

Winner Creek Trails Feasibility Study



February 2007

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FEASIBILITY STUDY

*Nordic Ski Trails
Glacier-Winner Creek Valley
Girdwood, Alaska*

February 2007

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FEASIBILITY STUDY –NORDIC SKI TRAILS

Glacier-Winner Creek Valley

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Introduction

The Municipality of Anchorage Heritage Land Bank (HLB) commissioned this study to determine the feasibility of constructing nordic ski trails in Girdwood, Alaska.

HLB proposes to develop approximately 17 kilometers of Nordic ski trails within the Glacier Creek/Winner Creek valleys. The trail will be part of a phased development, and be coordinated with other development initiatives in the area, including the Winner Creek Ski and Golf Resort, the Arlberg Road Extension and the Crow Creek Neighborhood. This study evaluates the conceptual alignment that had been developed in conjunction with the concept plan for a golf and alpine ski resort in the study area (The SE Group Concept Plan).

This study assesses the trail project's feasibility with respect to design standards, constructability and sustainable maintenance. Alternative alignments, design standards, construction techniques and maintenance strategies were also evaluated. The preferred alternative will optimize development of the trail within the project's financial, technical, political and environmental constraints.

Project Goals and Objectives

The goal of this study is to identify appropriate Nordic ski corridor(s) in the study area that balance community sensitivities to increased public use with the needs, environmental consequences and proposed development in the area. To achieve this goal, the following objectives were pursued:

Objective 1: Assemble concepts and proposals by agencies and private developers addressing land use and trail development in the project area.

Objective 2: Work closely with the affected community, listen to and record concerns and perspectives on environmental, political, technical and financial issues.

Objective 3: Characterize opportunities for near-term and future phases of development and coordination with development in the project area.

Objective 4: Evaluate technical, environmental, financial, and political requirements for alternative access routes. Key elements of this evaluation will include alignment and cross-section, life-cycle costs, right-of-way requirements, utility conflicts and permitting requirements.

Objective 5: Document these analyses, conclusions, and recommendations in a series of plainly written, well-illustrated documents. Identify a recommended alternative and present an implementation plan to consider phasing of the trail development, costs and funding sources, operation and maintenance responsibilities. Consider opportunities for partnerships in the construction, operation and maintenance of the facilities with HLB, the Girdwood Board of Supervisors, the Anchorage Parks and Recreation Foundation, user groups and Girdwood businesses.

Study Methodology

Preparation of the feasibility study was divided into six tasks, followed by a project closeout phase. Specifics of each task are discussed below.

Task 1: Project Scoping

During the scoping phase, information was gathered from a number of different sources through meetings, field reconnaissance, and document review.

September 5, 2006 Presentation to Girdwood Trails Committee

September 12, 2006 On Site workshop with the Girdwood Trails Committee

Information was gathered from interested groups, individuals, and through on-site visits, including:

- Presentation to the Girdwood Trails Committee – September 5, 2006. presentation
- Winner Creek Trails Workshop with Girdwood Trails Committee – September 12, 2006.
- Questionnaires developed, circulated and data collected.
- Geographic Information System (GIS) Mapping.
- Field Reconnaissance utilizing Global Positioning System (GPS).
- Meeting with Alyeska Resort, Chugach Powder Guides.
- Discussion with U.S. Forest Service Trail ROW and Buffers.
- Discussion with Girdwood Residents

Existing documents and information was assembled, including:

- SE Group Concept Plan
- Crow Creek Neighborhood Land Use Plan
- Anchorage Area Wide Trails Plan
- Girdwood Trails Map
- Snow Avalanche & Mass-Wasting Hazard Analysis of Glacier/Winner Creek
- Trail Design and Construction Standards
- United States Ski Association 1991
- International Ski Federation Homologation Manual 2003
- Trail Design and Management Handbook
- Canadian Ski Trail Standards 2005
- U.S. Forest Service Design Standards
- U.S. Forest Service Wetland Trail Design and Construction
- International Mountain Bike Association, Trail Guide
- Nordic Ski Association of Anchorage 10-Year Plan for Soft Surface Trails
- Colorado Outdoor Training Initiative, Trail Instructors Guide
- Natural Surface Trails by Designer Troy Scott Parker
- Tread Lightly on the Land, Student Conservation Association

Management and Economic Examples

- Methow Valley Trail Association, Washington
- West Yellowstone Ski Education Foundation, Montana
- Nordic Ski Association of Anchorage
- Jackson Ski Touring Foundation, New Hampshire
- Bohart Ranch, Bozeman Montana

Studies Reviewed (The following studies, or links to these studies, can be found at americantrails.org.)

- Trail expenditures have been shown to reduce health care cost.
- The economic and social benefits of trails, Parks and Trails Council of Minnesota
- Economic Impacts of Trails, RTCA-National Park Service
- Trails in new developments a case study
- How cities use parks and trails for economic and community development
- How the Methow Grew and Economy-American Trails
- Nordic Trail Easements and Property Values in Crested Butte Colorado-American Trails
- Trails-A Scientifically Proven Asset
- Trail Based Economic Development
- Cost-Benefit Analysis of Physical Activity Using Trails

During Task 1, we entered all available trail data into the GIS system. Components included existing Girdwood trails, trail corridors as proposed by the SE Group Concept Plan, and trails proposed in earlier plans.

Task 2: Conduct a Screening Analysis of Proposed Route and Alternatives

The data collected in Task 1 was reviewed and assembled into a project database. The database employs a GIS system to memorialize project data in an open-source, three-dimensional format. This data was then used to identify alternative routes; these alternatives were presented in the draft report, and are included in this Final Report under the **ALTERNATIVES CONSIDERED** section.

Task 3: Detailed Analysis and Evaluation of Design Standards

During Task 3, attention was focused on the “short list” of access alternatives identified under Task 2. Additional research and field investigations were performed to fill in “data gaps” and fully understand key planning and engineering parameters, including topography, drainage, wetlands, right-of-way requirements, life-cycle costs, and coordination with other area development initiatives for each alternative. Task 3 was divided into two sub-tasks; develop screening methodology and analysis of alternatives.

Screening Methodology

Our evaluation of alternative access routes will use quantitative and qualitative criteria. We have proposed a weighted scoring matrix for these criteria that yields a numerical score and allows direct comparison. We will study alternative routes in sufficient detail to permit scoring against all the criteria. The total scores will then be tallied and the alternative route with the highest score will be the preferred alternative. The screening process is discussed more fully under the **Screening Process** section.

Alternatives Analysis

The evaluation methodology will be applied to a “short list” of alternatives. Evaluation criteria will include the following engineering, environmental, and planning factors:

- Conformance with recommended trail design standards
- Consistency with existing and proposed development
- Environmental consequences, primarily wetlands impacts
- Life-cycle costs (construction, operation, and maintenance)
- Impacts to drainage patterns and utilities
- Neighborhood concerns

Task 4: Public Involvement

Two series of public meetings were held for this project: one at the completion of Task 1, and the second after submittal of the draft study report (middle of Task 5.) Extensive public coordination after Task 1 allowed us to present our “list of alternatives” and explain why some of them were removed from further consideration. It also gave the public an opportunity to bring additional alternatives forward that may not have been identified in Task 1.

Our second series of public meetings included presentations to the Girdwood Trails Committee, the Mayor’s Open House, and a community open house that focused exclusively on the trail proposal. We scheduled the second open house for the convenience of area residents, to focus exclusively on this study without a time limit. This second open house helped Girdwood residents understand and accept our recommendations.

The second series of public meetings were:

- Mayors Open House-Alyeska Day Lodge, October 30th, 2006, and
- Nordic Ski Trail Open House-Town Hall, December 7th, 2006

The agenda for these meetings was:

- Briefly review the results of the first series of meetings
- Present the short list of alternative access routes
- Present our evaluation methodology and demonstrate its application
- Discuss our recommended alternative(s) and how the Municipality would proceed
- Listen to audience reactions to the conclusions and recommendations

Task 5: Draft Report

The activities accomplished in Tasks 1-4 above were documented in a draft report submitted November 6, 2006 that integrated the project database, Technical Memorandum 1, a summary of the alternatives analysis, and records of public involvement.

The report provided conceptual plan, profile and cross-sectional details of alternatives, graphically depicting the range of alternatives under consideration. Other elements incorporated into the report graphics included existing infrastructure, topography and land status, other proposed development projects (i.e., Crow Creek Neighborhood, water and sewer improvements, the Arlberg Extension), environmental constraints (i.e., identified wetlands, habitat areas, avalanche zones, etc) and other relevant features.

The Draft Report was circulated among agencies, the community, user groups and project stakeholders for review and comment. In addition to providing published “hard copies”, a digital version was provided for HLB’s web page and posted on TBC’s web site.

The draft report did not identify a “preferred” alternative. Rather the report presented the results of our alternative analysis and highlights the advantages and disadvantages of the alternatives considered in the context of our screening analyses. We believe an important element of alternative analysis and selection is the integration of public and agency comments into the final analysis.

We used the draft report comment period, November 8, 2006 through January 7, 2007, to implement our second series of public meetings (see Task 4 above).

Task 6: Final Report

Following the second comment period, we prepared this final report that incorporates public comments and presents final conclusions and recommendations for action. The Final Report will be circulated among agencies, the community, user groups and project stakeholders. In addition to providing published “hard copies”, a digital version will be provided for HLB’s web page and posted on TBC’s web site.

