ENVIRONMENTAL ASSESSMENT
CRYSTAL MOUNTAIN RESORT EXPANSION,
WESTBANK, BC

Addendum Report

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1.0 BACKGROUND

As part of the regional district rezoning process for the expansion of the existing Crystal Mountain Ski Hill in Westbank, BC, Pheidias Development Management Corporation requested ENKON Environmental Limited update the original Environmental Assessment dated June 2001 based on a revised mountain and resort base plan. The following report compares the changes made from the original mountain/resort Base Plan in 2001 through the final Master Plan approved in 2003 and further minor modifications proposed in the resort base/golf area during the current regional district rezoning process.

1.1 June 2001

ENKON's June 2001 Environmental Assessment report was based on the following mountain and resort base facilities (Figure 1). The mountain area was to be expanded from the existing 3 lifts and 20+ ski trails to 12 lifts and associated ski trails that would encompass the area to the north beyond Mount Last. The expansion to Mount Last (1500 meters elevation) combined with a new lift on Mount Clements on the west side would provide a vertical drop of approximately 700-750 meters. The vertical drop would not compete with some other ski hills in the Okanagan but the emphasis at Crystal Mountain is on family skiing, not extreme or expert skiing.

The base village area was to be expanded to include new residential areas (single-family chalets and townhome units), golf course, and a resort core area with a small number of hotel units and retail space to support the base area and mountain facilities. The key for the expansion would be to develop the four-season recreation component including winter skiing and snowboarding, golfing, summer events/festivals and a number of other recreation and tourist venues.

The 2001 Environmental Report identified the environmental resources, concerns and issues associated with the proposed expansion of Crystal Mountain Ski Hill. Additionally, it provided conceptual mitigation measures and management plans to reduce or eliminate potential impacts of the proposed expansion on environmental resources. Guiding principles for sustainability were also provided including site design, building design and construction, water management, energy management, and waste management and recycling.

1.2 August 2003 Approved Master Plan

From 2001-2003, the resort base and ski area Master Plan was modified due to public, First Nations and government input. One of the most significant changes was the re-location of the 18-hole golf course to the north and east of the existing Nordic trails (Figure 2). This change also resulted in an overall increase of 94 bed units (Table 1) and a shifting of the majority of the bed units to the north. The total skiable terrain also was reduced by approximately 34 hectares largely as a result of shifting the bed units to the north.

