Environmental Assessment

Spearhead Huts Project

Prepared for: BC Parks, Box 220 Brackendale, BC, V0N 1H0

Prepared by: Spearhead Huts Committee, c/o 8291 Mountainview Drive, Whistler, BC, V0N 1B8

Spearhead Huts Committee,
c/o 8291 Mountainview Drive,
Whistler, BC
V0N 1B8

May 31, 2012

Mr. Chris Platz
Area Supervisor, Squamish
BC Parks,
Ministry of Environment.
Box 220
Brackendale, BC
V0N 1H0

Dear Mr. Platz,

Re: Spearhead Huts Project Environmental Assessment

The Spearhead Huts Committee is pleased to provide you with a DRAFT copy of the Spearhead Hut Environmental Assessment. Please review the report with comments and written revisions you feel are appropriate. Once comments and revision requests are received and reviewed, we will finalize the report and circulate signed copies. Please allow the Spearhead Huts Committee one week to review and finalize the Environmental Assessment once comments have been received.

The Spearhead Huts Committee has appreciated working with BC Parks on this Project. We trust that this report will meet BC Parks requirements. Please feel free to contact the undersigned by phone or email regarding questions or further information regarding the Environmental Assessment.

Best Regards,
THE SPEARHEAD HUTS COMMITTEE

Jasmin Dobson, B.Sc.
Environmental Assessment Coordinator
778.887.9012
jasmindobson@yahoo.com

Tobin Seagel, MEDes, R.P. Bio.
Project Manager
604.669.0424 (202)
tseagel@shaw.ca

TABLE OF CONTENTS

List of Tables

Acronyms

BC	British Columbia
EA	Environmental Assessment
m	Metres
nd	No Date
VC	Valued Component

1.0 PROJECT INFORMATION

1.1 PROJECT LOCATION

The proposed project (the Project) will involve the construction of a network of trails, campsites, and huts (described as the "Site") in the Spearhead and Fitzsimmons Ranges located in the Coast Range mountains of south-western British Columbia (BC). Both ranges are situated inside Garibaldi Provincial Park, a 195,000 hectare Class "A" Provincial Park which has been operational since 1927 (BC Parks, nd).

Both the Spearhead and Fitzsimmons Ranges are found directly south-east of the Resort Municipality of Whistler and the Whistler Blackcomb ski areas. The Spearhead and Fitzsimmons Ranges can both be accessed from the ski area boundaries of both Whistler and Blackcomb ski areas.

The Spearhead and Fitzsimmons Ranges join together forming a horseshoe shaped series of connected mountains, valleys, and glaciers. The Ranges are characterized by high alpine peaks reaching elevations over 2,600 metres (m) and coastal glaciers with depths greater than 30 m. There are no roads traversing the Spearhead or Fitzsimmons Ranges and access is typically gained through hiking, ski touring[1], and in some cases, helicopter. The "Spearhead Traverse" is the common term for traveling by hiking (summer) or ski touring (winter) between Whistler and Blackcomb mountains along the high divide of the Spearhead and Fitzsimmons Ranges.

1.2 PROJECT DESCRIPTION

The Spearhead Huts Committee, with assistance from BC Parks, is conducting an Environmental Assessment[2] (EA) of the proposed Spearhead Huts Project, located within Garibaldi Provincial Park. Background reports are available for Garibaldi Provincial Park and the Project including the Master Plan for Garibaldi Provincial Park (BC Parks 1990), Park Design Guidelines and Data (Ministry of Environment, Lands and Parks 1995), Level 1 Preliminary Screen Report (Spearhead Huts Committee 2011), and the Project Description Report (Spearhead Huts Committee 2012).

A brief description of the proposed trails, campsites, and huts is provided in **Tables 1 – 3**.

A full description of the Project is contained in the *Spearhead Huts System – Proposal to BC Parks* document.

[1] Ski touring refers to a form of backcountry skiing whereby a skier has free heels allowing a walking motion. Ski touring may also be referred to as backcountry skiing, randonée, alpine touring, or telemark skiing.

[2] Environmental Assessment means, in respect of a project, an assessment of the environmental effects of the project in accordance with requirements of BC Parks.

Table 1 Proposed Trails

Trail Descriptions	Length (km)	Tread Width (m)	Trail Footprint (m^2)	Creek Crossing
Decker Loop Junction to Mount Pattison Junction Trail	9	0.75	6750	Decker Creek, elevation 2100 m, no known fish usage.
Mount Pattison Junction to Mount Pattison Hut Trail	1	0.75	750	n/a
Mount Pattison Junction to Fitzsimmons Creek Junction Trail	6	0.75	4500	Curtain Glacier Creek, elevation 1700 m, no known fish usage.
Fitzsimmons Creek Junction to Macbeth West Ridge Hut Trail	4	n/a	n/a	n/a
Fitzsimmons Creek Junction to Russet Lake	8	0.75	6000	Fitzsimmons Creek, elevation 1500 m, no known fish usage at this elevation. Adit Creek, elevation 1400 m, no known fish usage.
Russet Ridge Junction to Russet Hut Trail	1.5	1.25	1875	Russet Creek, elevation 1700 m; Cheakamus Glacier Creek, elevation 1600 m; Overlord Northwest Ridge Creek, elevation 1400 m; no known fish usage in any of the creeks.

The *Proposal to BC Parks* document describes a new trailhead and three additional trail segments as being part of a potential future phase. These are not part of the proposed Project and are not included in this EA.

Table 2 Proposed Campsites

Campsite Description	Latitude/ Longitude	Campsite Area (m^2)	Tent Sites	Services	Construction Type
Mount Pattison South Ridge Campsite (next to hut)	50° 3'29.25"N/ 122°49'33.63"W	900	6	Tent Pads	Dry Masonry (flattened stone)
Macbeth West Ridge Campsite (next to hut)	50° 1'51.97"N/ 122°48'8.08"W	450	4	Tent Pads	Dry Masonry (flattened stone)
Russet Lake Campsite (Renovation of existing Himmelsbach Hut site)	50° 1'31.78"N/ 122°51'46.33"W	1400	8	Tent Platforms, Outhouse, Wind-Resistant Cooking Shelter	Dry Masonry, Wood

Table 3 Proposed Huts

Hut Description	Latitude/ Longitude	Approximate building footprint (m^2)	Sleeping Capacity	Services
Pattison Hut	50° 3'29.25"N/ 122°49'33.63"W	200	To be determined (TBD), up to 40 people	Overnight shelter with emergency vestibule; on-site wastewater disposal; on-site water capture; cooking facilities with gas stoves; passive and active heating systems; on-site electricity generation.
Macbeth Hut	50° 1'51.97"N/ 122°48'8.08"W	230	TBD, up to 40 people	Overnight shelter with emergency vestibule; on-site wastewater disposal; on-site water capture; cooking facilities with gas stoves; passive and active heating systems; on-site electricity generation.
Russet Hut	50° 0'49.73"N/ 122°52'6.37"W	210	TBD, up to 40 people	Overnight shelter with emergency vestibule; on-site wastewater disposal; on-site water capture; cooking facilities with gas stoves; passive and active heating systems; on-site electricity generation.

