding the day lodge building plans and the exact composition of surficial materials below 1m depth in the soil profile, it is recommended that an Engineer or Geoscientist or their representative inspect the excavation prior to any foundation placement.**

## **5.2 Foundation Drainage**

The slopes at and surrounding the proposed lodge site are dry with no signs of surface flows. No signs of subsurface flows were noted in test pits at the site. Furthermore the native surficial materials present at the site are very coarse and are free draining. However, due to uncertainty surrounding the proposed lodge design and subsurface conditions, recommendations concerning site drainage cannot be formulated at this time. A foundation drainage plan can be developed when building plans are developed.

## **5.3 Structural Fill**

The sand with some silt and some gravel and numerous cobble materials found on site could potentially be used as structural fill; however, this would need to be confirmed by the geotechnical engineer following an inspection of the material excavated from the site. Where the native material is not found to be suitable, material will need to be transported to the site.

Where structural fills are required, including the use of crushed gravel beneath footings, they are to be founded on compacted native soils, stripped of all organics. The native soils are to be benched to limit their gradient to no greater than 2% where they underlie structural fills. The benches should slope to daylight or have perimeter drains to ensure the structural fill is drained. The following guidelines should be followed when placing structural fill:

## **5.4 Building Foundations**

The day lodge building design and therefore also the foundation design is not known at this time. Detailed recommendations concerning placement of the foundation will be formulated once the lodge design is supplied to OEL. However, for planning purposes the foundation should be designed for a maximum bearing capacity of 100kPa.

## **6.0 Proposed Bungee Platform**

The proposed bungee jump platform and viewing deck is still in the initial proposal phase and no detailed structural designs or locations have been formulated. The structure will likely protrude out over the bedrock bluff downslope of the lodge site and may be tied back to the top of the bluff via rock bolts. From an initial planning perspective such as structure may be feasible. The rock present at the site is competent and appears suitable for rock anchor and foundation placement. No signs of an impending major rock detachment event were apparent along the top of the bluffs.

However, it must be noted that these are just initial observations and any sort of detailed assessment of such a structure will require the completion of detailed structural designs and identification of an exact location for the structure. Further works would then include deep drilling at the site and a detailed assessment of bedrock conditions at the bungee jump location. It will be necessary to retain a geological engineer with experience in such structures at this time.

## **7.0 Slope Stability Discussion**

The proposed lodge site is located on broad ridge with local irregular, benchy terrain with dominantly gentle to moderate gradient slopes. This type of terrain continues upslope of the lodge site for at least 350m and does not contain any signs of historic or insipient instability. The location of the site on a broad ridge in the mid-slope of the mountainside removes its connection to any upslope hazards (See Figure 3). The majority of the drainage



from the mountainside is directed into the broad deep draw containing the unnamed drainage to the east of the ridge. There are no surface flows, nor previous channels present in the vicinity of the lodge site. As a result of these conditions, no upslope hazards such as a landslide or hydrogeomorphic events are foreseeable.

Terrain downslope of the site breaks over into a 20-30m tall somewhat overhung rock bluff approximately 30m downslope of Test Pit 3. At the toe of the rock bluff, the terrain drops away with 70 to 90% planar slopes leading to the valley bottom. The bluff is composed of competent orthogneiss with minimal fracturing. No signs of historic or incipient major rock detachments, such as obvious faults or open spreading fractures, were noted at the top of the bluff; however, much of the top of the bluff is covered in surficial materials making a detailed assessment difficult. It is also apparent that small scale ( $<5\text{m}^3$ ), rock fall events do occur on the face of the bluff at relatively frequent intervals and small boulders can be seen scattered at the base of the bluffs, though, no large colluvial talus deposits are present as would be expected in large scale active rockfall zones. The rockfall events appear to dominantly originate in the somewhat overhung upper portion of the bluffs. It is conceivable that such events could impact the upper lip of the bluffs.

Due to this uncertainty, the potential does exist for rock detachments to impact structures constructed near the edge of the top of the bluffs. Therefore a setback line should be established 25m back from the top of the bedrock bluffs. This setback line would demark the edge of any conventional construction from the bluffs. The setback applies to the proposed lodge, but also extends to other site development including, no swimming pools, hot-tubs, equipment sheds or dwellings.

Any construction within the setback (such as the proposed bungee jump platform and viewing deck) will require a more detailed investigation of the rock to determine its suitability for foundations.

## 8.0 Closure

This assessment has been carried out in accordance with generally accepted geotechnical practice for the area. Conclusions and recommendations presented herein are based on visual site inspections. Assessments of soils and slope stability are based on interpretation of surface features and limited sub-surface investigation; actual ground conditions may vary from those inferred. Should the proposed development/subdivision plans change and/or the soil/bedrock conditions encountered differ from those outlined in this report; Onsite should be contacted so that the recommendations contained in this report can be reviewed.

Factual data and interpretation contained within this report were prepared specifically for Black Tie Properties LP with whom OEL has entered a contract. The local government or approving agency may rely on the findings of this report; no other party may rely upon this report without the express written permission of OEL.

We trust that this report satisfies your present requirements. Should you have any questions or comments, please contact our office at your convenience.

Sincerely,

Onsite Engineering Ltd.

Prepared by:



Ryan Williams, GIT  
Project Geoscientist



Adam Muddiman, P. Geo.  
Project Geoscientist



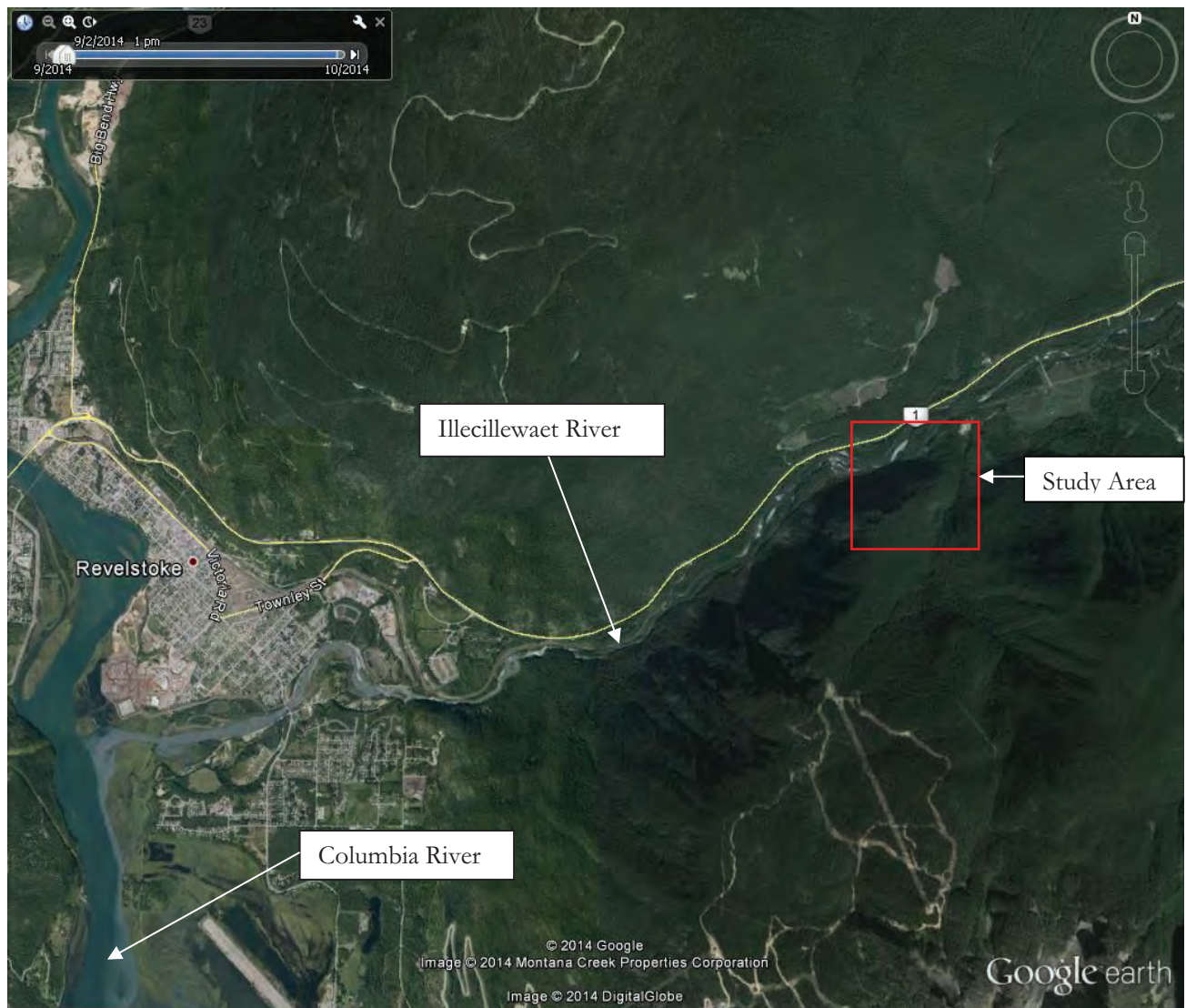


Figure 1 – Location Key Map

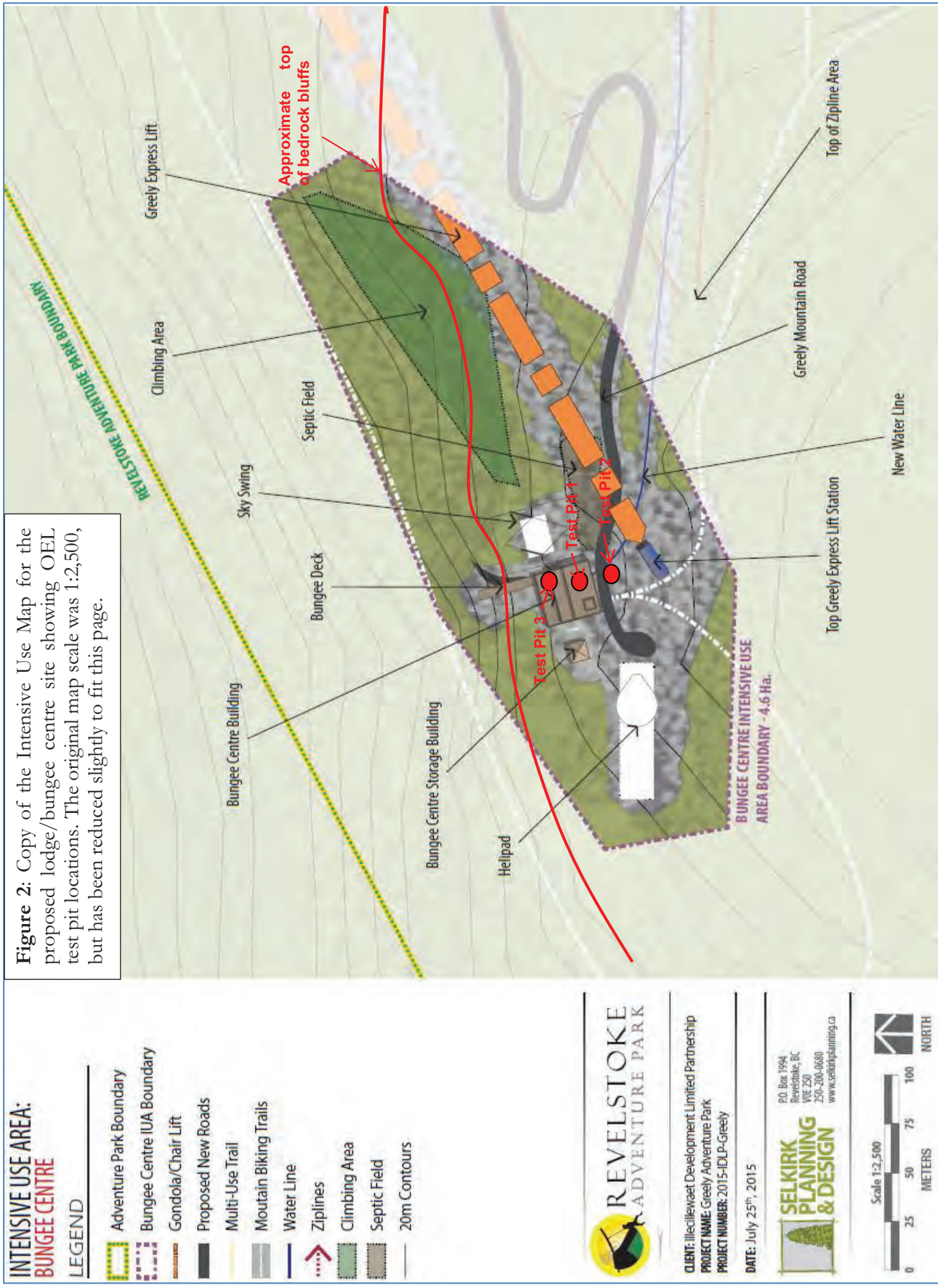






Figure 3: Oblique view of lodge site. Note the ridge top location and separation from the upper mountainside due to the dry ridge and creek draw



