

# **Jumbo Glacier Resort Master Plan**

## **Appendix 8-F**

### **PROJECT REPORT VOLUME 2**



# Jumbo Glacier Resort Project Report

VOLUME 2

PART B: COMMERCIAL ALPINE SKI POLICY (CASP)  
PART C: SPECIFIC TECHNICAL RESORT DESIGN  
AND MANAGEMENT ISSUES

2



# **Jumbo Glacier Resort Project Report**

## **VOLUME 2**

**PART B: COMMERCIAL ALPINE SKI POLICY (CASP)**

**PART C: SPECIFIC TECHNICAL RESORT DESIGN AND  
MANAGEMENT ISSUES**

December, 2003

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## APPENDIX TO THE PROJECT REPORT

Jumbo Glacier Resort Master Plan Concept:<sup>1</sup>

- Volume 1: Introduction
- Volume 2: The Site
- Volume 3: Environment
- Volume 4: Project Components
- Volume 5: Infrastructure
- Volume 6: Socio-Economic and Market Analysis
- Volume 7: Approval Process and Governance
- Volume 8: Map Volume

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<sup>1</sup> The Master Plan is the primary Appendix to the Project Report. Because of its size, and the fact that it is applicable to all Volumes of this Project Report, it is published as a free-standing or “floating” document for ease of reading.

## **PART B. COMMERCIAL ALPINE SKI POLICY (CASP) PROCESS**

The Commercial Alpine Ski Policy (CASP) is the primary government policy framework for new and existing alpine ski developments on Crown lands in British Columbia. Under CASP, the principle objective is to make additional Crown land available for commercial alpine ski use purposes, and to encourage the private sector to develop skiing facilities to meet provincial employment, revenue and backcountry recreation goals.

It is also government policy to facilitate further ski industry development, given its significant positive employment and investment impacts, and given also the ability of such resort development to contribute to the transition of British Columbia's economy from one based primarily on resource extraction to include the more sustainable tourism sector.

The CASP policy was originally released on August 18, 1982, and the latest version was amended on December 1, 1995. The document *Commercial Alpine Ski Policy - Ski Area Guidelines* was also updated in 1995, and released in 1996, and now forms part of the CASP policy. These guidelines are used to plan and evaluate ski area development proposals. References to CASP which are cited below are taken from the December 1, 1995 amended version. The CASP policy and *Ski Area Guidelines* are available from MELP (BC Environment and Lands).

Section B addresses the following specific topics:

- present status of Jumbo Glacier proposal under CASP - section B.1;
- formal proposal review under CASP process and its relationship to the EA process - section B.2;
- preparation of a ski area master plan and its relationship to the EA process - section B.3; and
- assessment of project feasibility - section B.4.

### **B.1 Present Status of Jumbo Glacier Proposal Under CASP Process**

#### **EA Issues Profile**

##### ***Topic***

Progress to date in evaluating Jumbo Glacier project under Commercial Alpine Ski Policy (CASP) process.

##### ***Issues***

- Status of compliance of project with basic CASP criteria for ski facility development.
- Status of completion of steps in processing 'expression of interest'.

***Relevant Project Components***

- All on-site facilities
- All facilities and activities for which costs are internalized to project.

***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands

***Comments also Received From***

Ministry of Employment and Investment (MEI)

***Relevant Public Comments on Application and Draft Specifications***

- This is real estate development; with land being provided free of charge. (15p)
- Under-priced land which will eventually become subdivided for cottages and condos represents large public subsidy. (16d)
- Need complete disclosure of CASP review documentation on project selection.

***Relevant Public Advisory Committee Comments on Draft Specifications***

- Re. CASP 2.5 - Method of Disposition, point (a)(viii) - should read "...a review is proceeding under the EA review process..."

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Draft specs do not recognise that a detailed design phase follows EA, as does permitting.

***Related Issues and Relevant Specifications***

- Re. CASP, see other parts of section B of specs.

***Additional EA Reporting Requirements?***

No – section B.1 is for information only.

***General Status of Project under CASP***

The history of past review of the project under CASP is summarised in *Appendix A – Background to Review of Application* of these specifications - see section 2 (*Government Decisions to Date and Summary of Previous Project Review*)

*History*). As a result of CASP review, which formally began in 1991, Glacier Resorts has been afforded sole proponent status in the upper Jumbo Creek valley for ski development purposes, an arrangement confirmed in a July 1995 Interim Agreement which officially concludes the first stage of the CASP process.

With enactment of the *EA Act* on June 30, 1995, the project review and EA functions which would normally comprise the next stage of the CASP review process are being met through the EA process. This next stage of CASP (the 'formal proposal review' stage) is intended to evaluate the general acceptability of the Jumbo Glacier proposal. If a project approval certificate is issued following EA review of the project, then the CASP process will resume at its final step. This step entails the review of a detailed ski area master plan, and the negotiation of a master development agreement between the proponent and the province to permit project development. Depending on the proponent's progress in developing the ski area master plan at the time of the EA certification decision, it is possible that, if a certificate is granted to the project, development tenures and final approval to proceed could be issued under the *Land Act* either concurrently with, or shortly after, issuance of a project approval certificate.

EA review of the project is based on the project description provided by the proponent. It represents, in effect, a preliminary concept for the ski area master plan. Thus, many of the information requirements which would ordinarily be met in the final stage of the CASP process will have been addressed in some degree of detail (although not in final design detail) through the EA process. In order to ensure that necessary aspects of CASP policy requirements have been considered at the time of the certification decision under the EA process, CASP requirements are being explicitly itemised and examined as the review proceeds.

### ***Status of Project Compliance with Basic CASP Requirements***

The status of CASP steps and information requirements are as outlined below (Note: provisions in the CASP process are cross-referenced in the underlined headings below):

#### **CASP 2.2 - Policy Application**

Applies to all Crown lands utilised for alpine ski operators as defined in Part 2.3(a) of CASP, including land within provincial forests and provincial park and recreation areas.

- The Jumbo Glacier project is proposed on eligible lands.

#### **CASP 2.3 - Definitions**

(a) 'Alpine Ski Operation' means a temporary or permanent operation which provides fixed lifts and associated facilities for alpine skiing, in return for a user fee.

- The Jumbo Glacier project, as proposed, is consistent with this definition.

#### **CASP 2.4 - Applicant Eligibility**

Expressions of Interest and Applications are accepted from:

- (iii) a corporation registered in British Columbia or incorporated under the laws of

## Part B: Commercial Alpine Ski Policy (CASP) Process

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Canada.

- The proponent satisfies this requirement.

### CASP 2.5 - Method of Disposition

(a) Disposition of Crown land for new, or expansion of existing, Type 1 or 2 ski operations is made in response to receipt of an expression of interest and completion of the following process:

- (i) Ministry [i.e. MELP] reviews expression of interest and decides if process should proceed;
- (ii) expression of interest is advertised and public meeting may be required [per Part 3.4 of the CASP policy];
- (iii) Ministry [i.e. MELP] requests formal proposal from interested party(ies) [per Part 3.5 of the CASP policy];
- (iv) Ministry [i.e. MELP] evaluates formal proposal(s) with assistance from other agencies;
- (v) proposal selected/endorsed and interim agreement signed with proponent;
- (vi) proponent provides financial performance guarantee;
- (vii) proponent prepares ski area master plan;
- (viii) plan reviewed and approved [per Part 3.7 of CASP policy];
- (ix) proponent and Ministry [i.e. MELP] sign master development agreement which incorporates ski area master plan;
- (x) tenures issued.

As of April 1998:

- (i) through (v) are completed;
- (vi) the intended approach to financing needs to be outlined during the EA process; if the project is certified, the identities of the financial backers and the forms of guarantee which they are providing, will have to be declared to MELP (BC Environment and Lands) at key stages in the development, and in accordance with a specified schedule;
- (vii) will commence under the EA process, and will be concluded if and when the project is certified at the conclusion of the EA process;
- (viii) review is proceeding under the EA Act, incorporating CASP review process requirements; and
- (ix) and (x) must wait until a project approval certificate has first been granted for the project under the EA Act, and an acceptable ski area master plan has been finalised.

### Project Report Specifications – B.1

*No EA reporting requirements which are specific to this issue. See above for an*



*explanation of the current status of the project under CASP.*

## **B.2 Formal Proposal Review under CASP Process and its Relationship to EA Process**

### **EA Issues Profile**

#### ***Topic***

'Formal proposal review' stage of CASP, and its relationship to EA process reporting requirements.

#### ***Issues***

- Status of proponent's compliance with itemised information requirements at formal proposal review stage of CASP.
- Role of EA process in satisfying outstanding information requirements for this stage.
- Items for which information will not be required until after conclusion of EA process.

#### ***Relevant Project Components***

- All on-site facilities
- All facilities and activities for which costs are internalized to project.

#### ***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands

#### ***Comments also Received From***

Ministry of Employment and Investment (MEI)

#### ***Relevant Public Advisory Committee Comments on Draft Specifications***

- Re. CASP 3.5(a) Formal Proposal Review - amend 'trapper' to 'trappers' in point (v).

#### ***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Draft specs do not recognise that a detailed design phase follows EA, as does permitting.

***Related Issues and Relevant Specifications***

- Re. CASP, see other parts of section B of specs.

***Additional EA Reporting Requirements?***

No – section B.2 is for information only.

***Evaluation***

The proponent's application has been reviewed in light of the requirements for a draft ski area master plan submission at the CASP formal proposal review stage, and also with reference to other ski area master plans, as well as in the context of EA process requirements.

The proponent's EA application meets, and in many ways exceeds, CASP information requirements which are usually stipulated at this stage of project review. The intent at this stage of CASP is to facilitate both inter-agency and public review and discussion of a proposed destination ski development. In effect, the EA application represents a preliminary draft of a ski area master plan.

***Status of Compliance with CASP Information Requirements***

The status of CASP steps and information requirements are as outlined below (Note: provisions in the CASP process are cross-referenced in the underlined headings below):

**CASP 3.5(a) Formal Proposal Review**

Completion of the EA process and acquisition of a project approval certificate under the *EA Act* are the next steps in the approval process for the project. Integrating the consideration of CASP formal proposal review requirements directly into the EA review ensures the most cost-effective and timely response to the proposal.

If a project approval certificate is issued at the conclusion of the EA review of the project, this would clear the way for a formal resumption of the CASP process, with the necessary land tenures for the project being issued under the *Land Act*. As noted in section B.1 (above), at the conclusion of the CASP process, the proponent must enter into a master development agreement with the province, based on an approved ski area master plan, before ski resort development would be permitted.

The following represents the status of specific CASP information requirements on a clause-by-clause basis:

(i) technical assessment of the area, including a detailed contour/topographic map;

- Generally provided in application.

