Jackson Town Council Workshop

February 18, 2020
3:00 PM
Town Council Chambers

NOTICE: THE VIDEO AND AUDIO FOR THIS MEETING ARE STREAMED TO THE PUBLIC VIA THE INTERNET AND MOBILE DEVICES WITH VIEWS THAT ENCOMPASS ALL AREAS, PARTICIPANTS AND AUDIENCE MEMBERS. PLEASE SILENCE ALL ELECTRONIC DEVICES DURING THE MEETING

I. CALL TO ORDER AND ROLL CALL

II. WORKSHOP ITEMS

A. King Street and Gill Avenue Complete Street Design (Johnny Ziem, 30 Minutes)

B. 174 North King Development Off-Site Parking (P20-026, Paul Anthony, 30 Minutes)

C. 4:15 p.m. Discussion with U.S. Forest Service regarding Snow King Master Plan (Tyler Sinclair, 1 Hour)

III. PROPOSED ITEMS FOR FUTURE WORKSHOPS

A. 3/16 Legal Review of JMC Title __
B. 3/16 RFQ for Low Income Housing Tax Credit Developer
C. 3/16 Bond Financing for Core Services Vehicle Maintenance Facility
D. 3/16 Public Art Posters
E. 3/16 Place-making for Capital Construction Projects
F. 4/20 Prioritization of Capital Improvements and Rate Structure Options
G. 5/18 -
H. 6/15 Draft Release of the Rate and Capacity Study
I. 7/20 Updates to Rate and Capacity Study, Identify Ordinance Changes
J. 8/17 Review Proposed Ordinance Changes related to Rate and Capacity Study
K. *Future* St. John's Hospital Memorandum of Understanding

IV. ADJOURN

Adjourn meeting to executive session to consider matters concerning litigation to which the governing body is a party or proposed litigation to which the governing body may be a party in accordance with Wyoming Statute 16-4-405(a)(iii).

Please note that at any point during the meeting, the Mayor and Council may change the order of items listed on this agenda. In order to ensure that you are present at the time your item of interest is discussed, please join the meeting at the beginning to hear any changes to the schedule or agenda.

TOWN OF JACKSON
WORKSHOP DOCUMENTATION

SUBMITTING DEPARTMENT: Public Works **PRESENTER**: Johnny Ziem

WORKSHOP DATE: February 18, 2020

SUBJECT: **King Street and Gill Avenue Complete Street Design Program**

PURPOSE OF WORKSHOP ITEM
The purpose of this item is to seek Council input for the future use/need of tour bus parking within the King Street corridor.

DESIRED OUTCOME
The desired outcome would be for Town Council to provide direction to staff relating to the future use of tour bus parking within the King Street corridor, between Gill Avenue and Deloney Street.

BACKGROUND/ALTERNATIVES
The Town Council last discussed this at the December 16, 2019 workshop. The discussion centered around the two conceptual designs provided by staff: alternative designs "C" and "D". A motion was made and approved for alternative design "D" with the understanding that this project would be back before Council for further consideration on the tour bus parking zone. Council listed a few items that would need further deliberation in regards to the tour bus parking component of the approved conceptual design, alternative "D":

- What is the ultimate tour bus parking goal that is being considered for this corridor?
- Should the proposed tour bus parking component be pick up/drop off only, standard tour bus parking, or no tour bus parking at all?
- Is the King Street corridor the right location, considering possible future pedestrian use (school, Genevieve block, multi-use/density) and high density?

COMPREHENSIVE PLAN ALIGNMENT
- Community Value #1: Ecosystem Stewardship
- Community Value #2: Growth Management
- Community Value #3: Quality of Life

STAKEHOLDER ANALYSIS
Stakeholder analysis for this staff report included further conversations with Public Works, Planning, and the Police Department. Staff feels that since the additional 17' of ROW was purchased for tour bus parking, moving forward with this concept could be beneficial in terms of providing an adequate space to park. Currently, tour bus parking within Home Ranch involves navigating around many vehicles and pedestrians crossing the parking lot. If tour bus parking was provided beside an adequate and safe sidewalk, off the roadway, perhaps a more convenient experience could be provided. Further staff discussions determined that King Street provided a good location, but perhaps not the best location. Willow Street (between Gill and Deloney) was discussed as a possible future location when an appropriate sidewalk is constructed on the west side of the corridor. Staff feels a design alternative can be provided within the tour bus parking zone whereby a future change of use, vehicular parallel parking, could replace the tour bus parking if Council feels the necessity to move the tour bus parking to another location. The cost to convert the tour bus parking to parallel vehicular parking would be very minor and include adding signage.

FISCAL IMPACT

In the current FY20 Budget, appropriations were delineated in the 2006 SPET for the North King Street Charter Bus & Gill Sidewalk in the amount of $75,000. This appropriation includes the complete design of the King Street/Gill Sidewalk project. If approved in the FY21 Capital Projects, these complete streets improvements will be constructed in FY21.

STAFF IMPACT

Staff impact for this item resulted in internal meetings with department stakeholders and public outreach. Additional staff time has been expensed working with design engineers (roughly 15 hours) on the appropriate conceptual, alternative designs. Further staff impact will require roughly 10 hours to complete final design, and once construction starts, an estimated 8 hours a week for project management. The CIP Workplan for Public Works has yet to be created for FY21. The design of this project coincides with other current projects, including our Rate/Capacity Study, Center St. water main, Karns Meadow sewer feasibility study and the Hansen/Jackson St. sidewalks

LEGAL ISSUES

No Legal review required at this time.

ATTACHMENTS

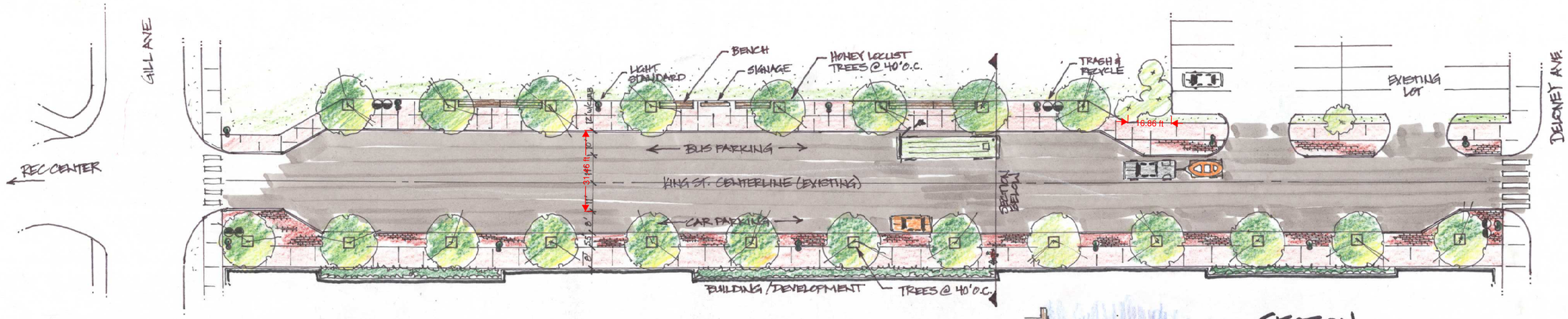
- Alternative Design "D"

RECOMMENDATION

Staff recommends proceeding with the approved Alternative Design "D" to include tour bus parking within the King Street corridor.

SUGGESTED MOTION

I move to approve the tour bus parking with the approved Alternative Design "D" and direct staff to finalize the design concept.

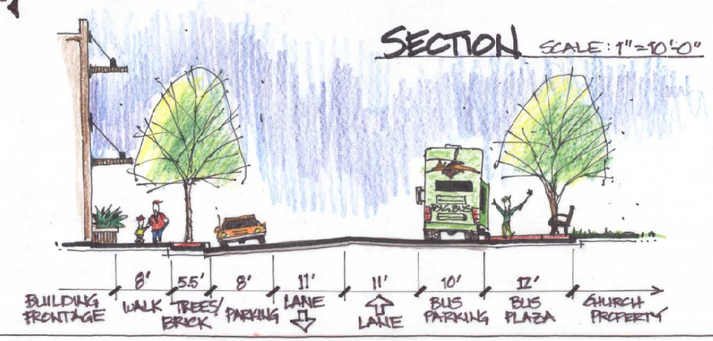


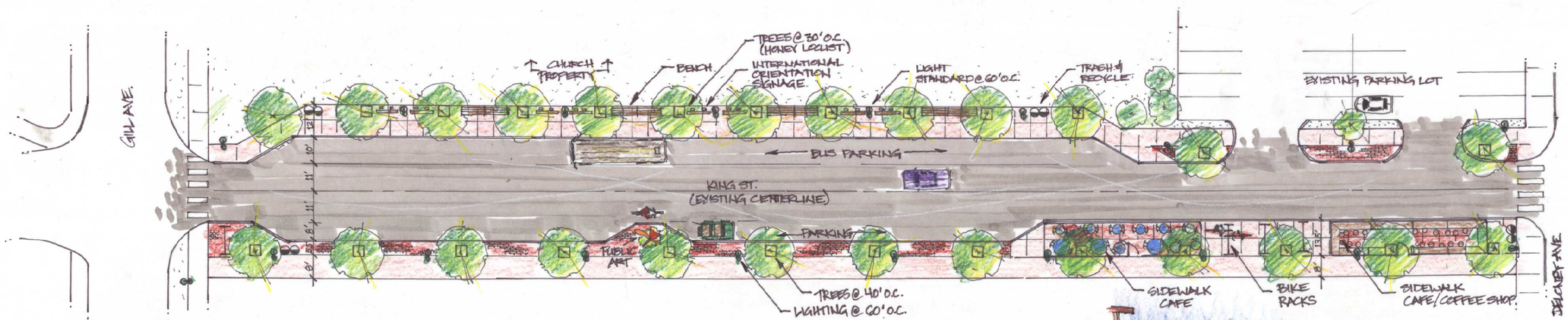
KING STREET - ALTERNATIVE 'C'

PLAN VIEW SCALE:

NORTH 0 5' 10' 20' 40'

DOUBLE-LOADED PARALLEL PARKING, PUBLIC/PEDESTRIAN ORIENTATION



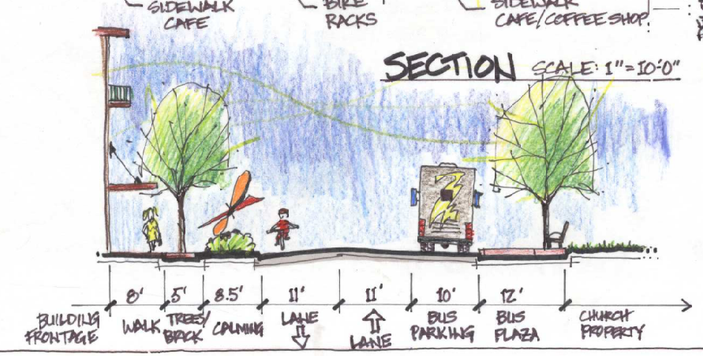


KING STREET - ALTERNATIVE 'D'

PLAN VIEW SCALE:

NORTH 0 5' 10' 20' 40'

MIX OF TRAFFIC CALMING & PARALLEL PARKING, STRONG PUBLIC/PEDESTRIAN ORIENTATION, SIDEWALK CAFES ACTIVATE THE STREET CORRIDOR



5/24/18

DARIN MARTENS DESIGN STUDIO, LLC.
303-413-8413 DBY@DARINMARTENS.NET

TOWN OF JACKSON
WORKSHOP DOCUMENTATION

SUBMITTING DEPARTMENT: PLANNING **PRESENTER**: PAUL ANTHONY

MEETING DATE: FEBRUARY 18, 2020

SUBJECT: P20-026: REQUEST FOR COUNCIL TO APPROVE THE LEASING OF SIX (6) OFF-SITE PARKING SPACES IN A TOWN PARKING LOT FOR THE DEVELOPMENT OF THE 174 N. KING AFFORDABLE HOUSING PROJECT

PURPOSE OF WORKSHOP ITEM

The purpose of this item is to present for Town Council's discussion and approval options to lease six Town parking spaces to the Jackson Hole Community Housing Trust (Housing Trust) for the 174. N. King Street project.

DESIRED OUTCOME

The intent is to have the Council determine the location and terms for leasing six public parking spaces to the Housing Trust for the 24-unit affordable mixed-use housing project at 174. N. King Street.

BACKGROUND/ALTERNATIVES

Background

Through an RFP process managed by the Teton County/Jackson Housing Department, the Town selected the affordable housing project proposed by the Housing Trust to be located at 174. N. King Street. The land is owned by the Town of Jackson and the project includes 24 deed-restricted housing units and approximately 2,300 sf of ground-level commercial space. The applicant's proposal also shows 30 on-site parking spaces and a request for an additional six off-site parking spaces to be provided by the Town. The additional six parking spaces are not required by the Land Development Regulations (LDRs) but are desired by the applicant to increase the marketability and functionality of the residential units. The ground lease with the applicant approved by the Town on January 19, 2020, stated that the Town will dedicate "six parking spaces off-site at a proximate location to be determined."

Based on the above, the applicant is making the following proposal (see attached memo from the applicant for full details):

- That the Council reserve six spaces in the Deloney parking lot for an initial period of at least 5 years, after which the Council could reevaluate its options with the applicant;

- Each off-site parking space will be managed by the issuance of a parking permit [presumably by the applicant] that explains the duties and rules of using the Town parking space. The primary purpose of the permits is to identify cars to the police so that the cars are not ticketed for parking overnight; and
- The applicant will review the parking plan each spring with the Public Works Department to consider changes as necessary.

Staff Analysis

To assist the Council in its discussion, staff met with the applicant and talked internally to develop a list of options for the Council to consider. These options were developed primarily by the Planning Department and the Public Works Department, who has the primary responsibility for maintaining Town parking lots and will be most impacted by any option the Council chooses.

In addition, staff had preliminary discussions with Police Chief, Todd Smith, and Town Attorney, Lea Colasuonno, about any potential enforcement and/or legal issues (e.g., ability to enforce violations, liability, etc.) related to the reserved parking spaces. Chief Todd stated that his department could manage the six parking spaces in the same general manner as they currently manage the three leased parking spaces in the parking garage for residents of the Jackson and Pearl building. For these three spaces, the spaces are signed as "permit parking only," the police department issues parking permits that must be displayed on the mirror of the cars, and the police then ticket any non-permitted vehicles in the spaces. Chief Todd also stated that he prefers that permits not be given to individual spaces but for the right to park in any one of the six spaces because this would reduce possible conflicts and calls to the police. These enforcement issues and any other legal requirements will be addressed in more detail and clarified in the terms of the lease agreement for the six parking spaces that would be presented for the Mayor's signature at a later date.

The table below provides general options for the Council to consider. The Council may want to consider other options as well.

Location	Pros	Cons	Comments
1. Parking Garage	• Covered • No additional maintenance costs to Town • Overnight parking already allowed • No resident maintenance required	• Distance from project (approx. 9+ minute walk) • Inconvenience, bad weather	Residents would likely drop off kids, groceries, other large items at building and then drive to garage. Could cause congestion on site.
2. Deloney Parking Lot	• Closest surface lot to the project	• Not covered. If Town required to snow plow, additional coordination/management by Town • Some additional cost (minor) to Town	• An option would be to allow use of Deloney lot only during the winter overnight parking ban period (Nov. 1 – April 15), then relying on-street parking during the summer. • Town would need to install (and take down) signs

3. Home Ranch Lot	• Close to project	• Not covered. If Town required to snow plow, additional coordination/management by Town • Some additional cost (minor) to Town • More crowded with visitors than Deloney lot generally	• An option would be to allow use of Home Ranch lot only during the winter overnight parking ban period (Nov. 15 – April 15), then relying on-street parking during the summer.
4. Recreation Center lot	• Close to project	• Has all the same issues as Deloney/Home Ranch but also will not be available during construction of King Street extension new Rec Center.	• While not likely available for a few years, it might make sense to shift parking to this site because it is a less visitor-oriented lot.
Other?			

Based on the above information, staff recommends that the Town provide six parking spaces at the Deloney Street Parking Lot with the following conditions:

1. The Town shall lease six spaces in the far northeast corner of the parking lot for the exclusive use of the 174 N. King Street project;
2. The six parking spaces shall be reserved for an initial period of five years, after which the Town Council may reconsider the lease and take any one or more of the following actions: renew the lease, modify the terms of the lease, modify the location of the leased parking spaces, not renew the lease, or another action at the Council's discretion.
3. The parking spaces will be reserved from November 1 to April 15 to coincide with the overnight on-street parking ban during the winter months. The applicant shall use on-street overnight parking all other months of the year. *(Comment: Allowing use of the parking spaces during the winter when visitor demand is lower and overnight parking is not allowed makes sense but use of the six spaces during the high summer demand is less justified and not necessary for the project's residents when overnight on-street parking is available)*
4. The Town shall not be responsible for clearing snow from the leased six spaces. The applicant or the users of the parking spaces shall be responsible for all snow removal from the spaces. *(Comment: While the Town could agree to plow the parking spaces, the practical difficulty is that the spaces can only be plowed if the residents move their cars and there is no way that the Town (or applicant) can ensure the cars will be moved early in the morning to allow the plows access to the spaces (e.g., car owner goes on vacation and then it snows). This is a major problem in plowing parking lots in housing developments and staff does not want to incur the additional liability of plowing around cars or get involved in a situation where we are expected to return to the lot multiple times in hopes that cars have been moved).*
5. The Town shall provide passes to all authorized users of the leased parking spaces to assist the Police Department in the proper enforcement of the parking spaces.
6. The applicant shall meet with the Public Works Department each year to discuss the parking plan for the six reserved spaces and discuss options for making improvements as necessary.

STAKEHOLDER ANALYSIS

The primary stakeholders for this project will be the future residents of the project, the Town Public Works Department, Town Police Department, and visitors and employees who will have fewer public parking spaces available.

FISCAL IMPACT

Minimal if staff's recommendation is selected by the Council. Minor additional costs will be incurred for the provision of parking passes and enforcement by Police. Also, Public Works will have minor additional costs related to installations and maintenance of signs.

STAFF IMPACT

The staff impact is expected to be minor but will include a small increase in employee time in the Public Works and Police Departments to manage the signage and enforcement of the six parking spaces.

LEGAL ISSUES/REVIEW

Ongoing as needed.

ATTACHMENTS

Memo from Jackson Hole Community Housing Trust
Ground lease between Town and the Jackson Hole Community Housing Trust for 174 N. King Street (1/18/20)

RECOMMENDATION

Staff recommends that the Town lease six parking spaces at the Deloney Street Parking Lot for the 174 N. King Street project with the following conditions:

1. The Town shall lease six spaces in the far northeast corner of the parking lot for the exclusive use of the 174 N. King Street project;
2. The six parking spaces shall be reserved for an initial period of five years, after which the Town Council may reconsider the lease and take any one or more of the following actions: renew the lease, modify the terms of the lease, modify the location of the leased parking spaces, not renew the lease, or another action at the Council's discretion.
3. The parking spaces will be reserved from November 1 to April 15 to coincide with the overnight on-street parking ban during the winter months. The applicant shall use on-street overnight parking all other months of the year.
4. The Town shall not be responsible for clearing snow from the leased six spaces. The applicant or the users of the parking spaces shall be responsible for all snow removal from the spaces.
5. The Town shall provide passes to all authorized users of the leased parking spaces to assist the Police Department in the proper enforcement of the parking spaces.
6. The applicant shall meet with the Public Works Department each year to discuss the parking plan for the six reserved spaces and discuss options for making improvements as necessary.

SUGGESTED MOTION

I move to direct staff to draft a lease for the Mayor's signature to allow the applicant to lease six parking spaces in the Deloney Public Parking lot under the terms and conditions directed in this meeting and to direct the Public Works Department to place all necessary signage to implement the terms of the lease.

[Memo From the Jackson Hole Community Housing Trust]

174 N King St Parking

36 total parking spaces will support the redevelopment of 174 N King Street.

30 parking spaces will be provided by the developer on-site in a covered parking garage on the 1st floor

In accordance with the Ground Lease Agreement between the Town of Jackson and the Jackson Hole Community Housing Trust dated 19th January 2020, 6 parking spaces will be accommodated off-site at a proximate location.

This parking proposal attempts to take into consideration the current and projected parking challenges facing the Home Ranch, Rec Center and Deloney parking lots and incorporates feedback provided by the TOJ Public Works Department.

In light of imminent transformation of the Rec Center parking area (and predictable impacts that will accrue to the Home Ranch parking lot as a result) we propose the dedication of 6 parking spaces in the Deloney lot for a minimum five-year period. At the end of the initial five-year period, the TOJ and JHCHT agree to review the state of parking in the neighborhood and reconsider if the dedicated parking spaces should be relocated to either the Rec Center or the Home Ranch parking lots.

These off-site parking spaces will be the 2nd allocated parking spaces for 4 of the larger one-bedroom units and the 2nd allocated parking spaces for the 2 two-bedroom units.

Management and Operations

In addition to the installation of dedicated parking signs, each homeowner will be issued a parking permit to display on his or her car. This parking permit will clarify the responsibility of each permit holder to responsibly keep the area around their designated parking space clear of snow.

In addition, permit holders will be required to vacate the parking area once a week at a designated, recurring time so that Public Works can clear the entire parking area. Because JHCHT will continue to have an administrative relationship with all residents of the property, it is understood that Public Works can coordinate with JHCHT at any time other issues arise that need to be addressed.

As part of the approval of this parking plan, JHCHT agrees to review this parking plan each spring with Public Works and amend the parking plan as needed to better meet the operational goals of the Town, the Housing Trust and the needs of affordable homeowners at 174 N King St.

GROUND LEASE
(KING STREET CONDOMINIUMS)

THIS GROUND LEASE (the "Lease") is entered into and made to be effective as of the 8TH day of JANUARY, 2020 (the "Effective Date"), by and among the **Town of Jackson,** a Wyoming municipal corporation (the "Lessor" or "Town") and the **Jackson Hole Community Housing Trust,** a Wyoming nonprofit corporation (the "Lessee" or "JHCHT").

RECITALS

WHEREAS, Lessee is a 501(c)3 tax exempt organization organized exclusively for charitable purposes including, but not limited to, the provision, management and administration of affordable housing in Teton County, Wyoming and lessening the burden of government;

WHEREAS, Lessee is an approved affordable housing provider in accordance with Section 6.3.2.C.2 of the Town of Jackson Land Development Regulations in effect on the Effective Date (the "LDRs") and as such is exempt from meeting the requirements of the Affordable Workforce Housing Standards set forth in Section 6.3 of the LDRs with respect to the residential condominium unit construction;

WHEREAS, Lessee is not exempt from the LDR requirements associated with the commercial condominium units and shall comply with all relevant and applicable LDR standards therefore;

WHEREAS, Lessor has determined the shortage of affordable housing opportunities is a growing burden of the Town and part of its governmental function, and that there is a strong need for the assistance of the Lessee in meeting such need;

WHEREAS, Lessor owns certain real property located within the Town of Jackson legally described on Exhibit A attached hereto with a physical address of 174 King Street, together with all rights, privileges and appurtenances thereto (the "Property");

WHEREAS, Lessor has determined that the Property is suited for affordable housing opportunities for the benefit of the community and desires that Lessee develop a minimum of twenty-four (24) affordable residential condominium units and up to three (3), but not less than one (1), commercial condominium units on the Property (the King Street Condominiums");

WHEREAS, in exchange for the Town leasing the Property to JHCHT, a financial contribution of $1,250,000 to JHCHT for the development of the King Street Condominiums, and the dedication of six parking spaces off-site at a proximate location to be determined , all in accordance with the terms and conditions set forth in this Lease: (i) JHCHT will be solely responsible for the permitting, entitlement, development, construction and financing of the King Street Condominiums in accordance with this Lease; (ii) JHCHT will be solely responsible for the marketing, selection of buyers and sale of the King Street Condominiums; (iii) JHCHT will be solely responsible for the administration of the Homebuyer Special Restriction (as defined below) recorded against the King Street Condominiums; and (iv) JHCHT will grant Lessor for the benefit of its employees five (5) revolving first options to purchase residential units within King Street Condominiums.

WHEREAS, Lessor and Lessee now desire to enter into this Lease pursuant to the terms and conditions set forth herein so that Lessee can accomplish the permitting, entitlement, financing, construction, marketing, sale and administration of the King Street Condominiums thereby lessening the burden of government.

NOW THEREFORE, in consideration of the foregoing Recitals and the mutual promises and covenants herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Lessor hereby leases the Property to the Lessee, and the Lessee hereby leases the Property from Lessor subject to the terms and conditions set forth hereafter.

ARTICLE 1. DEFINITIONS

1.1 Definitions. The following terms shall have the following meanings in this Lease.

(a) "Award" means any compensation or payment made or paid for the Total, Partial or Temporary Taking of all of any part of or interest in the Property and/or the Improvements, whether pursuant to judgment, agreement or otherwise.

(b) "Guidelines" shall mean procedural and administrative matters not otherwise addressed in this Lease. References made herein to the Guidelines are references to the written policies and procedures of JHCHT, as the same may be amended, modified or updated from time to time and which policies and guidelines are on file with JHCHT or if there are no such written policies, procedures or guidelines with respect to a specific matter, then the reference shall be to the then current applicable policy or procedure of JHCHT. In the case of a conflict between this Lease and the Guidelines, the provisions of this Lease shall control over the Guidelines.

(c) "Homebuyer Special Restriction" or "Fannie Mae Approved Special Restriction" shall mean the Special Restriction that will be recorded against each Residential Unit by the Lessee.

(d) "Improvements" shall mean the buildings, structures and other improvements, including the building fixtures therein, hereafter located on the Property, including but not limited to the Residential Units; provided, however, that the buildings and structures on the Property as of the Effective Date will be demolished by Lessee and shall not constitute "Improvements" for purposes of this Lease.

(e) "Lease" shall mean this ground lease between the Lessee and the Lessor for the Property and shall include any and all duly approved amendments made to this Lease in writing.

(f) "Lease Term" shall have the meaning set forth in Section 2.2.

(g) "Leasehold Mortgage" shall mean any mortgage, deed of trust, security agreement or collateral assignment securing a Loan and encumbering Lessee's leasehold interest in the Property.

(h) "Lender(s)" shall mean only those lenders identified by Lessee to the Lessor in writing, and any assignee of such Lenders who are also identified to the Lessor in writing during the term of the identified loans.

(i) "Loans" shall mean collectively any loans or funding sources originated by Lessee secured by the Property.

(j) "Loan Documents" shall mean all loan agreements, notes, deeds of trust, security documents, including regulatory agreements, use agreements, security agreements, fixture filings, and financing statements required in connection with any Loans.

(k) "King Street Condominiums" has the meaning set forth in the Recitals.

(l) "Notice of Intended Taking" means any notice or notification on which a reasonably prudent person would rely, and which said person would interpret as expressing an existing intention of Taking as distinguished from a mere preliminary inquiry or proposal. It includes, without limitation, the service of a condemnation summons and complaint on a party to this Lease. The notice is considered to have been received when a party to this Lease receives from the condemning agency or entity a notice of intent to take, in writing, containing a description or map of the taking which reasonably defines the extent of the taking.

(m) "Partial Taking" means any taking of the fee title of the Property and/or the Improvements that is not either a Total, Substantial or Temporary Taking.

(n) "Party" shall mean the Lessor or the Lessee individually.

(o) "Parties" shall mean the Lessor and the Lessee collectively.

(p) "Property" has the meaning set forth in the Recitals.

(q) "Qualified Buyer" shall mean natural persons that meet the requirements of "Eligible Buyer" as defined in the Guidelines and as determined by JHCHT in its sole discretion.

(r) "Residential Units" has the meaning set forth in Section 2.4(a).

(s) "Taking" means institution of any proceedings for the taking or condemnation of all or a portion of the Property by the government of the United States, State of Wyoming, County of Teton, or any other governmental authority, or any other entity under the right of eminent domain. Unless otherwise provided, the taking shall be deemed to occur as of the earlier of (a) the date actual physical possession is taken by the condemnor, or (b) the date on which the right to compensation and damages accrues under the law applicable to the Property and/or the Improvements.

(t) "Substantial Taking" means the taking of so much of the Property and/or the Improvements that the portion of the Property and/or the Improvements not taken cannot be repaired or reconstructed, taking into consideration the amount of the Award available for repair or reconstruction, rendering the Property and/or Improvements economically unfeasible for the Lessee's intended purpose. Eminent domain actions filed by Lessor against owners of portions of the Property and pending as of the date of this Lease shall not be deemed, construed or interpreted as a Substantial Taking under this Lease.

(u) "Temporary Taking" means a taking of all or any part of the Property and/or the Improvements for a term certain which term is specified at the time of taking. Temporary Taking does not include a taking which is to last for an indefinite period or a taking which will terminate only upon the happening of a specified event unless it can be determined at the time of the taking substantially when such event will occur. If a taking for an indefinite term should take place, it shall be treated as a Total, Substantial or Partial Taking in accordance with the definitions set forth herein.

(v) "Total Taking" means the taking of the fee title to all of the Property.

ARTICLE 2. LEASE OF THE PROPERTY; TERM; LEASE PAYMENTS; CONSTRUCTION OF UNITS TAXES AND ASSESSMENTS

2.1 Lease of the Property. The Lessor, for and in consideration of the covenants and agreements to be kept and performed by the Lessee, leases the Property to the Lessee, and in consideration thereof, the Lessee does take, hire and lease the Property from the Lessor pursuant to the terms of this Lease. Concurrently with the execution of this Lease, Lessor and Lessee shall record this Lease in the Office of the Teton County Clerk.

2.2 Term. The term of this Lease shall commence upon the Effective Date and end fifty (50) years from that date, unless sooner terminated as provided for herein (the "Lease Term").

2.3 Lease Payments. The Lessee shall make all lease payments to the Lessor, at Post Office Box 1687, Jackson, Wyoming 83001, or such other place as Lessor may designate in writing. Rent for the Property will be $10.00 per year. If at any time the Property is not used in accordance with the intent of this Ground Lease to provide for decent, affordable housing, the rent shall be increased to an amount calculated by the Town to equal the market rental value of the Leased Land for unrestricted use.

2.4 Construction of King Street Condominiums; Sale of Residential Units and Administration of Special Restriction.

(a) Obligation to Entitle, Develop and Construct. The Lessee shall be obligated to entitle, develop and construct a minimum of twenty-four (24) residential condominium units consisting of at least thirty four (34) bedrooms (the "Residential Units") on the Property, approximately 2,200 square feet of commercial condominium space on the Property comprising not less than one (1) and not more than three (3) commercial condominium units, and a minimum of twenty seven (27) parking spaces on

the Property, as generally depicted on Exhibit B attached hereto. Lessee shall be obligated to install, at its sole cost and expense, all site improvements required by the laws and regulations of the Town of Jackson, Lessor or desired by Lessee, for the King Street Condominiums, including, but not limited to, the burying or relocation of power lines, utilities, sewer and storm sewer lines, water lines, and storm drains; the connection to sewer, water, storm drain and electrical systems; and the modification of or additions to landscaping and roads on the site or in the adjacent right-of-way. Lessee shall be obligated, as required by the Jackson Municipal Code, to screen and undertake mitigation measures in order to minimize construction disturbance to adjacent and nearby properties, business operations, and the general public.

(b) Building Permit; Verification of Sufficient Funds. Prior to the issuance of the building permit for the King Street Condominiums, Lessee will provide to Lessor written verification from Lender that Lessee holds sufficient private funding and has secured sufficient third-party financing funds for the completion of the construction of the King Street Condominiums. The building permit will not be issued until the foregoing requirement has been deemed satisfied by Lessor in its reasonable discretion. The Lessee, at its expense, will obtain a payment and performance bond pursuant to LDR Sec. 8.2.11, as amended, to ensure the completion of the King Street Condominiums.

(c) Reporting Requirements. Upon commencement of construction, Lessee will review, on a quarterly basis, the progress of the construction with Lessor for the King Street Condominiums. This review would include budget and schedule tracking, as well as a discussion of any key project issues, to ensure the construction is on time and on budget. Upon project completion, Lessee will provide the Lessor will a full cost accounting of the construction project. Lessor, at its sole discretion, may demand and Lessee shall provide, any additional documentation related to the project.

(d) Final Plat. The Lessee shall be obligated to pursue and accomplish the Final Plat approval of the King Street Condominiums by Lessor, in compliance with the Town of Jackson Land Development Regulations (the "LDRs"). The Final Plat application to the Town of Jackson shall include the following: (i) the Homebuyer Special Restriction; (ii) King Street Condominium Employee Right of Purchase Agreement, in substantially the form attached hereto as Exhibit C (the "Employee Right of Purchase Agreement"); and (iii) the Condominium Declaration for the King Street Condominiums (the "Condo Dec"). The Lessor has discretion, which shall not be unreasonably withheld and provided such discretion is not exercised arbitrarily, to approve or deny the proposed Condo Dec. Criteria for evaluating the Condo Dec includes, but is not limited to: (1) provisions for automatically transferring the declarant's interest in the Property to the condominium owners' association; (2) provisions designed to capitalize the condominium owners' association for necessary future repairs; and (3) provision for distribution of costs and fees between the owners of residential units and owners of commercial space.

(e) Escrow. Upon the Lessor's Final Plat approval, the Plat, the Homebuyer Special Restriction, the Employee Right of Purchase Agreement and the Condo Dec shall be held for recordation by an escrow agent mutually acceptable to Lessor and Lessee until such time that Lessee obtains Certificates of Occupancy for the Residential Units.

(f) Financial Verification. Upon receipt of a Certificate of Occupancy, Lessee shall deliver to Lessor written confirmation from Lessee's Lender that Lessee is in good standing with the Loans and Lender is confident in Lessee's ability to satisfy all obligations of the Loan ("Financial Verification").

(g) Warranty Deed and Termination of Ground Lease. Upon Lessor's satisfaction with the Financial Verification, which satisfaction shall not be unreasonably withheld, Lessor shall execute, and deliver the following documents to the escrow agent: (i) a Warranty Deed from Lessor to Lessee for the Property in form and substance mutually acceptable to Lessor, Lessee and Lender (the "Conveyance Deed"); and (ii) a Termination of Ground Lease that terminates this Lease in form and substance mutually acceptable to Lessor, Lessee and Lender (the "Ground Lease Termination").

(h) Escrow Instructions and Recordation of Documents. Upon satisfaction of Sections 2.4(b) through (e) above, the Lessor and Lessee agree to direct the escrow agent, in writing, to immediately record the Conveyance Deed, the Ground Lease Termination, the Final Plat, the Condo Dec, Employee Right of Purchase Agreement and the Homebuyer Special Restriction, in that order.

(i) Sale of Units. Lessee shall determine whether a prospective purchaser of a Residential Unit is a Qualified Buyer and therefore eligible to purchase a Residential Unit. Such determination shall be based upon the written applications, representations, information and verification as are deemed by Lessee, in its sole discretion, to be necessary to establish and substantiate eligibility. No person shall have the right to any appeal of such decision by Lessee, and each applicant shall, by making the application, waive any such right he or she may otherwise have.

(j) Administration Agreement. Fannie Mae guidelines require that a qualified Community Land Trust manage and administer the terms and conditions of the Homebuyer Special Restriction in order for the property to qualify for Fannie Mae financing. The Homebuyer Special Restriction will expressly name the JHCHT as the administrator of the Special Restriction, and provide that the administrator shall be responsible for enforcing the terms of the Special Restriction.

(k) Amendment for Alternative Development Structure. Notwithstanding anything herein to the contrary, if prior to January 1, 2021, Lessor, Lessee and Lender mutually agree upon an alternative development structure that results in Lessor retaining an ownership interest in the Property, then this Lease shall be amended as necessary to accommodate the alternative development structure. If an alternative development structure is not agreed upon by Lessor, Lessee and Lender in writing by January 1, 2021, the Property shall be conveyed in accordance with Section 2.4(g).

2.5 Taxes and Assessments.

(a) Payment by Lessee. Lessee covenants and agrees during the entire Lease Term, at its own cost and expense, to pay, subject to any applicable exemptions, prior to delinquency and before any fine, penalty, interest, or other charge may be added to them for nonpayment, all real estate taxes, general and special, ordinary and extraordinary, unforeseen as well as foreseen, of any kind and nature, made, assessed, levied or imposed upon, or due and payable in connection with, or which become a lien upon, the Property, the Improvements located thereon, or any part of the Property or Improvements located thereon, or upon this Lease, as well as assessments for sidewalks, streets, sewers, water, or any other public improvements and any other improvements or benefits which shall, during the Lease Term, be made, assessed, levied, or imposed upon or become due and payable in connection with, or a lien upon the Property, the Improvements, or any part of the Property or Improvements, or upon this Lease. Nothing herein shall impair Lessee's right to request and receive exemption from the payment of real estate taxes. Notwithstanding anything in this Lease to the contrary, Lessee shall not be required to pay any franchise tax or transfer tax imposed on any document to which Lessor is a party (other than this Lease) creating or transferring an estate or interest in the Property, any municipal, state or federal income taxes levied against Lessor, any income, profits or revenues tax, assessment or charge imposed upon the Rent received by Lessor under this Lease, any estate, gift, succession, inheritance or transfer taxes of Lessor, or any business and occupational tax attributed and imposed upon Lessor for work, business or income not related or attributable to the Property.

(b) Lessee's Right to Contest. If Lessee disputes any amount or validity of any liens, taxes, assessments, or charges upon the Property or the Improvements located thereon, Lessee may contest and defend against the same at its cost, and in good faith diligently conduct any necessary proceedings in connection therewith to prevent and avoid the same; provided, however, that such contest shall be prosecuted to a final conclusion as speedily as possible. Lessor agrees to render to Lessee all reasonable assistance, at no expense to Lessor, in contesting the validity or amount of any such liens, taxes, assessments or charges, but specifically excluding joining in the signing of any protests or pleadings to the tax assessor. During any such contest, Lessee shall (by the payment or bonding of such liens, disputed taxes, assessments or charges, if necessary) prevent any advertisement of tax sale, any foreclosure of, or any divesting thereby of Lessor's title, reversion or other interest in or to the Property.

ARTICLE 3. MAINTENANCE; USE OF PREMISES

3.1 Title to Improvements.

(a) During the Lease Term title to all Improvements, now existing or later made, on the Property are and shall be vested in Lessee, provided, however, that Lessee shall have no right to destroy, demolish or remove the Improvements except as specifically provided for in this Lease or as approved in writing by Lessor. Lessor acknowledges and agrees that any and all depreciation, amortization and tax credits for federal or state tax purposes relating to the Improvements located on the Property and any and all additions thereto, substitutions therefor, fixtures therein and other property relating thereto shall be deducted or credited exclusively to Lessee during the Lease Term and for the tax years during which the Term begins and ends.

3.2 Permits. Licenses and Easements; Utilities. The Lessor, by virtue of its fee title to the Property, may hold certain rights, entitlements or credit with respect to utility capacity and connections, and in that capacity, Lessor agrees that, within a reasonable period after receipt of written request from the Lessee, it shall (at no expense to the Lessor) join in any and all applications for permits, licenses or other authorizations required by any governmental or other body claiming jurisdiction in connection with any work the Lessee may do pursuant to this Lease, and shall also join in any grants of easements for public utilities useful or necessary to the development of the Property.

3.3 Use of Property. The Lessee shall at all times during the Lease Term use the Property and the Improvements for the purposes set forth in this Lease, consistent with all applicable zoning and environmental laws of any governmental authority having jurisdiction over the Property and the Improvements. The Lessee agrees to comply with all applicable statutes, rules, orders, ordinances, requirements and regulations of the United States, the State of Wyoming, the County of Teton, the Town of Jackson and of any other governmental authority having jurisdiction over the Property or the Improvements.

3.4 Utilities. The Lessee shall be responsible for the cost of all utilities, including water, heat, gas, electricity, waste removal, sewers, and other utilities or services supplied to the Property, and the Lessee shall pay or cause same to be paid currently and as due.

3.5 Damage to Person or Property; Hazardous Materials; Indemnification.

3.6.1 Damage to Person or Property - General Indemnification. During the Lease Term Lessor shall not in any event whatsoever be liable for any injury or damage to any person happening on or about the Property, for any injury or damage to the Improvements, or to any property of Lessee, or to any property of any other person, entity or association on or about the Property. Lessee shall defend, hold harmless and indemnify the Lessor, and its respective officers, agents, and employees (each an "Indemnified Party" and together, the "Indemnified Parties"), of and from all claims, loss, damage, injury, actions, causes of action and liability of every kind, nature and description directly or indirectly arising from and during its tenancy, its use of the Property and the Units, and any of its operations activities thereon or connected thereto; provided, however, that this Section 3.6 shall not be deemed or construed to and shall not impose an obligation to indemnify and save harmless the Lessor, the Town or any of their officers, agents or employees from any claim, loss, damage, liability or expense, of any nature whatsoever, arising from or in any way related to or connected with any willful misconduct or gross negligence by the person or entity seeking such indemnity. This Section 3.6.1 shall survive termination of this Ground Lease.

3.6.2 Hazardous Materials – Indemnification.

(a) Lessee shall indemnify, defend, and hold the Lessor, and its officials, officers, agents and employees (individually, an "Indemnified Party" and collectively, the "Indemnified Parties") harmless from and against any and all losses, costs, claims, damages, liabilities, and causes of action of any nature whatsoever (including, without limitation, the reasonable fees and disbursements of counsel and engineering consultants) (the "Liabilities") incurred by or asserted against any Indemnified Party in connection with, arising out of, in response to, or in any manner relating to violation of any Environmental Law, or any Release, threatened Release and any existing or future condition of pollution, contamination or Hazardous Substance-related nuisance on, or under or from the Property. The foregoing indemnity shall apply to any Liabilities arising from and during Lessee's tenancy. This

Section 3.6.2 shall survive termination of this Ground Lease.

(b) For purposes of this Section 3.6.2, the following definitions shall apply:

(i) "Hazardous Substance" shall have the meaning set forth in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended as of the date of this Agreement, 42 U.S.C. '9601(14), and in addition shall include, without limitation, petroleum (including crude oil or any fraction thereof) and petroleum products, asbestos, asbestos-containing materials, polychlorinated biphenyls ("PCBs"), PCB-containing materials, all hazardous substances identified in the Wyoming Health & Safety Code 25316 and 25281(d), all chemicals listed pursuant to the Wyoming Health & Safety Code 25249.8, and any substance deemed a hazardous substance, hazardous material, hazardous waste, or contaminant under Environmental Law.

(ii) "Environmental Law" shall include all federal, state and local laws, regulations and ordinances governing hazardous waste, wastewater discharges, drinking water, air emissions, Hazardous Substance releases or reporting requirements, Hazardous Substance use or storage, and employee or community right-to-know requirements related to the work being performed under this Agreement.

(iii) "Release" shall mean any spillage, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including the abandonment or discharging of barrels, containers, and other closed receptacles containing any Hazardous Substances.

ARTICLE 4. MORTGAGE LOANS

4.1 Liens and Encumbrances Against Lessee's Interest in the Leasehold Estate. The Lessee shall have the right to mortgage, pledge, deed in trust, assign rents, issues and profits and/or collaterally (or absolutely for purposes of security if required by any Lender) assign its interest in this Lease or otherwise encumber the leasehold estate, and/or the interest of Lessee hereunder, in whole or in part, and any interests or rights appurtenant to this Lease, and to assign or pledge the same as security for any debt (the holder of such mortgage, pledge or other encumbrance, and the beneficiary of any such deed of trust being hereinafter referred to as "Mortgagee" and the mortgage, pledge, deed of trust or other instrument hereinafter referred to as "Leasehold Mortgage").

4.2 Cost of Loans to be Paid by Lessee. The Lessee affirms that it shall bear all of the costs and expenses in connection with (i) the preparation and securing of the Loans, (ii) the delivery of any instruments and documents and their filing and recording, if required, and (iii) all taxes and charges payable in connection with the Loans.

4.3 Proceeds of Loans. It is expressly understood and agreed that all Loan proceeds shall be paid to and become the property of Lessee, and that the Lessor shall have no right to receive any such Loan proceeds.

4.4 Notice and Right to Cure Defaults Under Loans. Any Loan which encumbers the leasehold must provide the Town of Jackson with adequate rights to cure any defaults by Lessee, including (a) providing the Lessor or its successor with copies of any notices of default at the same time and in the same manner as provided to Lessee, and (b) providing the Lessor with a cure period of at least sixty (60) days to cure any default.

4.5 Notice to Lessor of Leasehold Mortgages. Lessee shall provide written notice to Lessor of the name and address of each Lender under this Lease, and shall provide Lessor with updates based on any changes in name or address or assignments that occur.

4.6 Pledge of Property. In addition to the Leasehold Mortgage, the Lender requires, and Lessor hereby agrees, that prior to the closing of the Loan, Lessor shall pledge the Property to Lender in form and substance approved by Lessor, Lessee and the Lender, such approval not to be unreasonably withheld. If Lessor fails to pledge Property required by this provision, Lessee shall have the right to terminate this Lease. The pledge contemplated by this Section is made in accordance with Wyoming

Statutes §§15-10-103 et seq., as amended.

ARTICLE 5. INSURANCE

5.1 Required Insurance Coverage.

(a) Property Insurance. The Lessee shall during the Lease Term keep the Improvements insured against loss or damage by a property insurance policy providing coverage of the perils of direct damage as insured under the Insurance Services Office (ISO) "Causes of Loss-Special Form" or equivalent with limits in sufficient amounts such that the proceeds of such insurance shall not be less than the replacement value of the Improvements.

(b) Commercial General Liability (CGL) Insurance. During the Lease Term, the Lessee shall keep in full force and effect a policy or policies of Commercial General Liability insurance against liability for bodily injury to or death of any person or property damage arising out of an occurrence on or about the Property. The limits of such insurance shall be not less than One Million Dollars ($1,000,000) combined single limit for bodily injury and property damage.

(c) Builders' Risk Insurance. During the course of any alteration, construction or reconstruction, the cost of which exceeds One Hundred Thousand Dollars ($100,000), either Lessee or its contractor shall provide builders' risk insurance for not less than the amount of work to be performed, insuring against the perils of direct damage as insured under the Insurance Services Office ISO "Causes of Loss – Special Form" or equivalent.

(d) Adjustment of Coverage Limits. Whenever the insurance coverages required by this Section 5.1 are renewed or extended, the Lessee shall increase the coverage limits required to an amount that incorporates the insurance coverage limits customarily required by lenders in Teton County, Wyoming at the time the insurance is renewed or extended which shall be confirmed at such time by Lessee by obtaining documentation of the insurance coverage limits required by at least one Teton County, Wyoming lender for financing of similar types of property.

5.2 Insurance Policies and Premiums.

(a) All policies required by this Lease shall name the Lessor as an additional insured.

