The Summit-at-Snoqualmie MDP – Implementation, Operations, Restoration, and Monitoring Plan

October 28, 2005

Prepared for:
Ski Lifts, Inc.
The Summit-at-Snoqualmie Ski Area
P.O. Box 1068
Snoqualmie Pass, WA 98068

Prepared by:
SE GROUP
3245 146th PL SE
Bellevue WA 98007

SE GROUP

Table of Contents

1.0 INTRODUCTION....1
1.1 Project Area....1
1.2 Document Organization....2
1.2.1 Planning, Scheduling, and Permitting....2
1.2.2 Construction....2
1.2.3 Operations and Maintenance....2
1.2.4 Restoration....2
1.2.5 Monitoring....3
2.0 PLANNING, SCHEDULING, AND PERMITING....4
2.1 Annual Construction Plan....4
2.2 Planning and Permitting....4
2.3 Annual Monitoring Plan....6
2.4 Construction Implementation and Monitoring....6
2.5 Annual Monitoring Report....7
2.6 Phasing....7
3.0 CONSTRUCTION....9
3.1 General Construction Procedures....9
3.2 Roads and Parking Lots....12
3.2.1 Road Construction....12
3.2.2 Parking Lot Construction and Expansion....16
3.2.3 Parking lot and Road Paving....17
3.3 Ski Trails....18
3.3.1 Full Clearing with Grading....19
3.3.2 Full Clearing with No Grading....21
3.3.3 Glading....22
3.3.4 Blasting....24
3.4 Facilities....25
3.5 Utilities....27
3.5.1 Standard Utility Construction....27
3.5.2 Wastewater Utility Construction....28
3.6 Stream Crossings....29
3.6.1 Bridges....29
3.6.2 Culverts....31
3.6.3 Ski Trail Crossings....32
4.0 OPERATIONS AND MAINTENANCE....34
4.1 Roads and Parking Lots....34
4.1.1 Road Use....34
4.1.2 Road Inspection and Reporting....35
4.1.3 Road Maintenance....35
4.1.4 Roadside Vegetation Maintenance....37
4.1.5 Snow Management....38
4.1.6 Parking Lot Maintenance....40
4.2 Ski trails....40
4.2.1 Ski Trail Maintenance....40
4.2.2 Tree Island Maintenance....41
4.3 Facilities....42
4.4 Stream Crossings....43
4.4.1 Bridges....43
4.4.2 Culverts....43
4.4.2 Fords....44
5.0 RESTORATION....45
5.1 Restoration Projects....45
5.2 Slope Stabilization....49

5.3 Road Deactivation 50
5.4 Revegetation 53
5.4.1 General Revegetation Guidelines 53
5.4.2 Tree Island Revegetation 54
5.4.3 Revegetation of Decommissioned Facilities 56
5.5 Stream and Wetland Restoration 58
5.5.1 Wetland Restoration 58
5.5.2 Stream Restoration 59
5.5.3 Culvert Removal 60
6.0 MONITORING 61
6.1 General Monitoring Framework 61
6.2 Annual Monitoring Plan 62
6.3 Site Scale Monitoring 63
6.3.1 Purpose and Goals 63
6.3.2 Site Scale Monitoring Process 63
6.3.3 Construction Monitoring 63
6.3.4 Restoration Monitoring 66
6.4 Annual Monitoring Report 70
7.0 GLOSSARY 71
8.0 REFERENCES 72

1.0 INTRODUCTION

The Summit-at-Snoqualmie Master Development Plan Implementation, Operation, Restoration, and Monitoring Plan (hereafter referred to as the MDP Implementation Plan) combines elements typically found in a vegetation management plan, road management plan, monitoring framework plan, and watershed restoration plan. The overall objective of this plan is to simplify the implementation of the Proposed MDP for The Summit-at-Snoqualmie and the U.S. Forest Service (USFS). Prior to the development of this plan, The Summit-at-Snoqualmie would have had to consult several, different managements plans to implement the Proposed MDP. This MDP simplifies the implementation of the Proposed MDP by providing one document that provides all necessary information in an organized and sequential order.

The guidelines contained in this plan have been developed to ensure that the Proposed MDP is implemented in a manner consistent with Standards and Guidelines contained in the Mount Baker-Snoqualmie National Forest (MBSNF) Land and Resource Management Plan (USDA 1990a), and the Okanogan-Wenatchee National Forest (OWNF) Land and Resource Management Plan (USDA 1990b), as amended by the *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (USDA USDI, 1994). In addition, the Standards and Guidelines contained the Snoqualmie Pass Adaptive Management Area Plan (USDA 1997) and the Alpine Lakes Adaptive Management Area Plan (USDA 1981) have been considered. Additional information on the forest management plans can be found in the FEIS, in Section 1.2 – Management Direction and Consistency with USFS Policy.

1.1 PROJECT AREA

The Summit-at-Snoqualmie is situated in the Cascade Mountain Range of western Washington, approximately 46 miles east of Seattle and is accessed via Interstate 90 (see Figure 1, Vicinity Map). The Summit-at-Snoqualmie is located on private land and National Forest System Lands (NFSL) within the Snoqualmie Ranger District of the MBSNF and the Cle Elum Ranger District of the OWNF.

The Summit-at-Snoqualmie currently operates under a USFS Special Use Permit (SUP), administered by the MBSNF, encompassing approximately 1,834 acres of NFSL. The Summit-at-Snoqualmie also operates on private lands within both King and Kittitas Counties. This MDP Implementation Plan applies to all NSFL operated by The Summit-at-Snoqualmie under the existing SUP. The MDP Implementation Plan does not apply to private land even though some of the laws and regulations referenced within it do because projects proposed on private land are not within the scope of the USFS decision on the MDP.

1.2 DOCUMENT ORGANIZATION

This MDP Implementation Plan is organized into five chapters, which are summarized below.

1.2.1 Planning, Scheduling, and Permitting

The Planning, Scheduling, and Permitting chapter of this document is intended to document the sequence of events that will guide the USFS and The Summit-at-Snoqualmie through the implementation of the Proposed MDP. Included in this chapter is guidance for the development of the Annual Construction Plan (ACP), Annual Monitoring Plan and an outline of the phasing process.

1.2.2 Construction

The Construction chapter of this document is intended to provide guidelines for the construction of projects on NFSL identified in the Proposed MDP. Each proposed project in the Proposed MDP is grouped under one of the following construction components;

- Roads and Parking Lots
- Ski Trails
- Facilities
- Utilities
- Stream Crossings

Implementation of a particular construction component may also rely on other components, and therefore, more than one component may apply to a single construction project. For example, the construction of a new building will fall under the main component of facilities, but utilities and possibly roads will need to be constructed to service the building. Each construction component has been assigned a standardized vegetation clearing prescription, either described as maximum clearing limits for roads, facilities, and utilities, or as clearing prescriptions for ski trails.

1.2.3 Operations and Maintenance

The Operations and Maintenance chapter is focused towards providing guidance on the daily management of the portions of the ski area on NFSL. This takes into account seasonal maintenance of ski trails, roads, facilities, and stream crossings. Additionally, new operational procedures included as part of the Proposed MDP are discussed separately within the chapter, (i.e., magnesium chloride applications).

1.2.4 Restoration

This MDP Implementation Plan identifies the restoration components that will be implemented on NFSL under the Proposed MDP (see Table 5-1 – Restoration). The restoration projects are proposed as part of the MDP in order to restore disturbed areas and maintain or improve the

health of the aquatic and riparian ecosystems within the South Fork Snoqualmie River and Upper Yakima River watersheds. The restoration chapter is divided into slope stabilization, road deactivation, revegetation, and stream and wetland restoration sections. A list of restoration projects proposed under the MDP can be found in Table 5-1.

1.2.5 Monitoring

The monitoring chapter of this document is intended to provide a framework for monitoring impacts associated with the implementation of the Proposed MDP. An Annual Monitoring Plan will be developed in conjunction with the ACP. The Annual Monitoring Plan will contain contingencies for the development of future construction plans based on fulfillment of monitoring goals and objectives for the previous year's construction plans. Future construction phases may be delayed until the USFS determines that all monitoring goals and objectives for the current year's monitoring plan have been completed.

Specifically, the framework plan will also include separate site scale monitoring approaches for construction, operation, and restoration monitoring. Site-scale monitoring requirements would be specified for individual projects in the Stormwater Pollution Prevention Plans (SWPPP) for each project. Specific types of projects may require special monitoring conditions to meet applicable permits from regulatory agencies (i.e., wetland construction and restoration). Accordingly, subsections for these activities have been developed in order to aid The Summit-at-Snoqualmie and the USFS in implementing the monitoring program so that these requirements are met. Specific site scale monitoring plans will be developed as specific project information is developed for the Annual Constructions Plans.

2.0 PLANNING, SCHEDULING, AND PERMITING

This chapter is intended to serve as a set of guidelines for the planning and permitting of each project on NSFL identified under the Proposed MDP. Planning and scheduling will include the development of an ACP. The ACP will be submitted to and approved by the USFS prior to construction. Permitting of Proposed MDP projects will occur on a project by project basis. The ACP will identify which permits are needed for each Proposed MDP project. Due to the stringent nature of regulatory permitting at the local, state, and federal levels, this document provides a summary of required materials and applications for each permit as well as a general timeframe for each permit. The timeframe is designed to identify when to gather the necessary permit information, when to submit the permit application, and how long it shall take before the permit is approved.

2.1 ANNUAL CONSTRUCTION PLAN

Each year, an ACP will be submitted to the USFS identifying which construction and restoration projects from the selected alternative are scheduled to be implemented in the subsequent year (see Table 2-2). The ACP will include as much project detail as available at the time of submittal, including anticipated construction windows and sequencing for each project. The ACP will be used by the USFS and involved regulatory agencies during the permitting process and will also serve as the basis for the detailed construction plans that will be developed during the planning and permitting process. Due to the length of time necessary for agency coordination and permit acquisition, the ACP will be submitted to the USFS 12 to 18 months before the construction activities are scheduled to begin.

2.2 PLANNING AND PERMITTING

Once the ACP is approved by the USFS, detailed design and construction plans will be developed for each MDP project. These individual plans will be reviewed and approved by the USFS prior to initiation of construction. A topographic base of each project site will be developed at an appropriate scale in order to create construction plans. In addition, sensitive areas (e.g., wetlands, streams, endangered plants, etc.) in the vicinity of each project site will be flagged in the field and surveyed, as necessary. In accordance with the Mitigation Measures, Management Requirements, and Other Management Provisions (see Chapter 2.0 of the FEIS, Table 2.4-2), impacts to sensitive areas from the selected alternative will be avoided and/or minimized to the greatest extent practicable during the planning and implementation phases. In addition, construction will be scheduled to minimize impacts to soil and watershed resources. Specifically, construction of facilities involving significant ground disturbance will take place during the dry season (generally summer and fall) to the greatest extent possible. Once detailed construction documents are developed for the projects proposed in the ACP, all necessary permits and approvals will be acquired from the regulatory agencies identified in Table 2-1. A

SWPPP contained in the Annual Monitoring Plan will be used to provide documentation for, and to obtain a National Pollution Discharge Elimination System (NPDES) permit for all of the projects in the ACP, as required. The SWPPP will include the development of project-specific Best Management Practices (BMPs). Project-specific Mitigation Measures, Management Requirements, and Other Management Provisions from FEIS Table 2.4-2 and permit conditions from all construction permits will be incorporated into construction documents and permit applications when judged necessary by the concerned agencies. Mitigation Measures, Management Requirements, and Other Management Provisions and other permit conditions that are identified by the regulatory agencies during the permit acquisition process will be incorporated into the Annual Monitoring Plan and the Individual Monitoring Plans for the applicable projects. Planning and Permitting will be conducted during a 6-12 month period prior to the construction season.

Table 2-1:
Summary of Permits, Approvals and Consultation

Agency	Action/Regulation	Description of Permit/Action
Federal:		
U.S. Army Corps of Engineers	Corps Permit under Section 404 of the Clean Water Act (U.S.C. 1344)	Authorization for discharge of dredged/fill material into wetlands and other waters of the U.S.
Environmental Protection Agency	Clean Air Act, as amended, 42 U.S.C.A. Section 7410-762 (PL 95-604, PL 95-95). Federal Water Pollution Control Act, as amended by the Clean Water Act (U.S.C. 1344). Safe Drinking Water Act, 452 U.S.C.A. Section 300F-300J-10 (PL 93-523)	Provide review and comments on the "federal action." Provide information and technical assistance in the environmental analysis.
U. S. Fish and Wildlife Service	Section 7 Consultation and Biological Opinion Corps Section 404 Permit Consultation	Protection of Threatened and Endangered Species (see Interagency Coordination – Section 1.6.2). Consultation under the Fish and Wildlife Act.
State:		
Washington Department of Ecology	Stormwater Permi	Control of stormwater discharges at construction sites.
Washington Department of Fish and Wildlife	Hydraulic Project Approval	Authorize development projects and in State waters (i.e., culverts).

Table 2-1:
Summary of Permits, Approvals and Consultation

Agency	Action/Regulation	Description of Permit/Action
Local:		
King and Kittitas County Code Compliance	Building Permit	Authorize construction of building
Snoqualmie Pass Utility District	Utility Connection Permits	Hookups to water and sewer for new facilities proposed under the MDP.

2.3 ANNUAL MONITORING PLAN

The Annual Monitoring Plan will include a summary of the projects in the ACP, a list of permit conditions and applicable Management Requirements and Mitigation Measures (see Table 2-2) to be applied in each project, a SWPPP for all of the projects in the plan (as required), and guidelines for the site scale and watershed scale monitoring to be performed in the subsequent construction year. The Annual Monitoring Plan will also combine the elements of the Individual Monitoring Plans for all of the projects to be implemented in the upcoming construction year so that monitoring efforts can be organized in an efficient manner. The Annual Monitoring Plan will be completed 3-6 months prior to construction season. The Annual Monitoring Plan will be approved by the USFS prior to construction activities.

2.4 CONSTRUCTION IMPLEMENTATION AND MONITORING

Once the necessary permits and approvals are obtained and the Annual Monitoring Plan has been reviewed and approved by the USFS, construction will begin in accordance with the approved construction documents, conditions outlined in agency permits, the Individual Monitoring Plans, and the Annual Monitoring Plan. Generalized construction techniques for the projects contained in the ACP are described in Table 3-1 Generalized Construction Guidelines. Detailed construction plans that outline site-specific engineering and construction techniques will be developed during the planning and permitting process.

Site scale monitoring specified in the Annual Monitoring Plan will ensure that permit conditions and the Individual Monitoring Plans are being followed properly for all projects during the construction year. Erosion control and water quality monitoring will be performed according to the Annual Monitoring Plan during the active construction phase and will be discontinued once the construction is complete and the sites have been declared stabilized by the USFS. Monitoring efforts for all construction and restoration projects will be tracked in a database to ensure that all monitoring requirements, permit conditions, and Mitigation Measures, Management Requirements, and Other Management Provisions are implemented in an organized and efficient fashion.

2.5 ANNUAL MONITORING REPORT

Subsequent to the construction season, the Annual Monitoring Report will contain a summary of the results of the previous year's monitoring efforts and make recommendations for additional restoration or stabilization for the ACP in following years. In addition, information from the Annual Monitoring Reports could be used by The Summit-at-Snoqualmie and/or the USFS to alter or supplement the current list of Mitigation Measures, Management Requirements, and Other Management Provisions. Due to the 12 to 18 month timeframe required for planning and permitting before each construction year, it is expected that the planning for future construction years will coincide with active construction from previous years. Recommendations from the monitoring report will be incorporated into ACP during the planning and permitting process. If the Annual Monitoring Report indicates that detrimental effects are evident at the site or watershed scale, the USFS may elect to withhold approval of subsequent construction phases until mitigation and monitoring indicate that the effects have been reduced to an acceptable level. The Annual Monitoring Report will be made available to the regulatory agencies for their review and subsequent action if appropriate.

2.6 PHASING

The Summit-at-Snoqualmie will implement the Proposed MDP over a ten-year period, beginning after the publication of the ROD. The projects proposed over this ten-year period are broken down into three phases. Phase 1 projects will occur in years one through three with Year one equal to the year the MDP is approved. Phase 2 will occur during years four through 7, and Phase 3 will occur during years eight through ten. The Summit-at-Snoqualmie will implement projects on an annual basis, based upon the schedule shown in Table 2-2.

Table 2-2:
Phasing of the Proposed MDP

Master Development Plan Projects	Phase of Implementation
Lifts and Associated Trails	
Surface Lift I (S)	1
Mill Creek (C-2)	1
Rampart (C-4)	1
Creek Run (C-4)	1
Sessel (C-4)	2
St. Bernard (C-2)	2
Internationale (C-4)	2
Wildside (C-4)	2
Dodge Ridge (C-4)	2
Julie's (C-4)	2

Table 2-2:
Phasing of the Proposed MDP

Master Development Plan Projects	Phase of Implementation
Surface Lift II (S)	2
Lil' Thunder (C-4)	2
Ski School (C-4)	2
Pulse Gondola	3
Easy Street (C-4)	3
Triple 60 (DC-4)	3
Holiday (C-4)	3
Northside (C-2)	3
Support Facilities	
East Mt. Top Restaurant	2
Silver Fir Lodge	2
Alpental Maintenance Shop	2
Central Lodge	3
T-Bird Lodge	3
Maintenance Shop West	3
Alpenhaus / Slide In Exp.	3
Guest Services Alpental	3
Alpental Mountain-Top Lodge	3
Parking Lots	
West Lot Expansion & Paving (SW Lot 1)	1
Silver Fir Lot Paving (SF Lot 1)	1
Alpental Lot Paving (Alp Lots 3, 4, 5, 6, 7)	2
Existing West Lot Paving (SW Lot 2)	3
Crossover Trails	
West-Central Crossover	1
Central-East Crossover	1
Restoration	
See Tables 5-1 and 5-2.	

3.0 CONSTRUCTION

This chapter contains construction guidelines for the implementation of the proposed Summit at Snoqualmie MDP on lands regulated by the USFS. For the purposes of this plan, each approved MPD project has been broken down into components. At this level, each Proposed MDP project shares similar components. Five different components of the MDP projects have been identified; Roads and Parking Lots, Ski Trails, Facilities, Utilities, and Stream Crossings. Stormwater design and management in parking lots on NFSL are components of the MDP projects, however, these guidelines are discussed separately in the *Conceptual Stormwater Management Plan for The Summit-at-Snoqualmie* (Golder Associates 2004, see Appendix G of the FEIS).

Implementation of construction projects each year will be dependant on completion and approval of the ACP, acquisition of all associated federal, state, and local permits, and the approval of the Annual Monitoring Report for the previous year's construction. Construction will follow all approved construction documents, permit conditions, and mitigation measures. Individual design and construction plans for each MDP project will be submitted and approved by the USFS prior to construction.

This chapter is broken down into the following sections:

- General Construction Guidelines
- Roads and Parking Lots
- Ski Trails
- Facilities
- Utilities
- Stream Crossings

For any Proposed MDP project, one or more of these component guidelines may be utilized in the construction of the project. The ACP will contain information on which components would be required for each project scheduled for construction.

3.1 GENERAL CONSTRUCTION PROCEDURES

Common to all construction projects are general construction guidelines. These are typically actions that will be taken prior to the construction of each project. Generalized construction guidelines common to all construction projects are presented in Table 3-1. The list presented in Table 3-1 is intended to provide an overview of BMPs that will be included and utilized during construction of Proposed MDP components. Specific BMPs will be listed and documented for each project during the permit and approval stages of project implementation.

Table 3-1:
General Construction Guidelines

Code	Guideline Description
GC1	The maximum clearing limits will be flagged in the field by a qualified environmental specialist according to construction plans. Generalized clearing limits are identified in Table 3-2 for each component.
GC2	All equipment and material staging areas will be flagged in the field and identified in construction documents. Erosion control measures (i.e., silt fencing, hay bales) will be placed around the perimeter of all staging areas prior to initiation of construction, in accordance with the SWPPP.
GC3	Sensitive areas (streams, wetlands, etc.) and sensitive species will be identified and flagged in the field by a qualified environmental specialist. Orange barrier fencing will be established around the area to keep out construction equipment and personnel.
GC4	Erosion control measures will be installed along the flagged construction limit boundaries where appropriate. All erosion control measures will be onsite prior to the initiation of construction activities. Erosion control measures will be implemented per the SWPPP to minimize sedimentation impacts to streams and wetlands. These measures may include, but are not limited hay bales, straw mulching, hyrodseeding, silt fencing, etc.
GC5	The applicable mitigation guidelines contained in Section 2.4 of The Summit-at-Snoqualmie FEIS shall be included in the construction documents and implemented with guidance from the USFS and a qualified environmental specialist.
GC6	Low ground pressure construction equipment and other low impact equipment (e.g., spider excavators, helicopters, etc.) shall be used for construction where practical to reduce soil and vegetation impacts subject to review and approval by the USFS.
GC7	No construction equipment shall operate outside of the flagged clearing limits.
GC8	No work shall occur within wetlands or streams unless otherwise specified in the FEIS, and permitted by the appropriate federal and state agencies (*e.g.*, WA Department of Ecology, US Army Corps of Engineers, etc.).
GC9	If any cultural remains are encountered during construction, work shall be suspended in that area until the MBSNF and/or OWNF archaeologist, the State Historic Preservation Officer, and potentially affected tribes can be consulted.
GC10	Noxious weeds shall be identified and controlled following the guidelines contained in the *EA for Noxious Weed Management on the MBSNF* (USFS 1999), the *Final EIS for Managing Competing and Unwanted Vegetation* (USFS 1988), and the mitigation guidelines contained in Section 2.4 of The Summit-at-Snoqualmie FEIS. Pertinent guidelines from these documents will be included in the construction documents.
GC11	Any and all soils exposed during construction activities will be stabilized in accordance with the SWPPP to minimize erosion. Stabilization methods can include hydroseeding, erosion control fabrics, or straw mulch.
GC12	After construction is completed, all soils exposed during construction will be revegetated. Revegetation will consist of hydroseeding or broadcast seeding all bare soil areas and installing plants as applicable and approved by the USFS.
GC13	Chipping, lopping, and scattering of excess slash will be implemented wherever practical. Pile burning will only be used where necessary. Any slash burning will be carried out under USFS guidelines permitting procedures, with appropriate fire control measures. The partial burial of LWD would occur where directed by the USFS to act

Table 3-1:
General Construction Guidelines

Code	Guideline Description
	as water bars.
GC14	Topsoil will be stockpiled in approved staging areas during construction for use in site stabilization and or restoration projects. If the salvaged topsoil is determined to be unproductive, additional topsoil inoculated with mychorrizal fungi will be added as specified in the project specific SWPPP and approved by the USFS.