(ii) project description (phase 1 in detail, with subsequent phases in conceptual form, including infrastructure requirements);

- Information relative to phasing and timing will require updating in project report, and formatting within the ski area master plan.

Note: Projected cost of Phase I construction has been provided in the application. Specific engineering and construction plans will be required prior to each phase of development.

Note: See also sections A.2 and A.4 of these specifications.

(iii) servicing and economic feasibility, including detailed 'pro forma' cash flow projections, development cost estimates and formal market study;

- During EA review of project, an independent review will be commissioned of the information which has been provided in the application - see section B.4, below (independent review will be co-ordinated by the project committee through MELP (BC Environment and Lands) and MEI).
- Independent review may lead to requests for additional information, to be provided either during the EA review or in the context of finalising a ski area master plan.
- Cash flow projections required for initial stages (first five years).

(iv) environmental issues/hazards and remedial measures;

- Responses to environmental concerns and plans to minimise or avoid environmental impacts are required for EA process.

Note: See section D of these specifications.

- Avalanche control program is needed for access road, to be reviewed and monitored by MoTH.

Note: EA process information requirements are as outlined in section E.6(D) of these specifications.

- On-mountain safety plan must be developed in detail for the ski area master plan, following EA review of the project, and prior to any project development.

(v) land use issues and proposed resolution of conflicts, if any;

- During EA review of project, will require detailed plans to address any potential conflicts with existing users, including guide/outfitter, trappers, heli-ski operator, and forestry and mining interests - see sections D.4, D.5, D.6 and E.5 of these specifications.
- During EA review of project, must address any First Nations issues and concerns - see section G.1 of these specifications.

(vi) summary of ownership and management structure in a detailed prospectus;

- For the project report, the proponent should outline the relationship between the ownership and management structure of the resort and the continuity of agreements for funding of facilities and services - see section F.1 of these specifications.
- More detail is required, especially re: financing partnerships, ownership, signing authority, accountability and reporting structure, following the EA review of the project, and prior to completion of the master development

agreement.

- Require outline of operating management plan, sketched in preliminary detail for project report, and in more detail for master development agreement.

(vii) evidence of financial capability;

- Required following the EA review of the project, and prior to the completion of the master development agreement - this may be provided in the form of conditional acknowledgements or agreements with investors.

### **Project Report Specifications – B.2**

*No EA reporting requirements which are specific to this issue. See above for a discussion of the relationship between CASP information requirements at the 'formal proposal review' stage and those for the EA process.*

## **B.3 Preparation of a Ski Area Master Plan and its Relationship to EA Process**

### **EA Issues Profile**

#### ***Topic***

'Ski Area Master Plan' stage of CASP process, and its relationship to EA process reporting requirements.

#### ***Issues***

- Status of proponent's compliance with itemised information requirements at formal proposal review stage of CASP.
- Role of EA process in satisfying outstanding information requirements for this stage.
- Items for which information will not be required until after conclusion of EA process.

#### ***Relevant Project Components***

- All on-site facilities
- All facilities and activities for which costs are internalized to project.

#### ***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands

***Comments also Received From***

Ministry of Employment and Investment (MEI)

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Draft specs do not recognise that a detailed design phase follows EA, as does permitting.

***Related Issues and Relevant Specifications***

- Re. CASP, see other parts of section B of specs.

***Additional EA Reporting Requirements?***

No – section B.3 is for information only.

***Evaluation***

At the second stage of the EA Process, and while the project report is in preparation, the proponent may also begin work on a detailed ski area master plan for the project. Terms of reference for a master plan are as outlined in the CASP policy. Much of the required information will be derived from the proponent's application and project report submissions prepared for the EA process, but, for master plan approval purposes, should eventually be submitted in a format consistent with MELP (BC Environment and Lands) CASP guidelines, and in an appropriate level of detail. If the Jumbo Glacier project is granted a project approval certificate at the conclusion of the EA review, then, depending on the proponent's progress in completing its ski area master plan, the latter could be approved concurrently with, or shortly after, the issuance of the certificate.

Some of the CASP information requirements for a ski area master plan have already been met, at least in part, in the proponent's application reports, as noted below. For the purposes of EA review, several other listed topics should be addressed in preliminary detail (at least) in the project report. **The project committee stresses that information is not required in the final design level of detail which is necessary for the formal ski area master plan approval decision of MELP (BC Environment and Lands) - see also section A.3 of these specifications. It should be noted that, for some of the topics noted below, additional information may be required for purposes other than to satisfy CASP requirements, and these topics (and the level of detail required) are indicated at appropriate points elsewhere in these specifications.**

CASP 3.7(b) Site Evaluation

- (i) physical site analysis, including weather/snowfall data;

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- Provided in application:
- Volume 1, section 1.3 (Site Selection)
- Volume 2, section 4.2 (Baseline Conditions - includes section 4.2.1 - Climate)

Note: see also section B.4 of these specifications.

(ii) avalanche assessment and proposed safety program;

- Provided in application:
- Volume 2, section 3.5 (Geotechnical Hazard Assessment)
- Volume 3, Appendix G (report by NRC: Avalanche Hazard to Road at Jumbo Creek)

Note: see comments on section 3.5(a)(iv) requirement of CASP, noted in section B.2 of these specifications.

- Copy of comprehensive safety plan must be provided prior to final approval of ski area master plan.

Note: - see also sections C.3, E.6.D and E.7.I of these specifications.

(iii) Ski slope analysis;

Provided in application:

- Volume 1, section 1.3.3.6 (Vertical Drop)
- Digital Terrain Modelling by Alpentech, Inc.:
- Figure 1.3.3.4(d) Slope Analysis
- Figure 1.3.3.4(e) Winter Skiing Suitability Analysis
- Figure 1.3.3.4(f) Land Use Analysis
- Figure 1.3.3.4(g) Solar Aspect
- Figure 1.3.3.4(h) Summer Skiing

(iv) environmental impact assessment and resource conflict evaluation mitigation.

Some information provided in application:

- Volume 2, section 4 (Environmental Aspects)

Note: subject to ongoing EA review and discussion.

Note: see comments on section 3.5(a)(v) requirement of CASP, noted in section B.2 of these specifications.

CASP 3.7(b) Development

(v) lift and trail location, configuration, and sequence of development;

- Map of sequence of development of lifts and trails is required.

Note: see also section C.5 of these specifications.

(vi) access roads, parking, and vehicle circulation;

- Map of location and dimensions of roads and parking lots is required.

Note: see also section E.6.C of these specifications.

(vii) snowmaking requirements (if applicable);

Note: Not applicable.

(viii) non-alpine winter sports activity potential;

- Description of all activity on Crown land is to be provided, including an indication of both areas of use and levels of use.

Note: see also sections E.5.A, E and G of these specifications.

(ix) non-ski recreation and social amenities;

- Description is to be provided of non-ski recreation and social amenities, as they relate to the overall operation of the resort.

Note: see also sections E.5.A and D of these specifications.

(x) overall area capacity ('comfortable carrying capacity') and design capacity of the various facilities (lifts/tows, ski slopes, lodging, parking);

- Information still to be provided.

Note: see also section B.4 of these specifications.

(xi) base area evaluation, design concept, and development sequence;

- Information still to be provided, including staging of base area development in relation to on-mountain development, and the role of base area development in the overall development of the resort.

Note: see also sections A.4 and B.4 of these specifications.

(xii) civil engineering report; water and power distribution systems; sewage treatment and drainage plans;

- Conceptual plans already provided in application
- Detailed engineering plans required prior to each phase of development.

Note: see also sections D.1.B, D.2.A and E.6.F of these specifications.

(xiii) architectural design concept - location, size, and use of proposed buildings;

- Provided in application:
- Volume 1, section 2.1 (Village)

(xiv) base area accommodation plan (if applicable), including employee housing;

- Information still to be provided, including information on the scope and affordability of employee housing.

Note: see also section E.9 of these specifications.

(xv) commercial space evaluation;

- Detailed evaluation of marketability of commercial space to be provided at master development agreement stage.

NOTE - With respect to clauses (vii), (ix), (x), (xi), (xiv) and (xv):

- Information provided in application will be subject to independent review.

Additional information may be requested from the proponent as the EA review progresses.

Note: see also section B.4 of these specifications.

**Project Report Specifications – B.3**

*No EA reporting requirements which are specific to this issue. See above for a discussion of the relationship between CASP information requirements for a ski area master plan and those for the EA process.*

**B.4 Assessment of Project Feasibility**

**EA Issues Profile**

***Topic***

Project's overall marketability and financial and technical feasibility.

***Issues***

- Need for independent assessment of project feasibility and markets, as required by CASP process.
- Need for additional reporting to update and expand upon market information in application (e.g. with respect to visitor projections and visitor origin).

***Relevant Project Components***

- All on-site facilities
- All facilities and activities for which costs are internalized to project.

***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands  
Ministry of Employment and Investment (MEI)

***Comments also Received From***

Ministry of Small Business, Tourism and Culture (MSBTC)

***Relevant Public Comments on Application and Draft Specifications***

- Have concern over predominately south-facing aspect of proposed ski runs, given susceptibility of snow to sun and heat. (5e)



- Glaciers are receding at rate which, over next 20 years, will severely impact overall glacier ski potential. (5f)
- Project will facilitate training of ski racers in summer and fall, and allow Canadians to train at home rather than elsewhere. (15c,d)
- There is steady downward trend in popularity of summer skiing in Europe. Need independent review of this? (15e) Has project committee arranged independent review of current tourism trends in USA and Europe? (15k)
- Is there really year-round market when other ski resorts in BC close after Easter Holidays? (15f)
- Phased-in development and ownership arrangement of resort will eliminate risk of bankruptcy or need for public money. (15g)
- How demonstrate that project is economically feasible? Full disclosure of financial arrangements needed. (15h)
- Downhill resort costs are escalating, competition is increasing, and subscribers are falling, so proposal is suspect. (15h)
- It is unlikely that business plan for project will be achieved. Panorama ski resort could not achieve its plan. (15l)
- Doubt proponent's revenue projections. (15j)
- Local alpine ski hills may experience increasing economic problems, due to decline in this type of tourism, plus competition from Jumbo resort. Further investment in alpine skiing should entail expanding existing facilities. (17l) How will project affect viability of Panorama's current expansion?
- Ski resorts in area draw customers from more-or-less fixed population. Visits to new Jumbo ski resort will take customers from small nearby resorts. (17l)
- How will initial lodge, by itself, attract visitors from Japan and Europe?
- Project will be accessible to all. (23f)
- Too much feasibility analysis is being deferred to CASP. Need fair, unbiased assessment of real costs and benefits. Should use full cost accounting.
- Should evaluate project costs and benefits using ecological economic costing approach.
- How are project economics affected by dropping golf course and equestrian facilities?
- Why does EA process not look at alternative, more suitable resort locations?