# **APPENDIX C:**

**LETTER FROM RCMP**



Royal Canadian Gendarmerie royale  
Mounted Police du Canada

Security Classification/Designation

**Confidential**

Non-Commissioned Officer in Charge  
Revelstoke Royal Canadian Mounted Police Detachment  
404 Campbell Avenue, PO Box 1480  
Revelstoke, British Columbia  
VOE 2S0

Your File

Jason ROE  
PO Box 2790  
Revelstoke, British Columbia  
VOE 2S0

Our File

2016-02-10

Dear Mr. ROE,

**Revelstoke Adventure Park consultation with Revelstoke RCMP**

In the late fall of 2015 the City of Revelstoke approached the Revelstoke RCMP to obtain opinion on the proposed project of the Revelstoke Adventure Park in the Greely area of the Trans-Canada Highway. I can confirm that the several issues that the Revelstoke RCMP identified have been discussed with yourself in our previous conversations. The Revelstoke RCMP are interested in working with local agencies and businesses to decrease motor vehicle incidents and increase public safety. Through Crime Prevention Through Environmental Design (CPTED) the Revelstoke RCMP are prepared to work with the Revelstoke Adventure Park (RAP) owners, designers and operators to ensure public safety at the design, construction and implementation stages. I am confident that this relationship will continue as the project progresses.

The issues that were identified to Revelstoke City Council included concern over the access point from the Trans-Canada Highway. Consideration needs to be made as to how the highway interchange is constructed or modified. We wish to ensure the safe entrance and exit in the area of Greely Road and the Trans-Canada Highway, where the public and employees will be accessing the RAP. I am confident that the RAP will be working with both the RCMP and the Ministry of Highways to seek the best solution.

Further concerns were expressed for the development of the site to include cameras, lighting, open pathways and other issues to ensure user safety and reduce thefts and vandalism. This issue was also discussed between the RCMP and yourself, Jason ROE, in order to ensure that as the project progresses, that these suggestions are considered and implemented.

Respectfully,

Staff Sergeant Kurt GRABINSKY  
Non-Commissioned Officer in Charge  
Revelstoke Detachment  
Royal Canadian Mounted Police

# **APPENDIX D:**

## **COMMERCIAL RECREATION TENURE OVERLAP INFORMATION**

# **APPENDIX D-1:**

**Adventure Tourism Operator Input Form**



## Appendix 5: Adventure Tourism Operator Input Form (ATOIF)

This form is provided to obtain input from Adventure Tourism (AT) Tenure holders Tenured under the Land Act or licensed Guide Outfitters Tenured under the Wildlife Act.

Input is requested on potential issues or resolution of issues associated with overlapping tenure areas as a result of an AT application made by:

Name of AT Applicant: Illecillewaet Development Limited Partnership

AT Applicant's Crown land File Number: **#4405329**

Information provided on this form will be used by the Decision Maker(DM) as part of the adjudication process for reviewing Adventure Tourism applications with overlapping tenure and does not imply a veto for AT Tenure holders.

Company name of the existing AT Tenure holder/licensed Guide Outfitter:

Revelstoke Mountain Resort Limited Partnership

Crown land Tenure file number of AT Tenure holder/licensed Guide Outfitter: 864906

**Instructions: AT Tenure holders or Guide Outfitters please respond to the specific questions relating to the proposed tenure management plan (see attached) for this application. Please attach any additional information to this form if you require more space for a complete reply.**

**1. Within the areas of overlap, do you believe the AT applicant's proposed activities may affect the way in which you currently operate?**

  X   No        Yes (please explain how it will affect your current operations).

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2. Within the areas of overlap, are there ways in which you and the AT applicant could both operate that would help minimize any changes to your current operation? For example, operating at different times, using different areas for activities that are not compatible, etc.

\_\_\_\_\_ No ☒ Yes (please explain).

The two operations are separated by both season and space. Revelstoke Mountain Resort (RMR) is primarily a winter operation and Revelstoke Adventures is a summer only operation. Although this area is in the RMR tenure there is very limited access to this area from the resort as there is approximately 2000m of standing timber and un-disturbed ground between the two operations.

Illecillewaet Development LP shall not, in any other way impede or restrict the use of RMR's Tenure.

3. If there are ways in which you and the AT applicant could both operate that would help minimize any changes to your current operation, are the services of Authorizing Agency staff still needed to help address overlapping area issues?

☒ No ☐ Yes (Please explain the role the Authorizing Agency may play to assist you with this).

4. Within the areas of overlap, do you believe this AT applicant's proposed activities may negatively affect the kind of experience that you currently offer to your guests?

☒ No ☐ Yes (Please explain how it will affect the experience that you currently offer your guests).

5. Within the areas of overlap, are there ways in which both you and the AT applicant could operate which would minimize any changes to the experience you currently offer your guests?

☒ No ☐ Yes (please list).

Provided that the AT Applicant restricts its activities to summer time activities and is confined to the area specified.

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6. Within the areas of overlap, do you believe the AT applicant's proposed activities may affect safety or risk management efforts associated with your business?

☒ No ☐ Yes (Please explain how it will affect your safety and risk management efforts).

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7. Within the areas of overlap, what ways would you suggest both you and the AT applicant may operate that would help minimize any changes to the safety or risk management practices associated with your business?

Given the separation between the two operations as noted above there should little or no impact to the safety and risk management of either operation by the other.

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Land Use Operational Policy: Adventure Tourism

8. With respect to this AT application, are there any concerns related to activities that would occur adjacent to your tenure boundaries?

☒ No    ☐ Yes – please explain.

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9. With respect to this AT application, are there any concerns that may prevent your operation from modifying your Tenure (Client Days, approved uses)? If so, please explain.

No

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Signature of AT Tenure holder

June 12, 2015  
Date (month/day/year)

Robert Thomas Gagliardi  
Print Name

Please send completed ATOIF to the Authorizing Agency at the following address:



# **APPENDIX D-2:**

**Mountain Resort Branch Referral Response**

**Illecillewaet Limited Partnership: File 4405329: Application  
Mountain Resort Branch Referral Response  
April 22, 2013  
Updated – June 12, 2015**

**Prepared by:  
Terry Pratt, Sr Manager, Major Projects**

**Referral Question Responses:**

- This application does impact our Branch's legislated responsibilities because summer recreation activities and a portion of the proposed lift infrastructure are within Revelstoke Mountain Resort's (RMR) Controlled Recreation Area (CRA) which we administer through the RMR Master Development Agreement (MDA) dated March 17, 2005.
- If the proposal proceeds, the proponent will require approval from our Branch to operate within the CRA. RMR has already provided its consent through the original ATOIPF signed by Tom Gaglardi, which has been updated. Any recreational infrastructure must be in the name of RMR and administered by our Branch as a tenure tied to the MDA. The ILP licence can overlap the CRA as proposed, allowing the other summer non-lift based recreational activities within the CRA. To permit this, the MDA will be modified to allow the Licence activities within the CRA.
- Ongoing compliance monitoring will be required by our agency to ensure that the operations are consistent with RMR's resort operation and provincial objectives and do not contravene any provisions of the MDA.
- Our Branch is not familiar with the amount of public use within the application area; however given that this is a commercial application that will bring clients into the area, public use will be affected.

**Mountain Resort Branch Conditional Support for Application:**

Based on Jason Roe's response to our initial questions about the business ties and synergies between ILP and RMR ( see attached), our Branch supports ILP's application but wants to ensure that the long term interests of the province and RMR are protected through appropriate tenure agreements should there be changes in ownership of either entity. We provide our conditional support for the proposal subject to:

- RMR to be the tenure-holder of the Statutory Right of Way (SRW) for the mountain bike lift. ILP's interest in the lift can be secured as an interest noted on the SRW and ILP's operations can be managed through a sub-tenure agreement with RMR administered by our Branch. The portion of private land covered by the SRW will need to be transferred to the Crown as part of the SRW issuance process and will be administered by our office through the SRW as the province must be the landholder for the entire lift.

- The summer recreation activities within the CRA can be permitted by the Licence of Occupation that ILP is applying for because it is supported by RMR and consistent with the long term objectives of the resort development; however to protect ILP's interest as part of the resort operations, the MDA will be amended to note it as a tenure interest.
- Our Branch will collect revenue for the portion of summer recreation activities within the CRA (both lift-based and non-mechanized access, eg. trail fees for mountain bikers not using the lift and any other commercial recreation activities). ILP's activities within the CRA are considered Independent Operator Revenue as defined by RMR's MDA and fees will be collected according to Article V of the MDA. Payment of these fees must be a condition of ILP's licence of occupation.
- Our Branch only supports ILP's summer activities within the CRA and then only with RMR's consent, which RMR has provided. The summer activities proposed and directly tied to RMR's operations help move the resort to an all season operation which is the province's long term objective for the resort.
- Any proposal by ILP for winter-based recreation activities would need to be applied for by RMR and sub-tenured to ILP and must be consistent with an approved Resort Master Plan.
- Our Branch does not support any permanent winter bed units for the ILP proposal as their value would be derived by access to lift-based winter recreation in the CRA and would draw potential visitors from RMR's base area and the City of Revelstoke.





# **APPENDIX E:**

## **LETTERS OF COMMUNITY SUPPORT**



# City of Revelstoke

P.O. Box 170, Revelstoke, British Columbia V0E 2S0  
revelstoke.ca

## OFFICE OF THE MAYOR

July 16, 2015

Illecillewaet Development Limited Partnership  
PO Box 963  
Revelstoke, BC V0E 2S0

**Attention: Jason Roe, COO, Black Tie Properties LP**

### **RE: Request for Support for Revelstoke Adventure Park (RAP)**

On behalf of the City of Revelstoke I am pleased to provide a letter of support in principal for the concept of the Revelstoke Adventure Park and the application for an Adventure Tourism License of Occupation.

The City acknowledges that this unique development will enhance Revelstoke's reputation as leading outdoor adventure tourism destination while stimulating economic progress in our community.

This letter of support in principal does not disregard the City's main concern for protection of the community's watershed area.