1.2.1 Proponent Identification

The Project Proponent is the Spearhead Huts Committee (the Committee), a group formed in 2009 for the specific purpose of undertaking this Project. The Committee is comprised of volunteer representatives from the following non-profit organizations: Alpine Club of Canada – Whistler Section), Alpine Club of Canada – Vancouver Section, British Columbia Mountaineering Club, Kees and Claire Memorial Society, and the Brett Carlson Memorial Group. Together these organizations form the Committee whereby decisions are made through an inclusive, consensus based approach.

The Committee proposes designing, coordinating, financing, and building the Project. Once the design and construction of the Project enters completion, the Committee will dissolve and responsibilities for the operations of the huts will be transferred to the Alpine Club of Canada – Whistler Section. The Committee, BC Parks, and other stakeholders will work together on a maintenance plan for the continual upkeep of the network of trails and campsites.

As the manager of the lands contained within Garibaldi Provincial Park, BC Parks has requested that the Committee complete an EA prior to any irrevocable decisions being taken with respect to the Project.

1.2.2 Purpose of the Project – Rationale

The objectives of the Project are to enhance and expand recreation opportunities in Garibaldi Park and to reduce adverse environmental impacts caused by people recreating there. These objectives will be achieved by building a series of trails, campsites, and huts in the Spearhead and Fitzsimmons Ranges in Garibaldi Provincial Park. Currently, there is one existing hut in the Fitzsimmons Range at Russet Lake, known as the Russet Lake or Himmelsbach Hut. The hut can be reached through an existing trail network on the Musical Bumps from Whistler Mountain or by way of the Singing Pass trail from the village. Tenting areas can also be found at Russet Lake. Beyond Russet Lake no formal trails, tenting areas, or huts exist.

In 2009/2010, Garibaldi Provincial Park had over 97,000 day visits and 8,000 overnight camping visits[3] (BC Parks 2011); and it is estimated that nearly 2,000 people per year travel in the Spearhead Range. BC Parks (*personal communication* 2012) and the Committee have noted an increase in the usage of Garibaldi Provincial Park over the past ten years, particularly in the Spearhead and Fitzsimmons Ranges, and it is expected that this trend will continue. Visitors to Garibaldi Provincial Park have the potential to negatively affect the environment through damage to sensitive areas and ecosystems, pollution, campfires, and wildlife disturbances.

In the summer months, the lack of a designated trail system and tenting areas can lead to damage in natural areas by way of trampling. Winter activities typically take place on glacier and snow covered land and impacts from trampling are typically not a concern; however, human waste left behind on glaciers or in the snow has the potential to pollute water sources required in the summer months. Wildlife disturbances can occur at any time of the year and visitors may unknowingly enter into sensitive wildlife habitat.

The rationale for the Project is to benefit the Spearhead and Fitzsimmons Ranges environmentally and visitors to the Ranges socially. By concentrating visitors onto formal trails and tent pads, the Project aims to reduce foot traffic in sensitive areas including ecosystems and wildlife. Toilet facilities at the huts will concentrate human waste where it can be disposed of properly and not contaminate water sources. Various toilet systems such as composting, incinerating, vermiculture, or fly-out barrel are being considered. The system will be chosen by evaluating cost, maintenance, and environmental impact factors.

The public has the opportunity to benefit from the huts socially in terms of enhancing the recreational opportunities found in the Garibaldi Provincial Park. Furthermore, the Project has the potential to increase the margin of safety while traveling in the backcountry, as the huts can provide a refuge during extreme weather events or other emergencies.

[3] Attendance taken from 2009/2010 is indicated to be a high year with exceptional weather throughout the summer season.

1.2.3 Project Components

Table 4 below outlines the Project components and activities.

Table 4 Project Components and Activities

Project Phase	Project Components
Pre-Construction Activities	• Pre-construction activities include surveying and final design of trails, campsites and huts.
Construction	• Preparation of a lay down areas for campsites and hut construction; • Excavation[4] of surficial soils for trails, campsites and hut construction; • Site grading/levelling of excavated soil for the trails, campsites and huts; • Supply and installation of materials for trails, campsites and huts; and, • Installation of education signage to promote backcountry environmental ethics and First Nations culture.
Operations	• Operation of the trails, campsites, and huts.
Decommissioning/ Abandonment	• At present, there are no plans for decommissioning or abandonment of the trails or campsites. The existing Himmelsbach hut will either be removed or will be renovated to serve a cook shelter for the campsite to be developed on that site.

1.3 PROJECT SCHEDULE

The Project schedule has been defined as follows:

- Pre-construction activity is scheduled between 2012 – 2013:
  - Conduct final surveys and finalize Project designs.
- Construction is scheduled for the period 2013 – 2017, subject to approvals from BC Parks:
  - Begin trail construction in summer of 2013 with a completion target of 2016;
  - Foundation preparation of the first hut (Pattison) starts in 2013;
  - Prefabrication of of the Pattison hut starts in the early 2014;
  - Weather tight hut assembly and construction in the summer of 2014;
  - Interior finishing in June 2015;
  - Foundation preparation for the second hut (Macbeth) starts in 2014 and follows the same three year construction schedule as the Pattison hut;
  - Foundation preparation for the third hut (Russet) starts in 2015 and also follows the three year construction schedule; and

[4] While blasting is not planned, should it be required, BC Parks would be consulted and necessary permissions obtained.

- Campsite construction begins and ends in the summer of 2015.

- Operations for the first hut are scheduled to begin in 2015 and will continue in perpetuity.

Construction for any hut or trail segment will only begin when all of the funds required to complete the hut or trail segment are raised.

1.4 REGULATORY CONSIDERATIONS

This EA is addressed in accordance with requirements of BC Parks, under the BC *Park Act*[5].

All work associated with the Project will comply with the requirements of the BC *Park Act*.

Fisheries Act authorizations are not required for the Project as no harmful alteration, disruption or destruction of fish habitat (HADD) will take place. No in stream works will be required for the duration of the Project. There is no fish habitat at or adjacent to the Site. Fish barriers are located on the main streams downstream of the Site and the Site is primarily located in the alpine.