(b) Any policy of insurance shall provide that any change or cancellation of said policy shall be made in writing and sent to the Lessee and the Lessor at their respective principal offices at least thirty (30) days before the effective date of change or cancellation.

(c) Any insurance provided for in this Article 5 may be placed by a policy or policies of blanket and/or excess liability (or umbrella) insurance.

5.3 Proceeds of Insurance.

(a) For so long as any Loan on the Improvements is outstanding, all fire and standard risk or extended coverage (casualty) insurance proceeds shall be applied to the payment of the costs of repairing or rebuilding that part of the Improvements damaged or destroyed if to the extent required, each Lender with an outstanding Loan permits such repair or rebuilding. If the Improvements are not repaired or rebuilt, all such proceeds shall be applied in a manner consistent with the terms of the Loans.

(b) In the event that no Loan is outstanding, all insurance proceeds received under the policies set forth in this Article shall be paid to the Lessee, provided that the Lessee shall apply such proceeds to the repair or rebuilding of the Improvements, and if repair or rebuilding is not economically feasible in Lessee's reasonable discretion, then all insurance proceeds shall be paid to Lessor and Lessee shall have no further obligation to repair or rebuild the Improvements. Lessor, at its sole discretion, may demand and Lessee shall provide, relevant and appropriate documentation related

to the insurance proceeds received; the repair or rebuilding of the Improvements; and the economic infeasibility of the repair or rebuilding of the Improvements.

ARTICLE 6. CONDEMNATION

6.1 Taking of Land or Improvements. If, during the term of this Lease, there is any Taking of all or any part of the Improvements, or the Property, the rights and obligations of the parties shall be determined as follows:

6.2 Total Taking. If the Improvements, or the Property are totally taken by condemnation, this Lease shall terminate on the date of the taking. If this Lease is terminated pursuant to this Section 6.2, the Award for such taking shall be apportioned and distributed as follows:

(a) First, to the Mortgagees, if any, to the extent of the Leasehold Mortgage;

(b) Second, to Lessee, a sum equal to the fair market value of the Improvements on the date immediately preceding the Taking as determined by the appraisal method set forth in Section 6.7 and determined as if there were no Taking, nor threat of condemnation; plus the residual value of the Term, subject to the rent reserved; and

(c) Third, to Lessor, the remainder, if any.

6.3 Reserved.

6.4 Substantial Taking.

(a) In the event of a Taking which is substantial, Lessee may, subject to the rights of the Mortgagee, if any, terminate this Lease. For purposes hereof, a Taking shall be deemed to be "substantial" if it renders the Property and/or Improvements economically infeasible for Lessee's intended purpose. If Lessee elects to terminate this Lease under this provision, Lessee shall give written notice of its election to do so to Lessor within forty-five (45) days after receipt of a copy of a Notice of Intended Taking.

(b) In the event Lessee terminates this Lease in accordance with this Section 6.4, such termination shall be as of the time when the Taking entity takes possession of the portion of the Property and the Improvements taken. In such event, the Award for such Substantial Taking (including any award for severance, consequential or other damages which will accrue to the portion of the Property and/or the Improvements not taken) shall be apportioned and distributed as follows:

(i) First, to the Mortgagee, if any, to the extent of the Leasehold Mortgage;

(ii) Second, to Lessee a sum equal to the fair market value of the Improvements taken preceding the date of the Taking as determined by the appraisal process provided for in Section 6.7, commenced as provided in Section 6.2, and as modified by Section 6.5(c); plus the residual value of the Term, subject to the rent reserved; and

(iii) Third, to Lessor, the remainder, if any.

(c) Notwithstanding anything to the contrary contained in Section 6.7, if Lessee has elected to terminate this Lease, and the taking authority abandons or revises the Taking, Lessee shall have forty-five (45) days from receipt of written notice of such abandonment

or revision to revoke its notice of termination of this Lease.

6.5 Partial Taking.

(a) In the event of a Partial Taking, this Lease shall continue in full force and effect and there shall be no abatement in or reduction of any of Lessee's obligations hereunder.

(b) The Award for such Partial Taking shall be apportioned and distributed first to the Mortgagee, if any, to the extent of the Leasehold Mortgage, then to Lessor and Lessee in proportion to the fair market value of their respective interests in the Property and Improvements, as such interests existed immediately prior to such Partial Taking.

(c) The fair market value of the parties' respective interests in the Property and the Improvements shall be determined by the appraisal process provided in Section 6.7, except the assumptions listed in such Section shall not apply. Rather, the appraisal shall be based on the value of the Property as improved and encumbered by this Lease and on the value of the Improvements as they stand, but without regard to any Taking or threat of condemnation.

(d) Any Award for severance, consequential or other damages which accrues by reason of the Partial Taking to the portion of the Property or the Improvements not taken shall be distributed first to the Mortgagee, if any, to the extent of the Leasehold Mortgage, then shall be apportioned between Lessor and Lessee in accordance with the diminution in value of their respective interests.

6.6 Temporary Taking.

(a) In the event of a Temporary Taking of the whole or any part of the Property and/or Improvements, the Term shall not be reduced or affected in any way and Lessee shall continue to pay in full any sum or sums of money and charges herein reserved and provided to be paid by Lessee, and, Lessee shall be entitled to any Award or payment for the temporary use of the Property and/or Improvements prior to the termination of this Lease, and Lessor shall be entitled to any Award or payment for such use after the termination of this Lease.

(b) Any Award or payment for damages or cost of restoration made on or after the termination of this Lease shall be paid first to the Mortgagee, if any, to the extent of the Leasehold Mortgage, then to Lessor absolutely, together with the remaining balance of any other funds paid to Lessee for such damages or cost of restoration.

6.7 Appraisal. Whenever an appraisal of the Property or the Improvements is called for under the terms of this Lease, the parties shall use the following procedure:

(a) Appointment of Appraiser. Within ten (10) days after notice from Lessor to Lessee, Lessor and Lessee shall each appoint an MAI appraiser to participate in the appraisal process provided for in this Section 6.7 and shall give written notice thereof to the other party. Upon the failure of either party to appoint, the non-defaulting party shall have the right to apply to the District Court of Teton County, Wyoming, to appoint an appraiser to represent the defaulting party. Within ten (10) days of the parties' appointment, the two (2) appraisers shall jointly appoint a third MAI appraiser and give written notice thereof to Lessor and Lessee, or if within ten (10) days of the appointment of said appraisers the two (2) appraisers shall fail to appoint a third, then either party hereto shall have the right to make application to said District Court to appoint such third appraiser.

(b) Determination of Fair Market Value.

(i) Within thirty (30) days after the appointment of the third appraiser, the appraisers shall determine the fair market value of the Property and/or the Improvements in accordance with the provisions hereof, and shall execute and acknowledge their determination of fair market value in writing and cause a copy thereof to be delivered to each of the parties hereto.

(ii) The appraisers shall determine the fair market value of the Property and the Improvements based on sales of comparable property in the area in which the Property are located; provided, however, the appraisal should reasonably reflect the deed restrictions imposed on the Property and/or the Improvements pursuant to Article 2 of this Lease.

(iii) If a majority of the appraisers are unable to agree on fair market value within thirty (30) days of the appointment of the third appraiser, the three (3) appraisals shall be added together and their total divided by three (3). The resulting quotient shall be the fair market value of the Property and the Improvements. If, however, either the low appraisal and/or high appraisal is ten percent (10%) lower or higher than the middle appraisal, such appraisal shall be disregarded. If only one appraisal is disregarded, the remaining two appraisals shall be added together and their total divided by two (2). The resulting quotient shall be the fair market value of the Property and the Improvements. If both the low and high appraisals are disregarded, the middle appraisal shall be the fair market value of the Property.

(c) Payment of Fees. Each of the parties hereto shall (a) pay for the services of its appointee, (b) pay one-half (1/2) of the fee charged by the appraiser selected by their appointees, and (c) pay one-half (1/2) of all other proper costs of the appraisal.

6.8 Lessor's Waiver of Rights to Eminent Domain. Lessor hereby waives any and all rights to condemnation or eminent domain of the Property for the duration of the Lease Term.

ARTICLE 7. ASSURANCES OF LESSOR

7.1 Lessor to Give Peaceful Possession. The Lessor covenants that it owns in fee simple, and that it has good and marketable title to the Property, that as of the date of execution of this Lease, the Property is free of all easements, covenants, conditions and restrictions except as disclosed in writing to Lessee. The Lessor has the full right and authority to make this Lease. The Lessor covenants and warrants that the Lessee shall have, hold and enjoy, during the Lease Term, peaceful, quiet and undisputed possession of the Property leased without hindrance or molestation by or from Lessor so long as no Event of Default exists and is continuing under this Lease.

7.2 Lessor to Lease the Property with Marketable Title. The Lessor covenants and warrants that as of the date of execution of this Lease, there were no outstanding liens and encumbrances on the Property, other than created by Lessee or disclosed in the Ownership and Encumbrance Report issued by Wyoming Title & Escrow, Inc. on December 13, 2019 as Order No. W-21385.

7.3 Release of Lessor. The Lessor may sell, assign, transfer or convey (but not encumber), with the prior written consent of the Lenders which shall not be unreasonably withheld, conditioned or delayed, all or any part of Lessor's interest in the Property or this Lease without obtaining Lessee's consent, provided that the purchaser, assignee, or transferee expressly assumes all of the obligations of the Lessor under this Lease by a written instrument in a form reasonably satisfactory to the Lessee and recordable in the Office of the Teton County Clerk (an "Assumption Agreement"). In the event of a sale, assignment, transfer or conveyance by Lessor of the Property or its rights under this Lease, provided an assumption agreement is executed as required above, the same shall operate to release the Lessor from any future liability upon any of the covenants or conditions of this Lease, expressed or implied, in favor of Lessee, and in such event the Lessee shall look solely to the successor in interest of Lessor in and to the Property or this Lease. This Lease shall not be affected by any such sale, and the Lessee agrees to attorn to any such purchaser or assignee provided Lessee has received an Assumption Agreement.

ARTICLE 8. DEFAULTS AND REMEDIES

8.1 Events of Default; Notices.

(a) Any one or more of the following events shall constitute an "Event of Default".

(1) Failure to make Lease payments, as required pursuant to Section 2.3 of

this Lease, or any other payment required under this Lease, and continuance of such failure for a period of thirty (30) days after receipt by the Lessee of written notice specifying the nonpayment;

(2) Failure of the Lessee to observe and perform any material covenant, condition or agreement hereunder on its part to be performed, and (i) continuance of such failure for a period of forty five (45) days after receipt by the Lessee of written notice specifying the nature of such default, or (ii) if by reason of the nature of such default the same cannot be remedied within said forty five (45) days, the Lessee fails to proceed with reasonable diligence after receipt of said notice to cure the same; or

(3) A general assignment by the Lessee for the benefit of creditors; or

(4) The filing of a voluntary petition by the Lessee, or the filing of an involuntary petition by any of the Lessee's creditors seeking the rehabilitation, liquidation or reorganization of the Lessee under any law relating to bankruptcy, insolvency or other relief of debtors, provided that in the case of an involuntary petition Lessee shall have ninety (90) days to cause such petition to be withdrawn or dismissed; or

(5) The appointment of a receiver or other custodian to take possession of substantially all of Lessee's assets or of this leasehold which appointment is not withdrawn or dismissed within ninety (90) days; or

(6) The Lessee becomes insolvent or declares it is unwilling to pay its debts as they become due; or any court enters a decree or order directing the winding up or liquidation of Lessee or of substantially all of its assets; or the Lessee takes any action toward the dissolution or winding up of its affairs or the cessation or suspension of its use of the Residential Units; or

(7) Attachment, execution or other judicial seizure of substantially all of the Lessee's assets or this leasehold, which is not dismissed, bonded, or stayed within ninety (90) days.

8.2 Remedy of Material Breach by Lessee. At any time after the occurrence of an Event of Default hereunder, Lessor may terminate this Lease by giving Lessee written notice thereof, setting forth in such notice an effective date for termination which is not less than thirty (30) days after the date of such notice, in which event this Lease and Lessee's estate created hereby and all interest of Lessee and all parties claiming by, through or under Lessee shall automatically terminate upon the effective date for termination as set forth in such notice, with the same force and effect and to the same extent as if the effective date of such notice had been the date originally fixed in Article 2 hereof for the expiration of the Lease Term. In such event, Lessor, its agents or representatives, shall have the right, without further demand or notice, to reenter and take possession of the Property (including all buildings and other Improvements comprising any part thereof) at any time from and after the effective termination date without being deemed guilty of any manner of trespass and without prejudice to any remedies for arrears of rent or existing breaches of covenants. Upon the exercise of Lessor's remedies pursuant to this Section 9.2, Lessee shall execute such releases, deeds and other instruments in recordable form as Lessor shall reasonably request in order to accurately set forth of record the then current status of Lessee's estate and Lessee's rights hereunder.

8.3 Deficiency Judgments. Lessor, for itself and for each and every succeeding owner of Lessor's estate in the Property, agrees that it shall not be entitled to seek a personal judgment against Lessee and that upon any Event of Default hereunder, the rights of Lessor to enforce the obligations of Lessee, its successors or assigns, or to collect any judgment, shall be limited to the termination of this Lease and of Lessee's estate and the enforcement of any other rights and remedies specifically granted to Lessor hereunder.

ARTICLE 9. ASSIGNMENTS AND TRANSFERS

9.1 Consent Required. Except as expressly provided herein, Lessee shall not,

without the prior written consent of Lessor which shall not be unreasonably withheld, conditioned or delayed, assign this Lease or any interest therein ("Transfer"). A Transfer shall be deemed to include any attempt by Lessee to make or permit any voluntary or involuntary, total or partial, sale, assignment, conveyance, mortgage, pledge, encumbrance, or other transfer of any or all of the Improvements. Any attempt to Transfer Lessee's interest in this Lease without Lessor's prior written consent shall be null and void, and any assignee, sublessee, secured party or transferee shall acquire no right or interest by reason of such attempted Transfer.

9.2 Permitted Transfers. Notwithstanding the foregoing, Lessor's prior written consent of an assignment or transfer of this Lease or conveyance of Lessee's leasehold interest in the Property, or any part thereof, shall not be required to effectuate any of the following ("Permitted Transfers"):

(a) A transfer to a Wyoming entity owned entirely by Lessee or co-owned by Lessee.

(b) In the event of a Permitted Transfer by Lessee pursuant to this Section, Lessee nevertheless agrees that within thirty (30) days following such Permitted Transfer it shall give written notice to Lessor of such assignment or transfer along with a true and complete copy of the executed assignment or transfer document.

ARTICLE 10. MISCELLANEOUS

10.1 Instrument Is Entire Agreement. This Lease including the Recitals above and the attached Exhibits constitute the entire agreement between the Parties with respect to the matters set forth in this Lease. This Lease shall completely and fully supersede all other prior understandings or agreements, both written and oral, previously entered into between the Lessor and the Lessee relating to the lease of the Property by the Lessor to the Lessee.

10.2 Notices. All notices, requests, demands, or other communications required or permitted to be given hereunder shall be in writing and shall be addressed and delivered by hand or by certified mail, return receipt requested, or by Federal Express, or by hand delivery by a recognized, reputable courier, to each party at the addresses set forth below. Any such notice, request, demand or other communication shall be considered given or delivered, as the case may be, on the date of receipt. Rejection or other refusal to accept or inability to deliver because of changed address of which proper notice was not given shall be deemed to be receipt of the notice, request, demand or other communication. By giving prior written notice thereof, any Party, from time to time, may change its address for notices hereunder. Legal counsel for the respective Parties may send to the other Party any notices, requests, demands or other communications required or permitted to be given hereunder by such Party:

If to the Lessee:
Jackson Hole Community Housing Trust
P.O. Box 4498
Jackson, Wyoming 83001
Facsimile: 307-739-0922

To Lessor at:
Town Attorney
Town of Jackson
P.O. Box 1687
Jackson, Wyoming 83001
Facsimile:

With a copy to:
Town Clerk
Town of Jackson
P.O. Box 1687
Jackson, Wyoming 83001
Facsimile: 307-739-0919

10.3 Non-Waiver of Breach. Neither the failure of the Lessor or the Lessee to insist

upon strict performance of any of the covenants and agreements of this Lease nor the failure by the Lessor or the Lessee to exercise any rights or remedies granted to such Party under the terms of this Lease shall be deemed a waiver or relinquishment (i) of any covenant contained in this Lease or of any of the rights or remedies of the Lessee or the Lessor under this Lease, or (ii) or the right in the future of the Lessor or the Lessee to insist upon and to enforce by any appropriate legal remedy a strict compliance with all of the covenants and conditions of this Lease.

10.4 Effective Date; Counterparts. This Lease shall be effective during the Lease Term. This Lease may be executed in counterparts, each of which shall be an original and all of which shall constitute the same instrument.

10.5 Lease Binding on Successors. This Lease and all of its provisions and attached Exhibits shall inure to the benefit of, and shall be binding upon, the Lessor, the Lessee, and their respective permitted successors and permitted assigns and, as provided in this Lease, Lenders of the Lessee.

10.6 Relationship of Parties. Nothing contained in this Lease shall be deemed or construed by the Parties or by any third party to create the relationship of principal or agent or of partnership, joint venture or association or of buyer and seller between the Lessor and the Lessee, it being expressly understood and agreed that neither the computation of any payments and other charges under the terms of this Lease nor any other provisions contained in this Lease, nor any act or acts of the Parties, shall be deemed to create any relationship between the Lessor and the Lessee other than the relationship of landlord and tenant.

10.7 No Merger. There shall be no merger of this Lease or any interest in this Lease nor of the leasehold estate created by this Lease, with the fee estate in the Property, by reason of the fact that this Lease or such interest in the Lease, or such leasehold estate may be directly or indirectly held by or for the account of any person who shall hold the fee estate in the Property, or any interest in such fee estate, nor shall there be such a merger by reason of the fact that all or any part of the leasehold estate created by this Lease may be conveyed or mortgaged in a leasehold mortgage to a leasehold mortgagee who shall hold the fee estate in the Property or any interest of the Lessor under this lease.

10.8 Gender and Number. Words of any gender used in this Lease shall be held to include any other gender, and any words in the singular number shall be held to include the plural (and vice versa), when the sense requires.

10.9 Titles. The titles and article or paragraph headings are inserted only for convenience, and are in no way to be construed as a part of this Lease or as a limitation on the scope of the particular provisions to which they refer.

10.10 Severability. If any provision of this Lease or the application of any provision to any person or circumstances shall be invalid or unenforceable to any extent, the remainder of this Lease, or the application of such provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected, and each provision of this Lease shall be valid and be enforced to the fullest extent permitted by law.

10.11 Applicable Law. This Lease shall be governed by and construed in accordance with the laws of the State of Wyoming.

10.12 Amendments. This Lease may not be amended or modified without the prior written consent of Lessor and Lessee. The Town Manager of the Town of Jackson, or his or her designee, shall have the authority on behalf of the Lessor to approve amendments to this Agreement.

10.13 No Mortgage Encumbrance by Lessor. Except as contemplated by Section 4.6, Lessor shall not mortgage its fee estate unless there exists an express subordination of any fee mortgage to Lessee's interest in the Lease. Lessee shall not be obligated to subordinate its leasehold

interest and any interests in subleases and subrents to a subsequent mortgage of the fee estate granted by Lessor.

10.14 GOVERNMENTAL IMMUNITY. Lessor does not waive its governmental immunity by entering into this Ground Lease and specifically retains immunity and defenses available to it as a governmental entity pursuant to Wyo. Stat. Ann. §1-39-101, *et seq.,* and all other state law.

ARTICLE 11. LENDER PROTECTIONS AND OBLIGATIONS

11.1 Rights and Obligations of Lenders. If Lessee obtains a Leasehold Mortgage in accordance with the provisions of Article 4, as long as any such Leasehold Mortgage shall remain unsatisfied of record, the following provisions shall apply:

(a) No Cancellation. Lessor will not cancel, accept a surrender of, terminate or modify this Lease in the absence of a default by Lessee without the prior consent in writing of the Lender and until Lessor has complied with the provisions of this Article as to the Lender's rights to cure and obtain a new lease.

(b) Notice of Defaults to Lender. Lessor agrees to give to each Lender a written copy of all notices of default that Lessor gives to Lessee; provided, however, that the failure to give notice to Lender will not invalidate or otherwise affect the notice given to Lessee. Such copy shall be mailed or delivered to any Lender at, or as near as possible to, the same time such notices are given to Lessee. Upon the execution of any Leasehold Mortgage, Lessor shall be informed in writing of the vesting of the security interest evidenced by the Leasehold Mortgage and of the address to which all notices to the Lender are to be sent. Any notices of default given by Lessor under the Lease shall describe the default(s) with reasonable detail. Each Lender shall have the right to cure any breach or default within the time periods given below.

(c) Lender's Cure Rights.

(i) Notice and Cure. After receipt by Lessee of a notice of default under the Lease and the expiration of any applicable period of cure given to Lessee under the Lease, Lessor shall not terminate the Lease or exercise its other remedies under the Lease if:

1. Within sixty (60) days after Lender's receipt of the notice of default, any Lender (i) cures the default, or (ii) if the default reasonably requires more than sixty (60) days to cure, commences to cure said default within such sixty (60) day period and thereafter diligently prosecutes the same to completion; or

2. Where the default cannot be cured by payment or expenditure of money or without possession of the Property or otherwise, Lender initiates foreclosure or other appropriate proceedings (after Lender complies with its obligations set forth in Section 11.2 below) within sixty (60) days after receipt of the notice of default, thereafter cures all other defaults reasonably capable of cure by the payment of money to Lessor, and thereafter continues to pay all rents, real property taxes and assessments, and insurance premiums to be paid by Lessee under the Lease. Lender shall then have sixty (60) days following the later to occur of (i) the date of execution and delivery of a New Lease of the Property pursuant to Section 11.1(d) of the Lease, or (ii) the date on which Lender or its nominee is able to occupy the Property following foreclosure under such Leasehold Mortgage and the eviction of or vacating by Lessee of the leased premises, to cure such default; provided, however, that if any such default, by its nature, is such that it cannot practicably be cured within sixty (60) days, then Lender shall have such additional time as shall be reasonably necessary to cure the default provided that Lender commences such cure within such sixty (60)-day period and thereafter diligently prosecutes the cure to completion.

(ii) Lessor agrees to accept performance by Lender of all cures, conditions and covenants as though performed by Lessee, and agrees to permit Lender access to the Property

to take all such actions as may be necessary or useful to perform any condition or covenants of the Lease or to cure any default of Lessee. Lender shall not be required to perform any act or cure any default which is not reasonably susceptible to performance or cure by Lender.

(iii) If Lender elects any of the above-mentioned options after complying with the obligations of Lender set forth in Section 11.2 below, then upon Lender's acquisition of the Lease by foreclosure, whether by power of sale or otherwise or by deed or assignment in lieu of foreclosure, or if a receiver be appointed, the Lease shall continue in full force and effect subject to Section11.5. If Lender proceeds as provided in Section 11.1(c)(i)(2) above, then upon Lender's acquisition of the Lease, Lender shall cure all prior defaults of Lessee under the Lease that are reasonably capable of being cured by Lender within the time set forth in said Section, Lessor shall treat Lender as Lessee under the Lease. If Lender commences an action as set forth in Section 11.1(c)(i)(2) above, and thereafter Lessee cures such defaults (which cure Lessor shall be obligated to accept) and Lender then terminates all proceedings under the option in said Section, then the Lease shall remain in full force and effect between Lessor and Lessee and all of the covenants, agreements, conditions, provisions, restrictions and limitations contained in Section 2.4 of this Lease shall survive.

(d) New Lease. In the event the Lease is terminated for any reason, excepting pursuant to Section 2.4(g), prior to the end of the Lease Term, Lessor shall promptly give Lender written notice of such termination and shall enter into a new lease ("New Lease") with Lender or Lender's nominee covering the Property, provided that Lender (a) requests such New Lease by written notice to Lessor within sixty (60) days after Lender's receipt of written notice by Lessor of termination of the Lease, and (b) cures all prior defaults of Lessee that are reasonably capable of being cured by Lender. The New Lease shall be for the remainder of the Lease Term, effective at the date of such termination, subject to Section 11.5. In connection with a New Lease, Lessor shall assign to Lender or its nominee all of Lessor's interest in all existing subleases of all or any part of the Property and all attornments given by the sublessees. Lessor shall not terminate or agree to terminate any sublease or enter into any new lease or sublease for all or any portion of the Property without Lender's prior written consent, unless Lender fails to deliver its request for a New Lease under this Section. In connection with any such New Lease, Lessor shall, by grant deed, convey to Lender or its nominee title to the Improvements, if any, which become vested in Lessor as a result of termination of the Lease.

(e) Permitted Delays. So long as Lender is prevented by any process or injunction issued by any court or by any statutory stay, or by reason of any action by any court having jurisdiction of any bankruptcy or insolvency proceeding involving Lessee or any other person, from commencing or prosecuting foreclosure or other appropriate proceedings in the nature thereof, provided that Lender uses reasonable efforts to contest and appeal the issuance or continuance of any such process, stay or injunction, the time periods specified in Sections 11.1(c)(i)(1) and (2) above shall be extended for the period of such prohibition; provided that Lender shall have fully cured any default in the payment of any monetary obligations of Lessee under this Lease and shall continue to pay currently such monetary obligations as and when the same fall due.

(f) Anything herein contained to the contrary notwithstanding, the provisions of this Section shall inure only to the benefit of the holders of the Leasehold Mortgage. If the holders of more than one such Leasehold Mortgage shall make written requests upon Lessor in accordance with this Lease, the New Lease (as provided for in Section 13.1(d) above) shall be entered into pursuant to the request of the holder whose Leasehold Mortgage shall be prior in lien thereto and thereupon the written requests for a New Lease of each holder of a Leasehold Mortgage junior in lien shall be and be deemed to be void and of no force or effect.

11.2 Lender Obligation to Provide Notice of Default and Right to Cure Default of Leasehold Mortgage; Lessor's Forbearance.

(a) Notice of Default; Right to Cure. If a Lender sends notice of default of a Leasehold Mortgage to the Lessee because the Lessee has failed to comply with the terms of the Leasehold Mortgage, the Lender shall, at the same time, send a copy of that notice to the Lessor. Upon receiving a copy of the notice of default and within that period of time in which the Lessee has a right to cure such

default, the Lessor shall have the right to cure the default on the Lessee's behalf, provided that all current payments due the Lender since the notice of default was given are made to the Lender. If after the cure period has expired, the Lender intends to accelerate the note secured by the Leasehold Mortgage or begin foreclosure proceedings under the Leasehold Mortgage, the Lender shall first notify the Lessor of its intention to do so, and Lessor shall then have the right, upon notifying the Lender within thirty (30) days of receipt of such notice, to acquire the Leasehold Mortgage by paying off the debt secured by the Leasehold Mortgage. If the Lender acquires the leasehold interest and Improvements through foreclosure or acceptance of a deed in lieu of foreclosure (in which event the Lease shall continue in full force and effect and Lessor shall treat the Lender as Lessee subject to Section 11.5), the Lender shall give Lessor written notice of such acquisition and Lessor shall then have an option to purchase the leasehold interest and Improvements from the Lender for the full amount owing to the Lender under the Leasehold Mortgage. Lender shall not be required to complete any or all Improvements prior to exercising its right to accelerate indebtedness or foreclose pursuant to this Article 11. To exercise this option to purchase, Lessor must give written notice to the Lender of its intent to purchase the foregoing within thirty (30) days following Lessor's receipt of the Lender's notice. Lessor must then complete the purchase within sixty (60) days of having given written notice of its intent to purchase. If Lessor does not complete the purchase within this sixty (60) day period, the Lender shall be free to sell the leasehold interest and Residential Units to any person or entity.

(b) Lender's Transferees. Etc. In the event the leasehold estate hereunder shall be acquired by foreclosure, trustee's sale or deed or assignment in lieu of foreclosure of a Leasehold Mortgage, the purchaser at such sale or the transferee by such assignment and its successors as holders of the leasehold estate hereunder shall not be liable for any Rent, if any, or other obligations accruing after its or their subsequent sale or transfer of such leasehold estate and such purchaser or transferee and its successors shall be entitled to transfer such estate or interest without consent or approval of Lessor; provided that, the purchaser or transferee or successor as holder of the leasehold estate hereunder shall be liable for the payment of all Rent, if any, becoming due with respect to the period during which such purchaser, transferee or other successor is the holder of the leasehold estate hereunder. This Section shall also apply to the rights of a Lender in connection with the entry into a New Lease under Section 11.1(d) and to the appointment of a receiver on behalf of a Lender.

(c) Insurance and Condemnation. In the event of any casualty to, or condemnation of, all or any part of the leased premises or any improvements now or hereafter located thereon, the provisions of the Leasehold Mortgages, relating thereto shall prevail over any provisions of this Lease relating thereto.

11.3 No Liability of Lender for Prior Indemnified Acts. A Lender shall not be obligated to assume the liability of Lessee for any indemnities arising for a period prior to Lender's acquiring the right to possession of the Property under this Lease.

11.4 Further Amendments: Estoppels. Lessor and Lessee shall cooperate in including in the Lease by suitable amendment from time to time any provision which may be reasonably requested by any proposed Lender for the purpose of implementing the mortgagee protection provisions contained in this Lease. Lessor and Lessee each agree to execute and deliver (and to acknowledge for recording purposes, if necessary) any agreement required to affect any such amendment. At the request of Lessee or any proposed or existing Lender, Lessor shall promptly execute and deliver (i) any documents or instruments reasonably requested to evidence, acknowledge and/or perfect the rights of Lenders as herein provided; and (ii) an estoppel certificate certifying the status of this Lease and Lessee's interest herein and such matters as are reasonably requested by Lessee or such Lenders. Any such estoppel certificate may be conclusively relied upon by any proposed or existing leasehold Lender or assignee of Lessee's interest in this Lease.

11.5 Survival of Provisions in Section 2.4. In the event of Lender's acquisition of the Lease by foreclosure, or if a receiver be appointed, pursuant to Section 11.1(c)(iii) or Section11.2(a), or a New Lease is entered into pursuant to Section 11.1(d), the Lease shall continue in full force and effect except that covenants, conditions and restrictions in Sections 2.4(b), 2.4(c), 2.4(e), 2.4(i) and 2.4(j) shall be deleted and the obligations to provide and record the Homebuyer Special Restriction and the Right of First Purchase Agreement shall be deleted from Sections 2.4(d) and 2.4(h).

ARTICLE 12. - FORCE MAJEURE

12.1 Any prevention, delay, nonperformance or stoppage by Lessee due to any of the following causes shall be excused: any regulation, order, act, restriction or requirement or limitation imposed by any federal, state, municipal or foreign government or any department or agency thereof, or civil or military authority; acts of God; acts or omissions of Lessor or its agents or employees; fire, explosion or floods; strikes, walkouts or inability to obtain materials; war, riots, sabotage or civil insurrection; or any other causes beyond the reasonable control of Lessee.

12.2 No prevention, delay, or stoppage of performance shall be excused unless Lessee notifies Lessor within ninety (90) days of such prevention, delay or stoppage that it is claiming excuse of its obligations under this Article 12.

IN WITNESS WHEREOF, the Parties have executed this Lease as of the date first written above.

LESSEE:

Jackson Hole Community Housing Trust, a Wyoming nonprofit corporation

By: Dale Hoyt
Title: Secretary

By: Lynne Wagner
Title: President

STATE OF WYOMING)
) ss.
COUNTY OF TETON)

The foregoing instrument was acknowledged before me by Dale Hoyt and Lynne Wagner, as Officers of the Jackson Hole Community Housing Trust, a Wyoming nonprofit corporation, this 8th day of January, 20 20.

WITNESS my hand and official seal.

Stefani Ewert
Notary Public

My commission expires:

STEFANI J. EWERT - NOTARY PUBLIC
COUNTY OF TETON
STATE OF WYOMING
MY COMMISSION EXPIRES February 23, 2023

LESSOR:

TOWN OF JACKSON

Approved as to form: _____
Lea Colasuonno, Town Attorney

The foregoing Agreement is hereby accepted by the Town of Jackson this 9th day of January, 2020.

BY: _____
PETE MULDOON, Mayor

ATTEST:

BY: _____
Sandra P. Birdyshaw, Town Clerk

THE TOWN OF JACKSON INCORPORATED ★ SEAL ★ 1914 TETON COUNTY, WYOMING

State of Wyoming)
) ss.
County of Teton)

The foregoing instrument was acknowledged before me by PETE MULDOON, SANDRA P. BIRDYSHAW, and LEA COLASUONNO , as Mayor, Town Clerk and Town Attorney, respectively, of the Town of Jackson this 9th day of January, 2020.

Witness my hand and official seal.

_____
Notary Public

My Commission Expires: 4.8.2020

TIFFANY STOLTE – NOTARY PUBLIC
COUNTY OF TETON STATE OF WYOMING
My Commission Expires April 08, 2020

Exhibit A
Legal Description of the Property

(see attached deed)

EXHIBIT "A"
LEGAL DESCRIPTION

A tract of land located in the SW¼SW¼, Section 27, T41N, R116W, 6th P.M., Teton County, Wyoming, described as follows:

Beginning at a point which lies East 50.0 feet and North 60.0 feet from the NW corner and corner number 2 of the Van Vleck Second Subdivision to the Town of Jackson, Wyoming;

thence East, 125.0 feet to corner number 2;
thence North, 115.0 feet to corner number 3;
thence West, 125.0 feet to corner number 4;
thence South, 115.0 feet to corner number 1 and the Point of Beginning.

AND

A tract of land located in the SW¼SW¼, Section 27, T41N, R116W, 6th P.M., Teton County, Wyoming, described as follows:

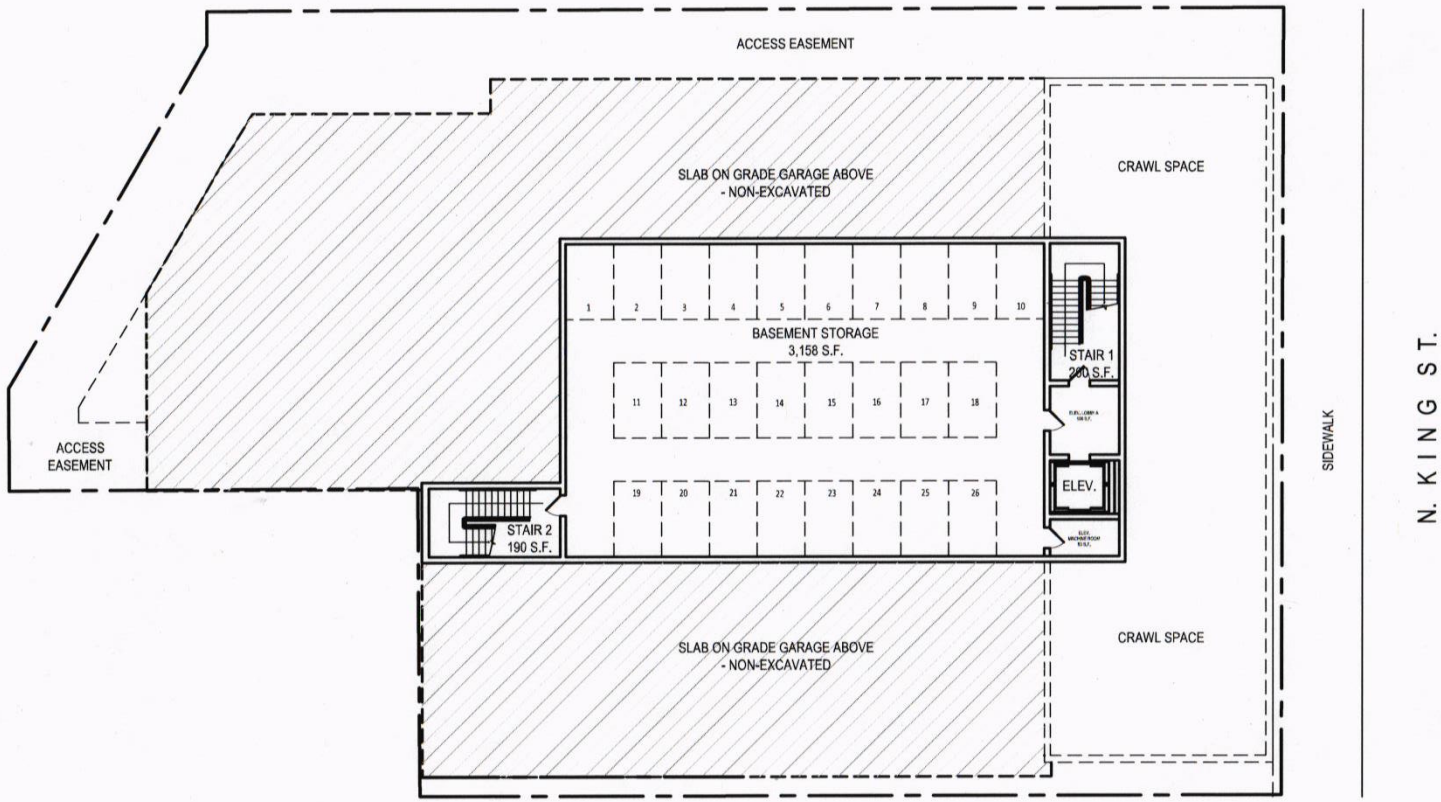
Beginning at the Northeast Corner of Lot 5, Block 3 of the Clubhouse Addition to the Town of Jackson;
thence East, 60 feet to Corner No. 2;
thence North, 70 feet to Corner No. 3;
thence West, 30 feet to Corner No. 4;
thence South, 5 feet to Corner No. 5;
thence S 30°58'W, 58.31 feet to Corner No. 6;
thence South, 15 feet to Corner No. 1 and the Point of Beginning.

PIDN: 22-41-16-27-3-00-021

Exhibit B

(see attached)

CAFE JACKSON
74



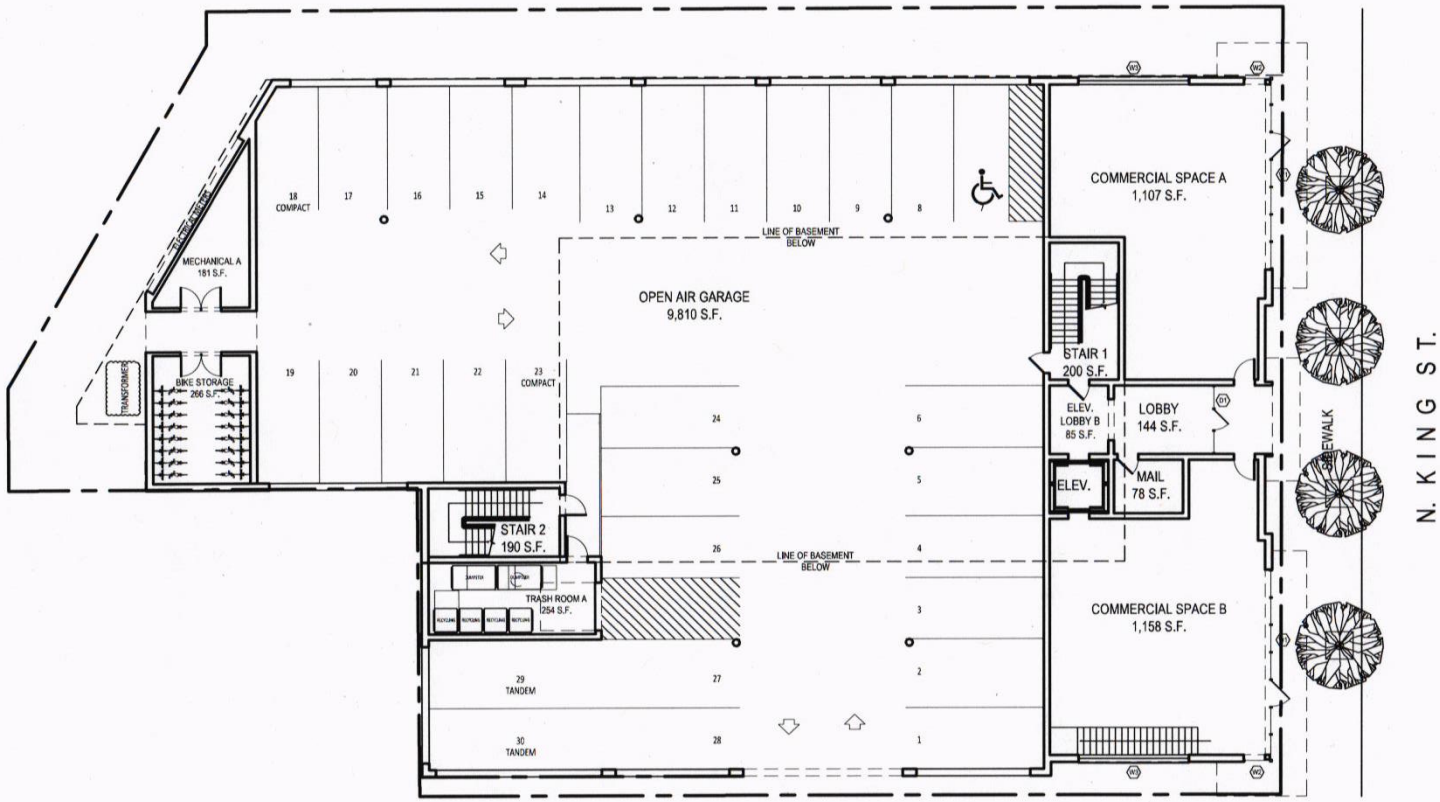
174 N. KING STREET CONCEPT PLAN STUDIES

CONCEPT PLAN - LOWER FLOOR LEVEL

NOVEMBER 06, 2019

SCALE : 1/16" = 1'-0"

NORTHWORKS



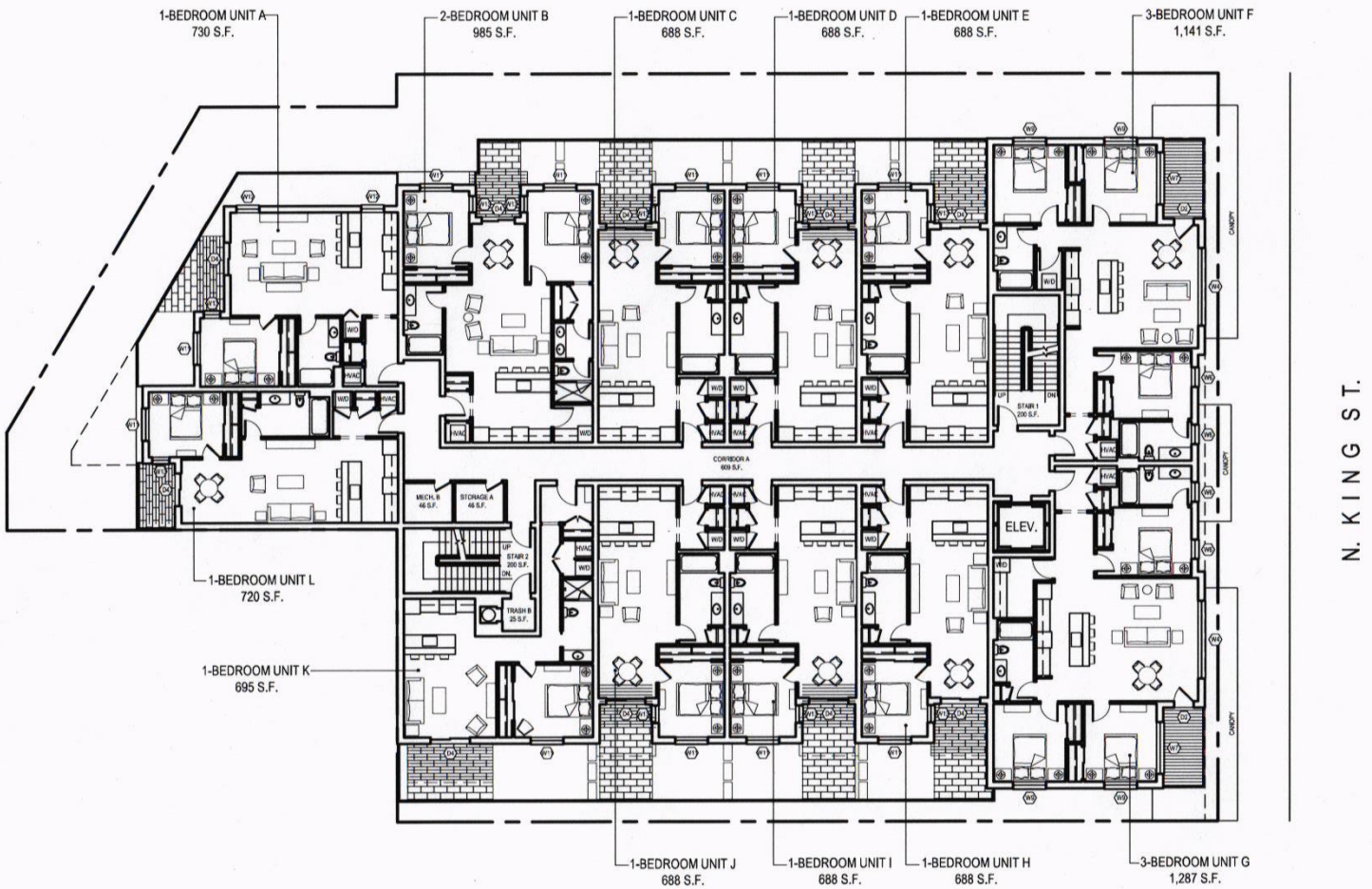
174 N. KING STREET CONCEPT PLAN STUDIES

CONCEPT PLAN - 1ST FLOOR LEVEL

NOVEMBER 06, 2019

SCALE : 1/16" = 1'-0"