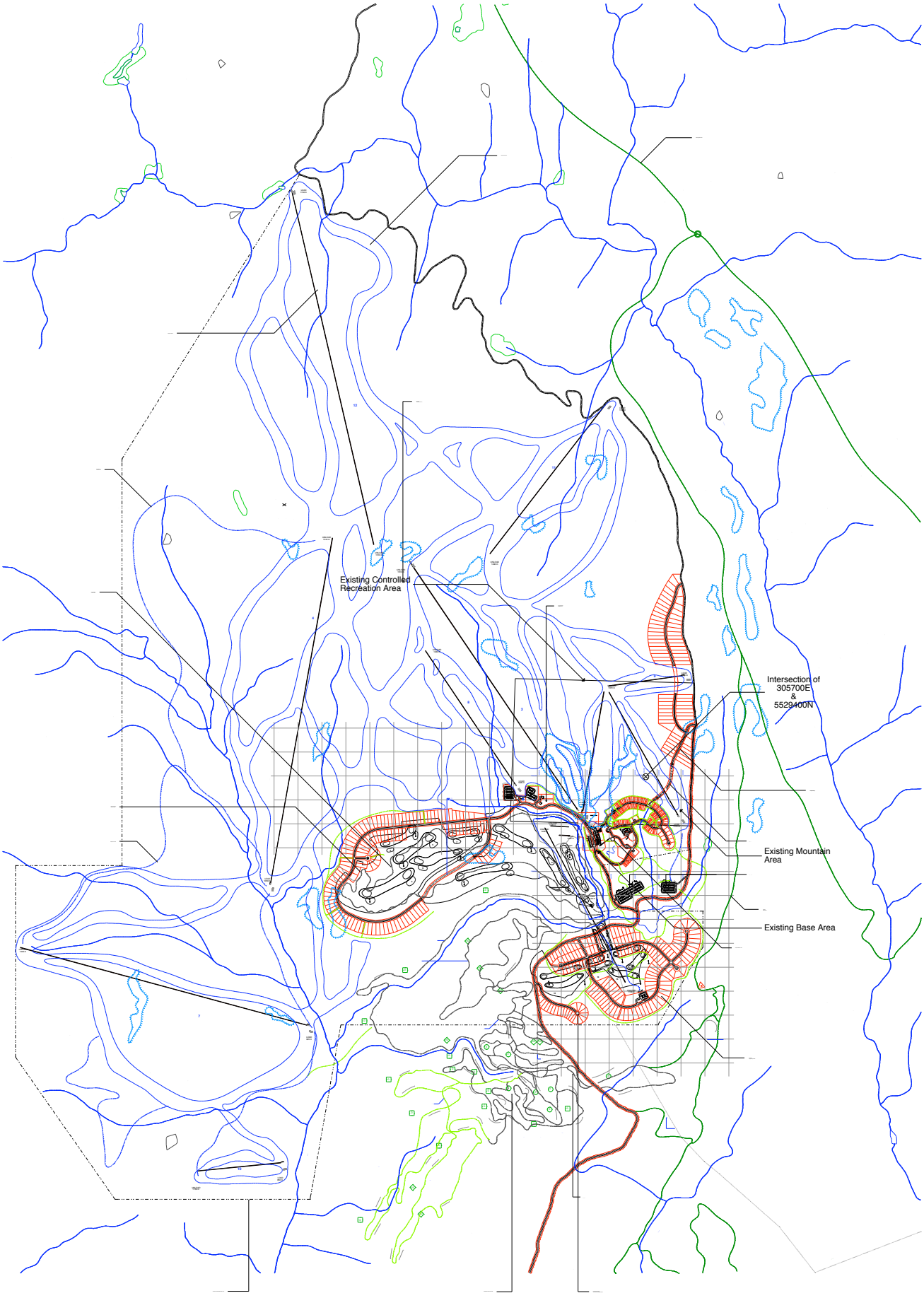

FIGURE 1

CRYSTAL MOUNTAIN PROJECT PLAN - JULY 2001

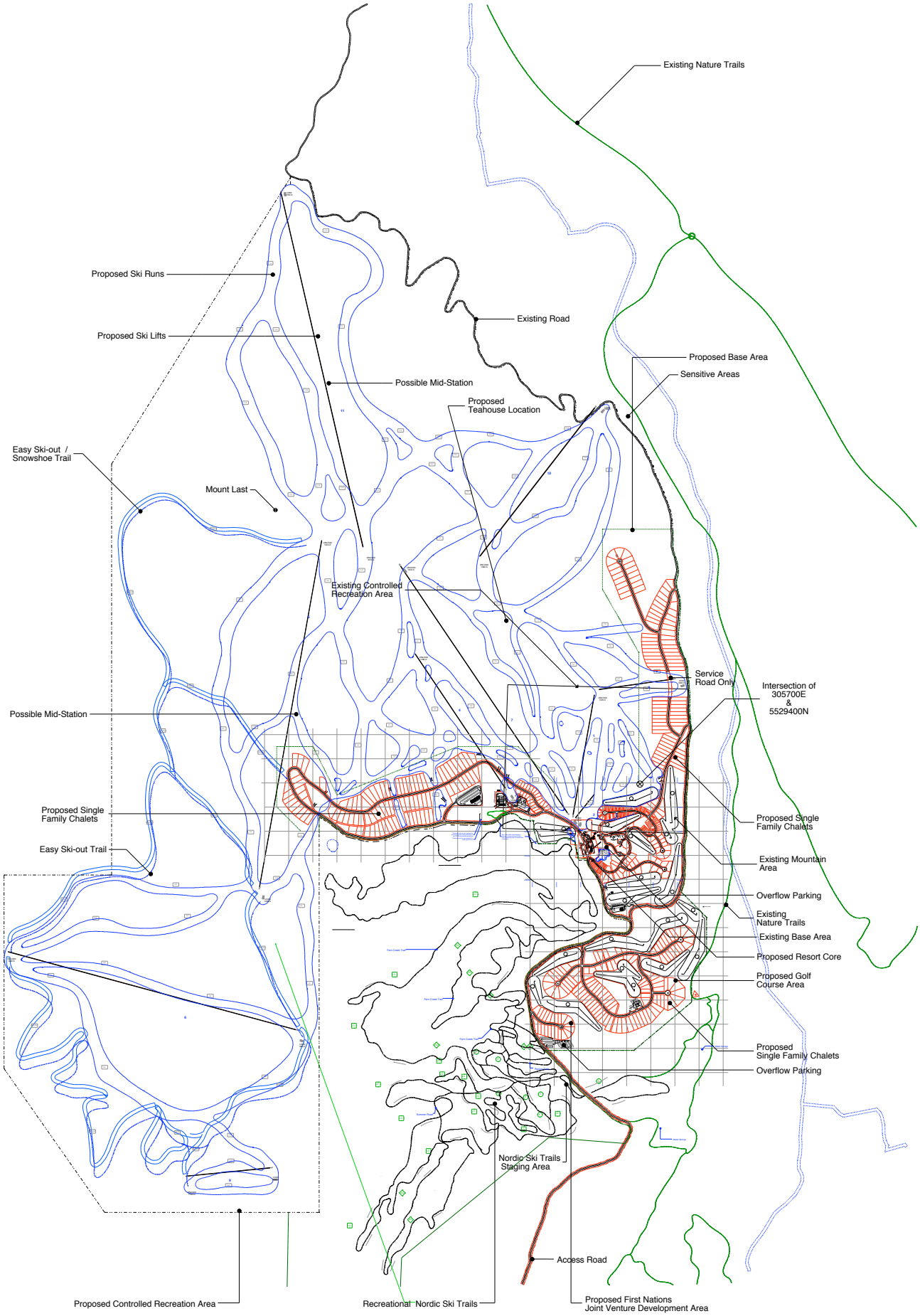

FIGURE 2

CRYSTAL MOUNTAIN PROJECT PLAN - AUGUST 2003

Table 1 Comparison of Crystal Mountain Project Plan from 2001, 2003 and 2006

ACCOMODATION TYPE	NUMBER OF BED UNITS		
	2001	**2003**	**2006**
Hotels	600	600	600
Bed and Breakfast	40	40	50
Condominiums	480	480	480
Townhouses	580	556	556
Single Family Houses	2,130	2,160	2,190
Employee Housing	30	30	30
Total Bed Unit	**3,860**	**3,954**	**3,994**
Other Facilities	18 hole golf course, daylodge, teahouse, commercial space, conference centre, visitor centre	18 hole golf course, daylodge, teahouse, commercial space, conference centre, visitor centre	18 hole golf course, daylodge, teahouse, commercial space, conference centre, visitor centre
Total Skiable Area (hectares)	**551**	**517**	**518**

1.3 June 2006 Master Plan

The June 2006 Master Plan (Figure 3) largely reflects the August 2003 approved master plan with the following minor modifications. The number of bed units increased by 40 units while the skiable terrain remained the same. Changes were made to the streamside protection and enhancement areas (i.e., setbacks) to reflect the current provincial Riparian Areas Regulation. Field inspections were also conducted by ENKON in May 2006 to verify the location and extent of some watercourses and to determine the presence/absence of federally and provincially listed wildlife species and potentially sensitive habitats.

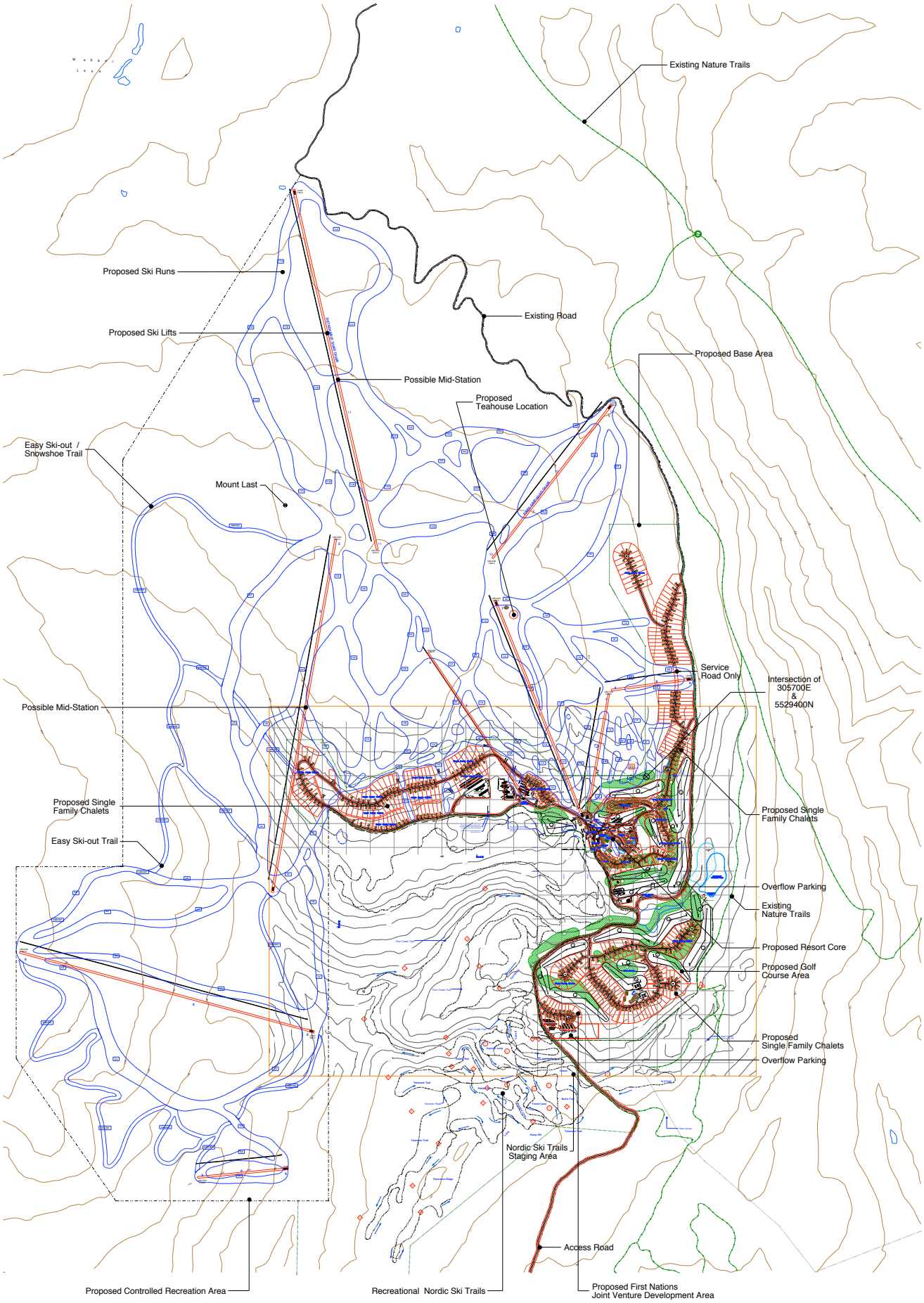

FIGURE 3

CRYSTAL MOUNTAIN PROJECT PLAN - 2006

2.0 RESULTS

2.1 Fisheries Resources

Jack, Law and Trepanier Creeks are important habitat for fish and wildlife. Jack and Law Creek drain into a larger stream, Trepanier Creek to the south that eventually flows into Okanagan Lake.

The only fish species documented to be of regional concern to this project were rainbow trout (*Onchyrhyncus mykiss)* (FISS mapping) and Kokanee salmon (FISS Database and Ministry, pers. comm. D. Tesch). The Ministry of Environment in Pentiction indicated that rainbow trout and Kokanee salmon are present in the watershed along the base of Powers Creek to Highway 97 where a potential culvert barrier may obstruct/prevent upstream migration. Further, there exists a natural waterfall barrier to fish movement approximately 500 meters upstream from this Highway 97 culvert. The lower portion of Powers Creek is a known spawning area for Kokanee salmon, while the lower portion of Trepanier Creek is a known spawning area for both Kokanee salmon and rainbow trout.