***Relevant Public Advisory Committee Comments on Draft Specifications***

- Re. draft spec. #2 - add requirement to identify costs to local residents.

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Proposal on record does not request government's financial assistance.
- Re. draft spec. #1 - market fundamentals are well known. Updated market studies only needed when master development agreement is negotiated and banks are involved. Project is so different from other resorts that comparative evaluation is of little value.
- Re. draft spec. #2 - responds to unfounded claims of project's exclusivity, as though project is different from others in BC. Proponent has already compared fees and addressed issue. Agrees that issue not yet addressed in detail. As is common in ski sector, preferential pricing for local area residents is intended, and will be outlined for master development agreement. Will consider options such as 'early bird' passes. May identify local residents by ID (e.g. driver's licence).
- Re. draft spec. #3 - seems aimed at keeping process continuing forever. Is hypothetical – will be addressed if the need arises.

***Related Issues and Relevant Specifications***

- Re. CASP, see other parts of section B of specs.

***Additional EA Reporting Requirements?***

Yes – see below; main focus is on independent feasibility/market assessment, with only modest reporting requirements for proponent. Draft spec. on affordability for local skiers eliminated, since there is no policy basis to require this.

***Rationale and Intended Approach and Phasing***

At this point in the CASP review of a ski resort, an independent review of the mountain terrain, lift layout, infrastructure needs, and base development would usually be conducted to confirm that the proposal provides for a balanced and feasible ski development. Often, this also entails independent confirmation of the proposed capital costs and services to be provided, and of the proponent's market analysis. Commissioning of such assessments is undertaken by MELP (BC Environment and Lands).

The proponent's application contains a great deal of information on the various features envisaged for the resort development (i.e. hotels, ski lifts, single family dwellings , etc.), and also preliminary estimates of project construction and operating costs. For the EA review of the project, an independent expert review and evaluation of the information submitted by the proponent on the topics outlined below will be commissioned through the EA Office and the project committee. MELP (BC Environment and Lands) and MEI have taken the lead in developing the terms of reference for this assessment of project feasibility, and, together with the EA Office, will manage the independent expert consultant. The

review will be based on current industry standards and international ski resort experience.

The independent assessment will examine various parameters of the physical site plan and also the market and financial feasibility of the project. As part of the independent assessment, the proponent's market analysis will be assessed, including projections of the impact of project development on visitor levels at other ski resorts in the region, notably the Panorama ski resort. This will include an assessment of the projected visitor profile for the project (which is expected to differ from that at other resorts in BC), and the demand and capacity for comparable skiing in BC, and in other relevant competing areas. A break-even analysis will be conducted which will allow an evaluation of the skier and visitor capacity and proposed utilisation in light of planned capital and operating costs. This type of analysis has been a key component in the evaluation of the viability of ski area proposals in the past. A comparative analysis of the proposed operations against Canada West Ski Areas Association (CWSAA) or National Ski Area Association (NSAA) data, including the economic ratios, is also intended.

The project committee will arrange for review of market analysis information provided by the proponent, but does not intend to conduct independent market research. Any additional information which is required will be provided by the proponent.

The project committee, on the advice of MELP (BC Environment and Lands) and MEI, has decided to commission the independent assessment in two phases.

- The initial phase of the assessment will entail a detailed examination of the extensive information provided in the proponent's application with respect to the project's overall marketability and financial and technical feasibility. It is possible, as an outcome of this initial review, that further information (e.g. additional detail or firmer estimates) will be required from the proponent, either for the purposes of the EA process, or subsequently, when the ski area master plan is being finalised.
- Based on the initial phase of the assessment, the proponent will be advised of any additional information which it should provide, either in the project report or separately. If additional information is needed for EA review purposes, the second phase of the independent assessment will be commissioned once the proponent has filed the extra information. The independent feasibility assessment must be completed before the project committee makes its report and recommendations to ministers at the end of the project report review stage.

More information would only be requested, following the initial stage of analysis, if it is missing from the application, and is important to a conceptual-level determination of project feasibility. The terms of reference for the independent assessment are outlined below, thereby providing the proponent with some basis to compare the available information with the information which may be needed to complete the independent assessment (and therefore some foreknowledge of possible additional information requests). At the same time, as noted below, the project committee has already identified certain issues for which it is satisfied that the proponent should provide further information in its project report.

### ***Terms of Reference for Independent Feasibility and Market Assessment***

While the project committee reserves the right to fine-tune the terms of reference outlined in this section, they provide a reliable indication of the focus of the study.

#### *Background*

The proponent has provided proposed plans for a destination ski area development. These plans incorporate market, financial and land development assumptions and assertions on the likely success of the development. An independent assessment of the information in the application is required.

#### *Objective*

The objective is to assess the information provided in the proponent's application to confirm the validity of this information, the assumptions and the analysis, and to seek a second professional opinion on the market, financial, and resort development viability of the project proposals. To undertake this assessment, the consultant will require expertise in engineering, ski area design and market and financial factors.

#### *Level of Detail*

The intent for EA review purposes is to determine if the conceptual plans which are available at this stage are logistically and economically viable, as proposed, from a physical land development, financial and market perspective. If the project is certified under the *EA Act*, additional ski area master plan review will be conducted in greater detail in a subsequent phase of project planning, in keeping with CASP practice. It would be appropriate for the consultant to advise of missing information which would be required to complete a meaningful assessment at the EA stage of review, and also any additional information needed for a more detailed assessment at the next stage of review.

#### *Market*

The consultant should:

- comment on the market research provided and on relevant trends in the skiing and tourism markets for BC and the resort proposal;
- assess the market for the project in terms of local, regional and destination visitors; review volume forecasts of winter and summer users, origins of visitors, skier and summer user profiles, market share and competitive impacts, against the historical performance of the ski sector in BC;
- assess the implications of competition for visitors from (and on) existing ski operations and proposed new ski facilities (both proposed new resorts and proposed expansions of existing resorts);
- determine the ski area utilisation and accommodation occupancies (hotel and condo hotel) on the basis of the forecasted skier visitation

and resort development;

- check for sensitivity analysis in the case of a good or bad season;
- provide analysis of the proposal with variations in the visitor forecasts and estimated expenditures;
- comment on the project rationale and the proposed positioning of the resort in western Canada's skier and resort market, given current and likely trends in the market; and
- comment on market access, and proposed transportation access to the resort.

#### *Financial*

The consultant should:

- evaluate the cashflow analysis and assumptions, review pricing, including contributions from other departments, analyse the capital budget, cost of capital, length of seasons, proposed utilisation;
- compare proposed revenues and operating costs with CWSAA or NSAA economic and financial norms for ski area developments; and
- undertake a break even analysis of the proposal in accordance with the CASP ski area development guidelines, and provide comments on the potential revenue and visitor volumes needed for a viable resort operation of the size proposed.

#### *Physical Site Plan, Land Development and Real Estate*

The consultant should:

- comment on the following components of the physical resort development plan:
  - physical site analysis;
  - avalanche control assessment, including costs;
  - ski slope analysis;
  - lift and trail location, configuration and sequence of development;
  - non-alpine winter sports activity;
  - non-ski recreation;
  - overall area capacity and facility design capacity;
  - base area accommodation plan;
  - summer skiing potential and other summer uses;
  - infrastructure needs and proposed solutions; and
  - an overall user capacity balancing statement;\*

**[\*Note - A balancing statement is a phasing schedule, intended to ensure an appropriate synchronising of on-mountain and base area**

**user capacities (and actual use levels). The independent assessment will entail a review of terrain capacity, base area capacity, predicted utilisation levels, the number of bed units to be provided, and infrastructure constraints.]**

- comment on the proposed location of facilities and improvements in light of any potential avalanche hazard;
- evaluate bed unit calculations in accordance with the CASP guidelines, the proposed mix of real estate in relation to proposed visitors, availability of land for development, proposed pricing, and absorption rates for the development;
- assess the land development proposal in light of other competitive and regional developments;
- review costs of resort development and road access construction, costs of construction, lot size, unit size, phasing of land development in relation to mountain build-out phasing plans; and
- comment on the proposed or likely profile of the real estate purchaser, identify the net cashflow and timing of the cashflow likely to originate from real estate development.

### *Financial Capability*

The consultant should:

- comment on the capital cost of development, proposed financing, operations strategy, and relevant development experience of the proponent in undertaking and completing the first phase of the project.

### ***Issues for Proponent to Address***

#### *Review of Application*

Much of the market analysis for the resort which is considered necessary for EA review purposes has already been provided in the proponent's application (see *Volume 2*, chapter 6). The marketing section of the application contains a wide range of statistics. The research undertaken to date has been very broad in scope. Some of these statistics need to be updated with more current data (e.g. Canada and BC tourism information, sector profiles, BC traffic counts, etc.).

The large volume of market-related information in the application addressed emerging markets, European and Japanese customer trends, the numbers of visitors to Canada, analysis of the ski industry and skier statistics. Target markets appear to be international rather than regional.

The information in the application from other locales in the US and in the other provinces provides useful insights, but BC examples which parallel the geographical similarities to the Jumbo Glacier proposal are also of interest, to the extent that comparable resort settings exist in BC.

It is noted that the proponent has cited the ski study, *BC Skiers in Profile*:

1993-94. This study also contains pertinent information on the Kootenay ski market which should be consulted.

The public is interested in the affordability of the new resort for local skiers. In response to this interest, the proponent has indicated that there will be a preferential pricing policy, and suggested that day passes will be available for local ski enthusiasts. Community benefit and involvement are criteria which MELP (BC Environment and Lands) takes into account in evaluating proposed ski ventures. However, there is no government policy which specifically requires that ski resort proponents demonstrate the affordability of their resorts' products for local skiers, and this has not been a requirement at other ski resorts in the province. Thus, reporting on this issue is not being imposed as an information requirement in these specifications. Anticipated income of a proposed ski resort *is* an issue which is addressed under CASP, and for this project, it will be considered in the independent financial feasibility analysis. MELP and MEI note that it would not be logical for a resort not to try to acquire a share of the local market in some way. Competition and ski area capacity are recognised as the two factors which keep pricing in line with local markets.

MELP notes that the maintenance of public access to ski areas is a requirement under CASP, which ensures that the land will not be restricted to a club or a particular market which would exclude local residents.

*Additional Information Needs*

There is no need for the proponent to undertake a complete overhaul of its original market studies. However, some updating and expansion of this market information may be needed to take account of the passage of time (e.g. for visitor projections and visitor origin). Thus, irrespective of the outcome of the first phase of the independent assessment, the proponent will be required to provide some additional market-related information (per the specifications outlined in section B.4(b)).