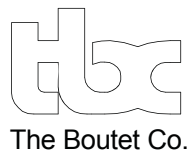
This report does present a “preferred” alternative; our recommendation is presented and fully discussed in the “Preferred Alternatives” and “Analysis” sections of this feasibility report

Project Close-out

The ultimate goal of this study is to identify a preferred trail network alignment that optimizes the technical, financial, political and environmental factors that will influence its development. Our implementation plan will also recommend a near-term development option that best uses the available funding, leverages other development activities that may contribute to the trail’s development, and “sets the stage” for further trail development in the study area.



Figure 1
Vicinity Map



Winner Creek Trails

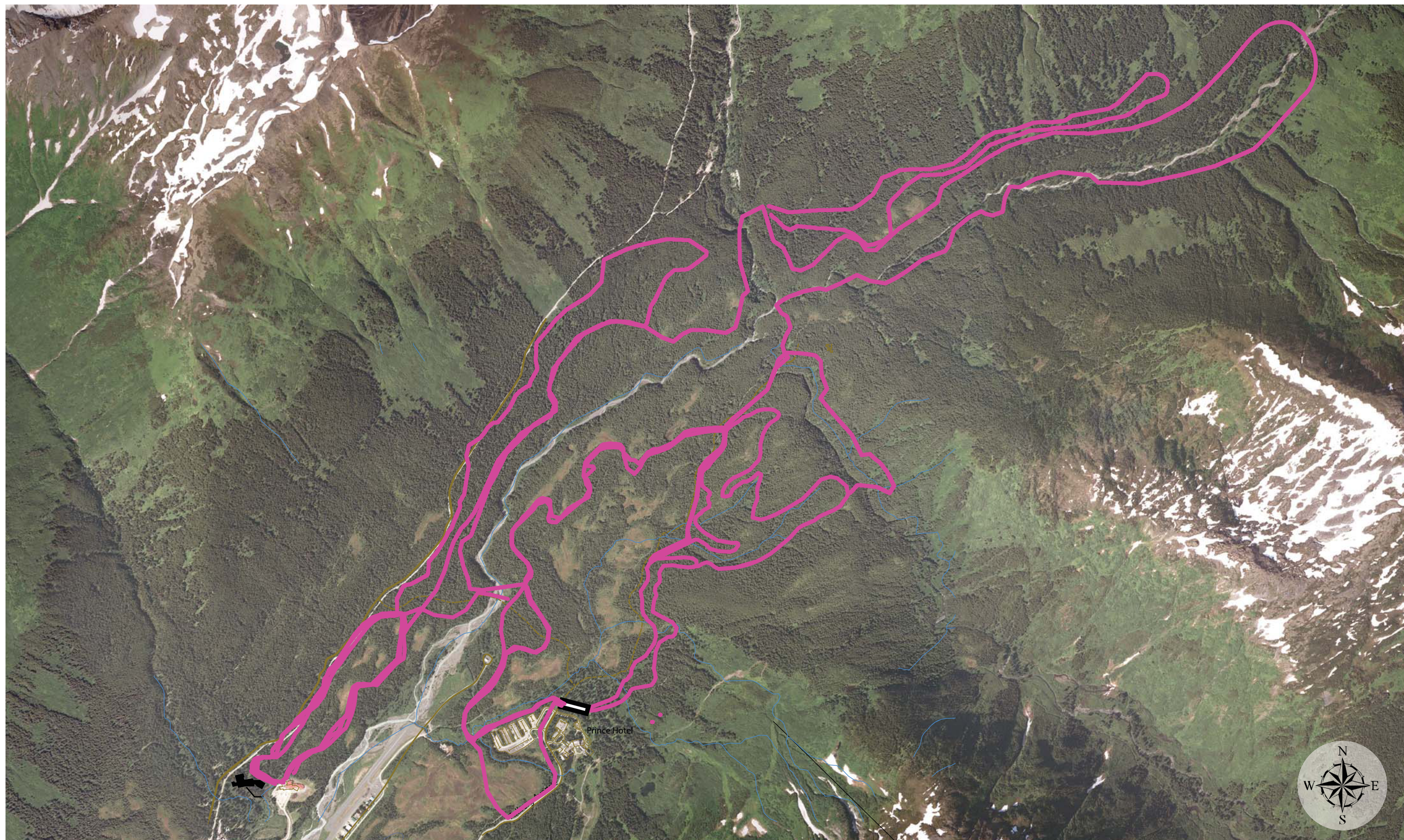
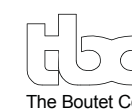


Figure 2
SE Group Proposed Corridors



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Girdwood Nordic Ski Trail Options

Trail Design Criteria

We evaluated trail design criteria that consider a wide range of functionality and development options, ranging from winter-only trails to year-round multi-use trails. Each option was then assigned general design criteria related to cross-section, horizontal/ vertical alignment, foundation and surfacing, drainage, construction and maintenance requirements and associated life cycle costs.

The following tables outline the design criteria for each of the preferred alternatives.

Designed Use Cross-Country Ski		Trail Type 1	Trail Type 2	Trail Type 2A
Usage Pattern		Accommodates high volume of summer and winter use	Moderate	Low to Moderate
Alignment		Good line of sight and very smooth changes in direction and grade.	Increasing challenging terrain. The trail follows existing terrain.	Most challenging terrain. Following natural terrain as much as possible.
Design Groomed Width*		20 Feet (6 Meters)	15-18 Feet (4.5-5.5 Meters)	18-30 feet (5-9 meters)
Clearing Width		A minimum of 1 meter outside the trail width, on each side of the trail. More width will be needed in side hills to contour the back slope.	A minimum of 1 meter outside the trail width, on each side of the trail. More width will be needed in side hills to contour the back slope.	A minimum of 1 meter outside the trail width, on each side of the trail. More width will be needed in side hills to contour the back slope.
Climb per Kilometer		5-15 Meters	15-20 Meters	25-40 Meters
Design Grade**	Target Range (>90% of Trail)	4-6%	5-8%	6-12% 12-15% up to 500-600 meters
	Short Pitch Max (Up to 200' lengths)	10%	15%	18% for 30-40 meters
	Max Pitch Density***	<5% of trail	<5%	<5%
Trail Surface	Trail Surface	Very Smooth	Smooth to variable	Smooth
	Trail Material	Imported Stabilizers to improve durability	Natural Material	Natural material or imported stabilizers if trail use is anticipated to be high
Grooming	Equipment	Large Snow Cat	Large Snow Cat	Large Snow Cat
	Standards	Groomed for both classic and skate	Groomed for both classic and skate	Groomed for both classic and skate
Summer Use		High density of use, mountain bike, hiking, walking, running	High density of use, mountain bike, hiking, walking, running	Low to Moderate due to difficulty of terrain
Other Comment		Good trail for lights if desired	Erosion control must be considered in the design and construction because of the steeper hills	Erosion control must be considered in the design and construction because of the steeper hills

Designed Use Multi-Use Trails		Trail Type 5
Usage Pattern		High Volume
Alignment		Constructed trail, grades, corner transitions, terrain will be determined by anticipated use
Design Groomed Width*		10-14 feet (3-4.5 meters)
Clearing Width		A minimum of 1 meter outside the trail width, on each side of the trail. More width will be need in side hills to contour the back slope.
Climb per Kilometer		10-15 meters, can be as high as 15-20 meters but not more
Design Grade**	Target Range (>90% of Trail)	5-10%
	Short Pitch Max (Up to 200' lengths)	12-15%
	Max Pitch Density***	<5%
Trail Surface	Trail Surface	Very Smooth
	Trail Material	Gravel hardened
Grooming	Equipment	Large Snow Cat
	Standards	Skate and Classic
Summer Use		All users. Because the trail is gravel hardened it will dry out early in the spring and dry out well after wet periods.
Other Comment		Multi use trail- Classic tracks are compromised due to multiple uses and the narrow width of the trail.

Trail Terrain Specifications and Standards

The FIS, International Ski Federation, provides the only credible standards for the design of competitive cross-country ski trails. (See table on Page 11). These standards address three categories of climbs, the maximum grade and vertical gain in climbs, the height difference, high to low point of the course, the total amount of climb in the course, and the width of the course. Additional data has been collected that establishes less rigid standards for novice and intermediate ski trails.

Trails for beginner, or novice, skiers should be no more than two to five kilometers in length, and have 10 meters or less climb per kilometer of trail. The maximal uphill grade should be in the 5%-10% range with no climbs or down hills in excess of 10% grades. In areas of two-way traffic, the grades should never exceed 6%.

Trails for intermediate skiers should fall 25% or more under the minimum standards established by FIS. Uphill climbs should be in the 9%-14% range. With maximum uphill and down hill grades not to exceed 14%.

Trails for competitive use or advanced skiers should be designed at the low to mid levels of the FIS standards. With uphill grades of 9%-18%, the steepest 18% grades are limited to climbs of five to six meters only.

Course Design Terminology

Climbs A, B, C

- A= Major uphill = Partial Height Difference (PHD) of 30-80 meters, gradient 9 - 18 %, normally broken with some short undulating sections less than 200 meters in length or a down hill that does not exceed 10 meter , PHD. Normally the maximum PHD should not exceed 80 meters
- B = Short uphill = PHD of 10 to 29 meters, gradient 9 - 18 % B-climbs can also permit sections with gradients of less than 9% providing that the B-climb includes some sections with a gradient $\geq 9\%$ and the average gradient is $> 6\%$.
- C = Steep uphill = PHD of 4-10 meters gradient of $> 18\%$. Climbs with < 4 m PHD will be included as undulating terrain or as part of an A- or B-climb.

* PHD is the net vertical climb, expressed in meters of all climbs on a homologated race course.

