

ARCTIC VALLEY TRAILS FEASIBILITY ASSESSMENT AND MASTER PLANNING SUPPORT

By

Anthony Naciuk, B.B.A.

A Project Submitted in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF SCIENCE

in

Project Management

University of Alaska Anchorage

May 2022

APPROVED:

Roger Hull, B.S., PMP, Committee Chair

LuAnn Piccard, M.S., PMP, Committee Member

Maeve Nevins-Lavtar, B.S., Committee Member

LuAnn Piccard, M.S., PMP, Chair

Department of Project Management

Kenrick Mock, Ph.D., Dean

College of Engineering

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Acknowledgments

The author thanks the University of Alaska Anchorage School of Engineering Project Management staff, Roger Hull and LuAnn Piccard, for their tutelage and guidance in seeing this project through to completion.

Gratitude is extended to the Anchorage Ski Club whose contributions of historical insight, key statistics, and time were key to achieving the project's goals.

Abstract

This project conducted a feasibility assessment to determine whether it is feasible to implement new trails at Arctic Valley. This assessment was executed by reviewing literature, collecting primary and secondary data, organizing data into tables, maps, interview logs, and documents. The data was analyzed and presented in summary reports elaborating on data collected, analysis performed, and findings. Findings were organized into six product packages for knowledge transfer to Anchorage Ski Club (ASC). These included a Stakeholder Feedback Report, Historical Infrastructure Analysis Report, Literature Review, Chugach State Park Regulation Change Process Model, Trail Mapping and Models Analysis, and Feasibility Assessment Report.

Upon conclusion of the research and reports, the feasibility of trails implementation was affirmed. It is tenable to build trails within ASC's Concession Contract area in accordance with regulatory guidelines, modern trail construction best practices, and ASC's financial capabilities. The data collected, analysis performed, and products created were transferred to the project sponsor and advisory committee. ASC was recommended to utilize the results conveyed and perform alternatives analysis of their proposed projects and investment opportunities.

Key Words

Concession Contract, Cross Country Bike, Downhill Bike, Fat Bike, Heatmap, Historical Infrastructure, Social Trail, Trail Management Plan

Arctic Valley Trails Feasibility Assessment And Master Planning Support

Introduction

Arctic Valley Ski Bowl was originally founded by military stakeholders in the 1940s, who were tasked with determining and implementing a recreational opportunity to improve morale among the troops; they chose to build Arctic Valley Ski Bowl (Tower, et al., 2004). Alpenglow, a civilian ski area later renamed Arctic Valley, was built to the north and exists to this day. It has existed under different Lease and Concession Contracts with Chugach State Park (CSP), which stipulated the terms and conditions for its operations on state parkland. Dedicated stakeholders maintained the area over decades, and in the most recent decade, have achieved a notable positive increase in patronage due to increased community events, infrastructure and recreation improvements. Recent improvement project ideas were unactionable due to their previous 60-year Concession Contract coming due to expire in 2020. The Contract was successfully renewed for 20 years, with 2 auto-renewal provisions. Given ASC may plan for 60 years of operations, ASC finds itself in a new position to renew their Master Plan, research, and analyze project opportunities anticipated to provide positive benefits to the community. As ASC begins to create their 50-year Master Plan, this effort served to execute planning, coordination, literature reviews, interviews, data gathering, analysis, mapping, trail modeling, and cost estimations. All information gathered was converted into reports on stakeholder feedback, the literature reviewed, historical infrastructure, trail models and cost estimates, and a summary feasibility report. The summary feasibility report contains a summary of research conducted, products created, and the assessed feasibility of implementing trails at Arctic Valley.

Problem Statement

With the renewal of Arctic Valley’s Concession Contract looming, stakeholders were not sure what the future held for the ski area. Proposed improvement project ideas were left unactionable, and they faced difficulty gaining momentum in terms of project resources and funding. The Contract was subsequently renewed, and they have begun drafting a Master Plan in collaboration with Huddle, Inc. ASC is in an optimal position to further enhance its recreational amenities for Alaskans. As engagement efforts associated with Master Planning, another effort to collect, arrange and analyze data was warranted to determine which opportunities possess the most potential to improve and sustain enhanced trail-based recreation, and to determine which opportunities would serve the most stakeholders best. Recent improvement project ideas that were previously unactionable have now garnered renewed support from stakeholders who foresee an increased likelihood of completion.

Among the many proposed questions and project ideas, was the question of the feasibility of implementing trails within ASC's Concession Contract.

Project Management Plans

Scope

The project utilized scope management to control the changes among project deliverables. A scope change log was updated iteratively as scope updates become available. See Exhibit 1, below. The sponsor was notified of scope changes as they surfaced.

SCOPE CHANGE LOG							
ID	Schedule Task #	DATE	REQUESTED BY	CHANGE DESCRIPTION	REASONS FOR THE CHANGE	STATUS	ACTIONS RELATED TO THE CHANGE

Exhibit 1: A scope change log was used to log scope changes in line with the category headings above

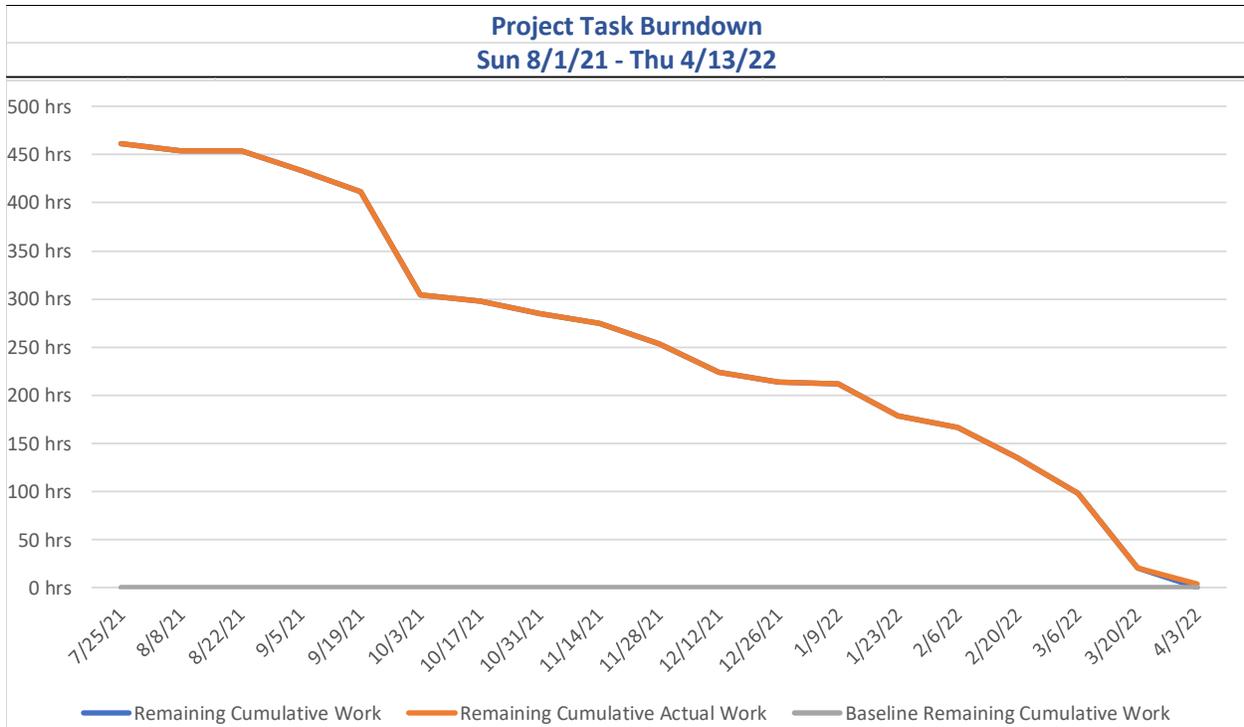
A total of 41 scope changes were logged throughout the project, all denoting changes of varying degrees to project concept, project management plan, research methods, and anticipated deliverables.

Requirements were logged in requirements traceability matrices during project initiation and execution.

These requirements molded the design of the feasibility assessment and the sub-deliverables. A work breakdown structure was also created for the maintenance of visibility to the scheduled tasks, as it relates to tracking completion of the defined requirements.

Schedule

The project schedule was managed in Microsoft Project and was the sole tool used for management of the schedule. Schedule and metrics variances were monitored in line with the metrics management plan and reported out at project committee and sponsor facing status updates. The metrics provided at status updates included CPI (cost performance index), SPI (schedule performance index), Task Burndown, and percent tasks complete. The template used for these status updates is included in Appendix G. This template is included below, in Exhibit 2.



Metrics				
WBS	Task Name	% Complete	CPI	SPI
1	AV Feasibility Study Project	99%	0.89	0.96
1.1	Project Initiation and Planning	100%	1.00	1.00
1.3	Project Execution and Closeout	98%	0.81	0.92
1.3.1	Literature Review	100%	1.00	1.00
1.3.3	Stakeholder Analysis	100%	1.00	1.00
1.3.5	Infrastructure Analysis	100%	0.77	1.00
1.3.7	Trail Mapping and Models Analysis	100%	0.61	1.00
1.3.9	Trail Modeling	100%	0.60	0.82
1.3.11	Create Feasibility Report	100%	1.08	0.86
1.3.13	Create Final Project Report	100%	1.00	1.00
1.3.15	Deliver Final Reports and Project Closeout	4%	0.00	0.00

Exhibit 2: This is the project performance schedule KPI status template as mentioned in the metrics management plan

Stakeholder

Stakeholder management was used on the project for various functions. The Stakeholder Identification Matrix was critical in identifying which roles stakeholders held on the project, and more importantly which stakeholders were identified as SMEs possessing the data necessary to execute the stakeholder interviews work package, which set the course for many of the deliverables thereafter. The matrix identified stakeholders as responsible, accountable, consulted, and informed (RACI). This was utilized as

a visual aid, and also confirmed which tasks each stakeholder was responsible, accountable, consulted, and informed. The stakeholder power-interest grid was utilized to visualize stakeholders’ power and interest concerning the project. More than anything, this was a useful reminder to remain engaged with these stakeholders at levels corresponding to their calculated power and interest. Throughout project execution, the scores assigned to these stakeholders were informally validated by observing the extent to which project continuation and performance relied on maintaining positive relationships and fostering open lines of communication. The stakeholder power-interest grid template used is below, in Exhibit 3.

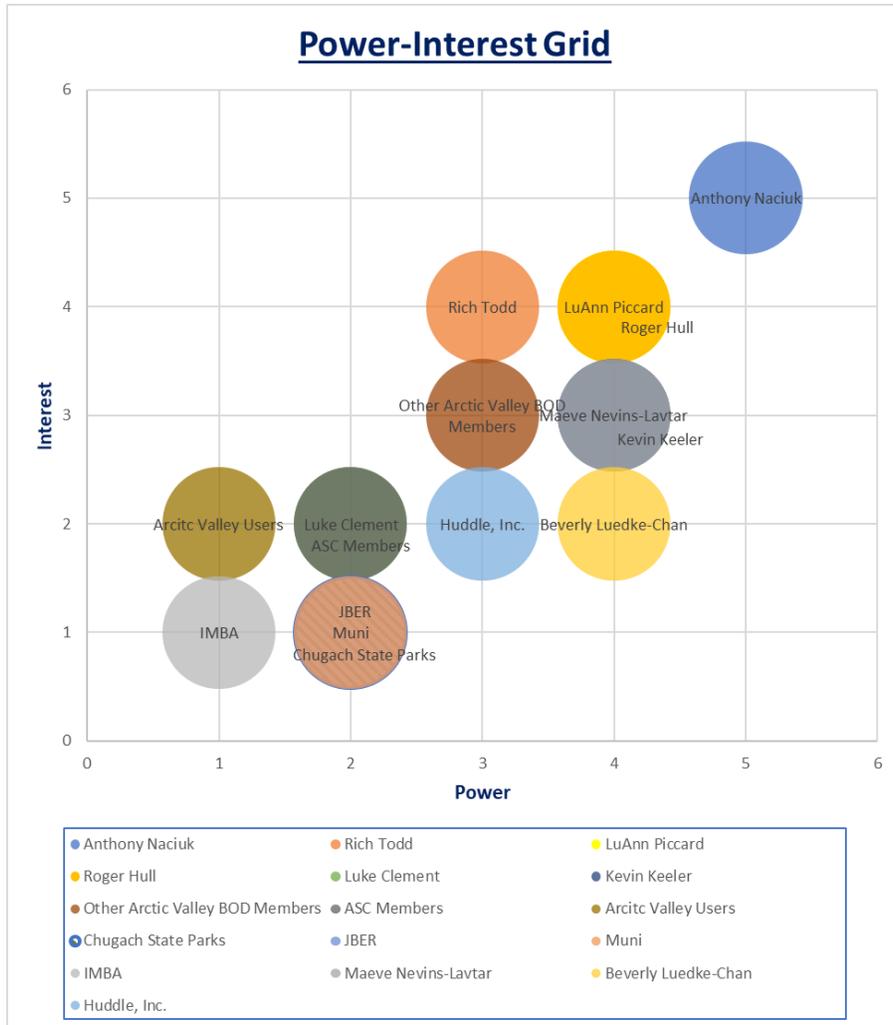


Exhibit 3: The stakeholder power-interest grid was utilized to visualize stakeholder power and interest concerning the project

Communication

The communication management plan was comprised of a set of six service level agreements (SLAs). The goal was for the project manager to adhere to these SLAs, from which benefits would be realized in terms

of improved project schedule and deliverable quality. Data was tracked and reported in line with each required submission of knowledge skill area performance data. This data is tracked in Appendix H.

Metrics

A metrics management plan featuring four primary components was created to establish critical success factors for enhanced project performance. Scope management critical success factors (CSFs) included immediate addition of scope changes to the scope change log and reporting of scope changes to the sponsor.

Communications CSFs included adhering to an email response SLA of under twelve hours, communication of project status between milestone updates, and visual presentation of communications performance data. This data is included in Appendix H.

Risk management CSFs included monitoring and updating of the risk log and Monte Carlo risk impact simulation. Both were updated throughout the life of the project as risks occurred, with realized risks appearing in status updates. One such realized multiple times was Risk ID #3, "Tech Issue Slippage." The impacts to the project were relatively minor, at less than 24 hours total. The probability score for #3 was raised to a 6 out of 6, from 2 out of 6. After making corresponding updates to the Monte Carlo risk impact simulation, a project cost increase averaging \$55 was observed.

Key performance indicators comprise the fourth section of the metrics management plan, with CPI, SPI, Task Burndown, and percent tasks completed provided in incremental status updates.

Risk

The risk management plan was implemented with the goals of risk prediction, mitigation and if necessary, response. Several approaches were utilized to track and mitigate risks, beginning with the Monte Carlo risk impact simulation mentioned as a component of the metrics management plan. The risk management plan defined three additional tools by which to improve risk monitoring and control. These included the risk level assignment table with risk register chart, risk management process flow diagram, and risk management RACI chart. In concert, these tools were used to assist the project manager in anticipating, monitoring, mitigating, and responding to risks. The example of Risk ID #3 "Tech Issue Slippage" was used to illustrate a risk realization. While the risk was realized and responded to per the planned response, the magnitude of the risk was reduced due to the mitigation emplaced: implementation of the cloud storage OneDrive for use as an additional buffer against data loss. Without this use of this mitigation, the risk realization would likely have been more significant.

Research Methods

A series of research methods and activities were utilized to conglomerate the information needed to perform analysis and draw conclusions.

The Literature Review was completed by receiving research recommendations from subject matter expert (SME) stakeholders. Initially, ten documents were selected for review, but this scope was reduced to four to align with schedule constraints. These sources include the Girdwood Trails Plan, Far North Bicentennial Park Trails Plan, Chugach State Park Management Plan, and Guidelines for a Quality Trail Experience. Requirements were extracted in the Literature Review Requirements & Notes Log when pertaining to trail design, upgrade, or regulatory topics. SMEs were referred to for questions, and the summary Literature Review document was created.

Stakeholder Interviews were conducted individually via phone with representatives from the following organizations: Anchorage Ski Club, Anchorage Muni Parks and Recreation, Single Track Advocates, Chugach Mountain Bike Riders, and Happy Trails. The stakeholders were asked to verbalize responses to the following questions:

- What is your background and involvement at Arctic Valley?
- Have you been involved with the Concession Agreement process? If so, in what capacity?
- Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
- What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
- What are 3 (or more) things you think should change at Arctic Valley?
- What are 3 (or more) things you think should not be changed at Arctic Valley?
- What changes are impossible at Arctic Valley?

Stakeholder responses were documented and consolidated into one document: Consolidated Stakeholder Feedback. Appendix D contains the full-length text, including response data.

Interviews with subject matter expert stakeholders elicited additional feedback which further corroborated Chugach State Park Management Plan guidance indicating trails implementation is aligned with CSP management plans. This process is not documented in any public online sources; thus, the process was documented using the feedback provided by the aforementioned SMEs. Refer to Exhibit 1 to view this process.

The Historical Infrastructure Analysis was accomplished by documenting ad hoc stakeholder feedback, reviewing the Alaska Lost Ski Areas Project website, and comparing against overgrown lift alignments viewable on Google Earth Pro. Findings therein were compared against SME feedback for additional corroboration of findings.

Research for the Trail Mapping and Models Analysis was executed by answering planned questions in the scope of the Approved Research Methods, contained in the Project Management Plan. Along with resolving these questions, primary data gathering was performed by taking photos at the study area, with a focus on gathering data points on trail erosion, as well as areas with the highest potential for developing trails. As well, a consumer retail phone was used to gather GPS data on potential trail alignments. All data collected was logged in the Trail Data Collection Log, which is included in Appendix J. The data gathered and analysis performed for this deliverable influenced the results of the Feasibility Assessment Deliverable.

The research required to sufficiently inform and populate the Trails Research Summary and Feasibility Assessment was performed in all the previous research and analysis activities. The following components of the Trail Mapping and Models Analysis deliverable informed the assessment of Technical Feasibility: Trail Building Best Practices, Trail Use Intensity Heatmaps, Hiking Trails summary & concepts, Cross Country Biking Trails summary & concepts, Downhill Biking Trails summary & concepts, Fat Biking Trails summary & concepts, Approved Trails, Social Trails, and Data Collection summaries.

The Literature Review analysis and results were the primary informant of the Regulatory Feasibility section. A review of the Girdwood Trails Plan, Far North Bicentennial Park Trails Plan, Chugach State Park Management Plan, and Guidelines for a Quality Trail Experience was executed with this in mind. Items of focus for extraction included any guidance on permissible uses of CSP, permissible development, and frameworks for determining the alignment of the proposed activities with CSP Management Plan guidance. Also of concern were any indications of requirements related to trail design, infrastructure upgrades, and regulatory compliance issues.

Research for determining financial feasibility was completed under various defined research packages, including Stakeholder Interviews, Literature Review, Mapping Analysis, and Trail Mapping and Models Analysis. Both Stakeholder Interviews and the Literature Review yielded information used to estimate the costs of concept trails. During Stakeholder Interviews, Lee Boling reported that in 2021, Single Track Advocates recorded costs of a recent trail implementation at between \$50,000 and \$60,000 per mile (personal communication, 2022). DOWL HKM reported linear trail cost estimates at \$5/ft for class 1 & 2 trails, and \$10-12/ft for class 3 (2011, p.158). The proposed concept trails are class 2 and 3, thus, these

estimates from two different sources were used to provide a range of estimated trail costs. Per Lee Boling (2022) the estimated trail costs observed by STA (Single Track Advocates) included professional trail planning, design, machine clearing, and construction by an esteemed bike trail construction company. These estimates did not include costs of project management, public engagement, and volunteer efforts. For pending verification of concept trail affordability required data on ASC's financial capabilities. Thus, the most recent financial statement data available was sought from ASC stakeholders. 2020-2021 fiscal year financial statements were provided by ASC stakeholders, and are included in Appendix I.

Results

The project's baseline scope included a set of deliverables, which were intended to gather the information and perform the analysis and documentation necessary to arrive at a determination on the feasibility of trails implementation at Arctic Valley. The project executed completion of six product packages:

- Literature Review
- Stakeholder Interviews
- Trails Regulation Change Process
- Historical Infrastructure Analysis
- Trail Mapping and Models Analysis
- Trails Research Summary and Feasibility Assessment

A discussion of the deliverables ensues below.

Literature Review

The purpose of the Literature Review was to document information, requirements, and guidance contained in the identified materials, and perform knowledge transfer to Anchorage Ski Club (ASC). The goal was to provision ASC with information pertaining to planning and management of trails in CSP, to the effect that they can be more successful in complying with state trail planning requirements, management guidance, and best practices.

The document contains an overview of source material sections and excerpts implying how trails should be planned and managed by ASC. The findings are summarized within, and initial notes are captured in the Literature Review Requirements Log which has been provided to ASC. The management plans and other guidance documents reviewed have also been provided separately. The two deliverables Trail Mapping and Models Analysis, and Trails Research Summary and Feasibility Assessment both featured significant amounts of content informed by the findings of the Literature Review.

At a high level, some of the most important findings of the Literature Review were contained within the Chugach State Park Management Plan and Chugach State Park Trail Management Plan (CSPMP). Per the CSPMP, Recreation Development Zone is a management area “established to meet the more intensive recreational needs of the public by providing easy and well-defined access points into the park, and by developing appropriate facilities. The most intensive activities and developments are meant to occur in these zones, including, developed parking facilities and trailheads, vehicle and tent camping, developed picnic and group areas, toilet facilities, visitor and interpretive centers, high-standard trails for all ages and abilities, and park management facilities” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47). Furthermore, “the only area of recreation development land in the Ship Creek Unit coincides with the developments and land base associated with the Arctic Valley ski area and the Nike Site” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47). Refer to the full-length Literature Review document in Appendix C.

CSP’s above guidance implies that among other activities, improving and increasing the number of trails for various public uses is consistent with the designated managed use of CSP’s lands within the ASC Concession Contract. Refer to Appendix C to reference Ship Creek Planning Unit and CSP’s Recreation Development Zone.

Stakeholder Interviews

Interviews with SME stakeholders were documented in order to gather information, anecdotes, and feedback. This helped to steer the entire project, all deliverables, and the feasibility assessment. The SMEs provided valuable input, which helped set the project context and steer research activities for the project. Feedback was elicited for the seven questions below. Full-length responses can be found in Appendix D.

A unique output of the stakeholder interviews was the discovery and documentation of the process required to complete regulation changes. Via discussions with subject matter experts, we documented the unpublicized process known only to a limited number of stakeholders engaged in trail planning. See below in Exhibit 4.

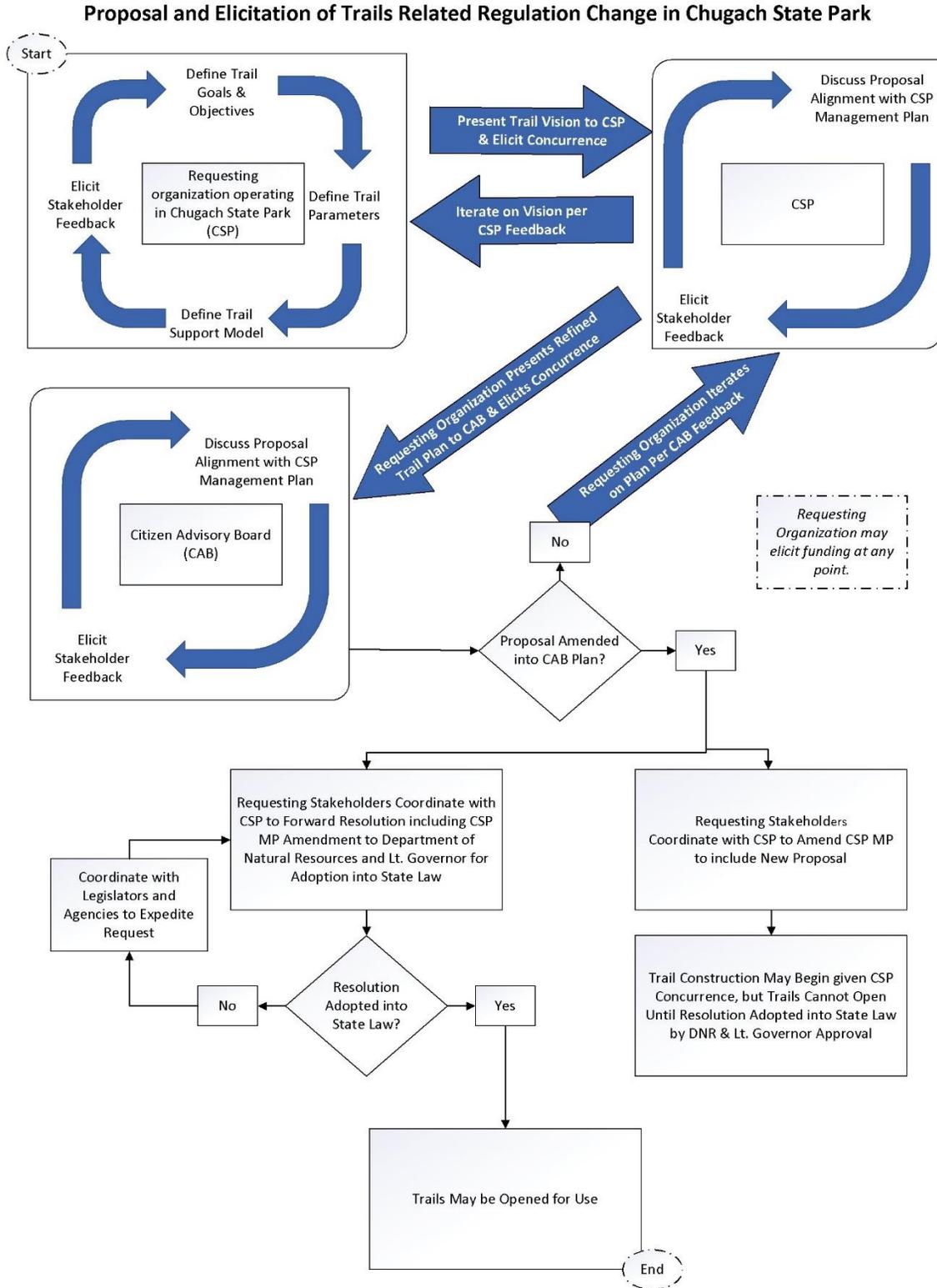


Exhibit 4: Trails Regulation Change Process: the Process for proposing and implementing trail-related regulation changes in Chugach State Park

Historical Infrastructure Analysis

The primary driver for conducting research and cataloging infrastructure over fifty years old at Arctic Valley is to fulfill NHPA (National Historic Preservation Act) and the SHPO (State Historic Preservation Office) requirements. For Anchorage Ski Club (ASC) to be eligible for grants, ASC must satisfy NHPA and SHPO requirements to prove an effort was made to document the locations of infrastructure over fifty years old. The requirements imposed by NHPA and SHPO apply to structures on State Land. This means this effort's primary concern was the identification of historical structures within the boundaries of CSP.

This document contains the results of a search for information on infrastructure greater than fifty years old at the site of the decommissioned Arctic Valley Ski Bowl. This was to assist ASC in satisfying requirements from the National Historic Preservation Act (NHPA) and the State Historic Preservation Office (SHPO), requiring they document locations of infrastructure over fifty years old. The project compared maps, photos, written and verbal accounts against corroborating SME stakeholder feedback to determine locations for structures of interest. The project manager found twenty-two structures of interest, documented in the Infrastructure Log spreadsheet and Google Earth kmz file map package delivered to Anchorage Ski Club (ASC). NHPA and SHPO requirements apply to lands in state parks, in which eleven of the structures identified exist. ASC should amend this document when additional pertinent information is discovered.

The project endeavored to determine where and when infrastructure existed in the Arctic Valley area by comparing maps, photos, written and verbal accounts against corroborating SME stakeholder feedback.

This outcome was the discovery of the location and age of twenty-two structures in the area, eleven of which are in the scope of required documentation per NHPA and SHPO. This information was provided to ASC and is subject to additional amendments as new information is discovered.

The research conducted and product outcomes from each deliverable are anticipated to be reviewed and have components incorporated into the pending Masterplan. The Historical Infrastructure Analysis is unique in that it was the only deliverable specifically requested by ASC in project initiation.

The full-length Historical Infrastructure Analysis document is included in Appendix E.

Refer to Exhibits 5 and 6, below. Partially overgrown past lift alignments were observed in Google Earth Pro and juxtaposed against historical photos provided by Tower, et al. (2004) on the Alaska Lost Ski Areas Website. Thus, deduction of past lift locations was made via comparison of Exhibits 5 and 6. CSP parkland comprises the east side of the blue line in Exhibit 5.

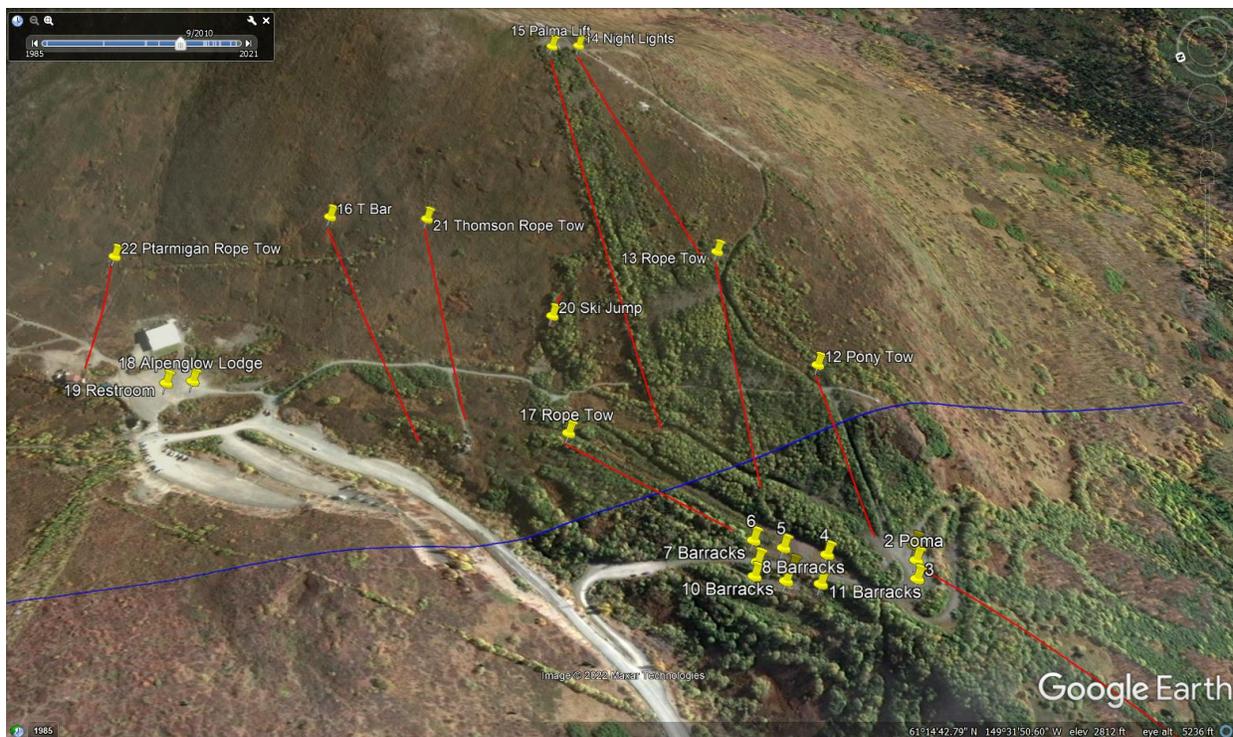


Exhibit 5: Map of infrastructure fifty years old or greater at Arctic Valley (Maxar Technologies, 2009). Compare against Rope Tow location in Exhibit 3 photo

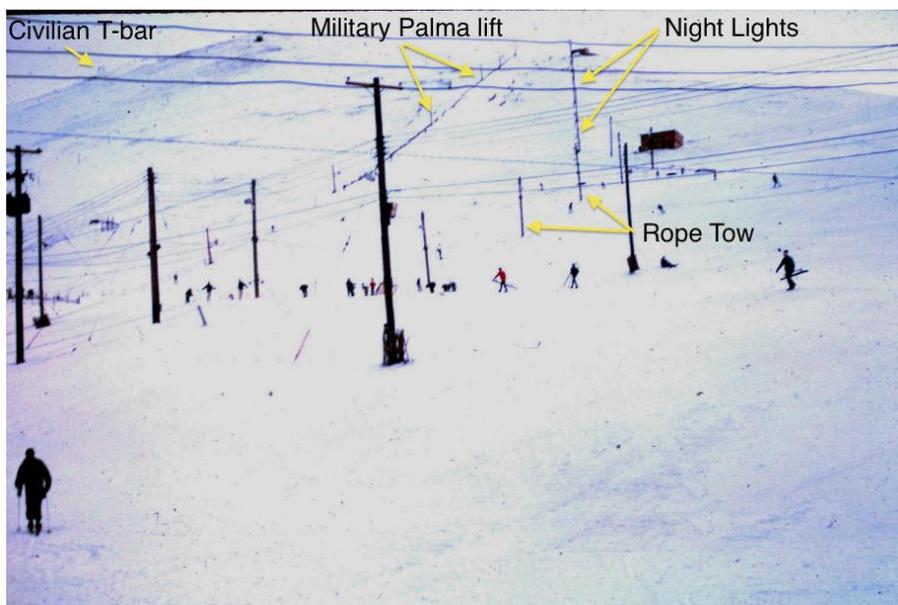


Exhibit 6: Historical photo of infrastructure at the decommissioned Arctic Valley Ski Bowl (Callahan W., 1966)

Trail Mapping and Models Analysis

The goal of this document is multi-fold, with one goal being the presentation of trail construction best practices and elaboration on how to incorporate them into trail management policies at ASC. Also, to present data on existing and proposed concept trails at ASC. Finally, to discuss the intent of proposed concept trails and open items to resolve before continuing with implementation.