Sincerely,

Mark McKee  
Mayor

:cf

#### DEVELOPMENT SERVICES

(250) 837-3637  
development@revelstoke.ca

#### PUBLIC WORKS

(250) 837-2001  
works@revelstoke.ca

#### FINANCE

(250) 837-2161  
finance@revelstoke.ca

#### FIRE RESCUE SERVICES

(250) 837-2884  
fire@revelstoke.ca

#### PARKS, RECREATION & CULTURE

(250) 837-9351  
pro@revelstoke.ca

#### CORPORATE ADMINISTRATION

(250) 837-2911  
admin@revelstoke.ca

#### COMMUNITY ECONOMIC DEVELOPMENT

(250) 837-5345  
ced@revelstoke.ca

July 10, 2015

Honourable Steve Thomson  
Minister of Forests Lands Natural Resource Operations  
Victoria, BC

Dear Minister Thomson,

Please accept this letter as support for the proposed Revelstoke Adventure Park. This project will benefit the overall economy in our community. Our rich heritage, majestic setting and epic adventure experiences are becoming world renowned by travellers and potential new residents.

Revelstoke Mountain Resort has brought our community opportunities for winter employment that attracts seasonal workers from November to April. This creates several challenges in our community, such as:

- Seasonal workers, many of whom are young and searching for career options, often have to leave the community in the off and summer seasons to find other employment or look to the EI system to carry them over to the next work season.
- Many homes and rental properties are vacant for extended vacancy periods, driving up winter accommodation costs.
- Our municipal services, such as schools and facilities, would benefit from economies of scale with more permanent residents and families.
- Retail businesses see a significant drop in sales in the off-season.

The proposed Revelstoke Adventure Park would be a much needed employer in these seasons and would support year round resident opportunities for this market of young professionals seeking a healthy mountain lifestyle. In addition, the Revelstoke Adventure Park will round out our world-class winter product, with an equally impressive summer product, to make us the year-round destination of choice for travelers.

Tourism is one of the most significant contributors to our community's economy, and in May 2008, Revelstoke was granted Resort Municipality status by The Province and joined the MRDT program. This program has assisted us to increase visitors and build new tourism infrastructure. As Revelstoke continues to grow as a resort community, we welcome new developments such as the Revelstoke Adventure Park to increase the value of our destination.

Sincerely,



Judy Goodman  
Executive Director  
Revelstoke Chamber of Commerce

Cc: 2015 Chamber Board of Directors





Ministry of Forests Lands Natural Resource Operations (MFLNRO)  
Victoria, BC

To Whom This May Concern,

On behalf of Tourism Revelstoke, please accept this letter in support of the Revelstoke Adventure Park development. We are very excited at the potential that an operation such as this would bring to our community, specifically from a tourism standpoint. Travel & Tourism related operations, such as the above proposed, help us to continue to market Revelstoke as a prime vacation destination.

Tourism is one of the most significant contributors to our community's economy, and in May 2008, we obtained "resort community" status. As we continue to grow as a resort community, we welcome new developments such as the Revelstoke Adventure Park to increase the value of our destination.

We have the advantage in that our location is ideal for recreation potential in all seasons. The Revelstoke Adventure Park will round out our world-class winter product, with an equally impressive summer product, to make us the year-round destination of choice for travelers.

Our mission at Tourism Revelstoke is to "Inspire more people to visit Revelstoke for unforgettable experiences." The newly proposed Revelstoke Adventure Park development will help to do just that.

This proposed development will help Tourism Revelstoke meet our objectives, including, but not limited to:

- Increasing overnight visitor stays in Revelstoke
- Drawing traffic off the Trans-Canada Highway into the downtown core
- Attracting travelers and tour groups on a national and international scale
- Hosting world-class events that draw people in from neighboring communities, and abroad

Tourism is one of the most important economic engines for Revelstoke. To encourage its growth and development, we need operations like this to flourish. We are very much in support of the Revelstoke Adventure Park Development.

Kind Regards,

A handwritten signature in blue ink, appearing to read "Meghan Tabor", written over a light blue horizontal line.

Meghan Tabor  
Marketing Manager, Tourism Revelstoke  
250.837.5345  
[Meghan.Tabor@SeeRevelstoke.com](mailto:Meghan.Tabor@SeeRevelstoke.com)



July 14, 2015

To whom it may concern

I am writing in support of the proposed Revelstoke Adventure Park. I have been a resident, homeowner and business owner in Revelstoke now for just over eight years. Revelstoke is an amazing place for adventure and outdoor recreation. With the expansion and creation of Revelstoke Mountain Resort, we are slowly becoming a world renowned tourist destination. The Proposed adventure park in my opinion will be a great addition to our already growing list of amenities. Bringing in more tourist visits and permanent employment will greatly help our community sustain, grow, and thrive. Being located directly on the Trans Canada highway is a perfect spot for heavy views from passing traffic. There is a "hole" that this adventure park will fill in the Revelstoke area. We have great hiking, climbing, fishing, hunting, dirt biking, boating, mountain and cross country biking, a new skateboard park slated to go in and so much more. We are missing commercial Downhill biking parks and access (lift access biking would be a clutch addition as Whistler now does more dollars during summer operations than winter). There is no bungee jumping available close by and the Surf pool would be something rare and thus very desirable.

In short, this adventure park will be a great asset to the Revelstoke area creating jobs and increased tourism. Our local economy changing and now having tourism as our number one industry, this type of infrastructure is and will be needed. I am in full support of this project as well as my staff and team riders (totaling 17 people) as well as the general local residents I see and talk to on a daily basis. I hope you will in turn support this project and the healthy growth of our mountain town. Thank you for taking the time to listen and feel free to contact me in regards anytime.

Karl Jost



<https://www.facebook.com/societysnowandskate>











# **APPENDIX F:**

## **MAPS**



## CONTEXT

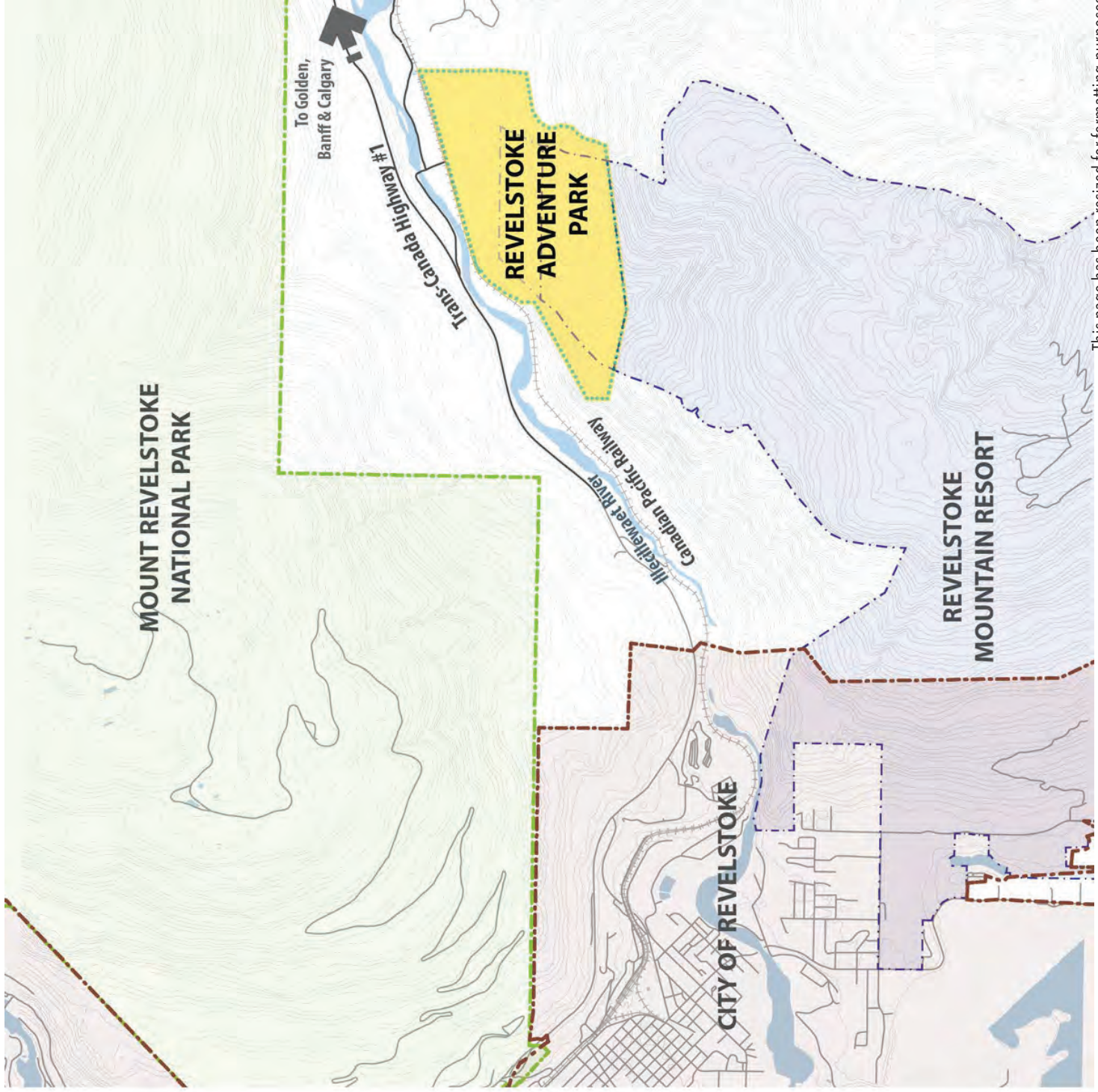
### LEGEND

-  Proposed Revelstoke Adventure Park Boundaries  
321.0 Hectares
-  City of Revelstoke Boundary
-  Mount Revelstoke National Park
-  Revelstoke Mountain Resort  
CRA Tenure
-  Revelstoke Mountain Resort  
CRA Tenure Reserve
-  Waterbodies
-  Roads
-  Railway



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Greely Adventure Park  
PROJECT NUMBER: 2015-IDLP-Greely

