REPORT

Ridge North America
Fortress All-Season Resort: Environmental Assessment

December 4, 2025

CA0058874.3096

Distribution List

1 Electronic Copy - Ridge North America

1 Electronic Copy - Western Securities Ltd.

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1 INTRODUCTION

Western Securities, Ltd. (WSL) in partnership with Ridge North America (RNA) is proposing to develop the Fortress All-Season Resort and Resort Center in Kananaskis Country, approximately 125 km east of Calgary (the Project) (Figure 1.0-1). The existing Fortress Mountain Resort (Resort) is on land leased from the Province of Alberta where Fortress Mountain Holdings are the current leaseholders. From Calgary, the Resort is accessed via the Trans-Canada Highway and Highway 40 to the turnoff along the Fortress Mountain Access Road. Canmore is the closest town to the Resort and is approximately 80 km northwest of the Resort.

Skiing at the Resort began in the late 1960s and a variety of ski lifts and ski runs offered access to terrain suitable for beginner through to advanced skier capability. The Resort base area included a large day lodge that offered motel style accommodation; however, most of the skiers were day visitors from Calgary (Ecosign 2015). The Resorts of the Canadian Rockies purchased the Resort in the 1990s and operated the Resort until 2004, when, due to the lifts nearing the end of their life cycle and declining skier visits, the Resort closed in April 2004.

FMH purchased the Resort in 2010. Currently, FMH operates a cat skiing service, which has been in operation since the winter of 2011/2012. In addition to skiing operations, the Resort is used for a variety of film and television commercial productions. Additionally, FMH supports several universities (e.g., Universities of Calgary, Alberta, Saskatchewan, Waterloo, and Guelph) with conducting studies in the current Lease for various environmental topics such as geology, hydrology, wildlife, and vegetation.

The All-Season Resort and Resort Center Master Plan for the Project, outlining the components of the Project, has been prepared by Ecosign (Ecosign 2025). The Project is proposed to be completed in five phases. The components of each phase of the Project are listed in Table 1.0-1 and shown on Figure 1.0-2. Most attractions will be constructed during Phase 1, but overnight guests will not be accommodated until Phase 2. Many of the proposed attractions are conceptual at this early stage in the planning process and are subject to change.

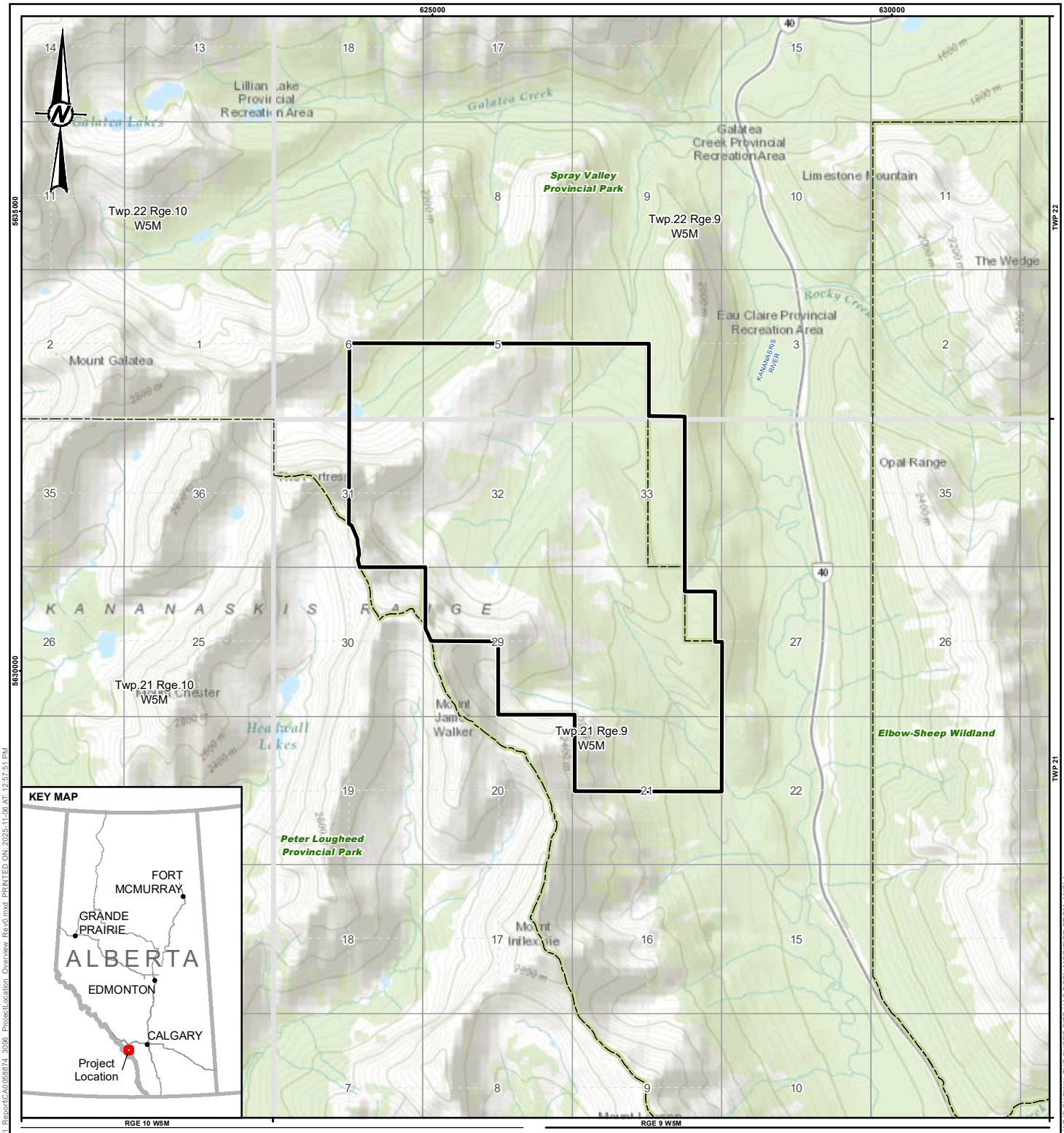
This Environmental Assessment report is being submitted to fulfil requirements under the *All-Season Resorts Act*, and Section 18 of the current Miscellaneous Lease (MLL 100011, as amended). It has been developed for review by Alberta Tourism and Sport and considers the *Guidelines for Terms of Reference (TOR) for an All-Season Resort Environmental Assessment (EA)* (draft Guidelines). This document is intended to be the first step of an ongoing and iterative evaluation of effects on the environment and lays out FMH's commitment to environmental stewardship via the environmental assessment process.

Table 1.0-1: Major Components Proposed to be Constructed During Phase 1 and Future Phases of the Project

Phase 1	
Public Infrastructure	***Resort Center Projects***
▪ Upgrade transportation and water infrastructure	▪ Remove historical lodge building
	▪ Upper day lodge
On-Mountain Projects	▪ Operations base
▪ Remove decommissioned lift infrastructure	▪ Maintenance and operations building
▪ Widen existing downhill ski trails	▪ Temporary employee housing (50 beds) with septic
▪ Construct new downhill ski trails	▪ Beginner and snow play zones
▪ Cat skiing	▪ Toboggan hill
▪ Three sight-seeing gondolas	▪ All-season tubing
▪ Alpine sight-seeing facility and mountain restaurant	▪ Climbing walls
▪ Summer recreation trails	▪ All-age playground
▪ Access to backcountry trailheads	▪ Games area
▪ Via ferrata	▪ Splash pad
▪ Canyon swing	▪ Temporary roads and parking lots
▪ Zipline	▪ Maintenance garage
▪ Suspension bridges	***Cross-Country Area Projects***
▪ Mountain coaster	▪ Nighttime multimedia walk and light show
▪ Mountain slides	▪ Mini golf course
	▪ Net park
	▪ Aerial obstacle course
	▪ Splash pad
	▪ Cross-country day lodge
	▪ Snowshoeing trails
	▪ Temporary roads and parking lots

Table 1.0-1: Major Components Proposed to be Constructed During Phase 1 and Future Phases of the Project

Future Phases	
Public Infrastructure ■ Upgrade water and power, communications, and energy infrastructure ***On-Mountain Projects*** ■ Ski lift infrastructure ■ Alpine skiing ■ Mountain coaster ■ Mountain slides ■ Zipline ■ Power zipline ■ Wedding ceremony and observation deck ■ Learn to mountain bike zone ■ Bungee jump ■ Cliff walk ■ Dark Sky Preserve ■ Alpine lake activities (e.g., paddleboarding, canoeing) ■ Paragliding ■ Mountain restaurant ■ Serviced camping at Bonsai Lake and Fortress Lake	***Resort Center and Cross-Country Area Projects*** ■ Moving carpet ski lifts (3) ■ Indigenous Cultural Center / Event Center ■ Skating rink ■ Nordic spa ■ Glamping ■ Event center ■ Horse drawn rides ■ Horseback riding ■ Lower day lodge ■ Permanent employee housing ■ Condominiums, townhomes, and hotels ■ Permanent roads and parking lots ■ Biking and skiing trails ■ Roller ski paved trail ■ Tree top journey ■ Lit ice-skating trails ■ Dog sledding trails ■ 18-hole golf course ■ Cross-country skiing stadium ■ Cross-country technical buildings ■ Biathlon stadium ■ Biathlon technical buildings ■ Permanent roads and parking lots



LEGEND

PARK / PROTECTED AREA BOUNDARY

FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

0 1,200 2,400

1:60,000 METRES

REFERENCE(S)

PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
PROJECT LOCATION

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
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APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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5634184 5633184 5632184 5631184 5630184 5629184

TWP 22 TWP 21

RGE 9 W5M

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

Lift 11 / 4C
Lift 10 / P
Gondola 3
Lift 7 / 4C
Gondola 2
Lift 3 / D6C
Lift 12 / CAB
Lift 6 / CAB
Gondola 1
Lift 4 / 4C
Lift 8 / P
Lift 9 / D6C

Spray Valley Provincial Park

Peter Lougheed Provincial Park

KEY MAP

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- PROJECT DEVELOPMENT

0 500 1,000

1:17,500 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
FULL PROJECT BUILDOUT

CONSULTANT

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2 APPROACH AND REPORT ORGANIZATION

The draft Guidelines require “an overall assessment of the environment, how the environmental values will be impacted by the development and mitigation measures for those impacts”. This report provides an overall assessment of the environment (Section 4), how the environmental values will be impacted by the development (Section 5), and mitigation actions (Section 5).

The approach to meeting the draft Guidelines includes, firstly, providing a description of the existing infrastructure present at the Resort. This is followed by a description of the Phase 1 Development Plan and each of the various components of the Development Plan. The environmental setting of the Resort is described next, using both current literature sources (through 2025) and empirical data collected on-site throughout 2018.

An Environmental Management Plan is subsequently included based on the proposed development components, the environmental resources that will be affected, the construction schedule, and construction and reclamation mitigation actions to be adopted. The Environmental Management Plan is intended to cover the major environmental considerations during Project construction and reclamation: soils, vegetation, wildlife, and aquatic resources (e.g., waterbodies and fish). A final section of the report provides details on the environmental management actions specifically associated with each of the development components. Supporting figures and additional details are provided in Appendices to the report. Appendix A provides a reference list of existing approvals, licences and authorizations that have been received by FMH to date.

3 DEVELOPMENT PLAN

3.1 Lease Boundary

The existing Lease boundary is 1,423.2 ha and is within the Alpine and Subalpine Ecoregions of the Eastern Front Ranges of the Rocky Mountains.

3.2 Overview

The main objective of Phase 1 is to reopen the Resort and all the previous ski terrain by providing the maximum amount of skiable terrain utilization with minimal cost.

3.3 Existing Facilities and Infrastructure

3.3.1 Overview

The existing facilities, their current condition, and status on either remaining in place or scheduled to be removed are presented in Table 3.3-1. The existing chair lifts (deactivated) and existing ski runs are shown in Figure 3.3-1. The existing access road, parking lots, and building locations are also shown in this figure.

Table 3.3-1: Existing Infrastructure at Fortress Mountain Resort

Infrastructure Component	Current Condition	Future Use
chair lifts	decommissioned	removed
day lodge	closed to public access	removed
lift stations	closed to public access	removed
power lines	in operation. Upgraded by Fortis in 2018	continued operation
water lines	re-developed in 2018	upgrade and continued use
lagoons, reservoirs, and sanitary pipelines	re-developed in 2018/19	upgrade and continued use
bridges and watercourse crossings	bridge over Kananaskis River in operation. Restricted public access	upgrade and reopen to public use
access road	in operation	upgrade and continued use
parking areas	in operation	re-develop and continued use
snowcat shop maintenance building, five-bay storage, and six-unit condominium building	snowcat shop maintenance building and five-bay storage building are in use. the condominium building is closed to public access.	removed

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TWP 22 TWP 21

RGE 9 W5M

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

Spray Valley Provincial Park

Peter Lougheed Provincial Park

6 5 31 32 33 30 29 28 20 21

KEY MAP

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

EXISTING DEVELOPMENT

- DECOMMISSIONED SKI LIFT STATION
- GROOMER ACCESS
- PARKING LOT
- POWERLINE
- ROAD
- SKI TRAIL

0 500 1,000

1:17,500 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
EXISTING FACILITIES

CONSULTANT

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3.3.2 Ski Lifts

There are three remaining ski lifts at the Resort: one triple chair and two double chairs (Figure 3.3-1). The triple chair was known as the “Canadian chair”, while the double chairs were identified as the “Backside” and the “Farside” lifts. These lifts have not operated since 2004. The load and unload stations remain in place for all three remaining lifts, although they have deteriorated in condition and have not been maintained since 2004. All towers and tower foundations remain in place for each of the three lifts.

The vegetation beneath each lift line reflects regeneration growth of shrubs and early succession tree growth following cessation of annual vegetation management practices since 2004. Only localized tree brushing has occurred since then on those areas currently used for cat skiing.

Two former T-bar lifts were removed from the Lease in 2012.

3.3.3 Ski Runs

The existing Resort Facilities map illustrates 81 numbered ski trails and off-piste routes covering approximately 164.5 ha of slope area, over a combined length of 46.9 km (Figure 3.3-1).

To maintain the ski runs for current cat skiing operations, the runs undergo summer brushing both by hand and with an Aebi flail mower. Brushing will be required on an ongoing basis as the Resort expands winter operations to reintroduce alpine skiing and boarding and introduces summer activities.

Several of the ski runs have slumps from the flood event of 2013. While the majority have been repaired, two runs will require more slope stabilization and reclamation work in subsequent summer seasons. Very little or no topsoil remains in these areas and others because of late 1960s construction practices, which involved limited topsoil salvage.

3.3.4 Day Lodge, Base Area Buildings, and Facilities.

The existing day lodge consists of a multi-storey building with four separate single-storey wings radiating from a central area. Constructed in 1968, this building is approximately 3,252 m^2 (35,000 square feet) and housed administration, cafeteria/concession, accommodation, beverage, and utility service areas (Envirotech 2008). The existing day lodge has been boarded up for several years and is considered not suitable for public use.

A condominium building is at the southern extent of parking lot P1, constructed in 1996 and extending approximately 836 m^2 (9,000 square feet) (Envirotech 2008). It consists of six units that have not been used for several years. Other existing buildings include the snowcat shop and a separate five-bay storage/administrative building. These two maintenance buildings together have a combined area of approximately 742 m^2 (8,000 square feet) (Envirotech 2008). A staff accommodation building (approximately 836 m^2 [9,000 square feet]) and a ski rental building with second-floor accommodations (approximately 836 m^2 [9,000 square feet]) were historically present on the Lease but have since been removed.

3.3.5 Parking

The existing parking lots at the Resort base area are at the terminus of the access road (Figure 3.3-1). Three areas within the upper lot (P1) were formerly used for employees and buses, while the main lots (P2 and P3) were historically used by day skiers. All parking lots require re-grading and additional gravel surfacing.

3.3.6 Water Supply, Reservoirs, Lagoons, and Treatment Facilities

The former water supply system consisted of two dams on an unnamed tributary to Galatea Creek on the Backside area of the Lease. The first and southernmost dam was constructed to supply potable water withdrawals. The existing potable water dam was impacted by the 2013 flood and was renovated as part of recovery efforts. The dam is currently suitable for supporting current licensed water withdrawals, but an alternative potable water source may be required to support long-term redevelopment goals (McElhanney 2025a).

The second dam was approximately 150 m downstream of the first dam and provided non-potable water for snowmaking. This dam was not re-developed after being impacted by the 2013 flood.

Reference to existing water approvals, licenses and authorizations are provided in Table 3.3-2 and in Appendix A.

Table 3.3-2: Existing Approvals, Licenses and Authorizations

Approval, License or Authorization	Purpose
Water Licence #12562	Potable water withdrawals from the potable water reservoir. Approximate volume of 98,700 cubic metres (m^3) (80 acre feet) for domestic use.
Water Licence #12562-3	Snowmaking water withdrawals from the non-potable water reservoir. Approximate volume of 92,500 m^3 (75 acre feet) for snowmaking purposes.
Environmental Protection and Enhancement Act Approval #370469-00-00	Construction, operation and reclamation of a waterworks system for the Fortress Mountain Resort Waterworks System.

The former water supply system included a potable water treatment system and a storage tank at the top of the Canadian Ridge where water was stored prior to use. A new bolted steel reservoir with a capacity of 1,471 to 1,753 m^3 was recently installed.

The existing sewage lagoons are at the southeastern corner of the Lease. A historical sewage lagoon has been decommissioned and buried under native soil (Envirotech 2008). An upgraded sewage lagoon area is southwest of the historical lagoon and consists of two large, lined storage lagoons connected by a single, buried polyvinyl chloride (PVC) pipe approximately 200 millimetres (mm) in diameter (Envirotech 2008). The lagoons are staged such that when the primary lagoon is full, a single buried PVC pipe gravity-drains waste material into the second storage lagoon. Another 200 mm PVC line extends from the secondary lagoon to a natural drainage course west of the former lagoon. A valve controls the permitted surface discharge of treated sewage waste off the Lease (Envirotech 2008). The sewage lagoons are unsuitable for long-term development with upgrades (McElhanney 2025a).

A pumphouse was originally constructed several decades ago and underwent substantial upgrades in 2020 (McElhanney 2025a). The wet well structure remained unchanged, but all internal pumps and electrical systems were replaced to meet modern operational standards (McElhanney 2025a).

A modular, containerized water treatment plant was installed in 2020, but it not yet fully commissioned (McElhanney 2025a).

A 7,500 m^3 backwash pond was recently constructed and can accommodate one year of filter backwash and clarifier blowdown to manage filter backwash and process wastewater (McElhanney 2025a).

3.3.7 Pipelines

Potable water storage is provided by a 1,471 to 1,752 m^3 bolted steel reservoir that is at an elevation of 2,128 m. Potable water is distributed from the reservoir to the base area via a 300 mm HDPE pipeline that has hydrants and service connections to historical staff quarters and the old main lodge.

Non-potable water for snowmaking was pumped from the non-potable reservoir directly into the snowmaking network, which serviced many ski runs on the mountain. During the physical infrastructure upgrade in 2018, the raw water transmission system was installed or replaced with 300 mm high-density polyethylene (HDPE) pipelines (McElhanney 2025a). These pipelines connect the intake at Galatea Creek to the treatment and storage facilities (McElhanney 2025a).

Waste/sewage has historically been gravity fed by means of buried PVC pipelines from the base area facilities to the two sewage treatment lagoons that are southeast of the Resort entrance. No gas pipelines have historically been present on the Lease.

3.3.8 Power Supply and Power Lines

The power supply for the Resort is currently supplied via an overhead triple phase transmission line owned by Fortis Alberta extending from Highway 40 in a northwesterly direction to the base area. Fortis owns the transmission line and spurs/transformers to the Bell Axia supernet site near Station 4 to the north of parking lot P1 and the maintenance area. FMH owns the line that follows the Rampart ski run to the existing Farside chair lift and then south up the valley to the existing Backside chair lift (Figure 3.3-1). Buildings that are currently in use receive power from overhead power lines that are stepped down from the main access transmission line via transformers. Back up power is afforded through propane tanks in the base area.

3.3.9 Access Road and Bridge

The Resort has historically been accessed via an 8 km graveled access road from Highway 40 and a bridge over the Kananaskis River. The single-lane bridge has a wooden deck and is supported by steel pilings buried in the riverbed. The bridge spans 27.5 m and is thought to have been built in the early 1960s. Since this time, the bridge has undergone several repairs, the most recent being completed in 2009, as per the design specifications of Stantec Consulting Ltd. (2009). The bridge is designed to carry the posted loads of:

- 20 ton (t) for a CS1 truck (3 axle unit)
- 34 t for a C22 truck (4 axle unit)
- 52 t for a C53 truck (5 axle unit)

In addition, the 24.7 t fire engine used by the Kananaskis Improvement District can safely cross the current bridge. The speed limit is posted at 10 kilometres per hour.

The bridge was recertified in 2010 by McElhanney Engineering. It is currently closed to the public by ministerial order. The load constraints on the existing bridge are expected to be exceeded during Phase 1 Project construction. As such, the bridge will be replaced with an interim bridge at the same location. The interim bridge will be the same dimensions as the existing bridge. The interim bridge will be used to support the Phase 1 construction and operations but will not be used for long-term access to the Project (McElhanney 2025b).

Following the 2013 flood, five culverts were replaced along the access road, while others were increased in size. The Kananaskis River bridge was not adversely affected by the 2013 flood.

3.4 Proposed Development Components

3.4.1 Phase 1

During Phase 1, on-mountain, resort area, and cross-country area attractions will accommodate approximately 3,000 daily users. Overnight accommodation will only occur at the glamping site and for a small number of employees. Attractions are anticipated to accommodate approximately 1,330 guests per day.

3.4.1.1 Public Infrastructure

3.4.1.1.1 Transportation Infrastructure

During Phase 1, the intersection of the Project access road with Highway 40, the bridge over the Kananaskis River, and the Project access road will be upgraded to support the number of visitors anticipated during Phase 1.

3.4.1.1.2 Water Infrastructure

The existing paved road stormwater management system will be upgraded during Phase 1. As the Project moves through the approval process towards construction, a qualified engineering firm will be retained to prepare a design brief of a servicing plan for the Resort development such as water supply, treatment, storage and distribution, and wastewater collection, treatment, and disposal. The capacity of the Resort's current potable water source has been assessed and will be assessed to confirm that it has sufficient capacity to meet demand for each major phase of Resort development (McElhanney 2025a).

3.4.1.2 On-Mountain Projects

3.4.1.2.1 Removal of Decommissioned Ski Lifts

The existing ski lifts at the Resort are currently deactivated and will be removed during Phase 1.

3.4.1.2.2 Widening and New Downhill Ski Trails and Cat Skiing

In Phase 1, the ski trail improvements are generally to improve connectivity, especially for lower ability level skiers, and for new trails to improve the skier skill class balance of the overall Resort. Cat skiing operations will also be developed in Phase 1.

3.4.1.2.3 Sight-seeing Gondolas

Three sight-seeing gondolas will be developed in Phase 1 and will connect to the Frontside, Backside, and Farside portions of the Canadian Ridges. The exact alignment for each gondola has not yet been determined.

3.4.1.2.4 Alpine Sight-seeing Facility and Mountain Restaurant

An alpine sight-seeing facility and mountain restaurant will be constructed on Whiskey Ridge. The facility will be accessible via one of the sight-seeing gondolas.

3.4.1.2.5 Summer Recreation Trails and Access to Backcountry Trailheads

On-mountain summer recreation trails for walking, horseback riding, mountain biking, and other touring opportunities will be developed during Phase 1. Guided electric all-terrain vehicle (ATV) access to backcountry trailheads will also be developed during Phase 1.

3.4.1.2.6 Via Ferrata

Planned on the face of Mount James Walker. The course is in the design process with construction planned for summer 2026. The via ferrata will only be operated during daylight hours.

3.4.1.2.7 Aerial Obstacle Course

The aerial obstacle course will have a limited ground footprint as most of the Project components will be installed directly on trees, at various heights above the ground. The aerial obstacle course will only be operated during daylight hours.

3.4.1.2.8 Canyon Swing

The canyon swing will require foundations to be excavated and constructed but the ground footprint is expected to be minimal. The canyon swing will only be operated during daylight hours.

3.4.1.2.9 Ziplines

Ziplines will require foundations to be excavated and constructed but the ground footprint is expected to be minimal. Ziplines will only be operated during daylight hours.

3.4.1.2.10 Suspension Bridges

The suspension bridges will require foundations to be excavated and constructed but the ground footprint is expected to be minimal. The suspension bridges may be operated at night during special events.

3.4.1.2.11 Mountain Coaster

One mountain coaster is planned to be constructed during Phase 1. The mountain coaster may require foundations to be excavated and constructed. The mountain coaster will only be operated during daylight hours.

3.4.1.2.12 Mountain Slides

The mountain slides may require foundations to be excavated and constructed. The mountain slides will only be operated during daylight hours.

3.4.1.3 Resort Area Projects

3.4.1.3.1 Removal of the Historical Lodge Building

The existing lodge building is currently condemned and closed to the public and will be removed during Phase 1.

3.4.1.3.2 Upper Day Lodge

The upper day lodge is planned with guest service space, equipment rental and repair, and ticket space on the lower level. Lockers and restaurant space will be on the second level of the day lodge.

3.4.1.3.3 Operations Base

An operations base is planned to be developed below the main parking lot.

3.4.1.3.4 Employee Housing

A temporary camp for approximately 50 employees, including a septic tank, will be constructed during Phase 1. The temporary employee camp will be at the northeast end of the parking lot P3.

3.4.1.3.5 Glamping

A glamping zone will be developed during Phase 1 and will allow for 46 overnight guests.

3.4.1.3.6 Beginner Zone, Snow Play Zone, and All-season Tubing Area

The north end of the Resort Center is planned to be expanded during Phase 1 to provide a beginner zone, snow play zone, and all-season tubing hill.

The existing tubing hill extends for 100 m in length and 12 m in elevation, with capacity for three tubing lanes. During Phase 1, the tubing hill will undergo some grading to ensure an optimal tubing experience.

A beginner zone and dedicated snow play zone will also be constructed during Phase 1. The snow play zone will feature an area for kids to build snow men and snow forts, as well as short tobogganing hill. This area may include various play structures and could also include a fire pit for participants to stay warm.

3.4.1.3.7 Other Resort Area Attractions

Other attractions that are planned for construction in the resort area during Phase 1 are a climbing wall, learn to mountain bike park, Indigenous cultural center, skating rink, all-age playground, and a net park.

3.4.1.3.8 Temporary Parking Lots

During Phase 1, day visitor parking for cars and buses in the resort area will be provided in parking lots P1, P2, and P3. Overnight parking for recreational vehicles (RVs) will be provided in P3. The parking capacity of each lot in Phase 1 is provided in Table 3.4-1.

Table 3.4-1: Phase 1 Temporary Parking Lot Capacity in the Resort Area

Parking Lot	Number of Cars	Number of Buses	Number of RVs	Number of Employees	Total
P1	550	4	0	0	554
P2	150	4	0	0	154
P3	200	0	50	250	500
Total	**900**	**8**	**50**	**250**	**1,208**

3.4.1.3.9 Temporary Roads

In the resort area, temporary roads will be constructed during Phase 1 to support Project development and operation.

3.4.1.4 Cross-Country Area Projects

3.4.1.4.1 Nighttime Multimedia Walk and Light Show

The integration of a nighttime multimedia walk and light show within the cross-country ski area is a concept that is under development. Additional details will be provided should this concept be carried forward during the planning stage.

3.4.1.4.2 Mini Golf Course

The integration of a mini golf course within the cross-country ski area is a concept that is under development. Additional details will be provided should this concept carried forward during the planning stage.

3.4.1.4.3 Summer and Winter Recreation Trails

The construction of trails and buildings in the cross-country area to support cross-country skiing, biathlon, snowshoeing, dog sledding, horse drawn carriage and sleigh ride, fat bike, and horseback riding (summer and winter recreation trails) will be initiated in Phase 1.

3.4.1.4.4 Temporary Parking Lots

One temporary day visitor parking lot (P4) will be constructed in the cross-country area during Phase 1. The parking lot provide parking for 200 visitor cars and 50 employee cars.

3.4.1.4.5 Temporary Roads

Temporary roads will be constructed in the cross-country area during Phase 1 to support Project development and operation.

3.4.2 Future Phases

3.4.2.1 Public Infrastructure

3.4.2.1.1 Water Infrastructure

Existing water wells, pumps, and reservoirs will be upgraded during Phase 2. A new sewage treatment plant will also be constructed during Phase 2.

As the Project moves through the approval process towards construction, a qualified engineering firm will be retained to prepare a design brief of a servicing plan for the Resort development such as water supply, treatment, storage and distribution, and wastewater collection, treatment, and disposal. The capacity of the Resort's current potable water source will be assessed to confirm that it has sufficient capacity to meet demand for each major phase of Resort development.

3.4.2.1.2 Power, Communication, and Energy Infrastructure

The power, communication, and energy infrastructure at the Project will be upgraded during Phase 2. As the Project moves through the approval process towards construction, a qualified engineering firm will be retained to prepare a design brief of a servicing plan for the Resort development such as electrical power.

3.4.2.2 Future On-Mountain, Resort Area, and Cross-Country Area Projects

Attractions and other developments that will be constructed on-mountain, in the resort area, and in the cross-country area during future phases of the Project have not been confirmed. A list of potential developments is presented in Table 1.0-1.

3.5 Schedule

The full build out of the Project is anticipated to take approximately 14 years (Table 3.5-1).

Table 3.5-1: Project Development Schedule

Project Phase	Development Type	Start	End
Phase 1	Public Infrastructure[(a)]	Q2 2026	Q3 2028
Phase 1	Project components[(b)]	Q2 2026	Q3 2031
Phase 2	Public Infrastructure[(a)]	Q2 2026	Q3 2030
Phase 2	Project components[(b)]	Q2 2029	Q3 2034
Phase 3	Project components[(b)]	Q2 2031	Q3 2036
Phase 4	Project components[(b)]	Q2 2033	Q3 2038
Phase 5	Project components[(b)]	Q2 2035	Q3 2040

(a) Includes tasks such as upgrading or installing new transportation, water, or power infrastructure to support visitors.

(b) Construction of Project components discussed in this report.

4 ENVIRONMENTAL SETTING

4.1 Overview

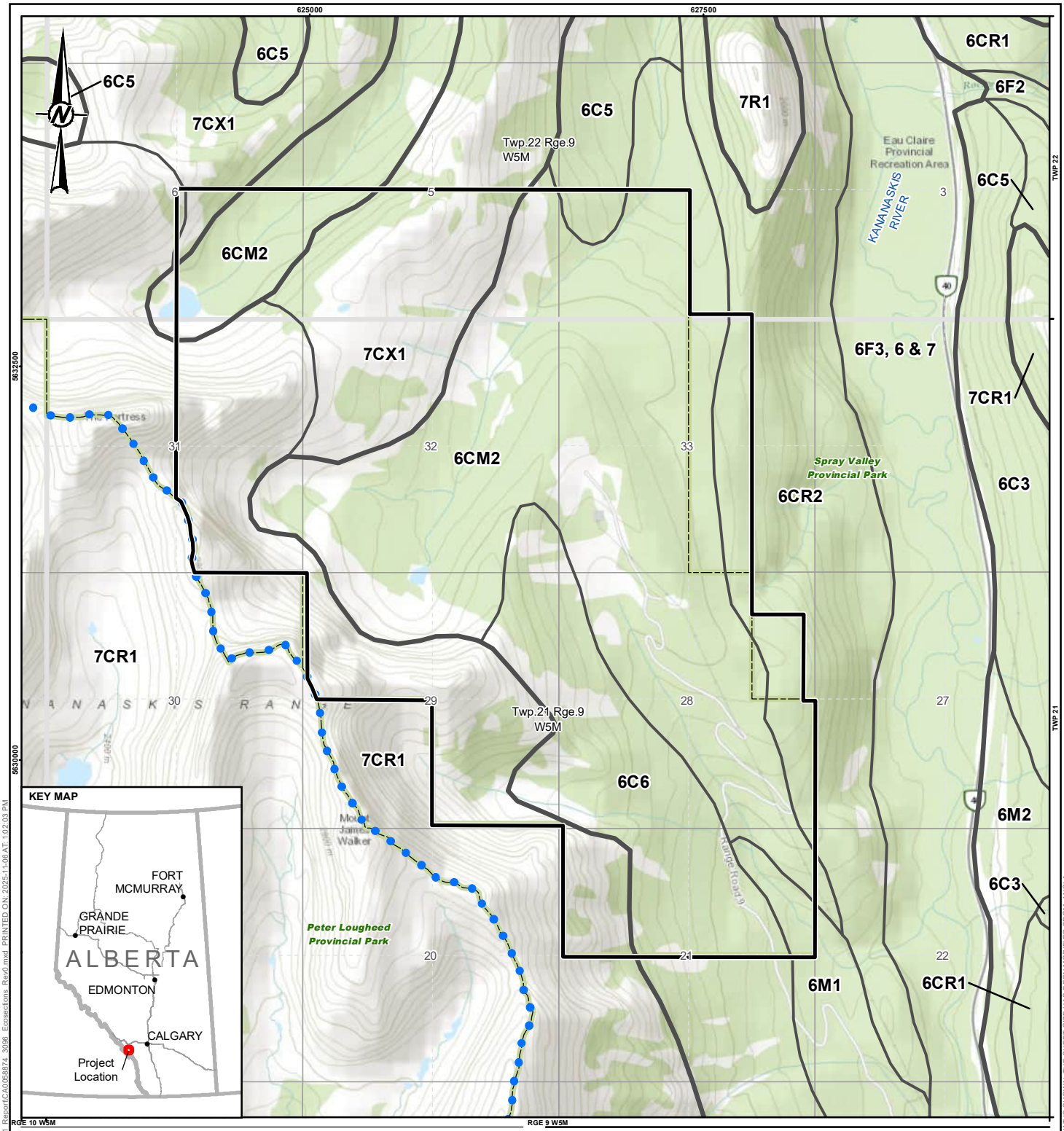
The Resort is within the Alpine and Subalpine Ecoregions of the Eastern Front Ranges of the Rocky Mountains. The boundary typically occurs between the 2,200 to 2,300 m elevation mark and is marked by noticeably steeper terrain and a transition from closed coniferous tree cover in the Subalpine Ecoregion to more open, dwarf scrub vegetation in the Alpine Ecoregion.

The central portion of the Lease is bounded by a steep southwest to northeast trending ridge that extends from Fortress Mountain to Galatea Creek (Figure 4.1-1). Ski runs have been developed on the south-facing slopes of this ridge (“Farside”) and on both sides of a secondary, lower elevation ridge that extends in a southeast to northwest direction across the lease.

Within the Alpine and Subalpine Ecoregions, the Ecosection level has been mapped at 1:100,000 scale. Map units are based on distinct physiographic and/or geological features and characteristics such as vegetation, landform, soils, and slope (McGregor 1984). Ecosection mapping for the Lease is presented in Figure 4.1-1 and described in Table 4.1-1.

Table 4.1-1: Ecosections in the Fortress Mountain Resort Lease

Ecosection	Ecoregion	Ecodistrict	Landform	Slope %	Vegetation	Soils
7R1	Alpine	Bedrock	mountain slope, limestone cliffs	100 +	non-vegetated	Regolithic
7CX1	Alpine	Colluvial and Residual	mountain and high foothills slopes	2-30	dwarf scrub	Regolithic
7CR1	Alpine	Colluvial and Bedrock	mountain and high foothill slopes; limestone and dolomitic limestone	70-100 +	very sparse large unvegetated slopes	Regolithic
6CM2	Subalpine	Colluvial and Morainal	high foothills and mountain slopes; inactive colluvial veneers and morainal blankets (northerly aspect)	46-70	closed coniferous forest	Orthic Regosol and Orthic Eutric Brunisol
6CR2	Subalpine	Colluvial and Bedrock	mountain slope; colluvial veneer, limestone bedrock outcrops	46-100	open and closed coniferous forest	Orthic Regosol
6C5	Subalpine	Colluvial	mountain slope colluvial veneer (northerly aspect)	46-100	closed coniferous forest	Orthic Eutric Brunisol, Orthic Regosol
6F 3,5 and 7	Subalpine	Fluvial	meandering channel incised to braided	0-1	open and closed coniferous forest; riparian scrub	Orthic and Humic Regosol



LEGEND

- ECOREGION BOUNDARY
- ECOSECTION OR ECODISTRICT BOUNDARY
- WATERSHED BOUNDARY
- PARK / PROTECTED AREA BOUNDARY
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

0 500 1,000

1:35,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
ECOSECTIONS OF THE FORTRESS MOUNTAIN LEASE

CONSULTANT

wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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Within the Alpine Ecoregion, the southwestern portions of the Lease are characterized by the 7CR1 Ecosection. Bedrock and thin veneers of colluvium material restrict vegetation growth to localized occurrences of upland sedges (*Carex* spp.) and graminoids adapted to high alpine environments. Slopes typically range from 70% to 100%. Dwarf scrub vegetation is common on lower alpine slopes, where colluvial deposits are slightly thicker and may also contain residual material that is weathered in-situ (Ecosection 7CX1). Typical species include mountain avens (*Dryas octopetala*), grouseberry (*Vaccinium scoparium*), snow willow (*Salix reticulata*), mountain heaths (*Phyllodoce* spp.), and graminoids such as kobresia (*Kobresia* spp.) and high wildrye (*Elymus violaceus*).

The Resort base area, including much of the proposed Project development, and the existing access road are within the Subalpine Ecosection 6CM2. Slopes range from 46% to 70% with both colluvial and morainal deposits supporting Orthic Regosols on steep slopes and Orthic Eutric Brunisols on moderate slopes and valley bottoms. Closed-canopy coniferous forest, interspersed with dwarf scrub and shrublands, occurs on all slope aspects. Lodgepole pine (*Pinus contorta*) is deeper-rooted and fire-adapted and is found on drier, southwest facing slopes. More shallow rooted species, such as white spruce (*Picea glauca*), Engelmann spruce (*Picea englemannii*), and spruce hybrids, dominate subhumid and humid northeast-facing slopes.

The understory and ground cover vary with slope, aspect, elevation, and crown closure but do not vary according to dominant canopy species. Mid to lower slopes with southwesterly aspects typically support open or closed coniferous forest, generally have a sparse shrub stratum dominated by buffaloberry (*Shepherdia argentea*) and wild rose (*Rosa acicularis*) with a ground cover dominated by a mixture of Canada wild rye, pinegrass (*Calamagrostis rubescens*), and showy aster (*Eurybia conspicua*). Steeper slopes (≥70%) support ground cover with higher proportions of juniper and bearberry. Northeast slopes at similar elevations are dominated by sparse shrub cover of alder (*Alnus* spp.) and willow (*Salix* spp.) with feathermoss species ground cover. At higher elevations, grouseberry makes up more of the ground cover. Coniferous forests occurring in seepage zones on imperfectly drained soils have a dense shrub stratum of alder and gooseberry (*Ribes uva-crispa*) and in wetter areas may locally support horsetail (*Equisetum* spp.) moss as the ground cover.

The eastern margins of the Lease are characterized by Ecosection 6CR2, which is an area of both open and closed coniferous forest developed on colluvial and exposed bedrock outcrops with a predominantly north-easterly aspect. Slopes range from 46% to 100% with soils dominated by Orthic Regosols.

The Kananaskis River is east of the Lease and drains in a south to north direction (Ecosection 6F3,6 and 7). A variety of open to closed coniferous forest and riparian shrub communities is typical of the meandering, incised to braided river channel.

4.2 Terrain

Terrain mapping for the Lease was based on observable differences in the slope gradient, surface expression, vegetation cover, and implied geological processes. Distinct map units were delineated on remote sensing images by on-screen digitization to a scale of 1:20,000. Terrain map units were identified using the simple terrain unit symbolization and associated terrain characteristics outlined in the BC Terrain Classification System (Howes and Kenk 1997).