The intended audience was all stakeholders involved in trail planning at Arctic Valley. Recipients should come away with a greater understanding of trail building best practices, the current state of existing sanctioned and unsanctioned trails, and knowledge of proposed concept trails.

Documents from CSP and IMBA (International Mountain Bike Association) have provided this report with useful frameworks and guidelines for planning trails. Trail intensity Heatmaps by Strava, Inc. were used to illustrate the most intensely used areas in the area, as well as to point out the relatively intense use of Arctic Valley when compared to other areas of the CSP front range.

Concept trail models were mapped for hiking and biking use cases, with sixteen being mapped in total. For each concept trail type section – hiking, cross country bicycle, downhill bicycle, and fat bicycle – a summary was provided on trail system intent, implementation specifications, target users, and medical response contingency planning. An example of Trail Design Details Matrices and Concept Trails Map can be found in Exhibits 7 and 8 below, respectively.

The data, designs, maps, and information contained were fed into the Trails Research Summary and Feasibility Assessment.

The full-length Trail Mapping and Models Analysis report is included in Appendix F.

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
302e Muktuk Marston to SFER TH	Conceptual	Moderate	Multi-use, Pedestrian optimized	Bi-directional travel	Pedestrian, Bicycle	1.12	13%
Trail Objectives							
Primary Objectives	Description: The intention for this trail is to emplace a more gradual, accessible, and sustainable trail from South Fork Eagle River Trailhead to Hunter Pass. This will reduce reliance on the steep and eroding 228 Hunter Pass trail. This will increase accessibility to, and opportunities for new loops with 301 Muktuk Marston Trail, built in 2021-2022.						
Escape, Exercise							
Trail Narrative							
Class 3 pedestrian trail, 13% average climbing, and 0% descending. Typically 18-36" wide, built on native soils, with intermittent rough surface, grading, and imported material where needed for stabilization.							

Exhibit 7: Example Trail Design Details Matrix for concept hiking trail 302e

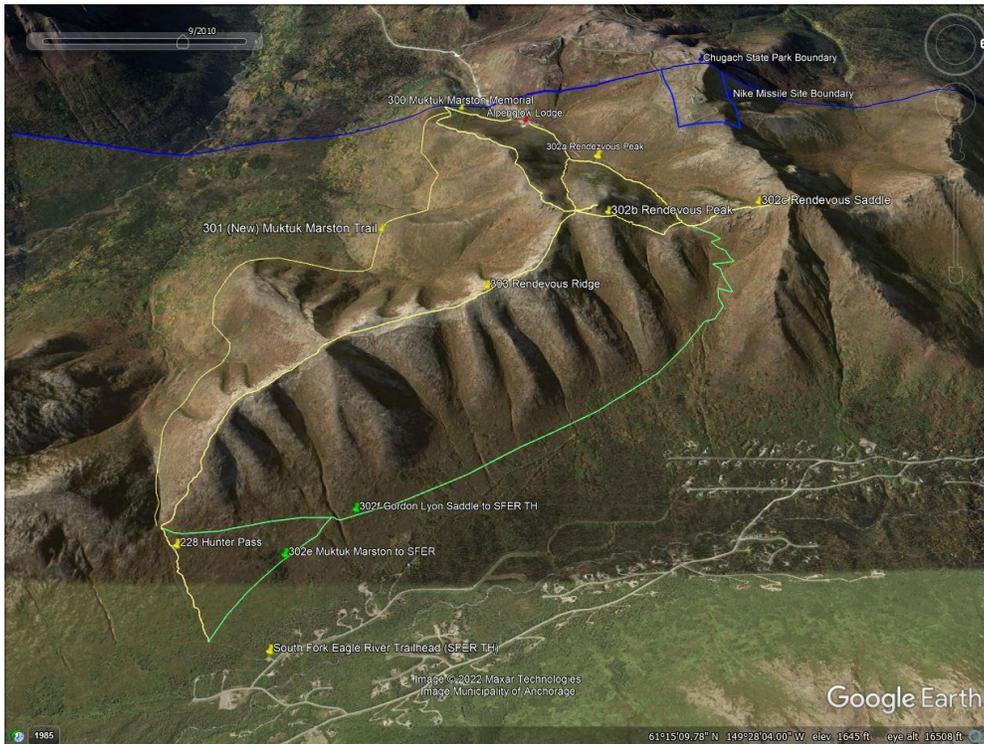


Exhibit 8: Concept hiking trails map

Trails Research Summary and Feasibility Assessment

The document served as an overview and restatement of research findings from each of its previous products, including the Literature Review, Stakeholder Interviews, Infrastructure Analysis, and Trail Mapping and Models Analysis Report.

The new content provided in the Trails Research Summary and Feasibility Assessment includes an organization of all analysis findings indicating support for the hypothesis; application of Project Management techniques to data gathering and analysis would result in affirmation of feasibility for implementation of stakeholder-acceptable trails within ASC's Concession Contract area, as well as supporting the Master Planning efforts.

The document categorizes the discussion of feasibility into three sections: regulatory feasibility, technical feasibility, and financial feasibility.

Regulatory feasibility was assessed by reviewing the results of the Literature Review. ASC is subject to the terms of their Concession Contract with CSP, which define terms for permissible operations in the area defined by the contract. Given that the area defined exists entirely within CSP, the construction and enhancement of trails within the Concession Contract are also subject to CSP management plan guidance. The Chugach State Park Management Plan (CSPMP) and Chugach State Park Trail Management Plan (CSPTMP) Public Review Draft provide direct guidance indicating trail planning and implementation is an activity in alignment with CSP's goals and objectives. ASC's Concession Contract exists in two management zones, each with provisions directly implicating that enhancement of recreation activities is a permissible activity. This was corroborated by multiple subject matter experts, who also supplied the previously unknown regulatory process for proposing and implementing trails in CSP (L. Boling, personal communication, February 23, 2022).

Technical feasibility was assessed by reviewing trail implementation best practices and recommendations in the CSPMP, CSPTMP, and the International Mountain Bike Associations Guide to Quality Trail Experiences. A review with subject matter experts confirmed Arctic Valley's terrain is more conducive to trail implementation when compared to recent implementations in the Hillside area of Far North Bicentennial Park (FNBP), and Glen Alps (L. Boling, personal communication, February 23, 2022). Trail implementations in FNBP and Glen Alps faced more significant issues concerning dense vegetation and drainage. Moreover, it was corroborated that Arctic Valley's physical topography, geology, hydrology, and vegetation are likely more conducive for trail implementation than neighboring low elevation bike areas (L. Boling, personal communication, February 23, 2022).

Financial feasibility was assessed by making analogous comparisons for concept trail implementation cost versus ASC's 2021 fiscal year financial statement, and currently proposed projects. Investments in trail implementation was determined to be within the financial means of ASC. Estimation of trail construction costs was completed using linear per-foot and per-mile estimates provided by subject matter experts. These estimates included professional trail planning, design, machine clearing, and construction by an esteemed bike trail construction company. This did not include project management, public engagement, and other volunteer efforts. The resulting average estimated cost of a trail was \$44,556, whereas the average estimated cost of other proposed projects was \$276,154. Moreover, it was postulated that ASC can refrain from implementing all proposed trails, and still provide great network benefits by implementing a sub-package of trails. Instead of implementing all sixteen proposed trails, greatly increase looping opportunities by implementing two hiking trails. Implementation of hiking specific trails 302e and 302f would provide network benefits to the entire system, as it would create new loop opportunities for trails 227a, 227b, 228, 302a, 302b, 302c, and 302b. Implementation of trails 302e and 302f has an estimated total maximum cost of \$215,400 and a minimum of \$124,344.

The full-length Trails Research Summary and Feasibility Assessment report is included in Appendix B. ASC's 2021 Profit and Loss Statement is included in Appendix I.

Conclusion

Project Outcomes

The project hypothesized that the application of Project Management techniques to data gathering and analysis would result in affirmation of feasibility for implementation of stakeholder-acceptable trails within ASC's Concession Contract area, as well as supporting the Master Planning efforts. A review of collected data, subject matter expert feedback, and analysis of proposed concept trails in the context of ASC's regulatory environment validated that stakeholder-acceptable trails can be implemented at Arctic Valley.

By leveraging the findings provided in the project products and supporting assets created, this conclusion affirming feasibility was primarily drawn from three bases.

1. It was determined that the regulatory conditions to which ASC is subject, are in alignment with the initiation and planning of new trails at Arctic Valley. Adherence to guidance within CSP management and planning documentation will ensure that proposed trails meet management goals for the area question. Engagement of stakeholders and agencies per the Regulation Change Process will ensure that proposals gain concurrence with requisite organizations.

2. It was determined that the technical approaches reviewed for trail implementation are conducive to the successful completion of trails implementation projects. The level of effort to implement trails, considering the area's physical topography, geology, hydrology, and vegetation, is of equal or lesser value to comparable implementations in Alaska.
3. It was determined via comparison of trail implementation cost estimates versus ASC's 2021 fiscal year financial statements, that ASC possesses the finances and fundraising abilities sufficient to invest in trail implementation.

The project deliverables, research conducted, analysis completed, and data collected have been transferred to ASC via a privately shared Google Drive folder. An explanatory knowledge transfer email provided an overview of the activities completed. The following activities are planned to be completed in the last two weeks of April 2022, following the submission of deliverables to the Project Advisory Committee.

Contribution to the PM Body of Knowledge

The project's contribution to the PM (project management) Body of Knowledge are the documents created during planning and execution. After recycling the project's documents, future trail planners will realize a positive effect on their project initiation timelines. Having been armed with a Project Management Plan (PMP) focused on planning trails based on regulatory guidance, stakeholder input, and construction best practices, they will be able to use these documents as needed for their endeavors. The following PMP components are anticipated as applicable for reuse in future trail-related planning projects: Work Breakdown Structure, Requirements Traceability Matrix, Schedule, Stakeholder Management Plan, Communications Management Plan, Risk Management Plan, and Metrics Management Plan.

The products created in project execution are also anticipated to provide valuable information and efficiencies to stakeholders engaging in trail planning projects. After decomposition and reconstruction in accordance with specific project needs, stakeholders may realize a lower level of effort to create project documentation. For example, the infrastructure and trail data collection tables, and trail detail matrices provide templates for documenting trail construction specifications. The custom maps in Strava may inspire planners to utilize this resource to spot improvement opportunities for social trails in their region. The reports on stakeholder interviews, literature review, trail approval process diagram, and feasibility assessment can inspire and expedite similar work for others.

Recommendations for Further Research

Recommended Future Research from Stakeholder Interviews

- Continue to explore ways to improve the area of Arctic Valley; it is undeveloped when compared to other American park areas in urban settings.
- Enhance Arctic Valley's current trails, or purposefully build new designed, sustainable, and erosion resistant trails.
- Collaborate with agency partners to expand Arctic Valley's permissible areas of operations to facilitate increased public recreational opportunities.
- Plan how to address trail degradation.
- Continue to explore opportunities to coordinate regulation change to improve and allow bicycles on trails 300, 301, 302a, 303, 304a, and 304b.
- Evaluate the opportunity for road serviced Bike trails.
- Evaluate the opportunity for Visitor Center Reception or Education area.
- Evaluate the opportunity for Interpretive Trail Infrastructure.
- Evaluate the opportunities for Guided Hikes and Outdoor Educational Services for a fee.
- Evaluate the opportunities to build E-Bike specific trails and permitting.
- Evaluate the required improvements to current ASC chairlifts in order to maintain long-term (6 years or longer), reliable, and profitable lift-serviced downhill biking.
- Evaluate the opportunity to build a Zipline.
- Evaluate the opportunity for Public Use Cabins.
- Evaluate the opportunity to build an Alpine Restaurant Hut midmountain.
- Evaluate the opportunity to provide Childcare as a service for a fee.
- Evaluate the opportunities for collaboration with ASD and after school programs.
- Evaluate the opportunities for collaboration with UAA (University of Alaska Anchorage) and APU (Alaska Pacific University) for Alpine Campus.
- Increase lift serviced hiking and site-seeing for a fee.
- Implement equipment maintenance and storage shack to increase the quality of repairs, quality of work environment, and the serviceable lifetime of the equipment.

Recommended Future Research from Historical Infrastructure Report

- Given an updated map is now available, what benefits could come from studying previous lift circulation patterns? Might those patterns fit current day needs, constraints and make sense to incorporate into development plans?

- Given that ASC is engaged in Master Planning efforts, which previous lift alignments could be utilized to reduce the cost of implementing potential new lifts?
- Identification of previous lift base areas and foundations might be useful for future infrastructure, as the soil might be a stronger foundation for future buildings, vegetation may be cleared, and new construction on areas of previously disturbed earth might face fewer regulatory hurdles.
- In which previously flat-graded areas could a groomer storage shed be built?
- The base terminal of 12 Pony Tow, 13 Rope Tow, 15 Palma Lift, and 17 Rope Tow appear to be road accessible. What benefits could exist in refurbishing this access road?
- Were structures in the Arctic Valley Ski Bowl area deconstructed to mitigate the risk of additional regulatory requirements imposed by NHPA and SHPO?
- What is the merit and feasibility of new construction on the alignment of the previous ASC BOD (Board of Director)?
- Subject Matter Experts (SMEs) suggested the project manager collect data from the public room of BLM for old photography. Varying, old versions of USGS maps may depict rope tows lines and a couple of telephone poles. This suggestion was not completed and is a recommended activity for potential future research.
- ASC BOD Subject Matter Experts (SMEs) suggested the project manager collect data from the JBER (Joint Base Elmendorf Richardson) Civil Engineering shop, where historians may have some maps that ASC has not yet discovered. This suggestion was not completed due in part to lack of JBER access, and Covid-19 restrictions, and is a recommended activity for potential future research.
- ASC BOD Subject Matter Experts (SMEs) suggested the project manager collect data from Loussac Library and search for photos or maps which ASC has not yet discovered. This suggestion was not completed and is a recommended activity for potential future research.

Recommended Future Research from Literature Review

- After reviewing materials cited within documents in scope of the literature review, it was discovered that an economic impact analysis might reveal interesting implications on net benefits or disbenefits when introducing new trails in an area. Completing an economic impact analysis might provide decisions makers information enabling them to make decisions with more conviction, once they discover what economic impact trails might have on the community. Those publications are bibliography entries 3, 4, 5, and 6.
- The Chugach State Park Trail Management Plan Public Review Draft (CSPTMP) published in 2009 was discovered to contain requirements directly applicable to trails development at ASC.

However, a review of the CSPTMP was not included in the scope of the literature review. While the CSPTMP was reviewed, with content and requirements being referenced in other documents of the Feasibility Assessment, additional review of this document would be logical for inclusion in related future Literature Reviews.

Recommended Future Research from Trails Research Summary and Feasibility Report

- It is recommended to review the survey responses from the following survey, completed in 2020, concerning public feedback on Master Planning at Arctic Valley, and incorporate them into recreation enhancement plans: <https://www.surveymonkey.com/results/SM-QTXBKTNG7/data-trends/>.
- Complete a financial analysis for the implementation of each of the following items:
 - a. Remediation and enhancements to approved trails 302a, 302b, 302c, 302b, and 303.
 - b. Implementation of a medical response program for downhill bike trail park.
 - c. Monetization techniques and estimated cash flow from monetization of new trails.
- After reviewing materials cited within documents in scope for literature review, it was discovered that an economic impact analysis might reveal interesting implications on net benefits or disbenefits when introducing new trails in an area. Completing an economic impact analysis might provide decisions makers information enabling them to make decisions with more conviction, given they know what economic impact they might have on the community. Those publications are bibliography entries four, five, six, and eight.
- The Chugach State Park Trail Management Plan Public Review Draft (CSPTMP) published in 2009 was discovered to contain requirements directly applicable to trails development at ASC. However, a review of the CSPTMP was not included in the scope of the literature review. While the CSPTMP was reviewed, with content and requirements being referenced in other documents of the Feasibility Assessment, a review of this document would be logical for inclusion in related future Literature Reviews.

Acronyms

ADF&G: State of Alaska Department of Fish and Game

ASC: Anchorage Ski Club

ASCBOD: Anchorage Ski Club Board of Directors

AV: Arctic Valley

BLM: Bureau of Land Management

CSP: Chugach State Park

DH: Downhill

FNBP: Far North Bicentennial Park

GPS: Global Positioning System

HLB: Heritage Land Bank

KM: Kilometer

MOA: Municipality of Anchorage

MTB: mountain biking

PMBOK: Project Management Body of Knowledge

PMP: Project Management Pan

RACI: Responsible, Accountable, Consulted, Informed

ROM: Rough Order of Magnitude

STA: Single-Track Advocates

TOA: Tour of Anchorage

WBS: Work Breakdown Structure

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Appendix A

Project Management Plan

Document Control

Versioning

As an iterative living document edited, saved and backed up *live* in Microsoft's cloud storage product, OneDrive, document version control has been deemed unnecessary and out of project scope by the Project Manager (PM), Anthony Naciuk. Therefore, no delineation between different versions of this document will be made or tracked within the primary version of this PMP. However, offline copies will be saved, submitted and emailed ad hoc as needed to satisfy requirements concerning tasks, milestones and feedback elicitation. The PM shall always disburse the most current version of the document.

Change Tracking

Any change to this document after the Project Initiation and Planning Complete milestone will be considered a change in project scope. As such, all changes to project scope will be included in the Scope Change Log. Refer to the Scope Management Plan and Scope Change Log for details on document revisions and other scope changes.

Project Charter

See the Project Charter in Appendix M.

Introduction

For Anchorage Ski Club (ASC), use various data gathering and analytical techniques to perform an inventory of existing trails, assess areas for enhancement, and provide support for the organizations Master Planning efforts in progress. The project will produce assets created with consideration given to ASC's unique stakeholders, physical setting, financial capabilities, and modern trail development best practices such that they can provide guidance and inform decision making for future developments and Master Planning.

Abstract

ASC has recently completed efforts to renew their 20-year Concession Agreement from Chugach State Parks, with 2 additional auto-renewal provisions. Given ASC may plan for 60 years of operations, this places ASC in a new, unique position to renew their Master Plan, explore, and analyze CAPEX project opportunities which could enhance its recreational offerings.

Preceding Concession Agreement renewal, many ASC affiliated stakeholders had put forth informal project proposals which were unactionable due to unmet regulatory requirements. Projects are now more likely to gain the support necessary to move from idea to reality.

This project serves to perform documented planning, and analysis of current and future state of trails development. It's products are to be used for future project planning, decision making, and incorporation into the Master Plan.

The project will execute the planning, coordination, literature reviews, interviews, data gathering, analysis, mapping, trail modeling, and compilation of information into a cohesive report. The Report will contain condensed information from a stakeholder analysis, infrastructure analysis, mapping analysis, and trail modeling reports.

Description

ASC is a non-profit organization, operating and maintaining ASC's winter and summer facilities for the benefit of Alaskans. ASC exists in a unique setting; in the alpine of Anchorage's Front Range mountains, near Alaska's most populated city.

As a downhill ski area in Anchorage's Front Range mountains which has driven recent improvements to its organizational, regulatory, and financial positions, ASC is in an optimal position to further enhance their recreational amenities for Alaskans. As they engage in efforts associated with Master Planning, an effort to collect, arrange and analyze data is warranted to determine which opportunities possess the most potential to improve and sustain enhanced trail-based recreation, and determine which opportunities would serve stakeholders best.

Having successfully completed negotiations with Chugach State Park for a new 20-year Concession Contract followed by 2 auto-renewal provisions, ASC has entered a new era of possibilities. ASC is perennially regarded as a jewel of the Front Range, with untapped potential to capitalize on its unique setting. As such, a concerted effort should be taken to aggregate and analyze available information to determine which available opportunities warrant most attention and investment as candidates for capital projects.

ASC Board of Director members and ASC affiliated stakeholders have produced ideas and informal proposals for future capital expenditure projects to increase recreational opportunities at Arctic Valley – those ideas now have a leg to stand on, given that the organization may plan for 60 years of operations.

This project will act as the first concerted effort to gather, analyze and present information on new and existing ideas in a single cohesive deliverable. This will entail documentation gathering, literature review, stakeholder interviews, requirements elicitation, GPS data gathering via site walkthroughs, suggesting alignments for new trails, trails modeling and other activities required to create deliverables that can inform Board level decisions and assist in ASC's Master Planning.

This project will serve to investigate and answer questions of how best to enhance ASC's array of trails based summer recreational opportunities, with consideration given to its unique stakeholders, physical setting, financial capabilities, and modern trail building best practices.

This project will produce deliverables that provide a cohesive feasibility study document with which the Anchorage Ski Club Board of Directors will incorporate into the Master Plan and use to inform future strategic decisions.

Scope

Expected Research Instruments, Methods and Approach to Analysis

The PM has prepared research methods by which they plan to obtain the information necessary to complete their Expected Products. See the planned Research Methods in Appendix H.

Expected Products

Project will produce a Project Management Plan (PMP), inclusive of:

- Charter, Work Breakdown Structure, Requirements Traceability Matrix, Schedule, Stakeholder Management Plan, Communications Management Plan, Risk Management Plan, PMI-PMP Knowledge Areas of focus, Metrics Management Plan, Contribution to the Project Management Body of Knowledge, Research Methodology Plan, IRB Deliverables and Request for Determination.

Project will produce a Professional presentation, inclusive of:

- Delivery of final Power Point presentation of charter, project objectives, project management plan and description of project deliverables.

Project will produce a report containing findings derived from a set of sub-deliverables, with which the Anchorage Ski Club Board of Directors will incorporate into the Master Plan and use to inform future strategic decisions, titled Arctic Valley Trails Feasibility Assessment and Master Planning Support, inclusive of the deliverables below:

1. Literature Review in Microsoft Word

- **(Product #3)**
 - a. Summary documentation in Microsoft Word of key findings found within the literature identified as applicable to ASC trail development – literature identified below:
 - i. Girdwood Trails Plan
 - ii. Far North Bicentennial Park Trails Plan
 - iii. Chugach State Park Management Plan
 - iv. Guidelines for a Quality Trail Experience
 - v. Huddle, Inc. RFP Response
 - vi. ASC Strategic Plan and Concession Agreement
 - b. Applicable findings and requirements documented in MS Excel and transferred to ASC
 - c. Literature Review Report delivered in Microsoft Word. Scope inclusive of documents i. – iv.

2. Stakeholder Interviews in Microsoft Word

- **(Product #1)**
 - a. Facilitate and document stakeholder interview notes in Microsoft Word
 - i. Anchorage Ski Club (ASC) Board of Director (BOD) representatives
 - ii. Anchorage Muni Parks and Recreation representatives
 - iii. Single Track Advocates (STA) representatives
 - iv. Chugach Mountain Bike Riders (CMBR) representatives
 - v. Happy Trails representatives
 - b. Summary Microsoft Word document containing all stakeholders, their feedback, requirements, comments, recommendations, interests, departments, contacts, other key findings from interviews as applicable to ASC trail development. Raw feedback is prefaced with a Summary.
 - i. Anchorage Ski Club (ASC) Board of Director (BOD) representatives
 - ii. Anchorage Muni Parks and Recreation representatives
 - iii. Single Track Advocates (STA) representatives
 - iv. Chugach Mountain Bike Riders (CMBR) representatives
 - v. Happy Trails representatives

3. Infrastructure Analysis

- a. Historical Infrastructure Analysis in Microsoft Excel, Google Earth and MS Word

- **(Not a numbered Product in scope. In scope: Research findings and logs transferred to ASC for additional research)**
 - i. Historical Infrastructure Information gathered in point 3.c, 3.d. are catalogued in Microsoft Excel and Custom Google Earth map.
 - ii. Consolidate information gathered into an MS Excel matrix, specifying structures identified, points of interest, year emplaced, and affiliated organizations.
 - iii. Consolidate information gathered into a Custom Google Earth map labeling structures and alignments identified.
 - iv. Presentation and organization of Historical Infrastructure Information will be provided in the Summary MS Word Document “Historical Infrastructure Analysis”.
 - b. **Non-historical Infrastructure Analysis in Microsoft Excel, Google Earth**
 - **(Product #2)**
 - i. Facilitate and document stakeholder interviews in Microsoft Word, contained in the “ASC Trails Development Consolidated Stakeholder Feedback” document. Intent is to gather stakeholder input, anecdotes, and suggestions for additional research
 - ii. Document suggested infrastructure improvement projects as future project suggestions.
 - iii. Inventory existing infrastructure in Microsoft Excel matrix and Google Earth
 - iv. Document required infrastructure enhancements in Microsoft Excel matrix required to support trails development and recreation enhancements
 - v. Analysis consolidated into high level cost estimation where infrastructure is required to be upgraded to support a trails related enhancement
4. **Trail Data Gathering in Google Earth and MS Excel (submitted as Supporting Documents)**
- **(Not a numbered Product in scope. In scope: Research findings, maps and logs transferred to ASC for additional research. These findings heavily influenced other products in scope.)**
 - a. Consolidate publicly available photos, maps, heat maps, guidance documents into transferrable cloud folders
 - b. Consolidate self-sourced photos, maps, Google Earth kmz files into transferrable cloud folders
 - c. Plot existing and conceptual trail alignments in Google Earth
 - d. Inventory existing sanctioned, conceptual sanctioned, existing unsanctioned, and conceptual unsanctioned trail alignments data from Google Earth data in MS Excel
 - e. Based on verbal and documented SME input, provide Cost Estimates for implementing conceptual trails in MS Excel
5. **CSP Regulation Change Process**
- **(Product #4)**
 - a. Via the SME stakeholder interviews, document the process required to effect regulation change specific to trails in CSP. Document in Visio and include in the final report.
6. **Trail Mapping and Models Analysis in MS Word. Use all data & analysis inputs from line item #4, above.**
- **(Product #5)**
 - a. In MS Word, a summary and linkage of data gathered, and analysis performed concerning trails enhancements
 - i. Shall include a summary of topics discussed in the document
 - ii. Shall include a summary of best practice trail construction guidance from SME Organizations publishing material upon which was reviewed in the Literature Review

- iii. Shall include a summary of hiking trails
- iv. Shall include a summary of cross country biking trails
- v. Shall include a summary of downhill biking trails
- vi. Shall include a summary of winter fat biking trails
- vii. Shall include maps plotted for each of the above points ii. – v.
- viii. Shall include design details matrices for each of the above points ii. – v.
- ix. Shall include medical response planning details for each of the above points ii. – v.
- x. Shall include summary and map of existing approved trails
- xi. Shall include summary and map of social trails

7. **Final Deliverable**

- **(Product #6)**

- a. Summarize research and analysis into cohesive deliverable in Microsoft Word.
 - i. To include all Stakeholder Analysis findings, outputs, and recommended next steps
 - ii. To include all Infrastructure Analysis findings, outputs, and recommended next steps
 - iii. To include all Trail Mapping and Models Analysis findings, outputs, and recommended next steps
 - iv. To include assessment of feasibility of implementing new trails at Arctic Valley. Declare whether or not feasibility on the following basis: regulatory, technical, financial.
- b. Facilitate Knowledge Transfer
 - i. Write & send summary email to ASC SME's & BOD
 - ii. Include all assets gathered and produced in cloud hosted folder, and share link with ASC BOD SME's via email
 - 1. Project Documents and Reports
 - 2. CSP Regulation Change Process Diagram
 - 3. Stakeholder Feedback Interview Notes
 - 4. Matrices
 - 5. Maps
 - 6. Photos
 - 7. Source Documents
 - iii. Outline a plan to provide the following activities post-project closeout.
 - 1. Execute knowledge transfer via final presentation of project deliverables in Microsoft PowerPoint.

Scope Exclusions

- 1. Version control logging for the PMP or associated documents. Changes in scope will be logged in the Change Log.
- 2. This report will not specifically design trails, but rather provide suggested trail alignments as the highest level of detail pertaining to trail location and technical design
- 3. Project will not provide the definitive determination on what opportunities ASC shall pursue, ie; a Go or No-go decision, but rather recommend steps based on analysis
- 4. This project will not perform work in direct support of grant writing.
- 5. Quality Management Plan has been determined to be out of scope by the PM due Scope Change Log, and Communications Plans being sufficient.

6. Creation, maintenance, and execution of a Procurement Management Plan has been determined to be out of scope by the PM due to no goods or services needing to be procured.
7. Creation, maintenance, and execution of a Cost Management Plan has been determined to be out of scope by the PM due to all project resources' providing efforts and inputs on a volunteer basis, free of charge.

Assumptions

1. Stakeholder SME's will be available for interviews.
2. Weather will be conducive for on-sites walk throughs.

Constraints

1. Site walkthroughs to gather photos must complete before snowfall.
2. Project must complete by May 5th, 2022.
3. Budget may not exceed \$440 USD.

Threats

1. Regulatory requirements from Chugach State Parks and JBER may prove too insurmountable to attempt significant projects.
2. Nearing winter season impedes observations and physical data gathering at Arctic Valley.
3. Being a resource driven project, Project Manager availability and time management will drive project success.

Opportunities

1. The underdeveloped location and improving organization that Arctic Valley consists of is rife with opportunities for enhancement.

Milestones

WBS	Task Name	Finish
1	AV Feasibility Study Project	Wed 4/13/22
1.1	Project Initiation and Planning	Mon 12/6/21
1.1.1	Project Initiation and Planning Commenced	Sun 8/1/21
1.1.3	Milestone 1 Complete	Fri 9/10/21
1.1.5	Milestone 2 Complete	Thu 9/23/21
1.1.7	Milestone 2.5 Complete	Thu 9/23/21
1.1.9	Milestone 3 Complete	Fri 10/15/21
1.1.11	Revise Final PMP, Integrated Plans and Assets	Fri 11/19/21
1.1.11.14	Milestone 4 Complete	Fri 11/19/21
1.1.15	Milestone 5 Complete	Thu 11/25/21
1.1.17	Milestone 6 Complete	Mon 12/6/21
1.2	Project Initiation and Planning Complete	Mon 12/6/21
1.3	Project Execution and Closeout	Wed 4/13/22
1.3.2	Literature Review Complete	Fri 12/17/21
1.3.3	Stakeholder Analysis	Sun 1/2/22
1.3.3.2	Stakeholder Analysis Interviews Complete	Thu 12/23/21
1.3.3.4	Stakeholder Analysis Documented in word document	Sun 1/2/22
1.3.4	Stakeholder Analysis Complete	Sun 1/2/22
1.3.16	Project Closeout Complete	Tue 4/12/22
1.4	Execution and Closeout Complete	Tue 4/12/22
2	Project Complete	Tue 4/12/22

Scope Management Plan

Abstract

Scope Management will be executed by the PM, by ensuring the iterative artifacts below are updated as soon as material scope updates become available.

Scope Change Log

The PM will maintain the Scope Change Log in a matrix separate to this PMP, template below, to document changes to Project scope. Every scope change, addition or removal of a task #, shall be logged in the Change Log. Every change shall be written and verbally mentioned in each status report. Every change after Project Initiation and Planning Complete milestone shall receive written acknowledgement from the project sponsor. See the Scope Change Log in Appendix A. The template has been included below for additional context.

SCOPE CHANGE LOG							
ID	Schedule Task #	DATE	REQUESTED BY	CHANGE DESCRIPTION	REASONS FOR THE CHANGE	STATUS	ACTIONS RELATED TO THE CHANGE

Requirements Management Process

The requirements management process will flow as follows.

1. Elicitation
2. Logging
3. Elaboration
4. Prioritization
5. Execution
6. Validation
7. Closure

Requirements Traceability Matrix

The PM will manage the Requirements Traceability Matrix (RTM) as an iterative artifact separate to this PMP, and will make updates to the RTM as soon as material updates become available. See template below. See the RTM in Appendix C. The template has been included below for additional context.

Naciuk PM686A						
Arctic Valley Trails Feasibility Assessment Requirements Traceability Matrix						
Requirement ID #	WBS ID #	Task Name	Stakeholder Source	Description	Comments	Questions

Work Breakdown Structure

The PM will manage the Work Breakdown Structure (WBS) as an iterative artifact separate to this PMP, using the Microsoft Project – WBS Pro integration, and will make updates as soon as material updates become available. See the WBS in Appendix D.