Clearing limits are intended to represent the maximum width of disturbance to soils and vegetation as a result of construction activities. Maximum disturbances have been defined generally as corridors for purposes of GIS analysis for impacts. The corridor widths listed in Table 3-2 are measured as a distance from a specified point, i.e., a building's footprint or a road centerline. Corridors are typically measured from edge to edge with the midpoint representing a known centerline. For example, roads have a maximum corridor width of 34 feet or 17 feet on either side of the centerline.

Table 3-2:
Maximum Clearing Limits

Component	Maximum Corridor Width
Roads and Parking Lots	
Road Construction	34-foot corridor
Road Paving	Existing road prism
Parking Lot Construction	30-foot buffer from the lot edge
Ski Trail	
Lift Corridor	60-foot corridor
Ski Trail	Varies by type
Facilities	
Buildings	50-foot buffer from the footprint
Utilities	
Standard Utilities (Water Lines, Powerlines, Communications Lines, Propane Lines)	15-foot corridor
Wastewater Lines	50-foot corridor
Stream Crossings	
Bridge	50-foot buffer from the footprint
Culvert	50-foot buffer from the footprint

3.2 ROADS AND PARKING LOTS

Two types of road construction will occur under the Proposed MDP for The Summit-at-Snoqualmie. The construction of permanent roads to access proposed lift terminals and the paving of existing gravel roads would occur, as described under the Proposed MDP (see Figures 2 and 3, Locations of Proposed Road Construction and Deactivation for The Summit and Alpental, respectively). Permanent roads will be constructed and surfaced with native materials, which includes gravels and soil. Total road construction under the Proposed MDP is approximately 1,500 feet, resulting in a total disturbance area, including construction clearing limits, of approximately 1.2 acres. Approximately 2,500 feet of the existing Alpental Road in the vicinity of parking lots 4, 5, and 6 will be paved. No construction outside of the existing road prism of Alpental road will occur.

An existing parking lot at Silver Fir (Silver Fir Lot 1) is proposed for paving. Paving of existing parking lots will also occur at Alpental (Lots 3, 4, 5, 6, and 7) and Summit West (SW Lots 1 and 2). Total parking lot construction and expansion will result in 9.8 acres of new parking area. Paving of existing parking lots will occur on 20.1 acres. Figures 2 and 3, Locations of Proposed Road Construction and Deactivation display the locations of proposed road and parking lot construction and paving at The Summit-at-Snoqualmie.

3.2.1 Road Construction

Under the Proposed MDP, road construction would occur in the three locations depicted in Figure 2, Locations of Proposed Road Construction and Deactivation. As described in the Geology and Soils section of the FEIS (Section 4.2), road construction can cause soil erosion and sediment yield to water bodies, increased mass wasting, and changes in the drainage network. The construction sequencing and guidelines listed below are designed to reduce the potential for these impacts to occur. The construction guidelines are based on USFS and other relevant agency standards and requirements.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented prior to project initiation.
- The road centerline and edges will be marked in the field according to construction plans using flagging or stakes as appropriate.
- Construction will occur within approved construction windows during periods of dry weather in the summer months.
- General Construction Guidelines GC7, GC8, GC9, and GC10 will be implemented during construction.
- All construction will occur during summer months when potential sedimentation impacts to streams are low.

- General Construction Guidelines GC11, GC12, and GC13 will be implemented after road construction is complete.

Construction Guidelines

- All new roads will have a maximum clearing width of 34 feet during construction. The final road width will not exceed 16 feet.
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- If tree removal is necessary for the construction of a new road, all trees within the clearing limits that are outside of the road prism will be flush-cut to the ground and yarded to landing areas or left to lay outside the road prism as directed by USFS.
- Per guidance from the USFS, full bench and end haul construction techniques will be used where side cast material cannot be stabilized in place and has the potential to enter a stream.
- The road base and surface will be designed and constructed to support anticipated uses.
- The road base will be compacted with a pneumatic or vibrating roller to stabilize the roadbed and provide structural support to the road surface.
- The roads surface will be constructed with a crowned or out sloped shape so as to prevent standing water that makes the road surface vulnerable to rutting and deterioration of the road base. Table 3-3 provides guidelines for road slopes and crowns.

Table 3-3:
Considerations for Selection of a Road Tread Grading Method

Grading Method (%)	Best Places to Use	Areas of Concern
Outslope (4% to 7%)	• mountain slope benches • upper mountain “shallers” • gentler terrain • cutslopes do not intercept seepage • collapsing cutslopes frequently fill ditches • small and stable fillslope volume • lightest-use roads	• fillslopes in hollows upslope of streams • cutslopes that intercept seepage • native materials prone to rutting
Inslope (4% to 7%)	• steep mountain slopes • larger, less stable fillslope volume • landforms constrict road width and locally preclude ditches • cutslopes intercept minor seepage	• gentler terrain with road gradient less than approximately 3% • extended length without drainage relief

Table 3-3:
Considerations for Selection of a Road Tread Grading Method

Grading Method (%)	Best Places to Use	Areas of Concern
Crown (4% to 7%)	• most landscape positions • cutslopes intercept seepage • tight curves in road • frequently used roads	• elevation of crown above ditch <2 feet • more difficult to establish and maintain

The source of the information presented in the table is taken from Crystal Mountain Road Management Plan (Jones and Stokes 2003).

A native road surface will consist of granular aggregate that is inert, clean, tough, durable particles of crushed rock, gravel, sand and fines capable of withstanding the deleterious effects of exposure to water, freeze-thaw, handling, spreading and compacting.

- The road surface will be compacted with a pneumatic or vibrating roller to seal the surface and retain fines.

Hazard trees along the new road shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the Context of Hazard Tree Management* (USFS 1992).

- In addition to road construction, drainage structures (e.g., drainage ditches, water bars, and cross-drain culverts) will also be constructed to maintain and protect the road prism and reduce erosion impacts. Rainfall, slope gradient, and road gradient affect placement of drainage structures. Additional information on the proper design and spacing of cross-drain culverts can be found in the Washington Forest Practices code for road construction and maintenance (WAC 222-24-025). The following procedures apply specifically to the construction of drainage ditches, water bars, and cross-drain culverts.

Water Bars

- Locate and install water bars upslope of stream crossings to minimize ditch water and sediment impacts to streams and wetlands. Cut trees could be used as water bars by partially burying them in the soil at regular intervals. Specific details for installation of trees as water bars would be developed based on recommendations provided by the USFS in the final construction plans.
- A sufficient number of water bars would be installed to prevent ditch scour, over flowing drainage structure capacity, or erosion at the drainage structure outlets.
- Construct road surface water bars at frequent intervals to be approved by the USFS. Surface water bars do not necessarily intercept the ditch, but are designed to divert road surface water on steep gradient roads and/or roads that are subject to high runoff. The frequency of water bars depends on several factors including; road grade, surface

material, elevation and expected rainfall, opportunity created by the road configuration, local experience.

- Water bar gradients should be steep enough to provide for a self-cleaning drainage with minimum maintenance. Outflows should be located on stable ground.
- Typically, water bars should be skewed at least 30 degrees from perpendicular to the road centerline on roads in excess of 3 percent grade. On roads less than 3 percent grade, or at the bottom of vertical curves, water bars can be perpendicular to the road centerline (WDNR 2004).
- Use rock or other energy dissipation methods to armor the water bar at potential scour points such as outlets and trench bottoms.
- Water bars should remain drivable and durable to provide access for road maintenance and land management.
- Drivable dips are especially suitable for dry sites and for native surface roads. When in erodible soils, the drivable dips should be armored with rock and where feasible grass seeding of outflow near typed waters and wetlands is encouraged. Drain dips should be designed so that they will not drain into typed waters or wetlands.

Drainage Ditches

- Ditch locations will be flagged in the field by a qualified environmental specialist according to maps and detailed construction documents.
- All drainage ditches will be constructed adjacent to the road and not exceed the maximum clearing width.
- Sediment catchment basins will be installed in drainage ditches at regular intervals to trap sediments and reduce impacts to streams and wetlands during storm events.
- Energy dissipaters will be installed in ditches on steep slopes, or where a water bar outfalls onto fill or other erodible material. Energy dissipaters include rock check dams, rock aprons, flumes, and down spouts.
- Drainage ditches will be hydroseeded with grass species to minimize erosion in the ditch and provide a natural filtration capability.

Cross-drain Culverts

- A sufficient number of cross-drain culverts will be installed to prevent ditch scour, over flowing drainage structure capacity, or erosion at the drainage structure outlets.
- Culvert locations will be flagged in the field by a qualified environmental specialist according to detailed construction documents.
- Culvert spacing will be implemented according to plans approved by the USFS. Table 3-4 lists example spacing requirements from the Washington Department of Natural Resources Forest Practices Board Manual (WDNR 2004).

Table 3-4:
Example Cross-drain Culvert Spacing Requirements

Road Grade	Western Washington		Eastern Washington	
	Maximum (feet)	Minimum (feet)	Maximum (feet)	Minimum (feet)
0-2%	1,000	500	1,000	500
3-6%	800	300	800	350
7-12%	700	200	600	250
>12 %	600	100	500	200

- Culvert inlets and outlets will be armored with appropriately sized rock to minimize erosion impacts.
- Sediments traps will be installed according to the SWPPP which would be reviewed and approved by the USFS prior to construction of the project.
- Backfill material will be compacted to provide stability and support to surface above the road.
- Culvert location will be clearly identified with signs (Carsonite posts or reflectors) to ensure each culvert can be located during annual inspections and to reduce the risk of damage during operations and maintenance activities.
- Proposed culvert crossings shall be sized for a 100-year flood event with consideration for the passage of debris likely to be encountered.
- Unimproved stream crossings (fords) should be rock armored, replaced with a culvert or bridge, or abandoned to prevent damage to streambed and banks.

3.2.2 Parking Lot Construction and Expansion

Under the Proposed MDP, parking lot construction would occur in two locations on private land and parking lot expansion would occur at Summit West in SW lot 1 (see Figure 4, Locations of Proposed Chairlift, Ski Trail and Facility Construction). Parking lot construction and expansion can cause soil erosion and sediment yield to water bodies, increased surface water runoff, and contribute pollution to waterbodies. The construction sequencing and guidelines listed below are designed to reduce the potential for these impacts to occur. The construction guidelines are based on USFS and other relevant agency standards and requirements.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented during initialization of project construction.
- The parking lot edges will be marked in the field according to construction plans using flagging or stakes as appropriate.

- Construction will occur within approved construction windows during periods of dry weather in the summer months.
- General Construction Guidelines GC7, GC8, GC9, and GC10 will be implemented during construction.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after road construction is complete.

Construction Guidelines

- The *Conceptual Stormwater Management Plan for The Summit-at-Snoqualmie* (Golder Associates 2004) will be incorporated into the final design of the parking lots on NFSL. Incorporation of stormwater management into the parking lot design will reduce the amount of sediment and petrochemicals leaving the parking lot and delay the peak water runoff during storm events.
- The maximum clearing width will be established by the footprint of the proposed parking lot plus the 30-foot construction buffer. All necessary stormwater drainage structures, equipment and material staging, and fill placement shall occur within the construction buffer.
- The parking lot base and surface will be constructed to support anticipated uses.
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- Inlet protection will be established around all catch basins to prevent untreated stormwater from entering waterbodies.
- All surplus asphalt and concrete left over from the construction shall be removed from National Forest land and disposed of at an approved facility.
- Paved areas adjacent to the project site shall be swept as needed to remove excess mud, dirt, or rock that is tracked from the project site.
- All bare soil areas within the project site shall be stabilized with seed mix and covered with weed free straw if there is no activity in that area for more than 15 days.
- A spill kit will be on the project site in a visible location to contain and clean up any petroleum or chemical spills that may occur during construction. The contents of the spill kit and response protocol will be included in the SWPPP for the project.
- Hazard trees around the perimeter of the new parking lot shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992).

3.2.3 Parking lot and Road Paving

Under the Proposed MDP, parking lots at Alpental (Lots 3, 4, 5, 6, and 7), Summit West (Lots 1 and 2, and Silver Fir (Lot 1) would be paved. In addition, Alpental road would be paved from the

bridge over the South Fork Snoqualmie River near Alpental parking lot 3 to the northern end of the road in Alpental parking lot 6. Due to the proximity of these projects to waterbodies, the following construction sequencing and guidelines have been developed.

Construction Sequencing

- General construction guidelines GC2, GC3, GC4, and GC5 will be implemented prior to construction initiation.
- Stormwater management facilities proposed in the Stormwater Management Plan will be implemented in conjunction with the project's road paving.
- Paving operations will occur within approved work windows for protection of resident fish species.
- General Construction Guidelines GC8, GC9, and GC10 will be implemented during construction.
- General Construction Guideline GC11 and GC12 will be implemented after construction.

Construction Guidelines

- The *Conceptual Stormwater Management Plan for The Summit-at-Snoqualmie* (Golder Associates 2004) will be incorporated into the final design of the parking lots and roads to be paved on NFSL. Incorporation of stormwater management into the parking lot and road design will reduce the amount of sediment and petrochemicals leaving these areas and delay the peak water runoff during storm events.
- All paving operations would occur within the existing parking lot area and road prism. No additional widening or ground disturbance would occur.
- Appropriate erosion control measures would be implemented according to the SWPPP for the project.
- Inlet protection will be established around all catch basins to prevent untreated stormwater from entering waterbodies.
- All surplus asphalt and concrete left over from the construction shall be removed from National Forest land and disposed of at an approved facility.
- Paved areas adjacent to the project site shall be swept as needed to remove excess mud, dirt, or rock that is tracked from the project site.
- All bare soil areas within the project site shall be stabilized with seed mix and covered with weed free straw if there is no activity in that area for more than 15 days.
- A spill kit will be on the project site in a visible location to contain and clean up any petroleum or chemical spills that may occur during construction. The contents of the spill kit and response protocol will be included in the SWPPP for the project.

3.3 SKI TRAILS

New trails will be constructed within The Summit-at-Snoqualmie SUP area using four different construction prescriptions. These prescriptions include Full Clearing with Grading, Full Clearing

with No Grading, Glading, and Blasting. The areas where these four prescriptions will be implemented are displayed in Figures 4 and 5, Locations of Proposed Chairlift, Ski Trail and Facility Construction for The Summit and Alpental, respectively. The guidelines in this section for ski trail construction encompass the construction of new ski trails, egress routes, and lift corridors (collectively referred to here as trails) described under the Proposed MDP.

The objective of the guidelines in this section are to ensure that the construction of new trails, as described in the Proposed MDP, will be carried out in such a way as to minimize impacts to water quality, wildlife, threatened, endangered, and special status plants and animals, and Visual Quality Objectives (VQOs). As such, guidelines have been developed for sediment and erosion control during trail construction, avoidance of special status plants and animals, revegetation of newly constructed trails, and noxious weed control. Additionally, two types of trail edge treatments are proposed, Forest Edge Scalloping, and Forest Edge Feathering. These treatments are designed to reduce impacts to VQOs and are incorporated into each set of construction guidelines. The guidelines contained in this component are supplemental to the trail construction prescriptions contained in the Proposed MDP and the mitigation measures identified in Section 2.4 - Mitigation of the FEIS. Further, these guidelines shall be included in the construction documents.

3.3.1 Full Clearing with Grading

All trees, shrubs, and herbaceous vegetation will be removed within the flagged construction limits, stumps will be removed, and the surface will be graded and revegetated, where appropriate. Grading will occur at locations within the trail where structures are proposed (e.g., lift towers and terminals) where a smooth surface is necessary. All spoils from grading would be placed in designated staging areas or transported offsite to a disposal location approved by the USFS. Grading may include the use of explosives for the removal of bedrock or large boulders, or the use of heavy equipment (e.g., excavators, bulldozers, etc.) for earthmoving. The method of tree removal will be determined and approved by the USFS on a case-by-case basis and will include removal by lop and scatter, skidders (yarding over snow, where possible), and/or helicopter. Construction will occur according to the following guidelines.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented prior to project initiation.
- The trail location will be flagged in the field using GPS receivers and GIS generated coordinates, based on the GIS database created by the USFS and SE GROUP for The Summit-at-Snoqualmie DEIS and FEIS. The flagging locations will be approved by the USFS permit administrator prior to trail clearing. Upon review of the flagging of the trail, the USFS will determine if construction plans and design are required for the project.

- Construction will occur within approved construction windows for sensitive plant and animal species according to mitigation measures and permit conditions.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during construction.
- All construction will occur during summer months when potential sedimentation impacts to streams and wetlands are relatively low.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after trail construction is complete.

Construction Guidelines

- A qualified environmental specialist will flag all sensitive areas within and adjacent to new trails and assist The Summit-at-Snoqualmie and the USFS in field fitting the trail so as to avoid and minimize impacts to wetlands, streams, riparian areas, sensitive plant and animal species, and other sensitive areas. This may result in slight deviations from actual mapped locations. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.
- Areas to be graded within the marked trail will be flagged separately with a different color and labeled “Grading Area” to facilitate identification of permitted impacts to streams, wetlands, and other sensitive areas. Construction will be stopped if un-permitted sensitive area impacts are identified within the “Grading Areas” until the required permits are obtained or the trail alignment can be modified to avoid the un-permitted impact.
- Storage and stockpiling areas for grading spoils would be established at locations approved by the USFS.
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- Redundant erosion control measures (i.e., silt fencing, haybales, wattles, geotextile fabrics, etc.) will be placed on all downslope edges of the grading area to further the retention of sediment and reduce potential impacts to waterbodies downslope of the project area.
- Locate and install water bars in all new trails where grading is taking place. Water bars shall be located carefully to divert runoff to vegetated uplands and prevent sediment yield to waterbodies. Water bar spacing will be determined in the field by a qualified environmental specialist with approval from the USFS.
- Install water bars upslope of stream crossings and wetlands to minimize sediment impacts from erosion on ski trails. Cut trees would be partially buried as directed by the USFS for use as water bars.
- Trees shall be flush-cut to the ground and stumps left in place in all areas where grading is not prescribed. Skidding will occur over snow or other impact reducing techniques (i.e., helicopter, processor/forwarders or low pressure rubber tired vehicles) will be used

wherever possible to minimize ground disturbance. The methodology to be used will be approved by the USFS.

- Forest Edge Scalloping and Forest Edge Feathering treatments will be applied to the trail edge to reduce visual impacts and windthrow potential.
- Hazard trees along the new trail shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992). Hazard trees shall be felled in the forest and away from the ski trail, then lopped and scattered on the forest floor.

3.3.2 Full Clearing with No Grading

All trees and shrub/herbaceous vegetation will be removed within the construction limits. Trees will be cut flush to the ground and stumps will not be removed. The surface will not be graded. The method of tree removal will be determined on a case-by-case basis and will include removal by lop and scatter, skidders (yarding over snow), and/or helicopter. Construction will occur according to the following guidelines.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, and GC5 will be implemented prior to project initiation.
- The trail location will be flagged in the field using GPS receivers and GIS generated coordinates, based on the GIS database created by the USFS and SE GROUP for The Summit-at-Snoqualmie DEIS and FEIS. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.
- Construction will occur within approved construction windows for sensitive plant and animal species according to mitigation measures and permit conditions.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during construction.
- All construction will occur during summer months when potential sedimentation impacts to streams and wetlands are relatively low.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after trail construction is complete.

Construction Guidelines

- A qualified environmental specialist will flag all sensitive areas within and adjacent to new trails and assist The Summit-at-Snoqualmie and the USFS in field fitting the trail so as to avoid and minimize impacts to wetlands, streams, Riparian Buffers, sensitive plant and animal species, and other sensitive areas. This may result in slight deviations from

actual mapped locations. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.

- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- Redundant erosion control measures (i.e., silt fencing, haybales, wattles, geotextile fabrics, etc) will be placed on all downslope edges of the grading area to further the retention of sediment and reduce potential impacts to waterbodies downslope of the project area.
- Locate and install water bars only where needed to protect sensitive areas and where installation of water bars will not create more disturbance that was originally proposed. Water bars shall be located carefully to divert runoff to vegetated uplands and prevent sediment yield to waterbodies. Water bar spacing will be determined in the field by a qualified environmental specialist with approval from the USFS.
- Install water bars upslope of stream crossings and wetlands to minimize sediment impacts from erosion on ski trails.
- Trees shall be flush-cut to the ground and stumps left in place in all areas. Skidding will occur over snow or other impact reducing techniques (i.e., helicopter, processor/forwarders or low pressure rubber tired vehicles) will be used wherever possible to minimize ground disturbance. The methodology to be used will be approved by the USFS.
- Forest Edge Scalloping and Forest Edge Feathering treatments will be applied to the trail edge to reduce visual impacts and windthrow potential.
- Hazard trees along the new trail shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992). Hazard trees shall be felled in the forest and away from the ski trail, then lopped and scattered on the forest floor.

3.3.3 Glading

Glading will involve the selective removal of trees within the ski trail boundary to connect natural openings. In areas where existing tree canopy closure is greater than 70 percent, clearing will not reduce the resulting canopy cover to less than 70 percent. Where existing canopy cover is less than 70 percent (prior to clearing), no canopy clearing will occur. Trees will be cut flush to the ground and stumps will not be removed. The ground surface will not be graded and the natural ground cover will be maintained. Tree removal in sparsely vegetated areas (e.g., subalpine parkland) will be left in place and lopped and scattered. In densely vegetated stands, skidders or helicopters will be used for tree removal. Areas of soil disturbance would be restored

either with an excavator or by hand and seeded to minimize subsequent soil erosion. Construction will occur according to the following guidelines.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, and GC5 will be implemented prior to project initiation.
- The trail location will be flagged in the field using GPS receivers and GIS generated coordinates, based on the GIS database created by the USFS and SE GROUP for The Summit-at-Snoqualmie DEIS and FEIS. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.
- The selection of individual trees for harvest in gladed trails in Section 16 for construction of the Creek Run ski pod will require measurements of canopy cover to determine where overstory tree removal can occur. Consultation with the USFS will be required to obtain approval of trees selected for harvest before construction of gladed trails can begin.
- Construction will occur within approved construction windows for sensitive plant and animal species according to mitigation measures and permit conditions.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during construction.
- All construction will occur during summer months when potential sedimentation impacts to streams and wetlands are relatively low.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after trail construction is complete.

Construction Guidelines

- A qualified environmental specialist will flag all sensitive areas within and adjacent to new trails and assist The Summit-at-Snoqualmie and the USFS in field fitting the trail so as to avoid and minimize impacts to wetlands, streams, Riparian Buffers, sensitive plant and animal species, and other sensitive areas. This may result in slight deviations from actual mapped locations. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.
- Tree canopy measurements will be performed by a qualified environmental specialist in Section 16 during trail layout to determine which areas have more than 70 percent canopy cover and can receive the glading prescription. The qualified environmental specialist will also determine which understory trees and shrubs can be harvested in areas where canopy cover is less than 70 percent without affecting the overstory canopy cover.
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- No water bars will be needed for this construction prescription unless specifically requested by the USFS to protect sensitive areas.