INTERNATIONAL SKI FEDERATION, FIS, STANDARDS						
Trail Distance (kilometers)	MC, Max Climb (meters)	TC=Total Climb (meters) Minimum and Maximum		HD=Height Diff. (meters)	Climb Per Km (meters)	
2	30	0	60	30	0	40
2.5	50	75	105	50	30	42
3.3	50	100	135	65	30	41
3.75	50	100	150	75	27	40
5	50	150	210	100	30	42
7.5	65	200	315	125	27	42
10	80	250	400	150	25	40
15	80	400	600	200	27	40
30	80	800	1200	200	27	40
50	80	1400	2000	200	28	40
Recreational Trails						
Sector	MC (meters)	Max Hill Grade	Average Hill Grade	HD (meters)	Climb Per Kilometer (meters)	
Novice/Beginner	5-15	6-10%	4-6%	15-20	5	10
Intermediate	20-30	8-12%	4-10%	40-60	15	25
Advanced	30-50	9-16%	6-12%	60-80	25	30

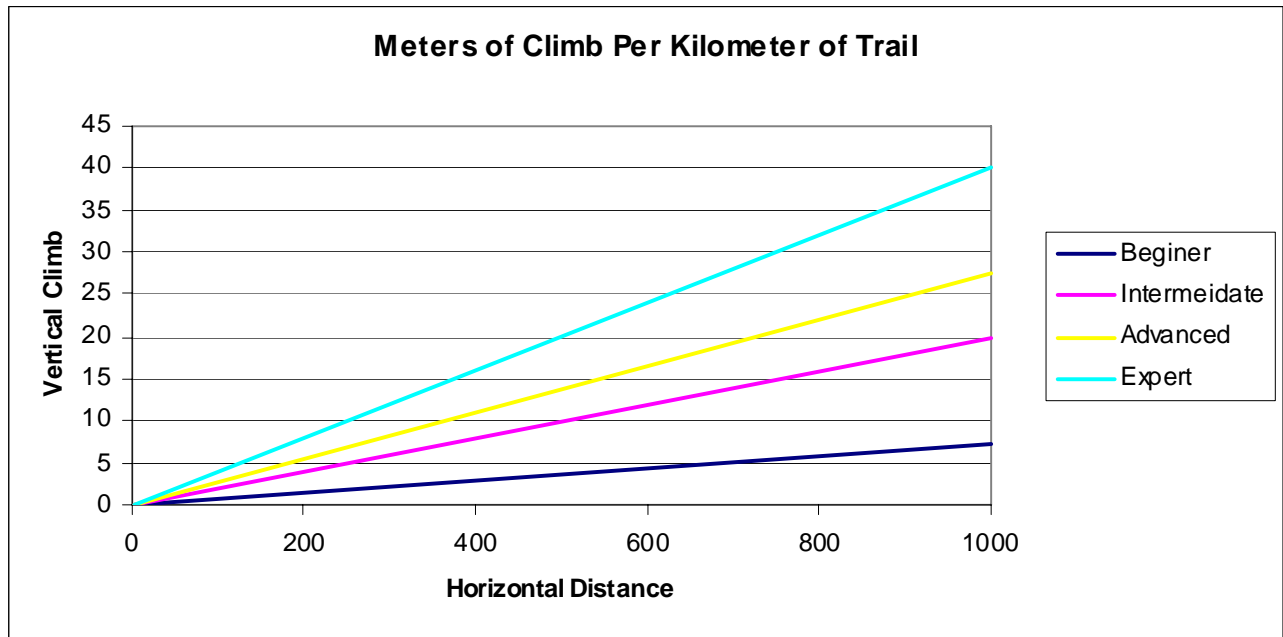


Figure 3a

Typical Trail Section Without Gravel Surface

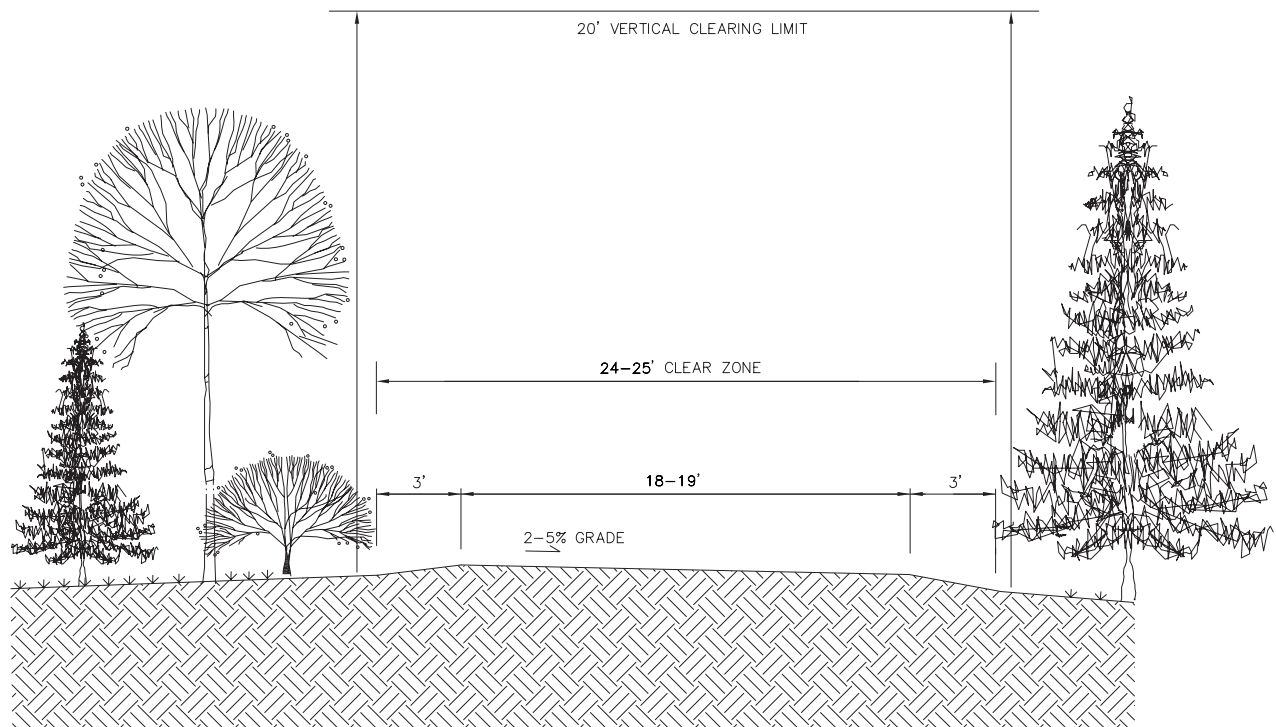


Figure 3b

Typical Trail Section With Gravel Surface

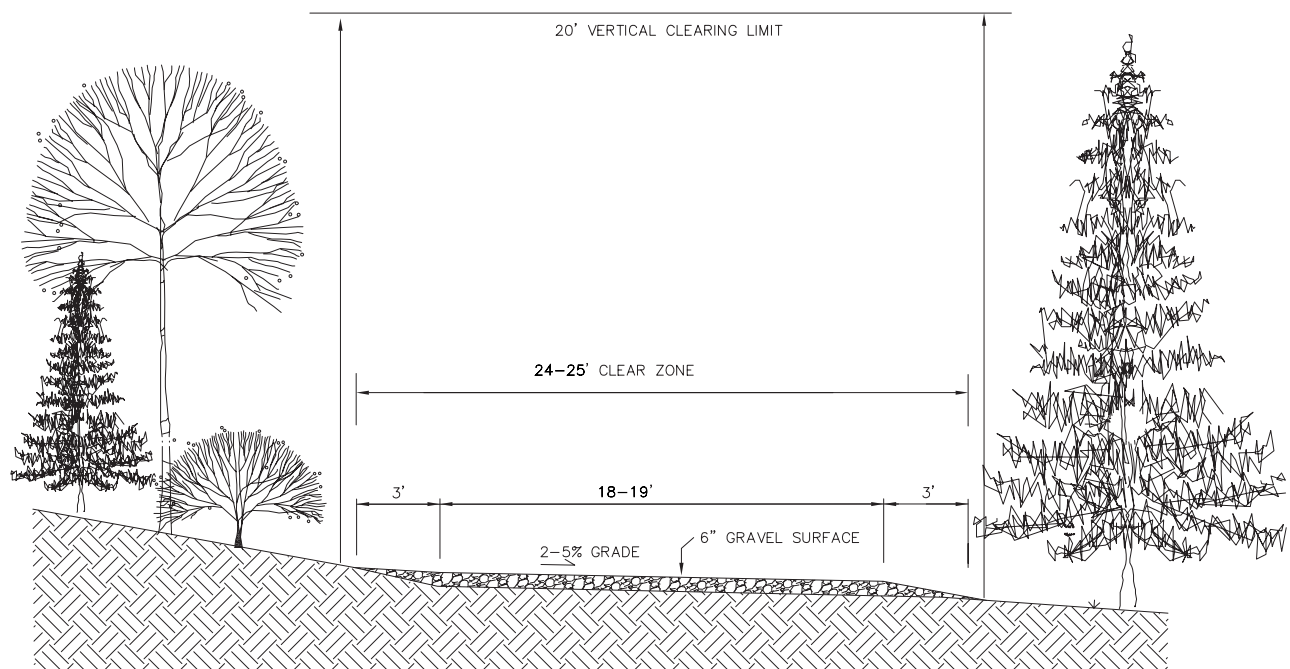
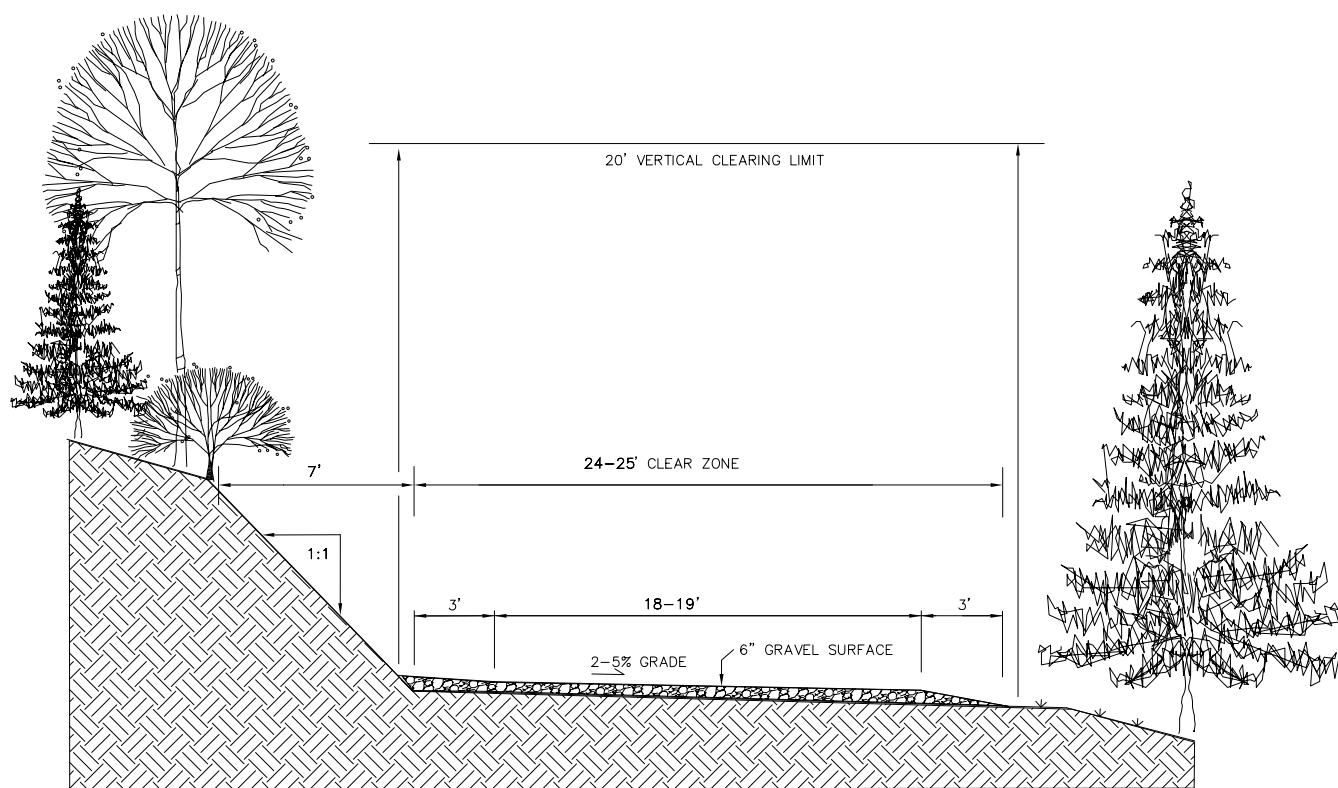


Figure 3c

Typical Trail Section With A 15% Sidehill Slope



Alternatives Considered

The draft study was initially divided into four areas that could be developed in phases and connected to create looped trails in each area, yet also create connections that link the entire Girdwood trail system.

- The **Winner Creek** section consists of an area of approximately one square mile, from the Alyeska Hotel north to the Winner Creek Trail and west to Glacier Creek.
- The **Upper Glacier Creek** section is the area north of Winner Creek, Four Corners Area, and on the east side of Glacier Creek. Although the SE Group concept included this area, we did not consider it in the scoping phase because of the need for extensive bridging, and the construction cost of trails in steep side hill terrain. If, in the future, development continues up the valley there is the potential for further trail development in this area.
- The **Crow Creek** section is an area that extends from Crow Creek's intersection with Glacier Creek to the proposed crossing of Glacier Creek, approximately three kilometers to the north. The Crow Creek area was not considered in the scoping phase because of accessibility issues, and the need for extensive bridging. This area has excellent terrain opportunities for future trail development.