NORTHWORKS



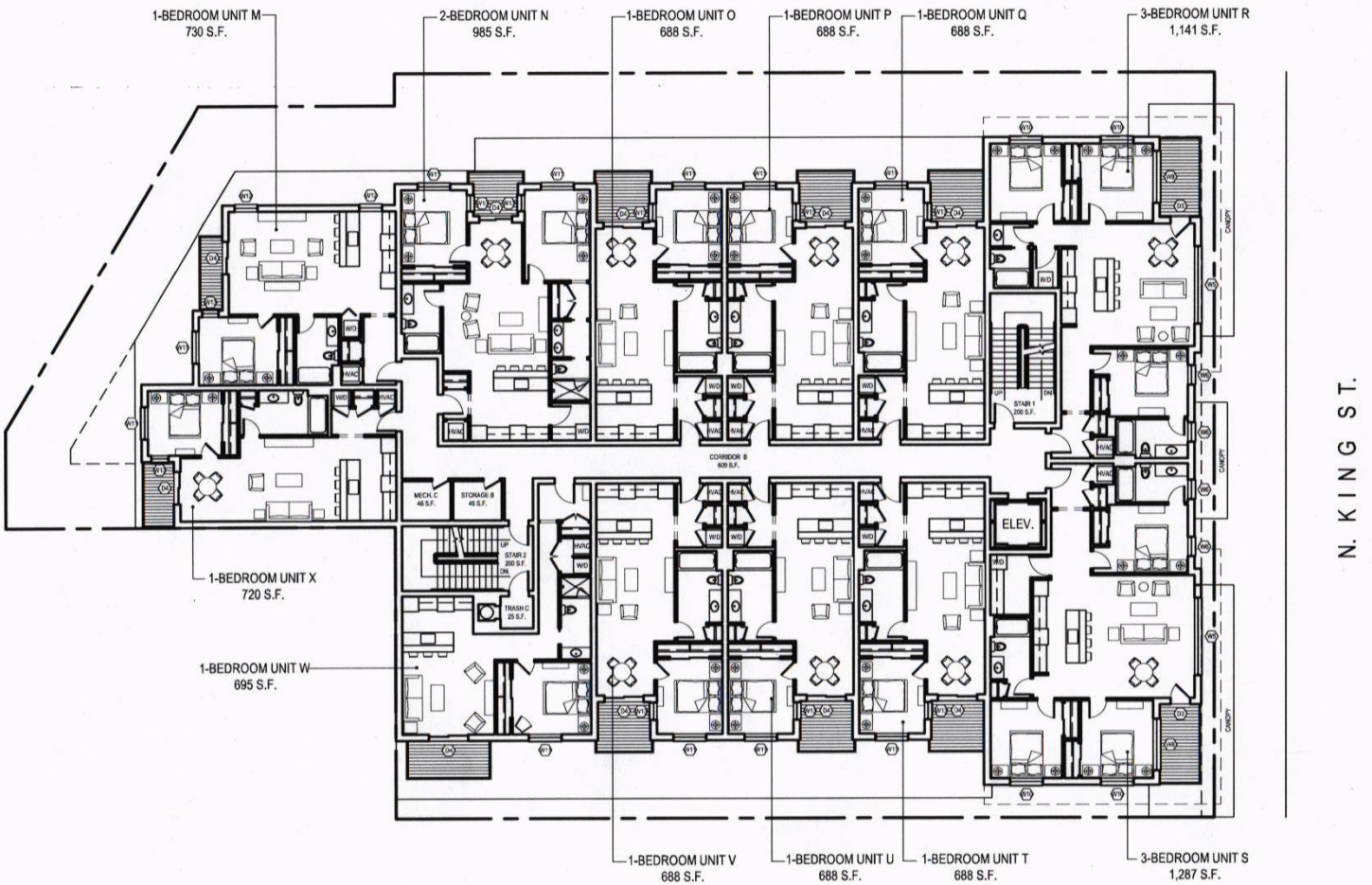
174 N. KING STREET CONCEPT PLAN STUDIES

CONCEPT PLAN - 2ND FLOOR LEVEL

NOVEMBER 06, 2019

SCALE : 1/16" = 1'-0"

NORTHWORKS



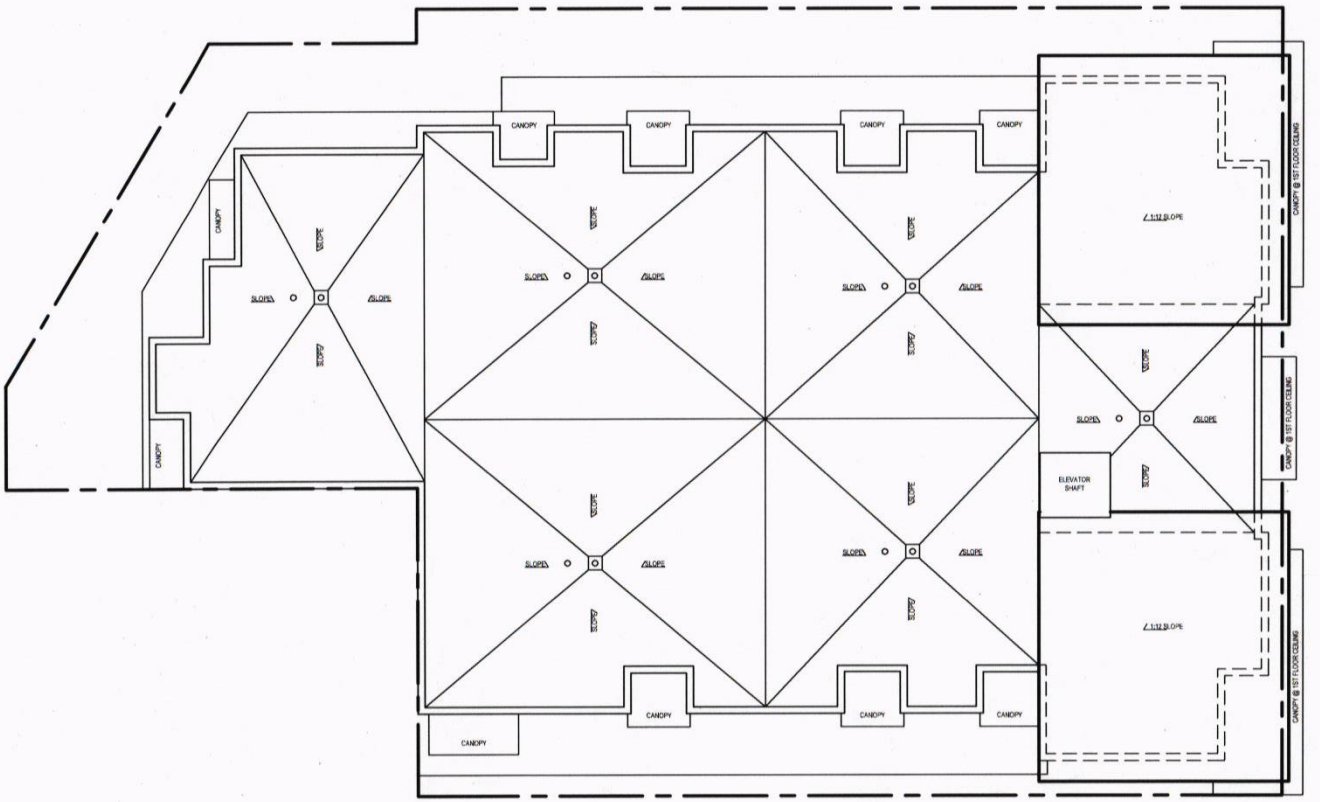
174 N. KING STREET CONCEPT PLAN STUDIES

CONCEPT PLAN - 3RD FLOOR LEVEL

NOVEMBER 06, 2019

SCALE : 1/16" = 1'-0"

NORTHWORKS



174 N. KING STREET CONCEPT PLAN STUDIES

CONCEPT PLAN - ROOF PLAN

NOVEMBER 06, 2019

SCALE : 1/16" = 1'-0"

NORTHWORKS

Exhibit C
King Street Condominium Employee Right of Purchase Agreement

(see attached)

EMPLOYEE RIGHT OF PURCHASE AGREEMENT
King Street Condominiums

THIS EMPLOYEE RIGHT OF PURCHASE AGREEMENT (this "Agreement") is dated this _____ day of _____, 20__ by the Jackson Hole Community Housing Trust, a Wyoming nonprofit corporation (the "Housing Trust") and the Town of Jackson, a Wyoming municipal corporation (the "Town"). The Housing Trust and the Town are collectively referred to herein as the "parties" and singularly as a "party."

RECITALS

WHEREAS, the Housing Trust is a 501(c)3 tax exempt organization organized exclusively for charitable purposes including, but not limited to, the provision of affordable housing in Jackson, Wyoming and lessening the burden of government;

WHEREAS, the Housing Trust is the owner of that certain real property known as the King Street Condominiums Addition, according to that final plat recorded in the Office of the Teton County Clerk on the same date hereof (the "Property");

WHEREAS, the Town has determined that assisting its employees to obtain stable, affordable housing opportunities is a growing burden of the Town and part of its governmental function and that there is a strong need for such assistance of the Housing Trust in meeting such need;

WHEREAS, in consideration of the Town's contributions to the development of the Properties as further detailed in Ground Lease between the Housing Trust and the Town dated _____, 2019, the Housing Trust desires to convey to the Town five (5) revolving rights of purchase for qualified Town employees to purchase a residential condominium unit at the Property (the "Residential Unit"), subject to the terms and conditions of this Agreement (and not as an investment).

NOW THEREFORE, in consideration of the foregoing recitals, the parties hereto agree as follows:

AGREEMENT

1. **EMPLOYEE RIGHTS OF PURCHASE.** The Housing Trust hereby grants to the Town five (5) revolving rights of first purchase, each and all of which are superior to any other revolving rights of purchase in existence now or in the future, for an Employee to purchase a Residential Unit, subject to the terms and conditions of this Agreement (each an "EROP" and collectively, the "EROPs"). For purposes of this Agreement, "Employee" shall be defined as an individual that meets the applicable requirements for qualification by the Town and by the Housing Trust, provided that an Employee of the Town does not need to comply with any income or assets qualifications of the Housing Trust.

A. **First Purchase Terms.** On the same date hereof, the Housing Trust recorded a Homebuyer Special Restriction against each Residential Unit in the Office of the Clerk of Teton County, Wyoming that memorializes of record those covenants

and restrictions that will affect each Residential Unit (the "Special Restriction"). Each of the Special Restrictions includes the following retained property rights: (i) an option for the Housing Trust to purchase each Residential Unit, and (ii) a right of first refusal in lieu of an option for the Housing Trust to purchase each Residential Unit. Such option and right of first refusal are triggered by several events, including but not limited to, the delivery of notice to the Housing Trust of a current owner's desire to sell its Residential Unit (each, a "Re-Purchase Event"). At such time that a Re-Purchase Event occurs whereupon the Housing Trust's rights and options to purchase a Residential Unit is triggered, and if there is an available EROP, the following requirements shall apply and the parties hereto agree as follows:

(i) the Housing Trust shall deliver notice to the Town of the Re-Purchase Event (the "EROP Notice"). Upon delivery of the EROP Notice, the Town shall have ten (10) days after receipt of the EROP Notice to either notify the Housing Trust in writing that the Town is waiving the applicable EROP with respect to the subject Residential Unit or that the Town has an Employee interested in looking at the subject Residential Unit. If the latter, the interested Employee shall have another ten (10) days to determine if it would like to purchase the Residential Unit and sign a binding purchase contract (the "Exclusive Purchase Option Period"). Prior to the expiration of the Exclusive Purchase Option Period, the Town must notify the Housing Trust in writing that the Town is either waiving the applicable EROP with respect to the Residential Unit or that the Town is exercising the applicable EROP for the Employee to purchase the subject Residential Unit.

(ii) If the Town exercises its EROP for an Employee to purchase the Residential Unit, such purchase shall be completed by the Employee pursuant to Section 3 of this Agreement and the terms and conditions set forth in the Special Restriction.

B. **Waiver; EROP Reviving Event.** If the Town does not send notice to the Housing Trust either within ten (10) days of receipt of the EROP Notice or if the Town waives the applicable EROP or if the Employee does not complete the purchase of the Residential Unit pursuant to Section 3 after being provided notice and the expiration of any applicable cure period set forth in an executed purchase contract, then the Housing Trust shall have the automatic right to facilitate the purchase of the subject Residential Unit to another qualified buyer and each party hereto shall have no further rights or obligations to the other party with respect to the subject Residential Unit. Thereafter, the Town will have an EROP on the next available Residential Unit until the Town exercises the applicable EROP and an Employee purchases a Residential Unit as a result thereof. After the Town exercises the applicable EROP and an Employee purchases a Residential Unit as a result thereof, the applicable EROP shall be stayed until the earlier to occur of the following events (each an "EROP Reviving Event"): (i) the Town notifies the Housing Trust that the Employee that owns the Residential Unit that was purchased as a result of the Town exercising the applicable EROP is no longer employed by the Town; or (ii) the Employee that owns the Residential Unit that

was purchased as a result of the Town exercising the applicable EROP sells such King Street Residential Unit.

2. **AFFIDAVITS.** The parties hereto agree to execute and record an affidavit in the Office of the Clerk of Teton County, Wyoming upon the occurrence of the following events for the purpose of providing clarity to the public and to the parties hereto as to the status of each revolving EROP granted herein:

A. Upon the occurrence of the Town of Jackson waiving an EROP, either by sending a notice of waiver to the Housing Trust within ten (10) days of receipt of the EROP Notice or by not sending notice to the Housing Trust after receipt of the EROP Notice, to clarify that the EROP remains active;

B. Upon the occurrence of the purchase of a Residential Unit by an Employee to clarify that the applicable EROP is stayed until the occurrence of an EROP Reviving Event; and

C. Upon the occurrence of an EROP Reviving Event to clarify that such EROP is revived as an active EROP.

3. CLOSING PROCEDURES FOR EXERCISE OF EROP. The purchase of the Residential Unit by the Employee shall occur as follows:

A. The Employee shall complete the purchase in accordance with any Housing Trust Guidelines adopted by the Housing Trust, as amended.

B. For the resale of Residential Units, the Employee shall purchase the Residential Unit at the Transfer Price or at the Actual Purchase Option Price or the Maximum Resale Price, as applicable, as these terms are defined in the Special Restrictions for the subject Residential Unit, and all amendments thereto, and the closing shall be completed in accordance with any applicable timelines and procedures set forth in the Special Restrictions and any guidelines adopted by the Housing Trust and as amended from time to time.

4. ENTIRE AGREEMENT; MODIFICATION; MEMORANDUM. This Agreement embodies and constitutes the entire understanding between the parties with respect to the option and terms contemplated herein and all prior or contemporaneous agreements, understandings, representations, and statements, or written, are merged into this Agreement. Neither this Agreement nor any provision hereof may be waived, modified, amended, discharged, or terminated except by an instrument in writing signed by the party against whom the enforcement of such waiver, modification, amendment, discharge, or termination is sought, and then only to the extent set forth in such instrument. The parties hereto agree to execute a Memorandum of Agreement in the Office of the Clerk of Teton County, Wyoming contemporaneously upon the execution of this Agreement, which shall be recorded against each Residential Unit. Notwithstanding anything herein contained to the contrary, this Agreement shall automatically lapse and become void and of no force or effect in the event of a lawful foreclosure of the Property after the expiration of all applicable redemption periods.

5. **APPLICABLE LAW**. This Agreement shall be governed by, and construed in accordance with, the laws of the State of Wyoming. Time is of the essence of this Agreement.

6. **HEADINGS; BINDING EFFECT**. Descriptive headings are for convenience only and shall not control or affect the meaning or construction of any provision of this Agreement. This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their heirs, executors, administrators, successors and assigns, provided that no assignment shall be made except in accordance with the provisions hereof. In the event any option or right set forth herein shall be construed to be subject to any rule of law limiting the duration thereof, the parties hereto agree as follows: (i) the time period for the exercising of such option or right shall be construed to expire on the last day of the 99th year after the execution of this Agreement; and (ii) for and in consideration of One Hundred and No/100 ($100.00) to be paid upon the expiration of this Agreement by the Town to the Housing Trust, this Agreement shall be renewed and extended for one additional 99 year term.

7. **COUNTERPARTS**. This Agreement may be executed in any number of counterparts and each such counterpart hereof shall be deemed to be an original instrument, but all such counterparts together shall constitute but one Agreement.

8. **INTERPRETATION; SEVERABILITY; CONSTRUCTION**. Whenever the context hereof shall so require, the singular shall include the plural, the male gender shall include the female gender and the neuter, and vice versa. In case any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof, and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein. The parties acknowledge that the parties and their counsel have reviewed and revised this Agreement and that the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement or any amendments or exhibits hereto.

9. **ENFORCEMENT**. If any party hereto fails to perform any of its obligations under this Agreement or if a dispute arises concerning the meaning or interpretation of any provision of this Agreement, the party not prevailing in such dispute shall pay any and all costs and expenses incurred by the other party in enforcing or establishing its rights hereunder, including, without limitation, all court costs and all reasonable attorneys' fees.

10. **NOTICES**. Notices hereunder shall be given only by hand-delivery, certified letter, fax or telegram and shall be deemed given when received, if hand-delivered, or when the letter (sent certified mail, return receipt requested, addressed as set forth below) is deposited in the mail, or when transmission is confirmed, if by fax, or when filed with the telegraph company, if telegraphed, postage or charges prepaid. All notices required or permitted by any provision of this Agreement shall be directed as follows:

To Housing Trust at:

Jackson Hole Community Housing Trust
P.O. Box 4498
Jackson, Wyoming 83001
Facsimile: 307-739-0922

To Town at:	Town Attorney Town of Jackson P.O. Box 1687 Jackson, Wyoming 83001 Facsimile:
With a copy to:	Town Clerk Town of Jackson P.O. Box 1687 Jackson, Wyoming 83001 Facsimile: 307-739-0919

[Signature Page Follows]

DRAFT

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

HOUSING TRUST:

Jackson Hole Community Housing Trust,
a Wyoming nonprofit corporation

By:_____
Title:_____

STATE OF WYOMING)
) ss.
COUNTY OF TETON)

On this ___ day of _____, 20____, before me personally appeared _____, to me personally known, who, being by me duly sworn, did say that _____ is the _____ of Jackson Hole Community Housing Trust, a Wyoming nonprofit corporation, and that the foregoing instrument was signed on behalf of said corporation by authority of its Board of Directors as the free act and deed of the corporation.

WITNESS my hand and official seal.

_____
Notary Public

My commission expires:

TOWN:

Town of Jackson, Wyoming
a Wyoming municipal corporation

Approved as to form: _____
Town Attorney

The foregoing Agreement is hereby accepted by the Town of Jackson this ____

TOWN OF JACKSON

BY:_____
its Mayor

ATTEST:

BY:_____
its Town Clerk

State of Wyoming)
) ss.
County of Teton)

The foregoing instrument was acknowledged before me by Pete Muldoon and Sandy Birdyshaw, who are each personally known to me or has each established their identity and authority to me by reasonable proof, this day of _____, 2019.

Witness my hand and official seal.

_____
Notary Public

My Commission Expires:

DRAFT

Return to: 733-3932 x1113
Town of Jackson
Town Clerk - Sandy
PO Box 1687
Jackson WY 83001

Thanks!

TOWN OF JACKSON
TOWN COUNCIL
AGENDA DOCUMENTATION

PREPARATION DATE: February 13, 2020
MEETING DATE: February 18, 2020

SUBMITTING DEPARTMENT: Community Development
DEPARTMENT DIRECTOR: Tyler Sinclair
PRESENTER: Tyler Sinclair

SUBJECT: Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project - United States Forest Service – Town Comments

STATEMENT/PURPOSE

The purpose of this item is for Town Council to consider providing comments to the United States Forest Service related to the Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project.

There will be no public comment taken on this item. Members of the public wanting to provide comment should do so directly to the United States Forest Service during the 45 day comment period.

BACKGROUND/ALTERNATIVES

The Town of Jackson as a recognized Cooperating Agency has been part of the United States Forest Service (Forest Service) Review of the proposed Snow King Mountain Resort On-Mountain Improvements Project over the past 2 years. Most recently the Town submitted formal comments to the Forest Service during the scoping comment period in a letter dated October 1, 2018, see attached. The Forest Service has now released a Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project identifying and analyzing four alternatives. All four alternatives have been reviewed pursuant to the Federal Environmental Impact Statement guidelines, see attached. Staff notes that included in this document is both analysis of the proposed 4 alternatives but also explanation as to why certain alternatives raised during scoping were not included for consideration. This document is currently within a 45 day required public comment period which will end March 16, 2020. Staff has attached a Decision Process Flow Chart indicating the entire review process, where we are in it and next steps to be completed.

Staff requests that Council review the previous Town scoping comments and the draft EIS document to determine what comments individual members would like to provide at this time. Sean McGinness, Mountain Resorts Coordinator, for the Bridger-Teton and Caribou-Targhee National Forests will be available at the meeting to answer any questions Council may have. Town comments could be provided as list of all comments made by individual members with no consensus or by a vote of the Council summarizing Town comment.

STAKEHOLDER ANALYSIS

The stakeholders involved in this issue include Snow King Mountain Recreation, the Town of Jackson organization, all patrons and users of Snow King Mountain, and the community at large.

ATTACHMENTS

- Town of Jackson letter to the United States Forest Service, dated October 1, 2018
- Bridger-Teton National Forest Decision Process for the Snow King Mountain Resort On-Mountain Improvement Project
- Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project – Executive Summary
- Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project – Complete Report
    - https://www.fs.usda.gov/nfs/11558/www/nepa/109524_FSPLT3_5228500.pdf

FISCAL IMPACT

None

STAFF IMPACT

The staff impact has been moderate attending Cooperating Agency Meetings with the Forest Service and preparing Town Council reports and correspondence on this item.

LEGAL REVIEW

This item has not been provided to the Town Attorney for review.

RECOMMENDATION

The Community Development Director has not provided a recommendation on this item.

SUGGESTED MOTION

I move to direct staff to draft a letter to the United States Forest Service outlying comments provided by Council at this meeting for consideration at the March 2, 2020 Town Council meeting.

Synopsis for PowerPoint (120 words max):

Purpose:

Background:

Fiscal Impact:

October 1, 2018

United States Forest Service
Bridger-Teton National Forest
Patricia O'Connor, Forest Supervisor
Mary Moore, District Ranger
PO Box 1888
Jackson, WY 83001

RE: Town of Jackson Scoping Comments - Snow King Mountain Resort On-Mountain Improvements Project Proposal

Dear Ms. O'Connor and Ms. Moore,

Thank you for the opportunity to comment and for extending the scoping period comment deadline.

As the Forest Service begins its analysis of Snow King's proposed on-mountain improvements, we ask that you consider the Jackson-Teton County Comprehensive Plan, adopted in 2012 to balance development with environmental stewardship and community character. The vision statement is: "Preserve and protect the area's ecosystem in order to ensure a healthy environment, community and economy for current and future generations."

Regarding the proposed action, the Town of Jackson asks that the environmental analysis address impacts of each proposed element on wildlife and habitat and provide alternatives, particularly for the boundary expansions and facilities proposed on the summit. The Town's Comprehensive Plan is centered on providing balance between the three common values of Ecosystem Stewardship, Growth Management and Quality of Life. Specifically, our Comprehensive Plan lays out the following goals for Ecosystem Stewardship: maintain healthy populations of all native species, preserve and enhance water and air quality, maintain the scenic resources of the community, and protect and steward open space. Related to Growth Management and Quality of Life, the analysis of each element of the proposal should also address additional needs for parking and employee housing, as these will have impacts on the Town. The Town recommends that you provide a variety of alternatives that attempt to balance these Common Values as your review process moves forward.

Of further concern are the proposed access road across the north face of the mountain and the proposed gondola and zip line along the Exhibition run from the summit to base. Construction of the access road raises concerns about potential rock slides, landslides and avalanches, as well as visual impacts to the community. The proposed zip line may further erode community character, create parking challenges, impact Phil Baux Park and create noise impacts for neighbors. Furthermore, the town may not approve a landing site on town land at the base. For these proposed features, the Forest Service should include a range of alternatives, including using the existing access road on the south side of the mountain, a no-action alternative and other possible alignments. Also, the range of alternatives for development should include a net-zero increase of current resort boundary acreage. In addition, the Town asks the

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Forest to consider possible impacts and different alternatives for the proposed additional lighting for night skiing as this may impact the Town's dark sky goals and impact surrounding neighbors.

Additionally, the Town-commissioned Snow King Stakeholder's group identified the following list of interests that we think should be considered and balanced during the review of alternatives:

- Conservation of wildlife habitat and wildlands
- Economic viability of Snow King Mountain recreation and resort area
- Diversity of year-round recreational opportunities for diverse user groups
- Community accessibility and affordability
- Preservation of the cultural, environmental, and historical character of Jackson
- Prioritization of community safety
- Availability of high-quality facilities
- Minimized impacts to the surrounding areas.
- Consideration of impacts to infrastructure and services, both positive and negative
- Balanced impacts of development and tourism on the community, both positive and negative, that can serve as a model for others
- Consideration of community-wide educational opportunities
- Consideration for holding events
- Broadened appeal of the offerings and amenities at Snow King Mountain
- Clear and concise guiding documents to clarify rights, responsibilities, and accountability for all parties involved in the future of Snow King Mountain
- Maintained and enhanced world-class training and facilities
- Prioritization of environmental sustainability

Thank you and we look forward to working with the Forest Service on the next steps in the process.

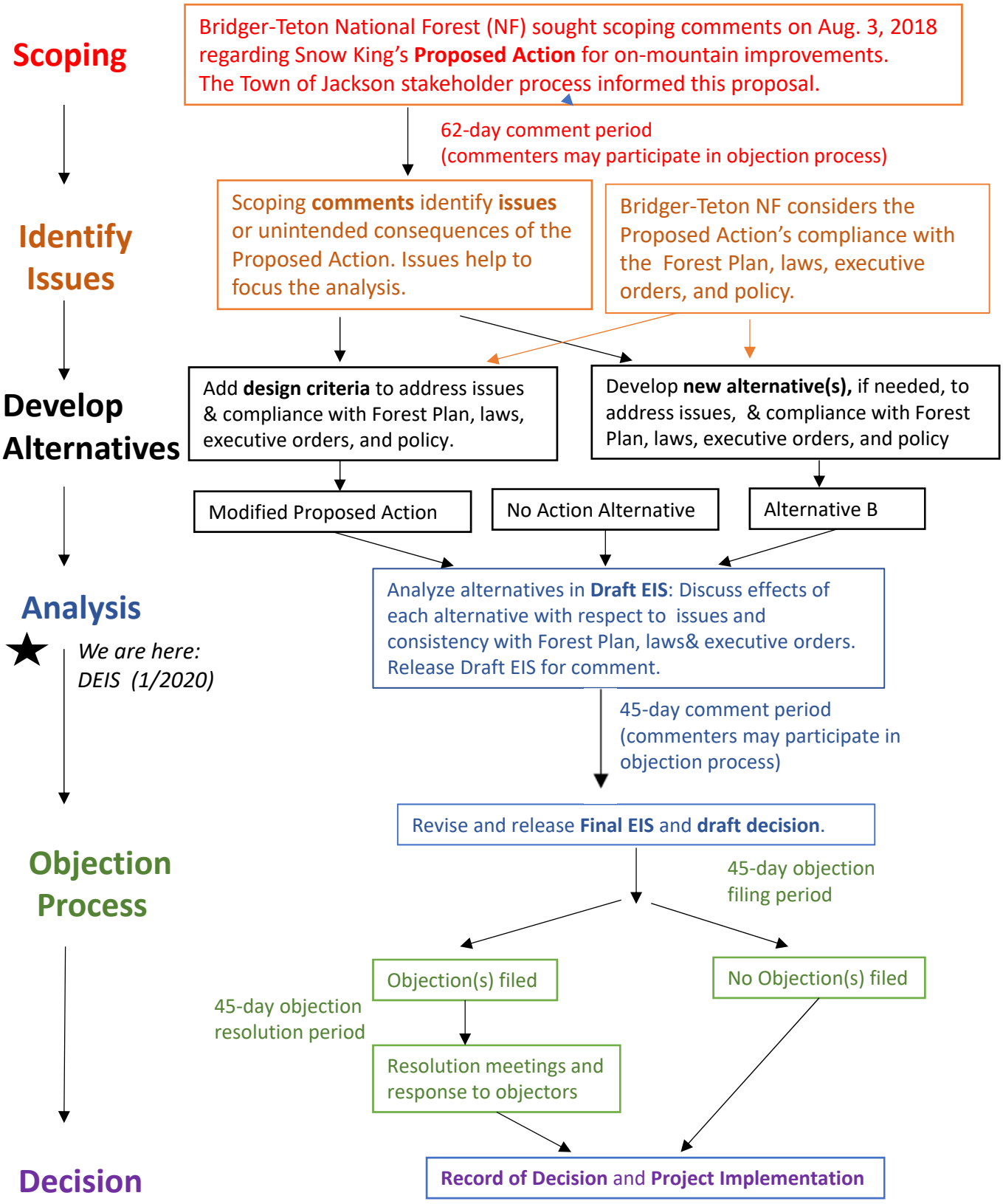
Sincerely,

Pete Muldoon
Mayor, Town of Jackson

Attest:
Sandra P. Birdyshaw, Town Clerk

THE TOWN OF JACKSON INCORPORATED ★ SEAL ★ 1914 TETON COUNTY, WYOMING

Bridger-Teton National Forest Decision Process for the Snow King Mountain Resort On-Mountain Improvement Project



Draft Environmental Impact Statement: Snow King Mountain Resort On-Mountain Improvements Project

Prepared by:
US Department of Agriculture – Forest Service
Bridger-Teton National Forest

With the assistance of:
Cirrus Ecological Solutions, LC
Logan, UT

January 2020

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To file a complaint, write the Secretary of Agriculture, US Department of Agriculture, Washington, D.C. 20250 or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal opportunity employer.

SNOW KING MOUNTAIN RESORT
ON-MOUNTAIN IMPROVEMENTS PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT

JACKSON, WYOMING

Lead Agency:	USDA Forest Service
Responsible Official:	Patricia O'Connor, Forest Supervisor Bridger-Teton National Forest 340 N. Cache / P.O. Box 1888 Jackson, WY 83001
Information Contact:	Sean McGinness, Mountain Resorts Coordinator Bridger-Teton National Forest 340 N. Cache / P.O. Box 1888 Jackson, WY 83001 (307) 739-5415

Abstract: The Jackson Ranger District, Bridger-Teton National Forest, proposes to authorize Snow King Mountain Resort, which operates under Forest Service special use permit, to implement the first phase of the ski area's accepted master development plan. Elements of the project are intended to maintain and improve the winter-sports infrastructure on National Forest System lands at Snow King, provide new and innovative forms of year-round outdoor recreation for residents and visitors to Jackson Hole, and capitalize on the partnership between the Bridger-Teton and Snow King to connect visitors with the natural environment and support the quality of life and the economy of the local community.

Four alternatives including the required no-action alternative, the proposed action, and two action alternatives, were developed and analyzed to provide a range of options for development at the ski area. No preferred alternative has been identified.

Public Notice and Comment: The Bridger-Teton National Forest is providing those interested in or affected by the actions analyzed and documented in this Draft EIS an opportunity to make their concerns known. This project is subject to the Forest Service's project-level pre-decision administrative review process pursuant to 36 CFR 218, Subparts A and B. Only those individuals or organizations who submitted timely specific written comments during a public comment period are eligible to file an objection.

How to Comment and Timeframe: Comments should be in writing and should be specific to the proposed action, describing as clearly and completely as possible any issues or concerns the commenter has with the proposal.

Comments will be accepted for 45 days following the date of publication of Notice of Availability (NOA) of this Draft EIS in the Federal Register. Electronic comments are encouraged. Submit electronic comments at https://cara.ecosystem-management.org/Public//CommentInput?Project=54201. Mail written comments to Derek Ibarguen, Acting Forest Supervisor, Bridger-Teton National Forest – Jackson Ranger District, P.O. Box 1888, Jackson, WY 83001. Please write "Snow King On-Mountain Improvements EIS" on the envelope. Comments may be faxed to 307-739-5010 or hand-delivered to 340 N. Cache St. between 8:00 AM and 4:30 PM, Monday through Friday, excluding holidays. Comments received, including the names and addresses of those who comment, will become part of the public record for this EIS and will be available for public inspection.

Information about this EIS will be posted on the internet, under the "Analysis" tab, at:

http://www.fs.usda.gov/project/?project=54201

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EXECUTIVE SUMMARY

INTRODUCTION

On June 5, 2018, the Bridger-Teton National Forest (Bridger-Teton) received a proposal from Snow King Mountain Resort (Snow King), requesting authorization to implement Phase 1 of improvements included in their 2017 master development plan (MDP). The MDP analyzes current conditions at the resort and, based on that analysis, outlines anticipated development and management of the resort over the next 10 years. The MDP is intended to enhance the year-round recreational opportunities available at the resort and on the Bridger-Teton. It is the result of a collaborative, multi-year process involving input from Snow King, the Bridger-Teton, the Town of Jackson, Teton County, the Snow King Mountain Stakeholder Group, and members of the public (see Chapter 5, Consultation and Coordination).

Snow King is located in the Gros Ventre mountain range adjacent to Jackson, Wyoming (Figure 1-1), in Teton County, T41N, R116W, Sections 33 and 34, and T40N R116W, Sections 3 and 4. The operational ski area is approximately two-thirds on National Forest System land and one-third on Town of Jackson land or private property.

The resort operates under a special use permit (permit) issued by the USDA Forest Service (Forest Service) and administered by the Bridger-Teton. The *Bridger-Teton National Forest Land and Resource Management Plan*, as amended (hereafter referred to as the Forest Plan; Forest Service 1990), provides primary guidance for management of Bridger-Teton resources, including those within the ski area.

PROPOSED ACTION

The proposed action includes the following elements:

<u>Permit Boundary Adjustment</u>

- A 67-acre permit boundary adjustment on the front side, east of the existing permit area, to accommodate part of a summit access road/novice skiway, intermediate-level terrain lower on the slope (including groomed runs and tree and glade skiing), and a novice route down from Rafferty lift (via the access road/novice skiway).
- A 89-acre permit boundary adjustment on the front side west of the existing permit area to accommodate a summit teaching center, another part of the summit access road/novice skiway, and expert-level tree and glade skiing.

<u>Terrain Development</u>

- A new ski school/teaching center with beginner and novice terrain on the ridgeline west of the Snow King summit.
- New ski runs on both the front and back side and adjustments to some existing runs totaling 117.8 acres of new terrain. Includes runs 3–14, 16–25, Lift B and C terrain, and modifications of Moose, Belly Roll, Upper Exhibition, and Bearcat.
- Gladed ski terrain and forest health maintenance totaling about 35 acres.

<u>Summit Access Road/Novice Skiway</u>

- A new roughly 2-mile access road to the top of the summit gondola that would also serve as a novice skiway.

<u>Lifts</u>

- A new gondola replacing the aging Summit lift.
- A new back-side chairlift.

- Two teaching center conveyor lifts.
- A new surface tow on the back side bringing skiers to the summit.

Facilities

- Summit restaurant/guest services building and ski patrol facility, 20,000–25,000 square-feet. Construction would require removal of the existing Panorama House and the unloading dock of the original Summit lift.
- A 500-square-foot observatory near the summit.
- A temporary ski patrol building at the top of Cougar.
- A year-round yurt camp at the southern point of the permit area, with nine yurts 20-30 feet in diameter and a 1-mile ADA-compliant access trail from the summit.
- A small, open-air wedding venue west of the summit building.

Night Skiing

- 27.3 acres of expanded lighting for night skiing.

Snowmaking Coverage

- 147.1 acres of added snowmaking (with few exceptions, all existing and proposed runs).

Summer Activities

- A 3,900-linear-foot zip line from the summit to the west base area, paralleling the Summit lift.
- About 6.5 miles of front-side mountain bike trails and a 110-acre back-side mountain bike zone with a skills park and trails of various difficulty levels. Detailed plans for this zone have not been developed.
- Hiking trails between the summit and the west base, west of Exhibition run, including an improved 0.6-mile Stairway Trail and a 1.5-mile trail in the Bearcat Glades area.
- Obliteration of 1.1 miles of existing service roads made unnecessary by the proposed summit access road/novice skiway and user-created trails.

Comfortable carrying capacity would increase to 2,620.

PURPOSE AND NEED

Management considerations at three levels underlie the purpose and need for the proposed action. At the national level, extensive customer surveys conducted by the ski industry indicate that visitors are increasingly seeking a more diverse range of recreational activities, particularly for families, that includes year-round opportunities and activities that are more adventurous. The Forest Service response to this trend includes our 2012 introduction of the *Framework for Sustainable Recreation*, which sets goals for providing a diverse array of recreational opportunities aimed at connecting people with the outdoors and promoting healthy lifestyles, in partnership with other public and private recreation providers. Passage of the *Ski Area Recreational Opportunity Enhancement Act of 2011* provides direction on the types of summer activities the Forest Service should consider authorizing to round out the range of opportunities provided to the public at permitted mountain resorts.

At the Forest level, the Bridger-Teton Forest Plan provides direction for the Forest to contribute to community prosperity and provide high-quality developed recreation facilities to serve Forest visitors (Goal 1.1 and Goal 2.2 pp. 112–114). Forest Plan Objective 1.1(f) is to “Provide areas for alpine skiing and commercial ski and snowmobile operations.” Objective 2.2(a) is to “Retain, improve and add developed sites” and Objective 2.2(b) is to “Design facilities for people of all ages and abilities.”

At the level of the ski area itself, Snow King has been in operation for over 80 years. Locally known as the "Town Hill," it is an integral part of the community. That said, two ongoing constraints limit the ski area's ability to move ahead in accordance with the national and Forest-level direction cited above. First, ski terrain within the current operating boundary is extremely steep. This meets the needs of expert skiers and race-training programs but does not fit the ability-level profile of the broader skier market. There are few options for beginner, novice, and low intermediate skiers within the current ski area boundary at Snow King due to the topography of the site.

Second, while Snow King has developed several summer recreation activities on private and National Forest System land at the base area and around the Rafferty lift mid-station, the upper slopes have been developed mostly for skiers. Aside from a few hiking and biking trails, there is little infrastructure for summer recreation.

Beyond these two constraints, the on-mountain facilities and infrastructure at Snow King are in need of replacement and/or upgrades.

Reflecting these considerations, the purposes of the proposed Snow King Mountain Resort On-mountain Improvements Project are to:

- Maintain and improve the winter-sports infrastructure on National Forest System lands at Snow King,
- Provide new and innovative forms of year-round outdoor recreation for residents and visitors to Jackson Hole, using the existing resort infrastructure as the hub, and
- Capitalize on the partnership between the Bridger-Teton and Snow King to connect visitors with the natural environment and support the quality of life and the economy of the local community.

The needs for action to achieve these purposes include:

- Improve and increase beginner and intermediate ski terrain, lifts, and facilities to serve as the primary ski resort in Jackson Hole and to introduce and recruit new skiers to the sport.
- Expand the snowmaking system to enable an early November opening for ski race training, provide coverage to the upper mountain, and aid in fire suppression.
- Introduce high-quality guest service facilities to attract and retain local and destination skiers, serve as an event venue, and provide an outdoor education center for Jackson residents and visitors.
- Provide access to a wide range of year-round activities catering to a variety of visitors passing through the Town of Jackson.

The alternative descriptions in Chapter 2 provide additional detail on the need for individual elements of the alternatives.

DECISIONS TO BE MADE

In consideration of the stated purpose and need and the analysis of environmental effects documented in this EIS, the Responsible Official will review the proposed action and alternatives in order to make the following decisions:

- Whether to authorize the proposed action or an alternative, including the required no-action alternative, all or in part;
- What design criteria to require as a condition of the authorization; and
- What evaluation methods and documentation to require for monitoring project implementation and the effectiveness of design criteria.

RELATIONSHIP TO THE FOREST PLAN

A vision statement prepared by the Bridger-Teton summarizes management goals as follows: "The Bridger-Teton is home to world-class headwaters, wildlife, Wilderness, and wildlands. Providing for year-round recreation and sustainable uses, while conserving these values is our legacy."

As indicated in the Forest Plan (Forest Service 1990), Snow King falls within Forest Plan Management Area 41, Jackson Hole South, Desired Future Condition (DFC) 9B, Special Use Recreation Areas. A DFC 9B area is defined as:

> An area managed for permitted, private recreation homes, permittees, and others offering services to the public, including related roads and sites. Overall, you find many signs of people. But, you see little or no evidence of resource development other than recreation. Cabins and buildings used by permittees are visible but blend into the surroundings. Roads are generally graveled but may be paved in higher use areas. Off-highway vehicle use is limited to entry and departure routes. In some locations, you see extensive development associated with ski areas: hotels, buildings, ski lifts, gondolas, and snowcat equipment. In the winter, such areas are often quite crowded with roads clogged and many pedestrians in the area. (Forest Service 1990).

Within this context, the Forest Plan provides direction for management of lands in the Forest to sustain plant, wildlife, water, and soil conditions, contribute to community prosperity, and provide a diversity of recreation opportunities. Three relevant Forest Plan goals for DFC 9B are:

- 1.1(f) "Provide areas for alpine skiing and commercial ski and snowmobile operations,"
- 2.2(a) "retain, improve, and add developed sites," and
- 2.2(b) "design facilities for all ages and abilities."

All elements of the proposed action are within the DFC 9B boundary, are consistent with the Forest Plan management prescription for DFC 9B, and implement this Forest Plan direction.

PUBLIC INVOLVEMENT

On August 3, 2018, the Bridger-Teton issued a public scoping notice summarizing Snow King's proposed improvements project and inviting comments regarding the scope of the associated NEPA review. The projects included in the proposed action are included in Snow King's current master development plan, accepted by the Bridger-Teton.

Information regarding the scoping period and available materials for review was sent to the agencies, organizations, and individuals on the Bridger-Teton mailing list. The scoping notice was posted on the Bridger-Teton website at https://www.fs.usda.gov/project/?project=54201 and made available on CD or in hard-copy form to anyone requesting it.

The scoping period formally began on August 3, 2018, when a Notice of Intent to Prepare an Environmental Impact Statement was published in the Federal Register (Vol. 83, No. 150, pp. 38117-38118). The scoping period was scheduled to close 30 days later on September 2, 2018. A correction to the project website address and extension of the scoping comment period to September 13, 2018, was published in the Federal Register on August 14, 2018 (Vol. 83, No. 157, pp. 40215-40216). A news release was circulated August 14, 2018, notifying the public of the comment period extension. On September 14, 2018, notice of a second extension of the scoping period was published in the Federal Register (Vol. 83, No. 179, p. 46701), allowing submittal of comments until October 4, 2018.

Comment letters were received from 10 agencies, 11 organizations, and 419 individuals. The scoping notice, comment letters, and scoping report are included in the project record.

ALTERNATIVES

NEPA requires that an EIS address a reasonable range of alternatives to the proposed action. An EIS must address the alternative of no action to provide a benchmark for comparison of the magnitude of environmental effects of the proposed action and action alternatives. Action alternatives should achieve the same purpose and need, and they should include alternatives that address issues raised and avoid or otherwise mitigate adverse environmental effects associated with the proposed action.

Alternative 1 - No-Action Alternative

The no-action alternative is defined as continuation of current operation and maintenance activities on National Forest System lands at Snow King, with no further infrastructural development or operational changes.

Alternative 2 - Proposed Action

The elements of the proposed action are described above and in detail in Chapter 2 of this DEIS. It emphasizes improving recreational opportunities.

Alternative 3

This alternative was developed to address the following environmental concerns while still meeting the recreational opportunity objectives of the proposed action:

- The recreational effects of locating the bottom terminals of the proposed gondola and zip line in Phil Baux Park.
- The effects of lift-served mountain bike access to the summit of Snow King Mountain on the recreational experience of hikers and bikers using the existing Cache Creek/Game Creek trail system.
- The effects of proposed improvements on the eligibility of Snow King's historic landscape for listing on the National Register of Historic Places.
- The Bridger-Teton's concerns regarding fire protection within with fuel management and fire protection at the wildland/urban interface.
- The impact on skier safety of an additional road–the proposed summit access road/novice skiway–crossing the front-side ski runs.
- The impact on big game winter habitat on the back side of Snow King Mountain.
- The visual effect of additional infrastructure on the already highly developed front side of Snow King Mountain.
- The quality and sustainability of proposed Bearcat Glades hiking trail in terms of alignment, maintenance, and erosion control.
- The noise the proposed zip line might generate at the base area.

In response to these concerns, Alternative 3 alters elements under the headings of boundary adjustment, lifts, facilities, and summer activities relative to Alternative 2, as described in Chapter 2 of the DEIS. Terrain development, summit access road/novice skiway, night skiing, and snowmaking coverage would remain the same as Alternative 2.

Alternative 4

This alternative was developed to emphasize resource protection rather than full achievement of the recreational opportunity objectives of the proposed action. It addresses more aggressively the concerns driving Alternative 3, particularly impacts on Snow King's historic landscape and the existing Cache Creek/Game Creek trail system and its users. This alternative also responds to the following, additional concerns identified through scoping, community input, and internal, interdisciplinary review:

- The impact and sustainability of proposed biking trails on the front side in terms of location, maintenance, and erosion control.
- The effects of development in the eastern boundary adjustment area and associated infrastructure and use on goshawk post-fledging habitat.

In response to these concerns, Alternative 4 alters elements under the headings of terrain development, snowmaking coverage, and summer activities relative to Alternative 3, as described in Chapter 2 of the DEIS. Boundary adjustment, summit access road/novice skiway, lifts, facilities, and night skiing would remain the same as Alternative 3.

COMPARISON OF ENVIRONMENTAL EFFECTS

Table S-1 summarizes and compares the direct and indirect environmental effects of the proposed action and alternatives. The full, in-depth analysis that this summary is based on is provided in EIS Chapter 3.