- Trees shall be flush-cut to the ground and stumps left in place in all areas. Skidding will occur over snow or other impact reducing techniques (i.e., helicopter, processor/forwarders or low pressure rubber tired vehicles) will be used wherever possible to minimize ground disturbance. Selection of tree skidding techniques will be based on which technique would avoid and minimize damage to standing trees and soil productivity to the greatest practical extent and approved by the USFS.
- Hazard trees along the new trail shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992). Hazard trees shall be felled in the forest and away from the ski trail, then lopped and scattered on the forest floor.

3.3.4 Blasting

Blasting would involve the use of explosives to remove or fragment bedrock, rock outcrops and/or large boulders from ski slopes. All vegetation and soil would be removed during this process. Resulting debris would be scattered onsite or hauled to an approved location. Blasting would only occur under the direct supervision and permission of USFS personnel.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, and GC5 will be implemented prior to project initiation.
- The blasting location will be flagged in the field with locations approved by the USFS permit administrator prior to construction.
- Construction will occur within approved construction windows for sensitive plant and animal species according to mitigation measures and permit conditions.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during construction.
- All construction will occur during summer months when potential sedimentation impacts to streams and wetlands are relatively low.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after construction is complete.

Construction Guidelines

- A qualified environmental specialist will flag all sensitive areas within and adjacent to the blasting area and assist The Summit-at-Snoqualmie and the USFS in field fitting the trail so as to avoid and minimize impacts to wetlands, streams, Riparian Buffers, sensitive plant and animal species, and other sensitive areas. This may result in slight deviations from actual mapped locations. The flagging locations will be approved by the USFS permit administrator prior to trail clearing.

- Areas where blasting will occur within the marked trail will be flagged separately with a different color and labeled “Blasting Area”.
- Construction will be stopped if un-permitted sensitive area impacts are identified within “Blasting Areas” until the required permits are obtained or the trail alignment can be modified to avoid the un-permitted impact.
- All blasting activities will occur during approved work windows. Blasting would only occur between the hours of 9:00AM and 6:00PM to reduce potential noise impacts to surrounding communities.
- Signs indicating blasting dates and times will be posted throughout The Summit-at-Snoqualmie SUP area, at trailheads, and within parking areas. Public notice of blasting activities will be mailed to local business and residents at least two weeks prior to activities.
- The use of explosives will occur in accordance with USFS and ATF guidelines and requirements.
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- Redundant erosion control measures (i.e., silt fencing, haybales, wattles, geotextile fabrics, etc) will be placed on all downslope edges of the blasting area.
- After completion of blasting activities, the blast area will be stabilized using appropriate erosion control measures as approved by the USFS.

3.4 FACILITIES

This component of the MDP Implementation Plan applies to proposed and modified facilities identified in the Proposed MDP for The Summit-at-Snoqualmie (see Figures 4 and 5, Locations of Proposed Chairlift, Ski Trail and Facility Construction). The construction component for facilities is intended to ensure that the construction of new facilities and modification of existing facilities, as described in Proposed MDP, will be carried out in such a way as to minimize impacts to water quality, wildlife, threatened, endangered, and special status plants and animals. The construction sequencing and guidelines for sediment and erosion control during and after construction, avoidance of special status plants and animals, revegetation and fertilization around newly constructed facilities, and noxious weed control are designed to reduce the potential for these impacts to occur. These guidelines are supplemental to the construction and mitigation guidance contained in the Proposed MDP and the Mitigation Measures identified in Section 2.4 – Mitigation of the FEIS. The construction guidelines are based on USFS and other relevant agency standards and requirements and will be included in the construction documents.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented during initialization of project construction.

- The proposed facility footprint will be staked in the field by qualified surveyors according to approved construction plans, and the 50-foot disturbance limit (see Table 2.3.1-2 – Clearing Assumptions in Chapter 2 of the FEIS) will be marked around the building footprint.
- Construction will occur within approved construction windows during periods of dry weather in the summer months.
- General Construction Guidelines GC7, GC8, GC9, and GC10 will be implemented during construction.
- General Construction Guidelines GC11, GC12, and GC13 will be implemented after construction is complete.

Construction Guidelines

- Facility construction will proceed according to construction plans approved by the appropriate local agencies (e.g., King County Department of Development and Environmental Services).
- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- Inlet protection will be established around all catch basins to prevent untreated stormwater from entering waterbodies.
- As required, clearing and grading will occur according to the prescription described in Section 3.3.1 – Full Clearing with Grading.
- Any proposed landscaping around the facility will utilize native and desirable non-native shrubs approved by the USFS.
- All surplus asphalt and concrete left over from the construction shall be disposed of in an upland concrete disposal area approved by the USFS.
- Paved areas adjacent to the project site shall be swept as needed to remove excess mud, dirt, or rock that is tracked from the project site.
- All bare soil areas within the project site shall be stabilized with seed mix and covered with weed free straw if there is no activity in that area for more than 15 days.
- A spill kit will be on the project site in a visible location to contain and clean up any petroleum or chemical spills that may occur during construction. The contents of the spill kit and response protocol will be included in the SWPPP for the project.
- Hazard trees around the perimeter of the new facility shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992).

3.5 UTILITIES

Under the Proposed MDP, utility installation would occur throughout the SUP area in conjunctions with the construction of chairlifts and facilities as depicted in Figures 6 and 7, Proposed Utilities, Night Skiing and Roads – Alternative 2. As described in the Geology and Soils section of the FEIS (Section 4.2) and in the Watershed Resources Section (Section 4.3), utility installation can cause soil erosion, and sediment yield to water bodies, and changes to stream channel structure from trenching through channels. The construction sequencing and guidelines listed below are designed to reduce the potential for these impacts to occur. Utility construction had been divided into two categories based on their maximum clearing widths, Standard Utility Construction and Wastewater Utility Construction.

3.5.1 Standard Utility Construction

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4 GC5 and GC14 will be implemented prior to construction.
- Construction will occur within approved construction windows during periods of dry weather in the summer months.
- The utility centerline and the 15-foot wide disturbance corridor will be flagged and approved by the USFS prior to constriction initiation.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during standard utility construction.
- General Construction Guidelines GC11 and GC12 will be implemented after construction is completed.

Construction Sequencing

- Appropriate erosion control measures will be implemented according to the SWPPP for the project.
- The 15-foot wide disturbance corridor (total width) will be flagged in all locations and marked with orange barrier fence in areas near sensitive areas.
- If tree removal is necessary for the utility trenching, all trees will be flush-cut to the ground and stumps will be left in place.
- Utilities will be trenched or plowed into the ground to a depth of 1 to 2 feet. Certain utility lines may need to be insulated where this depth cannot be achieved due to shallow soils or bedrock.
- Utilities will be buried in existing roads whenever possible. If no existing roads are present, utilities will be installed in proposed roads, existing trails, or proposed trails.

- Utilities that are installed in existing or proposed roads and parking lots will need to be backfilled with suitable materials and compacted to the standards specified in the construction plans and approved by the USFS.
- For all proposed utility line corridors, ground surface conditions will be restored with salvaged topsoil and revegetated with native plant species. Utility corridors in roads and parking lots will not be revegetated.

3.5.2 Wastewater Utility Construction

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented prior to construction.
- Construction will occur within approved construction windows during periods of dry weather in the summer months.
- The utility centerline and the 50-foot wide disturbance corridor will be flagged and approved by the USFS prior to constriction initiation.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during standard utility construction.
- General Construction Guidelines GC11 and GC12 will be implemented after construction is completed.

Construction Sequencing

- Appropriate erosion control measures will be implemented according to the SWPPP for the project. This guideline does not apply to above-ground utilidor construction where no erodible materials are present (e.g., rock outcrops and talus slopes).
- The 50-foot wide disturbance corridor (total width) will be flagged in all locations and marked with orange barrier fence near sensitive areas. The fencing should be placed on the edge of the sensitive area to facilitate the exclusion of equipment during construction.
- If tree removal is necessary for the wastewater utility trenching, all trees will be flush-cut to the ground and stumps will be left in place.
- Wastewater utilities will be trenched or plowed into the ground to a depth of 1 to 2 feet. Certain utility lines may need to be insulated where this depth cannot be achieved due to shallow soils or bedrock.
- The wastewater utility trench will be graded to provide adequate slope and drainage to ensure proper function of the line. This guideline does not apply to above-ground utilidoor construction.
- In locations where rock outcrops and talus slopes prevent burial of the wastewater utilities, the specifications contained in the report entitled, *Mountain-Top Restaurant Utility Corridors Memo* in Appendix H of the FEIS.

- Wastewater utilities will be buried in existing roads whenever possible. If no existing roads are present, utilities will be installed in proposed roads, existing trails, or proposed trails. This guideline does not apply to above-ground utilidoor construction.
- Wastewater utilities that are installed in existing or proposed roads and parking lots will need to be backfilled with suitable materials and compacted to the standards required for that use. This guideline does not apply to above-ground utilidoor construction.
- For all proposed wastewater utility line corridors, ground surface conditions will be restored with salvaged topsoil and revegetated with native plant species. Utility corridors in roads and parking lots will not be revegetated. This guideline does not apply to above-ground utilidoor construction.

3.6 STREAM CROSSINGS

The design of stream crossings encompasses more than the design of structural components. Three types of stream crossing structures are included in The Summit-at-Snoqualmie Proposed MDP; culverts, bridges, and ski trails. Locations of proposed stream crossings can be seen in Figures 8 and 9, Hydrography Impacts – Alternative 2. Bridge or stream culvert design will consider the composition and interaction of all the components, as well as their relationship and impact to the users, road or trail, and stream. A bridge comprises the superstructure, substructure, connections, vertical and horizontal alignment controls, approach fills, and scour protection works. Similarly, a stream culvert comprises the culvert materials, compacted backfill, scour protection, and roadway. Ski trail crossings occur where proposed ski trails cross streams without the installation of any culverts or bridges. Physical crossing occur only during the winter ski season when snowpack accumulation prevents impacts to the stream channel. Section 3.6.3 – Ski Trail Crossings applies only to the construction of ski trails as they cross streams.

3.6.1 Bridges

Bridge design criteria must be consistent with the standards and guidelines of the Aquatic Conservation Strategy (ACS) (USDA and USDI 1994), and the requirements of the Memorandum of Understanding between the USFS and the Washington Department of Fish and Wildlife (WDFW) (WDFW and USDA Forest Service 2003). Bridges on fish-bearing streams often require considerable planning and design. The bridge must not create an upstream passage barrier to fish by going dry, adding a large vertical step to the stream profile, or generating high water velocities due to small size or steep gradient. Bridge design would be reviewed and approved by the USFS fish biologist and/or hydrologist, and the USFS engineer.

All bridge components (including rip-rap or scour protection) will be located outside of the ordinary high water mark (OHWM). The stream shall be historically stable, in a well-defined channel, with erosion-resistant banks, which are not subject to erosion or shifting in flood flows.

The following guidelines have been developed to assist The Summit-at-Snoqualmie in the construction of proposed bridges.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented during initialization of project construction.
- The bridge footprint will be staked in the field by qualified surveyors according to approved construction plans, and the 50-foot disturbance limit will be marked around the building footprint.
- Construction will occur within approved construction windows for sensitive fish species during periods of dry weather in the summer months.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during facility construction.
- General Construction Guidelines GC11 and GC12 will be implemented after construction is completed.

Construction Guidelines

- Erosion control measures will be installed according to the SWPPP for the project.
- Whenever possible, bridges will be constructed perpendicular to the stream centerline to minimize impacts to Riparian Buffers, stream banks, and the stream channel.
- Bridges shall be constructed with a single span to avoid placement of materials in the stream channel.
- Bridges shall be designed to pass water and debris from 100-year storm events with considerations for debris likely to be encountered. Bridges would be inspected annually and debris would be removed as necessary to maintain the bridge. Final bridge design would be reviewed and approved by the USFS hydrologist and/or engineer.
- The OHWM of the stream will be staked in the field by a qualified environmental specialist.
- Construction equipment will not be allowed to work below the OHWM to minimize impact to the stream channel.
- Water bars will be placed in the trail upslope of the bridge and divert surface water to a sediment trap.
- Silt fencing and straw bales will be placed waterward of the bridge abutments on both sides of the structure to minimize sedimentation impacts to the stream channel during and after construction.
- Areas clearing and grading will occur according to the guidelines outlined in Section 3.3.1 – Full Clearing with Grading as necessary.
- Abutments and rip-rap armoring shall be placed above the OHWM wherever possible.

3.6.2 Culverts

Properly designed, located and maintained culverts can help to minimize both the need for road and trail maintenance and the environmental impacts. Conversely, culverts that are undersized, poorly located or installed, or not well maintained may impound water or saturate soils, leading to catastrophic failure of the road.

Culvert design criteria must be consistent with the standards and guidelines of the ACS (USDA and USDI 1994), and the requirements of the Memorandum of Understanding between the USFS and the WDFW (WDFW and USDA Forest Service 2003).

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, GC5 and GC14 will be implemented during initialization of project construction.
- The culvert location will be staked in the field by qualified surveyors according to approved construction plans, and the 50-foot disturbance limit will be marked around the building footprint.
- Construction will occur within approved construction windows for sensitive fish species during periods of dry weather in the summer months.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during facility construction.
- General Construction Guidelines GC11 and GC12 will be implemented after construction is completed.

Construction Guidelines

- Erosion control measures will be installed according to the SWPPP for the project.
- Culverts should be designed to pass water from 100-year storm events with considerations for debris likely to be encountered. Culverts would be inspected annually for debris clogging and maintained as necessary (see Section 4.4 - Stream Crossings). Final culvert design would be reviewed and approved by the USFS hydrologist.
- The habitat upstream of proposed culverts would be assessed for fish presence. If fish are present above the proposed culvert location, culverts would need to be sized according to the Design of Road Culvert for Fish Passage Manual (WDFW 2003) method of 1.2 times the bankfull channel width plus 2 feet. If no fish habitat is present, culverts would be to the standards provided by the USFS engineer.
- Culverts will be a corrugated metal pipe or a box culvert, depending on the stream type and use of the culvert (i.e., road or trail).
- The OHWM of the stream will be staked in the field by a qualified environmental specialist.

- Whenever possible, culverts will be constructed in line to the stream centerline to maintain as natural as possible flow regimes.
- Culverts will be sized accordingly and provide enough width to accommodate the existing width of the stream measured between the OHWM on each bank.
- Construction equipment will not be allowed to work below the OHWM to minimize impact to the stream channel.
- Water bars will be placed in the trail upslope of the bridge and divert surface water to a sediment trap.
- Silt fencing and straw bales will be placed on both sides of the stream to minimize sedimentation impacts during construction.
- Area clearing and grading will occur according to the guidelines outlined in Section 3.3.1 – Full Clearing with Grading as necessary.
- Culvert inlets and outlets will be armored with appropriately sized rock to minimize erosion and seepage.
- Backfill material will be compacted to provide stability and support to surface above the road.
- Culvert location will be clearly identified with signs (Carsonite posts or reflectors) to ensure each culvert can be located during annual inspections and to reduce the risk of damage.

3.6.3 Ski Trail Crossings

All ski trail crossings will occur over intermittent or ephemeral stream channels. There will be no crossings of fish-bearing reaches under the projects proposed under Alternative 2. This prescription applies only to the construction of ski trails as they cross streams. The following BMPs have been developed to assist The Summit-at-Snoqualmie in the construction of proposed bridges.

Construction Sequencing

- General Construction Guidelines GC1, GC2, GC3, GC4, and GC5 will be implemented during initialization of project construction.
- The crossing location will be flagged in the field by a qualified environmental specialist.
- Construction will occur within approved construction windows for sensitive fish species, which are located downstream of The Summit-at-Snoqualmie permit area and could potentially be included in any Action Area during consultation, during periods of dry weather in the summer months.
- General Construction Guidelines GC6, GC7, GC8, GC9, and GC10 will be implemented during facility construction.
- General Construction Guidelines GC11 and GC12 will be implemented after construction is completed.

Construction Guidelines

- The crossings location will be flagged in the field by a qualified environmental specialist according to maps and GIS data. The upstream and downstream limits of the stream segment that is involved in the crossing will be clearly identified in the field.
- Erosion control measures will be installed according to the SWPPP for the project.
- Silt fencing and straw bales will be placed upslope of the crossing to minimize sedimentation impacts to the stream channel during and after construction.
- Whenever possible, ski trails will be constructed perpendicular to the stream centerline to minimize impacts to riparian areas, stream banks, and the stream channel.
- The OHWM of the stream will be staked in the field by a qualified environmental specialist and no construction equipment will be allowed to work below the OHWM to minimize impact to the stream channel.
- Water bars will be placed in the trail upslope of the stream and divert surface water to a sediment trap to reduce sediment impacts from trail construction.
- Areas of clearing and grading will occur according to the guidelines outlined in Section 3.3.1 – Full Clearing with Grading as necessary.

4.0 OPERATIONS AND MAINTENANCE

This chapter contains guidelines for the operation and maintenance of the portions of The Summit-at-Snoqualmie Ski Area on NFSL. The objective of this chapter is to minimize overall environmental impacts from the day to day operations and management of the ski area. For the purposes of this chapter, the guidelines are broken down into components based on the activities and facilities involved. For simplicity, the five components used for this chapter are identical to those identified in Chapter 3 of this document. The components are Roads and Parking Lots, Ski Trails, Facilities, Utilities, and Stream Crossings. For maintenance on any given project, one or more of these component guidelines may be utilized in combination.

4.1 ROADS AND PARKING LOTS

This section outlines specific maintenance activities and advises how these activities may be most effectively implemented at The Summit-at-Snoqualmie. The principal road operation activities at The Summit-at-Snoqualmie are; Road Use, Road Inspection and Reporting, Road Maintenance, Roadside Vegetation Maintenance, and Snow Management. Culvert and bridge maintenance are discussed later in Section 4.4 - Stream Crossings. The deactivation of roads is considered a restoration component and is therefore discussed in Section 5.1 - Road Deactivation.

4.1.1 Road Use

- An important part of road operations includes measures that are taken on active roads that reduce the risk of impacting public resources. These measures are useful in maintaining roads and reducing the amount of repairs necessary.
- Road use shall not exceed road design limitations.
- Minimize disturbance of road surfaces caused by tracked equipment through planning and operator education.
- Road surface erosion on unpaved roads is proportional to traffic use. Temporary closure or traffic limitations on roads will be used during periods of freeze/thaw or heavy rain to reduce road damage and road erosion.
- Gate or physically block roads, where necessary, to control unwanted access.
- Plan for environmental emergency response to chemical and petroleum spills. Machine operation and maintenance in the forest can result in water contamination.
- Dispose of used oil, hydraulic fluids, filters, and contaminated soils at designated hazardous waste sites or recycling centers.

4.1.2 Road Inspection and Reporting

- The Summit-at-Snoqualmie will designate a roads manager who is trained and responsible for road inspections and reporting. The roads manager may train and delegate road maintenance tasks to other Summit at Snoqualmie personnel in order to implement plan policies in a timely manner.
- The roads manager shall complete one documented road inspection per year on every permanent road. For example, roads that have been deactivated will require monitoring to assure treatment measures are effective. Further monitoring details are discussed in Section 6.0 - Monitoring.
- Inspections shall be performed soon after the end of spring snowmelt so that drainage structures may be inspected while they are conveying flows.
- Roads shall also be inspected after extreme storm events, where “extreme” events usually occur at intervals of three years or more. Storm-response inspections shall be done as soon as possible after extreme storm events, and shall normally note only major maintenance problems.
- Apart from official inspections by designated staff, all staff that travels on ski area roads shall be educated about road operations and encouraged to report any road maintenance problems they encounter.
- Inspection reports shall be in writing, using a standard form (see Appendix A). Any major problems shall be documented by photographs. Inspection reports will be submitted to the USFS Permit Administrator within two weeks of the inspection. Reports shall be kept on file by the roads manager, and shall be retained for at least ten years.
- Road repairs and maintenance work identified by the inspections shall be performed and documented by the USFS before the fall rains begin. Such work shall also be documented in writing, on the original inspection form or a follow-up sheet, to show that problems identified during inspection were remedied in a timely fashion. Photographs will be taken after repairs have been made as identified on inspection reports.

4.1.3 Road Maintenance

The road consists of the road tread, surface and subsurface materials (such as gravel or pavement), cutslopes, fillslopes, and ditches. Active roads shall be continually monitored and maintained to ensure public resource protection. Road maintenance can help to provide a smooth running surface, minimize wear on vehicles, protects the road surfacing material, and extend the life of the road. Road maintenance has been broken down into the following three subsections; General Road Maintenance, Road Surface Maintenance, and Drainage Network Maintenance.

General Road Maintenance

- Maintain roads, no wider than necessary, for safety and anticipated traffic uses.

- Schedule maintenance activities in phases and during low precipitation and flow periods to minimize sediment production.
- Reduce the need for return maintenance visits by taking permanent corrective action. Use creative and appropriate alternatives to correct reoccurring maintenance problems as identified by road inspection reports.
- Maintenance activities that expose soils will be revegetated with approved plant species to minimize potential sediment input to nearby streams and wetlands.
- Plan for emergency response to storm events: Use road patrols to correct immediate small problems and identify conditions needing repair by heavy equipment.
- Waste material from landslides (mass wasting events) or other sources shall be transferred to a stable location above the 100-year flood level to prevent entry into any typed waters or wetlands.

Road Surface Maintenance

- Roads shall be regraded at least once a year if it will be beneficial to increasing or maintaining road structural capability or will help protect the road subgrade from damage and improve the surface for user safety. Road graders are the most effective grading machines, but bulldozers are more practical on many of the winding access and maintenance roads at Summit at Snoqualmie.
- To protect the subgrade, roads shall be regraded before the surface either becomes severely washboarded or potholed, or begins to trap water in windrows or ruts, which can channel water along the road, scouring the surface and causing washouts at dips.
- Regrade roads as necessary to control surface runoff. Schedule the grading frequency to account for the number and type of vehicles traveling over roads, this will prevent excessive rutting and chuck holes which could damage the sub-grade and encourage fine sediment pumping to the surface.
- Avoid regrading roads when surface materials are excessively wet. When saturated, road surface material becomes rutted easily by traffic resulting in increase in fines and a potential water quality problem.
- Avoid regrading roads when surface materials are too dry. Material cannot be compacted resulting in the loss of fines as dust and segregation of large aggregates. Surface treatments (water or other products) may be required to control dust and to retain fine surface rock.
- Do not undercut the cut slope or the fill slope during grading operation.
- For in sloped roads, maintain ditch gradients that will prevent ditch erosion and move sediment inputs to a non-deliverable location.
- Suitable surface material shall be maintained on the road surface. Replace lost or worn surface rock as needed to prevent further road deterioration and sediment delivery.