**Project Report Specifications – B.4**

1. While the proponent is not expected to repeat its entire market study, the following information and clarifications must be provided by the proponent in the project report:

- an update of the market information and visitor projections for the project, presented in a clear manner; and
- estimates of skier visits and summer visitors by market origin, to help address the issues of overall viability and transportation needs. (Note - The proponent will need to consult staff of MEI, the Ministry of Finance and Corporate Relations and MSBTC in addressing these issues.)

**Conditional Project Report Specification – B.4**

2. In the event that the first phase of the independent feasibility assessment of the

project reveals a need for more information on project feasibility in order to complete that assessment for EA review purposes, the project committee reserves the right to request the additional information, either in the proponent's project report or separately.

**RESPONSE – B.4**

The updated market information and visitor projections for the project are presented in a clear manner in the Master Plan. Volume 5 and 6 of the Master Plan present the estimates of skier visits and summer visitors by market origin. Viability and transportation needs have been addressed in the Master Plan on the basis of the updated project information. The transportation needs have been addressed in the Route Study (Appendix 5-A of Volume 5 of the Master Plan) as well as in Volume 5, Infrastructure, Sections 5 to 5.2.6 of the Master Plan. Volume 5, Infrastructure, includes also Section 5.3.3. Design Assumptions and Visitor Calculations which provide detailed visitor projections as design assumptions, while Volume 6, Socio-Economic and Market Analysis includes Section 6.6 Skier, Visitor and Occupancy Projections For Jumbo Glacier Resort based on market analysis. Summer and winter occupancy and utilization are discussed in detail.



## **PART C. SPECIFIC TECHNICAL RESORT DESIGN AND MANAGEMENT ISSUES**

Various specific issues concerning the implementation and operations of the proposed ski resort have been raised by both government agencies and the public. These issues are typically addressed through the CASP process, either at the 'formal proposal review' stage or during the development of the ski area master plan, and have been noted in sections B.2 and B.3 of these specifications. For EA review purposes, such issues need not be addressed in the same level of detail as would be required for a ski area master plan. Indeed, based on its evaluation of the feedback received on the draft specifications, the project committee has concluded that no further reporting is required for EA review purposes on three of the issues. However, for three other issues, some additional information needs to be provided in the project report in order to address outstanding matters which are considered relevant to the EA review of the project.

Section C addresses the following six topics

- snow wastage and glacier ablation - section C.1;
- glacier management - section C.2;
- avalanche control at the resort - section C.3;
- wildfire control at the resort - section C.4;
- ski lift location and design - section C.5; and
- environmental design - section C.6.

### **C.1 Snow Wastage and Glacier Ablation**

#### **EA Issues Profile**

##### ***Topic***

Surface condition and long-term extent of skiable terrain.

##### ***Issues***

- Potential effects of solar and wind wastage on snow conditions over ski runs.
- Potential effects (if any) of glacier ablation on extent of skiable terrain over longer term.

##### ***Relevant Project Components***

- Ski runs and skiable terrain.

***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands  
Ministry of Employment and Investment (MEI)

***Relevant Public Comments on Application and Draft Specifications***

- Proponent reports impressive ski run elevations, measured from maximum height of glacier to end of ski-out, but skiable terrain is much more limited. Need independent review of issue. (5a)
- If snow-cats cannot adapt runs, glacier ice will have to be moved into place with explosives. This is very common in Europe. (5d)
- Have concern about predominately south-facing aspect of proposed ski runs, given susceptibility of snow to sun and heat. (5e)
- Glaciers are receding at rate which, over next 20 years, will severely impact overall glacier ski potential. (5f)

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Points in draft specs are unnecessary and beyond normal review requirements.
- Based on more than 7 years of study, there is no solar aspect problem. There is no “...*significant wastage due to solar or wind exposure...*” Issue is addressed in application.
- For almost two decades, there has been no unusual sign of glacier modification during R.K.’s heli-ski operations.
- Request for comparison with other resorts is not reasonable, since there are no comparable resorts, as stated in application. The glacier terrain is higher than elsewhere, and of all resorts, least likely to be affected by ablation.
- Re. draft spec. #1 – what purpose will study serve? Southern exposure of glacier is readily skiable, even in summer. Spec reflects misunderstanding of project, mountains and local geography.
- Re. draft spec #2 – already disproved - these glaciers have been heli-skied for 15 years.

***Related Issues and Relevant Specifications***

- See section B.3, CASP ski area master plan item 3.7(b)(iii).

***Additional EA Reporting Requirements?***

No – no outstanding concerns; draft specs. for this issue eliminated, since project is less at risk from snow wastage and glacier ablation problems than other ski

resorts in BC, due to its higher elevation.

### ***Review of Application/Evaluation***

#### *Solar Aspect*

The project committee is satisfied with the level of information provided in the application with respect to the current extent of skiable terrain, which it considers sufficient in terms of detail for the purposes of the resort plan required in the project report. On the basis of the proponent's application, while south-facing slopes are a significant proportion of the total, it appears that other aspects are also well represented (see the solar aspect digital terrain model map in Figure 1.3.3.4(g), located in *Volume 1* of the application).

#### *Glacier Ablation*

With respect to longer-term climatic influences, some discussion of the climatic stability of the project area was presented in the proponent's application (see *Volume 2*, section 4.2.1), although the topic of glacier ablation was not specifically addressed.

The project committee has noted questions from the public regarding the potential effect of global warming on this glacier-based resort proposal. More specifically, some members of the public raised a concern that the glacier terrain base could be eroded over time by glacier ablation. MELP advises that, while it requires proponents of projects which could contribute significant volumes of greenhouse gases to the atmosphere to propose strategies to mitigate greenhouse gas emissions, it has not been requiring project proponents in the EA process to predict the impact of climate change on their projects. The assessment of the impact of long-term climate change is an area of much uncertainty, and it is not clear how any information which the proponent could provide would be evaluated. Moreover, it is not anticipated that climatic change would affect this resort significantly without having already had much more severe impacts on many of the other mountain resorts in BC, which are situated at significantly lower elevations.

With specific reference to the Jumbo Glacier project, solar aspect and wind activity were taken into consideration by the proponent when the site was selected, and specific skiable areas were chosen based on the climate and weather conditions usually present. This information is included in the application. The proponent has stated that there are no comparable glacier skiing areas in North America, and that projected effects cannot be determined by comparison with existing developments. Given the size and elevation of the subject glacier terrain, it is considered unlikely that skiing activity will impact glacier extent significantly (e.g. by magnifying solar exposure or wind effects). Glacier management activities which could have a major effect on glacier extent over time are not being proposed for this project – see section C.2 of these specifications.

Based on this assessment of the issues of solar aspect and glacier ablation, the project committee has eliminated draft specifications C.1#1 and #2, since no further study is deemed necessary.

**Project Report Specifications – C.1**

*No further EA reporting requirements with respect to these issues, which do not represent significant problems for this resort proposal (see section above).*

**RESPONSE – C.1**

Although the Project Specifications do not include any further reporting requirements, project opponents and the Jumbo Creek Conservation Society have continued to spread erroneous information widely circulated by the local paper and a further response appears to be in order. We should start with the content of the letter to Stephanie Stevens of the Valley Echo, dated January 8, 2002, for which the editor never found space on the paper. We will then follow with a discussion of the implications of accessing the glaciers proposed for this project along the lines that form the essence of the Master Plan Concept and conclude with the key observation derived from the United Nations' 5<sup>th</sup> World Conference on Sport and Environment held in Turin, Italy, on December 2 and 3, 2003.

**1. The unpublished letter:**

**The warming trend and glacier retraction:**

*From the Middle Ages to the end of the eighteenth century a cooling trend made glaciers expand, then at that point in history until now the trend reversed itself. Anyone who has visited the Columbia Icefields can see a measure on the ground of the retreat that is typical of most glaciers.*

*Not all glaciers are retreating and not all glaciers are retreating at the same speed, but in general, the pattern shown by the Columbia Icefields is rather typical and is the same pattern of the glaciers in the Purcell Mountains.*

*People visit the Columbia Icefields on buses traveling on the ice looking at the bottom toe of the glaciers, where the retraction is most visible and where the ice surface is exposed in the summer.*

*Similarly most hikers visit glaciers in the summer and see the bottom of glaciers where the growth of the moraines and the retreat of the ice are most visible.*

*However, the part of the glaciers that is most interesting is the accumulation area, which is at the top and is covered with snow both in summer and winter. This is the area where people would ski in the summer. This is where people would have the most beautiful views, which are visible from the top, where the glaciers are permanently covered in snow, as one can see from the top of the Jungfrau, in the Alps.*

*The health of a glacier is dependent on the snow that is falling in the accumulation area as well as the ice that is melting from ablation. The growth or decrease of glaciers is more dependent from the amount and type of precipitation than from the general rise in temperature. In fact it is not clear whether the warming trend will continue and increase the retraction of glaciers in general, or whether it will increase precipitation to the point that glaciers may expand rather than contract. A*

warming trend could increase precipitation and snowfall in areas that are hard to pinpoint but that could easily include the higher elevations of the interior of BC. For the collection area of major glaciers to reduce in size or to disappear to the point that you could not ski on them it would take a cataclysm that is currently not foreseeable. Such a cataclysm would probably render every ski resort inoperable. During the current warming trend the choice of an area that is in the proximity of glaciers or where it is possible to ski on glaciers is the guarantee of good snow seasons without exceptions.

In summary, for the proposed Jumbo Glacier Resort project the glaciers are not only an opportunity to have unparalleled views from the mountaintops, but also evidence of the abundant snowfall that makes the area a skiing paradise. It is only reasonable to be concerned with the retraction of the glaciers, but unless there is a catastrophic change in climate we will not see the collection area change substantially in the foreseeable future, and this has been the expert advice that the proponent has received from Dr. Michael Maxwell and from Peter Lev, among the many qualified members of the project consulting team.

**Crevasses:**

The project studies focused on four glaciers, Glacier Dome, Jumbo Glacier, Commander Glacier and Farnham Glacier. They are different glaciers, which move differently and have different crevasse areas.

Glacier Dome is a very easy glacier, working mostly in compression and with narrow crevasses over which it is possible to walk across even in the summer when they are most open. Farnham Glacier is also a relatively easy glacier on which to map ski runs, and has been repeatedly proposed for summer training by the Canadian Alpine Ski Team. Commander Glacier is at the opposite end of the spectrum, with a mid range icefall of crevasses reminiscent of the Vallee' Blanche in the Mont Blanc area of the Alps. It is a beautiful glacier which will provide the most spectacular winter ski runs in the world, according to many experts and particularly according to Peter Lev, who explained this point to the Project Committee in 1995. The crevasses of Commander Glacier can look like a formidable and frightening area to cross, just like La Mer de Glace of the Mont Blanc area.