Schedule Management Plan

Abstract

The PM will create and manage the schedule. The PM shall consult and coordinate with ASC SME's and Project Committee to review the appropriateness and feasibility of scheduled tasks as needed.

The PM shall update the schedule as soon information warranting an adjustment to the schedule is available.

Once the project enters the execution phase due to the Milestone 'Project Initiation and Planning Complete' having passed, any changes to the schedule will be documented in the Scope Change Log, detailed in the previous section. See the Schedule in Appendix E.

Stakeholder Management Plan

Abstract

Stakeholder Management will be executed by the PM in accordance with the Stakeholder Management Artifacts provided below. The PM is the primary stakeholder responsible for identifying, coordinating, and managing stakeholders as necessary to ensure their interests, concerns and feedback are

considered and incorporated into the projects scope and deliverables as necessary, to be determined by the PM. The PM will update the Stakeholder Management artifacts as new information is available.

Stakeholder Identification Matrix

The PM has documented a number of project stakeholders and details related to their involvement in the project, in the matrix below. See the Stakeholder Identification Matrix, RACI, and Power-Interest Grid in Appendix F. The fully populated Stakeholder Identification Matrix template has been included below for additional context.

Stakeholder Identification Matrix				
NAME OR GROUP	ROLE	ANTICIPATED ISSUES	MOTIVATION / DRIVERS	COMMUNICATIONS CADENCE
Anthony Naciuk	Project Manager	Time constraints	ASC SME, Project Manager, vested interest in Arctic Valley success, vested interest in PM success	constant
Rich Todd	Project Sponsor	Time constraints	ASC President of BOD, vested interest in Arctic Valley success	bi-weekly, ad hoc
Maeve Nevins-Lavtar	External Committee Member, SME	Time constraints	ex ASC BOD, ASC SME, trails SME, BLM SME, vested interest in Arctic Valley success	weekly, ad hoc
LuAnn Piccard	Committee Member	Time constraints	committee member, vested interest in PM success	bi-weekly, ad hoc
Roger Hull	Primary Project Advisor, Committee Member	Time constraints	Primary Project Advisor, vested interest in PM success	weekly, ad hoc
Luke Clement	SME	Time constraints	ASC SME, ASC SME, ex board member, vested interest in Arctic Valley success	ad hoc
Kevin Keeler	SME	Time constraints	BLM SME, ASC BOD, vested interest in Arctic Valley success	ad hoc
Other Arctic Valley BOD Members	Beneficiary	Stakeholder resistance	SME, vested interest in Arctic Valley success, beneficiary of deliverables	ad hoc
Beverly Luedke-Chan	SME	Time constraints	BLM SME, ASC BOD, vested interested in Arctic Valley success	ad hoc
Huddle, Inc.	Master Planning Consultant	Resource Constraints	Hired as Master Planning Consultant	ad hoc
ASC Members	Beneficiary	Stakeholder resistance	Beneficiary of deliverables	ad hoc
Arctic Valley Users	Beneficiary	Stakeholder resistance	Beneficiary of deliverables	ad hoc
General Public	Stakeholder	Stakeholder resistance	Beneficiary of deliverables	ad hoc
Chugach State Parks	Regulatory stakeholder	Stakeholder resistance	Regulatory stakeholder	ad hoc
JBER	Regulatory stakeholder	Stakeholder resistance	Regulatory stakeholder	ad hoc
Muni	Regulatory stakeholder	Stakeholder resistance	Regulatory stakeholder	ad hoc
IMBA	Regulatory stakeholder	Stakeholder resistance	Beneficiary of deliverables	ad hoc

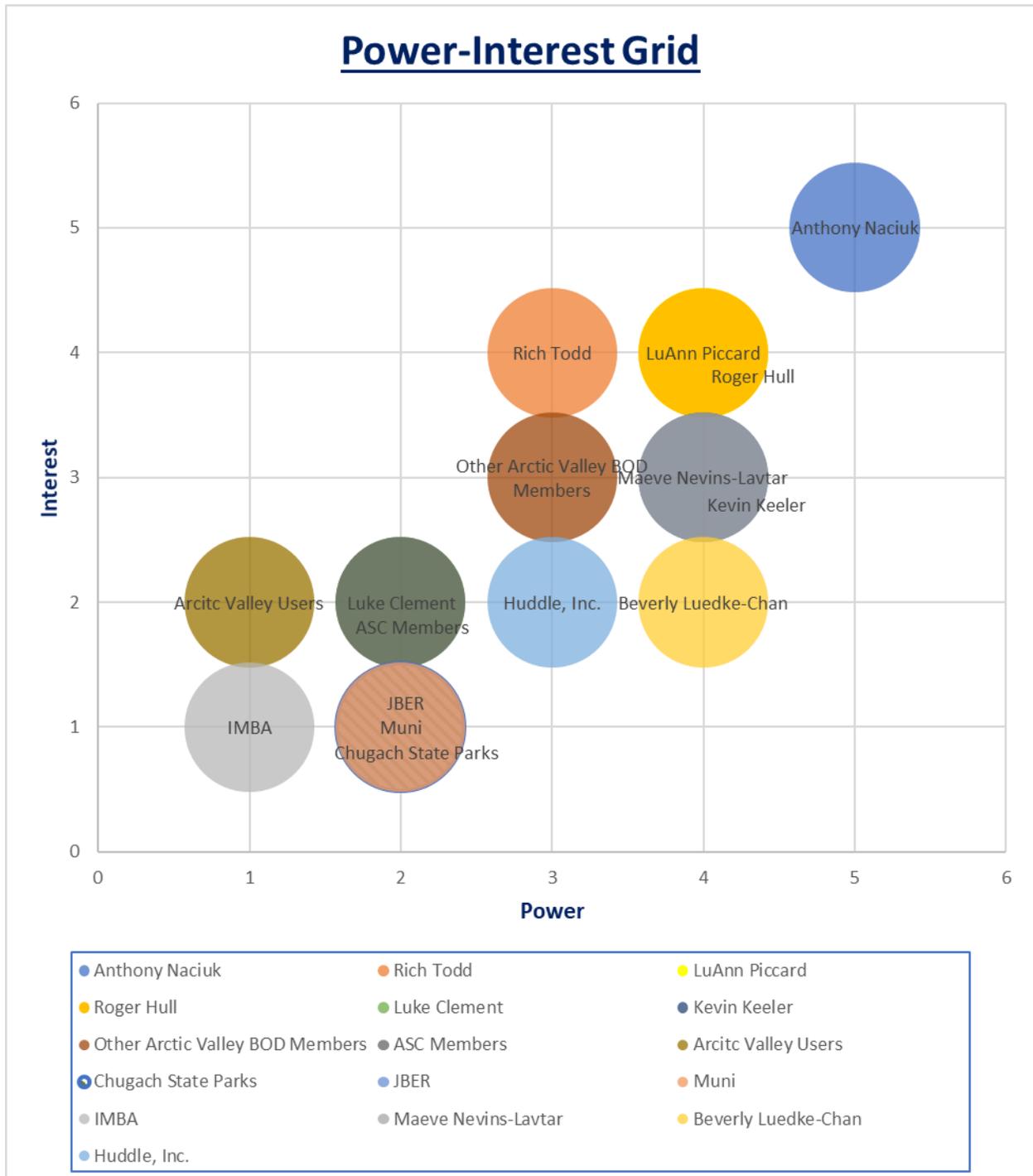
Stakeholder Management RACI Matrix

The PM has documented the Project Team's RACI (responsible, accountable, consulted, informed) roles in the matrix below. The matrix will be updated as the project stakeholders evolve, as determined to be necessary by the PM. See the Stakeholder Identification Matrix, RACI, and Power-Interest Grid in Appendix F. The fully populated RACI template has been included below for additional context.

RACI				
Task	R (Responsible)	A (Accountable)	C (Consulted)	I (Informed)
Create and Manage PMP	PM	PM	ASC SME, Advisors	Project Committee
Project Advisement	Advisors	Advisors	ASC SME, Advisors	Project Committee
ASC SME Advisement	PM	ASC SME	ASC SME	Project Committee
IRB Advisement	Advisors	Advisors	Advisors	Project Committee
IRB Submittal	PM	PM	Advisors	Project Committee
Research Execution	PM	PM	ASC SME	Project Committee
Research Advisement	PM	PM	ASC SME	Project Committee
Go / No-go Decisions	Advisors	Advisors	Advisors	Project Committee
Literature Review	PM	PM	ASC SME	Project Committee
Review Regulatory Documentation	PM	PM	ASC SME	Project Committee
Elicit Regulatory Requirements	PM	PM	ASC SME	Project Committee
CSP Coordination	PM	PM	ASC SME	Project Committee
Perform Technical Analysis	PM	PM	ASC SME	Project Committee
Execute Required Deliverables	PM	PM	ASC SME	Project Committee
Deliver PMP Presentation	PM	PM	Committee	Project Committee
Deliver Required Report	PM	PM	Committee	Project Committee
Deliver Required Analysis	PM	PM	Committee	Project Committee

Stakeholder Power-Interest Grid

The PM has estimated the project Stakeholders Power and Interest in the project’s area of research and deliverables, and for reference, has plotted those intersections on the grid below. The grid will be updated as the project stakeholders evolve, as determined to be necessary by the PM. See the Stakeholder Identification Matrix, RACI, and Power-Interest Grid in Appendix F. The fully populated Power-Interest Grid has been included below for additional context.



Expectations Contract

The PM, Primary Advisor, and Committee Members will perform the duties as assigned in the Expectations Contract. See the Expectations Contract in Appendix G.

Communications Management Plan

Abstract

The PM is responsible for planning, coordinating, and executing Communications Management. The PM shall identify the channels by which information will flow to stakeholders for the duration of the project, and maintain communications on those channels at the determined frequency.

The Stakeholder Management RACI and Expectations Contract matrices also document communications expectations. View these assets in Appendix F.

Communications Management SLA's

The PM has identified a set of CSFs which will serve as performance benchmarks for communications management, and will improve the quality of the project as a whole by encouraging improved communications to permeate the management and execution of all deliverables.

1. An Email reply SLA of <12 hours will be followed by PM.
2. Status update will be disbursed to Committee and ASC stakeholders at every milestone.
3. If time between milestones is >20 days, then PM is to disburse a status update at the midpoint between the milestones in question.
4. Communications SLA performance data will be monitored and plotted on a line graph to display communications performance.
5. Communications SLA performance data to be presented at every milestone, starting at milestone 3, or at the midpoint between any milestone where a >20-day gap exists.
6. PM to report on communication anomalies in Communications SLA performance the scheduled status reports, in accordance with the syllabus and Communications Management SLA's.

In line with Communications SLA CSF's 4, 5, and 6, the PM shall maintain the SLA performance data on a line graph, report on SLA performance at each milestone update – this is available in Appendix J.

Metrics Management Plan

Metrics Management Abstract

The PM is responsible for managing and updating project metrics. The intent of the metrics management guidelines are to enhance the delivery of the project by infusing performance benchmarks that will improve the quality of the whole project by permeating into the management and execution of all deliverables.

The PM shall ensure the CSF's below are incorporated into each subsidiary plan. The PM's status updates shall include the KPI's identified below.

Scope Management Plan CSF's

1. Every scope change, addition or removal of a task #, will be logged in the Change Register.
2. Every scope change will be written and verbally mentioned in each status report, including at the halfway mark between required status reports, if the time between status reports are over 20 days.
3. Every scope change after Project Initiation and Planning Complete must receive written acknowledgement from the project sponsor.

Communications Management Plan CSF's

1. An Email reply SLA of <12 hours will be followed by PM.
2. Status update will be disbursed to Committee and ASC stakeholders at every after Project Initiation and Planning Complete.
3. If time between milestones is >20 days, then PM is to disburse a status update at the mid point between the milestones in question.
4. Communications SLA performance data will be monitored and plotted on a line graph to display communications performance.
5. Communications SLA performance data to be presented at every milestone, starting at milestone Project Initiation and Planning Complete, or at the mid point between any milestones where a >20 day gap exists.
6. PM to report on communication anomalies in Communications SLA performance the scheduled status reports, in accordance with the syllabus and Communications Management SLA's.

Risk Management Plan CSF's

1. Every newly identified risk with a score of 16 or greater shall incorporated into every status update, with the following details included; Risk Description, Importance, and Mitigation.
2. Every risk with an Importance of 16 or higher must receive written acknowledged by project sponsor. The acknowledgement shall be documented in the PM's MS OneDrive's project repository.
3. Intolerably High Risks (16 and higher) must have their corresponding risk mitigation applied as treatment before each Status Update.
4. Every risk shall have an identified mitigation and contingency.
5. PM must identify and document at least 5 new risks in the interim between every milestones after Project Initiation and Planning Complete.
6. PM shall create and maintain a Monte Carlo risk simulation to identify and model risks.

Project KPI's

The PM shall display, update and maintain the following KPI's on a dashboard, to be included in the status updates during the execution phase.

1. CPI
2. SPI
3. Burndown
4. % tasks complete

Risk Management Plan

Abstract

Risk Management will be executed by the PM in accordance with the Risk Management Plan outlined below. A number of approaches will be taken to ensure that project risks are monitored and controlled to the highest extent feasible. The PM shall be the resource solely responsible for identifying, logging, appraising, mitigating, and managing risk to the project. The PM shall consult and coordinate with the project committee and subject matter experts available to evaluate risk when assistance is needed. Risks will be logged, monitored, and controlled in the Risk Register – see Appendix K.

Risk Categories

Once all risks have been identified, risk categories will be assigned to logically organize the risks. The categories of risk are defined as below. This list does not preclude the creation of additional categories if project risks if warranted.

- Cost
- Environment
- Equipment
- Resource
- Scope
- Software
- Theft

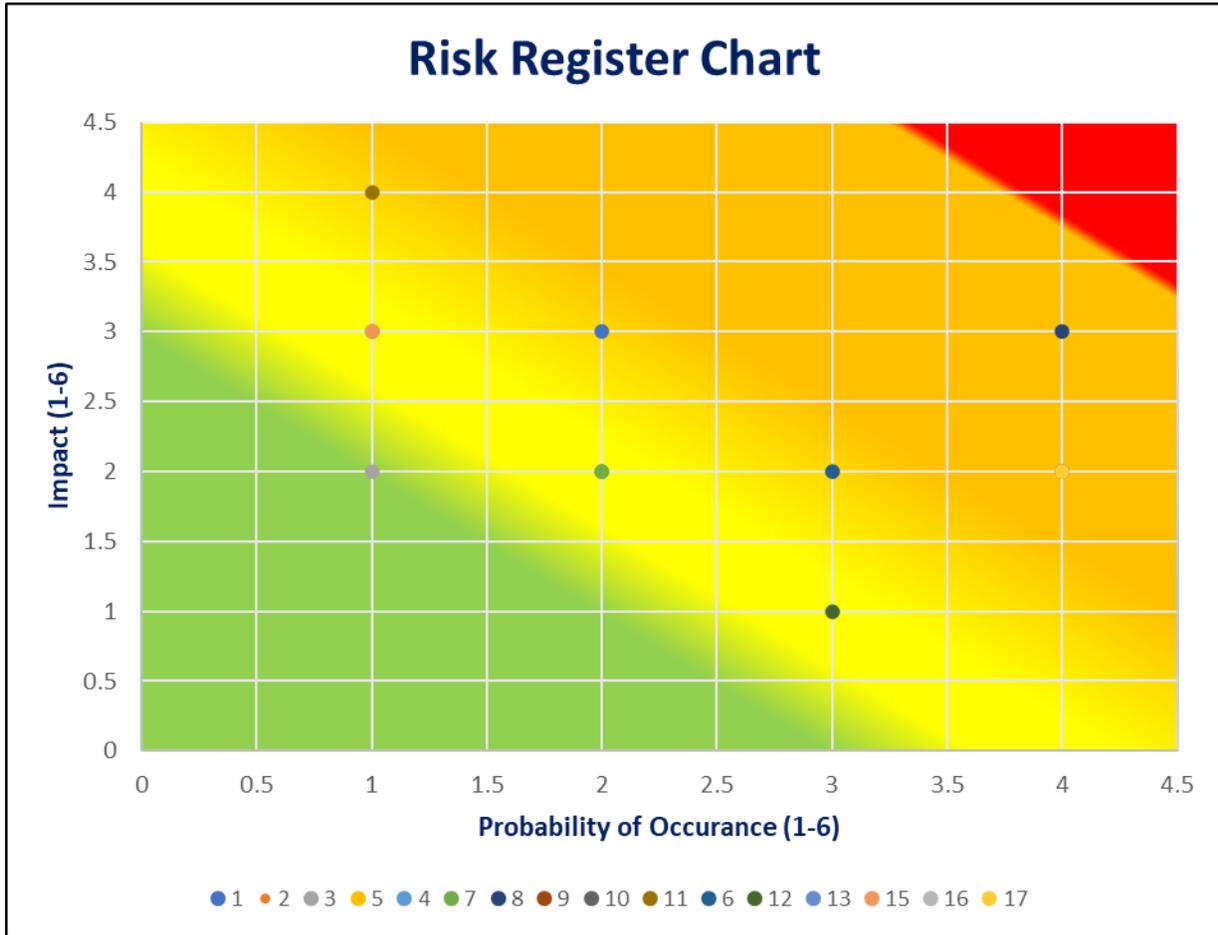
Risk Levels

Risk levels will be assigned as a product of the risk's probability and impact, in accordance with the Risk Register and Risk Register Chart. Risk Level descriptive ratings and color coding will be assigned as below. This formatting is consistent with Risk Level formatting in the Appendix K Risk Register and Risk Register Chart.

Risk Level Assignment		
Descriptive Rating	Risk Level Range	Color Coding
Low	<=3	Green
Moderate	3-6	Yellow
Considerable	6-15	Orange
High	>=16	Red

Risk Register Chart

The PM shall maintain a Risk Register Chart. It shall be a scatter plot containing all of the identified risks, plotted at the intersection of their Probability and Impact. See the Risk Register Chart from Appendix K, below. The fully populated Risk Register Chart has been included below for additional context.



Risk Management Process

Risks will be identified and managed in accordance with the process below.

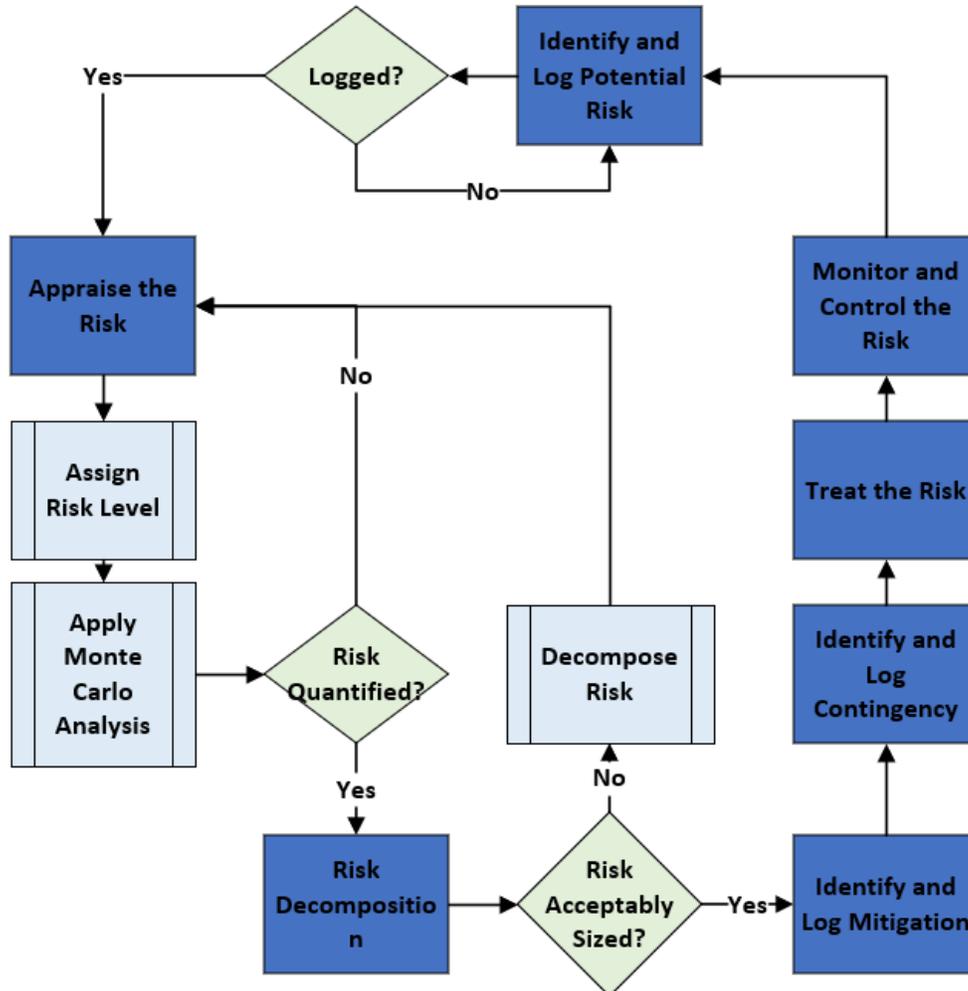


Figure 1: Risk Management Process

Identify and Log Potential Risk

The PM shall log the risk in the risk log.

Appraise the Risk

The PM shall appraise the risk by assigning a probability and impact score.

Monte Carlo

The PM shall incorporate the risk into a Monte Carlo analysis to assist in determining the ROM impact to schedule and budget for realized risks. See Appendix L.

Risk Decomposition

The PM shall decompose any risk into smaller components, where such a risk exceeds the acceptable risk size threshold of 16 or greater. For any risk that exceeds the acceptable risk size threshold, the PM shall notify the sponsor in writing, and elicit written acknowledgement of the risk.

Identify Mitigation

The PM shall identify a risk mitigation control that is estimated reduce the risk impact and likelihood as much as is feasible.

Identify Contingency

The PM shall identify a risk contingency control that is estimated to be the best approach to limit adverse effects of risks that occur.

Treat

The PM shall apply the mitigation control identified to reduce the risk as much as is feasible, and conduct the coordination and execution of related activities necessary to address the risk.

Monitor and Control

The PM shall monitor for risk triggers, partake in the review, re-evaluation, modification of risk scores, and eliciting acknowledgement from the Project Sponsor for High level risks with a Risk Level equaling or exceeding 16.

Risk Management Roles

The PM has identified the following resources as participants in risk management.

Risk Management RACI Chart				
	Responsible	Accountable	Consulted	Informed
Identify	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Log	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Analyze	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Appraise	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Identify Mitigation	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Identify Contingency	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Treat	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee
Monitor and Control	PM	PM	Sponsor, ASC SME's, Project Committee	Sponsor, ASC SME's, Project Committee

Quality Management Plan

Creation, maintenance and execution of a Quality Management Plan has been determined to be out of scope by the PM due to PM decision. A Scope Change Log will be maintained to monitor and control

changes to the PMP and Project Deliverables, ensuring project changes are surfaced to ASC stakeholders for review, and amendment if applicable. See the Scope Change Log under Appendix A.

Procurement Management Plan

Creation, maintenance and execution of a Procurement Management Plan has been determined to be out of scope by the PM due to no goods or services needing to be procured.

Cost Management Plan

Creation, maintenance and execution of a Cost Management Plan has been determined to be out of scope by the PM due to all project resources' providing efforts and inputs on a volunteer basis, free of charge.

Project Closeout Plan

Abstract

The PM shall plan and execute a number of activities to facilitate project closeout and knowledge transfer, so that ASC may better understand the project products and findings.

Closeout Activities to be Completed within the Scheduled Project Timeline

Deliver Final Project Report to ASC BOD & Advisory Committee Stakeholders

The PM shall deliver the final project report, PMP process and product results presentation to the Committee stakeholders.

Write & Send summary email to ASC SME's & BOD

The PM shall summarize the projects activities, results, and products in a <1000-word email to the ASC BOD SMEs, providing a high-level outline and explanation on what was delivered, where to find them, and how to use the models/templates/tools for their own future analysis.

Lessons Learned Log

A Lessons Learned log will be maintained as a document separate to this Project Management Plan. The Lessons Learned log will be maintained in Appendix N.

Closeout Activities to be Completed Shortly after the Scheduled Project Timeline

Deliver Final Feasibility Presentation to ASC BOD Stakeholders

The PM shall deliver the final project feasibility report and product results presentation to the ASC BOD stakeholders.

Facilitate One ASC SME & BOD Knowledge Transfer Q&A Session

The PM shall facilitate one of two project knowledge transfer sessions with the ASC BOD SMEs, for additional opportunities to share findings, help familiarize stakeholders with the project's products.

Lessons Learned Closeout Meeting

The PM shall facilitate a lesson learned meeting with the ASC BOD stakeholders to facilitate a lessons learned meeting in order to document what can be improved for future related efforts.

Acronyms

1. ABG - Alaska Botanical Gardens
2. ADF&G - State of Alaska Department of Fish and Game
3. ASC - Anchorage Ski Club
4. ASCBOD - Anchorage Ski Club Board of Directors
5. ASDRA - Alaskan Sled Dog and Racing Association
6. ATGC - Anchorage Trails and Greenways Coalition
7. ATVs - all-terrain vehicles
8. AV - Arctic Valley
9. AVST - Arctic Valley Ski Team
10. BLM - Bureau of Land Management
11. CAPEX - Capital Expenditure
12. CSP - Chugach State Park
13. DH - Downhill
14. DOT&PF - State of Alaska Department of Transportation and Public Facilities
15. FNBP - Far North Bicentennial Park
16. GIS - Geographic Information System
17. GPS - Global Positioning System
18. HLB - Heritage Land Bank
19. KM - Kilometer
20. MOA - Municipality of Anchorage
21. MTB - mountain biking
22. NPS - National Park Service
23. NSAA - Nordic Skiing Association of Anchorage
24. P&R - Parks and Recreation
25. PMBOK - Project Management Body of Knowledge
26. PMI - Project Management Institute.
27. PMO - Program Management Office
28. PMP - Project Management Pan
29. PMP - Project Management Plan
30. QM - Quality Management
31. RACI – Responsible, Accountable, Consulted, Informed
32. ROM – Rough Order of Magnitude
33. RTCA - Rivers, Trails, and Conservation Assistance Program
34. STA - Single-Track Advocates
35. TAG - Technical Advisory Group
36. TOA - Tour of Anchorage
37. TRACS - Trail Assessment and Condition Survey
38. UDC - Urban Design Commission
39. USACE - United States Army Corps of Engineers
40. USFS - United States Forest Service
41. UV - Ultraviolet
42. WBS - Work Breakdown Structure

Definitions

1. Acceptance Criteria - The criteria that a system or component must satisfy in order to be accepted by a user, customer, or other authorized entity
2. Assumptions - Planning factors that, for planning purposes, will be considered true, real, or certain
3. Baseline - A specification or product that has been formally reviewed and agreed upon that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures
4. Concession Agreement – a contract allowing an organization to operate their business on the premises of a specific firm’s or government’s property, under specific terms
5. Constraints - Factors that will (or do) limit the project management team’s options
6. Contingency – an alternative strategy to be used to ensure project success if specified risk events occur
7. Critical Path - The series of activities that determines the duration of the project
8. Deliverable - Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project that is subject to approval by the project sponsor or customer
9. Dependencies - Dependencies defined by the project management team
10. Duration - The number of work periods (not including holidays or other nonworking periods) required to complete an activity or other project element
11. Lessons Learned - The learning gained from the process of performing the project
12. Milestone - A scheduled event for which some individual is accountable and that is used to measure progress
13. Program - A group of related projects managed in a coordinated way
14. Program Management Office - An organizational entity responsible for management and oversight of the organization’s projects
15. Project Charter - A document issued by senior management that formally authorizes the existence of a project
16. Project Management - The application of knowledge, skills, tools, and techniques to project activities to meet the project requirements
17. Project Management Plan - A formal, approved document used to guide both project execution and project control
18. Project Manager - The role with total business responsibility for an entire project
19. Project Schedule - A tool used to indicate the planned dates, dependencies, and assigned resources for performing activities and for meeting milestones
20. Project Scope - The work that must be done to deliver a product with the specified features and functions
21. Project Sponsor - The individual that provides the primary sponsorship for an approved project
22. RACI Chart - A RACI chart (sometimes called a Responsibility Assignment Matrix) is a way to identify your project teams' roles and responsibilities for any task, milestone, or project deliverable.
23. Risk - Possibility of suffering loss
24. Risk Management - An approach to problem analysis, which weighs risk in a situation by using risk probabilities to give a more accurate understanding of, the risks involved

25. Risk Management - Risk mitigation seeks to reduce the probability and/ or impact of a risk to below an acceptable threshold
26. Risk Management Plan - The collection of plans that describes the Risk Management activities to be performed on a project
27. Scope Change - Any change to the project scope
28. Stakeholder - Individuals and organizations that are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or project completion
29. Task - A well-defined unit of work that provides management with a visible checkpoint into the status of the project
30. Work Breakdown Structure - A deliverable-oriented grouping of project elements that organizes and defines the total work scope of the project

Bibliography

Institute., P. M. I. P. M. (2021). *Guide to the Project Management Body of Knowledge (Pmbok® Guide) - seventh edition*. Project Management Institute.

Appendix B

Arctic Valley Trails Research Summary and Feasibility Assessment

Document Summary

This document provides a summary of the activities and research completed, as well as presents findings on the feasibility of implementing and enhancing trails at Arctic Valley.

Research Summary

Literature Review

A literature review was completed to document information, requirements and guidance contained in the identified materials, and perform knowledge transfer to Anchorage Ski Club (ASC). The intended result of literature review and knowledge transfer is to provision ASC with information pertaining to planning and management of trails in Chugach State Park (CSP). By retaining and utilizing the information contained, they can realize increased alignment with state trail planning requirements, management, and industry best practices.

The document created contains an overview of source material sections and excerpts implying how trails should be planned and managed by ASC. These findings are summarized, with initial notes captured in the documents themselves, and in the Literature Review Requirements & Notes Log, both of which were provided to ASC. The management plans and other guidance documents reviewed have also been provided separately.

The four document below were in scope of the literature review.

Chugach State Park Management Plan (CSPMP): Adopted by the Commissioner of the Department of Natural Resources in February 2016, the CSPMP is the most recent iteration of CSP management plans. It contains guidance for trail planning, development, and management at Arctic Valley, including park goals and objectives, natural and cultural resources, park use and issues, areawide management direction and guidelines, unit management, and management plan implementation. ASC is advised to reference this document for eventual trail management planning, to increase alignment with CSP policies.

Guidelines for a Quality Trail Experience (GQTE): The GQTE provides a brief historical account of mountain bike trail development in North America, modern development techniques and best practices for building in today's environment of increasing demand for sustainable trails in terms of environmental, economic, and socio-cultural factors. Adherence to the trails construction guidance contained will ensure any trails planning and development ASC engages in will be in alignment with globally recognized best practices.

Far North Bicentennial Park Trails Improvement Plan (FNBPTIP): The FNBPTIP does not contain direct requirements for ASC; the FNBPTIP contains guidance and requirements for FNBP. However, it was included in scope due to SME recommendation. The document contains guidance for trail management in the largest and closest public park to CSP, and should be reviewed for guidance providing similar, different, or conflicting trail management principles. Doing so achieves a wider base of information for trails management at Arctic Valley.

Girdwood Trails Plan (GTP): Like the FNBPTIP, the GTP does not provide direct requirements for ASC, but was included in scope. This was due to anticipated similarities of preservation and development principles. This was observed as true, as the GTP did not provide vastly different guidance than the 3 aforementioned documents. It did provide value in corroborating local Alaskan trails management best practices.

It was discovered during completion of the literature review, that review of two additional subjects would be relevant for completion in future efforts. These include review of economic impact analyses listed in bibliography entries 4, 5, 6, and 8, as well as the Chugach State Park Trail Management Plan.

Stakeholder Interviews

Interviews with subject matter expert (SME) stakeholders were documented in order gather information, anecdotes, and feedback. The SME stakeholders provided valuable input which helped set context and steer research activities for the project.

The feedback and information provided was incorporated into additional research questions, as well as into analysis documents. For example, linear trail-cost estimates from Single Track Advocates were leveraged to complete cost estimates for concept trails. This effort also enabled the documentation of twenty-one future recreation project ideas, which have been saved in this document, as well as the Trails Mapping and Models Analysis Report.

This document has been provided to ASC, with stakeholder input incorporated into the project analysis and reports.

Infrastructure Analysis

An effort to research and catalogue information on 50 years old structures within ASC's Concession Contract area was commenced by ASC to meet requirements from the National Historic Preservation Act (NHPA) and the State Historic Preservation Office (SHPO). This was initiated for ASC to meet eligibility requirements for several grants, where ASC must satisfy NHPA and SHPO requirements to undergo a documented effort of cataloguing locations of previously emplaced structures over 50 years old. Applying to structures on State Land, the focus of the analysis was to identify structures within the boundaries of the Concession Contract.