An authorization under the *Navigable Waters Act* and approval under the BC *Water Act* are not required as the Project will not involve works or a structure crossing a navigable body of water, or watercourse.

1.5 ASSESSMENT SCOPE

This report assesses impacts of the Site due to pre-construction activities, construction activities, and operations (including the footprint). Decommissioning is not included in the assessment scope as the Project is part of Garibaldi Provincial Park, and because a long-term (80+ years) operation period is expected. At the time of decommissioning, the facilities operator will follow the BC Parks environmental management of the day.

The assessment scope includes consideration of potential direct and cumulative effects of the Project, on Valued Components (VCs) (**Section 1.5.3** and **Table 5)**. Spatial and temporal boundaries are described in **Sections 1.5.1 and – 1.5.2**.

1.5.1 Spatial Boundaries

The spatial extent of the EA is the Study Area, which spans the Spearhead and Fitzsimmons Ranges of Garibaldi Provincial Park connecting the network of trails to campsites and the huts. The Study Area includes the Site (i.e. the network of trails, campsites, and huts) with an additional 100 m buffer on all

[5] Government of British Columbia, 1996. Parks Act. RSBC 1966.

components of the Project directly occupied during construction and operation, including temporary work areas and the general surrounding area (e.g., 100 m buffer) where project activities have the potential to impact VCs.

1.5.2 Temporal Boundaries

Temporal boundaries are defined based on the timing and duration of Project activities that could cause environmental and social effects. Temporal boundaries for the assessment are based on the Project schedule defined in Section 1.3 of this report.

1.5.3 Valued Components

VCs are components of the environment considered important by the Committee, local First Nations, stakeholders, scientists and BC Parks who have provided input to the Project. VCs have been identified based on the Committee's experience on EA projects in the southwest of British Columbia and elsewhere, and knowledge and review of existing standards and guidelines as conducted by qualified professionals involved with the Committee.

Table 5 Valued Components (VCs)

Section	Subject Area	Valued Components (VC)
1.6.2 Biophysical	Soils	• Soil stability and erosion. • Geohazards.
	Vegetation	• Plants and plant communities; and, • *Species at Risk Act* (SARA) listed Schedule 1 plants and Conservation Data Centre (CDC) listed plant communities.
	Terrestrial Wildlife	• Large and small mammals; and, • SARA listed Schedule 1 wildlife.
1.6.3 Social	Visual Resources	• Enclosure and focal experiences.
	Recreation	• Recreational values.
	Archaeology	• Identified archaeological sites.
	Human Health and Safety	• Workforce Health and Safety; and, • Public Health and Safety.

1.5.4 Identification and Analysis of Potential Project Effects

The methodology used to identify and assess effects from the Project includes:

- VC selection (see above);
- Collection and analysis of relevant background or baseline information;
- Screening of each potential direct effect that may occur during each project phase to determine whether there is an interaction between the Project components and/or operations and the selected VC; and,
- Determination of whether direct Project impacts on the VC are likely to result in indirect effects on other VCs (e.g. effects on water quality translate into further effects on wildlife VCs).

1.5.5 Mitigation Measures

Mitigation measures, which will be implemented to address potential effects, are described. Mitigation will be implemented to:

- Result in positive environmental and social effects;
- Avoid and/or minimize any potential threat/risk to VCs;
- Prevent and/or reduce potential effects of the threat/risk to VCs (e.g. erosion control, pollution prevention equipment/technologies); and,
- Respond to threats/risks to VCs if they occur (e.g. emergency response, clean up).

Mitigation measures for potential Project effects and relevant mitigation success rating are summarized in a table format.

1.5.6 Residual Effects of the Project

Residual effects will be identified if applied mitigation measures are unlikely to offset the effects. The EA will assess the significance of any residual adverse project effects. Residual effects will be carried forward to a cumulative effects assessment. The significance of adverse residual effects of the Project will be determined using the following criteria:

- **Magnitude:** This refers to the severity of the effect giving consideration to factors such as the uniqueness of the effect, and its severity as compared to natural or background variation. The magnitude of the effect may vary from low magnitude (typically negligible or un-measurable) to high. The basis for magnitude is provide for each VC;
- **Geographic Extent:** This refers to the geographic area over which Project-related effects are expected to occur. The geographic extent of effects can be at the Site, local (which is within the Study Area) or regional (which is beyond the Study Area);
- **Duration and Frequency:** This refers to the length of time the effect lasts and how often the effect occurs. The duration of an effect may range from Long term, to Moderate term, to Short term, to Transient. The frequency of an effect can be rare, uncommon, frequent or continuous;
- **Reversibility:** This refers to the degree to which existing baseline conditions can be regained after the factors causing the effect are removed. Effects can be reversible or permanent;
- **Context:** This refers to the ability of the ecology of the Study Area to accept change. A typical scale for ecological context is Well Developed, Developed, and Intact. For this Project, the ecological context is largely Intact, with occasional minor anthropomorphic intrusion;
- **Probability:** The likelihood that an adverse effect will occur; and,
- **Significance:** The significance, or Level of Effect, of the residual effect is based on published standards, criteria or thresholds, and in their absence professional judgement.

1.5.7 Potential Interaction between Residual Project Effects and Other Projects or Activities

Potential cumulative effects are considered where:

1. There are residual effects of the Project that are greater than negligible and measureable, with a possibility of a significant level of effect when the residual effect of the Project interacts with the residual effect of another project or activity.
2. The interaction must affect the same VC; and
3. The interaction must overlap within the same spatial and temporal boundaries for the VC.

For a project or activity to be included in the cumulative effects assessment, it must have a degree of certainty and be reasonably foreseeable, and may be a past, present or future projects and activities in the area.

It is noted that the three potential interactions would be the development of the Blackcomb and Whistler ski areas, development of Whistler municipality, and planning and management of Garibaldi Provincial Park.

1.6 POTENTIAL PROJECT AND ENVIRONMENTAL INTERACTIONS

The Project activities (**Table 4**) and VCs (**Table 5**) were examined to identify potential project and environment interactions (**Table 6**). Project activities and VCs that interacted were examined in the effects assessment (**Section 2.0**).