- Remove berms from the outside edge of road except when necessary to protect sensitive slopes and fills and reduce sediment delivery.
- Add rock to roads that become soft and rutted in wet weather to build a surface that can be maintained.
- Leave established herbaceous vegetation on outside road edges and in ditches to help filter surface sediments.

Drainage Network Maintenance

- Maintain all cut and fill slopes at a stable angle no steeper than the existing slope.
- Remove overhanging material from cut slopes and fill slopes.
- Remove slides from the ditches and roadway.
- Clean ditches only as necessary to maintain and restore functionality.
- Do not undercut the cut slope when cleaning ditches.
- Match equipment used to clean ditches with the type of maintenance work required. Excessive excavation will cause additional erosion.
- Maintenance of cuts and fills shall be done in suitable weather and soil conditions to prevent erosion of soils that could deliver sediments to all waters.
- Maintain vegetated ditch line where functional to help control soil erosion. Retain grasses and other herbaceous vegetation in ditches to reduce water velocity, collect sediment, and eliminate woody plants and debris from ditches.
- Where significant ditch length delivers directly to the stream system and maintenance removes vegetation from ditches or disturbs soil, develop and maintain sediment traps between the disturbed segments and the nearest down slope stream crossing.
- Stabilize fill slopes over stream crossing culverts using herbaceous vegetation, riprap, slash filter windrows, or other appropriate measures.
- Clean out cross-drain culverts if they become clogged with debris.
- Regularly check sediment traps and clean as necessary. All sediment would be disposed of in an upland location with erosion control measures in place and approved by the USFS.

4.1.4 Roadside Vegetation Maintenance

- Hazard trees along the road shall be identified and felled under the guidance of the USFS and a qualified environmental specialist, and in accordance with the document entitled, *Long Range Planning for Developed Sites: the context of Hazard Tree Management* (USFS 1992).
- In areas that are not within a Riparian Buffer, evaluate removing the canopy over roads as needed to increase the drying benefits of air movement and sun exposure.

- Remove brush and trees from ditches and from the roadway to a width that allows proper maintenance functions including surface grading, trimming shallers, pulling ditches, and cleaning headwalls. Clear ditch lines of all debris generated during logging.
- Control roadside brush vegetation by hand brushing, mechanical brushing, or by establishing low-growing herbaceous ground covers.

4.1.5 Snow Management

Gravel and sand that are applied to road surfaces to provide winter traction and subsequently removed by traffic and plowing, have been principal sources of sediment delivered to streams in the SUP area. A variety of strategies can avoid or minimize the adverse impacts of sedimentation to fish habitat associated with snow management. They include the controlled application of deicing agents, which eliminates the need for gravel and sand application; snow storage and removal; and adaptive management driven by efforts to monitor the application and subsequent fate of sand and deicing chemicals.

While the goal of The Summit-at-Snoqualmie is to eliminate the use of road sand/gravel through the use of deicing agents, in the event that water quality monitoring reveals adverse impacts due to the application of such agents, road sanding may be a required alternative to the deicing agent. If the use of sand/gravel is deemed necessary and approved by the USFS, specifications should be developed to control the competence and particle size distribution of gravel and sand purchased and applied.

Application of Deicing Agents

The roads manager must document and justify various application rates and methods that address variables such as road surfacing, air temperatures, snow depths, and environmental concerns. These considerations will be specified in a winter traction control plan that will include monitoring provisions specific to deicing agent within The Summit-at-Snoqualmie SUP area. The following measures provide guidance for developing the winter traction control plan.

- A record-keeping procedure will be established to enable tracking of the location and amount of anti-icing agents that are applied. Required information includes:
    1. The date of application,
    2. The application locations, noting the road and milepost (if applicable) or the parking lot name;
    3. The deicing agent(s) used, rate of application, and ratio of deicing agent to sand (if any sand is applied), and

4. The current weather and environmental conditions, including air temperature, precipitation type (rain or snow), timing of application with respect to storm events, and road conditions at the time of application.

- Where appropriate, identify and implement “no de-icer/ice-inhibitor” zones to reduce application in proximity to streams.
- Perform other management and monitoring activities to be identified in the winter traction control plan and defined through cooperative planning with MBSNF, OWNF, and Summit at Snoqualmie personnel.

Snow Storage and Removal

- The following procedures will be used to manage snow after deicing agents (or road sand/gravel if it is determined to be necessary) have been applied to road and parking lot surfaces:
- Prior to the winter season, delineate and clearly mark snow storage areas near parking lots that are consistent with the Stormwater Management Plan in Appendix G of the FEIS. Discuss the importance of plowing to these areas with personnel responsible for plowing.
- Store as much of the snow from Alpental Lots 5 and 6 in the snow storage basin described in the Stormwater Management Plan to take advantage of the snow melting and sediment retention properties of the facility. Maintain and monitor the snow storage basin between Alpental Lots 5 and 6 according to the requirements outlined in the Stormwater Management Plan.
- The Stormwater Management Plan contains a pilot program that involves a switch that would divert additional water into the snow storage basin to increase snowmelt. Experiment with the switch during different climatic conditional and keep records of when the switch is in-use and not in-use in sufficient detail to determine optimal performance conditions.
- When plowing parking lots, plow toward and pile snow in the storage areas. When plowing along roads, avoid piling the snow in ditches. Instead, move snow to a well-drained location on the road shoulder. Upslope locations are preferable to downslope ones.
- Where feasible, enlarge the catch basins at the inlets of ditch relief culverts. Use these sites for sediment retention and recovery of road sand/gravel if its use is determined to be necessary.
- Do not construct snow berms that can channel melt water along the road. Breach berms that develop incidentally. There shall be frequent gaps (every 100-200 yards depending on road gradient) allowing meltwater to flow off the road. On insloped roads, gaps shall be on the ditch side.

- Do not locate drainage gaps within 100 feet of a culvert or bridge.
- Plowing may be desirable on access roads to accelerate drainage, dry out roads, and enable summer maintenance activities.

4.1.6 Parking Lot Maintenance

- Clean out catch basins and replace the passive oil skimmers according to the maintenance protocols provided in the Stormwater Management Plan and materials provided by the manufacturer.
- Inspect bioswales and sediment ponds adjacent to parking lots once a year and clean out sediment once the depth exceeds one-fourth the elevation from the original pond bottom to the outfall. Sediment will be disposed of at a location approved by the USFS.
- Inspect and repair cut and fill slopes that have excessive erosion and repair catch basins and outfall structures that have been damaged.
- Inspect and repair paved parking lot surface if pot holes develop.

4.2 SKI TRAILS

This operational prescription applies to all existing and proposed ski trails, egress routes, and lift corridors (referred to collectively as trails) present within The Summit-at-Snoqualmie SUP area. Special precautions are to be taken in the vicinity of tree island revegetation areas and are discussed under a separate heading.

Manual and mechanical vegetation maintenance methods are recommended over the use of herbicides. Brushing shall occur before vegetation is too large (typically more than 2 inches diameter) for available equipment to cut efficiently. However, herbaceous and low shrub vegetation shall be encouraged slopes to reduce failures and provide erosion control.

4.2.1 Ski Trail Maintenance

The operational prescription for ski trails is intended to provide guidance for vegetation maintenance that is consistent with the Forest Plan, as Amended. This prescription contains guidelines for sediment and erosion control during trail maintenance, avoidance of special status plants and animals, and noxious weed control. The guidelines contained in this prescription are supplemental to the mitigation measures identified in Section 2.4 - Mitigation of The Summit-at-Snoqualmie FEIS.

- Vegetation maintenance will occur between the months of May and November, unless a hazardous situation develops that requires attention during the winter months.
- Vegetation maintenance in existing and proposed ski trails will occur according to the following rotation schedule:

1. Maintenance will occur every two to four years on Normal Trails. Normal trails are defined as formal ski terrain that has not been classified as Sensitive.
2. Maintenance will occur every 10 to 20 years in Sensitive Trails. Sensitive trails are those which contain steep slopes, wetland areas, or other sensitive features.

- Vegetation maintenance will be performed on Normal Trails with a low-ground pressure tractor or tracked vehicle that are equipped with a rotating flail mower.
- The cutting apparatus shall be set at an elevation of 6 to 12 inches above the ground surface for maintenance of Normal Trails.
- Vegetation maintenance will be performed by hand using chain saws and weed-whackers on Sensitive Trails.
- Maintenance equipment and vehicles will not be allowed in wetlands.
- No earthwork will occur within wetlands or streams unless otherwise specified in the FEIS, and permitted by the appropriate federal and state agencies (e.g., WA Department of Ecology, US Army Corps of Engineers, etc.).
- Only shrubs may be cut in wetlands, no trees or herbaceous vegetation may be cut. Shrubs shall be cut by hand at an elevation of 6 to 12 inches above the ground/water surface.
- Retain shrubs and low ground cover along Stream Banks in existing ski trails to the greatest extent possible.
- Noxious weeds will be identified and controlled in existing trails following the guidelines contained in the EA for Noxious Weed Management on the MBSNF (USFS 1999), the Final DEIS for Managing Competing and Unwanted Vegetation (USFS 1988), and the mitigation guidelines contained in Section 2.4 – Mitigation of The Summit-at-Snoqualmie FEIS.
- Appropriate BMPs will be implemented during trail maintenance with the guidance of a qualified environmental specialist and approval by the USFS.

4.2.2 Tree Island Maintenance

Tree island revegetation is proposed by The Summit-at-Snoqualmie as a restoration project. As such, details regarding tree islands are presented in Section 5.2 - Revegetation. Details regarding operational procedures in and around the proposed tree islands are discussed here. This section is intended to guide operations around and within the tree islands so as not to impact the revegetated area.

Proper maintenance around and within tree islands is important to the establishment and continued success of these areas. Maintenance will focus on the removal of non-native invasive species and management of shrubs and herbaceous species so they do not out-compete the trees. The following BMPs have been established to aid The Summit-at-Snoqualmie.

- All mechanical equipment and maintenance machinery (i.e., mowers, brushhogs, etc.) will be kept out of the fenced/flagged tree islands. No ground based maintenance equipment will be allowed until the trees are ten years old and/or have a minimum DBH of 5 inches.
- Undesirable shrubs and herbaceous vegetation (e.g., noxious weeds, skier safety concerns, etc.) will be controlled through manual removal, including the use of weed-whackers within the tree islands.
- Maintenance will occur at regular intervals according to normal ski trail maintenance.
- Tree islands areas will be watered on a periodic schedule during the first growing season to aid in plant establishment.
- Maintenance activities identified by regular inspections will be performed accordingly. These activities include, but are not limited to; manual removal of noxious weeds, replacement of dead plants, and installation of additional plants.

4.3 FACILITIES

The facility operations prescription applies to the new and modified facilities located in The Summit-at-Snoqualmie SUP area. A limit of work boundary shall be flagged in the field around the facility by a qualified environmental specialist with approval by the USFS permit administrator.

The intent of this prescription is to ensure that the maintenance of vegetation surrounding existing and proposed developed facilities will be carried out in such a way as to minimize impacts to water quality, wildlife, threatened, endangered, and special status plants and animals, and VQO's. This prescription contains guidelines for sediment and erosion control during vegetation maintenance, avoidance of special status plants and animals, re-vegetation of newly constructed trails, and noxious weed control. The guidelines contained in this prescription are supplemental to the mitigation guidance contained in the MDP and the mitigation measures identified in Section 2.4 - Mitigation of the FEIS.

- Vegetation maintenance will occur between the months of May and November, unless a hazardous situation develops that requires attention during the winter months.
- Vegetation shall be maintained at a height of 1-foot above the ground around the existing facility in a zone that extends from the perimeter of the facility to 20 feet away from the facility.
- Shrubs shall be maintained at a height of 2 feet above the ground around the existing facility in a zone that extends from 20 feet away from the facility to the existing forest or 30 feet from the facility, whichever is encountered first.
- A low-ground pressure tractor or tracked vehicle that is equipped with a rotating flail mower shall be used to maintain vegetation around the facility. If the facility is

inaccessible to tractors or tracked vehicles the vegetation maintenance shall be performed by hand.

- Noxious weeds will be identified and controlled in the vicinity of existing facilities following the guidelines contained in the *EA for Noxious Weed Management on the MBSNF* (USFS 1999), the *R6 Invasive Species ROD* (USDA 2005), and the mitigation guidelines contained in Section 2.4 – Mitigation of The Summit-at-Snoqualmie FEIS.
- Appropriate BMP's shall be implemented during vegetation maintenance with the guidance of a qualified environmental specialist and approval by the USFS.
- The applicable mitigation guidelines contained in Section 2.4 – Mitigation of The Summit-at-Snoqualmie FEIS will be implemented under USFS guidance.

4.4 STREAM CROSSINGS

There are three types of stream crossings present within The Summit-at-Snoqualmie SUP area. There are 87 identified culvert crossing for trails and roads, 3 bridges, and 14 ford crossings by roads. The following sections discuss operational maintenance activities for bridges, culverts, and fords in The Summit-at-Snoqualmie SUP area.

4.4.1 Bridges

- Annual bridge inspections shall focus on signs of erosion and damage or deterioration of bridge structural members (abutments, piers, ties, stringers, needle beams, curbs, rails, delineators, fender logs and running planks).
- Maintenance for erosion damage is similar to that for culverts.
- Structural members shall be repaired or replaced whenever they are found to be damaged or decayed.
- Bridge decks will be cleaned annually to remove gravel and debris accumulations that might be washed into streams.

4.4.2 Culverts

- All culverts within The Summit-at-Snoqualmie SUP area will be inspected on an annual basis during the summer. Inspections will focus on checking for observable damage, obstructed water flow through the culvert, headcutting and downcutting at culvert outlets, and debris blockages.
- Culverts should be inspected as soon as possible after extreme storm events, a three year 24-hour storm or 0.50 inch. If any culvert is identified as a concern all culverts within the ski area should be checked. Blockages should be cleared to minimize future failure.
- To maintain functional drainage, inspect and clean culverts routinely and immediately after any significant storm events.

- Install drainage structures up slope of stream crossings to minimize ditch water and entry of surface sediment into streams.
- Clean woody debris from culverts in recently cut or logged areas.
- Keep culvert inlets and outlets of clear of obstructions. Remove brush from around inlets and outlets to aid in visual inspection for problems and to reduce the risk of blockage.
- When replacing permanent stream crossings, size culverts according the *Design of Road Culverts for Fish Passage* (WDFW 2003) for a 100-year flood event with consideration for the passage of debris likely to be encountered. When future high waters are ignored, the potential for water quality damage is enormous.

4.4.2 Fords

- Unimproved stream crossings (fords) shall be rock armored to minimize erosion and sediment impacts to the stream channel.
- These crossings shall be replaced with a culvert or bridge, as deemed necessary by the USFS.

5.0 RESTORATION

A simple and useful definition of restoration was developed by the National Research Council. In its 1992 report, *Restoration of Aquatic Ecosystems*, the National Research Council defined restoration as the "return of an ecosystem to a close approximation of its condition prior to disturbance." Achieving this level of a 'restored ecosystem' can be accomplished through different activity types. These activity types include creation, enhancement, mitigation, revegetation, and road deactivation. The Summit-at-Snoqualmie has proposed restoration projects that include creation, enhancement, revegetation, and road deactivation activities as a means to achieve restoration.

This section of the MDP Implementation Plan discusses restoration projects by a general category. These general categories focus on different restoration activity types; slope stabilization, road deactivation, revegetation, and stream and wetland restoration.

5.1 RESTORATION PROJECTS

A listing and brief description of all restoration projects identified in the Proposed MDP, categorized by type, have been included in Table 5-1. These projects have been included in the analysis for the FEIS.

Table 5-1:
Restoration Projects Proposed by The Summit-at-Snoqualmie for All Action Alternatives

Project Name	7th Field Drainage	Type	Project Code	Description
Watershed Condition Assessment - H-2	Summit South	Slope Stabilization	SS1	Revegetate slopes adjacent to Road M-5 in order to address sediment source issues and stabilize slopes. Work will be performed in conjunction with the deactivation of Road M-5 and will help to increase soil stabilization in the Summit South drainage.
Watershed Condition Assessment - H-10	Lower Mill Creek	Slope Stabilization	SS2	Revegetate slopes adjacent to Roads TR-17, TR-17-1, TR-17-3 and TR-17-4 to address sediment source issues and stabilize slopes. Revegetation will help to increase soil stabilization in the Lower Mill Creek drainage.
Watershed Condition Assessment - K-6	Tunnel and Hyak	Slope Stabilization	SS3	Revegetate unused road perimeter to improve water quality in Tunnel Creek drainage. This is a heavily used site near the Silver Fir chairlift's lower terminal and parking lot – improving this condition will reduce sediment yield to Tunnel and Hyak Creeks.

Table 5-1:
Restoration Projects Proposed by The Summit-at-Snoqualmie for All Action Alternatives

Project Name	7th Field Drainage	Type	Project Code	Description
Watershed Condition Assessment - S-46	Beaver Creek	Slope Stabilization	SS4	Revegetate slopes adjacent to Road C near Beaver Lake Creek in order to address sediment source issues and stabilize slopes. Work will be performed in conjunction with the deactivation of Road C and will help to increase soil stabilization in the Beaver Creek drainage.
Watershed Condition Assessment - K-46	Ski Acres	Slope Stabilization	SS5	Correct water bars and revegetate to control runoff and address sediment source issues to avoid sediment delivery to nearby wetlands and streams. Stabilization will address water quality issues in the Ski Acres drainage.
Road M-5 Restoration	Creek Run	Road Deactivation	RD1	Removal of approximately 1,550 feet of road through deep ripping and soil improvements, removal of all drainage structures, and revegetation with native plant species.
Road C Restoration	Beaver	Road Deactivation	RD2	Removal of approximately 350 feet of road through deep ripping and soil improvements, removal of all drainage structures, and revegetation with native plant species.
Tree Island Revegetation	U. Yakima Watershed: Lower Mill Creek, Summit South, Ski Acres, Beaver. S.F. Snoqualmie Watershed: Northside, Summit North, Nacrinomical	Revegetation	TIR	Plant tree islands consisting of Pacific Silver Fir saplings at Summit West, Central and East.
Lift Terminal Revegetation	Lower Mill Creek, Ski Acres, Summit North,	Revegetation	LTR	Remove existing lift terminals, lift towers and lift structures and revegetate with shrub or herbaceous plant communities.

Table 5-1:
Restoration Projects Proposed by The Summit-at-Snoqualmie for All Action Alternatives

Project Name	7th Field Drainage	Type	Project Code	Description
Trail 71 Restoration	Creek Run	Revegetation	T71	The existing crossover trail would be abandoned and revegetated in conjunction with proposed development in the Creek Run Pod.
Wetland #207 Restoration	Beaver	Wetland Restoration	WR1	Restoration will be performed in conjunction with planting of tree islands at Summit West and grading within the proposed Little Thunder ski pod.
Wetland #142 Restoration	Ski Acres	Wetland Restoration	WR2	Restoration will be performed in conjunction with planting of tree islands at Summit Central.
Downcutting of creek immediately north of tubing area	Ski Acres	Stream Restoration	SR1	Downcutting channel through abandoned road located between the two tubing areas is contributing sediment to wetlands at base of tubing area. Stream through wetland at base of tubing area is also downcut. Installation of checkdams and/or raising channel bed, and improving culvert condition across road to tubing area will reduce downcutting and sediment delivery into wetland in Ski Acres drainage. Planting native vegetation in the riparian zone will improve buffer functions and further reduce downcutting in the long term.
Beaver Lake Creek Restoration	Beaver	Stream Restoration	SR2	Culverted segments would be removed and the riparian zone would be revegetated with Pacific Silver Fir saplings. A more natural stream channel would be constructed and engineered structures (logjams, boulders) would be placed to simulate natural stream conditions.

In addition to the projects listed in Table 5-1, The Summit-at-Snoqualmie would implement the following restoration projects (as identified in the Watershed Condition Assessment, Jones and Stokes 2001) if Alternatives 3, 4, or 5 is selected (Table 5-2). These projects are typically small and size and would not contribute to a large total acreage of restoration. Due to the small size of these projects they could easily be incorporated into other projects.

Table 5-2:
Restoration Projects[a] Required by the USFS for Alternatives 3, 4, and 5

Site Code	7th Field Drainage	Description of Problem Area	Phase of Implementation
A-3	Nacrinomical	Bare soils, minor rill development	2
A-4	Nacrinomical	Bare soils, minor rill development	2
A-5	International	Bare soils, minor rill development	2
A-6	International	Bare soils, minor rill development	3
A-9	Nacrinomical	Bare soils, minor rill development	2
A-15	Nacrinomical	Cutslope erosion, or unvegetated cutslope	2/3
S-1	Northside	Trail cutslopes, surfaces, or ditch erosion	3
S-2	Summit North	Small gullies on cleared ski slopes	
S-5	Beaver	Severe gullying	1/2
S-6	Beaver	Bare soils, minor rill development	1/2
S-8	Beaver	Small gullies on cleared ski slopes	1/2
S-9	Beaver	Small gullies on cleared ski slopes	1/2
S-12	Beaver	Small gullies on cleared ski slopes	1/2
S-15	Beaver	Bare soils, minor rill development	1/2
S-16	Beaver	Bare soils, minor rill development	1/2
S-30	Summit North	Cutslope erosion, or unvegetated cutslope	3
S-33	Northside	Cutslope erosion, or unvegetated cutslope	3
S-34	Northside	Cutslope erosion, or unvegetated cutslope	3
K-1	Tunnel	Trail cutslopes, surfaces, or ditch erosion	1
K-3	Hyak	Small gullies on cleared ski slopes	1
K-4	Hyak	Small gullies on cleared ski slopes	1
K-5	Hyak	Severe gullying	1
K-10	Hyak	Severe gullying	1
K-11	Hyak	Cutslope erosion, or unvegetated cutslope	1
K-12	Hyak	Small gullies on cleared ski slopes	1
K-13	Hyak	Trail cutslopes, surfaces, or ditch erosion	1
K-14	Hyak	Small gullies on cleared ski slopes	1
K-22	Hyak	Cutslope erosion, or unvegetated cutslope	1
K-23	Hyak	Small gullies on cleared ski slopes	1
K-32	Tunnel	Cutslope erosion, or unvegetated cutslope	1
K-42	Tunnel	Cutslope erosion, or unvegetated cutslope	1
K-44	Ski Acres	Cutslope erosion, or unvegetated cutslope	3

Table 5-2:
Restoration Projects[a] Required by the USFS for Alternatives 3, 4, and 5

Site Code	7th Field Drainage	Description of Problem Area	Phase of Implementation
H-3	Creek Run	Small gullies on cleared ski slopes	1
H-6	Summit South	Small gullies on cleared ski slopes	1
H-7	Summit South	Small gullies on cleared ski slopes	1
H-8	Summit South	Small gullies on cleared ski slopes	1
H-9	Summit South	Small gullies on cleared ski slopes	1
H-11	Summit South	Bare soils, minor rill development	1
H-13	Summit South	Bare soils, minor rill development	
H-17	Creek Run	Ditch erosion, or blocked ditch	1

[a] The site code and description of these restoration projects come from the South Fork Snoqualmie River and Coal Creek Watershed Condition Assessment (Jones and Stokes 2001).