Table S-1. Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Climate Change and Snow Quality				
Issue 1: How would climate change affect snow quantity and the viability of the proposed infrastructure and uses?	No change in snowmaking or summer recreation opportunities. Winter recreational use and the long-term viability of Snow King would remain vulnerable to the effects of climate change.	Snowmaking system coverage would increase by nearly 60%, and additional summer recreational opportunities would be provided. These changes would effectively offset the impact of reduced snowfall due to climate change on Snow King's winter recreational use and long-term viability.	Same as Alternative 2.	This alternative would be somewhat less effective in offsetting the impact of reduced snowfall on Snow King's winter recreational use and long-term viability. Snowmaking coverage would increase by less. The front-side mountain bike system would be shorter, and the back-side mountain bike zone would be eliminated.
Air Quality				
Issue 1: How would construction and use of the proposed infrastructure affect protected airsheds around the project area?	No notable change in Snow King's impact on visibility or particulate concentrations in Teton National Park or other area Class I airsheds.	A temporary increase in emissions and dust would occur during construction due to grading and excavation. Glading would increase by 32.7 acres, with associated slash burning. With the design criteria identified through this analysis in place, Alternative 2 is unlikely to have a discernible effect on visibility or particulate concentrations in Grand Teton National Park or other Class I airsheds in the area.	Same as Alternative 2 but with 154.2 acres of additional thinning and associated slash burning. However: there is a wide margin between current visibility and particulate ratings; slash burning is a minor contributor of particulates; burning would comply with Wyoming Air Quality Division Smoke Management Program requirements; and burning would take place in late fall, when air quality is good. Based on these considerations, slash	Grading and excavation would decrease by 11.1 acres relative to Alternative 3, and glading would increase by 3.8 acres. These minor changes would not alter the conclusion drawn under Alternative 3.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
			burning could be increased substantially without causing a poor visibility rating in the Park or exceeding Wyoming or national particulate standards in Class I airsheds.	
Issue 2: How would the proposed increase in snowmaking system coverage affect the "snowmaking cloud" that impacts the neighborhood around the base area?	No change from current snowmaking practices. The frequency and duration of snow cloud formation would remain unchanged.	Some increase in the frequency and duration of snowmaking cloud formation would result from increased water use. However, most of the increase in snowmaking coverage would be at higher elevations where wind would dissipate the cloud or on the back side where the cloud would not affect Jackson.	Same as Alternative 2.	Same as Alternatives 2 and 3. Minor changes in the location of snowmaking system additions would not alter the conclusion draw under Alternative 2.
Water, Soils, and Watershed				
Issue 1: How would the proposed increase in snowmaking and clearing of ski runs affect surface runoff, and groundwater recharge?	No change from current conditions in terms of snowmaking or run clearing. Surface runoff currently does not leave the ski area boundary but infiltrates to groundwater.	Snowmaking system coverage would increase by over 160% and cleared ski terrain would increase by nearly 90%. Snowmaking system coverage would not necessarily correspond to a proportional increase in water. Any change in snowmelt runoff, infiltration, and groundwater recharge would remain within the current range of variability in volumes and rates.	Same as Alternative 2.	Slightly less snowmaking system coverage would be added (11.4 acres less than Alternatives 2 and 3), and minor changes in run clearing would occur. These changes would not alter the conclusion drawn under Alternative 2.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Issue 2: How would the ground disturbance associated with construction and use of the proposed infrastructure affect soil erosion and slope stability?	No change from current infrastructure. Erosion would continue at existing rates, and conditions that influence soil erosion and slope stability would remain unchanged.	Temporary erosion and stability impacts could occur during and immediately following construction within the 144.5-acre disturbance area. Of the 31 separate project elements, 13 would have a high erosion/sedimentation risk rating before BMPs were applied, and 13 would have a moderate risk rating. With BMPs in place, risk ratings for all project elements would fall to low, and no measurable long-term change in erosion, sediment transport, or slope stability would result.	Disturbance area would increase by up to 154 acres, due primarily to forest stand thinning. Of 32 project elements, up to 15 would have high risk ratings before BMPs were applied, and up to 14 would have moderate ratings. These changes would not alter the conclusion drawn under Alternative 2.	Disturbance acreage would decrease by 5.9 acres relative to Alternative 3, but there would be no change in project element risk ratings. These changes would not alter the conclusion drawn under Alternative 2.
Issue 3: How would construction and use of the proposed infrastructure affect impaired water bodies in the area?	No change from current water quality conditions in Cache Creek or Flat Creek would occur.	Construction activities would result in disturbance and short-term opportunities for erosion and surface runoff. Due to the distance between proposed disturbance and creek channels, the BMPs that would be in place, and the naturally high filtration rates, no long-term or short-term impacts on water quality in Cache Creek or Flat Creek would occur.	Same as Alternative 2. Alteration of disturbance acreage would not affect the conclusion drawn under Alternative 2. See Issue 2 above.	Same as Alternatives 2 and 3. Alteration of disturbance acreage would not affect the conclusion drawn under Alternative 2. See Issue 2 above.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Vegetation				
Issue 1: How would construction and use of the proposed infrastructure affect the introduction and spread of noxious weeds?	No change from current noxious weed conditions. Seventeen noxious weed species have been reported within or adjacent to the ski area boundary. The ski area would continue to treat existing and new weed infestations, consistent with the terms of their vegetation management plan.	This alternative would result in 80.4 acres of glading and clearing, with limited potential to increase weed introduction or spread, and 64.1 acres of grading and excavation, with higher potential to create conditions favorable to weeds due to high levels of soil disturbance and equipment operation. Recreational use during the spring, summer, and fall months would increase, potentially expanding this vector for the spread of weeds. Implementation of the integrated weed management program identified as a design criterion in this analysis should preclude any substantial increase in weed introduction and spread.	Glading and clearing acreage would increase by up to 154.6 acres due mostly to stand thinning, and grading and excavation would decrease by up to 0.6 acre. Increased efforts to obliterate unnecessary roads and trails would help concentrate increased recreational use on established routes. These changes would not alter the conclusion drawn under Alternative 2.	Gladed and cleared acreage would increase by 4.2 acres relative to Alternative 3, but grading and excavation would decrease by 10.1 acres, reducing the risk of spreading noxious weeds compared to Alternative 3. Decreasing the extent of front-side bike trails and eliminating the back-side mountain bike zone would substantially reduce the potential for weed introduction and spread through recreational use. Overall, relative to Alternatives 2 and 3, this alternative would have the least potential for the introduction and spread of noxious weeds.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Wildlife				
Issue 1: How would construction and use of the proposed infrastructure affect special-status wildlife species?	Since there would be no change from current habitat and disturbance conditions under this alternative, there would be no change in Snow King's effect on threatened and endangered species, Forest Service sensitive species, migratory birds, or specialized habitats.	Alternative 2: - Has the potential to negatively impact Canada lynx habitat but is consistent with the *Northern Rockies Lynx Management Direction* and its amendment to the Forest Plan. - Would have no impact on the grizzly bear, wolverine, bald eagle and peregrine falcon. - May impact individuals but is not likely to result in a measurable impact on bighorn sheep population numbers. - May impact individuals but is not likely to cause a trend toward federal listing or loss of viability for: fisher, spotted bat, Townsend's western big-eared bat, boreal owl, flammulated owl, great gray owl, northern goshawk, and three-toed woodpecker. - May impact migratory birds but not substantially given design criteria and the large amount of alternative habitat available.	Relative to Alternative 2: - Disturbance of lynx habitat would increase but the determination would remain the same. - The amount of forested habitat impacted would increase, but the determinations for the fisher, boreal owl, flammulated owl, great grey owl, and northern goshawk would remain the same. - Impacts on bighorn sheep, spotted bat, Townsend's western big-eared bat, bald eagle, peregrine falcon, three-toed woodpecker, and migratory birds would be the same.	Relative to Alternative 3: - Disturbance of lynx habitat would increase slightly, but the determination would remain the same. - The amount of forested habitat impacted would increase, but the determinations for the Fisher, boreal owl, flammulated owl, great grey owl, and northern goshawk would remain the same. - Impacts on migratory birds would be the same.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Issue 2: How would construction and use of the proposed infrastructure affect elk or mule deer winter use?	No change from current elk or mule deer winter habitat conditions would occur, as there would be no back-side development.	No designated winter or parturition range for elk or mule deer would be directly affected, with exception of the lightly used northeast corner of the permit area on the front side. Localized displacement of elk and mule deer in and around the project area due to disturbance from expanded recreation would occur but would not result in a measurable impact on population numbers due to the abundant surrounding habitat, relatively low levels of habitat loss, and low level of current use in both the ski area permit boundary and its zone of visual influence.	Shifting the southern boundary of the western boundary adjustment up to the ridgeline above Leeks Canyon would provide minor benefit to wintering, but the conclusion drawn for Alternative 2 would remain the same.	The changes in infrastructural development and use under this alternative would not alter the effects on winter elk and deer use described under Alternative 2.
Cultural				
Issue 1: How would construction and use of the proposed infrastructure affect Snow King's historic landscape?	The remaining resources contributing to the eligibility of Snow King's historic landscape would be unaffected.	Fourteen of the 15 remaining contributing resources would be adversely affected: the 12 historic ski runs by modification and/or alteration of their visual signature through construction of intermingled new runs, and the Panorama House and unloading platform/observation deck by removal. The CCC Summit Shelter would not be affected. Consultation under Section 106 of the Historic Preservation Act will result in mitigation	Impacts on contributing resources would be the same, but Snow King would develop an interpretive program focusing on the history of the ski area to offset these effects.	Most of the proposed new ski runs in and adjacent to the historic landscape would be eliminated to protect the visual integrity of the 12 historic ski runs. Impacts on the other contributing resources would be the same as under Alternative 3.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		measures to address these impacts.		
Issue 2: How would construction and use of the proposed infrastructure affect Traditional Cultural Places or other Native American tribal resources?	No change from current effects on Native American concerns would occur.	Tribal consultation identified no Native American concerns, and no significant Native American sites have been identified within the project area. As a result, no impacts on this resource are anticipated under this alternative. Design criteria would protect any undiscovered heritage resources or sites encountered during construction.	Same as Alternative 2.	Same as Alternatives 2 and 3.
Land Use				
Issue 1: How would construction and use of the proposed infrastructure affect grazing?	No back-side development would occur, so impact on the Leeks Canyon grazing allotment would not change and utilization rates would be unchanged.	A minor reduction in forage availability and some disturbance or displacement of livestock would occur within the ski area boundary. Beyond the ski area boundary, mountain bike traffic down Leeks Canyon Road could increase, potentially disturbing and displacing horses in lower portion of the canyon. However, additional use would be limited due to steepness of road and the private property boundary near the bottom. The allotment is of sufficient size to ensure adequate amounts of forage for the number of livestock involved, even if some	Mountain bikers would be restricted to the dedicated downhill mountain bike trail system, precluding any new impact on livestock in lower Leeks Canyon. Otherwise, impacts would be the same as under Alternative 2. Compared to Alternative 2, reduced potential effects on utilization rates outside the ski area would occur.	The back-side mountain bike zone would not be developed, reducing impact on forage production and precluding any new mountain bike use in lower Leeks Canyon. Utilization levels within the allotment would be essentially the same as Alternative 1.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		displacement of animals occurred. Increased levels of utilization could occur in some areas of the allotment, but annual standards would be met.		
Noise				
Issue 1: How would construction and use of the proposed infrastructure affect noise levels around the ski area?	No change from current noise levels would occur. Avalanche explosive use may temporarily exceed the Town of Jackson's 65 dBa property-line noise limit (used as a threshold in this analysis though the ordinance does not apply to National Forest System land).	A short-term increase in equipment noise during construction and a long-term increase in noise due to increased avalanche control explosives, mechanical noise from the zip line trolley, and zip line rider noise would occur. All new snowmaking would be higher on the mountain than current activities and would generally not lead to increased noise. Helicopter staging on private land during gondola construction, if authorized by the Town of Jackson, may temporarily exceed 65 dBa.	Moving the bottom zip line terminal to the Rafferty mid-station would reduce noise at Phil Baux Park. Otherwise, noise impacts would be similar to Alternative 2.	The addition of run 15 would result in an increase in temporary construction noise, including chainsaw operations, and long-term noise due to snowmaking within 200 feet of homes adjacent to the ski area. Both noise sources would be substantially reduced by distance and vegetation screening. It is unlikely the Town of Jackson noise standard would be exceeded by these activities. Otherwise, noise impacts would be the same as outlined under Alternative 3.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Recreation				
Issue 1: How would the proposed ski terrain development affect Snow King's terrain mix?	The current terrain mix would be unchanged, limiting Snow King's ability to meet the needs of the broader skier market and bring new skiers into the sport.	An additional 117.8 acres of new ski terrain, including 39.8 acres of beginner, novice, and low intermediate and 20.8 acres of intermediate terrain. Terrain mix would remain heavily skewed toward advanced and expert terrain, but would be substantially closer to the skier market profile and provide a better progression in terrain for lower skier ability levels.	Same as Alternative 2.	The shift from clearing to glading runs 4, 5, and 7 in the eastern boundary adjustment area would reduce low intermediate terrain, a limiting factor at Snow King, by 3.8 acres. Otherwise the effects would closely match Alternatives 2 and 3.
Issue 2: How would the proposed summit access road/novice skiway affect existing ski runs?	Current ski run conditions would not change because no new ski runs or skiways would be constructed. Upper mountain runs would cross skiways nine times.	The number of skiway crossings would increase to 15, reflecting the new summit access road/novice skiway and construction of new front-side runs. However, skiway crossings are a common and manageable issue at ski areas. The impact on skier flow would vary by run.	Obliteration of more existing skiways would eliminate six crossings of existing runs and bring the net number or crossings to five. That would be a notable improvement in skier flow over existing runs.	Same as Alternative 3 for existing runs. Impacts on new trails would also be the same except that run 3 would not be constructed, reducing crossings by one, and run 2 may merge onto run 4, creating a new crossing of the summit access road/novice skiway.
Issue 3: How would the proposed downhill mountain bike trails and zone affect the existing Cache Creek/Game Creek trail system and its users?	No change from current use beyond the 1–3% annual increase associated with population growth in Jackson.	Lift-served mountain bike access to the summit is projected to result in a small increase in the number of trail system users but a major shift in use patterns. Higher-elevation, more distant trails would be much more accessible to mountain bikers, resulting in roughly two to four times more use on trails such as	A combination of rider information, trail design, enforcement, and changes to allowed use of existing trails that would be employed under this alternative to restrict lift-served bike use to the dedicated downhill trail system and mountain bike zone. This should	This alternative would eliminate the proposed bike zone on the back side, restrict the front-side downhill mountain bike trail system to a smaller area, and would not change the allowed use of existing Cache Creek/Game Creek trails.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		Skyline, Ferrin's, Wilson Canyon, and Josie's Ridge. This could increase user conflicts, trail damage, and resource impacts. Traffic on currently heavily used lower trail segments would be correspondingly reduced, decreasing crowding and trail damage. These effects may remain consistent with the Roaded Natural Recreational Opportunity Spectrum classification, but they could degrade the recreational opportunity provided by the Cache Creek/Game Creek trail system.	preclude notable adverse effects on the Cache Creek/Game Creek trail system and its users.	Overall, this alternative is projected to be slightly more effective in protecting the Cache Creek/Game Creek trail system and users than Alternative 3, but it would also provide substantially less opportunity for downhill mountain biking at Snow King.
Issue 4: How would the proposed Summit gondola and zip line affect users of Phil Baux Park?	Recreational opportunities for park users would remain unaltered.	Construction of the gondola and zip line bottom terminals would result in the loss of the Phil Baux Park parking lot and a change in the recreational opportunities it currently provides. Open green space available for recreational activities would increase.	No new infrastructure would be sited in Phil Baux Park. The gondola bottom terminal would be located nearby but far enough away to maintain the park's current recreational opportunities. The parking lot would remain intact.	Effects would be the same as outlined under Alternative 3.

Table S-1 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Safety				
Issue 1: How would the proposed mountain bike trails and mountain bike zone affect the safety of other summer visitors?	The safety of other summer visitors would not change because there would be no development of additional mountain bike trails under this alternative.	Use of trails within the Snow King boundary would increase, with most of this increase occurring on the new downhill mountain bike trails. A combination of design criteria requiring adequate sight lines around intersections, signage warning users of both trails that they were approaching an intersection, features designed to slow riders on the downhill trails, and bridges or underpasses where necessary would preclude any substantial change in safety risk.	Same as Alternative 2.	The number of trail crossings would be reduced relative to Alternatives 2 and 3, reducing impacts marginally. Otherwise, changes in visitor safety would be similar.

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Figure 3-24. View from turnout on US Highway 26 entering Jackson from the north under Alternative 3. .198
Figure 3-25. View from turnout on US Highway 26 entering Jackson from the north under Alternative 4. .199

LIST OF ACRONYMS

ABAAS	Architectural Barriers Act Accessibility Standard
ADA	Americans with Disabilities Act of 1990
BA	biological assessment
BEIG	The Built Environment Image Guide for the National Forests and Grasslands
BMP	best management practices
Bridger-Teton	Bridger-Teton National Forest
CCC	Civilian Conservation Corps
CDA	connected disturbed area
CWPP	Community Wildfire Protection Plan
dBa	A-weighted decibels
DFC	desired future conditions
EIS	environmental impact statement
EVC	existing visual conditions
Forest Plan	Bridger-Teton National Forest Land and Resource Management Plan
GPM	gallons-per-minute
LAU	Lynx Analysis Unit
MDP	master development plan
MOU	memorandum of understanding
NEPA	National Environmental Policy Act of 1969
NHD	National Hydrography Dataset
NOI	Notice of Intent to Prepare an Environmental Impact Statement
NRCS	National Resources Conservation Service
NRLMD	Northern Rockies Lynx Management Direction
NWI	National Wetlands Inventory
Permit	special use permit
pph	person-per-hour
ROD	Record of Decision
SNOTEL	snowpack telemetry
Snow King	Snow King Mountain Resort
SWPPP	Storm Water Pollution Prevention Plan
UFAS	Uniform Federal Accessibility Standards
USDA Forest Service	Forest Service
Vegetation Management Plan	2015 Snow King Mountain Resort Vegetation Management Plan
VQO	Visual Quality Objectives
WDEQ	Wyoming Department of Environmental Quality
WPDES	Wyoming Pollutant Discharge Elimination System

CHAPTER 1: PURPOSE AND NEED

1.1 INTRODUCTION

On June 5, 2018, the Bridger-Teton National Forest (Bridger-Teton) received a proposal from Snow King Mountain Resort (Snow King), requesting authorization to implement the first phase of improvements included in their 2017 master development plan (MDP). The MDP analyzes current conditions at the resort and, based on that analysis, outlines anticipated development and management of the resort over the next 10 years. The MDP is intended to enhance the year-round recreational opportunities available at the resort and on the Bridger-Teton. It is the result of a collaborative, multi-year process involving input from Snow King, the Bridger-Teton, the Town of Jackson, Teton County, the Snow King Mountain Stakeholder Group, and members of the public.

Snow King is located in the Gros Ventre mountain range adjacent to Jackson, Wyoming (Figure 1-1), in Teton County, T41N, R116W, Sections 33 and 34, and T40N R116W, Sections 3 and 4. The resort operates under a special use permit (permit) issued by the USDA Forest Service (Forest Service) and administered by the Bridger-Teton. The operational ski area is approximately two-thirds on National Forest System land and one-third on Town of Jackson land or private property.

The *Bridger-Teton National Forest Land and Resource Management Plan*, as amended (hereafter referred to as the Forest Plan; Forest Service 1990), provides primary guidance for management of Bridger-Teton resources, including those within the ski area. This environmental impact statement (EIS) is tiered to the Forest Plan, and the Forest Plan and associated EIS are incorporated by reference.

Under the terms of the *National Forest Ski Area Permit Act of 1986*, development and operation of ski areas on National Forest System lands is guided by MDPs, which describe existing conditions; identify physical, environmental, and socio-economic opportunities and constraints; establish the permittee's conceptual vision for the ski area; and outline near-to-long-term plans for achieving that vision. As a condition of permit issuance, the Forest Service must review and accept, modify, or reject a ski area's MDP. MDPs are intended to be dynamic documents, amended or revised periodically to reflect changes in operational opportunities and constraints, recreation-market demands, or agency management requirements.

One component of an MDP is planned development of the ski area's physical infrastructure. When a ski area decides to move ahead with specific development that involves National Forest System land, the permittee submits a proposal to the Forest Service describing those elements of the MDP. Implementation of the MDP is generally divided into phases, each addressing elements to be implemented within roughly the next 5 years. The Forest Service then evaluates the proposal, on the basis of established screening criteria, and initiates our decision-making process, including seeking public comments on the proposal and analyzing and disclosing the environmental impacts, in accordance with the *National Environmental Policy Act of 1969* (NEPA).

Snow King's current proposal is to implement the first phase of the ski area's 2017 MDP. As Snow King operates partially on National Forest System land, some of the proposed infrastructural improvements require Forest Service approval prior to implementation. These improvements on National Forest System lands (hereafter referred to as the proposed action or Alternative 2) have the potential to impact the human environment and therefore are reviewed in this EIS. Based on this EIS and associated documentation, the responsible official will determine whether, and under what conditions, the Forest Service will authorize this proposed action or an alternative, all or in part (see Chapter 2).

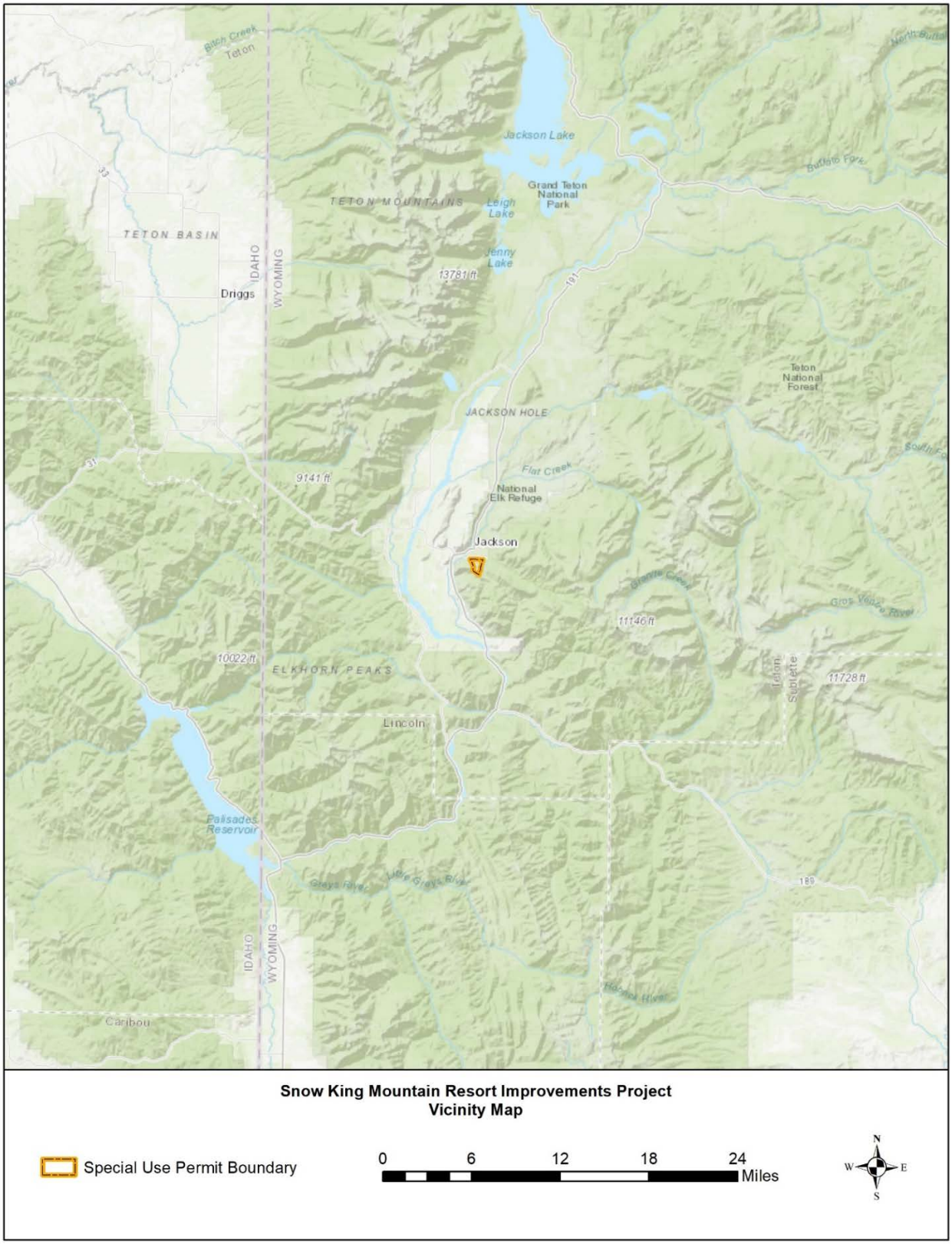

Figure 1-1. Vicinity map.

1.2 ORGANIZATION OF DOCUMENT

The Bridger-Teton has prepared this EIS in accordance with NEPA and Forest Service regulations regarding its implementation (36 CFR Part 220). The document is organized as follows:

Chapter 1 – Purpose and Need. This chapter introduces the proposed action and the EIS process. Specifically, it:

- Summarizes the proposed action.
- Outlines the purpose of and need for action.
- Identifies the decisions to be made on the basis of this EIS.
- Discusses the relationship of the proposed action to the Forest Plan.
- Describes the scoping process and the environmental issues addressed in this EIS and those considered but not carried into in-depth analysis.
- Discusses the project record.
- Notes other permits and authorizations that may be required.

Chapter 2 – Proposed Action and Alternatives. This chapter outlines the alternative development process, describes in detail the alternatives carried into in-depth analysis, lists associated design criteria, identifies alternatives considered but not analyzed in depth, then summarizes and compares the environmental impacts of the alternatives analyzed in depth.

Chapter 3 – Affected Environment and Environmental Consequences. This chapter documents the environmental impact analysis. It is organized by resource category, and each resource section begins with the issues addressed, as identified through public scoping and internal, interdisciplinary review. The affected environment is described next to provide context for the discussion of environmental consequences that follows. The direct, indirect, and cumulative effects of the no-action alternative (the analysis baseline), proposed action, and the action alternative are outlined in that order. The section concludes with discussion of other required disclosures.

Chapter 4 – Consultation and Coordination. This chapter describes the public input the agencies and other entities consulted during the development of this EIS.

Chapter 5 – List of Preparers. This chapter identifies the Bridger-Teton and contractor personnel involved in preparation of this EIS.

Chapter 6 – References. This chapter contains an alphabetized list of the documents referenced in this EIS.

Additional documentation is available in the project record available at the Jackson Ranger District Office in Jackson, WY. (See section 1.8 below.)

1.3 PROPOSED ACTION

Snow King's current MDP, *Snow King Mountain 2017 Master Development Plan* (SE Group 2017), was accepted by the Bridger-Teton in March 2018. The infrastructural improvements on National Forest System lands included in the MDP have the potential to impact National Forest resources, and Bridger-Teton authorization is required for their implementation. These improvements, described in detail in section 2.4, comprise the proposed action addressed in this EIS. They can be summarized as follows:

Permit Boundary Adjustment

- A 67-acre permit boundary adjustment on the front side, east of the existing permit area, to accommodate part of a summit access road/novice skiway, intermediate-level terrain lower on the slope (including groomed runs and tree and glade skiing), and a novice route down from Rafferty lift (via the access road/novice skiway).

- A 89-acre permit boundary adjustment on the front side west of the existing permit area to accommodate a summit teaching center, another part of the summit access road/novice skiway, and expert-level tree and glade skiing.

Terrain Development

- A new ski school/teaching center with beginner and novice terrain on the ridgeline west of the Snow King summit.
- New ski runs on both the front and back side and adjustments to some existing runs totaling 117.8 acres of new terrain. Includes runs 3–14, 16–25, Lift B and C terrain, and modifications of Moose, Belly Roll, Upper Exhibition, and Bearcat.
- Gladed ski terrain and forest health maintenance totaling about 35 acres.

Summit Access Road/Novice Skiway

- A new roughly 2-mile access road to the top of the summit gondola that would also serve as a novice skiway.

Lifts

- A new gondola replacing the aging Summit lift.
- A new back-side chairlift.
- Two teaching center conveyor lifts.
- A new surface tow on the back side bringing skiers to the summit.

Facilities

- Summit restaurant/guest services building and ski patrol facility, 20,000–25,000 square-feet. Construction would require removal of the existing Panorama House and the unloading dock of the original Summit lift.
- A 500-square-foot observatory near the summit.
- A temporary ski patrol building at the top of Cougar.
- A year-round yurt camp at the southern point of the permit area, with nine yurts 20-30 feet in diameter and a 1-mile ADA-compliant access trail from the summit.
- A small, open-air wedding venue west of the summit building.

Night Skiing

- 27.3 acres of expanded lighting for night skiing.

Snowmaking Coverage

- 147.1 acres of added snowmaking (with few exceptions, all existing and proposed runs).

Summer Activities

- A 3,900-linear-foot zip line from the summit to the west base area, paralleling the Summit lift.
- About 6.5 miles of front-side mountain bike trails and a 110-acre back-side mountain bike zone with a skills park and trails of various difficulty levels. Detailed plans for this zone have not been developed.
- Hiking trails between the summit and the west base, west of Exhibition run, including an improved 0.6-mile Stairway trail and a 1.5-mile trail in the Bearcat Glades area.

- Obliteration of 1.1 miles of existing service roads made unnecessary by the proposed summit access road/novice skiway and user-created trails.

Comfortable carrying capacity would increase to 2,620.

1.4 PURPOSE AND NEED

Management considerations at three levels underlie the purpose and need for the proposed action. At the national level, extensive customer surveys conducted by the ski industry indicate that visitors are increasingly seeking a more diverse range of recreational activities, particularly for families, that includes year-round opportunities and activities that are more adventurous. The Forest Service response to this trend includes our 2012 introduction of the *Framework for Sustainable Recreation*, which sets goals for providing a diverse array of recreational opportunities aimed at connecting people with the outdoors and promoting healthy lifestyles, in partnership with other public and private recreation providers. Passage of the *Ski Area Recreational Opportunity Enhancement Act of 2011* provides direction on the types of summer activities the Forest Service should consider authorizing to round out the range of opportunities provided to the public at permitted mountain resorts.

At the Forest level, the Bridger-Teton Forest Plan provides direction for the Forest to contribute to community prosperity and provide high-quality developed recreation facilities to serve Forest visitors (Goal 1.1 and Goal 2.2 pp. 112–114). Forest Plan Objective 1.1(f) is to "Provide areas for alpine skiing and commercial ski and snowmobile operations." Objective 2.2(a) is to "Retain, improve and add developed sites" and Objective 2.2(b) is to "Design facilities for people of all ages and abilities."

At the level of the ski area itself, Snow King has been in operation for over 80 years. Locally known as the "Town Hill," it is an integral part of the community. That said, two ongoing constraints limit the ski area's ability to move ahead in accordance with the national and Forest-level direction cited above. First, ski terrain within the current operating boundary is extremely steep. This meets the needs of expert skiers and race-training programs but does not fit the ability-level profile of the broader skier market. There are few options for beginner, novice, and low intermediate skiers within the current ski area boundary at Snow King due to the topography of the site.

Second, while Snow King has developed several summer recreation activities on private and National Forest System land at the base area and around the Rafferty lift mid-station, the upper slopes have been developed mostly for skiers. Aside from a few hiking and biking trails, there is little infrastructure for summer recreation.

Beyond these two constraints, the on-mountain facilities and infrastructure at Snow King are in need of replacement and/or upgrades.

Reflecting these considerations, the <u>purposes</u> of the proposed Snow King Mountain Resort On-mountain Improvements Project are to:

- Maintain and improve the winter-sports infrastructure on National Forest System lands at Snow King,
- Provide new and innovative forms of year-round outdoor recreation for residents and visitors to Jackson Hole, using the existing resort infrastructure as the hub, and
- Capitalize on the partnership between the Bridger-Teton and Snow King to connect visitors with the natural environment and support the quality of life and the economy of the local community.

The <u>needs</u> for action to achieve these purposes include:

- Improve and increase beginner and intermediate ski terrain, lifts, and facilities to serve as the primary ski resort in Jackson Hole and to introduce and recruit new skiers to the sport.
- Expand the snowmaking system to enable an early November opening for ski race training, provide coverage to the upper mountain, and aid in fire suppression.

- Introduce high-quality guest service facilities to attract and retain local and destination skiers, serve as an event venue, and provide an outdoor education center for Jackson residents and visitors.
- Provide access to a wide range of year-round activities catering to a variety of visitors passing through the Town of Jackson.

The alternative descriptions in Chapter 2 provide additional detail on the need for individual elements of the alternatives.

1.5 DECISIONS TO BE MADE

In consideration of the stated purpose and need and the analysis of environmental effects documented in this EIS, the Responsible Official will review the proposed action and alternatives in order to make the following decisions:

- Whether to authorize the proposed action or an alternative, including the required no-action alternative, all or in part;
- What design criteria to require as a condition of the authorization; and
- What evaluation methods and documentation to require for monitoring project implementation and the effectiveness of design criteria.

The Responsible Official will document her decision and rationale in a Record of Decision (ROD). The Responsible Official is Tricia O'Connor, the Bridger-Teton Forest Supervisor.

1.6 RELATIONSHIP TO THE FOREST PLAN

A vision statement prepared by the Bridger-Teton summarizes management goals as follows: “The Bridger-Teton is home to world-class headwaters, wildlife, Wilderness, and wildlands. Providing for year-round recreation and sustainable uses, while conserving these values is our legacy.”

As indicated in the Forest Plan (Forest Service 1990), Snow King falls within Forest Plan Management Area 41, Jackson Hole South, Desired Future Condition (DFC) 9B, Special Use Recreation Areas (Figure 1-2). A DFC 9B area is defined as:

> An area managed for permitted, private recreation homes, permittees, and others offering services to the public, including related roads and sites. Overall, you find many signs of people. But, you see little or no evidence of resource development other than recreation. Cabins and buildings used by permittees are visible but blend into the surroundings. Roads are generally graveled, but may be paved in higher use areas. Off-highway vehicle use is limited to entry and departure routes. In some locations, you see extensive development associated with ski areas: hotels, buildings, ski lifts, gondolas, and snowcat equipment. In the winter, such areas are often quite crowded with roads clogged and many pedestrians in the area. (Forest Service 1990).

Within this context, the Forest Plan provides direction for management of lands in the Forest to sustain plant, wildlife, water, and soil conditions, contribute to community prosperity, and provide a diversity of recreation opportunities. Three relevant Forest Plan goals for DFC 9B are:

- 1.1(f) “Provide areas for alpine skiing and commercial ski and snowmobile operations,”
- 2.2(a) “retain, improve, and add developed sites,” and
- 2.2(b) “design facilities for all ages and abilities.”

All elements of the proposed action are within the DFC 9B boundary, are consistent with the Forest Plan management prescription for DFC 9B, and implement this Forest Plan direction.

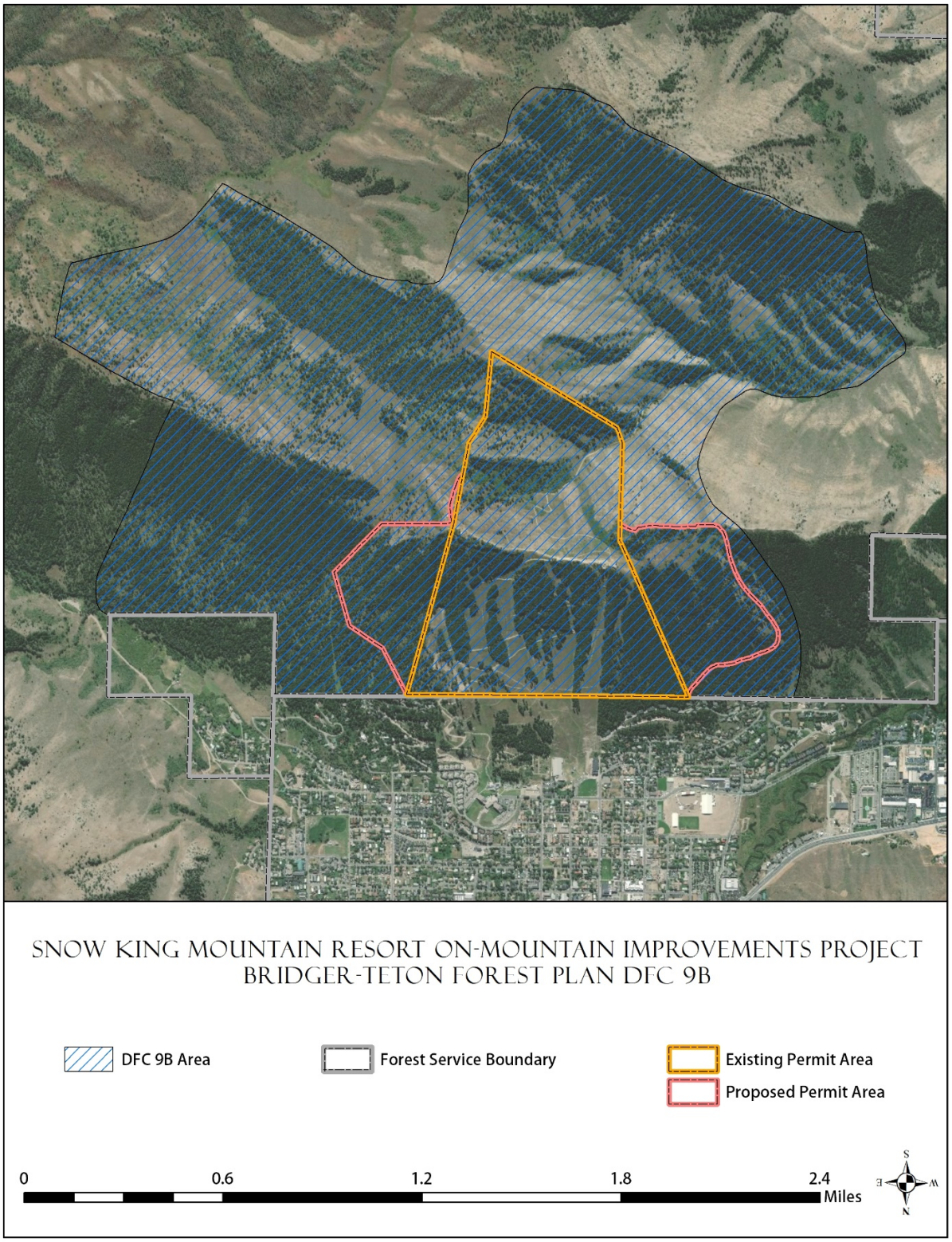

Figure 1-2. Forest Plan Management Area 41, Jackson Hole South, Desired Future Condition (DFC) 9B, Special Use Recreation Area.

1.7 SCOPING AND IDENTIFICATION OF ISSUES

On August 3, 2018, the Bridger-Teton issued a public scoping notice summarizing the proposed action and inviting comments regarding the scope of the associated NEPA review. Information regarding the scoping period and available materials for review was sent to the individuals, organizations, and agencies on the Bridger-Teton mailing list. The scoping notice was posted on the Bridger-Teton website at https://www.fs.usda.gov/project/?project=54201 and made available in hard-copy form to anyone requesting it.

The scoping period formally began on August 3, 2018, when a Notice of Intent to Prepare an Environmental Impact Statement (NOI) was published in the Federal Register (Vol. 83, No. 150, pp. 38117-38118). The scoping period scheduled to close 30 days later on September 2, 2018. A correction to the project website address and extension of the scoping comment period to September 13, 2018, was published in the Federal Register on August 14, 2018 (Vol. 83, No. 157, pp. 40215-40216). A news release was circulated August 14, 2018, notifying the public of the comment period extension. On September 14, 2018, notice of a second extension of the scoping period was published in the Federal Register (Vol. 83, No. 179, p. 46701), allowing submittal of comments until October 4, 2018.

Comment letters were received from 10 agencies, 11 organizations, and 419 individuals. A scoping report identifying commenters, summarizing comments, and indicating how comments would be incorporated in this NEPA process was prepared and posted on the Bridger-Teton website on June 25, 2019. The scoping notice, NOI, comment letters, and scoping report are included in the project record.

Collectively, scoping and internal, interdisciplinary review identified the following issues to be addressed in this EIS. They begin with the physical environment, move to the biological environment, and conclude with the human environment. The issues may be addressed by analysis and disclosure of effects, development of project design criteria, or alternative development. Issue statements were released to the public on June 24, 2019.

1.7.1 ISSUES CARRIED INTO IN-DEPTH ANALYSIS

These issue statements introduce each resource-specific section in Chapter 3, where they are followed by the indicators used to identify the direct, indirect, and cumulative effects.

1.7.1.1. Physical and Biological Environment

1.7.1.1.1 Climate Change and Snow Quantity

- *How would climate change affect snow quantity and the viability of the proposed infrastructure and uses?*

While no material effect is anticipated, it would be impossible to make a valid quantitative assessment of the proposed action's effect on climate change and snow quantity given the current state of climate-change science. However, a significant reduction in snowfall over time could preclude the need for any additional winter recreation infrastructure or recreational opportunities. The analysis will address that issue.

Indicator: Conclusions drawn from pertinent studies of climate change and its potential effects on snowfall, including the Forest Service, Region 4 report *Climate Change Vulnerability and Adaptation in the Intermountain Region* (Halofsky et al. 2018).

1.7.1.1.2 Air Quality

Protected Airsheds

- *How would construction and use of the proposed infrastructure affect protected airsheds around the project area?*

There are several areas in the vicinity of Jackson with airsheds protected under the Clean Air Act, as amended, and associated programs. These include national parks and designated wildernesses. Slash burning, off-road equipment operation, and soil disturbance could generate smoke and dust, adversely affecting air quality in these protected airsheds.

Indicator: Assessment of the extent of these practices and the efficacy of design criteria available to minimize any adverse effects on Class 1 airsheds.

Snowmaking Cloud

- *How would the proposed increase in snowmaking system coverage affect the "snowmaking cloud" that impacts the neighborhood around the base area?*

On cold winter days, snowmaking can generate a cloud of ice crystals that remains suspended in the air, spreading to surrounding areas and blocking the sun. Increased snowmaking could make this effect more extensive.

Indicator: Assessment of the effect of the proposed system expansion on the frequency and extent of the snowmaking cloud.

1.7.1.1.3 Water, Soils, and Watershed

Hydrology

- *How would the proposed increase in snowmaking and clearing of ski runs affect surface runoff, and groundwater recharge?*

The proposed action would increase snowmaking coverage at Snow King. Most of the proposed coverage is within the current permit boundary (on the north and south sides of Snow King Mountain) with minor amounts in the proposed east and west boundary adjustment areas. No stream channels exist within the current or potentially expanded permit boundary, but the expanded snowmaking coverage would include previously undeveloped drainages. Beyond that, clearing of proposed ski runs would affect the existing pattern of tree cover and could influence snow accumulation and runoff patterns. The combined influence of additional snowmaking and changes in tree cover could impact surface runoff and groundwater hydrology.

Indicator: Primarily qualitative assessment of current conditions, the amount and location of water potentially added to the system, the location and extent of vegetation clearing, the timing of runoff, and the resulting impacts on channel stability and groundwater recharge.

Erosion and Slope Stability

- *How would the ground disturbance associated with construction and use of the proposed infrastructure affect soil erosion and slope stability?*

The project area is characterized by steep slopes and erosive soils, and there is evidence of erosion and historic mass soil movement. Construction-related disturbance and subsequent use could potentially increase erosion and sediment transport to downslope areas. It could also create areas of instability on Snow King's slopes.

Indicator: Use of the connected disturbed area (CDA; Forest Service 2006) approach to assess the risk of erosion, sedimentation, and instability for each proposed project element that entails ground disturbance, both prior to and following implementation of best management practices (BMPs).

Water Quality

- *How would construction and use of the proposed infrastructure affect impaired water bodies in the area?*

Short-term surface disturbance during construction of the proposed infrastructure, and long-term use of the proposed ski runs and expanded snowmaking system, have the potential to mobilize sediment. While there

are no streams to be affected inside the current permit boundary, the proposed east boundary adjustment area includes part of the Cache Creek watershed. Cache Creek is a tributary of Flat Creek, which is included on Wyoming's 2018 303(d) list of impaired water bodies. Any pollutants entering Cache Creek could contribute to Flat Creek's existing impairment.

Indicator: Primarily the results of the hydrology and CDA analyses discussed above, specifically their conclusions regarding surface runoff, erosion, sedimentation, and effectiveness of BMPs in avoiding these issues. Assessment of these conclusions in light of the current impairments in Flat Creek and intervening conditions between Snow King and Flat Creek.

1.7.1.1.4 Vegetation

Noxious Weeds

- *How would construction and use of the proposed infrastructure affect the introduction and spread of noxious weeds?*

The project area supports plant species that are included on the list of noxious weeds maintained by the Wyoming Department of Agriculture, and construction, maintenance, and use of proposed infrastructure could introduce new weed species or spread existing infestations.

Indicator: Identification of weed species that may occur at Snow King based on past observations and reconnaissance completed for this analysis, then assessment of the risk of spreading those species and introducing new ones based on characteristics of each proposed element.

1.7.1.1.5 Wildlife

Special-status Species

- *How would construction and use of the proposed infrastructure affect special-status wildlife species?*

The US Fish and Wildlife Service's Information for Planning and Consultation database indicates that several wildlife species listed under the *Endangered Species Act of 1973* may occur in the project area, and the Forest Service's list of sensitive species in the Intermountain Region also includes several species potentially found in the area. The *Migratory Bird Species Act of 1918* provides protections to some bird species that may frequent the project area. Construction and use of the proposed infrastructure could affect these special-status species through disturbance, displacement, or habitat impacts.

Indicators: Survey of areas that would be disturbed by construction and subsequent use for appropriate species and habitat-based assessments for more reclusive species, then assessment of impacts on special-status species based on occurrence and type, extent, and timing of disturbance of individuals or habitat. Conclusions determined and expressed as called for in the protocols for federally listed, Forest Service sensitive, migratory bird species.

Specialized Habitats

- *How would construction and use of the proposed infrastructure area affect elk or mule deer winter use?*

Parts of Leeks Canyon and adjacent areas include winter range for elk and mule deer, and there are wildlife migration corridors in the vicinity. To protect these specialized habitats, winter wildlife closure areas have been established around Snow King. Construction and use of the proposed infrastructure could affect these habitats through disturbance, displacement, or fragmentation.

Indicators: Review of existing data on these specialized habitats, then assessment of potential effects based on the type, extent, and timing of disturbance of individual animals or habitat.

1.7.1.2 Human Environment

1.7.1.2.1 Cultural

Historic Landscape

- *How would construction and use of the proposed infrastructure affect Snow King's historic landscape?*

Snow King is one of the oldest ski areas in the US, with its roots in the 1920s when Jackson residents climbed the "town hill" under their own power. The first lift, a rope tow, was constructed in 1939. While most historic infrastructure has been demolished or upgraded, some evidence of the ski area's history remains. In 2014, part of the ski area was recommended as eligible for listing on the National Register of Historic Places as a historic landscape. The Wyoming State Historic Preservation Office concurred with that determination, but the site has not been formally nominated for listing. Construction of the proposed infrastructure could affect the historic resources on which this recommendation was based.

Indicator: Assessment of potential impacts on the resources supporting the eligibility recommendation. Consultation under Section 106 of the National Historic Preservation Act is an ongoing, parallel process.

Native American Concerns

- *How would construction and use of the proposed infrastructure affect Traditional Cultural Places or other Native American tribal resources?*

The Jackson Hole area has been used for various purposes by Native Americans for millennia. Tribes who frequented the area include the Crow, Eastern Shoshone, Gros Ventre and Assiniboine, Northern Arapaho, and Shoshone-Bannock. Construction and use of new facilities at Snow King could impact resources or uses important to area tribal groups.

Indicator: Government-to-government consultation with tribal groups with interest in area resources, in accordance with Executive Order 13175.

1.7.1.2.2 Land Use

- *How would construction and use of the proposed infrastructure affect grazing?*

The southern expansion area, which is within Snow King's current ski area special use permit boundary, is overlapped by an active grazing allotment, which is also permitted by the Bridger-Teton. Construction and use of the proposed summer infrastructure could affect forage availability, disturb or displace livestock, or otherwise impact the grazing permittee's operation.