Numerous terrain map units were identified in the Lease. Although they are considered distinct units, many of the units share the same or similar general composition with only slight variations in surface expression, slope gradient, and geological modifying processes, which separate them into distinct units. Terrain units mapped in the Lease are of four surficial material types: Colluvium (C), Morainal/Till (M), Fluvial (F), and Bedrock (R). The surficial material types, surface expression, and geological modifying processes associated with the terrain units

mapped in the Lease are summarized in Table 4.2-1, Table 4.2-2, and Table 4.2-3. The map units are shown in Figure 4.2-1.

Table 4.2-1: Description of Surface Material Identified in the Fortress Mountain Resort Lease

Material Name	Map Symbol	Description
Colluvium	C	Materials that have reached their present position because of direct, gravity-induced movement.
Fluvial	F	Materials transported and deposited by streams and rivers.
Morainal (Till)	M	Materials deposited directly by glacier ice without modification by any other agent of transportation.
Bedrock	R	Bedrock outcrops and rocks covered by a thin mantle (<10 cm thick) of unconsolidated or organic materials.

< = less than.

Source: Howes and Kenk 1997.

Table 4.2-2: Description of Surface Expressions Identified in the Fortress Mountain Resort Lease

Surface Expression Name	Map Symbol	Description
Moderate Slope	a	A planar surface with a slope gradient >20% and <50%, and a smooth longitudinal profile that is either straight concave or convex.
Blanket	b	A mantle of unconsolidated materials that is >1 m thick.
Cone(s)	c	A cone or segment of a cone with a smooth slope gradient from the apex to toe >26%, and a longitudinal profile that is either straight concave or convex.
Fan(s)	f	A relatively smooth segment of a cone with a slope gradient from apex to toe ≤26%, and a longitudinal profile that is either straight concave or convex.
Hummock(s)	h	Steep side hillocks and hollows with multidirectional slopes dominantly >20% and <70%.
Gentle Slope	j	A planar surface with a slope gradient >3% to 26% and a smooth longitudinal profile that is either straight concave or convex.
Steep Slope	s	A planar surface with a slope gradient >70%, and a smooth longitudinal profile that is either straight concave or convex.
Undulating	u	Gently sloping hillocks and hollows with multidirectional slopes <26%.
Veneer	v	A mantle of unconsolidated materials that is 10 cm to 1 m thick.

> = greater than; < = less than.

Source: Howes and Kenk 1997.

Table 4.2-3: Description of Geological Processes Identified in the Fortress Mountain Resort Lease

Geological Process Name	Map Symbol	Description
Snow Avalanches	A	Rapid downslope movement of snow and ice, as well as incorporated rock, surficial material and vegetation debris by flowing or sliding.
Slow Mass Movement	F	Slow downslope movement of masses of cohesive or non-cohesive surficial material and/or bedrock by creeping, flowing or sliding.
Meandering Channel	M	A clearly defined channel characterized by a regular and repeated pattern of bends with relatively uniform amplitude and wave length.
Rapid Mass Movement	R	Rapid downslope movement of dry, moist or saturated debris from surficial material and/or bedrock by falling, rolling, sliding or flowing.

Source: Howes and Kenk 1997.

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Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

RGE 9 W5M

TWP 22 TWP 21

Cbv/Ra Mbu Mvbs/Rs Mbu Fp-M Water Mvbs/Rs Mbu Fp-M Cvs-R/Rs

Gondola 3

Mbh Mcvb/Ra Mbu Csc-R/Rs Mbva/Ra Building Spray Valley Provincial Park Mbh

Gondola2

Ccvb-R/Rs Cfb-F/Rj Fp-M Mbvj Fp-M Mbvj Mbva/Ra Building Mbj

Water Cfb-F/Rj Mbva-R/Ra Gondola1 Fp-M Building Water Water Mbj

Rs Mbj Cfb-R/Ra Mvbs-R/Rs Ccb-R/Rs Mbj

Peter Lougheed Provincial Park

Cvs-R/Rs Cvb-R/Ra Rs-R Cvbs-A/Rs Fp-M Cba/Ra

6 5 31 32 33 30 29 28 20 21

KEY MAP

FORT MCMURRAY
GRANDE PRAIRIE
ALBERTA
EDMONTON
CALGARY
Project Location

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- SOIL DISTURBANCE
- TERRAIN MAP UNIT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 500 1,000
1:17,500 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
TERRAIN MAPPING

CONSULTANT
wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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4.3 Soils

4.3.1 Survey Methods

Soil Mapping

A preliminary soil map for the Lease was completed at a 1:5,000 scale prior to the initiation of the soil field program in 2018. Soils with related characteristics (i.e., parent material, slope, vegetation cover and drainage) were grouped together and delineated into soil map units on remote sensing images by on-screen digitization. The soil map units were based on the review of available background information and the vegetation and landform patterns visible on aerial imagery. Map unit nomenclature was assigned according to the soil landscape model method outlined by the Canada – Alberta Environmentally Sustainable Agriculture (CAESA) Soil Inventory Working Group (1997).

Preliminary soil mapping polygons and soil map units were adjusted based on the results of the field program to generate a final soil map for the Lease at a scale of 1:5,000.

Field Survey

A soil survey was completed on September 11 and 12, 2018. Soils field inspection sites were accessed by truck and by foot. Field information was recorded on global positioning system (GPS)-enabled iPads. Soil test pits were excavated and inspected to a maximum depth of 100 cm, where possible, or to the extent that the upper subsoil was exposed to allow a proper classification of the soil profiles.

The following site and soils information was recorded for soil survey inspection sites, when applicable:

- site identification
- GPS location
- slope position, gradient, and aspect
- parent material
- soil horizon designation and thickness, including humus/litter layer
- soil horizon structure, consistence, colour, texture, and coarse fragment content (%)
- drainage
- soil subgroup classification

The soil profiles were described according to Canadian Soil Information System (Agriculture Canada 1983) field methods and standards. Soil horizon information was used to classify soils using the Canadian System of Soil Classification (SCWG 1998) and to determine suitability, soil erosion risk, and soil management and conservation actions (Appendix B).

Soil subgroups were assigned soil series names based on their distinct physical and chemical characteristics and according to Alberta Soil Names File (Generation 4) (ASIC 2016). Referring to the series name to describe a soil type conveys the distinct soil characteristics of that soil, which includes, at minimum, a soils Order, Great Group, Subgroup, Parent Material type, and texture.

Laboratory Analysis

Routine soil analytical data were required to verify the field level classification of the soils according to the Canadian System of Soil Classification (SCWG 1998) and to guide the soil management and conservation actions. Eight samples were obtained from three representative inspections sites. Sampled were analyzed for pH, salinity (electrical conductivity and sodium adsorption ratio), and soil texture (particle size, percent gravel, sand, silt, clay) (Appendix C).

Soil samples were collected from each horizon of the soil profiles, wherever possible. Coarse fragments were removed and approximately 500 grams (g) of mineral soil were collected. Samples were delivered to ALS Environmental Laboratories Inc. in Calgary, Alberta for analysis.

Soil Sensitivities

Erosion Sensitivity

Water and wind erosion ratings and potentials were assigned to soil map units within the Lease based on characteristics of soils and terrain (i.e., mineral soil texture and slope gradient) recorded during the field program.

Determining soil erosion potential by water is based on methods described by the Transportation Association of Canada (2005). The textures of the surface mineral soil and subsoil were used to determine the water erosion rating as the first step in determining the water erosion potential. Water erosion potential was then determined using the erosion rating and the dominant slope class, and length. Organic soils were not assigned water erosion potential ratings.

Wind erosion risk ratings were determined using an adapted version from Wind Erosion Risk, Alberta (Coote and Pettapiece 1989). Wind erosion ratings were based on the textures of the surface mineral soil and subsoil.

Water and wind erosion risk ratings are based on disturbed, “bare soil” conditions.

Sensitivity to Compaction

Compaction ratings for soil map units in the Lease were determined using the criteria outlined in Lewis et al. (1989) under prevailing moisture conditions. Soils occurring at toe slopes and in depressions were assigned compaction ratings based on soil texture under wet (saturated) soil conditions.

Soil Stability

Soil stability refers to the ability of an exposed soil to withstand movement or slumping. Soil map units in the Lease were classified as stable or unstable (to indicate the presence of risk characteristics) based on the dominant texture of the soils in the unit and the landscape characteristics (i.e., drainage and slope gradient) of the unit. Soils with coarse textures of sandy loam, loamy sand, or gravel with very friable to loose consistency lack cohesion properties which results in lower stability and these soils are more prone to slumping when exposed. Heavy clayey soils can also be unstable, especially when wet. All soils with a high-water table are unstable and exposed faces will fail (Pedocan 1993). Soil stability ratings are intended for planning purposes and do not take the place of a proper geotechnical assessment.

Reclamation Suitability

The reclamation suitability of soils in the Lease was evaluated to support reclamation planning. The dominant soil series in each soil map unit was rated as Good, Fair, Poor, or Unsuitable by evaluating soil properties such as texture, coarse fragment content, and select soil chemistry parameters for the Eastern Slope Region (Alberta Agriculture 1987). Soil chemistry values used to evaluate reclamation suitability were obtained from the soil sampling and laboratory analysis results and supplemented with information from the Canadian Soil Information Service website (CanSIS 2018).

Reclamation suitability ratings for the rooting zone material were determined from the soil characteristics of the uppermost surface mineral soil (up to 15 cm) for each soil map unit. The most limiting property of soil chemical or physical parameter was used to determine the final overall rating (Alberta Agriculture 1987).

4.3.2 Soil Types

Soils in the Lease are greatly influenced by the cold climate and steep slopes associated with the alpine and mountainous environment. The parent material and vegetation also have an influence, to a lesser degree, on the soil types identified in the Lease.

The Lease is characterized by steep, medium to moderately fine textured veneers and blankets of morainal (till) deposited over bedrock. Lesser areas of medium textured colluvium appear as fans or cones at the toe slopes of bedrock cliffs and outcrops in the Lease. Medium textured fluvial material can be found in the lower slope areas and depressions associated with valley bottoms and active or seasonal drainages. Moderate to steep slopes dominate the topography in the Lease, while more subdued hummocky and undulating topography is observed in the lower and toe slope areas, and valley bottoms. Slope gradients range from 2% to 45% in the eastern half of the Lease, increasing from 45% to 80% or greater along the western margins of the Lease.

Soils in the Lease are dominated by Brunisolic soils with a lesser amount of Luvisols, Regosols, and Gleysols. Dystric and Eutric Brunisols developed on medium to moderately fine textured tills were identified on the crest, upper, mid, and lower slopes of the steep terrain. Regosols were also observed on these same slope positions where vegetation cover was low or non-existent, and continuous surficial material movement had occurred. Areas of subdued topography along the lower and toe slopes and along the valley bottoms were associated with the development of Gray Luvisolic and Gleysols soils on till deposits. Detailed soil map unit information is described in Table 4.3-1 and distribution of the map units is shown in Figure 4.3-1.

Table 4.3-1: Soil Map Unit Distribution within the Fortress Mountain Resort Lease

Soil Map Unit	Dominant Soil Series	Dominant Soil Subgroup(s)	Parent Material	Dominant Soil Texture(s)	Drainage Class	Dominant Slope Class (%)	Water Erosion Potential	Wind Erosion Rating	Soil Compaction Rating	Soil Stability	Reclamation Suitability (Limiting Factors[b])
WLBzz1	Willoughby	Orthic Dystric Brunisol	till	sandy loam	rapid	>30 to 45	High	Medium	Low	Unstable	Fair (pH)
WLBzz5	Willoughby	Orthic Dystric Brunisol	till	sandy loam	rapid	>10 to 30	Moderate to High	Medium	Low	Unstable	Fair (pH)
WLBzz6	Willoughby	Orthic Dystric Brunisol	till	sandy loam	rapid	>30 to 45	High	Medium	Low	Unstable	Fair (pH)
WLzzFR6	Willoughby, Frank	Orthic Dystric Brunisol	till, colluvium	sandy loam, loam	very rapid	>30 to 45	High	Medium	Low	Stable to Unstable	Fair (pH)
WLzzLT6	Willoughby, Leighton Centre	Orthic Dystric Brunisol, Dark Gray Luvisol	till	sandy loam	rapid	>5 to 15	Low to Moderate	Medium	Low	Unstable	Good to Fair (pH)
BPWL5	Beaupre, Willoughby	Orthic Dystric Brunisol, Eluviated Dystric Brunisol	till	sandy loam	rapid	>15 to 30	Moderate to High	Medium	Low	Unstable	Fair (texture, pH)
FRK1	Frank	Orthic Eutric Brunisol	colluvium	sandy loam, loam	very rapid	>30 to 45	High	Medium	Low	Stable to Unstable	Fair (pH)
FRK5	Frank	Orthic Eutric Brunisol	colluvium	sandy loam, loam	very rapid	>15 to 45	High	Medium	Low	Stable to Unstable	Fair (pH)
LTCgl2	Leighton Centre - gleyed	Gleyed Dark Gray Luvisol	till	loam	imperfect	>0.5 to 2	Moderate	Medium	Moderate to High	Stable	Good
SPR6	Spruce Ridge	Orthic Gray Luvisol	till	silt loam	well	>15 to 30	High	Medium	Moderate	Stable	Fair (texture, pH)
TBRaa2	Twin Bridges	Gleyed Humic Regosol	fluvial	sandy loam, loam	imperfect	>2 to 5	Low to Moderate	Medium	Moderate to High	Stable	Fair (pH, coarse fragment content)
TBaaLTgl2	Twin Bridges, Leighton Centre - gleyed	Gleyed Humic Regosol, Gleyed Dark Gray Luvisol	fluvial, till	sandy loam, loam	imperfect to poor	>2 to 5	Low to Moderate	Medium	Moderate to High	Stable to Unstable	Good to Fair (pH, coarse fragment content)
TBaaR6	Twin Bridges, Bedrock	Gleyed Humic Regosol	fluvial/bedrock	sandy loam, loam	moderately well to imperfect	>5 to 10	Moderate	Medium	Moderate	Stable	Fair (pH, coarse fragment content)
WDCco2	Wildcat	Humic Luvic Gleysol	glaciolacustrine/till[a]	loam	poor	>0.5 to 2	Moderate	Medium	High	Unstable	Fair (texture)

> = greater than.

(a) Layered parent material; glaciolacustrine overlying till.

(b) Proper construction planning and good management can overcome the limitations imposed by these soil characteristics.

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Spray Valley Provincial Park

Peter Lougheed Provincial Park

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

TWP 22 TWP 21

RGE 9 W5M

6 5 31 32

WLBzz1/ I4h
WLBzz6/I3h
WLBzz5/ H5m
WLBzz5/ H5m
WLBzz6/I3h
WLBzz6/I3m
Gondola 3
TBRaa2/ FP3
WDCco2/ L2
WLBzz6/ I3m
WLBzz6/I3h
FRK1/ I3h
TBRaa2/ FP3
WLBzz5/ IUh
WLBzz6/ I3m
WLBzz5/ IUh
WLBzz5/ IUh
TBRaa2/ FP3
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SPR6/IUh
FRK5/IUh
WLBzz6/ I3h
TBRaa2/ FP3
TBaaR6/ I3l
ZWA
WLBzz6/ I3h
WLzzFR6/I4h
TBaaR6/ I4h
TBaaR6/ I3l
TBaaR6/ I3l
R1/I4h
Gondola 1
R1/ I4h

KEY MAP

A B C D

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- SOIL DISTURBANCE
- SOIL MAP UNIT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400
1:10,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
DETAILED SOILS MAPPING

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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TWP 22 TWP 21

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

RGE 9 W5M

33

Spray Valley Provincial Park

Gondola 3

Gondola 2

LIFT 1 / D4C

Building

Building

Building

WLBzz6/l3m

TBRaa2/FP3

WLBzz6/l3h

WLBzz6/l3m

WLBzz5/lUh

BPWL5/l3l

BPWL5/lUh

WLBzz5/lUh

WLzzFR6/l4h

SPR6/lUh

LTCgl2/L2

WLzzLT6/lUl

ZWA

TBaaLTgl2/FP3

KEY MAP

A B C D

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- SOIL DISTURBANCE
- SOIL MAP UNIT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
DETAILED SOILS MAPPING

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO. CA0058874.3096 | CONTROL | REV. 0 | FIGURE 4.3-1B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

627000 628000

5631000 5630000 5629000

TWP 21

RGE 9 W5M

Gondola 2

Gondola 1

LIFT 1 / D4C

Building

Building

WLBzz6/ I3h

WLBzz6/ I3h

WLzzFR6/I4h

LTCgl2/ L2

BPWL5/I3l

WLzzLT6/ IUl

BPWL5/IUh

WLzzLT6/ IUl

WLzzLT6/ IUl

ZWA

ZWA

WLBzz5/IUh

R1/I4h

WLzzFR6/I4h

BPWL5/IUh

R1/ I4h

TBaaLTgl2/ FP3

BPWL5/ IUh

28

21

Twp.21 Rge.9 W5M

Spray Valley Provincial Park

Peter Lougheed Provincial Park

KEY MAP

A B C D

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- SOIL DISTURBANCE
- SOIL MAP UNIT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
DETAILED SOILS MAPPING

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.3-1C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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624000 625000 626000

5631000 5630000 6240000

WLBzz6/ l3m
FRK5/lUh
TBaaR6/ U1h
FRK5/ lUh
FRK5/ lUh
SPR6/lUh
SPR6/lUh
SPR6/lUh
FRK5/lUh
WLBzz6/ l3h
TBRaa2/ FP3
TBaaR6/ l3l
ZWA
WLBzz6/ l3h
WLzzFR6/l4h
TBaaR6/ l3l
TBaaR6/ l4h
TBaaR6/ l3l
R1/l4h
Gondola 1
R1/ l4h

30 29 20

Twp.21 Rge.9 W5M

TWP 21

Spray Valley Provincial Park

Peter Lougheed Provincial Park

KEY MAP

A B C D

RGE 9 W5M

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- SOIL DISTURBANCE
- SOIL MAP UNIT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400
1:10,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
DETAILED SOILS MAPPING

CONSULTANT

wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.3-1D

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

Soil Map Units

Willoughby Soil Map Units

The Willoughby soil map units (WLBzz1, WLBzz5, WLBzz6, WLzzFR6, WLzzLT6, and BPWL5) dominate much of the Lease and Project development. Soils in these map units are generally Orthic Dystric Brunisols developed on medium to moderately fine textured till with small proportions of Dark Gray Luvisols developed on till and Orthic Eutric Brunisols developed on colluvial parent material. Layers of moderate to high coarse fragment content may be present within the soil profile of Willoughby soils.

Frank Soil Map Units

The Frank soil map units (FRK1 and FRK5) are generally Orthic Eutric Brunisols developed on medium textured colluvium with small proportions of Dark Gray Luvisols developed on till and Orthic Eutric Brunisols developed on colluvial parent material. High coarse fragment content is expected in the profile of these soils.

Leighton Centre Soil Map Unit

The Leighton Centre soil map unit (LTCgl2) is generally Gleyed Dark Gray Luvisols developed on moderately fine textured till. There may also be a small proportion of non-gleyed Gray Luvisolic soils and Gleysolic soils developed on moderately fine textured till in this unit. Soils of this map unit occur in low lying depressed areas of the terrain with low slope gradients (<2%).

Spruce Ridge Soil Map Unit

The Spruce Ridge soil map unit (SPR6) is generally Orthic Gray Luvisols developed on moderately fine textured till. There may also be a small proportion of Gray Luvisolic soils developed on coarser textured till in this unit. Layers of gravel and moderate to high coarse fragment content are expected in these soils.

Twin Bridges Soil Map Units

The Twin Bridges soil map units (TBRaa2, TBaaLTgl2, and TBaaR6) are generally Gleyed Regosolic soils developed on moderately coarse textured fluvial material with a small proportion of Gleyed Dark Gray Luvisols developed on till and in-situ weathered bed rock or bedrock outcrops. Soils of the Twin Bridges map unit are associated with lower slope areas and depressions associated with active or seasonal drainages.

Wildcat Soil Map Unit

The Wildcat soil map unit (WDCco2) is generally Gleysolic soils developed on moderately fine textured glaciolacustrine materials underlain by moderately fine textured till. There may also be a small proportion of non-gleyed Brunisolic soils developed on till and Gleysolic soils developed on coarser textured till in this unit. Soils of this Wildcat map unit occur in depressed areas with low slope gradients (>2%).

4.3.3 Soil Sensitivities

Water Erosion

Erosion potential from water for the soil map units were generally rated as Moderate to High (Table 4.3-1). Many of the soils occur on long (>70 m) slopes with moderate (10% to 20%) to high (>20%) gradients and have medium to moderately fine, sandy loam, and loam textures. These characteristics explains the higher risk to water erosion for the soils of the Willoughby and Frank soil map units. Lower slope gradients, more subdued topography, and shorter slopes (<70 m) characterize the Low water erosion potential in the Twin Bridges soil map units.

Wind Erosion

Wind erosion risk was rated as Medium for all the soil map units and was based on the sandy loam to loam textures of these soils (Table 4.3-1).

Soil Compaction

The risk of soil compaction depends on soil texture, drainage, and slope gradient present in the soil map units. Soils in the Willoughby and Frank map units have Low risk for soil compaction because of their steep slopes, rapid drainage, and sandy loam textured soils. Soils in the Leighton Centre, Spruce Ridge, Twin Bridges, and Wildcat soil map units were given Moderate to High ratings because they occur in lower lying and depressed areas with poorer drainage and are likely to be moist or wet for much of the spring and summer.

Soil Stability

Soil stability in the Lease is highly dependent on the soils' position on the landscape. Generally, Willoughby soil map units occur on mid, upper, and crest position in the landscape and have a dominant sandy loam texture; as such, these units were rated as Unstable. Soil map units that occur at lower positions and more level areas of the landscape, such as the Leighton Centre and Twin Bridges map units, were rated as Stable even though they have similar dominant soil textures to the Willoughby soil units. Soil stability in the Twin Bridges soil map units was rated as generally Stable; however, these soil units may be Unstable after heavy precipitation events or during the spring freshet.

Reclamation Suitability

Soils in the development areas are rated as Good to Fair (Table 4.3-1). The soils are considered suitable for reclamation based on the physical and chemical characteristics (Alberta Agriculture 1987). Good to Fair rated soils have none to moderate limitations that can affect their use as a plant growth medium. The limitations on the soil in the development areas were identified as acidic pH, high coarse fragment content (%), and/or less than suitable soil textures within the uppermost surface mineral soil. Proper construction planning and good management can overcome the limitations imposed by these soil characteristics.

4.3.4 Geotechnical Soil Properties

A geotechnical investigation of the proposed Project development has been completed by Clifton Associates Ltd. c/o McElhanney Consulting Services Ltd. 2015 (Appendix D). The investigation consisted of six boreholes investigations using a track-mounted, solid stem auger rig. Two boreholes were drilled at the location of the proposed water treatment building and water tank area. Two other boreholes were drilled in the central portion of the base area, associated with the proposed mixed-use buildings, as well as two other boreholes at the location of the proposed day lodge. The report is provided in its entirety, along with each borehole log in Appendix D.

4.4 Vegetation

4.4.1 Survey Methods

Ecological Land Classification Mapping

Prior to field assessment, provincial Derived Ecosite Phase (DEP) polygons were used as preliminary Ecological Land Classification (ELC) mapping within the Lease. Provincial DEP mapping follows the Ecological Classification Hierarchy of Alberta with natural subregion, ecological site (ecosite), and ecosite phase are the main levels of classification. The product was derived by AEP (now AEPA) with the use of Alberta Vegetation Inventory (AVI) and Light Detection and Ranging (LiDAR) digital data (GoA 2017). Areas of disturbance were incorporated into the mapping with the use of spatial disturbance data obtained from FMH, as well as manual digitizing from imagery sources.

Ground-truth surveys were completed to verify ecosite classification and boundaries and provide information that could be used to update provincial DEP mapping. These surveys were completed on July 12, 13 and 30, 2018, and August 22, 23, and 28, 2018, in conjunction with surveys for listed plants and invasive plants. Plots were selected in the field by qualified vegetation ecologists at locations representative of the dominant vegetation type within the polygon based on vegetation characteristics, slope, aspect, moisture regime, and nutrient regime.

Two types of ground-truth surveys were conducted: reconnaissance plots and visual inspections. Reconnaissance plots provided a description of the vegetation present within a 400 m^2 area (generally represented by a 20 m by 20 m plot). At these plots the following data were collected: unique plot number, survey date, GPS location coordinates, land cover type (e.g., ecosite phase or wetland type), soil moisture and nutrient regimes, list of dominant plant species, and cover classes. Visual inspections focused on collecting key information for site classification and mapping support. The locations of the survey plots are shown on Figure 4.4-1.

Following ground-truthing field work, plot field data were used to rectify DEP mapping ecosite classifications and polygon boundaries to finalize ELC mapping within the Lease. Wetland polygons were also incorporated into the final ELC mapping product. Further discussion of wetlands is provided in Section 4.4.4.

Listed Vascular Plants and Communities

Provincial and federal agencies maintain lists of vegetation elements of conservation concern. In Alberta, the Alberta Conservation Information Management System (ACIMS) maintains an online database of listed vegetation species and ecological communities by Natural Subregion (Allen 2014; ACIMS 2025a). Sensitive vegetation elements can be placed on the ACIMS tracking list, or the Watched list. Elements the Tracking list have been determined to be of high conservation priority because they are rare or of concern in some other way. Although species on the Watched list are not of immediate conservation concern, ACIMS endeavours to gather more information about the abundance and distribution of these species throughout the province (ACIMS 2025b).

At the federal level, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses and evaluates species that are in danger of disappearing from Canada (COSEWIC 2025). There are seven COSEWIC status categories: Extinct, Extirpated, Endangered, Threatened, Special Concern, Not at Risk, and Data Deficient. Species can also be designated by COSEWIC as Candidate Wildlife Species, which are species that have not yet been assessed by COSEWIC but are suspected of being at some risk of extinction or extirpation. The federal government periodically reviews the COSEWIC list to determine if a listed species should be protected by law. The *Species at Risk Act* (SARA) establishes Schedule 1 as the official List of Wildlife Species at Risk (GoC 2025). As such, listed plant and ecological community surveys were completed in conjunction with the wetland surveys to identify the location of listed plant species and ecological communities in the Project Lease.

Prior to the field program, a desktop review was undertaken to identify listed vascular plant species and ecological community occurrences historically observed within the Lease and select areas exhibiting high potential for listed plants (e.g., uncommon landscape features, transitional habitats, wetlands, previous listed plant observations) for visitation during the field surveys.

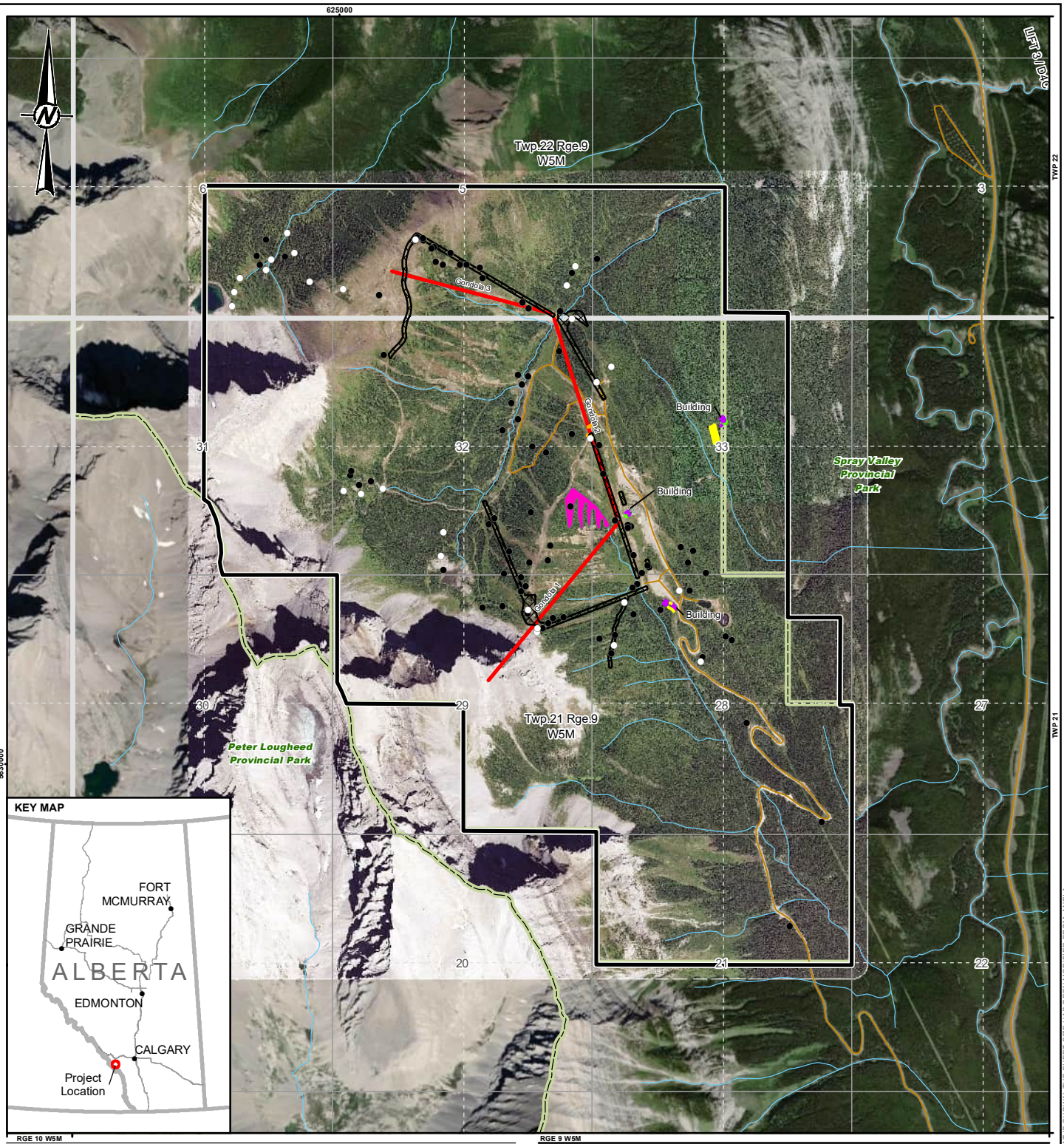
The desktop review indicated that two federally listed species, whitebark pine (*Pinus albicaulis*) and limber pine (*Pinus flexilis*), are known to occur in the vicinity of the Lease (ACIMS 2025a). Additionally, the lease interests with suitable range for limber pine (ACIMS 2025a). Specific surveys for these species were conducted in 2017 within the ski hill expansion areas that were proposed in 2018 (McAnally 2017).

Listed plant surveys are typically conducted several times over the growing season during periods when potentially listed species are most likely to be visible and when diagnostic features present. As such, early season surveys were conducted within the Project development on July 12, 13 and 30, 2018, and late season surveys were conducted on August 22, 23, and 28, 2018. Locations of these surveys are shown in Figure 4.4-1.

Occurrences of listed plants species that have been detected in the Lease from 2018 to 2025 were determined by reviewing ACMIS (ACIMS 2025a).

Surveys were conducted according to the Alberta Native Plant Council (ANPC) Rare Plant Survey Guidelines (ANPC 2012), Protocols for Rare Vascular Plant Surveys (Penny and Klinkenberg 2010), and Occupancy Survey Guidelines for Prairie Plant Species at Risk (Henderson 2009). At each targeted survey location, a systematic meander transect was walked to determine the diversity of microhabitats present. The beginning of each meander transect was marked with a GPS location. Full species inventories were documented along the meander transect as were general site characteristics, such as ecosite type, moisture regime, and nutrient regime. When rare plants were observed, GPS points were taken and additional data were collected, such as microhabitat characteristics, population size, and distribution. This same information was collected when rare plants were incidentally encountered (e.g., when travelling between sample sites).

Collection was limited to specimens that could not be identified in the field, and only when local populations could withstand sampling following guidance in applicable rare plant survey guidelines (ANPC 2012; Henderson 2009; Penny and Klinkenberg 2010).



LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

VEGETATION SURVEYS

- RECONNAISSANCE SURVEY
- VISUAL SURVEY LOCATION
- RARE PLANT SURVEY EXTENT

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 700 1,400

1:35,000 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
VEGETATION SURVEY LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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Invasive Plant Species

Weeds are regulated by the *Weed Control Act* and Regulations. Landowners or occupants must control vegetation species designated as Noxious weeds and must destroy species designated as Prohibited Noxious weeds. The spread of invasive weed species across the landscape is also a concern for landowners, agricultural producers, and managers of natural areas. Use of construction equipment can result in the introduction of or spread of weed species in an area. As such, documentation of the locations of weed species in the Lease provides a baseline comparison for future years and can inform focused mitigation strategies to reduce the potential for weed introduction or spread.

Targeted invasive plant surveys were concentrated near existing disturbances within the ski hill expansion areas that were proposed in 2018. The surveys were completed in conjunction with the late season vegetation surveys on August 22, 23, and 28, 2018. Incidental invasive plant observations were also documented as they were encountered. Invasive plant surveys focused on plant species listed as Noxious and Prohibited Noxious by the *Weed Control Act*; however, other non-native or invasive species were noted when observed as part of ground-truth or listed plant surveys. Where invasive plant species were observed, a GPS waypoint was taken, and the size of the occurrence was recorded.

Merchantable Timber

During summer 2018 field surveys, potentially merchantable timber stands within the Project development were evaluated to determine whether they meet provincial merchantable criteria. Given that development associated with Phase 1 will largely occur on existing disturbed land, merchantable timber stands were expected to be limited in occurrence. Additionally, a desktop analysis conducted using a federal merchantable volume dataset indicated that there were no merchantable forests within the lease area with the closest merchantable forest appearing 6.6 km northeast of the Lease (NRCAN 2022).

Wetlands

Wetlands are land that is saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to wet environments (ESRD 2015). Prior to field surveys in 2018, a preliminary desktop assessment was performed to identify and delineate wetlands within and adjacent to the ski hill expansion areas that were proposed in 2018. This remote mapping was undertaken with the use of the following data sources:

- 1.5 m world imagery (Valtus 2016)
- AltaLIS 1:20,000 Base Features Hydrography Layer (AltaLIS 2018)

Wetland class and permanence were assigned following the Alberta Wetland Classification System (ESRD 2015), and wetland polygons were incorporated into ELC mapping of the Lease.

Wetland field surveys were conducted in conjunction with the ELC surveys and other vegetation surveys. During the surveys, each desktop-delineated wetland site was searched for water-adapted vegetation, wet soils, and primary or strong secondary indicators of wetland hydrology. Where wetland-upland transitional areas were indistinct in the available aerial imagery, the wetland boundaries were field-delineated using GPS locations. In the office, boundaries were refined based on a review of imagery, field track files and GPS points, and field notes.

4.4.2 Ecological (Ecosite) Land Classification

Terrestrial Ecosite descriptions were based on Archibald et al. (1996), Willoughby and Alexander (2007, 2008), and field observations.

Ecosite b2 – Grassland. The b2 ecosite occurs on southern slopes or has coarse soils and has a well-developed grass layer and poorly developed shrub and forb layer. The moisture regime is dry, ranging from xeric to mesic with a medium nutrient regime. Generally, there is a high diversity in common graminoid species such as high wildrye, mountain rough fescue (*Festuca campestris*), sedges, June grass (*Koeleria macrantha*), oat grasses (*Danthonia* spp.), bluebunch fescue (*Festuca idahoensis*), and wheat grasses (*Elymus* spp.). The shrub layer is dominated by common bearberry (*Arctostaphylos uva-ursi*), shrubby cinquefoil (*Dasiphora fruticosa*), ground juniper (*Juniperus communis*), and willows. Wild strawberry (*Fragaria virginiana*), hedysarums (*Hedysarum* spp.) common yarrow (*Achillea millefolium*), goldenrods (*Solidago* spp.), cinquefoils (*Potentilla* spp.), and field pussytoes (*Antennaria neglecta*) are common forb species. Within the Lease, b2 ecosites are above the tree line in the Farside area (Photo 1).

Ecosite b3 – Shrubland. The b3 ecosite is similar to the b2 ecosite but has a drier moisture regime that ranges from xeric to submesic. Graminoids are dominated by high wildrye and sedges. Common shrub species are bog birch (*Betula occidentalis*), common bearberry, ground juniper, willows, crowberry (*Empetrum nigrum*), and shrubby cinquefoil. The forb layer commonly includes hedysarums, goldenrods, common fireweed (*Chamerion angustifolium*), and white camas (*Zigadenus elegans*). Within the Lease, b3 ecosites are near the tree line in the Farside area.

Ecosite c1 – Subalpine Larch/Heather – Subalpine Larch – Subalpine Fir. Occurring at high elevations near the treeline, a high winter snowpack and short growing season influence this ecosite. Shallow soils and thin organic layers result in very poor nutrient regime and subxeric to mesic moisture levels. This forest community is dominated by subalpine larch (*Larix lyallii*), subalpine fir (*Abies lasiocarpa),* and Engelmann spruce, with a shrub layer consisting of grouseberry (*Vaccinium scoparium*), heathers (*Phyllodoce* spp.), and subalpine fir saplings. Arnica species (*Arnica* spp.), brook ragwort (*Senecio triangularis*), and mountain valerian (*Valeriana sitchensis*) are present within the forb layer. The graminoid later is poorly developed. These ecosites are at the tree line throughout the Lease (Photo 1 and Photo 2).

Ecosite c2 – Yellow Mountain Avens. Similar to the c1 ecosite, this ecosite occurs at high elevations near the treeline where it is exposed to harsh environmental conditions and, subsequently, has shallow soils and thin organic layers. Dwarf shrubs, such as yellow mountain avens (*Dryas drummondii*) and willows, dominate the shrub layer, while locoweeds (*Astragalus* spp.) and common fireweed dominate the forb layer. Sedges and high wildrye are common graminoids within this ecosite. Within the Lease, c2 ecosites are above the treeline on the northwest side of the ridge in the Farside area (Photo 1).

Ecosite c3 – Forb Meadow. This ecosite usually occurs on the lower sections of south and west facing slopes from 1,500 to 1,900 m elevation. The moisture regime ranges from submesic to mesic and nutrient regime is rich. Generally, the drier site conditions and exposure to westerly winds leads to a climax community dominated by grass species. High wildrye, rough fescue (*Festuca altaica*), and Parry oat grass (*Danthonia parryi*) are the dominant grass species. Common forbs are wild strawberry, common fireweed, yellow hedysarum (*Hedysarum sulphurescens*), graceful cinquefoil (*Potentilla gracilis*), and wild vetch (*Vicia sativa*). Shrubby cinquefoil and prickly rose are the common shrubs. Within the Lease, one occurrence of the c3 ecosite was observed at the tree line at the base of the Fortress and was dominated with common fireweed.

Ecosite d1 – Spruce/Heather – Engelmann Spruce. This ecosite occurs on at high elevations near the treeline where a high snow cover and short growing season is typical. This ecosite generally has poor nutrient conditions and a submesic to subhygric moisture regime, and shallow and coarse textured or very stony soils. Typically, this ecosite is characterized by an open canopy of Engelmann spruce and subalpine fir with a shrubby understory dominated by heathers, willows, grouseberry, and mountain heathers (*Cassiope* spp.). Within the Lease, d1 ecosites represent a transitional area between the c and e ecosites, and have species such as lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), subalpine larch, and subalpine fir. The understory is dominated by heathers, false azalea (*Menziesia ferruginea*), and white-flowered rhododendron (*Rhododendron albiflorum*). The d1 ecosites are generally on the east side of the Lease.

Ecosite e1 – False Azalea – Grouseberry – Lodgepole Pine. This ecosite is generally situated in lower to mid-elevations of the subalpine natural subregion, and generally occupies mesic to subhygric moisture regimes and mesic nutrient conditions. This forested ecosite is dominated by a canopy of lodgepole pine, with smaller proportions of Engelmann spruce and subalpine fir. Buffaloberry, grouseberry, twinflower (*Linnaea borealis*), green alder (*Alnus viridis*), low bilberry (*Vaccinium myrtillus*), white-flowered rhododendron, and false azalea dominate a diverse shrub layer. Heart-leaved arnica (*Arnica cordifolia*) and high wildrye are common in the herbaceous and graminoid layers, respectively. Bryophytes are dominated by feathermosses such as stair-step moss (*Hylocomium splendens*) and Schreber's moss (*Pleurozium schreberi*). This ecosite occurs on the southern portion of the Lease.