- The **Girdwood Elementary School** section is the area just north of Girdwood Elementary School, continuing north approximately six kilometers to Crow Creek.

Aerial photography and GIS mapping were used to identify potential trail corridors, determine terrain suitability and constructability, and to identify alternatives. The mapping work was followed by extensive fieldwork using GPS. The fieldwork consisted of walking existing trails in the study area and a site assessment of several key corridors in a grid fashion to identify specific terrain features that should be included and/or excluded from any possible trail developments. The areas studied during the field work include the Winner Creek Area, the area of the proposed Crow Creek Neighborhood, and the Girdwood Elementary School.

We identified four possible trail configurations totaling about fifteen kilometers of new trails.

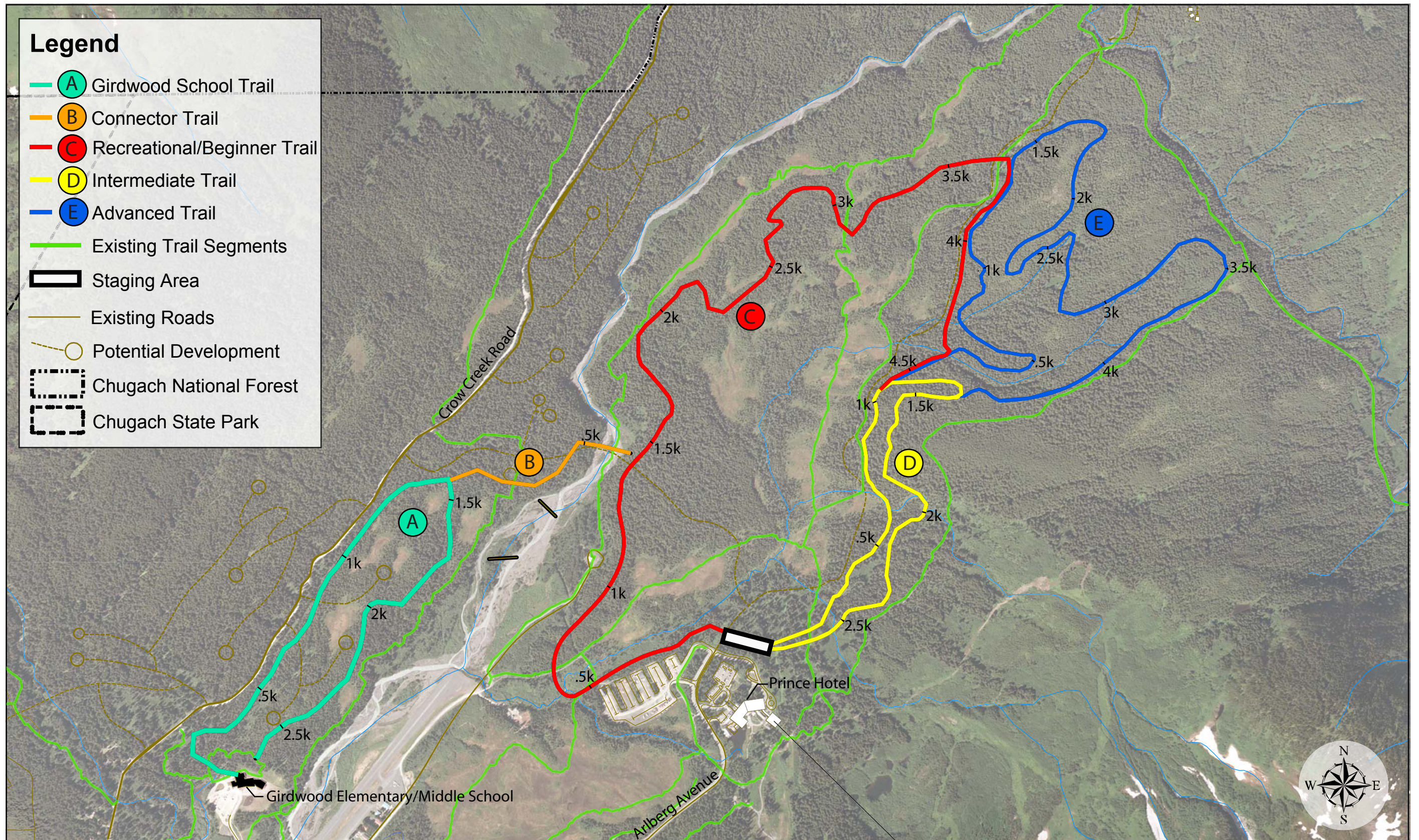
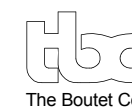


Figure 4
Final Study Area



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Girdwood Nordic Ski Trail Options

Crow Creek

The first option is in the area of the Girdwood School where there is potential for an approximately three-kilometer loop that would provide low challenge trails for Novice users. An additional four to five kilometers could be developed up to the Crow Creek area; due to the nature of the terrain, however they would be recreational trails in nature and would consist of a gradual 3%-4% outbound and inbound grade.

Girdwood School-Trail A-Green

Alignment should provide good line of sight distance and gentle sweeping turns to accommodate novice users. The profile of the trail should not include grades steeper than 10% and avoid abrupt transitions or changes in direction.

- Length: ~3 kilometers
- Proposed Design Standard: Trail Type 1
- Climb per Kilometer: 15-20 meters
- Volume of Use: High volume ski trail that accommodates a wide variety of users' abilities.
- Trail Width: 20 feet, 6 Meters
- Trail Surface: The surface should be smooth and have a flat cross section and incorporate soil stabilizers to improve durability of heavy summer use.