Indicator: Review of utilization levels and patterns of livestock use to assess how proposed activities would impact forage availability and grazing operations.

1.7.1.2.3 Noise

- *How would construction and use of the proposed infrastructure affect noise levels around the ski area?*

Snowmaking, explosive avalanche control, and summer activities such as the mountain coaster generate noise that is audible to visitors and residents in areas adjacent to the resort. While some may accept increased noise levels as a consequence of being close to a mountain resort, the noise associated with the proposed snowmaking expansion, zip line, and increased avalanche control activities may be an annoyance to some.

Indicators: Review of noise levels associated with these activities, then a largely qualitative assessment of impacts on area visitors and residents base on the projected noise levels, timing, duration, and frequency.

1.7.1.2.4 Recreation

Terrain Mix

- *How would the proposed ski terrain development affect Snow King's terrain mix?*

Most ski terrain at Snow King is steep, which limits use to advanced or expert skiers. Accordingly, a central element of the purpose and need for action is to develop terrain accessible to lower ability level skiers. This would be conducive to integrating beginning skiers into the sport and to accommodating families and groups with varying ability levels.

Indicator: Comparison of the terrain mix resulting from proposed development to the mix of ability levels in the skier market.

Existing Ski Runs

- *How would the proposed summit access road/novice skiway affect existing ski runs?*

The proposed access road/novice skiway crosses the major front-side ski runs high on the steeper portions of the slope where substantial cut and fill would be required. Existing access roads/novice skiways including Fast Trail, Slow Trail, and Elkhorn Trail also cross these ski runs, so the added access road/skiway would potentially constitute an additional impediment to smooth skier flow on these runs.

Indicator: Review of preliminary design of the access road/novice skiway, then largely qualitative assessment of its potential impact on skier flow, in conjunction with other features crossing these runs.

Existing Trail System

- *How would the proposed downhill mountain bike trails and zone affect the existing Cache Creek/Game Creek trail system and its users?*

The popular, well-developed and maintained Cache Creek/Game Creek multi-use trail system includes trails that cross or pass near Snow King's permit area. The proposed lift-served mountain biking could adversely affect this trail system and its users by increasing bike traffic inside or outside the permit boundary.

Indicators: Assessment of the likely number of lift-served mountain bikers that would use the existing trail system, the existing system's capacity to absorb any additional use, and the effects of that use on cross-country bikers and hikers. Some variables, such as the number of intersections of proposed and existing trails, will be quantified.

Phil Baux Park

- *How would the proposed summit gondola and zip line affect users of Phil Baux Park?*

Phil Baux Park is an old, well established and well used town park adjacent to Snow King's private-land base area. Under the proposed action, the bottom terminals of the proposed summit gondola and zip line would be located in the park, eliminating the parking lot.

Indicator: Primarily qualitative assessment of the impact of siting these facilities in the park on the recreational uses and users of the park.

1.7.1.2.5 Safety

Safety of Summer Visitors

- *How would the proposed mountain bike trails and mountain bike zone affect the safety of other summer visitors?*

Snow King's permit area supports summer recreational use of various types, including resort infrastructure such as the mountain coaster, alpine slide, and ropes course accessed from the Rafferty lift mid station, as well as numerous formal and user-created hiking and biking trails throughout the permit area. The proposed

mountain bike zone and trail network overlaying these other recreational uses could create collision risks and other safety issues.

Indicator: Review of the integration of existing and proposed summer recreation infrastructure with proposed mountain bike park and trails network to qualitatively assess safety risks.

Skier Safety

- *How would the proposed summit access road/novice skiway affect skier safety?*

This issue has two aspects, the safety of skiers using the skiway, and the safety of skiers crossing the skiway on the front-side runs. In the first case, the steepness of the slope adjacent to the skiway could make it dangerous for beginners or others who skied off the skiway. They could slide down the groomed runs or be trapped in deep snow in the forested patches. For skiers crossing the skiway, the cut and fill slopes necessary to construct it could block smooth skier flow and pose a hazard to skiers attempting to cross it at speed.

Indicator: Generally qualitative assessment of the design of the skiway and the efficacy of measures to minimize these risks, based on experience at Snow King and elsewhere.

Avalanche

- *How would the proposed ski run clearing and summit access road/novice skiway affect avalanche hazard?*

Snow King's steep slopes lie directly above the base area and adjacent commercial and residential development, making avalanche an important concern. The proposed expansion and associated ski run clearing could increase this hazard and the level of effort required to manage it. The steep cut and fill slopes along the proposed summit access road/novice skiway could create new starting zones and add to the problem.

Indicator: Qualitative assessment of the current avalanche situation and snow safety program, followed by analysis of the impact of proposed infrastructure on the hazard level and the effectiveness of the snow safety program to manage it.

1.7.1.2.6 Scenery

Scenic Quality

- *How would the proposed infrastructure affect the scenic quality of Snow King Mountain?*

The front side of Snow King is the southern backdrop of the town, where scenic quality is a widely held value. While the resort is already part of that backdrop, additional infrastructure, individually and collectively, on the front side and the summit could result in an even less natural appearing view from the town.

Indicator: Assessment of the impact of the proposed infrastructure using the methodology established in the Forest Service's Visual Management System (Forest Service 1974).

- *How would the proposed lighting for night skiing and operation of summit facilities affect the nighttime view and dark sky?*

While lighting for night skiing, grooming, and other on-mountain activities has been part of the nighttime setting on the mountain for some time, the proposed expansion of night lighting and addition of summit lighting would constitute a greater departure from the natural setting.

Indicator: Review of the current setting and applicable local regulations regarding lighting, then assessment of the extent, intensity, and duration of the proposed change, in the context of those local regulations.

1.7.2 Issues Considered but Not Carried into In-depth Analysis

This section identifies issues that were raised during scoping or internal, interdisciplinary review that were considered not to be relevant to this particular decision or not to require in-depth analysis in order to determine that no significant impact was likely. The rationale for this decision follows each issue. This is consistent with NEPA and CEQ regulations (40 CFR 1501.7[3] and 1909.15 [12.41]).

1.7.2.1 Water, Soils, and Watershed

- *How would expanded snowmaking affect municipal water availability?*

Rationale: The Town of Jackson supplies Snow King's snowmaking water, and the town has identified no impending water shortage. Should municipal water supplies become limited, the town would be under no obligation to meet increase demands for snowmaking. It is also important to note that expanding snowmaking system coverage does not correlate directly with increased water use. Rather, it provides the ski area with the flexibility to use available water for snowmaking where it is needed most. Based on these considerations, in-depth analysis of this issue is not required to determine that there would be no significant impact.

- *How would construction and use of the proposed infrastructure affect wetlands and other jurisdictional Waters of the US?*

Rationale: Scoping and internal, interdisciplinary review raised the issue of potential impacts on any wetlands or other jurisdictional Waters of the US that may occur in the project area. As a first step, we consulted the National Wetlands Inventory (NWI) and National Hydrography Dataset (NHD). The NWI does not show any wetlands within the ski area boundary or the proposed boundary adjustment areas, and the NHD shows only three intermittent stream channel segments. In 2018, the potential wetlands and NHD-mapped stream segments were surveyed in the field for features used by the US Army Corp of Engineers to define jurisdictional Waters of the US such as riparian and wetland vegetation, hydrology and hydric soils, stream channel bed and bank features, and ordinary high-water mark. The survey did not identify any areas meeting the Corps of Engineers requirements for wetlands or relatively permanent waterways. Based on these findings, no Waters of the US exist in the project area, so in-depth analysis of this issue is not required to determine that there would be no significant impact.

1.7.2.2 Vegetation

- *How would construction and use of the proposed infrastructure affect general vegetation and plant communities?*

Rationale: Impacts on general vegetation and plant communities are addressed in the EIS in terms of their effects on other resources values including watershed conditions, wildlife habitat, and scenic values. With these specific effects addressed, this issue does not require further in-depth analysis to determine that there would be no significant impact.

- *How would construction and use of the proposed infrastructure affect special-status plant species?*

Rationale: The US Fish and Wildlife Service IPaC database indicates that no plant species listed as threatened or endangered under the Endangered Species Act occur in the project area. The IPaC database does show that the project area is potential habitat for whitebark pine, a candidate species for listing under the Endangered Species Act. All areas potentially subject to ground disturbance during construction or use of the proposed infrastructure were surveyed in 2018, and no whitebark pine were observed.

The Forest Service's list of sensitive species in the Intermountain Region includes several species potentially occurring at Snow King. The Wyoming Natural Diversity Database and Rocky Mountain Herbarium records were searched for known occurrences of Forest Service sensitive species in the project area, and no occurrences have been reported. The project area does have suitable potential habitat for three sensitive species (crenulate moonwort, puzzling moonwort, and Payson's bladderpod), and those areas were

searched thoroughly on two occasions during the 2018 surveys. No Forest Service sensitive plant species were observed, and the unoccupied habitat was found to be of poor to marginal quality.

Based on these considerations, in-depth analysis of this issue is not required to determine that there would be no significant impact. The biological evaluation being prepared for this project will provide additional discussion.

- *How would the proposed clearing and glading of forest affect the project area?*

Rationale: Forest clearing and glading are addressed in the EIS in terms of their impact on other resources including watershed conditions, wildlife habitat, and scenic values. These analyses will indicate the acreage of forest clearing and grading. With these effects addressed, this issue does not require further in-depth analysis to determine that there would be no significant impact.

- *How would the proposed snowmaking expansion affect vegetation?*

Rationale: While clearing and grading of ski runs obviously affects vegetation, snowmaking has not shown that potential. This is primarily because snowmaking typically involves much less water than natural precipitation and, by definition, is used primarily to offset shortfalls in natural snowfall. Note the EIS does address the impacts of snowmaking on hydrology as well as the effects of snowmaking system construction on vegetation. Based on these considerations, in-depth analysis of this issue is not required to determine that there would be no significant impact.

1.7.2.3 Wildlife

- *How would construction and use of the proposed infrastructure affect general wildlife and wildlife habitat?*

Rationale: As discussed in the introduction to this section, NEPA, the CEQ, and Forest Service regulations direct that an EIS should focus on issues that are relevant to the specific decision to be made and require in-depth analysis to determine whether significant impacts are likely. Accordingly, as discussed above under Issues Carried into In-depth Analysis, this EIS addresses potential impacts on special-status wildlife species and on elk and mule deer winter range. In-depth analysis of impacts on general wildlife species or habitats is not required to determine that there would be no significant impact, as other species are common and lack specialized habitat in the project area.

- *How would construction and use of the proposed infrastructure affect wildlife closure areas in the vicinity of Snow King?*

Rationale: Most winter activities are prohibited in areas around Jackson that have been previously identified as key winter-use or migration areas. The proposed action would not authorize any development or use in these areas, and use of them by ski area visitors would be a violation of the closure regulations, as it is now. Based on these considerations, this issue does not require in-depth analysis to determine that there would be no significant impact.

- *How would the proposed snowmaking and skiing affect subnivean species (those living under the snow)?*

Rationale: As discussed above under Issues Carried into In-depth Analysis, this EIS focuses on special-status wildlife species. Any subnivean species that are federally listed under the Endangered Species Act or identified as Forest Service sensitive species are addressed in the EIS. Beyond that, this issue does not require in-depth analysis to determine that there would be no significant impact.

1.7.2.4 Cultural Resources

- *How would construction and use of the proposed infrastructure affect archaeological resources?*

Rationale: In 2018, the areas subject to disturbance by proposed construction and use (i.e., the area of potential effect) was subject to a SHPO records search and to a pedestrian survey for archaeological

resources. None were located, and a "no effect" was reported to the SHPO. As a result, pending SHPO concurrence with this finding, no in-depth analysis of this issue is required to determine that there would be no significant impact.

1.7.2.5 Land Use

- *How would construction and use of the proposed infrastructure affect the snow course on the summit of Snow King Mountain?*

Rationale: Under permit with the Bridger-Teton, the Natural Resources Conservation Service (NRCS) has operated a snow monitoring course on the summit since 1959. The permit was issued in accordance with a nationwide memorandum of understanding (MOU) between the two federal agencies that directs how such facilities are established and managed, and how conflicts are resolved. Development of the proposed summit learning area would eliminate the snow course, requiring the two agencies to work together, as directed in the MOU, to identify and establish a replacement. This is an administrative matter rather than an environmental one, and it does not require analysis in this EIS.

- *How would construction and use of the proposed infrastructure in the southern expansion area affect private land owners and highway users around the mouth of Leeks Canyon?*

Rationale: The specific issues raised included the potential for trespass onto private land near the canyon mouth, the need for access to the expansion area via Leeks Canyon Road, and the potential for mule deer displaced from the expansion area to create a collision hazard on US Highway 191. In regard to trespass, the Forest Service has no authority to keep the public from traveling down Leeks Canyon, but that potential currently exists, and the proposed development would not create any additional incentive for people to do so. It is roughly 1.4 miles to the fenced and posted private property line, and anyone trespassing would be in violation of state law, as they would be now. As to access via the Leeks Canyon Road, the proposed summit access road would preclude that need. Regarding displaced deer becoming a hazard on US 191, the highway is roughly 1.6 miles from the expansion area, with a wildlife closure area for wintering wildlife in between. While deer on the highway are a serious, ongoing concern, this action would not notably alter current conditions. In short, in-depth analysis of these issues is not required to determine there would be no significant impacts.

1.7.2.6 Recreation

- *How would the proposed infrastructure affect Snow King's pass prices?*

Rationale: Concern was expressed during scoping that completion of the proposed improvements would be expensive, so Snow King might be required to raise pass prices. The concern was that this could potentially price some visitors out and reduce affordable access to lift-served skiing in the Jackson area. However, ticket pricing is determined by the permittee's business model and is subject to limited Forest Service authority. As a result, this issue is outside the scope of the EIS and does not require analysis.

- *How would the proposed buildings affect the services available to winter and summer visitors?*

Rationale: Development of the proposed summit learning area and summer recreational infrastructure would create the need for additional skier service facilities on the summit and elsewhere on the mountain. These would include restrooms, food and beverage service, ski and mountain bike instruction, equipment rental, retail sales of essential items, and ski/bike patrol facilities. We have reviewed Snow King's proposal to provide these services, particularly by developing the summit building, and found them to be adequate pending engineering review of detailed plans prior to construction authorization. Accordingly, all action alternatives would provide the same visitor services, so analysis of this issue would provide no information useful in deciding among the alternatives.

- *How would the proposed mountain bike trail system affect public access to the existing Cache Creek/Game Creek trail system?*

Rationale: As noted above, the Jackson area provides a popular, well-developed and maintained system of multi-use trails, several of which cross or pass near Snow King's permit area. Concern was expressed during scoping that development of new mountain bike trails would result in closure of public trails at the resort, or in fees charged for public use. The proposed action does not include plans for either of these actions. Access to the existing Cache Creek/Game Creek trail system would remain unchanged, as would Snow King's ability to charge for public access to the permit area when that public use involves facilities that the resort pays to build or maintain. No such fees have been proposed. Based on these considerations, this issue does not require in-depth analysis to determine that there would be no significant impact.

1.7.2.7 Safety

- *How would the proposed infrastructure in general affect skier safety:*

Rationale: Scoping commenters pointed out several potential safety benefits of the proposed infrastructure, particularly for children. These included a safer summit lift that would also transport emergency personnel, expanded and improved night lighting, and expanded and improved beginner terrain. These effects are inherent in the stated purpose and need for action and do not require in-depth analysis to document their effect.

- *How would the proposed summit access road/novice skiway affect the safety ski area personnel operating groomers or other vehicles on it?*

Rationale: One objective of the proposed access road/novice skiway is to provide safer summit access for mountain operations personnel. The existing route is steeper and narrower, with more switchbacks to negotiate. In-depth analysis is not required to determine that this would improve this aspect of the safety situation.

- *How would the southern expansion affect skier safety?*

Rationale: A commenter raised concerns about the more remote nature of the back-side expansion and the ability of Snow King to respond effectively to accidents and injuries. However, the area would be subject to the same level of ski patrol surveillance as the existing ski runs, and the proposed Lift A would provide ready summit access for injured skiers and accompanying ski patrollers. From there, the gondola would provide fast transport to the base area. In-depth analysis is not required to determine that this issue does not constitute a significant safety risk.

- *Would the proposed zip line constitute a risk to riders?*

Rationale: The proposed zip line would carry riders from the summit to the base area in a single span, at speeds up to 70 miles/hour. Above-ground height could be up to 50 feet. Commenters expressed concern that collisions or falls could result in serious injury or death.

In accepting Snow King's MDP, the Bridger-Teton considered the appropriateness and safety of the proposed summer recreational infrastructure. Zip lines are increasingly common and popular features at permitted resorts and, while there have been injuries and even deaths, they have been extremely infrequent and far fewer than those resulting from skiing. Beyond that, Forest Service engineering review would be required before construction was authorized. In-depth analysis is not necessary to determine that this issue does not constitute a significant safety risk.

- *Would the proposed mountain bike trails and mountain bike zone pose a risk to users?*

Rationale: While downhill mountain biking, like skiing, has inherent risks, the designers of such facilities have extensive experience in how to build and manage them in ways that reduce those risks. Bike parks are an increasingly common and popular feature at permitted resorts and, while there have been injuries and

even deaths, they have been infrequent and fewer than those resulting from skiing. In-depth analysis is not necessary to determine that this issue does not constitute a significant safety risk.

- *Would increased visitation and vegetation change increase the risk of wildfire?*

Rationale: Some commenters expressed concern that more visitors at the ski area could increase the chance of fire starts, and that infestations of weedy plant species, particularly cheatgrass, following soil disturbance could result in increased rates of fire spread. While more people could result in more careless behavior with fire, this has not proved to be an issue at Snow King or other mountain resorts. Fire prevention campaigns have highlighted the problem, and high levels of use increase detection of irresponsible behavior as well as early detection of fire. Beyond that, existing and proposed ski runs constitute fire breaks, fuel reduction efforts are included in Snow King's Vegetation Management Plan (section 2.5.4.4), and the snowmaking system provides water supplies throughout the permit area. Based on these considerations, in-depth analysis is not necessary to determine that this issue does not constitute a significant safety risk.

- *How would mountain bike use affect the safety of dogs on the trails?*

Rationale: Dog safety can be considered a correlate of human safety, and hikers will not be allowed to use the proposed mountain bike trails. In-depth analysis is not necessary to preclude any significant impact.

- *Would the high-frequency radio waves from the towers on the summit pose a risk to visitors and staff?*

Rationale: Snow King visitors and staff have long frequented the summit with no reported ill effects from radio waves. In-depth analysis is not necessary to preclude any significant impact.

1.7.2.8 Socioeconomic

1.7.2.8.1 Town Character

- *How would construction and use of the proposed infrastructure affect the character of the Town of Jackson?*

Rationale: The EIS addresses a number of more concrete effects on the town (e.g., recreation, visual impacts, and noise), but the desired character of the town is a topic of ongoing debate in the community. As a result, people have divergent individual opinions about the impact of the proposed action, as indicated by scoping results. In this context, objectively assessing town character is not possible, and it would not contribute to a better understanding of environmental effects or a more reasoned decision.

1.7.2.8.2 Employee Housing and Utilities

- *How would the proposed action affect employee housing and utility demand?*

Rationale: Increased infrastructure and visitation would increase the number of Snow King employees as well as demands on utilities from local providers. Employee housing is already a major concern in Jackson, and provision of sufficient water, power, sanitation, and other services is a pressing demand on local government.

Addressing these concerns is an ongoing effort on the part of the Town of Jackson and Teton County. The Snow King base area and lower portion of the mountain are on private land within the Town of Jackson, and the town has developed the *Snow King Resort District Master Plan* specifically to address these socioeconomic and related concerns. The master plan is a dynamic document, and the town, the resort, and other stakeholders are involved in the ongoing process of keeping it up to date as conditions change. The plan establishes employee housing requirements and addressing growing utility demands, and it is based on projected growth at Snow King and in the community at large. Snow King is bound by the master plans stipulations. In short, these issues are in the jurisdiction of the town and county, and those entities are managing them effectively. As a result, they are outside the scope of this EIS.

1.7.2.8.3 Resort Viability

- *What would happen if the proposed action did not result in a viable resort?*

Rationale: The economic performance of Snow King is not a Forest Service matter and will not be addressed in the EIS. However, a viable MDP is a requirement of ski area special use permits, in accordance with the *Ski Area Permit Act of 1986*. We reviewed Snow King's MDP and determined that it met this requirement prior to accepting it and initiating this NEPA review of elements involving National Forest resources. Our intent in issuing this special use permit is to provide the public with diverse recreational opportunities on the Bridger-Teton and supporting our local community, and our permit administration will be directed toward meeting that objective. Beyond that, when special use permits are terminated, the permittee is responsible for removal of facilities from the permit area (FSM 2700 – Special Uses Administration, 2716.2[3]). Based on these considerations, this issue is beyond the scope of this EIS and will not be analyzed in this EIS.

1.7.2.8.4 Project-specific Economics

- *What is the projected use level cost: benefit projection for each element of the proposed action?*

Rationale: It is not clear how analysis of this issue would contribute to understanding the potential environmental effects or to a more reasoned decision. It will not be analyzed in this EIS.

1.7.2.9 Traffic and Parking

- *How would the proposed action affect traffic and parking availability around the base area?*

Rationale: Increased infrastructure and visitation would increase the number of Snow King employees and visitors, with associated increases in traffic and demand for parking in and around the base area. As discussed above, the base area and surroundings are within the Town of Jackson and subject to stipulations of the *Snow King Resort District Master Plan*. In addition to addressing various socioeconomic considerations, that plan assesses the traffic and parking situation, identifies any issues warranting attention, stipulates then takes into consideration studies as needed, and lays out responsive plans. Snow King, like other stakeholders, is subject to those plans. In short, these issues are within the jurisdiction of the town and county, and those entities are managing them effectively. As a result, they are outside the scope of this EIS.

1.8 PROJECT RECORD

The project record contains the technical documentation used to support the analysis and conclusions in this EIS. The project record is available for review at the Jackson Ranger District Office, 340 N. Cache St., Jackson, WY 83001.

1.9 OTHER PERMITS AND AUTHORIZATIONS

Table 1-1 lists the permits and authorizations, beyond Bridger-Teton authorization, that may be required in order for Snow King to implement the proposed action or an action alternative.

Table 1-1. Other permits, approvals, and consultations that may be required for implementation of the proposed action or an action alternative.

Agency	Type of Action	Description of Permit or Action
Federal		
USDA-Forest Service	American National Standards Institute, American Society for Testing and Materials, Architectural Barriers Act, Americans with Disabilities Act, and other code compliance review for lifts and structures.	Final designs for approved lifts and structures go through Regional Office-level engineering review to ensure compliance with applicable codes and agency standards. Ski Lifts and zip lines also require post-construction testing and approvals.
US Environmental Protection Agency	Review and comment regarding: Clean Air Act, as amended, 42 USCA. Section 7410-762 (PL 95-604, PL 95-95) Federal Water Pollution Control Act, as amended by the Clean Water Act, 33 USCA. Section 1251-1376 (PL 92-500, PL 95-217) Safe Drinking Water Act, 452 USCA. Section 300F-300J-10 (PL 93-523)	Under NEPA, the Environmental Protection Agency is required to review and comment on "major federal actions that have a substantial impact on the human environment." The Environmental Protection Agency's responsibility and role is to provide scoping comments, review EISs, and provide information and appropriate technical assistance during and following the environmental analysis process. Specific environmental legislation for which the Environmental Protection Agency is responsible, and which may be applicable to this proposed action, is shown to the left. Administrative and enforcement responsibilities have been delegated to the State of Wyoming for all three acts.
US Fish and Wildlife Service	Endangered Species Act, Section 7 Consultation Fish and Wildlife Coordination Act Consultation	If impacts on federally listed species are possible, the Fish and Wildlife Service will consult with the Forest Service, review a biological assessment, and issue a biological opinion. The Fish and Wildlife Service also coordinates with the Forest Service in accordance with the Fish and Wildlife Coordination Act to avoid adverse impacts to federally listed species.
State of Wyoming		
Department of Environmental Quality: - Water Quality Division	Wyoming Pollutant Discharge Elimination System (WPDES) permit and Stormwater Pollution Prevention Plan	The Water Quality Division review ensures that state and federal water quality standards are not exceeded. This is achieved through issuance of a 5-year WPDES permit for large construction projects which is updated annually to reflect Snow King's plans for construction each year.
State Historic Preservation Office	Consultation on national Historic Preservation Act, Section 106 compliance process	The Forest Service is required to consult with State Historic Preservation Office on cultural resource survey, site recordation, site eligibility determination, determination of project effects on eligible sites, and protocols for inadvertent discovery of historic properties.

Table 1-1 (cont'd). Other permits, approvals, and consultations that may be required for implementation of the proposed action or an action alternative.

Agency	Type of Action	Description of Permit or Action
Teton County		
Fire Marshal	Electrical and Life Safety Review	As a condition of Forest Service construction authorizations, the Teton County Fire Marshal inspects buildings during construction to ensure that wiring and electrical facilities are properly installed and required safety devices such as smoke alarms and sprinkler systems are in place.
Town of Jackson		
Town of Jackson	Building and Grading Permits	In order to construct the base of the gondola and remove the Cougar lift, the Town of Jackson would need to issue permits to ensure compliance with City codes.

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CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter outlines the alternative development process, describes in detail the alternatives carried into in-depth analysis, lists associated design criteria, identifies alternatives considered but not analyzed in depth, then summarizes and compares the environmental impacts of the alternatives analyzed in depth.

2.2 ALTERNATIVE DEVELOPMENT PROCESS

The alternative development process centered on interdisciplinary review of Snow King's proposal, coupled with public input derived through scoping (see section 1.7), to identify which of the environmental concerns to be carried into in-depth analysis in this EIS also warranted consideration in the formulation of alternatives. Four alternatives, including the proposed actions, were developed to address such concerns and standard NEPA requirements. The rationales for development of these four alternatives can be summarized as follows.

- The NEPA-required no-action alternative, Alternative 1, is described first, as it provides the baseline for assessing the impacts of the proposed action and action alternatives (40 CFR 1502.14 [d]). It reflects on-going operations at Snow King without any of the proposed improvements. Accordingly, the effects of this alternative on most resources may not vary appreciably from the EIS's description of the affected environment.
- The proposed action, Alternative 2, is described next. It matches Snow King's June 5, 2018, proposal requesting authorization to implement the first phase of improvements included in their 2017 MDP. This alternative was the subject of public scoping, initiated August 3, 2018. It emphasizes improving recreational opportunities.
- Alternative 3 was developed to balance improved recreational opportunities and resource protection. It addresses concerns regarding the proposed action identified in discussions between the Town of Jackson, a cooperating agency in this EIS process, and Snow King shortly after scoping. Those concerns centered on the recreational and land-use impacts of locating the bottom terminals of the proposed gondola and zip line in town-owned Phil Baux Park. It also addresses effects on the historic landscape at Snow King, which was identified through past analysis as eligible for listing on the National Register of Historic Places, as well as the impacts of lift-served mountain biking on the existing Cache Creek/Game Creek hiking and biking trail system and its users, and the Bridger-Teton's concerns regarding fuel management and fire protection at the wildland/urban interface. Skier-safety, winter big game habitat, visual, and noise impacts identified during scoping were added considerations.
- Alternative 4 was developed to emphasize resource protection while still providing a range of improved recreational opportunities. It addresses the same issues that drove development of Alternative 3, but it provides a greater degree of protection to two primary resources. The first is Snow King's historic landscape and its visual setting. The second is the Cache Creek/Game Creek trail system and its users.

These alternatives are described below, starting with the no-action alternative, Alternative 1. To make the action alternatives that follow as clear as possible, the proposed action, Alternative 2, is described first, in detail, then the subsequent description of Alternative 3 identifies differences from Alternative 2, and the description of Alternative 4 identifies differences from Alternative 3. This sequential approach serves two purposes. It highlights the differences among the action alternatives rather than reiterating similar components, and that in turn provides a guide for the EIS's analysis of environmental effects so that it

unambiguously sets the impacts of the alternatives apart, providing a clear comparison for the public and the responsible official. This is consistent with NEPA direction (40 CFR 1502.14).

To provide a quick reference on the make-up of each alternative, Table 2-1 lists all elements comprised by the four alternatives, indicates which alternatives include each element, and notes any alternative-specific differences in how a given alternative incorporates that element. An alternative summary document with a draft of Table 2-1 and supporting maps was released to the public on October 2, 2019, in advance of this DEIS.

Table 2-1. Summary comparison of elements included in the four alternatives analyzed in depth.

Proposed Improvement	Alternative 1 No Action	Alternative 2 (See Figure 2-1)	Alternative 3 (See Figure 2-2)	Alternative 4 (See Figure 2-3)
Permit Boundary Adjustment				
East Area	No	Yes, 67 acres.	Yes, same as Alternative 2.	Yes, same as Alts. 2 and 3.
West Area	No	Yes, 89 acres.	Yes, same as Alternative 2 except 1 acre less in west-side area due to shifting the southern boundary back to ridge	Yes, same as 3.
Terrain Development				
Teaching Center Terrain	No	Yes	Yes	Yes
New and Modified Ski Runs	No. Existing developed terrain would remain, 135.6 acres.	Yes, 117.8 acres across ability levels. Includes runs 3–14 on the front side, 16–25 on the back side, Lift B and C terrain on the ridge, and modifications of existing Moose, Belly Roll, Upper Exhibition, and Bearcat runs. New total 253.4 acres.	Yes, same as Alternative 2.	Yes, same as Alts. 2 and 3 except runs 3 and 8–12 on the front side would be dropped and runs 4, 5, and 7 on the front side would be gladed rather than cleared to protect historic landscape. Runs 1, 2, and 15 would be added on the front side to offset the resulting loss in trail capacity in balance with the new gondola. Total new terrain 122.2 acres, bringing area total to 257.8 acres.
Grading of Existing Runs (see section 2.4.2.2)	No	Yes, grading to smooth terrain irregularities at six locations on the front side, totaling 5.5 acres.	Yes, same as Alternative 2.	Yes, same as Alts. 2 and 3.

Table 2-1 (cont'd). Summary comparison of elements included in the four alternatives analyzed in depth.

Proposed Improvement	Alternative 1 No Action	Alternative 2 (See Figure 2-1)	Alternative 3 (See Figure 2-2)	Alternative 4 (See Figure 2-3)
Glading (See Figure 2-4)	No	Yes, about 32.7 acres.	Yes, same as Alternative 2.	Yes, same as Alts. 2 and 3 but with 3.8 more acres due to glading rather than clearing runs 4, 5, and 7. Total 36.5 acres.
Summit Access Road/ Novice Skiway				
Summit Gondola Access Road	No. Existing access road would remain in place.	Yes	Yes	Yes
Lifts				
Replace Summit Lift	No. Existing chairlift would remain in place.	Yes, bottom terminal in Phil Baux Park and top terminal near current location.	Yes, but bottom terminal shifted to current Cougar bottom terminal site, top terminal near current location.	Yes, same as Alternative 3.
Lift A (Back-side Quad Lift)	No	Yes	Yes	Yes
Conveyor Lifts	No	Yes	Yes	Yes
Back-side Surface Tow	No	Yes	Yes	Yes
Removal of Cougar Lift	No	No	Yes	Yes
Facilities				
Summit Building	No. Existing summit structures would remain in place	Yes	Yes	Yes
Observatory	No	Yes	Yes	Yes
Removal of Panorama House	No	Yes	Yes	Yes
Removal of Observation Deck	No	Yes	Yes	Yes
Removal of Existing Summit Ski Patrol Building	No	Yes	Yes	Yes

Table 2-1 (cont'd). Summary comparison of elements included in the four alternatives analyzed in depth.

Proposed Improvement	Alternative 1 No Action	Alternative 2 (See Figure 2-1)	Alternative 3 (See Figure 2-2)	Alternative 4 (See Figure 2-3)
Temporary Ski Patrol Building (at Top of Cougar Lift)	No	Yes	No	No
Yurt Camp	No	Yes	Yes	Yes
Wedding Venue	No	Yes	Yes	Yes
Snow King Historical Interpretive Center	No	No	Yes	Yes
Night Skiing				
Expanded Night Skiing	No. Existing coverage of 73.8 acres would remain, covering all existing runs below Slow Trail.	Yes, an additional 27.3 acres, covering Flying Squirrel, Moose, upper Elk, and summit terrain, bringing total to 101.1.	Yes, same as Alternative 2.	Yes, same as Alts. 2 and 3.
Snowmaking Coverage				
Additional Snowmaking	No. Existing coverage would remain, approximately 90 acres, including all existing runs below Slow Trail and Elk run to the summit.	Yes, an additional 147.1 acres covering all remaining existing runs, except the S Chutes, and all new runs developed or modified under this alternative, bringing total to 237.1 acres.	Yes, same as Alternative 2.	Yes, an additional 135.7 acres, covering all runs developed or modified under this alternative except runs 1, 2, 4, 5, 7, and upper 15, bringing total to 225.7 acres.
Summer Activities				
Zip Line	No	Yes, paralleling Summit gondola, landing in Phil Baux Park.	Yes, except landing at Rafferty mid-station. Straight and three-segment options.	Yes, same as Alternative 3.
Downhill Mountain Bike System	No. Existing trails would remain in place.	Yes, approximately 6.5 miles on front side with access from Summit gondola and a 110-	Yes, same as Alternative 2, but with only one trail off the summit to the front side trail	Yes, but front-side trail system only and no back-side mountain bike zone. Front-side trail system shorter

Table 2-1 (cont'd). Summary comparison of elements included in the four alternatives analyzed in depth.

Proposed Improvement	Alternative 1 No Action	Alternative 2 (See Figure 2-1)	Alternative 3 (See Figure 2-2)	Alternative 4 (See Figure 2-3)
		acre mountain bike zone on back side, accessed from Summit gondola and Lift A. Existing Cache Creek/Game Creek trail system also accessible.	system and no lift-served access to the existing Cache Creek/Game Creek trail system. Rider information, trail design/barriers, enforcement, and changes in allowed use of existing trails would be used to restrict lift-served bike use to the dedicated downhill trail system and mountain bike zone	(5.6 miles total length) and mostly in the Rafferty area. Access from the Summit gondola, via a single beginner trail off the summit. Access to the existing Cache Creek/Game Creek trail system prohibited but no change in allowed use of existing trails.
Hiking Trails	No. Existing trails would remain in place.	Yes, improved 0.6-mile Stairway trail and new 1.5-mile trail in the Bearcat Glades area.	Yes, same as Alternative 2 except new hiking trail realigned and shortened to 1.2 miles.	Yes, same as Alternative 3.
Forest Stand Thinning (for Fire Protection and Fuel Reduction at Wildland/Urban Interface; see Figure 2-4)	No	No	Yes, 154.2 acres, involving most front-side forested areas, including some proposed for glading for skiing purposes.	Yes, same as Alternative 3. Acreage of 147.8 differs from Alternative 3 due to differences in overlapping ski run configuration between Alts 3 and 4.
Road and Trail Obliteration (See Figure 2-5)	No	Yes, 1.1 miles of roads, including all but the top section of Elkhorn Trail and an unnamed service road and user-created hiking trail on the lower front side, made unnecessary by the proposed summit access road/novice skiway.	Yes, with an additional 0.9 miles (2 miles total) of roads/trails, including Slow Trail and Fast Trail, made unnecessary by removal of Cougar lift.	Yes, same as Alternative 3.

It is important to note that some elements of Snow King's proposal would be located on land belonging to the Town of Jackson, and their construction would be subject to all pertinent review and permitting requirements of the Town of Jackson, including but not limited to grading and building permits. These elements include the proposed bottom terminal of the gondola under Alternatives 2, 3, and 4 as well as the zip line bottom terminal under Alternative 2.

Beyond that, planning for the base area is ongoing, involving the Town of Jackson, Snow King, and other stakeholders. The analysis documented in this EIS is based on what the Bridger-Teton and cooperating agencies, including the Town of Jackson and Teton County, identified as the most likely scenarios when the analysis was being completed. Elements of Snow Kings proposal that are sited on lands beyond the National Forest boundary could change as a result of this ongoing planning effort.

2.3 ALTERNATIVE 1 – NO ACTION

NEPA requires that an EIS includes a no-action alternative to provide a point of comparison for the impacts of the proposed action and action alternatives (40 CFR 1502.14 [d]). In this case, the no-action alternative is defined as continuation of current operation and maintenance activities on National Forest System lands at Snow King, with no further infrastructural development or operational changes. Any anticipated planning and development on private lands on the lower portion of the mountain and base area that are not subject to Forest Service jurisdiction would proceed. Comfortable carrying capacity would remain at 1,580 people. Existing infrastructure is shown on the maps below illustrating the proposed action and action alternatives.

2.4 ALTERNATIVE 2 - PROPOSED ACTION

The elements of the proposed action are described in detail below. Figure 2-1 illustrates proposed winter and summer infrastructure with the exception of lighting for night skiing and snowmaking which are described in text. The proposed permit area adjustments are also displayed. Proposed glading and forest stand thinning are shown on Figure 2-4 and proposed obliteration of existing service roads and user-created trails are shown in Figure 2-5. Construction of authorized elements would begin within 5 years following approval, but full implementation could take longer (see section 2.4.9 Timing, below).

Section 3.2 provides additional detail on the projected disturbance associated with each element of the proposed action. Table 3-1 in section 3.1 shows the basic dimensions of disturbance associated with various types of elements (e.g., lift towers or mountain bike trails). These dimensions were used in calculating element-specific disturbance areas in Table 3-2.

In the descriptions below the terms "run" or "ski run" refer to wider ski routes where the skier is moving primarily down the fall line. The term "skiway" refers to a narrower ski route where the skier is moving primarily across the fall line. The purpose of ski runs is recreation whereas the purpose of a skiway is access from one place to another. The term "trail" refers to a very narrow route that is used for hiking or biking, or both. As the term is used below, recreational use of trails occurs primarily in the summer.

2.4.1 SPECIAL USE PERMIT BOUNDARY ADJUSTMENT

Snow King proposes adjustments to both their operating boundary and their special use permit boundary. These boundary adjustments are necessary to resolve the current lack of terrain for beginner, novice, and low intermediate skiers. Snow King currently offers 17.1 acres in these three categories, and as detailed below this proposal would add 37.7 acres of beginner, novice, and low intermediate terrain. Attracting, accommodating, and advancing beginning skiers is critical not only to Snow King but also to the community. Local ski school programs, the Jackson Ski and Snowboard Club, and Coombs Outdoors' effort to involve underprivileged children in mountain recreation would not be feasible without Snow King, but they remain severely limited by this lack of low-ability-level terrain. To meet Snow King's desire in sustaining these programs and the desire to meet public recreational needs, a quality teaching center and appropriate terrain to support efficient, step-wise skier progression are essential.

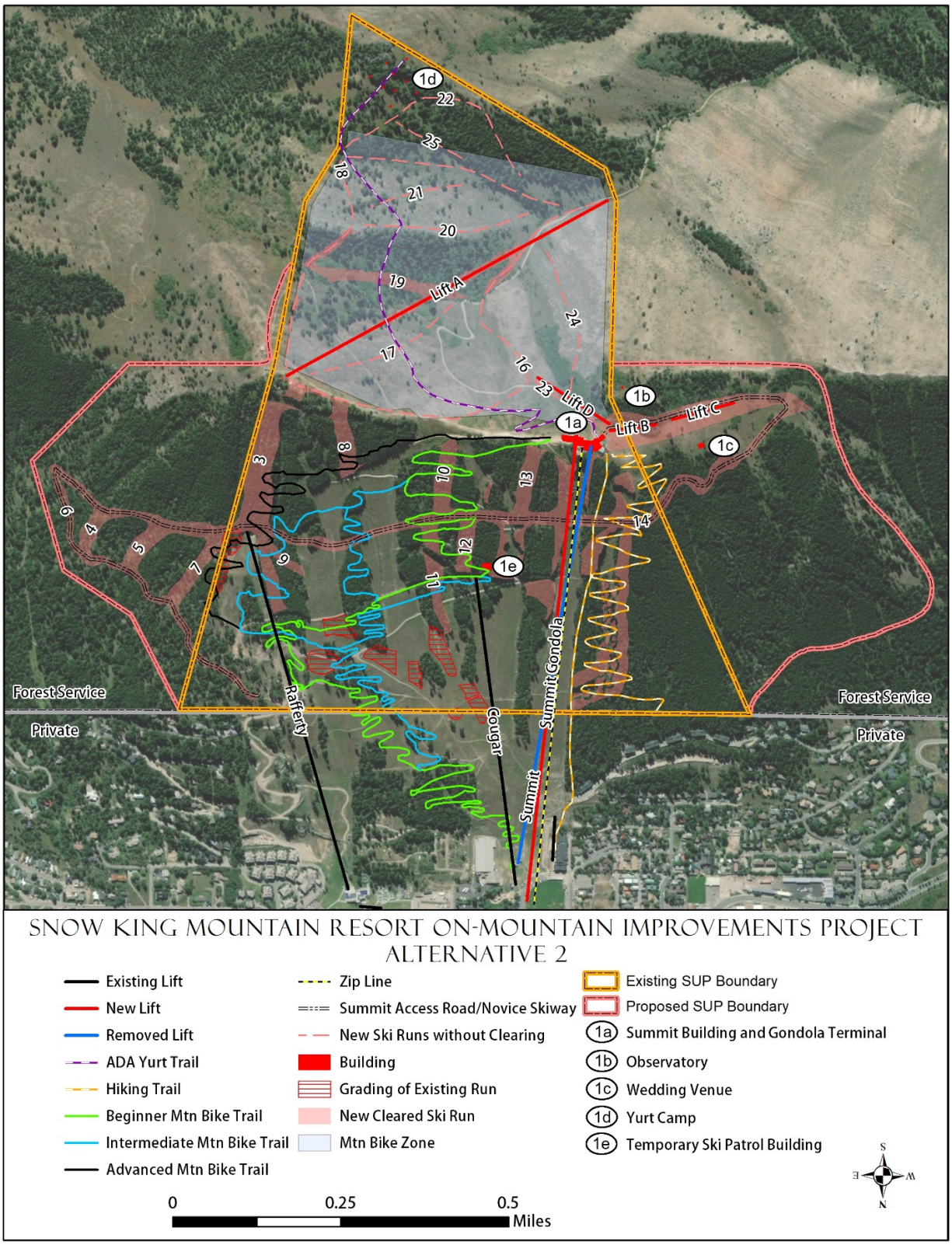

Figure 2-1. Alternative 2 – all elements except snowmaking, night lighting, and glading.

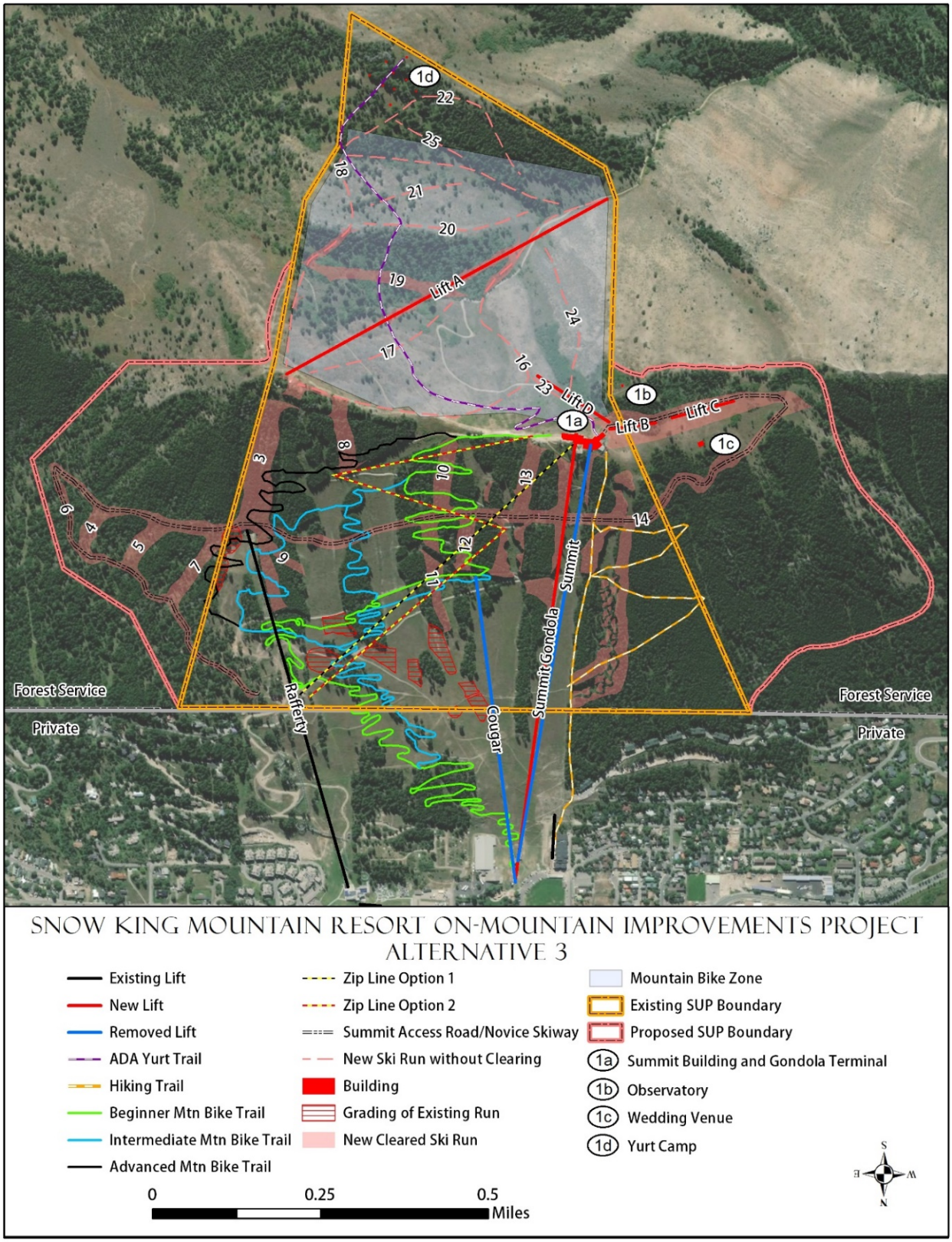

Figure 2-2. Alternative 3 – all elements except snowmaking, night lighting, and glading.