Ecosite e3 – False Azalea – Grouseberry – Engelmann Spruce. This ecosite occupies a similar diversity of elevations and moisture/nutrient regimes as the e1 ecosite, but with Engelmann spruce as the leading tree species instead of lodgepole pine. Smaller proportions of subalpine fir occur within the tree layer, with a diverse shrub layer comprised of grouseberry, false azalea, white -flowered rhododendron and subalpine fir and Engelmann spruce saplings. The understory exhibits low diversity, with a dominance of arnica species (*Arnica* spp.) in the forb layer with a poorly developed graminoid layer. This is the most abundant ecosite within the Lease, covering forested areas below the tree line (Photo 3).

Ecosite e4 – False Azalea – Grouseberry – Subalpine Fir. The e3 ecosite occupies similar elevations as the e1 and e3 communities. The e4 ecosite exhibits submesic to subhygric moisture regime and mesic nutrient conditions. It is characterized by a forest dominated by subalpine fir, with lower proportions of Engelmann spruce. The shrub layer within the e4 ecosite is less diverse than those found in the e1 and e3 ecosites, with false azalea, white-flowered rhododendron, grouseberry, low bilberry, and regenerating subalpine fir being the dominant shrubs. Arnica species, common fireweed, and wild strawberry are commonly present in the understory. Within the Lease, the e4 is relatively abundant below the tree line.

Ecosite f2 – Thimbleberry – Subalpine Fir – Engelmann Spruce. The f2 ecosite is associated with seasonal seepage areas at lower elevations and is typified by high species diversity influenced by a rich nutrient regime. The forest is co-dominated by subalpine fir and Engelmann spruce. The shrub layer is characterized by sapling subalpine fir and Engelmann spruce, false azalea, and currants (*Ribes* spp.). The diverse forb layer contains western meadow rue (*Thalictrum occidentale*), red and white baneberry (*Actaea rubra*), heart-leaved arnica, bronzebells (*Stenanthium occidentale*), green false hellebore (*Veratrum viride*), one-sided wintergreen (*Orthilia secunda*), sweet-scented bedstraw (*Galium triflorum*), cow parsnip (*Heracleum maximum*), and sugar scoop (*Tiarella trifoliata* var. u*nifoliata*). Within the Lease, the f2 ecosite occurs along seepages and streams.

Ecosite g1 – Dwarf Birch/Tufted Hairgrass. This shrub-dominated ecosite occurs in level to depressional landscape positions in the lower valley where frost pockets restrict tree growth. Rich and moist (subhygric to subhydric) conditions result in a dominance of dwarf birch (*Betula pumila*) with smaller proportions of shrubby cinquefoil in the shrub layer. Herbaceous species include arrow-leaved coltsfoot (*Petasites frigidus* var. *sagittatus*), purple avens (*Geum rivale*), dwarf raspberry (*Rubus arcticus*) and common yarrow. Tufted hair grass (*Deschampsia cespitosa*) dominates the graminoid layer. Within the Lease, this ecosite is dominated by willow species and sedge species and occurs in moist depressions (e.g., near Fortress Lake) and in other areas near watercourses.

Ecosite g3 – Forb Meadow. Occupying similar landscape positions and moisture/nutrient regimes as the g1 ecosite, g3 forb meadow exhibits a diverse assemblage of herbaceous species such as broad-leaved fireweed (*Chamerion latifolium*), broad-leaved arnica (*Arnica chamissonis*), mountain valerian, western anemone (*Anemone occidentalis*), brook ragwort, woolly everlasting (*Antennaria lanata*), western lousewort (*Pedicularis bracteosa*) and paintbrushes (*Castilleja* spp.). A sparse shrub layer is generally characterized by willows and western mountain-heather (*Cassiope mertensiana*). Sedges and Drummond's rush (*Juncus drummondii*) typically dominate the graminoid layer. Within the Lease, one g3 ecosite was documented in the Rock Garden area.

Ecosite h1– Horsetail – Engelmann Spruce. Seepage and high-water tables are commonly associated with this ecosite, which occupies lower valley slope positions with a hygric to hydric moisture regime and medium to very rich nutrient levels. Characterized by mostly monotypic stands of Engelmann spruce, the shrub layer consists of Engelmann spruce saplings and willow species. Meadow horsetail (*Equisetum pretense*) and common horsetail (*Equisetum arvense*) dominate the herbaceous layer and water sedge (*Carex aquatilis*) dominates the graminoid layer. One h1 ecosite was observed to the northeast of Fortress Lake.

Miscellaneous Land Classification Descriptions were developed as outlined below:

- The Rock, Lake, and Avalanche Path land cover type classification description was developed based on the Miscellaneous Landscapes presented in Holland and Coen (1982).
- Avalanche Path – Areas where disturbance from snow avalanches has created or maintained non-forested vegetation communities.
- Rock – consolidated bedrock of all lithologies. This community type primarily has no soil and is unvegetated. However, the community can be sparsely vegetated with saxicolous lichen, dwarf shrubs, or stunted trees growing in cracks and pockets of shallow soil.
- Lake – permanent, natural waterbodies greater than 2 m in depth (e.g., Fortress Lake).
- Ephemeral Alpine Lake – natural waterbodies where surface water is present but only for a period after spring snowmelt. Biophysical condition (e.g., soil conditions, freeze-thaw cycle) prevent development of water tolerant vegetation in this community.
- Wetland –Wetland descriptions are based on the Alberta Wetland Classification System (ESRD 2015):
  - Seasonal shallow open water wetlands (W-A-III) are mineral wetlands that exhibit surface water throughout most of the growing season but are typically dry by the end of the summer (ESRD 2015).

Ecosites and the approximate percentage of each type within the Lease are presented in Table and Figure 4.4-2.

Table 4.4-1: Ecosites (Vegetation communities) within the Fortress Mountain Resort Lease

Map Unit	Ecosite	Area (ha)	Proportion of Lease (%)
b2	Grassland	18.9	1.4
b3	Shrubland	20.1	1.5
c1	Subalpine Larch/Heather	92.3	6.9
c2	Yellow Mountain Avens	67.0	5.0
c3	Forb Meadow	0.6	<0.1
d1	Spruce/Heather	108.3	8.1
e1	False Azalea – Grouseberry – Lodgepole Pine	80.4	6.0
e3	False Azalea – Grouseberry – Engelmann Spruce	338.8	25.3
e4	False Azalea – Grouseberry – Subalpine Fir	77.6	5.8
f2	Thimbleberry – Subalpine Fir – Engelmann Spruce	97.2	7.3
g1	Dwarf Birch/Tufted Hairgrass	13.5	1.0
g3	Forb Meadow	0.8	0.1
h1	Horsetail – Engelmann Spruce	1.2	0.1
-	Lake	2.2	0.2
-	Rock / Talus	246.0	18.4
-	Disturbed Vegetation (Regenerating Ski Slopes)	99.4	7.4
-	Ephemeral Alpine Lake	0.7	0.1
-	Disturbed ground (Roads, Trails Infrastructure)	41.2	3.1
-	Avalanche terrain	34.0	2.5
	Total	**1,340.2**	**100.0**

- = not applicable; < = less than.

624000 625000 626000

5634000 5633000 5632000 5631000

Spray Valley Provincial Park

Peter Lougheed Provincial Park

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

RGE 9 W5M

TWP 22 TWP 21

6 5 31 32

Lake

Alpine

Rock

Ephemeral Alpine Lake

Subalpine

Gondola 3

Gondola 1

KEY MAP

A B C D

LEGEND

- NATURAL SUBREGION (GOLDER)
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- ECOLOGICAL LAND CLASSIFICATION
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- VEGETATION DISTURBANCE

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
VEGETATION COMMUNITY TYPES

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.4-2A

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5634000 5633000 5632000 5631000

TWP 22 TWP 21

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

RGE 9 W5M

Gondola 3

Gondola 2

Building

Building

Building

Subalpine

Montane

Spray Valley Provincial Park

W-A(IV)

Rock

Rock

KEY MAP

A B C D

LEGEND

- NATURAL SUBREGION (GOLDER)
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- ECOLOGICAL LAND CLASSIFICATION
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- VEGETATION DISTURBANCE

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
VEGETATION COMMUNITY TYPES

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.4-2B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

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Building Building Gondola 1 Gondola 2 Montane Subalpine Alpine Spray Valley Provincial Park Peter Lougheed Provincial Park Rock Avalanch Path Twp.21 Rge.9 W5M 28 21 TWP 21 RGE 9 W5M

KEY MAP

A B C D

LEGEND

- NATURAL SUBREGION (GOLDER)
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- ECOLOGICAL LAND CLASSIFICATION
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- VEGETATION DISTURBANCE

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
VEGETATION COMMUNITY TYPES

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO. CA0058874.3096 | CONTROL | REV. 0 | FIGURE 4.4-2C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm 0

624000 625000 626000

5631000 5630000 6240000

Rock e4 e3 e3 g1 f2 e3 e3 b3 g3 e4 e4 e3 e3 e3 c1 e3 e3 e3 f2 Subalpine c2 e3 e4 f2 e4 e3 e3 e3 c1 e3 Ephemeral Alpine Lake c2 e3 c1 c1 e4 e4 e4 e4 e4 c1 c1 e4 Gondola 1 e4 e4 e4 e4 e4 e4 c1

30 29 20

Twp.21 Rge.9 W5M

Alpine

Rock

c1 d1 g1 c1

TWP 21

Spray Valley Provincial Park

Peter Lougheed Provincial Park

RGE 9 W5M

KEY MAP

A B C D

LEGEND

- NATURAL SUBREGION (GOLDER)
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- ECOLOGICAL LAND CLASSIFICATION
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- MAPPING AREA BOUNDARY
- VEGETATION DISTURBANCE

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 200 400

1:10,000 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
VEGETATION COMMUNITY TYPES

CONSULTANT

wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO. CA0058874.3096 | CONTROL | REV. 0 | FIGURE 4.4-2D

Photo 1: Tree Line Ecosites: b2 – Grassland and c2 - Yellow Mountain Avens in the Foreground. c1 – Subalpine Larch/Heather - Subalpine Larch - Subalpine Fir at the Tree Line

Photo 2: Ephemeral Lake in the Bonzai Area. c1 – Subalpine Larch/Heather La-Fa Ecosite Surrounding the Ephemeral Lake

Photo 3: e3 – False Azalea – Grouseberry – Engelmann Spruce Ecosite at the Top of Farside

Native plant communities within the Lease were observed to be relatively homogeneous in nature, dominated by the e3 (false azalea-grouseberry - Engelmann spruce) ecosite, which covers 338.8 ha (25.3% of the Lease). Other common ecosites are d1 (Spruce-Heather), covering 108.3 ha (8.1% of the Lease), f2 (Thimbleberry-Subalpine fir- Engelmann Spruce), covering 97.2 ha (7.3% of the Lease), and c1 (Subalpine larch-Heather), covering 93.2 ha (6.9% of the Lease).

Existing disturbance within the Lease include areas used as historical ski runs and gladed areas. In 2018, these areas were found in varying states of regeneration, from shrub cover to young forest growth. Regeneration has continued since 2018, and it is likely that there are more areas of young forest growth. These disturbed areas cover 99.4 ha (7.4% of the Lease). Areas that have been disturbed to accommodate parking areas, buildings, roads, trails and associated infrastructure cover 41.2 ha (3.1%) of the Lease.

4.4.3 Listed and Invasive Plant Species

The desktop review revealed no historical occurrences of federally listed vascular plant species within the Lease (ACIMS 2025a). Three provincially considered vascular plant species have been previously observed within the Lease and are provided in Table 4.4-2.

Table 4.4-2: Provincially Considered Vascular Plants Previously Observed Near the Development Area

Common Name	Scientific Name	ACIMS Rank	Date of Last Observation
Arethusa copper	*Lycaena hypophlaeas arethusa*	S3 (vulnerable)	1972
Calder's rockcress	*Boechera calderi*	S2 (imperiled)	1974
Macoun's draba	*Draba macounii*	S3 (vulnerable)	1969

Source: ACIMS 2025.

No federally listed vascular plant species were observed, and no ecological communities of conservation concern were observed during vegetation field surveys in the ski hill expansion areas that were proposed in 2018.

One provincially sensitive vascular plant species was observed during field surveys in the ski hill expansion areas that were proposed in 2018 (Figure 4.4-3). A patch of beautiful cotton grass (*Eriophorum callitrix*) was identified growing in a seepage area at the base of willow-dominated ski runs. The species is listed as S2 (imperiled) in Alberta and is on the ACIMS tracking list (ACIMS 2025a). The population of beautiful cotton grass was observed growing on exposed mineral soil in conjunction with close-sheathed cotton grass (*Eriophorum brachyantherum*) and wire rush (*Juncus balticus*). At the time of the observation, both co-occurring cotton grass species had largely senesced, causing difficulties in identification between the species. As such, the population was estimated to cover approximately 1 m^2 within an approximately 25 m^2 area.

624000 626000 628000

5632500 5630000

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

RGE 9 W5M

TWP 22

TWP 21

Gondola 3

Gondola 2

Gondola 1

creeping thistle
Cirsium arvense

ox-eye daisy
Leucanthemum vulgare

ox-eye daisy
Leucanthemum vulgare

beautiful cotton grass
Eriophorum callitrix

Building

Building

Building

Building

Spray Valley Provincial Park

Peter Lougheed Provincial Park

6 5 31 32 33 30 29 28 20 21

KEY MAP

LEGEND

- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

PLANT SPECIES OCCURRENCES

- NOXIOUS WEED LOCATION
- RARE PLANT LOCATION
- NOXIOUS WEED PATCH

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 500 1,000
1:17,500 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
LISTED AND INVASIVE PLANT SPECIES OCCURRENCES

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.4-3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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Invasive Plant Species Surveys

Two noxious weeds species as designated by the *Weed Control Act* were observed within the ski hill expansion areas that were proposed in 2018: Canadian thistle (*Cirsium arvense*) and ox-eye daisy (*Leucanthemum vulgare*) (Table 4.4-3). One patch (approximately 20 m^2) containing approximately 60 Canadian thistle individuals was observed on a soil stockpile at the lower terminal (Figure 4.4-3). Two occurrences of ox-eye daisy were observed: approximately 400 plants were observed extending along the southern perimeter of the lower parking lot, and approximately 20 plants were observed along the western edge of the upper parking lot (Figure 4.4-3).

In addition to provincially regulated weeds, scattered patches of seven unregulated invasive, exotic vascular plant species were incidentally observed during vegetation surveys of the Lease. Many of these species, such as crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), timothy (*Phleum pretense*), and clover species (*Trifolium* spp.), were likely introduced via seed mixes employed during historical reclamation practices. These species are no longer used in ski area revegetation programs, and it is recommended that future reclamation practices avoid the use of these exotic species. There is no regulatory requirement to control these species in Alberta.

Table 4.4-3: Invasive Plant Species Observed within the Fortress Mountain Resort Lease in 2018

Common Name	Scientific Name	Weed Designation[(a)]	Location[(b)]
creeping thistle	*Cirsium arvense*	Noxious, Exotic	lower terminal
ox-eye daisy	*Leucanthemum vulgare*	Noxious, Exotic	lower parking lot upper parking lot

(a) Alberta *Weed Control Act* and Regulations.

(b) Occurrence locations are shown in Figure 4.4-3.

4.4.4 Wetlands

A seasonal (Class III) shallow open water wetland was observed along a drainage associated with the outflow from Fortress Lake (Photo 4). Shallow open water wetlands are mineral wetlands that exhibit surface water throughout much of the growing season but are typically dry by the end of the summer (ESRD 2015). The wetland was observed to be dry at the time of the field survey, with an unvegetated area at the deepest portion of the basin (filled with water during the growing season). Small bottle sedge (*Carex utriculata*) and Alaska willow (*Salix alaxensis*) were growing around the edge of the wetland. A willow-dominated shrubland was observed adjacent to the wetland, extending to the southwest towards the lake and to the northeast to the area where the flow emerges as an unnamed creek flowing to the northeast.

Photo 4: Seasonal Shallow Open Water Wetland Near Fortress Lake

4.4.5 Merchantable Timber Resource

Tree clearing may occur during Project development activities. To be merchantable, forests must be considered mature and available for cutting in the next 20 years. There are no merchantable forests within the lease area with the closest merchantable forest appearing 6.6 km northeast of the Lease (NRCAN 2022). Given that development will largely occur on existing disturbed land, stands are not anticipated to meet merchantable requirements therefore merchantable timber stands are expected to be limited in occurrence.

4.5 Wildlife

4.5.1 Survey Methods

In 2018, FMH undertook field studies to collect current wildlife data in accordance with the survey requirements outlined in the terms of reference (TOR) received from the AEP in 2018 (Golder 2018). Remote cameras and autonomous recording units (ARUs) were deployed throughout the Lease to detect wildlife presence and habitat use. The remote cameras targeted ungulates and medium to large mammalian carnivores. The ARUs targeted birds, bats, and amphibians. Incidental wildlife or their sign (e.g., tracks, scat) were recorded during all surveys. The 2018 field data were supplemented with anecdotal wildlife observations provided by FMH staff, historical remote camera data provided by AEP, telemetry data provided by Brett Boukall on November 14, 2018, and historical data accessed using the Fish and Wildlife Internet Mapping Tool (FWMIT). An update on species detections in the Lease was determined by reviewing the FWMIT database in 2025 (GoA 2025).

4.5.1.1 Remote Camera Survey

A total of 10 remote cameras were deployed throughout the Lease on June 22, 2018, and an additional 5 cameras were deployed in the Lease on July 24, 2018 (Figure 4.5-1). Remote cameras were deployed at various elevations and in different habitat types (i.e., stratified sampling design) to provide suitable coverage of the Lease. The targeted habitats were those suitable for large carnivores (e.g., grizzly bears [*Ursus arctos*], wolverines [*Gulo gulo*], gray wolves [*Canis lupus*]), furbearing species (e.g., red foxes [*Vulpes vulpes*], American martens [*Martes americana*], and ungulates (e.g., mountain goats [*Oreamnos americanus*], moose [*Alces alces*], and elk [*Cervus canadensis*]). Cameras installed were on visible game trails to increase the probability of detecting wildlife movement. Cameras were programmed to take two photos per second when triggered.

A maintenance check was completed on October 4 and 5, 2018 to replace batteries and download data. Only 12 of the 15 cameras were accessible due to early deep snow conditions. Two of the three remaining cameras were serviced on November 23, 2018. Remote cameras remained deployed until May 2019 to capture seasonal wildlife presence and habitat use in the Lease. Data for the whole survey period (June 2018 – June 2019) were analyzed using the Timelapse2 program. Individuals were considered “new” the first time they appeared within a photo-series or when photos were separated by more than five minutes. Small mammals were omitted from counts to allow for efficiency in processing the photos; however, presence for these species was noted.

In addition to the 2018 data, historical data from two remote cameras deployed by AEP within the Lease were obtained from AEP. One camera was deployed on July 5, 2012 and retrieved on December 21, 2012. The second camera was deployed on April 24, 2013 and retrieved on April 7, 2014. The cameras were installed along the lower portion of the access road (Figure 4.5-1). Both cameras were baited with scented lures and programmed to take five photos when triggered. The different methods used by AEP and FMH limits the ability to make comparisons among years; however, the data help inform the seasonal presence of medium and large mammals on the Lease.

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5632500 5631000 5630000

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

FMRRC001
FMRRC008
FMRRC006
FMRRC013
FMRRC002
FMRRC004
FMRRC003
FMRRC005
FMRRC009
FMRRC007
FMRRC014
FMRRC010
FMRRC015
FMRRC011
FMRRC012

FMRARU03
FMRARU04
FMRARU01
FMRARU02
FMRARU05

Gondola 3
Gondola 2
Gondola 1

Building
Building
Building
Buildling

Spray Valley Provincial Park

Peter Lougheed Provincial Park

JAMES WALKER CREEK

6 5 31 32 33 30 29 28 20 21

KEY MAP

FORT MCMURRAY
GRANDE PRAIRIE
ALBERTA
EDMONTON
CALGARY
Project Location

LEGEND

- AUTOMATED RECORDING UNIT (ARU)
- REMOTE CAMERA LOCATION
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 500 1,000
1:17,500 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT WILDLIFE MONITORING PROGRAM

TITLE
WILDLIFE CAMERA AND AUDIO RECORDING UNIT (ARU) LOCATIONS

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
CA0058874.3096		0	4.5-1

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4.5.1.2 Autonomous Recording Unit Survey

Five ARUs were deployed from June 22 to July 24, 2018, in various habitat types throughout the Lease (i.e., stratified sampling design) to detect birds, bats, and amphibians (Figure 4.5-1). Habitats suitable for these taxa and particularly species at risk (e.g., olive-sided flycatcher [*Contopus cooperi*]) were targeted. The ARUs were programmed to record for one, 10-minute interval every hour from one hour before sunset to 1:00 a.m. (evening sample period) and for one, 10-minute interval every hour from one hour before sunrise to four hours after sunrise (morning sampling period) each day throughout the deployment period.

Acoustic data were analyzed with Audacity version 2.2.0. The 10-minute recording intervals were selected for analysis according to the sampling requirements outlined in the Sensitive Species Inventory Guidelines (ESRD 2013). One ARU unit in Disturbed-e3 habitat malfunctioned after three days of deployment (ARU02). Two, 10-minute intervals were analyzed from the available recordings for this unit. During data analysis, species are recorded as present the first time they are heard during each 10-minute interval. In addition, automated classifiers from the Alberta Biodiversity Monitoring Institute were applied to all ARU data to increase the detection probability for select listed species such as bay-breasted warbler (*Setophaga castanea*), great-horned owl (*Bubo virginianus*), common nighthawk (*Chordeiles minor*), olive-sided flycatcher, yellow rail (*Coturnicops noveboracensis*), boreal owl (*Aegolius funereus*), barred owl (*Strix varia*), and western toad (*Anaxyrus boreas*).

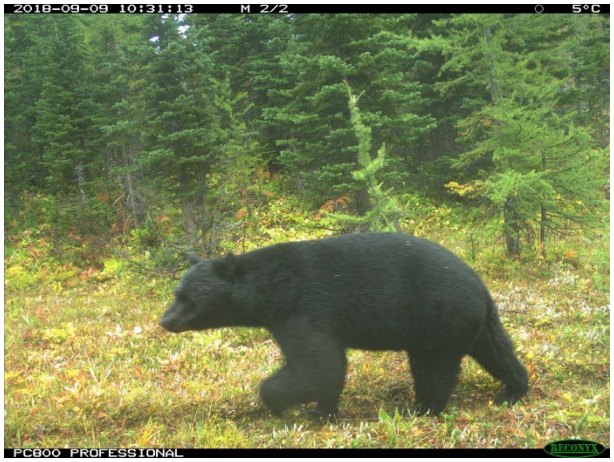
Bat recordings were analyzed using Sonobat version 4.2.1 and the Montana Mountains classifier suite. Results from the program's analysis of call files were vetted by an experienced biologist to confirm Sonobat's accuracy in assigning identifications. Sonobat identifies bat calls in call recordings and assigns a score of acceptable calls within a file. These accepted calls can usually be assigned a confident species identification. The number of accepted calls in a file is an indication of the recording's quality. During the vetting process, recordings that contained less than three accepted calls were grouped into either high or low frequency categories due to low confidence in species identification.

4.5.2 Wildlife Species Occurrence

The Project overlaps Mountain Goat and Sheep Area and Mountain Goat and Bighorn Sheep Areas Disease Buffer (GoA 2025). There are no key wildlife biodiversity zones (KWBZ) near the Project. The nearest KWBZ is along the Bow River, approximately 25 km north of the Project (GoA 2025). The Project does not overlap other sensitive wildlife areas (GoA 2025).

Spring, summer, fall, and winter results from the remote cameras deployed in the Lease are summarized in Table 4.5-1. A total of four ungulate species and seven mammalian carnivores were photographed between June 2018 and June 2019. The presence of red squirrel (Tamiasciurus hudsonicus, snowshoe hare (*Lepus americanus*), hoary marmot (*Marmota caligata*), Columbian ground squirrel (*Urocitellus collumbianus*), and golden-mantled ground squirrel (*Callospermophilus lateralis*) were also confirmed in the Lease. Examples of wildlife photographs taken by the remote cameras are shown in Photo 5 and Appendix F.

Mountain goat, bighorn sheep, wolverine, and red fox have the potential to occur in the Lease but were not detected during the deployment period. Incidental sightings of mountain goat and bighorn sheep by Golder Associates Ltd. (Golder) and FMH staff confirms the presence of these species in the Lease. For example, on July 13, 2018, Golder biologists observed 15 mountain goats at the top of the Canadian chair lift during a rare plant survey. Mountain goat have also been observed by FMH staff above the area of Fortress Lake beyond the Farside chair. Bighorn sheep have been observed by FMH staff, high on Fortress shoulder in the summer and fall, as well as high above the access road.



RC04 - American Black Bear; 11U 0625161 E 5631808 N (Taken September 9, 2018)

RC011 - American Marten; 11U 0628173 E 5629880 N (Taken October 4, 2018)

RC08 – Canada Lynx; 11U 0624944 E 5633199 (Taken September 19, 2018)

RC011 - Cougar; 11U 0628173 E 5629880 N (Taken September 15, 2018)

RC04 - Coyote; 11U 0625161 E 5631808 N (Taken August 10, 2018)

RC010 - Elk; 11U 0627442 E 5631148 N (Taken August 6, 2018)

Photo 5: Remote Camera Wildlife Photos

Table 4.5-1: Remote Camera Results - Detection Rate (Individuals/Camera-Day) of Medium and Large Mammals per Habitat Type in the Fortress Mountain Resort Lease Across Four Seasons, 2018-2019

Species[a]	Habitat Type[b]							Total
	c1	d1	e1	e3	e4	f2d	g3	
American black bear	0.003	-	-	0.001	0.003	0.043	-	0.050
American marten	0.003	0.003	0.006	0.003	-	0.006	-	0.021
Canada lynx	-	-	-	0.001	-	0.003	-	0.004
cougar	-	-	0.003	0.001	-	-	-	0.003
coyote	0.006	-	-	0.005	0.003	0.009	0.003	0.026
gray wolf	0.002	0.028	0.017	0.005	0.006	0.006	-	0.063
grizzly bear	0.002	-	0.003	0.003	0.008	0.003	-	0.019
elk	-	-	-	0.001	-	0.015	-	0.016
moose	-	0.037	0.099	0.013	-	0.049	-	0.198
mule deer	0.020	0.034	-	0.006	0.008	0.022	0.014	0.104
white-tailed deer	0.016	-	0.225	0.054	0.025	0.154	0.025	0.499
unidentified canid species	0.003	-	-	0.001	-	-	-	0.004
unidentified mammal species	0.030	0.006	0.008	0.002	0.003	0.012	0.003	0.065
unidentified ungulate species	-	0.003	0.008	0.001	-	0.003	0.011	0.027

(a) Species that are bold and italicized are listed provincially and federally.

(b) Full descriptions can be found in Section 4.4.2.

- = Species not detected by remote camera(s) in that habitat.

White-tailed deer were the most abundant species photographed in the Lease and were detected at a rate five times higher than mule deer. White-tailed deer and mule deer appear to use five of the seven habitat types where cameras. Mule deer were not detected in e1 – False Azalea/Grouseberry/Lodgepole Pine and white-tailed deer were not detected in d1 – Spruce/Heather – Engelmann Spruce. The habitats occupied by deer were forests at all elevations that were dominated by subalpine larch, subalpine fir, lodgepole pine, and/or Engelmann spruce, as well as a low elevation meadow.

Moose was the second most abundant species photographed in the Lease. Moose and elk were photographed in forested habitat at mid to low elevations; these species were not detected in the high elevation forest or low elevation meadow.

Gray wolf was the most abundant mammalian carnivore photographed in the Lease followed by American black bear, coyote, American marten, and grizzly bear. Cougar and lynx were detected at relatively low rates (0.003 and 0.004 individuals/camera-day) (Table 4.5-1). Mammalian carnivores were only detected in forested habitats and were not detected in meadow habitat. Gray wolf, coyote, American black bear, and American marten were detected at all elevations, whereas grizzly bear, cougar, and lynx were only documented at mid to low elevations.

A species summary report generated through the FWMIT (AEPA 2025) reported the presence of grizzly bear within the Lease. The Fisheries and Wildlife Management Information System (FWMIS) data has one grizzly bear telemetry location in June 2014 within 1 km of the Lease. Telemetry data provided by AEP shows seven grizzly bears within the Lease between April and November 2014 to 2017 (Figure 4.5-2). One female bear had telemetry locations in November, January, and April all in the same location indicating that she denned overwinter within the Lease (Figure 4.5-2); the denning location is outside of the proposed Phase 1 footprint. June through October had the highest number of collared bears present within the Lease (4-7 bears/month). Two adult males were recorded within the Lease in July. One adult female and one juvenile female were recorded within the Lease in June and July respectively. The last three female bears (1 adult and 2 juveniles) were within the Lease between April and November, with two of these bears using the Lease over multiple years. During this time, these individuals travelled across the entire Lease.

A total of 21 distinct bird species were recorded during the summer breeding bird season in 2018 (Table 4.5-2). The most abundant species were white-crowned sparrow (*Zonotrichia leucophrys*), hermit thrush (*Catharus guttatus*), chipping sparrow (*Spizella passerina*), and American robin (*Turdus migratorius*). A total of 10 species were recorded only once during the study. Disturbed-e3 (DIS-e3) habitat had the highest species richness with 12 species detected. The e3 (False Azalea-Grouseberry-Engelmann Spruce) had the lowest species richness with a total of five species detected. One species, olive-sided flycatcher, is provincially considered “May Be at Risk” and federally listed as “Special Concern”. Olive-sided flycatcher was recorded once at FMRARU03 in e4 (False Azalea-Grouseberry-Subalpine Fire) habitat (Figure 4.5-1). Results from the automated classifiers confirmed the presence of one additional listed species: western toad was identified at FMRARU02 in DIS-e3. FMH has also reported observations of unidentified swallow species nesting in the historical day lodge. Several bird species were additionally recorded during the 2018 to 2019 remote camera surveys, such as Canada jay (*Perisoreus canadensis*), spruce grouse (*Canachites canadensis*), and dusky grouse (*Dendragapus obscurus*).

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Twp.22 Rge.9 W5M

Twp.21 Rge:9 W5M

6 5 31 32 33 30 29 28 20 21

Gondola 3

Gondola 2

Gondola 1

6 MC LIFT

Building

Building

Building

Spray Valley Provincial Park

Peter Lougheed Provincial Park

JAMES WALKER CREEK

KEY MAP

FORT MCMURRAY

GRANDE PRAIRIE

ALBERTA

EDMONTON

CALGARY

Project Location

LEGEND

- BEAR DEN

TELEMETRY BEAR DATA

- AUTUMN
- SPRING
- SUMMER
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 500 1,000

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REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT WILDLIFE MONITORING PROGRAM

TITLE
GRIZZLY BEAR TELEMETRY DATA

CONSULTANT

wsp

YYYY-MM-DD	2025-11-06
DESIGNED	LD
PREPARED	AB
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APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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Table 4.5-2: Bird Autonomous Recording Unit Results – Total Number of Individuals Detected by Species per Habitat Type in the Fortress Mountain Resort Lease from June 23, 2018 to July 24, 2018

Species[a]	Habitat Type[b]					Total
	e1	e3	e4	DIS-e3	DIS-e4	
American robin	-	1	-	2	2	**5**
black-capped chickadee	-	-	-	1	-	**1**
cedar waxwing	-	-	-	1	-	**1**
chipping sparrow	1	-	1	3	-	**5**
dark-eyed junco	1	-	-	-	-	**1**
fox sparrow	-	-	2	-	1	**3**
hermit thrush	-	-	3	1	3	**7**
MacGillivray's warbler	-	-	-	1	-	**1**
olive-sided flycatcher	-	-	1	-	-	**1**
orange-crowned warbler	-	-	-	1	-	**1**
pine siskin	-	-	2	1	1	**4**
red-winged blackbird	-	1	-	-	-	**1**
ruby-crowned kinglet	-	-	1	1	1	**3**
Swainson's thrush	1	-	-	3	-	**4**
Tennessee warbler	1	-	-	-	-	**1**
tree swallow	-	2	-	-	-	**2**
varied thrush	1	-	-	1	1	**3**
warbling vireo	3	-	-	-	-	**3**
white-crowned sparrow	1	-	1	2	4	**8**
yellow warbler	-	1	-	-	-	**1**
yellow-rumped warbler	2	-	1	-	-	**3**
unidentified passerine species	-	1	-	-	-	**1**
Total	**11**	**6**	**12**	**18**	**13**	**60**

(a) Species that are bold and italicized are federally listed.

(b) Full descriptions can be found in Section 4.4.2.

- = Species not detected; DIS = Disturbed.

Four bat species were recorded within the Lease during summer 2018: hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), and little brown myotis (*Myotis lucifugus*) (Table 4.5-3). The ARU unit in DIS-e3 habitat (FMRARU02) malfunctioned after three days, which may explain the lower number of recorded species on this unit. Little brown myotis and silver-haired bats were the most frequently detected species across all habitats. These species were recorded at least twice as often as hoary bats and big brown bats. All four species had the highest detection rate in the subalpine fir dominated e4 (False Azalea-Grouseberry-Subalpine Fir) habitat and had the lowest detection rate in disturbed habitats. Silver-haired and hoary bats are provincially considered as “Sensitive” because as migratory tree roosting bats they are sensitive to mortality at wind energy projects (AEP 2017). Little brown bats are provincially considered as “May Be at Risk” and federally listed as “Endangered” due to large population declines in the eastern portion of their range as a result of white-nose syndrome (COSEWIC 2013).

Table 4.5-3: Bat Autonomous Recording Unit Results – Total Number of Bat Passes per Detector Night[a] by Species or Species Group per Habitat Type in the Fortress Mountain Resort Lease from June 22, 2018 to July 24, 2018

Species/Species Group[b]	Habitat Type[b,c]				Total
	e3	DIS-e3	e4	DIS-e4	
big brown bat	0.25	-	0.34	0.09	**0.22**
hoary bat	0.13	-	0.47	0.19	**0.26**
little brown myotis	0.19	-	1.72	0.16	**0.67**
silver-haired bat	0.78	-	0.94	0.06	**0.58**
big brown/silver-haired bat	0.13	-	0.53	0.03	**0.22**
unidentified myotis species	0.59	0.50	1.25	0.25	**0.69**
high frequency	0.66	0.50	17.56	2.44	**6.76**
low frequency	1.16	-	3.06	0.63	**1.58**
Total	**3.88**	**1.00**	**25.88**	**3.84**	**10.99**

(a) Species that are bold and italicized are considered at risk in Alberta or are federally listed.

(b) Bat passes per detector night is calculated based on 32 detector nights for each detector except the unit deployed in DIS-e3, which only recorded for two nights.

(c) Full descriptions can be found in Section 4.4.2.

- = Species not detected.

4.6 Aquatics Resources

4.6.1 Survey Methods

Desktop Assessment

Existing fish inventory information was obtained from FWMIS accessed on September 11, 2025 (GoA 2025), to determine fish species previously documented as being present within the Galatea Creek watershed, which consists of Fortress, Lilian, and Upper and Lower Galatea Lakes, as well as Galatea Creek and the watercourses that drain into it. The Restricted Activity Period (RAP) was determined based on the *Water Act* Code of Practice maps (ESRD 2006).

Field Assessment

A two-day aquatic survey was completed on August 10 and 14, 2018. During the August 10, 2018 site visit, a stream survey was completed to look for barriers to fish movement (i.e., waterfalls) and to assess whether the stream in the Lease provided suitable habitat for fish. During the August 14, 2018 site visit, a fish survey was completed to determine if there was fish present in the stream.

Habitat Survey and Barrier Assessment

The unnamed tributary to Galatea Creek in the Lease was divided into three survey reaches (Reach 1, 2, and 3 – see Figure 4.6-1), where each reach was assessed for potential barriers to fish movement. All potential barriers to fish movement were geolocated and photographed, and general habitat characteristics in each of the reaches were described to characterize fish habitat potential.

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TWP 22 TWP 21

RGE 9 W5M

Twp.22 Rge.9 W5M

Twp.21 Rge.9 W5M

6 5 31 32 33 30 29 28 20 21

Barrier 8 Photo 2.8
Barrier 9 Photo 2.9
Barrier 6 Photo 2.6
Barrier 7 Photo 2.7
Reach 2
GONDOLA 3
Wetland W-A(III)
Lake
Barrier 5 (Man-made reservoir) Photo 2.5
Reservoir
Barrier 4 (Man-made reservoir) Photo 2.4
Reach 3
Barrier 3 Photo 2.3
Barrier 2 Photo 2.2
Barrier 1 Photo 2.1
Ephemeral Alpine Lake
GONDOLA 2
GONDOLA 1
LIFT 6 / MC
Building
Building
Building
Spray Valley Provincial Park
Wetland W-A(IV)
Reservoirs

KEY MAP
Barrier 10 Photo 2.10 & 2.11
Reach 1
Reach 2
Reach 3
GALATEA CREEK
ROCKY CREEK
KANANASKIS RIVER
JAMES WALKER CREEK
Galatea Creek Provincial Recreation Area
E.C. Claire Provincial Recreation Area
Mount Jamie Walker
Limestone
S A N G E

LEGEND

- BARRIER
- REACH 1
- REACH 2
- REACH 3
- PARK / PROTECTED AREA BOUNDARY
- ROAD
- WATERCOURSE
- FORTRESS MOUNTAIN RESORT LEASE AREA BOUNDARY
- WATERBODY

PROPOSED PHASE 1 DEVELOPMENT

- GONDOLA
- MID OFF-LOAD
- BUILDING
- MOUNTAIN COASTER
- PATIO
- SURFACE PARKING

0 500 1,000
1:17,500 METRES

REFERENCE(S)

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CLIENT
FORTRESS MOUNTAIN RESORT

PROJECT
FORTRESS MOUNTAIN RESORT SKI HILL DEVELOPMENT

TITLE
AQUATIC RESOURCES

CONSULTANT

YYYY-MM-DD	2025-11-06
DESIGNED	LD
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REVIEWED	LD
APPROVED	LD

PROJECT NO.	CONTROL	REV.	FIGURE
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Fish Inventory Survey

A fish inventory survey was conducted using both backpack electrofishing and minnow traps to assess whether fish were present in the unnamed tributary to Galatea Creek (Table 4.6-1). Areas that were fished were deemed suitable fish habitat based on findings from the August 10, 2018 stream survey. Two clusters of five minnow traps were placed in each of the two reservoirs (within Reach 3) and were left to soak for approximately three hours, resulting in a total of 60 minnow trap-hours. Backpack electrofishing was done in approximately 100 m sections at the beginning of Reach 2, and in two different sections of Reach 3. In total, 809 seconds of backpack electrofishing was conducted.

Table 4.6-1: Fish Effort Summary in Unnamed Tributary on September 14, 2018

Method[a]	Location Description	Coordinates (NAD83, Zone 11 U)		Total Effort
		Start	End	
BP	Reach 2: Downstream from the beginning	626505 E 5632946 N	626439 E 5632900 N	309 seconds
BP	Reach 3: Between Potable and Snowmaking Reservoirs	626197 E 5632400 N	626162 E 5632400 N	292 seconds
BP	Reach 3: Upstream of Potable Water Reservoir	626156 E 5632206 N	626134 E 5632150 N	208 seconds
MT	Reach 3: Potable Water Reservoir	626154 E 5632240 N	626160 E 5632259 N	30 hours
MT	Reach 3: Snowmaking Reservoir	626194 E 5632447 N	626187 E 5632451 N	30 hours

BP = Backpack Electrofishing, MT = Minnow Trap 2.