Roger Madson and the guides of RK Heliski ski the runs of Commander Glacier by helicopter only occasionally, when the snow bridges are at their best. Peter Lev and Dan Griffith have studied the glacier when crevasse areas are wide open, and identified two runs, and probably a third run, that could be skied in winter with reasonable expectations of solid snow bridges over the crevassed areas. These runs would be marked by the ski patrol and the natural snow bridges made stronger by normal compaction done by snow groomers when grooming the ski runs. Groomed ski runs and ski patrol monitoring would eliminate most of the dangers that have to be assessed by the heli-ski guides in virgin terrain when selecting a downhill run. In winters, when the largest crevasses would not be bridged by the snowfall, as it occasionally happens, logs or wooden rafts would provide the bridging necessary for the snow to accumulate. The mid range icefall of Commander Glacier is an almost impassable barrier in the summer even for experienced climbers. In the summer, skiing occurs only at the higher elevations where perennial snow provides abundant bridging even in the summer.

On Jumbo-Commander Glacier there are more than 700 meters (2300 feet) of vertical drop available for summer skiing, starting from elevation 3400 meters (11,150 feet). One should not forget that at Horstman Glacier, where Blackcomb provides summer skiing, the elevation is

*between 1900 and 2200 meters (6230 to 7,200 feet). In August summer skiing must be closed.*

*The Jumbo/Commander Glaciers would provide summer skiing at elevations not accessible anywhere else in North America. Basically, Jumbo Mountain is 50% taller than Blackcomb. But, for an extreme point of view, even if there were no skiing, the proponent is convinced that the viewpoints offered by this project would surpass the Jungfrau in the Alps and would make the project worthwhile as a sightseeing experience of the mountaintops, even in the highly unlikely event that the glaciers melted away, and it would remain a unique experience that would be worthwhile to offer to the Canadian and North American public.*

*The notion that a formerly glaciated area would not be skiable is not correct. On the contrary, because of the high elevation of mountains like Jumbo, snowfields would replace the base of the ice mass and would make the area even easier to ski on, as it is where glaciers have already completely withdrawn.*

## **2. The Concept of a High Elevation Mountain Resort Giving Access to Glacier Skiing:**

Reliable scientific opinion received by the experts in the consulting team of the project supports the view that not only there will be more snow for skiing in winter where the glaciers currently are, but also that there is no real expectation that the top of mountains like Jumbo Mountain will change to the point of having the glacier disappear in the foreseeable future.

### The Experience of the Glaciated Mountain Tops:

Glaciers are important because of the unique experience of being there, of the views afforded and of the special experience of the serene majesty of the last remaining glaciated mountain tops following the retreat of the ice age. In addition to the sightseeing and generic experience of being there, in a special and awe inspiring environment, made accessible even to people in a wheelchair, glaciers are important to snow sports such as skiing and snowboarding because they indicated the areas of greater snow fall and of unique skiing experience. Glaciers have survived until our days after the end of the ice age because they are located in areas of greater snow accumulation than elsewhere, because of latitude, elevation and climate. In particular the glaciers surrounding Jumbo Mountain appear to have a very stable microclimate and collection area. On the September 25, 2003, visit to Glacier Dome the project team was able to see one of the stakes located by Dr. Maxwell near the top of the glacier in the summer of 1993 almost in the same location as originally placed, ten years before. Glaciers promise not only a unique mountain experience of "being there", but especially superior skiing conditions in winter, and the opportunity to ski also in the summer, creating a year round opportunity that is not possible elsewhere.

The glacier skiing experience is also something that other areas cannot offer. Because of elevation, glaciers offer a sun experience and a pure atmosphere more similar to that of Colorado and Utah than that of northern areas such as B.C., but because of the permanent snow and challenging peaks they also offer a true mountain top exhilaration that is missing in the hilly landscape of the U. S. mountains.

In the summer, when the sun is almost vertical to the glaciers at mid day, the feeling is often compared to that of a beach. The conditions are ideal for ski schooling, and perhaps this is why Passo Stelvio and its summer skiing on the glaciers became legendary. The argument has been noted that glaciers will soon disappear. Real time experience and observation, Golder Associates and most glaciologists indicate to us that short of an unforeseeable cataclysm no one being born

today will see the disappearance of these glaciers, but even if the glaciers were to disappear, it should be obvious that these higher elevations and better climatic areas would still see more snow than any of the other ski areas. It would mean that we would ski over moraines covered with snow at Jumbo Mountain while the other resorts would shut down a long time before. Finally, glaciers are not only an indication of more and better snow, but they are also a guarantee of snow conditions without having to depend on snow making like most ski areas in B. C. and in North America. Especially because of the warming trend, Jumbo Glacier Resort can wait with confidence for the doomsday scenario to unfold, if it will ever happen to the catastrophic proportions of today's Cassandras, because its fundamental attractions will still be there, from sight seeing from the tallest peaks to skiing in the best available snow conditions. In the meantime we expect to see for generations the best summer skiing in North America and some of the finest winter ski runs in the world. CODA has confirmed that it rates summer ski training on Farnham Glacier the best summer opportunity in the world for Canadians.

**3. The Recommendations of the 5<sup>th</sup> World Conference on Sport and Environment:**

The above noted conference, held in Turin, Italy, on December 2 and 3, 2003, noted that the expected warming trend will augment the problems already noted in the last quarter of a century, whereby a large number of ski resorts that have been built in low to mid range elevations depend on snow making for a good part of their season and of their ski area. It noted that most ski resorts face marginal skiing conditions many times in the winter season and will have to change substantially to survive in the future, if they can. The best solution to the problem is not more snow making, but is proposed as "development of higher terrain", that is the development of ski areas that access higher mountains and have higher resort bases. This is something that the project team had understood and proposed since the beginning of this project proposal. It would be fitting for British Columbia to have ready in time for the 2010 Winter Olympics the only resort and ski area in British Columbia that has a base at 1700 meters and reaches 3400 meters, capable of guaranteeing an abundance of natural snow.

## **C.2 Glacier Management**

### **EA Issues Profile**

#### ***Topic***

Glacier ski run maintenance.

#### ***Issues***

- Need for preliminary glacier skiing management plan.
- Clarification of intended glacier management techniques.

#### ***Relevant Project Components***

- Glacier ski runs at resort.

#### ***Lead Agency***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands  
Ministry of Employment and Investment (MEI)

#### ***Comments also Received From***

Ministry of Health (MoH)

#### ***Relevant Public Comments on Application and Draft Specifications***

- Glaciers will require extensive manipulation to enable year-round skiing. (5b) Explosives and bulldozing will be required. (5c) To maintain ski runs on rugged glaciers (e.g. Commander Glacier), snow-cats will have to push snow and ice into crevasses to create bridges. If snow-cats cannot achieve this, will have to use explosives. (5d)
- How can four-season ski resort be established without salt use? (5g). Given local climatic conditions, summer skiing will only be possible with use of 5 to 10 tons of salt per day. (5g) In North America, summer skiing is only possible through salt or chemicals use to enhance freezing of snow. (5h) How will heavy salt use affect water quality? (5i)
- Should assess physical, chemical and hydrological modifications to glacier surfaces.
- Should examine environmental effects of glacier resorts in Europe.
- Draft specs need more focus on public safety issues related to crevasses, out-of-bounds skiing, ice falls, etc.



- Re. draft spec. #3 – what does ‘limited’ salt and fertiliser use mean?
- Re. draft spec. #4 – need more detailed analysis of snow conditions.
- Re. draft spec. #5 – impacts on glaciers will be greatest near Lake of the Hanging Glacier drainage.
- Re. draft specs. #6 and #7 – need to know how glaciers will be altered, and visual effects.

***Relevant Public Advisory Committee Comments on Draft Specifications***

- Re. draft spec. #5 – change ‘potential’ in line 2 to ‘cumulative’.

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- As application states, only intend normal grooming of snow over the glacier, and bridging of crevasses with timber, where unavoidable.
- Site was selected because of naturalness of glaciers, which can be skied without significant modifications. Draft specs have been addressed many times by proponent, and ignore existing evidence.
- Re. draft spec. #2 - the intent is to ski on natural conditions, as already being done by R.K. Heli-Ski - the alleged glacier modification practices (e.g. salt and fertiliser use) are not required. Lifts will not alter glaciers, and there will be no crevasse infilling.
- Re. draft spec. #3 – why would salt or fertiliser be used in these conditions? Also, is there any proof of environmental problems where salt is used? Salt is not needed for general public use of runs, may be used by race organisers on a few race days per year?
- Re. draft spec. #4 – study is not needed. R.K. Heli-Ski’s operations already demonstrate snow suitability.
- Re. draft spec. #7 – no use of bulldozing or explosives.

***Related Issues and Relevant Specifications***

- See section B.3, CASP ski area master plan item 3.7(b)(iii).
- Re. related water quality issues, see section D.1.D.

***Additional EA Reporting Requirements?***

Yes – see section below; most draft specs. eliminated, given proponent confirmation that glacier modification techniques which had caused public concern will not be used.

***Evaluation***

*General*

The proponent's application indicates that there will be no modification of glaciers of the type with respect to which public concern has been expressed. In particular, there will be no use of explosives, bulldozing or significant salt application. Glacier management will entail primarily installation of surface lifts (see also section C.5 of these specifications), conventional ski area grooming practices such as snow-cat compaction, temporary lift, run and natural hazard markers, and the installation of log rafts to bridge selected crevasse areas on the glacier surface, where necessary for access purposes (see *Volume 1*, section 2.1.6 of the application).

*Use of Salt and/or Fertiliser*

Application of salt or fertiliser to harden the snow surface is common practice at many ski resorts (e.g. for major ski events or races, and sometimes also to preserve glacier runs in summer periods). However, in various submissions, most recently in a letter dated January 22, 1998, the proponent has stated that neither salt nor fertiliser will be used by the Jumbo Glacier resort's management to maintain runs for general public ski use. This is because of the higher-than-normal elevations of the proposed ski runs. It is possible that race organisers may opt to use salt on a few race days each year, but the quantities of salt involved, on an annual basis, would be very minor. In any cases where salt use is proposed on race days, MELP (BC Environment and Lands) will require advance notice of the salting sites and the salt quantities to be used, and the applicant will require specific prior approval from MELP (BC Environment and Lands).

Based on this analysis, the project committee has eliminated draft specifications C.2#3, #4 and #5, since no further assessment of this issue is required.

*Use of Explosives and Bulldozing*

Public submissions had raised concerns about glacier modifications achieved by means of explosives and/or bulldozing. However, in its January 22, 1998 letter, the proponent reaffirmed its earlier statements that neither explosives nor bulldozing will be employed as part of the resort's glacier management program. In any case, it is unlikely that the use of explosives and bulldozing to re-shape or alter the configurations of glaciers would have been permitted by government in any circumstances as a component of the resort's glacier skiing management plan.

Based on the proponent's assurances and government policy, the project committee has eliminated draft specifications C.2#6 and #7, since no further assessment of this issue is required.