Having conveyed the value of this effort to the organization, it was determined that this effort should be incorporated into the project to support grant elicitation components of their Master Planning work in progress. This research was completed by comparing maps, photos, written and verbal accounts against corroborating SME feedback to validate location and age for structures of interest.

In the area of the decommissioned Arctic Valley Ski Bowl, twenty-two structures of interest were documented in the Historical Infrastructure Analysis Report, as well as in the Infrastructure Log spreadsheet and Google Earth maps. NHPA and SHPO requirements apply to eleven of them, as they exist within the CSP boundary. It has been communicated to ASC that document amendments are appropriate and supported as pertinent information is discovered. All three products were delivered to ASC.

Trail Data Gathering

The project required data and information upon which to elaborate in the Trail Mapping and Models Analysis Report. This information was gathered from the CSPMP, CSPTMP, GQTE, Google Earth, and Strava.

From the CSPMP and CSPTMP, hiking and biking trail construction specifications were extracted and incorporated into design of concept trails in the Trail Mapping and Models Analysis Report. Multiple tables were critical for providing statistics on existing approved trails, which were added into data tables containing statistical data on all trails referred to in the Trail Mapping and Models Analysis Report. As well, these two documents provided planning guidance delineating between appropriate trail uses and development the CSP management units.

The GQTE provided information on trail management best practices and frameworks, some of which were utilized in the process of creating concept trails in alignment with the areas natural setting, end user goals and objectives. IMBA's trail difficulty rating system was cross referenced against CSPTMP's trail classification structures to create concept trail design parameters.

Data was also extracted from CSP sourced Google Earth kml files containing trail alignments. Once rendered in Google Earth, these kml files provided trail identifiers, length, and slope data. Class, source, material type, status and approved use cases was gathered from the CSPTMP. The same data points were made available by mapping concept trails. This data was saved in the Trails Log spreadsheet, containing three tabs named Trail Data Collection Table, Trail Class Summary Table and Trail Cost Estimation Table. These were included in the Trail Mapping and Models Analysis Report for reference and provided to ASC. As with existing approved trails, Google Earth was used to plot concept hiking and biking trail alignments, with the data being stored and tallied in the aforementioned spreadsheet.

Strava was used to gather visual data on trail usage intensity at Arctic Valley. Strava aggregates trail use intensity data for regions globally, with higher use trails denoted in brighter colors. This information was gathered to provide a visual aid, showing how users interact with existing approved trails, social trails, and how concept trails might increase user interactions.

Trail Mapping and Models Analysis Report

This document provided written elaboration and presentation of the data gathered during the Trail Data Gathering segment of the project. The goals of this document are multi-fold.

Goal One: Transfer knowledge of trail building best practices per guidance from Chugach State Park and the International Mountain Bike Association.

Goal Two: Gather and present data on currently existing trails at Arctic Valley.

Goal Three: Gather and present data on concept hiking and biking trails at Arctic Valley.

Goal Four; Discuss proposed concept trail intent and open items to resolve before implementation if ASC and CSP pursue additional trails enhancement related planning.

In support of the above goals, this report presents data sourced from the project, CSP, and IMBA, and presents the data in trail data tables, graphics, and maps.

The intended audience are those involved in trail planning at Arctic Valley. They should come away with a greater understanding of trail building best practices, the location of current existing sanctioned, existing unsanctioned, and proposed concept trails at Arctic Valley. This information was fed into the statement of feasibility.

Statement of Feasibility

Analysis of the information collected leads to the conclusion that the implementation of new and enhanced trails is feasible at Arctic Valley.

Regulatory Feasibility

Chugach State Park regulatory guidance contained in the Chugach State Park Management Plan (CSPMP) and Chugach State Park Trail Management Plan (CSPTMP) Public Review Draft provide information on guidance and regulations for CSP. ASC is subject to the terms of their Concession Contract with CSP, which define terms for permissible operations in the area defined by the contract. Given that the area defined exists entirely within CSP, the construction and enhancement of trails within the Concession Contract are also subject to CSP management plan guidance.

The CSPMP provides various trail management guidance for areas within CSP. Arctic Valley lays within the boundaries of the Recreation Development Zone and Ship Creek Planning Unit of CSP.

Per the CSPMP, Recreation Development Zone is a management area “established to meet the more intensive recreational needs of the public by providing easy and well-defined access points into the park, and by developing appropriate facilities. The most intensive activities and developments are meant to occur in these zones, including, developed parking facilities and trailheads, vehicle and tent camping, developed picnic and group areas, toilet facilities, visitor and interpretive centers, high-standard trails for all ages and abilities, and park management facilities” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47). Furthermore, “the only area of recreation development land in the Ship Creek Unit coincides with the developments and land base associated with the Arctic Valley ski area and the Nike Site” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47).

CSP’s above guidance implies that among other activities, improving and increasing the number of trails for various public uses is consistent with the designated managed use of CSP’s lands within the ASC Concession Contract. Refer to appendix A and B to reference Ship Creek Planning Unit and CSP’s Recreation Development Zone.

Interviews with subject matter expert stakeholder elicited feedback which further corroborated CSPMP guidance indicating trails implementation is aligned with CSP management plans, though searches for a documented trails implementation process not successful. Thus, the process was documented using feedback provided by the aforementioned stakeholders. Refer to appendix C: Proposal and Elicitation of Trails Related Regulation Change in Chugach State Park.

The trails discussed in the Trail Mapping and Models Analysis are in varying final states of the defined Regulation Changes process. In appendix D: Ship Creek Unit Trails, all trails listed are approved and implemented per their Designed User, except for trails 301 and 304a, which are fully approved but not yet implemented. See appendix E for map of aforementioned trails.

In appendix D, trails 300, 301, 302a, and 303 have Managed Uses including bicycles. However, it is noted a regulation change is required to allow bicycles. These changes would require administrative effort and coordination with CSP and the Citizen Advisory Board (CAB) to widen the user groups which can legally access trails. Among all regulation changes proposed, the comments in appendix D contain the changes which are likely to be implemented on the shortest timeline.

The concept trails listed in appendix F and proposed in the Trail Mapping and Models Analysis are in the earliest stage of the Regulation Changes process. Implementation of required regulation changes and trails would likely take several take years to complete. Continued refinement of trails plans and designs informed by CSPMP and IMBA guidance are key to realizes success of proposals. Extensive collaboration with agency and community stakeholders would result in the shortest implementation timeline.

Technical Feasibility

Review of trail construction guidance documentation and feedback from subject matter experts leads to the conclusion that approved and feasible methods exist to implement trails at Arctic Valley.

Planning and execution to a sufficient level degree is critical to creating acceptable infrastructure. Just as critical, is the land upon which it is built – that is, it must possess characteristics and qualities conducive to building trail. None of these aforementioned items are lacking at Arctic Valley. The Anchorage Ski Club has at their disposal resources with experience and training in project management, land management, trails planning, construction, and public recreation. ASC's culture of volunteerism is a positive driver for cost-effectiveness.

The most significant challenge identified by subject matter experts is the planning of physical logistics and distribution of equipment and labor into an area without roadway access. Planning a cost-efficient schedule for work and equipment dispatch into areas under development should be taken into consideration in project planning. It would be logical for heavier machinery to complete wider trails, typically closer to the base. Hand labor should be used to construct narrower remote trails. Trail excavation difficulty decreases as elevation increases, as costs associated with increased travel to construction site inversely increase with elevation.

Review of vegetation and physical features in CSP and project sourced maps display how vegetation is less dense at Arctic Valley. Subject matter experts concurred with the hypothesis that implementation of trails in the Arctic Valley area is more conducive to trail implementation when compared to recent implementations in the Hillside area of Far North Bicentennial Park (FNBP), and Glen Alps. Refer to appendix N, and compare vegetation types mapped in the two yellow boxes. The upper box highlights Arctic Valley, and the lower box highlights FNBP and Glen Alps. Review the map legend and compare vegetation types between the two areas; Arctic Valley is depicted as having primarily Alpine and Shrub vegetation. FNBP and Glen Alps is depicted with a mix of Conifer, Mixed Forest, and Shrub. This corroborates with stakeholder feedback confirming the costs of the trail implementation at FNBP and Glen Alps was likely impacted by denser vegetation. The same SMEs reported that drainage was another complicating factor on their previous sites, with complex hydrology apparent in areas of pooling which required elevated trail grade. Consistent downward sloping grades at Arctic Valley are anticipated to mitigate this risk.

There are no special extenuating circumstances indicating a specific equipment type must be or must not be used due to equipment capabilities, and geotechnical or regulatory constraints. Industry standard equipment is recommended for use in construction. This includes standard hand implements, and machinery. Small, maneuverable machinery is industry standard in trails construction. Models recommended by subject matter experts include the Bobcat MT100 Mini Track Loader, John Deere 17G and Bobcat 418 Compact Excavators.

Refer to an expounded discussion on trail implementation in the Trail Mapping and Models Analysis document in appendix M, provided separately.

The following activities are included in the forthcoming concept trail cost estimates: professional trail planning, design, machine clearing and construction by a globally acclaimed bike trail company. The estimates do not include project management, public engagement, and volunteer efforts.

Financial Feasibility

By comparing cost estimates for concept trail implementation versus ASC's 2021 fiscal year financial statement, it was determined it is within the capabilities of ASC to allocate necessary funding to invest in trails implementation.

The estimated costs to implement concept trails are in a similar range as the projects proposed in appendix G: ASC Immediate Action Project List and Estimated Costs. Project listed in appendix G have an average estimated cost of \$276,154, with \$15,000 and \$1,900,000 being the lowest and highest cost proposed projects, respectively. Concept trail cost estimates have an average estimated cost of \$44,556, with \$7,128 and \$123,500 being the lowest and highest cost proposed projects, respectively. See concept trail cost estimates in appendix H. These metrics do not include estimated costs to implement a holistic downhill bike trail park, just the trails.

This is only a comparison of estimated project costs. It is anticipated that both ASC's and this project's estimates would change upon additional stakeholder input and analysis.

Appendix L, separately attached, illustrates ASC's improving financial position and investment capabilities. Various metrics can be calculated from the data contained, including those below; see in appendix L, tab 4, separately attached. It is postulated that ASC has realized a vast improvement in their financial standings due to immense stakeholder effort to improve and invest in their recreational product offerings.

- Revenue increased over 6x at a 10-year average annual growth rate of 27%
- Total liabilities and equity on balance sheet over \$1,000,000
- Net income over \$274,000

As past performance is not indicative of future results, ASC should calculate estimated payoffs of potential investments, and select accordingly. Additional calculations such as return on investment, payback period, and internal rate of return are recommended to provide additional information for project selection.

This analysis does not imply feasibility of implementation of every proposed concept trail, but rather implementation of trail packages or individual trails which provide network benefits considering potential connections and loops with existing trails.

For example, implementation of hiking specific trails 302e and 302f would provide network benefits to the entire system, as it would create new loop opportunities trails 227a, 227b, 228, 302a, 302b, 302c, and 302b. Implementation of trails 302e and 302f has an estimated total maximum cost of \$215,400 and minimum of \$124,344.

Implementation of a package of cross-country biking trails is also more cost effective than implementation of every concept cross-country biking trail. For example, implementation of trails 2xc, 3xc, and 4xc would create a functional route for intermediate bikers. Implementation of trails these three trails cost an estimated cost of \$292,800 at most and a minimum of \$128,832 at least.

See aforementioned concept hiking and biking trails in appendices I and J, respectively.

The trail cost estimates per Single Track Advocates include professional trail planning, design, machine clearing and construction by a globally acclaimed bike trail company. These costs did not include project

management, public engagement, and volunteer efforts. ASC is known to be entrepreneurial, and often finds alternative solutions for project cost reductions. It is anticipated that ASC can materially reduce trail implementation costs via grants, donations, volunteer labor, and creativity.

Cost estimations and feasibility analysis for the implementation of a downhill bike trail park medical response program was not completed due to being out of project scope. This program is an essential component of a downhill bike park; thus, estimation overall is not included in the feasibility assessment. An additional recommended activity is analysis of potential monetization techniques and estimated required cashflows required to support trails.

ASC's current infrastructure can support lift serviced downhill biking with estimated an investment of \$6,500 for bike carrying hardware and installation. ASC would need to determine the patronage volume feasible for support of a downhill bike park. A balance must be struck between increased maintenance of deprecating support structures and cashflow required to support operations. See cost estimate calculation in appendix K.

Considering all of the above, additional internal analysis or engagement of an external consultant might yield different results, which should be utilized if considered to possess merit in excess of the cost estimates provided in this report.

Recommended Future Actions

Recommended Future Research

1. It is recommended to review the survey responses from the following survey, completed in 2020, concerning public feedback on Master Planning at Arctic Valley. Incorporate into recreation enhancement plans. <https://www.surveymonkey.com/results/SM-QTXBKTNG7/data-trends/>
2. Complete a financial analysis for implementation of the following items:
 - a. Remediation and enhancements to approved trails 302a, 302b, 302c, 302b, and 303.
 - b. Implementation of a medical response program for downhill bike trail park.
 - c. Monetization techniques and estimated cashflows from monetization of new trails.
3. After reviewing materials cited within documents in scope for literature review, it was discovered that an economic impact analysis might reveal interesting implications on net benefits or disbenefits when introducing new trails in an area. Completing an economic impact analysis might provide decisions makers information enabling them to make decisions with more conviction, given they know what economic impact they might have on the community. Those publications are bibliography entries four, five, six and eight.
4. The Chugach State Park Trail Management Plan Public Review Draft (CSPTMP) published in 2009 was discovered to contain requirements directly applicable to trails development at ASC. However, review of the CSPTMP was not included in scope of the literature review. While the CSPTMP was reviewed, with content and requirements being referenced in other documents of the Feasibility Assessment, review of this document would be logical for inclusion in related future Literature Reviews.

Potential Future Projects

Ideas for potential future projects were conveyed by ASC stakeholders during interviews and are documented in the list below.

1. Work with ASC Stakeholders to prioritize all ASC project ideas via requirements gathering, stakeholder interviews, research, financial analysis, document all findings in spreadsheets, and documents.
2. Create new estimate to improve trail 302a from previous improvements endpoint to Gordon Lyon - Rendezvous saddle.
3. Research how to get E-Bikes permitted for use at Arctic Valley. Currently incompatible except as allowed in 11 AAC 20.015. May be authorized under 11 AAC 18.010 in areas in addition to those in 11 AAC 20.015 (a-b) only for park management purposes, research, or in support of authorized or other permitted activities where there is park benefit.
4. Improve trail from Arctic Valley base area to Mt. Gordon Lyon - Rendezvous saddle.
5. Marston Extension from Marston Extension Endpoint, over Hunter Pass, to South Fork Eagle River Trailhead.
6. Feasibility and advocacy Study of Marston Extension trail and adding a loop from South Fork Eagle River Trailhead to Mt. Gordon Lyon - Rendezvous saddle.
7. Amend Concession Contract with respect to permissible area of operation.
8. Planning effort for Public Use Cabin at far south of parking pad.
9. Relocate Arctic to Indian Trailhead, and Trail Alignment to 'blue' line, reduce parking user conflicts. An engaged SME suggested the Arctic to Indian trailhead should be relocated. This often interferes with safe access and egress on Arctic Valley Road. This aligns with CSPMP Access Goals to "Enhance the visitor experience through management of access points and

promoting of access etiquette to ensure that there is a balance between the demand for an area and its capacity” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.20). The SME suggested the issue be resolved by creating a new trailhead or moving the designated trailhead for the Arctic to Indian Trail.

10. Improve and length the trail from Muldoon to ASC as a multi-use trail.
11. Mountain Biking specific Feasibility Study.
12. Checklist of all phase gates and deliverables required to Execute opening of a lift serviced bike park.
13. Public Use Cabins at far SE of ASC Concession Contract.
14. Look for opportunities to improve parking facilities, disperse parking pressure, user conflicts near the South Fork Eagle River Trailhead.

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Acronyms

1. AKDNR: Alaska Department of Natural Resources Division Of Parks And Outdoor Recreation
2. ASC: Anchorage Ski Club
3. CSPMP: Chugach State Park Management Plan
4. CSPTMP: Chugach State Park Trail Management Plan
5. DH: downhill

6. FB: fat bike
7. GQTE: Guidelines for a Quality Trail Experience
8. IMBA: International Mountain Bike Association
9. SME: subject matter expert
10. ST: social trail
11. STA: Single Track Advocates
12. XC: cross country

Key Terms

1. Concession Contract: a contract between a government entity and another party outlining the specific operating terms for the party within the government's jurisdiction.
2. Heatmap: a map depicting intensity of human traffic by overlaying color formatted GPS data onto user selected base maps.
3. Social Trail: informal trails created by combined erosional forces of humans, animals, and natural elements. Typically indicative of human trail use misaligned with local management plans.

Appendix C

Literature Review

Summary

Purpose of Research

The purpose of the Literature Review was to document information, requirements and guidance contained in the identified materials, and perform knowledge transfer to Anchorage Ski Club (ASC). The goal is to provision ASC with information pertaining to planning and management of trails in Chugach State Park (CSP), to the effect that they can be more successful in complying with state trail planning requirements, management, and best practices.

The document contains an overview of source material sections and excerpts implying how trails should be planned and managed by ASC. These findings are summarized in this document, with initial notes captured in the Literature Review Requirements Log, which has been provided to ASC. The management plans and other guidance documents reviewed have also been provided separately.

Research Approach

The Literature Review sourced materials at the recommendation of subject matter experts, by performing web searches, and by reviewing references and bibliographies of primary source materials. Over ten documents were found to contain information relevant to trails planning and development at Arctic Valley, but scope of the review was limited to four to achieve completion of the Arctic Valley Trails Feasibility Assessment and Master Planning Support Project per the schedule.

The four documents were reviewed, notated initial indication of relevance for Literature Review and future trail planning at ASC. These notations are included as comments on the source documents, provided to ASC. The requirements which apply to trails planning and development for ASC are included in the Literature Review Requirements Log, also provided to ASC. This Literature Review serves to provide high level summary of each document's intent, list information and quotations implicating trails planning and development requirements for ASC. The information is organized into 3 sections for each of the 4 documents: Summary, Content Pertaining to Physical Setting and Trail Design Planning, and Content Pertaining to Regulatory Requirements and Trail Management Planning.

Chugach State Park Management Plan

Summary

The Chugach State Park Management Plan (CSPMP), adopted by the Commissioner of the Department of Natural Resources in February 2016, is the most recent iteration of Chugach State Park (CSP) plans. This plan's guidance supersedes plans approved in 1980, 1986, as well as the Chugach State Park Trail

Management Plan (CSPTMP) Public Review Draft approved in 2009. However, where guidance was provided in the CSPTMP and not in the CSPMP, the guidance in the CSPTMP takes precedence.

For example, the 2009 CSPTMP provides guidance on management and approved uses for all trails in CSP, listed in tables, whereas the 2016 CSPMP does not. See pages 43 – 62 in the CSPTMP Public Review Draft for tables containing trail management details.

In another example, the CSPMP published in 2016 provides multiple maps with management intent for each management zone and planning unit, whereas the CSPTMP contains maps with specific trail alignments.

The plan discusses topics with implications for trail planning, development, and management at Arctic Valley, including park goals and objectives, natural and cultural resources, park use and issues, areawide management direction and guidelines, unit management, and management plan implementation.

Content Pertaining to Physical Setting and Trail Design Planning

The CSPMP frames the physical setting of CSP, discussing its location in Southcentral Alaska, abutting against the greater Anchorage metropolitan area in the west. The park contains approximately 495,000 acres of land and is one of the four largest state parks in the United States. The area in which Anchorage Ski Club specifically operates is approximately 600 acres, though the greater alpine valley area enjoyed by locals and colloquially referred to as Arctic Valley, is approximately 800 acres (Nevins-Lavtar, 2021, p.4). These areas represent 0.12% or 0.16% of CSP's total landmass, respectively.

The CSPMP provides details framing the physical setting, geography, geology, hydrology, flora, and fauna of the Ship Creek Management Unit, from which anecdotes guiding trail design can be extracted.

With its lowest elevation lift beginning at 2500', Arctic Valley exists entirely in the Alpine Life Zone (as defined by CSPMP); a zone consisting of a thin covering of windblown deposits and volcanic ash over gravelly colluvium and bedrock, with mixed non-vegetated rock outcroppings and low shrubs is consistent with observed flora at Arctic Valley (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.24). This is noteworthy, as subject matter experts have indicated construction of trails on land with low shrubs or non-vegetated rocks require less construction effort, and correspondingly less funds (L. Boling, personal communication, February 23, 2022).

Below the primary and most popular regions of Arctic Valley, is the subalpine transition zone, denoted by a transition from alpine vegetation to denser vegetation, including alder and willow (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.26). This is consistent with firsthand observations on fauna density in the area. The level of effort to construct trail becomes correspondingly higher as vegetation density increases.

As seen in exhibit 1 below, vegetation at ASC is primarily Alpine and Shrub, with smaller distributions of Barren, Mixed Forest and Conifer vegetation types identified. No Hardwood, permanent Snow or significant Water source represented in exhibit 1. Note the approximate area contained in the yellow box (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.32). The

same document also provided guidance for trail building practices, including use of large rocks, berms, depressions where appropriate per Division of Parks and Outdoor Recreation (DPOR).

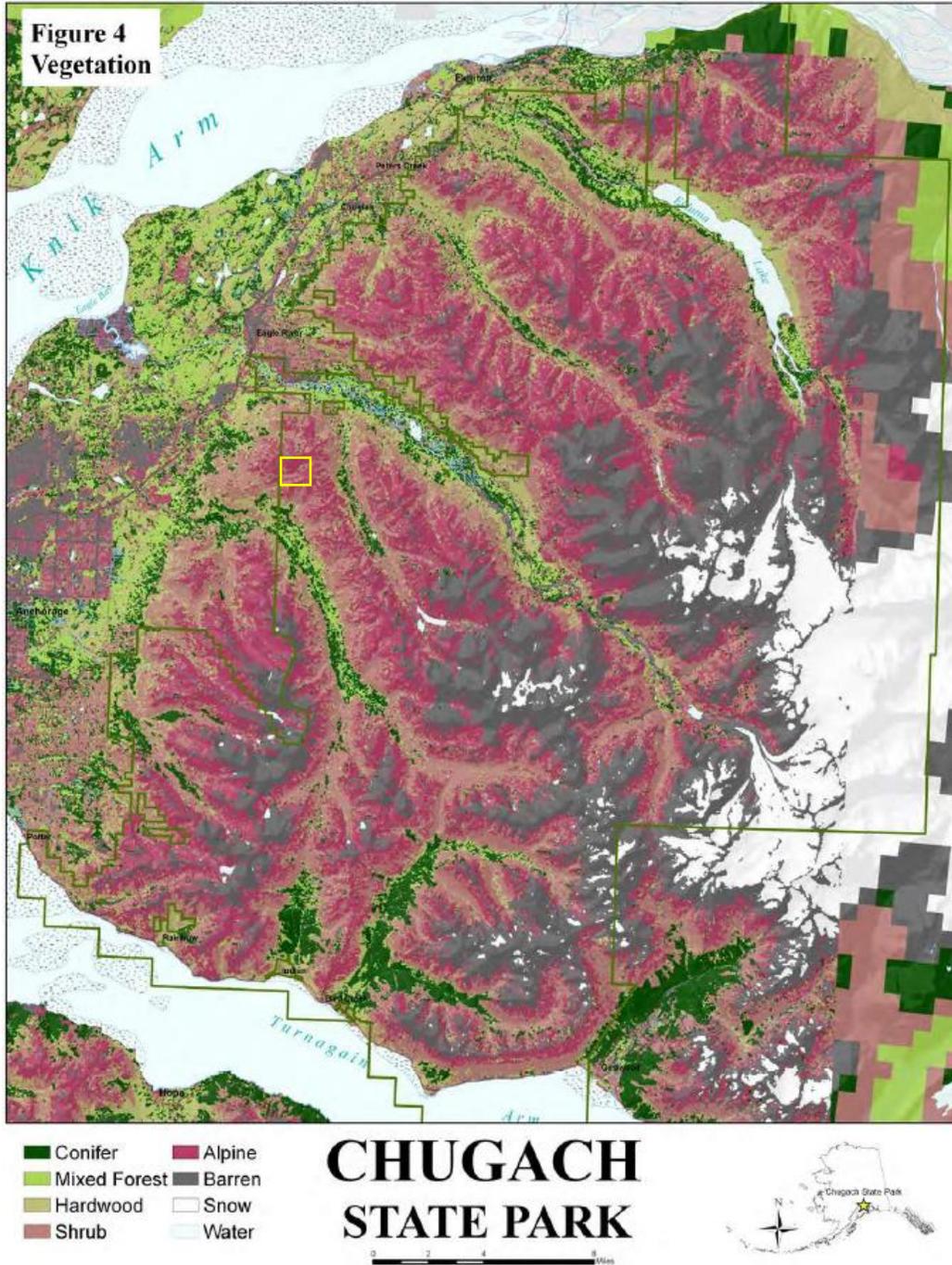


Exhibit 1: CSP Vegetation Map (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)

Content Pertaining to Regulatory Requirements and Trail Management Planning

The CSPMP contains information pertaining to the management of trails and regulatory requirements to the effect that said information provides guidance on how trails, their uses and users need to be governed and monitored for alignment with the CSPMP to be achieved.

At a high level, this includes information on specific intent and guidelines for managed park uses within defined Planning Units and Management Zones, existing and proposed multi-agency Management Agreements, and facility improvement recommendations.

Arctic Valley exists near the intersection of multiple management boundaries, each with their own management goals, created by different agencies. First, ACS's Concession Contract is delineated by CSP's and Joint Base Elmendorf-Richardson's (JBER) shared boundary west of Arctic Valley. Second, Arctic Valley's Concession Contract contains area classified entirely as Recreation Development Zone and Ship Creek Planning Unit, per the CSPMP (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.48). Given the above, there is not conflicting guidance between the various agencies and management requirements. However, there might be heightened awareness from both CSP and JBER of development activities taking place in close proximity to state park and management area borders.

The aforementioned Planning Units and Management Zones define the intensity, type of activity and development which can take place therein. This was defined by CSP to concentrate human activities in certain areas and to protect others. The result was higher concentration of Recreation Development Zones in the peripheries of the park, with the Wilderness Zone primarily in the east, and Natural Zone in between. ASC's Concession Contract permits them to operate in an area designated as Recreation Development Zone.

With that being said, the majority of the feasibility assessment's prototype trails are mapped within the Recreation Development Zone (see orange areas in exhibit 3), with a minority mapped in the Natural Zone. Development of trails in the Natural or Wilderness Zone is not prohibited. However, they would be subject to the constraints of these zones. Natural and Wilderness Zone trail requirements purposefully emphasize reduction of development, as compared to the Recreation Development Zone. The result is trails in these zones have a smaller physical and ecological footprint, as well as lower intensity of designated uses.

ASC's Concession Contract permits ASC to operate in the Recreation Development Zone; a management area "established to meet the more intensive recreational needs of the public by providing easy and well-defined access points into the park, and by developing appropriate facilities. The most intensive activities and developments are meant to occur in these zones, including, developed parking facilities and trailheads, vehicle and tent camping, developed picnic and group areas, toilet facilities, visitor and interpretive centers, high-standard trails for all ages and abilities, and park management facilities" (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47). This statement implies that among other activities, improving and increasing the number of trails for various public uses is consistent with the designated managed use of Arctic Valley.

Further to the point above, the statement below specifically implicates Arctic Valley as an area in the Recreation Development Zone; a designation which is congruent with improving and increasing high-standard trails for a variety of users. “This designation typically applies to front country or periphery areas of the park and to areas along major roads and highways. The only area of recreation development land in the Ship Creek Unit coincides with the developments and land base associated with the Arctic Valley ski area and the Nike Site” (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.47).

Bearing in mind the previous 5 paragraphs, note the CSP Planning Units and Management Zones pictured in exhibits 2 and 3 below. Note ASC’s approximate Concession Contract area contained in the yellow box (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.17).

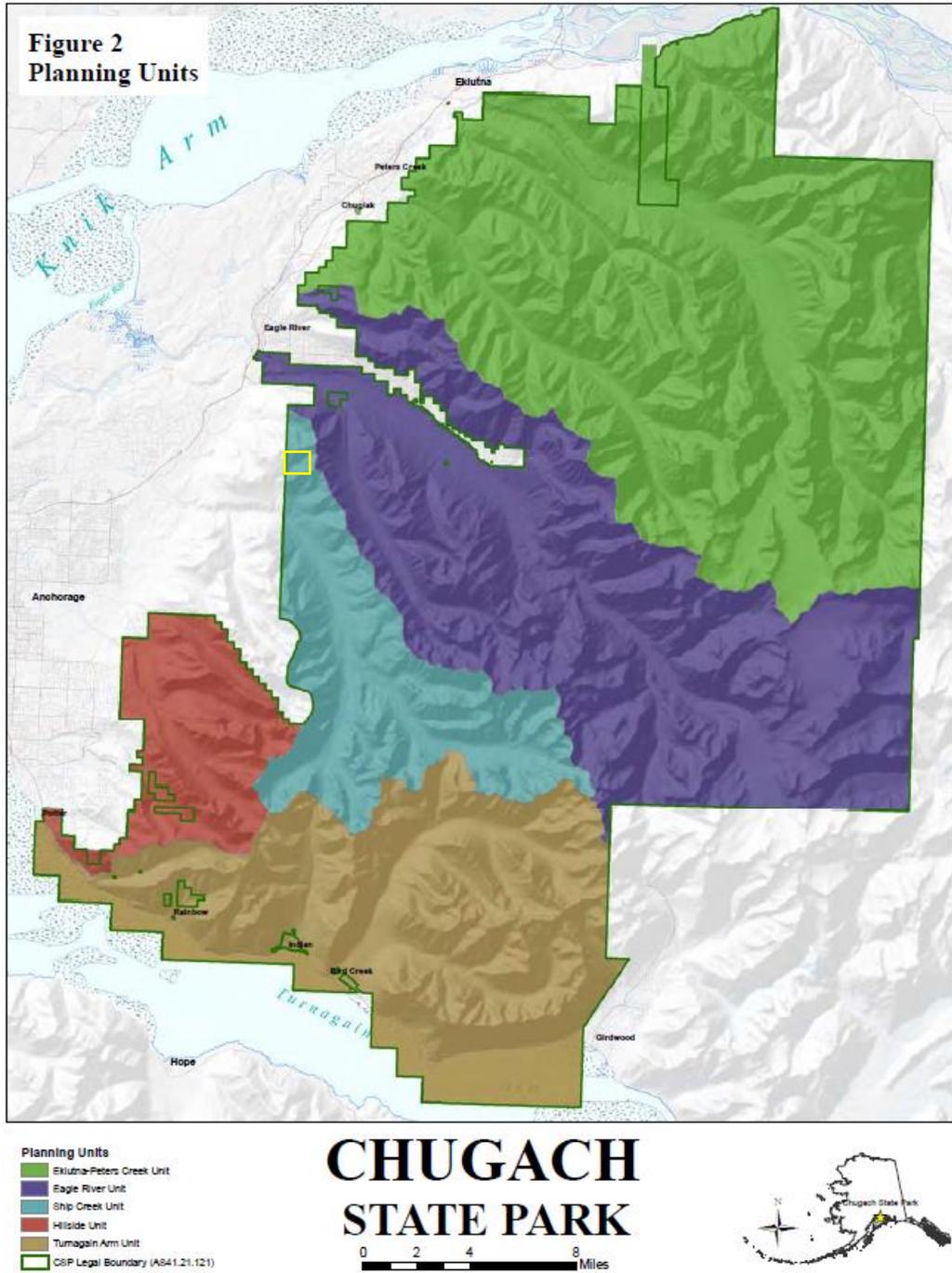


Exhibit 2: CSP Planning Units (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)

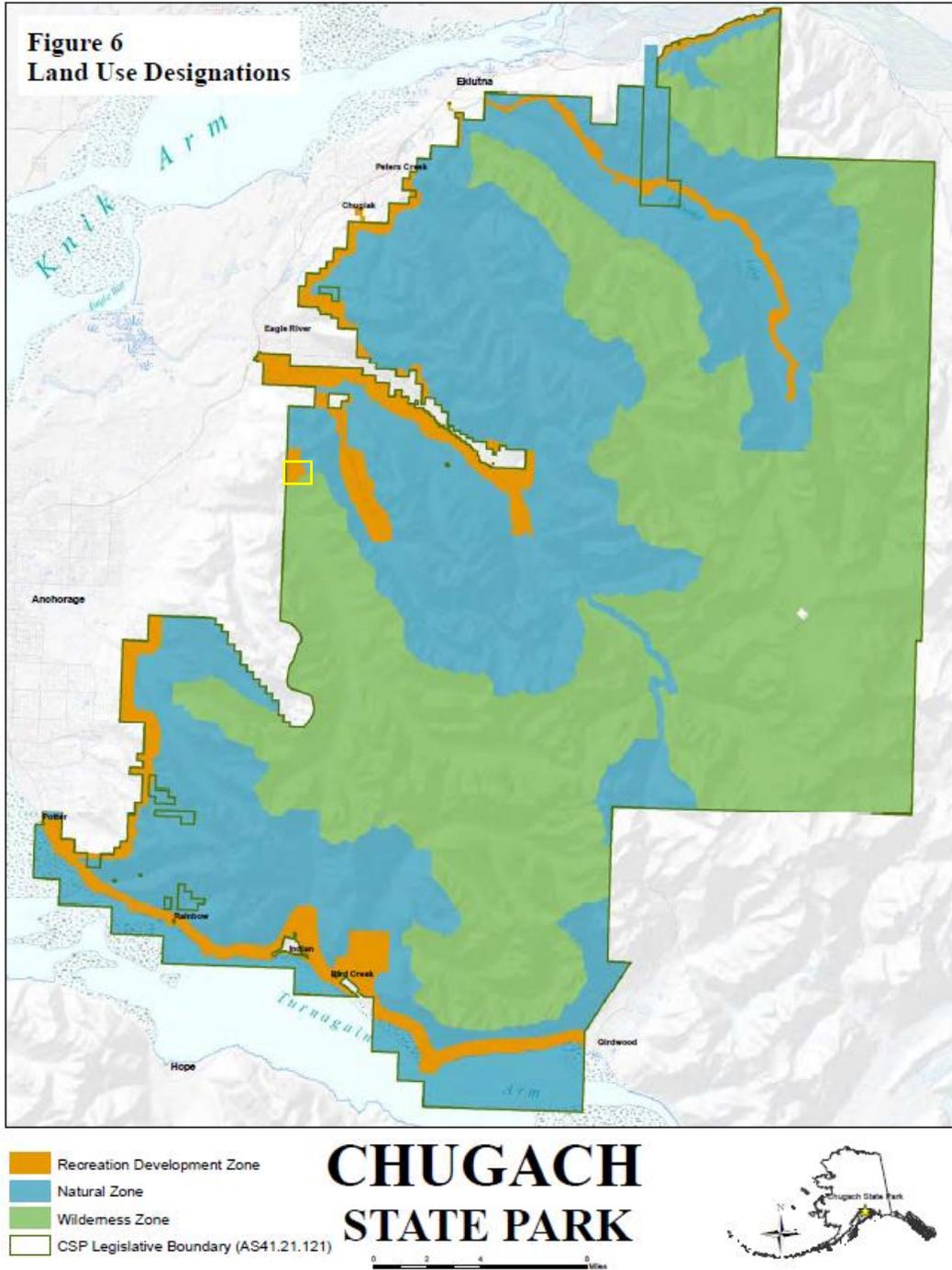


Exhibit 3: Land Use Designation Zones (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)

Chapter 5 makes it apparent that thoughtful consideration for watershed protection is crucial for trails planning, as highlighted in numerous sections throughout the CSPMP. Development of trails should implement tactics to mitigate risk to watershed integrity of the Ship Creek drainage. Acting under the authority of AS 41.21.121, Alaska Department of Natural Resources Division of Parks and Outdoor Recreation (AKDNR) identified watershed protection as the highest land and water resource for Ship

Creek (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.67, p.44). It would behoove ASC to align trail development plans with this goal. Further to this point, CSP states "One of the purposes of the park and reasons for its establishment was due to concerns regarding the protection of the watershed and the delivery of a satisfactory water supply to the people of the State of Alaska" (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.44).