Field Water Quality Measurement

In-situ water quality measurements were taken using a calibrated water quality sensing (YSI) meter. Water quality parameters measured were pH, temperature (˚C), specific conductivity (microSiemens per centimeter [µs/cm]), and dissolved oxygen (milligrams per liter [mg/L], and percent saturation [%]).

4.6.2 Results

Desktop Assessment

The unnamed tributary is a drainage of Galatea Creek, which is a Class C watercourse with a RAP of May 16 to August 15 and September 1 to April 30 (ESRD 2006). The FWMIS (AEPA 2025) indicates a presence of three sport fish species caught and/or stocked in the watershed of Galatea Creek: Brook Trout (*Salvelinus fontinalis)*, Cutthroat Trout (*Oncorhynchus clarkii)*, and Golden Trout (*Oncorhynchus aguabonita*). Cutthroat Trout has been historically stocked into Fortress Lake, Upper and Lower Galatea Lakes, and Lillian Lake; Golden Trout was only stocked once into Lower Galatea Lake. Brook Trout and Cutthroat Trout have been previously caught in Fortress Lake and Galatea Creek. There are no records of fish presence in the unnamed tributary of Galatea Creek in the Lease.

Field Assessment

The unnamed stream in the Lease is an irregular meandering, incised, confined channel with mostly large substrate comprised of large boulders, cobble, and gravel with some areas with unstable banks. It originates from subsurface flow at the upstream end of Reach 3. Reach 3 consisted of mainly riffle and run habitats, with some cascades and pools, while Reach 2 had more cascades and some waterfalls in addition to the riffle and run habitats, mainly due to a change in elevation gradient between the two survey reaches. Both Reach 3 and Reach 2 had instream cover provided by overhanging vegetation, woody debris, and substrate while the riparian area consisted of grass and shrubs in the first 3 m adjacent to the stream channel and mixed forest in the next 25 m. Reach 1 is downstream of the Lease and was not surveyed in its entirety. A short section of the reach near the confluence with Galatea Creek was assessed; the creek was confined within a deep canyon and a major barrier to upstream fish passage was documented approximately 5 m upstream from the confluence.

There were approximately 10 barriers (either full or partial barriers) to fish movement located across all three survey reaches (see Figure 4.6-1 for locations and Appendix F for photos). Two of the 10 barriers identified are man-made barriers in the form of reservoirs that Fortress Mountain Resort uses for potable water and snow-making. Barrier 10, at the confluence to Galatea Creek, is likely a permanent fish barrier under most flow conditions that prevents fish in Galatea Creek from moving upstream into the unnamed tributary. Although not directly surveyed during the field assessment, additional barriers are likely present within Reach 1 throughout the lower canyon section, where steep elevation gradients are evident from aerial imagery and topographic maps.

A fish inventory survey was conducted to confirm whether there was either a resident or migratory fish population present in the unnamed tributary from Galatea Creek. No fish were caught or observed during the fish survey. The fish habitat within Reach 3 and Reach 2 was suitable to support fish, so the absence of fish would be an indication that the barriers observed further downstream are likely preventing access to the upstream habitats in Reaches 2 and 3.

The measured field water quality indicated a water temperature of 6.44 °C, specific conductivity of 322 µs/cm, percent saturation of 63.0 % and dissolved oxygen of 7.71 mg/L, and a pH of 7.79 are within the tolerance limits of the fish documented with the Galatea Creek watershed.

5 ENVIRONMENTAL MANAGEMENT PLAN

Recognizing that the natural setting is foundational to the visitor experience, WSL and RNA are committed to the sustainable development of the Project and the preservation of ecological integrity in the areas surrounding the Lease and the proposed Lease addition. Construction and reclamation of all Project components will follow the *Best Management Practices for Development at Ski Areas in Banff and Jasper National Parks of Canada* (Parks Canada 2008), the *Canada West Ski Areas Association* (CWSAA) *Environmental Guidelines and Recommendations* (2009), the *Reclamation Guidelines* from the Banff Field Unit (BFU)/Lake-Louise-Yoho-Kootenay (LLYK). These best management practices address well-known environmental effects common to mountain parks and provide industry accepted environmental approaches and mitigation actions. The primary mitigation to avoid impacts to the environment is to construct Project infrastructure in areas of existing disturbance wherever possible. The mitigations presented below follow the mitigation hierarchy (e.g., avoid, minimize, restore) and are anticipated to minimize effects from the Project on the environment. These mitigations will be implemented as appropriate for all construction., operation and maintenance activities.

5.1 General Best Management Practices

Limiting the amount of soil and vegetation (wildlife habitat) disturbance (i.e., avoidance) is the principal method by which soils, vegetation, and wildlife management goals will be achieved. Primarily implemented during the planning and design phases of the Project, the following actions will reduce vegetation and terrain (i.e., wildlife habitat) disturbance to the extent feasible:

- Design construction plans to have minimum environmental impact and use existing disturbance wherever possible.
- Schedule components of the development plan around efficient construction and reclamation timeframes.

Where disturbance cannot be avoided, the following general low-disturbance construction methods should be followed:

- Clearly mark out the area that will be disturbed, including all storage areas for excavated materials, construction supplies and equipment.
- Should temporary workspace be required in undisturbed natural vegetation communities, the site should not be graded or grubbed.
- Minimize compaction off already-established trails.
- Remove all woody debris through low impact methods, (e.g., hand clearing) when working in sensitive subalpine areas, where necessary.
- Use low impact machinery, such as the use of low tire pressure vehicles, when working on vegetated surfaces.

Although development can result in a shift in the structure and composition of vegetation locally, these mitigation actions are expected to preserve regional natural diversity and reflect patterns found in naturally fragmented areas in the region. For example, glading activities could provide vegetation characteristics of naturally disturbed areas (e.g., avalanche paths) in the region and serve as habitat for wildlife.

5.2 Soil Handling Plan

Proper soils handling procedures are required for successful reclamation of disturbed areas. Appropriate soils conservation practices will prevent soil loss or movement due to erosion, compaction, and slumping. Sod cutting, storage, and replacement will be completed for site-specific footprints in previously undisturbed vegetation. Appropriate sod salvage, storage, and replacement techniques have been shown to increase the likelihood of successful reclamation.

Project-specific soils management goals are:

- To maintain soil structure and composition to improve the likelihood of successful reclamation.
- To reduce topsoil losses due to wind, water, and mass erosion.
- To preserve natural water drainage patterns and terrain stability to the extent practical.

The following sections provide mitigation actions to be implemented during all phases of construction to prevent or reduce impacts to soils.

5.2.1 Topsoil/Sod Removal and Storage

Successful reclamation and revegetation require appropriate planning throughout all phases of construction, beginning with planning and scheduling. General best management practices for soil and sod handling associated with the Project development are provided in Table 5.2-1.

Table 5.2-1: Best Management Practices for Removal and Storage of Topsoil and Sod

Construction Phase	Best Management Practices
Planning and Design	■ Prepare a reclamation plan prior to construction. ■ Ensure design has avoided changes to the overall drainage regime. ■ Conduct a pre-construction site visit to determine the application of best management practices to site-specific conditions. ■ Schedule construction activities to avoid wet soil conditions and rainfall events, as much as practical. ■ Design erosion control plans using bioengineering practices, where practical. ■ Where possible, schedule construction to allow for completion of reclamation prior to frozen ground conditions. ■ Sod replacement is preferred over seeding for reclamation.
Site Preparation	■ Clearly mark out the area that will be disturbed including all storage areas for excavated materials, construction supplies and equipment. ■ Clearly mark areas for sod salvage.
Clearing and Brushing	■ Chipping slash may be used for reclamation, however, ensure chip depth is not greater than 5 cm (2 inches) and not greater than 35% ground cover.

Table 5.2-1: Best Management Practices for Removal and Storage of Topsoil and Sod

Construction Phase	Best Management Practices
Sod Salvage	▪ Wherever a project requires excavation in an area of undisturbed sod, sod should be salvaged for reclamation of the disturbed site. Always maximize sod salvage. ▪ Sods should be comprised of 50% or more vascular plant species and have established root structures before vegetation sod salvage and transplantation should be attempted. ▪ Remove sods in square cornered blocks, hand cut by shovel or with clean-up bucket of excavator, on a level plane below the root, and maintain a consistent depth of 10 to 15 cm. ▪ Use hand crews to assist the excavator to remove sod blocks with cutting and storage of sods. Gather loose soil and root material to be retained with sod. ▪ Do not bend or roll sod blocks and minimize the amount of handling. ▪ Store sod on flat ground or on a conveyance apparatus (e.g., pallet, wood sheeting). ▪ Stack sod blocks and cover salvaged sod with a white, breathable geo-textile fabric to protect from precipitation and sun. ▪ Removal of sods by hand in the alpine is preferred, to better protect sensitive plant communities and to maximize reclamation success in alpine areas. ▪ Keep sod stockpiles moist in dry weather without over-watering; wet sod may compost.
Topsoil Salvage	▪ Salvage topsoil at all excavation sites for reclamation purposes. ▪ At minimum, the upper 15 cm of soil, below the sod layer, if present, is considered topsoil. ▪ If topsoil depth exceeds 15 cm, salvage the entire depth of topsoil. ▪ Strip topsoil under thawed, dry conditions, whenever possible. ▪ Halt topsoil salvage operations if conditions become excessively wet (e.g., soil sticking to equipment wheels or tracks). ▪ Remove stumps and woody debris from topsoil, wherever possible. ▪ Prioritize directly placing salvaged topsoil for reclamation and stockpile excess topsoil for future reclamation. ▪ Cover excavated material with heavy-duty plastic or filter cloth to prevent erosion during soil salvage operations.
Excavated Material Storage	▪ Allow space for separate storage of sods, topsoil and spoil; where space is available separate stored topsoil from sods and spoil by at least 1 m. Use appropriate material (e.g., geo-textile) to separate soil components where space is limited. ▪ Create gaps in the topsoil and/or subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction. ▪ Topsoil may be stored on hardened surface, geo-textile material, or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required. ▪ Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events. ▪ Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain. ▪ Construct soil barricades to prevent losses on steep terrain (i.e., slopes of >18° or >3:1) within 10 m of watercourses. ▪ Excavated material may be stored in flight bags on steep terrain.

5.2.2 Erosion Prone Soils

Where soils have been identified as having a high potential for erosion (see soil map unit descriptions, Table 4.3-1 and Figure 4.3-1), additional erosion and sediment control precautions will be taken to ensure that topsoil is protected and the addition of sediment into nearby waterbodies is avoided as much as possible.

5.2.3 Reclamation Practices

General best management practices for soils reclamation associated with the Project development are provided in Table 5.2-2. Further details pertaining to revegetation are provided in Section 5.3.4.

Table 5.2-2: Best Management Practices for Soils Reclamation within the Development Area

Construction Phase	Best Management Practices for Reclamation
Construction	▪ Ensure proper soils handling to prevent mixing of topsoil and subsoil materials and to improve chances of successful rehabilitation. ▪ Employ erosion control techniques, as required (e.g., silt fencing, drainage for localized runoff). ▪ Use appropriate equipment or use hand tools to minimize scalping of underlying vegetation when replacing excavated material. ▪ Water bars and erosion control features should be installed prior to soil replacement. ▪ Non-site-specific grading will return terrain to near original contours. ▪ Complete final grading prior to application of topsoil and/or sod. ▪ Begin reclamation works at the earliest opportunity post works.
Topsoil Replacement	▪ Implement reclamation plan of the disturbed area immediately following the completion of construction. ▪ Postpone clean-up on wet ground until soils are dry. ▪ Replace topsoil to all areas immediately following fine grading. ▪ Do not compact topsoil. ▪ Save some topsoil to seal exposed sod edges, where sod was removed. ▪ Where insufficient topsoil is available, soil amendments (e.g., fertilizers) may be warranted. ▪ Imported soil should be used only as a last resort.
Sod and Seedbed Preparation	▪ Use machines to create soil surface roughness to minimize erosion potential and maximize seed germination. ▪ If the topsoil is compacted, scarify entire site just prior to seeding, unless the site is very rocky. ▪ Scarify the seedbed if seeding occurs more than seven days after final grading or if there has been a rainfall between final grading and the seeding date. ▪ Scarify the seedbed by hand or by machine on large areas (i.e., roadbeds), where accessible and appropriate. ▪ Use the cleats of a tracked vehicle or a harrow device, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) that is substantially free of soil crusts. ▪ On slopes, align cleat marks at right angles to trap seed and sediment.

Table 5.2-2: Best Management Practices for Soils Reclamation within the Development Area

Construction Phase	Best Management Practices for Reclamation
Sod Replacement	■ Re-distribute salvaged material over the excavated site following backfilling and topsoil replacement. ■ Replace sod as soon as the site can be prepared following disturbance. ■ Use a hand crew to assist equipment operators with sod replacement. ■ Distribute available sod evenly throughout reclamation sites. ■ Stake sod with bamboo or other biodegradable stakes on steep slopes, where necessary. ■ Sod salvaged from one site may be used at another site providing that ecosite conditions are similar (i.e., temperature and moisture). ■ Site rehabilitated with sod transplants may require seeding with a native grass mix to ensure site stabilization.

5.3 Vegetation Management Plan

Vegetation disturbance may occur during Project activities.

The purpose of the vegetation management plan is to provide a set of best management practices to be used in the management of vegetation resources prior to, during, and subsequent to Resort construction and reclamation.

Project-specific vegetation management goals are:

- To ensure minimal disturbance of native species and vegetation communities throughout the Lease.
- To allow plant communities to continue to reflect regional and local vegetation diversity.
- To have native vegetation serve as an anchor against soil and terrain erosion.
- To identify listed plant populations to allow them to persist.

The following sections outline best practices specific to timber management, the avoidance and mitigation of listed (rare or endangered) species, weed management, reclamation, and revegetation monitoring.

5.3.1 Timber Management Plan

Tree removal will be carried out to allow for construction and operational requirements, public safety, and improved skier experience. Areas designated for tree removal will be delineated using biodegradable flagging tape, and hazard trees outside of delineated areas will be clearly identified for removal. Strong-rooted, long-lived tree clumps and trees with obvious wildlife value will be selectively retained, as conditions allow. Low impact harvesting methods and equipment will be preferentially used over snow or during frozen ground conditions, where practical.

Tree removal will be undertaken so that all trees fall inside of cleared perimeters and away from environmentally sensitive areas and areas with less soil disturbance. Stumps and brush remaining after clearing will be flush cut to a maximum stump height of 15 cm, and stump grinders will be used to preserve root structures and reduce the potential for erosion.

Merchantable timber is not anticipated within the Project development as development will largely occur on existing disturbed land, which are unlikely to meet merchantable requirements. Chips and mulch will be salvaged to enhance reclamation efforts at other areas of the ski area.

5.3.2 Listed Species Avoidance and Mitigation Actions

Several characteristics specific to a listed plant occurrence should be considered during mitigation development, such as the ranking of the species, the reasons why it is listed (if known), its habitat preference and distribution patterns, and its response to disturbance (Bush 2001). No historical occurrences of federally listed vascular plant species have been reported within the Lease (ACIMS 2025a). Three provincially considered vascular plant species have been previously observed within the Lease (Table 4.4-2). One provincially sensitive vascular plant species was observed during field surveys in the ski hill expansion areas that were proposed in 2018 (Table 4.4-2). No federally listed vascular plant species were observed, and no ecological communities of conservation concern were observed during vegetation field surveys in the ski hill expansion areas that were proposed in 2018.

The most successful mitigation technique is avoidance (California Native Plant Society 1998). Listed plant occurrences can usually be avoided by adjusting the development footprint, reducing the extent of the disturbance (e.g., narrowing or altering the shape of a disturbance), or drilling/boring beneath it. Should avoidance not be possible, additional mitigation actions may be developed to encompass site-specific conditions and species-specific traits. Mitigation actions to reduce disturbance may be any of the following, either alone or in combination:

- alter the construction schedule to occur during frozen conditions to preserve the seedbank and reduce disturbance to sensitive plant populations and vegetation communities (e.g., rock tundra vegetation sites)
- clearly mark locations of all listed species and use traffic control markers, such as rope fences, to facilitate avoidance
- use water diversion and/or erosion and sediment control structures (e.g., water bars, silt fencing) to prevent erosion and sediment deposition onto listed plant populations
- revise or eliminate reclamation seed mixes in areas where listed plant species are present to minimize interspecific competition
- if wind scoring or moisture retention present challenges to plant establishment, install wind barriers or snow fencing around the occurrence
- reduce traffic to essential personnel

If avoidance or disturbance minimization techniques are not feasible, alternative reclamation techniques may be designed on a case-by-case basis. Alternative techniques may be:

- lifting the top third of the soil separately from the remaining topsoil and subsoil to salvage the local seed bank, with replacement prior to anticipated germination
- collection, storage, and redistribution of ripe seed
- propagating collected seed and planting of the cultivated seedlings
- transplantation of rare plants (and essential companion plants, where applicable) to similar suitable habitat away from the disturbance

These alternative techniques are experimental in most cases and should not be considered a substitute for protecting existing rare plant populations (Canadian Botanical Association 2014).

5.3.3 Weed Management

The introduction of noxious and invasive plant species threatens native plant diversity (Royer and Dickinson 1999). Preventing noxious and invasive species from entering an area is often more efficient and cost effective than dealing with their removal once established (Clark 2003; Polster 2005; Carlson and Shepard 2007). Areas of soils or vegetation disturbance such as roadsides or construction sites are the primary vectors for weed infestations (Royer and Dickinson 1999). As such, areas associated with soils or vegetation disturbance will be targeted for mitigation actions to preserve the integrity of vegetation communities and maintain native vegetation diversity and listed plant species in the vicinity of the development.

Pre-disturbance weed surveys will be conducted prior to construction to identify infestations of provincially regulated weeds (i.e., regulated as Noxious and Prohibited Noxious according to the *Weed Control Act* and Regulations). Applicable best management practices relating to minimizing the spread of invasive plant species are:

- in heavily infested weed areas, control weeds prior to construction to prevent the transmission of weed seeds by equipment and vehicles
- if cutting weeds, cut before plants go to seed
- all equipment must arrive at the construction site free of dirt and vegetative debris
- equipment used in infested weed areas must be cleaned prior to moving off the infested site
- if required, additional topsoil and organics must come from an approved source or location to prevent introduction of weed species
- all seed used for reclamation must be certified
- disturbed sites should be managed aggressively for weeds using methods appropriate to identified weed species

Should herbicide be determined to be an appropriate method for weed control, the following best management practices will be followed:

- use a qualified and licensed applicator that is trained in the proper handling, storage, use, and disposal of herbicides
- use only herbicides registered under the *Pest Control Products Act* and only use as intended
- post public notices on-site and inform on-site land users prior to applying herbicides
- apply herbicide in a manner that eliminates drift to non-target areas
- do not apply herbicides where there are visible signs of soil erosion

Post-construction revegetation monitoring, including monitoring for provincially regulated weeds, is discussed in Section 5.3.5.

5.3.4 Revegetation and Seed Mixes

The desired outcome for reclamation activities is the establishment of appropriate, self-sustaining native vegetation cover that is stable, fully functional, compatible with surrounding vegetation, and free of invasive species (weeds). Considering these goals, the best management practices outlined here aim to re-establish vegetation cover to stabilize soil, reduce slope instability, and prevent erosion.

Proper soils handling is crucial to successful reclamation and revegetation outcomes. Reclamation within the Project development is complicated by relatively shallow and coarse textured topsoil, as well as a reduced availability and germination success of native seed (Avens 2016). As natural vegetation communities occurring in the Lease exhibit low grass cover (see description of vegetation communities in Section 4.4.2), typical grass-dominated reclamation seed mixes do not reflect surrounding undisturbed vegetation communities and may even inhibit natural revegetation processes through competitive exclusion. As such, sod replacement is preferred over seeding for reclamation, where feasible. General best management practices for soil and sod handling within the development area throughout all construction phases are provided in Section 5.2.

Seeding

Although sods and localized organic matter will be preferentially used for reclamation, seeding may be required in areas that lack topsoil and organics. Appropriate seed mixes and seeding rates depend on the site, elevation, soil type, and desired results. For example, in areas where available topsoil contains the seedbank from the original plant community, a small selection of native grasses seeded at a very low seeding rate can serve to temporary stabilize the soil, prevent erosion, and reduce the potential for invasive species invasion in the short-term while native species re-establish (Avens 2016). On the other hand, a higher seeding rate may be preferable in frequently disturbed areas with a history of invasive species (e.g., roadsides).

Site-specific seed mixes appropriate for the vegetation communities and elevations encountered within the development areas are provided in Table 5.3-1. These are derived from recommended seed mixes for the Lake Louise Yoho Kootenay Field Unit of Banff, Kootenay and Yoho National Parks (Avens 2016). Seed Certificates should be obtained from suppliers prior to seed application. Seed lots should be selected based on pedigreed named variety and quality (i.e., lowest weed seed content and highest purity and germination).

Table 5.3-1: Recommended Seed Mixes

Seed Mix[(a)]	Recommended Use	Scientific Name	Common Name	Proportion
Seed Mix A	Dry to moist mid-high elevation sites above 1,700 m, good for coarse soils	*Poa alpina*	alpine bluegrass	45%
		Trisetum spicatum	spike trisetum	45%
		Elymus trachycaulus[(b)]	slender wheatgrass	10%
Seed Mix B	Wet areas and drainage areas with standing water during the growing season, 1,200 – 2,000 m+	*Deschampsia caespitosa*	tufted hairgrass	50%
		Poa palustris	fowl bluegrass	50%

(a) Source: Avens 2016.

(b) Either *Elymus trachycaulus* ssp. *subsecundus* or *Elymus trachycaulus* ssp. *trachycaulus* can be used.

Seeding should be completed within seven days after construction or completion of a section of reclamation, unless there is a risk of young seedling mortality because of fall frost. In areas where native plant community restoration is the goal, broadcast seeding at a rate of no more than 25 kilograms per hectare (kg/ha) should be completed under calm wind conditions, followed by integration into the soil by light rake or harrow. A heavier seeding rate should be applied to areas where erosion and/or weeds are a concern (e.g., roadsides).

Hydro-seeding may be preferred in these areas, at a rate not to exceed 75 kg/ha with light mulch rates (500 kg/ha) and 150 kg/ha with heavy mulch rates (1,500 kg/ha).

The seeding rate should not be increased to compensate for poor seedbed conditions. Consider ordering extra seed to account for potential over seeding by crew workers and monitor temporary erosion control to prevent seed loss. Some seeding procedures may need to be completed or repeated in subsequent years.

5.3.5 Revegetation Monitoring Plan

Post-construction revegetation monitoring will occur in accordance with the reclamation standards for plant density and cover detailed in the *Best Management Practices for Development at Ski Areas in Banff and Jasper National Parks of Canada* (Parks Canada 2008). This includes monitoring and maintaining all erosion control methods and drainage features of disturbed sites during spring runoff until reclamation revegetation objectives are met. Site conditions, soil characteristics and salvage volumes, seed mixtures, seed rate, and fertilizer use will be documented.

It is intended that over time, revegetated areas will mirror adjacent areas regarding parameters such as species composition and density. To measure the success in reaching these goals, the following monitoring will be conducted annually during the growing season for at least five years post-reclamation in the subalpine natural subregion and seven years post-reclamation in the alpine natural subregion:

- Construction sites will be photographed before disturbance from repeatable points.
- Areas where vegetation disturbance has occurred will be monitored to observe regrowth success and identify sites that may require remedial treatment.
- Areas adjacent to new developments will be monitored to determine if site conditions remain suitable for the persistence of listed species occurrences historically known from the area.
- The success of noxious weed controls will be monitored at the locations of sites where noxious invasive species have been observed, with the focus on roadsides, reclaimed, and partially reclaimed areas.
- For all sites undergoing reclamation, progress against reclamation performance standards will be assessed for plant density and cover, and the presence, density, and cover of non-native species.

Should the reclamation trajectory of a revegetated area be determined not likely to achieve reclamation standards within a given period (i.e., five years in the subalpine natural subregion and seven years in the alpine natural subregion), additional mitigation actions may be employed by means of adaptive management. Such remedial actions may be application of additional soil amendments or re-seeding.

5.4 Wildlife Management Plan

The wildlife management plan describes how wildlife movement patterns and habitat connectivity will be maintained during and after construction of Project components and how disturbance to such features as nests or dens will be avoided. Mitigative actions to avoid and reduce human-wildlife conflict are also described. The recommendations in this section follow current best practices and meet the requirements to minimize potential adverse effects on key wildlife in and around the development areas as outlined in the 2018 TOR from AEP.

Prior to the commencement of work, a briefing should be provided to all Project personnel and contractors that clearly establishes wildlife management expectations, such as care of the environment where work is being performed, prohibited attracting or harassment of wildlife, pollution and garbage management, and wildlife awareness. Project personnel and contractors are advised to follow the recommendations outlined below.

While currently legal, FMH identifies hunting as a non-compatible use within the Lease. “No hunting” signs have been posted in recognition of employee safety and wildlife management planning and conservation within the Lease. The *Occupational Health and Safety Act* highlights the roles and responsibilities of employers, workers, prime contractors, and suppliers to provide for a safe work environment. Given the increased numbers of employees and visitors anticipated by FMH to be present within the Lease during hunting seasons, this represents a safety risk not seen in other resorts in the region. Site safety and security actions to be implemented during Project construction and operations will be determined during future conversations between RNA and appropriate regulatory agencies.

5.4.1 Key Wildlife and Habitat Considerations

A key wildlife management consideration is to minimize the disturbance to vegetation. Disturbed areas should be stabilized and reclaimed as described in the vegetation management plan (Section 5.3).

Deliberate destruction or disturbance of sensitive wildlife features (e.g., active nests, eggs, dens, burrows) are prohibited under the *Alberta Wildlife Act* and the *Migratory Birds Convention Act, 1994* (MBCA). Based on the baseline surveys conducted in the Lease, the following federally listed species are present in the Lease:

- little brown myotis
- silver-haired bat
- hoary bat
- olive-sided flycatcher
- grizzly bear
- western toad

Migratory birds are federally protected from being killed, harmed, or harassed under Section 5 of the MBCA. The 2022 update to the Migratory Birds Regulations under the MBCA protects the active and inactive nests of 18 species, including pileated woodpecker (*Dryocopus pileatus*). Pileated woodpecker roosting and feeding cavities are not protected under the updated MBR. Pileated woodpecker nest cavities require registration through Environment and Climate Change Canada’s (ECCC) Abandoned Nest Registry (GoC 2022) and confirmation of non-occupancy by any migratory bird over 36 months prior to removal of the tree containing the nest cavity. Pileated woodpeckers require large-diameter trees that are dead but not completely decayed (GoC 2023).

If there is the potential for federally Threatened or Endangered migratory bird species to occur in the areas scheduled for development, Sections 32(1), 33, and 58(1) of the SARA prohibits the killing, harming, or harassing of individuals; the damage and destruction of their residences; and the destruction of critical habitat, respectively. Harassment of non-federally protected wildlife should always be prohibited as it is contravention of the *Alberta Wildlife Act* in Section 36(1). Harassment of wildlife can lead to the abandonment of habitat, and the disruption of critical activities (e.g., nesting).

Sensory disturbance (e.g., lights, presence of people, noise) during Project construction and operations can also have negative impacts on wildlife.

The site manager should be aware of the importance of sensitive wildlife features and instructed to avoid impact to known features by either Project-related activities or Project personnel. The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). Where not possible to avoid impacts to sensitive wildlife features, case-specific impact mitigation plans will be developed.

The site manager should ensure that gaps are created in the topsoil and subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction.

Wildlife observations by on-site personnel should be recorded in an on-site Wildlife Log to track presence of wildlife in the Lease. Specifically, wildlife observations should be recorded for large animals: moose, elk, bighorn sheep, mountain goat, grizzly bear, black bear, gray wolf, and cougar. A wildlife observation may be observation of sign (e.g., tracks, scat, nests, dens) or visual or auditory detection of animals. All reported wildlife observations should have notes on location, habitat, and behaviour. Observations should be submitted within 24 hours either with Wildlife Observation forms through a centrally located drop box or to the site manager. Sightings of species at risk by on-site personnel should be reported immediately. Wildlife observation reports should be reviewed for evidence of a potential problem (e.g., habituation of potentially dangerous wildlife to humans). Wildlife observation reports will be provided to AEPA at the completion of construction.

5.4.2 Baseline Surveys and Mitigation Actions

The footprints, construction methods, and other details of Project components (e.g., lift type, sight-seeing gondola alignment) have not been finalized. As such, this section outlines the approach to minimize effects on the environment during the planning and design portion of each Project phase. Project component planning and design should also incorporate feedback received during consultation.

Environmental baseline data are relatively old (from 2018) (Section 4), not all areas of the existing Lease and proposed Lease expansion have been adequately surveyed (Figure 4.5-1), and the FMR lease has not been active since 2004, except for cat skiing operations during the winter. As such, the following baseline surveys should be completed prior to the footprint development for each Project component in undisturbed areas or areas that have not been disturbed since 2004 (e.g., historical lodge building, historical downhill ski trails) to identify important environmental areas and features to be avoided during Project planning and design. Additionally, some habitat features, such as little brown myotis critical habitat and pileated woodpecker nesting cavities, may require consultation with regulators and/or monitoring to determine the activity status of these features, which could impact Project development footprint locations and construction timing.

- Recommended Baseline Surveys:
  - Determine wildlife movement corridors using grizzly bear satellite collar data and aerial ungulate survey data (if available; data to be requested from Alberta Environment and Protected Areas).
  - Determine mammal species presence and detection rates using remote cameras. This program should be implemented prior to development and throughout Project build out through to five years post-full

build out to determine if the Project is altering the presence and relative abundance of medium to large mammals to a degree that poses a management concern.

- Determine presence of local mountain goat and bighorn sheep habitat using remote cameras, aerial surveys, and/or intensive and repeated ground counts (Section 5.4.6, Section 5.4.7).
- Determine presence of waterbirds, including species at risk, on alpine lakes to be used for alpine lake activities such as paddleboarding, canoeing, and cold plunges using point counts.
- Determine if species at risk (e.g., barn swallow, little brown myotis) are using the historical lodge building for nesting, roosting, or hibernating using dusk emergence surveys, bat (ultrasonic) detector surveys, and/or a survey of the exterior of the building to look for evidence of bat and bird use (i.e., guano and nests) (Section 5.4.8, Section 5.4.9).
- Determine if pileated woodpecker nesting cavities are present in mature forest areas to be cleared for Project development through wildlife and/or nest sweeps (Section 5.4.1, Section 5.4.9, Section 5.4.10).

If baseline surveys find wildlife species at risk or important wildlife habitat areas in areas to be developed for the Project, RNA will consult with Environment and Climate Change Canada/Alberta Tourism and Sport to develop species-specific mitigation plans, as required.

5.4.3 Sensory Disturbance Management and Timing Constraints

Sensory disturbance (e.g., noise, lights, presence of people, dust) can have negative effects on wildlife habitat quality, habitat use, movement, and behaviour. Construction activities should be scheduled to avoid sensitive wildlife life stages and the important foraging times of dusk and dawn (i.e., between 7:00 a.m. and 7:00 p.m.). For ungulates, the timing of construction and vegetation clearing within species' preferred habitats should be scheduled outside the late gestation and calving season to reduce effects to these species during this time. AEPA has identified critical risk timing windows for selected wildlife to provide guidance on the lowest risk times of year to conduct development activities. The critical risk window for mountain goat and bighorn sheep occurs from August 23 to June 30 (GoA 2024). If working within a critical window is unavoidable within mountain goat and bighorn sheep habitat, AEPA should be contacted to discuss alternatives, and potential mitigation and monitoring plans.

The nesting activities of >95% of migratory bird species that may breed in the area containing the Project occur from April 14 to August 12 (Nesting Zone A3) (ECCC 2025). Upland game birds, which are protected under the *Wildlife Act*, have the same nesting period. Construction and vegetation clearing activities should also be scheduled to occur outside the migratory bird nesting period. Clearing activities scheduled from March 1 to April 30 have the potential to disturb active owl nests, while clearing activities scheduled from February 1 to August 31 have potential to disturb active raptor nests; owl and raptor nests are protected under the *Wildlife Act*. If construction occurs during the migratory bird nesting period, ECCC's *Guidelines to Avoid Harm to Migratory Birds* (ECCC 2023) should be followed. Protocols and mitigation strategies for meeting the guidelines are described in Section 5.4.8 and can also be applied to minimize the risk of disturbing active owl, raptor, and upland game bird nests.

Important wildlife features (e.g., dens, mineral licks, hibernacula) for species prescribed under the Wildlife Regulations are protected Alberta's *Wildlife Act*. Protocols and mitigation strategies for avoiding impacts to important wildlife features are described in Section 5.4.10 and can also be applied to minimize the risk of

disturbing important wildlife features. A no harassing, feeding, or approaching wildlife policy will be implemented and enforced throughout construction and operation and maintenance.

Lights should be limited as much as possible. Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised. During operations, on-mountain attractions will only be open to visitors during daylight hours and lights should be turned off overnight, where feasible and where it does not compromise safety or nighttime experiences. Noisy equipment will be enclosed in buildings, where feasible. During construction and operations, speed limits will be established and enforced on roads and traffic areas to limit noise and traffic-related sensory disturbance (e.g., fugitive dust) and dust suppressants will be applied to roads and traffic areas, as required, to reduce fugitive dust. All construction and maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.

5.4.4 Wildlife Corridor Management Plan

Wildlife movement corridors in and around the Lease are not well understood. Baseline surveys and provincial data (Section 5.4.1) are proposed to be used to determine important wildlife movement corridors, the mammal species that are using these corridors, and rates at which mammals are detected on the Lease.

Should changes in wildlife movement patterns, species presence, and/or detection rates from baseline conditions be detected during Project operations, qualified professionals and/or regulatory agencies will be contacted to develop appropriate mitigations. Mitigations could include:

- Seasonally avoid wildlife movement corridors.
- Control motorized access in areas with high wildlife movement, presence, and/or detection rates to maintain habitat quality (AEP 2020).
- During construction, helicopter activity should remain at least 400 m from where large mammals (e.g., gray wolf, elk) are observed.
- Provide visitor education (e.g., boundary fencing, signage) to minimize disturbance to wildlife that are encountered, particularly for people recreating in the backcountry.
- Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.

5.4.5 Grizzly Bear Management Plan

The grizzly bear is listed as Threatened under the *Wildlife Act* and is a species of Special Concern under SARA. In the past, hunting has been identified as the largest source of grizzly bear mortality, resulting in the suspension of licensed hunting of grizzly bears until recovery actions have successfully re-established healthy population sizes. As grizzly bears have been detected using areas throughout the Lease (Figure 4.5-2), the following mitigation actions are recommended to protect grizzly bears during all phases of construction, operation, and reclamation:

- Habitat management, access planning, and access control will incorporate recommended guidelines for access and land use inside grizzly bear priority areas as outlined in the Alberta Grizzly Bear Recovery Plan (AEP 2020), where appropriate.

- Report illegal poaching of grizzly bears in the Lease by calling AEPA Fish and Wildlife Division toll-free at 1-800-642-3800 or alberta.ca/report-a-poacher.
- Control motorized access to maintain habitat quality and reduce human-caused mortality (AEP 2020). This can be accomplished by limiting the number, location, and use of access roads throughout the Lease, particularly in key grizzly bear habitats (e.g., areas that are regularly frequented by grizzly bears).
- Report grizzly bear observations and encounters (including location, habitat use, and behaviour) from in and around the Project. This information is useful in tracking bear use of areas and habitat types in the Lease.
- Seasonally avoid areas with known grizzly bear use.
- If construction activities are to occur during the grizzly bear denning season (October 1 to April 30), complete pre-construction den surveys in areas of suitable denning habitat that are within 100 m of construction activities (GoA 2024).
- In the event an active grizzly bear den is discovered during the den surveys or during construction, AEPA should be notified and a setback buffer around the den should be established where human activity is prohibited.
- Grizzly bear den setback buffers should be clearly marked with signage for worker awareness and safety. Education and outreach programs to enhance grizzly bear conservation should be delivered to all employees and individuals entering the Lease including the BearSmart Community Program at *https://www.bearsmart.com/community-initiatives/overview* (People and Carnivores 2024).
- Regulations, enforcement, and communication regarding grizzly bear attractants such as food, waste handling and waste storage should be created. This would include keeping a clean site and using electric fencing or bear-proof containers for storing waste.
- A problem wildlife response plan for grizzly bears should be in place. In the case of unwanted grizzly bear behaviour, aversive conditioning may be used. This should be done by a bear deterrent specialist using techniques such as noisemakers, rubber bullets, and the use of Karelian bear dogs. This management strategy directed at influencing bear behaviour may be necessary if human-bear conflict rates become high as construction progresses.

For more information on reducing human-grizzly bear conflicts refer to Section 5.4.11 Wildlife Conflict Management Plan.

5.4.6 Bighorn Sheep Management Plan

Surveys to identify possible bighorn sheep summer and winter ranges and key features such as mineral licks, rutting areas, escape terrain, and lambing grounds should be completed prior to Project construction. These habitats can be identified through use of remote cameras, results from consultation, incidental sightings, and/or intensive and repeated ground counts. Although helicopters have been found to provide rapid and superior estimates over extensive areas, they are not recommended for bighorn sheep surveys for the Project because low-altitude helicopter activity has been found to have adverse effects on bighorn sheep individuals. Bighorn sheep demonstrate greater responses to helicopters with repeated overpasses producing sustained anxiety for several hours with animals running to escape terrain (MacArthur et al. 1982; Stemp 1983).

The scarcity of food during winter makes winter ranges the most critical to the survival of bighorn sheep herds and thus the priority habitat for conservation (GoA 1993). Bighorn sheep are not well adapted to deep or crusted snow and so during the winter individuals occupy areas with southern exposure or windblown slopes. The Resort is in the Mountain Goat and Bighorn Sheep Range (GoA 2025). Any herds of sheep observed in the Lease should be noted and mitigation employed to avoid disturbance to sheep.

The Project may affect bighorn sheep through habitat loss, sensory disturbance, or direct mortality. The following mitigation actions are recommended to protect bighorn sheep during all phases of the Project:

- During construction, helicopter activity should remain at least 400 m from where bighorn sheep are observed. Helicopter activities can re-commence once bighorn sheep have left the area. Avoid permanent habitat alterations and minimize new disturbances such as construction, helicopter activity, and recreational use in identified bighorn sheep winter range and escape terrain (GoA 2010).
- Avoid disturbance to steep cliffs adjacent to sheep habitat that can be used as escape terrain from predators (GoA 2010).
- Reclaim temporarily disturbed sites within all portions of the bighorn sheep range (GoA 2010).
- Avoid scheduling construction within the bighorn sheep critical risk timing window. The critical risk window for bighorn sheep occurs from August 23 to June 30 (GoA 2024).
- If bighorn sheep lambing grounds are identified, an activity setback buffer and restricted activity period should be established in consultation with AEPA.
- Report poaching immediately.
- During ski hill operations, employ low-noise or passive avalanche control and limit the need for explosives, to the extent practical in accordance with industry standards.
- Provide visitor education (e.g., boundary fencing, signage) to minimize disturbance to bighorn sheep encountered, particularly for people recreating in the backcountry.

In the past, hunting of trophy rams has been a significant source of mortality for bighorn sheep and a cause of decreased population sizes. Regulations are now in place to control hunting by residents and non-residents of the province. In addition, limiting motorized vehicle access to sheep ranges has reduced poaching and disturbances to populations. For this reason, the construction of access routes to bighorn sheep habitats within the Lease should be avoided and when necessary, temporary access routes should be reclaimed as soon as feasible (GoA 2010). In terms of hunting, the best management strategy, is to keep population levels below the biological carrying capacity through annual cropping of both sexes (Jorgenson et al.1993). Thus, if a healthy and stable bighorn sheep population is identified in the Lease, hunting under provincial regulations could be allowed. However, FMH identifies hunting as a non-compatible use within the Lease and “No hunting” signs have been posted. Given the increased numbers of employees and visitors anticipated by FMH to be present within the Lease during hunting seasons, this represents a safety risk not seen in other resorts in the region.