Note - It is important to clarify that use of explosives is often permitted for

avalanche control for public safety purposes at ski resorts, and in many other situations also (e.g. to minimise avalanche risk to traffic along public highways and resource roads). If the Jumbo Glacier resort project proceeds, explosives use for this purpose may well be required.

**Project Report Specifications – C.2**

1. To facilitate public review and understanding of the project, in its project report, the proponent must reaffirm that its intent is to manage glacier skiing sites by means of conventional ski slope grooming techniques (with details), complemented by routine on-site ski area management and regular ski area patrolling to identify problem locations.

**RESPONSE – C.2**

1. The Proponent confirms that the ski area will be managed for the general public with the same ski slope grooming and ski area management techniques, including ski patrol, that are employed in places such as Whistler, Panorama and Kicking Horse, including the glacier areas. Ski slope grooming means the preparation of compacted powder snow ski runs by means of snowcats.

There will be no artificial modification of the glaciers; in the unlikely event that in some seasons passages over open crevasses may be required in particular locations, these would be provided with placement of logs or wooden rafts covered with snow which would have no impact on the glaciers. Ski runs on the glaciers will have danger areas roped off. Skiers will be required to stay on the groomed ski runs.

As noted on many occasions, Jumbo Glacier Resort is planned as it is in order to provide the skiing experience on natural snow that is the dream of all skiers. Consequently it is easy to realize that the Proponent's assurance not to use chemicals or salts on the snow is very consistent with the nature of the project.

If ski training programs were to materialize, as CODA has announced it would like to do, a specific program would be separately submitted for approval by the organizers of the racing programs, but the Proponent does not expect any significant concern arising from race training programs as commonly held in Canada. CODA has already made it known to the Proponent that if it needed to use chemicals to freeze a ski run, this would be in insignificant quantities and experience has indicated that there is no discernible impact. In addition, winter training and probably all ski races will be held at Panorama, not at Jumbo Glacier Resort, and summer training on Farnham Glacier can normally depend on natural conditions for overnight freezing, because of the elevation of the glacier.

Jumbo Glacier Resort expects to collaborate with CODA and with ski training programs, especially in view of the 2010 Olympics, and this is on the assumption that their activities will be carried out in an environmentally sustainable way. In this regard, training by means of lifts on Farnham Glacier is a more sustainable activity than training by means of helicopters and snowcats as was done in the Summer 2003 experiment.

### **C.3 Avalanche Control at the Resort**

#### **EA Issues Profile**

##### ***Topic***

Management of avalanche hazard at resort site.

##### ***Issues***

- Need for detailed avalanche hazard assessment.
- Need for avalanche hazard management plan for resort.
- Costs of avalanche monitoring and control.

##### ***Relevant Project Components***

- All on-site facilities which are threatened to any significant extent by avalanche activity.

##### ***Lead Agency***

Ministry of Transportation and Highways (MoTH)

##### ***Comments also Received From***

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands  
Ministry of Employment and Investment (MEI)

##### ***Relevant Public Comments on Application and Draft Specifications***

- Road from Panorama ski resort to proposed village will pass through 33 avalanche paths. How will avalanche danger be managed? (8c)
- Access road to resort will be treacherous and dangerous, and will probably be closed for much of winter, due to avalanche hazard. Routing tourists along such a road invites safety problems. (8c)
- Who pays for managing avalanche hazard? (16i)

##### ***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Re. draft spec. #3 - Unnecessary. Avalanche concerns have been reviewed in detail on site, and planning and risk avoidance techniques are being used.

- Outstanding issues can be addressed in CASP. Proposed village is located outside hazard zones.

***Related Issues and Relevant Specifications***

- See section B.3, CASP ski area master plan item 3.7(b)(ii).
- Re. avalanche hazard along access road, see section E.6.D.
- Re. general emergency preparedness planning, see section E.7.I.

***Additional EA Reporting Requirements?***

Yes – see section above; draft specs. retained in revised form.

***Policy Context***

Avalanche hazard is an issue which needs to be addressed in the siting of the facilities at the resort, including the village and the resort hotel, and any other occupied residential and commercial structures, on-site roads, ski lifts and ski runs. MoTH's Provincial Subdivision Approving Officer routinely considers natural hazards related to the subdivision of land and buildings in considering subdivision approval applications, and in this case, will require detailed site analyses for that purpose at such a time as an application is filed for a subdivision layout approval.

*Occupied Residential and Commercial Structures*

The proponent is expected to pay particular attention to the hazard assessments of any proposed residential and/or commercial structures (excluding ski lifts – see section C.5 for discussion of ski lift issues) which may be exposed to snow avalanche hazards. Such assessments are reviewed when considering approvals for highway access permits.

It is the proponent's responsibility to identify these sites, and the assessment must consider the maximum extents of the avalanche activity in terms of a once-in-200-to-300-year return period. The assessment must be conducted by a credible expert within the Canadian Avalanche Association. Should a proposed structure be found to be located within the once-in-200-to-300-year hazard area, MoTH will recommend against development and deny an access permit to the site.

*Avalanche Management Responsibility at Resort*

On-site avalanche control at the resort is the responsibility of the proponent. The CASP policy incorporates information requirements with respect to the management of avalanche hazards, to be addressed together with other safety considerations in the project proposal. However, given the liability implications, specific avalanche control methods and safety plans are not incorporated, as such, within the master development agreement.

For CASP purposes, MELP (BC Environment and Lands) will accept a program of avalanche monitoring and control which has been reviewed and approved by MoTH.

### ***Review of Application/Evaluation***

The information which is provided in the application focuses on the access road corridors, rather than the resort, and MoTH has not received any information from the proponent on this issue since the original application was filed. The application includes a report which contains a very preliminary assessment of the existing avalanche hazard probability, and some discussion of risk management, but does not identify specific control measures (see the NRC report in *Volume 3, Appendix G*, entitled: *Avalanche Hazard to Road at Jumbo Creek*). Some additional discussion is also found in sections 3.5 and 3.6 of *Volume 2*, which summarises the results of an initial investigation of site-specific hazards. The issue of avalanche hazard at the resort was discussed briefly during the May 17, 1997 field trip by representatives of both the proponent and MoTH. The focus of discussion was the exposure of the Glacier Dome Lodge to potential avalanche hazard. MoTH expressed the view that the proposed lodge location may be at risk from large avalanches. Further information will be needed in the project report with respect to how avalanche hazard at the resort is to be managed for any project components which are at significant risk from avalanche hazard.

### *Location of Resort*

In the view of avalanche specialists from MoTH, the location of the Glacier Dome Lodge appears to have been carefully situated to avoid direct exposure to the avalanche hazard, given its siting in an area where avalanche hazard constrains siting options. The trimlines of the avalanche paths within the base area provide only a limited safe area for resort visitors and staff. During periods of high hazard, there will be a need to restrict travel outside the immediate area of the Glacier Dome Lodge. The avalanche hazard to this lodge requires further assessment.

The avalanche hazard information prepared by the proponent does not elaborate on probable-maximum-event avalanches which may occur in the Jumbo Creek valley corridor. The trimlines which clearly define regular activity in this valley may not reveal these maximum probable avalanches.

### *Application, Volume 3, Appendix N – Design Concept of Plan 1 and 2*

MoTH's avalanche specialists have provided some brief review comments on this appendix.

In both plans, Node 'A' appears to be located "...at the South perimeter of the Karnak and the Wolverine avalanche runout zones...It would house the ski school facility, ski area operations, and a residential/commercial pedestrian village core..."

During the May 17, 1997 site tour, the proponent advised MoTH officials that it was no longer intending to develop the nodes identified in the

application, and that all facilities and accommodation would be located at either the lodge or the village. However, this has not been confirmed in writing by the proponent, and needs to be clarified under the reporting requirements for section A.2 (*Project Description*). If these nodes remain part of the project, then, as stated above, until the proponent presents material on the hazard assessment for these sites, and for the access road connecting these Nodes, it is not possible to evaluate this proposal from the perspective of avalanche hazard. With Node 'A' located at the south perimeter of the Karnak and Wolverine runout zones, caution must be taken in the development of this area to ensure that the Node is located in a safe zone. The access road connecting these Nodes will also be of concern to MoTH.

### **Project Report Specifications – C.3**

1. For the project report, the proponent must prepare a detailed long-term avalanche hazard assessment for the resort location (i.e. for the lodge, the village, the ski lifts and the ski runs). This assessment must be suitable for the planning and mitigation of long-term avalanche hazard at the resort.

### **Conditional Project Report Specifications – C.3**

2. If the long-term assessment required in specification #1 identifies significant avalanche hazard in the vicinity of any road, ski lift or ski run, the proponent, in the project report, must present a conceptual operations plan for monitoring avalanche hazards to protect those sites for public safety purposes. This plan must include emergency preparedness, emergency response, avalanche monitoring/reporting, avalanche control and safety. For project components where minimal hazard is present, operations planning can be left to the CASP process at the permitting stage.

3. If the long-term assessment required in specification #1 identifies avalanche hazard in the vicinity of any proposed occupied residential and/or commercial structure (excluding ski lifts), the assessment of this structure must consider the maximum extents of the avalanche activity in terms of the once-in-200-to-300-year return period hazard area. If the proposed structure is found to be sited within the once-in-200-to-300-year return period hazard area, the proponent must either eliminate the proposed structure from the project proposal, or identify a new site for it, located outside the hazard area.

### **RESPONSE – C.3**

1. The Project Specifications appear to address the 1991 conceptual plan of the Formal Proposal, which was based on the development of four nodes (reported as a matter of information in the Appendix of the 1995 Master Plan in order to show the progress made responding to the concerns raised from the earlier proposal) and refer to node A as potentially close to the Karnak avalanche path. This is an academic point not worth discussing because the 1995 Master Plan concept submitted to the EA Office carefully limited the development area to the area surrounding the sawmill site, completely outside avalanche hazard, and to the Glacier Lodge location at the base of Glacier Dome, also outside the avalanche areas. The 1995 Master Plan drawings are

very clear.

Following the 1995 Master Plan, in order to further reduce the scope of the project and to facilitate its development with a single small development area, the revised current Master Plan clearly shows only one development area (see Volume 4, Section 4.3 of the Master Plan). This area is centered around the sawmill site and is outside any area of influence of the mapped and potential avalanche runs (as verified on site by Peter Lev and Peter Schaerer). The resort is bound by a riparian area that is approximately a kilometer south of the Karnak avalanche area.