If ASC is successful in maintaining a practice of safe water conservation, the Federal Land and Water Conservation Fund (LWCF) makes available a 50/50 federal matching grant to winning applicants who submitted proposals which outline compliance with LWCF requirements for water conservation (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.42). As such, ASC should plan to maintain compliancy with the LWCF program for any future development.

Repeating concerns for conservation of wilderness and water as a priority for the Ship Creek unit on page 105, the CSPMP state management intent of the Ship Creek Unit; "Protect the unit's wilderness values and water quality. Manage for low intensity recreational use. Work with the military to maintain access to Arctic Valley. Work with the Anchorage Ski Club, Inc. to enhance recreational opportunities at their lease site" (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.105). Fish do not inhabit or spawn in Tokle Creek, the only body of water in the Concession Contract. Tokle Creek drains into Ship Creek, habitat and spawning grounds for Coho and King Salmon. CSPMP seemingly introduces contradicting requirements to manage Ship Creek for low intensity use, while enhancing recreational opportunities at Arctic Valley. In reality, this would require stakeholders to work in concert to ensure enhancements have engrained environmental protections.

Exhibit 4, below, provides a summary depiction of common ranges for various fauna in CSP. Goat, Dall Sheep, Moose and Salmon are shown to exist in various concentrated areas of CSP, none of which plotted at Arctic Valley. However, it is indicated that Dall Sheep, Goat, Wolf, Wolverine, Moose and Bear could inhabit areas across the entire park (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.26). Note ASC's approximate Concession Contract area contained in the yellow box.

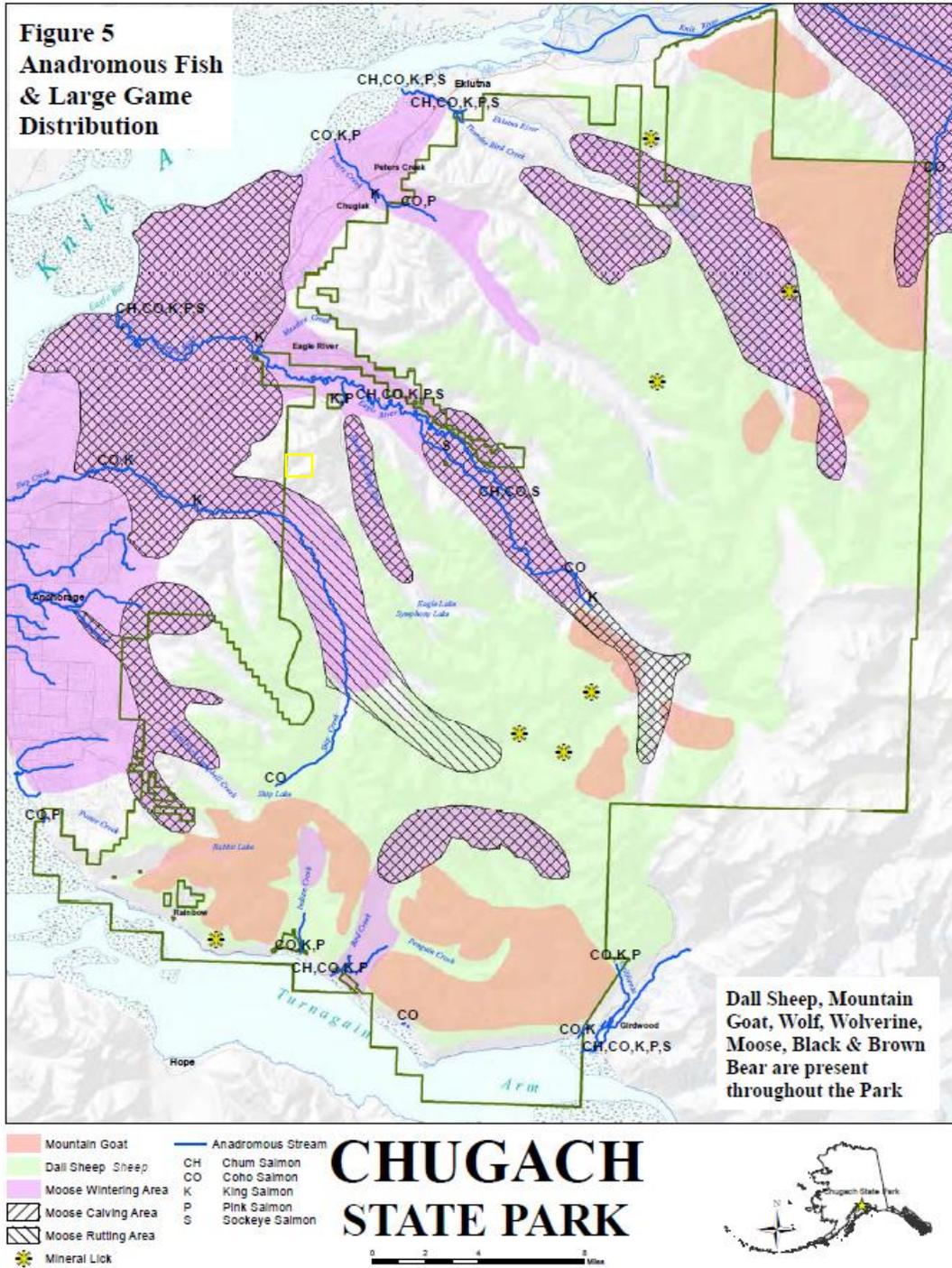


Exhibit 4: Anadromous Fish & Large Game Distribution in CSP (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)

The CSPMP makes several brief mentions on the topic of reducing user conflicts, and that trails should be planned to minimize stakeholder conflicts (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.40).

Requirements were expressed for specifically allowing bicycles on certain trails. In short, this trail use case needs to be permitted on a case-by-case basis and approved by State Legislators in coordination with CSP. As much was indicated on page 58, where it's highlighted which specific regulations permit bicycle use; 11 AAC 20.050, 11 AAC 18.010, 11 AAC 20.050(a)(1-14), 11 AAC 20.050(b) and 11 AAC 20.050(c)(1-3), if in keeping with park purposes and after evaluating possible resource impacts (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.58).

The CSPMP provides proposed facility enhancement recommendations, which have positive implications for trails development at Arctic Valley. The table containing Proposal ID number 50, corresponding to Map # 6.3, indicates a Management Objective exists to upgrade the ASC Concession Contract area by undertaking a planning process to evaluate potential site uses to enhance recreational opportunities consistent with park standards (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016, p.107).

Guidelines for a Quality Trail Experience

Summary

Guidelines for a Quality Trail Experience (GQTE) provides a brief history on mountain bike trail development in North America, modern development techniques and best practices for building in today's environment of increasing demand for sustainable trails in terms of environmental, economic, and socio-cultural factors.

IMBA's GQTE does not implicate Arctic Valley in any of the content discussed therein. However, given that the primary interest of the feasibility assessment associated with this literature review is research on the feasibility of enhanced trails at Arctic Valley, it was determined as pertinent to review the information provided in the document, and save applicable findings for future reference on potential trail enhancement projects. Moreover, this specific document and other IMBA publications are popular across the globe for use as guidance documents for planning and building mountain bike specific trails.

Content Pertaining to Physical Setting and Trail Design Planning

IMBA (2018) notes that *good* mountain bike trails are appropriate to the physical place of the trail and skills of the intended users. They should be sustainable for the local environmental and socio-cultural setting, as well as economically responsible (IMBA, 2018, p.22).

IMBA (2018) asserts on page 22 and reasserts on page 27 that generally, trails designed with the planned outcome in mind, result in higher quality trails. In a similar vein, IMBA indicates implementation of frequent trail features of any size, if appropriately designed per the use case, are often more sustainable than trails which are benign due to the misconception that more benign trails are more sustainable (2018, p.34).

A thematic repetition on page 95 is that trail builders and land managers partnered in construction of technically progressive trails can do so by planning for environmental sustainability, erosion control and

resource impacts, all the while not mandating a flat and smooth trail. Moreover, a trail not meeting desires of users cannot be considered *sustainable* by every tenet of the term in this context (IMBA, 2018, p.95).

IMBA provides a number of graphically formatted frameworks and visual aids for the trail design and construction process. See an abbreviated list below.

- IMBA Trail Difficulty Rating System (2018, p.65) assists with assignment of trail difficulty rating, based on standardized measurements of trail width, surface, grade, and more.
- Trail Index Matrices help create route-experience goals and trail narratives for focusing the design and construction effort (IMBA, 2018, p.76).
- Trail Specifications Matrix provides a template for users to document specific trail parameters for construction and management (IMBA, 2018, p.83).
- Trail System Index Matrices provides a template for users to document specific trail parameters for construction, management and maintenance (IMBA, 2018, p.89).

Content Pertaining to Regulatory Requirements and Trail Management Planning

IMBA exists to organize, elevate, and advocate for the sport of mountain biking. Their mission is to “protect, create, and enhance great mountain bike experiences” (IMBA, 2018, p.3). IMBA does not however hold regulatory authority over CSP or ASC. Rather, they can *only* provide trail construction and management best practices. Thus, only suggestions contained therein for trail management planning best practices are below.

IMBA provides a brief list of common stakeholders sharing mountain bike trails; E-Bikers, Equestrians, Hikers, Mountain Bikers and Trail Runners (IMBA, 2018, p.23). These stakeholders are common to CSP, and IMBA’s guidance on planning management controls or separation of users with competing goals is applicable to CSP trails.

IMBA provides a number of graphically formatted frameworks and visual aids for the trail management process. See an abbreviated list below.

- Outcomes Focused Management Framework is for gathering OFM data prior to planning and designing new trails, to guide towards selection of trails of the right type and place (IMBA, 2018, p.27).
- Recreation Setting Characteristics exist to assist trail managers in determining trail themes and types appropriate to the setting (IMBA, 2018, p.30).
- Trail User Objectives and Features Framework assists trail planners with determining appropriate trail features in accordance with constraints and user objectives (IMBA, 2018, p.67).
- Trail System Planning framework is a step-by-step guide for planning cohesive, progress and sustainable trail networks (IMBA, 2018, p.73).

Far North Bicentennial Park Trails Improvement Plan

Summary

The Far North Bicentennial Park Trails Improvement Plan (FNBPTIP) was initially selected as a literature review subject at the recommendation of a SME. Their supposition was requirements applying to ASC would be contained therein. It has since been discovered that the FNBPTIP does not contain content specifically implicating Arctic Valley, nor any requirement by which Arctic Valley needs to operate in the present or future.

However, as a large park neighboring Arctic Valley, managed under similar preservation and development objectives, under similar government organizations and requirements, it was found that reviewing the material was beneficial for increasing knowledge on park and trail management in the Anchorage front range near CSP.

This plan does not contain direct requirements for ASC, as ASC is solely within the confines of CSP. Rather, the Chugach State Park Management Plan contains direct requirements for ASC. The document contains guidance for trail management in the largest and closest public park to CSP, and should be reviewed for guidance providing similar, different, or conflicting trail management principles.

Content Pertaining to Physical Setting and Trail Design Planning

The FNBPTIP presents management guidance and information on the largest park in the Municipality of Anchorage (MOA). Under the Chugach Mountains, the 4,011-acre park provides users with various recreation opportunities, including but not limited to Alaska Botanical Garden, Hilltop Ski Area, 80 miles of multi-use trails, and trail junctions to elsewhere in CSP (DOWL HKM, 2011, p.27).

DOWL HKM highlighted an important and growing need to intelligibly design access points into CSP, given that many users access CSP from FNBP itself. In this sense, the value of their sums is greater than the individual parts. Specifically called out were high level requirements from the author for fluid connection between CSP and FNBP. As well, improvements to access in East Anchorage, including but not limited to Stuckagain Heights were suggested. Not expounded upon was the fact that CSP was developing their own masterplan at the time of DOWL HKM's FNBPTIP publication (DOWL HKM, 2011, p.49).

DOWL HKM conducted user feedback sessions with public stakeholders and documented said feedback in the FNBPTIP. The project took particular interest in the trail cost estimation information below, provided by a trail design SME. This was useful in providing estimates for conceptual trails in the feasibility assessment.

“Values of FNBP Trails:

1. \$5/ft. for Trail Class 1 & 2 - (construction/design) - 1' to 4' wide trail.
2. \$10-\$12/ft. for Trail Class 3 - (imported/improved trail tread) - 4' to 6' wide.
3. \$20/ft. for Trail Class 4 & 5 - (larger, wider than 6' trails)” (DOWL HKM, 2011, p.158).

Content Pertaining to Regulatory Requirements and Trail Management Planning

DOWL HKM (2011) conveyed that with positive increases in trail use, a corresponding requirement for maintenance activities and user conflict management should follow suit (p.7). This was reflected in the FNBPTIP, where the author organized information on planned improvements, the organization and actions required to execute said improvements. This included level setting information on current trail and park facilities, mapping newly proposed trails, and defining maintenance and construction parameters.

High level goals within the FNBPTIP maintain a theme consistent with the CSPMP. Preservation of the parks water resources and wildlife habitat for the benefit of state citizens in perpetuity was highlighted. As with CSPMP, development facilitating improved recreation is consistent with park uses, if in designated areas (DOWL HKM, 2011, p.22).

Similar to the CSPMP, the FNBPTIP identifies zones for low, medium and high use, as well as development (DOWL HKM, 2011, p.27). This highlights the need for ASC to ensure planned trails align with goals of CSP management zones.

Earlier plan iterations from the 1990's preceding the FNBPTIP by DOWL HKM (2011) included introduction of new standards and regimen for maintaining trails in FNBP, namely, the Tour of Anchorage trail (TOA). Interestingly, the same improved maintenance regime implemented, conflicted with trail use cases for mountain bikers. Consistent maintenance applied to the TOA trail caused surface topography and texture to be flattened, reducing enjoyment for the mountain bike user group. This was the onus for the founding of Single Track Advocates (STA) in 2004 (DOWL HKM, 2011, p.8). This shows that ASC should ensure user goals and objectives are accounted for in planning of trails, so as to reduce conflicting user goals.

Girdwood Trails Plan

Summary

Similar to the FNBPTIP, this plan does not have direct requirements for ASC, as ASC is subject to the terms of their Concession Contract with CSP. As such, the CSPMP contains direct requirements for trails management at Arctic Valley. The Girdwood Trails Plan (GTP) contains proposed guidance for trail planning and development in the Girdwood Valley of Chugach National Forest.

However, as a large park neighboring CSP and Arctic Valley, managed under similar preservation and development principles, created by similar government organizations, it was found that reviewing the material was beneficial for increasing knowledge on park and trail management in the region. The information reviewed increased the breadth and depth of the literature review on the subject of planning, constructing and maintaining trails in Alaska.

Content Pertaining to Physical Setting and Trail Design Planning

The Girdwood Trails Committee (2021) presented total park trail length information in an organized fashion (p.20), to the effect it was determined to be implemented in a similar manner in the Feasibility Assessment. Specifically, a matrix of existing and proposed trails organized by ID number, name, length, and classification is a useful matrix for showing percent distribution of trails. Assuming a trails planner knows their regions objectives for percent distribution of trails by classification rating, they can refer to the matrix to determine if that objective has been met. ASC can utilize a similar technique by comparing ratios of current trail classifications versus the desired distribution of trails by class. From there, they can plan to close the gap and create more trails of the class which are in line with management goals.

Avalanche Zone maps were noted as useful for planning trail in areas with mountainsides sufficiently steep to harbor avalanches terrain (Girdwood Trails Committee, 2021, p.18). However, while relatively steep, Arctic Valley does not possess the slope angles and orientations necessary to be afflicted by large avalanches and should not need to complete a similar Avalanche Zone map. If avalanche terrain is identified, that should be noted in trail plans. Trails in avalanche terrain might need additional spring debris cleaning and regrading. More importantly, users should be notified that avalanche hazard can still exist on slopes overhead even though the trails in lower elevations may be clear.

Content Pertaining to Regulatory Requirements and Trail Management Planning

The Girdwood Trails Committee (2021) issued a survey to attendees of the Imagine! Girdwood public meeting in April 2019 (p. 16). Among other survey results, the GTC called out respondents 61% rate of support for building additional trails. It would be thorough of ASC to engage in similar surveys with stakeholders in order to gauge support for enhanced trails at Arctic Valley. Doing so could provide valuable data to guide ASC in creating information trail plans.

The topic of wayfinding and signage has made appearances in all literature review documents. Wayfinding is an important mechanism for safety and user enjoyment across all trail systems. Girdwood Trails Committee (2021) specifically noted that unmarked intersections with social trails can lead to challenging navigation (p.28). The Feasibility Assessment identified 23 social trails at Arctic Valley, many of which intersect with CSP sanctioned trails. ASC should consider incorporation of wayfinding signage in potential trail plans, though this is likely less critical at Arctic Valley. Most areas feature low-lying vegetation growth or barren rock outcroppings, giving Arctic Valley condition which makes trail navigation relatively easy when compared to more densely vegetated areas of CSP.

Recommendations for Further Research

1. After reviewing materials cited within documents in scope for literature review, it was discovered that an economic impact analysis might reveal interesting implications on net benefits or disbenefits when introducing new trails in an area. Completing an economic impact

analysis might provide decisions makers information enabling them to make decisions with more conviction, once they discover what economic impact trails might have on the community. Those publications are 3, 4, 5 and 6 in the bibliography.

2. The Chugach State Park Trail Management Plan Public Review Draft (CSPTMP) published in 2009 was discovered to contain requirements directly applicable to trails development at ASC. However, review of the CSPTMP was not included in scope of the literature review. While the CSPTMP was reviewed, with content and requirements being referenced in other documents of the Feasibility Assessment, review of this document would be logical for inclusion in related future Literature Reviews.

Acronyms

AKDNR - Alaska Department of Natural Resources Division Of Parks And Outdoor Recreation
ASC-Anchorage Ski Club
CSPMP - Chugach State Park Management Plan
CSPTMP - Chugach State Park Trail Management Plan
DH - downhill
FB – fat bike
GQTE - Guidelines for a Quality Trail Experience
IMBA - International Mountain Bike Association
SME - subject matter expert
ST - social trail
STA - Single Track Advocates
XC - cross country

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11. DOWL HKM. (2011). *Far North Bicentennial Park Trail Improvements Plan*.
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List of Exhibits

1. Exhibit 1: CSP Vegetation Map. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)
2. Exhibit 2: CSP Planning Units. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)
3. Exhibit 3: Land Use Designation Zones. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)
4. Exhibit 4: Anadromous Fish & Large Game Distribution in CSP. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2016)

Appendix D

Stakeholder Interviews

Feedback Overview

Interviews with subject matter expert (SME) stakeholders were documented in order gather information, anecdotes and feedback which could help inform or guide this project's feasibility assessment, as well as related future projects.

The SMEs provided valuable input which helped set context and steer research activities for the project.

Feedback Overview per Question

1. What is your background and involvement at Arctic Valley?

Some SMEs interviewed were general membership pass holders, some were on the Anchorage Ski Club Board of Directors (ASC BOD), and some hail from local outdoor organizations with shared interests in increasing recreational opportunities for Alaskans.

2. Have you been involved with the Concession Contract process? If so, in what capacity?

Rich Todd and Maeve Nevins-Lavtar joined the efforts to support planning and execution of the Concession Contract. The resources leading that effort were not within scope for these interviews, but include Matthew Mead, John Robinson-Williams, and others not mentioned.

3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?

The majority of SMEs have not been involved in trail planning at Arctic Valley. Their experience was primarily related to building the Marston Extension Overlook Trail, as well as periodic maintenance of other trails within the concession Contract.

4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?

Twenty-one recreational opportunities were suggested – see below.

- a. Continue to explore ways to improve the relatively undeveloped CSP front range alpine environment (undeveloped when compared to other USA parks in urban settings).
- b. Enhance Arctic Valley's current trails, or purposefully build new designed, sustainable, use & erosion resistant trails.
- c. Collaborate with agency partners to expand Arctic Valley's permissible areas of operations to facilitate increased public recreational opportunities.
- d. Plan how to address trail degradation.
- e. Continue to explore opportunities to coordinate regulation change to improve and allow bicycles on trails 300, 301, 302a, 303, 304a, 304b.
- f. Evaluate opportunity for lift serviced DH Bike trails.

- g. Evaluate opportunity for road serviced Bike trails.
- h. Evaluate opportunity for Visitor Center Reception / Education area.
- i. Evaluate opportunity for Interpretive Trail Infrastructure.
- j. Evaluate opportunity for Guided Hikes and Outdoor Educational Services for a fee.
- k. Evaluate opportunity for winter Fat Bike Users.
- l. Evaluate opportunity to build E-Bike specific trails and permitting.
- m. Evaluate required improvements to ASC chairlifts currently insufficient for sustained lift serviced DH biking.
- n. Evaluate opportunity for Zipline.
- o. Evaluate opportunity for Public Use Cabins.
- p. Evaluate opportunity for Alpine Restaurant Hut midmountain.
- q. Evaluate opportunity Childcare as a service for a fee.
- r. Evaluate opportunity for collaboration with ASD and after school programs.
- s. Evaluate opportunity for collaboration with UAA & APU for Alpine Campus.
- t. Increase lift serviced hiking and site-seeing for a fee.
- u. Implement Equipment maintenance and storage shack to increase quality of repairs, quality of work environment, lifetime of equipment.

5. What do you think should change at Arctic Valley?

There were a number of items suggested to be changed – see below.

- a. Address trail degradation and excessively steep routing on existing trails.
- b. Spread workload among ASC volunteers.
- c. Increase engagement of general membership for volunteer projects and maintenance.
- d. Discuss how to collaborate with partner agencies for an increased area of operations.
- e. Increase coordination and relationships with JBER stakeholders.
- f. Modernize old infrastructure and implement new infrastructure which meets needs of ASC's existing and new lines of business which are growing.

6. What do you think should not change at Arctic Valley?

As reported by SMEs and other stakeholders, Arctic Valley has a distinct culture and atmosphere which makes it special. Some of this is due to the unique physical characteristics of the area; the landscape has remained unchanged, and the number of structures has actually decreased over the last 60 years by over 50%. The buildings that remain have not changed in appearance for decades, thus the area retains a vintage feel. The summer trails are more direct than those which might be designed using current trail design best practices, which in this case may be a desired experience for some users who prefer steeper hikes over meandering approaches. Additionally, maintaining vast southwest sightlines into Ship Creek and Anchorage was highlighted as important.

The ASC BOD and general membership has seen recent notable improvements in terms of growth and participation. There is a strong culture of volunteerism, a driving force for the organization when applied to completing projects, maintenance and events. Comradery among frequent users was noted as an attractant. The BOD is continuing to improve organization, membership engagement and knowledge transfer to up-and-coming board members.

7. What changes are impossible at Arctic Valley?

ASC would not be able to execute changes which need to be driven by a different organizing or by a federal agency. These include changing concession or park boundaries of Joint Base Elmendorf-Richardson (JBER), Chugach State Park (CSP) and ASC's concession contract. This would also include paving the Arctic Valley access road, which is owned and maintained by JBER, as well as paving the parking lots which are owned and maintained by CSP. It would be impossible for ASC to solely fund either of these projects. Also, for-profit, private real estate development is prohibited.

Raw Notes from Stakeholders Interviewed on ASC Trails Development

Notes from Chugach Mountain Bike Riders Representative, Adam Muggli

1. What is your background and involvement at Arctic Valley?
 - a. General Member of Arctic Valley. (A. Muggli, personal communication, February 27, 2022).
 - b. VP and an original founding Member of CMBR.
2. Have you been involved with the Concession Contract process? If so, in what capacity?
 - a. No.
3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
 - a. No.
4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
 - a. Nothing in particular. CSP front range alpine environment is relatively undeveloped compared to other national parks in urban USA areas.
 - b. Evaluate what increased outdoor access opportunities can be enhanced / developed at Arctic Valley.
 - c. Evaluate opportunity for lift serviced DH Bike Trails. Compare potential against success of Hillside lift serviced trails.
 - d. Evaluate opportunity for XC trails. Anticipate as more likely candidate for grant awards. Determine how to monetize and attain positive ROI. Consider an RFID access gate.
5. What are 3 (or more) things you think should change at Arctic Valley?
 - a. Determine approaches to mitigate and repair erosion issues on existing trails.
6. What are 3 (or more) things you think should not be changed at Arctic Valley?
 - a. Continue to bring a measured and open approach to assessing opportunities for development.
 - b. Do not invest significant monies in decommissioning or realigning remote and steep trails to make them easier. Some users prefer and expect more challenging experiences, like trail 228.
7. What changes are impossible at Arctic Valley?
 - a. No feedback.

Notes from Happy Trails Representative, John Underwood

1. What is your background and involvement at Arctic Valley?
 - a. Contractor providing services and volunteer efforts in trail planning and construction. (J. Underwood, personal communication, February 10, 2022).
2. Have you been involved with the Concession Contract process? If so, in what capacity?
 - a. No.
3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
 - a. Planned Muktuk-Marston Trail. Building Muktuk-Marston summer 2022.
 - b. Performed walkthrough of area, assessing topography for opportunities.
4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
 - a. Nothing in particular. CSP front range alpine environment is relatively undeveloped compared to other national parks in urban USA areas.
 - b. Enhance Arctic Valley's current trails, or purposefully build new designed, sustainable, use & erosion resistant trails.
 - c. Evaluate opportunity for lift serviced DH Bike trails. Rocky terrain in alpine is different from soil in Anchorage's other developed Bike trail zones. Use of Rock's to construct trail necessary. Some social trails could be stitched together into continuous trail. General Bike trail grades should range from 5-8% for ascents and 10%-20% for descents.
 - d. Evaluate opportunity for road serviced Bike trails following Military access road. Proximity to military shooting range is an issue.
5. What are 3 (or more) things you think should change at Arctic Valley?
 - a. Increase thoughtful development of ecologically, financially and culturally sustainable trails and recreational opportunities at Arctic Valley.
6. What are 3 (or more number) things you think should not be changed at Arctic Valley?
 - a. No feedback.
7. What changes are impossible at Arctic Valley?
 - a. No feedback.

Notes from Single Track Advocates Representative, Lee Boling

1. What is your background and involvement at Arctic Valley?
 - a. Not associated or involved. (L. Boling, personal communication, February 23, 2022).
2. Have you been involved with the Concession Contract process? If so, in what capacity?
 - a. No.
3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
 - a. No. Associated with Bike Trails focused organization, Single Track Advocates.
4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
 - a. Increased quality and quantity of alpine trails for Hiking and Biking users.
 - b. Pursue regulatory changes outlined in CSP plan stating regulation change required to permit Bicycles on certain trails.

5. What are 3 (or more) things you think should change at Arctic Valley?
 - a. Continue to explore opportunities to coordinate regulation change to allow bicycles on trails 300, 301, 302a, 303, 304a, 304b. Muktuk Marston and 303 are best candidates for Bike users.
 - b. Continue to explore opportunities to enhance 300, 301, 302a, 303, 304a, 304b as Bike appropriate trails.
 - c. Continue to collaborate with agency partners to expand Arctic Valley's permissible areas of operations to facilitate increased public recreational opportunities.
 - d. Plan how to address trail degradation.
 - e. Plan how to adjust CSP planned trails that are excessively steep.
6. What are 3 (or more) things you think should not be changed at Arctic Valley?
 - a. No feedback.
7. What changes are impossible at Arctic Valley?
 - a. No feedback.

Additional feedback:

- How to execute a Regulation change?
 1. Define trail vision and initial plans.
 2. Present ideas to CSP (under DNR) for initial feedback, discussions.
 3. Revise plan per CSP and stakeholder feedback.
 4. Elicit CSP buy-off.
 5. Present at Citizen Advisory Board (CAB) – elicit buy-off. New trails must be amended into their plan.
 6. Collaborate with CSP to get trails into CSP Plan.
 7. Build or Elicit Regulatory approval – progress per CSP guidance:
 1. Collaborate with CSP to forward proposed change to DNR for Lt. Gov signature
 2. Secure funding
 3. Build (regulation change may follow trail funding and construction)
- CSP Plan is a roadmap/guide – not law. Adhering to trails and guidance in plan will attain quicker results.
- Typical DNR legislature packages historically was 2-year cadence – this is picking up.
- Approach from angle of “new trail system would protect nature by diverting access from social trails, eroding and degrading trails, reducing .”
- CSP funding is limited. Seek grants, sources such as CaresAct, Anchorage Assembly, Private Donations.
- Freeriding off trail not permissible in CSP.
- Recent Anchorage professionally planned and machine constructed trails have ranged from \$50,000 - \$60,000 per mile.
 1. This is high in national range, and high in general trail development range.
 2. These costs included professional trail planning, design, machine clearing and building by a world class bike trails company.
 3. Does not include project management, public engagement, volunteer efforts (STA volunteers covered this).
- At Arctic Valley, anticipate excavation and construction costs to be lower due to less vegetation / trees, but mobilization / logistics / access costs higher due to remote site. Rocky soil is unique, and will have an unknown effect on costs.

- STA incurs \$15,000 annual costs, plus requires volunteers for trail brushing (maintenance).