Average Uphill Grade			9%
Average Downhill Grade			-7%
	Meters	Kilometers	
Length	2743.2	2.74	
HD	38.10		
TC	64.00		
Climb Per Kilometer (meters)	20.33		

In the draft phase of this study three critical issues surfaced regarding the potential to develop trails in the area of the Girdwood Elementary School. Those concerns were parking, school and playground security, and the need for public restroom facilities. There was strong public support for a trail in this area, and the terrain would be good for a beginner to intermediate trail. Unfortunately, the potential cost of developing additional parking and facilities away from the school made it economically unfeasible for the first phase of Nordic trail development to be in this area. Additionally, the economic feasibility of connecting this trail with the Winner Creek area was not possible within the financial constraints of this project.

*All of the trails outlined on the following maps represent proposed corridors. It should be noted that the location of any portion of this trail may move as much as 50 meters during the design phase, as the trail location is center-lined in the field.

Winner Creek Area

The second trail area is in the vicinity of the Alyeska Hotel and the Winner Creek Trail. In this area the development of novice, intermediate and advanced trails is possible.

C Trail-Red-Recreational/Novice

This is a constructed trail with user's speeds, terrain changes, and corner transitions considered in the design.

- Length: ~5.2 kilometers
- Proposed Design Standard: Trail Type 5
- Volume of Use: A high volume multi-use trail, difficulty level is low but there may be some sections in the intermediate range.
- Trail Width: 10-14 feet, 3-4.5 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section and gravel hardened if possible.

Average Uphill Grade			6%
Average Downhill Grade			-7%
	Meters	Kilometers	
Length	5.2	5.9	
HD	77.72		
TC	129.54		
Climb Per Kilometer (meters)	21		

D Trail-Yellow-Intermediate Level

Alignment should provide good line of sight distance and gentle sweeping turns to accommodate novice users. The profile of the trail should not include grades steeper than 10% and avoid abrupt transitions or changes in direction.

- Length: 3-3.5 kilometers
- Proposed Design Standard: Trail Type 1 (see page 16 for trail design standards)
- Volume of Use: High volume ski trail, which accommodates a wide variety of users' abilities.
- Trail Width: 20 feet, 6 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section, and incorporate soil stabilizers to improve durability of heavy summer use.

Average Uphill Grade			5%
Average Downhill Grade			-9%
	Meters	Kilometers	
Length	2743.2	2.74	
HD	51.82		
TC	74.676		
Climb Per Kilometer (meters)	27.22		

E Trail-Blue-Advanced Level

Alignment generally follows existing terrain, with maximum grades of 18% for short distances and average uphill grades of 6-12%. Line of sight distance and changes in direction are shorter and tighter.

- Length: ~4.5-5 kilometers
- Proposed Design Standard: Trail Type 2
- Volume of Use: Moderate user volume due to more challenging terrain.
- Trail Width: 18-20 feet, 5.5-6 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section, and uses existing material.

Average Uphill Grade			5%
Average Downhill Grade			-6%
	Meters	Kilometers	
Length	4632.96	4.63	
HD	76.20		
TC	150.876		
Climb Per Kilometer	32.57		

* Both the D and the E Trail have additional alternatives for, International Ski Federation, FIS, homologated trails that could be developed. To develop this option a start area would need to be developed in between the D and E Trails. Homologated trails would be designed to meet the standards shown on page 19-20. Homologation means the trails have been approved and certified by the FIS, for high level competition.

Screening Process

A weighted matrix was used to quantitatively and qualitatively assess the four proposed trail areas. In addition, we weighted the input of stakeholders, the agencies, and the community.

Nordic Ski Trails in Girdwood-Weighted Matrix

			Trail A=Green		Trail B=Orange		Trail C=Red		Trail D=Yellow		Trail E=Blue	
Parameters		Weighting	Raw	Score	Raw	Score	Raw	Score	Raw	Score	Raw	Score
Political	Groomed Trails	5	3	15.00	3	15.00	3	15.00	3	15.00	3	15.00
	Multi Use Trails	3	3	9.00	2	6.00	3	9.00	3	9.00	3	9.00
	Beginner Terrain	5	3	15.00	3	15.00	3	15.00	2	10.00	0	0.00
	Intermediate Terrain	4	1	4.00	1	4.00	2	8.00	3	12.00	2	8.00
	Race Terrain	2.5	0	0.00	0	0.00	1	2.50	2	5.00	3	7.50
	Lighting	1	1	1.00	0	0.00	0	0.00	1	1.00	0	0.00
	Consistency within proposed development	5	3	15.00	3	15.00	4	20.00	5	25.00	3	15.00
	Snow Making	4	0	0.00	0	0.00	0	0.00	3	12.00	1	4.00
Economic	Construction Cost	5	3	15.00	0	0.00	3	15.00	3	15.00	2	10.00
	O&M Cost	4	3	12.00	1	5.00	2	10.00	3	15.00	2	10.00
	Income Potential	4	1	4.00	0	0.00	3	12.00	3	12.00	1	4.00
	Meet Budgets Constraints	5	3	15.00	0	0.00	3	15.00	2	10.00	3	15.00
Environmental	Wetland Impacts	5	2	10	2	10	3	15	4	20	5	25
	Permit Requirements	5	1	5.00	0	0.00	3	15.00	3	15.00	3	15.00
Technical	Constructability	5	2	10.00	0	0.00	3	15.00	3	15.00	2	10.00
	Site Control	4	1	4.00	0	0.00	3	12.00	3	12.00	3	12.00
	Accessibility	3	1	3.00	1	3.00	3	9.00	3	9.00	1	3.00
	Connectivity	4	0	0.00	3	12.00	2	8.00	3	12.00	2	8.00
	USSA/FIS Standards	2.5	0	0.00	0	0.00	1	2.50	2	5.00	3	7.50
TOTAL SCORE			137.00		85.00		198.00		229.00		178.00	
Weighting scale, 1 being a low or minimal importance, 5 being very important.												
Raw Scores, 1 being of low, 3 being high												
For example: Lighting on trails is rated a 1 because it has not been supported in the community as highly desirable.												

Weighting of Public Comments (1 being low, 5 being high, public interest and support)

Consensus of Input of Trails to Develop

Develop Trail A-Green	3
Develop Trail B-Orange	1
Develop Trail C-Red	4
Develop Trail D-Yellow	5
Develop Trail E-Blue	2

Other Critical Issues

Connectivity to other trails in the valley	3
Competition caliber trails	4
Mix of beginner, intermediate and competitive trails	4

Moose Meadows Trails are in Class A High Value Wetlands and no changes or further development in those areas are possible	5
Do not build Trail C, as it encroaches on wilderness experience	1
Do not encroach on existing trails	4
Well planned and constructed trails have a positive economic impact on the community	4
Too little snow in the valley to develop ski trails	1
Girdwood School Security Issues	4
Develop 5-10 kilometers of ski trails	5
Snow making is possible on Trail D	3
Dedicate existing trails in the community	2
Girdwood needs to develop a comprehensive trail plan	4
Do not build any new trails in Girdwood	1
Develop single track mountain bike trails	1
Build trails close to existing road and parking infrastructure	5

Analysis of Preferred Alternatives

Public comments are summarized in the chart titled, “Weighted Scale of Public, Stakeholder and Agency Comments”. In this matrix we weighted the comments based on the number of people who expressed a particular opinion. A rating of 1 would mean very few people spoke in favor of this specific opinion, while a ranking of 5 indicated a very high level of public support.

Through the public process it became clear that the primary area to focus trail development was in the Winner Creek area, near the Alyeska Hotel. There was very strong support for developing a trail system that covered all ability levels from beginning, entry level, to more advance trails required for competitive skiing. There was also very strong community support for maintaining the Moose Meadows wetland area to preserve that particular recreational experience for the users.

Finally, there was strong support for creating connections to other trails and sections of Girdwood, as well as developing a master plan to consider all the varied trails and their uses in the valley. These issues are outside the scope of this study, but they are important issues to address in a separate study or in the master-planning phase.