Table 6 Potential Project and Valued Components (VCs) Interaction Table

Project Phase/ Component/Activity	Valued Components							
	Biophysical				Social			
	Soils	Geohazards	Vegetation	Terrestrial Wildlife	Visual Resources	Recreation	Archaeology	Human Health and Safety
Pre-Construction Activities								
Pre-construction activities include surveying and final design of trails, campsites and huts	CF	CF	CF	CF	CF	CF	CF	CF
Construction								
• Preparation of a lay down areas for campsite and hut construction	CF	M	CF	CF	CF	M	M	M
• Excavation of surficial soils for trail, campsite and hut construction	CF	CF	CF	CF	CF	M	M	M
• Site grading/levelling of soil for the trails, campsites and huts	CF	CF	CF	CF	CF	M	M	M
• Supply and installation of materials for trails, campsites and huts	CF	CF	CF	CF	CF	M	M	M
• Installation of education signage to promote backcountry environmental ethics and First Nations culture	M	N	CF	CF	N	N	CF	CF
• Waste Generation	M	N	M	CF	CF	CF	N	CF
Operations								
Operation of the trails, campsites, and huts	CF	N	CF	CF	CF	CF	N	CF
Waste generation	M	N	M	CF	CF	CF	N	CF

2.0 DISCUSSION OF ENVIRONMENTAL EFFECTS, SIGNIFICANCE AND MITIGATION

2.1 BIOPHYSICAL

2.1.1 Soil

The soil landscape profile in the Study Area is elevation dependant. According to HectaresBC (2012), treeline and alpine elevations (+1400 m) are characterized by hard, acidic rock formed by bedrock, rock, and rubble. The soils of the treeline and alpine elevations are typically shallow and derived from shallow bedrock (MoF 2006). Where the Study Area descends into the Fitzsimmons Creek valley (northwest of the Fitzsimmons Glacier and below 1400 m) the soil landscape is characterized by moderately well drained, ferro-humic podzolic mineral soil. HectaresBC (2012) does not identify grasslands or wetlands in the Study Area.

Potential effects to soils as a result of Project construction activities include erosion, due to rain and surface runoff, from exposure and or loosening of soils during construction activities such as excavation or vegetation removal. The extent and magnitude of these effects are very small and expected to be confined to the Site. The proposed trails will traverse streams; however, no in-stream work is planned and any structures will try to avoid encroachment on the highwater mark of the water body.

Mitigation measures to prevent effects to soil as a result Project will include Best Management Practices (BMPs) contained in the Ministry of Forests, Recreation Manual (Chapter Ten Trail Management) (MoF, nd) for erosion control during trail construction and BC Parks guidelines for trail construction will be used to design and construct trails. Final design of the trails, campsites, and huts will encourage siting of Project component areas that are dry, of moderate (or low angle) grade, and require little terrain modifications. Specific mitigation measures may include, but are not limited to the following:

- Construction during dry months when soil saturation and water levels are low;
- Construction activities will avoid naturally wet and sensitive areas;
- On steep slopes, low trail grades will be applied;
- The use of heavy equipment will be avoided in most circumstances and construction activities will primarily occur by hand; and
- Natural drainage patterns will not be disturbed.

It is expected that the creation of new trails and campsites in the Spearhead and Fitzsimmons Ranges can have a positive effect on soils, because it will reduce the frequency and extent of unregulated trails and campsites, and the effects that proliferating uncontrolled trails and campsites can have on soils, erosion and loss of alpine and ground vegetation. Established trails and campsites concentrate use and

can be focused on areas that are more durable and less susceptible to erosion and ecological damage. Non regulated trails may climb steep grades and travel through wetted areas and have great potential to cause erosion issues.

With the implementation of mitigation measures to prevent erosion of soil at the Site it is expected that the extent and magnitude of residual effects to soil will be low or negligible.

With mitigation measures in place (**Table 7**), insignificant residual environmental effects on soils are anticipated to result from the planned Project works at the Site. The soil disturbance will be an uncommon onetime occurrence with a short term duration required to complete the Project works and for soils to stabilize following disturbance. It is recognized that trail maintenance will be required to minimize off-trail soil erosion.

2.1.1.1 Generation of Waste

Minimal waste is expected due to the nature of construction activities. All non-natural (i.e. waste that is not wood etc.) construction generated waste will be appropriately contained, collected, removed from Garibaldi Provincial Park and recycled/disposed of at appropriate locations outside of Garibaldi Provincial Park.

Waste generated during operations will be minimized through backcountry education, such as the Leave No Trace principles, found on the BC Parks and Alpine Club of Canada websites. Garbage cans will not be provided at the huts and campsites, and visitors are reminded on the BC Parks Garibaldi Park information page to “pack it in, pack it out”.

Furthermore, the toilet facilities at the huts will properly contain human waste and the Alpine Club of Canada, Whistler section will be responsible for ensuring that human waste at the huts is properly disposed of. No residual effects as a result of waste are expected from Project activities (as mentioned above and in **Table 7**).

2.1.2 Geohazards

The selection of geohazards as a VC relates to significant rock fall, landslide, and avalanche events. Construction activities for the Project (specifically the huts) are not expected to require blasting. However, if blasting is required the amount that would be involved is expected to be small and would not be carried out without approval from BC Parks, and any required permits. A geotechnical engineer has been retained by the Committee to provide oversight on the placement of the huts and any blasting-related construction activities that may be required. Furthermore, an engineer with avalanche consulting

experience has provided advice on the placement of the huts to ensure that all locations are not frequented or threatened by avalanches.

Therefore, the Project is not expected to impact or exacerbate the incidence of rockfalls, landslides or avalanches in the Study Area. In addition, the huts have been sited to avoid known avalanche areas.

No residual effects are expected.

2.1.3 Vegetation

The character of vegetation in the Study Area is elevation dependent. The biogeoclimatic zone in the treeline and alpine elevations (+ 1400 m) are characterized as Coastal-mountain heather (CMA) while below treeline areas are characterized as Moist Maritime Mountain Hemlock (MH) (Hectares BC 2012). Vegetation near treeline in the CMA includes krummholtz (stunted trees) and patches of mountain hemlock, yellow cedar, and sub-alpine fir. At higher elevations the dominant vegetation is primarily extensive beds of white and pink mountain-heathers (MoF 2006). Other vegetation that may be found include alpine wildflowers such as paintbrushes, glacier lily, arnicas, and arctic lupine. In the very high alpine mosses, liverworts, and lichens may be the dominant vegetation.

Lower in elevation, the MH biogeoclimatic zone is characterized with mountain hemlock, oval-leafed blueberry, black huckleberry, and white-flowered rhododendron (MoF 2006).

A search of the Ministry of Environment, Conservation Data Centre Ecosystems Explorer (CDC 2012) did not identify species-at-risk vegetation occurring in the Whistler area in the CMA or MH biogeoclimatic zones.