Regarding the preliminary ski lift alignments of the current Master Plan concept, every attempt will be made to locate the departure and arrival stations outside the mapped and potential avalanche runs as shown by the Master Plan layout. Some departure stations will require special considerations, like the positioning of the departure point for the gondola to Glacier Dome and the base departure point currently selected for the pulse lift starting from the moraine of Commander Glacier (Peter Schaerer), which would require monitoring of the avalanche potential from the western slopes of the valley utilizing common ski area protection techniques. Several ski runs and ski trails, particularly in the Jumbo Creek drainage and in the Farnham Creek drainage will require monitoring and avalanche danger mitigation with closures and controlled discharges after snowfalls.

Peter Schaerer has provided the preliminary reviews and comments that are included in the Master Plan in Volume 4, Sections 4.2.2, 4.2.8.3, and 4.2.8.4. Additional comments have been received by Peter Lev and Dan Griffith. Ski runs have been mapped so that closures of hazardous areas and trails are possible during avalanche control activity by the ski patrol without requiring a complete closure of skiing activity. The ski area safety plan that will be filed prior to start of operations will detail the areas of exposure and the safety programs that will be put in place as it is customary for high alpine ski areas.

Skiing during closures (normally in the first half of the morning) for avalanche discharge would be concentrated initially in the areas outlined by the previous logging operations near the resort base during the first phase, where there is no avalanche risk. Following the opening of access to Jumbo Mountain, skiing would also be possible on the upper section of Jumbo, Commander and Farnham Glaciers on the glacier ski runs that are not exposed to avalanche danger.

Peter Schaerer has also provided advice on the road alignment selections in the Jumbo Creek drainage and has commented on the level of risk for the Toby Creek section that is maintained by the Department of Highways. According to his advice, confirmed by Gordon Bonwick, the avalanche expert with the Ministry of Transportation, the selection of the most advantageous alignments among the existing logging roads following the north side of the Jumbo creek drainage makes it possible to decrease and mitigate the exposure to avalanche activity in the Jumbo Creek drainage, with consequent reduction of requirements for monitoring and discharging.

This is also illustrated in the Route Study attached as Appendix 5-A of Volume 5 of the Master Plan. The road in the Toby Creek drainage is currently managed without excessive difficulty by the Ministry of Transportation and avalanche exposure, which is reduced by relatively low snowfalls in the lower Toby Creek drainage, will be further reduced once road alignment improvements are initiated. The Ministry of Transportation maintains a record of avalanche closures and activity in the Toby Creek valley.

**2.** As indicated above, avalanche hazard in the vicinity of the road or ski lifts will be mitigated with



careful planning and monitoring. Ski run avalanche hazard in the identified locations is similar to that of other ski areas and is addressed in the Master Plan in Volume 4, Section 4.2.8.4.

3. There is no avalanche hazard in the vicinity of any proposed occupied residential and/or commercial structure. They have been located in areas that are not exposed to avalanche hazards.

## **C.4 Wildfire Control at the Resort**

### **EA Issues Profile**

#### ***Topic***

Management of wildlife hazard at resort site.

#### ***Issues***

- Incorporation of wildfire hazard considerations into resort design.
- Suitability of resort community road system to cope with wildfire situations.
- Related emergency vehicular access issues.

#### ***Relevant Project Components***

- All on-site project facilities.

#### ***Lead Agency***

Ministry of Forests (MoF)

#### ***Comments also Received From***

- Ministry of Attorney General (MAG)
- Office of the Fire Commissioner (OFC)
- Regional District of East Kootenay (RDEK)
- Ministry of Employment and Investment (MEI)

#### ***Relevant Public Comments on Application and Draft Specifications***

- What will happen if forest fire occurs in valley *en route* to resort? (8b)
- Should address suitable building materials and construction methods to minimise wildfire risk.

- Should estimate fire-fighting needs, using risk assessment.

***Relevant Proponent Comments on Draft Specifications and Specifications Feedback***

- Proven practices at resorts such as Panorama, Fairmont, Kimberley or Fernie Snow Valley demonstrate that wildfire issues are readily addressed. Conceptual architectural design already provided is based on best available experience. Reference to 'Community Design' is misplaced, since resort is not for 'residential community'.
- Re. draft spec. #6 - application explains planned fire-fighting station location, and plan to establish volunteer fire-fighter organisation. Application quotes relevant sections of *BC Building Code*. Buildings will be sprinklered.

***Related Issues and Relevant Specifications***

- Re. wildfire hazard along the access road, see section E.6.E.
- Re. fire-fighting requirements, see section E.7.G.
- Re. general emergency preparedness planning, see section E.7.I.

***Additional EA Reporting Requirements?***

Yes – see section C.4 below; draft specs. refocused at conceptual strategic level.

***Review of Application***

The application makes mention of traces of past major forest fire activity (*Volume 1*, section 1.3.6.1, page 39), but does not assess local wildfire potential or discuss the project location/design implications of wildfire hazard.

***Evaluation***

Historically, there have been few actual wildfire events which have posed a significant threat to ski resorts and their visitors in BC, although building fires are more common. Most ski resorts are most active primarily during winter. Thus, while issues of risk to property exist during the summer fire season, there may not be significant numbers of people on-site at that time of year. The Jumbo Glacier project is intended to be a four-season resort, with a sizeable on-site population expected during the summer.

*Wildfire Considerations in Overall Community Design*

Project Setting

MoF has advised the project committee that the proposed Jumbo Glacier project lies within an area of the southern Purcell Mountains which is subject to a significant risk of wildfire in a typical fire season. The topography of the area which surrounds the project site is sufficiently

steep and timbered that it creates the potential for rapid fire spread, and also offers the prospect of difficult emergency access and fire control in the event of a wildfire outbreak. Southerly and westerly aspects are of highest wildfire concern. Dominantly southerly winds would be expected to affect the project area's surroundings during high fire hazard times, and, in the event of wildfire occurrence, could create significant fire control difficulties.

Thus, the Jumbo Glacier project represents a significant 'wildland/urban interface' (i.e. a community which abuts against forested areas). Interface fires (wildfires which threaten communities) are considered to be the most serious wildfires to manage. The values and risks associated with a wildfire event in the 'interface' complicate the implementation of strategic wildfire suppression techniques. Moreover, the resort is located at the upper end of a narrow valley, with only one access road, which raises issues with respect to access and egress during a potential wildfire event.

#### *Wildfire Risk Management*

In planning the resort community, the proponent is advised to consider the risk and occurrence of wildfire as a priority design and management issue. Careful planning of the development is needed to ensure that the hazards and risks are minimised. The management of hazards and risks must be a long-term commitment.

There will be various land clearing requirements for each construction phase. Typically, land clearing involves some burning of the slash residue remaining from the removal of vegetation. The presence of slash debris increases the likelihood of wildfire ignition, especially if the debris is burned. Careful planning and timing of clearing and disposal are essential.

The proponent should incorporate into community design the community planning guidelines set out in MoF's *Beware and Prepare Community Planner*, which was developed in collaboration with MMA's Office of the Fire Commissioner. The guidelines themselves are considered to be advisory in nature. Nonetheless, public safety in community design, and the related liability implications for both the private and public sectors, will be among the criteria used by the project committee in evaluating the project report. Implementation of measures similar to those proposed in the MoF *Community Planner*, or of corresponding effectiveness, will be necessary to satisfactorily address wildfire concerns.

It will also be prudent for government to consider instruments such as covenants and bylaws to influence community design in a way which will help minimise the risks of serious fire events.

#### *Wildfire Considerations in Community Road Design*

Given the resort community's significant wildland/urban interface and attendant wildfire risk, selecting appropriate community road standards should take into account the importance of maintaining the ability to suppress fires and evacuate the public who are at risk. MoF's *Beware*

*and Prepare Community Planner*, mentioned above, is a recommended source of advice on the designing of community road systems for wildfire risk management purposes. The access to, and egress from, a community are a major component of the planning for a fire-safe community, and the *Community Planner* provides advice to both developers and government agencies on road standards. The recommended standards are appropriate for communities where wildfire poses a significant potential risk, as at the project site.

MoF recognises that, pending incorporation of the resort community as some form of local government entity, it is the responsibility of MoTH to decide on the ultimate road design standards for the Jumbo Glacier project. However, for the benefit of the project committee, MoF has identified road standards which have proven to be suitable in dealing with wildfires in situations elsewhere in BC where the wildfire risk is significant. Road design preferences developed on the basis of experience elsewhere are outlined below, and should be considered by the proponent in the design of local street systems.

Community roads (i.e. those that service subdivisions) ideally should not exceed 8% grades, except over short distances, where 10% grades may be acceptable. Ideally they should have a minimum radius of curvature of at least 15 meters, and at least 7 meters' width of paved surface with a 0.5-meter unpaved shoulder on each side. If parking is to be permitted on the roadway, roadway width ideally should be widened to allow a minimum of 2.4 meters on either side of the paved surface.

Neighbourhood roads ideally should not exceed 10% in gradient, except for short pitches of up to 12%. Neighbourhood roads with dead-ends should be avoided, if possible, and if unavoidable, preferably should not exceed 200 meters in length. Preferably all dead-end roads should be provided with a turnaround at the closed end with a minimum 30-meter diameter. 'Hammerhead-T' dead-ends should not be considered in developments where there is a high risk of wildfire. Two-lane standards are preferred on neighbourhood roads.

### *Advice of the Office of the Fire Commissioner (OFC)*

The OFC has also provided advice to the project committee on road design issues (e.g. with respect to 'hammerhead-T' dead-ends vs. turnarounds), and is in general agreement with the position of MoF on community design issues as they relate to wildfire risk. In the OFC's view, the road standards cited by MoF (see above) are deemed to equal or exceed the basic requirements for access for fire-fighting purposes in the *BC Building Code*.

For fire-fighting access routes, the Fire Commissioner's Office would prefer that community design meet or exceed minimum *BC Building Code* standards in all fire prevention areas (including street width and radius of curvature).

One road design parameter specifically noted by the OFC is that of change in road grade. The *Code* indicates that this should not exceed 1-

in-12.5 over a minimum distance of 15 meters.

#### *Permitting Requirements*

For the EA process, attention is focused on establishing the extent of any potential wildfire hazard, and whether or not, in general terms, a range of location, design and operations measures is available to minimise to acceptable levels any identified wildfire hazard. If the project is approved at the conclusion of the EA process, subsequent permitting processes will address wildfire hazard issues as part of a more general focus on the planning details for emergency access and public safety. These processes include the subdivision approval process conducted by MoTH's provincial subdivision approving officer and the Official Community Plan (OCP) by-law process of the RDEK (assuming that the project remains within the RDEK's jurisdiction).

MoTH's provincial subdivision approving officer routinely addresses the issue of emergency access in considering an application for a subdivision layout approval. Sections 75(1)(a) and (2) of the *Land Title Act* provide specific direction to the approving officer in this regard. Consideration of wildfire issues is a relatively new matter for the approving officer, and is most likely to be triggered where MoF identifies the area as having a moderate to high wildfire risk, and local government agrees that this is an issue of concern. Any restrictive covenant with respect to wildfire issues would require local government endorsement, given the logistics of enforcement. Where a wildfire issue is raised, a detailed wildfire assessment can be required of the proponent.