A report by Wildstone Resources Ltd. (1996) identified rainbow trout and potentially eastern brook trout as being present in Jack Creek along the mainstem from Trepanier Creek to the headwaters. Kokanee salmon are likely restricted to upstream migration from Trepanier Creek due to a natural barrier (waterfall) about one kilometer upstream of Okanagan Lake. There is no fish presence documented from approximately 1000 meters elevation to the headwaters of the east arm of Jack Creek (D. Tesch). Additionally, there have been no fish identified in two west branches of Jack Creek at elevations 856 m and 960 m elevation. The Ministry of Environment indicated that the headwaters of Law Creek are very dry and likely would not be able to support fish populations.

In 2001, ENKON recommended that the fisheries leavestrip requirements of the provincial “Fish Protection Act - Streamside Protection Regulations” should be utilized (Table 2) to protect fish habitat within the streams flowing through the mountain or base area development lands. Development of ski runs and lift lines should also minimize the number of crossings of Jack Creek mainstem and tributaries. Where possible, ski runs should be developed outside the minimum leavestrip requirements and should run parallel to Jack Creek mainstem and tributaries where possible. Ski run and lift line crossings of streams should minimize clearing and top trees where feasible. Ski lift lines should avoid placing towers within the leavestrip areas.

Table 2 Years 2001 and 2006 Comparison of Streamside Protection and Enhancement Areas (i.e. Setbacks) Associated with Watercourses within or Draining from Crystal Mountain Resort

Stream	2001 Leavestrips (meters)	2006 Leavestrips (meters)
Jack Creek mainstem above 1,000 meters elevation	Minimum 30 meters from the high water mark or the top-of-ravine bank for a non-fish-bearing permanent stream	Minimum 10 meters from the high water mark and expanded to >30 meters adjacent to base area developments
Jack Creek mainstem below 1,000 meters elevation	Minimum 30 meters from the high water mark or the top-of-ravine bank for a fish-bearing stream	Minimum 10 meters from the high water mark and expanded to >30 meters adjacent to base area developments
Jack Creek West Branch	Minimum 30 meters from the high water mark or the top-of-ravine bank for a non-fish-bearing permanent stream	Minimum 10 meters from the high water mark adjacent to the driving range and expanded to 72 meters adjacent to the south side of the parking lot
Jack Creek Tributaries	Minimum 15 meters from the high water mark or the top-of-ravine bank for a non-fish-bearing non-permanent stream	Minimum 10-15 meters from the high water mark and expanded to 68 meters adjacent to golf hole #17 and 87 meters adjacent to the east side of the parking lot
Jack Creek Wetland	Minimum 30 meters from the top of bank	Minimum 30 meters from the high water mark and expanded to 89 meters on the north side of the wetland
Powers Creek Mainstem	Minimum 30 meters from the high water mark or the top-of-ravine bank for a fish-bearing stream or non-fish-bearing permanent stream	Not assessed. Setbacks remain the same.

Stream	2001 Leavestrips (meters)	2006 Leavestrips (meters)
Powers Creek Tributaries	Minimum 30 meters from the high water mark or the top-of-ravine bank for a fish-bearing stream or non-fish-bearing permanent stream. Minimum 15 meters from the high water mark or the top-of-ravine bank for a non-fish-bearing non-permanent stream	Not assessed. Setbacks remain the same.
Law Creek Mainstem	Minimum 30 meters from the high water mark or the top-of-ravine bank for a fish-bearing stream or non-fish-bearing permanent	Not assessed. Setbacks remain the same.

On March 31 2005/2006 the new provincial Riparian Areas Regulation (RAR) replaced the Streamside Protection Regulation (SPR) with an ability to conduct detailed assessments of watercourses to determine setback widths on a case-by-case basis. During May 2006, ENKON conducted detailed assessments on the main watercourses within the resort base lands to re-evaluate setback widths and adjust the development plan where necessary (Table 1).

Overall, the setbacks were initially reduced from the original 15-30 meters to 10-30 meters adjacent to Jack Creek and tributaries. However, after environmental review of the 2006 Base Area Development Plan, setbacks were expanded in a number of locations beyond the requirements of either regulation (SPR or RAR) to provide additional protection for wildlife (Figure 4). For example, while both regulations required a 30 meter setback adjacent to Jack Creek wetland, it was possible to provide a 30-89 meter setback. Similarly, the setbacks applied to the unnamed tributary adjacent to Golf Hole #17 were expanded to a maximum of 68 meters to protect habitat for the provincially blue-listed red-legged frog.

All fish habitat mitigation measures proposed in the June 2001 Environmental Report (Section 3.1.4) prepared by ENKON are still applicable including:

1. Development of ski runs and lift lines should minimize the number of crossings of Jack Creek mainstem and tributaries. Ski runs should be developed outside the minimum leavestrip requirements and should run parallel to Jack Creek mainstem and tributaries where possible. Ski run and lift line stream crossings should be conducted to minimize clearing and top trees where feasible. Ski lift line construction plans should avoid placing towers within the leavestrip areas.
2. All instream work should be done under summer low flow conditions during the "fisheries window."

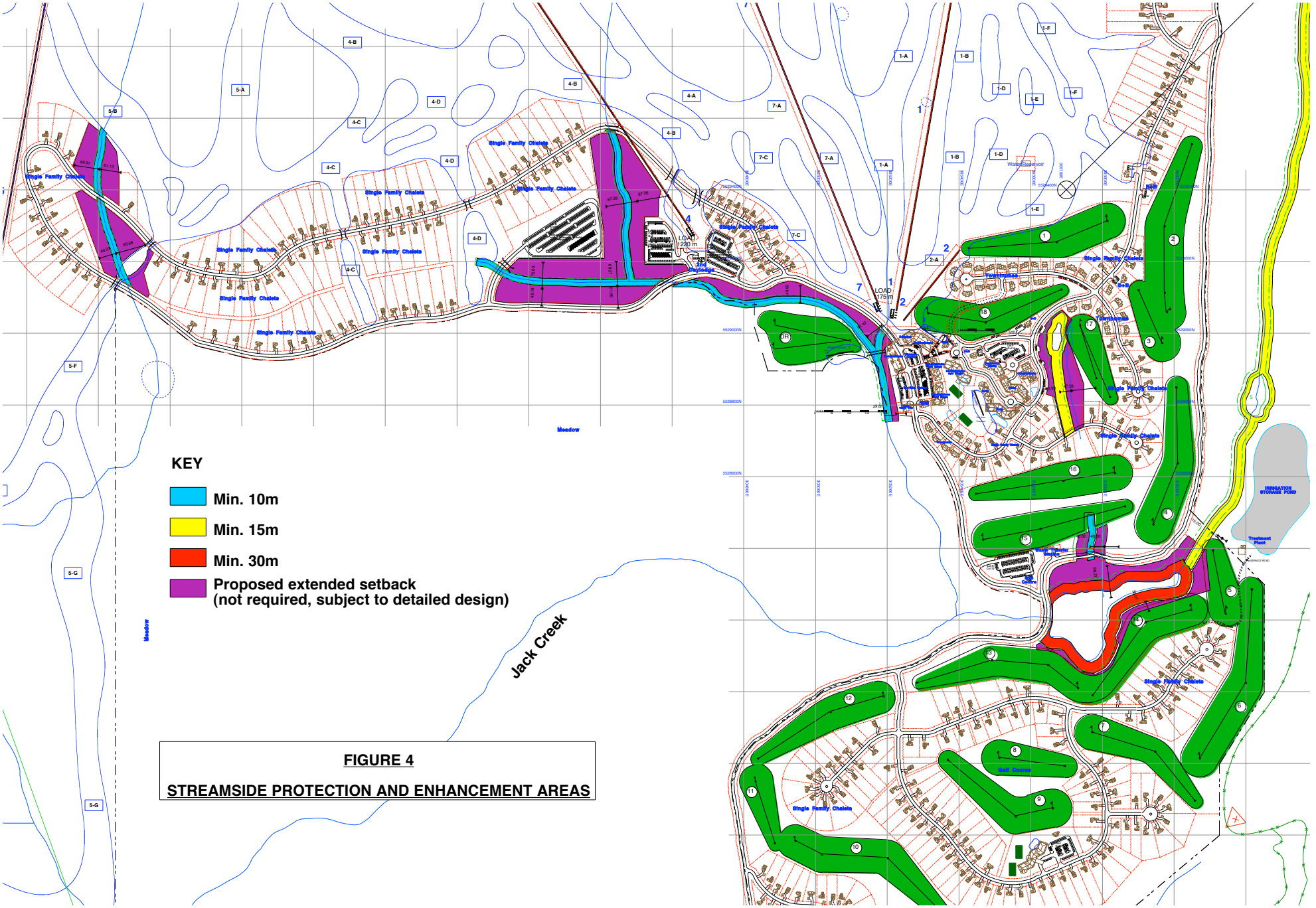

FIGURE 4

STREAMSIDE PROTECTION AND ENHANCEMENT AREAS

3. Stream crossings should avoid critical fish habitat within the base area lands and should adhere to the following guidelines to protect non-fish-bearing streams:

   a) Access roads and utility corridors within the base area lands should be designed for the same locations as existing crossings to eliminate any additional stream crossings;

   b) No infilling or stormwater detention/retention should be proposed in Webber Lake and the wetland near the existing base area;

   c) Where necessary, stream crossing structures should be considered in the following order of priority:

      - Bridges (preferred clear span)
      - Open bottom culverts
      - Box culverts
      - Pipe arch culverts
      - Stacked culverts
      - Round culverts

   d) Culverts should be designed as per the recommendations of the federal/provincial "Land Development Guidelines for the Protection of Aquatic Habitat" (1992) with the following criteria:

      - Diameters of all culverts will be >0.45 meters
      - Average water velocities and slopes will not exceed:
        - 1.2 meters per second and <1.0% for culverts <24 meters in length (unless baffled)
        - 0.9 meters per second and 0.5% for culverts >24 meters in length (unless baffled)
      - Depth of water will not be <0.23 meters
      - Culverts >61 meters will generally not be considered
      - All culverts will be designed to the 1:100 year flood
      - All culvert bottoms will be 0.31 meters below the grade line of the natural stream bed
      - All culverts will be designed with outlet pools and tail water controls

   e) Stream crossings should be constructed perpendicular to the flow of water in all cases.

   f) Stream crossings for ski trails should be avoided, but if necessary they should follow the same requirements for road crossings outlined in the Forest Practices Code.

4. In order to limit the post-development storm/snowmelt off-site runoff rate to the pre-development runoff rate, and to maintain, as closely as possible, the natural pre-development flow pattern and water quality in the receiving watercourse, the following protection measures should be used:

   a) If retention or protection of in-stream habitat or adjacent riparian habitat is not feasible, rehabilitation and bank stabilization of streambanks impacted by the proposed development should be implemented.

   b) Clearing of forest for the development of ski runs should be performed to manage forest harvesting so that spatial distribution of cutblocks (i.e., aspect and elevation) and harvesting techniques maintain the existing timing and magnitude of streamflows.

3.0 WILDLIFE RESOURCES

The Crystal Mountain project falls within the Interior Douglas-fir Very Dry Hot and Montane Spruce Dry Mild Biogeoclimatic Subzones which are characterized by closed-canopy Douglas-fir forests on cooler sites and in riparian areas. Lodgepole pine and Subalpine fir are common at higher elevations. The prominent red stems of red-osier dogwood stand out along streambanks. Dry sites such as upper, south-facing slopes and ridges are where ponderosa pines form open, park-like forests. Wetlands are found in depressions and around open water. Cattails, sedges, and bulrushes surrounded by shrubby willows and birches surround marshes. There are 123 species of plants that are provincially red and blue-listed in these biogeoclimatic zones (Appendix A), however, none have been detected to date in the study site.

The study area is located within the Okanagan Shuswap Forest District which is associated with 14 provincially red- and blue-listed wildlife species including red-legged frog (*Rana aurora*), peregrine falcon (*Falco peregrinus anatum*), western screech-owl (*Megascops kennicottii macfarlanei*), Lewis's woodpecker (*Melanerpes lewis*), wolverine (*Gulo gulo luscus*), fisher (*Martes pennanti*), bighorn sheep (*Ovis canadensis*) and grizzly bear (*Ursus arctos*) (Appendix B). Western toads, which may be present in the study site, are a federal species of concern (Appendix C).

Blue-listed red-legged frogs were detected at 5 locations within the un-named tributary on the north side of Jack Creek wetland in May 2006 (Photograph 1). This species requires slow moving creeks or ponds in which to breed but for most of its life-history it inhabits moist forest habitat, often quite far from bodies of water. If the forest floor is dry, red-legged frogs tend to stay within riparian areas and close to the creek edges. The BC *Wildlife Act* protects red-legged frogs from disturbance or harm. The federal/provincial Identified Wildlife Management Strategy requests a 30 meter non-disturbance buffer on creeks where red-legged frogs have been documented. This strategy along with the provincial Best Management Practices for Development in Urban and Rural Areas provide the following guidelines for protection of amphibian habitat:

- Maintain buffers of undisturbed native vegetation around and adjacent to key amphibian habitats and discourage human and livestock access to these areas;
- Prevent road mortality and mortality due to construction activities during the breeding season (March–August);
- Provide suitable landscape linkages to allow movements of animals between important seasonal habitats; riparian management areas, parks, and greenways;
- Maintain as closely as possible the natural hydrological regime of wetlands;
- Maintain the structural integrity of emergent vegetation to provide egg-laying sites and rearing habitat for developing tadpoles;

- Maintain forest or vegetation cover adjacent to breeding sites to provide suitable microclimatic conditions for emerging juveniles and foraging adults;
- Maintain important habitat features including natural levels of coarse woody debris, a deciduous component to stands where appropriate, and understory vegetation surrounding wetlands;
- Protect shallow water areas and their vegetation from trampling by livestock and other disturbance; these areas serve as breeding habitat and cover for many amphibians;
- Control the spread of non-native animals and plants; introduced bullfrogs and fish compete with and prey on native amphibians; weedy exotic plants can overtake native vegetation and choke wetlands; and
- Do not use pesticides.

Based on the 2006 Crystal Mountain project plan, minimum setbacks for protection of red-legged frog have been generally achieved.

Photograph 1 Red-legged Frog in un-named tributary of Jack Creek

Jack Creek Wetland is located in the southeast portion of the study area and feeds into Jack Creek. The wetland is well established and contains aquatic plants typical of long-term wetlands (Photograph 2). Abundant bird, amphibian and large mammal sign around and within the wetland showed evidence of a high diversity of use and implied the wetland is an important environmental element in the local landscape. The wetland provides a dynamic system of breeding and foraging sites for a range of taxa from moose, bears, deer, coyotes, toads, frogs and a host of bird and insect species. It is very important to the long-term health of Jack Creek Wetland to restrict the trampling of shoreline, emergent vegetation by cattle using the ski hill as summer grazing stock.

Photograph 2 Jack Creek Wetland

Both Jack Creek and Jack Creek Wetland have high suitability for several species of amphibians including red-legged frog and western toad. Western toad tadpoles were observed on the west side of Jack Creek Wetland in May 2006. Guidelines for the protection of western toad habitat are similar to those presented above for red-legged frogs. Based on the 2006 Crystal Mountain project plan, minimum setbacks for protection of western toad have been exceeded.

In general, although clearing of forests for development of ski runs/lifts is anticipated to enhance wildlife species diversity by changing the composition to those that utilize early seral habitats, it will also have potential negative consequences for those wildlife species that depend primarily on mature and old-growth forest stands, and/or require forest-interior conditions. However, many species (e.g. black bear, moose, elk, mule deer, rubber boa, and various raptor and songbird species) that use interior forests do forage to some extent in openings and edges adjacent to forest stands. Although it is not possible to analyze both the positive and negative effects of ski trail clearing for each wildlife species, we believe that potential negative impacts are unlikely to outweigh positive ones, if habitat for rare listed species is protected.