5.4.7 Mountain Goat Management Plan

Surveys to identify possible mountain goat summer and winter ranges and key features such as mineral licks, rutting areas, escape terrain, and lambing grounds should be completed prior to Project planning and design. These habitats can be identified through use of remote cameras, results from consultation, incidental sightings, aerial surveys, and/or intensive and repeated ground counts. All development activities, including construction and operational activities, should be avoided on foraging areas, escape terrain, and winter ranges, especially during periods when goats are normally present (GoA 2010). Anthropogenic noise can affect mountain goat populations through habitat abandonment and decreased fitness (Barber et al. 2009; Blickley and Patricelli 2010). As such, key habitats should be avoided or have constrained human activities.

The following mitigation actions are recommended to protect mountain goat populations during all phases of the Project:

- Avoid scheduling construction within the mountain goat critical risk timing window. The critical risk window for mountain goat occurs from August 23 to June 30 (GoA 2024).
- Reduce the frequency and duration of operation of loud machinery in key mountain goat habitats.
- During construction, helicopter activity should remain at least 400 m from where mountain goats are observed. Helicopter activities can re-commence once mountain goats have left the area. Avoid permanent habitat alterations and minimize new disturbances such as construction, helicopter activity, and recreational use in identified mountain goat winter range and escape terrain (GoA 2010).
- During ski hill operations, employ low-noise or passive avalanche control and limit the need for explosives, to the extent practical in accordance with industry standards.
- Provide visitor education (e.g., boundary fencing, signage) to minimize disturbance to mountain goats encountered, particularly for people recreating in the backcountry.
- If mountain goat kidding grounds are identified, an activity setback buffer and restricted activity period should be established in consultation with AEPA.
- Report poaching immediately.

5.4.8 Little Brown Myotis Management Plan

The historical lodge building has been inactive since 2004. Abandoned buildings can be used by little brown myotis as maternity roost and/or hibernation sites (COSEWIC 2013). Little brown myotis maternity roost and hibernation sites are considered critical habitat and are protected under the *Species at Risk Act* (ECCC 2018). As such, it is recommended that surveys be completed at the building to determine if the building is being used by little brown myotis as a maternity roost or hibernation site. The use of the historical lodge building by bats can be determined through use of dusk emergence surveys, bat (ultrasonic) detector surveys, and/or a survey of the exterior of the building to look for evidence of bat use (i.e., guano).

If surveys determine that little brown myotises are using the historical lodge building as a maternity roost or hibernation site, RNA will consult with Environment and Climate Change Canada and/or Alberta Tourism and Sport to develop a species-specific mitigation plan. Mitigation actions to be implemented could include constructing replacement bat maternity habitat in an area outside of Project footprint, covering all entrances into

the building to prevent re-entry by little brown myotis, and/or demolishing the building outside of the little brown myotis maternity roost (June 25 to July 31) and hibernation (October 1 to May 31) seasons.

5.4.9 Nesting Bird Management Plan

It is recommended that the Project development be cleared prior to mid-April to discourage nesting of migratory birds. If this is not feasible and clearing or construction activities are scheduled to occur within the migratory bird nesting period (April 14 to August 12) (ECCC 2025), non-intrusive nest sweep surveys should be used to conduct an area search for evidence of nesting (e.g., aggressive behaviour, territorial males, alarm calls, distraction displays). Surveys are also recommended prior to any clearing activity scheduled from February 1 to August 31 to protect active owl and raptor nests, as required by the *Wildlife Act*. Pileated woodpecker nest cavities require confirmation of non-occupancy by any migratory bird over 36 months prior to removal of the tree containing the nest cavity.

Nest sweeps are non-intrusive surveys and accepted industry protocol that can successfully identify locations or approximate locations of nests when undertaken by experienced biologists. Surveys should be completed no more than seven days in advance of activities. If an active nest is found, it will be subjected to species-specific mitigation actions (i.e., clearly marked protective buffer around the nest and/or non-intrusive monitoring) until the young have fledged. Setback distances will be determined in accordance with ECCC guidelines (ECCC 2023). Active nest and indicated nests (e.g., behaviour indicative of nesting) that are found at any time during the year must also be protected with a suitable species-appropriate buffer until the young have fledged.

Specific to the historical lodge building, the exterior of the building should be surveyed to determine if the building is being used by birds (e.g., barn swallow [*Hirundo rustica*]) as a nesting site. If surveys determine that birds are using the historical lodge building as a nest site, RNA will consult with Environment and Climate Change Canada and/or Alberta Tourism and Sport to develop a species-specific mitigation plan. Mitigation actions to be implemented could include constructing replacement bird nesting habitat (e.g., barn swallow nesting structures) in an area outside of Project footprint and/or demolishing the building outside of the migratory bird nesting period (April 14 to August 12).

Specific to alpine lakes that will be used for activities such as paddleboarding, canoeing, and cold plunges, it is recommended that point count surveys be completed at the lakes to determine waterbird species that may be using the lakes as nesting areas. Waterbird can be more sensitive to disturbance than other bird species (ECCC 2023).

5.4.10 Important Wildlife Feature Management Plan

Prior to all clearing or construction activities wildlife sweep surveys should be used to search for important wildlife features (e.g., dens, mineral licks, roosts, hibernacula, pileated woodpecker nesting cavities). Surveys are recommended to be completed prior to clearing or construction activities that occur at any time of the year. Wildlife sweeps should be completed following the *Wildlife Sweep Protocols: Sensitive Species Inventory Guidelines*, which recommends completing wildlife sweeps no more than 10 days in advance of activities (GoA 2021). If an important wildlife feature is found, it will be subjected to feature-specific mitigation actions (e.g., clearly marked protective buffer around the active den and/or non-intrusive monitoring). Setback buffers and/or non-intrusive monitoring are only required for dens while the features are active (e.g., contain young). However, direct disturbance to important wildlife features should be avoided, even if the feature is inactive. In cases where avoidance may not be possible, ECCC/Alberta Tourism and Sport should be consulted prior to initiating construction activities.

5.4.11 Wildlife Conflict Management Plan

Best practices to prevent habituation and attraction of wildlife should prevent most wildlife conflict along with project personnel and contractor wildlife awareness. Feeding wildlife may result in wildlife becoming attracted to human foods and habituated to human presence. Food wastes can attract animals and may also result in the development of problem wildlife (AEP 2016). Approaching wildlife or remaining close to wildlife to watch or photograph them may also lead to habituation. This can create problem wildlife and have serious consequence to wildlife, project personnel, and the public.

The following mitigation actions are designed to reduce wildlife conflict throughout all stages of the Project:

- Develop and implement a human-wildlife coexistence plan.
- Prohibit littering in the Lease. Dispose of all waste in designated temporary storage containers that are not accessible to wildlife (e.g., bear-proof containers or containers housed in bear-proof buildings).
- Require that all employees and contractors take wildlife awareness training as part of their site orientation to help reduce wildlife-human interactions and eliminate grizzly bear and black bear mortalities associated with the Project.
- Crews working in more remote locations of the Lease may carry commercially available personal deterrent devices (i.e., bear spray, bear bangers). Prior to use, provide an instructional overview on the proper use of deterrents with qualified personnel.
- Direct intervention with respect to problem bears will be conducted by a bear deterrent expert, except in emergencies threatening imminent harm to human life.
- If bears or other wildlife species display aggressive behaviour or persistent intrusion, stop work, vacate the area and stay away from the immediate location until AEPA has been notified and dealt with the situation.
- Report wildlife incidents (e.g., close or aggressive encounters, unusual wildlife behaviour in the Lease, traffic accidents or near misses, persistent intrusion, and observations of dead or injured animals) to the site manager immediately.

Wildlife incidents should be entered into a Project-specific Wildlife Log. Wildlife incidents should be reviewed for insight as to why/how the incident occurred, and how it could be prevented or handled more effectively in the future (e.g., adaptive management).

5.5 Waterbodies and Watercourse Management Plan

5.5.1 Key Fisheries and Aquatic Resources Considerations

Project-specific management goals for waterbodies and watercourses are:

- To reduce the amount of construction in waterbodies, watercourses, and riparian areas to the extent practical.
- To maintain natural water drainage patterns throughout the Resort area.
- To maintain water quality within waterbodies and watercourses.
- To reduce erosion and sedimentation in or near waterbodies and watercourses.

5.5.2 Setback Criteria and Authorizations

Unless authorized under the *Water Act*, Code of Practice (COP) or Fisheries and Oceans Canada (DFO) Letter of Advice or *Fisheries Act* Authorization, impacts to all waterbodies, watercourses and wetlands must be avoided. All waterbodies, watercourses, wetlands, and riparian areas within the limits of construction, or less than 10 m from access trails and workspaces must be visibly marked (e.g., flagged, fenced, staked) prior to any construction activities taking place near these features. This 10 m buffer will aid in avoidance of direct (i.e., wildlife mortality) and indirect (i.e., sedimentation) effects to water resources and riparian habitat in the vicinity of the Project. Where avoidance is not possible, approvals must be in place with the appropriate regulating authority prior to disturbance.

5.5.3 Working Near Water

General best management practices to be implemented to achieve Project-specific management goals for waterbodies and watercourses include, but are not limited to:

- Operate machinery on land above the high-water mark in a manner that avoids disturbance to the banks and bed of the watercourse, wetland, or waterbody.
- Perform construction activities and locate construction facilities, storage areas, and disposal sites in a manner that prevents degradation of water quality and prevents sediment-laden runoff, contaminants, debris, and other pollutants from entering drainage ditches, watercourses, wetlands, and underground water sources. Any debris or releases inadvertently introduced into waterbodies, watercourses, and wetlands will be immediately contained and reported to the site manager.
- All activities in, adjacent to, or across waterbodies must adhere to all requirements under the *Water Act*, COP, DFO Measures to Protect Fish and Fish Habitat (DFO 2025), the Alberta Wetland Policy, and the *Navigation Protection Act* as applicable.
- Surface water drainage patterns must be maintained during any soil disturbance activities. Erosion and surface water runoff control must be implemented, as required. Soil and subsoil stored within 100 m of a watercourse, wetland, or waterbody must have appropriate erosion and sediment control installed to prevent any discharge to the watercourse, wetland, or waterbody.
- Shallow groundwater encountered during construction activities must be immediately reported to the site manager. Site-specific mitigations must be developed by, and implemented under the direction of, a qualified professional hydrogeologist.
- Use crossing structures to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.
- Install properly sized water conveyance structures (e.g., culverts) to maintain surface hydrology along temporary and permanent roads.
- Water from any dewatering activities must be discharged in a manner that will not directly enter drainage courses, waterbodies or wetlands, or lead to soil erosion.
- Use of herbicides near waterbodies, watercourses, and wetlands must adhere to the Alberta Environmental Code of Practice for Pesticides.

- Completing works above the high-water mark will avoid direct disturbance to the riverbed and should be pursued as a preferred method, if feasible.
- No fueling of vehicles within 100 m of any watercourse, wetland, or waterbody is permitted.

If construction method changes and requires any works to the bed and/or banks of any waterbody, watercourse, or wetland, FMH will comply with applicable, current regulatory requirements. Conditions of the banks immediately surrounding any instream works should be documented before and after the proposed disturbance (via photograph and noted observations) takes place to verify that no erosion concerns arise. Should access within the bed and banks of any watercourse or waterbody be required during construction, use protection methods (e.g., swamp mats, pads, woven geotextiles) for equipment access to prevent damage to the bed and banks.

5.5.4 Run-off and Sediment Control

The Project will require the run-off and sediment control to prevent sediment-laden surface runoff from discharging to watercourses and other down-gradient areas.

- Site-specific sedimentation control will be developed prior to start of construction.
- Runoff management, including water diversions, will be installed to minimize contact between site runoff and exposed soils. Sediment-laden water will be managed to prevent discharge into waterbodies.
- Instream sediment control, in the form of isolation or containment, should be considered in the event of instream activity or disturbance. Based on current understanding of the Project, instream sediment control is not required.
- All temporary sediment control (e.g., silt fence) must be removed when reclamation is deemed complete, unless materials are compatible with the natural environment.

6 ENVIRONMENTAL PROTECTION MEASURES FOR DEVELOPMENT COMPONENTS

The following section identifies general and site-specific environmental protection actions that may be implemented during the design, pre-construction, construction, and operations of the Project. Emphasis is placed on Phase 1 because future phases are not well defined at this time. WSL and RNA are committed to conducting the appropriate level of environmental assessment in advance of future phases. The mitigation identified for Phase 1 is indicative of WSL and RNA's approach to avoiding and minimizing adverse impacts on the environment. A similar approach will be followed for future phases.

6.1 Construction Limitations or Constraints

These environmental protection actions have been prepared in accordance with the general construction, operation, and maintenance methods used at ski hill and summer recreation developments in Alberta. Revisions to planned mitigation may become necessary through revisions to the Project scope as determined through detailed engineering or unforeseen conditions that may arise during construction. Should this become necessary, revised or additional environmental protection actions will be implemented by the Project Construction Supervisor in consultation with resource specialists (e.g., wildlife biologists, reclamation specialists) and/or regulators, when necessary.

6.1.1 Summary of Key Constraints and Mitigation Actions

Key constraints, timing considerations, and proposed mitigation actions to avoid each constraint during the construction phase of the Project are summarized in Table 6.1-1.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Terrain and Soils	▪ Erosion ▪ Compaction ▪ Soil Stability on Steep Slopes	▪ Schedule construction activities to avoid wet soil conditions and rainfall events, as much as practical. ▪ Postpone clean-up on wet ground until soils are dry.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ Minimize compaction off already-established trails. ▪ Clearly mark out the area that will be disturbed including all storage areas for excavated materials, construction supplies, and equipment. ▪ Remove all woody debris through low impact methods, (e.g., hand clearing) when working in sensitive subalpine areas, where necessary. ▪ Strip topsoil under thawed, dry conditions, whenever possible. ▪ Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events. ▪ Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain. Excavated material may be stored in flight bags on steep terrain. ▪ Construct soil barricades to prevent losses on steep terrain (i.e., slopes >18° or >3:1) within 10 m of watercourses. ▪ Ensure proper soils handling to prevent mixing of topsoil and subsoil materials and to improve chances of successful rehabilitation. ▪ Employ erosion control techniques, as required. ▪ Halt topsoil salvage operations if conditions become excessively wet (e.g., soil sticking to equipment wheels or tracks). ▪ Remove stumps and woody debris from topsoil, wherever possible. ▪ Cover excavated material with heavy-duty plastic or filter cloth to prevent erosion during soil salvage operations. ▪ Begin reclamation works at the earliest opportunity post works. ▪ Tree removal will be undertaken so that all trees fall inside of cleared perimeters and away from environmentally sensitive areas and areas with less soil disturbance. ▪ Stumps and brush remaining after clearing will be flush cut to a maximum stump height of 15 cm, and stump grinders will be used to preserve root structures and reduce the potential for erosion.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Vegetation	▪ Disturbance to Native Vegetation and Listed Plants ▪ Introduction and Spread of Invasive Plants ▪ Revegetation	▪ Conduct a pre-disturbance inventory of listed plants and weeds prior to any vegetation or ground disturbance. ▪ Control weeds prior to construction in heavily invested areas to prevent transmission of seed by equipment and vehicles. ▪ Begin reclamation works at the earliest opportunity post works. ▪ Where possible, schedule construction to allow for completion of reclamation prior to frozen ground conditions.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ Clearly mark out the area that will be disturbed including all storage areas for excavated materials, construction supplies and equipment. ▪ Should temporary workspace be required in undisturbed natural vegetation communities, the site should not be subject to grading and grubbing. ▪ Remove all woody debris through low impact methods, (e.g., hand clearing) when working in sensitive subalpine areas, where necessary. ▪ Use low impact machinery, such as the use of low tire pressure vehicles, when working on vegetated surfaces. ▪ Use glading practices instead of clearing on ski trails to the extent practical. ▪ Avoid listed plant populations where possible. Should avoidance not be possible, reduce disturbance to known populations by means of site-specific mitigation actions. ▪ Clearly mark locations of all listed species and use traffic control markers, such as rope fences, to facilitate avoidance. ▪ Use water diversion and/or erosion and sediment control structures (e.g., water bars, silt fencing) to prevent erosion and sediment deposition onto listed plant populations. ▪ If wind scoring or moisture retention present challenges to plant establishment, install wind barriers or snow fencing around the occurrence. ▪ Reduce traffic to essential personnel. ▪ Revise or eliminate reclamation seed mixes in areas where listed plant species are present to minimize interspecific competition. ▪ All equipment must arrive at the construction site free of dirt and vegetative debris. ▪ Equipment used in infested weed areas must be cleaned prior to moving off the infested site. ▪ All seed used for reclamation must be certified. ▪ Conduct post-construction revegetation monitoring in accordance with the *Best Management Practices for Development at Ski Areas in Banff and Jasper National Parks of Canada* (Parks Canada 2008). ▪ Tree removal will be undertaken so that all trees fall inside of cleared perimeters and away from environmentally sensitive areas and areas with less soil disturbance. ▪ If required, additional topsoil and organics must come from an approved source or location to prevent introduction of weed species. ▪ Disturbed sites should be managed aggressively for weeds using methods appropriate to identified weed species. ▪ If cutting weeds, cut before plants go to seed. ▪ Use a qualified and licensed applicator that is trained in the proper handling, storage, use, and disposal of herbicides. ▪ Use only herbicides registered under the *Pest Control Products Act* and only use as intended. ▪ Apply herbicide in a manner that eliminates drift to non-target areas. ▪ Do not apply herbicides where there are visible signs of soil erosion.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Wildlife	▪ Grizzly Bear	▪ Conduct pre-construction den sweeps in areas of suitable habitat.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ Implement regulations and enforcement and communication practices regarding grizzly bear attractants such as food, waste handling, and waste storage. ▪ Reduce temporary vehicle access to the extent practical to maintain habitat quality and reduce human-caused mortality. Reclaim temporary access as soon as possible following construction. ▪ Develop and implement a human-wildlife coexistence plan. ▪ Should an active grizzly bear den be discovered during pre-construction surveys or during construction, AEPA should be notified and an activity setback buffer around the den should be established. Setback buffers will be clearly marked with signage for worker awareness and safety. ▪ Create gaps in the topsoil and/or subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction. ▪ The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. ▪ Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). ▪ Habitat management, access planning, and access control will incorporate recommended guidelines for access and land use inside grizzly bear priority areas as outlined in the Alberta Grizzly Bear Recovery Plan (AEP 2020), where appropriate. ▪ Report illegal poaching of grizzly bears in the Lease by calling AEPA Fish and Wildlife Division toll-free at 1-800-642-3800 or alberta.ca/report-a-poacher. ▪ Seasonally avoid areas with known grizzly bear use. ▪ Grizzly bear den setback buffers should be clearly marked with signage for worker awareness and safety. Education and outreach programs to enhance grizzly bear conservation should be delivered to all employees and individuals entering the Lease including the BearSmart Community Program at ***https://www.bearsmart.com/community-initiatives/overview*** (People and Carnivores 2024). ▪ A problem wildlife response plan for grizzly bears should be in place. In the case of unwanted grizzly bear behaviour, aversive conditioning may be used. This should be done by a bear deterrent specialist using techniques such as noisemakers, rubber bullets, and the use of Karelian bear dogs. This management strategy directed at influencing bear behaviour may be necessary if human-bear conflict rates become high as construction progresses.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
	▪ Bighorn Sheep	▪ Schedule construction outside of the critical risk window for bighorn sheep (August 23 to June 30). ▪ Determine bighorn sheep habitat use before construction commences to identify summer and winter ranges and key features including mineral licks, rutting areas, escape terrain, and lambing grounds.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ Reduce temporary vehicle access to the extent practical to maintain habitat quality and reduce human-caused mortality. Reclaim temporary access as soon as possible following construction. ▪ Avoid permanent habitat alterations and minimize new disturbances such as construction, helicopter activity, and recreational use within identified bighorn sheep winter range. ▪ Avoid disturbance to steep cliffs adjacent to sheep habitat that are likely used as escape terrain from predators. ▪ Reduce the frequency and duration of operation of loud machinery in key bighorn sheep habitats. ▪ During construction, helicopter activity should remain at least 400 m from where bighorn sheep are observed. Helicopter activities can re-commence once the sheep have left the area. ▪ If bighorn sheep lambing grounds are identified, an activity setback buffer and restricted activity period should be established in consultation with AEPA. ▪ During ski hill operations, employ low-noise or passive avalanche control and limit the need for explosives, to the extent practical and in accordance with industry standards. ▪ Provide visitor education (e.g., boundary fencing, signage) to minimize disturbance to bighorn sheep encountered, particularly for people recreating in the backcountry. ▪ Create gaps in the topsoil and/or subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction. ▪ The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. ▪ Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). ▪ Reclaim temporarily disturbed sites within all portions of the bighorn sheep range (GoA 2010). ▪ Report poaching immediately.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Wildlife	▪ Mountain Goat	▪ Schedule construction outside of the critical risk window for mountain goat (August 23 to June 30). ▪ Determine local mountain goat habitat use before construction to identify pockets of winter range and other important seasonal nodes of habitat use such as mineral licks, calving areas, travel routes and escape terrain.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ Reduce temporary vehicle access to the extent practical to maintain habitat quality and reduce human-caused mortality. Reclaim temporary access as soon as possible following construction. ▪ Avoid permanent habitat alterations and minimize new disturbances such as construction, helicopter activity, and recreational use within identified mountain goat winter range. ▪ Avoid disturbance to steep cliffs adjacent to goat habitat that are likely used as escape terrain from predators. ▪ Reduce the frequency and duration of operation of loud machinery in key mountain goat habitats. ▪ During construction, helicopter activity should remain at least 400 m from where mountain goats are observed. Helicopter activities can re-commence once the goat have left the area. ▪ If mountain goat kidding grounds are identified, an activity setback buffer and restricted activity period should be established in consultation with AEPA. ▪ During ski hill operations, employ low-noise or passive avalanche control and limit the need for explosives, to the extent practical and in accordance with industry standards. ▪ Provide visitor education (e.g., boundary fencing, signage) to minimize disturbance to mountain goats encountered, particularly for people recreating in the backcountry. ▪ Create gaps in the topsoil and/or subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction. ▪ The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. ▪ Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). ▪ Report poaching immediately.
	▪ Little Brown Myotis	▪ Schedule demolition outside of the critical risk windows for little brown myotis (maternity season: June 25 to July 31; hibernation season: October 1 to May 31)	▪ Complete surveys of the historical lodge building prior to demolition to determine if little brown myotises are using the building as a maternity roost or hibernation site. ▪ Consult with Environment and Climate Change Canada/Alberta Tourism and Sport to develop species-specific mitigation plans, if required.
	▪ Nesting Migratory Birds	▪ Schedule clearing activities outside of the general nesting period for migratory birds (April 14 to August 12). ▪ If clearing activities are scheduled to occur within the general nesting period for migratory birds, pre-construction nest sweep surveys must be conducted.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ If an active nest is found during pre-construction nest sweeps, species-specific mitigation actions will be employed until the young have fledged. Mitigation actions may include a setback buffer in accordance with the ECCC guidelines and/or non-intrusive monitoring. ▪ The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. ▪ Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). ▪ Nest sweeps are non-intrusive surveys and accepted industry protocol that can successfully identify locations or approximate locations of nests when undertaken by experienced biologists. Surveys should be completed no more than seven days in advance of activities. If an active nest is found, it will be subjected to species-specific mitigation actions (i.e., clearly marked protective buffer around the nest and/or non-intrusive monitoring) until the young have fledged. ▪ Complete surveys of the historical lodge building prior to demolition to determine if birds are using the building as a nest site. ▪ Consult with Environment and Climate Change Canada/Alberta Tourism and Sport to develop species-specific mitigation plans, if required.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Wildlife	▪ Other Wildlife Species ▪ Wildlife Conflict	▪ Schedule clearing activities outside of February 1 to August 31 to protect active owl and hawk nests. ▪ Pre-construction wildlife sweep surveys should be completed prior to all construction activities at any time of year.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ If an active nest or den is found during pre-construction wildlife sweeps, species-specific mitigation actions will be employed. Mitigation actions may include a setback buffer in accordance with AEPA and/or non-intrusive monitoring. ▪ Prohibit littering in the Lease. Dispose of all waste in designated temporary storage containers that are not accessible to wildlife (e.g., bear-proof containers or containers housed in bear-proof buildings). ▪ Require that all employees and contractors receive wildlife awareness training as part of their site orientation to help reduce wildlife-human interactions and limit wildlife mortalities associated with the Project. ▪ If wildlife display aggressive behaviour or persistent intrusion, stop work, vacate the area, and stay away from the immediate location until AEPA has been notified and dealt with the situation. ▪ Report wildlife incidents (e.g., close or aggressive encounters, unusual wildlife behaviour in the Lease, traffic accidents or near misses, persistent intrusion, and observations of dead or injured animals) to the site manager immediately. ▪ Establish a speed limit appropriate for the situation and determine enforcement procedures. ▪ Crews working in more remote locations of the Lease may carry commercially available personal deterrent devices (i.e., bear spray, bear bangers). Prior to use, provide an instructional overview on the proper use of deterrents with qualified personnel. ▪ Direct intervention with respect to problem bears will be conducted by a bear deterrent expert, except in emergencies threatening imminent harm to human life. ▪ Create gaps in the topsoil and/or subsoil piles to maintain wildlife movement patterns and habitat connectivity during construction. ▪ The site manager will promote awareness among Project personnel about avoidance disturbance to sensitive wildlife features and the knowledge of the location of some features will be to a limited to key personnel to prevent inadvertent disturbance of wildlife or wildlife habitat by curious personnel or members of the public. ▪ Where possible, impacts to the sensitive feature will be minimized by following applicable recommended land use guidelines provided in the Master Schedule of Standards and Conditions (GoA 2024). ▪ If an important wildlife feature is found, it will be subjected to feature-specific mitigation actions (e.g., clearly marked protective buffer around the active den and/or non-intrusive monitoring). Setback buffers and/or non-intrusive monitoring are only required for dens while the features are active (e.g., contain young). However, direct disturbance to important wildlife features should be avoided, even if the feature is inactive. In cases where avoidance may not be possible, AEPA should be consulted prior to initiating construction activities.

Table 6.1-1: Key Constraints, Timing Considerations and Mitigation Actions

Discipline	Key Constraints	Timing Considerations	Selected Mitigation[(a)]
Watercourses and Waterbodies	▪ Working in the Vicinity of Watercourses and Waterbodies ▪ Run-off and Sediment Control	▪ The Restricted Activity Period (RAP) for the unnamed tributary to Galatea Creek is May 16 to August 15 and September 1 to April 30.	▪ Use existing disturbance (e.g., roads, trails) wherever possible. ▪ A 10 m buffer will be employed around all water bodies, watercourses, wetlands, and riparian areas within the limits of construction, or less than 10 m from access trails and workspaces. This buffer must be visibly marked (e.g., flagged, fenced, staked) prior to any construction activities taking place near these features. ▪ All activities in, adjacent to, or across waterbodies (e.g., drainages, creeks, rivers, wetlands, lakes), must adhere to all requirements under the *Water Act*, COP, DFO Measures to Protect Fish and Fish Habitat (DFO 2025), the Alberta Wetland Policy and the *Navigation Protection Act* as applicable. ▪ Surface water drainage patterns must be maintained during excavation activities. Erosion and surface water runoff control must be implemented, as required. Soil and subsoil stored within 100 m of a watercourse, wetland, or waterbody must include appropriate erosion and sediment control to prevent any discharge to the watercourse, wetland, or waterbody. ▪ Completing works above the high-water mark will avoid direct disturbance to the riverbed and should be pursued as a preferred method if feasible. ▪ No fueling of vehicles within 100 m of any watercourse, wetland, or waterbody is permitted. ▪ Runoff management, including water diversions, will be installed to minimize contact between runoff and exposed soils. Sediment-laden water shall be managed to prevent discharge into waterbodies. ▪ All temporary sediment control (e.g., silt fence) must be removed when reclamation is deemed complete, unless materials are compatible with the natural environment. ▪ Operate machinery on land above the high-water mark in a manner that avoids disturbance to the banks and bed of the watercourse, wetland, or waterbody. ▪ Perform construction activities and locate construction facilities, storage areas, and disposal sites in a manner that prevents degradation of water quality and prevents sediment-laden runoff, contaminants, debris, and other pollutants from entering drainage ditches, watercourses, wetlands, and underground water sources. Any debris or releases inadvertently introduced into waterbodies, watercourses, and wetlands will be immediately contained and reported to the site manager. ▪ Shallow groundwater encountered during construction activities must be immediately reported to the site manager. Site-specific mitigations must be developed by, and implemented under the direction of, a qualified professional hydrogeologist. ▪ Use temporary crossing structures to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. ▪ Water from any dewatering activities must be discharged in a manner that will not directly enter drainage courses, waterbodies or wetlands, or lead to soil erosion. ▪ Use of herbicides near waterbodies, watercourses, and wetlands must adhere to the Alberta Environmental Code of Practice for Pesticides. ▪ Instream sediment control, in the form of isolation or containment, should be considered in the event of instream activity or disturbance. Based on current understanding of the Project, instream sediment control is not required. ▪ All temporary sediment control (e.g., silt fence) must be removed when reclamation is deemed complete, unless materials are compatible with the natural environment.

6.1.2 Contingency Plans

The Construction Supervisor will be responsible for monitoring construction conditions and implementing contingency plans in consultation and liaison with appropriate regulatory representatives, as necessary.

6.1.2.1 Saturated Soils

Adverse conditions may be encountered during construction whereby construction activities may cause damage to soils under excessively wet conditions. Contingency action will be implemented, if warranted, with the following triggers:

- rutting of topsoil or root zone material to the extent that admixing may occur with the underlying subsoil
- excessive vehicle and/or equipment wheel slip
- excessive mud build-up on tires and cleats, and/or tracking of mud as vehicles and equipment travel between sites
- flooding or the formation of large puddles

Should these wet soils conditions be encountered, the following contingency action may be implemented individually or in combination, as necessary, based on site-specific conditions:

- restrict construction traffic, where possible, to equipment with low ground pressure tires or wide pad tracks
- reduce unnecessary traffic and the number of vehicles within the limits of construction
- work only in non-problem areas, such as well-drained soil or well-sodded lands, until conditions improve
- place wooden rig mats to eliminate contact of equipment during travel within wet soils
- consider stripping an additional width of topsoil in problem areas
- temporarily suspend construction until soils dry out

6.1.2.2 Adverse Weather Conditions

Given the location of the Project at high elevation within mountainous terrain, it is possible that adverse weather conditions may be encountered during construction. Where adverse weather conditions have the potential to, or are causing wind erosion, water erosion, or other potential for soil degradation, the following contingency actions may be implemented individually or in combination based on site-specific conditions.

- temporarily suspend construction until weather conditions improve
- reduce unnecessary traffic and the number of vehicles within the limits of construction
- work only in non-problem areas, such as well-drained soil or well-sodded lands, until conditions improve
- apply water, hydromulch, tackifier, heavy-duty plastic or filter cloth, or equivalent to soil stockpiles and/or other areas affected by sufficient winds to create the potential for erosion
- install temporary berms, silt fencing, or other controls in highly erodible and sensitive areas where the potential for water erosion has been identified

Should adverse weather conditions result in excessively wet soils, mitigation actions outlined within the saturated soils contingency plan may be warranted (Section 6.1.2.1).

6.2 Phase 1

6.2.1.1 Public Infrastructure

Construction

A description of mitigation actions and best management practices to be implemented during construction of public infrastructure are provided in Table 6.2-1.

Table 6.2-1: Public Infrastructure Construction Mitigation Actions and Applicable Best Management Practices

Removal Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	■ Setback Criteria and Authorizations (Section 5.5.2) ■ Working Near Water (Section 5.5.3) ■ Run-off and Sediment Control (Section 5.5.4)
	Complete a rare plant survey in areas of soil disturbance and vegetation brushing or clearing and determine appropriate mitigation actions for listed plants in the vicinity of the development.	■ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation brushing or clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-construction	Control known weed infestations prior to construction.	■ Weed Management Plan (Section 5.3.3)
	Clear vegetation with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	■ General Best Management Practices (Section 5.1) ■ Topsoil/Sod Removal and Storage (Section 5.2.1) ■ Timber Management Plan (Section 5.3.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in early spring prior to construction to allow the site to thaw and dry out.	■ Topsoil/Sod Removal and Storage (Section 5.2.1) ■ Erosion Prone Soils (Section 5.2.2) ■ Reclamation Practices (Section 5.2.3) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile)	

Table 6.2-1: Public Infrastructure Construction Mitigation Actions and Applicable Best Management Practices

Removal Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Transport equipment and other materials with the use of roads and/or helicopter.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
	Construction debris will be removed by truck or helicopter, depending on road proximity.	
	Establish a speed limit appropriate for the situation and determine enforcement procedures	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Conflict Management Plan (Section 5.4.11)
	Dust suppressants will be applied to roads and traffic areas, as required	
Construction	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
Reclamation	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	■ Reclamation Practices (Section 5.2.3) ■ Revegetation and Seed Mixes (Section 5.3.4) ■ Revegetation Monitoring Plan (Section 5.3.5) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of public infrastructure and associated best management practices are provided in Table 6.2-2.

Table 6.2-2: Public Infrastructure Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-2: Public Infrastructure Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2 On-Mountain Projects

6.2.1.2.1 Removal of Decommissioned Ski Lift Facilities

When removing of the existing, decommissioned ski lifts, historical towers will be reused as winch anchors or wind guards for Project facilities where possible. Towers and other construction debris that cannot be reused or recycled will be transported to an approved landfill site. Following facility removal, concrete foundations will be lowered to a minimum of 1 m below grade, cracked to prevent water ponding, and reclaimed.

A description of mitigation actions and best management practices to be implemented during removal of decommissioned ski lifts are provided in Table 6.2-3.

Table 6.2-3: Decommissioned Ski Lift Removal Mitigation Actions and Applicable Best Management Practices

Removal Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk (e.g., barn swallow, little brown myotis), sensitive wildlife habitat, and important wildlife habitat features that should be considered during demolition	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Little Brown Myotis Management Plan (Section 5.4.8) ▪ Nesting Bird Management Plan (Section 5.4.9)
	Consult with Environment and Climate Change Canada/Alberta Tourism and Sport to develop species-specific mitigation plans, if required.	
	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete a rare plant survey in areas of soil disturbance and vegetation brushing or clearing and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation brushing or clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule ski lift removal activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Ski lift removal activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-removal	Control known weed infestations prior to construction.	▪ Weed Management Plan (Section 5.3.3)
	Clear vegetation along the alignment by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in early spring prior to ski lift removal to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile)	

Table 6.2-3: Decommissioned Ski Lift Removal Mitigation Actions and Applicable Best Management Practices

Removal Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Transport equipment and other materials with the use of roads and/or by helicopter.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
	Towers and other construction debris will be removed by snow cat, truck, or helicopter, depending on road proximity.	
	Speed limits will be established and enforced on roads and traffic areas	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5) ■ Wildlife Conflict Management Plan (Section 5.4.11)
	Dust suppressants will be applied to roads and traffic areas, as required	
Lift Removal	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
Reclamation	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	■ Reclamation Practices (Section 5.2.3) ■ Revegetation and Seed Mixes (Section 5.3.4) ■ Revegetation Monitoring Plan (Section 5.3.5) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)

6.2.1.2.2 Downhill Ski Trails and Cat Skiing

Phase 1 activities related to ski trail development are widening of existing downhill and cat skiing ski trails and constructing new downhill ski trails (Figure 1.0-2). Cat skiing operations will be also developed during Phase 1, if feasible.

Widening of Existing Trails

A description of mitigation actions and best management practices to be implemented during ski trail widening are provided in Table 6.2-4.

Table 6.2-4: Widening of Existing Ski Trails Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete a rare plant survey in the areas of trail widening and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of trail widening and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1 ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Trail Widening	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	

Table 6.2-4: Widening of Existing Ski Trails Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

Construction of New Trails

A description of mitigation actions and best management practices to be implemented during construction of new ski trails and associated best management practices are provided in Table 6.2-5.

Table 6.2-5: New Ski Trail Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the ski trail footprints and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the ski trail footprints and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-5: New Ski Trail Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of ski trails and associated best management practices are provided in Table 6.2-6.

Table 6.2-6: Ski Trail Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of trail maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas requiring trail maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Trail Operation	Ski trails will only be open to visitors during daylight hours	
	Ski trails will not be lit.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
Trail Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	

Table 6.2-6: Ski Trail Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2.3 Sight-seeing Gondolas

Construction

A description of proposed methods for construction of the sight-seeing gondolas, and associated best management practices are provided in Table 6.2-7.

Table 6.2-7: Sight-seeing Gondola Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	■ Setback Criteria and Authorizations (Section 5.5.2) ■ Working Near Water (Section 5.5.3) ■ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	■ Baseline Surveys and Mitigation Actions (Section 5.4.2) ■ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	■ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Grizzly Bear Management Plan (Section 5.4.5) ■ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Grizzly Bear Management Plan (Section 5.4.5) ■ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-7: Sight-seeing Gondola Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management Plan (Section 5.3.3)
	Clear vegetation along the alignment by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in early spring prior to construction to allow the tower sites to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile)	
Equipment and Materials Transport	Equipment and materials will be transported with the snow cat, truck, or helicopter, depending on road proximity.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Dust suppressants will be applied to roads and traffic areas, as required.	
General Construction	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-7: Sight-seeing Gondola Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Excavation of Station Foundations	Sods and topsoil will be removed first and stored/stockpiled for reclamation in clearly marked locations. Following sod and topsoil salvage, subsoils will be excavated and stored separately. Excavations will be completed either by track hoe, walking backhoe or by hand.	■ Topsoil/Sod Removal and Storage (Section 5.2.1) ■ Reclamation Practices (Section 5.2.3) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
Pouring Station Foundations	Foundations will be formed and poured as early in the season as possible.	■ General Best Management Practices (Section 5.1) ■ Topsoil/Sod Removal and Storage (Section 5.2.1)
Excavation of Tower Site Foundations	Sods and topsoil will be removed first and stored/stockpiled for reclamation in clearly marked locations. Depending on the location of the tower site, sods and topsoil may be stored at the location of salvage or may be relocated to old tower sites of lifts being removed. This may be done by vehicle, snow cat or helicopter, depending on the distance to the desired location. Following sod and topsoil salvage, subsoils will be excavated and stored separately. Excavations will be completed either by track hoe, walking backhoe or by hand.	■ General Best Management Practices (Section 5.1) ■ Topsoil/Sod Removal and Storage (Section 5.2.1) ■ Reclamation Practices (Section 5.2.3) ■ Timber Management Plan (Section 5.3.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
Pouring Tower Site Foundations	Methods will vary depending on access, location, and elevation. Concrete will be flown to each tower site in a synchronous fashion following completion of tower site preparation.	■ Reclamation Practices (Section 5.2.3) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
Station Terminal and Lift Placement	Terminals will be placed by crane. Best results occur under dry conditions. Towers may be placed by crane or helicopter.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)

Table 6.2-7: Sight-seeing Gondola Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of proposed methods for operation and maintenance of the sight-seeing gondola, and associated best management practices are provided in Table 6.2-8.

Table 6.2-8: Sight-seeing Gondola Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Prior to vegetation maintenance activities in the gondola alignment, complete a wildlife sweep survey in the areas of vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-8: Sight-seeing Gondola Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Maintenance	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Dust suppressants will be applied to roads and traffic areas, as required	
Operation	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	
	The sight-seeing gondola will only be open to visitors during daylight hours	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Noisy equipment will be enclosed in buildings, where feasible	

6.2.1.2.4 Alpine Sight-seeing Facility and Restaurant

Construction

A description of mitigation actions and best management practices to be implemented during construction of the alpine sight-seeing facility and restaurant are provided in Table 6.2-9.

Table 6.2-9: Alpine Sight-seeing Facility and Restaurant Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation in the footprint by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in construction footprint in the early spring to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile).	

Table 6.2-9: Alpine Sight-seeing Facility and Restaurant Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Construction	Foundations will be formed and poured as early in the season as possible.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ General Best Management Practices (Section 5.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Use of Excess Soils	Excess soils will be used on-site (e.g., landscaping, further leveling and contouring the existing site).	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the alpine sight-seeing facility and restaurant are provided in Table 6.2-10.