Project-related activities have the potential to interact with vegetation at the Site. Potential effects on vegetation include the loss of vegetation at the Site through levelling and excavation activities. Trail width clearing is expected to be between 0.75 to 1.25 m in width. The footprint for campsites is expected to be 450 m^2 at the Macbeth West Ridge campsite, 900 m^2 at the Mount Pattison South Ridge campsite, and 1400 m^2 at the Russet Lake campsite where a renovation of the campsite will occur. Both the Macbeth and Pattison campsite occur in the alpine. The footprint at each hut is expected to be 230 m^2 or less depending on final hut design.

Project design will be used to minimize the footprint impact on vegetation. Clearing of vegetation will be restricted to the direct footprint of the trails, campsites, and huts. Laydown areas during construction will be chosen based on durability (i.e. rock, gravel, snow where available). BMPs for trail construction (MoF, nd) and BC Parks guidelines for the removal of vegetation will be followed.

The magnitude of effects to vegetation is expected to be negligible due to the availability of large areas of similar habitat outside of the Site, and limited to the extent of the footprint in the Site where construction activities are taking place.

In the absence of species-at-risk vegetation associated with the Study Area and the negligible magnitude of effects to vegetation at the Site, it is anticipated that residual effects will be negligible, as outlined above and in **Table 7**.

2.1.4 Terrestrial Wildlife

2.1.4.1 Mountain Goat

Mountain goat (*Oreamnos americanus*) are currently listed as S4 (apparently secure) according to the Provincial Conservation Status and yellow listed (not at-risk) in BC. The province of BC places a very high conservation priority on mountain goat and in 2010 released a provincial mountain goat management plan (MGMT 2010).

Mountain goats are known to occupy the Spearhead and Fitzsimmons Ranges. Throughout the year, they generally reside at or above treeline and will move up and down elevations seasonally. Lower, forested elevations are generally favoured in the spring in order to take advantage of the first flush of green vegetation (MGMT 2010). As the spring progresses into summer, the mountain goats tend to follow the melting snow line up-slope and feed on emerging vegetation. Mountain goats will further seek summer habitat based on thermal cover (e.g., rock walls and or higher elevations and persistent snow) to avoid warm temperatures (MGMT 2010). Higher, exposed south facing slopes are favoured in the winter in order to avoid the energetic costs of moving through deep snow (MGMT 2010). Proximity to escape terrain is an important factor in habitat selection during both the summer and winter. Of all the seasons, winter habitat selection is the most critical as mountain goats are restricted in their movements as they cannot move to new terrain as easily as in other months.

The Project footprint will not result in a permanent winter range loss of high-rated winter habitat in the Study Area. In the summer, the hiking trail, specifically the Macbeth and the Russet location are within goat range. However, as summer is not a limiting factor for mountain goat survival, and considering the availability of large areas of summer habitat outside of the Site, these effects are believed to be limited in extent to the Site and low in magnitude. Habitat fragmentation, as a result of the hiking trail, is also considered to be not significant as the hiking trail will be limited in extent to short stretches of trail in steep moderate to high-rated mountain goat habitat.

The Project schedule, as defined in this EA, does not include Site-specific construction activities in the winter or spring. As a result the magnitude of effects due sensory disturbance in those months is

expected to be negligible. Construction activities are planned to take place during the summer months and sensory disturbance effects during the summer are expected to be temporary in duration and limited in extent to the Site where construction is taking place. Sensory disturbance effects are reversible, and mountain goats are anticipated to return to habitats adjacent to/close to the Project footprint after construction is complete.

Mitigation for Project activities and mountain goats will include the following:

- All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time;
- Project construction activities will cease temporarily should mountain goats be within 100 m line-of-sight in open areas during the designated winter (1 November to 30 April) or kidding/early rearing periods (1 May to 15 July) until the mountain goats have moved from the area; and,
- Education will be provided at the huts informing visitors of the importance of viewing setbacks and not disturbing wildlife.

Impacts of the Project on mountain goats are expected to be short term and not anticipated to be significant.

2.1.4.2 Wolverine

Wolverine (*Gulo gulo luscus*) are known to occupy the CMA as high elevation alpine tundra is typical habitat of the species (Halter 1998). Wolverine are listed as S3 (special concern) on the Provincial Conservation Status and Blue listed on the BC List (special concern). Wolverines are well-adapted to deep snow packs, and appear to require large sparsely inhabited wilderness areas to meet their life requisites (Banci 1994). Wolverine habitat selection is based on the availability of prey and carrion, as well as availability of large tracts of mostly undeveloped habitat. Low levels of habitat fragmentation do not appear to affect wolverine, which travel considerable distances (30 to 40 km) on a daily basis (Banci 1994).

Impacts of the Project on wolverine are expected to be limited to sensory disturbance during construction, limited in extent to the Site, and low in magnitude, because of the availability of suitable habitat surrounding the Site.

Mitigation for Project activities and wolverine will include the following:

- All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time;
- Project construction activities will cease temporarily should a wolverine be within 100 m line-of-sight in open areas until the wolverine has moved from the area; and,
- Education will be provided at the huts informing visitors of the importance of viewing setbacks and not disturbing wildlife.

Given the above, and the relatively small footprint of the Project, impacts on wolverine due to the Project are expected to be short term not significant.

2.1.4.3 Hoary Marmot

The hoary marmot (*Marmot caligata*) is found in the alpine and sub-alpine areas at elevations of 1250 to 2450 m (Nagorsen 2005). Marmots can typically be found in meadows and open forests of subalpine fir, talus slopes, and often near large boulders. In BC, they are listed as S5 (secure) on the Provincial Conservation Status and yellow (secure) on the BC List (CDC 2012).

Marmots are hibernators and will spend up to eight months of the year in their burrow (Nagorsen 2005). Hibernating burrows are placed next to easy to access spring food sources. The marmot enjoys a diet of grasses, flowering plants, berries, roots, lichens, and mosses (Nagorsen 2005). The home range of individual marmots is reported to be relatively large (nearly ten hectares) Blumstein 2010.

Project related impacts on marmot are expected to be limited to sensory disturbance during construction, limited in extent to the Site, and low in magnitude, because of the availability of suitable habitat surrounding the Site. Clearing of available vegetation as food sources for the marmot is expected to be minimal, and limited to hiking trail, campsite, and hut footprints. Dogs are not permitted in Garibaldi Provincial Park, consequently the impacts from dogs are not included in the assessment.

Studies have shown that marmots habituated to significant human presence are found to have comparable reproductive and survival rates and had similar body condition when compared with marmots not exposed to human presence (Griffin et. al 2007). The presence of humans can drive off predators of the marmot (such as eagles, wolves, cougars, and bears); however, behavioural changes such as looking up more often has been noted in marmots exposed to a heavy human presence (Griffin et. al 2007).