In 2001, wildlife management plans were developed for birds, mammals and herptiles to reduce the potential impacts of the proposed development on wildlife populations and their required habitats. The plans were intended to provide guidance for future planning and for mitigating construction and operation activities. These plans are still applicable for the 2006 Crystal Mountain Resort Plan and include the following:

Permanent Habitat Loss

Full mitigation for permanent alienation of habitat is usually not possible. Nevertheless, some general measures can be taken to mitigate the effects of habitat loss as follows:

- Maximize greenways between buildings and roads for use as connectivity corridors by small wildlife species (this is also desirable for aesthetic reasons);
- Carry out forest clearing outside of the breeding season (March 31 - August 1st);
- Re-vegetate any disturbed sites not occupied by structures, using native plants if possible; and
- Erect bird boxes for cavity-nesting species.

Habitat Alteration

The negative effects of forest clearing on wildlife habitat for new ski runs or for the proposed golf facility can be reduced in the following ways:

- Carry out forest clearing outside of the breeding season (March 31st to August 31st);
- Confine clearing to only the width needed for skiing;
- Re-vegetate any sites where clearing or grubbing has resulted in soil disturbance;
- Maintain sufficient spacing between ski trails so as to avoid extremely narrow forest strips which have significantly reduced ecosystem function;
- Maintain riparian areas with pre-development seral stage characteristics; and
- During the planning stage retain functional connectivity corridors at the habitat, landscape and regional level. Provide for functional connectivity between important habitats in close proximity to each other to allow for the dispersal needs of plants and animals. Where possible, retain a minimum 15 m natural vegetative cover between and around the fairways to provide wildlife habitat and movement corridors.

Recreational Disturbances

To reduce environmental disturbance to the natural landscape from recreational use and to manage potential human-wildlife conflicts, the following guidelines are recommended to mitigate short and long term impacts:

- Erect and maintain appropriate signage to identify accessible and non-accessible areas, and identify use by motorized and non-motorized access;
- Develop seasonal access restrictions for specific areas in consultation with identified user groups;
- Encourage periodic discussions by local residents and interested parties to redefine strategies to manage and integrate recreational opportunities and uses;

- Encourage a stewardship role by organized user groups or clubs in the management of recreational activities and facilities; and
- Ensure the trail corridor/network and the associated recreation opportunities are maintained or enhanced for continued public use. Implement residential bylaws requiring control of pets, prevention of weed invasion, noise mitigation, litter control, and solid waste management. Request adherence to trails and thus reduce human impact in sensitive habitat.

Construction-related Disturbances

The following practices are recommended to mitigate for disturbance caused by construction:

- For all construction work, take measures to reduce engine noise as much as possible; and
- In the ridge crest area, construction-related noise, blasting, and helicopter flights should be temporarily suspended when bighorn sheep are within 500 meters of work sites, and should not be resumed until the animals have left the area (this is expected to be an infrequent event).

Traffic Collisions with Wildlife

To mitigate disturbance to wildlife and wildlife mortality and reduce the potential for human injury;

- Post appropriate signage to warn motorists of wildlife crossings, seasonal movements or potential danger areas;
- Monitor and document recurring collision sites, if any, so that problem areas can be identified for specific attention; and
- In years of deep snow, berms created by ploughing should be cleared at regular intervals so that animals can easily escape from roadways.

4.0 ENVIRONMENTALLY SENSITIVE AREAS

Section 4.1.2 of ENKON's June 2001 Environmental Report identified a number of ephemeral ponds and wetlands as sensitive habitat within the proposed development area. ENKON recommended the following guidelines for protection of amphibian habitat:

- Establish a minimum 15-meter buffer adjacent to the Jack Creek wetland, Jack Creek and Wetlands 8-10, 13,14 (Figure 5);
- Any construction-related runoff waters should be maintained sediment free if discharged into the Jack Creek wetland. Water levels within the wetland should be maintained no higher than the top of emergent vegetation;
- Where possible, maintain Wetlands/Meadows 1-7, 11-14 (Figure 5) to retain microclimatic conditions for foraging adult herptiles;
- Rehabilitate temporary access roads;
- Any selective tree harvesting should be conducted to promote mature secondary or old growth forest characteristics such as the retention of large diameter trees, multilayered canopies, snags and coarse woody debris;
- Minimize the risk of windthrow adjacent to wetlands and meadows;
- Avoid the use of pesticides. Spot treatments with herbicides may be used in exceptional circumstances (e.g., noxious weeds) where it can be demonstrated that the herbicide will not be harmful to the aquatic environment or herptile habitat being managed;
- Riparian areas adjacent to the Jack Creek wetland should be managed according to the recommended "Best Management Practices" from the *Riparian Management Area Guidebook*;
- Prevent the introduction of fish populations as potential predators to the Jack Creek wetland;
- Restrict livestock access to wetlands;
- If possible, retain ephemeral wetlands, and if possible, provide a minimum 15 m wide naturally vegetated movement corridor between wetlands;
- If wetlands cannot be retained, re-construct permanent wetlands (fed by the golf course irrigation system or stormwater) and associated minimum 15 m buffer within the expanded study area. To provide functional wildlife habitat, the wetland(s) should be a minimum size of approximately 0.6 acres (0.25 ha) and measure at least 50 m at one location perpendicular to its longitudinal axis.