Table 6.2-10: Alpine Sight-seeing Facility and Restaurant Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Dust suppressants will be applied to roads and traffic areas, as required	
Operation	The sight-seeing facility and mountain restaurant will only be open to visitors during daylight hours	
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas and on buildings where site safety is not compromised.	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Noisy equipment will be enclosed in buildings, where feasible	

6.2.1.2.5 Summer Recreation Trails and Access to Backcountry Trailheads

Construction

A description of mitigation actions and best management practices to be implemented during construction of walking, horseback riding, mountain biking, and touring trails and access to backcountry trailheads are provided in Table 6.2-11.

Table 6.2-11: Trail and Access Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-11: Trail and Access Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of walking, horseback riding, mountain biking, and touring trails and access to backcountry trailheads are provided in Table 6.2-12.

Table 6.2-12: Trail and Access Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of trail and access maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas requiring trail or access maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-12: Trail and Access Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Summer recreation trails will only be open to visitors during daylight hours.	
	Summer recreation trails will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2.6 Via Ferrata

Construction

A description of mitigation actions and best management practices to be implemented during construction of the via ferrata are provided in Table 6.2-13.

Table 6.2-13: Via Ferrata Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2)
	Complete a rare plant survey in the areas of vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

Table 6.2-13: Via Ferrata Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the via ferrata and associated best management practices are provided in Table 6.2-14.

Table 6.2-14: Via Ferrata Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-14: Via Ferrata Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Operation	The via ferrata will only be open to visitors during daylight hours.	
	The via ferrata will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2.7 Canyon Swing and Ziplines

Construction

A description of mitigation actions and best management practices to be implemented during construction of the canyon swing and ziplines are provided in Table 6.2-15.

Table 6.2-15: Canyon Swing and Ziplines Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey on the proposed footprints and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation in the footprint by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in construction footprint in the early spring to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile).	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

Table 6.2-15: Canyon Swing and Ziplines Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Construction	Foundations will be formed and poured as early in the season as possible.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ General Best Management Practices (Section 5.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Use of Excess Soils	Excess soils will be used on-site (e.g., landscaping, further leveling and contouring the existing site).	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the canyon swing and ziplines, and associated best management practices are provided in Table 6.2-16.

Table 6.2-16: Canyon Swing and Ziplines Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas requiring vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	The canyon swing, ziplines, and bungee jump will only be open to visitors during daylight hours	
	The canyon swing, ziplines, and bungee jump will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-16: Canyon Swing and Ziplines Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Bighorn Sheep Management Plan (Section 5.4.6) ■ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2.8 Suspension Bridges

Construction

A description of mitigation actions and best management practices to be implemented during construction of the suspension bridges are provided in Table 6.2-17.

Table 6.2-17: Suspension Bridges Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	■ Baseline Surveys and Mitigation Actions (Section 5.4.2)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	■ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey on the proposed footprints and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	■ Key Wildlife and Habitat Considerations (Section 5.4.1) ■ Grizzly Bear Management Plan (Section 5.4.5) ■ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation).	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-17: Suspension Bridges Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation in the footprint by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in construction footprint in the early spring to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile).	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Construction	Foundations will be formed and poured as early in the season as possible.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ General Best Management Practices (Section 5.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-17: Suspension Bridges Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Use of Excess Soils	Excess soils will be used on-site (e.g., landscaping, further leveling and contouring the existing site).	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the suspension bridges, and associated best management practices are provided in Table 6.2-18.

Table 6.2-18: Suspension Bridges Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas requiring vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-18: Suspension Bridges Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety and any nighttime cliff walk and suspension bridge experience is not compromised.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.2.9 Mountain Coaster and Mountain Slides

Construction

A description of mitigation actions and best management practices to be implemented during construction of the mountain coaster and mountain slides are provided in Table 6.2-19.

Table 6.2-19: Mountain Coaster and Mountain Slide Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	▪ Wildlife Corridor Management Plan (Section 5.4.4)
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-19: Mountain Coaster and Mountain Slide Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the mountain coasters and mountain slides, and associated best management practices are provided in Table 6.2-20.

Table 6.2-20: Mountain Coaster and Mountain Slide Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Important Wildlife Feature Management Plan (Section 5.4.10)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Mountain coasters and mountain slides will only be open to visitors during daylight hours	
	Mountain coasters and mountain slides will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-20: Mountain Coaster and Mountain Slide Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.3 Resort Area Projects

6.2.1.3.1 Removal of the Historical Lodge Building

Demolition and Removal

Mitigation actions and applicable best management practices for demolition and removal of the historical lodge building, as described in the Environmental Management Plan above, are presented in Table 6.2-21.

Table 6.2-21: Historical Lodge Building Removal Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Complete baseline surveys to determine the presence of wildlife species at risk (e.g., barn swallow, little brown myotis), sensitive wildlife habitat, and important wildlife habitat features that should be considered during demolition	▪ Key Wildlife and Habitat Considerations (Section 5.4.1 ▪ Little Brown Myotis Management Plan (Section 5.4.8) ▪ Nesting Bird Management Plan (Section 5.4.9)
	Consult with Environment and Climate Change Canada/Alberta Tourism and Sport to develop species-specific mitigation plans, if required.	
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation)	▪ Construction Scheduling and Timing Constraints (Section 5.4.2)
	Activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-decommissioning	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile)	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Equipment and Materials Transport	Transport equipment and other materials with the use of existing access roads	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Dust suppressants will be applied to roads and traffic areas, as required	

Decommissioned Facilities

The old day lodge contains several assets intended to be re-purposed in future projects beyond the scope of the Phase 1 (e.g., stainless steel kitchen equipment, walk-in freezers, sinks, and large wood beams). The structure will be closed from public access and will be used as storage until the items of historical value can be re-used during future renovations and construction. It is possible that this building may be preserved and adaptively re-used, however this initiative is not included in the scope presented here.

6.2.1.3.2 Resort Center Buildings and Attractions

Construction

A description of mitigation actions and best management practices to be implemented during construction of the upper day lodge, operations base, administration and employee housing, climbing wall, learn to mountain bike park, skating rink, all-age playground, net park, Indigenous Cultural Center, event center, Nordic spa, and commercial retail units in the Resort Center (Resort Center buildings and attractions), as described in the Environmental Management Plan above, are provided in Table. 6.2-22.

Table 6.2-22: Resort Center Buildings and Attractions Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Construct Project infrastructure in areas of existing disturbance wherever possible.	▪ General Best Management Practices (Section 5.1)
	Complete baseline surveys to determine potential movement corridors.	▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffer and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation)	▪ Construction Scheduling and Timing Constraints (Section 5.4.2)
	Construction will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation in the footprint by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in construction footprints in the early spring to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile).	
Equipment and Materials Transport	Equipment and materials will be transported with the use of existing access roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Excavation of Footings	Excavated materials will primarily be non-organic because of the site being on an existing disturbed area.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Reclamation Practices (Section 5.2.3)

Table 6.2-22: Resort Center Buildings and Attractions Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Construction	Foundations will be formed and poured as early in the season as possible.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ General Best Management Practices (Section 5.1) ▪ Construction Scheduling and Timing Constraints (Section 5.4.2
Removal of Excess Soils	Excess soils will be used on-site (e.g., landscaping, further leveling and contouring the existing site).	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the Resort Center buildings and attractions, as described in the Environmental Management Plan above, are provided in Table 6.2-23.

Table 6.2-23: Resort Center Building and Attractions Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation)	■ Construction Scheduling and Timing Constraints (Section 5.4.2)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Operation	Directional/shaded lighting and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
Maintenance	Control known weed infestations.	■ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	■ Timber Management Plan (Section 5.3.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
Equipment Transport	Equipment will be transported with the use of existing roads.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.3.3 Beginner Zone, Snow Play Zone, and All-season Tubing Area

Construction

A description of mitigation actions and best management practices to be implemented during construction of the beginner zone, snow play, and tubing area, and associated best management practices, as described in the Environmental Management Plan above, are provided in Table 6.2-24.

Table 6.2-24: Beginner Zone, Snow Play Zone, and All-season Tubing Area Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Construct Project infrastructure in areas of existing disturbance wherever possible.	▪ General Best Management Practices (Section 5.1)
	Complete baseline surveys to determine potential movement corridors.	▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffer and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation)	▪ Construction Scheduling and Timing Constraints (Section 5.4.2)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Equipment and Material Transport	Equipment and material will be transported with the use of existing access roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of proposed methods for operation and maintenance of the beginner zone, snow play zone, and all-season tubing area, and associated best management practices, as described in the Environmental Management Plan above, are provided in Table 6.2-25.

Table 6.2-25: Beginner Zone, Snow Play Zone, and Tubing Area Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation brushing and 100 m buffer and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation)	▪ Construction Scheduling and Timing Constraints (Section 5.4.2)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Operation	Directional/shaded lighting and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
Maintenance	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Equipment Transport	Equipment will be transported with the use of existing access roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.3.4 New Parking Lots and Parking Lot Upgrades

Construction and Upgrading

The parking lots upgrades and construction of the new parking lots during Phase 1 will occur primarily within existing disturbance. A description of mitigation actions and best management practices to be implemented during parking lot upgrades and construction are provided in Table 6.2-26.

Table 6.2-26: Parking Lot Construction and Upgrading Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning and Scheduling	Construct Project infrastructure in areas of existing disturbance wherever possible.	▪ General Best Management Practices (Section 5.1)
	Complete baseline surveys to determine potential movement corridors.	▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of new vegetation disturbance and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of new vegetation disturbance and 100 m buffer and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation)	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Construction Scheduling and Timing Constraints (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Delineate the construction area and construction access routes. Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile)	▪ Reclamation Practices (Section 5.2.3) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Materials Transport	Transport fill, gravel and equipment with the use of existing access roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Grading	Work will occur within areas of previous disturbance.	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Fill and gravel installation	Fill and gravel will be installed by means of dump truck, backhoe and packers.	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Removal of Excess Materials	Excess materials will be removed via existing access.	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

The parking lots will be maintained at a reasonable grade (>1%) to re-establish drainage and reduce the likelihood of stormwater accumulation and subsequent deterioration of the parking lot surface. As the compacted subsoil and gravel is an impermeable surface, stormwater runoff is anticipated from all parking lot infrastructure within the development area.

Salt and other chemicals are not intended to be part of the parking lot snow management practices during winter operations. Gravel and sand will be used to manage traction within parking areas during the winter. As such, sediment is likely to be the largest risk to storm water quality because of parking activities. Storm water will drain into established vegetated dispersion areas. Additional mitigation actions and best management practices for erosion and sediment control in the context of run-off are outlined in Section 5.5.4.

6.2.1.4 Cross-Country Area Projects

6.2.1.4.1 Nighttime Multimedia Walk and Light Show

Construction

A description of mitigation actions and best management practices to be implemented during construction of the nighttime multimedia walk and light show and associated best management practices are provided in Table 6.2-27.

Table 6.2-27: Nighttime Multimedia Walk and Light Show Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the trail footprints and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the trail footprints and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-27: Nighttime Multimedia Walk and Light Show Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Material Transport	Equipment and material will be transported with the use of roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of proposed methods for operation and maintenance of the nighttime multimedia walk and light show, and associated best management practices are provided in Table 6.2-28.

Table 6.2-28: Nighttime Multimedia Walk and Light Show Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	■ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	■ Timber Management Plan (Section 5.3.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5) ■ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety and the nighttime multimedia walk and light show experience is not compromised.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Material Transport	Equipment and material will be transported with the use of roads.	■ General Best Management Practices (Section 5.1) ■ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas.	■ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ■ Wildlife Corridor Management Plan (Section 5.4.4) ■ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required.	

6.2.1.4.2 Aerial Obstacle Course

Construction

A description of mitigation actions and best management practices to be implemented during construction of the aerial obstacle course are provided in Table 6.2-29.

Table 6.2-29: Aerial Obstacle Course Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of grading and vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-29: Aerial Obstacle Course Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the aerial obstacle course and tree top journey, and associated best management practices are provided in Table 6.2-30.

Table 6.2-30: Aerial Obstacle Course and Tree Top Journey Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of maintenance that were determined to be suitable for rare plants during the pre-construction survey and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of vegetation maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-30: Aerial Obstacle Course and Tree Top Journey Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	The aerial obstacle course will only be open to visitors during daylight hours	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	The aerial obstacle course will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Materials Transport	Equipment and materials will be transported with the use of helicopter, existing roads, and/or the sight-seeing gondola.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Bighorn Sheep Management Plan (Section 5.4.6) ▪ Mountain Goat Management Plan (Section 5.4.7)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.4.3 Summer and Winter Recreation Trails

Construction

A description of mitigation actions and best management practices to be implemented during construction of summer and winter recreation trails in the cross-country area and associated best management practices are provided in Table 6.2-31.

Table 6.2-31: Summer and Winter Recreation Trail Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the trail footprints and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the trail footprints and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	▪ Wildlife Corridor Management Plan (Section 5.4.4)
Construction	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	

Table 6.2-31: Summer and Winter Recreation Trail Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Equipment and Material Transport	Equipment and material will be transported with the use of roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of proposed methods for operation and maintenance of summer and winter recreation trails in the cross-country area, and associated best management practices are provided in Table 6.2-32.

Table 6.2-32: Cross-Country Area Trail Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Complete a rare plant survey in the areas of trail maintenance that may be suitable for rare plants and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas requiring trail maintenance and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	

Table 6.2-32: Cross-Country Area Trail Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Summer and winter recreation trails will only be open to visitors during daylight hours.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Summer and winter recreation trails will not be lit.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Equipment and Material Transport	Equipment and material will be transported with the use of roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.2.1.4.4 Cross-Country Area Buildings and Attractions

Construction

A description of mitigation actions and best management practices to be implemented during construction of the cross-country day lodge, net park, mini golf course, net park, and other attractions in the cross-country area (cross-country buildings and attractions) are provided in Table 6.2-33.

Table 6.2-33: Cross-Country Area Buildings and Attractions Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Construct Project infrastructure in areas of existing disturbance wherever possible.	▪ General Best Management Practices (Section 5.1)
	Evaluate the potential for direct and indirect disturbance to waterbodies and watercourses through desktop mapping and where necessary field surveys. If an interaction with waterbodies or watercourses is identified then Best Management practices apply.	▪ Setback Criteria and Authorizations (Section 5.5.2) ▪ Working Near Water (Section 5.5.3) ▪ Run-off and Sediment Control (Section 5.5.4)
	Complete baseline surveys to determine the presence of wildlife species at risk, sensitive wildlife habitat, and important wildlife habitat features that should be avoided during Project planning and design.	▪ Baseline Surveys and Mitigation Actions (Section 5.4.2) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Complete a rare plant survey in the areas of grading and vegetation removal and determine appropriate mitigation actions for listed plants in the vicinity of the development.	▪ Listed Species Avoidance and Mitigation Actions (Section 5.3.2)
	Complete a wildlife sweep survey in the areas of new vegetation clearing and 100 m buffers and determine appropriate mitigation actions for sensitive wildlife features found in the vicinity of the development.	▪ Key Wildlife and Habitat Considerations (Section 5.4.1) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Schedule construction to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Construction activities will occur only between 7:00 a.m. and 7:00 p.m.	
Pre-installation	Control known weed infestations prior to construction.	▪ Weed Management (Section 5.3.3)
	Clear vegetation in the footprint by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ General Best Management Practices (Section 5.1) ▪ Topsoil/Sod Removal and Storage (Section 5.2) ▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Remove snow in construction footprints in the early spring to allow the site to thaw and dry out.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Erosion Prone Soils (Section 5.2.2) ▪ Reclamation Practices (Section 5.2.3)
	Identify material storage areas in existing disturbed sites or on protected undisturbed sites (e.g., separated from the ground with geo-textile).	
Equipment and Materials Transport	Equipment and materials will be transported with the use of roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required.	

Table 6.2-33: Cross-Country Area Buildings and Attractions Construction Mitigation Actions and Applicable Best Management Practices

Construction Phase	Mitigation Actions	Applicable Best Management Practices
Excavation of Footings	Excavated materials will primarily be non-organic because of the site being on an existing disturbed area.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ Reclamation Practices (Section 5.2.3)
Construction	Foundations will be formed and poured as early in the season as possible.	▪ Topsoil/Sod Removal and Storage (Section 5.2.1) ▪ General Best Management Practices (Section 5.1)
	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	All construction equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Use of Excess Soils	Excess soils will be used on-site (e.g., landscaping, further leveling and contouring the existing site).	▪ Reclamation Practices (Section 5.2.3) ▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
Reclamation of Temporary Disturbances	Revegetation will be preferentially undertaken with the use of sods and localized organic matter. Seeding may be required in areas with a lack of topsoil or available organic materials.	▪ Reclamation Practices (Section 5.2.3) ▪ Revegetation and Seed Mixes (Section 5.3.4) ▪ Revegetation Monitoring Plan (Section 5.3.5) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)

Operation and Maintenance

A description of mitigation actions and best management practices to be implemented during operation and maintenance of the cross-country area buildings and attractions are provided in Table 6.2-34.

Table 6.2-34: Cross-Country Area Building and Attractions Operation and Maintenance Mitigation Actions and Applicable Best Management Practices

Operation or Maintenance Phase	Mitigation Actions	Applicable Best Management Practices
Planning, Design, and Scheduling	Schedule maintenance activities to avoid wildlife sensitive periods (e.g., nesting, hibernation).	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4)
	Maintenance activities will occur only between 7:00 a.m. and 7:00 p.m.	
Maintenance	Control known weed infestations.	▪ Weed Management (Section 5.3.3)
	Clear vegetation by hand, with the use of machinery, or by a combination of both methods depending on the density of vegetation, access, and location.	▪ Timber Management Plan (Section 5.3.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	All maintenance equipment and vehicle internal combustion engines will be outfitted with well-maintained muffler systems.	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5) ▪ Wildlife Conflict Management Plan (Section 5.4.11)
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy.	
Operation	Directional lighting, shaded lights, red lights, and/or reduced lighting will be installed in peripheral areas where site safety is not compromised.	
	Lights will be turned off between 7:00 p.m. and 7:00 a.m., where possible and where safety is not compromised.	
	Implement and enforce a no harassing, feeding, or approaching wildlife policy, which includes fruit tree restrictions.	
	Implement and enforce a waste management policy, which includes storage of waste in bear-proof containers prior to disposal at an appropriate facility.	
	Noisy equipment will be enclosed in buildings, where feasible.	
Equipment and Material Transport	Equipment and material will be transported with the use of existing roads.	▪ General Best Management Practices (Section 5.1) ▪ Key Wildlife and Habitat Considerations (Section 5.4.1)
	Speed limits will be established and enforced on roads and traffic areas	▪ Sensory Disturbance Management and Timing Constraints (Section 5.4.3) ▪ Wildlife Corridor Management Plan (Section 5.4.4) ▪ Grizzly Bear Management Plan (Section 5.4.5)
	Dust suppressants will be applied to roads and traffic areas, as required	

6.3 Future Phases

The potential effects and mitigation of effects from the construction and operation and maintenance of future attractions and other infrastructure will be assessed and developed once details about the development are known. Appropriate baseline field studies and mitigation actions, such as pre-construction/pre-maintenance surveys, will be determined based on factors such as component location (e.g., located in a disturbed or undisturbed area), footprint size, sensory disturbance effects (e.g., lit overnight), and construction requirements (e.g., excavation requirements).

7 SUMMARY AND CONCLUSIONS

Environmental management and stewardship of the Resort is based on a comprehensive environmental baseline description of the Lease, which includes a literature review and biophysical inventory (terrain, soils, vegetation and wildlife) through field data collection in 2018 and analyses of these data. Best management practices are described for each biophysical resource, as well as the application of these practices to each of the development components. These practices are generally recognized as meeting standards for federally regulated all-season developments and ski developments in the Rocky Mountain national parks, as well as provincial standards for developments in Alberta.

Following approval to proceed with the development plan, environmental baseline surveys, monitoring, and reporting will form part of the pre-construction, construction, operation, and maintenance protocols, in consultation with Alberta Sports and Tourism.

Signature Page

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LD/KS

https://wsponlinecan.sharepoint.com/sites/ca-2025ca453096/shared documents/06. deliverables/2025 ea/rev1/ca0058874.3096 fmr environmentalassessment_rev1.docx

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APPENDIX A

Existing Approvals, Licences and Authorizations

Alberta

ENVIRONMENT

LICENCE
to DIVERT AND USE WATER

Pursuant to Sections 11 and 33
THE WATER RESOURCES ACT

File No 12562

Priority No 1968-10-30-01

Purpose Municipal

Drainage Basin Bow River

First Issued 1982 23

Fortress Mountain Resorts Ltd.
c/o Howard, Mackie
Barristers and Solicitors
300, One Calgary Place
330, 5th Avenue, S.W.
Calgary, Alberta
T2P 0L4

TRANSFER RECORDED
CONTROLLER OF WATER RESOURCES
SEE LETTER DATED 1987-05-11

HAVING COMPLIED with the applicable provisions of The Water Resources Act and the regulations thereunder and Interim Licence No 6298 a copy of which is attached hereto and incorporated herein

IS HEREBY GRANTED LICENCE to divert and use the quantities of water prescribed in the Interim Licence in accordance with and subject to all other applicable provisions of that Act and the regulations thereunder, and the terms and conditions attached hereto and incorporated herein at locations described in the Interim Licence

BY MEANS AND THROUGH works and undertakings described in the Interim Licence

1982 23

Alberta
ENVIRONMENT

UPDATED AND RE-ISSUED

INTERIM LICENCE

Pursuant to Section 18
THE WATER RESOURCES ACT

Issued to: Fortress Mountain Resorts Ltd.
c/o Howard, Mackie
Barristers and Solicitors
300, One Calgary Place
330, 5th Avenue S.W.
Calgary, Alberta T2P 0L4

No. 6298

File No. 12562

Priority No. 1968-10-30-01

This updated and re-issued Interim Licence particularizes the rights, privileges and obligations embodied in and associated with the original Interim Licence as numbered above, or with any other form of authorization or approval issued in connection with the project identified herein under any former applicable Act or regulation, and updates same to conform to and comply with the current Act, regulations and standards.

In particular this Interim Licence provides for the right to

A. Construct, maintain and operate works as shown on current plans and reports filed, approved and identified in departmental records as:

12562-1 General and Detail Plan
12562-2 Key Plan and Water Supply Layout

B. Divert and use water as hereinafter specified and described subject to the terms and conditions attached hereto and incorporated herein:

PURPOSE: Municipal (Urban Water Supply)

SOURCE OF SUPPLY: Coulee tributary to Galatea Creek

POINT OF DIVERSION: NE 32-21-9-5

GROSS DIVERSION: Up to 80.0 acre-feet annually consisting of:

1. Estimated Consumptive Use 80.0 acre-feet
2. Estimated Losses Ni
3. Estimated Return Flow: Nil

RESERVOIR CAPACITY 0.54 acre-feet

Date first issued 1968 12 05

Date re-issued 1982 11 23

First issued to Kanaka Holdings Lt

Original—Department
Copy—Licensee

WR 2A (Aug/82)

File: 12562

TERMS AND CONDITIONS INTERIM LICENCE NO. 6298

1 The licensee shall provide facilities for the release of water to riparians and prior licensees when requested to do so by the Controller of Water Resources.

2. The licensee is responsible for the operation and maintenance of the works and for any damages that may result therefrom.

3. The licensee shall submit an annual water use return to the Controller of Water Resources, Alberta Environment on or before January 31st in each year for the preceding calendar year showing:

periods and rates of diversion;

the total annual quantity of water diverted;

(c) the total annual quantity of water returned;

4. The rights and privileges hereby granted are subject to periodic review and to modification to ensure the most beneficial use of the water in the public interest and more particularly to ensure preservation of the rights of other water users.

5. The rights and privileges hereby granted can only be extended or modified with the approval of the Controller of Water Resources and are subject to cancellation or modification as provided in the Water Resources Act.

6. Following completion of the works herein authorized this interim licence and its terms and conditions shall be attached to and become part of the licence to use water issued under the provisions of Section 33 of the Water Resources Act.

1982 11 23
Dated at Edmonton

Alberta Environment and Parks

APPROVAL
PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO.: 370469-00-00

APPLICATION NO.: 001-370469

EFFECTIVE DATE: , 2017

EXPIRY DATE: , 2027

APPROVAL HOLDER: Fortress Mountain Holdings Ltd.

ACTIVITY: Construction, operation and reclamation of a waterworks system for the Fortress Mountain Resort Waterworks System

is subject to the attached terms and conditions.

Designated Director under the Act

Randy Poon, P.Eng.

Date Signed , 2017

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) "alternate program" means the Alternate Laboratory Data Quality Assurance Program, as detailed in the Department's *Laboratory Data Quality Assurance Policy Procedures and Guidelines*;

(c) "approved laboratory" means laboratory accredited to the requirements of ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories,* for the drinking water tests methods specified by the Director;

(d) "as-built engineering drawings" means the drawings used in construction that have been updated to record what was actually built;

(e) "bacteriological analysis" means the analysis of water for the presence of *E. coli* or total coliforms;

(f) "chemical" means any substance that is added or used as part of the treatment process;

(g) "chlorine residual" means free chlorine, or combined chlorine or total chlorine;

(h) "clearwell" means a reservoir for the storage of filtered water of sufficient capacity to prevent the need to vary the filtration rate with variations in demand. May also be used to provide chlorine contact time for disinfection;

(i) "contact time" ("T_{10}") means the time taken in minutes for 10% of the water to pass through the particular process unit;

(j) "continuous monitoring" means flow measurement or sample analysis through in-line equipment that creates flow measurements or frequent, discrete sample analysis output and includes a data recorder;

(k) "CT" means disinfectant residual in mg/L multiplied by the contact time;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(l) "$CT_{lowest\ actual}$" means the lowest CT calculated in a particular day:

$$CT_{\ lowest\ actual} = C \times \frac{T_{10}}{T} \times \frac{V_{min}}{Q_{peak}}$$

Where: C = lowest recorded daily free chorine residual concentration (in milligrams per litre) at the point T_{10} is measured;

$\frac{T_{10}}{T}$ = 0.1; OR

Varies based on the empirical method using typical baffling conditions as per Appendix D in the Standards and Guidelines Document; OR

Varies based on a tracer study, where

T_{10} = the contact time established from the most recent tracer study; and

T = the calculated contact time, assuming no short-circuiting and obtained by dividing the treated water chlorine contact storage volume that was used to determine $T_{10,}$ by the flow that was used to determine T_{10};

V_{min} = the daily minimum volume (in Litres) of water in the clearwell;

Q_{peak} = maximum recorded hourly flow (Litres per minute) or twice the daily average flow (Litres per minute)

(m) "$CT_{required}$" means the CT required to demonstrate the specified Log reduction of *Giardia* cysts and / or viruses as specified in Appendix A or Appendix B of the "Standards and Guidelines Document";

(n) "$CT_{performance\ ratio}$" means $CT_{lowest\ actual}$ / $CT_{required;}$;

(o) "day" means calendar day;

(p) "design capacity" means the production capacity for which the waterworks system was designed, as stated in the engineering drawings and specifications for the waterworks system;

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(q) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(r) "disinfectant residual" means total concentration of disinfectant in water;

(s) "disinfection" means a chemical or physical process of treating water to inactivate microorganisms;

(t) "*E. coli*" means *Escherichia coli* bacteria;

(u) "electronic reporting" means submitting monitoring results to the Director as required in this approval, electronically through the secure internet website provided by Environment and Parks at http://aep.alberta.ca/water/programs-and-services/drinking-water/knowledge/drinking-water-quality-information-electronic-submissions/default.aspx;

(v) "GCDWQ" means the *Guidelines for Canadian Drinking Water Quality*, published by Health Canada, as amended;

(w) "grab", when referring to a sample, means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(x) "ISO/IEC" means the International Organization for Standardization / the International Electrotechnical Commission;

(y) "Log reduction" means the base 10 logarithm of the ratio of raw water concentrations divided by the treated water concentration of total *Giardia* cysts, *Cryptosporidium* oocysts or viruses;

(z) "MAC" means the Maximum Acceptable Concentration, specified in the GCDWQ for a particular parameter;

(aa) "PWR" means the *Potable Water Regulation*, as amended;

(bb) "produced water" means all water that has gone through treatment and has entered the water piping system;

(cc) "Provincial Laboratory of Public Health" means:

(i) the Environmental Microbiology Provincial Laboratory of Public Health, University of Alberta Hospital, Edmonton, Alberta, or

(ii) the Provincial Laboratory of Public Health, Foothills Hospital, Calgary, Alberta;

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(dd) "raw water" means untreated source water from water wells, surface water intakes or infiltration galleries that constitute the water supply;

(ee) "regulations" means the regulations enacted pursuant to the Act and as amended;

(ff) "Standards and Guidelines Document" means the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*, published by the Alberta Environment, as amended;

(gg) "User Agreement" means the *Drinking Water Quality User Agreement* signed by the approval holder and the Director; and

(hh) "UV" means ultraviolet light.

PART 2: GENERAL PROVISIONS

SECTION 2.1: GENERAL

2.1.1 The approval holder shall comply with all conditions in this approval.

2.1.2 Any conflict between the approval application and the terms and conditions of this approval shall be resolved in favour of this approval.

2.1.3 The terms and conditions of this approval do not affect any rights or obligations created under any other authorization issued by the Department.

2.1.4 The approval holder shall carry out all electronic reporting, or cause all electronic reporting to be carried out in accordance with the User Agreement.

2.1.5 The approval holder shall comply with the terms and conditions of the User Agreement.

2.1.6 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.1.7 If the approval holder monitors for any substances or parameters, which are the subject of limits in this approval more frequently than is required, using procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the next reports required by this approval.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 3: PLANNING, CONSTRUCTION AND / OR UPGRADING REQUIREMENTS

SECTION 3.1: PLANNING

3.1.1 The approval holder shall complete a Drinking Water Safety Plan of the waterworks system by May 1, 2018.

3.1.2 The *Drinking Water Safety Plan* in 3.1.1 shall:

(a) identify potential risks to the waterworks system including, but not limited to risks associated with the following:

(i) the source of raw water,

(ii) the treatment processes associated with the water treatment plant,

(iii) the distribution of treated water within the water piping system,

(iv) the consumer's premises located on the waterworks system; and

(b) prescribe appropriate measures to control and/or reduce such risks to the waterworks system

in accordance with the requirements in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems; Part 1 Standards for Municipal Waterworks* (2012), as amended.

3.1.3 The *Drinking Water Safety Plan* in 3.1.1 shall utilize the *Drinking Water Safety Plan* template located at http://www.environment.alberta.ca/apps/regulateddwq/dwsp.aspx unless otherwise authorized in writing by the Director.

3.1.4 The approval holder shall:

(a) maintain; and

(b) update the *Drinking Water Safety Plan*

at least once per calendar year in every year following May 1, 2018.

SECTION 3.2: CONSTRUCTION

3.2.1 The approval holder shall construct the waterworks system in accordance with the application, plans and specifications submitted to the Director on August 18, 2015 unless otherwise specified in this approval.

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3.2.2 The approval holder shall notify the Director in writing upon commencement of the waterworks operation.

3.2.3 The approval holder shall notify the Director in writing that any previous waterworks system components have been disconnected in accordance with the information submitted to the Director dated May 27, 2016 including details on the following:

(a) chemicals,

(b) piping, and

(c) structures.

3.2.4 The notification in 3.2.3 shall be:

(a) signed and stamped by a professional engineer, and

(b) submitted prior to the commissioning of the waterworks system in 3.2.2.

3.2.5 If a MAC specified in the *GCDWQ* is changed or a new limit MAC is added in the *GCDWQ and the waterworks system will be unable to meet the new or revised* MAC*,* then the approval holder shall make application to the Director to upgrade the waterworks system such that the waterworks system will be able to meet the new or revised MAC within five (5) years of the date the new or revised guideline was published.

PART 4: OPERATIONAL REQUIREMENTS

SECTION 4.1: WATERWORKS SYSTEM

4.1.1 The approval holder shall:

(a) operate; and

(b) maintain

a waterworks system which shall include all of the following:

(i) a source consisting of:

(A) surface water from tributary to Galatea Creek;

(ii) raw water storage,

(iii) a water treatment plant consisting of:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(A) coagulation and flocculation,

(B) clarification,

(C) rapid sand filtration unit(s),

(D) disinfection by chlorination, and

(E) disinfection by UV light;

(iv) a clearwell, and

(v) a treated water piping system serving the Fortress Mountain Resort.

4.1.2 On or before May 1, 2018, the approval holder shall develop a waterworks system *Operations Program* that shall include, at a minimum, all of the information in SCHEDULE 1 of this approval.

4.1.3 The approval holder shall update the *Operations Program* at least on an annual basis.

4.1.4 Where the first sample of a sampling event pursuant to 5.1.1 is less than the chlorine residual (Secondary Disinfection) limit in SCHEDULE 3, the approval holder shall:

(a) immediately flush the piping line in the vicinity of the sample;

(b) resample and analyze the chlorine residual at the same location;

(c) resample and analyze the chlorine residual from:

(i) a minimum distance of 1 service connection upstream, and

(ii) a minimum distance of 1 service connection downstream

where each location is no closer than 100 m and no further than 500 m from the location of the first sample; and

(d) in the event that any of the resample results are less than the limit in SCHEDULE 3 the approval holder shall report as per 6.1.1 and continue to take corrective action.

4.1.5 Where any sample of a sampling event pursuant to 5.1.1 exceeds the turbidity limit in SCHEDULE 3, the approval holder shall:

(a) immediately divert the water from entering the clearwell until the water does not exceed the turbidity limit in SCHEDULE 3; or

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(b) in the event that the water has entered the clearwell then:

(i) immediately divert all the water from the clearwell to waste, and

(ii) continue to divert to waste until all the water that exceeded the turbidity limit in SCHEDULE 3 has been flushed from the clearwell; or

(c) report in accordance with 6.1.1.

4.1.6 Where any sample of a sampling event pursuant to 5.1.1:

(a) is less than the UV sensor reading in SCHEDULE 3 for the UV reactor;

(b) exceeds the flow limit in SCHEDULE 3 for the UV reactor; or

(c) is less than the UV transmittance of filtered water limit in SCHEDULE 3 entering the UV reactor

the approval holder shall:

(i) immediately divert all the water from the clearwell, and

(ii) continue to divert until all the water that:

(A) is less than the UV sensor reading in SCHEDULE 3 for the UV reactor,

(B) exceeded the flow limit in SCHEDULE 3 for the UV reactor, or

(C) was less than the UV transmittance of filtered water limit in SCHEDULE 3 entering the UV reactor

so that no more than:

(I) 1% of water in a month, and

(II) 2% of water in a day

passes through the UV reactor without the required level of UV dose being applied; or

(d) report in accordance with 6.1.1.

4.1.7 The approval holder shall maintain positive pressure at all points throughout the water piping system.

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SECTION 4.2: FACILITY CLASSIFICATION AND CERTIFIED OPERATOR REQUIREMENTS

FACILITY CLASSIFICATION

4.2.1 The water treatment facility in this approval is classified as Class II in accordance with the *Water and Wastewater Operators' Certification Guidelines*.

CERTIFIED OPERATOR

4.2.2 At all times the operation of the waterworks system shall be performed by, or under the direction of, a person who holds a valid Level II (or higher) Water Treatment Operators Certificate.

SECTION 4.3: PERFORMANCE LIMITS

POTABLE WATER QUALITY STANDARDS

4.3.1 All produced water shall meet the Treated Water Limits specified in SCHEDULE 3.

4.3.2 At all times, the disinfection and filtration, together, shall achieve:

(a) a total 4-Log reduction for viruses; and

(b) a total 5.5-Log reduction for *Giardia* and *Cryptosporidium (sp)*

as specified in Table 4.3.

TABLE 4.3: Available Log Reduction Credits of *Giardia* Cysts, *Cryptosporidium* Oocysts and Viruses

WATER TREATMENT PROCESS	SYSTEM PERFORMANCE	LOG REDUCTION CREDIT		
		Cryptosporidium	***Giardia***	**Viruses**
Rapid Sand Filtration	As per SCHEDULE 3	3.0	3.0	0
UV Disinfection		3.0	3.0	0
Chlorine Disinfection		0	0	4.0
Total Log Reduction Credit		6.0	6.0	4.0

4.3.3 In addition to compliance with the limits specified in SCHEDULE 3, the produced water shall comply with the *Potable Water Quality* requirements of the *Potable Water Regulation,* as amended, for those parameters specified in SCHEDULE 4, and any parameters added to the GCDWQ.

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SECTION 4.4: CHEMICALS USED

4.4.1 The approval holder shall not add any substance, material or compound to water being treated to be potable unless the substance, material or compound:

(a) conforms to American National Standards Institute and National Sanitation Foundation ANSI/NSF Standard 60 or Standard 61; or

(b) is certified for potable use by an agency accredited to the requirements of ISO/IEC 9000 and ISO/IEC 14001; and

(c) is added in a dosage that does not exceed the dosage specified as Maximum Use; or

(d) as otherwise authorized in writing by the Director.

SECTION 4.5: WASTE STREAM

4.5.1 Waste streams shall be released only as follows:

(a) filter backwash shall be discharged to the backwash pond;

(b) filter-to-waste shall be discharged to the backwash pond;

(c) sanitary wastewater shall be discharged to the wastewater system; and

(d) any other waste stream shall be discharged as authorized in writing by the Director.

PART 5: MONITORING REQUIREMENTS

SECTION 5.1: MONITORING

5.1.1 The approval holder shall monitor the waterworks system in accordance with:

(a) SCHEDULE 2; and

(b) SCHEDULE 3.

SECTION 5.2: DATA QUALITY ASSURANCE

5.2.1 With respect to any monitoring required pursuant to this approval, all samples shall be:

(a) collected;

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(b) preserved;

(c) stored;

(d) handled; and

(e) analysed in accordance with:

(i) the *Standard Methods for the Examination of Water and Wastewater*, published by the American Public Health Association, the American Waterworks Association and the Water Environment Federation, as amended or replaced from time to time, or

(ii) a method authorized in writing by the Director.

5.2.2 Any analysis of a sample required pursuant to this approval shall be done only in an approved laboratory or in a laboratory that complies with the Department's alternate program.

5.2.3 Data results of the on-line or continuous monitoring equipment must be validated to ensure that the results reflect the actual quality of the water and are not an electronic or meter spike by direct or indirect means.

5.2.4 Any analysis for treated water bacteriological quality required pursuant to this approval shall be conducted by the Provincial Laboratory for Public Health.

PART 6: REPORTING REQUIREMENTS

SECTION 6.1: CONTRAVENTION REPORTING

6.1.1 In addition to any other reporting required pursuant to this approval, the Act, or the regulations, the approval holder shall immediately report to the Director any contravention of this approval, either:

(a) by telephone at 1-780-422-4505; or

(b) by a method:

(i) in compliance with the release reporting provisions in the Act and the regulations, or

(ii) as authorized in writing by the Director.

6.1.2 In addition to any other reporting required pursuant to this approval, the Act, or the regulations, the approval holder shall immediately report to the Director by a method

TERMS AND CONDITIONS ATTACHED TO APPROVAL

specified in 6.1.1, any structural or equipment malfunction in the waterworks system that may affect the quality or supply of potable water.

6.1.3 In addition to the immediate reporting in 6.1.1, the approval holder shall provide a report to the Director:

(a) in writing; or

(b) by a method:

(i) in compliance with the release reporting provisions in the Act and the regulations, or

(ii) authorized in writing by the Director

within seven (7) calendar days after the discovery of the contravention, or within another time period specified in writing by the Director, unless the requirement for the report is waived by the Director.