Mitigation for Project activities and marmot will include the following:

- All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time;
- Project construction activities will cease temporarily should a marmot be within 15 m line-of-sight in open areas until the marmot has moved from the area; and

- Education will be provided at the huts informing visitors of the importance of viewing setbacks and not disturbing wildlife.

Given the above, and the relatively small footprint of the Project, impacts on marmot due to the Project are expected to be short term and not significant.

2.2 SOCIAL

2.2.1 Visual Resources

The visual resources of Garibaldi Provincial Park are primarily represented by three types of visual experiences: panoramas, enclosures, and focals (BC Parks 1990). Panoramas are characterized by uninterrupted views of the mountain ranges and valleys that make up Garibaldi Provincial Park, often seen from high elevation peaks and viewpoints. Enclosure experiences are defined by large-scale features such as u-shaped valleys. Focal experiences occur when the landscape focuses the viewer toward a particular feature such as a glacier (BC Parks 1990).

Currently, there is a trail system, campsites, and a single hut in the Fitzsimmons Range. The Whistler and Blackcomb ski areas, Resort Municipality of Whistler, and Sea-to-Sky highway are visible from many areas in the Spearhead and Fitzsimmons Ranges.

The trails, campsites, and huts have the potential to affect enclosure and focal experiences. In terms of the trail system and campsites the affect is anticipated to be positive on both enclosure and focal experiences. Concentrating usage into a single area reduces the likelihood that multiple routes and campsites are developed which can be viewed as unsightly at the enclosure and focal level.

The huts have the potential to affect focal experiences immediately at their locations by drawing attention away from landscape features in the area. To mitigate this effect, the final design of the huts will incorporate the BC Parks Design Guidelines on Park Structures. This may include, but is not limited to:

- Using simple designs to allow the natural landscape to dominate the visual experience;
- Following the natural contours of the Site;
- Design leaving behind the urban and sub-urban world; and,
- Materials matching the local landscape in colour.

The final designs of the huts will further incorporate the survey results of the Garibaldi Park Management Plan Amendment Survey, completed in March 2012. In particular, the Committee will incorporate the public feedback regarding hut size into the final design.

After the application of mitigation measures, the effects to visual resources are expected to be limited in extent and magnitude. The extent will be limited to focal experiences surrounding the Site. Residual effects for visual resources are not expected to be significant with appropriate mitigation strategies consistent with BC Parks management plans and objectives, as outlined above and in **Table 7**.

2.2.2 Recreation

The Spearhead and Fitzsimmons Ranges offer a wide variety of alpine backcountry recreational opportunities including hiking, camping, mountaineering, ski touring and heli-skiing. The Project has the potential to affect recreational resources both positively and negatively.

The positive effects from the Project on recreation include the following:

- Improved access to backcountry areas by way of trails;
- Trails and campsites that will reduce the risk of unsightly multiple and unmaintained trail systems or campsites;
- The hut locations are strategically planned to offer terrain to a wide variety of skills from beginner to expert;
- The huts will provide comfortable backcountry accommodations, especially with regards to winter recreation;
- The huts will allow users to reduce their gear loads by allowing users to not require some types of camping equipment such as stoves and tents; and,
- The huts will offer emergency shelter.

Negative effects from the Project on recreation potentially include increased usage of the alpine backcountry in the Spearhead and Fitzsimmons Ranges. In particular, winter activities such as ski touring

and heli-skiing may be affected by an increase in the number users in the area, drawn to the huts. The mountains immediately surrounding the huts may experience higher traffic volumes which may result, at times, in the reduced availability of powder skiing opportunities. The heli-skiing operator (Whistler Heli-ski) in the Spearhead and Fitzsimmons Ranges may experience an increase in ski tourers using the runs frequented by the company. There is the potential for increased heli-skiing and ski tourer conflicts in the Spearhead and Fitzsimmons Ranges as a result of the Project.

Mitigation for the potential effects of the Project on recreation includes design, operation, and education. The final hut design will incorporate the results on preferred hut size in the Garibaldi Park Management Plan Amendment survey (completed March 2012). The potential users of the huts have then indicated to the Committee their expectations for usage in and surrounding the hut. While the hut design is not finalized, it is expected that each hut will sleep 40 or fewer people. By mitigating the hut design to sleep 40 people or fewer, the potential effects of a crowded backcountry environment can be minimized. Furthermore, the placement of the huts along the Spearhead and Fitzsimmons Ranges is a strategic mitigation that ensures that the huts are not in close proximity of one another, thereby further reducing the potential effects of a crowded backcountry environment.

The management of the huts during the operational period will be a mitigating factor for recreational effects. Guests will be able to book the huts using the Alpine Club of Canada's online booking system whereby the user will be able to determine if the huts are occupied or empty. Huts that do not have online booking systems operate on a "first come, first served" basis and can at times have more occupants than the hut permits. Informing potential users of the hut availability will help to prevent over-crowding of the huts, and backcountry environments.

To reduce the potential for heli-skiing and ski touring user group conflicts, education will be the primary tool. Whistler Heli-Skiing will be encouraged to continue avoiding ski runs that have ski tourers on or in close proximity to the top while ski tourers will be encouraged to avoid traveling to areas where obvious or known heli-skiing is occurring.

The negative effects associated with recreation are anticipated to be longer term in duration and uncommon (or infrequent), and limited to certain times of the year such as holidays when more visitors may be present. The probability of adverse effects on recreation is anticipated to be low and the extent and magnitude expected to be small when compared to the Study Area and the region. After the application of the mitigation measures, it is not expected that significant residual effects on recreation in the Study Area will occur, as outlined above and in **Table 7**.

2.2.3 Archaeology and Heritage

There are known cultural resources in Garibaldi Provincial Park such as historical cabins and fossils that occur outside of the Study Area (BC Parks 1990). The Squamish First Nation has been known to traditionally visit Garibaldi Provincial Park, in particular to gather obsidian in an area which is outside of the Study Area (BC Parks 1990). In the 1990 Garibaldi Park Management Plan, BC Parks notes that no known First Nation artefacts have been recorded in Garibaldi Provincial Park (BC Parks 1990).

Archaeological sites (both recorded and unrecorded) are protected under the *Heritage Conservation Act* and must not be altered or damaged without a site alteration permit from the Archaeology Branch. Excavation for the Project is expected to include site leveling activities which will likely be at depths less than one metre. Archaeological finds are not anticipated; however, in the case that an unanticipated or chance find occurs the following mitigation measures will be applied:

- In the event that archaeological resources / remains are encountered, all ground altering or other activities which threaten the archaeological site must be suspended at once; and,
- In the case of human remains being encountered the Committee representative will first notify the police. For archaeological resources / remains BC Parks will be promptly notified of the existence and location of the potential archaeological resource. Mitigative measures specified by BC Parks will be followed.