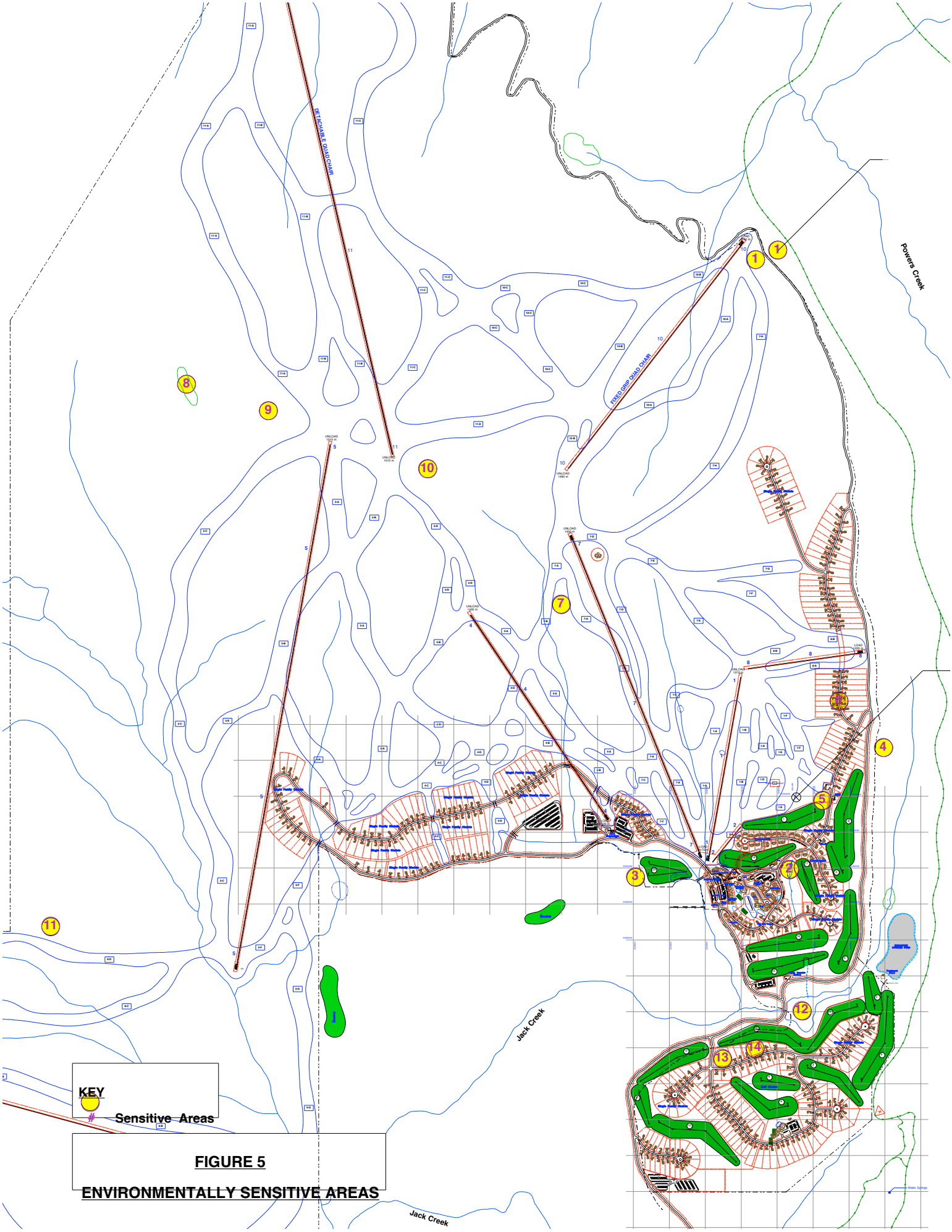

FIGURE 5

ENVIRONMENTALLY SENSITIVE AREAS

The 2006 Crystal Mountain Project Plan protects the main wetlands and associated buffers including the Jack Creek Wetland and Wetlands 8-10 (Figure 5). Although single family residential lots north of the golf course impact Wetland/Meadows 6, the remaining seven smaller wetland/meadows are protected. In addition, the expanded buffers around the majority of wetlands and watercourses within the development areas should ensure that amphibian habitat is protected.

During the detailed "Master Plan" phase of the project in 2001, the study area was expanded to the south to include an area of approximately 110 hectares for residential and golf course development. During mid-August 2001, ENKON conducted additional field inventories to assess the potential impacts to environmental resources of the expanded area. ENKON identified two wetlands (#13 and #14 on Figure 5) within the expanded area and although neither wetland provides habitat for listed species, ENKON recommended the following:

1. If possible, retain one or both ephemeral wetlands, and a minimum 15m buffer measured from the high water mark. If possible, provide a minimum 15 m wide naturally vegetated movement corridor to the Jack Creek wetland; or

2. If the wetlands cannot be retained, re-construct permanent wetlands (fed by the golf course irrigation system or stormwater) and associated minimum 15 m buffer within the expanded study area. To provide functional wildlife habitat, the wetland(s) should be a minimum size of approximately 0.6 acres (0.25 ha) and measure at least 50 m at one location perpendicular to its logitudinal axis; and

The 2001 Project Plan provides protection for both wetlands #13 and #14 (Figure 5).

5.0 CONCLUSIONS

The following conclusions from ENKON's June 2001 Environmental Report are still applicable based on the revised 2006 Crystal Mountain Resort Plan.

> *Based on existing baseline resource information on fish and wildlife habitat, forest resources (including old-growth), terrain information and surface/groundwater resources, significant environmental impacts from the siting of mountain and base area facilities have been avoided to a large degree. However, there will still be impacts to forest resources and associated wildlife habitat from the development of ski lifts, ski runs, base area commercial and residential units, and access roads. Impacts to wildlife from forest removal will likely result in a species shift from mature forest dwelling wildlife to wildlife that prefer edge habitat and early seral stage vegetation. Careful siting and management of wastewater treatment facilities will be required to avoid impacts to surface and groundwater users in the base area. It is anticipated that environmental impacts can be managed through the implementation of wildlife management plans, stormwater management plans, erosion and control plans, spill contingency plans, riparian setbacks, and fertilizer and pesticide plans.*

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APPENDIX A

Provincially Listed Plant Species Okanagan Shushwap Forest District IDF and MS Biogeoclimatic Zones

June 2006

ENKON

Provincially Listed Species - Okanagan Shushwap Forest District - IDF and MS Biogeoclimatic Zones - June 2006

Scientific Name	English Name	Global Rank	Prov Rank	BC Status
Acorus americanus	American sweet-flag	G5	S2S3	Blue
Castilleja minor ssp. *minor*	annual paintbrush	G5T5	S1	Red
Cyperus squarrosus	awned cyperus	G5	S3	Blue
Eleocharis rostellata	beaked spike-rush	G5	S2S3	Blue
Carex comosa	bearded sedge	G5	S2	Red
Carex amplifolia	bigleaf sedge	G4	S2S3	Blue
Ranunculus pedatifidus ssp. *affinis*	birdfoot buttercup	G5T5	S2S3	Blue
Bouteloua gracilis	blue grama	G5	S1	Red
Verbena hastata var. *scabra*	blue vervain	G5T5	S2	Red
Stellaria obtusa	blunt-sepaled starwort	G5	S2S3	Blue
Salix boothii	Booth's willow	G5	S2S3	Blue
Lomatium brandegeei	Brandegee's lomatium	G3?	S2S3	Blue
Mimulus breweri	Brewer's monkey-flower	G5	S2S3	Blue
Myosurus apetalus var. *borealis*	bristly mousetail	G5T3T5	S2	Red
Potentilla paradoxa	bushy cinquefoil	G5	S1	Red
Polygonum ramosissimum var. *ramosissimum*	bushy knotweed	G5T5	S1	Red
Polygonum polygaloides ssp. *confertiflorum*	close-flowered knotweed	G4G5T3T4	S1	Red
Juncus confusus	Colorado rush	G5	S1	Red
Pyrrocoma carthamoides var. *carthamoides*	Columbian goldenweed	G4G5T4	S2	Red
Dryopteris cristata	crested wood fern	G5	S2S3	Blue
Trifolium cyathiferum	cup clover	G4	S1	Red
Berula erecta	cut-leaved water-parsnip	G4G5	S1	Red
Chenopodium atrovirens	dark lamb's-quarters	G5	S1	Red
Potentilla diversifolia var. *perdissecta*	diverse-leaved cinquefoil	G5T4	S2S3	Blue
Carex xerantica	dry-land sedge	G5	S2	Red
Gayophytum humile	dwarf groundsmoke	G5	S2S3	Blue
Valeriana edulis ssp. *edulis*	edible valerian	G5T5	S1	Red
Polemonium elegans	elegant Jacob's-ladder	G4	S2S3	Blue
Polygonum douglasii ssp. *engelmannii*	Engelmann's knotweed	G5T3T5	S2S3	Blue
Floerkea proserpinacoides	false-mermaid	G5	S2S3	Blue
Lindernia dubia var. *anagallidea*	false-pimpernel	G5T4	S2S3	Blue
Cuscuta pentagona	field dodder	G5	S2S3	Blue
Potentilla nivea var. *pentaphylla*	five-leaved cinquefoil	G5T4	S2S3	Blue
Orobanche corymbosa ssp. *mutabilis*	flat-topped broomrape	G4T3?	S2	Red
Carex vulpinoidea	fox sedge	G5	S2S3	Blue
Astragalus lentiginosus	freckled milk-vetch	G5	S2	Red
Allium geyeri var. *tenerum*	Geyer's onion	G4G5T3T5	S2S3	Blue
Epipactis gigantea	giant helleborine	G3G4	S2S3	Blue
Gayophytum ramosissimum	hairstem groundsmoke	G5	S1	Red
Marsilea vestita	hairy water-clover	G5	S1	Red
Heterocodon rariflorum	heterocodon	G5	S3	Blue
Arabis holboellii var. *pinetorum*	Holboell's rockcress	G5T5?	S2S3	Blue
Carex scopulorum var. *bracteosa*	Holm's Rocky Mountain sedge	G5T3T5	S2S3	Blue
Isoetes howellii	Howell's quillwort	G4G5	S1	Red
Hutchinsia procumbens	hutchinsia	G5	S1	Red
Polygonum polygaloides ssp. *kelloggii*	Kellogg's knotweed	G4G5T3T5	S2S3	Blue
Botrychium simplex	least moonwort	G5	S2S3	Blue
Erigeron leibergii	Leiberg's fleabane	G3?	S1	Red
Potamogeton nodosus	long-leaved pondweed	G5	S1	Red
Calochortus lyallii	Lyall's mariposa lily	G3	S2	Red
Carex sychnocephala	many-headed sedge	G4	S3	Blue
Muhlenbergia glomerata	marsh muhly	G5	S3	Blue
Azolla mexicana	Mexican mosquito fern	G5	S2	Red
Delphinium bicolor ssp. *bicolor*	Montana larkspur	G4G5T4T5	S2S3	Blue
Coleanthus subtilis	moss grass	G3G5	S1	Red
Navarretia divaricata var. *divaricata*	mountain navarretia	G5T3T5	S1	Red
Poa fendleriana ssp. *fendleriana*	mutton grass	G5T5	S1	Red
Brickellia oblongifolia ssp. *oblongifolia*	narrow-leaved brickellia	G5T5	S2	Red
Navarretia intertexta	needle-leaved navarretia	G5	S2	Red
Agastache urticifolia	nettle-leaved giant-hyssop	G5	S3	Blue
Lomatium triternatum ssp. *platycarpum*	nine-leaved desert-parsley	G5T3T5	S2	Red
Ribes oxyacanthoides ssp. *cognatum*	northern gooseberry	G5T4	S1	Red