5.2 SLOPE STABILIZATION

Slope stabilization is defined in the context of The Summit-at-Snoqualmie as revegetation measures taken to stabilize existing exposed soils that have resulted from ski area operations during its entire operational life. As such, slope stabilization occurs adjacent to active and deactivated roads, wetlands, streams, and ski trails. Additionally, some areas proposed for stabilization occur within existing ski trails. The location of proposed slope stabilization areas within The Summit-at-Snoqualmie SUP can be seen in Figures 10 and 11, Locations of Proposed Restoration Projects.

The general goals of slope stabilization are to;

- Stabilize unstable slopes,
- Minimize downslope erosion impacts, and
- Restore natural vegetation found within The Summit-at-Snoqualmie SUP where possible.

The following plants have been identified for use in slope stabilization. This listing represents only a partial listing of species native to The Summit-at-Snoqualmie SUP. Additional plant species may be selected according to project specific restoration plans.

Table 5-3:
Selected Plant Species for Slope Stabilization Restoration Projects

Trees	Shrubs	Herbaceous
Western Hemlock (*Tsuga heterophylla*)	Salmonberry (*Rubus specatbilis*)	Deer Fern (*Blechnum spicant*)
Pacific Silver Fir (*Abies amabilis*)	Huckleberry (*Vaccinium spp.*)	Bentgrasses (*Agrostis spp.*)
Mountain Hemlock (*Tsuga mertensiana*)	Vine Maple (*Acre circinatum*)	
Douglas Fir (*Pseudotsuga menziesii*)	Sitka Willow (*Salix sitchensis*)	
Western Red Cedar (*Thuja plicata*)		

Slope Stabilization Guidelines

- All identified slope stabilization project areas (see Table 5-1) will be flagged in the field by a qualified environmental specialist according to maps and GIS data.
- Erosion control measures will be placed around the flagged perimeter to reduce downslope sedimentation impacts. Erosion control measures will be implemented according to the SWPPP and include, but are not limited to, hay bales, silt fencing, and erosion control matting.
- Plant species selected for restoration (see Table 5-3) will be native to The Summit-at-Snoqualmie SUP, or approved non-native desirable species from the USFS Region 6 plant notebook (Potash and Aubry 1997). Complete listings of plant species selected for each slope stabilization project will be completed during individual project planning.
- Plants will be installed per a planting plan developed specifically for each restoration project. All plans will meet permit requirements and be approved by the regulatory agencies.
- Depending on specific restoration site locations, appropriate plantings will occur within existing or proposed ski trails. Trees and shrubs listed in Table 5-3 will not be planted in these areas as they are incompatible with safe ski terrain.
- Additional features such as water bars and geotextile fabrics may required in specific sites to provide additional soil stabilization.
- The stabilization area will be hydroseeded after plant installation.

5.3 ROAD DEACTIVATION

Road deactivation, also called decommissioning, rehabilitation, or obliteration, refers to activities intended to remove real or potential environmental impacts associated with a road that is no

longer needed (FPCBC 1998). If a road is no longer needed, either for normal operations or for extraordinary purposes such as fire control, then road deactivation provides a means of restricting unauthorized access to the area, reducing liability associated with road failure, and minimizing erosion risk.

The goal of road deactivation is to stabilize the roadway prism and to maintain or restore the natural drainage. Deactivation measures are intended to minimize erosion from the road cutslopes, fill slopes, road surfaces, and ditches while providing access as needed. Permanent deactivation includes where a road is being converted to a trail, i.e., the existing Summit East-Summit Central crossover trail (Trail 71). Locations of proposed road deactivation can be seen in Figure 2, Locations of Proposed Road Construction and Deactivation.

Road deactivation includes the following actions:

- Road stabilization
- Culvert or bridge removal
- Erosion control and revegetation
- Road blockage

Road Stabilization

Stabilize the road prism and clearing width.

- Pull back side cast on roads and landings that have the potential of failing and entering any typed waters or wetlands. The excavated material may be placed against the cut slope.
- When the road surface is not stable, the material shall be end hauled to a stable location.
- The objective for side cast retrieval is to reduce deliverability by decreasing the weight and volume of material to a point where there is little or no risk to public resources.

Culvert or Bridge Removal

The purpose of culvert or bridge removal is to restore natural drainage and ensure that culvert related failures do not occur. There may be alternatives to culvert removal provided that adequate protection to public resources can be demonstrated. Leaving culverts in shall be a rare exception – due to the inability to maintain the culvert once the road is deactivated. Specific details regarding culvert and bridge removal are discussed in Section 5.4 - Stream Crossings.

- Remove all stream-crossing structures (except in trail conversion projects) and, as needed, perform large woody debris or rip-rap placement and plantings to restore channel and bank stability.
- Replace existing cross-drain culverts with cross-ditches and permanent ditch blocks.

Reestablish Natural Drainage

- Restore or maintain the surface drainage patterns, and control subsurface drainage, consistent with natural drainage patterns.
- Avoid actual or potential water quality impacts by using appropriate BMPs provided in the project SWPPP.
- Provide safe fish passage and protect fish habitat at crossings or in riparian zones.
- If streams are crossed, in-water work will coincide with approved work windows.
- The natural streambed shall be reestablished as close to the original location as possible and in a fashion that matches the up and downstream width and gradient characteristics.
- Rip the road surface to reestablish permeability.

Erosion Control and Revegetation

- Outslope or inslope the road surface or construct water bars, as appropriate.
- Spread topsoil and hydroseed all exposed mineral soil surfaces with native species and conduct plantings as appropriate. Planting plans will be developed in individual road deactivation plans and will include site specific species.
- The removed fill material shall be placed in a suitable stable location above the 100-year flood level in a manner that will not allow sediments to erode into typed waters or wetlands.
- Revegetate all exposed erodible soils resulting from road deactivation to minimize potential sediment delivery. Revegetation shall occur at the appropriate times of the year to optimize growth.
- Erosion control can be accomplished using one or more of the following: biomatting, hay, hydro mulching, seeding, planting trees and native vegetation, and by using native tree boughs and plants, etc.
- Apply seed first when combining with other methods. Consider surface preparation before seeding and planting. Also consider wildlife forage enhancement opportunities when doing revegetation for erosion control.

Road Blockage

Block the road so that four-wheeled highway vehicles cannot pass the point of closure. The preferred alternative is to obliterate the intersection and restore the entrance to the road to the pre-road condition. Also consider using tank traps, rip-rap, root wads, logs or slash to block access. The method used must not create any safety hazard for the public.

- Proposed road obliteration sites will be evaluated for unstable areas prior to road closure. If landslides are determined to be an issue with road obliteration, the USFS will be contacted to determine an appropriate course of action.
- Install cross-ditches or other drainage systems where there are (1) steep grades, (2) ground water seepages, (3) switchbacks or road junctions, (4) ditches prone to plugging,

(5) places where ponding may occur, or (6) other conditions conducive to seasonal saturation of the road and substrate.

- Pull back sidecast fill onto the outsloped road grade so gradient does not exceed the existing hillslope gradient.
- Remove organic material that may reasonably be expected to fail and de-stabilize the road fill.

5.4 REVEGETATION

This revegetation section focuses on improving the quality of ski trails at The Summit-at-Snoqualmie. A primary area of concern is to address the lack of trees throughout the ski area. The previous clearing history has resulted in ski terrain that is considerably lacking in tree cover, especially at lower elevations, within Summit at Snoqualmie SUP area. In an effort to create a more aesthetic ski experience, the ski area has proposed to plant tree islands (see Figures 2.3.3-1, Alternative 2 Proposed Conditions - The Summit and Figure 2.3.3-2, Alternative 2 Proposed Conditions - Alpental), exact details are discussed below. Similarly, the proposed removal of several lift terminals will create new disturbances in the vegetation communities present. Revegetation projects are proposed to restore native plant communities where previous lift terminals or trails were located and removed.

Additionally, this section outlines general revegetation guidelines that are to be applied to exposed soils and disturbed ground. Specific revegetation activities covered under the General Revegetation Guidelines include proposed lift terminal restoration. Where lifts are proposed for removal, the terminal areas will be revegetated to minimize downslope erosion impacts. Revegetation will be compatible with the proposed use of the area, i.e., if a lift terminal proposed for removal lies within a proposed ski trail, a modified shrub community will be utilized in the specific project design. These general guidelines have been developed to minimize the spread of non-native invasive species and provide erosion control measures.

5.4.1 General Revegetation Guidelines

Plant species used to revegetate areas of ground disturbance will include native and desirable non-native species. Planting and/or seeding of exposed soils resulting from construction activities is intended to be an erosion control measure.

Native plants materials (seeds, cuttings, salvaged transplants, etc.) will be derived from the Snoqualmie or Yakima River Basins, and collected from elevations similar to that of the ski area. Under no circumstances will commercial cultivars of native species be used.

Native species used in revegetation will include green fescue, red fescue (*Festuca rubra*), showy sedge (*Carex spectabilis*), Hitchcock's woodrush (*Luzula glabrata var. hitchcochii*), pearly everlasting (*Anaphalis margaritacea*), lupines, yarrow (*Achillea millefolium*), lady fern

(Athyrium felix-femina), twin flower (*Linnea borealis*), huckleberry (*Vaccinium spp.*), and mountain-heather (*Phyllodoce empetriformis*). Seed for native species will be used for direct seedings or propagated at a local USFS approved nursery as part of The Summit-at-Snoqualmie native plant propagation and establishment program for revegetation.

Desirable non-native species, selected from a list of species identified in the USFS Region 6 plant notebook (Potash and Aubry 1997), and consistent with Region 6 revegetation policies, will be used to establish initial plant cover as an erosion control measure on project areas not specifically described above (e.g., the existing ski trail network). In the long term, a host of native species commonly found on existing ski trails, such as those previously mentioned, are expected to naturally establish similar to conditions within the existing ski trail network.

To avoid the spread of weeds during construction and restoration projects all vehicles and equipment doing work outside the limits of the road surface or in infested areas will follow appropriate BMPs listed in the *EA for Noxious Weed Management on the MBSNF* (USFS 1999), the *R6 Invasive Species ROD* (USDA 2005), and the mitigation guidelines.

5.4.2 Tree Island Revegetation

As mentioned previously, the goal of the tree islands is to restore vegetation to the ski area and improve the skiing experience for guests. All tree island restoration sites will be identified using a unique ID, i.e., TI1, TI2, etc. Sizes of tree islands range from approximately 0.01 acre to 1.8 acres. Monitoring of revegetated tree islands is discussed in Section 6.3.5 - Restoration Monitoring.

The objective of tree island restoration is to:

- Create skiways and separation between the different skier types.
- Improve VQOs by creating a more natural landscape.
- Improve skier satisfaction by creating a more natural ski area setting.

Tree Island Revegetation Guidelines

- Locations for tree islands will flagged in the field by a qualified environmental specialist according to maps and GIS data.
- Species chosen for planting will be consistent with current surrounding vegetation communities present near the chosen island location. Species listed below in Table 5-4 represent the dominant species within each community that shall be used in the creation of tree islands. Further information on plant communities can be found in Chapter 3.5 of The Summit-at-Snoqualmie FEIS.

Table 5-4:
Suitable Species for Tree Island Revegetation

Dominant Species	Additional Species
Western Hemlock (*Tsuga heterophylla*)	Douglas Fir (*Pseudotsuga menziesii*)
Pacific Silver Fir (*Abies amabilis*)	Western Red Cedar (*Thuja plicata*)
Mountain Hemlock (*Tsuga mertensiana*)	

- Plants will be obtained from onsite locations or from nurseries that have propagated plants from materials collected from similar elevations within the Yakima or Snoqualmie River Basins.
- Planting density shall be high to ensure plant survival. Densities shall average one plant per 25 square feet. Thinning of these trees can be done once they grow large enough.
- Interplant sun tolerant trees and shrubs to protect sun intolerant species, such as western red cedar or western hemlock, during establishment.
- Plants selected for tree islands shall be between three and five years old.
- No bare root plant material will be used in revegetation. All plant stock will be in a minimum 5 gallon container.
- Plants will be installed in such a manner as to maximize the potential for success. This includes over-excavating the hole, backfilling with new topsoil and fertilizer, and regular watering during the first year.
- Installed plants will be regularly watered and fertilized as necessary for as long as it takes to establish.
- All exposed soils will be hydroseeded and covered with straw mulch to minimize erosion.
- Upon completion of a revegetated tree island, the area will be fenced off with orange barrier fencing to maximize potential survival and minimize intrusion during regular maintenance activities.
- Fertilizing of re-vegetated areas will occur no less than 100 feet from streams and will follow all state and federal guidelines. The fertilizer currently used is NuLife, a 10-20-20 mixture ratio which is spread at a rate of 300 pounds per acre. A certified weed free mulch or straw is placed over the seed and fertilizer.

Soil Supplementation BMPs

Some areas proposed for tree islands may need soil supplementation because they are currently devoid of or lacking a surface soil horizon. The following BMPs have been developed to assist The Summit-at-Snoqualmie in transporting and applying new topsoil to these areas.

- Soil to be imported will be obtained from a USFS approved source.

- A perimeter will be established around the 'soil supplementation zone' to contain the soil in the desired area. The perimeter will consist of either hay bales or silt fencing.
- Erosion control measures will be placed around the soil supplementation zones. The measures will be detailed in the SWPPP and include, but are not limited to, silt fencing, straw mulch, erosion control fabric, etc.
- The surface layer will be applied to a minimum depth of 12 inches.
- Planting will occur immediately following the application of surface soils.
- All supplemented soils will be hydroseeded and/or covered with straw mulch after revegetation to minimize potential erosion.
- Regular watering will occur to aid in establishment of the seeded areas.

Tree Island Maintenance and Monitoring

Following completion of tree island plantings, the treatment areas will need to be monitored and maintained in order to ensure the survival. Maintenance and monitoring activities are summarized here. Additional details and BMPs regarding these activities can be found in Section 4.2 - Ski Trail Operations and Section 6.0 - Monitoring.

Tree island maintenance includes regular watering during the period of establishment and the replacement of dead or dying plants identified during monitoring events. Dead plants would be replaced on a one-for-one basis as necessary to ensure survival requirements are met. Additionally, supplemental fertilizer may be required to aid in successful establishment. Non-native invasive species will be controlled through hand removal methods within the tree island treatment area on an as needed basis.

Monitoring of tree islands will occur on a monthly basis during the first growing season. Site visits shall focus on noting plant health and vigor, inspecting for signs of plant disease, ensure that the area is being properly watered, and to note the presence of non-native invasive species. Observations made during monthly site visits will be documented in writing and kept on file. After the first growing season, monitoring of tree islands will follow the standard monitoring guidelines detailed in Section 6.0 - Monitoring.

5.4.3 Revegetation of Decommissioned Facilities

Lift terminal revegetation will occur using similar methods to the tree island revegetation prescription. The main difference between the two are the types of plants used in the revegetation. Lift terminal revegetation will use the plants listed in Table 5-3. Likewise, planting will occur based on the proposed use of the area to be revegetated.

- Locations for lift terminal revegetation will flagged in the field by a qualified environmental specialist according to maps and GIS data.

- Species chosen for planting will be consistent with current surrounding vegetation communities present near the chosen island location. Species listed in Table 5-3 represents typical species found within The Summit-at-Snoqualmie SUP that will be used for revegetation. Further information on plant communities can be found in Section 3.5 - Vegetation of The Summit-at-Snoqualmie FEIS. A map of existing vegetation communities can be found in Volume 3 of The Summit-at-Snoqualmie FEIS, Figures 3.5.1-1, Existing Vegetation Cover - The Summit and 3.5.1-2, Existing Vegetation Cover - Alpental.
- Plants will be obtained from nurseries that have propagated plants from materials collected from similar elevations within the Yakima or Snoqualmie River Basins. All plants will be inspected by a qualified environmental specialist and agreed upon by the USFS prior to installation to verify plant health.
- Planting density shall be high to ensure adequate plant survival and coverage. Densities shall average one plant per 25 square feet.
- Interplant sun tolerant trees and shrubs to protect sun intolerant species during establishment.
- Plants selected for lift terminal revegetation shall be between one and three years old.
- No bare root plant material will be used in revegetation. All plant stock will be in a minimum 1 gallon container.
- Plants will be installed in such a manner as to maximize the potential for success. This includes over-excavating the hole, backfilling with new topsoil and fertilizer, and regular watering during the first year.
- Installed plants will be regularly watered and fertilized as necessary for as long as it takes to establish.
- All exposed soils will be hydroseeded and covered with straw mulch to minimize erosion.
- Upon completion of a revegetated lift termianl, the area will be fenced off with orange barrier fencing to maximize potential survival and minimize intrusion during regular maintenance activities.

Soil Supplementation BMPs

As described for tree island revegetation, lift terminals may need soil supplementation in order to sustain plant communities. These areas are currently considered to be in a detrimental soil condition (see Section 3.2 - Geology and Soils of The Summit-at-Snoqualmie FEIS for more information on detrimental soil conditions). As defined by the MBSNF Land and Resource Management Plan, soils in a detrimental condition are not capable of supporting plant communities. The following BMPs have been developed to assist The Summit-at-Snoqualmie in transporting and applying new topsoil to these areas.

- Soil to be imported will be obtained from a USFS approved source if the supplementation area is on NFSL.
- A perimeter will be established around the 'soil supplementation zone' to contain the soil in the desired area. The perimeter will consist of either hay bales or silt fencing.
- Erosion control measures will be placed around the soil supplementation zones. The measures will be detailed in the SWPPP and include, but are not limited to, silt fencing, straw mulch, erosion control fabric, etc.
- The surface layer will be applied to a minimum depth of 12 inches.
- Planting will occur immediately following the application of surface soils.
- All supplemented soils will be hydroseeded and/or covered with straw mulch after revegetation to minimize potential erosion.
- Regular watering will occur to aid in establishment of the seeded areas.

5.5 STREAM AND WETLAND RESTORATION

5.5.1 Wetland Restoration

Two wetland restoration projects have been identified and included in the Proposed Action. These projects are listed in Table 5-1 in Section 5.1 - Restoration Projects. Detailed wetland restoration plans will be developed separately for each project. This section is intended to guide the development of the individual restoration plans.

For The Summit-at-Snoqualmie, wetland restoration projects encompass several different aspects that have been lumped under a general heading. These different aspects of wetland restoration include:

- Revegetation and enhancement of degraded or impacted wetlands.
- Revegetation and enhancement of wetland buffers. This is described under Section 5.2.2 – Riparian Zone Slope Stabilization.

Wetland plant species selected for restoration projects will be based on observations of existing wetland plants found within The Summit-at-Snoqualmie SUP area (see Table 5-5). Ultimately, all plants selected will be approved by the USFS.

Table 5-5:
Wetland Plants Occurring within The Summit-at-Snoqualmie SUP Area

Salmonberry (*Rubus spectabilis*)	Sitka Willow (*Salix sitchensis*)	Sitka Alder (*Alnus sinuata*)	Stink Currant (*Ribes bracteosum*)	Subalpine Spirea (*Spiraea densiflora*)
Soft Rush (*Juncus effusus*)	Dagger-leaf Rush (*Juncus ensifolius*)	Small-fruited Bulrush (*Scirpus microcarpus*)	Horsetail (*Equisetum arvense)*	Marsh Marigold (*Caltha biflora*)
Cottongrass (*Eriophorum sp*.)	Beaked Sedge (*Carex utriculata*)	Labrador Tea (*Rhododendron groenlandicum*)	Devil's Club (*Oplopanax horridum*)	Skunk Cabbage (*Lysichitcum americanum*)

Detailed wetland restoration plans will be prepared for each individual project. Restoration plans will include the following specific items,

- A description of the restoration site, including observations of existing hydrology and soil conditions, vegetation present, and site topography.
- A description of the proposed restoration project, including the size, in acres, of the project, what types of wetland communities are intended (emergent, scrub-shrub, forested, open water), the size in acres of each community, and a list of species selected for the project. The description shall include any proposed grading necessary for construction.
- A detailed set of construction plans of the restoration site that shows the locations of proposed grading, wetland communities, and other relevant features of the project, i.e., locations of nearby facilities, etc. Construction plans shall be developed to meet the permitting requirements of regulatory agencies such as the Army Corps of Engineers, King County, and Kittitas County. Construction plans will include BMPs for erosion control, construction methods, and planting guidelines.
- Monitoring protocol, including the number of monitoring sample plots necessary. Monitoring protocol shall be developed according to the guidelines found in Section 6.3.5 – Restoration Monitoring.

5.5.2 Stream Restoration

Stream restoration will focus on two specific projects where in-channel restoration work will occur (see Table 5-1). Restoration techniques will focus on creating a more natural stream channel and placing strategic engineered logjam structures. Specific stream restoration objectives will be developed under individual construction plans. Additional stream restoration opportunities, not currently identified, may develop during implementation of the MDP.

- Examples of other stream restoration opportunities.

5.5.3 Culvert Removal

The purpose of culvert removal is to restore natural drainage and ensure that culvert related failures do not occur (i.e., clogging). The following BMPs have been developed to assist The Summit-at-Snoqualmie in culvert removal.

- Culvert removal shall occur during the low flow summer months to minimize potential erosion and sedimentation impacts.
- Equipment will not work below the OHWM if there is water present in the channel.
- Disturbance or removal of vegetation will not exceed the minimum necessary to complete operations.
- Divert water flows, if working in a perennial or intermittent stream, to create a dry work area.
- Install sediment control downstream from the culvert. This includes, but is not limited to rock check dams, log weirs, catchment basins, etc.
- Remove the road fill from the vicinity of the culvert until the culverts are visible. All spoils shall be placed within a designated storage area and/or endhual-hauled to an approved disposal site.
- Excavate a cross-ditch immediately next to the culvert, from outlet to inlet. Leave some material on the upstream side (inlet) to maintain the water flow through the pipe.
- Slope the channel and armor the base of the cross-ditch.
- Divert the flow from the culvert to the armored channel; move to the camp side of the culvert.
- Remove the culvert and excavate the near side of the road fill; armor as required.
- Revegetate and stabilize banks to minimize erosion.
- Remove any temporary dewatering device.
- All disturbed areas will be revegetated to minimize erosion.