No residual effects for archaeology are expected. Mitigation measures are identified for unanticipated or chance finds during construction, as outlined above and in **Table 7**.

2.2.4 Health and Safety

Effects of the Project on Human Health and Safety may be present to both Committee workers constructing the trails, campsites, and huts and visitors to Garibaldi Provincial Park should they venture on to the Site.

Human health and safety risks may be present as a result of construction activities and natural backcountry hazards such as weather and wildlife. To mitigate effects, the Committee will adopt the BC Parks Health and Safety plans for workers constructing the trails, campsites, and huts in Garibaldi Provincial Park. A health and safety meeting will be a requirement prior to work commencing on-Site and will discuss Site hazards, current conditions, and emergency procedures.

A site-specific emergency response plan will be created for construction activities. Committee members participating in construction activities will be required to wear appropriate personal protective equipment as deemed necessary by BC Parks.

Site access for the public will be restricted as per BC Parks guidelines. Mitigative measures specified by BC Parks must be followed and may include the installation of signage during Project construction to warn visitors that construction is taking place.

During the operations period, the campsites and huts have the potential to affect human health and safety positively by reducing the potential for human and wildlife conflicts. The campsites and huts will separate human and food wastes from one another. This separation reduces the risk of interaction between humans and wildlife.

The human health and safety effects are expected to be small to nil during construction, and low during operations. The extent will be limited to the Site where work is taking place, and temporary in duration for the construction work. During operations the effects are considered long term and low to negligible with adherence to mitigation identified. No residual effects are expected with appropriate mitigation measures in place as outlined above and in **Table 7**.

2.3 ACCIDENTS AND MALFUNCTIONS

The Project may require the use of hand-held machinery and potentially a small front end loader. There is the potential that the usage of such equipment could result in the release of grease, oil and gas into the environment, particularly soil. To minimize the potential of hazardous materials into the environment, the Committee will adopt BC Parks guidelines for backcountry construction to avoid the release of hazardous materials into the environment.

The guidelines may include, but are not limited to the following:

- Machinery on-site will be inspected regularly to ensure it is in good repair, and clean and free of leaks;
- Equipment staging areas will be at least 100 m away from any watercourse;

- If fuel storage areas are required, they will be located on level ground;
- A spill kit will be present at the Site when machinery is present that uses hazardous materials;
- The spill kit size and contents will be representative of the machinery on-Site;
- The Committee will report all spills of a deleterious substance and environmental emergencies to BC Parks; and,

- The Committee will make all reasonable effort to contain spills and mitigate the effects of the spill.

It is expected that by applying the above mitigation measures, most, if not all, accidents and malfunctions will be prevented. However, should an accident and malfunction occur it is expected that the magnitude of the effect will be low or negligible. Furthermore, the extent of the effect will be limited to the Site where the work is taking place and temporary in duration (one time occurrence). With mitigation measures in place (above and in **Table 7** - **Soils**), no residual effects are anticipated from the Project.

2.4 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The Site is located at high elevations (+1400 m) in the mountains of the Spearhead and Fitzsimmons Ranges of Garibaldi Provincial Park. Extreme environmental events such as rainstorms, snow storms, extreme winds and seismic events may affect the Project during construction and operations. Such types of events that exceed required design standards are of unknown frequency and magnitude. Should extreme events occur, the consequence may affect the stability of trails and the hut(s).

It is noted that even with such events the Project may afford users of the area a degree of support and assistance, either because the facilities have largely remained intact, and/or because the trails and huts provide logical starting points for search teams when the events occur.

The consequence of these events on the Project the subsequent effects of the damage to the facilities is not expected to pose significant risk to the environment.

3.0 SUMMARY OF RESIDUAL EFFECTS AND MITIGATION

Table 7 below provides a summary of the residual effects and mitigation discussed in Section 2.

Table 7 Valued Component (VC) Effects Analysis and Mitigation Measures

VC	Description of Potential Project Interaction with VC	Required Mitigation	Residual Effects	Significance of Residual Effects [6]	Mitigation Effectiveness Rating
Soils	Disruption as a result of excavation activities	Mitigation measures to prevent effects to soil as a result Project will be incorporated into Project design. Best Management Practices (BMPs) for erosion control during trail construction and BC Parks guidelines for trail construction will be adopted as necessary. In general, the final design of the trails, campsites, and huts will pay specific attention to zones that are dry, of moderate grade, and require little terrain modifications. Specific mitigation measures may include, but are not limited to the following: • Construction during dry months when soil saturation and water levels are low; • Construction activities will avoid naturally wet areas; • Construction activities • On steep slopes, low trail grades will be applied; • The use of heavy equipment will be avoided in most circumstances and construction activities will primarily occur by hand; and, • Natural drainage patterns will not be disturbed.	Insignificant residual effects are anticipated with appropriate mitigation measures in place	NS	High
	Generation of waste during construction and operations	Due to the nature of construction activities, minimal waste is expected. All generated waste will be appropriately contained, collected, and recycled/disposed of at appropriate locations outside of Garibaldi Provincial Park.	No residual effects are anticipated with appropriate mitigation measures in place	NS	High
	Contamination due to spills and leaks from machinery and equipment.	BMPs and BC Parks guidelines for construction in a backcountry environment will be applied. The BMPs may include, but are not limited to the following: • Machinery on-site will be inspected regularly to ensure it is in good repair, and clean and free of leaks;	No residual effects are anticipated with appropriate mitigation measures in place.	NS	High

[6] Significance of Residual Impacts rated as follows: NS = Not significant, 1 = Insignificant, 2 = Significant, 3 = Unknown, (+) = Positive Impact.