6.1.4 The report required in 6.1.3 shall contain, at a minimum, the following information:

(a) a description of the contravention;

(b) the date of the contravention;

(c) the duration of the contravention;

(d) the legal land description of the location of the contravention;

(e) an explanation as to why the contravention occurred;

(f) a summary of all preventive measures and actions that were taken prior to the contravention;

(g) a summary of all measures and actions that were taken to mitigate any effects of the contravention;

(h) a summary of all measures that will be taken to address any remaining effects and potential effects related to the contravention;

(i) the number of the approval issued under the Act for the waterworks system, and the name of the approval holder who held the approval at the time the contravention occurred;

(j) the name, address, phone number and responsibilities of all persons operating the waterworks system at the time the contravention occurred;

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(k) the name, address, phone number and responsibilities of all persons who had charge, management or control of the waterworks system at the time that the contravention occurred;

(l) a summary of proposed measures that will prevent future contraventions, including a schedule of implementation for these measures;

(m) any information that was maintained or recorded under this approval, as a result of the incident; and

(n) any other information required by the Director in writing.

6.1.5 Where a bacteriological quality sample shows the presence of:

(a) total coliform; or

(b) *E. Coli*

in addition to any reporting or other requirements pursuant to the Act, or the Regulations, the approval holder shall carry out the corrective actions set out in the *Communication and Action Protocol for Failed Bacteriological Results in Drinking Water for Waterworks Systems Authorized under the Environmental Protection and Enhancement Act*, August 2009, entered into by Alberta Environment, Alberta Health Services, Alberta Health and Wellness and Health Canada, as amended.

6.1.6 Where a sample does not meet the Maximum Acceptable Concentration as specified in the GCDWQ for one or more of the physical, inorganic, organic chemical or pesticide parameters in SCHEDULE 4, in addition to any reporting or other requirements pursuant to the Act, or the Regulations, the approval holder shall carry out the corrective actions set out in the *Action Protocol for Exceedances of Chemical Health Parameters in Drinking Water*, Alberta Environment, August 2009, as amended.

SECTION 6.2: MONTHLY REPORTING

6.2.1 The approval holder shall compile and retain monthly reports at the water treatment plant.

6.2.2 The monthly report in 6.2.1 shall include, at a minimum:

(a) the name, telephone and fax numbers of all certified operators;

(b) the analytical results for all parameters required to be monitored in accordance with this approval during the month;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) the locations of all sampling performed during the month in accordance with this approval;

(d) the name and manufacturer of all treatment chemicals added during the month, and each manufacturer as listed by the certified agency that tested the chemical to ANSI/NSF Standard 60 or Standard 61;

(e) the results of all required monitoring and measurements conducted during the month in accordance with this approval; and

(f) a description of any problems experienced, and corrective actions taken at the waterworks system during the month, including all actions taken as per 4.1.4 through 4.1.6.

SECTION 6.3: ANNUAL REPORTING

6.3.1 In addition to any other reporting required under the Act, the regulations and this approval, the approval holder shall compile an annual report, by February 28 of the year following the calendar year in which the information on which the report is based was collected.

6.3.2 Unless otherwise notified in writing by the Director, the approval holder shall submit to the Director the annual report in 6.3.1, by February 28 of the year following the calendar year in which the information on which the report is based was collected.

6.3.3 The annual report in 6.3.1 shall contain, at a minimum, all of the following information:

(a) a summary of the monthly reports, specifying the monthly minimum, average, and maximum results for each parameter monitored, excluding bacteriological results, for each month;

(b) a summary of the total volume of treated water, for each month;

(c) a summary of the number, sampling dates and analytical results of the bacteriological samples analyzed for each month;

(d) the results of any other compliance monitoring done during the year pursuant to this approval, that was not included in any monthly report;

(e) a description of any problems experienced, and corrective actions taken at the waterworks system during the year; and

(f) any changes to the *Operations Program*.

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SECTION 6.4: ELECTRONIC REPORTING

6.4.1 The approval holder shall submit periodic reports to the Director:

(a) in an electronic format; and

(b) with the following frequency:

(i) monthly, to the Director on or before the end of the month following the month in which the information on which the report is based was collected,

(ii) annually, to the Director on or before February 28 of the year following the year in which the information on which the report is based was collected, or

(iii) as specified in writing by the Director.

PART 7: RECORD KEEPING REQUIREMENTS

SECTION 7.1: GENERAL

7.1.1 The approval holder shall:

(a) record the following information; and

(b) maintain and retain the following records for five (5) years from the date the record was created:

(i) bacteriological analysis results,

(ii) daily records, including but not limited to:

(A) flow meter readings,

(B) chlorine concentrations,

(C) treatment chemical dosages, and

(D) all the requirements of SCHEDULE 3 specific to daily monitoring

required under this approval;

(iii) all monthly reports required under this approval, and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iv) records of action taken by the approval holder to correct contraventions of the limits in SCHEDULE 3, including the following information for each contravention:

(A) name and address of the person who discovered the contravention, and

(B) copies of all notifications to the public.

7.1.2 The approval holder shall retain the following records for the life of the waterworks system:

(a) the *Operations Program*;

(b) copies of all:

(i) applications submitted to the Department for an approval regarding the waterworks system which includes, but are not limited to:

(A) correspondence, and

(B) drawings;

(ii) project reports,

(iii) engineering drawings and specifications issued for approved construction,

(iv) as-built engineering drawings,

(v) reports of inspections conducted by the Department,

(vi) correspondence and written notifications sent to the Department regarding a proposed extension of a water piping system, replacement of a portion of a water piping system, expansion or modification of potable water storage within the water piping system,

(vii) approvals issued under the Act for the waterworks system,

(viii) annual reports, and

(ix) reports prepared pursuant to 6.1.3 and 6.1.4; and

(c) all physical, organic and inorganic chemical and pesticide analytical results required pursuant to this approval, excluding daily monitoring.

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7.1.3 The results and records in 7.1.1(b) shall contain, at a minimum, all of the following information:

(a) the date, location and time of monitoring, and the name of the person collecting the sample;

(b) identification of the sample type, including, but not limited to whether the sample is taken as required in the approval, a repeat sample, a source or potable water sample, or other special purpose sample;

(c) date of analysis;

(d) laboratory name and person responsible for performing analysis;

(e) the analytical method used; and

(f) the results of the analysis.

7.1.4 The approval holder shall immediately provide any records, reports or data required under this approval to the Director or an inspector, upon request.

PART 8: RECLAMATION REQUIREMENTS

SECTION 8.1: GENERAL

8.1.1 Where the land surface has been disturbed during construction, expansion, modification or repair of any portion of a waterworks system, reclamation of the land surface to equivalent land capability shall be performed following the construction, expansion, modification or repair, in accordance with the Standards and Guidelines Document.

8.1.2 Within six months after the waterworks system, or a portion of the waterworks system, permanently ceases operation, the approval holder shall submit a reclamation plan to the Director for the portion of the waterworks system that is no longer in operation.

8.1.3 The approval holder shall not commence reclamation of the waterworks system until that person has received an amendment to this approval from the Director for the reclamation.

DATED _____, 2017

_____
DESIGNATED DIRECTOR UNDER THE ACT
RANDY POON, P.ENG.

SCHEDULE 1
Fortress Mountain Resort Waterworks System
OPERATIONS PROGRAM

1) Routine Operational Procedures, which shall, at a minimum, include:

   (a) contact name and telephone numbers for the waterworks system owner, waterworks system operator, engineering consultants and equipment suppliers;

   (b) operating instructions:

      (i) general description of treatment process and operating procedures,

      (ii) performance requirements, and

      (iii) location of equipment major controls;

   (c) general maintenance schedule;

   (d) general maintenance instructions for:

      (i) treatment / process equipment,

      (ii) monitoring equipment,

      (iii) pumping equipment,

      (iv) chlorine disinfection equipment,

      (v) UV disinfection equipment,

      (vi) rapid sand filter cleaning; and

   (e) the schedule and procedures for cleaning and flushing of the water piping system, including potable water storage reservoirs.

2) Routine Operational Procedures for Monitoring and Analysis, which shall, at a minimum, include:

   (a) operational and compliance tests to be performed;

   (b) bacteriological quality monitoring plan;

   (c) methods used for monitoring and analysis;

   (d) locations of monitoring points;

   (e) laboratory data quality assurance information;

SCHEDULE 1
Fortress Mountain Resort Waterworks System
OPERATIONS PROGRAM

3) *Emergency Response Plan* which shall at a minimum, include:

(a) steps to be taken in the event of the following:

(i) bacteriological results exceeding the prescribed limits,

(ii) turbidity exceeding the limits,

(iii) chemical overfeed,

(iv) no chemical or coagulant feed,

(v) low chlorine residual,

(vi) equipment breakdown,

(vii) UV disinfection equipment breakdown,

(viii) flood,

(ix) water piping system pipeline break and repair, and the return of the pipeline to service,

(x) power failure,

(xi) the waterworks system becoming inoperable, including steps in providing an alternate potable water supply;

(b) cover-off in the event that the Certified Operator is not available to operate the waterworks system;

(c) Water Shortage Response Plans for raw and treated water;

(d) list of contacts; Alberta Environment and Parks, Alberta Health, Regional Health Authorities, Fire Department, Disaster Coordinator, and other agencies; and

(e) date of last update.

4) Copy of the as-built engineering drawings.

SCHEDULE 2 – RAW WATER
Fortress Mountain Resort Waterworks System
Monitoring, Measuring and Reporting Frequency Requirements

PARAMETER	STATION LOCATION	MONITORING TYPE and FREQUENCY	REPORTING FREQUENCY
Turbidity	RAW WATER ENTERING THE WATER TREATMENT PLANT	Grab sample, Once per day	Reported monthly As per Part 6 of the approval
Volume		Metered, Once per day Reported as Total in m^3	

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water BACTERIOLOGICAL					
Bacteriological quality *E. coli* Total Coliforms	WATER PIPING SYSTEM: BACTERIOLOGICAL, RANDOM LOCATIONS	Grab samples in the quantity specified in the GCDWQ, and the samples shall be taken at regular intervals throughout the month	Number of Grab samples taken per month and Presence or Absence of indicator organisms	Reported monthly As per 6.2, 6.3 and 6.4 of this approval	Zero *E. coli* organisms per 100 mL Zero Total coliform organisms per 100 mL

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
RAPID SAND FILTER - *Treated Water TURBIDITY*					
Turbidity	INDIVIDUAL FILTER TRAIN #1 INDIVIDUAL FILTER TRAIN #2 INDIVIDUAL FILTER TRAIN #3 (after each Individual filter train at a point upstream of the clearwell)	Continuous monitoring and recording at ≤ 5 minute sampling intervals	Report MAXIMUM DAILY value	Reported monthly As per Part 6 of the approval	≤ 0.3 NTU, at least 99% of the samples on a daily basis; and ≤ 1.0 NTU, 100% of the time
			Report number of cumulative minutes per day the turbidity was between 0.3 and 1.0 NTU		

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water PRIMARY DISINFECTION					
Chlorine Residual – Free	ENTERING WATER PIPING SYSTEM (where "C" is measured for log reduction of Viruses prior to entering water piping system)	Continuous monitoring and recording at ≤ 5 minute sampling intervals	Record MINIMUM value mg/L Recorded Once per day	Reported monthly As per Part 6 of the approval	≥ 0.2 mg/L as Free Chlorine

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water PRIMARY DISINFECTION					
$CT_{required}$ *Viruses*	ENTERING WATER PIPING SYSTEM	Once per day	Daily values	Reported monthly As per Part 6 of the approval	N/A
$CT_{lowest\ actual}$ *Viruses*		Calculated Once per day			N/A
CT performance ratio *Viruses*		Calculated Once per day			≥ 1
Volume	CLEARWELL	Once per day	Daily value		N/A
Flow	ENTERING WATER PIPING SYSTEM	Continuous	MAXIMUM hourly flow in L/Min Recorded Once per day		L/Min
pH	ENTERING WATER PIPING SYSTEM	Grab Sample Once per day	Daily value		6.5 -8.5 pH
Temperature	ENTERING WATER PIPING SYSTEM	Grab Sample Once per day	Daily value		N/A

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water UV Disinfection					
UV Sensor Reading	UV REACTOR #1 or UV REACTOR #2	Continuous monitoring and recording at ≤ 5 minute sampling intervals	AVERAGE and MINIMUM Daily values	Reported monthly As per Part 6 of the approval	≥ 11.7 mA
Flow	UV REACTOR #1 or UV REACTOR #2	Continuous monitoring and recording at ≤ 5 minute sampling intervals	MAXIMUM daily value		≤ 3.23 L/sec
UV transmittance of filtered water	ENTERING UV REACTORS	Grab sample Once per day	Daily value		≥ 85%T

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water SECONDARY DISINFECTION					
Chlorine Residual – Free, Combined or Total	WATER PIPING SYSTEM: RANDOM LOCATIONS	Grab sample Once per week	Weekly value	Reported monthly As per Part 6 of the approval	≥ 0.1 mg/L, based on 75% of the samples taken on a particular day
	WATER PIPING SYSTEM: BACTERIOLOGICAL, RANDOM LOCATIONS	1 Grab sample, taken at the same time and at the same location as the bacteriological quality sample is collected	Report each value mg/L		

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water – TOTAL TRIHALOMETHANES AND TOTAL HALOACETIC ACIDS					
Total Trihalomethanes (TTHM) and Total Haloacetic Acids (HAA)	4 Grab samples every three months within the operating season distributed as per the following and the samples are to be taken within a 24 hour period		Analytical Results	Reported annually As per Part 6 of the approval	As per the PWR
	ENTERING WATER PIPING SYSTEM	1 Grab sample every 3 months within the operating season			
	WATER PIPING SYSTEM: RANDOM LOCATIONS	2 Grab samples every 3 months within the operating season			
	WATER PIPING SYSTEM: EXTREME END	1 Grab sample every 3 months within the operating season			
Total Trihalomethanes (TTHM) and Total Haloacetic Acids (HAA)	If and only if the TTHM and HAA results from the same location, based on running annual average from the previous 12 months, is less than the GCDWQ MAC, subsequent monitoring shall be conducted, at a minimum, in the following manner:				
	WATER PIPING SYSTEM: EXTREME END	1 Grab sample every 3 months within the operating season			

SCHEDULE 3 – TREATED WATER QUALITY
Fortress Mountain Resort Waterworks System
Limits, Monitoring and Reporting Frequency

PARAMETER	STATION LOCATION	MONITORING/MEASUREMENT TYPE, NUMBER AND FREQUENCY	REPORTING CONTENT	REPORTING FREQUENCY	LIMITS
Treated Water – PHYSICAL, INORGANIC AND ORGANIC CHEMICAL AND PESTICIDE PARAMETERS					
The physical, inorganic and organic chemical and pesticide parameters listed in SCHEDULE 4, and any new parameters with MAC's published in the GCDWQ	WATER PIPING SYSTEM: RANDOM LOCATIONS	2 Grab samples per annum for all parameters: (a) One sample taken during late winter (January to March); and (b) One sample taken during late fall (November to December);	Analytical Results	Reported annually As per Part 6 of the approval	As per the PWR

SCHEDULE 4
Fortress Mountain Resort Waterworks System
Table of Physical, Inorganic chemicals, Organic chemicals and Pesticides

Substance	Specific Parameter
Physical Parameters (Primary and Secondary	Colour; pH; and Total Dissolved Solids.
Inorganic chemicals (Primary)	Antimony; Arsenic; Barium; Boron; Bromate; Cadmium; Chloramines; Chromium; Cyanide; Fluoride; Lead; Mercury; Nitrate; Nitrite; Selenium; and Uranium.
Inorganic and Organic Chemicals (Secondary	Aluminum; Ammonia; Calcium; Chloride; Copper; Total Hardness; Iron; Magnesium; Manganese; Silver; Sodium; Sulphate; Sulphide; Total Organic Carbon; Xylenes (total); and Zinc.

Substance	Specific Parameter
Organic Chemicals and Pesticides (Primary)	Atrazine + metabolites; Benzene; Benzo(a)pyrene; Bromoxynil; Carbon Tetrachloride; Chlorpyrifos; Cyanazine; Cyanobacterial toxins (as Microcystin – LR; Diazinon; Dicamba; 1,2-Dichlorobenzene; 1,4-Dichlorobenzene; 1,2-Dichlorethane; Dichloromethane; 2,4-Dichlorophenol; 2,4-D; Diclofop-methyl; Diuron; Dimethoate; Ethylbenzene; Glyphosate; Malathion; Methoxychlor; Metolachlor; Metribuzin; Monochlorobenzene; Nitrilotriacetic Acid (NTA); Pentachlorophenol; Picloram; Simazine; Terbufos; Tetrachloroethylene; 2,3,4,6-Tetrachlorophenol; Toluene; Trichloroethylene; 2,4,6-Trichlorophenol; Trifluralin; and Vinyl Chloride.

APPENDIX B

Detailed Soil Profiles

Table II-1 Summary of Soil Characteristics, Soil Profile and Analytical Results – Willoughby Soil Series

E.DYB Willoughby (WLB) – FMS027	
Soil Characteristics	**Description**
soil classification	Eluviated Dystric Brunisol
parent material	Till
texture (surface/subsurface)	Loam/Sandy Loam
topography (% slope)	10 to 15%
slope position	Lower
drainage class	Well drained
reclamation suitability and limitations (Root Zone Material)	Fair (texture, pH)
associated Soil Map Units (SMUs)	BPWL5

Soil Profile									
Horizon	**Depth [cm]**	**Physical**					**Analytical**		
		Colour	**Texture**	**Coarse Fragment Content [%]**	**Structure**	**Consistence**	**pH (0.01 M $CaCl_2$)**	**Electrical Conductivity (dS/m)**	**Sodium Adsorption Ratio**
LFH	5 to 0	n/a	n/a	n/a	n/a	n/a	4.75	0.581	<0.10
Ae	0 to 8	10YR 5/1	Silt loam	n/a	Platy	Very Friable	4.23	0.127	<0.40
Bm	8 to 25	10YR 4/6	Sandy loam	n/a	Subangular blocky	Very Friable	4.54	0.073	n/d
BC	25 to 30+	n/d	Sandy loam	n/a	Massive	Friable	n/d	n/d	n/d

n/a = not applicable; n/d = not determined.

Photo II-1: Site id FMS027 – Representing an Eluviated Dystric Bruniosl (E.DYB) on Till.

Table II-2 Summary of Soil Characteristics, Soil Profile and Analytical Results – Willoughby-zz Soil Series

O.DYB Willoughby-zz[1] (WLBzz) – FMS016									
Soil Characteristics	**Description**								
soil classification	Orthic Dystric Brunisol								
parent material	Till								
texture (surface/subsurface)	Loam/Clay Loam								
topography (% slope)	5 to 10%								
slope position	Crest								
drainage class	Well drained								
reclamation suitability and limitations (Root Zone Material)	Fair (pH)								
associated Soil Map Units (SMUs)	WLBzz1, WLBzz5, WLBzz6, WLzzFR6, WLzzLT6, BPWL5								
Soil Profile									
Horizon	**Depth [cm]**	**Physical**					**Analytical**		
		Colour	**Texture**	**Coarse Fragment Content [%]**	**Structure**	**Consistence**	**pH (0.01 M $CaCl_2$)**	**Electrical Conductivity (dS/m)**	**Sodium Adsorption Ratio**
LFH	4 to 0	n/a	n/a	n/a	n/a	n/a	5.60	0.350	<0.20
Ah	0 to 10	10YR 2/2	Sandy Loam	20	Granular	Very Friable	5.44	0.100	<0.40
Bm	10 to 32	10YR 3/3	Sandy Loam	15	Subangular blocky	Friable	4.97	0.047	<0.60
BCgj	32 to 55	2.5Y 4/4	Clay loam	10	Massive	Firm	5.79	0.066	<0.50

[1] "zz" denotes a variation on the modal Willoughby soil series; modal Willoughby subgroup is a Eluviated Dystric Brunisol.

n/a = not applicable; n/d = not determined.

Photo II-2: Site id FMS016 – Representing an Orthic Dystric Bruniosl (O.DB) on Till.

Table II-3 Summary of Soil Characteristics, Soil Profile and Analytical Results – Frank Soil Series

O.EB Frank (FRK) – FMS017	
Soil Characteristics	**Description**
soil classification	Orthic Eutric Brunisol
parent material	Colluvium
texture (surface/subsurface)	Loam/Loam
topography (% slope)	30 to 45%
slope position	Mid
drainage class	Rapidly drained
reclamation suitability and limitations (Root Zone Material)	Fair (pH)
associated Soil Map Units (SMUs)	FRK1, FRK5, WLzzFR6

Soil Profile									
Horizon	**Depth [cm]**	**Physical**					**Analytical**		
		Colour	**Texture**	**Coarse Fragment Content [%]**	**Structure**	**Consistence**	**pH (0.01 M $CaCl_2$)**	**Electrical Conductivity (dS/m)**	**Sodium Adsorption Ratio**
LFH	2 to 0	n/a	n/a	n/a	n/a	n/a	n/d	n/d	n/d
Ah	0 to 5	10YR 2/1	Loam	10	Granular	Very Friable	n/d	n/d	n/d
Ahe	5 to 9	2.5YR 4/1	Loam	10	Loam	Friable	n/d	n/d	n/d
AB	9 to 14	n/d	Loam	20	Subangular blocky	Friable	n/d	n/d	n/d
Bm	14 to 28	10YR 3/6	Loam	15	Subangular blocky	Very Friable	n/d	n/d	n/d
BCgj	32 to 55	n/d	Loam	25	Subangular blocky	Friable	n/d	n/d	n/d

n/a = not applicable; n/d = not determined.

Photo II-3: Site id FMS017 – Representing an Orthic Eutric Brunisol (E.OB) on Colluvium.

Table II-4 Summary of Soil Characteristics, Soil Profile and Analytical Results – Wildcat Soil Series

R.G Wildcat (WDC) – FMS026	
Soil Characteristics	**Description**
soil classification	Rego Gleysol[1]
parent material	Glaciolacustrine/Till
texture (surface/subsurface)	Clay Loam/-
topography (% slope)	5 to 10%
slope position	Crest
drainage class	Well drained
reclamation suitability and limitations (Root Zone Material)	Fair (texture)
associated Soil Map Units (SMUs)	WDCco2

Soil Profile

Horizon	Depth [cm]	Physical					Analytical			
		Colour	Texture	Coarse Fragment Content [%]	Structure	Consistence	pH (0.01 M $CaCl_2$)	Electrical Conductivity (dS/m)	Sodium Adsorption Ratio	Total Organic Carbon (%)
LFH	3 to 0	n/a	n/a	n/a	n/a	n/a	n/d	n/d	n/d	n/d
Cg1	0 to 15	2.5Y 4/1	Clay loam	5	Massive	Sticky	n/d	n/d	n/d	n/d
Cg2	15 to 30+	2.5Y 5/1	Clay loam	45	Massive	Slightly sticky	n/d	n/d	n/d	n/d

[1] Site FMS026 is a variation on the modal Wildcat soil series; modal Wildcat subgroup is a Humic Luvic Gleysol.

n/a = not applicable; n/d = not determined.

Photo II-4: Site id FMS026 – Representing a Rego Gleysol (R.G) on Glaciolacustrine overlying Till.

Table II-5 Summary of Soil Characteristics, Soil Profile and Analytical Results – Leighton Centre Soil Series

GLBR.GL Leighton Centre (LTCgl) – FMS007									
Soil Characteristics	**Description**								
soil classification	Gleyed Brunisolic Gray Luvisol[1]								
parent material	Till								
texture (surface/subsurface)	Loam/Clay Loam								
topography (% slope)	15 to 30%								
slope position	Lower								
drainage class	Moderately well drained								
reclamation suitability and limitations (Root Zone Material)	Good								
associated Soil Map Units (SMUs)	LTCgl2, WLzzLT6, TBaaLTgl2								
Soil Profile									
Horizon	**Depth [cm]**	**Physical**					**Analytical**		
		Colour	**Texture**	**Coarse Fragment Content [%]**	**Structure**	**Consistence**	**pH (0.01 M $CaCl_2$)**	**Electrical Conductivity (dS/m)**	**Sodium Adsorption Ratio**
LFH	1 to 0	n/a	n/a	n/a	n/a	n/a	n/d	n/d	n/d
Ah	0 to 5	10YR 2/1	Loam	2	Granular	Friable	n/d	n/d	n/d
Ahe	5 to 8	10YR 4/2	Loam	2	Granular	Friable	n/d	n/d	n/d
Bm	8 to 19	10YR ¾	Loam	3	Subangular blocky	Friable	n/d	n/d	n/d
Btgj	19 to 30	2.5Y 4/3	Clay loam	7	Subangular blocky	Firm	n/d	n/d	n/d

[1] Site FMS007 is a variation on the modal Leighton Centre soil series; modal Leighton Centre subgroup is a Dark Gray Luvisol.

n/a = not applicable; n/d = not determined.

Photo II-5: Site id FMS007 – Representing a Gleyed Brunisolic Gray Luvisol (GLBR.GL) on Till.

Table II-6 Summary of Soil Characteristics, Soil Profile and Analytical Results – Twin Bridges Soil Series

O.R Twin Bridges (TBRaa) – FMS024									
Soil Characteristics	**Description**								
soil classification	Orthic Regosol[1]								
parent material	Till								
texture (surface/subsurface)	Loam/Loam								
topography (% slope)	30 to 45%								
slope position	Mid								
drainage class	Rapidly drained								
reclamation suitability and limitations (Root Zone Material)	Fair (pH, coarse fragment content)								
associated Soil Map Units (SMUs)	TBRaa2, TBaaLTgl2, TBaaR6								
Soil Profile									
Horizon	**Depth [cm]**	**Physical**					**Analytical**		
		Colour	**Texture**	**Coarse Fragment Content [%]**	**Structure**	**Consistence**	**pH (0.01 M $CaCl_2$)**	**Electrical Conductivity (dS/m)**	**Sodium Adsorption Ratio**
LFH	1 to 0	n/a	n/a	n/a	n/a	n/a	n/d	n/d	n/d
Ah	0 to 2	n/d	Loam	15	Granular	Friable	n/d	n/d	n/d
C1	2 to 15	n/d	Loam	35	Massive	n/d	n/d	n/d	n/d
C2	15 to 20+	n/d	Loam	65	Massive	n/d	n/d	n/d	n/d

[1] Site FMS024 is a variation on the modal Twin Bridges soil series; modal Twin Bridges subgroup is a Gleyed Humic Regosol.

n/a = not applicable; n/d = not determined.

Photo II-6: Site id FMS024 – Representing an Orthic Regosol (O.R) on Till.

APPENDIX C

ALS Soils Lab Results

Golder Associates Ltd.
ATTN: Marcin Stanislawski
102 - 2535 3 Avenue SE
Calgary AB T2A 7W5

Date Received: 15-OCT-18
Report Date: 22-OCT-18 10:06 (MT)
Version: FINAL

Client Phone: 403-509-1858

Certificate of Analysis

Lab Work Order #: L2180800

Project P.O. #: NOT SUBMITTED
Job Reference: 1896628
C of C Numbers:
Legal Site Desc:

Jessica Spira, Env. Tech. DIPL
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2180800-1 FM016LFH(4-0)							
Sampled By: CLIENT on 11-SEP-18							
Matrix: SOIL							
Miscellaneous Parameters							
pH (1:9 CaCl2)	5.60		0.10	pH		20-OCT-18	R4289636
Basic Salinity							
% Saturation							
% Saturation	254		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	40.1		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	9.2		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	31.2		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.350		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	102		13	mg/kg		19-OCT-18	
Magnesium (Mg)	23		13	mg/kg		19-OCT-18	
Potassium (K)	79		13	mg/kg		19-OCT-18	
Sodium (Na)	<13		13	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.20	SAR:DL	0.20	SAR		19-OCT-18	
L2180800-2 FM016AH(0-10)							
Sampled By: CLIENT on 11-SEP-18							
Matrix: SOIL							
Particle Size							
% Sand	66.2		1.0	%		19-OCT-18	R4289233
% Silt	22.0		1.0	%		19-OCT-18	R4289233
% Clay	11.8		1.0	%		19-OCT-18	R4289233
Texture	Sandy loam					19-OCT-18	R4289233
Basic Salinity							
% Saturation							
% Saturation	66.7		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	13.5		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.100		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	9.0		3.3	mg/kg		19-OCT-18	
Magnesium (Mg)	<3.3		3.3	mg/kg		19-OCT-18	
Potassium (K)	<3.3		3.3	mg/kg		19-OCT-18	
Sodium (Na)	<3.3		3.3	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.40	SAR:DL	0.40	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	5.44		0.10	pH		20-OCT-18	R4289650
L2180800-3 FM016BM(10-32)							
Sampled By: CLIENT on 11-SEP-18							
Matrix: SOIL							
Particle Size							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2180800-3 FM016BM(10-32)							
Sampled By: CLIENT on 11-SEP-18							
Matrix: SOIL							
Particle Size							
% Sand	70.0		1.0	%		19-OCT-18	R4289233
% Silt	13.0		1.0	%		19-OCT-18	R4289233
% Clay	17.0		1.0	%		19-OCT-18	R4289233
Texture	Sandy loam					19-OCT-18	R4289233
Basic Salinity							
% Saturation							
% Saturation	51.3		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	5.5		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.047		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	2.8		2.6	mg/kg		19-OCT-18	
Magnesium (Mg)	<2.6		2.6	mg/kg		19-OCT-18	
Potassium (K)	<2.6		2.6	mg/kg		19-OCT-18	
Sodium (Na)	<2.6		2.6	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.60	SAR:DL	0.60	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	4.97		0.10	pH		20-OCT-18	R4289650
L2180800-4 FM016BCGI(32-55)							
Sampled By: CLIENT on 11-SEP-18							
Matrix: SOIL							
Basic Salinity							
% Saturation							
% Saturation	40.0		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	7.3		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.066		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	2.9		2.0	mg/kg		19-OCT-18	
Magnesium (Mg)	<2.0		2.0	mg/kg		19-OCT-18	
Potassium (K)	<2.0		2.0	mg/kg		19-OCT-18	
Sodium (Na)	<2.0		2.0	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.50	SAR:DL	0.50	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	5.79		0.10	pH		20-OCT-18	R4289650
L2180800-5 FM027LFH(5-0)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Miscellaneous Parameters							
pH (1:9 CaCl2)	4.75		0.10	pH		20-OCT-18	R4289636

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2180800-5 FM027LFH(5-0)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Basic Salinity							
% Saturation							
% Saturation	370		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	71.4		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	18.8		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	60.3		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.581		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	264		19	mg/kg		19-OCT-18	
Magnesium (Mg)	70		19	mg/kg		19-OCT-18	
Potassium (K)	223		19	mg/kg		19-OCT-18	
Sodium (Na)	<19		19	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.10	SAR:DL	0.10	SAR		19-OCT-18	
L2180800-6 FM027AE(0-8)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Particle Size							
% Sand	30.1		1.0	%		19-OCT-18	R4289233
% Silt	51.1		1.0	%		19-OCT-18	R4289233
% Clay	18.7		1.0	%		19-OCT-18	R4289233
Texture	Silt loam					19-OCT-18	R4289233
Basic Salinity							
% Saturation							
% Saturation	96.8		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	11.1		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.127		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	10.8		4.8	mg/kg		19-OCT-18	
Magnesium (Mg)	<4.8		4.8	mg/kg		19-OCT-18	
Potassium (K)	<4.8		4.8	mg/kg		19-OCT-18	
Sodium (Na)	<4.8		4.8	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.40	SAR:DL	0.40	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	4.23		0.10	pH		20-OCT-18	R4289650
L2180800-7 FM027BM(8-25)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Particle Size							
% Sand	53.3		1.0	%		19-OCT-18	R4289233
% Silt	39.4		1.0	%		19-OCT-18	R4289233

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2180800-7 FM027BM(8-25)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Particle Size							
% Clay	7.3		1.0	%		19-OCT-18	R4289233
Texture	Sandy loam					19-OCT-18	R4289233
Basic Salinity							
% Saturation							
% Saturation	105		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.073		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	<5.3		5.3	mg/kg		19-OCT-18	
Magnesium (Mg)	<5.3		5.3	mg/kg		19-OCT-18	
Potassium (K)	<5.3		5.3	mg/kg		19-OCT-18	
Sodium (Na)	<5.3		5.3	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	Incalculable	SAR:INC	0.10	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	4.54		0.10	pH		20-OCT-18	R4289650
L2180800-8 FM009CGI(19-32)							
Sampled By: CLIENT on 12-SEP-18							
Matrix: SOIL							
Particle Size							
% Sand	28.1		1.0	%		19-OCT-18	R4289233
% Silt	39.4		1.0	%		19-OCT-18	R4289233
% Clay	32.5		1.0	%		19-OCT-18	R4289233
Texture	Clay loam					19-OCT-18	R4289233
Basic Salinity							
% Saturation							
% Saturation	43.3		1.0	%		17-OCT-18	R4287367
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	23.4		5.0	mg/L		19-OCT-18	R4289102
Magnesium (Mg)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Potassium (K)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Sodium (Na)	<5.0		5.0	mg/L		19-OCT-18	R4289102
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.183		0.010	dS/m		17-OCT-18	R4287367
Salinity in mg/kg							
Calcium (Ca)	10.1		2.2	mg/kg		19-OCT-18	
Magnesium (Mg)	<2.2		2.2	mg/kg		19-OCT-18	
Potassium (K)	<2.2		2.2	mg/kg		19-OCT-18	
Sodium (Na)	<2.2		2.2	mg/kg		19-OCT-18	
Sodium Adsorption Ratio (Sat. Paste)							
SAR	<0.30	SAR:DL	0.30	SAR		19-OCT-18	
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	6.77		0.10	pH		20-OCT-18	R4289650

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
SAR:DL	SAR is incalculable due to undetectable Na. Detection Limit represents maximum possible SAR value.
SAR:INC	SAR is incalculable due to Ca and Mg below detection limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
EC-PASTE-CL	Soil	Conductivity in Soil (Paste) by Meter	CSSS ch.15
This analysis is adapted from the methods outlined in "Soil Sampling and Methods of Analysis" by M. Carter. In summary, 200 to 500 grams of sample is extracted for a minimum of 4 hours with an amount of deionized water as required to create a saturated paste. The sample is then filtered or centrifuged and decanted to produce an extract that is ready for analysis. Conductivity is determined using a conductivity electrode.			
MET-PASTE-ICP-CL	Soil	Ca,K,Mg,Na in Soil (Paste) by ICPOES	CSSS CH15/EPA 6010B
A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium, Sodium by ICPOES.			
PH-1:2 CACL2-CL	Soil	pH (1:2 CaCl2)	CSSS 16.3 - 1:2 Extraction w/0.01M CaCl2
Soil and 0.01M CaCl2 solution (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PH-1:9 CACL2-CL	Soil	pH (1:9 CaCl2)	CSSS 16.3 - 1:9 Extraction w/0.01M CaCl2
Soil and 0.01M CaCl2 solution (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PSA-1-CL	Soil	Particle Size	CSSS 55.3 - Hydrometer
Particle Size analysis in soil using a hydrometer			
SAL-MG/KG-CALC-CL	Soil	Salinity in mg/kg	Manual Calculation
SALINITY-INTCHECK-CL	Soil		CSSS 18.4-Calculation
SAR-PASTE-CALC-CL	Soil	Sodium Adsorption Ratio (Sat. Paste)	CSSS 15.4.4-Calculation
Sodium Adsorption Ratio (SAR) is calculated as per "Soil Sampling and Methods of Analysis" by M. Carter.			
SAT-PCNT-CL	Soil	% Saturation	CSSS 18.2-Calculation
Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Golder Associates Ltd.
102 - 2535 3 Avenue SE
Calgary AB T2A 7W5
Contact: Marcin Stanislawski

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-PASTE-CL	**Soil**							
Batch R4287367								
WG2907891-3 IRM		**SAL-STD9**						
Conductivity Sat. Paste			106.6		%		80-120	17-OCT-18
WG2907891-7 IRM		**SAL-STD9**						
Conductivity Sat. Paste			108.2		%		80-120	17-OCT-18
WG2907891-1 MB								
Conductivity Sat. Paste			<0.010		dS/m		0.01	17-OCT-18
WG2907891-5 MB								
Conductivity Sat. Paste			<0.010		dS/m		0.01	17-OCT-18
MET-PASTE-ICP-CL	**Soil**							
Batch R4289102								
WG2907891-3 IRM		**SAL-STD9**						
Calcium (Ca)			92.0		%		70-130	19-OCT-18
Magnesium (Mg)			93.7		%		70-130	19-OCT-18
Potassium (K)			103.6		%		70-130	19-OCT-18
Sodium (Na)			93.1		%		70-130	19-OCT-18
WG2907891-7 IRM		**SAL-STD9**						
Calcium (Ca)			104.1		%		70-130	19-OCT-18
Magnesium (Mg)			118.1		%		70-130	19-OCT-18
Potassium (K)			122.7		%		70-130	19-OCT-18
Sodium (Na)			104.6		%		70-130	19-OCT-18
WG2907891-2 LCS								
Calcium (Ca)			87.2		%		70-130	19-OCT-18
Magnesium (Mg)			89.2		%		70-130	19-OCT-18
Potassium (K)			91.0		%		70-130	19-OCT-18
Sodium (Na)			96.3		%		70-130	19-OCT-18
WG2907891-6 LCS								
Calcium (Ca)			92.5		%		70-130	19-OCT-18
Magnesium (Mg)			94.0		%		70-130	19-OCT-18
Potassium (K)			96.3		%		70-130	19-OCT-18
Sodium (Na)			103.0		%		70-130	19-OCT-18
WG2907891-1 MB								
Calcium (Ca)			<5.0		mg/L		5	19-OCT-18
Magnesium (Mg)			<5.0		mg/L		5	19-OCT-18
Potassium (K)			<5.0		mg/L		5	19-OCT-18
Sodium (Na)			<5.0		mg/L		5	19-OCT-18
WG2907891-5 MB								
Calcium (Ca)			<5.0		mg/L		5	19-OCT-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-PASTE-ICP-CL	**Soil**							
Batch R4289102								
WG2907891-5 MB								
Magnesium (Mg)			<5.0		mg/L		5	19-OCT-18
Potassium (K)			<5.0		mg/L		5	19-OCT-18
Sodium (Na)			<5.0		mg/L		5	19-OCT-18
PH-1:2 CACL2-CL	**Soil**							
Batch R4289650								
WG2909250-1 IRM		**SAL-STD9**						
pH (1:2 CaCl2)			7.55		pH		7.2-7.8	20-OCT-18
PH-1:9 CACL2-CL	**Soil**							
Batch R4289636								
WG2909249-2 DUP		**L2180800-5**						
pH (1:9 CaCl2)		4.75	4.75	J	pH	0.00	0.3	20-OCT-18
WG2909249-1 IRM		**SAL-STD9**						
pH (1:9 CaCl2)			7.79				7.49-8.09	20-OCT-18
PSA-1-CL	**Soil**							
Batch R4289233								
WG2908818-3 DUP		**L2180800-2**						
% Sand		66.2	65.0	J	%	1.2	5	19-OCT-18
% Silt		22.0	23.2	J	%	1.2	5	19-OCT-18
% Clay		11.8	11.8	J	%	0.0	5	19-OCT-18
WG2908818-2 IRM		**SAL-STD9**						
% Sand			44.0		%		41.3-51.3	19-OCT-18
% Silt			32.0		%		26-36	19-OCT-18
% Clay			24.0		%		17.7-27.7	19-OCT-18
SAT-PCNT-CL	**Soil**							
Batch R4287367								
WG2907891-3 IRM		**SAL-STD9**						
% Saturation			103.2		%		80-120	17-OCT-18
WG2907891-7 IRM		**SAL-STD9**						
% Saturation			101.8		%		80-120	17-OCT-18

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2180800-COFC

COC Number: 14 -

Page 1 of 1

Report To	Marcin Stanislawski	Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Golder Associates	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Marcin Stanislawski	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2535 3rd ave SE Calgary, AB T2A 7W5	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	403 880 6786 (cell)	Email 1 or Fax Marcin_Stanislawski@golder.com	Specify Date Required for E2,E or P:
	403 509 1858 (work)	Email 2 Brittney_Sammons@golder.com	

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	Golder Associates	Email 1 or Fax Marcin_Stanislawski@golder.com	
Contact:	Marcin Stanislawski	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	1896628	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L2180800	ALS Contact:	Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	SAL-BASIC-ABT1-ED	PSA-1-SK	MET-200.2-CCMS-SK	Number of Containers
	FM016LFH(4-0)	11-Sep-18		soil	R			
	FM016Ah(0-10)	11-Sep-18		soil	R	R		
	FM016Bm(10-32)	11-Sep-18		soil	R	R		
	FM016BCgj(32-55)	11-Sep-18		soil	R			
	FM027LFH(5-0)	12-Sep-18		soil	R			
	FM027Ae(0-8)	12-Sep-18		soil	R	R		
	FM027Bm(8-25)	12-Sep-18		soil	R	R		
	FM009BCgj(19-32)	12-Sep-18		soil	R	R		
				soil				
				soil				
				soil				
				soil				

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	PLEASE WAIT FOR INSTRUCTIONS	Frozen ☐ Ice packs ☐ Yes ☐ Cooling Initiated ☐ SIF Observations Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Are samples for human drinking water use? ☐ Yes ☑ No		INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Marcin stanislawski	Date:	Time:	Received by:	Date: 10/15	Time: 1542	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM 0326e Vol Front04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

APPENDIX D

McElhanney Geotechnical Investigation

25 September 2015 CG2682

Fortress Mountain Holdings Ltd. c/o McElhanney Consulting Services Ltd. Fortress Mountain Resort - Geotechnical Investigation

Kananaskis Country, Alberta

33-21-09-W5

Executive Summary

A geotechnical investigation was conducted for the proposed developments at Fortress Mountain Resort within 33-21-09-W5, Kananaskis Country, Alberta. The proposed developments consist of a new water treatment building, water tank, mixed use lodge with restaurant, and a day lodge. No further details were provided at the time of the report preparation.