Provincially Listed Species - Okanagan Shushwap Forest District - IDF and MS Biogeoclimatic Zones - June 2006

Scientific Name	English Name	Global Rank	Prov Rank	BC Status
Linanthus septentrionalis	northern linanthus	G5	S2S3	Blue
Viola septentrionalis	northern violet	G5	S1S3	Red
Cryptantha ambigua	obscure cryptantha	G4	S2	Red
Talinum sediforme	Okanogan fameflower	G3	S2S3	Blue
Melica bulbosa var. *bulbosa*	oniongrass	G5TNRQ	S2	Red
Impatiens aurella	orange touch-me-not	G4?	S2S3	Blue
Epilobium oregonense	Oregon willowherb	G5	S2S3	Blue
Salix amygdaloides	peach-leaf willow	G5	S2	Red
Crassula aquatica	pigmyweed	G5	S3	Blue
Agoseris lackschewitzii	pink agoseris	G4	S2S3	Blue
Carex hystricina	porcupine sedge	G5	S2S3	Blue
Hesperostipa spartea	porcupinegrass	G5	S2	Red
Gentiana affinis	prairie gentian	G5	S2S3	Blue
Lepidium densiflorum var. *pubicarpum*	prairie pepper-grass	G5T4	S1	Red
Sphenopholis obtusata	prairie wedgegrass	G5	S1	Red
Melica spectabilis	purple oniongrass	G5	S2S3	Blue
Epilobium ciliatum ssp. *watsonii*	purple-leaved willowherb	G5T3T5	S2S3	Blue
Gayophytum racemosum	racemed groundsmoke	G5	S1	Red
Leersia oryzoides	rice cutgrass	G5	S2S3	Blue
Descurainia incana ssp. *incisa*	Richardson's tansy mustard	G5T3T5	S3S4	Blue
Amsinckia retrorsa	rigid fiddleneck	G5	S1	Red
Scolochloa festucacea	rivergrass	G5	S2	Red
Schoenoplectus saximontanus	Rocky Mountain clubrush	G5	S1	Red
Sporobolus compositus var. *compositus*	rough dropseed	G5T5	S3	Blue
Entosthodon rubiginosus	rusty cord-moss	G1G3	S1	Red
Olsynium douglasii var. *inflatum*	satinflower	G4G5T3T4	S1	Red
Idahoa scapigera	scalepod	G5	S2	Red
Gaura coccinea	scarlet gaura	G5	S1	Red
Sphaeralcea coccinea	scarlet globe-mallow	G5?	S1	Red
Camissonia breviflora	short-flowered evening-primrose	G5	S1	Red
Mimulus breviflorus	short-flowered monkey-flower	G4	S1	Red
Phlox speciosa ssp. *occidentalis*	showy phlox	G5TNR	S1	Red
Arabis sparsiflora	sickle-pod rockcress	G5	S1	Red
Atriplex argentea ssp. *argentea*	silvery orache	G5T5	S1	Red
Gilia tenerrima	slender gilia	G5	S1	Red
Eleocharis elliptica		G5	S2S3	Blue
Sphenopholis intermedia	slender wedgegrass	G5	S3	Blue
Ipomopsis minutiflora	small-flowered ipomopsis	G4	S3S4	Blue
Melica smithii	Smith's melic	G4	S2S3	Blue
Solidago gigantea ssp. *serotina*	smooth goldenrod	G5TNR	S1	Red
Epilobium glaberrimum ssp. *fastigiatum*	smooth willowherb	G5T4T5	S2S3	Blue
Dicentra uniflora	steer's head	G4?	S2S3	Blue
Eriogonum strictum var. *proliferum*	strict buckwheat	G5TNR	S1	Red
Thelypodium laciniatum var. *laciniatum*	thick-leaved thelypody	G5T5	S2S3	Blue
Elatine rubella	three-flowered waterwort	G5	S2S3	Blue
Chamaesyce serpyllifolia ssp. *serpyllifolia*	thyme-leaved spurge	G5T5	S2S3	Blue
Salix tweedyi	Tweedy's willow	G4	S2S3	Blue
Botrychium paradoxum	two-spiked moonwort	G2	S1	Red
Botrychium ascendens	upswept moonwort	G2G3	S2	Red
Myriophyllum ussuriense	Ussurian water-milfoil	G3	S3	Blue
Carex vallicola var. *vallicola*	valley sedge	G5T5	S1	Red
Sparganium fluctuans	water bur-reed	G5	S2S3	Blue
Megalodonta beckii var. *beckii*	water marigold	G4G5T4	S3	Blue
Atriplex truncata	wedgescale orache	G5	S1	Red
Apocynum x *floribundum*	western dogbane	GNA	S2S3	Blue
Polemonium occidentale ssp. *occidentale*	western Jacob's-ladder	G5?T5?	S2S3	Blue
Artemisia ludoviciana var. *incompta*	western mugwort	G5T3T5	S2S3	Blue
Pyrola elliptica	white wintergreen	G5	S2S3	Blue
Trisetum wolfii	Wolf's trisetum	G4	S2S3	Blue
Arabis lignifera	woody-branched rockcress	G5	S2S3	Blue
Liparis loeselii	yellow widelip orchid	G5	S1	Red

APPENDIX B

Provincially Listed Animal Species Okanagan Shushwap Forest District IDF and MS Biogeoclimatic Zones

June 2006

ENKON

Provincially Listed Species - Okanagan Shushwap Forest District - IDF and MS Biogeoclimatic Zones - June 2006

Scientific Name	English Name	Global Rank	Prov Rank	COSEWIC	BC Status	SARA
Salvelinus confluentus	Bull Trout	G3	S3		Blue	
Cottus hubbsi	Columbia Mottled Sculpin	G4Q	S3	SC (May 2000)	Blue	1
Spea intermontana	Great Basin Spadefoot	G5	S3	T (Nov 2001)	Blue	1
Ambystoma tigrinum	Tiger Salamander	G5	S2	E (Nov 2001)	Red	1
Eumeces skiltonianus	Western Skink	G5	S2S3	SC (May 2002)	Blue	1
Coluber constrictor	Racer	G5	S3S4	SC (Nov 2004)	Blue	
Hypsiglena torquata	Night Snake	G5	S1	E (May 2001)	Red	1
Crotalus oreganus	Western Rattlesnake	G5	S3	T (May 2004)	Blue	1
Ardea herodias herodias	Great Blue heron, *herodias* subspecies	G5T5	S3B,S4N		Blue	
Falco mexicanus	Prairie Falcon	G5	S2B	NAR (May 1996)	Red	
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	G4T3	S2B	T (May 2000)	Red	1
Grus canadensis	Sandhill Crane	G5	S3S4B	NAR (May 1979)	Blue	
Numenius americanus	Long-billed Curlew	G5	S3B	SC (Nov 2002)	Blue	1
Asio flammeus	Short-eared Owl	G5	S3B,S2N	SC (May 1994)	Blue	3
Megascops kennicottii macfarlanei	Western Screech-Owl, *macfarlanei* subspecies	G5T4	S1	E (May 2002)	Red	1
Otus flammeolus	Flammulated Owl	G4	S3S4B	SC (Nov 2001)	Blue	1
Melanerpes lewis	Lewis's Woodpecker	G4	S2B	SC (Nov 2001)	Red	1
Picoides albolarvatus	White-headed Woodpecker	G4	S1	E (Nov 2000)	Red	1
Sphyrapicus thyroideus thyroideus	Williamson's Sapsucker, *thyroideus* subspecies	G5TU	S2B	E (May 2005)	Red	
Ammodramus savannarum	Grasshopper Sparrow	G5	S2B		Red	
Spizella breweri breweri	Brewer's Sparrow, *breweri* subspecies	G5T4	S2B		Red	
Euderma maculatum	Spotted Bat	G4	S3S4	SC (May 2004)	Blue	1
Myotis thysanodes	Fringed Myotis	G4G5	S2S3	DD (May 2004)	Blue	3
Gulo gulo luscus	Wolverine, *luscus* subspecies	G4T4	S3	SC (May 2003)	Blue	
Martes pennanti	Fisher	G5	S2S3		Blue	
Taxidea taxus	Badger	G5	S1	E (May 2000)	Red	1
Ursus arctos	Grizzly Bear	G4	S3	SC (May 2002)	Blue	1
Ovis canadensis	Bighorn Sheep	G4	S2S3		Blue	