The OCP process would entail the RDEK providing the proponent with direction on the various issues and requirements which must be satisfactorily addressed for an OCP. The RDEK Board would be asked to make a decision on the OCP by-law, once the proponent's plans satisfy these requirements. The proponent would have to provide information on emergency access, in addition to other matters (e.g. project staging, garbage disposal, sewage disposal, water supply, etc.) in satisfying these requirements.

Among the issues which would require more detailed attention by the proponent during those processes are:

- area-specific fire hazard and emergency access provisions for each of the phases of the development, based on the proponent's assessment of risk;
- the approach envisaged for vegetation management and 'defensible space';
- selection of structural designs and construction materials which are intended to reflect the likelihood of wildfire realistically;
- land use policies within the project site which consider the impact and risks of interface fire occurrence;
- road standards, bridges and utilities which reflect the potential for

interface fire events; and

- consideration and development of emergency procedures at the planning stage, rather than after the development is in place (see also section E.7.I, below).

As part of more detailed project planning, the proponent is advised to discuss the suitability of proposed road systems for emergency vehicular access and the handling of emergency wildfire situations (and indeed, other types of emergencies) with the appropriate local Fire Chiefs, the Regional Fire Commissioner in Cranbrook, the Fire Underwriter's Survey and the Provincial Emergency Program.

#### **Project Report Specifications – C.4**

##### ***Community Design***

1. In the project report, the proponent must provide an overview assessment of the extent and significance of any wildfire hazard to the proposed resort community. This must include a commentary on the types of community layout, design and operations measures proposed to minimise the risk of wildfire hazard to the community, making reference to MoF wildfire guidelines as appropriate.

##### ***Design of Community Roads and Emergency Vehicular Access***

2. The overview and commentary required in specification #1 must include consideration of the role of the resort's access road and street system in combating wildfire hazard, addressing the issues of accessibility, response time and reliability for emergency vehicular access (e.g. for fire and ambulance fleets) in all types of conditions year-round, and again making reference to MoF wildfire guidelines as appropriate.

#### **RESPONSE – C.4**

1. The Master Plan addresses the fire protection design issues noted above in Volume 7, Sections 7.5.3.7 Fire Protection Services and 7.5.3.8 Resort Fire Prevention and Control.

2. The resort is planned as a very small and tight development and the concept of "Community Roads" and "street system" mentioned by the Project Specifications may not address appropriately what is proposed in the Master Plan. There will be only one public road leading to the chalets. There will be only one public street, bisecting where it enters the resort center, leading into the hotel and condominium areas. Unlike any other community in the Columbia Valley, the resort is planned to have entirely sprinklered buildings meeting NFPA requirements. Sprinklering is an accepted equivalency in remote destinations where access by fire truck may not be available or the response time initially may not meet the B.C. Building Code requirements of response time. Unlike other communities in the Columbia Valley, Jumbo Glacier Resort will have the availability of experienced personnel from the security personnel, ski patrol and mountain

guides who will be able to provide first aid treatment and to take patients to the first aid treatment center, from where they will assist taking patients to the ambulance, who for all serious cases will be taken away by helicopter.

A Community Fire Protection Strategy report is included as Appendix 7-A to Volume 7 of the Master Plan.

## **C.5 Ski Lift Location and Design**

### **EA Issues Profile**

#### ***Topic***

Resort's system of ski lifts.

#### ***Issues***

- Capacity, siting and technical design of lift structures.

#### ***Relevant Project Components***

- On-site – the resort's ski lift system.

#### ***Lead Agency***

Ministry of Municipal Affairs (MMA)

#### ***Relevant Public Comments on Application and Draft Specifications***

- Need to address concerns regarding: ice loading; exposure to wind from west; exposure of top return station terminal; special carriers required for items such as water, food, fuel and garbage; effect of snow creep on towers; avalanche risks affecting towers along lift line from east side.
- \* Uneven ice movement may create problems for tower structures. Should document success or failures of glacier skiing at other resorts.

#### ***Related Issues and Relevant Specifications***

- Re. avalanche hazard at the resort, see section C.3.

#### ***Additional EA Reporting Requirements?***

No – issues can be left to permitting.

### ***Evaluation***

For MMA's Engineering and Inspection Branch, the issue is whether or not it is technically feasible to install the proposed system of ski lifts in compliance with regulatory requirements, and to ensure public safety. MMA has no role in adjudicating ski lift proposals from an environmental and land use perspective, and any such issues are addressed elsewhere in these specifications.

### ***Review of Application***

#### *Review of Project Plans and Site Inspection*

The first phase of the project envisages one large main access lift which will extend to the top of Glacier Dome, and three surface lifts (T-bars) which would be built on the glacier behind Glacier Dome. The following points were noted during a site inspection on September 14, 1995:

- The first main access lift will be large, spanning a vertical distance of perhaps 800 to 900 meters over 2,000 to 2,400 meters inclined length. It may be built with a quad detachable or gondola configuration, or a combination of both. The initial capacity will be low, with a capacity in the range of 1200 persons per hour (PPH). The lift will be of a bottom-drive type, since no power is available at the top station. The following items will have to be considered in the design of this installation:
  - ice loading and exposure to wind from the west;
  - exposure of the top return station terminal - there is no protection from the elements on top of Glacier Dome;
  - if the lift is to be used for transportation of items such as water, food, fuel and garbage, special carriers may be required;
  - snow creep will affect towers, which are all to be constructed in the snow-loading lee side of Glacier Dome; and
  - avalanches may affect towers along the lift line from the east side of the valley.
- Locations for the glacier T-Bars were not specifically identified. No rock outcroppings which could be used as station anchor points were identified. It is proposed that all of the station and tower structures for these T-Bars would be built on the ice. This may lead to problems associated with uneven ice movement between structures.

Poma Lifts staff were present on-site during the September 14, 1995 site inspection, conducting a lift-line survey for the proponent. More technical data concerning the proposed type of lift equipment and specific locations are required to conduct a more thorough review, and this can be provided at the permitting stage.



*Location and Design Issues*

MMA has informed the project committee that it has no need of further reporting on ski lift location and design from the EA process for its own purposes (regulation of ski lifts for engineering feasibility and public safety).

In regulating ski lift construction and operation, MMA has seldom, if ever, found that ski lift proposals had to be rejected because engineering solutions could not be found to cope with terrain conditions (e.g. difficult topography, geology or natural hazard problems such as avalanche hazard). In part, this is because ski lift proponents have a strong incentive to select appropriate locations, in order to reduce engineering and operational problems and costs. MMA currently regulates more than 190 ski lifts in the province. MMA evaluates ski lift permit applications with reference to standards set in *National Standard of Canada Can/CSA-Z98-96 for Passenger Ropeways*. For lift design and permit applications, MMA requires ski lift proponents and their consultants to take into account such factors as ice loading, exposure to wind and avalanche risk, and the engineering necessary to compensate for the conditions. Avalanche risk is commonplace in preferred ski terrain, and a combination of lift design and avalanche management will normally suffice to address concerns. Managing wind conditions normally entails a combination of lift design and continuous wind monitoring to ensure that lifts are shut down when design wind speeds are exceeded. The use of special carriers for commodities such as water, fuel, food and garbage is normal, and raises no unusual concerns, but may require special operating conditions.

MMA notes that, where possible, it expects lift towers to be located on solid ground. However, the technology exists to locate lift towers on many (but not all) glaciers, and to compensate for some degree of glacier movement (although it may be necessary to relocate the towers from time to time). Based on the proponent's application, it appears that lift positioning on glaciers is being considered, but the application does not indicate whether lifts would be of the fixed T-bar type or the portable handle tow type. Thus, it is not clear if lift towers would be located on the glacier surface. With either type of lift, glacier disturbance is minor. Handle tows require no intermediate support structures. T-bars are supported by towers which either rest on the glacier surface or are embedded to a shallow depth beneath the surface. Major ice excavation is not necessary.

**Project Report Specifications – C.5**

*No further EA reporting requirements with respect to this issue, since outstanding matters can be addressed at the permitting stage (see section above).*

## C.6 Environmental Design

### EA Issues Profile

#### *Topic*

Environmentally progressive resort design.

#### *Issues*

- Specific environmental design measures envisaged by proponent for resort.

#### *Relevant Project Components*

- All on-site resort components.

#### *Lead Agency*

Ministry of Environment, Lands and Parks (MELP) – BC Environment and Lands

#### *Comments also Received From*

- Ministry of Health (MoH)
- Ministry of Employment and Investment (MEI)

#### *Relevant Public Comments on Application and Draft Specifications*

- There should be three smaller villages rather than one larger village. (4a)
- Current proposal is too large. A smaller project could be model of environmentally responsible recreation and tourism. (4b)
- With design capacity of 10,000 people per day, a label of 'mass tourism' would be more appropriate than 'eco-tourism'. (14e)

#### *Relevant Proponent Comments on Draft Specifications and Specifications Feedback*

- What are government approved 'green' policies, and what is related legal reporting obligation? Application indicates that 'green' measures are proposed - these are self-evident in application.
- Re. draft spec. #1 – there is no 'proof' of green practices – cannot study this.

***Related Issues and Relevant Specifications***

- Re. waste disposal issues, see section D.1.
- Re. water supply issues, see section D.2.
- Re. fish and wildlife management issues, see section D.3.
- Re. outdoor recreation resource management issues (including visual and noise management), see section E.5.

***Additional EA Reporting Requirements?***

No – draft spec. C.6 #1 eliminated, duplicates issues addressed elsewhere in specs.

***Evaluation***

At many points in its application, the proponent notes that project development will be guided by ‘green’ approaches, but provides few specifics. Certainly, there are various possible opportunities for progressive resort design (e.g. with respect to recycling, energy efficiency, sewage disposal technology, drainage and erosion control, physical landscaping of the development site, and the aesthetics of structures). However, there is neither a government policy requirement nor a logical policy context for assessing the proposition of a resort’s ‘greenness’.

Proponents are expected to develop projects in compliance with the laws, regulations and government policies in effect when development is undertaken, including those which pertain to environmental management and protection. Where issues of environmental acceptability have been raised in this review, they are addressed in other sections of the specifications, and the project committee, on reflection, sees no value in insisting that the reporting required elsewhere be re-packaged to address the resort’s ‘greenness’. Thus, the project committee has deleted draft specification C.6#1. In so doing, the committee leaves it entirely to the proponent’s discretion whether or not it wishes to elaborate in the project report on questions from the public about the features of resort design which reflect the proponent’s ‘green’ philosophy.

**Project Report Specifications – C.6**

*No further EA or permitting requirements specific to this issue (see above).*