DATE: July 25<sup>th</sup>, 2015





# REVELSTOKE ADVENTURE PARK

**EXTENSIVE AREA**

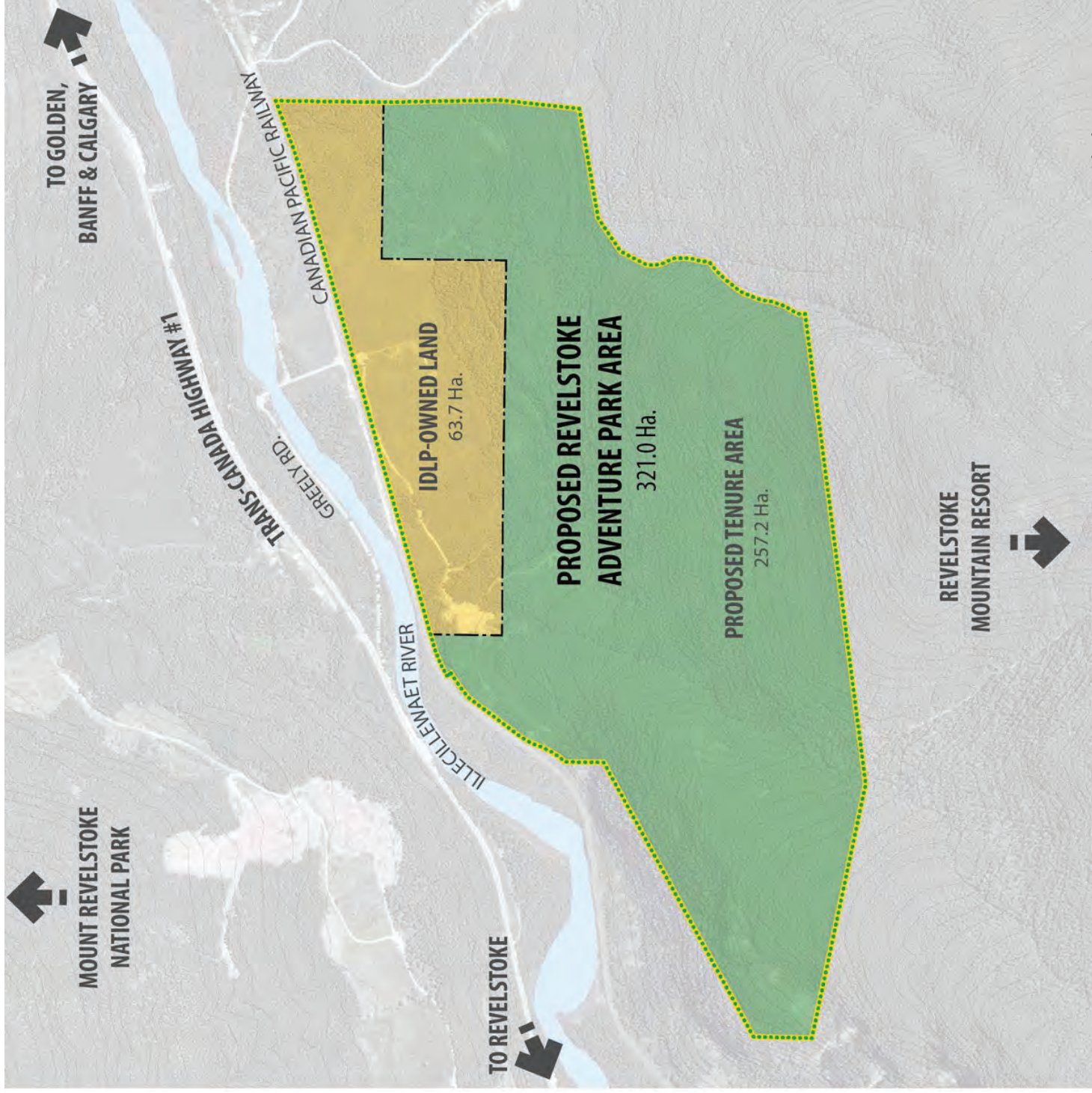
## LEGEND

-  Proposed Revelstoke Adventure Park Boundaries  
321.0 Hectares
-  Proposed Tenure Area  
257.2 Hectares
-  IDLP-Owned Land  
63.7 Hectares



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Greely Adventure Park  
PROJECT NUMBER: 2015-IDLP-Greely

DATE: July 25<sup>th</sup>, 2015





# REVELSTOKE ADVENTURE PARK: INTENSIVE USE SITES & EXTENSIVE USE AREAS

## LEGEND

- Revelstoke Adventure Park Boundary
- Primary Intensive Use Site
- Secondary Intensive Use Site
- Bike Zone Extensive Use Area
- Tree Top Adventures Extensive Use Area
- Zip Lines Extensive Use Area
- Bungee Centre Extensive Use Area
- Greeley Meadows - Private Land



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

DATE: AUGUST 5<sup>th</sup>, 2016





# REVELSTOKE ADVENTURE PARK FINAL BUILDOUT & FEATURES

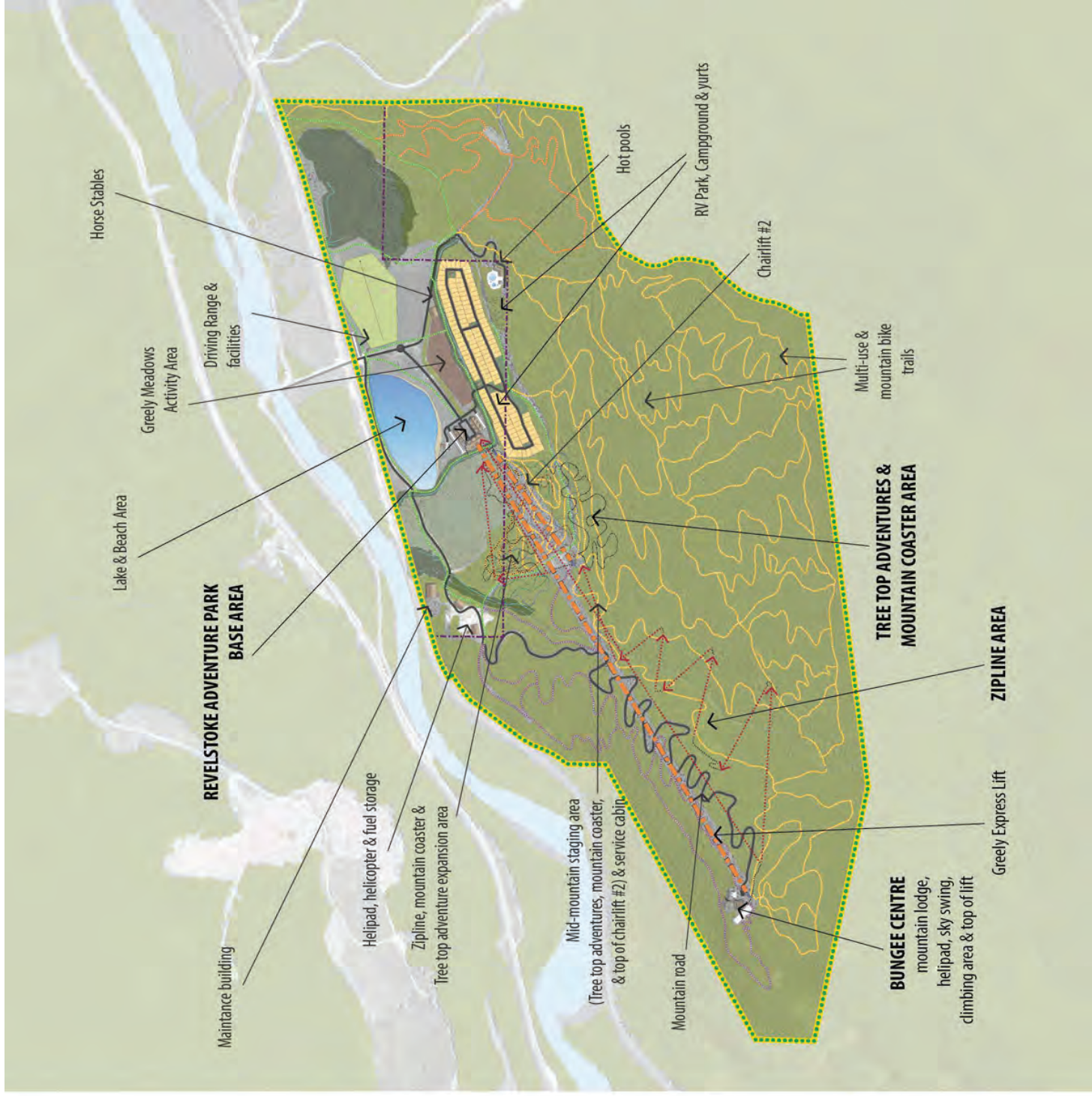
## LEGEND

- Adventure Park Boundaries
- IDLP-Owned Land
- Proposed Lake & Beach
- Waterbodies
- Gondola/Chair Lift
- Roads
- Mountain Bike Trail
- Kid's Mountain Bike Trail
- Hiking Trail
- Multi-Use Trail
- Access Trail
- Tree Top Adventure Routes
- Ziplines
- Mountain Coaster
- Greely Meadows Activity Area
- Climbing Area
- Wetland Area (RAR)



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

DATE: JULY 21<sup>st</sup>, 2016





# PRIVATE LAND: GREELY MEADOWS

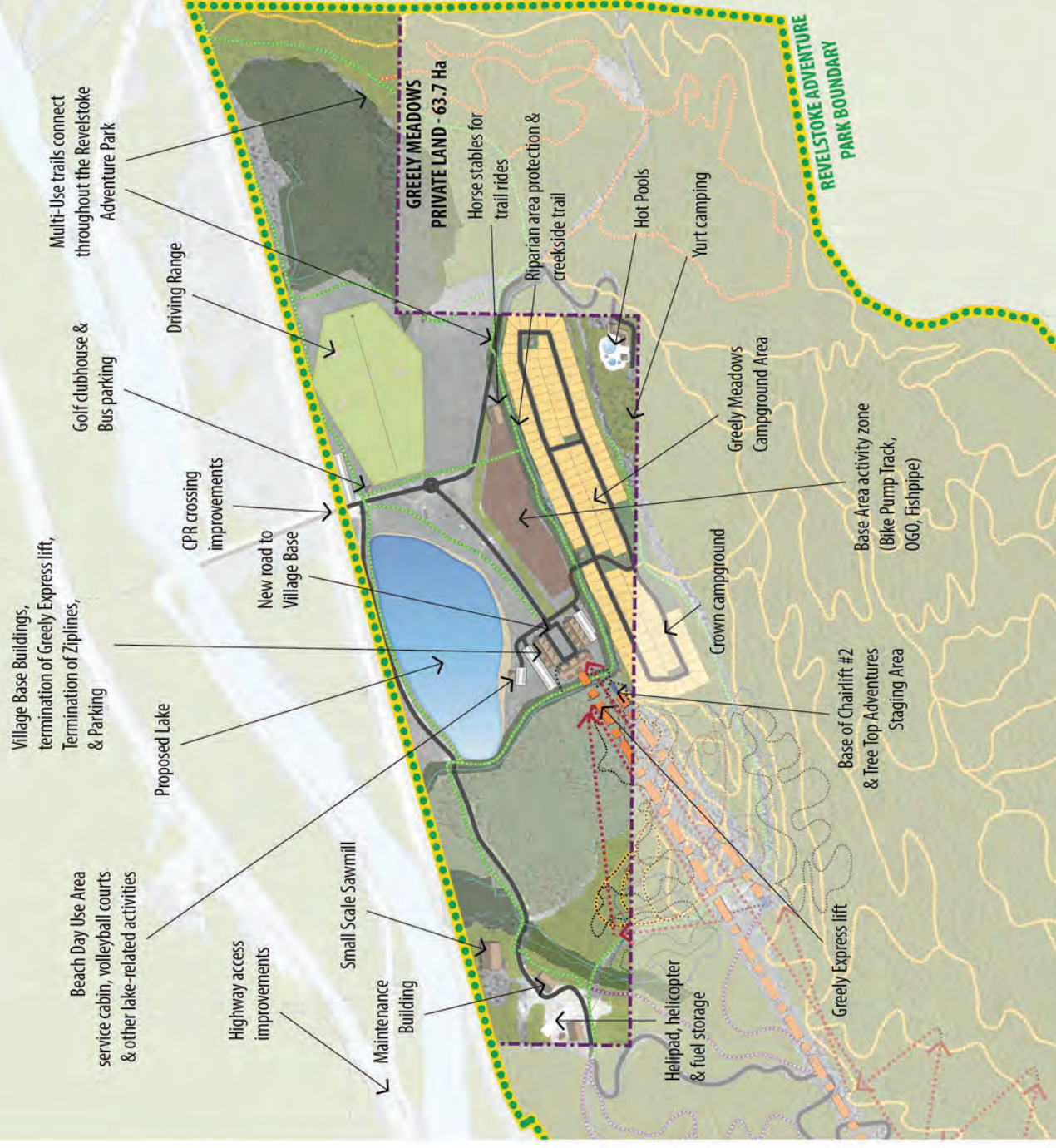
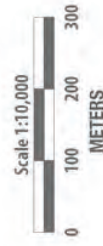
## LEGEND