VC	Description of Potential Project Interaction with VC	Required Mitigation	Residual Effects	Significance of Residual Effects [6]	Mitigation Effectiveness Rating
		• Equipment staging areas will be at least 100 m away from any watercourse; • If fuel storage areas are required, they will be located on level ground; • A spill kit will be present at the Site when machinery is present that uses hazardous materials; • The spill kit size and contents will be representative of the machinery on-Site; and • The Committee will report all spills of a deleterious substance and environmental emergencies to BC Parks. The Committee will make all reasonable effort to contain spills and mitigate the effects of the spill.			
Vegetation	Loss of vegetation.	Project design will be used to minimize effects to vegetation by way of direct footprint. Clearing of vegetation will be minimized to the direct footprint of the trails, campsites, and huts, as necessary. Laydown areas during construction will be chosen based on durability (i.e. rock, gravel, snow where available). BMPs for trail construction and BC Parks guidelines for the removal of vegetation will be applied, as necessary.	Insignificant residual effects are anticipated with appropriate mitigation measures in place.	NS	High
Terrestrial Wildlife	Mountain Goat – habitat avoidance at Site.	Mitigation for Project activities and mountain goats will include the following: • All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time; and • Project construction activities will cease temporarily should mountain goats be within 100 m line-of-sight in open areas during the designated winter (1 November to 30 April) or kidding/early rearing periods (1 May to 15 July) until the mountain goats have moved from the area.	Insignificant residual effects are anticipated with appropriate mitigation measures in place.	NS	High
	Wolverine – habitat avoidance at the Site.	Mitigation for Project activities and wolverine will include the following: • All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time; • Project construction activities will cease temporarily should a wolverine be within 100 m line-of-sight in open areas until the wolverine has moved from the area; and	Insignificant residual effects are anticipated with appropriate mitigation measures in place.	NS	High

VC	Description of Potential Project Interaction with VC	Required Mitigation	Residual Effects	Significance of Residual Effects [6]	Mitigation Effectiveness Rating
		• Education will be provided at the huts informing visitors of the importance of viewing setbacks and not disturbing wildlife.			
	Marmot – habitat avoidance at the Site.	Mitigation for Project activities and marmot will include the following: • All workers involved with Project construction activities will be instructed to not approach, feed, or harass wildlife at any time; • Project construction activities will cease temporarily should a marmot be within 15 m line-of-sight in open areas until the marmot has moved from the area; and • Education will be provided at the huts informing visitors of the importance of viewing setbacks and not disturbing wildlife.	Insignificant residual effects are anticipated with appropriate mitigation measures in place.	NS	High
Visual Resources	The trail system and campsites are anticipated to be positive on both enclosure and focal experiences. The huts have the potential to affect focal experiences immediately at their Site-specific locations.	The final design of the huts will incorporate the BC Parks Design Guidelines on Park Structures and the survey results of the Garibaldi Park Management Plan Amendment survey. This may include, but is not limited to: • Using simple designs to allow the natural landscape to dominate the visual experience; • Following the natural contours of the Site; • Design leaving behind the urban and sub-urban world; and • Materials matching the local landscape in colour.	Insignificant residual effects anticipated with appropriate mitigation measures in place.	NS	High
Recreation	Recreational values have the potential to be affected positively	Mitigation for the potential effects of the Project on recreation includes design, operation, and education.	Insignificant residual effects anticipated with appropriate mitigation measures in place.	NS	
Archaeology	The Site has unknown archaeological potential.	All employees and contractors involved in Project construction will be aware of and comply with, requirements regarding discovery of any archaeological resources / remains, including the following: • Archaeological resources / remains in the Province of BC are protected from disturbance, intentional or accidental, by the *Heritage Conservation Act* (1994). In the event that archaeological resources / remains are encountered, all	No residual effects anticipated with appropriate mitigation measures in place.	NS	High

VC	Description of Potential Project Interaction with VC	Required Mitigation	Residual Effects	Significance of Residual Effects [6]	Mitigation Effectiveness Rating
		ground altering or other activities which threaten the archaeological site must be suspended at once and the area cordoned off; • It is an individual's responsibility to immediately advise the on-site Committee representative; and • In the case of human remains being encountered the Committee representative will first notify the police. For archaeological resources / remains BC Parks will be immediately notified. Project work in the area will cease until further direction from BC Parks. Mitigative measures specified by the BC Parks must be followed.			
Human Health and Safety	Physical labour and environmental hazards (weather and wildlife) for workers	Appropriate health and safety plans must be in place for workers prior to construction taking place. This will include a site specific emergency response plan and health and safety meetings prior to work taking place. Workers will be required to wear the appropriate PPE during pre-construction and construction activities.	No residual effects are expected with appropriate mitigation measures in place.	NS	High
	Site access	Site access will be restricted as per BC Parks guidelines. Mitigative measures specified by BC Parks must be followed and may include the installation of signage during Project construction to warn visitors that construction is taking place.	No residual effects are expected with appropriate mitigation measures in place.	NS	High

4.0 CONCLUSION

Based on the above assessment no significant residual effects are expected, and with the mitigation proposed the Project can be carried out with negligible effect on the environment.

The Committee is committed to the mitigation identified and will work with BC Parks to ensure that the work is carried out in accordance with BC Parks requirements.

5.0 REFERENCES

BC Parks. nd. Garibaldi Provincial Park. Retrieved April 2012 from http://www.env.gov.bc.ca/bcparks/explore/parkpgs/garibaldi/

BC Parks. 1990. Master Plan for Garibaldi Provincial Park. Retrieved April 2012 from http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/garibaldi/garibaldi_mp.pdf

Government of British Columbia, 1996. Parks Act. RSBC 1966. Chapter 344

Griffin, S., Valois, T., Taper, M., and Mills, L.S. 2007. Effects of Tourists on Behavior and Demography of Olympic Marmots. Conservation Biology Aug 21 (4): 1070-81.

HectaresBC. 2012. Hectares BC – Natural Resource Geospatial Data. Retrieved April 2012 from http://www.hectaresbc.org/app/habc/HaBC.html

Ministry of Environment, Lands and Parks, BC Parks (BC Parks). 1995. Park Design Guidelines and Data. Retrieved April 2012 from http://www.env.gov.bc.ca/bcparks/operations/design_guidelines.pdf

Ministry of Environment. 2012. Conservation Data Centre Ecosystems Explorer. Retrieved April 2012 from http://a100.gov.bc.ca/pub/eswp/

Ministry of Forests. No date. Recreation Manual. Chapter Ten. Retrieved April 2012 from http://www.for.gov.bc.ca/hfp/publications/00201/

Ministry of Forests. 2006a. The Ecology of the Alpine Zones. Retrieved April 2012 from http://www.for.gov.bc.ca/hfd/pubs/docs/bro/bro56.pdf

Ministry of Forests. 2006b. The Ecology of the Mountain Hemlock Zone. Retrieved April 2012 from http://www.for.gov.bc.ca/hfd/pubs/docs/bro/bro51.pdf

Mountain Goat Management Team. 2010. Management Plan for the Mountain Goat (Oreamnos americanus) in British Columbia. Retrieved April 2012 from http://www.env.gov.bc.ca/wld/documents/recovery/management_plans/MtGoat_MP_Final_28May2010.pdf

Spearhead Huts Committee. 2012. Spearhead Huts Project Draft Project Description. Prepared for the Ministry of Natural Resource Operations.