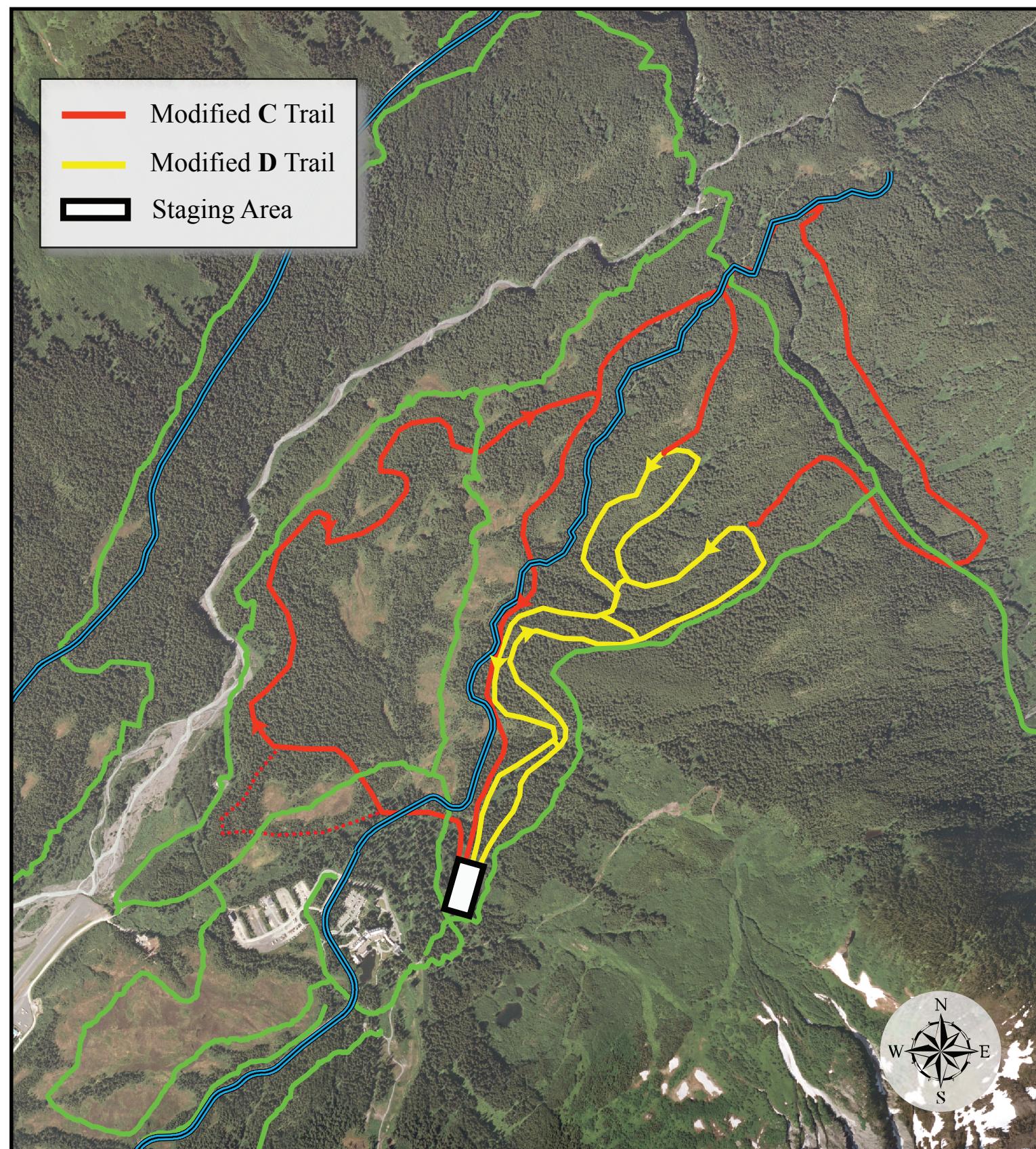
In the draft study three possible trail configurations were identified in the Winner Creek area. The D Trail - Yellow was proposed as an intermediate trail approximately two and one-half to three kilometers in length, and the E Trail - Blue was proposed as an advanced trail approximately four and one-half to five kilometers in length. These two trails combined represented an approximately seven to eight kilometer trail.

The third possible configuration was the C Trail - Red, designed as a Novice or less-challenging trail approximately five kilometers in length. This trail would use some portion of the existing Moose Meadows Trail for the shorter beginner’s loops and part of Stumpy’s summer trail for the longer portion of the loop.

RECOMMENDED ALTERNATIVE

Based on the assessment of the political, economic, environmental and technical data, we propose the initial development of 10 kilometers of trails in the Winner Creek area; the C Trail - Red, and a modified version of the D Trail, Yellow. These two trails would accommodate all anticipated short term needs and uses.

While not highly supported by public comments, trail lighting should be given further consideration. Given the short day light hours in the first three months of winter, a lack of lighting would have a negative impact on skier days and would deter potential trail use. It is also critical to consider the long-term cost. Installing trail lighting during the initial construction phase will be more cost effective than coming back in the future and disturbing the trail to install lights. This report recommends a minimum of 2.5 and up to 5 kilometers of lighted trail.



Trail Profiles

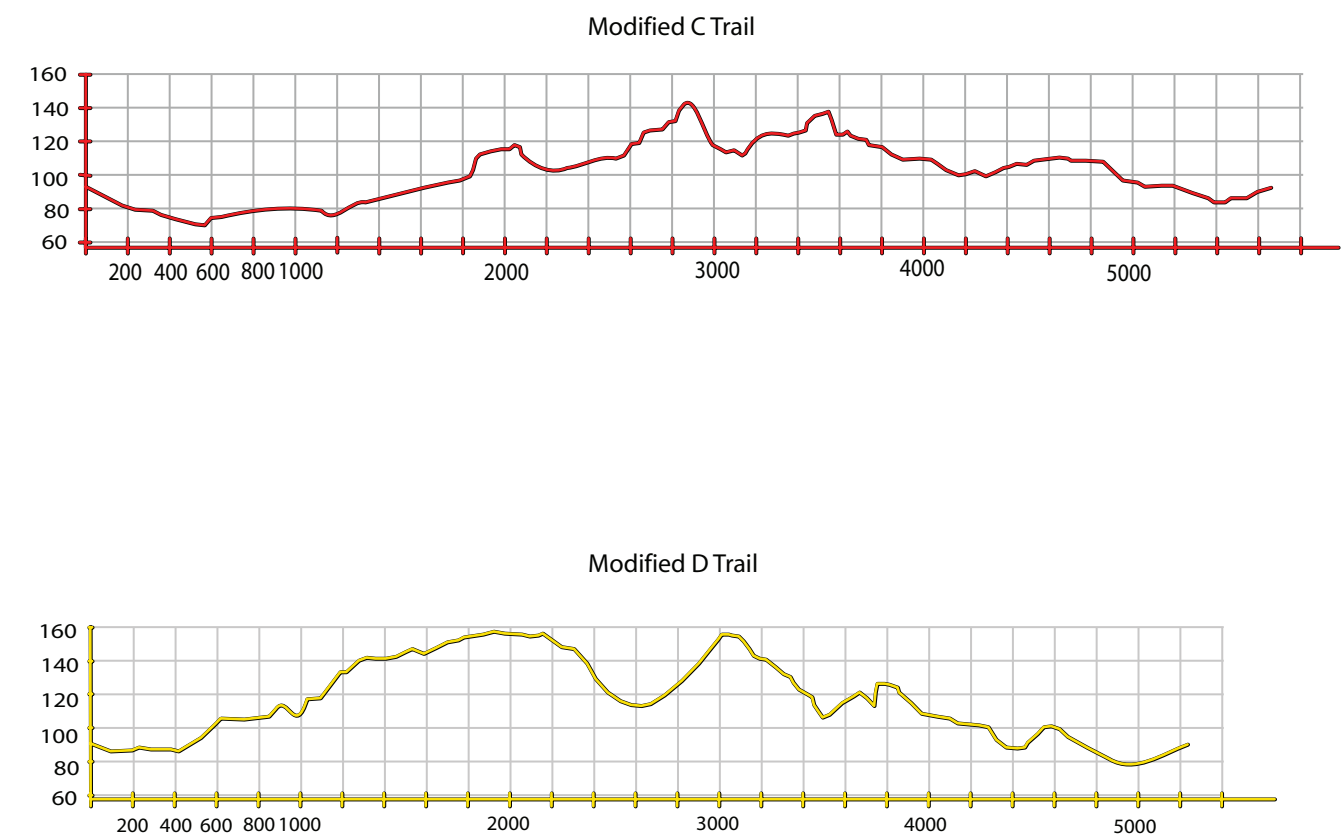
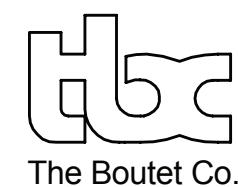


Figure 5
Final Alternatives



Heritage land Bank

Girdwood Nordic Ski Trail Options

Yellow Trail Details

The recommended Yellow Trail , made up of Trail D - Yellow as proposed in the draft study and some sections of E Trail - Blue, would meet two highly desired use patterns. The first 2.5-kilometer loop would provide intermediate skiing, while the second 2.5-kilometer section would provide a more advanced trail. This 5.0-kilometer loop could also serve as a race trail for multiple levels of competition, and would be assigned a moderate level of trail difficulty.

Alignment for the first 2.5-kilometer section should provide good line of sight distance and gentle sweeping turns to accommodate intermediate users and a high density of use. The profile of the trail should not include grades steeper than 10% and avoid abrupt transitions or changes in direction. This section of the yellow trail should accommodate the planned expansion of the Alyeska snow making system, and plans should address the need for water, power, and the necessary trail widths to accommodate snowmaking.

- Length: 2.5 Kilometer
- Proposed Design Standard: Trail Type 1
- Volume of Use: High volume ski trail, which accommodates a wide variety of users' abilities.
- Trail Width: 20 feet, 6 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section, and incorporate soil stabilizers to improve durability of heavy summer use.

First 2.5 Km Section				Second 2.5 Km Section			
Average Uphill Grade			3.5%	Average Uphill Grade			8%
Average Downhill Grade			--5%	Average Downhill Grade			-10%
Steepest Uphill			10%	Steepest Uphill			18%
	Meters	Kilometers			Meters	Kilometers	
Length	2500	2.5		Length	2500	2.5	
HD	45			HD	34		
TC	58			TC	100		
Climb Per Kilometer (meters)	23			Climb Per Kilometer (meters)	40		

Alignment of the second 2.5-kilometer section of the yellow loop generally follows existing terrain, with maximum grades of 16-18% for short distances and average uphill grades of 6-12%. Line of sight distance and changes in direction would be shorter and tighter.

- Length: 2.5 kilometers
- Proposed Design Standard: Trail Type 2
- Volume of Use: Moderate user volume due to more challenging terrain. .
- Trail Width: 18-20 feet, 5.5-6 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section, and uses existing material.