- Adventure Park Boundary
- Private Land: Greely Meadows
- Base Area Activity Zone
- Gondola/Chair Lift
- Multi-Use Trail
- Kid's Mountain Bike Trail
- Mountain Bike Trail
- Hiking Trail
- Horseback Trail
- Access Trail
- Zip Lines
- Tree Top Adventure - Difficult
- Tree Top Adventure - Moderate
- Tree Top Adventure - Easy
- Mountain Coaster
- Camping Space
- Campground Park
- Riparian Area Setback
- New Road
- Creeks / Ditches
- 20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

















DATE: JULY 21<sup>st</sup>, 2016





# EXTENSIVE USE AREA: TREETOP ADVENTURES

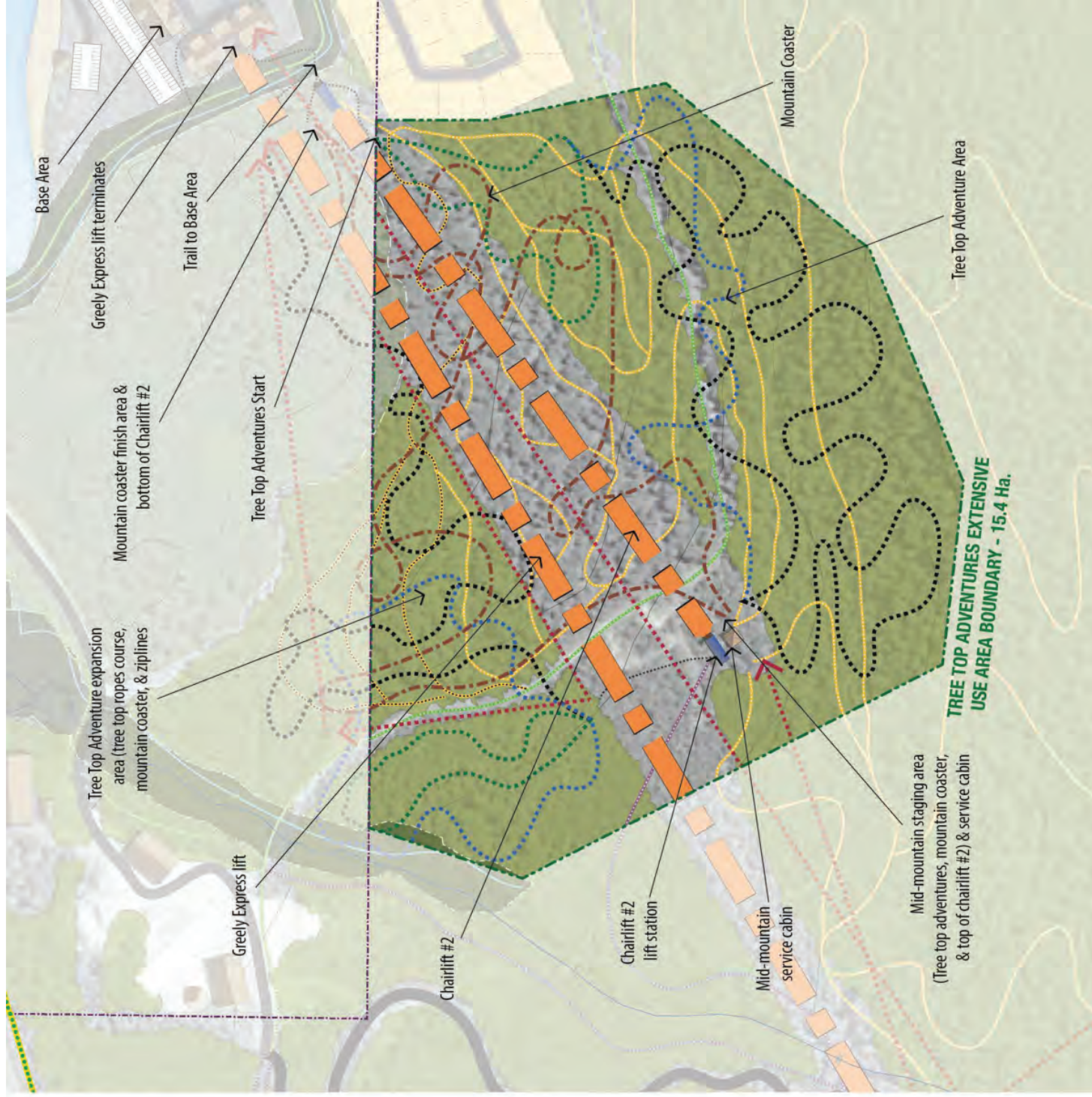
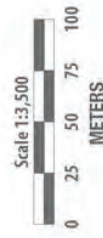
## LEGEND

-  Adventure Park Boundary
-  Tree Top Adventure EUA Boundary
-  IDLP-Owned Land
-  Gondola/Chair Lift
-  Tree Top Ropes Course - Difficult
-  Tree Top Ropes Course - Moderate
-  Tree Top Ropes Course - Easy
-  Mountain Coaster
-  Access Road
-  Ziplines
-  20m Contours
-  Multi-Use Trail
-  Hiking Trail
-  Mountain Bike Trail
-  Kid's Mountain Bike Trail
-  Access Trail



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP













DATE: JULY 21<sup>st</sup>, 2016





## EXTENSIVE USE AREA: ZIPLINES

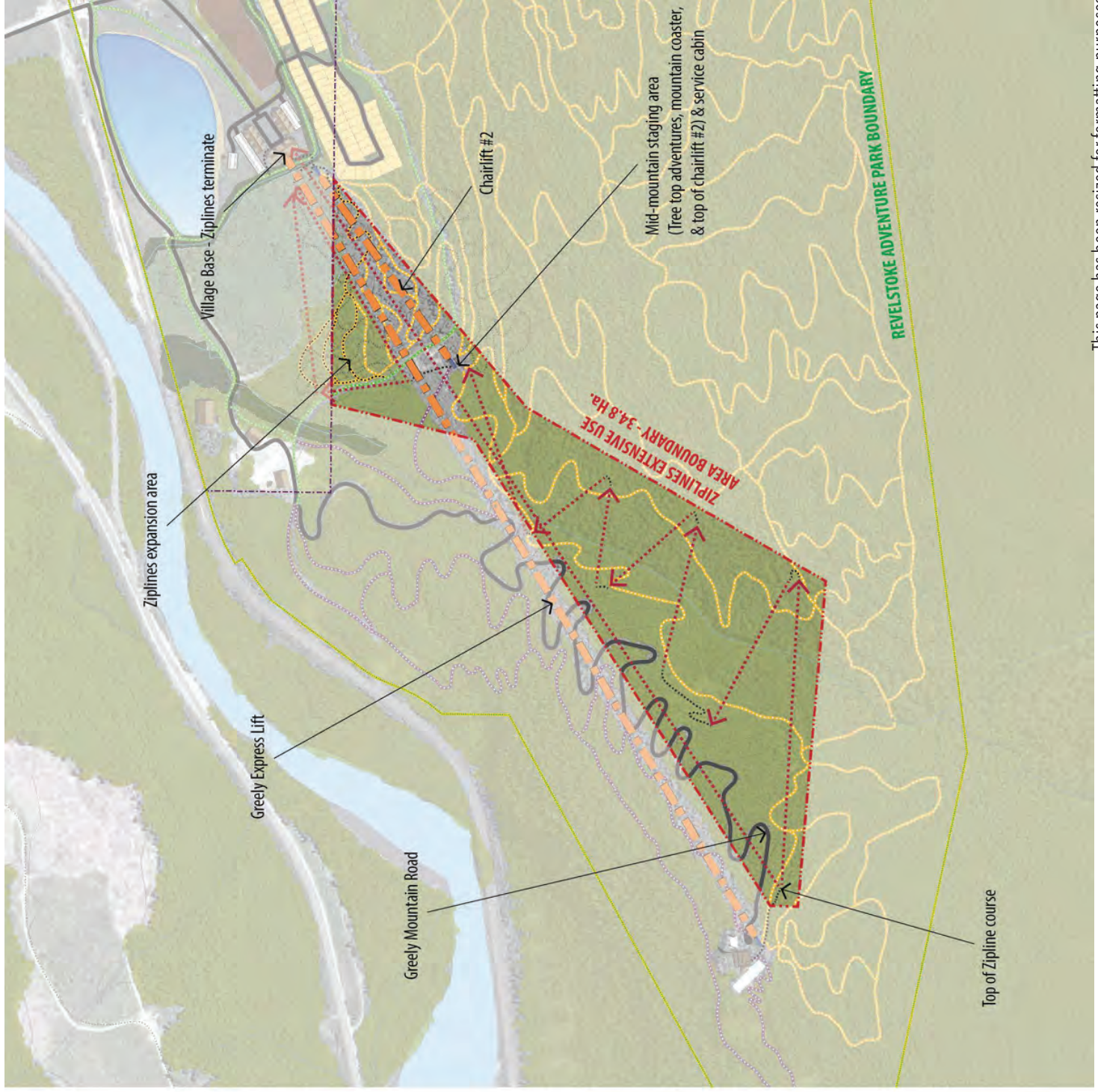
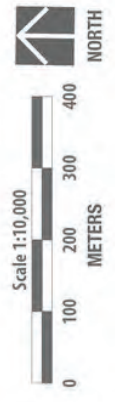
### LEGEND

	Adventure Park Boundary
	Ziplines EUA Boundary
	IDLP-Owned Land
	Gondola/Chair Lift
	Proposed New Roads
	Mountain Bike Trail
	Hiking Trail
	Multi-Use Trail
	Access Trail
	Ziplines
	Creeks
	20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP













DATE: JULY 21<sup>st</sup>, 2016





## EXTENSIVE USE AREA: BIKE ZONE

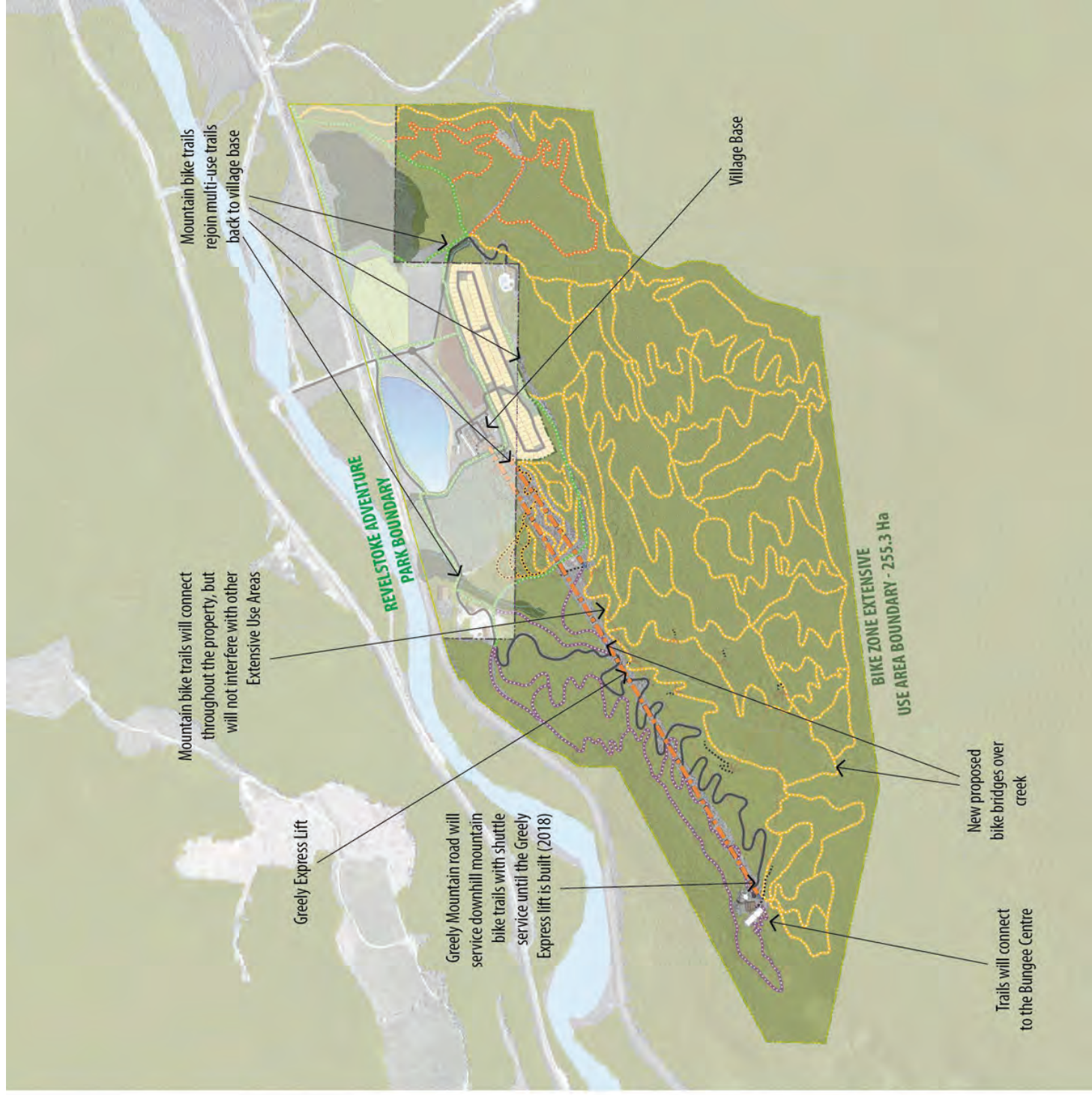
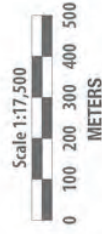
### LEGEND

-  Adventure Park Boundary
-  Bike Zone EUA Boundary
-  IDLP-Owned Land
-  Gondola/Chair Lift
-  Mountain Bike Trail
-  Kid's Mountain Bike Trail
-  Hiking Trail
-  Horseback Trail
-  Access Trail
-  Multi-Use Trail
-  Greely Mountain Road
-  Creeks
-  Irrigation Ditches
-  20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
 PROJECT NAME: Revelstoke Adventure Park  
 PROJECT NUMBER: IDLP-RAP

DATE: JULY 21<sup>st</sup>, 2016





# EXTENSIVE USE AREA: BUNGEE CENTRE

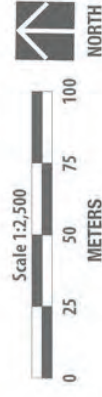
## LEGEND

- Adventure Park Boundary
- Bungee Centre EUA Boundary
- Gondola/Chair Lift
- Proposed New Road
- Hiking Trail
- Mountain Bike Trail
- Ziplines
- Climbing Area
- Septic Field
- 20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

DATE: JULY 21<sup>st</sup>, 2016





# REVELSTOKE ADVENTURE PARK: PROPOSED TRAIL MAP

## LEGEND

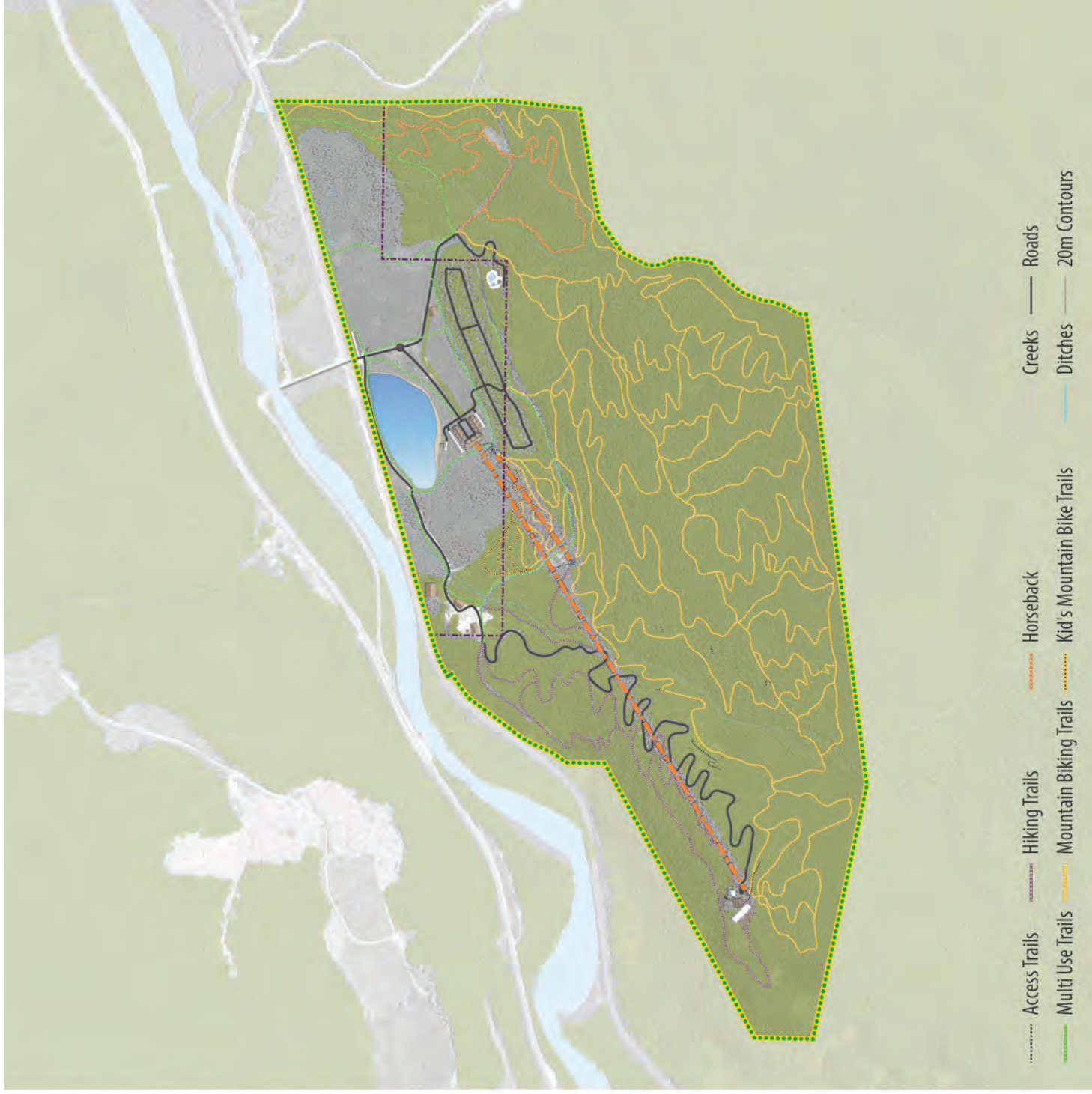
- Adventure Park Boundaries
- IDLP-Owned Land
- Proposed Lake & Beach
- Waterbodies
- Gondola/Chair Lift
- Access Trails
- Multi Use Trails
- Hiking Trails
- Mountain Biking Trails
- Horseback Trails
- Kid's Mountain Bike Trails
- Creeks
- Ditches
- Roads
- 20m Contours

\*Trails within +/- 10m of centre line



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

DATE: JULY 21<sup>st</sup>, 2016





# CONSTRUCTION PHASE ONE (2016)

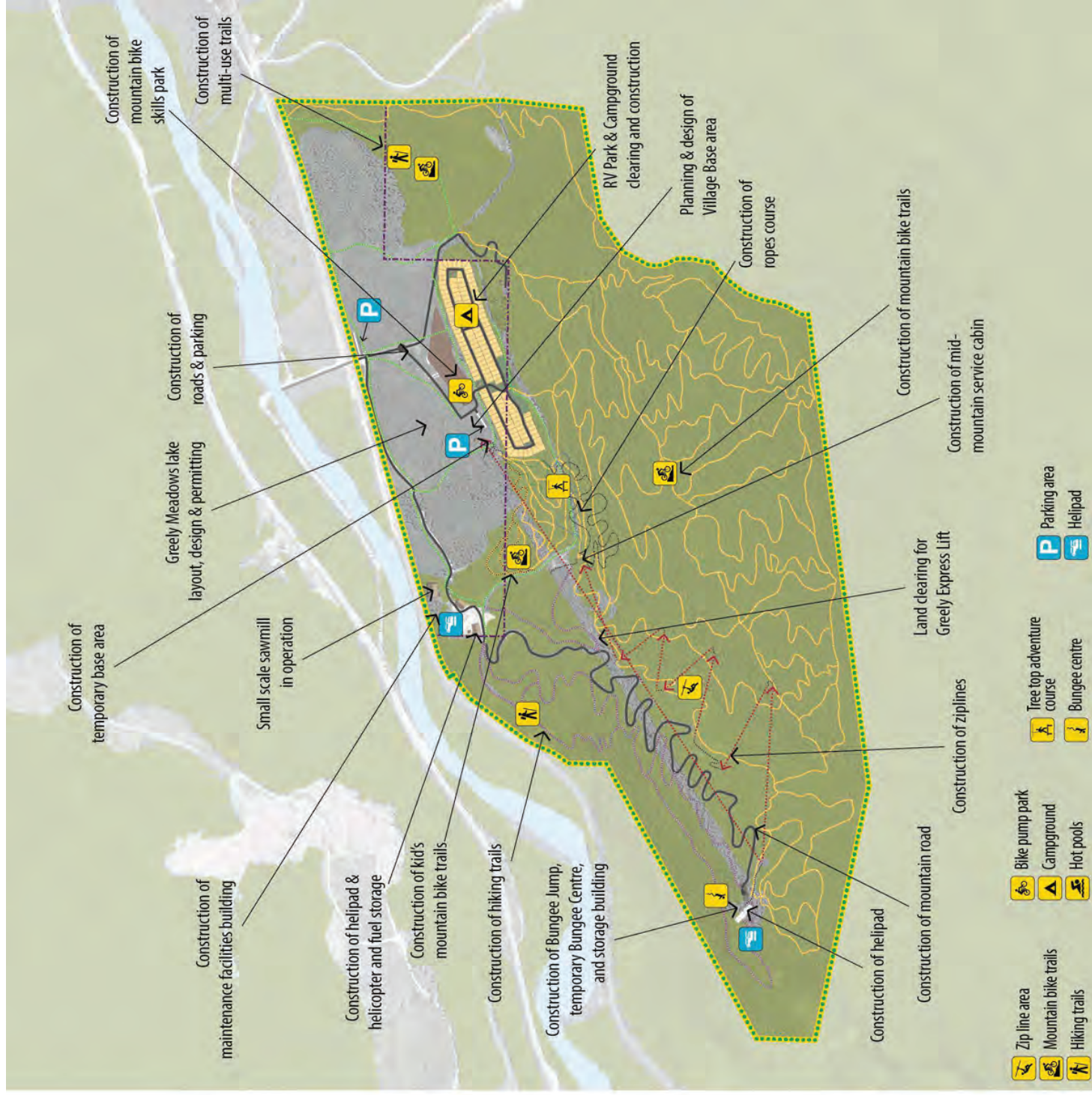
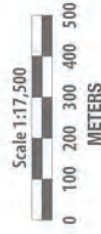
## LEGEND