Notes from Ex Municipality of Anchorage Representative, Maeve Nevins-Lavtar

1. What is your background and involvement at Arctic Valley?
 - a. Ex MOA Parks and Recreation trails planner. (M. Nevins-Lavtar, personal communication, February 23, 2022).
 - b. Ex ASC BOD Member. Previously lead resource on Master Planning effort.
2. Have you been involved with the Concession Contract process? If so, in what capacity?
 - a. Assisted in support capacity.
3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
 - a. Provided general support for Master Planning, and Marston Extension.
4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
 - a. Agree with feedback from Rich Todd:
 - i. Visitor Center Reception / Education area
 - ii. Interpretive Trail Infrastructure
 - iii. Guided Hikes and Outdoor Educational Services for a fee
 - iv. Bike Trails.
 1. Explore opportunities for winter Fat Bike Users.
 2. Build E-Bike trails / Permit E-Biking.
 3. Explore opportunities for E-Bike. Refer to Scottish E-Bike Parks as model in Scotland
 4. Propose due to ASC chairlifts insufficient for sustained lift serviced DH biking. Regardless of biking type, appropriate separation of trail user types is needed.
 - v. Zipline. This might serve tourist stakeholders and some Alaskans, but anticipate Alaskan stakeholders would provide feedback that a zipline fits environment of Arctic Valley and CSP. Do not anticipate repeat customers. This is a low barrier to entry adventure (for customers) close to airport.
 - vi. Public Use Cabins.
 1. Cluster the cabins for simpler construction and logistics.
 2. Review Tent Mountain Division in Colorado as a comparable model with huts close to road. These should be accessible to those with impaired mobility – these users could park at the cabins.
 3. These cabins should have multiuse rooms for different stakeholder uses. Classrooms, parties, etc.
 4. Site selection must be thoughtful; consider user circulation, trail connections, seasons, required access gear/apparel, mud, snow, water, vegetation.
 5. Berry picking stakeholders may appreciate easy access to good berry picking on ‘Military side.’
 - b. Alpine Restaurant Hut midmountain.

- c. Childcare as a service. Is there federal funding for this? Where can this be provided? What are staff certification requirements?
 - d. Evaluate opportunity for collaboration with ASD / after school programs and activities.
 - e. Evaluate opportunity for collaboration with UAA/APU for Alpine Campus building and associated labs, outdoor based classes, and activities.
 - f. Increase lift serviced hiking and site-seeing for a fee.
 - g. Implement Equipment maintenance and storage shack to increase quality of repairs, quality of work environment, lifetime of equipment.
5. What are 3 (or more) things you think should change at Arctic Valley?
- a. Increase overall diversity and representation on the BOD in terms of ethnicity, culture, age, gender, user groups, etc.
 - b. Spread BOD/volunteer workload/responsibilities among more BOD members.
 - c. Enhance engagement of general membership for volunteer projects and maintenance.
 - d. Discuss how to collaborate with partner agencies for an increased area for operations.
 - e. Deepen relationship with JBER stakeholders:
 - i. Discuss with JBER on how to capitalize on Arctic Valley's setting for Arctic warfare.
 - ii. Coordinate with JBER to arrange representation at BOD meetings.
 - iii. Coordinate regular meetings with JBER representatives.
 - iv. Discuss with JBER how to collaborate / leverage their program making servicemen available for public service projects.
 - f. Avoid holding events out of sync with prescribed uses of the area.
6. What are 3 (or more) things you think should not be changed at Arctic Valley?
- a. Continue to foster a strong culture of volunteerism.
 - b. Continue to look for opportunities to provide paid positions.
 - c. Continue to share knowledge to *up and coming* BOD members.
 - d. Continue to foster a professional / engaged BOD.
 - e. Continue to clean up & organize the base area.
 - f. Continue to increase racer use of the race shack.
 - g. Retain ambiance and general culture of friendliness.
 - h. Centralize buildings and future development, such that primary views and site lines remain unobstructed. Eastern ski-slope views and southern Ship Creek views should remain unimpeded. Keep builds under 2 stories max.
 - i. Allow vegetation growth around parking lots to increase interaction with nature.
7. What changes are impossible at Arctic Valley?
- a. Paving the military owned access road.
 - b. Existing military boundaries, regulations and conditions would be difficult to change.

Notes from Anchorage Ski Club Representative, Rich Todd

- 1. What is your background and involvement at Arctic Valley?
 - a. 2009 as volunteer, board on 2010, volunteer ever since, done everything from lift maintenance to tube park, kitchen, bar, fundraising events, ball, auction. (R. Todd, personal communication, February 27, 2022).
 - b. 4th year as president
- 2. Have you been involved with the Concession Contract process? If so, in what capacity?

- a. Joined after commenced by Matt Mead, John Robin-Williamson, et al.
3. Have you been involved with planning trails or other enhancements at Arctic Valley? If so, in what capacity?
 - a. Not involved in trail planning.
 - b. One initial small project was tube park installation.
 - c. 2010's reinvigoration of Arctic Valley was all based on volunteer work. Only last few years have seen significant influx of paid staff and mechanics.
4. What outdoor recreational opportunities are lacking in Anchorage and Alaska that Arctic Valley could feasibly provide?
 - a. Visitor Center Reception building or area. Could be space/opportunity to provide for a fee or free, education (historical on anthropological, environmental or geologic history), guided hikes, interpretive hikes, trail maps, trail hosting.
 - b. Interpretive Trail Infrastructure. Benches, Plaques, Memorials and Point of Interest Signage.
 - c. Guided Hikes and Outdoor Educational Services for a fee.
 - d. Bike Trails. These are feasible and supported at ASC. Must be designed/built for biking. Proper "biking only" / "hiking only" signage required. Anticipate CSP supportive of efforts to plan bike trails. New lifts to support DH bike trails are not anticipated in near term. Thus, trails must be XC, and XC trails are hard to monetize – how to monetize? How to earn positive ROI? Daily pass? Season pass? Increased grant \$ and donations increase likelihood of success.
 - e. Zipline. Larger hurdles likely exist on regulatory and stakeholder basis, as well as financial. Requires usage of Chair 2 – increasing maintenance costs or requiring replacement.
 - f. Public Use Cabins. Build 2-3 cabins for rent by public. Propane heating. ADA accessible. Relatively basic. Locate at either end of parking lot 3, or at far south end of Concession Contract area. Possibly use incinerator toilets for human waste management. Advertise on Arctic Valley website. Anticipate State Parks is supportive of cabins.
5. What are 3 (or more) things you think should change at Arctic Valley?
 - a. New Chairlifts. Replace aging lift infrastructure to implement newer technology, and increase reliability. Implement Chair 3 to replace T Bar. Retire Chair 1. Implement Beginner lift on slopes below lodge.
 - b. Renovate Lodge. Centralize this facility as the primary restaurant to serve as kitchen for potential surrounding buildings/venues. Expand or build new 2nd floor deck.
 - c. New Wedding venue/facility.
 - d. New maintenance building for groomers and mechanical work.
 - e. Improve diversity of users and use of area. Skiers / snowboarders are generally more affluent.
6. What are 3 (or more) things you think should not be changed at Arctic Valley?
 - a. Culture. Culture of general friendliness, openness, *easy-going* nature of Arctic Valley.
7. What changes are impossible at Arctic Valley?
 - a. Paving the military owned access road. Insurmountable for ASC to finish alone. Complex and relatively expensive project. This would need to be managed and funded by Military or State resources. 6-mile-long road on BLM land.
 - b. Paving ASC parking lots. Insurmountable for ASC to finish alone. State Parks might consider paving all 3 parking lots if funding became available.

Real Estate development and sales is not permissible.

Appendix E

Historical Infrastructure Analysis

Summary

This document contains the results of a search for information on infrastructure greater than fifty years old at the site of the decommissioned Arctic Valley Ski Bowl. This was to assist ASC in satisfying requirements from the National Historic Preservation Act (NHPA) and the State Historic Preservation Office (SHPO), requiring they document locations of infrastructure over fifty years old. The project compared maps, photos, written and verbal accounts against corroborating SME stakeholder feedback to determine locations for structures of interest. The project manager found 22 structures of interest, documented below, as well as in the Infrastructure Log spreadsheet (see appendix A) and Google Earth kml file map pack delivered to Anchorage Ski Club (ASC). NHPA and SHPO requirements apply to lands in state parks, of which eleven of the structures identified existed in. ASC should amend this document when additional pertinent information is discovered.

Drivers for Research of Historical Infrastructure

The primary driver for conducting research and cataloguing of infrastructure over fifty years old at Arctic Valley, is to fulfill NHPA and the SHPO requirements. For Anchorage Ski Club (ASC) to be eligible for several grants, ASC must satisfy NHPA and SHPO requirements to prove an effort was made to document the locations of infrastructure over fifty years old. The requirements imposed by NHPA and SHPO apply to structures on State Land. This means this effort's primary concern is identification of historical structures within the boundaries of Chugach State Park (CSP). See exhibit 3, where structures in focus are east of the CSP boundary, denoted by the north-south blue line.

The aforementioned effort was commenced by ASC Board of Directors (BOD) members, and this document is meant to advance their progress in completing their goal of confirming where and when structures historically existed at Arctic Valley.

Research Approach

The project endeavored to determine where and when infrastructure existed in the Arctic Valley area by comparing maps, photos, written and verbal accounts against corroborating SME stakeholder feedback.

Example of evidence corroboration is below, where maps, photos and stakeholder feedback arrived at concurrence on the location and age of structures.

Example: Locating "12 Pony (Rope) Tow"

Locations of the buildings below can be triangulated to the location of structure 12 Pony (Rope) Tow, alignment mapped in Exhibit 3. Barracks and other unidentified buildings are in the foreground of Exhibit 1, below. 12 Pony (Rope) Tow can be seen on the right-most side of the photo. Also see appendix B, C, and D for additional triangulation of structures. 12 Pony Tow can be seen in the left edge of appendix D. Additionally, 15 Palma Lift can be spotted in the foreground of appendix D.



Exhibit 1: Identified structure number 13, Pony (Rope) Tow, seen in middle elevation of photo (ALSAP, 2004).

Research Findings

Through analysis of maps, photos, written and verbal accounts, it was determined that there were twenty-two structures previously emplaced, of which all but one (18 Alpenglow Lodge) have been dismantled. eleven of these structures were located outside of CSP and eleven inside.

Most of the structures identified outside CSP boundaries were shelters of various types, including multiple barracks and a ski lodge. Otherwise, there was one T Bar and four unidentified buildings.

Most of the structures identified inside CSP boundaries were lift related. Seven lift related structures were identified, one shelter, one restroom, and a row of lights for night skiing.

See exhibit 2, below, where twenty-two structures identified as over fifty years old are listed. The eleven structures boldened and underlined below, are in-scope for documentation requirements per NHPA and SHPO.

Label in Google Earth Map	Year Built
<u>1 Arctic Valley Ski Lodge</u>	<u>1960</u>
<u>2 T Bar</u>	<u>1941</u>
<u>3</u>	<u>1941</u>
<u>4</u>	<u>1941</u>
<u>5</u>	<u>1941</u>
<u>6</u>	<u>1941</u>

7 Barracks	1941
8 Barracks	1941
9 Barracks	1941
10 Barracks	1941
11 Barracks	1941
<u>12 Pony (Rope) Tow</u>	<u>1941</u>
<u>13 Rope Tow</u>	<u>1941</u>
<u>14 Night Lights</u>	<u>1941</u>
<u>15 Palma Lift</u>	<u>1955</u>
<u>16 T Bar</u>	<u>1955</u>
<u>17 Rope Tow</u>	<u>1955</u>
<u>18 Alpenglow Lodge</u>	<u>1960</u>
<u>19 Restroom</u>	<u>1960</u>
<u>20 Ski Jump</u>	<u>1950</u>
<u>21 Thomson Rope Tow</u>	<u>1950</u>
<u>22 Ptarmigan Rope Tow</u>	<u>1960</u>

Exhibit 2: List of infrastructure fifty years old or greater at Arctic Valley (ALSAP, 2004). The type of structure is unknown for buildings 3, 4, 5 and 6.

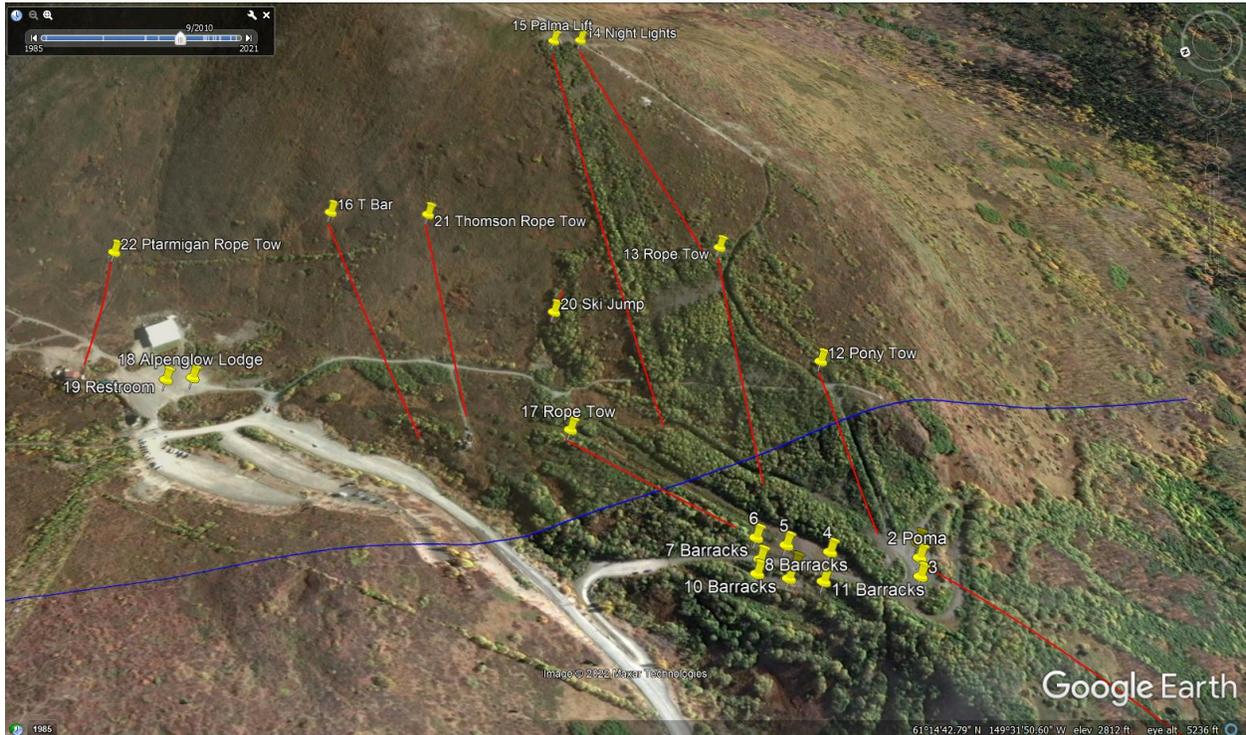


Exhibit 3: Map of infrastructure fifty years old or greater at Arctic Valley (Maxar Technologies, 2009).

Recommendations for Further Research

ASC BOD identified other questions, for which answers might provide benefits to their Master Planning in progress. The additional questions are listed below but are out of scope for resolution in this document.

1. Given an updated map is now available, what benefits could come from studying previous lift circulation patterns? Might those patterns fit current day needs, constraints and make sense to incorporate into development plans?
2. Given that ASC is engaged in Master Planning efforts, which previous lift alignments could be utilized to reduce cost of implementing potential new lifts?
3. Identification of previous lift base areas and foundations might be useful for future infrastructure, as the soil might be a stronger foundation for future buildings, vegetation may be cleared, and new construction on areas of previously disturbed earth might face less regulatory hurdles.
4. In which previously flat-graded areas could a snow cat storage shed be built?
5. The base terminal of 12 Pony Tow, 13 Rope Tow, 15 Palma Lift, and 17 Rope Tow appear to be road accessible. What benefits could exist in refurbishing this access road?
6. Were structures in the Arctic Valley Ski Bowl area deconstructed to mitigate risk of additional regulatory requirements imposed by NHPA and SHPO?
7. What is the merit and feasibility of new construction on the alignment of the previous 15 T Bar?
8. ASC BOD Subject Matter Experts (SMEs) suggested the project manager collect data from the public room of BLM for old photography. Varying, old versions of USGS maps may depict rope tows lines and couple of telephone poles. This suggestion was not completed and is a recommended activity for potential future research.
9. ASC BOD Subject Matter Experts (SMEs) suggested the project manager collect data from the JBER Civil Engineering shop, where historians may have some maps that ASC has not yet discovered. This suggestion was not completed due in part to lack of JBER access, Covid-19 restrictions, and is a recommended activity for potential future research.
10. ASC BOD Subject Matter Experts (SMEs) suggested the project manager collect data from Loussac Library, and search for photos or maps which ASC has not yet discovered. This suggestion was not completed and is a recommended activity for potential future research.

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4. (B. Leudke, personal communication, March 1, 2022).
5. (K. Keeler, personal communication, February 20, 2022).
6. (R. Todd, personal communication, February 27, 2022).

List of Exhibits

1. Exhibit 1: Identified structure number 13, Rope Tow, seen in middle elevation of photo. (ALSAP, 2004)
2. Exhibit 2: List of infrastructure fifty years old or greater at Arctic Valley. (ALSAP, 2004)
3. Exhibit 3: Map of infrastructure fifty years old or greater at Arctic Valley. (Maxar Technologies, 2009).

Appendices

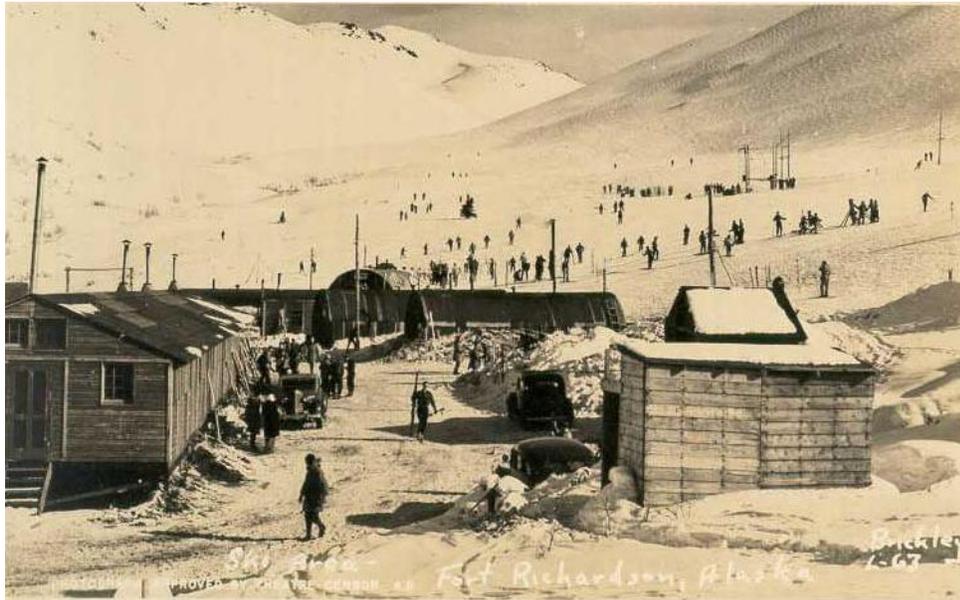
Appendix A

Log of Previous Infrastructure

Label in Google Earth Map	Base Latitude	Base Longitude	Base Elevation (ft)	Year Built
1 Arctic Valley Ski Lodge	61°14'27.49"N	149°32'29.88"W	2420	1960
2 Poma	61°14'27.49"N	149°32'29.88"W	2420	1941
3	61°14'27.49"N	149°32'29.88"W	2420	1941
4	61°14'30.17"N	149°32'28.46"W	2420	1941
5	61°14'31.30"N	149°32'26.99"W	2420	1941
6	61°14'32.04"N	149°32'25.81"W	2430	1941
7 Barracks	61°14'32.04"N	149°32'25.81"W	2410	1941
8 Barracks	61°14'32.24"N	149°32'27.25"W	2410	1941
9 Barracks	61°14'32.52"N	149°32'28.02"W	2410	1941
10 Barracks	61°14'31.71"N	149°32'29.05"W	2410	1941
11 Barracks	61°14'30.79"N	149°32'30.06"W	2410	1941
12 Pony (Rope) Tow	61°14'27.39"N	149°32'15.93"W	2580	1941
13 Rope Tow	61°14'28.70"N	149°32'4.72"W	2700	1941
14 Night Lights	61°14'30.42"N	149°31'44.95"W	3060	1941
15 Palma Lift	61°14'31.46"N	149°31'44.68"W	3070	1955
16 T Bar	61°14'41.31"N	149°31'52.35"W	2790	1955
17 Rope Tow	61°14'36.09"N	149°32'14.30"W	2510	1955
18 Alpenglow Lodge	61°14'47.07"N	149°32'2.29"W	2610	1960
19 Restroom	61°14'47.87"N	149°32'1.94"W	2610	1960
20 Ski Jump	61°14'35.09"N	149°32'5.25"W	2630	1950
21 Thomson Rope Tow	61°14'38.10"N	149°31'55.21"W	2790	1950
22 Ptarmigan Rope Tow	61°14'48.76"N	149°31'49.83"W	2740	1960

Previous Infrastructure Log. (ALSAP, 2004), (Maxar Technologies, 2009).

Appendix B



Barracks north orientation (ALSAP, 2004).

Appendix C



Barracks south orientation (ALSAP, 2004).

Appendix D



Lift number 12, Pony Tow, at left edge of photo. Pony Tow 15 can be spotted in the foreground (ALSAP, 2004).

Appendix F

Trail Mapping and Models Analysis

Summary

The goal of this document is multi-fold. One; to provide information on trail building best practices per guidance from Chugach State Park and the International Mountain Bike Association, and elaborate on how this can be incorporated into trail management planning at Anchorage Ski Club (ASC). Two; gather and present data on where CSP trails currently exist at Arctic Valley. Three; gather and present data on concept hiking and biking trails. Four; discuss proposed concept trail intent and open items to resolve before implementation if ASC and CSP pursue additional trails enhancement related planning.

In support of the above goals, this report presents data contained in CSP and IMBA sourced trail data tables and graphics, as well as project sourced maps and trail data tables.

The intended audience, those involved in trail planning at Arctic Valley, should come away with a greater understanding of trail building best practices, the current state of existing sanctioned trails, existing unsanctioned, and proposed concept trails at Arctic Valley.

The information, designs, data, and maps contained were fed into the statement of feasibility, provided to ASC.

Trail Building Best Practices

Trail Modeling Sources

Documents from CSP and IMBA have provided this report with useful frameworks and guidelines for planning trails. The CSPMP is the most recent iteration of Chugach State Park (CSP) management plans. This plan's guidance supersedes previously plans approved in 1980, 1986, as well as the Chugach State Park Trail Management Plan (CSPTMP) Public Review Draft, created in 2009. The CSPMP provides management intent for all management zones and planning units, facility upgrade recommendations, primers on park founding principles and many associated maps. What the CSPMP lack in trail specific guidance, the CSPTMP provides tables with management specifications and alignments for existing trails, proposed trails, construction, maintenance, and more.

The Guidelines for a Quality Trail Experience (GQTE) provides a brief history on mountain bike trail development in North America, modern development techniques and best practices for building in today's environment of increasing demand for sustainable trails in terms of environmental, economic, and socio-cultural factors. This report leveraged the IMBA frameworks listed below to arrive at completed concept trails.

- Outcomes Focused Management Framework (IMBA, 2018, p.26).
- Recreation Setting Characteristics (IMBA, 2018, p.30).
- Trail User Objectives and Features Framework (IMBA, 2018, p.67).
- Trail Index Matrices (IMBA, 2018, p.76).
- Trail Specifications Matrix (IMBA, 2018, p.83).

Trail classification assignments and design parameters are based on the Hiking and Bicycle design parameters discussed in two sources; the CSPTMP and International Mountain Bike Association (IMBA) Guidelines for a Quality Trail Experience (GQTE) Trail Difficulty Rating System. For comparison, the Girdwood Trails Committee also provides the USFS Trail Class System; see in appendix A.

Trail statistics (trail lengths, slope angles) were gathered from the CSPMP for existing trails, and from mapping analysis in Google Earth for unsanctioned conceptual trails and unsanctioned existing trails. It is not known whether a margin of error exists in the Google Earth data presented for mapped trail alignments.

Trail Specifications and Difficulty Ratings

The GQTE and CSPMP both provide similar guidance on trail specifications for items such as trail width and grade. Where only the CSPTMP provides guidance, CSPTMP should take precedence. This is applicable for proposed hiking trails, where only the CSPTMP provides construction specifications for hiking trails; see exhibit 1 below. The hiking trails proposed concept trails in this report are assigned class 2 and 3.

Figure 3.3: Hiker/Pedestrian Design Parameters

Designed Use HIKER/PEDESTRIAN		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	0" – 12"	6" – 18"	18" – 36"	24" – 60"	36" – 72"
	Double Lane	36"	36"	36" – 60"	48" – 72"	72" – 120"
	Structures (Minimum Width)	18"	18"	18"	36"	36"
Design Surface	Type	Native, ungraded May be continuously rough	Native, limited grading May be continuously rough	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough	Native with improved sections of borrow or imported material, and routine grading Minor roughness	Likely imported material, and routine grading Uniform, firm, and stable
	Protrusions	≤ 24" Likely common and continuous	≤ 6" May be common and continuous	≤ 3" May be common, not continuous	≤ 3" Uncommon, not continuous	No protrusions
	Obstacles (Maximum Height)	24"	14"	10"	8"	No obstacles
Design Grade	Target Grade	5% – 25%	5% – 18%	3% – 12%	2% – 10%	2% – 5%
	Short Pitch Maximum	40%	35%	25%	15%	5% – 12%
	Maximum Pitch Density	20% – 40% of trail	20% – 30% of trail	10% – 20% of trail	5% – 20% of trail	0% – 5% of trail
Design Cross Slope	Target Cross Slope	Natural side slope	5% – 20%	5% – 10%	3% – 7%	2% – 3% (or crowned)
	Maximum Cross Slope	Natural side slope	25%	15%	10%	3%
Design Clearing	Height	6'	6' – 7'	7' – 8'	8' – 10'	8' – 10'
	Width	≥ 24" Some vegetation may encroach into clearing area	24" – 48" Some light vegetation may encroach into clearing area	36" – 60"	48" – 72"	60" – 72"
	Shoulder Clearance	3" – 6"	6" – 12"	12" – 18"	12" – 18"	12" – 24"
Design Turn	Radius	No minimum	2' – 3'	3' – 6'	4' – 8'	6' – 8'

Exhibit 1: CSPTMP guidance for hiker/pedestrian trail design parameters. Assists with assignment of trail classification per construction specifications. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2009, p.24).

Both the CSPTMP and GQTE provide trail specification guidance for mountain bike trails. Where both sources provide guidance pertaining to bike trail specifications, and the GQTE provides construction guidance which would result in an easier trail (wider, less steep, more trail surface compaction), the GQTE guidance should take precedence. As IMBA bike trail guidance is more current and provides trail resulting in an easier experience, adherence to IMBA guidance may lead to improved accessibility for users and maintenance of trails. Compare exhibit 2 and 3, below, where trail specification guidance diverges between the CSPTMP and IMBA’s Trail Difficulty Rating System.

Figure 3.5: Bicycle Design Parameters

Designed Use BICYCLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	6" – 12"	12" – 24"	18" – 36"	24" – 48"	36" – 60"
	Double Lane	36" – 48"	36" – 48"	36" – 48"	48" – 84"	72" – 120"
	Structures (Minimum Width)	18"	18"	36"	48"	60"
Design Surface	Type	Native, ungraded May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native, with limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present, but not common	Native, with improved sections of borrow or imported materials and routine grading Stable, with minor roughness	Likely imported material and routine grading Uniform, firm, and stable
	Protrusions	≤ 24" Likely common and continuous	≤ 6" May be common and continuous	≤ 3" May be common, but not continuous	≤ 3" Uncommon and not continuous	No protrusions
	Obstacles (Maximum Height)	24"	12"	10"	8"	No obstacles
Design Grade	Target Grade	5% – 20%	5% – 12%	3% – 10%	2% – 8%	2% – 5%
	Short Pitch Maximum	30% 50% on downhill segments only	25% 35% on downhill segments only	15%	10%	8%
	Maximum Pitch Density	20% – 30% of trail	10% – 30% of trail	10% – 20% of trail	5% – 10% of trail	0% – 5% of trail
Design Cross Slope	Target Cross Slope	5% – 10%	5% – 8%	3% – 8%	3% – 5%	2% – 3%
	Maximum Cross Slope	10%	10%	8%	5%	5%
Design Clearing	Height	6'	6' – 8'	8'	8' - 9'	8' - 9'
	Width	24" – 36" Some vegetation may encroach into clearing area	36" – 48" Some light vegetation may encroach into clearing area	60" – 72"	72" – 96"	72" – 96"
	Shoulder Clearance	0" – 12"	6" – 12"	6" – 12"	6" – 18"	12" – 18"
Design Turn	Radius	2' – 3'	3' – 6'	4' – 8'	8' – 10'	8' - 12'

Exhibit 2: CSPTMP guidance for bike trail design parameters. Assists with assignment of trail classification per construction specifications. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2009, p.28).

IMBA Trail Difficulty Rating System					
	 Easiest White Circle	 Easy Green Circle	 More Difficult Blue Circle	 Very Difficult Black Diamond	 Extremely Difficult Dbl Black Diamond
Trail Width	72" or more	36" or more	24" or more	12" or more	6" or more
Trail Surface	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
Average Trail Grade	Less than 5%	5% or less	10% or less	15% or less	20% or more
Maximum Trail Grade	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
Natural Obstacles and Technical Trail Features (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF 2' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF 4' high or less, width of deck is unpredictable Many sections may exceed criteria

Exhibit 3: IMBA Trail Difficulty Rating System. Assists with assignment of trail difficulty rating, based on standardized measurements of trail width, surface, grade, and more (IMBA, 2018, p.65).

User Objectives and Descriptions

IMBA created a series of Trail User Objectives, which trail planners can use as one component in their trail planning toolset, to describe a high-level objective of the trail being planned. Many trail statistics and descriptors should be documented prior to construction. When presented as a single word, Trail User Objective can provide a lot of information to designers on the trail characteristics they should plan so as to achieve the desired objective.

The Trail User Objectives listed below have been suggested for the concept trails in this report.

- **“Escape:** Something that takes you away from your daily grind, allows you to get lost in the experience of riding. Often means getting away from the urban environment, but a bike park, even indoors, can provide this as well.
- **Challenge:** Seeking to improve technical abilities, to solve a difficult problem, “clean” a trail feature or segment; sense of accomplishment.
- **Risk:** Exposure to danger, harm, or loss; intentional interaction with uncertainty. The perception of risk creates a thrill for many trail users. It can be a positive or negative part of the trail experience, depending on user expectations and risk tolerance.
- **Play/Playfulness:** Engaging in the activity purely for the enjoyment, bringing a childlike wonder to the pursuit, no destination. On a trail, this often means seeking features to enhance, alter the experience, rather than simply riding from point to point. Playfulness is a hugely important characteristic in mountain bike trails, and distinguishes trail experiences from many other trail user goals (hikers, equestrians).
- **Exercise:** Health and fitness are part of the sport. For some this is a primary goal, for others a bonus, for some an obstacle. Defining the physical fitness needed for a particular ride is important in setting user expectations appropriately. Recognition that some riders have high skill and low fitness (and vice versa) plays a role in trail planning.
- **Efficiency:** Getting to a destination or accomplishing a task with the least amount of time or effort expended. Road climbs are very efficient, as are trails that ascend directly to a destination. Efficiency sometimes means compromising sustainability and fun/play. Hiking trails tend to be much more efficient than biking trails” (IMBA, 2018, p.29)

IMBA’s full graphical list of Trail User Objectives is available in appendix C.

Trail Use Intensity Heatmaps

A useful tool can be referenced for comparing planned trail use against aggregated trail use data transposed onto Heatmaps, by Strava, Inc. Users of Strava’s activity tracking application can elect to allow Strava to incorporate their anonymized GPS data onto a map of any region in the world. These maps show aggregated trail use intensity data for a region. Higher use trails are denoted in brighter colors. Different base maps can be selected upon which the data is transposed, such as Standard topographical, Satellite, and others.

Compare trail use heatmaps in appendix K and L to review how trail users track activities on both approved and social trails at Arctic Valley. Compare against exhibits 4, 5, 6, 7, and 8, and note where existing trails are used versus where concept trails are proposed. This information can be used to plan enhancements for social trails, conservation, and other trail management planning.

Furthermore, by using Strava Heatmaps, one can validate that Arctic Valley is one of the most intensely used areas in the CSP front range; review Appendix M. This observation is in line with CSP’s designation of Arctic Valley as a “Recreation Zone;” a zone designated for the most intense trail uses and development in CSP.

Note the following assumptions when reviewing the Strava Heatmaps:

- Assume there is an even distribution of Arctic Valley trail users with GPS enabled and disabled. For example, there are just as many users who do use Strava GPS tracking for their activities, as there are who do not.
- Assume the data displayed on Heatmaps accurately portrays the true mode of travel by trail users. For example, pedestrian users categorize their activities as a “walk” or “hike.” Bicycle users categorize their activities as a “ride.”