6.0 MONITORING

6.1 GENERAL MONITORING FRAMEWORK

The purpose this monitoring section is intended to demonstrate that construction of MDP components identified in the Proposed Action would be consistent with approved construction plans, permit conditions, and mitigation measures. Additionally, monitoring protocol outlined in this document is consistent with monitoring guidelines presented in the MBSNF Land and Resource Management Plan and the OWNF Land and Resource Management Plan, as amended. The Standards and Guidelines indicate that, since a variety of management actions may be implemented in a watershed, a monitoring program is needed to evaluate the effects of those actions and develop an adaptive management response to any adverse effects that may develop. To this end, the general objectives of monitoring framework plan are to:

- Determine if mitigation measures have been implemented at appropriate times (implementation monitoring), and
- Determine the effectiveness of the mitigation measures at individual sites (effectiveness monitoring).
- Validate the FEIS analysis results and process (e.g., WEPP model, flow model).
- Determine if subsequent ACPs will be approved based upon successful implementation, stabilization and monitoring of previous projects.

Monitoring of the implementation of MDP components at Summit at Snoqualmie would focus on two spatial scales, the site scale and the watershed scale. The site scale would address actions that would be carried out in a project scale context. Each project would require detailed planning, including designation of site-specific measures to reduce and mitigate environmental impacts of the project, as well as designation of specific monitoring actions relevant to that project. Monitoring at the site scale would focus on compliance with permit conditions during construction, monitoring implementation of Mitigation Measures, and on whether those measures were effective within the project area. Within the context of site scale monitoring, monitoring of Construction, Operations, and Restoration projects would occur.

Monitoring at the 6th field watershed scale is not tied to any specific MDP component. The watershed scale monitoring efforts for any given year would be comprised of the ongoing monitoring of flow at four sites within the Study Area, along with the site specific monitoring for recent past and ongoing projects. Thus, the monitoring requirements for one year would include any monitoring from previous projects (e.g., site stabilization, turbidity above and below construction activities, restoration success criteria monitoring), along with any required monitoring as specified in project-specific SWPPPs.

During the lifetime of the MDP implementation, monitoring of individual projects and at the watershed scale would take place until all MDP components have been installed, including

developed facilities and restoration projects, and when such projects have been determined complete and stabilized. When all success criteria, established in individual monitoring plans, have been met. Site-scale and watershed-scale monitoring for the MDP would be completed.

6.2 ANNUAL MONITORING PLAN

An Annual Monitoring Plan would be submitted each year, prior to construction, to the MBSNF for approval. This plan identifies the monitoring requirements for individual projects during and after construction. The plan also identifies the success criteria by which "substantial completion" of project construction and stabilization can be determined. The Annual Monitoring Plan would include a summary of the projects listed in the ACP for that year, a list of permit conditions and applicable mitigation measures to be applied to each project, a SWPPP for all of the projects in the ACP for that year, and guidelines for the site scale and watershed scale monitoring to be performed during and after construction. In addition to projects planned for the given construction year, the Annual Monitoring Plan would include a list of ongoing monitoring from previous projects, which would be carried forward to the monitoring plan for that given year. The Annual Monitoring Plan would be completed 3-6 months prior to construction season.

This plan would explain the mitigation measures to be applied in each project, what type of site scale monitoring (i.e., Construction, Operations, or Restoration) would be used for each MDP component. Project specific mitigation measures would be identified during detailed project design, and would be designated during coordination meetings between The Summit-at-Snoqualmie and involved regulatory agencies, including the (but not limited to) USFS, the Army Corps of Engineers (for projects impacting wetlands), U.S. Fish and Wildlife Service or National Marine Fisheries Service (for projects affecting threatened or endangered species), and U.S. Environmental Protection Agency (for projects affecting water quality). Monitoring provisions would be incorporated into construction documents and permit applications when judged necessary by the concerned agencies. Mitigation measures and other permit conditions that are identified by the regulatory agencies during the permit acquisition process would be incorporated into the annual monitoring plan and the SWPPPs for the applicable projects.

The plan would provide common monitoring guidelines and requirements for each individual project, as well as common permit requirements. Individual monitoring plans would be prepared for each project completed in the preceding construction season. Individual monitoring plans would reflect the larger goals of the Annual Monitoring Plan, and would focus specifically on each project's goals and objectives. All of the project-specific monitoring results would be incorporated into a GIS database and reported as specified in the project-specific monitoring requirements.

The Annual Monitoring Plan would include the results of monitoring from the previous year, i.e., a summary of the Annual Monitoring Report described in Section 6.4 – Annual Monitoring Report. Any information from the annual report could be used by The Summit-at-Snoqualmie

and/or MBSNF to alter or supplement the current mitigation measures list. Additionally, future construction phases may be delayed until all monitoring requirements are met.

6.3 SITE SCALE MONITORING

6.3.1 Purpose and Goals

Site-scale monitoring would focus on several different aspects. First, each MDP project would be monitored to ensure that mitigation measures are implemented as described in the ACP and Annual Monitoring Plan. Additionally, mitigation measures would be assessed to determine if they are achieving their desired effectiveness based on existing law, regulation, or policy.

The SWPPP prepared for each project would also include the site scale monitoring plan for that project and Mitigation Measures that are specific and applicable erosion and sedimentation control for the project. Finally, the SWPPP would be consistent with mitigation and monitoring measures identified by supporting project environmental documents, such as permit conditions.

The effects of the Proposed Action on the biological environment would be monitored through data collection and observation of physical environmental conditions. Examples of monitoring the biological environment include measuring water quantity (i.e., flow), water quality (e.g., temperature, pH, etc.), type and amount of vegetation removal, and physical and chemical soil properties. A complete list of parameters to monitor would be included in site specific plans. Monitoring key components of the biological environment at the site scale would ensure that conditions are being maintained within the confines of environmental, and that exceedences of monitoring standards would be corrected. The health of the biological environment is to be maintained at the site scale through construction monitoring, operations monitoring, restoration monitoring, and recreation monitoring.

6.3.2 Site Scale Monitoring Process

Site-scale monitoring would vary between the different MDP components described in this Restoration and Implementation Plan. Therefore, monitoring would occur according to Construction, Operational, or Restoration procedures. These procedures are outlined in the following sections.

6.3.3 Construction Monitoring

Monitoring for construction projects begins at the project planning and design phase, approximately 6 to 12 months before the project is scheduled to begin. The first step is to review construction plans and acquire the necessary environmental and building permits for the project, including the development of a SWPPP and acquisition of a NPDES permit, if necessary. The site scale monitoring plan (SWPPP) for each project proposed in a given year would be

incorporated into an annual monitoring plan that would conjoin the monitoring efforts for all proposed projects during the summer construction season. Next, the watershed restoration plan would be consulted to determine if any restoration projects would need to be implemented concurrent with specific construction projects. If restoration project(s) need to be implemented, monitoring would be performed according to the guidelines outlined below in Restoration Monitoring.

Once the necessary permits and approvals are obtained and the documentation has been reviewed and approved by the USFS, construction can begin and site-scale monitoring would ensure that permit conditions and the SWPPP are being followed properly. Erosion control and water quality monitoring would be performed according to the SWPPP during the active construction phase and would be discontinued once the construction is complete and the site has been declared stabilized by the USFS. Monitoring efforts for all construction and restoration projects would be tracked using GIS databases to ensure that all monitoring requirements, permit conditions, and Mitigation Measures are implemented in an organized and efficient fashion.

Post Construction Monitoring

Following completion of a MDP project a Notice of Termination is typically filed after the construction site is stabilized to complete the NPDES construction monitoring requirements. In an effort to ensure the impacts of the Proposed Action are minimal, The Summit-at-Snoqualmie would perform follow-up monitoring visits to closed out construction sites. Monitoring of closed construction sites would occur as specified in the Annual Monitoring Plan. Monitoring would consist of documenting visual observations of the entire site to verify the status of the site relative to the established success criteria. Mitigation measures, such as silt fencing and hay bales, may be required at closed construction sites until hydroseeding, or other stabilization method, has become established. The closed construction site would be photo-documented at each site visit to track the site over time. Follow-up monitoring events to closed construction sites would be completed upon verification that the success criteria have been met.

Surface Water Monitoring

Water Quality

Water quality monitoring at The Summit-at-Snoqualmie was conducted from November 1994 through October 1995, October 1997 through May 1998, and July 2002 to the present. This monitoring program will continue through the ten-year implementation period of the MDP. Monitoring objectives included establishing current (baseline) conditions for the purpose of evaluating impacts associated with MDP implementation. As described in greater detail below, water samples or *in situ* measurements were collected at various locations across the Study Area, including upstream and downstream locations on streams passing through SUP boundaries. Sample locations, shown in Figures 8 and 9, Hydrography Impacts - Alternative 2, are intended to detect the influences of ski area management, including clearing, road maintenance, and base

area development, but do not necessarily isolate the Study Area from all other adjacent influences. Sample data were collected to reflect a variety of hydrologic and climatological events, including winter low flow, winter rain-on-snow, spring melt, summer low flow, and rain-on-bare-ground.

Magnesium Chloride Application Monitoring

The Summit-at-Snoqualmie proposes to implement a deicing program, which involves the application of a liquid magnesium chloride solution to the paved surfaces within The Summit-at-Snoqualmie ski areas. Magnesium chloride applications would only occur during the winter months as needed to keep snow and ice from sticking to the road surfaces. Surface water and groundwater samples would be collected to monitor the impacts from magnesium chloride application.

Summit at Snoqualmie would monitor the South Fork Snoqualmie River and Coal Creek for possible effects of magnesium, chloride, and iron. The South Fork Snoqualmie River and Coal Creek are respectively listed as Core Salmon and Trout and Char surface waters of Washington State. In addition, groundwater monitoring would be performed along the roads adjacent to streams to effectively monitor potential impacts to vegetation and soils from the application of magnesium chloride.

Sample sites would be established to correspond with existing monitoring stations for The Summit-at-Snoqualmie. Groundwater monitoring stations would be installed along Alpental Road, and other roads adjacent to streams. Groundwater wells would be installed to collect shallow groundwater within the top 18 inches of soil. A map of existing surface water sample site locations can be seen in Figures 8 and 9, Hydrography Impacts – Alternative 2. Additional surface water monitoring sites for may be identified by the USFS to effectively determine magnesium chloride effects on water quality if the existing sites are not sufficient. The number and location of sites would be determined in accordance with recommendations to be provided by the USFS hydrologist.

Samples would be collected monthly from each USFS approved location for analysis. Testing would be conducted by a Washington State certified laboratory for the required tests. Water would be tested for magnesium, chloride and iron. Results would be given in mg/L (parts per million). Well sites would be tested for soil-water chemistry for chloride in mg/L (parts per million).

Testing results would be collected for the entire winter ski season from November to April. Within six weeks of the final sample being collected for the season the results of the monitoring would be sent to the Snoqualmie Ranger District for review. The Ranger District would be able to provide feedback as future monitoring requirements.

6.3.4 Restoration Monitoring

Monitoring for restoration projects is similar to construction project monitoring that is, except that the intent of the restoration project is to recreate natural ecosystem processes instead of potentially disrupting them. Even though the intent of restoration projects is to restore long-term ecosystem health, short-term detrimental impacts may occur during project implementation. Therefore, monitoring is required during construction to reduce the likelihood for detrimental impacts and following construction to ensure than restoration goals are achieved. Five to ten years of compliance monitoring may be required by the ACOE for wetland and stream mitigation projects (compensatory mitigation for a Section 404 permit), which may be in addition to USFS monitoring requirements. Concurrent implementation of construction projects and restoration projects can minimize disturbance related to multiple entries into the watershed and can facilitate monitoring of cumulative effects.

Specific monitoring requirements for several restoration components would likely be required for compliance with regulatory permitting. The components are slope stabilization, road deactivation, tree island revegetation, stream restoration, and wetland restoration. A monitoring procedure is outlined for each component that would help to meet regulatory compliance.

Slope Stabilization Monitoring

The monitoring protocol for slope stabilization restoration areas follows the approach of the tree island and wetland monitoring. At the first monitoring visit to a slope stabilization site, a 0.01-acre sample plot would be marked. Sample plots may be located adjacent to tree islands, wetlands, and stream monitoring areas. Sample plots should be located within each site so as to obtain the broadest diversity of species present. The number of sample plots for each restoration project would depend largely on the size of the area and the requirements of regulatory agencies. Specific details regarding the location of monitoring sample plots would be developed in project specific restoration plans.

The sample plot would be identified by placing a ‘T’ fence post in the ground and establishing an 11.8-foot radius. The top of the post would be labeled with the monitoring station number. During the first monitoring visit, a baseline count of each species planted within the sample plot area would be made and incorporated into the standard monitoring form (see Appendix A) under the heading “Initial Planting”. The condition of each plant, dead or alive, would be noted.

At subsequent monitoring site visits, the survival, health, and general condition of each species would be recorded. Minimum survival standards after the monitoring period are likely to be required by regulatory agencies. Monitoring would occur at the beginning and end of subsequent growing seasons during the monitoring period established for each specific project. Minimum monitoring periods can range from five to ten years.

A general sample plot description would be documented during each site visit. General observations should note the proportions of vegetative cover within the sample. This is best assessed through visual observations of the aerial coverage of each stratum, i.e., herbaceous, shrub, and tree. Aerial coverage standards are likely to be required by regulatory agencies. Additional observations can include wildlife observations within the restoration area, weather conditions, and occurrences of new species (recruits or volunteers) within the sample. Other information to add to the record may be added as appropriate.

Photographs of the monitoring sample plot and the restoration area as a whole would be taken and added to the record. Digital cameras work best for this situation. Photographs would be taken the center of the sample plot for each cardinal direction. The direction of the photograph would be noted in the record for future comparisons.

Road Deactivation Monitoring

Monitoring of deactivated roads would occur in a similar method to the operational monitoring of existing roads (see Section 4.1.2 - Road Inspection and Reporting). The designated Summit at Snoqualmie roads manager would be responsible for monitoring deactivated roads. All monitoring plans and reports would be reviewed and approved by the USFS for all roads located on NFSL. The roads manager may train and delegate monitoring tasks to other Summit at Snoqualmie personnel in order to complete monitoring in a timely manner.

Deactivated roads would be monitored on a yearly basis in conjunction with existing road operations. Monitoring would focus on slope stability and revegetation monitoring to assure treatment measures are effective.

Monitoring events should be performed soon after the end of spring snowmelt so that drainage structures may be inspected while they are conveying flows. Digital photographs would e taken at points along the road the document conditions after deactivation and track conditions through time.

Monitoring reports would be document in writing, using a standard form (see Appendix A). Any major problems should be documented by photographs (disposable or digital cameras are well suited for this). Reports should be kept on file by the roads manager, and should be retained for at least ten years. Any additional work recommended by monitoring reports should be performed before the fall rains begin. Such work should also be documented in writing, on the original form or a follow-up sheet, to show that problems identified during monitoring were remedied in a timely fashion. Digital photographs are helpful and should always be taken after repairs have been made as identified on inspection reports.

Revegetation Monitoring

Monitoring of revegetation sites would occur on a monthly basis during the first growing season. Site visits should focus on noting plant health and vigor, inspecting for signs of plant disease,

ensure that the area is being properly watered, and to note the presence of non-native invasive species. Observations made during monthly site visits would be documented on a standard monitoring form, summarized in yearly report for submittal to required regulatory agencies. The following specific components should be undertaken in monitoring tree islands.

At the first monitoring visit to a revegetated tree island, sample plots would be located within the project area. Where possible, a 0.01-acre plot should be established for assessing shrubs and herbaceous strata. Larger sample plots, up to 0.1 acre may be required to monitor tree species. The size of the sample plot may be limited due to the size of the project area. For project areas less than 0.5 acre, a 0.01-acre sample plot should be used for all strata. Sample plots should be located within each tree island so as to obtain the broadest diversity of species present. One sample plot per tree island should be sufficient for monitoring purposes. Larger tree islands, greater than 0.5 acre, may require additional sample plots.

The sample plot would be identified by placing a fence post in the ground and establishing an 11.8-foot radius. The top of the post would be labeled with the monitoring station number. During the first monitoring visit, a baseline count of each species planted within the sample plot area would be made and incorporated into the standard monitoring form (see Appendix A) under the heading “Initial Planting”. The condition of each plant, dead or alive, would be noted.

At subsequent monitoring site visits during the first growing season, the survival, health, and general condition of each species would be recorded. Minimum survival standards after the monitoring period are likely to be required by regulatory agencies. Dead or dying plants, as identified during monitoring events, should be replaced on a yearly basis to ensure that survival requirements are met. Monitoring would occur at the beginning and end of subsequent growing seasons during the monitoring period established for each specific project. Minimum monitoring periods can range from five to ten years.

A general sample plot description would be documented during each site visit. General observations should note the proportions of vegetative cover within the sample. This is best assessed through the sum of visual observations of the aerial coverage of each plant. Aerial coverage standards are likely to be required by regulatory agencies. Additional observations can include wildlife observations within the restoration area, weather conditions, and occurrences of new species (recruits or volunteers) within the sample.

Photographs of the monitoring sample plot and the restoration area as a whole would be taken and added to the record. Digital cameras work best for this situation. Photographs would be taken the center of the sample plot for each cardinal direction. The direction of the photograph would be noted in the record for future comparisons.

Stream Restoration Monitoring

Monitoring standards and protocols for stream restoration projects will be developed will be developed in conjunction with the final restoration design to assure appropriate monitoring approach. The monitoring will include more detail on the following elements;

- Photo-documentation of restored channel, LWD locations, etc.
- Verifications of LWD and riffle creation
- Check LWD anchors
- Macroinvertebrate surveys
- Water quality sampling
- Sediment surveys, i.e., percent fines measurements, embeddedness
- Channel width measurements

Wetland Restoration Monitoring

The monitoring protocol for wetland restoration areas is similar to the tree island monitoring. At the first monitoring visit to a wetland restoration site, a 0.01-acre sample plot would be marked. Sample plots should be located within each wetland restoration so as to obtain the broadest diversity of species present. The number of sample plots for each restoration area would depend largely on the size of the area, the number of different vegetation categories (i.e., emergent, scrub-shrub, forested) present, and the requirements of regulatory agencies. Typically, monitoring stations should span different vegetation categories to minimize the number necessary and obtain a better measure of restored wetland function. Large restoration sites would require more sample plots than smaller sites.

The sample plot would be identified by placing a fence post in the ground and establishing an 11.8-foot radius. The top of the post would be labeled with the monitoring station number. During the first monitoring visit, a baseline count of each species planted within the sample plot area would be made and incorporated into the standard monitoring form (see Appendix A) under the heading “Initial Planting”. The condition of each plant, dead or alive, would be noted.

At subsequent monitoring site visits, the survival, health, and general condition of each species would be recorded. Minimum survival standards after the monitoring period are likely to be required by regulatory agencies. Monitoring would occur at the beginning and end of subsequent growing seasons during the monitoring period established for each specific project. Minimum monitoring periods can range from five to ten years.

A general sample plot description would be documented during each site visit. General observations should note the proportions of vegetative cover within the sample. This is best assessed through the sum of visual observations of the aerial coverage of each plant. Aerial coverage standards are likely to be required by regulatory agencies. Additional observations can include wildlife observations within the restoration area, weather conditions, and occurrences of

new species (recruits or volunteers) within the sample. Other information to add to the record may be added as appropriate.

Photographs of the monitoring sample plot and the restoration area as a whole would be taken and added to the record. Digital cameras work best for this situation. Photographs would be taken the center of the sample plot for each cardinal direction. The direction of the photograph would be noted in the record for future comparisons.

6.4 ANNUAL MONITORING REPORT

Subsequent to the construction season, an Annual Monitoring Report would be prepared summarizing the results of the previous years monitoring efforts and make recommendations for additional restoration or stabilization for the ACP in following years. In addition, any information from the Annual Monitoring Reports could be used by Summit at Snoqualmie and/or the MBSNF and OWNF to alter or supplement the current list of mitigation measures. Due to the 12 to 18 month timeframe required for planning and permitting before each construction year, it is expected that the planning for future construction years would coincide with the monitoring report from the previous construction period. Recommendations from the monitoring report would be incorporated into ACP during the planning and permitting process. If the Annual Monitoring Report indicates that detrimental effects are evident at the site or watershed scale, the USFS may elect to withhold approval of subsequent construction phases until mitigation and monitoring indicate that the effects have been reduced to an acceptable level. Similarly, other regulatory agencies may elect to halt onsite activities to insure that permit conditions are satisfactorily met.

7.0 GLOSSARY

Developed Facility: The term Developed Facility refers to all existing and proposed buildings, storage tanks, lift towers, parking lots, and ski patrol duty stations.

Forest Edge Feathering: Selectively removing trees along the flagged limit of clearing boundary where appropriate, so that a hard line in the new trail-to-forest transition is not evident. The area to be thinned for forest edge feathering shall be between approximately 15 feet and 30 feet wide. Large trees shall be selectively removed starting at the flagged limit of clearing boundary, so that the tree density gets progressively lower as you move towards the center of the new trail within the 15 to 30-foot feathering area. All forest edge feathering shall be performed under the supervision of a qualified environmental specialist.

Forest Edge Scalloping: Flagging a separate, limit of clearing boundary outside of the flagged new trail edge so the boundary is non-linear to reduce visual impacts associated with straight trail edges. The limit of clearing boundary shall resemble an irregular sine wave that is outside of, but adjacent to the flagged trail edge. The flagged limit of clearing boundary shall not exceed a maximum distance of 30 feet from the original flagged trail edge. All forest edge scalloping shall be performed under the supervision of a qualified environmental specialist and approved by the USFS.

Formal Ski Terrain: The term Formal Ski Terrain refers to all existing and proposed ski trails, lift corridors, cat tracks, and egress routes.

Hazard Tree: Any living or dead tree that is located within or in close proximity to Formal Ski Terrain that has the potential to injure a person or damage a facility shall the tree, or a portion of it fall. Hazard trees shall be identified by the USFS or a qualified environmental specialist.

Normal Trails: Formal Ski Terrain that has not been classified as a High Traffic or Sensitive Trail, and has no special safety requirements with respect to vegetation maintenance. Normal Trails shall be identified by Summit at Snoqualmie and approved by the USFS. Examples of Normal Trails include, but are not limited to: Dodge Ridge, Alpine, Easy Gold, and Sessel.