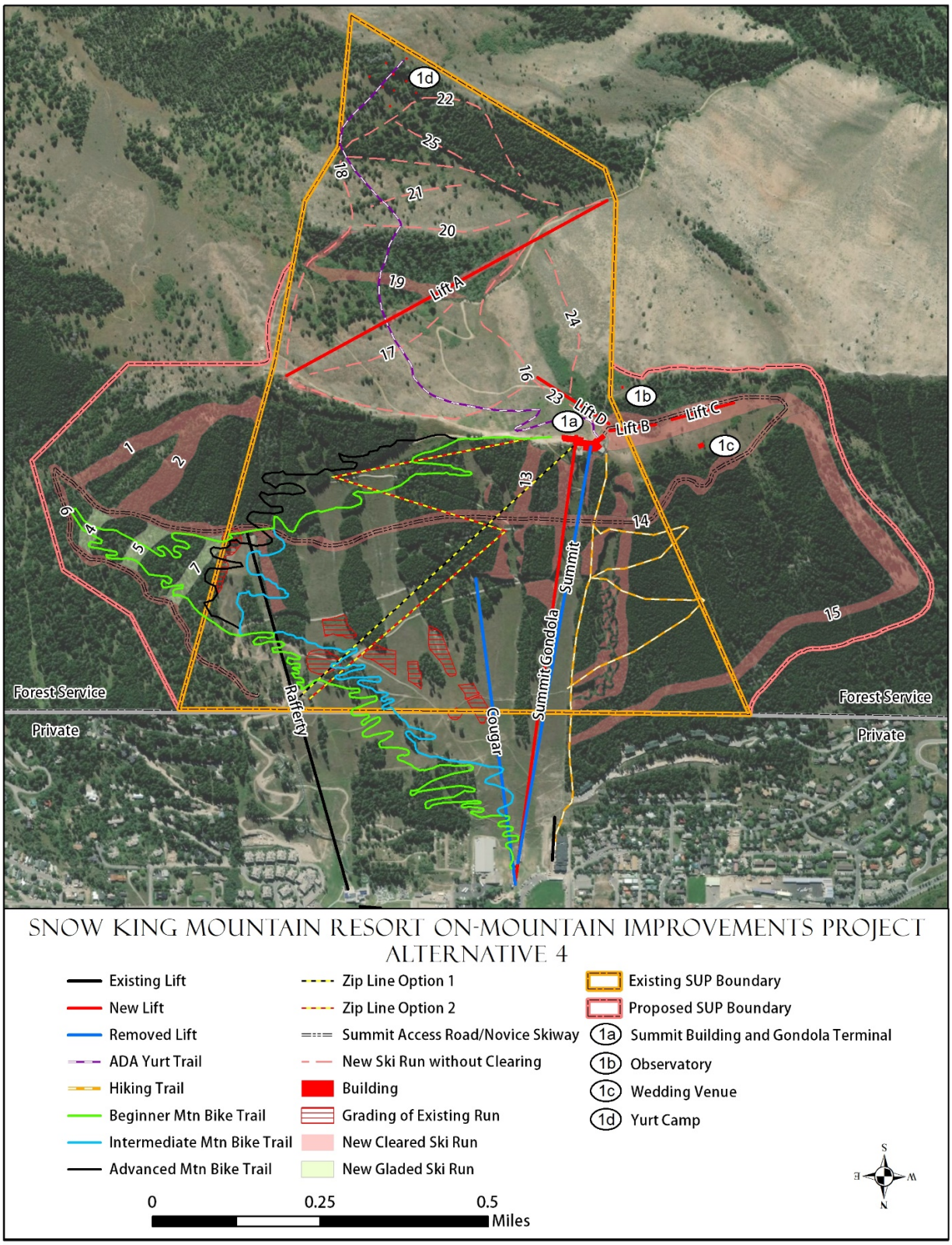

Figure 2-3. Alternative 4 – all elements except snowmaking, night lighting, glading, and thinning.

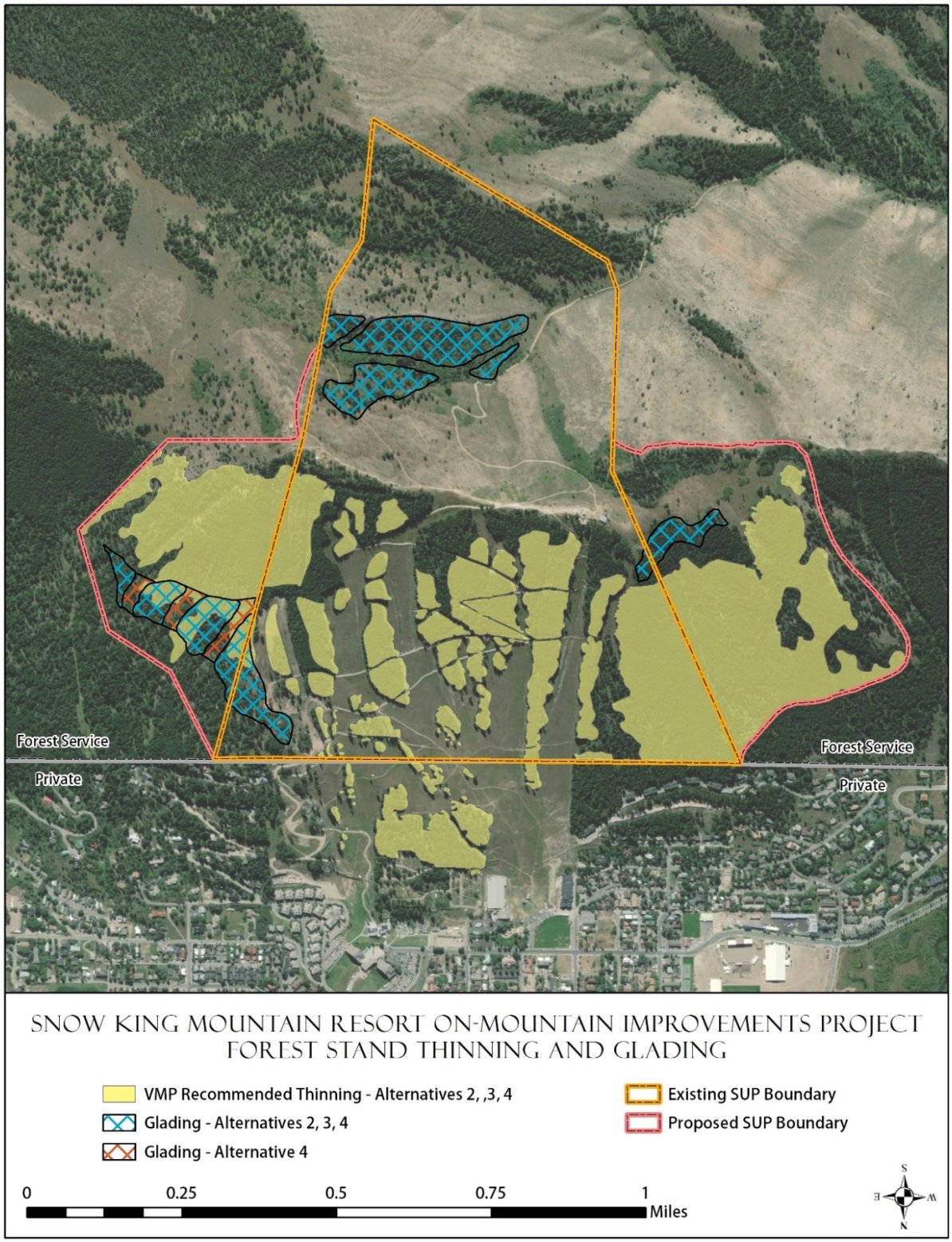

Figure 2-4. Glading and forest stand thinning for fuel fire protection and fuel reduction at the wildland/urban interface.

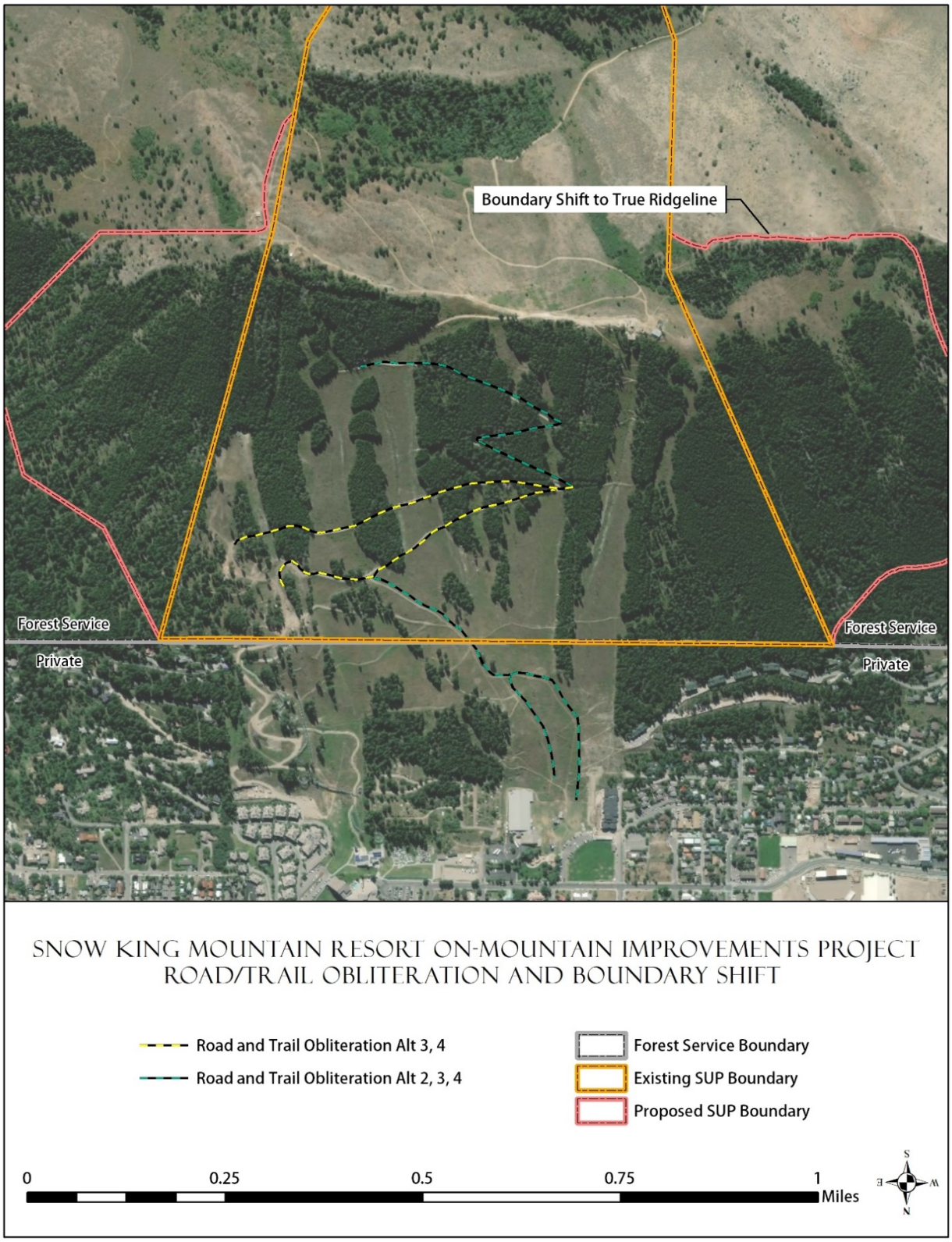

Figure 2-5. Obliteration of existing service roads and user-created trails.

From a planning standpoint, topography and past development preclude increasing these terrain types within the existing operational boundary. Based on thorough analysis, development of terrain along the ridgeline west of the Snow King summit and on the back side is the only feasible option. The base area is already fully developed, and other than the ridgeline and back side, appropriate, low-angle terrain does not exist within or adjacent to the current permit boundary.

The existing permit boundary includes 142.5 acres south of the Snow King ridgeline which would be added to the operational ski area boundary. The proposed action would expand winter and summer operations, including lifts, ski runs, and a mountain bike park (see details below), into this currently permitted area.

Development of the summit and back-side terrain would require, at a minimum, a beginner friendly and downloadable lift accessing the summit, a skier-service and ski patrol building on the summit, an access road to build and maintain summit facilities, and a safe, "easy way down" to the base area in the event of lift failure.

As discussed in more detail below, the proposed teaching area and associated infrastructure would require new special use permit terrain both east and west of their existing front-side operations. Those additions, in turn, set the stage for other improvements not directly associated with the teaching center that are included in the proposed action and discussed below.

The eastern permit boundary adjustment would add approximately 67 acres. In addition to accommodating a segment of the required summit access road/novice skiway, this area would provide three new short intermediate runs, glade skiing between these runs, and a beginner route down from the top of Rafferty lift via the summit access road/novice skiway.

The western boundary adjustment would add approximately 89 acres to Snow King's permit area, for a total adjustment of 156 acres. In addition to allowing development of the critical teaching center on the ridge, it would accommodate another segment of the summit access road/novice skiway. Glading would open the forested area between the westernmost access road/novice skiway switchbacks to expert tree skiing.

Snow King visitors increasingly venture into this currently unpatrolled and unmaintained western area. Including this area in the permit would allow Snow King to control and patrol it, making it safer for guests of Snow King and the Bridger-Teton. Together, these proposed boundary adjustments would expand the permit area from 369 to 525 acres.

2.4.2 TERRAIN DEVELOPMENT

Ski run development within the expanded ski area boundary (i.e., current and adjusted permit boundary and private land) would add the following acreage by ability level:

- Beginner – 3.9 acres
- Novice – 33.6 acres
- Low Intermediate – 4.1 acres
- Intermediate – 25.2 acres
- Advanced – 24.5 acres
- Expert – 26.5 acres

These new runs would total 117.8 acres (Figure 2-1). They would be cleared of trees and tall shrubs then graded where necessary to remove terrain irregularities and allow winter grooming.

2.4.2.1 Teaching Center Terrain

Snow King has a deficit in beginner and novice terrain, and dedicated teaching terrain is insufficient. Currently, lower ability level skiers are limited to a small amount of suitable terrain around the base area, mostly on private land. This restricts Snow King's capability to introduce and recruit new skiers to the

sport. The inability to visit Snow King's summit also limits beginner skiers' recreational experience and their exposure to National Forest System lands visible and accessible from the summit.

Development of the summit teaching center would add 3.9 acres of beginner terrain (Figure 2-1, Runs Lift-B and Lift-C) on the ridge, west of the gondola terminal and summit building. Once beginners had the basic ability to move on their skis, they would have ready access to 33.6 acres of novice terrain from the summit. This includes Runs 16 and 23 on the back side and Runs 14 and 6, the access road/novice skiway providing an easy way down from the summit to the base area.

This terrain combined with gondola access and the proposed conveyor carpets (discussed below under Lifts), and with the nearby summit building providing guest services and housing the ski school (discussed below under Summit Building), would vastly improve the experience Snow King provides to beginner and novice skiers. The proposed development would benefit the learning progression and the instructors' teaching abilities, would maximize new skiers' recreational access and exposure to National Forest resources, and would bolster visitors' connection to their public lands. Developing teaching terrain at the summit would extend the season for beginner and novice skiers and avoid the soft and variable snow conditions at lower elevations late in the ski season. The proposed teaching terrain is effectively separated from higher ability level terrain, avoiding the potential problems of mixing skiers of differing ability levels.

2.4.2.2 New and Modified Ski Runs

The next step in skier skill progression requires low intermediate terrain. Runs 4, 5, and 7 would provide 4.1 addition acres of low intermediate terrain in the eastern adjustment area, accessed from the summit or the top of Rafferty lift via the access road/novice skiway. About 25.2 acres of intermediate terrain would be developed, primarily in the back-side bowl (Runs 18, 19, 20, and 22). This would add to the terrain progression available from the summit learning area.

New advanced terrain would total about 24.5 acres, comprising Runs 17, 21, 24 and 25 on the back side and modification of Moose run on the front side.

Additional expert terrain would include new runs 3 and 8–13 as well as modifications to widen and clear Belly Roll, Upper Exhibition, and Bearcat/Bearcat Glades and to improve skier access and circulation in the Summit pod. Collectively, these new runs and modifications of existing runs would comprise 26.5 acres of new expert terrain.

In addition to the grading and leveling required for the development of the new runs, some grading of existing runs is needed to enhance ski race training lanes and decrease snowmaking requirements. The grading would occur on a total of 5.5 acres in nine areas:

- The top of Flying Squirrel would be graded to remove a prominent knob that impedes skier flow. This would involve 1 acre.
- The area between Grizzly and Kelly's Alley, where Karen's Way is located, would be regraded to eliminate the road and improve skier flow, involving 0.9 acres.
- An area at the top of the Lower Grizzly run would be regraded to improve the transition below a service road, involving 0.7 acres.
- Two areas would be regraded on the Old Man's Flats run. Material would be cut from the lower area and used to fill the upper area. This would involve 1.1 acres.
- A 0.9-acre area between the Lower Elk and Bison runs would be regraded to fill erosional depressions.
- Three areas near the confluence of the Bison and Old Man's Flats runs would be regraded to remove a high spot and smooth the transition near a summer trail. This would involve a total of 0.9 acres, including 0.6 acres on National Forest System land.

A small amount of clearing (less than 0.1 acres) would take place on the uphill margin of the existing Old Man's Flats run.

2.4.2.3 Glading

The northern exposure of the front side and extensive forest cover result in excellent opportunities to develop intermediate- to expert-level tree and glade skiing. This type of off-piste skiing is growing rapidly in popularity, and the proposed permit area adjustment, upgrade of the Summit lift, and development of back-side infrastructure create the potential to respond to that demand.

This proposal includes glading on the back side (15.8 acres) and the east and west boundary adjustment areas on the front side (13.3 and 3.6 acres, respectively). Glading prescriptions would be developed in conjunction with the Bridger-Teton and included in annual summer operations plans subject to Bridger-Teton approval prior to any additional glading. Glading prescriptions are discussed in the 2015 *Snow King Mountain Resort Vegetation Management Plan* (Vegetation Management Plan), and the general goal for gladed terrain is a spacing of 15 to 18 feet between trees. In many cases, this may not require much tree removal, but it would certainly involve brushing and limbing, as well as removal of any diseased or hazard trees.

2.4.3 Summit Access Road/Novice Skiway

Proposed development on the summit would require an access road for construction, operations, maintenance, and emergency services. As discussed above, a novice skiway from the summit to the base is essential to get lower-level skiers from the summit to the base area in the event of a lift failure. This element of the proposal would meet both needs. In addition, it would provide an easy way down from the top of Rafferty lift, which does not currently exist.

As demonstrated in the MDP, options considered during the planning process attempted to keep the access road/novice skiway within the existing permit area or in either the eastern or western permit boundary adjustment areas. However, the best solution to providing appropriate grades, i.e., 10 percent or less, for both construction access and a novice skiway, and to minimize the amount of ground disturbance to achieve these goals, is the current proposed alignment. (See section 2.7.3 Access Road Alternatives).

The proposed alignment follows the gentle grades down the ridge west from the summit to a point near the western boundary of the adjusted permit area. From there it turns eastward, traversing across the front side of the mountain in one continuous span to the top of the Rafferty lift (Run 14), then continues on to near the eastern boundary of the adjusted permit area (Run 6). At that point, it turns back to the northwest to tie into the existing road and run network near the northern boundary of the current permit area. This section would be bench cut to achieve a running surface width of 16 feet. Cut and fill areas would widen the area of disturbance to an average of about 90 feet.

This alignment significantly improves on-mountain safety and circulation, and minimizes impact in terms of disturbance area, visual effects, and impacts on existing ski terrain, since it simply crosses the face once, without any switchbacks within the current permit boundary.

2.4.4 Lifts

2.4.4.1 Summit Gondola

As discussed above, a beginner-friendly and downloadable lift access to the summit is a requirement for developing the new teaching area. An upgraded lift would also help serve the added front-side ski terrain and provide summit access for non-skiing winter and summer activities (e.g., dining and events at the proposed summit building and proposed summer recreation and educational activities, including mountain biking). The top terminal would be incorporated into or adjacent to the summit building described below, as would the gondola storage/maintenance shop.

The Summit lift would be upgraded to a 1,500 person-per-hour (pph) gondola. Note that this is maximum design capacity. Actual operating capacity would be managed to match demand by varying lift speed and number of cabins. The new lift would: provide two-way summit access for beginner skiers and pedestrians

year-round, including evenings; improve overall ski terrain access; and reduce waiting time in the lift line. With the installation of the gondola, the bottom terminal of the existing Summit lift would be removed, as would the pumphouse adjacent to it. The new lift would extend about 200 feet farther downhill, into Phil Baux Park, to improve access to the terminal.

2.4.4.2 Lift A

As depicted on Figure 2-1, Lift A would service novice, intermediate, and advanced terrain on the back side. This top-drive, fixed-grip, four-person chairlift would have a slope length of approximately 3,015 feet and a capacity of 1,800 pph. From the top terminal, skiers would have access to one novice run, four intermediate runs, three advanced runs, and six expert runs. Utilities would be provided via connections from the summit building. There is existing road access to the bottom terminal. Some maintenance work on the road may be necessary.

2.4.4.3 Conveyor Lifts

Two conveyor carpets (Lifts B and C) at the summit would serve the new beginner terrain on the ridge west of the summit building. Lift B would be 363 feet in length and Lift C would be 506 feet in length. Each would have a capacity of 600 pph. These lifts would be located in close proximity to the proposed summit building. Power would be extended from the summit building.

2.4.4.4 Back-side Surface Tow

Lift D would be a surface tow (e.g., a platter or T-bar type) to take skiers from the Lift A pod back to the summit building. Following Run 23, it would be 679 feet long, with a capacity of 300 pph. Power would come from the summit building.

2.4.5 FACILITIES

2.4.5.1 Summit Building

Guest services (e.g., food/beverage service, restrooms, and basic retail sales), ski patrol facilities, and ski school functions are proposed on the summit to support development of a quality learning area, and gondola access to the site would open a range of year-round recreational possibilities. The summit building is proposed as a state-of-the-art, LEED-certified, on-mountain resort facility to meet the changing desires and expectations of Snow King, community, and regional markets.

This facility would provide multiple functions, including gondola terminal, ski school, food service (dining/cafeteria/bar/lounge), restrooms, planetarium, ski patrol (headquarters, patient assessment space, warming area, and limited equipment storage), employee space/storage, and ticketing for summer activities. These functions are currently not provided on-mountain, and the proposed facility would take Snow King to a new level in terms of guest services and experience. To include all of these functions, the summit building would be 20,000–25,000 square feet in size. It would be a single story and set back from the skyline, and it would be designed and built in accordance with the Forest Service's *Built Environment Image Guide* (Forest Service 2007; https://www.fs.fed.us/recreation/programs/beig/) and its stipulations for the Rocky Mountain Province. It would employ dark sky designs and operating practices such as minimal exterior lighting, appropriate bulbs and downcast reflectors, no exterior lights on after operating hours, and non-reflective glass

This development would also require a septic line to the summit area, which would be collocated with the buried snowmaking line running up Exhibition run. Snow King currently has water and power connections to the summit.

Construction of this building would require removal of three existing summit structures: Panorama House, the ski patrol building (formerly the top drive building for the original Summit lift), and the observation deck (formerly the unloading dock for the original Summit lift).

2.4.5.2 Observatory

An observatory building approximately 500 square feet in size would be located south of the summit building. It would be used year-round for stargazing, research, and educational purposes.

2.4.5.3 Temporary Ski Patrol Building

Until the new ski patrol facilities in the summit building were completed, a small, temporary, pre-built, pull-on structure would be installed at the top of the Cougar lift as a base for the ski patrol operations during night skiing. This would allow the patrol to station people at the top of the lift for rapid response when only the lower portion on the mountain was open. Some leveling may be done, but no foundation would be necessary. Power would come from the top of Cougar lift. It would be designed and built consistent with the *Built Environment Image Guide* stipulations and would be removed once the summit building was complete.

2.4.5.4 Yurt Camp

A new *Americans with Disabilities Act of 1990* (ADA) compliant yurt camp would be constructed on the back side at the far south end of the existing permit boundary. A 1-mile ADA compliant trail connecting to the summit of Snow King would access this facility. The yurt camp would consist of approximately six yurts for sleeping and three multi-use cooking/dining/gathering yurts. These yurts would range in size from 20 to 30 feet in diameter with additional deck space. This year-round camp would serve backcountry skiers, hikers, bikers, and a wide range of groups. No commercial overnight accommodation would be offered, but overnight group activities would be accommodated. This offering of a wilderness-like experience only a short walk/ski from civilization would attract a wide range of visitors seeking a unique activity during their visit to Jackson. This facility would be unique in the region due to the ease of access, spectacular setting in the National Forest, and number of activities offered.

2.4.5.5 Wedding Venue

In conjunction with the summit building, a wedding venue would be constructed a few hundred feet west of the new building. This would be an in-ground facility, constructed with stone benches/tiers in a semi-circle around a raised platform. A trail roughly 400 feet long, spurring off an existing trail, would be constructed to access the wedding venue from the Summit Building.

2.4.6 Night Skiing

At present, Snow King offers night skiing on approximately 73.8 acres of night skiing on the lower two-thirds of the mountain, in the Rafferty and Cougar pods. This is primarily intermediate ability-level terrain, with some advanced and beginner terrain. Until recently, approximately 50 lights were mounted on a variety of structures including trees, lift towers, light poles, and buildings. Coverage was limited, and the technology was obsolete. This was a particular impediment to race training, which occurs in the evening after school hours. Good lighting is an important safety factor in race training. A general system upgrade was implemented in 2015 and remains underway, replacing lighting fixtures with more efficient models designed to increase lighting of the snow surface but reduce light pollution (glare and sky glow).

Under this proposal, Snow King would expand lighting coverage using this upgraded technology. Additional lighting would be provided on the racing lanes in the Cougar pod, and lighting would be extended to the top of the Rafferty pod (Flying Squirrel and Moose runs), the top of Upper Elk run, Lift B and C terrain, and the proposed access road/novice skiway. No night skiing is proposed on the back side. Overall, this proposal would increase system coverage by 27.3 acres across all skier ability levels to meet demand for this unique experience and provide for safe and effective race training.

2.4.7 SNOWMAKING

Snow King's snowmaking system covers approximately 90 acres of the ski area, in the Rafferty and Cougar pods, as well as to the top of Elk run. This system is served by two 1,000-gallon-per-minute (GPM) pumps in the main pump house and is fed by domestic water provided by the Town of Jackson.

To provide more consistent, season-long snow coverage over a wider area, Snow King proposes to expand coverage on both existing and proposed runs. Coverage would be added on all existing front-side runs except East and West S Chutes, and all proposed front-side and back-side runs, except Run 9. This would result in approximately 147.1 acres of additional snowmaking coverage.

Water lines would be installed on the upwind side of covered runs, in excavated trenches approximately 4 feet deep. Snowmaking hydrants would be plumbed in adjacent to these main snowmaking lines. Snowmaking guns or hose lines would be attached to these hydrants. All water would continue to be supplied by the Town of Jackson. At some point in the future, Snow King may investigate alternative sources of snowmaking water, including wells. However, this possibility is speculative and not covered in this analysis.

2.4.8 SUMMER ACTIVITIES

The Snow King MDP documents the "activity zone" analysis completed as part of their planning process, in compliance with the *Ski Area Recreational Opportunity Enhancement Act of 2011*. The following proposed summer activities would not change or compromise existing winter snow sports, nor exceed the level of development required for snow sports, but are designed to integrate with and supplement the primary purposes of the ski area. Hiking and biking trails would generally not be collocated with ski runs but may intersect them. Year-round use of the summit building, observatory, and other support facilities would complement these activities. See Figure 2-1.

2.4.8.1 Zip Line

Expanding on current summer operations, Snow King proposes a zip line from the proposed summit building to the base area, paralleling the Summit lift. This project is consistent with the 2013 Jackson Town Council amendment to Snow King's land use lease to include "additional recreational uses related to ski areas such as zip lines, mountain bike trails and other outdoor amenities." This would be an attractive amenity, as guests would quickly descend approximately 1,555 vertical feet, over a distance 3,900 linear feet, at a 48 percent grade to the base area. Guests would ride the new Summit gondola to reach the summit station of the proposed zip line and terminate at the west base area.

2.4.8.2 Downhill Mountain Bike System

Lift-served downhill mountain biking is among the fastest growing summer activities at mountain resorts in the US and abroad. Not surprisingly, demand for this activity is particularly high in the Jackson area. To meet this demand, Snow King proposes to develop a system of lift-served trails on the front side and a more consolidated mountain bike park-type "mountain bike zone" on the back side. In addition to these dedicated downhill mountain bike facilities, lift-served bikers would also have access to the existing Cache Creek/Game Creek trail system on National Forest System land within and adjacent to the ski area.

The front-side trails would include an advanced and a beginner trail angling down from near the top of the Summit lift to near the top of the Rafferty lift. These would be smooth, excavated trails with a 4-to-5-foot tread. Spurs of narrower hand-built, single-track trail with constructed terrain features would depart from the excavated trails and drop more directly down the slope. At about the elevation of the top of Cougar lift, these upper-mountain trails would merge into a beginner and an intermediate-level excavated trail. These two trails would subsequently merge into a single beginner-level excavated trail crossing the toe of the slope down to the west base area. An easy trail connection would be provided from the top of Lift A to direct riders back to the top of the Summit gondola.

The front-side bike trail system would total about 6.5 miles, including approximately 1.8 mile of advanced trail (all on National Forest System land), 2.7 miles of intermediate trail (2.5 miles on National Forest System land), and 2.0 miles of beginner trail (0.9 miles on National Forest System land).

On the back side, a skills park and a network of trails of differing types and ability levels would be developed within a roughly 110-acre mountain bike zone. This area would be accessed via the Summit lift, and uphill transit within it would be provided by the proposed Lift A.

The proposed trail designs are conceptual. The exact alignments, lengths, and difficulty levels of trails may change when developed to achieve desired grade and location with respect to existing, site-specific, terrain features. Intersections with existing cross-country trails would be designed to promote the safety of riders on both the existing and new trails (section 3.11).

2.4.8.3 Hiking Trails

Due to Snow King's close proximity to a fairly populated, residential area of the Town of Jackson, there has been long-standing local interest in maintaining an uphill hiking trail at the ski area. To accommodate this interest on National Forest System lands, Snow King proposes to improve the Stairway trail, including portions in the western permit boundary adjustment area. A direct ascent route to the summit would be created in the trees along Exhibition run to eliminate erosion problems associated with community trails that have been created in this corridor. This 0.6-mile trail (0.4 miles on National Forest System land) would cater to the many trails users who demand a challenging workout ascending the mountain. In the winter months, this route would serve as the designated direct boot-pack ascent route.

In addition, a new approximately 1.5-mile uphill hiking trail to the summit would be developed just west of the Stairway trail in the Bearcat Glades area, extending into the western permit boundary adjustment area near the top. With an approximate grade of 13 percent, it would create an improved experience for hikers seeking to ascend the mountain via a less direct route. This trail would route trail users off the face of the mountain where service roads provide access to the summit and create potential safety concerns. In winter months, this trail would serve as the primary designated uphill ski route. Taking uphill skiers off the main ski runs in winter would reduce conflicts between uphill and downhill skier traffic, as well as limit the interaction between uphill skiers and grooming operations at night.

2.4.8.4 Road and Trail Obliteration

Several existing mountain access roads and trails would be unnecessary once the summit access road/novice skiway was complete, and they would be obliterated. They include all but the uppermost portion of Elkhorn Trail as well as a lower service road and several user-created hiking and biking trails on the front side that pose resource-management concerns (Figure 2-5). These roads and trails total about 1.1 miles and would be progressively removed as associated elements are completed. Other user-created trails may be identified and obliterated as part of this process. All would be regraded to restore a more natural contour and revegetated.

2.4.9 TIMING

Implementation of these project elements is anticipated to begin within 5 years following authorization, but full implementation may take longer.

2.5 ALTERNATIVE 3

This alternative was developed to address the following environmental concerns associated with the proposed action while still meeting the proposed action's recreational opportunity objectives:

- The recreational effects of locating the bottom terminals of the proposed gondola and zip line in Phil Baux Park.

- The effects of lift-served mountain bike access to the summit of Snow King Mountain on the recreational experience of hikers and bikers using the existing Cache Creek/Game Creek trail system.
- The effects of proposed improvements on the eligibility of Snow King's historic landscape for listing on the National Register of Historic Places.
- The Bridger-Teton's concerns regarding fire protection within with fuel management and fire protection at the wildland/urban interface.
- The impact on skier safety of an additional road–the proposed summit access road/novice skiway–crossing the front-side ski runs.
- The impact on big game winter habitat on the back side of Snow King Mountain.
- The visual effect of additional infrastructure on the already highly developed front side of Snow King Mountain.
- The quality and sustainability of proposed Bearcat Glades hiking trail in terms of alignment, maintenance, and erosion control.
- The noise the proposed zip line might generate at the base area.

In response to these concerns, Alternative 3 alters elements under the headings of boundary adjustment, lifts, facilities, and summer activities relative to Alternative 2. Terrain development, summit access road/novice skiway, night skiing, and snowmaking coverage would remain the same as Alternative 2.

2.5.1 BOUNDARY ADJUSTMENTS

This alternative would shift the southern boundary of the western boundary adjustment area to the actual ridgeline (Figure 2-2) to reduce the amount of potential human activity visible to deer and elk wintering on the south-facing slopes of Leeks Canyon, west of the proposed back-side development. This would reduce the western adjustment area by 1 acre. An intervening sub-ridge visually screens the rest of the proposed back-side development from view. Under Alternative 2, this boundary extends about 100 feet further south, to the other side of the Snow King Mountain ridgeline.

2.5.2 LIFTS

2.5.2.1 Summit Gondola

The gondola bottom terminal would be moved from Phil Baux Park to the site of the current Cougar lift bottom terminal. Beyond this change, the gondola would remain as described above under Alternative 2, other than being slightly shorter in the shifted alignment. Access and utilities are already in place at the Cougar bottom terminal site. The site was previously disturbed. No further clearing would be required, as the minor widening of Exhibition run near the top on the east side, which would occur under Alternative 2, would accommodate the revised alignment.

This modification is intended to reduce adverse impacts on recreation at Phil Baux Park. Accessing the gondola from the parking lot would require a slightly longer walk.

2.5.2.2 Cougar lift

The Cougar lift would be removed and may be reinstalled on the back side as Lift A. Top and bottom terminals and lift towers would be removed. Tower bases would be demolished to below ground level. The top terminal and tower sites would be backfilled and restored. The Cougar lift would be configured to match the specifications outlined above under Alternative 2 if it were reinstalled as Lift A.

Access to the ski terrain currently served by the Cougar lift would be via the proposed gondola, which would provide a shorter ride time (4 minutes v. 7 minutes), in a warmer cabin, with increased safety and access to the Cougar terrain via the proposed summit access road/novice skiway. Once the existing access

road to the top of Cougar was obliterated (discussed below under Summer Activities), the Cougar terrain would not be crossed by the road, providing uninterrupted runs and improved racecourses for the ski club.

Removal of the lift and access road are intended to reduce the visual effect of infrastructure on the front side of the mountain. Obliterating the existing access road is also intended to improve skier safety.

2.5.3 FACILITIES

A historic cabin built by the Civilian Conservation Corps near the summit of Snow King Mountain lies adjacent to the proposed ski school/teaching center on the ridgeline west of the summit. Under this alternative, the cabin would be developed as an interpretive center showcasing Snow King's history with photographs and other materials dating back to the early days of the ski area. The displays would include photographs of the historic layout of ski runs on the front side, helping to minimize the impact of the new runs in the historic landscape area proposed under this alternative.

If necessary to protect its historic integrity, the building would be moved to a site adjacent to the proposed observatory (see Alternative 2). The intent is to preserve this historic building as well as documenting the ski area's past. This building may be used as an interpretive facility to inform the public about the ski area's historic past. The proposed summit building may also include interpretive displays of the ski area's history.

2.5.4 SUMMER ACTIVITIES

2.5.4.1 Zip-line

The bottom terminal of the zip line would be moved from Phil Baux Park to the Rafferty mid-station area. Two options are proposed (Figure 2-2). The first is a straight line, single span from the summit to the mid-station. This would offer a similar experience to the zip line under Alternative 2, though somewhat less extreme. This realignment would change the total length of the zip line from 3,900 linear feet to 3,200 feet and the overall grade from 40 to 32 percent. The top terminal would be in the same location as under Alternative 2, incorporated into the summit building. The bottom terminal would be constructed on a previously cleared and disturbed site near the Rafferty mid-station, entailing about 0.15 acre of disturbance. Some tree clearing or topping would be necessary to meet clearance requirements on roughly the upper third of the alignment. No other infrastructure or disturbance would be required between the top and bottom terminals.

The second option would reflect a gentler, canopy-tour experience. This option was included in Snow King's MDP as a complement to the more extreme summit-to-base zip line, but it was not included in the proposed action. It would include three separate segments with a combined length of about 5,200 feet. Two intermediate terminals would connect the first segment to the second and the second to the third. Riders would move more slowly and at lower elevation through the forest canopy.

The top and bottom terminals would be as described above for the first option. The two intermediate terminals between the summit building and the Rafferty mid-station would each entail about 0.15 acre of clearing and disturbance. Additional tree clearing or topping may be required to meet clearance requirements along a substantial portion of the alignment. Construction of the intermediate terminals would entail the use of an excavator, and both sites are adjacent to roads. No infrastructure would be required between the paired terminals.

These options are intended to avoid adverse impacts on recreation at Phil Baux Park and reduce noise in the base area. The zip line experience would be less intense than under the proposed action.

2.5.4.2 Downhill Mountain Bike System

The front- and back-side downhill mountain bike trail system would remain basically the same under this alternative, but mountain bikers using the gondola to get to the summit would not be allowed access to the

existing Cache Creek/Game Creek trail system. Methods used to implement this restriction within the downhill trail system would include:

1. Rider Information: Lift tickets for bikers would clearly state that access was restricted to the downhill trail system. Trail maps would clearly identify the downhill trail system and include clear warnings prohibiting lift-served bikers from leaving the downhill system. Signage at the top and bottom of the lift and at trail intersections would identify designated downhill trails and repeat the warning that downhill bikers must stay on the downhill trail system.
2. Trail design: Downhill trail design would incorporate features to make it difficult for lift-served bikers to physically get onto existing cross-country trails. These would include providing only a single downhill mountain bike trail off the summit down the front side, resulting in only one access point to manage in order to keep lift-served bikers on the downhill trail system. An advanced downhill trail would spur off the beginner trail after it dropped from the ridge. Below that point, intersections with cross-country trails would be designed with approach angles and grades that made it difficult to leave the downhill trail. Intersections would be located in open, visible areas so infractions were more easily detected, and bridges or underpasses would be used as necessary to physically separate downhill trails at intersections.
3. Enforcement: Snow King's bike patrol and other operations personnel would enforce the closure and have the authority to pull the lift passes of bikers who violated the prohibition on leaving the downhill trail system.
4. Proactive change in allowed use of upper Skyline and Josie's Ridge trails: Upper Skyline trail between Ferrin's saddle and Snow King and Josie's Ridge trail would be closed to bike use in order to provide a clear separation between the intensive bike activity within the ski area and the desired less-intensive, more nature-based experience outside of the ski area. Barriers would be installed to clearly establish this closure.

The ski area, with assistance from the Bridger-Teton and partner groups, would monitor the effectiveness of these measures in avoiding user conflicts and trail damage in the Cache Creek/Game Creek trail system and identify additional measures as necessary. Snow King would be responsible for repair of any damage to Cache Creek/Game Creek trails caused by lift-served bikers leaving the downhill trail system.

2.5.4.3 Hiking Trails

Under this alternative, the new hiking trail included in Alternative 2 in the Bearcat Glades area would be realigned to start at the junction of Sink or Swim trail and Stairway trail then climb at 18 to 20 percent for about 1.2 miles, tying into Stairway trail at alternate switchback points (Figure 2-2). Rather than including a series of tight, stacked switchbacks, this alternative alignment would extend this trail out at grade further and follow more natural contours, with less excavation required, to provide the main hiking access to the summit. The intent is to reduce the amount of new construction, erosion potential, and visual impact of the trail.

2.5.4.4 Forest Stand Thinning

In accordance with the *National Forest Ski Area Permit Act of 1986*, permitted ski areas must maintain a vegetation management plan documenting how forest vegetation in the permit area will be maintained to provide for safe recreation, fire protection and fuel management, and forest health. In 2016, Snow King prepared a vegetation management plan (Western Bionomics 2016), and it was accepted by the Bridger-Teton. The plan breaks the forest vegetation in and around the ski area into five strata and identifies appropriate management treatments for each stratum. For strata 1, 2, and 5, which cover a substantial portion of the permit area, thinning of trees is recommended (Figure 2-4). These thinning recommendations would be implemented under Alternative 3 and comprise 154.2 acres (includes 6.2 acres that overlap proposed glading).

Note that the thinning prescriptions are similar to what would be done to complete the glading described above (section 2.4.2.3) and that thinning would overlap 6.2 acres slated for grading. The distinction between these elements is maintained because they stem from two different needs (i.e., the ski area's desire to provide additional tree skiing and the vegetation management plan's broader objectives including improved forest health, skier safety, and reduced fire hazard.

In terms of fire hazard reduction, the ski area lies within the designated Teton County wildland/urban interface zone, and the *Teton County, Wyoming, Community Wildfire Protection Plan* (CWPP; Teton Area Wildfire Protection Coalition 2014) was developed to help manage wildfire threat in the interface zone. Snow King's permit area falls within Priority Areas 2 and 3 designated in the CWPP, and thinning dense tree stands, as well as removal of dead and down fuel, is recommended as a fuel reduction treatment in these zones. Accordingly, the proposed thinning would help meet CWPP objectives.

2.5.4.5 Road and Trail Obliteration

Alternative 3 would allow removal of another 0.9 mile of service roads and trails to be obliterated, in addition to the 1.1 miles proposed under Alternative 2 (Figure 2-5). These would include all of Fast Trail and most of Slow Trail. These roads and trails would no longer be necessary once the Cougar lift was removed as proposed. They would be regraded to restore a more natural contour and revegetated. Other user-created trails may be identified and obliterated as part of this process.

These efforts are intended to reduce the visual effect of infrastructure on the front side of the mountain and improve skier safety by reducing road and trail crossings.

2.6 ALTERNATIVE 4

This alternative was developed to emphasize resource protection rather than full achievement of the recreational opportunity objectives of the proposed action. It addresses more aggressively the concerns driving Alternative 3, particularly impacts on Snow King's historic landscape and the existing Cache Creek/Game Creek trail system and its users. This alternative also responds to the following, additional concerns identified through scoping, community input, and internal, interdisciplinary review:

- The impact and sustainability of proposed biking trails on the front side in terms of location, maintenance, and erosion control.
- The effects of development in the eastern boundary adjustment area and associated infrastructure and use on goshawk post-fledging habitat.

In response to these concerns, Alternative 4 alters elements under the headings of terrain development, snowmaking coverage, and summer activities relative to Alternative 3, as described below. Boundary adjustment, summit access road/novice skiway, lifts, facilities, and night skiing would remain the same as Alternative 3.

2.6.1 TERRAIN DEVELOPMENT

This alternative would drop development of all proposed runs within or adjacent to the eligible historic landscape (i.e., runs 3 and 8–12; 13.8 acres) with the exception of the proposed widening of Bearcat and Belly Roll runs and development of the new run 13 (Figure 2-3). These runs would be maintained to provide sufficient run capacity from the top of the new Summit lift. The intent is to reduce impacts on the eligible historic landscape. To provide needed access down the front side from the top of proposed Lift A, runs 1 and 2 from the accepted MDP would also be developed, dropping from near the top terminal of Lift A to the proposed summit access road/novice skiway, well outside the historic landscape.

This alternative would also add another run, included in Snow King's accepted MDP as run 15, which roughly follows the outside boundary of the western boundary adjustment area. Run 15 is intended to provide a route back to the base area for skiers taking advantage of the thinned forest in the boundary

adjustment area (see thinning discussion under Alternative 3, Summer Activities above). It would also provide a safe and reliable egress route for ski patrol evacuations; support the Bridger-Teton's fuel reduction and fire protection efforts at the wildland/urban interface by providing a fire break between the National Forest and adjacent parts of the Town of Jackson; and reduce intrusions onto private property adjacent to the ski area by skiers continuing too far down the slope.

The alignment of Run 15 would be shifted slightly up slope from what was depicted in the MDP to minimize crossings of existing trails (i.e., one crossing of Sink or Swim, and no crossings of Shade Monkey) and to further buffer adjacent private property. The trail would add 13.7 acres to the new, developed ski terrain.

Alternatives 2 and 3 also call for clearing of three conventionally cleared ski runs (Runs 4, 5, and 7, comprising 4.1 acres of low intermediate terrain) in the eastern boundary adjustment area, connecting the two legs of the summit access road/novice skiway. Under Alternative 4, this terrain would be gladed rather than cleared. The intent is to reduce impacts on post-fledging goshawk habitat and the visual impacts of terrain developments adjacent to Snow King's historical landscape.

Collectively, these changes would bring the amount of new, developed ski terrain to 122.2 acres.

2.6.2 Snowmaking Coverage

This alternative would add snowmaking on the lower, east-west running portion of run 15 (6.5 acres) and eliminate the need for snowmaking coverage on runs 3 and 8–12, which would not be developed. These runs total 13.8 acres. Snowmaking would also not be necessary on runs 4, 5, and 7, which total 4.1 acres, as they would be gladed rather than cleared. These changes would bring the total new system coverage to 135.7 acres.

2.6.3 Summer Activities

2.6.3.1 Downhill Mountain Bike System

This alternative would eliminate the mountain bike trail system proposed under Alternatives 2 and 3 and replace it with a trail system totaling about 5.6 miles, including approximately 1 mile of advanced trail (all on National Forest System land), 1.3 miles of intermediate trail (0.9 miles on National Forest System land), and 3.3 miles of beginner trail (2.1 miles on National Forest System land; Figure 2-3); all located on the front side. These trails would be accessed from the Summit gondola and end near the gondola base, passing through mostly forested terrain. There would be only one crossing of the popular Sink or Swim hiking and biking trail. Similar to Alternative 3, lift-served mountain bikers would not be allowed access to the existing hiking and biking trail system, but there would be no change in allowed use of upper Skyline and Josie's Ridge trails.

The beginner trail would run east through the eastern boundary adjustment area then cross west under the Rafferty lift and drop to the bottom of Rafferty lift. The intermediate trail would generally follow the fall line down Rafferty then parallel the beginner trail to the bottom terminal of the gondola. The advanced trail would branch off the beginner trail below the summit, then run above the beginner trail to near the top of Rafferty lift. At that point, it would drop down to join the intermediate trail above the Rafferty mid-station.