- Adventure Park Boundaries
- IDLP-Owned Land
- Planning & Design Areas
- Waterbodies
- Existing Streams
- Roads
- Mountain Bike Trails
- Kid's Mountain Bike Trails
- Hiking Trails
- Multi-Use Trails
- Access Trails
- Ziplines
- Tree Top Adventure Routes
- Greely Meadows Activity Area
- 20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP












DATE: JULY 21<sup>st</sup>, 2016





# CONSTRUCTION PHASE 2 (2017)

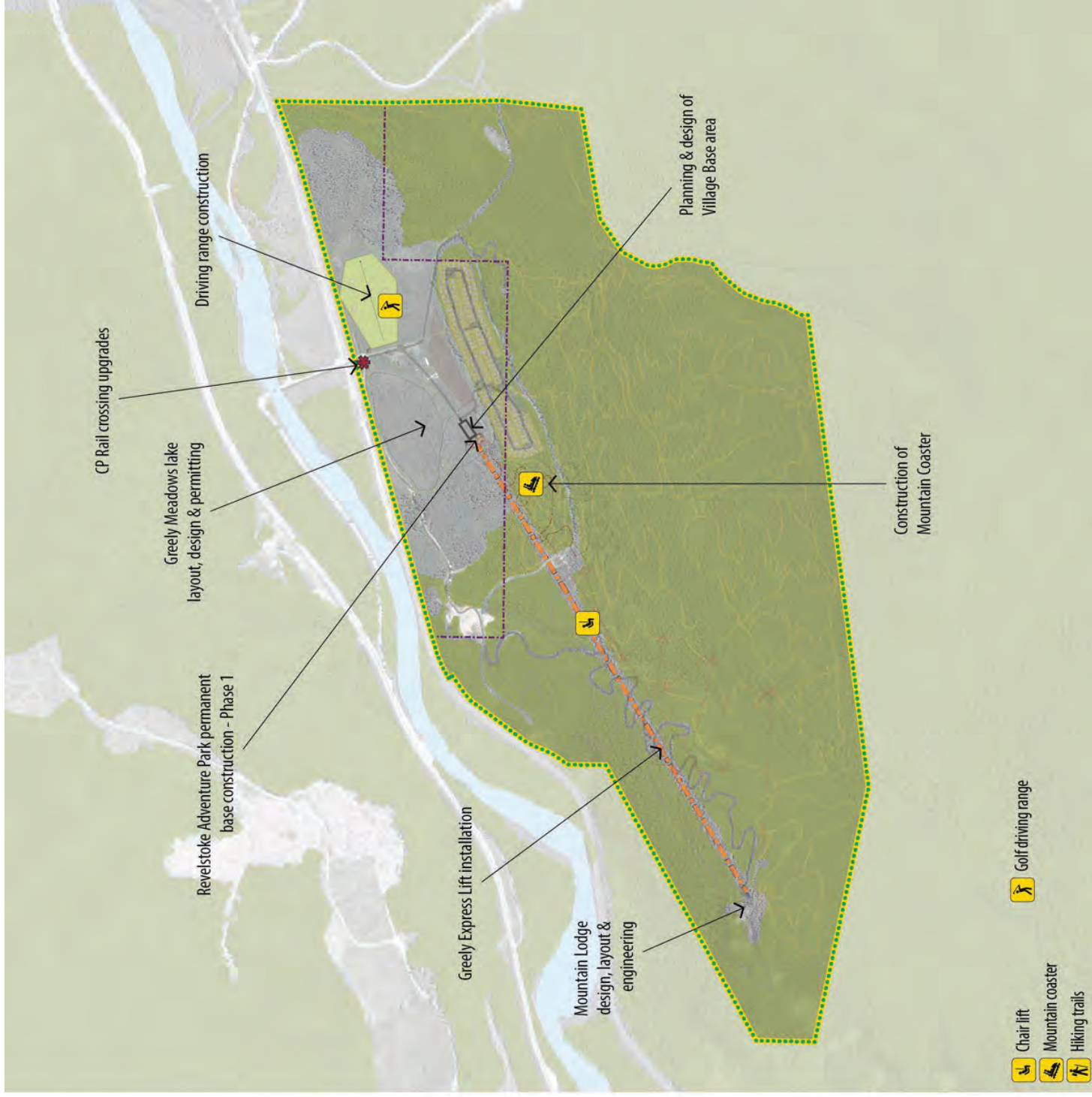
## LEGEND

-  Adventure Park Boundaries
-  IDLP-Owned Land
-  Planning & Design Areas
-  Waterbodies
-  Existing Streams
-  Chair lift
-  Lift Station
-  Adventure Park Building
-  Mountain Coaster
-  Infrastructure improvement
-  20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP











DATE: JULY 21<sup>st</sup>, 2016





# CONSTRUCTION PHASE 3 (2018)

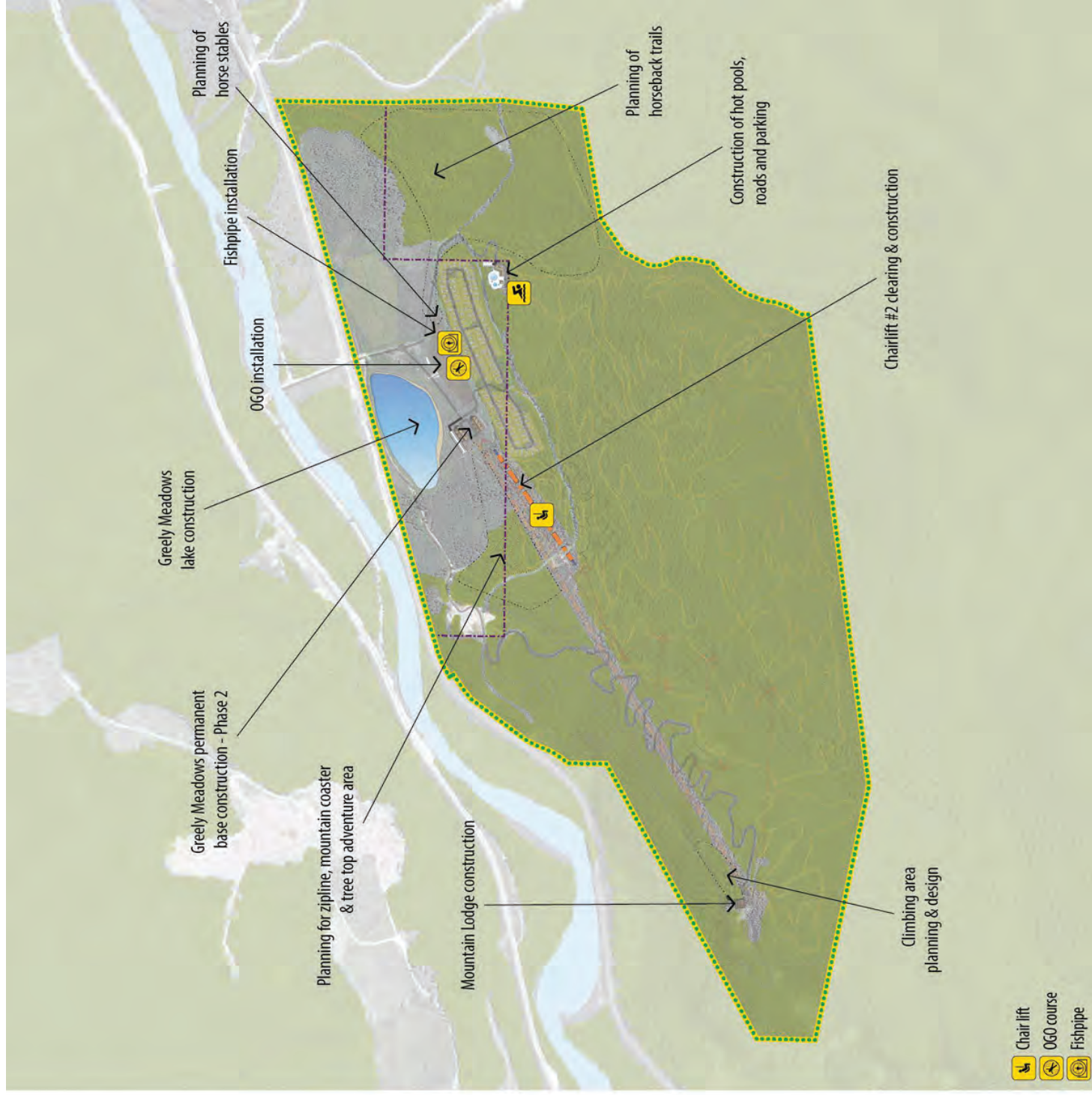
## LEGEND

-  Adventure Park Boundaries
-  IDLP-Owned Land
-  Planning & Design Areas
-  Waterbodies
-  Constructed Lake & Beach
-  Existing Streams
-  Chair lift
-  Lift Station
-  Adventure Park Building
-  20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP

DATE: JULY 21<sup>st</sup>, 2016





# CONSTRUCTION PHASE 4 (2019-2022)

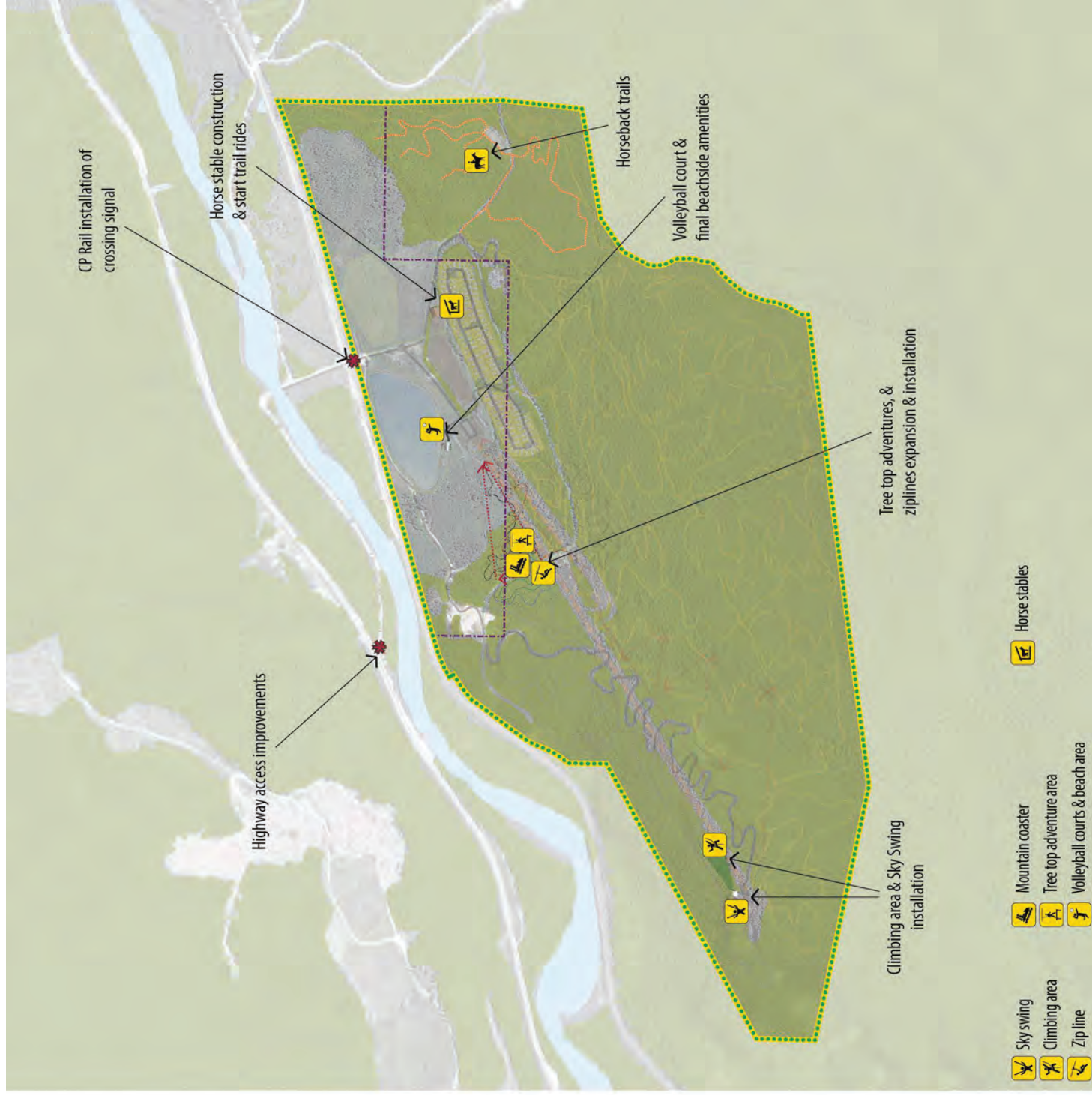
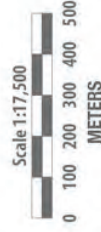
## LEGEND