APPENDIX C

Federal Species at Risk

June 2006

ENKON

Species at Risk Act: Endangered, Threatened and Special Concern Species (March 2006)

Scientific Name	English Name	Risk Category	Schedule
Fish			
Gasterosteus sp.	Benthic Paxton Lake stickleback	Endangered	Schedule 1
Gasterosteus sp.	Benthic Vananda Creek stickleback	Endangered	Schedule 1
Gasterosteus sp	Benthic Enos Lake stickleback	Endangered	Schedule 1
Gasterosteus sp.	Charlotte unarmoured sticklebacks	Special concern	Schedule 3
Cottus bairdi hubbsi	Columbia mottled Sculpin	Special concern	Schedule 1
Lampetra macrostoma	Vancouver lamprey	Threatened	Schedule 1
Cottus sp.	Cultus pygmy sculpin	Threatened	Schedule 1
Gasterosteus sp.	Giant stickleback	Special concern	Schedule 3
Acipenser medirostris	Green sturgeon	Special concern	Schedule 3
Gasterosteus sp.	Limnetic Enos Lake stickleback	Endangered	Schedule 1
Gasterosteus sp.	Limnetic Paxton Lake stickleback	Endangered	Schedule 1
Gasterosteus sp.	Limnetic Vananda Creek stickleback	Endangered	Schedule 1
Lampetra richardsoni	Morrison Creek lamprey	Endangered	Schedule 1
Rhinichthys sp.	Nooksack dace	Endangered	Schedule 1
Catostomus sp.	Salish sucker	Endangered	Schedule 2
Cottus confusus	Shorthead sculpin	Threatened	Schedule 1
Rhinichthys umatilla	Umatilla dace	Special concern	Schedule 3
Acipenser transmontanus	White sturgeon	Special concern	Schedule 3
Oncorhynchus kisutch	Coho salmon (interior Fraser population)	Endangered	Schedule 1
Herptiles			
Ambystoma tigrinum	Tiger salamander (southern mountain population)	Endangered	Schedule 1
Ascaphus montanus	Rocky mountain tailed frog	Endangered	Schedule 1
Ascaphus truei	Coast tailed frog	Special concern	Schedule 1
Dicamptodon tenebrosus	Coastal giant salamander	Threatened	Schedule 1
Plethodon idahoensis	Coeur d'Alene salamander	Special concern	Schedule 1
Rana aurora	Red-legged frog	Special concern	Schedule 1
Rana pipiens	Northern leopard frog (southern mountain population)	Endangered	Schedule 1
Rana pretiosa	Oregon spotted frog	Endangered	Schedule 1
Spea intermontana	Great basin spadefoot	Threatened	Schedule 1
Bufo boreas	Western toad	Special concern	Schedule 1
Hypsiglena torquata	Night snake	Endangered	Schedule 1
Phrynosoma douglassii douglassii	Pygmy short-horned lizard	Extirpated	Schedule 1
Contia tenuis	Sharp-tailed snake	Endangered	Schedule 1
Pituophis catenifer deserticola	Great basin gophersnake	Threatened	Schedule 1
Crotalus oreganus	Western rattlesnake	Threatened	Schedule 1
Charina bottae	Rubber boa	Special concern	Schedule 1
Eumeces skiltonianus	Western skink	Special concern	Schedule 1
Coluber constrictor mormon	Western yellow-bellied racer	Special concern	Schedule 1

Species at Risk Act: Endangered, Threatened and Special Concern Species (March 2006)

Scientific Name	English Name	Risk Category	Schedule
Birds			
Accipiter gentilis laingi	Northern goshawk	Threatened	Schedule 1
Ardea herodias fannini	Great blue heron	Special concern	Schedule 3
Asio flammeus	Short-eared owl	Special concern	Schedule 3
Athene cunicularia	Burrowing owl	Endangered	Schedule 1
Brachyramphus marmoratus	Marbled murrelet	Threatened	Schedule 1
Coturnicops noveboracensis	Yellow rail	Special concern	Schedule 1
Falco peregrinus anatum	Peregrine falcon	Threatened	Schedule 1
Falco peregrinus pealei	Peregrine falcon	Special concern	Schedule 1
Icteria virens auricollis	Yellow-breasted chat (BC population)	Endangered	Schedule 1
Melanerpes lewis	Lewis's woodpecker	Special concern	Schedule 1
Numenius americanus	Long billed curlew	Special concern	Schedule 3
Oreoscoptes montanus	Sage thrasher	Endangered	Schedule 1
Otus flammeolus	Flammulated owl	Special concern	Schedule 1
Picoides albolarvatus	White-headed woodpecker	Endangered	Schedule 1
Strix occidentalis caurina	Spotted owl	Endangered	Schedule 1
Synthliboramphus antiquus	Ancient murrelet	Special concern	Schedule 3
Tyto alba	Barn owl	Special concern	Schedule 1
Eremophila alpestris strigata	Horned lark	Endangered	Schedule 1
Megascops kennicottii macfarlanei	Western screech-owl	Endangered	Schedule 1
Sphyrapicus thyroideus	Williamson's sapsucker	Endangered	Schedule 1
Puffinus creatopus	Pink-footed shearwater	Threatened	Schedule 1
Phoebastria albatrus	Short-tailed albatross	Threatened	Schedule 1
Megascops kennicottii kennicottii	Western screech-owl	Special concern	Schedule 1
Mammals			
Antrozous pallidus	Pallid bat	Threatened	Schedule 1
Aplodontia rufa	Mountain beaver	Special concern	Schedule 1
Bison bison athabascae	Wood bison	Threatened	Schedule 1
Euderma maculatum	Spotted bat	Special concern	Schedule 3
Gulo gulo	Wolverine (Western population)	Special concern	Schedule 3
Marmota vancouverensis	Vancouver Island marmot	Endangered	Schedule 1
Mustela erminea haidarum	Ermine	Threatened	Schedule 1
Rangifer tarandus caribou	Woodland caribou (Boreal population)	Threatened	Schedule 1
Rangifer tarandus caribou	Woodland caribou (Southern Mountain population)	Threatened	Schedule 1
Rangifer tarandus caribou	Woodland caribou (Northern Mountain population)	Special concern	Schedule 1
Reithrodontomys megalotis megalotis	Western harvest mouse	Special concern	Schedule 3
Scapanus townsendii	Townsend's mole	Endangered	Schedule 1
Sorex bendirii	Pacific water shrew	Threatened	Schedule 1
Sylvilagus nuttallii nuttallii	Nuttall's cottontail	Special concern	Schedule 3
Taxidea taxus jeffersonii	American badger	Endangered	Schedule 1
Ursus arctos	Grizzly bear (Northwestern population)	Special concern	Schedule 3
Enhydra lutris	Sea otter	Threatened	Schedule 1
Eumetopias jubatus	Steller sea lion	Special concern	Schedule 1

Schedule 1: official list of species either extirpated, endangered, threatened, or a special concern.
Schedule 2: assessment must be completed within 30 days after the minister's request.
Schedule 3: assessment must be completed within one year after the minister's request