Hiking Trails

Summary

The ASC has previously expressed interest in exploring the potential for adding 2 hiking trails east of the Concession Contract area. The intent of these trails is to emplace a more gradual, accessible, and sustainable trail from South Fork Eagle River Trailhead to Hunter Pass, as well as creating extensive looping options.

Both existing and conceptual hiking trails were plotted in Google Earth, and printed for presentation in this report. See below in exhibit 4. Note the green concept hiking trails in the east, and existing trails further west.

Detailed specifications on existing trails can be found in appendix E. Detailed specifications on concept hiking trails can be found in appendix F and the Trail Design Details Matrices section.

Google Earth trail map kml file package including hiking trails has been provided to ASC.

Compare exhibit 4 trail use intensity Heatmaps in appendix K and L to see how new concept trails do not intersect approved trails or social trails.

Concept Trails Map

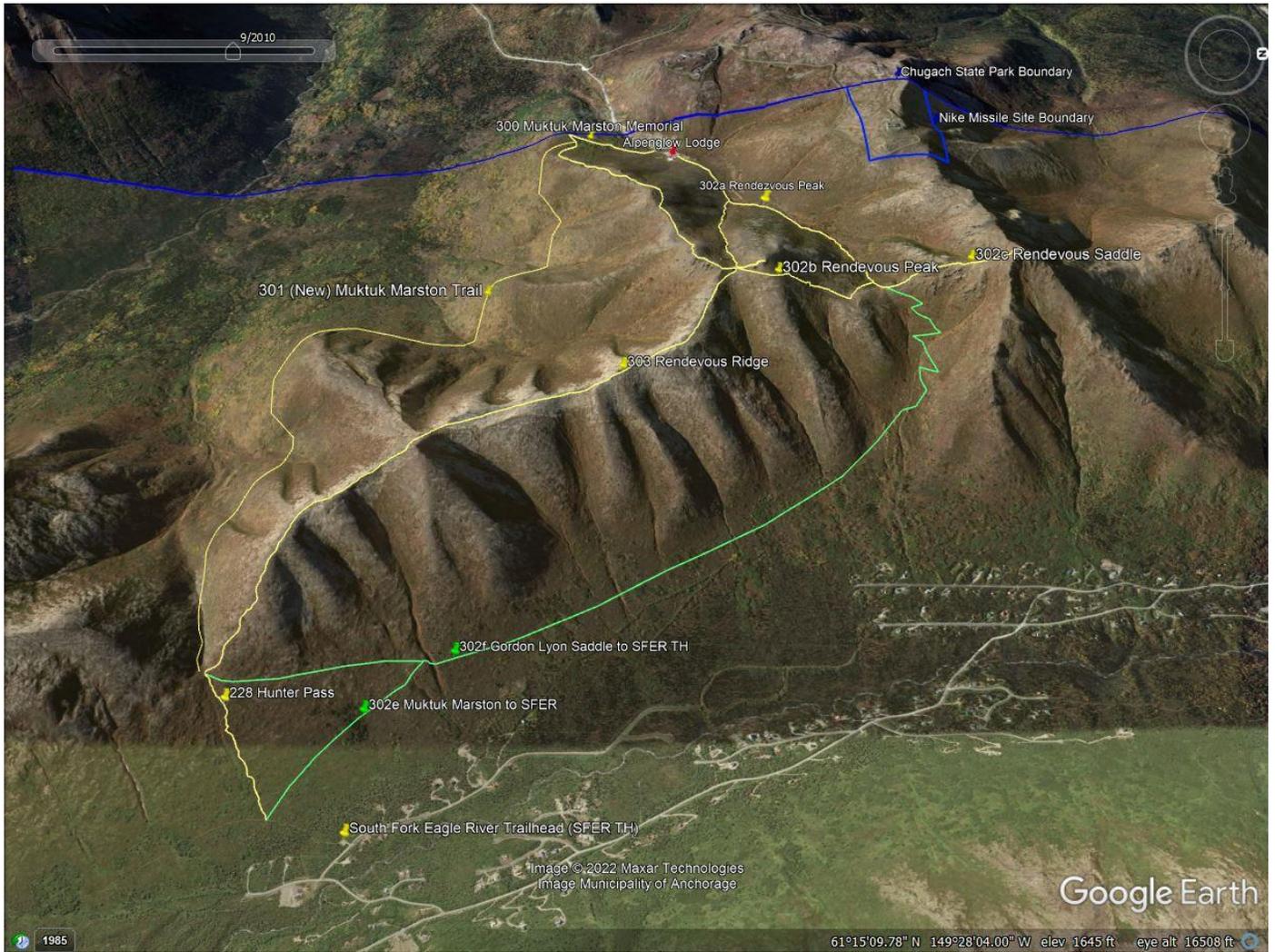


Exhibit 4: Map of concept hiking trails at Arctic Valley (Maxar Technologies, 2009).

Trail Design Details Matrices

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
302e Muktuk Marston to SFER TH	Conceptual	Moderate	Multi-use, Pedestrian optimized	Bi-directional travel	Pedestrian, Bicycle	1.12	13%
Trail Objectives							
Primary Objectives Escape, Exercise		Description: Intention for this trail is to emplace a more gradual, accessible, and sustainable trail from South Fork Eagle River Trailhead to Hunter Pass. This will reduce reliance on the steep and eroding 228 Hunter Pass trail. This will increase accessibility to, and opportunities for new loops with 301 Muktuk Marston Trail, built 2021-2022.					
Trail Narrative							
Class 3 pedestrian trail, 13% average climbing and 0% descending. Typically 18-36" wide, built on native soils, with intermittent rough surface, grading, and imported material where needed for stabilization.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
302f Gordon Lyon Saddle to SFER TH	Conceptual	Moderate	Multi-use, Pedestrian optimized	Bi-directional travel	Pedestrian, Bicycle	2.47	13%
Trail Objectives							
Primary Objectives Efficiency, Exercise		Description: Intention for this trail is to create a new opportunity for users to access Arctic Valley more directly from South Fork Eagle River Trailhead, creating new possible loops with 302b Rendevous Peak, 302c Rendevous Saddle, and 301 Muktuk Marston via existing 228 Hunter Pass and the conceptual 302e Muktuk Marston to SFER trails.					
Trail Narrative							
Class 2 pedestrian trail, 13% average climbing and 5% descending. Typically 6-18" wide, built on native soils, with a primarily rough surface.							

Trail Medical Response Planning

The extent to which emergency rescue and medical response planning needs to be incorporated in plans pertaining to these trails is not defined by CSP. General enhancements to user experience and safety should be considered. This could include the following: maps, emergency locator number and GPS coordinates posted on intersection way-finding posts.

Cross Country Biking Trails

Summary

The report created concept cross country biking trails in Google Earth. Concept trail details are discussed in the following sections. Approximate alignments and difficulties selected were informed by the topography of the area.

The valley ascending northeast to the Mt. Gordon Lyon saddle has a lower grade than the neighboring mountain sides. This area would be most befitting of lower gradient trails, such as for climbing or descending blue and green rated trails. Black rated trails would also be appropriate here, given they are constructed in alignment with their difficulty classification. Vegetation in the Tokle Creek drainage thins with elevation.

Note that of the existing approved trails, it is proposed that 302a Rendevous Peak trail (302a) be utilized for uphill bicycle access. This trail already has a grade which is feasible for use by mountain bikes as an ascending trail. If 302a could be incorporated for use by bikers to access 2xc Blue Ascent, this would significantly reduce costs. Some might expect user conflicts between pedestrians and uphill cyclists on 302a – it is anticipated conflicts might not be so prolific, due to lower deltas in velocity between these 2 user groups.

If 302a cannot be used, an alternative solution would need to be identified for uphill access. Two other alternatives proposed include extending the bottom half of 2xc Blue Ascent, or implementing a different trail ascending the drainage NW of the Tube Park.

Google Earth trail map .kml file package including cross country bike trails has been provided to ASC.

Compare exhibit 5 against approved trails in exhibit 4, and trail use intensity Heatmaps in appendix K and L to see how new concept trails do not intersect approved trails. The new concept trails do intersect social trails in multiple locations.

Concept Trails

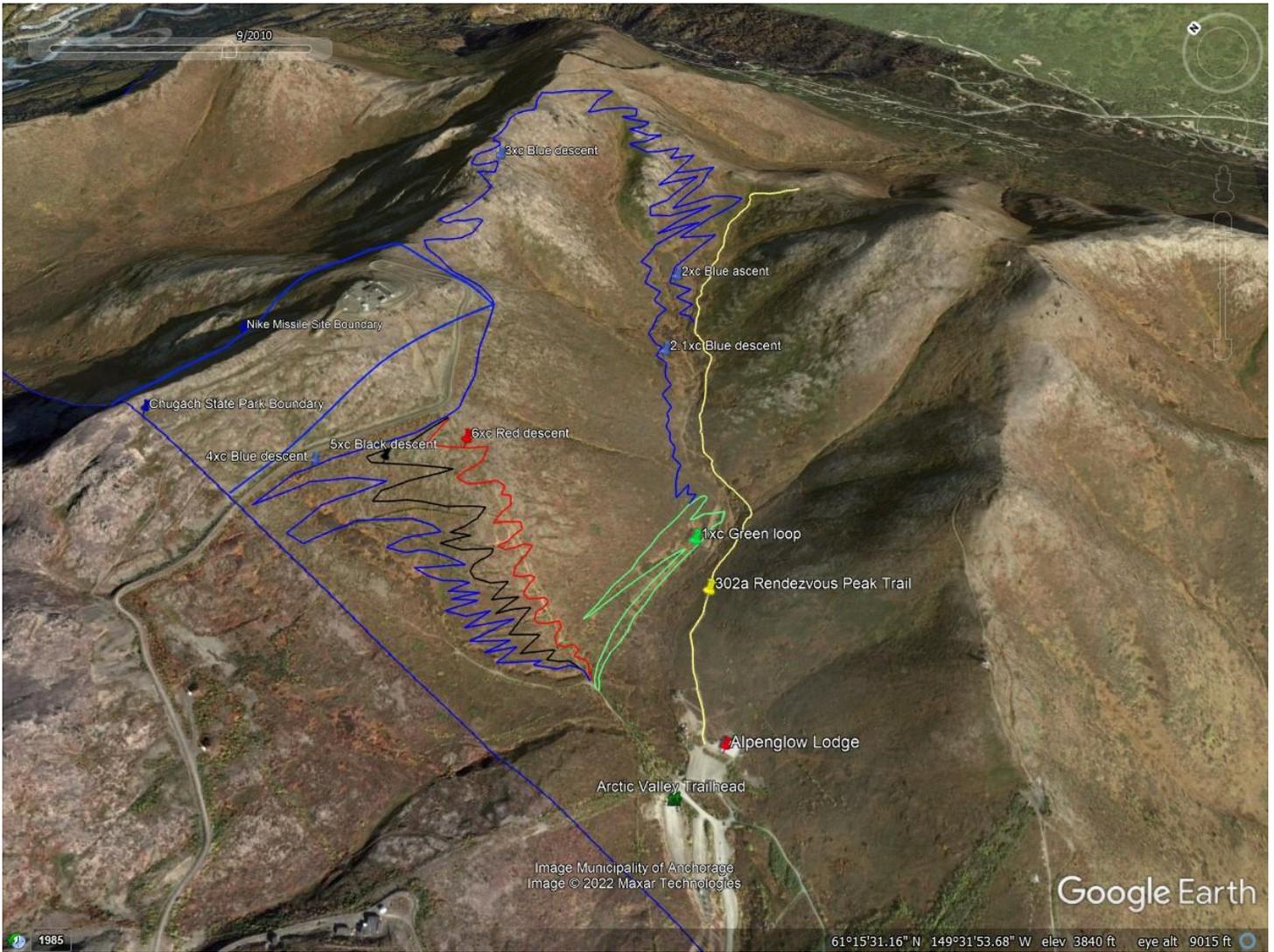


Exhibit 5: Map of concept cross country biking trails at Arctic Valley (Maxar Technologies, 2009).

Trail Design Details Matrices

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
1xc xc Green loop in basin	Conceptual	Easy / Green	MTB-Flow	Counter-clockwise	Bicycle, Pedestrian	1.20	5%
Trail Objectives							
Primary Objectives		Description: An entry into playful flow trails for beginner and intermediate riders. The trail grade is primarily up, then primarily down with intermittent flat zones, rollers, berms, and table-top jumps on the downhill portion.					
Play							
Trail Narrative							
Class 2 bicycle trail, 5% average climbing and 5% descending. Typically 36" wide, built on native soils, primarily smooth with intermittent rough surface, grading, and imported material where needed for stabilization. Edges of built terrain features should be rounded and easy to navigate for beginner and intermediate riders, with opportunities for intermediate and advanced riders to gap jump over some features. No unavoidable obstacles greater than 2" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
2xc xc Blue ascent to Gordon Lyon	Conceptual	More Difficult / Blue	Multi-use	Bi-directional Pedestrian, Bicycles Uphill Only	Bicycle, Pedestrian	1.76	9%
Trail Objectives							
Primary Objectives		Description: Provides an efficient climbing link to the top of other cross country descent trails. The trail grade is only up, except for where deviations from the most efficient line is required due to natural obstacles and slope angle limits. There are no proposed trail features, and it has a flat surface. This trail will provide exercise for most fitness levels.					
Efficiency, Exercise							
Trail Narrative							
Class 2 bicycle trail, 9% average climbing and 4% descending. Typically 24" wide, built on native soils, primarily smooth with intermittent rough surface and imported material where needed for stabilization. Grading should smoothen and provide drainage on the trail, to the effect that the only challenge is gaining elevation. Final alignment should endeavor to reduce vegetation impact by building on barren rock or lowest vegetation areas.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
2.1xc xc Blue descent from Gordon Lyon Saddle	Conceptual	More Difficult / Blue	MTB-flow	Downhill Only	Bicycle Only	1.45	11%
Trail Objectives							
Primary Objectives		Description: A primarily playful flow, and partially technical trail for intermediate riders. The upper portion of the trail will capitalize on rough terrain, taking riders over and around rough rock sections where appropriate. The bottom section will employ a smooth surface, rollers, berms, table-top jumps and drops. The trail grade is primarily down with intermittent flat zones and grade reversals where appropriate. With this trail commencing after approximately 60% of the elevation gain on "2xc," this will create opportunities for a shorter loop in terms of time and physical expenditure. After repetition, this trail should offer progression opportunities for beginner riders to gain confidence and skills necessary to ride the intermediate trails offered via access from "2xc."					
Play							
Trail Narrative							
Class 2 bicycle trail, 3% average climbing and 11% descending. Typically 24" wide, built on native soils, a mix of smooth and rough surface, imported material where needed for stabilization. Grading should be performed to build trail and drainage features. Built terrain features should have distinct edges, with no unavoidable obstacles greater than 8" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
3xc xc Blue descent from Gordon Lyon	Conceptual	More Difficult / Blue	Technical Downhill, MTB-Flow	Downhill	Multi-use	1.22	9%
Trail Objectives							
Primary Objectives		Description: A primarily technical, and partially flow trail for intermediate and advanced riders. This trail will capitalize on rough terrain, taking riders over and around rough rock sections where appropriate. The trail will meander south, down the Mt. Gordon Lyon ridge toward Nike Missile Site, maximizing opportunities for interesting natural terrain features and technical challenges. There will be intermittent ascents, intended to maximize utilization of interesting terrain features and descents on the way to the trail's terminus.					
Escape, Playfulness, Risk							
Trail Narrative							
Class 2 bicycle trail, 4% average climbing and 9% descending. Typically 24" wide, built on native soils, primarily rough surface, no imported material. Grading should be performed to build trail and drainage features. Features should include berms, rollers, jumps and drops, but fewer than "1xc" and "2.1xc," emphasizing enhancement of natural terrain features. Built terrain features should have rounded edges, with no unavoidable obstacles greater than 8" tall. There should be alternative lines and ride-arounds in short sections for both intermediate and advanced riders over intermediate or advanced terrain. Advanced alternative lines should have features with unavoidable obstacles no greater than 15" tall. Final alignment should endeavor to reduce vegetation impact by building on barren rock or lowest vegetation areas.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
4xc xc Blue descent from Nike Site	Conceptual	More Difficult / Blue	Technical Downhill, MTB-Flow	Downhill Only	Bicycle Only	1.90	9%
Trail Objectives							
Primary Objectives		Description: A mix of technical and flow trail for intermediate and advanced riders. This trail will utilize rough terrain where appropriate, and implement flow trail elements of berms, rollers, jumps and drops where trail cross-slope grade allows for wider trail features. Flat graded access roads exist in sections from previous efforts related to Nike Summit Site construction; these sections should be utilized for intermediate flow trail features.					
Playfulness, Challenge							
Trail Narrative							
Class 2 bicycle trail, 4% average climbing and 9% descending. Typically 24" wide, built on native soils, mix of smooth and rough surface, no imported material. Grading should be performed to build trail and drainage features. Features should include berms, rollers, jumps and drops in a similar fashion to "2.1xc". Built terrain features should have rounded edges, with no unavoidable obstacles greater than 8" tall, with ride-arounds available for sections exceeding IMBA definition of a "Blue" trail.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
5xc xc Black descent from Nike Site	Conceptual	Very Difficult / Black	Technical Downhill	Downhill Only	Bicycle Only	1.21	14%
Trail Objectives							
Primary Objectives		<p>Description: A primarily technical, and partially flow trail for advanced riders. This trail will capitalize on rough terrain, taking riders over and around rough rock sections where appropriate. The trail will twist and turn, using berms to change direction, and seek to maximize use of interesting natural terrain features and technical challenges. Flat graded access roads exist in sections from previous efforts related to Nike Summit Site construction; these sections should be utilized for sections of advanced flow trail features.</p>					
Challenge, Risk							
Trail Narrative							
<p>Class 2 bicycle trail, 3% average climbing and 14% descending. Typically 12" wide, built on native soils, primarily rough surface, no imported material. Grading should be performed to build trail and drainage features. Features should include berms, rollers, jumps and drops, emphasizing enhancement of natural terrain features. Built terrain features should have distinct edges, with no unavoidable obstacles greater than 15" tall, with ride arounds available for sections exceeding IMBA definition of a "Black" trail.</p>							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
6xc xc Red descent from Nike Site	Conceptual	Extremely Difficult / Red	Technical Downhill	Downhill Only	Bicycle Only	0.84	20%
Trail Objectives							
Primary Objectives		<p>Description: A primarily technical trail for expert riders, with IMBA goals of challenge and risk. This trail will maximize use of rough terrain, taking riders over steep rock sections where available along the trail alignment. The trail will twist and turn, using berms to change direction, and seek to maximize use of interesting natural terrain features and technical challenges. Flat graded access roads exist in sections from previous efforts related to Nike Summit Site construction; these sections should be utilized for sections of advanced flow trail features.</p>					
Challenge, Risk							
Trail Narrative							
<p>Class 2 bicycle trail, 3% average climbing and 20% descending. Typically 6-12" wide, built on native soils, primarily rough surface, no imported material. Grading should be performed to build trail and drainage features. Features should include berms, jumps, and drops, emphasizing enhancement of natural terrain features. Built terrain features should have distinct edges, with unavoidable obstacles greater than 15" tall. Ride-arounds should be implemented, where possible, for larger unavoidable obstacles.</p>							

Trail Medical Response Planning

The extent to which emergency rescue and medical response planning needs to be incorporated in plans pertaining to these trails is not defined by CSP. General enhancements to user experience and safety should be considered. This could include the following: maps, emergency locator number and GPS coordinates posted on intersection way-finding posts.

Downhill Bike Park Biking Trails

Summary

Downhill bike parks are becoming increasingly prolific in other areas of the nation. While there are some stand-alone parks only functioning in the summer, most downhill bike parks are emplaced as an addition to the operations of winter ski resorts, since they are optimally positioned to add another gravity-based attraction in what their off-season would otherwise be.

ASC is in a similar position. They operate as a ski and tubing area during winter operations, using their 2 chairlifts for uphill access. To implement downhill mountain biking, they would need to implement trails, add bike carrying hardware to the chairlift, and prepare to support first aid medical responses to biking related injuries as they do in the winter.

ASC can use the details in this report as starting points for future discussions on downhill bike park trails. Detailed specifications on concept downhill bike trails can be found in appendix F and the Trail Design Details Matrices section below.

Google Earth trail map kml file package including downhill bike trails has been provided to ASC.

Compare exhibit 6 against approved trails in exhibit 4, trail use intensity Heatmaps in appendix K and L to see how concept trails do not cross approved trails, or popular social trails.

Concept Trails

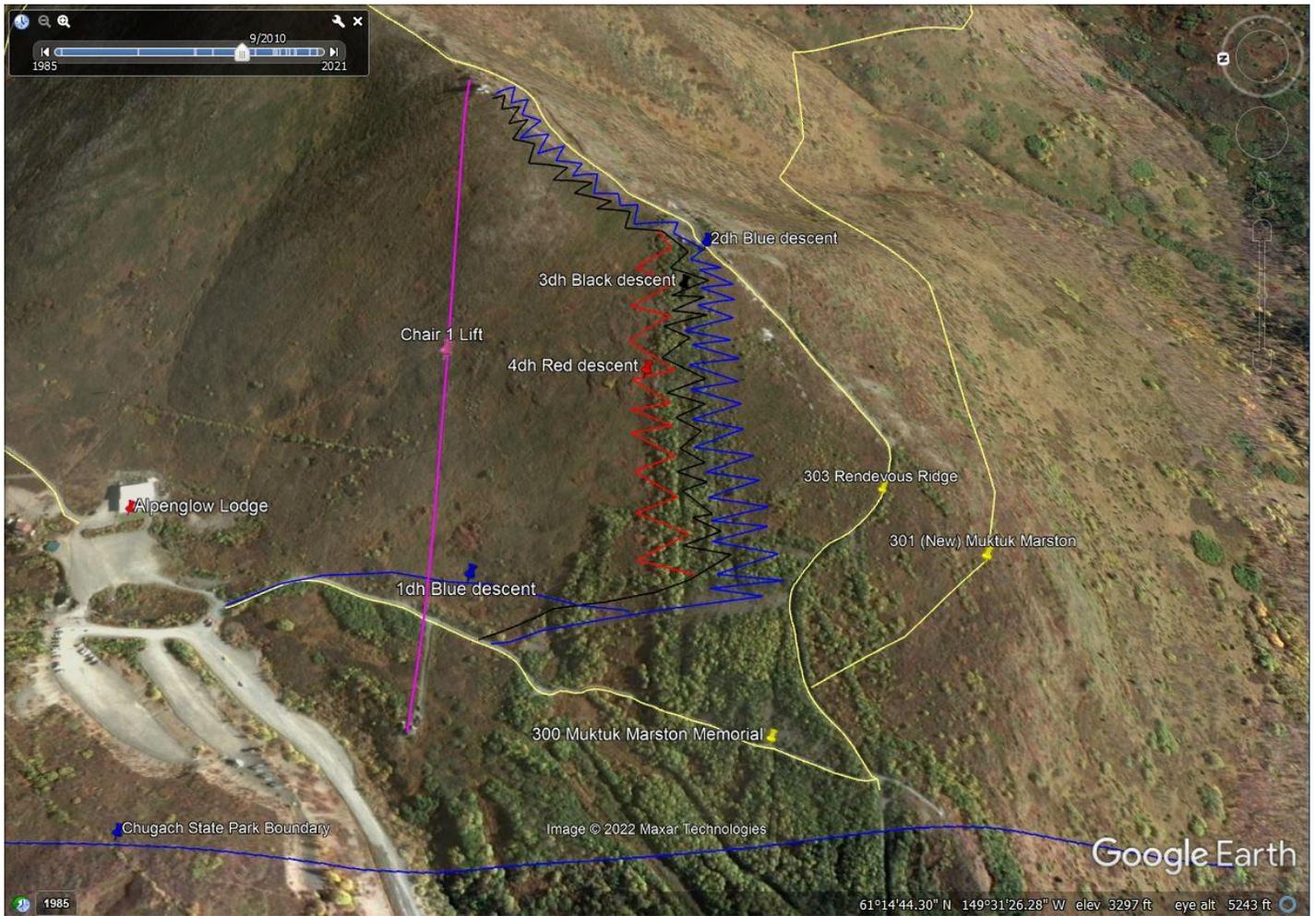


Exhibit 6: Map of concept downhill biking trails at Arctic Valley (Maxar Technologies, 2009).

Trail Design Details Matrices

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
1dh dh Blue descent from J2 to lodge	Conceptual	More Difficult / Blue	MTB-Flow	Downhill Only	Bicycle Only	0.20	8%
Trail Objectives							
Primary Objectives Efficiency, Playfulness		Description: A flow trail with primary goal of playfulness as riders move from the bottom of the DH Bike Park trails to the main parking lot of Alpenglow Lodge. The trail should have a smooth dirt surface, rollers, berms, and table-top jumps, appropriate for intermediate riders. There should be opportunities created for advanced and expert riders to gap jump over some features.					
Trail Narrative							
Class 2 bicycle trail, 3% average climbing and 8% descending. Typically 24" wide, built on native soils, a mix of smooth and rough surface, imported material where needed for stabilization. Grading should be performed to build trail and drainage features. Built terrain features should have round edges, with no unavoidable obstacles greater than 8" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
2dh dh Blue descent from C1 to J2	Conceptual	More Difficult / Blue	MTB-Flow	Downhill Only	Bicycle Only	0.98	15%
Trail Objectives							
Primary Objectives Playfulness		Description: A primarily flow trail. The trail should have a smooth surface, dirt rollers, berms, and table-top jumps, appropriate for intermediate riders. There should be opportunities created for advanced and expert riders to gap jump over some features.					
Trail Narrative							
Class 2 bicycle trail, 3% average climbing and 12% descending. Typically 24" wide, built on native soils, a mix of smooth and rough surface, imported material where needed for stabilization. Grading should be performed to build trail and drainage features. Rollable wooden features can be implemented, including bridges, jumps, tabletops, and rollers. Built terrain features should have round edges, with no unavoidable obstacles greater than 8" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
3dh dh Black descent from J1 to J2	Conceptual	Very Difficult / Black	MTB-Flow, Technical Downhill	Downhill Only	Bicycle Only	0.92	15%
Trail Objectives							
Primary Objectives		Description: A mixed flow and technical trail. The trail should have a mix of rough and smooth surface, dirt berms, drops, table-top and gap jumps appropriate for advanced riders. Rollable and non-rollable wooden features can be implemented, including bridges, jumps, tabletops, and rollers. There should be opportunities created for expert riders to gap jump over some features.					
Challenge, Risk							
Trail Narrative							
Class 2 bicycle trail, 1% average climbing and 15% descending. Typically 12" wide, built on native soils, a mix of smooth and rough surface, imported material where needed for stabilization. Grading should be performed to build trail and drainage features. Rollable wooden features can be implemented, including bridges, jumps, tabletops, and rollers. Built terrain features should have distinct edges, and have ride-arounds available where unavoidable obstacles exceed 15" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
4dh dh Red descent from J1 to J2	Conceptual	Extremely Difficult / Red	Technical Downhill, MTB-Flow	Downhill Only	Bicycle Only	0.50	16%
Trail Objectives							
Primary Objectives		Description: A primarily technical trail. The trail should have a primarily rough and partially smooth surface. Features should include dirt berms, drops, table-top and gap jumps, appropriate for expert riders. Non-rollable wooden features can be implemented, including bridges, jumps, tabletops, and rollers.					
Challenge, Risk							
Trail Narrative							
Class 2 bicycle trail, 1% average climbing and 16% descending. Typically 6-24" wide, built on native soils, a mix of smooth and rough surface, imported material where needed for stabilization. Grading should be performed to build trail and drainage features. Non-rollable wooden features can be implemented, including bridges, jumps, tabletops, and rollers. Built terrain features should have distinct edges, with unavoidable obstacles greater than 15" tall. Ride-arounds should be implemented, where possible, for larger unavoidable obstacles.							

Trail Medical Response Planning

The extent to which emergency rescue and medical response planning need to be incorporated in plans pertaining to these trails is not defined by CSP. However, relatively extensive planning would need to be

completed in order to create a safe environment for users. At a minimum, the items below are required components for implementing a complete medical plan.

- Bike patrol staff with valid training credentials meeting local standards.
- Bike patrol staff to be fully equipped with necessary supplies and equipment; access bikes, all-terrain vehicles, full stock of first aid medical equipment and supplies.
- Access road infrastructure on which quick medical response can be administered by bike patrol staff.
- Designated EMT road and helicopter access zones.
- Designated indoor first aid treatment area.
- Way-finding signage including maps, emergency locator number and GPS coordinates posted on intersection way-finding posts.

Cost estimation for downhill bike trail medical plan was not in scope of this report. If ASC is interested in downhill bike trail planning, additional attention should be given to formalizing a medical response plan and associated budget.

Winter Fat Bike Trails Models

Summary

Fat bike trails are flexible and can be made in different alignments annually, pending variations in accumulated snow fall. However, it is more beneficial to retain consistent alignments, as brush cutting is necessary in some cases where thick vegetation needs to be clear to maintain a pathway. Given the above, these trails can be planned more flexibly, but still benefit some a measured planning process.

As compared to summer bike trails, fat bike trails are generally flatter with less accentuated terrain features. This is due to snow being a less supportable surface than soils. This impacts the abilities of users to experience the same speed and forces as they do in the summer. This also incurs a lower level effort for construction.

As compared to trails built on soil, the only construction tools winter fat bike trails require are a compaction device; typically snowmobile, often dragging a weighted roller.

Additional consultation with SMEs should be conducted to successfully plan winter fat biking trails.

Google Earth trail map kml file package including winter fat bike trails has been provided to ASC.

Concept Trails

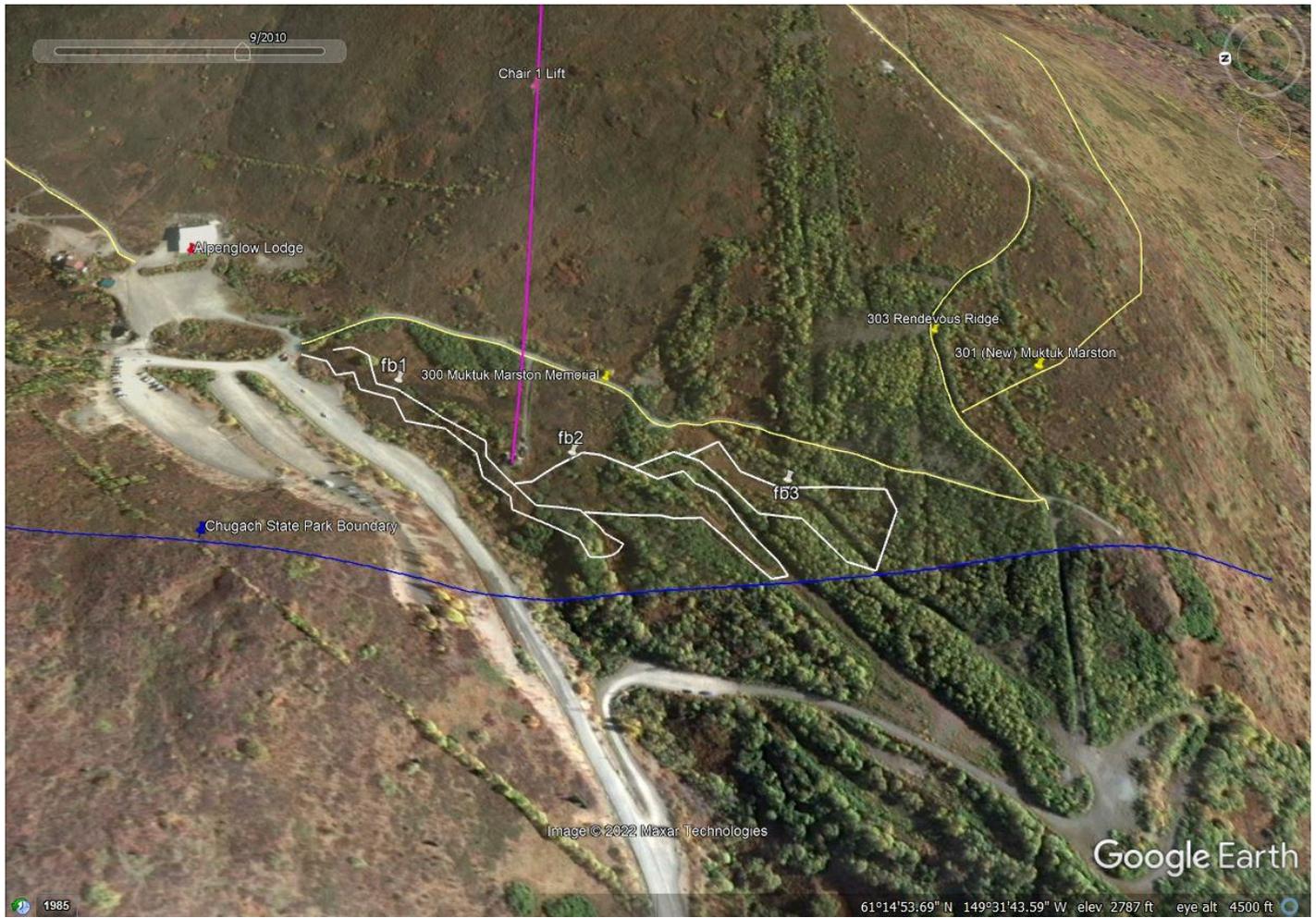


Exhibit 7: Map of concept winter fat biking trails at Arctic Valley (Maxar Technologies, 2009).