This element is designed to address several concerns with development on the back side and offer a phased approach that would allow future development to build on lessons learned in this first phase. Specifically, this alternative would: 1) address concerns associated with lift-served mountain biking from the summit, 2) reduce the number of intersections with existing front-side hiking and mountain-biking trails, and 3) reduce the construction, maintenance, and visual impact of the new front-side mountain bike trails by developing fewer trails and constructing them on lower-angled terrain in forested areas. If experience indicated that the downhill trail system could be managed without adverse effects on recreation and other resources, the back-side mountain bike park could be proposed and potentially authorized, subject to NEPA review.

2.7 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DEPTH

The following alternatives were suggested in scoping comments but will not be carried into in-depth analysis for the reasons noted. It is important to note that, in accordance with our NEPA regulations (FSH 1909.15, sec. 14.4), these alternatives are part of the range of alternatives considered in this analysis.

2.7.1 NO BOUNDARY ADJUSTMENT OR LIMITED BOUNDARY ADJUSTMENT ALTERNATIVES

Numerous scoping commenters requested an alternative the precluded any boundary adjustment or alternatives that dropped the south or west adjustment. These included "net-zero" alternatives and detailed "balanced" and "wildlife" alternatives suggested by the Jackson Hole Conservation Alliance.

These alternatives were considered but not carried into in-depth analysis because of the fundamental purpose and need for the proposed action, which can be outlined as follows:

- The ski area needs high-quality beginner and intermediate terrain to remain viable;
- The only suitable location for developing sufficient terrain of this type is the summit and the back side of Snow King Mountain;
- The lift serving this terrain must be easily downloadable to get beginner skiers to and from the summit;
- Given the distance between this new terrain and base-area skier services, new service facilities are required on the summit;
- Construction and maintenance of those facilities requires an access road and an "easy way down" from the summit for beginner skiers in the event of a lift failure is a necessity. The access road and novice skiway have similar design requirements and are logically collocated;
- The ski area has comprehensively identified and assessed options for the necessary access road/novice skiway, and the proposed alignment was identified as the only viable option; and finally;
- Industry wide, mountain resorts are developing summer recreation options in response to visitor expectations, climate change, and generation of sufficient operating income, and Snow King is no exception.

In terms of a no-adjustment or limited adjustment alternative, the east and west boundary adjustments are necessary to accommodate the access road/novice skiway, which would otherwise have to switchback continuously up the front side, within current permit boundaries and boundaries of the historic landscape, causing significant impacts in terms of soil disturbance, habitat fragmentation, skier safety, and visual quality. Beyond that, as a result of the continuous switchbacks it would not function well as either an access road or a novice skiway.

The southern addition, which involves land already within Snow King's special use permit boundary, is necessary to provide intermediate terrain – the next step up for beginners using the summit terrain. The main reason commenters cited for an alternative with no southern addition was concern over impacts on specialized wildlife habitat, particularly deer and elk winter and fawning/calving habitat and wildlife migration routes. However, initial investigations indicated that while specialized habitat does occur in the vicinity, the actual area proposed for development does not include any. The EIS does address potential impacts on specialized habitats in the area, but we concluded that was not an issue warranting a no-southern-expansion alternative.

In short, the suggested no-boundary-adjustment or limited-adjustment alternatives were not carried into in-depth analysis because they do not meet the purpose and need for action in terms of providing lower-level ski terrain and summit egress and, in the case of the southern addition, there is no alternative-driving issue.

2.7.2 ACCESS ROAD ALTERNATIVES

2.7.2.1 No New Road

Several commenters suggested an alternative with no new road, generally in conjunction with improving the existing road and down-sizing the summit building. These alternatives were not carried into in-depth analysis because, in addition to being inconsistent with purpose and need as outlined above, the existing road does need meet the need for an "easy way down" from the summit or from the top of Rafferty lift and is too steep for construction traffic. In addition, the erosion potential and maintenance costs of the existing road are high.

2.7.2.2 Use of Leeks Canyon Road

Many commenters suggested using the existing Leeks Canyon road, with improvements as necessary, to access the summit. This alternative was not carried into in-depth analysis because the Leeks Canyon road does need meet the need for an "easy way down" from the summit to the base area and because it crosses private land not owned by Snow King, so use could not be ensured.

2.7.2.3 Other Alignments

One commenter suggested extending Slow Trail up to Scott's Ridge. This alternative was not carried into in-depth analysis. We considered this alternative, but due to the topography an alignment at 1ess than 10 percent grade, required for a novice skiway, could not be achieved.

Some commenters suggested an alignment within the current permit boundary, including options identified in past master plans. These options were not carried into in-depth analysis because, as noted above and in the scoping notice, we assessed such alternatives and concluded that alternative routes within the existing permit boundary did not provide appropriate grades for both construction access and a novice skiway. Beyond that, they would generate the adverse environmental effects noted above (section 2.7.2).

One commenter asked for an alternative that included limiting uses of the access road/novice skiway and identification of avalanche control measures to be used where it crosses new terrain. This alternative was not carried into in-depth analysis because the proposed action already limits motorized vehicle use of the proposed access road/novice skiway to the purposes outlined in the scoping notice. The EIS does address avalanche hazard (see DEIS section 3.11).

Some commenters suggested using Leeks Canyon Road for construction and improving the existing front-side road as a skiway. This alternative was not carried into in-depth analysis because, as discussed above, the existing road does not meet the need for an "easy way down" from the summit or from the top of Rafferty lift.

2.7.2.4 Skiing between Switchbacks

Commenters suggested authorizing the proposed summit access road/novice skiway but not allowing skiing between the switchbacks in the east and west boundary adjustment areas. This alternative was not carried into in-depth analysis because closing this terrain would create substantial boundary management issues and because the proposed runs in the eastern area would provide much of the needed lower intermediate ski terrain necessary to meet purpose and need.

2.7.3 GONDOLA ALTERNATIVES

Most of the gondola alternatives identified through scoping are addressed by Alternatives 3 and 4's removal of the Cougar lift and relocation of the bottom gondola terminal to the current location of the Cougar lift bottom terminal. Other alternatives suggested were as follows.

One commenter suggested including a mid-station on the gondola to provide easy access to the lower slopes. This alternative was not carried into in-depth analysis because, given the steepness of the slope, the amount of earthmoving necessary to construct a mid-station would be prohibitive.

Some commenters suggested a high-speed quad, perhaps with covered chairs, rather than a gondola. This alternative was not carried into in-depth analysis because a high-speed quad would not accommodate non-skiing riders, diverse weather, and night use as well as a gondola, and these are important functions of the proposed lift.

Other commenters suggested a tram rather than a gondola. This alternative was not carried into in-depth analysis because no clear benefits were cited or are evident to us, and trams typically require longer wait times, have lower capacity, and cost more.

2.7.4 LIFT A ALTERNATIVES

Commenters suggested a shorter T-bar lift, without snowmaking, used only when natural snow was sufficient, with existing roads providing a return route to the "Saddle." This alternative was not carried into in-depth analysis because a T-bar would not accommodate mountain bikes, and it would not provide access to the desired beginner and intermediate terrain. The need for snowmaking is addressed in the description of the proposed action.

Commenters also suggested not building Lift A and allowing only human-powered activities on the back side. This alternative was not carried into in-depth analysis because it would not provide the lower-level ski terrain necessary to meet purpose and need.

2.7.5 MOUNTAIN BIKE TRAIL ALTERNATIVES

Commenters suggested an alternative mountain bike trail system beginning at the Rafferty mid-station, and internal review identified a potential alternative trail system from the top of Rafferty. These alternatives were not carried into in-depth analysis for three reasons. First, we believe a mountain bike trail system starting at the Rafferty mid-station would be too short to be a viable attraction. Second, the mid-station area is already highly developed and heavily used due to the siting of the ropes course, alpine slide, and mountain coaster. Third, as a result of those summer activities at the mid-station area, most Rafferty lift riders unload there, requiring the lift to slow or stop. Accordingly, lift capacity and ride time would both preclude the lift being able to support mountain bike use.

2.7.6 ZIP LINE ALTERNATIVES

Commenters suggested alternative zip line alignments, specifically adjacent to the proposed gondola on the east side, and adjacent to the Rafferty alignment. In negotiations with the Town of Jackson, Snow King agreed to avoid the western base area entirely, precluding the alignment east of the gondola. The terrain traversed by the Rafferty alignment is not suitable for a single-span zip line due to topography. There would not be sufficient ground clearance along the middle of the alignment.

2.7.7 BEGINNER AREA ALTERNATIVES

Some commenters suggested locating the beginner area in Rafferty pod or elsewhere on the lower front side rather than on the summit, particularly because of concerns about wind, other inclement weather, and snow accumulation at the summit. Examples include the Rafferty Area, the Turnpike run, or vacant land

behind the Snow King Resort Hotel. These alternatives were not carried into in-depth analysis because the summit area offers more appropriate topography on the wide, gently sloped area west of the summit, a longer season with good snow conditions due to elevation, more warmth and sun exposure, and better separation from more advanced skiers than lower-elevation, front-side options.

2.7.8 SUMMIT BUILDING ALTERNATIVES

Some commenters suggested a smaller summit building, including an upgraded Panorama House. These alternatives were not carried into in-depth analysis because they are not consistent with the rationale for the proposed facility as presented in the proposed action description, and because of the small size and deteriorated condition of the Panorama House.

Commenters also suggested that a park be provided at the summit building site, with picnic tables. This use would be consistent with proposed functions for the summit building and would not require additional infrastructure. As a result, this suggestion was not carried into in-depth analysis.

2.7.9 OBSERVATORY ALTERNATIVE

One commenter suggested an alternative observatory site on East or West Gros Ventre Butte. This alternative was not carried into in-depth analysis because we did not believe that these locations would complement or be supported by proposed development on the summit of Snow King.

2.7.10 WILDLIFE PROTECTION ALTERNATIVES

2.7.10.1 Obliteration of Leeks Canyon Road

Some commenters suggested decommissioning and obliterating the portion of Leeks Canyon Road that is on the National Forest to reduce the likelihood of skiers leaving the ski area and traveling down canyon, disturbing wintering wildlife and finding no legal egress at the bottom. This alternative was not carried into in-depth analysis because the road serves on-going uses, particularly providing access to an important communications site on the ridge. The site operator has a road easement across private and National Forest System land.

2.7.10.2 Fencing Wildlife Closure Boundaries

Also, to protect wintering wildlife, some commenters suggested installing permanent fences where the ski area permit is in close proximity to established wildlife closure areas. This alternative was not carried into in-depth analysis because hard fencing is not a normal Forest Service practice when there are alternative ways to control access. Permitted ski areas typically use rope lines, signage, and ski patrol to keep skiers away from closed areas, and we believe these measures will provide sufficient protection in this situation.

2.7.11 LYNX ALTERNATIVE

The US Fish and Wildlife Service spelled out an alternative based on reducing potential effects on Canada lynx:

> Due to the potential impacts to lynx and lynx habitat as a result of implementation of the proposed recreation activities, we recommend the EIS include at least one alternative implementing the following the NRLMD human use guidelines for developed recreation: HU Gl (maintaining inter-trail islands), HU G2 (providing lynx nocturnal foraging opportunities), HU G3 (lynx movement and habitat effectiveness), and HU G10 (maintaining security habitat when expanding ski areas and trails). Adopting these guidelines would ensure the proposed activities are designed to minimize the fragmentation of lynx foraging and denning habitat. Reducing the number of new graded/cleared areas, ski runs, bike trails, hiking trails, and buildings within currently contiguous lynx foraging and denning habitats would also reduce the fragmentation of lynx habitat.

> Alternatively, these Project-related activities could be moved to areas that do not contain lynx habitat. In addition, we recommend the Forest minimize the footprint of new lighted, night ski areas, especially in or adjacent to blocks of contiguous lynx habitat to give lynx the opportunity to forage at night. By implementing these measures, the Forest will appreciably reduce the impacts to lynx, lynx denning and foraging habitat, as well as, designated lynx critical habitat within in the Project area.

The EIS and associated biological assessment address lynx impacts in accordance with established lynx management protocols, and Northern Rockies Lynx Management Direction (NRLMD) is addressed as appropriate regardless of the alternative. We appreciate this information but do not believe that a lynx-specific alternative is necessary to incorporate it.

2.7.12 Terrain Park Expansion

Commenters suggested expanding the existing terrain park into the Rafferty and Old Man's Flats areas. This alternative was not carried into in-depth analysis because neither Snow King's proposal nor internal agency review indicated a need for such expansion, and the commenters did not provide any rationale for the suggestion.

2.7.13 Alternative Management

Some commenters suggested that the Town take over management of the resort and design their own, taxpayer-funded improvements. This alternative was not carried into in-depth analysis because Snow King operates on National Forest System land, under Forest Service special use permit, issued to the current permittee. As a result, this alternative is outside the scope of this EIS.

2.8 DESIGN CRITERIA

Design criteria are measures to avoid or reduce adverse environmental effects. Some are standard practice and identified prior to NEPA review, and others were identified in the course of the review. All design criteria applicable to a given resource are discussed as necessary and listed in Chapter 3, resource-specific analysis sections.

2.9 SUMMARY AND COMPARISON OF ENVIRONMENTAL EFFECTS

Table 2-2 summarizes and compares the direct and indirect environmental effects of the alternatives. The full, in-depth analysis that this summary is based on is provided in EIS Chapter 3.

Table 2-2. Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Climate Change and Snow Quality				
Issue 1: How would climate change affect snow quantity and the viability of the proposed infrastructure and uses?	No change in snowmaking or summer recreation opportunities. Winter recreational use and the long-term viability of Snow King would remain vulnerable to the effects of climate change.	Snowmaking system coverage would increase by nearly 60%, and additional summer recreational opportunities would be provided. These changes would effectively offset the impact of reduced snowfall due to climate change on Snow King's winter recreational use and long-term viability.	Same as Alternative 2.	This alternative would be somewhat less effective in offsetting the impact of reduced snowfall on Snow King's winter recreational use and long-term viability. Snowmaking coverage would increase by less. The front-side mountain bike system would be shorter, and the back-side mountain bike zone would be eliminated.
Air Quality				
Issue 1: How would construction and use of the proposed infrastructure affect protected airsheds around the project area?	No notable change in Snow King's impact on visibility or particulate concentrations in Teton National Park or other area Class I airsheds.	A temporary increase in emissions and dust would occur during construction due to grading and excavation. Glading would increase by 32.7 acres, with associated slash burning. With the design criteria identified through this analysis in place, Alternative 2 is unlikely to have a discernible effect on visibility or particulate concentrations in Grand Teton National Park or other Class I airsheds in the area.	Same as Alternative 2 but with 154.2 acres of additional thinning and associated slash burning. However: there is a wide margin between current visibility and particulate ratings; slash burning is a minor contributor of particulates; burning would comply with Wyoming Air Quality Division Smoke Management Program requirements; and burning would take place in late fall, when air quality is good. Based on these considerations, slash	Grading and excavation would decrease by 11.1 acres relative to Alternative 3, and glading would increase by 3.8 acres. These minor changes would not alter the conclusion drawn under Alternative 3.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
			burning could be increased substantially without causing a poor visibility rating in the Park or exceeding Wyoming or national particulate standards in Class I airsheds.	
Issue 2: How would the proposed increase in snowmaking system coverage affect the "snowmaking cloud" that impacts the neighborhood around the base area?	No change from current snowmaking practices. The frequency and duration of snow cloud formation would remain unchanged.	Some increase in the frequency and duration of snowmaking cloud formation would result from increased water use. However, most of the increase in snowmaking coverage would be at higher elevations where wind would dissipate the cloud or on the back side where the cloud would not affect Jackson.	Same as Alternative 2.	Same as Alternatives 2 and 3. Minor changes in the location of snowmaking system additions would not alter the conclusion draw under Alternative 2.
Water, Soils, and Watershed				
Issue 1: How would the proposed increase in snowmaking and clearing of ski runs affect surface runoff, and groundwater recharge?	No change from current conditions in terms of snowmaking or run clearing. Surface runoff currently does not leave the ski area boundary but infiltrates to groundwater.	Snowmaking system coverage would increase by over 160% and cleared ski terrain would increase by nearly 90%. Snowmaking system coverage would not necessarily correspond to a proportional increase in water. Any change in snowmelt runoff, infiltration, and groundwater recharge would remain within the current range of variability in volumes and rates.	Same as Alternative 2.	Slightly less snowmaking system coverage would be added (11.4 acres less than Alternatives 2 and 3), and minor changes in run clearing would occur. These changes would not alter the conclusion drawn under Alternative 2.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Issue 2: How would the ground disturbance associated with construction and use of the proposed infrastructure affect soil erosion and slope stability?	No change from current infrastructure. Erosion would continue at existing rates, and conditions that influence soil erosion and slope stability would remain unchanged.	Temporary erosion and stability impacts could occur during and immediately following construction within the 144.5-acre disturbance area. Of the 31 separate project elements, 13 would have a high erosion/sedimentation risk rating before BMPs were applied, and 13 would have a moderate risk rating. With BMPs in place, risk ratings for all project elements would fall to low, and no measurable long-term change in erosion, sediment transport, or slope stability would result.	Disturbance area would increase by up to 154 acres, due primarily to forest stand thinning. Of 32 project elements, up to 15 would have high risk ratings before BMPs were applied, and up to 14 would have moderate ratings. These changes would not alter the conclusion drawn under Alternative 2.	Disturbance acreage would decrease by 5.9 acres relative to Alternative 3, but there would be no change in project element risk ratings. These changes would not alter the conclusion drawn under Alternative 2.
Issue 3: How would construction and use of the proposed infrastructure affect impaired water bodies in the area?	No change from current water quality conditions in Cache Creek or Flat Creek would occur.	Construction activities would result in disturbance and short-term opportunities for erosion and surface runoff. Due to the distance between proposed disturbance and creek channels, the BMPs that would be in place, and the naturally high filtration rates, no long-term or short-term impacts on water quality in Cache Creek or Flat Creek would occur.	Same as Alternative 2. Alteration of disturbance acreage would not affect the conclusion drawn under Alternative 2. See Issue 2 above.	Same as Alternatives 2 and 3. Alteration of disturbance acreage would not affect the conclusion drawn under Alternative 2. See Issue 2 above.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Vegetation				
Issue 1: How would construction and use of the proposed infrastructure affect the introduction and spread of noxious weeds?	No change from current noxious weed conditions. Seventeen noxious weed species have been reported within or adjacent to the ski area boundary. The ski area would continue to treat existing and new weed infestations, consistent with the terms of their vegetation management plan.	This alternative would result in 80.4 acres of glading and clearing, with limited potential to increase weed introduction or spread, and 64.1 acres of grading and excavation, with higher potential to create conditions favorable to weeds due to high levels of soil disturbance and equipment operation. Recreational use during the spring, summer, and fall months would increase, potentially expanding this vector for the spread of weeds. Implementation of the integrated weed management program identified as a design criterion in this analysis should preclude any substantial increase in weed introduction and spread.	Glading and clearing acreage would increase by up to 154.6 acres due mostly to stand thinning, and grading and excavation would decrease by up to 0.6 acre. Increased efforts to obliterate unnecessary roads and trails would help concentrate increased recreational use on established routes. These changes would not alter the conclusion drawn under Alternative 2.	Gladed and cleared acreage would increase by 4.2 acres relative to Alternative 3, but grading and excavation would decrease by 10.1 acres, reducing the risk of spreading noxious weeds compared to Alternative 3. Decreasing the extent of front-side bike trails and eliminating the back-side mountain bike zone would substantially reduce the potential for weed introduction and spread through recreational use. Overall, relative to Alternatives 2 and 3, this alternative would have the least potential for the introduction and spread of noxious weeds.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Wildlife				
Issue 1: How would construction and use of the proposed infrastructure affect special-status wildlife species?	Since there would be no change from current habitat and disturbance conditions under this alternative, there would be no change in Snow King's effect on threatened and endangered species, Forest Service sensitive species, migratory birds, or specialized habitats.	Alternative 2: - Has the potential to negatively impact Canada lynx habitat but is consistent with the *Northern Rockies Lynx Management Direction* and its amendment to the Forest Plan. - Would have no impact on the grizzly bear, wolverine, bald eagle and peregrine falcon. - May impact individuals but is not likely to result in a measurable impact on bighorn sheep population numbers. - May impact individuals but is not likely to cause a trend toward federal listing or loss of viability for: fisher, spotted bat, Townsend's western big-eared bat, boreal owl, flammulated owl, great gray owl, northern goshawk, and three-toed woodpecker. - May impact migratory birds but not substantially given design criteria and the large amount of alternative habitat available.	Relative to Alternative 2: - Disturbance of lynx habitat would increase but the determination would remain the same. - The amount of forested habitat impacted would increase, but the determinations for the fisher, boreal owl, flammulated owl, great grey owl, and northern goshawk would remain the same. - Impacts on bighorn sheep, spotted bat, Townsend's western big-eared bat, bald eagle, peregrine falcon, three-toed woodpecker, and migratory birds would be the same.	Relative to Alternative 3: - Disturbance of lynx habitat would increase slightly, but the determination would remain the same. - The amount of forested habitat impacted would increase, but the determinations for the Fisher, boreal owl, flammulated owl, great grey owl, and northern goshawk would remain the same. - Impacts on migratory birds would be the same.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Issue 2: How would construction and use of the proposed infrastructure affect elk or mule deer winter use?	No change from current elk or mule deer winter habitat conditions would occur, as there would be no back-side development.	No designated winter or parturition range for elk or mule deer would be directly affected, with exception of the lightly used northeast corner of the permit area on the front side. Localized displacement of elk and mule deer in and around the project area due to disturbance from expanded recreation would occur but would not result in a measurable impact on population numbers due to the abundant surrounding habitat, relatively low levels of habitat loss, and low level of current use in both the ski area permit boundary and its zone of visual influence.	Shifting the southern boundary of the western boundary adjustment up to the ridgeline above Leeks Canyon would provide minor benefit to wintering, but the conclusion drawn for Alternative 2 would remain the same.	The changes in infrastructural development and use under this alternative would not alter the effects on winter elk and deer use described under Alternative 2.
Cultural				
Issue 1: How would construction and use of the proposed infrastructure affect Snow King's historic landscape?	The remaining resources contributing to the eligibility of Snow King's historic landscape would be unaffected.	Fourteen of the 15 remaining contributing resources would be adversely affected: the 12 historic ski runs by modification and/or alteration of their visual signature through construction of intermingled new runs, and the Panorama House and unloading platform/observation deck by removal. The CCC Summit Shelter would not be affected. Consultation under Section 106 of the Historic Preservation Act will result in mitigation	Impacts on contributing resources would be the same, but Snow King would develop an interpretive program focusing on the history of the ski area to offset these effects.	Most of the proposed new ski runs in and adjacent to the historic landscape would be eliminated to protect the visual integrity of the 12 historic ski runs. Impacts on the other contributing resources would be the same as under Alternative 3.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		measures to address these impacts.		
Issue 2: How would construction and use of the proposed infrastructure affect Traditional Cultural Places or other Native American tribal resources?	No change from current effects on Native American concerns would occur.	Tribal consultation identified no Native American concerns, and no significant Native American sites have been identified within the project area. As a result, no impacts on this resource are anticipated under this alternative. Design criteria would protect any undiscovered heritage resources or sites encountered during construction.	Same as Alternative 2.	Same as Alternatives 2 and 3.
Land Use				
Issue 1: How would construction and use of the proposed infrastructure affect grazing?	No back-side development would occur, so impact on the Leeks Canyon grazing allotment would not change and utilization rates would be unchanged.	A minor reduction in forage availability and some disturbance or displacement of livestock would occur within the ski area boundary. Beyond the ski area boundary, mountain bike traffic down Leeks Canyon Road could increase, potentially disturbing and displacing horses in lower portion of the canyon. However, additional use would be limited due to steepness of road and the private property boundary near the bottom. The allotment is of sufficient size to ensure adequate amounts of forage for the number of livestock involved, even if some	Mountain bikers would be restricted to the dedicated downhill mountain bike trail system, precluding any new impact on livestock in lower Leeks Canyon. Otherwise, impacts would be the same as under Alternative 2. Compared to Alternative 2, reduced potential effects on utilization rates outside the ski area would occur.	The back-side mountain bike zone would not be developed, reducing impact on forage production and precluding any new mountain bike use in lower Leeks Canyon. Utilization levels within the allotment would be essentially the same as Alternative 1.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		displacement of animals occurred. Increased levels of utilization could occur in some areas of the allotment, but annual standards would be met.		
Noise				
Issue 1: How would construction and use of the proposed infrastructure affect noise levels around the ski area?	No change from current noise levels would occur. Avalanche explosive use may temporarily exceed the Town of Jackson's 65 dBa property-line noise limit (used as a threshold in this analysis though the ordinance does not apply to National Forest System land).	A short-term increase in equipment noise during construction and a long-term increase in noise due to increased avalanche control explosives, mechanical noise from the zip line trolley, and zip line rider noise would occur. All new snowmaking would be higher on the mountain than current activities and would generally not lead to increased noise. Helicopter staging on private land during gondola construction, if authorized by the Town of Jackson, may temporarily exceed 65 dBa.	Moving the bottom zip line terminal to the Rafferty mid-station would reduce noise at Phil Baux Park. Otherwise, noise impacts would be similar to Alternative 2.	The addition of run 15 would result in an increase in temporary construction noise, including chainsaw operations, and long-term noise due to snowmaking within 200 feet of homes adjacent to the ski area. Both noise sources would be substantially reduced by distance and vegetation screening. It is unlikely the Town of Jackson noise standard would be exceeded by these activities. Otherwise, noise impacts would be the same as outlined under Alternative 3.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Recreation				
Issue 1: How would the proposed ski terrain development affect Snow King's terrain mix?	The current terrain mix would be unchanged, limiting Snow King's ability to meet the needs of the broader skier market and bring new skiers into the sport.	An additional 117.8 acres of new ski terrain, including 39.8 acres of beginner, novice, and low intermediate and 20.8 acres of intermediate terrain. Terrain mix would remain heavily skewed toward advanced and expert terrain, but would be substantially closer to the skier market profile and provide a better progression in terrain for lower skier ability levels.	Same as Alternative 2.	The shift from clearing to glading runs 4, 5, and 7 in the eastern boundary adjustment area would reduce low intermediate terrain, a limiting factor at Snow King, by 3.8 acres. Otherwise the effects would closely match Alternatives 2 and 3.
Issue 2: How would the proposed summit access road/novice skiway affect existing ski runs?	Current ski run conditions would not change because no new ski runs or skiways would be constructed. Upper mountain runs would cross skiways nine times.	The number of skiway crossings would increase to 15, reflecting the new summit access road/novice skiway and construction of new front-side runs. However, skiway crossings are a common and manageable issue at ski areas. The impact on skier flow would vary by run.	Obliteration of more existing skiways would eliminate six crossings of existing runs and bring the net number or crossings to five. That would be a notable improvement in skier flow over existing runs.	Same as Alternative 3 for existing runs. Impacts on new trails would also be the same except that run 3 would not be constructed, reducing crossings by one, and run 2 may merge onto run 4, creating a new crossing of the summit access road/novice skiway.
Issue 3: How would the proposed downhill mountain bike trails and zone affect the existing Cache Creek/Game Creek trail system and its users?	No change from current use beyond the 1–3% annual increase associated with population growth in Jackson.	Lift-served mountain bike access to the summit is projected to result in a small increase in the number of trail system users but a major shift in use patterns. Higher-elevation, more distant trails would be much more accessible to mountain bikers, resulting in roughly two to four times more use on trails such as	A combination of rider information, trail design, enforcement, and changes to allowed use of existing trails that would be employed under this alternative to restrict lift-served bike use to the dedicated downhill trail system and mountain bike zone. This should	This alternative would eliminate the proposed bike zone on the back side, restrict the front-side downhill mountain bike trail system to a smaller area, and would not change the allowed use of existing Cache Creek/Game Creek trails.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
		Skyline, Ferrin's, Wilson Canyon, and Josie's Ridge. This could increase user conflicts, trail damage, and resource impacts. Traffic on currently heavily used lower trail segments would be correspondingly reduced, decreasing crowding and trail damage. These effects may remain consistent with the Roaded Natural Recreational Opportunity Spectrum classification, but they could degrade the recreational opportunity provided by the Cache Creek/Game Creek trail system.	preclude notable adverse effects on the Cache Creek/Game Creek trail system and its users.	Overall, this alternative is projected to be slightly more effective in protecting the Cache Creek/Game Creek trail system and users than Alternative 3, but it would also provide substantially less opportunity for downhill mountain biking at Snow King.
Issue 4: How would the proposed Summit gondola and zip line affect users of Phil Baux Park?	Recreational opportunities for park users would remain unaltered.	Construction of the gondola and zip line bottom terminals would result in the loss of the Phil Baux Park parking lot and a change in the recreational opportunities it currently provides. Open green space available for recreational activities would increase.	No new infrastructure would be sited in Phil Baux Park. The gondola bottom terminal would be located nearby but far enough away to maintain the park's current recreational opportunities. The parking lot would remain intact.	Effects would be the same as outlined under Alternative 3.

Table 2-2 (cont'd). Summary and comparison of environmental effects.

Issue	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Safety				
Issue 1: How would the proposed mountain bike trails and mountain bike zone affect the safety of other summer visitors?	The safety of other summer visitors would not change because there would be no development of additional mountain bike trails under this alternative.	Use of trails within the Snow King boundary would increase, with most of this increase occurring on the new downhill mountain bike trails. A combination of design criteria requiring adequate sight lines around intersections, signage warning users of both trails that they were approaching an intersection, features designed to slow riders on the downhill trails, and bridges or underpasses where necessary would preclude any substantial change in safety risk.	Same as Alternative 2.	The number of trail crossings would be reduced relative to Alternatives 2 and 3, reducing impacts marginally. Otherwise, changes in visitor safety would be similar.

2.10 AGENCY'S PREFERRED ALTERNATIVE

A preferred alternative has not been identified at this time.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter documents the environmental impact analysis. Following introductory information that is common to all resources, the chapter is organized by resource category. Each resource section begins with the issues addressed, as identified through public scoping and internal, interdisciplinary review. The affected environment is described next to provide context for the discussion of environmental consequences that follows. The direct, indirect, and cumulative effects of the no-action alternative (the analysis baseline), Alternative 2 (the proposed action), and the action alternatives are outlined in that order. The section concludes with discussion of other required disclosures.

3.1.1 DISTURBANCE TYPES AND AREAS

Table 3-1 provides basic dimensions of disturbance associated with various types of project elements. These dimensions were used in calculating disturbance areas for each project element. Tables 3-2, 3-3, and 3-4 show the amount of disturbance for Alternatives 2, 3, and 4. Disturbance types, from least intensive to most intensive, are as follows:

- Glading – selective removal of trees to achieve vegetation management or Wildland Urban Interface goals in the case of Forest Stand Thinning under Alternatives 3 and 4 (see section 2.5.4.3 for additional detail), or to achieve a target spacing of 15 – 18 feet in the case of Glading as described under Alternative 2 (see section 2.4.2.3 for additional detail). May involve hand tools or equipment such as feller-bunchers. Trees chipped or stacked and burned on site or collected and removed to an off-site location.
- Clearing – removal of all trees and tall shrubs using tracked or wheeled equipment. Trees and slash chipped or burned on site or collected and removed to an off-site location.
- Grading – recontouring and smoothing the soil surface using caterpillars or other heavy equipment.
- Excavation – subsurface soil work using excavators or other heavy equipment, generally to construct building or tower foundations.

Note that the disturbance amounts presented in Tables 3-1, 3-2, 3-3, and 3-4 indicate only the highest intensity of disturbance occurring at any given location. For example, a site would be cleared before being excavated, but reporting it as being both cleared and excavated would over-represent the area of disturbance.

The total disturbance of 144.5 acres under Alternative 2 represents 29 percent of the total adjusted permit area of 525 acres. The total disturbance of up to 298.5 acres under Alternative 3 represents 57 percent of the total adjusted permit area. The total disturbance of up to 292.6 acres under Alternative 4 represents 56 percent of the total adjusted permit area.

Table 3-1. Typical disturbance dimensions by project element type.

Project Element Type	Disturbance Dimensions[1]	Disturbance Type[2]
Buildings/Facilities	Footprint plus 50-foot buffer	Excavation
Conveyor Lifts	25-foot width	Grading
Chairlifts		
Alignment Clearing	60-foot-width	Clearing
Terminals	0.5 acre rectangular disturbance area	Excavation
Towers	28-foot-diameter circle	Excavation
Ski Run	Actual width plus 10-foot buffer	Clearing
Existing Ski Run Grading	Actual width plus 10-foot buffer	Grading
Summit Access Road/Novice Skiway	Actual width plus 10-foot buffer	Excavation
Utility Lines (snowmaking, power, sewer, and utility)	15-foot-width	Excavation
Trails	6.5-foot width	Grading
Glading and Thinning	Footprint plus 10-foot buffer	Glading
Yurt Camp	40-foot-diameter circle	Grading
Zip-line		
Alignment Clearing	30-foot-width	Clearing
Terminals	0.15 acre rectangular disturbance area	Excavation

[1]These are the dimensions of construction-related disturbance, not the finished dimensions of projects.
[2] Indicates maximum disturbance intensity (e.g., excavation disturbance also includes clearing and grading).

Table 3-2. Disturbance types and acres disturbed under Alternative 2.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Terrain Development					
Teaching Center Terrain	--	--	6.1	--	6.1
New and Modified Ski Runs	--	38.2	6.3	--	44.5
Glading	32.7	--	--	--	32.7
Summit Access Road/Novice Skiway					
Summit Access Road/Novice Skiway	--	--	--	15.6	15.6

Table 3-2 (cont'd). Disturbance types and acres disturbed under Alternative 2.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Lifts					
Summit Gondola	--	4.4	--	0.5	4.9
Lift A	--	2.5	--	1.2	3.7
Conveyer Lifts (B&C)	--	--	--	0.3	0.3
Back-side Surface Tow (Lift D)	--	0.3	--	0.1	0.4
Facilities					
Summit Building	--	--	--	1.8	1.8
Observatory	--	--	--	0.4	0.4
Temporary Ski Patrol Building	--	--	0.2	< 0.1	0.2
Yurt Camp	--	--	1	--	1
Wedding Venue	--	--	< 0.1	0.4	0.4
Night Skiing	--	--	--	6.4	6.4
Snowmaking	--	--	--	7.8	7.8
Summer Activities					
Zip Line	--	2.3	--	0.5	2.8
Downhill Mountain Bike System	--	--	13.9	--	13.9
Hiking Trails	--	--	1.6	--	1.6
Total Disturbance	32.7	47.7	29.1	35	144.5

[1]Acreages include a disturbance buffer; the amount of actual ground disturbance may be less than the buffered distance. Areas of overlap, such as where the disturbance buffers for two different elements coincide, have only been counted one time. Disturbance acres have been rounded to the nearest tenth acre.

Table 3-3. Disturbance types and acres disturbed under Alternative 3.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Terrain Development					
Teaching Center Terrain	--	--	6.1	--	6.1
New and Modified Ski Runs	--	38.2	6.3	--	44.5
Glading	32.7	--	--	--	32.7
Summit Access Road/Novice Skiway					
Summit Access Road/Novice Skiway	--	--	--	15.6	15.6
Lifts					
Summit Gondola	--	4.2	--	0.7	4.9
Lift A	--	2.5	--	1.2	3.7
Conveyer Lifts (B&C)	--	--	--	0.3	0.3
Back-side Surface Tow (Lift D)	--	0.3	--	0.1	0.4
Facilities					
Summit Building	--	--	--	1.8	1.8
Observatory	--	--	--	0.4	0.4
Yurt Camp	--	--	1.0		1.0
Wedding Venue	--	--	< 0.1	0.4	0.4
Night Lighting	--	--	--	6.4	6.4
Snowmaking	--	--	--	7.8	7.8
Summer Activities					
Zip Line 1	--	1.7	--	0.1	1.8
Zip Line 2	--	2.9	--	0.4	3.3
Downhill Mountain Bike System	--	--	13.9	--	13.9
Hiking Trails	--	--	1.1	--	1.1

Table 3-3 (cont'd). Disturbance types and acres disturbed under Alternative 3.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Forest Stand Thinning	154.2	--	--	--	154.2
Total Disturbance (Option 1)	186.9	46.9	28.4	34.8	297.0
Total Disturbance (Option 2)	186.9	48.1	28.4	35.1	298.5

[1]Acreages include a disturbance buffer; the amount of actual ground disturbance may be less than the buffered distance. Areas of overlap, such as where the disturbance buffers for two different elements coincide, have only been counted one time. Disturbance acres have been rounded to the nearest tenth acre.

Table 3-4. Disturbance types and acres disturbed under Alternative 4.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Terrain Development					
Teaching Center Terrain	--	--	6.1	--	6.1
New and Modified Ski Runs	--	45.0	6.3	--	51.3
Glading	36.5	--	--	--	36.5
Summit Access Road/Novice Skiway					
Summit Access Road/Novice Skiway	--	--	--	15.6	15.6
Lifts					
Summit Gondola	--	4.2	--	0.7	4.9
Lift A	--	2.5	--	1.2	3.7
Conveyer Lifts (B&C)	--	--	--	0.3	0.3
Back-side Surface Tow (Lift D)	--	0.3	--	0.1	0.4
Facilities					
Summit Building	--	--	--	1.8	1.8

Table 3-4 (cont'd). Disturbance types and acres disturbed under Alternative 4.

	Disturbance Category and Acres Disturbed[1]				
Project Element	**Glading**	**Clearing**	**Grading**	**Excavation**	**Project Element Total**
Observatory	--	--	--	0.4	0.4
Yurt Camp	--	--	1.0	--	1.0
Wedding Venue	--	--	< 0.1	0.4	0.4
Night Lighting	--	--	--	6.4	6.4
Snowmaking	--	--	--	7.2	7.2
Summer Activities					
Zip Line 1	--	1.7	--	0.1	1.8
Zip Line 2	--	2.9	--	0.4	3.3
Downhill Mountain Bike System	--	--	4.4	--	4.4
Hiking Trails	--	--	1.1	--	1.1
Forest Stand Thinning	147.8	--	--	--	147.8
Total Disturbance (Option 1)	184.3	53.7	18.9	34.2	291.1
Total Disturbance (Option 2)	184.3	54.9	18.9	34.5	292.6

[1]Acreages include a disturbance buffer; the amount of actual ground disturbance may be less than the buffered distance. Areas of overlap, such as where the disturbance buffers for two different elements coincide, have only been counted one time. Disturbance acres have been rounded to the nearest tenth acre.

3.1.2 Cumulative Actions

Cumulative actions considered in the analysis are shown in Table 3-5.

Table 3-5. Cumulative actions considered in this analysis.

Project Name	Project Description
Past Projects	
Anchor Ranch Sign Permit Authorization	Location: 3100 N. Fish Creek Road, Wilson, Wyoming Description: To authorize a special use permit for a sign for use associated with an existing easement. The sign is necessary for emergency services and mail delivery to efficiently recognize the property. Implementation Date: 05/2019

Table 3-5 (cont'd). Cumulative actions considered in this analysis.	
Project Name	**Project Description**
Big Munger Trail Reroute	Location: The Snake River canyon south of Jackson, Wyoming. Description: Reroute of Big Munger Trail (#4205) to create a sustainable multi-use trail to the top of Munger Mountain (7.2 miles). Implementation Date: 07/2019
Permit Reissuance for Wyoming Game and Fish Department Facilities at Horse Creek	Location: Horse Creek area south of Jackson, Wyoming. Description: Authorize use and maintenance of an existing cabin, 9,000 feet of access roadway, 2,000 feet of fencing, and 6.6 acres of sub-irrigated hayfield. Implementation Date: 06/2019
Wyoming Game and Fish Department Game Creek Ditch Permit	Location: Game Creek Road in Teton County, Wyoming. Description: To authorize a special use permit for an irrigation water ditch for an existing use that is tied to water rights from 1910 and associated with a horse pasture that is located on WGFD land. Implementation Date: 06/2019
Current Projects	
Invasive Plant Management	Location: Bridger-Teton National Forest All Units Description: Control of noxious and other invasive plants through the integration of manual, mechanical, biological, and ground and aerial herbicide control methods. Implementation Date: 09/2019
Jackson Hole Mountain Resort Lower Valley Energy Power Line Installation	Location: Jackson Hole Mountain Resort Description: The existing primary power system feeding the snowmaking compressor building is near capacity. LVE and JHMR propose to install an additional buried power line from a building at the base to the existing air compressor building near Antelope Flats run. Implementation Date: 10/2019
Jackson Hole Mountain Resort Tram Snow Drift Mitigation	Location: Jackson Hole Mountain Resort Description: To reduce the size and height of the snow drift that forms under the travel path of the tram, JHMR proposes to remove vegetation from less than 1 acre, harvest weathered rocks, recontour the terrain, dispose excess material and reclaim the site. Implementation Date: 10/2019
Snow King Lower Elk Lighting	Location: Snow King Mountain Resort Description: Snow King Resort hopes to finish its 2015 project designed to reduce light pollution in the sky with energy efficient magnetic induction lights that are also less impactful on wildlife. Project includes additional 80 lights and 15 poles. Implementation Date: 10/2019

3.2 CLIMATE CHANGE AND SNOW QUANTITY

3.2.1 SCOPE OF ANALYSIS

- *How would climate change affect snow quantity and the viability of the proposed infrastructure and uses?*

While no material effect is anticipated, it would be impossible to make a valid quantitative assessment of the proposed action's effect on climate change and snow quantity given the current state of climate- change science. However, a significant reduction in snowfall over time could preclude the need for any additional winter recreation infrastructure or recreational opportunities. The analysis will address that issue.

Indicator: Conclusions drawn from pertinent studies of climate change and its potential effects on snowfall, including the Forest Service, Region 4 report *Climate Change Vulnerability and Adaptation in the Intermountain Region* (Halofsky et al. 2018).

3.2.2 AFFECTED ENVIRONMENT

Extensive analysis addressing climate change within the Greater Yellowstone Ecosystem (Chang and Hansen 2014) and the Rocky Mountain Region (Halofsky et al. 2018) provides the best projections currently available on climate change and its effects on precipitation, and thus on snowpack. While these broad studies do not provide detailed data to support in-depth, site-specific analysis and conclusions, they do provide meaningful insight into this issue.

Halofsky et al. (2018) divided the Rocky Mountain Region into subregions, including the Southern Yellowstone ecosystem, which includes Grand Teton National Park, the Caribou-Targhee National Forest, and the Bridger-Teton. While these areas are characterized by cold winters with high levels of precipitation, the Teton Range has a large impact on where precipitation falls within the subregion. Average precipitation on the west side of the Teton Range can be nearly triple the precipitation that falls on the eastern side of the range (Davey et al. 2007). The Bridger-Teton is located on the east side of the range, and thus receives lower levels of precipitation compared to other areas of the subregion.

Some precipitation models predict a slight increase in precipitation for the Southern Yellowstone Ecosystem, while others show no clear long-term trend in precipitation. Temperature models predict an increase from 6 to 12 degrees Fahrenheit in median minimum temperature by the year 2100 for the same region (Halofsky et al. 2018). The increase in temperature will result in warmer winters with less snow and more rain, likely reducing snowpack (Chang and Hansen 2014).

In terms of winter recreation, Halofsky et al. (2018) cites several sources who conclude that overall warming is expected to reduce season length and the likelihood of reliable winter recreation seasons. However, practical adaptations can be implemented to offset the potential for decreased snowfall and maintain the long-term viability of mountain resorts in the Intermountain West. To increase the operational season length for winter recreation, Scott and McBoyle (2007) and Halofsky et al. (2018) suggest utilizing snowmaking. Since 1952, snowmaking has become one of the most common adaptations to climate change, with approximately 89 percent of ski resorts in the Rocky Mountains currently utilizing snowmaking (Scott and McBoyle 2007). In eastern North America, ski resorts that utilized snowmaking extended their average ski season up to 120 days (Scott et al 2006).

Currently, approximately 90 acres of Snow King have snowmaking coverage, primarily on the lower portion of the mountain. This helps maintain coverage on lower-angle terrain that is lit for night skiing and used for race programs. Higher elevation terrain currently does not have snowmaking, with the exception of upper Elk run and the skiway to it from Summit lift. Snowmaking is needed less frequently at higher elevations, but the elevation on the ridge, at the top of the Summit lift, is just 7,808 feet, so lack of natural snow can be limiting at times.

In addition to snowmaking, Scott and McBoyle (2007) and Halofsky et al. (2018) suggest developing new runs at higher elevations on north facing slopes. Higher elevation terrain on north facing slopes retain snowpack longer, allowing for extended ski seasons (Scott and McBoyle 2007). Currently, the ski resort is located entirely on the north facing slope of Snow King.

The other climate change adaptation suggested by Halofsky et al. (2018) is utilizing resort land and infrastructure for summer recreation to increase the operating season and thus the long-term viability of mountain resorts. Increasing summer recreational opportunities provides additional revenue year-round for mountain resorts, decreasing their dependence on winter recreation. It is also consistent with the expectations of the recreating public and with Forest Service regulations and policies intended to meet those expectations, as discussed in section 1.4, Purpose and Need.

Currently, summer recreation opportunities at Snow King include several multi-use trails, most of which are part of a larger local trail network; an alpine slide, a mountain coaster, and a ropes course accessed from the Rafferty mid-station; and scenic rides to the top of Snow King Mountain on the Summit lift. These opportunities have proven popular, and summer use levels are high.

3.2.3 Direct and Indirect Effects

3.2.3.1 Alternative 1

Climate change models predict increases in temperature across the subregion, including the Jackson area and Snow King. As a result, Snow King is projected to experience reduced snowpack and a shorter winter recreation season.

Under this alternative, snowmaking would not be expanded to cover any additional ski terrain. Coverage would continue to be limited to the lower front-side terrain. To the extent that natural snowfall decreased, higher-elevation terrain would be affected. Without added snowmaking coverage, use of this terrain could decrease over time. The result would be a shrinking winter operation, with no option to address it through increased snowmaking or development of higher-elevation terrain.

No new summer recreational opportunities would be developed. The existing opportunities described above would be maintained but not expanded, and new off-season opportunities would not be pursued. As a result, this adaptation also would not be an effective offset to decreasing winter recreation at Snow King.

In short, natural snowfall would likely decrease, and Snow King would not implement any new adaptations to offset this critical element of climate change.

3.2.3.2 Alternative 2

Under this alternative, the expansion of snowmaking coverage and development of high elevation terrain would help offset the effects of climate change at Snow King. Snowmaking would be expanded to 147.1 acres to cover existing runs as well as newly developed terrain. Much of the newly developed terrain is located at higher elevations, where snow is retained longer than at lower elevations. While much of this higher elevation development is located on the south facing slope, it would have complete coverage by snowmaking.