Sensitive Trails: Formal Ski Terrain that is generally characterized as having steep slopes, sparse vegetative cover, or physical evidence of significant sediment movement, such as gully erosion or soil slumps. Sensitive Trails shall be identified by a qualified environmental specialist and approved by the USFS. Examples of Sensitive Trails include, but are not limited to: Parachute, Triple 60, Upper International, and Wildside.

Streams: Areas that have been identified as streams in The Summit-at-Snoqualmie FEIS and as displayed in Figures 8 and 9, Hydrography Impacts – Alternative 2.

Wetlands: Areas that have been identified as wetlands in The Summit-at-Snoqualmie FEIS and as displayed in Figures 8 and 9, Hydrography Impacts – Alternative 2.

8.0 REFERENCES

B.C. Ministry of Forests. 2002. Forest road engineering guidebook. For. Prac. Br., B.C. Min. For., Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

Forest Practices Code of British Columbia (FPCBC). 1998. Forest Road Engineering Guidebook.

Forest Road Deactivation Practices in the Pacific Northwest. http://www.culvertbc.com/fieldguide2/22.html.

Golder Associates. 2004. Conceptual Stormwater Management Plan for The Summit-at-Snoqualmie.

Jones and Stokes. 2001. Watershed Condition Assessment.

Jones and Stokes. 2003. Crystal Mountain Road Management Plan.

National Research Council. 1992. Restoration of Aquatic Ecosystems: Science, Technology and Public Policy. National Academy Press, Washington, D.C.

Potash and Aubry. 1997. USFS Region 6 plant notebook (Potash and Aubry 1997)

U.S. Department of Agriculture. 1990a. Mount Baker-Snoqualmie National Forest Land and Resource Management Plan.

U.S. Department of Agriculture. 1990b. Okanogan-Wenatchee National Forest Land and Resource Management Plan.

U.S. Department of Agriculture and U.S. Department of the Interior. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl.

U.S. Department of Agriculture. 1997. Forest Service Road Construction and Maintenance Specifications.

U.S. Department of Agriculture. 1981. Alpine Lakes Adaptive Management Area Plan.

U.S. Department of Agriculture. 2005. R6 Invasive Species ROD.

U.S. Environmental Protection Agency. 2000. Principles for the Ecological Restoration of Aquatic Resources. EPA841-F-00-003. Office of Water (4501F), United States Environmental Protection Agency, Washington, DC. 4 pp.

U.S. Forest Service. 1988. Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation.

U.S. Forest Service. 1992. Long Range Planning for Developed Sites: the Context of Hazard Tree Management.

U.S. Forest Service. 1999. Environmental Assessment for Noxious Weed Management on the Mount Baker-Snoqualmie National Forest.

Washington Department of Fish and Wildlife. 2003. Design of Road Culverts for Fish Passage.

Washington Department of Fish and Wildlife and U.S. Department of Agriculture, Forest Service. 2003. Memorandum of Understanding between the U.S. Forest Service and the Washington Department of Fish and Wildlife.

Washington Department of Natural Resources. 2004. Forest Practices Board Manual. Last updated November 2004.

Washington Administrative Code. 222-24. Road Construction and Maintenance. Last updated July 2001.

Appendix A:

Restoration Monitoring Forms

Date: _____

Name(s): _____

Site Number: _____

Restoration Site ID_____

County _____

Project Type

	Slope Stabilization
	Road Deactivation
	Revegetation
	Wetland Restoration
	Stream Restoration

Species Present	Initial Planting	Number Alive	Number Dead	Aerial Coverage (% of the sample plot area)	Health/Vigor and General Observations

General Observations of the Sample Plot and Restoration Area

Weather Conditions

Air Temperature (°F): _____ **Rainfall w/in 24 Hours (in.):** _____

Current Conditions: _____

Hydrology and Soil Characteristics (for Wetland Sites)		
Hydrology Present:	**At surface? (circle)**	**Yes / No**
	If yes, depth of surface water:	_____**in.**
	If no, depth to water in test pit:	_____**in.**
Hydric Soil Indicators:		
Soil Profile:		

Appendix B:

Road Monitoring Form

Summit at Snoqualmie Road Inspection Report

Date:	Road:	Inspector:
Inspection Type:	Construction Maintenance Deactivation	

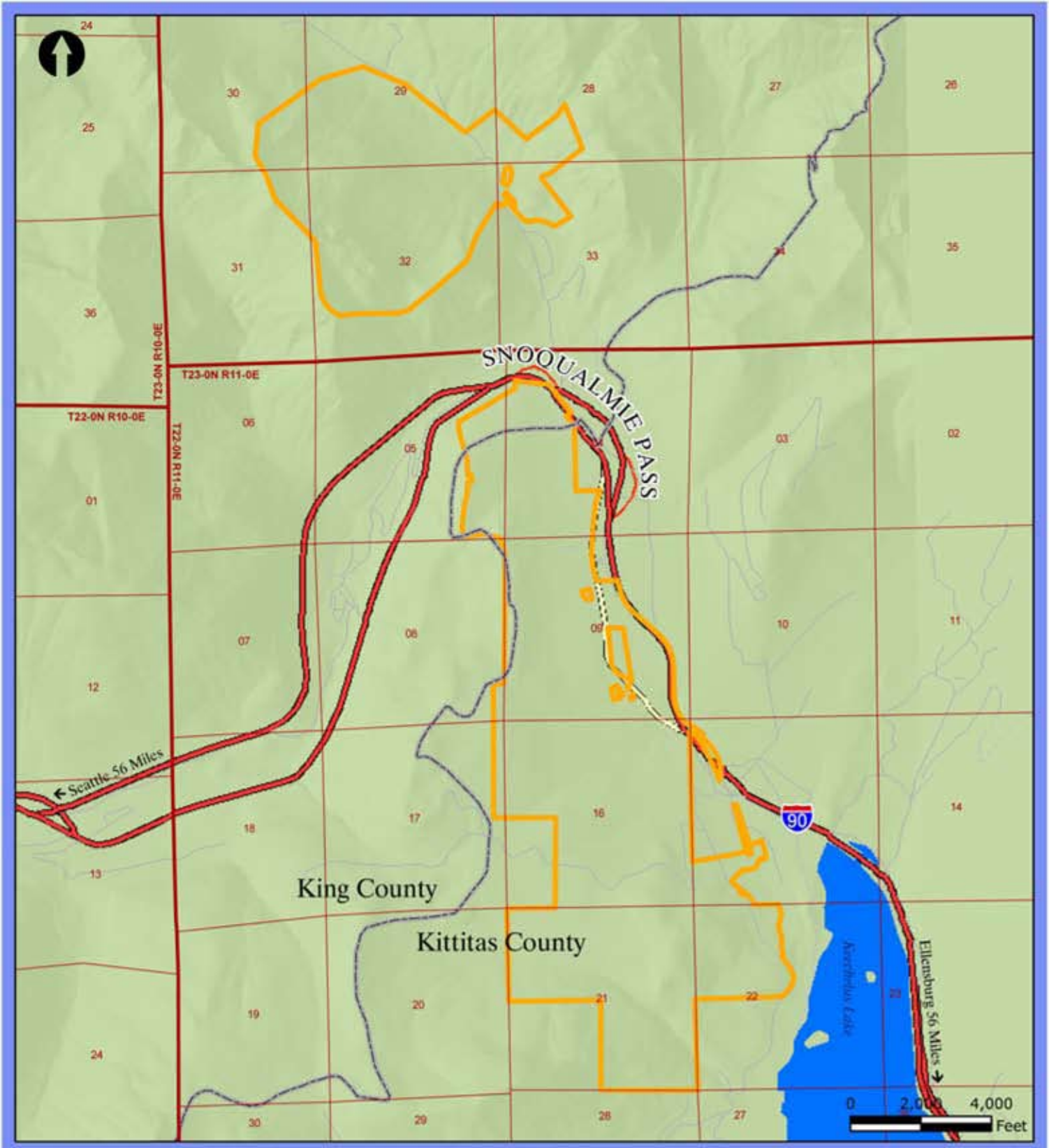
Mile	**Problems noted (Description)**	**Recommended Action**	**Date Completed**

Summit at Snoqualmie Road Inspection Report

Date:	Road:	Inspector:
Inspection Type:	Construction Maintenance Deactivation	

Mile	**Problems noted (Description)**	**Recommended Action**	**Date Completed**

Figures



The Summit at Snoqualmie

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

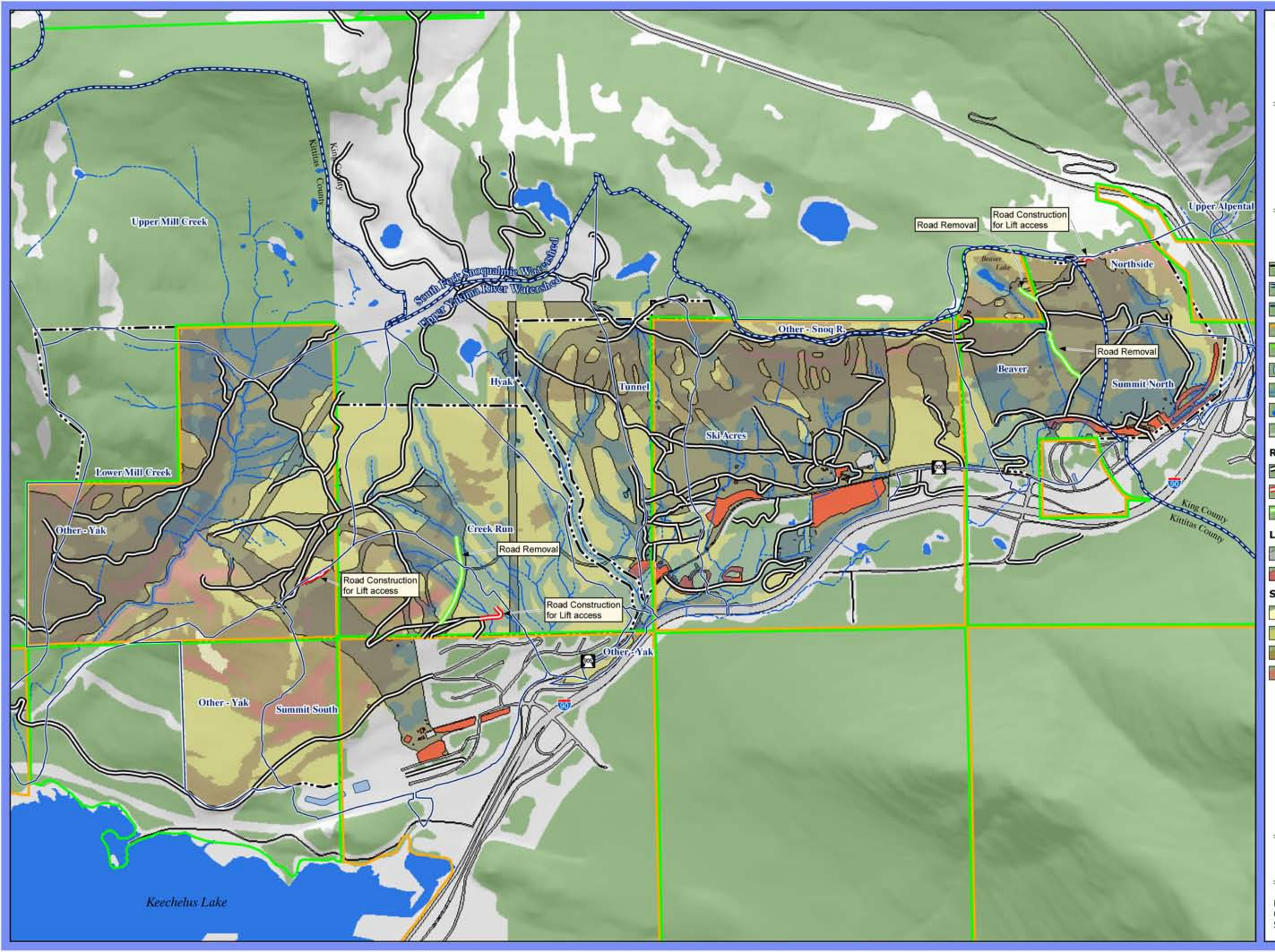
Study Area

Figure 1.1.1-1
Vicinity Map

The Summit

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 2
Locations of Proposed
Road Construction
and Deactivation



Legend

- SUP Boundary - Existing
- WatershedBoundary-5thField
- WatershedBoundary-7thField
- Privately Owned Land
- Publicly Owned Land
- Retention Pond
- Streams & Riparian Buffers
- Lake/Pond
- Paved Road

Road Type

- Existing
- Proposed
- Removal

Land Condition

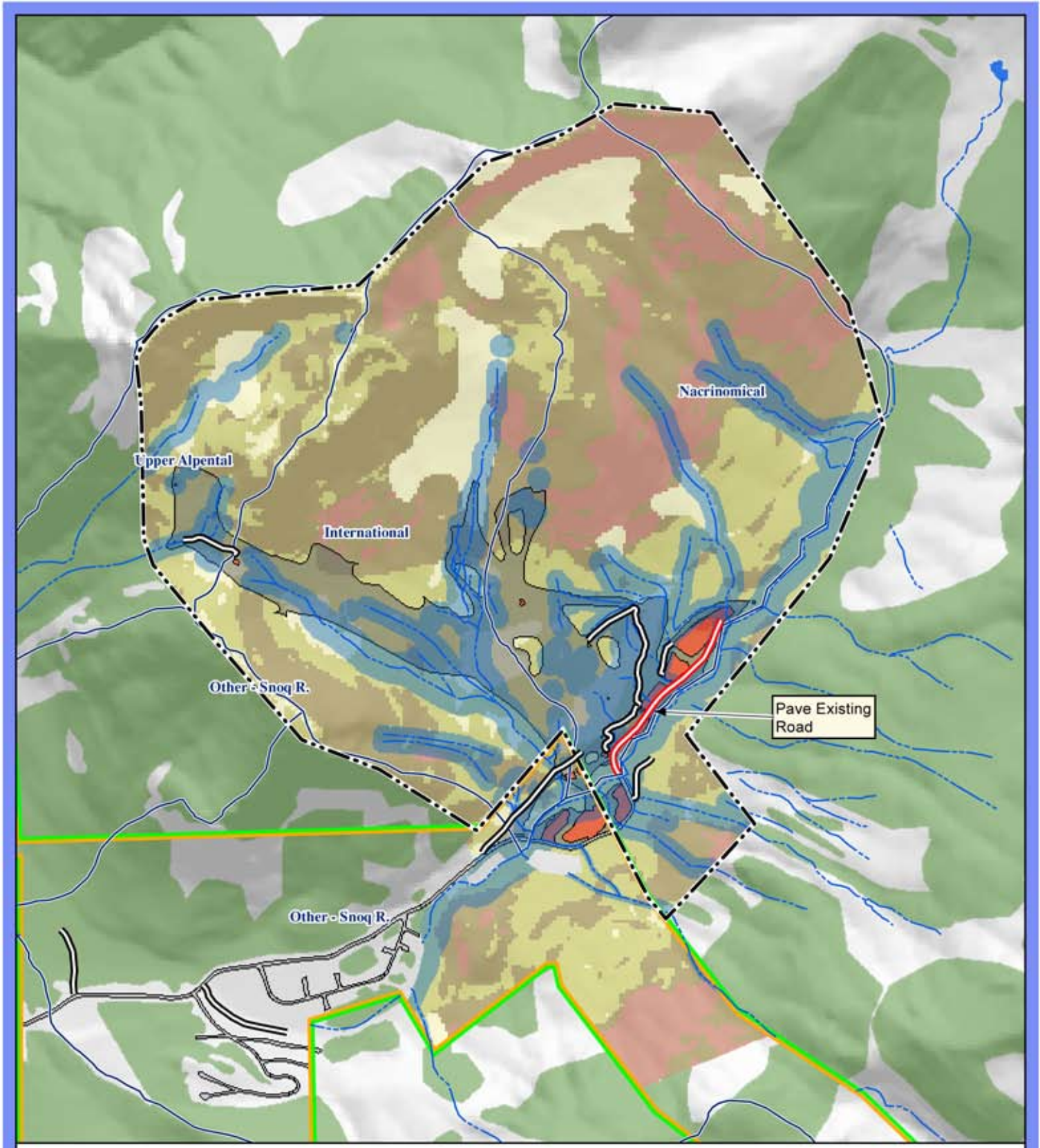
- Modified Condition
- Developed Condition

Soil Erosion Potential

- Soil Erosion Potential - 1
- Soil Erosion Potential - 2
- Soil Erosion Potential - 3
- Soil Erosion Potential - 4

0 750 1,500
Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1500'



Alpental

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 4.2.1-4
Locations of Proposed Road Construction and Deactivation

- SUP Boundary - Existing
- WatershedBoundary-7thField
- Privately Owned Land
- Publicly Owned Land
- Streams & Riparian Buffers
- Lake/Pond
- Paved Road

Road Type
- Existing
- Proposed

Land Condition
- Modified Condition
- Developed Condition

Soil Erosion Potential
- Soil Erosion Potential - 1
- Soil Erosion Potential - 2
- Soil Erosion Potential - 3
- Soil Erosion Potential - 4

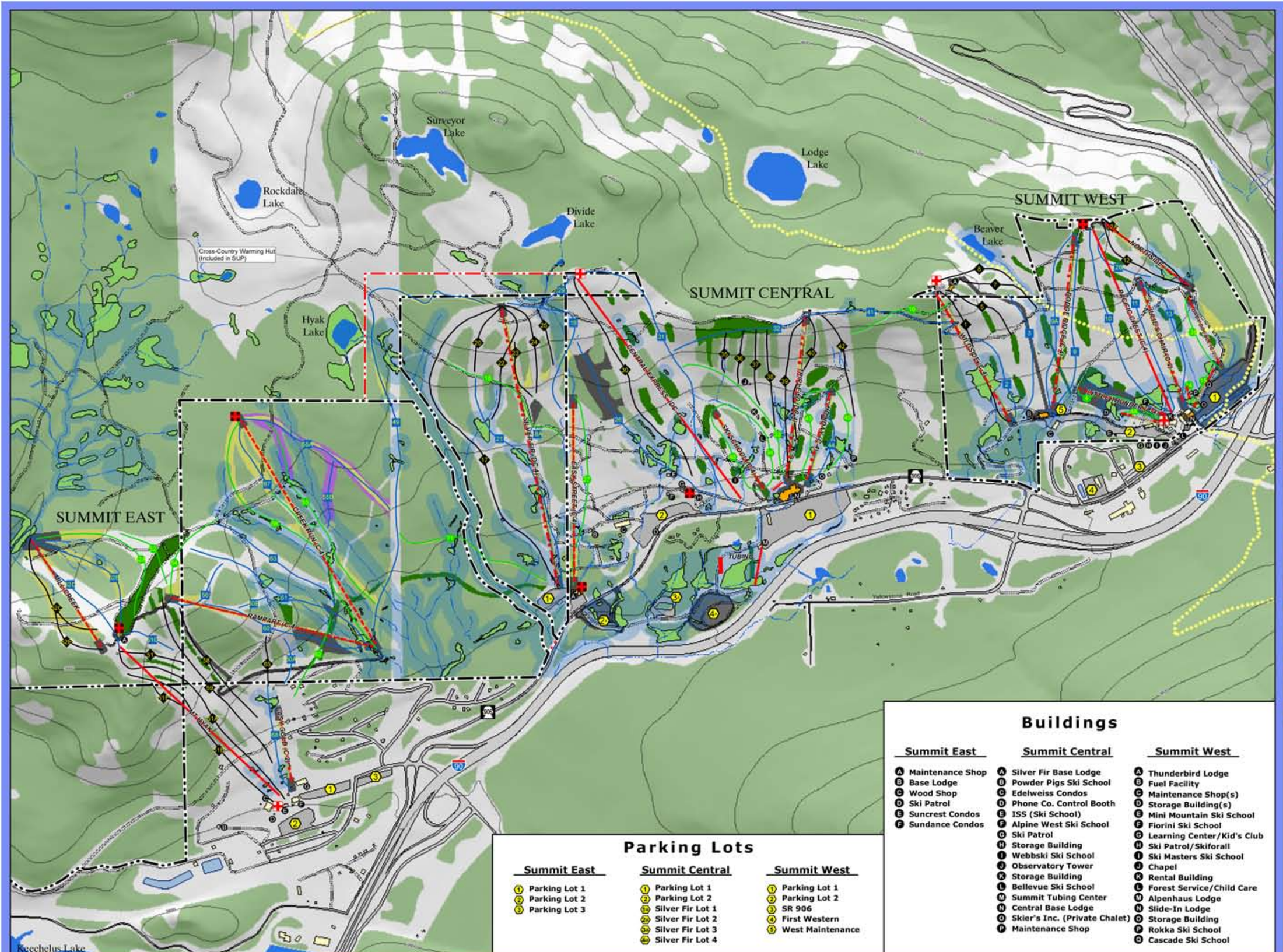
0 625 1,250 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1250'

The Summit

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 4
Locations of Proposed
Chairlift, Ski Trail
and Facility Construction