Trail Design Details Matrices

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
fb1	Conceptual	More Difficult / Blue	Fat bike	Bi-directional	Bicycle, Pedestrian	0.4	10%
Trail Objectives							
Primary Objectives		Description: A moderately difficult, packed snow trail designed for Fat bikes. Trail should have less twists and turns than its neighboring trails, "fb2" and "fb3." Trail intent is to enable bi-directional travel, access to "fb2" and "fb3," while avoiding conflicting users on the nearby ski trails.					
Escape, Exercise							
Trail Narrative							
Description: Class 2 bicycle trail, 10% average climbing and 10% descending. Typically 24" wide, built on compacted snow. Surface is as firm as possible, compacted bi-weekly by snowmachine and users. There should be no unavoidable obstacles greater than 8" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
fb2	Conceptual	More Difficult / Blue	Fat bike	Bi-directional	Bicycle, Pedestrian	0.25	8%
Trail Objectives							
Primary Objectives		Description: A moderately difficult, packed snow trail designed for Fat bikes. Trail should have more twists and turns than "fb1." Trail intent is to enable bi-directional travel, and interesting loops with "fb1" and "fb3," while avoiding conflicting users on the nearby ski trails.					
Escape, Exercise							
Trail Narrative							
Description: Class 2 bicycle trail, 10% average climbing and 6% descending. Typically 24" wide, built on compacted snow. Surface is as firm as possible, compacted bi-weekly by snowmachine and users. There should be no unavoidable obstacles greater than 8" tall.							

Ship Creek Unit							
Trail ID	Status	Difficulty	Style	Preferred Direction	Management Controls	Length (mi)	Average Grade
fb3	Conceptual	More Difficult / Blue	Fat bike	Bi-directional	Bicycle, Pedestrian	0.27	10%
Trail Objectives							
Primary Objectives		Description: A moderately difficult, packed snow trail designed for Fat bikes. Trail should have more twists and turns than "fb1." Trail intent is to enable					
Escape, Exercise							

	bi-directional travel, and interesting loops with “fb1” and “fb2,” while avoiding conflicting users on the nearby ski trails.
Trail Narrative	
Class 2 bicycle trail, 11% average climbing and 9% descending. Typically 24” wide, built on compacted snow. Surface is as firm as possible, compacted bi-weekly by snowmachine and users. There should be no unavoidable obstacles greater than 8” tall. Exploit winter possible access and connection to trail 300 Muktuk Marston Memorial.	

Trail Medical Response Planning

The extent to which emergency rescue and medical response planning needs to be incorporated in plans pertaining to these trails is not defined by CSP. General enhancements to user experience and safety should be considered. This could include the following: maps, emergency locator number and GPS coordinates posted on intersection way-finding posts.

Existing Approved Trails

Summary

There are 10 approved trails in the Ship Creek Unit. The majority traverse the ASC Concession Contract area, or share access points with trails that do. Refer to appendix G to review a map of ASC’s Concession Contract area.

Refer to appendix E for details on approved trails in Ship Creek Unit. Review trail use intensity heatmaps in appendix K and L, and compare against location of existing approved trails in exhibit 4.

A map showing approved trails is included in exhibit 4, under the Hiking Trails, Concept Trails section.

Concept Trail Maps and Trail Detail Matrices are not in the scope of this report for Existing Approved Trails.

Google Earth trail map .kml file package including approved trails has been provided to ASC.

Trail Medical Response Planning

The extent to which emergency rescue and medical response planning needs to be incorporated in plans pertaining to these trails is not defined by CSP. General enhancements to user experience and safety should be considered. This could include the following: maps, emergency locator number and GPS coordinates posted on intersection way-finding posts.

Social Trails

Summary

Typically indicative of human trail use misaligned with local management plans, a social trail is an informal path created by combined erosional forces of humans, animals and natural elements. Organizations involved in trail management should track use and saturation of social trails.

Social trails are not inherently *good* or *bad*. They are simply indicative of typical use patterns of the area and warrant observation from trail planners. They can be indicative of issues with current trail layouts; if a specific social trail is used more frequently than others, allocation of additional resources to enhance that trail might be warranted. Or if social trail use is observed in a highly sensitive area, managers might try to redirect traffic to approved trails. Mitigation of social trail use might not be necessary, if not harmful for the area and in keeping with local management plans.

Social trails were observed at ASC across the Concession Contract area. Users were observed walking and berry picking along both sanctioned trails and social trails. See appendix I and J for social trail photos from September 2021. Locations of these social trails are pictured in exhibit 8 and detailed specifications documented in appendix H. Social trail locations were corroborated by comparing first person observations, photos, and Strava Heatmaps against satellite imagery in Google Earth. Google Earth trail map kml file package has been provided to ASC. Compare exhibit 8 and 4 against Strava Heatmaps in appendix K and L to see density of trail use across Arctic Valley.

Included in report scope is the identification of social trails. If action on social trails is determined necessary by ASC or CSP, CSP should be engaged to discuss.

If ASC is interested in gathering additional information on social trails at Arctic Valley, and making additional plans related to management of social trails, the following activities are recommended:

- Discuss location, length, and condition of social trails in the Concession Contract area.
- Discuss user needs as it relates to use of social trails versus planned official trails.
- Discuss availability of time and financial resources of CSP and ASC for allocation to selected social trail related enhancement or remediation projects.
- If a new social trail management approach is determined appropriate, coordinate with CSP, ASC and other stakeholders to plan and execute.

Medical response planning is not applicable to social trails.

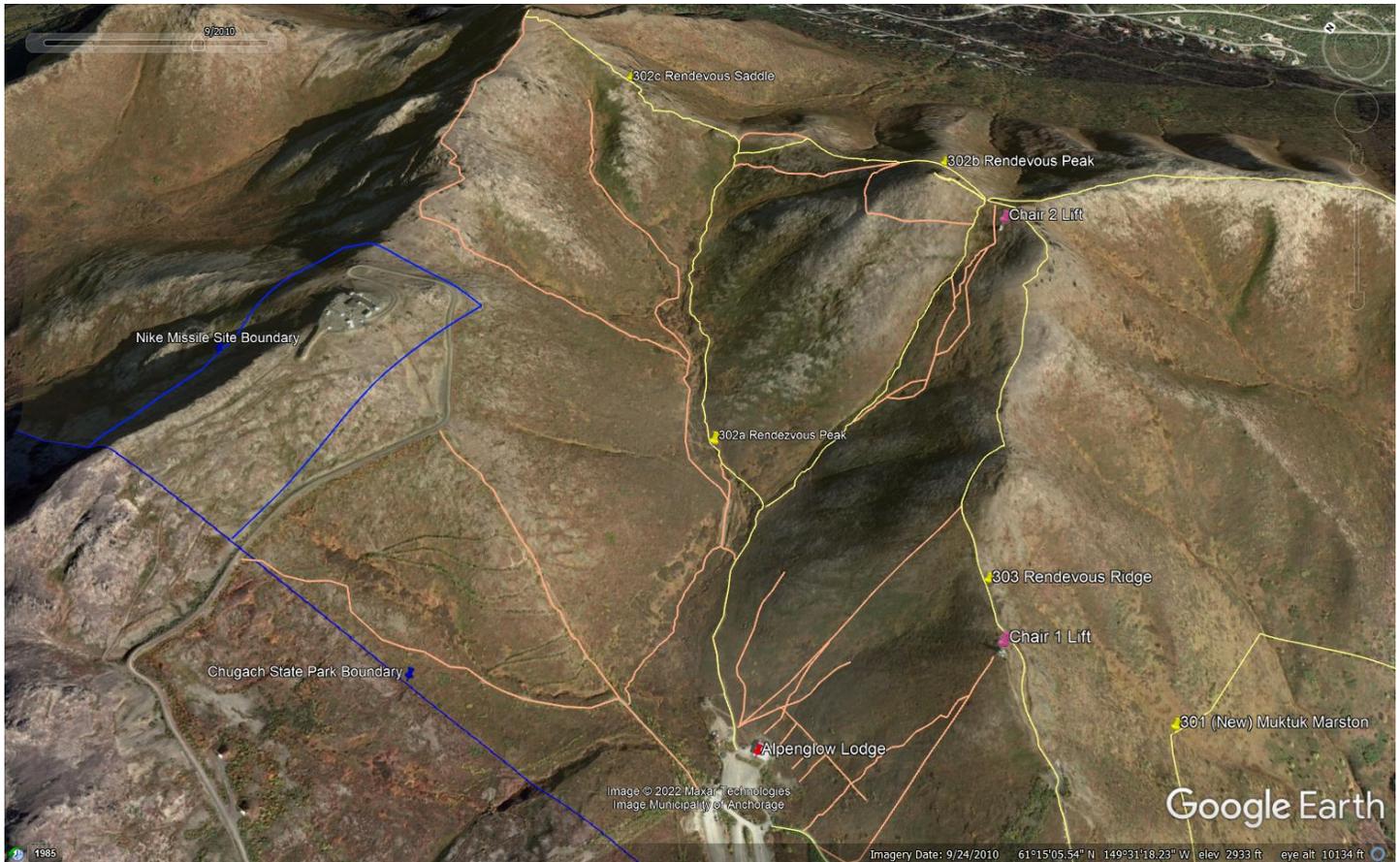


Exhibit 8: Map of social trails at Arctic Valley, denoted by orange coloring (Maxar Technologies, 2009).

Trail Data Collection and Specification Spreadsheets

To complete this report, data on existing sanctioned, existing unsanctioned, and conceptual trails were gathered from the CSPTMP, and project sourced concept trail alignments in Google Earth. This data is organized in 3 spreadsheets, discussed below. These should be used if additional trail management planning is desired.

Trail Data Collection Log

As mentioned, data on existing sanctioned, existing unsanctioned, and conceptual trails were gathered from the CSPTMP, and project sourced concept trail alignments in Google Earth. The data recorded are in appendix E, F and H.

Trail Class Summary Table

This table contains data calculated from the Trail Data Collection Log. By sorting trail class data into buckets based on CSP status and class, it can be used to plan and manage trails in accordance with the desired percent distribution of trails by class see appendix D.

Trail Cost Estimation Table

Estimation of trail construction costs using linear per-foot and per-mile estimates provided by subject matter experts, was in scope of the report. This information is provided in appendix N.

It is unknown if a margin of error exists in the data gathered from Google Earth. The validity of SME cost estimates is unknown. The concept trail cost estimates provided should face additional review and scrutiny before possible implementation.

These estimates included professional trail planning, design, machine clearing and construction by an esteemed bike trail construction company. This did not include project management, public engagement, and other volunteer efforts. Since ASC is entrepreneurial and often delivers high value on a constrained budget, it is anticipated that ASC can greatly reduce costs via grants, donations and volunteer efforts.

Additional short trail connections should be created where logical connectors can be established. These have not been included in the cost estimates for concept trails.

Acronyms

13. AKDNR: Alaska Department of Natural Resources Division Of Parks And Outdoor Recreation
14. ASC: Anchorage Ski Club
15. CSPMP: Chugach State Park Management Plan
16. CSPTMP: Chugach State Park Trail Management Plan
17. DH: downhill
18. FB: fat bike
19. GQTE: Guidelines for a Quality Trail Experience
20. IMBA: International Mountain Bike Association
21. SME: subject matter expert
22. ST: social trail
23. STA: Single Track Advocates
24. XC: cross country

Key Terms

4. Concession Contract: a contract between a government entity and another party outlining the specific operating terms for the party within the government's jurisdiction.
5. Heatmap: a map depicting intensity of human traffic by overlaying color formatted GPS data onto user selected base maps.
6. Social Trail: informal trails created by combined erosional forces of humans, animals, and natural elements. Typically indicative of human trail use misaligned with local management plans.

References

15. Alaska Department of Natural Resources Division of Parks and Outdoor Recreation. (2016). *CHUGACH STATE PARK MANAGEMENT PLAN*.
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18. DOWL HKM. (2011). *Far North Bicentennial Park Trail Improvements Plan*.
19. IMBA. (2018). *Trail Difficulty Rating System*.
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21. Maples, J. N., & Bradley, M. J. (2018). *Economic Impact of Mountain Biking in the Custer Gallatin National Forest*.
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23. Municipality of Anchorage. (2020). *Planning and Zoning Commission Resolution No. 2020-006*.
24. Shivy, V., & Suen, I.-S. (2017). *Economic Impact of the James River Park System*.
25. USDA Forest Service. (2020). *Chugach National Forest Land Management Plan*.

List of Exhibits

5. Exhibit 1: CSPTMP guidance for hiker/pedestrian trail design parameters. Assists with assignment of trail classification per construction specifications. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2009, p.24).
 6. Exhibit 2: CSPTMP guidance for bike trail design parameters. Assists with assignment of trail classification per construction specifications. (Alaska Department of Natural Resources Division of Parks and Outdoor Recreation, 2009, p.28).
 7. Exhibit 3: IMBA Trail Difficulty Rating System. Assists with assignment of trail difficulty rating, based on standardized measurements of trail width, surface, grade, and more. (IMBA, 2018, p.65).
 8. Exhibit 4: Map of concept hiking trails at Arctic Valley. (Maxar Technologies, 2009).
 9. Exhibit 5: Map of concept cross country biking trails at Arctic Valley. (Maxar Technologies, 2009).
 10. Exhibit 6: Map of concept downhill biking trails at Arctic Valley. (Maxar Technologies, 2009).
 11. Exhibit 7: Map of concept winter fat biking trails at Arctic Valley. (Maxar Technologies, 2009).
- Exhibit 8: Map of social trails at Arctic Valley, denoted by orange coloring. (Maxar Technologies, 2009).

Appendix G Status Update Template

Arctic Valley Trails Feasibility Assessment and Master Planning Support
02/24/2022 Status Update

Project Task Burndown
Sun 8/1/21 - Thu 4/21/22

Metrics

WBS	Task Name	% Complete	Earned Value	Actual Cost	CPI	SPI
1	AV Feasibility Study Project	76%	\$321.48	\$284.90	0.99	0.93
1.1	Project Initiation and Planning	100%	\$191.00	\$191.00	1.00	1.00
1.3	Project Execution and Closeout	62%	\$143.84	\$93.90	0.96	0.82
1.3.1	Literature Review	100%	\$28.00	\$28.00	1.00	1.00
1.3.3	Stakeholder Analysis	100%	\$10.00	\$10.00	1.00	1.00
1.3.5	Infrastructure Analysis	99%	\$29.70	\$30.00	1.00	1.00
1.3.7	Mapping Analysis	94%	\$21.62	\$18.90	1.05	0.90
1.3.9	Financial Modeling	22%	\$11.22	\$7.00	0.29	0.10
1.3.11	Create Feasibility Report	0%	\$0.00	\$0.00	0.00	0.00
1.3.13	Create Final Project Report	0%	\$0.00	\$0.00	0.00	0.00
1.3.15	Deliver Final Reports and Project Closeout	0%	\$0.00	\$0.00	0.00	0.00

Current Status

Project success >50% likely as currently planned, considering known risks and progress to date
 Anticipate slippage in Infrastructure Analysis, accommodable within existing slack
 Ahead of schedule on Mapping Analysis

Progress Since Previous Report

Progressed overall project from 68% to 76% complete
 Progressed project part B from 43% to 62% complete
 Progressed infrastructure analysis from 93% to 99% complete
 Progressed mapping analysis from 71% to 94% complete
 Commenced Financial Modeling - 22% complete

Risks Update

No new risks logged this period

Mitigation is focusing on risk #18 - Delayed knowledge acquisition; SME stakeholders do not possess salient list of current infrastructure and planned improvement / maintenance schedule; mitigate by engaging stakeholders early and often.

Scope Change Update

Remove E-Bike Trails Model work packages (WBS items 1.3.9.7.1-1.3.9.7.7 / tasks 176-183) from scope of this project
 Add work package to include in final Feasibility Assessment Report to Arctic Valley
 Remove questions #5, 6, 7, 8, 11, 14, 15, 16 from Stakeholder Analysis Survey questions
 Change (not remove) : Initial capture of information for task 125 / WBS 1.3.5.1 Historical Infrastructure Cataloguing will be in Excel. Fi
 Change (not remove) : Initial capture of information for task 134 / WBS 1.3.5.3 Non-Historical Infrastructure Cataloguing will be in Excel
 Add work package for proposed enhancement to the trail 302a, 302b to facilitate access to trail 303

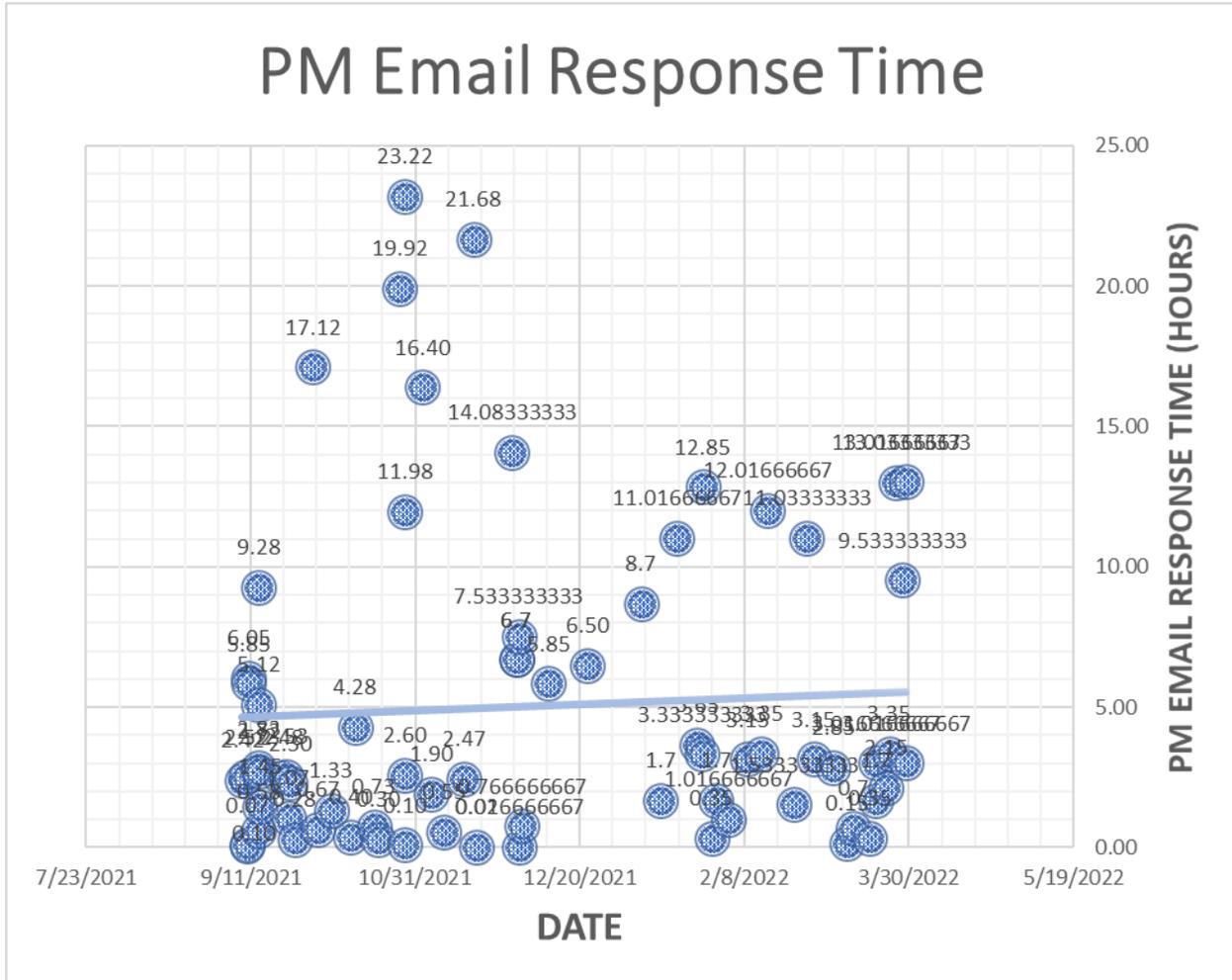
Data Collection Updates

Completed information collection for Historical Infrastructure
 Completed information collection for Non-Historical Infrastructure
 Completed information collection for Mapping Analysis
 Commenced feeding gathered data into financial analysis

Deliverables Update

Waiting for UAA to sign GSP following resolution of UA-Online issues
 Commenced Financial Analysis on all 3 Trail model types
 Validated Research Analysis will complete approximately 2 days late, pending UAA availability to review

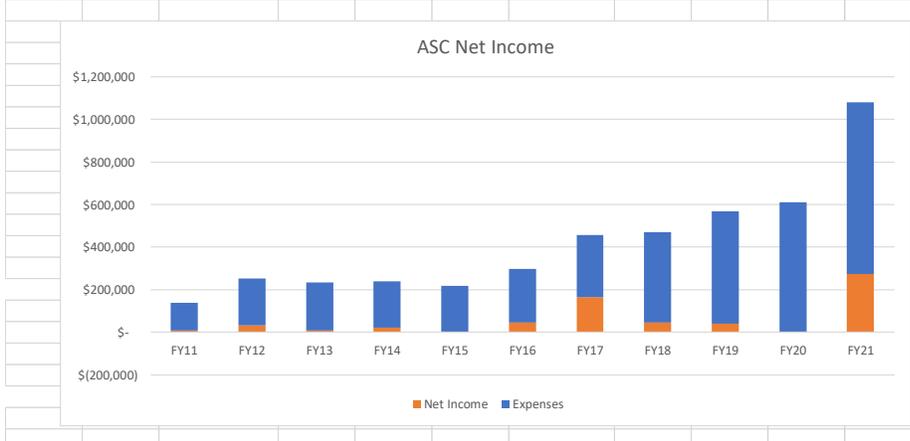
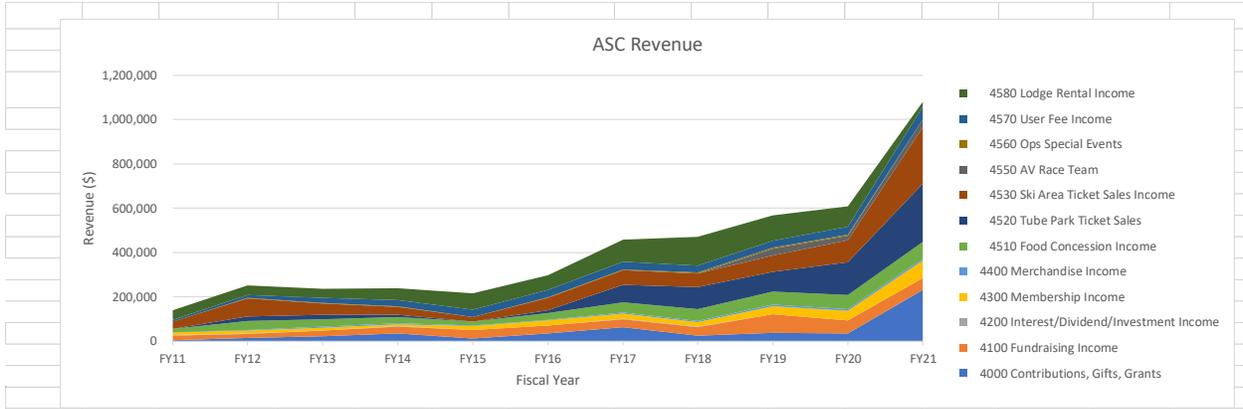
Appendix H Communications Performance Data



Appendix I

ASC 2020-2021 Profit and Loss Statement

Anchorage Ski Club Inc											
Profit and Loss											
FY11 - FY21											
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
	Jun 2010 - May 2011	Jun 2011 - May 2012	Jun 2012 - May 2013	Jun 2013 - May 2014	Jun 2014 - May 2015	Jun 2015 - May 2016	Jun 2016 - May 2017	Jun 2017 - May 2018	Jun 2018 - May 2019	Jun 2019 - May 2020	Jun 2017 - May 2019
Income											
4000 Contributions, Gifts, Grants	4,456	12,949	21,958	34,127	12,787	33,878	63,796	24,362	37,486	35,039	230,279
4100 Fundraising Income	20,732	19,650	24,489	30,547	35,760	36,273	33,704	38,741	83,758	59,298	53,841
4200 Interest/Dividend/Investment Income	1,725	760	1,348	1,978	932	(763)	2,452	2,783	379	28	13
4300 Membership Income	12,465	14,117	12,932	9,441	17,954	23,401	23,406	18,846	36,279	41,565	79,641
4400 Merchandise Income	1,569	2,482	3,661	4,679	2,579	2,191	5,048	4,775	6,070	8,523	7,933
4510 Food Concession Income	13,161	40,617	33,996	28,281	18,679	30,984	46,406	54,315	58,961	63,124	76,108
4520 Tube Park Ticket Sales	0	19,660	21,258	8,783	0	13,518	77,775	98,705	89,615	147,139	261,291
4530 Ski Area Ticket Sales Income	33,632	82,052	51,178	36,681	19,309	56,871	67,393	61,076	73,251	101,451	255,180
4550 AV Race Team	0	0	0	0	0	0	0	0	30,440	20,125	36,053
4560 Ops Special Events	1,645	1,855	1,810	1,680	1,155	735	3,042	5,556	5,670	4,960	0
4570 User Fee Income	7,234	13,069	21,866	28,198	33,132	32,765	35,054	32,288	31,639	34,085	57,418
4580 Lodge Rental Income	42,357	43,932	40,530	54,408	72,634	68,388	99,687	128,563	113,673	93,757	23,181
Income	\$ 138,975	\$ 251,143	\$ 235,025	\$ 238,802	\$ 214,920	\$ 298,242	\$ 457,764	\$ 470,009	\$ 567,219	\$ 609,093	\$ 1,080,938
Expenses											
Cost of Goods Sold	2,116	872	1,313	1,708	1,065	781	4,058	2,747	1,750	3,502	849
6100 Advertising Expense	8,013	10,953	7,568	5,083	6,481	5,688	7,812	14,664	11,363	12,673	7,259
6110 Marketing Expense	0	250	0	0	223	615	(38)	500	0	273	0
6120 Bank/Investment Charges	3,048	4,204	3,755	3,047	3,104	5,515	11,680	10,816	10,728	16,684	20,837
6130 Depreciation Expense	0	29,246	28,381	28,313	30,113	27,350	34,437	42,896	52,028	57,221	57,221
6136 Donations Charitable	0	264	(264)	310	0	6,600	1,729	2,455	3,000	2,277	213
6138 Dues & Subscriptions	580	250	250	250	0	0	0	0	0	30	1,930
6140 Equipment Rental	0	0	0	0	0	0	0	59	119	736	143
6142 Education & Development	0	0	210	0	1,500	0	3,175	2,671	4,303	0	281
6146 Fees, Licenses & Permits	810	1,984	1,175	1,590	1,580	1,790	1,060	2,163	1,280	1,608	1,037
6155 Grooming Expense	2,308	6,334	4,346	4,710	4,651	1,488	3,692	9,503	19,866	45,501	55,568
6160 Insurance	36,666	34,103	51,644	38,266	43,691	44,667	38,816	74,648	96,395	76,184	81,199
6180 Kitchen & Bar Expense	6,844	18,611	15,326	14,242	10,911	15,566	17,098	22,897	28,033	26,450	58,850
6200 Lift Maintenance Expense	5,822	6,596	5,443	12,808	10,162	8,561	6,659	16,235	16,918	12,631	19,636
6205 Lodge Rental Expense	168	121	0	0	0	340	726	363	346	476	0
6212 Miscellaneous Expense											51
6220 Payroll Tax Expense	2,253	6,036	6,717	6,740	5,239	6,510	8,996	12,459	12,946	19,536	30,794
6225 Payroll Wage Expense	25,795	55,770	62,664	61,995	51,397	66,850	95,904	138,058	148,572	226,066	325,537
6228 Payroll Service Fees	0	0	0	0	420	490	229	421	552	1,327	513
6230 Office Expense	1,817	1,695	3,434	3,185	3,307	3,523	5,042	6,036	6,858	7,922	11,245
6245 Postage & Freight	1,377	1,009	1,538	1,448	1,808	2,009	1,236	2,665	3,589	5,319	5,125
6250 Professional Fees	4,095	2,855	5,075	5,420	4,703	6,688	7,078	9,449	6,783	7,461	4,361
6253 Recruitment & Retention											820
6265 Rent & Lease Expense	761	761	761	791	761	761	761	761	761	761	0
6270 Repairs & Maintenance - Lodge	2,895	3,626	4,000	2,271	5,255	2,373	2,895	3,804	4,046	3,836	16,233
6280 Road Maintenance	4,365	4,703	3,118	1,719	4,718	954	1,919	3,338	2,590	3,449	3,797
6290 Ski Area Mountain Expense	3,717	970	1,991	1,448	1,277	1,105	707	722	13,294	3,559	17,350
6310 Ski Patrol Supplies	1,699	300	0	0	0	0	1,880	447	264	20	3,244
6315 Special Event Expense	981	1,748	0	496	856	300	1,433	2,423	5,841	3,888	0
6320 Fundraising Expense	529	974	738	783	495	2,680	2,748	4,485	9,117	8,145	5,888
6325 Tools & Equipment (< \$200)	0	199	166	152	516	294	120	0	2,535	2,805	3,514
6330 Travel & Entertainment	502	504	368	1,012	1,256	510	851	1,390	3,918	3,100	3,252
6335 User Fee & Kiosk Expense	1,423	1,202	74	650	1,269	547	1,731	1,815	2,263	0	4,225
6340 Utilities Expense	10,192	24,117	15,646	18,033	20,540	38,945	27,582	33,791	58,200	57,441	65,366
6999 Uncategorized Expenses	800	28	0	0	0	0	0	0	0	0	0
Expenses	\$ 129,578	\$ 220,287	\$ 225,438	\$ 216,469	\$ 217,299	\$ 253,499	\$ 292,014	\$ 424,683	\$ 528,256	\$ 610,879	\$ 806,336
Net Income	\$ 9,397	\$ 30,857	\$ 9,587	\$ 22,333	\$ (2,379)	\$ 44,743	\$ 165,750	\$ 45,326	\$ 38,962	\$ (1,786)	\$ 274,602



	Income	AGR
Year 1	\$ 138,975	
Year 2	\$ 251,143	81%
Year 3	\$ 235,025	-6%
Year 4	\$ 238,802	2%
Year 5	\$ 214,920	-10%
Year 6	\$ 298,242	39%
Year 7	\$ 457,764	53%
Year 8	\$ 470,009	3%
Year 9	\$ 567,219	21%
Year 10	\$ 609,093	7%
Year 11	\$ 1,080,938	77%
AAGR		27%

Appendix J

Trails Data Collection Log

Trail Data Collection Table								
ID #	Trail Segment Name in Google Earth Map	Trail Length (mi)	Trail Classification (1-5)	Elevation Gain (ft)	Elevation Loss (ft)	Average Slope (climbing)	Average Slope (descending)	Trail Type (Terra, Snow, Water)
302e	Muktuk Marston to SFER TH	1.12	3	748	8	13%	-	Terra
302f	Gordon Lyon Saddle to SFER TH	2.47	2	1239	219	13%	5%	Terra
1xc	xc Green loop in basin	1.20	2	206	201	5%	5%	Terra
2xc	xc Blue ascent to Gordon Lyon	1.76	2	889	22	9%	4%	Terra
2.1xc	xc Blue descent from Gordon Lyon Saddle	1.45	2	126	833	3%	11%	Terra
3xc	xc Blue descent from Gordon Lyon	1.22	2	84	484	4%	9%	Terra
4xc	xc Blue descent from Nike Site	1.90	2	62	915	2%	9%	Terra
5xc	xc Black descent from Nike Site	1.21	2	48	882	3%	14%	Terra
6xc	xc Red descent from Nike Site	0.84	2	53	898	3%	20%	Terra
1dh	dh Blue descent from J2 to lodge	0.20	2	50	77	3%	8%	Terra
2dh	dh Blue descent from C1 to J2	1.37	2	40	784	3%	12%	Terra
3dh	dh Black descent from J1 to J2	0.92	2	7	748	1%	15%	Terra
4dh	dh Red descent from J1 to J2	0.50	2	23	444	1%	16%	Terra
1fb	fb 1	0.40	2	119	118	10%	10%	Snow
2fb	fb 2	0.25	2	63	52	10%	6%	Snow
3fb	fb 3	0.27	2	91	90	11%	9%	Snow