5 Km Yellow Trail

Average Uphill Grade			6.8%
Average Downhill Grade			-6%
Steepest Uphill			18%
	Meters	Kilometers	
Length	5000	5.0	
HD	79		
TC	174		
Climb Per Kilometer (meters)	35		

Red Trail Details

This is a constructed trail with anticipated high usage patterns. The speed of various users, terrain changes, and corner transitions will be considered in the final design. This trail is classified as a novice or beginner trail, but the trail profile data would meet intermediate trail criteria. After final design and construction, this trail will be very close to a beginner/novice level. While the Height Difference is somewhat great for a beginner trail the climbs will be constructed at very shallow grades, with the majority of the climbs are less than 3% grade with many long sections of 1-2% grades.

- Length: 5.0 kilometers
- Proposed Design Standard: Trail Type 5, except wider to accommodate grooming equipment.
- Volume of Use: A high volume multi-use trail, difficulty level is low but there may be some sections in the intermediate range.
- Trail Width: 16-18 feet, 5-5.5 Meters
- Trail Surface: The surface should be smooth and have a flat cross-section and gravel hardened if possible.

5 Km Red Trail

Average Uphill Grade			3.0%
Average Downhill Grade			-4.7%
Steepest Uphill			10%
	Meters	Kilometers	
Length	5000	5.0	
HD	74		
TC	100		
Climb Per Kilometer	20		

Permits and Approvals

Throughout the study process, emphasis was placed on selecting trail alignments that would have the least impact on sensitive areas and existing uses. The recommended trails avoid wetlands whenever possible; minor impacts may be unavoidable. Figures 6 and 7 present maps of land ownership and wetlands within proposed trail area.

Regulatory agencies will be contacted and provided detailed information concerning trail construction. Required permits and approvals will be obtained prior to the start of construction.

The following agencies, at minimum, will be contacted:

- State of Alaska Department of Fish and Game
- State of Alaska Department of Natural Resources
- U.S. Army Corps of Engineers
- Federal Aviation Administration (this project lies within 5 miles of an airport)

Approvals and permits will be obtained from other land holders, public, and private entities:

- Municipality of Anchorage, Heritage Land Bank Advisory Commission
- Municipality of Anchorage Building Permit
- Amendment of the Municipality of Anchorage Trail Plan
- Alyeska Resort

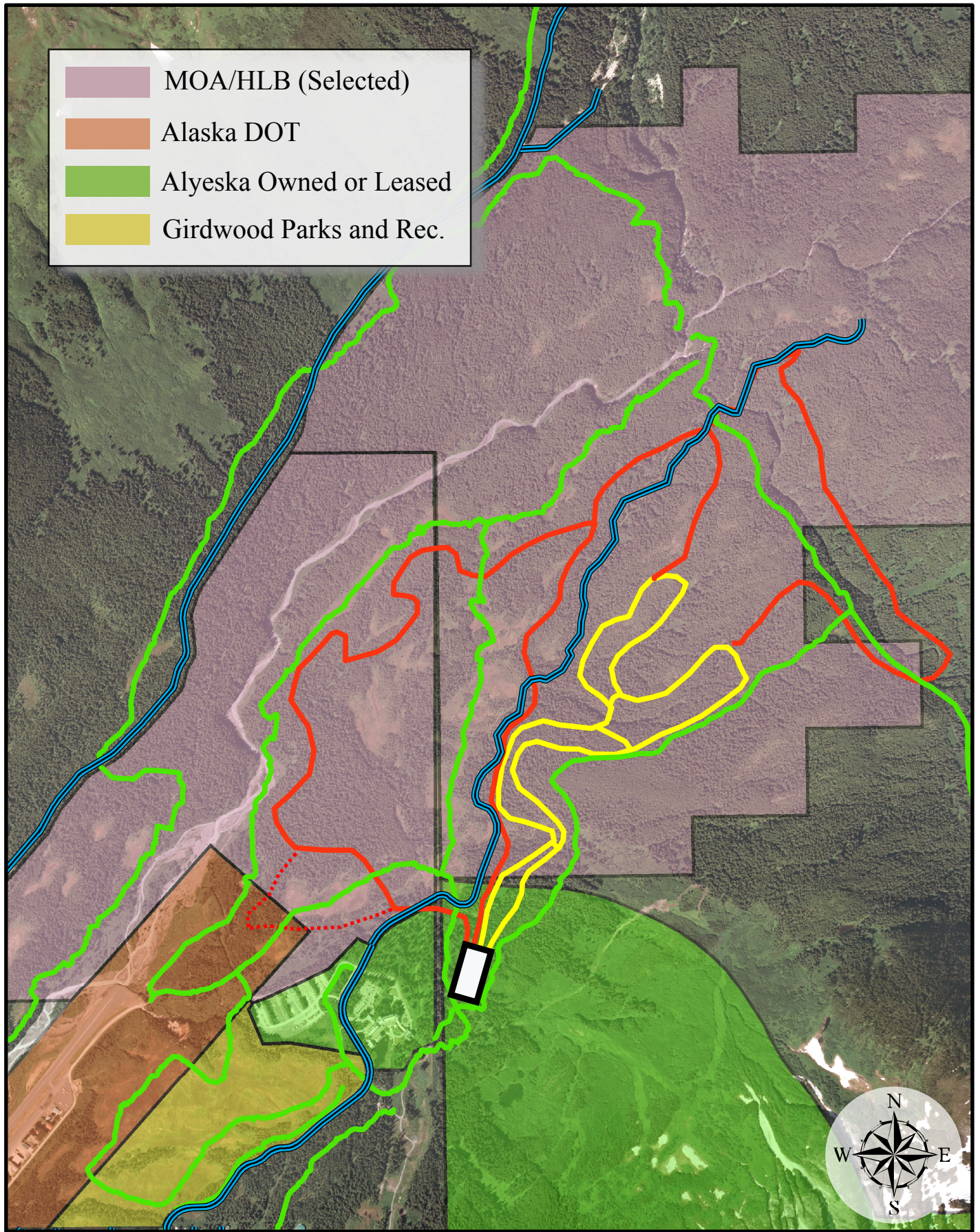


Figure 6
Study Area Land Ownership



Heritage Land Bank
Girdwood Nordic Ski Trail Options

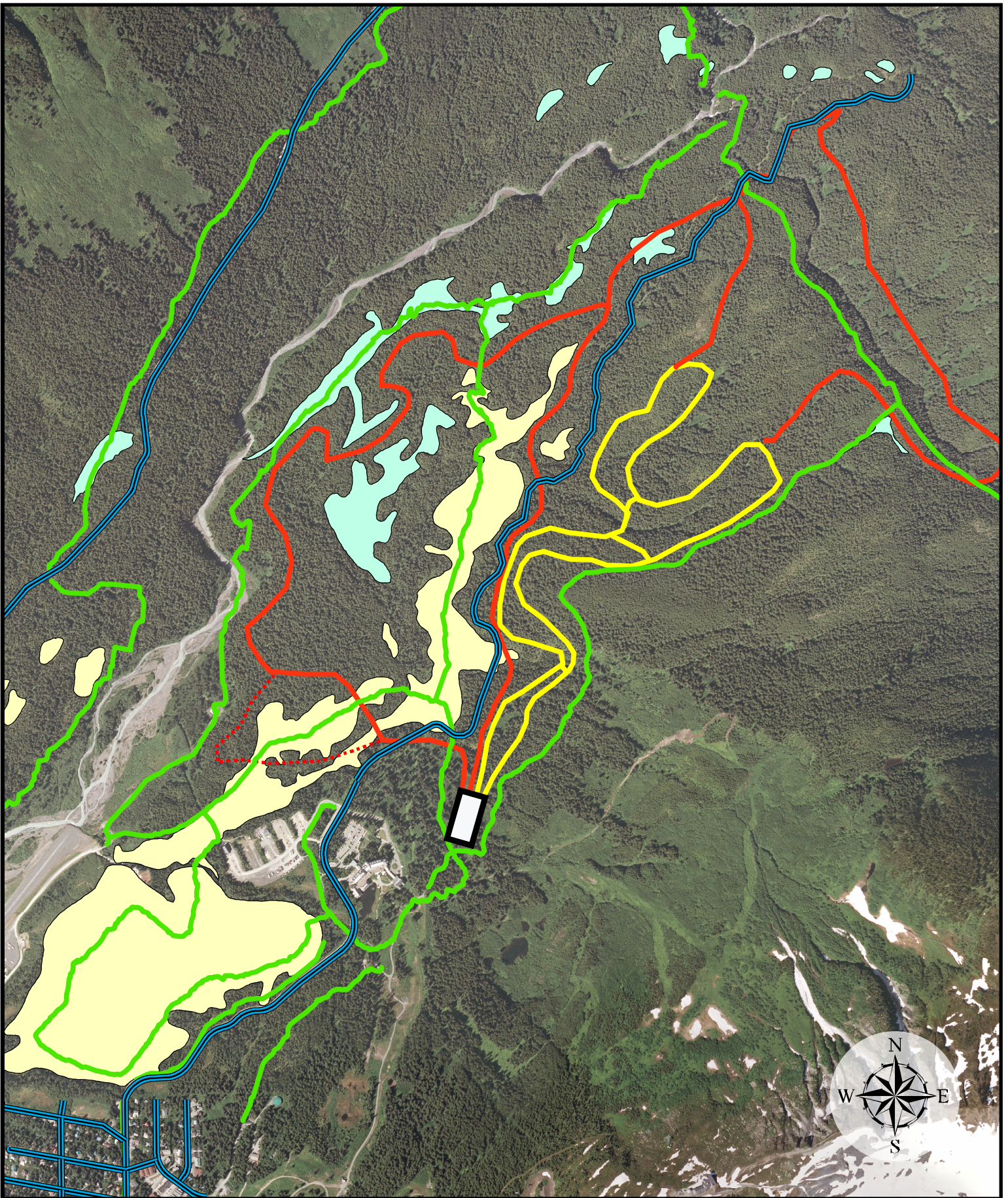
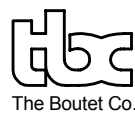


Figure 7
Study Area Wetlands



Heritage Land Bank

Girdwood Nordic Ski Trail Options

Construction Process

During the master-planning phase and prior to final approval the following key aspects will need to be determined.