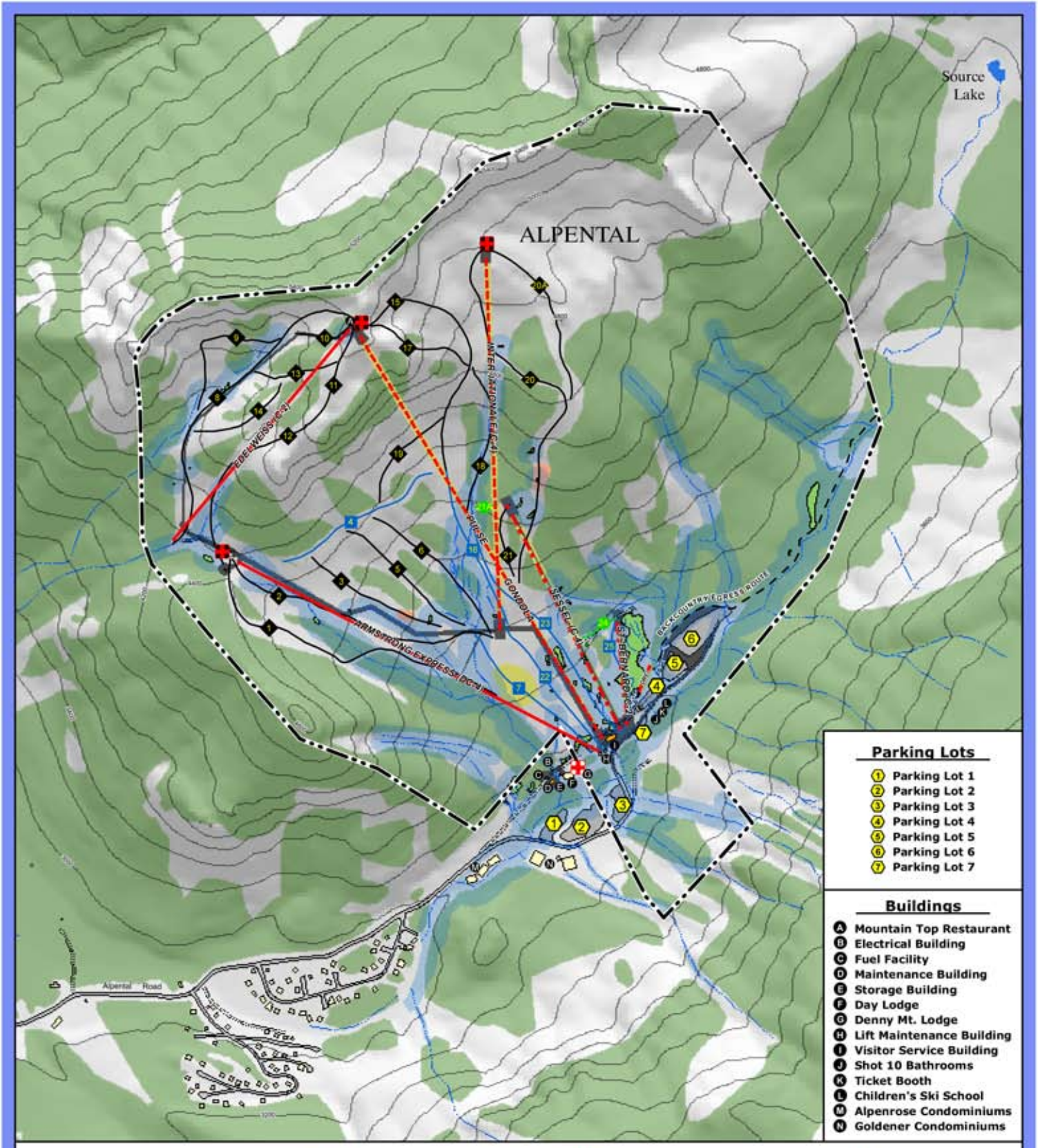


Legend

- Chair Lift - Existing
- Chair Lift - Proposed
- Chair Lift - Modified
- Ski Trail - Beginner
- Ski Trail - Expert
- Ski Trail - Intermediate
- SUP Boundary - Existing
- SUP Boundary - Proposed
- Ski Patrol - Existing
- Ski Patrol - Proposed
- Building - Existing
- Building - Proposed
- Parking Lot - Existing
- Parking Lot - Proposed
- Pacific Crest Trail
- Retention Pond
- Streams & Riparian Buffers
- Lake/Pond
- Wetland
- Paved Road
- Glading
- Grading
- Clearing
- Revegetation

0 625 1,250 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1250'



Alpental

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 5

Locations of Proposed Chairlift, Ski Trail and Facility Construction

- Chair Lift - Existing
- Chair Lift - Proposed
- Chair Lift - Modified
- Ski Trail - Beginner
- Ski Trail - Expert
- Ski Trail - Intermediate
- SUP Boundary - Existing
- Ski Patrol - Existing
- Ski Patrol - Proposed
- Building - Existing
- Building - Proposed
- Parking Lot - Existing
- Streams & Riparian Buffers
- Lake/Pond
- Wetland
- Paved Road
- Blasting
- Grading
- Clearing

0 625 1,250 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1250'

The Summit

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 6
Proposed Utilities
Night Skiing and Roads
Alternative 2

Legend

- SUP Boundary - Existing
- SUP Boundary - Proposed
- Lake/Pond
- Paved Road
- Night Skiing Equiped

Roads

- Road - Native
- Road - Proposed
- Road - Removal

Fuel Tanks

- Diesel Fuel Tank
- Gasoline Fuel Tank
- Propane Fuel Tank
- Proposed Propane Tank

Utility Lines by Status, Type

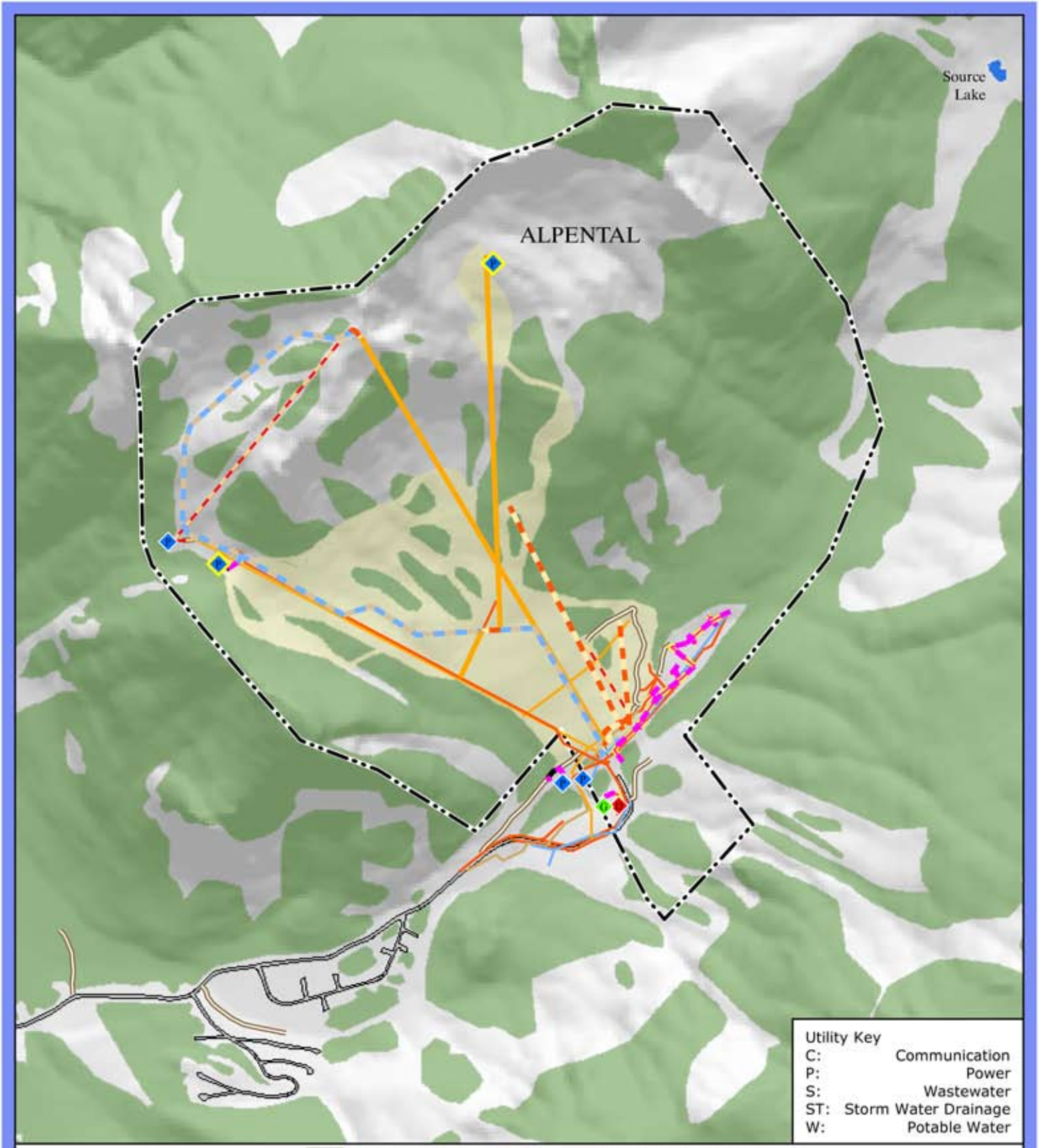
- existing, C
- proposed, C
- existing, C,P
- proposed, C,P
- existing, C,P,S
- existing, CATV
- existing, P
- proposed, P
- proposed, P,S,W
- existing, S
- existing, S,W
- proposed, S,W
- existing, W
- proposed, W
- proposed, ST
- proposed, C,P,S,W

Utility Key

C:	Communication
P:	Power
S:	Wastewater
ST:	Storm Water Drainage
W:	Potable Water
CATV:	Cable Television

0 625 1,250 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1250'



Alpental

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 7

Proposed Utilities
Night Skiing and Road
Alternative 2

SUP Boundary - Existing
Paved Road
Lake/Pond
Native Road
Night Skiing Equiped

Fuel Tanks

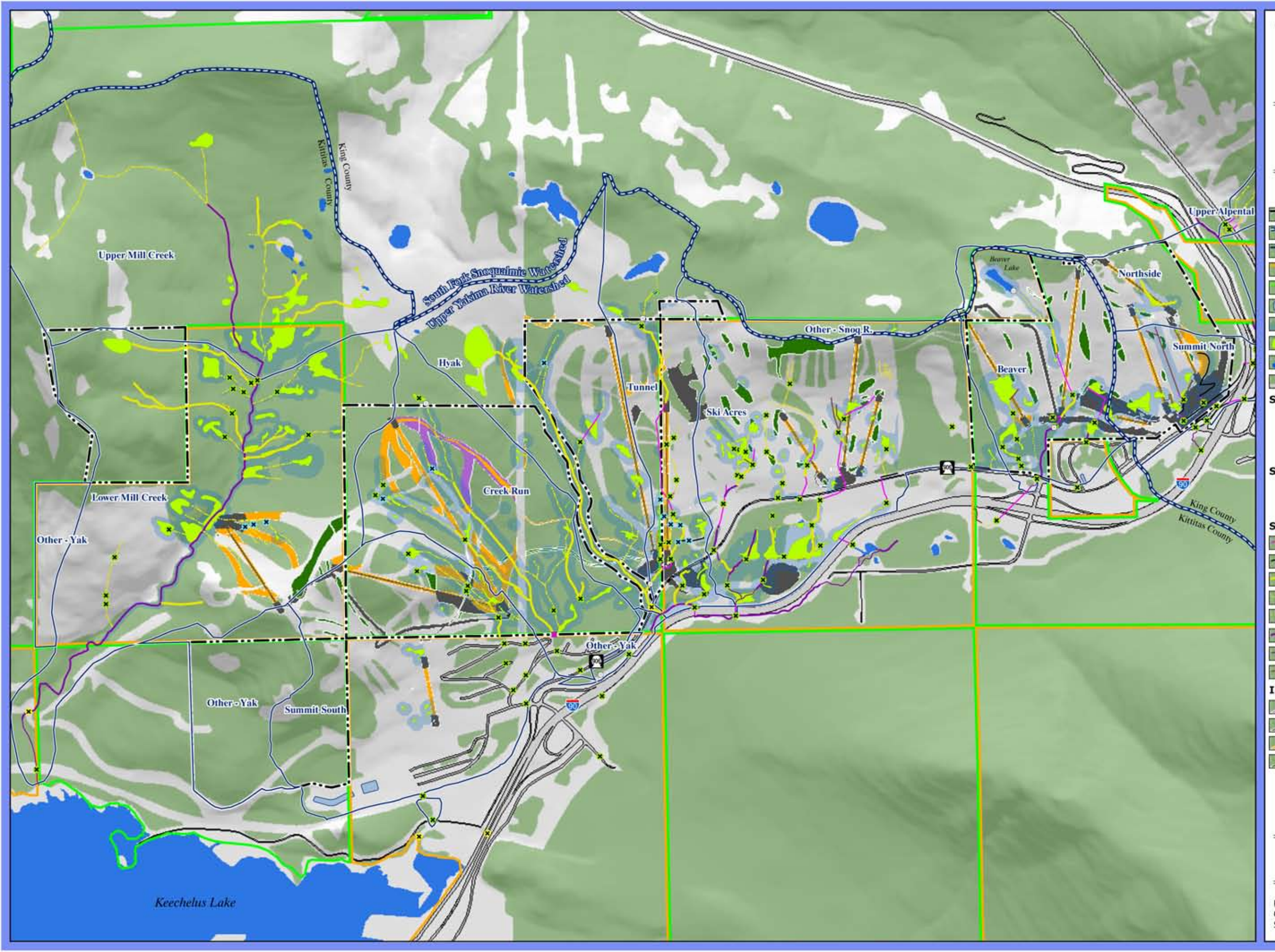
Diesel Fuel Tank
Gasoline Fuel Tank
Propane Fuel Tank
Proposed Propane Tank

Utility Lines by Status, Type

existing, C
proposed, C
existing, C,P
proposed, C,P
existing, P
existing, S
existing, W
proposed, ST
proposed, S,W
proposed, C,P,S,W

0 625 1,250 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1250'



The Summit

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 8
Hydrography Impacts
Alternative 2

Legend

- SUP Boundary - Existing
- Watershed Boundary - 5th Field
- Watershed Boundary - 7th Field
- Privately Owned Land
- Publicly Owned Land
- Retention Pond
- Riparian Buffers
- Wetlands
- Lake/Pond
- Paved Road

Stream Crossings

- Bridge - Existing
- Culvert - Existing
- Ford - Existing

Stream Monitor Site

- Stream Monitor Site
- Stream Monitor Site - Continuous

Streams - Channel Type

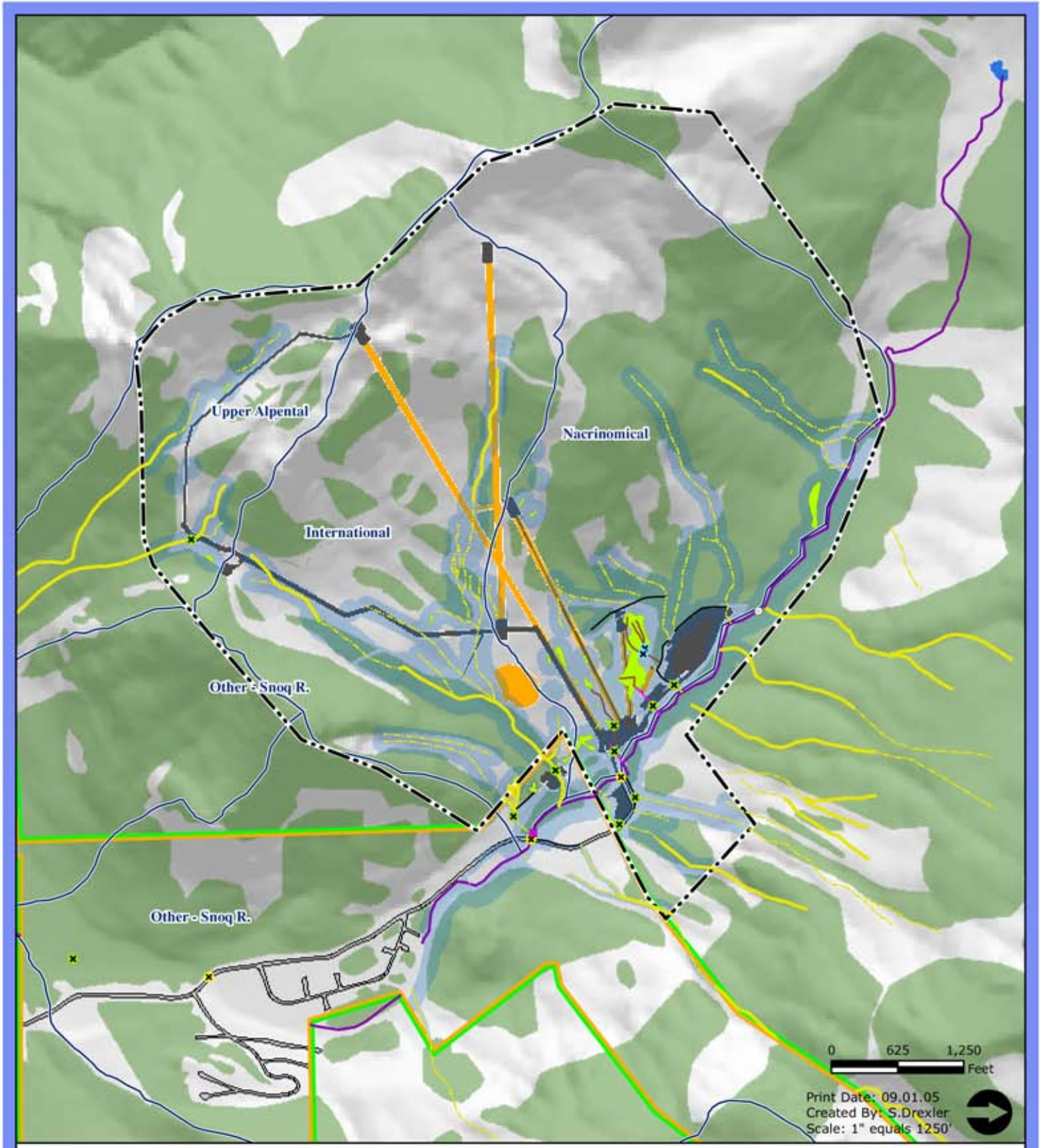
- Culvert (C)
- Ditch (D)
- Mountain Stream 1 (MS1)
- Mountain Stream 2 (MS2)
- Mountain Stream 3 (MS3)
- Valley Bottom 1 (VB1)
- Valley Bottom 2 (VB2)
- Waterbar (WB)

Impacts

- Glading
- Grading
- Clearing
- Revegetation

0 750 1,500 Feet

Print Date: 09.01.05
Created By: S.Drexler
Scale: 1" equals 1500'



Alpental

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 9
Hydrography Impacts
Alternative 2

- SUP Boundary - Existing
- WatershedBoundary-7thField
- Privately Owned Land
- Publicly Owned Land
- Riparian Buffers
- Lake/Pond
- Paved Road
- Wetlands

Streams - Channel Type

- Culvert (C)
- Ditch (D)
- Waterbar (WB)
- Mountain Stream 1 (MS1)
- Mountain Stream 2 (MS2)
- Mountain Stream 3 (MS3)
- Valley Bottom 1 (VB1)
- Valley Bottom 2 (VB2)

Impacts

- Blasting
- Grading
- Clearing
- Bridge - Existing
- Culvert - Existing
- Ford - Existing

Stream Monitor Site

- Stream Monitor Site
- Stream Monitor Site - Continuous

The Summit

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 10
Locations of Proposed
Restoration Projects

Legend

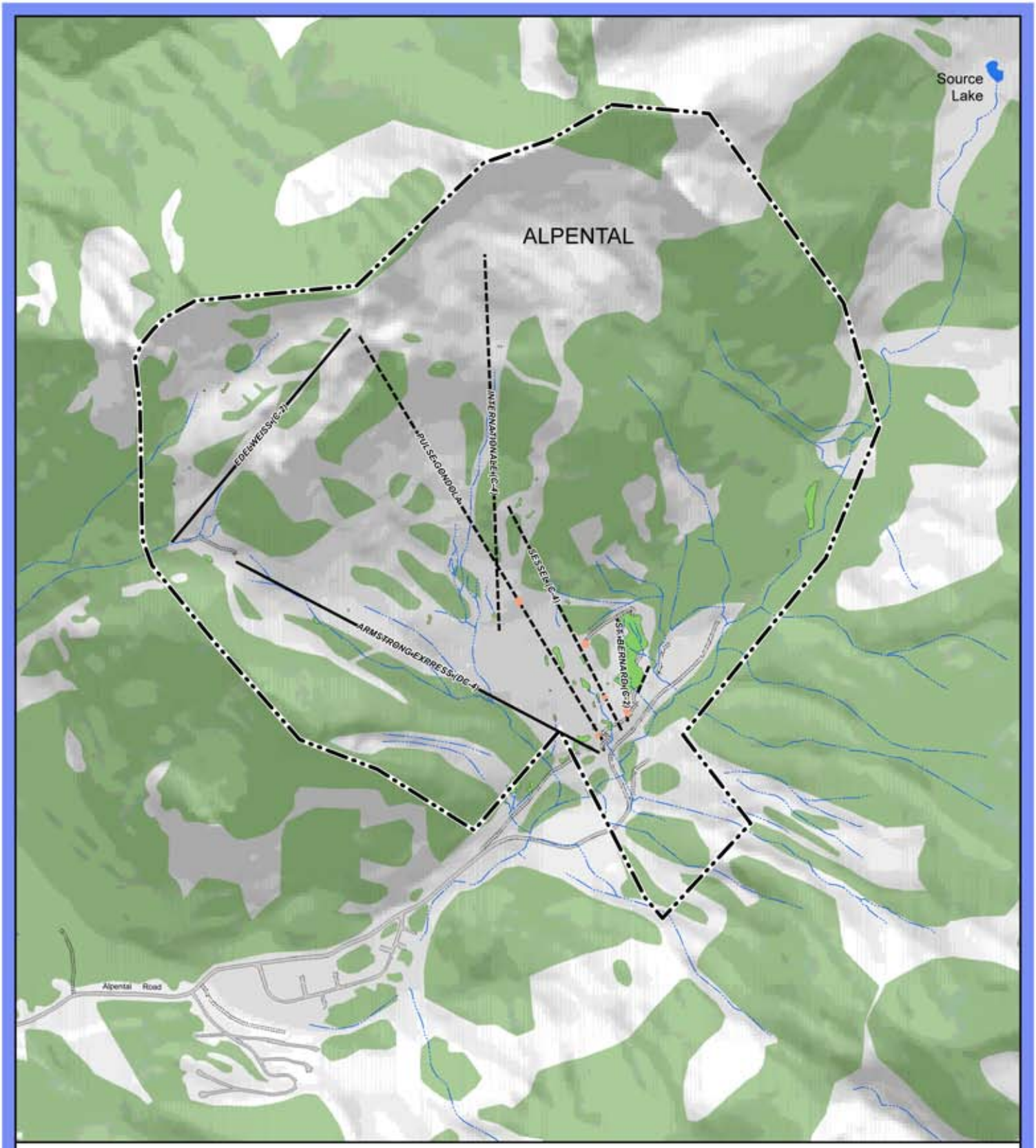
- Restoration Feature
- Chair Lift - Existing
- Chair Lift - Proposed
- SUP Boundary - Existing
- SUP Boundary - Proposed
- Streams
- Retention Pond
- Lake/Pond
- Wetland
- Paved Road

Restoration Type

- Road Decommision
- Slope Stablization
- Stream Restoration
- Tree Island Revegetation
- Wetland Restoration

0 625 1,250 Feet

Print Date: 07.07.05
Created By: S.Drexler
Scale: 1" equals 1250'



Alpental

Mt. Baker-Snoqualmie/
Okanogan-Wenatchee
National Forests

Figure 11
Locations of Proposed
Restoration Projects

- Chair Lift - Existing
- Chair Lift - Proposed
- SUP Boundary - Existing
- Streams
- Lake/Pond
- Wetland
- Paved Road

Restoration Type

- Tree Island Revegetation

0 625 1,250 Feet

Print Date: 05.17.05
Created By: S.Drexler
Scale: 1" equals 1250'