The investigation was performed to assess the existing subsoil and groundwater conditions, and to provide geotechnical recommendations related to foundation design and construction of the proposed development.

A total of six (6) geotechnical boreholes were drilled. The boreholes were advanced using a track-mounted drilling rig with a 150 mm diameter solid stem auger. The soil profile of the site consisted of varying gradations of till and overlying weathered bedrock.

Groundwater readings from the borehole locations were measured to be in the range of 1.1 m below ground surface (bgs) to dry.

The evaluation of the subsurface soil conditions encountered during our field investigation, led to the conclusion that the site is suitable for the proposed development. Shallow foundation (footings) may be used for the proposed structures.

Table of Contents

1.0 Introduction

Clifton Associates Ltd. (Clifton) was retained by Fortress Mountain Holdings Ltd. c/o McElhanney Consulting Services Ltd. (McElhanney) to conduct a geotechnical investigation at the proposed development located at Fortress Mountain Resort within 33-21-09-W5, Kananaskis Country, Alberta.

2.0 Background Information and Details of the Investigation

At the time of the field investigation, the proposed structure locations were occupied by an existing structure. We understand that as a part of the development, the existing buildings will be demolished and the proposed development will consist of a new water treatment building, water tank, mixed use lodge with restaurant, and a day lodge.

Clifton coordinated the drilling of six (6) boreholes (BH1 – BH6) on 17 September 2015 using a track-mounted solid-stem auger rig supplied and operated by All Service Drilling of Airdrie, Alberta. BH1 and BH2 were drilled at the proposed water treatment building and water tank area. BH3 and BH4 were drilled at the proposed mixed use lodge area. BH5 and BH6 were advanced at the proposed day lodge area.

The boreholes were advanced to the approximate depths between 3.3 meters (m) and 6.1 m below ground surface (bgs) due to auger refusal. Standard Penetration Tests (SPTs) were performed at selected intervals and soil samples were obtained from the auger or split-spoon sampler. The Borehole Location Plan is included in Appendix A. The soil stratigraphy, sampling sequences and the field and laboratory test results are shown on the Borehole Logs included in Appendix B.

The groundwater levels in the standpipes were measured upon drilling completion on 24 September 2015.

3.0 Subsurface Conditions

The subsurface strata and groundwater conditions encountered at each borehole location are described in detail on the Borehole Logs, with additional and supplementary information provided in this section. The Borehole Logs, along with an explanation of the symbols and terms used in its description, are provided in Appendix B.

In general, the observed stratigraphy consisted of varying gradations of fill overlying till and weathered bedrock.

3.1 Topsoil

A 0.05 m thick layer of topsoil was observed at the surface in BH1, BH2 and BH3. The topsoil was silt and clay, organic, black and moist.

3.2 Fill

A surficial layer of poorly-graded, rounded gravel was observed in BH4, BH5 and BH6.

3.3 Till

Till was encountered in all boreholes below topsoil or fill and extended to depths ranging from 3.3 m to 6.5 m bgs. The till consisted of varying gradations of clay, silt, sand and gravel. Traces of bedrock fragments were encounterd in BH1 and BH2 at 3.2 m and 1.6 m bgs, respectively. Water seepage within the till was observed in BH2 at a depth of 6.0 m bgs, and in BH5, 5.0 m bgs. Table 1,below, summarizes both in-situ and laboratory test results for till.

Table 1: Summary of In-situ and Laboratory Test Results for Till

Pocket Penetrometer (kg/cm²)	SPT (Blows/ 300 mm)	Moisture Content (%)	Atterberg Limits		Sulphate Analysis (%)
0.5 – 4.5+	12 – 50+	4.1 – 13.1	Plastic Limit (%)	13 and 17	0.009 -0.01
			Liquid Limit (%)	35 and 29	
			Plasticity Index (PI)	22 and 12	

3.4 Gravel

A 0.2 m thick layer of gravel was encountered in BH3 at depth of 5.6 m bgs. The gravel was poorly-graded, rounded and compact to dense.

3.5 Weathered Bedrock

Weathered bedrock was encountered in BH2 at a depth of 3.8 m bgs and extended to the termination depth of 6.1 m bgs. SPT blow counts within the bedrock were greater than 50 for 0.1 m to 0.3 m of advancement. Moisture contents of the bedrock samples ranged from 8.1% to 13.9%. The bedrock is described as weathered shale/siltstone.

3.6 Groundwater

Standpipes were installed in all boreholes to allow for groundwater level monitoring. Groundwater level measurements in the standpipe piezometers were taken on 24 September 2015. The groundwater readings are summarized in Table 2, below.

Table 2: Groundwater Summary

Borehole Number	Groundwater Depth (m bgs)
BH1	Dry to 4.15
BH2	3.6
BH3	Dry to 6.6
BH4	2.4
BH5	1.4
BH6	1.1

Groundwater levels can be influenced by many variables and may not be representative of long term stabilized groundwater conditions. Variables which affect groundwater readings include, amongst others: surface infiltration, puncture of perched water horizons and inadequate time for stabilization of groundwater pressures.

It should also be recognized that groundwater levels vary from season to season and year to year and are dependent on many factors including surface drainage, precipitation and the hydrogeology of the area.

4.0 Comments and Recommendations

All construction procedures during development activity should be guided by current Alberta Building Code (ABC) and Alberta Occupational Health and Safety (OHS) Act Regulation and Code.

The site subsurface ground and groundwater conditions are considered suitable for construction of the proposed structures, provided that the recommendations outlined within this report are adhered to.

4.1 Frost Protection

The maximum seasonal frost penetration depth was calculated for the near-surface soils using the procedure described in Canadian Foundation Engineering Manual 2006, (CFEM). A mean freezing index of 1,125°C days was used for the site. The average seasonal frost penetration depth is estimated to be approximately 2.1 m. The estimated frost penetration depth assumes a uniform concrete cover.

Foundation elements of heated and unheated structures should have a minimum frost protection equivalent to a soil cover of at least 1.2 m and 2.1 m for frost protection purposes, respectively.

4.2 Site Preparation

All topsoil, fill, organic soil, loose, contruction debris, soft or any other deleterious materials should be removed from beneath building structures and where engineered fill is needed. Upon removal of unsuitable material, the exposed subgrade should be reviewed by a qualified geotechnical engineering personnel, and a proof-roll be undertaken using a 8200 kg loaded single-axle gravel truck. Any areas which demonstrate rutting, cracking or other deformations should be examined in detail and remedial action taken, as required. The upper 300 mm of exposed subgrade should be scarified and re-compacted to minimum 98% Standard Proctor Maximum Dry Density (SPMDD).

If needed, engineered fill may consist of local native soil or imported non to low plastic soil which is similar to the native soil. Engineered fill soil must not contain organic matter, frozen material, or rocks over 200 mm in diameter.

Granular or non-cohesive fill should be placed in lifts not exceeding 300 mm loose measure, depending on compaction equipment used, and be compacted to a minimum of 98% SPMDD. The moisture content during placement should be within ±3% of its optimum moisture content for compaction purposes. A non-woven geotextile should be placed between native soils and granular fill to prevent migration of fine soil into the granular.

Subgrade surfaces should be protected from freezing. In addition, the subgrade should be protected from wetting or drying, both before and after the placement of fill. Subgrade surfaces that are allowed to dry or become wet must be scarified, moisture conditioned, and re-compacted.

4.3 Foundation Systems

Shallow (i.e. spread and strip footings) systems are considered feasible for the proposed structures. Foundation elements of heated and unheated structures should have a minimum frost protection equivalent to a soil cover of at least 1.2 m and 2.1 m for frost protection purposes, respectively.

Shallow foundations in the form of spread and strip footings founded on native undisturbed till are considered suitable for the soil conditions encountered on site. The geotechnical soil bearing resistance at Ultimate Limit States (ULS) for spread and strip footings vary with footing widths and embedment depths. The embedment depth is to be measured from final grade or from the top of adjacent non-structural slabs-on-grade, whichever is less.

For footings with minimum embedment depths of 1.2 m and widths ranging from 0.5 to 2.5 m, the unfactored geotechnical bearing resistance at ULS can be taken as 400 kPa. A resistance factor of 0.5 as per Nation Building Code of Canada should be applied to determine the factored bearing resistance at ULS. When applying the recommended factored ultimate geotechnical bearing resistance (200 kPa), total and differential settlements are expected not to exceed 25 and 20 mm.

The geotechnical bearing resistance at ULS generally increases with footing width and depth. However, larger footings are subject to increased settlement. A detailed settlement analysis should be completed for footings in excess of 2.5 m width to determine the geotechnical bearing pressure at Serviceability Limit State (SLS), or potential impact of total and differential settlement on the building superstructure.

The geotechnical bearing resistances presented above are for vertical, concentric loading as described in the CFEM (2006). If footings will be subject to eccentric and/or inclined loads, the bearing resistances need to be adjusted as outlined in CFEM (2006).

The ultimate lateral resistance of footings may be calculated by considering the sliding resistance acting along the footing base and the passive earth pressure resistance of permanent soil on the side of the buried structure opposite the applied lateral load. The ultimate sliding resistance at the foundation base may be calculated multiplying the total vertical load acting on the foundation by the coefficient of friction. A coefficient of friction of 0.3 is recommended between concrete foundation base and the soil bearing surface. A geotechnical resistance factor of 0.8 should be considered for factored lateral capacity of the foundation.

Bearing surfaces shall be protected from ingress of free water, typically resulting in softening of the soil. Footings must not be placed on, organic, disturbed, or frozen soil. Bearing material that becomes frozen, dried or softened must be removed and replaced with lean mixed concrete, or the footings shall be extended to reach material in an unaffected condition. If freezing of the soil below the constructed footing is suspected, the soil and the foundation must be inspected by qualified geotechnical engineering staff prior to continuing construction. It is also essential the foundation soil not be allowed to freeze before and after the concrete for the footing has been placed. All foundation elements should be placed on undisturbed and clean surfaces.

It is also recommended that all foundation bearing soils be inspected by geotechnical engineering staff to confirm that the bearing surface conditions are consistent with the design assumptions presented in this report.

4.4 Excavation

Temporary excavations at the site should be sloped or shored for worker and foundation protection. Construction must conform to good practice and comply with the regulations, such as the Alberta Building Code.

The soils that underlie the site may be excavated using conventional hydraulic excavation equipment. According to the Occupational Health and Safety Code Part 32, the site soil is classified as "likely to crack or crumble". Therefore, the walls of temporary excavations up to 3.0 m in depth should be sloped to within 1.5 m of the bottom of the excavation at an angle of not less than 45° measured from the vertical.

Deeper excavations should be shored or sloped at a flatter angle. All deeper excavations should be subject to a detailed slope stability analysis to determine minimum slope angles and other means to provide a safe temporary work environment. Qualified geotechnical personnel should be notified if excavations with more than 3 m depths are required.

Standard excavation techniques may be used for construction at this site. Excavations must be protected from rain, snow or any ingress of free water. Prolonged exposure of excavated areas should be avoided to prevent deterioration of exposed soil with resultant slope instability. Similarly, excavated materials should be stockpiled away from the excavations to avoid any slope instability and to prevent materials from falling back into the excavations. Temporary surcharge loads, such as stocks of material or heavy equipment, should be kept back from excavation facing a distance equal to the excavation depth.

4.5 Slab on Grade Construction

The subgrade soil for slab-on-grade areas should be prepared as outlined in Section 4.2 of this report. It is important that the subgrade surface be protected from moisture changes and freezing temperatures both during and after construction in order to minimize the potential of frost heave/thaw and softening action on the subgrade soil.

A layer of granular material (such as 25 mm minus crushed gravel) of at least 200 mm in thickness should be placed immediately beneath floor slabs for levelling. The material should be compacted to 98% SPMDD at moisture contents within +/- 3% of optimum moisture content.

Slab-on-grades should float independently of all load-bearing walls and columns to minimize the potential for damage from small differential settlements between these elements.

4.6 Requirements for Foundation Concrete

To determine the potential of sulphate attack on concrete in contact with soils at the site, three (3) soil samples were tested for water-soluble sulphates content. The completed test results indicate that the concentration of water-soluble sulphates in the soil was ranged from 0.009% to 0.01%. This value indicates that the potential for sulphate attack is negligible for this site. As such, Type GU cement can be used for concrete mix.

It is recommended that all concrete exposed to freeze-thaw conditions contain an air entraining agent and that all concrete produced and used at the subject property comply with CSA A23.1.

4.7 Construction Dewatering

Construction dewatering will likely be required. The amount of the seepage could vary significantly depending on the actual conditions encountered, precipitation or ground thaw during construction.

Internal dewatering using sumps and shallow trenches has typically provided the most successful dewatering system in these conditions. The location of trenches and sumps are best determined during construction based on the location of any channels encountered.

A variety of sizes of pumps, and suitable backups should be on-hand during construction to provide a dry working surface. Depending on the final depth of excavation, drainage of bearing surfaces prior to concrete placement if spread or mat footings are used will be required.

4.8 Seismic Conditions

Based on the Alberta Building Code 2006 Table 4.1.8.4.A., it is recommended that the site be considered class "C" for seismic design.

5.0 Review of Design and Construction Inspection

Clifton should be given the opportunity to review final designs, drawings and specifications, related to the geotechnical aspects of the proposed development, to ensure that our comments and recommendations have been properly interpreted and implemented.

6.0 Limitations and Closures

This report was prepared by Clifton for the use of Fortress Mountain Holdings Ltd. c/o McElhanney Consulting Services Ltd. and his agents for specific application to the proposed development located at Fortress Mountain Resort within 33-21-09-W5, Kananaskis Country, Alberta. The material and recommendations within this report reflects Clifton's best judgment available at the time of the report preparation. Use of this report by a third party or any decisions made on it is the responsibility of such third party. Clifton accepts no responsibility for damage, if any suffered by a third party as a result of their use of this report.

The conclusion and recommendations are solely based on the subsurface conditions encountered during the site investigation. This subsoil investigation was performed for the specific purpose of characterizing the subsurface conditions for the purpose of foundation design recommendations for the proposed development on the site. Geotechnical factors presented in this report were based on the subsurface conditions encountered within the test holes advanced at the site in question. Soil conditions present at the site may vary significantly between the locations tested. Groundwater conditions are subject to fluctuations dependent on many factors affecting the hydrogeology of the site. Should subsoil conditions other than those presented be

encountered during the construction phase, it would be vital that Clifton be notified in order for the recommendations outlined in this report to be re-evaluated as necessary. The enclosed report contains the results of the investigation, as well as recommendations arising from the investigation. Recommendations do not constitute a design, in whole or in part, of any of the elements of the proposed works. Incorporation of any or all of the recommendations into the design of any such element does not constitute Clifton as designers or co-designers of such elements, nor does it mean that such design is appropriate in geotechnical terms. The designer of such elements must consider the appropriateness of the recommendations in the light of all design criteria known to them, many of which may not be known to Clifton. Clifton's mandate has been to investigate and recommend, which has been completed by means of this report. Clifton had no mandate to design, or review the design of, any elements of the proposed works and accepts no responsibility for such designs or design review.

Yours Truly,

Clifton Associates Ltd.

Garrett Mayerchak, T.T.
Geotechnical Technologist

Jerry Leung, P.Eng
Geotechnical Engineer

Association of Professional Engineers, Geologists and Geophysicists of Alberta, Permit to Practice 4823

Appendix A

Clifton Associates
Borehole Location Plan

Clifton Associates

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2222 – 30th Avenue NE
Calgary, Alberta T2E 7K9

T (403) 263-2556
F (403) 234-9033

garrett_mayerchak@clifton.ca
www.clifton.ca

Borehole Location Plan

Clifton Associates

Note: Not to scale

File CG2682

2222 30th Avenue N.E., Calgary, Alberta, T2E 7K9
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Appendix B

Clifton Associates
Borehole Logs and Symbols & Terms

Clifton Associates

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Clifton Associates

BOREHOLE LOG

Borehole: BH1

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200) / Shear Strength - kPa: Unconf. ■ / Pocket Pen. ● / Lab Vane ◆ (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		TOPSOIL: Silt and clay. Organic. Black. Moist.		1-1						Bentonite
1		TILL: Silty clay, trace sand and gravel. Dark brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.		1-2	28 30 32					Solid 25 mm PVC
2		@ 1.5 m: Gravelly.		1-3						Cuttings
3				1-4	30 10 11					Slotted 25 mm PVC
4		@ 3.2 m: Trace bedrock fragments.		1-5						
				1-6	50+					
5		End of hole @ 4.15 m bgs due to practical refusal on possible bedrock. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 11:40-12:10. Dry upon completion. Dry to 4.15 m bgs on 24 Sep 2015.								
6										
7										
8										
9										
10										

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Clifton Associates

BOREHOLE LOG

Borehole: BH2

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200); Shear Strength - kPa: Unconf. ■ / Pocket Pen. ● / Lab Vane ◆ (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		TOPSOIL: Silt and clay. Organic. Black. Moist.		2-1						Bentonite
1		TILL: Silty clay, trace sand and gravel and bedrock fragments. Dark brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.		2-2	14 14 16					Solid 25 mm PVC
2		@ 1.5 - 1.6 m: Silt, trace sand. Light brown. Damp to dry.		2-3			.001			
3		@ 1.6 m: Bedrock fragments.		2-4	24 34 30					Cuttings 24 Sep 15
4		BEDROCK: Weathered shale. Dark brown to dark grey.		2-5						Slotted 25 mm PVC
5				2-6	50+					
6		@ 6.0 m: Seepage observed.		2-7						
7		End of hole @ 6.1 m bgs due to practical refusal on bedrock. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 12:15-12:55. Dry upon completion.		2-8	50+					
8										
9										
10										

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Clifton Associates

BOREHOLE LOG

Borehole: BH3

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit / Natural Moisture / Liquid Limit (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200); Shear Strength - kPa: Unconf. / Pocket Pen. / Lab Vane (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		TOPSOIL: Silt and clay. Organic. Black. Moist.								Bentonite
1		TILL: Silty clay, trace sand and gravel and bedrock fragments. Dark brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.		3-1						Solid 25 mm PVC
2				3-2	5 5 7					
3		@ 3.0 m: Trace rock.		3-3						
4				3-4	8 16 50+					Cuttings
5				3-5						Slotted 25 mm PVC
6		@ 5.6 - 5.8 m: Poorly-graded, rounded gravel. @ 5.8 m: Gravelly.		3-6	12 50+					
7		End of hole @ 6.6 m bgs due to practical refusal on bedrock. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 13:15-14:10. Dry upon completion. Dry to 6.6 m bgs on 24 Sep 2015.		3-7						
8				3-8	13 18 22					
9										
10										

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Clifton Associates

BOREHOLE LOG

Borehole: BH4

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit / Natural Moisture / Liquid Limit (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200); Shear Strength - kPa: Unconf. / Pocket Pen. / Lab Vane (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		FILL: Poorly-graded, rounded gravel.								
1		TILL: Silty clay, some gravel, trace sand. Dark brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.		4-1						
2		@ 2.2 - 2.4 m: Gravelly.		4-2	7 10 11		.015			
				4-3						
3				4-4	14 21 20					
4				4-5						
				4-6	8 13 19					
5		End of hole @ 5.1 m bgs due to practical refusal on cobble or rock. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 14:15-15:00. Dry upon completion.								Bentonite Solid 25 mm PVC 24 Sep 15 Cuttings Slotted 25 mm PVC
6										
7										
8										
9										
10										

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Clifton Associates

BOREHOLE LOG

Borehole: BH5

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200); Shear Strength - kPa: Unconf. ■ / Pocket Pen. ● / Lab Vane ◆ (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		FILL: Poorly-graded, rounded gravel. Some cobbles at surface.		5-1						Bentonite
1		TILL: Silty clay, some gravel, trace sand. Brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.								Solid 25 mm PVC
				5-2	9 12 18					24 Sep 15
2		@ 1.8 m: Gravelly. Seepage observed.		5-3			.019			
3				5-4	12 16 28					
				5-5						Cuttings
4				5-6	18 22 36					Slotted 25 mm PVC
5				5-7						
6				5-8	18 24 28					
7		End of hole @ 6.5 m bgs. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 15:25-16:10. Dry upon completion.								
8										
9										
10										

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Clifton Associates

BOREHOLE LOG

Borehole: BH6

Page: 1 of 1

Client:	McElhanney Consulting Services Ltd.	Northing:	0	Date Drilled:	17 Sep 2015
Project:	Geotechnical Investigation	Easting:	0	Drill:	CME-55
Location:	Fortress Mountain Resort	Ground Elev.:	0	Drilling Method:	Solid Stem Auger
Project No.:	CG2682	Top Casing Elev.:		Logged by:	GM

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	% Sulphate	Moisture Content (percent): Plastic Limit / Natural Moisture / Liquid Limit (0 – 50 – 100)	Dry Density - kg/m3 (1800 – 2200); Shear Strength - kPa: Unconf. / Pocket Pen. / Lab Vane (100 – 200 – 300 – 400)	Piezometer Construction Detail
0		FILL: Poorly-graded, rounded gravel. Some cobbles at surface.		6-1						Bentonite
1		TILL: Silty clay, some gravel, trace sand. Brown. Stiff to hard. Medium plastic. Trace iron stains and calcium deposits.								Solid 25 mm PVC
										24 Sep 15
2		@ 1.5 m: Gravelly.		6-6	8 14 20					Cuttings
				6-3						Slotted 25 mm PVC
3				6-4	50+					
4		End of hole @ 3.3 m bgs due to refusal on gravel. Standpipe installed. Backfilled with cuttings. Sealed with bentonite. Drilled/installed from 16:15-16:45. Dry upon completion.								
5										
6										
7										
8										
9										
10										

Soil Descriptive Terms

A soil description for geotechnical applications includes a description of the following properties:

- texture
- color, oxidation
- consistency and condition
- primary and secondary structure

Texture

The soil texture refers to the size, size distribution and shape of the individual soil particles which comprise the soil. The Unified Soil Classification System (ASTM D2487-00) is a quantitative method of describing the soil texture. The basis of this system is presented on the following page. The following terms are commonly used to describe the soil texture.

Particle Size (ASTM D2487-00)	
Boulder	300 mm plus
Cobble	75 – 300 mm
Gravel	4.75 – 75 mm
Coarse	19 – 75 mm
Fine	4.75 – 19 mm
Sand	0.075 – 4.75 mm
Coarse	2 – 4.75 mm
Medium	0.425 – 2 mm
Fine	0.075 – 0.425 mm
Silt and Clay	Smaller than 0.075 mm

Relative Proportions (CFEM, 4th Ed., 2006)	
Trace	1 – 10 %
Some	10 - 20 %
Gravelly, sandy, silty, clayey, etc.	20 – 35 %
And	>35 %
Gravel, Sand, Silt, Clay, etc.	35% and main fraction

Gradation	
Well Graded	Having a wide range of grain sizes and substantial amount of all intermediate sizes.
Uniform or Poorly Graded	Possessing particles of predominatly one size.
Gap Graded	Possessing particles of two distinct sizes.

Particle Shape	
Angular	Sharp edges and relatively plane sides with unpolished face.
Subangular	Similar to 'angular' but have rounded edges.
Subrounded	Well-rounded corners and edges, nearly plane sides.
Rounded	No edges, has smoothly curved sides.
Also may be flat, elongated, or both.	

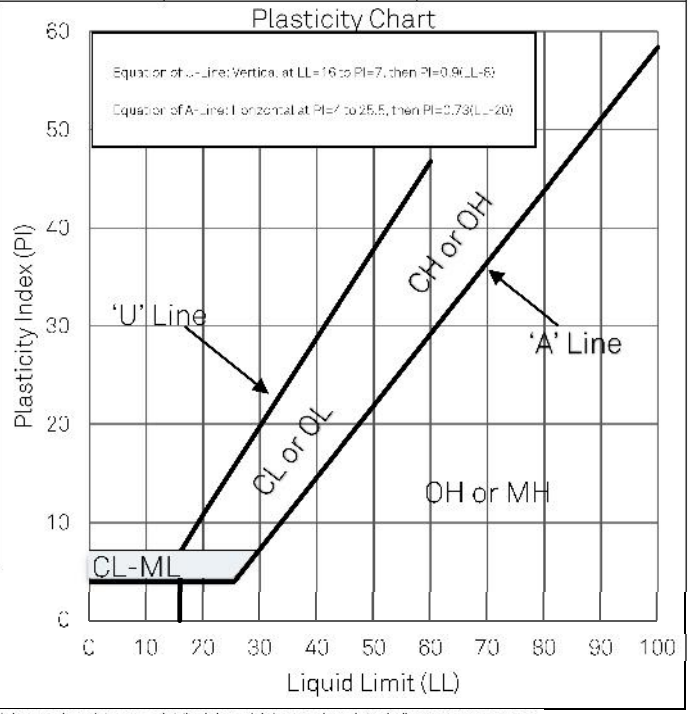
The term "TILL" may be used as a textural term to describe a soil which has been deposited by glaciers and contains an unsorted, wide range of particle sizes.

Colour and Oxidation

The soil color at its natural moisture content is described by common colors and, quantitatively, in terms of the Munsell color notation; (eg. 5Y 3/1). The notation combines three variables, hue, value and chroma to describe the soil color. The hue indicates its relation to red, yellow, green, blue and purple. The value indicates its lightness. The chroma indicates its strength of departure from a neutral of the same lightness. Departure of the soil color from a neutral color indicates the soil has been oxidized. Oxidation of a soil occurs in a oxygen rich environment where most commonly metallic iron, oxidizes and turns a neutral colored soil 'rusty' or reddish brown. Oxidized manganese gives a purplish tinge to the soil. Oxidation may occur throughout the entire soil mass or on fracture/joint/fissure surfaces.

Classification of Soils for Engineering Purposes

ASTM Designation D 2487-00 (Unified Soil Classification System)

Major divisions			Group Symbol	Typical Names	Classification Criteria		
Coarse-grained soils More than 50% retained on No. 200 sieve* (>0.075 mm)	Gravels More than 50% of coarse fraction retained on No. 4 sieve(4.75 mm)	Clean gravels <5% fines	GW	Well-graded gravel	If 15% sand add "with sand" to group name.	Classification on basis of percentage of fines: Less than 5% pass No. 200 sieve - GW, GP, SW, SP More than 12% pass No. 200 sieve - GM, GC, SM, SC 5 to 12% pass No. 200 sieve - Borderline classifications, use of dual symbols	$C_u = \frac{D_{60}}{D_{10}} \geq 4$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravel			Not meeting either Cu or Cc criteria for GW
		Gravels with >12% fines	GM	Silty gravel		Atterberg limits below "A" line or PI less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			GC	Clayey gravel		Atterberg limits on or above "A" line and PI > 7	If fines are organic add "with organic fines" to group name
	Sands 50% or more of coarse fraction passes No. 4 sieve(4.75 mm)	Clean sands <5% fines	SW	Well-graded sand	If 15% gravel add "with gravel" to group name		$C_u = \frac{D_{60}}{D_{10}} \geq 6$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sand			Not meeting either Cu or Cc criteria for SW
		Sands with >12% fines	SM	Silty sand		Atterberg limits below "A" line or PI less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			SC	Clayey sand		Atterberg limits on or above "A" line and PI > 7	If fines are organic add "with organic fines" to group name
Fine-grained soils50% or more passes No. 200 sieve* (<0.075 mm)	Silts and Clays Liquid Limit <50%	Inorganic	ML	Silt	If 15 to 29% coarse grained, add "with sand" or "with gravel" as appropriate. If >30% coarse grained, add "sandy" or "gravelly" as appropriate. Class as organic when oven dried liquid limit is <75% of undried liquid limit.		
			CL	Lean Clay -low plasticity			
		Organic	OL	Organic clay or silt (Clay plots above 'A' Line)			
	Silts and Clays Liquid Limit >50%	Inorganic	MH	Elastic silt			
			CH	Fat Clay -high plasticity			
		Organic	OH	Organic clay or silt (Clay plots above 'A' Line)			
	Highly Organic Soils		PT	Peat, muck and other highly organic soils			

*Based on the material passing the 3 in.(75 mm) sieve, if field samples contain cobbles or boulders, add "with cobbles or boulders" to group name

Consistency and Condition

The consistency of a cohesive soil is a qualitative description of its resistance to deformation and can be correlated with the undrained shear strength of the soil. The condition of a coarse grained soil qualitatively describes the soil compactness and can be correlated with the standard penetration resistance (ASTM D1586-99).

Consistency of Cohesive Soil (CFEM, 4th Edit., 2006)		
Consistency	Undrained Shear Strength (kPa) (CFEM, 4th Edit., 2006)	Field Identification (ASTM D2488-00)
Very Soft	<12	Thumb will penetrate soil more than 25 mm.
Soft	12 – 25	Thumb will penetrate soil about 25 mm.
Firm	25 – 50	Thumb will indent soil about 6 mm.
Stiff	50 – 100	Thumb will indent, but penetrate only with great effort (CFEM).
Very stiff	100 – 200	Readily indented by thumbnail (CFEM).
Hard	>200	Thumb will not indent soil, but readily indented with thumbnail.
Very Hard	N/A	Thumbnail will not indent soil.

Consistency of Coarse Grained Soil (CFEM, 4th Edit., 2006)	
Compactness Condition	SPT N – Index (Blows/300mm)
Very Loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	Over 50

Moisture Conditions (ASTM D2488-00)	
Description	Criteria
Dry	Absence of moisture, dusty, dry to touch.
Moist	Damp but no visible water.
Wet	Visible, free water, usually soil is below water table.

Structure

The soil structure is the manner in which the individual soil particles are assembled to form the soil mass. The primary soil structure is the arrangement of soil particles as originally deposited. The secondary soil structure refers to any rearrangement of the soil such as deformation and cracking which has taken place since deposition.

Primary Soil Structure (Depositional)

Geometry

Stratum	- A single sedimentary 'layer', greater than 10 mm in thickness, visibly separable from other strata by a discrete change in lithology and/or sharp physical break.
Homogeneous	- Same colour and appearance throughout.
Stratified	- Consisting of a sequence of layers which are generally of contrasting texture or colour.
Laminated	- Stratified with layer thickness between 2 – 10 mm.
Thinly Laminated	- Stratified with layer thickness less than 2 mm.
Bedded	- Stratified with layer thickness greater than 10 mm.
Very Thinly Bedded (Flaggy)	- Stratified with layer thickness between 10 – 60 mm.
Thinly Bedded (Slabby)	- Stratified with layer thickness between 60 – 600 mm.
Thickly Bedded (Blocky)	- Stratified with layer thickness between 600 – 1200 mm.
Thick-Bedded (Massive)	- Stratified with layer thickness greater than 1200 mm.
Lensed	- Inclusions of small pockets of different soil, such as small lenses of sand material throughout a mass of clay.

Bedding Structures

Cross-bedding	- Internal 'bedding' inclined to the general bedding plane.
Ripple-bedding	- Internal 'wavy bedding'.
Graded-bedding	- Internal gradation of grain size from coarse at base to finer at top of bed.
Horizontal bedded	- Internal bedding is parallel and flat lying.

Secondary Soil Structure (Post-Depositional)

Accretionary Structures

Includes nodules, concretions, crystal aggregates, veinlets, color banding, and:

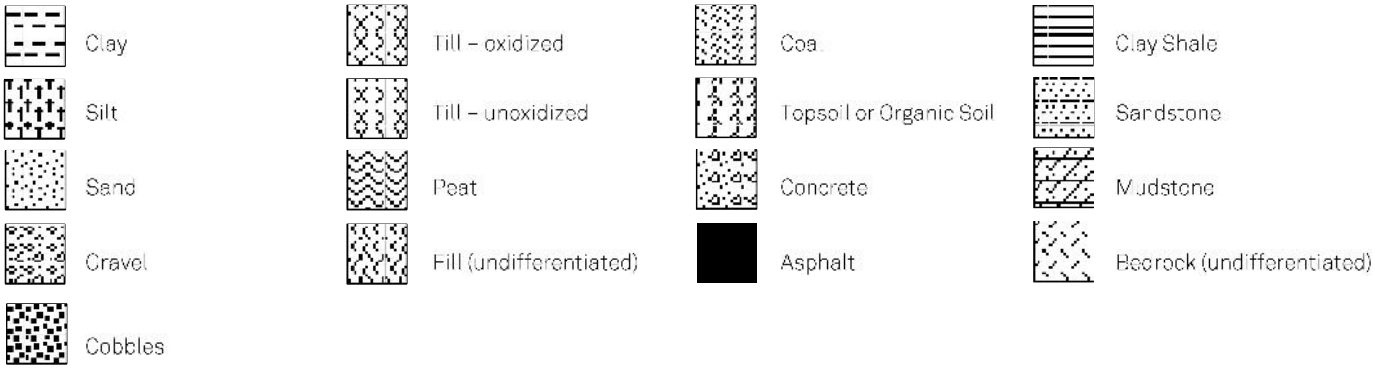
Cementation	- Chemically precipitated material, commonly calcite ($CaCO_3$), binds the grains of soil, usually sandstone. Described as weak, moderate, or strong (ASTM D2488-00).
Salt Crystals	- Groundwater flowing though the soil/rock often precipitates visible amounts of salts. Calcite ($CaCO_3$), glauber salts ($Na_2Ca(So_4)_2$), and gypsum ($CaSO_4*2H_2O$) are common.

Fracture Structures

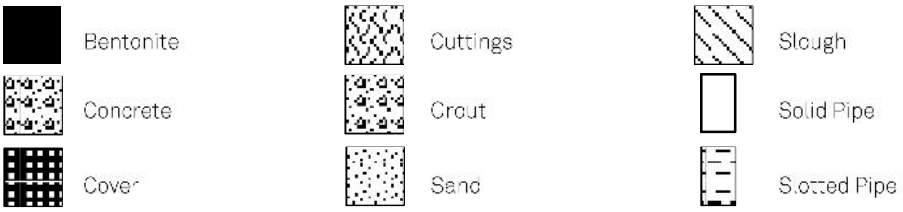
Fracture	- A break or discontinuity in the soil or rock mass caused by stress exceeding the materials strength.
Joint	- A fracture along which no displacement has occurred.
Fissure	- A gapped fracture, which may open and close seasonally. Usually an extensive network of closely spaced fractures, giving the soil a 'nuggetty' structure.
Slickensides	- Fractures in clay that are slick and glossy in appearance, caused by shear movements.
Brecciated	- Contains randomly orientated angular fragments of a finer mass, usually associated with shear displacement in soils.
Fault	- A fracture or fracture zone along with displacement has occurred.
Blocky	- A cohesive soil that can be broken down into small angular lumps which resist further breakdown.

Symbols Used on Borehole Logs

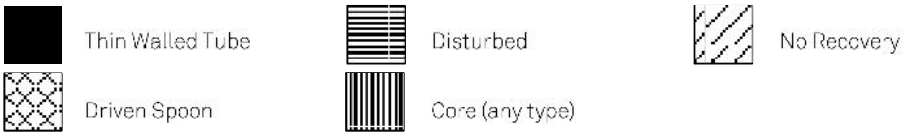
Lithology Type



Borehole Completion and Backfill Materials



Soil Sample Type



Groundwater Symbols

Piezometric elevation as determined by a piezometer installation.

Water levels measured in borings at time and under the conditions noted.

APPENDIX E

Remote Camera Photos

Photo 1: RC011- grey wolf; 11U 0628173 E 5629880 N (Taken June 28, 2018)

Photo 2: RC06- grizzly bear; 11U 0626414 E 5632970 N (Taken July 23, 2018)

Photo 3: RC05- hoary marmot; 11U 0625631 E 5631115 N (Taken June 22, 2018)

Photo 4: RC015- moose; 11U 0627487 E 5360358 N (Taken September 19, 2018)

Photo 5: RC04- mule deer; 11U 0625161 E 5631808 N (Taken August 29, 2018)

Photo 6: RC013 - white-tailed deer; 11U 0626729 E 5632942 N (Taken August 12, 2018)

APPENDIX F

Aquatics Photos

Photo 2.1: View of barrier #1 looking upstream in Reach 3, August 2018

Photo 2.2: View of barrier #2 looking upstream in Reach #3, August 2018

Photo 2.3: View of barrier #3 looking upstream in Reach #3, August 2018

Photo 2.4: View of barrier #4 created by the pottable water reservoir located in Reach #3, August 2018

Photo 2.5: View of barrier #4 created as part of the snow-making reservoir located in Reach #3, August 2018

Photo 2.6: View of barrier #6 looking upstream in Reach #2, August 2018

Photo 2.7: View of barrier #7 looking upstream in Reach #2, August 2018

Photo 2.8: View of barrier #8 looking upstream in Reach #2, August 2018

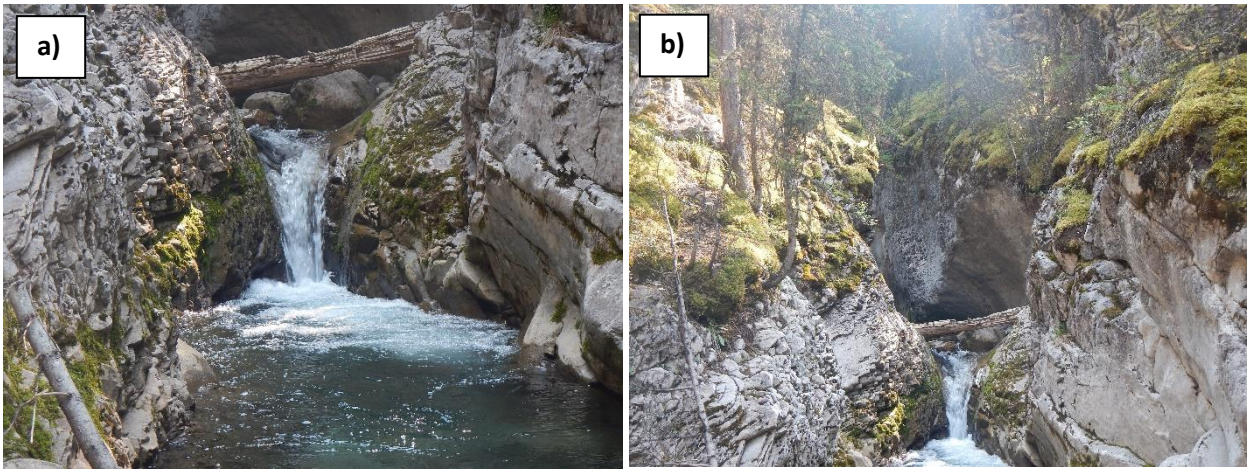


Photo 2.10: Views of barrier #10 looking upstream from the confluence of Galatea Creek in Reach #1, August 2018

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