- Who will build the trail and to what standards the trails will be built
- Identify the applicable construction features, import material versus local material, bridges, snowmaking infrastructure, drainage culverts, signage and amenities.
- Determine the construction window and time line.
- Identify construction concerns, wet areas, soils, and terrain.
- Trails should be designed and constructed for a maximum lifespan. Trails should be built to high quality standards of materials, specifications, and techniques. A quality built trail will minimize long term maintenance.
- The trails construction should be managed by a project manager to make “on the fly” construction decisions of construction methods, based on the conditions encountered.

The initial construction cost should be covered by HLB programmed dollars, foundation grants and other private sources.

Phase	Process	Estimated Cost per kilometer		Time Line
1	Tree Clearing and Stump Removal	\$8,000	\$10,000	2-3 Weeks
3	Excavation	\$20,000	\$35,000	3-4 Weeks
4	Soil Stabilization	\$5000	\$10,000	1-2 Weeks
5	Final Grade	\$1,000	\$2,000	1 Week
6	Trail Tread Compaction	\$1,000	\$2,000	1 Week
7	Seeding and Re-vegetation	\$500	\$1,000	2 Weeks
	TOTAL	\$35,500	\$60,000	

Construction Guidelines

- Stump tree clearing and stump removal. Trees will be felled and stumps removed. Small trees will be shredded to provide soil stabilization material as necessary. In areas where side hill cuts are necessary large trees and stumps will be buried on the out slope to add stabilization.
- Excavations of ditch lines on both sides of the trail, and the back slope and out slope cuts. The inorganic material excavated from the ditch lines will be used to form the trail tread. Side hill cuts will be full bench or partial bench depending on the existing soil conditions and the degree of side hill.
- Depending on the soil conditions D1 gravel or shredded trees may be mixed with the surface material of the trail.
- A small dozer will be used for final trail grading and out sloping of the trail where necessary.
- The trail will be rolled, especially on side hill cuts to compact the soils in the trail base.
- Seeding and revegetation

Side Hill Cuts

Full Bench cuts are most desirable for a sustainable trail. If partial bench cuts are made, then attention must be paid to retaining and stabilizing the downhill fill. Back slopes should never be vertical cuts and should have a 1:1 or minimum of 2:1 rise to run.

Water Management

Use grade reversals and rolling dips as often as necessary and when possible to shed the water from the trail. The trail should be ditched on both sides. In the case of severe water issues, culverts may be necessary in some areas, as often as possible culverts will be avoided in favor of rolling grade reversals, and rock armored ditches. Trail treads have a maximum out slope of 2%-3% to facilitate water sheeting off the trail.

Construction Cost

Approximate Construction Costs	Length (meters)	Cost
Red Loop	5000	\$177,500-\$300,000
Yellow Loop	5000	\$177,500-\$300,000
TOTAL		\$355,000-\$600,000

Operational Entity Alternatives

There are three possible alternatives for operational management of the trails.

- Private Sector Concession
- GBOS Allocated Park and Recreation Budget
- Establishment of a non-profit entity, similar to the Nordic Ski Club of Anchorage.

Private Sector

The management and new ownership of the Alyeska Resort has expressed a strong interest in the operation and management of new trail development in the Winner Creek area. A partnership between Girdwood Board of Supervisors, the city of Anchorage and the Alyeska resort is one alternative to maintain and sustain the new trail development. The Municipality of Anchorage, HLB, would negotiate an agreement with the Alyeska Resort to cover key aspect of the future operation, maintenance and management of the trails.

GBOS

The GBOS could allocate tax revenue for Parks and Recreation to pay for grooming, maintenance, and the future development of the trails. The GBOS they could contract with the Alyeska Resort or another entity for grooming and trail maintenance or they could provide the service through Parks and Recreation staff and equipment.

Non-Profit

A non-profit, similar to the Nordic Ski Association of Anchorage or the Methow Valley Trail Association could be formed to manage the trails and fund operation and management of grooming and development cost.

This report recommends that measures should be provided to avoid issues that are encountered by the Nordic Ski Association of Anchorage in their grooming and trail maintenance program. That is, approximately 1500 people voluntarily contribute to the trail grooming, while it is recognized that there may be as many as 45,000 regular skiers in Anchorage. All seasonal trail users should be expected to contribute in some fashion for the use of these trails.

Regardless of which form of operational entity is chosen, discussion of the following key points and the solutions should be outlined in a memo of understanding (MOU) between the MOA, HLB, GBOS and the operational entity. The MOU should clearly outline the financial, management, procedures and oversight of the business of trail operation.

- Establishing operational standards
- Setting and establishing cost for day use and seasonal passes.
- Methods for collecting trail/user fees.
- Future maintenance and development.

Grooming Cost and Income

The cost associated with grooming presented in the following charts was compiled and averaged from several sources. The chart summarizes the cost of grooming with a Pisten Bully or Prinoth Snow Cat. Cost estimates are based on a standard rate of depreciation, as well as the associated cost of maintenance and operation.

If the Private sector model is selected model is chosen, the Alyeska Resort already owns adequate equipment to groom and maintain ski trails. There will be some capital expense incurred by the resort to acquire and install a track pan on the existing equipment.

The establishment of a non-profit operation model would require the significant capital investment of grooming equipment, man power and training time.

Girdwood Trail Grooming Analysis			
Pisten Bully or Bombardier	Low	High	Average Cost
Capital Cost of New Equipment	\$ 150,000	\$ 235,000	\$192,500
Deprecation of Equipment (per hour)	\$ 20	\$ 30	\$ 25
Operational Cost Per Hour	\$ 125	\$ 155	\$ 140
Kilometers of Finished Trail (per hour)	6.0	8.0	7.0
Assumptions			
Length of Season (days)	130		
Kilometers of Trails Groomed Per Day	10		
Grooming Time	1.43		
Cost Per Hour of Grooming		\$ 165	
Cost of Grooming Per Day		\$ 236	
Cost of Grooming Per Year		\$ 30,643	

Economics of Trail Development

One key objective with this study is to identify costs and suggest opportunities that may exist to generate the necessary revenue for both trail construction and on-going maintenance. We used conservative estimates of 5,000 skier days, and moderately priced day use fees to project potential income.

A community can have many reasons to develop ski and multi-use trails. In many communities across the U.S., ski trails and multi-use trails were developed as a natural outgrowth of the communities' interest in skiing and other trail-based activities. In time, these trail systems grew and were improved, largely through volunteer efforts, as they have been in Anchorage. This is the first measure in creating sustainable trails: the desire and commitment of the community to develop and use their trails.

In recent years we have seen that there are other desirable results from a well-developed trail system in addition to recreational use by the community. Case studies have demonstrated that property values increase in proximity to trail systems; likewise some studies report that people are willing to pay almost 12% more for property located near or adjacent to trails.

Trails are viewed as providing an enhanced quality of life and improved communities. Businesses tend to locate and stay in communities that have well developed trails and recreational activities. Communities that invest in trail-based fitness activities see a corresponding decrease to their cost of medical care. Finally, a trail-based economy can be a significant part of a community's economic success.

User Fee Potential

User Fee Potential					
INCOME	Days	Users	Seasonal Rate	Daily Rate	TOTAL
Local Users		30	\$ 150		\$ 4,500
Daily Fees	130	38		\$ 20	\$ 98,800
Projected Daily Fee Skier Days		4940			
TOTAL					\$103,300
Expense					
Grooming Expense					\$ 30,643

The tables above showing the cost of grooming and the potential for income are estimates based on a moderate to high usage of the ski trails, and the ability to collect user fees for trail use. There are other business costs that are associated with the collection of user fees that are not accounted for here.

Research provided by the Cross Country Ski Areas Association indicates the average daily use fee ranges from a low of \$12 per day to a high of \$30 per day. Season passes for cross-country ski areas range from \$60 to \$500 per person. Insufficient data sets exist to predict skier days in a new area like Girdwood. However, research does suggest that a well-managed cross-country ski area located in an alpine resort community could capture 4%-6% of the alpine skier days in the first year, if the opportunity was marketed effectively.

Using conservative and quantifiable figures based on the number of trail pins sold in Anchorage, and participation in school programs, club programs, university programs, and races, we can estimate the base level of skier-days on the Anchorage Nordic trails at 189,000. It should be noted that the Nordic Ski Club trail pin program only captures a relatively small percentage of the actual trail users in Anchorage.

Given the popularity of the sport in Anchorage, combined with visitors to the Alyeska Resort, 5,000 to 10,000 skier-days should be easily attained.

The tables above showing the cost of grooming and the potential for income are estimates based on a low to moderate usage of the ski trails, and the ability to collect user fees for trail use. There are other business costs that are associated with the collection of user fees that are not accounted for here.

Implementation Strategies

There are six steps that need to be taken towards possible trail construction in the summer of 2008.

1. Review of Nordic Ski Trails plan within the master planning process for the Winner Creek Area.
2. Amendment of the Anchorage Area Wide Trails Plan
3. Corridor Preservation
4. Environmental Documentation
5. Preliminary Engineering
6. Final Design and Construction