- Adventure Park Boundaries
- IDLP-Owned Land
- Waterbodies
- Existing Streams
- Ziplines
- Mountain Coaster
- Tree Top Adventure Routes
- Horseback Trail
- Climbing Area
- Infrastructure improvement
- 20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Revelstoke Adventure Park  
PROJECT NUMBER: IDLP-RAP









DATE: JULY 21<sup>st</sup>, 2016





# REVELSTOKE ADVENTURE PARK: EXISTING CREEKS

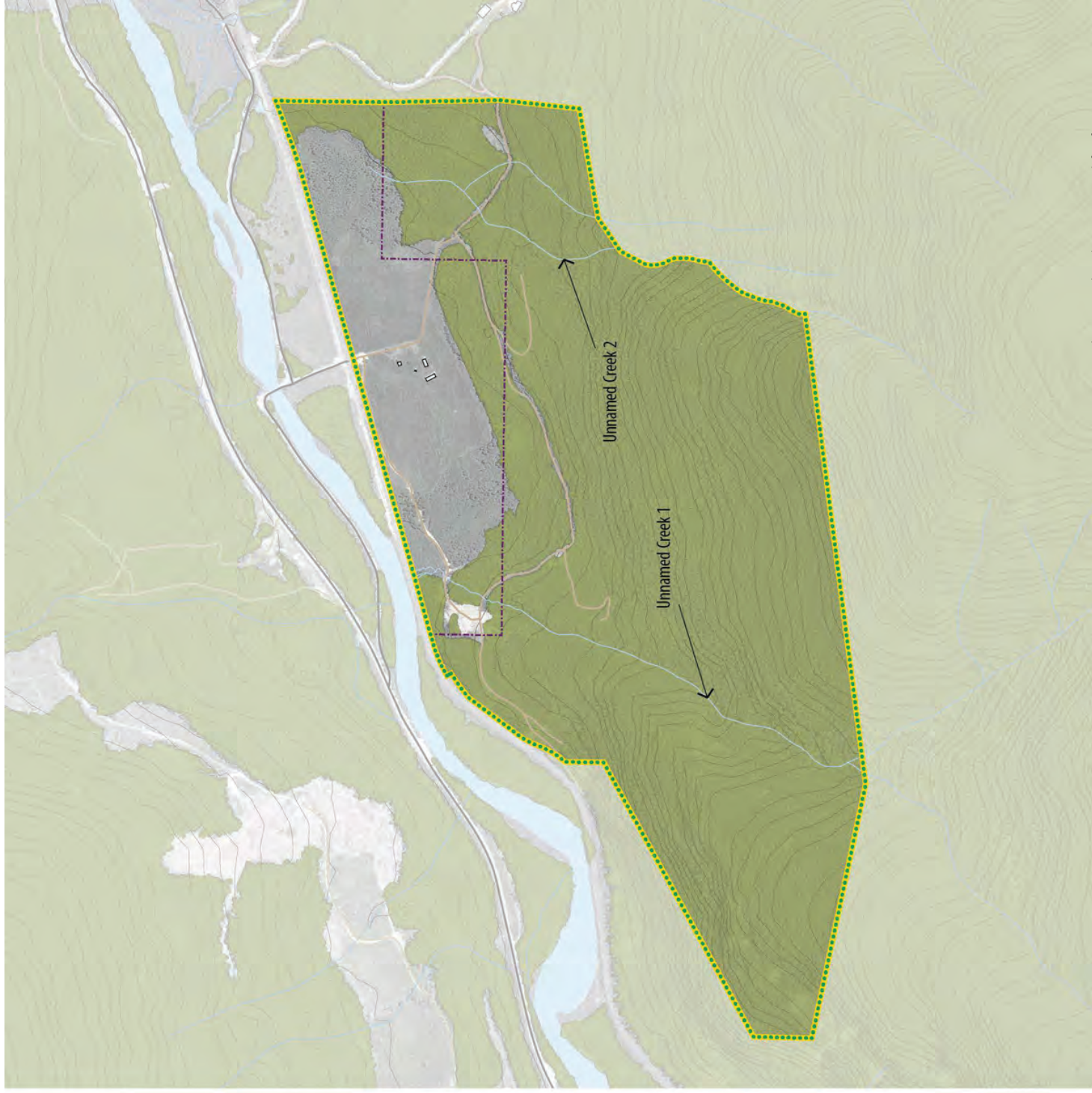
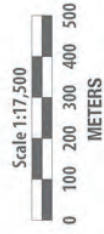
## LEGEND

-  Adventure Park Boundary
-  IDLP-Owned Land
-  Creeks
-  Waterbodies
-  Existing Buildings
-  Existing Roads - Unpaved
-  Existing Roads - Paved
-  20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Greely Adventure Park  
PROJECT NUMBER: 2015-IDLP-Greely

DATE: July 25<sup>th</sup>, 2015





# **WATER SOURCE PROTECTION:** **DISTANCE TO REVELSTOKE WATER SOURCE**

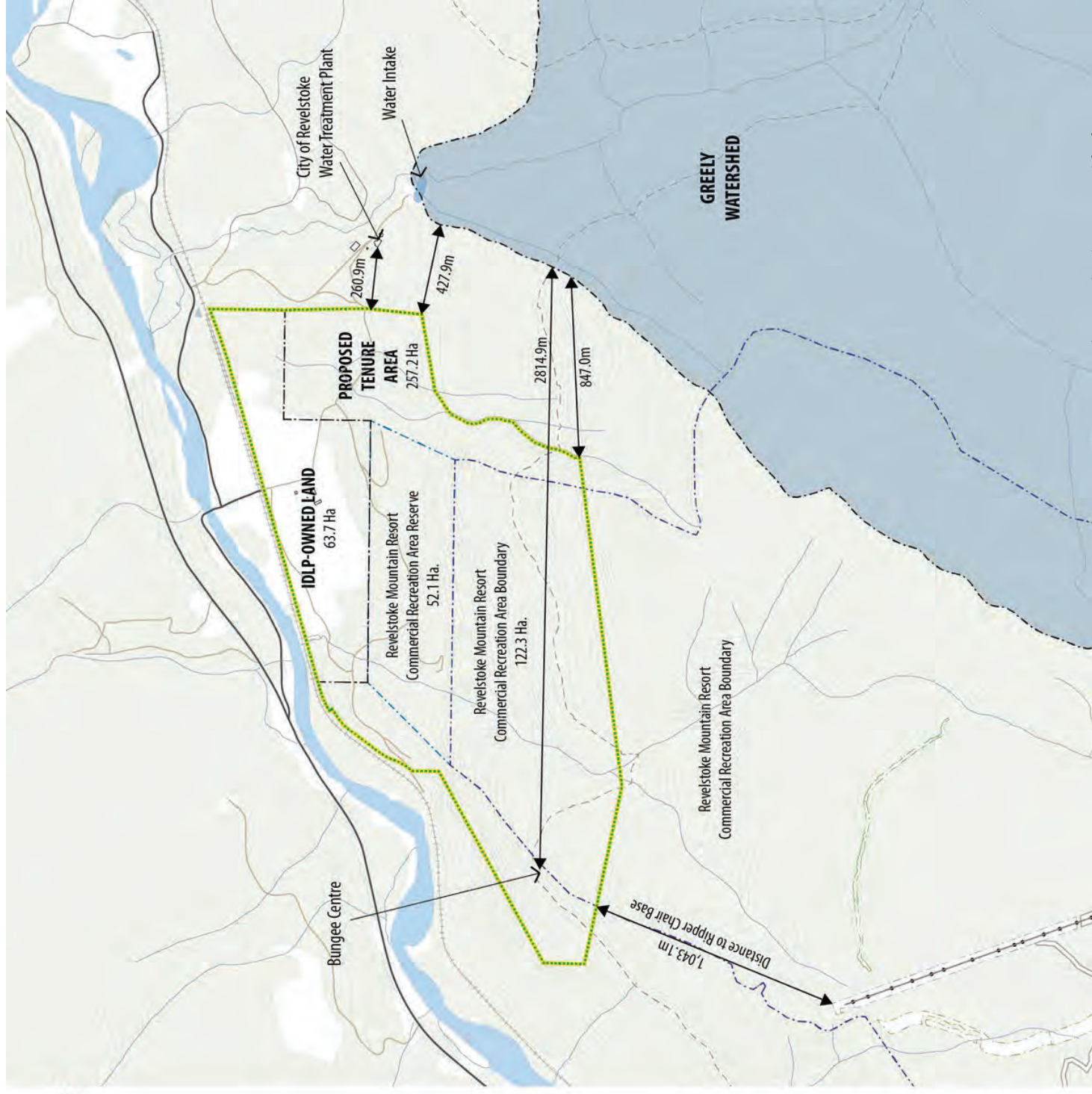
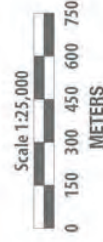
## **LEGEND**

- Adventure Park Boundary
- IDLP-Owned Land
- Creeks
- Waterbodies
- Existing Buildings
- Greely Watershed Boundary
- RMR CRA Boundary
- RMR CRA Reserve Boundary
- Existing Roads - Unpaved
- Existing Roads - Paved
- 20m Contours



CLIENT: Illecillewaet Development Limited Partnership  
 PROJECT NAME: Greely Adventure Park  
 PROJECT NUMBER: 2015-IDLP-Greely









DATE: July 25<sup>th</sup>, 2015





# REVELSTOKE ADVENTURE PARK LEGAL BOUNDARIES

## LEGEND

-  Proposed Revelstoke Adventure Park Boundaries  
321.0 Hectares
-  IDLP-Owned Land  
63.7 Hectares\*
-  Proposed Tenure Area  
257.2 Hectares
-  RAP Agricultural Land Reserve  
57.2 Hectares\*\*
-  Private ALR  
47.3 Hectares\*\*†
-  Tenure ALR  
9.9 Hectares\*\*†
-  RMR CRA Reserve  
52.1 Hectares\*
-  RMR CRA Boundary  
122.3 Hectares\*

\* Area calculated within proposed Adventure Park Boundaries

† Non Farm use granted by ALC Sept 4, 2014 - File #53546



CLIENT: Illecillewaet Development Limited Partnership  
PROJECT NAME: Greely Adventure Park  
PROJECT NUMBER: 2015-IDLP-Greely

DATE: July 25<sup>th</sup>, 2015