Furthermore, summer recreation would be expanded to provide additional recreation opportunities outside of the winter season. The existing Stairway hiking trail would be improved, and a new 1.5-mile hiking trail is proposed in the Bearcat Glades area. An additional 6.5 miles of mountain biking trails would include lift-served mountain biking, the fastest growing form of recreation at mountain resorts nationwide. There would also be a mountain biking zone on the backside of the mountain accessed via the Summit Gondola and Lift A. Lastly, a new zip line is proposed parallel to the Summit Gondola.

Overall, based on these considerations, Alternative 2 would effectively offset the impact of reduced snowfall due to climate change on Snow King's winter recreational use and long-term viability.

3.2.3.3 Alternative 3

This alternative would incorporate the same climate change adaptations as Alternative 2 in most respects. In terms of snowmaking expansion and development of higher-elevation terrain it would be exactly the same. The changes in summer recreational infrastructure would probably not noticeably affect potential off-season use. Either of the zip line options would likely be less appealing than the longer, faster alignment under Alternative 2 but would still be an important attraction. Eliminating one of the front-side mountain bike trails off the summit would have little impact on the appeal of the trail system, and the proposed hiking trail realignment would marginally increase its attraction.

Overall, based on these considerations, Alternative 3 would also effectively offset the impact of reduced snowfall due to climate change on Snow King's winter recreational use and long-term viability.

3.2.3.4 Alternative 4

This alternative would incorporate less climate change adaptation than Alternatives 2 and 3. Of the three alternatives, this alternative would have the least snowmaking coverage at 135.7 acres. This reduction is not substantial.

For summer recreation, this alternative would reduce the mountain biking trails off of Rafferty to 5.6 miles and emphasize lower ability levels. This would marginally decrease the capacity of the trail system and narrow the range of mountain bikers it would attract compared to Alternatives 2 and 3. Removal of the mountain bike zone on the back side of the mountain and shortening of the mountain biking trail system would likely reduce the potential contribution of mountain biking to Snow King's summer recreational offerings.

Overall, based on these considerations, Alternative 4 would be somewhat less effective in offsetting the impact of reduced snowfall on Snow King's long-term viability.

3.2.4 Cumulative Effects

With regard to climate change and the continued viability of the ski area, the improvements made by the Big Munger trail re-route would likely interact with the addition of summer activities included in each of the alternatives to promote the continued viability of the ski area. The improved trail conditions could marginally increase the number of summer visitors, helping to build a critical mass of recreational opportunities and retain more summer visitors in the Jackson area.

3.2.5 Design Criteria

This analysis of potential climate change impacts did not identify the need for any design criteria, beyond the terms of the alternatives, to avoid or reduce adverse effects.

3.3 AIR QUALITY

3.3.1 Scope of Analysis

3.3.1.1 Protected Airsheds

- *How would construction and use of the proposed infrastructure affect protected airsheds around the project area?*

There are several areas in the vicinity of Jackson with airsheds protected under the Clean Air Act, as amended, and associated programs. These include national parks and designated wildernesses. Slash burning, off-road equipment operation, and soil disturbance could generate smoke and dust, adversely affecting air quality in these protected airsheds.

Indicator: Assessment of the extent of these practices and the efficacy of design criteria available to minimize any adverse effects on Class 1 airsheds.

3.3.1.2 Snowmaking Cloud

- *How would the proposed increase in snowmaking system coverage affect the "snowmaking cloud" that impacts the neighborhood around the base area?*

On cold winter days, snowmaking can generate a cloud of ice crystals that remains suspended in the air, spreading to surrounding areas and blocking the sun. Increased snowmaking could make this effect more extensive.

Indicator: Assessment of the effect of the proposed system expansion on the frequency and extent of the snowmaking cloud.

3.3.2 AFFECTED ENVIRONMENT

3.3.2.1 Protected Airsheds

Clean air designations were established under the Clean Air Act, Title I, part C, Prevention of Significant Deterioration. Two classifications were initially created. Class I areas included international parks, national parks exceeding 6,000 acres, and national memorial parks and wilderness areas exceeding 5,000 acres. All other areas were designated Class II areas.

Class I areas are given special air quality and visibility protection under the Clean Air Act and managed by the National Park Service, US Fish and Wildlife Service, US Forest Service, and several Native American Tribes. Five Class I airsheds are located in Teton County and include Grand Teton and Yellowstone National Parks, and the Bridger, Gros Ventre, and Teton wildernesses. The Gros Ventre Wilderness and Grand Teton National Park are closest to Snow King and thus most susceptible to any adverse air quality effects. Since visibility and air quality are not monitored in the Wilderness, the Park provides the best baseline for addressing this issue.

The National Park Service monitors air quality and visibility in most Parks across the country. National Parks and Monuments in the West tend to exhibit better air quality and visibility conditions than those in the Mid-west and eastern US. However, only Alaska has National Parks identified with good visibility conditions, and all Parks in the Lower 48 have fair to poor air quality ratings.

Visibility is the main air quality concern for National Parks, including Grand Teton, and particulates are the main constituents generated by this project that could affect visibility. Accordingly, this analysis focuses on visibility and particulates.

The National Park Service monitors air quality in National Parks and provides Park-specific summaries on their website (NPS 2018). The results for Grand Teton National Park cover the last 5 years and indicate that air quality is rated as fair, with nitrogen and sulfur pulling the rating down.

Visibility is rated as fair, but the 5-year average is only slightly under the good rating threshold (5-year average 4.8 deciviews compared to a good threshold of 4.5 and a poor threshold of 10.5). Deciviews are a haze index corresponding to uniform incremental changes in visual perception, across the entire range of conditions from pristine to highly impaired. The trend is rated "relatively unchanging."

For particulates, PM10 is rated good (48 microgram/cubic meter compared to fair threshold of 54 and poor threshold of 155). PM2.5 is rated fair (4.8 microgram/cubic meter compared to fair threshold of 4 and poor threshold of 12.5). National and Wyoming Department of Environmental Quality standards for PM10 are 150 micrograms/cubic meter, 24-hour average.

Overall, for the constituents of concern in this analysis, air quality in Grand Teton's Class I airshed is fair but very close to the good threshold, and it would take a 2-to-3-fold increase in particulates or reduction in

deciviews to exceed the poor threshold or, in the case of PM10, the Wyoming and national standard. The haziest conditions are typically in the summer, when there is more fine particulate matter in the atmosphere that scatters or absorbs light. The clearest days occur during the winter.

Emissions from vehicles driving through the Park area constitute a substantial percentage of particulate matter emitted in the area. Estimates for Teton County in 2018 indicate 834,907 miles are driven daily by passenger cars and 57,090 miles by trucks (WYDOT 2019). Using Environmental Protection Agency estimates of 0.0041 and 0.0045 grams/mile of PM2.5 pollutants for cars and light trucks, over 8 pounds of PM2.5 are emitted into the atmosphere daily from vehicle traffic in Teton County. This equates to about 3,000 pounds annually.

In addition to vehicular sources, PM10 and PM2.5 emissions are produced from a wide range of industrial, diffuse, and natural sources. Rock quarrying, wood stoves, road dust, forest fires, and other emissions are all examples of sources for inhalable particulate matter. Emissions such as dust, dirt, soot, or smoke are often visible.

It is important to note that air quality monitoring and standards, including those cited above, are expressed as concentrations (e.g., micrograms of PM2.5 per cubic meter) while emissions from a given source are typically expressed as a mass quantity (e.g., pounds of PM2.5). The relationship between emissions and concentrations is extremely complex and variable.

In terms of Snow King's contribution of particulates, vegetation management (primarily thinning and cleanup of dead and down trees) occurs annually at Snow King at rate of 5 to 10 acres annually (Stanley 2019a). Downed timber and slash are collected, piled, and burned in October and November as conditions permit. Piles are burned according to the *Bridger-Teton National Forest Industrial Fire Precautions Plan* and methods outlined in the ski area's Vegetation Management Plan. Snow King's slash burning is included in annual updates to the programmatic burn plan for the North Zone of the Bridger-Teton and complies with Wyoming Air Quality Division Smoke Management Program requirements (DEQ 2004). Before burning, Bridger-Teton fire dispatch and local authorities are contacted to check atmospheric conditions and notify authorities as required.

Typically, 50 to 100 piles of slash are burned at Snow King each fall. The ski area burns from three to 10 piles a day, depending on conditions, with an estimated average slash pile size of 10 feet by 10 feet (Stanley 2019a). Using the *Piles Fuels Biomass and Emissions Calculator* developed by the Forest Service's Fire and Environmental Research Application Team, this equates to an estimated 24 to 48 tons of slash burned annually, with a maximum of 5 tons burned on a single day (FERA 2019).

Based on the same emissions calculator, an estimated 277 and 318 pounds, respectively, of PM2.5 and PM10 are being produced if 50 slash piles are burned per season, increasing to 555 and 637 pounds, respectively, if 100 piles are burned.

For comparison, a traditional wood-burning stove burning one cord of wood emits approximately 16 pounds of PM2.5 and 18 pounds of PM10. Based on these figures, the annual slash burning emissions at Snow King are comparable to 17 to 35 homes burning a cord of wood per year.

In terms of dust as a source of particulates, Snow King operates maintenance vehicles routinely on unpaved service roads. Smaller, PM2.5 particulates can remain suspended and potentially affect visibility in the Park and other Class I airsheds. Dust emissions are difficult to accurately project because of the number of variables involved, but one study in the Pacific Northwest (Roberts 1973) provided an emission factor of 0.1 pounds of PM2.5 per vehicle mile at 10 miles/hour speeds. Using that factor and an estimated 5,000 vehicle miles per season on Snow King's service roads (100 days when roads are passable, and five vehicles traveling 10 miles each per day) yields a gross estimate of 500 pounds of PM2.5 generated each year, or roughly the same amount as generated by slash burning.

3.3.2.2 Snowmaking Cloud

Snowmaking machines create snow by shearing water into very small water particles to create a nucleating site or by injecting a nucleator. The nucleating sites ranges in size from 30 to 70 micrometers and can consist of several different materials. Nucleating sites in nature can consist of tiny bits of dirt, bacteria, or other floating material. Water droplets condense onto the nucleator, which becomes a snow crystal that settles to the ground.

Relative humidity and temperature are the driving conditions for machine-made snow to form. Conditions too warm and high in relative humidity result in heavier slushy snows or rain. Conditions too cold and dry may produce fine snow or freeze water droplets before adhesion to the nucleator. Because weather and atmospheric conditions are always changing, snowmaking machines are often adjusted to correct mixture of air and water to get good adhesion to the nucleating site to form snow.

Colder and drier conditions are more effective for snowmaking, which makes most western resorts optimal for snowmaking. However, these colder dryer conditions can freeze water droplets before they attach to a nucleator. These frozen particles can be small enough to stay aloft under certain atmospheric conditions and form a snow cloud.

Snow King lies at the edge of town, and the majority of current snowmaking occurs on the lower portion of the mountain adjacent to the town. When snowmaking is underway, there is a chance for machine-made snow to remain in suspension and drift from the mountain into town. This occurs most often with machines at lower elevations during inversion weather events. In these circumstances, fine snow particles form a cloud over the valley causing a reduction in sunlight reaching the ground and lower felt temperatures at ground level. Wind direction, elevation, atmospheric conditions, weather, type of snowmaking machines, and the volume of water used for snowmaking affect the likelihood of this occurring.

3.3.3 Direct and Indirect Effects

3.3.3.1 Protected Airsheds

3.3.3.1.1 Alternative 1

Under the no-action alternative, emissions would remain the same as existing conditions and past output. Air quality impacts from annual slash burning associated with vegetation management and maintenance vehicle dust would be minor. These emissions would not constitute a notable impact on visibility or particulate concentrations in Teton National Park or other area Class I airsheds.

3.3.3.1.2 Alternative 2

As discussed above (section 3.3.2.1), the relationship between concentrations of air quality constituents and emissions from specific sources is extremely variable and complex, and this analysis correctly focuses on emissions. Beyond that, quantifying projected emissions is a complicated analytical process that would be undertaken in a NEPA review only if it were necessary to determine whether an air quality impact was significant or not. In this case, as discussed in section 3.3.2.1, there is a wide margin between the current visibility and particulate ratings for Grand Teton National Park and the poor rating threshold. As a result, this analysis can take a broader, less quantified approach and provide a sufficient basis for the significance determination.

Under this alternative, 32.7 acres of glading would occur to increase tree skiing opportunities. If Snow King continued their current program as planned, the acreage treated, and the volume of slash burned per season, would not increase relative to existing conditions (section 3.3.2.1). Particulate emissions would remain unchanged, though the additional acreage to be treated would extend the impact for roughly 3 to 6 years. These particulate emissions would continue to be generated in October and November, when visibility and particulate concentrations in the Class I airsheds are good. Burning would continue to be conducted in

compliance with applicable plans and regulations, including those provided under Wyoming's Smoke Management Program (DEQ 2004; see section 3.3.2.1).

Under Alternative 2, construction of a new summit access road/novice skiway, various facilities, biking and hiking trails, ski runs, gondola, and lifts has the potential to increase dust emissions. The proposed improvements require grading or excavation of 64.1 acres that would temporarily generate dust during construction. Projects such as the new summit access road/novice skiway, ski run grading, and facilities are likely to generate larger amounts of dust. Ski lift, hiking and biking trail construction will generate minor amounts.

Construction dust is impossible to accurately quantify given the wide range of heavy equipment and construction methods involved, the inherent variability in site conditions, and weather conditions. Nevertheless, the potential for substantial dust production is high. To offset this risk, the dust management BMPs listed in section 3.3.5 should be implemented. These are standard practices that have proven effective in reducing fugitive dust emissions across a wide range of construction projects.

Overall, with the design criteria identified in section 3.3.5 in place, Alternative 2 is unlikely to have a discernible effect on visibility or particulate concentrations in Grand Teton National Park or other Class I airsheds in the area.

3.3.3.1.3 Alternative 3

Under Alternative 3, the acreage disturbed by grading and excavation would not change appreciably, but 154.2 acres of forest stand thinning to reduce fuel loads in the wildland/urban interface zone would occur over time. As discussed under Alternative 2, if Snow King maintained their current glading/thinning operation, the air quality effects on a year-to-year basis would remain similar to what they are today, but they would extend further into the future, roughly for another 15 to 30 years.

Given the pressing need to complete fuel reduction treatments (section 2.5.4.4), it is likely that the Bridger-Teton would accelerate the thinning program. The rate of slash burning would likely increase proportionately. To assess the likely impact, a couple of key points from section 3.3.2.1 need to be considered. First, it would take a 2-to-3-fold increase in particulates and other airborne constituents to decrease the Park's visibility rating to poor. Second, the particulate pollution generated by slash burning is a small proportion of that associated with vehicle traffic, wildfire, and other sources. Third, burning would comply with Wyoming's Smoke Management Program requirements (DEQ 2004). Fourth, burning would continue to occur in late fall, when air quality in the Class I airsheds is good, which would minimize its impact. Based on these considerations, and with the design criteria noted in section 3.3.5 in place, the pace of forest stand thinning and slash burning could be increased substantially without causing a poor visibility rating in the Park or exceeding Wyoming or national particulate standards in Class I airsheds.

From another perspective, a 135-acre wildfire in this region would be considered relatively small. It would produce far more emissions than burning the slash from a 135-acre thinning project. All the emissions would be generated in a matter of days, and it would likely occur during the summer when ambient air conditions were at their worst.

3.3.3.1.4 Alternative 4

Under Alternative 4, impacts from grading and excavation relative to Alternative 2 would decrease by 10.1 acres, 0.6 acres for excavation and 9.5 acres for grading. While impacts may be reduced for air quality, the difference would be negligible.

An increase of 3.8 acres to 36.5 acres of glading would occur under this alternative, but that small change would not alter the impacts noticeably from those outlined under Alternative 2.

3.3.3.2 Snowmaking Cloud

3.3.3.2.1 Alternative 1

Under this alternative, snowmaking at Snow King would remain unchanged at 90 acres. No additional water would be used to create snow. The frequency and duration of snow cloud formation would remain unchanged.

3.3.3.2.2 Alternative 2

Under this alternative, snowmaking coverage would increase substantially, by 147.1 acres. With all variables held equal, the amount of snow produced, and thus the potential for snow cloud formation, is directly proportional to the amount of water used. Under Alternative 2, Snow King could increase water consumption up to a maximum of 60 million gallons seasonally (section 3.4.2.1.2), more than double what is currently being used. Newer, more efficient, snowmaking machines may reduce actual water use.

This increase in water use does not necessarily translate into a proportional increase in snow cloud formation for several reasons. Most of the snowmaking system expansion is at higher elevations where snowmaking would be required less frequently. It would also be spread across a wider area and be exposed to more winds, and both of these factors would increase dispersion. Snowmaking on the backside would not affect Jackson.

Overall, some increase in the frequency and duration of snowmaking cloud formation affecting Jackson is possible. To limit this potential, Snow King could limit front-side snowmaking during valley inversion conditions.

3.3.3.2.3 Alternative 3

Under Alternative 3, impacts would be the same as described under Alternative 2.

3.3.3.2.4 Alternative 4

Under this alternative, added snowmaking coverage would be reduced to 135.7 acres, relative to the 147.1 acres under Alternatives 2 and 3. This small reduction in acreage of snowmaking would not noticeably change the impacts described under Alternative 2.

3.3.4 Cumulative Effects

All of the cumulative actions identified in section 3.1.2 involve some combination of equipment operation and ground disturbance and thus have the potential to interact cumulatively with these alternatives in affecting air quality. However, these projects are generally small, implemented over a wide time span, and subject to various design criteria to reduce dust and emissions. As a result, the potential for significant cumulative effects is negligible.

None of the cumulative actions in section 3.1.2 have the potential to affect the snowmaking cloud.

3.3.5 Design Criteria

1. Fugitive Dust Control best management practices (BMPs):
    - To the extent feasible, plan construction to reduce the potential for fugitive dust emissions. Minimize the area of grading, and complete grading in segments.
    - Water all active grading areas, including roadways, building sites, and lift terminal locations, to minimize dust. Under dry conditions, water sites twice daily with complete coverage, preferably in late morning and after work is completed for the day.
    - Limit vehicle speeds on service roads and construction sites to 10 miles/hour.
    - Construct wind breaks or use natural vegetation to control stockpiles of earth.

2. Slash Burning BMPs:
    - Follow existing *Bridger-Teton National Forest Industrial Fire Precautions Plan* guidelines.
    - Comply with requirements of Wyoming's Smoke Management Program (DEQ 2004).
    - Notify Bridger-Teton fire dispatch and local authorities prior to any slash burning.
    - Avoid slash burning during valley inversions.
3. Snow Cloud BMPs:
    - Limit snow production on the front side during valley inversions.

3.4 WATER, SOILS, AND WATERSHED

3.4.1 SCOPE OF ANALYSIS

3.4.1.1 Hydrology

- *How would the proposed increase in snowmaking and clearing of ski runs affect surface runoff, and groundwater recharge?*

The proposed action would increase snowmaking coverage at Snow King. Most of the proposed coverage is within the current permit boundary (on the north and south sides of Snow King Mountain) with minor amounts in the proposed east and west boundary adjustment areas. No stream channels exist within the current or potentially expanded permit boundary, but the expanded snowmaking coverage would include previously undeveloped drainages. Beyond that, clearing of proposed ski runs would affect the existing pattern of tree cover and could influence snow accumulation and runoff patterns. The combined influence of additional snowmaking and changes in tree cover could impact surface runoff and groundwater hydrology.

Indicator: Primarily qualitative assessment of current conditions, the amount and location of water potentially added to the system, the location and extent of vegetation clearing, the timing of runoff, and the resulting impacts on channel stability and groundwater recharge.

3.4.1.2 Erosion and Slope Stability

- *How would the ground disturbance associated with construction and use of the proposed infrastructure affect soil erosion and slope stability?*

The project area is characterized by steep slopes and erosive soils, and there is evidence of erosion and historic mass soil movement. Construction-related disturbance and subsequent use could potentially increase erosion and sediment transport to downslope areas. It could also create areas of instability on Snow King's slopes.

Indicator: Use of a methodology based on the connected disturbed area (CDA; Forest Service 2006) approach to assess the risk of erosion, sedimentation, and instability for each proposed project element that entails ground disturbance, both prior to and following implementation of best management practices (BMPs).

3.4.1.3 Water Quality

- *How would construction and use of the proposed infrastructure affect impaired water bodies in the area?*

Short-term surface disturbance during construction of the proposed infrastructure, and long-term use of the proposed ski runs and expanded snowmaking system, have the potential to introduce pollutants (primarily

sediment) into downstream waterbodies. While there are no streams to be affected inside the current permit boundary, the proposed east boundary adjustment area includes part of the Cache Creek watershed. Cache Creek is a tributary of Flat Creek, which is included on Wyoming's 2018 303(d) list of impaired water bodies. Any pollutants entering Cache Creek could contribute to Flat Creek's existing impairment.

Indicator: Primarily the results of the hydrology and CDA-based analyses discussed above, specifically their conclusions regarding surface runoff, erosion, sedimentation, and effectiveness of BMPs in avoiding these issues. Assessment of these conclusions in light of the current impairments in Flat Creek and intervening conditions between Snow King and Flat Creek.

3.4.2 AFFECTED ENVIRONMENT

3.4.2.1 Hydrology

Snow King Mountain is part of the Gros Ventre mountain range. These mountains are in the greater Rocky Mountain range that covers much of western Wyoming (Omernik and Griffith 2014). Mountain ranges are generally oriented in the north-south direction and perpendicular to the prevailing regional wind patterns. Although Wyoming is far from moisture sources such as the Pacific Ocean, the increased elevation forces westerly air currents to rise and release precipitation on Jackson Hole and other areas of western Wyoming (WRCC 2019).

3.4.2.1.1 Natural Snowfall

Precipitation as snow in the Jackson Hole area typically begins in early October and persists through most of June, although snow falls for a few days even in July during some years (NRCS 2019a). As a result, snow accumulation and snowmelt runoff have a major influence on the hydrologic cycle in Jackson Hole and most of the greater Snake/Salt River Basin.

Snow accumulation at Snow King can be characterized with data from a snowpack telemetry (SNOTEL) station located 8 miles northeast on Phillips Bench (NRCS 2019a) and a snow survey course near the peak of Snow King Mountain (NRCS 2019b). Mean monthly snow depths on Snow King Mountain are 30–44 inches from December through May, with peak depths typically occurring in March (NRCS 2019b). The lower 10th percentile of monthly snow depth at Snow King Mountain ranges 11–33 inches. Elevations below the snow survey course receive less snow than this during the ski season.

Local factors that influence snow accumulation include aspect, elevation, and vegetation cover. The majority of ski slopes in the permit area face north towards the Town of Jackson. Less sunlight occurs on these slopes during the winter season, compared to slopes on the south side of Snow King Mountain. As a result, snow cover typically remains on north facing slopes after snow has disappeared from south facing slopes.

Elevation in the permit area has an influence on air temperature and subsequently snow accumulation. This influence is illustrated by precipitation events that sometimes produce rain at the base area and snow above the top of Cougar lift, midway up the mountain (Stanley 2019b).

Forest cover can also influence how snow accumulates and melts by interacting with radiation, sublimation, wind, and snow density (Boon 2012, Lundquist et al. 2013, Svoma 2017). The relationship between forest cover and snow processes is complex and can be influenced by site-specific conditions, some of which include magnitude of snowfall, slope, windspeed, canopy geometry, and size of clearings between forest cover (Varhola et al 2010).

Falling snow can accumulate in response to air turbulence created by trees or where wind velocity drops, such as at the edge of forest clearings. Snow captured in areas of tree cover is shielded from solar radiation and generally lasts longer than snow that collects in open areas. Based on existing vegetation mapping, approximately 134 acres (39 percent) of the existing permit area is covered by trees islands interspersed by

clearings. The remaining permit area is covered by a mix of shrubs and grass, including most of the south side of Snow King Mountain.

3.4.2.1.2 Snowmaking

Artificial snow is used to develop early season snow cover and then to supplement natural snow accumulation in the permit area as needed. The existing snowmaking systems covers 90.4 acres, primarily in the Rafferty and Cougar pods as well as Elk ski run up to the ridge. Water used for snowmaking is supplied by the Town of Jackson from the same sources used for municipal purposes (Ryan 2019). The annual volume of water used by Snow King for snowmaking is about 25 million gallons and varies each year depending on natural snow accumulation. Recent annual totals (2015-2019) range 22.5–30.5 million gallons (Stanley 2019b). The high cost of making artificial snow provides an incentive to limit application to areas where additional snow is needed to maintain a safe and desired skier experience.

Snowmaking at Snow King generally begins the first week of November at lower elevations and ends early in January. The opportunity to begin making artificial snow depends largely on daily air temperature. If air temperatures are low and natural snow is plentiful, then ski runs are covered quickly, and snowmaking ends earlier compared to a relatively warm and dry winter.

During a high snowfall year, little snowmaking occurs above the top of Cougar lift. In general, artificial snow is first applied to areas below the top of the Cougar lift and downslope of Slow Trail including beginner terrain, terrain parks, and the Tube Park. Priority areas for snowmaking during the season include the lower Elk ski run, Cougar lift to the base, Rafferty lift from mid-station to base, and the Tube Park.

3.4.2.1.3 Runoff and Groundwater Recharge

Snowmelt in Jackson Hole typically begins in April and extends through the month of June (NRCS 2019a). During these 3 months, melting snow produces surface runoff and groundwater recharge through infiltration. Surface runoff in the permit area is directed by topography. The majority of the permit area is located in the Lower Flat Creek subwatershed, including slopes that drain north towards the Town of Jackson, or south into upper Leeks Canyon. A small portion of the permit area (22 acres) is in the Cache Creek subwatershed.

Although limited snowmelt runoff occurs at Snow King, no stream channels are found in the permit area, including perennial, intermittent, or seasonal streams. Two intermittent stream channels are noted on US Geological Survey maps on the north face of the permit area (USGS 2017, USGS 2018). One mapped stream terminates in the base area, approximately 120 feet upslope of East Snow King Avenue, and the other stream appears as a tributary to Cache Creek. A third intermittent channel is mapped on the back side of Snow King Mountain in the Leeks Canyon watershed (USGS 2017). Field surveys did not identify bed and bank features or riparian vegetation at these mapped stream locations. Neither stream channel features nor wetlands have been identified at any location in Snow King's permit area.

Little runoff from the permit area enters the municipal stormwater system, even during winters with high snow accumulation (Lenz 2019). Snowmelt runoff from business lots along East Snow King Avenue is collected and diverted to a wetland in Karns meadow that removes suspended sediment and other pollutants before entering Flat Creek (Nelson Engineering 2001, TOJ 2013). Accordingly, the majority of snowmelt on Snow King Mountain infiltrates to recharge groundwater.

Groundwater recharge plays a critical role in the local hydrologic cycle by capturing and storing runoff from snowmelt and rain in the Snake/Salt River Basin including Jackson Hole (Lines and Glass 1975, WWDC 2007). Groundwater recharge along the valley floor of Jackson Hole is typically 5–6 percent of annual precipitation but can reach 60 percent in the surrounding mountains (Taboga et al. 2014).

Direct measurements of groundwater recharge from the permit area are not available. Recharge rates in the Snake/Salt River basin are estimated to range from 1–35 inches/year with higher recharge occurring in mountain and foothill areas (Taboga et al. 2014). Recharge primarily occurs in unconsolidated alluvium,

fault zones, and historic landslide debris found along the margins of Jackson Hole (Love and Albee 1972, Nolan and Miller 1995, Taboga et al. 2014) including lower elevations of the permit area and adjacent private land. Groundwater recharge is particularly important to the Town of Jackson, which depends on groundwater for municipal use due to the abundance, quality, and low treatment cost of this resource (Nelson Engineering 1993, Ryan 2019).

Most surface runoff in the permit area from rain and melting snow (including snow melt from natural and artificial snow) infiltrates into the lower slopes of Snow King Mountain, providing groundwater recharge.

3.4.2.2 Erosion and Slope Stability

3.4.2.2.1 Erosion Hazard

Most of the project area is characterized by steep slopes and soils with moderate or high erosion potential. Portions of lower elevations in the project area are covered by historic landslides. Disturbance created by construction activities has the potential to accelerate erosion and reduce ground surface stability and soil productivity. Many areas of Teton County experience minor earthquakes on a regular basis (USGS 2019a). The potential for surface erosion and instability to occur can be assessed on the basis of characteristic soil properties, landslide mapping and classification, and earthquake monitoring data.

Soil properties for this analysis were drawn from a soil survey of the Bridger-Teton completed by the Soil Conservation Service (SCS 1985) and the national SSURGO database maintained by the Natural Resources Conservation Service (NRCS 2017). Figure 3-1 and Table 3-6 identify all soil mapping units in the project area and provide this information for each.

Seven soil map units occur in the project area (Table 3-6). Soil texture in most locations is skeletal, indicating a lack of well-defined soil layers and a mixture of imperfectly weathered and coarse fragments in the upper profile that generally exceeds 35 percent of the total profile (SCS 1985, Miller and Donahue 1990). As a result, the soil profile is typically well-drained in the project area.

The north face of Snow King Mountain and the Snow King base area include four soil map units. Soil unit 391 covers the majority of this area and extends upslope from the permit boundary to Snow King summit on 40–70 percent slopes. The other three, soil units 14, 46, and 59, are all located downslope of the permit area on private land owned by Snow King and the Town of Jackson (NRCS 2017, Teton County 2019). Soil unit 14 has 0–5 percent slopes and underlies small portions of Snow King base area facilities and most of the Town of Jackson. Soil unit 46 is found to the east and west of soil unit 59 on slopes ranging 30–70 percent. Soil unit 59 includes most of the base area, on 30–60 percent slopes that extend up to the permit boundary. All soil map units on the north side of the permit have a high erosion hazard with the exception of unit 14 which has a low erosion hazard. The high erosion hazard in and around the project area is due primarily to slope.

The back side of the ski area includes three soil map units. Soil units 372 and 484 are located south of Snow King ridge on steep slopes that elevate the potential erosion hazard to high. Soil unit 392 has a low erosion hazard. This soil unit covers a small section of the project area with moderate slopes near the far southern boundary.

Table 3-6 identifies several soil map units with a limited ability to support revegetation in the absence of BMPs and other actions that enhance growth. “Revegetation limitation” is an inherent soil characteristic that describes the ability of a soil to respond to revegetation efforts. Ratings range from slight to very severe and indicate a response to revegetation efforts from acceptable to poor (SCS 1985). Five of the seven soil map units in the permit area have either a slight or moderate revegetation limit (Table 3-6).

3.4.2.2.2 Slope Stability

Teton County has recently identified risks from landslides as one of several hazard events that could potentially impact property and infrastructure in the county (TCEM 2016). That assessment notes that if

landslides near the Town of Jackson were to become active, damage could occur to structures and roads that are built in these areas. Furthermore, Cache Creek and Flat Creek could also be dammed if landslides near these creeks reactivated. Rupture of a landslide dam could ultimately cause flooding in Jackson (TCEM 2016).

Slope stability is indicated by historical landslide activity and the probability of mass movement. Mass movement, whether accelerated by anthropogenic activities or naturally occurring, can result in erosion and decreased soil productivity. Mass stability can range from stable–unstable (SCS 1985). Six of seven soil map units in the permit area have a mass stability rating of either stable or marginally unstable (Table 3-6).

Historical landslides within the project area cover 14 acres on slopes ranging up to 48 percent. Landslides were identified through aerial photo interpretation collected in the 1980s and 1990s (Wittke 2019) and described using the Wyoming Landslide Classification Scheme (Varnes 1978, WSGS 2019a). These features overlap the north permit boundary at lower elevations and extend into the Town of Jackson (Figure 3-1). The mapped landslide areas in the Town of Jackson have been developed for homes and roads, including areas along Upper Cache Creek Drive, Snow King Loop, Upper Redmond Drive, and Redmond Street.

Mapped landslides in and near the project area are categorized as slump or flow features containing debris, earth, and bedrock. Slump landslides are also referred to as rotational slides that occur as a block of material moves a limited distance along a concave surface. A flow landslide, also known as debris flow, includes a mass of loose, water-laden rock, soil, and mud that moves down a slope in response to gravity (WSGS undated). The cause of mapped landslides in the project area is currently unknown (Wittke 2019). With the exception of road failure due to poor construction, soil movement and surface instability have not been a concern in the project area (Stanley 2019c, Lenz 2019). Recent field surveys of mapped landslides in the project area did not identify evidence of past or recent surface movement and instability.

Landslides generally start from three causes including geology that is weak, weathered or sensitive; surface morphology responding to uplift or erosion; and human activities that create instability (USGS 2004). Earthquakes can be a trigger as well. Due to their historic nature, mapped landslides in and near the permit area likely occurred in response to geology or surface morphology.

The Budge Drive slide is the most recent slide to occur near the Town of Jackson (Jackson Hole Daily 2014). It originated on East Gros Ventre Butte near the west side of the town. The landslide is believed to be primarily a response to human activity following quarrying and excavation, fracture development, and water infiltration (GOJH 2014). The most significant slide in Teton County (in terms of size and damage) is the Gros Ventre slide, located about 16 miles northeast of Jackson. The slide occurred in 1925, and some people believed that seismic activity might have precipitated it (Forest Service 2016, Case et. al. 2002). Several other factors are now considered to have influenced the slide including heavy rains and rapidly melting snow, erosion created by the Gros Ventre River, and saturated soils at the top of the mountain indicated by numerous pools (Forest Service 2016).

Earthquakes in Teton County are common and occur almost every day throughout Wyoming, with the majority occurring in the northwest corner near Yellowstone Park (WSGS 2019a). However, most of these quakes go unnoticed due to their small magnitude (< 3 on the Richter scale) and few have resulted in damage in Teton County (Case et. al. 2002). In 2003 there was a 3.5 magnitude earthquake near the top of the Summit lift (USGS 2019a). No structural damage or surface instability was created by the earthquake (Stanley 2019c). Furthermore, existing ski resort infrastructure meets industry standards for structural integrity and state and local building codes for the area. Although earthquakes can produce short-term surface instability, no instability or damage due to earthquakes has occurred in the permit area or in downslope areas by rocks or other material moving from the resort (Lenz 2019).

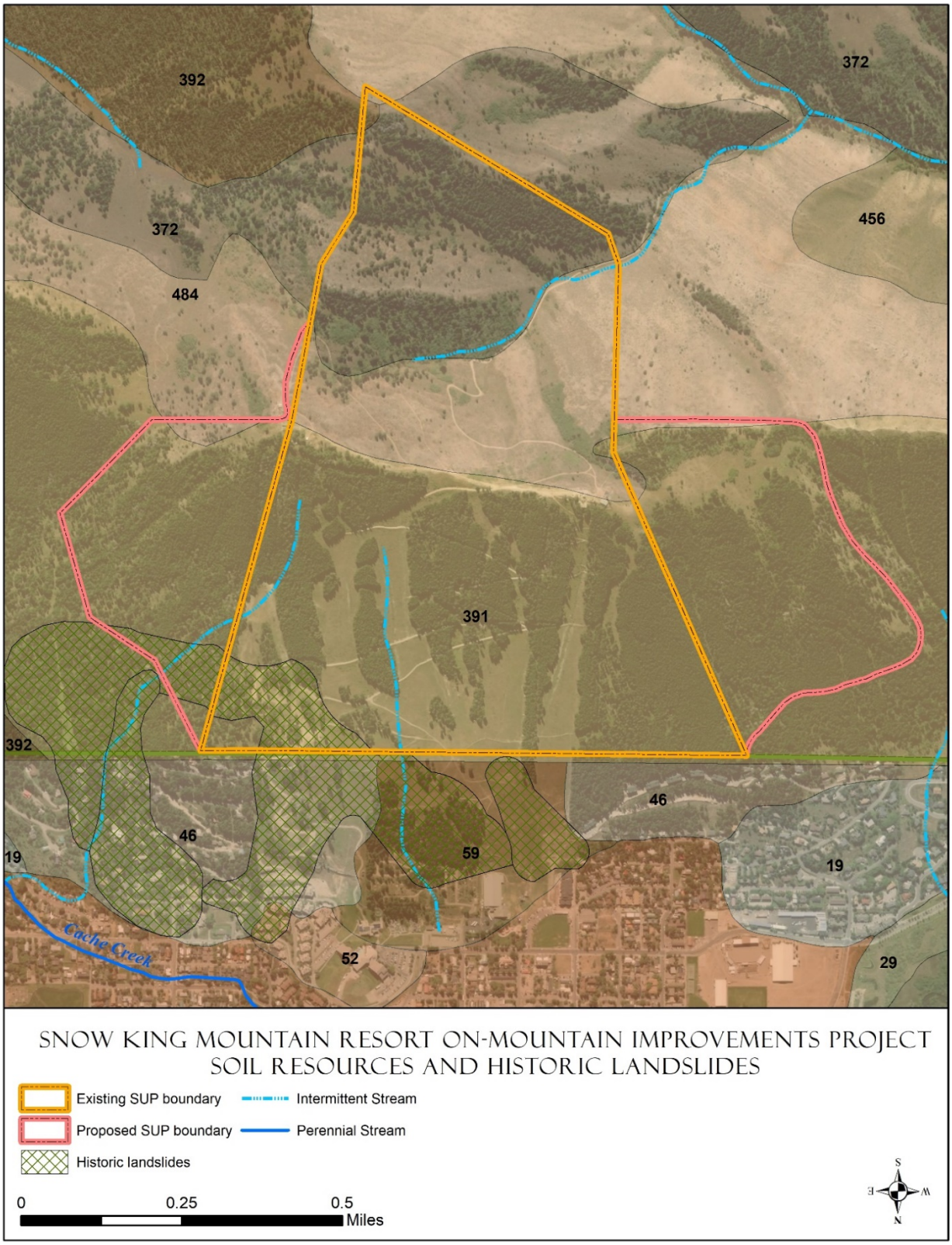

Figure 3-1. Soil resources and historic landslides.

Table 3-6. Characteristic soil properties in the Snow King Mountain Resort permit area.

Map Unit 372: Loamy to skeletal, mixed, and well-drained soil. Surface layers are commonly gravely loam to very cobbly loam 6–10 inches thick. Rock fragment content in surface soil is 15–40%. This map unit covers the north face slope south of Leeks Canyon road.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%):
High	Slight	Marginally Stable	30–60

Map Unit 391: Fine-loamy to loamy-skeletal, mixed, and well-drained soil. Surface layers are loam–gravelly loam about 5–10 inches thick. Rock fragments in surface soil are pebbles and cobbles and comprise 0–40%. This map unit is found north of Snow King ridge.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%):
High	Severe	Marginally Stable	40-70

Map Unit 392: Fine-loamy to coarse-loamy, mixed, and well-drained soil. Surface layers are commonly loam, gravelly loam, sandy loam, or silt loam about 7–8 inches thick. Rock fragments in surface soils include pebbles, cobbles, and comprise 0-25%. This map unit is found in the southeast corner of the permit area.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%):
Low	Moderate	Stable	10–40

Map Unit 484: Loamy-skeletal, mixed, and well-drained to excessively drained soil. Surface layers are commonly gravelly sandy loam–extremely cobbly loam 3–6 inches thick. Rock fragments are pebbles and cobble scattered throughout the profile and comprise 15–70 percent. This map unit extends south from Snow King ridge to Leeks Canyon road.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%)
High	Very Severe	Marginally Unstable	50-75

Map Unit 14: Gravelly loam to very gravelly loamy sand and somewhat excessively drained soil. Surface layers are commonly gravelly loam 5 inches thick. Rock fragments in surface soils include up to 15 percent cobble. This map unit extends north from Phil Baux Park to the Elk Refuge.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%)
Low	Slight	Stable	0-5

Map Unit 46: Loam to very stony loam and well-drained soil. Surface layers are commonly coarse upland to shallow loam from 4-10 inches thick. Rock fragments in surface soils comprise 5-60 percent cobble and boulders. This map unit covers land east of the Rafferty lift and north of the USFS boundary.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%)
High	Moderate	Marginally Stable	30-70

Map Unit 59: Loamy and well-drained soil. Surface layers are commonly loam to gravelly loam from 6-26 inches thick. Rock fragments in surface soils include up to 10 percent cobble. This map unit covers land between the Summit lift and the Rafferty lift and north of the USFS boundary to the base of the mountain.

Erosion Hazard:	Revegetation Limitation:	Stability Rating:	Slope (%)
High	Slight	Stable	30-60

Potential sources for earthquakes are the thrust faults in and around Jackson, including the project area (WSGS 2019a). The Jackson Thrust Fault intersects the lower portion of Snow King from east to west near the base area. The fault begins near the intersection of Highways 89 and 22 and extends just past the Rafferty lift. This is an inactive fault due to the absence of movement during the past 10,000 years and buried position (i.e., subsurface) in the geologic stratigraphy (USGS 2019b, WSGS 2019b).

3.4.2.3 Water Quality

The Wyoming Department of Environmental Quality has classified Flat Creek as impaired since 2002 due to poor physical substrate and habitat alteration (WDEQ 2019b). Existing water quality concerns include urban stormwater, encroachment by development on riparian habitat, and alterations to the stream channel (TCD 2019). A collaborative watershed committee including the Bridger-Teton is working to implement a watershed management plan to address these concerns (TCD 2019).

Cache Creek is a tributary stream to Flat Creek that receives municipal stormwater as it passes through the Town of Jackson. Additional stormwater is contributed directly to Flat Creek by stormwater outfalls along the northwest side of the town (Remlinger 2006). Substantial reductions in stormwater pollutant loads including sediment and nutrients have been achieved in the past 10 years due to treatment wetlands, wetland enhancements, and stormwater retention structures (TOJ 2013).

As described in section 3.4.2.1.2, field surveys and other existing data show there are no receiving water bodies or wetlands located in or adjacent to the permit area. Before entering the Town of Jackson, Cache Creek passes by the northeast corner of the existing permit boundary, approximately 1,900 feet away. Based on distance to the stream channel and local infiltration rates, no surface runoff from the permit area reaches Cache Creek. As mentioned in section 3.4.2.1.2, little snowmelt runoff from the permit area reaches East Snow King Avenue and the Town stormwater collection system. No stream channels or wetlands were identified in the south permit area or immediately downslope of this area. Although Leeks Canyon is included in the Flat Creek watershed, the stream channel in the lower canyon area does not reach Flat Creek.

3.4.3 Direct and Indirect Effects

3.4.3.1 Hydrology

3.4.3.1.1 Alternative 1

No additional snowmaking or clearing for ski runs would occur under the no-action alternative. The existing distribution of natural snow accumulation would continue on the front and back sides of Snow King Mountain. Snowmaking would continue to be used to develop early season coverage then on an as-needed basis to supplement natural snow cover and provide a desirable and safe skiing surface. Under the no-action alternative, the total volume of water used for snowmaking would continue to be approximately 25 million gallons per year. Conditions that influence surface runoff and groundwater recharge would remain the same as described under section 3.4.2.1. Snowmelt runoff generated in the permit area would continue to infiltrate and provide groundwater recharge to local aquifers.

3.4.2.1.2 Alternative 2

Under this alternative, snowmaking coverage would be expanded on both existing and proposed runs (Figure 3-2). Snowmaking coverage would be added on all existing front-side runs except East and West S Chutes, and all proposed front-side and back-side runs, except Run 9. This would result in approximately 147.1 acres of additional snowmaking coverage for a total of 240.5 acres (Figure 3-2).

As discussed below, snowmaking water use is projected to increase. However, the increase in snowmaking system coverage would not necessarily correspond to a proportional increase in water use and production of artificial snow. The purpose of the expansion would be to provide flexibility and increased efficiency regarding where snowmaking could be applied.

New snowmaking would focus on priority areas where skier demand is likely to be highest. North side priority areas would include the full length of the summit access road/novice skiway, beginner terrain on the summit, and the ridge area between the Summit gondola top terminal and Lift A. South side priority areas would include the south facing slope between Lift D and Lift A, including corridors from the ridge down to the bottom of Lift A. Snowmaking would be employed on remaining, lower priority areas as needed according to skier demand, existing snow cover, and weather conditions conducive to making snow.

Based on existing application rates that account for variation in snowfall between wet and dry years, elevation of proposed coverage, and best professional judgement, this alternative would require an additional 20–35 million gallons of water per year for snowmaking. Given the annual volume of 25 million gallons currently used for snowmaking, a total of 45-60 million gallons per year would be used annually for snowmaking under this alternative. The 60 million gallons per year total would be the maximum water volume if snowmaking occurred on all proposed areas of system coverage during a dry year. During most years, annual total water use would be less than this due to the focus on priority snowmaking areas.

Under this alternative, the permit area would expand to 525 acres including east and west boundary adjustment areas. This would add 133 acres of tree islands to the permit area and increase percent tree cover from 39 percent to 54 percent. Project elements under the Alternative 2 would reduce this tree cover through glading (32.7 acres) and clearing (47.7 acres). In many cases, glading would not require much tree removal. Clearing activities would primarily create new ski runs on the north side and east boundary adjustment area. Clearing for new ski runs on the south side would remove few trees due to the low density of tree cover.

These actions would modify the existing pattern of tree islands and tree density on the north and south sides of the permit area, including the east and west boundary adjustment areas. These modifications would alter existing low-level wind patterns that influence snow accumulation. Minor increases in snow accumulation could occur in response to these changes, particularly at the edge of new clearings. Gladed areas located adjacent to new ski runs in the east boundary adjustment area and on the south side would decrease this edge effect by deflecting less wind compared to complete tree cover. Snow that accumulated in cleared and gladed areas would also receive more sunlight compared to areas with tree cover.

Modifications of tree cover under this alternative would result in slight, localized changes in snow accumulation and snowmelt in areas where clearing occurred. These the changes would not result in measurable impacts on runoff volumes or timing compared to existing conditions.

Despite the fact that snowmaking water use at Snow King could more than double, the snowmelt runoff scenario in the permit area would remain similar to existing conditions (section 3.4.2.1.3). This is because snowmaking is expensive and therefore used as little as possible. When natural snow is sufficient to meet a ski area's needs, snowmaking does not occur. On the other hand, during dry years, or years when natural snow comes late, snowmaking offsets shortages of natural snow. As a result, similar amounts of snow accumulate naturally or as a result of snowmaking over the course of a season, and the amount of runoff remains comparable. During high snowfall years, when runoff increases notably, snowmaking is generally minimal and a minor contributing factor.

Depending on how much snow is made in any given year, the snowmelt period could be extended at some locations due to the higher density of machine-made snow. Extending the snowmelt period would benefit groundwater recharge by providing additional time for infiltration to occur.

Overall, any change in snowmelt runoff, infiltration, and groundwater recharge associated with this alternative would remain within the range of variability in volumes and rates experienced at Snow King in the past.

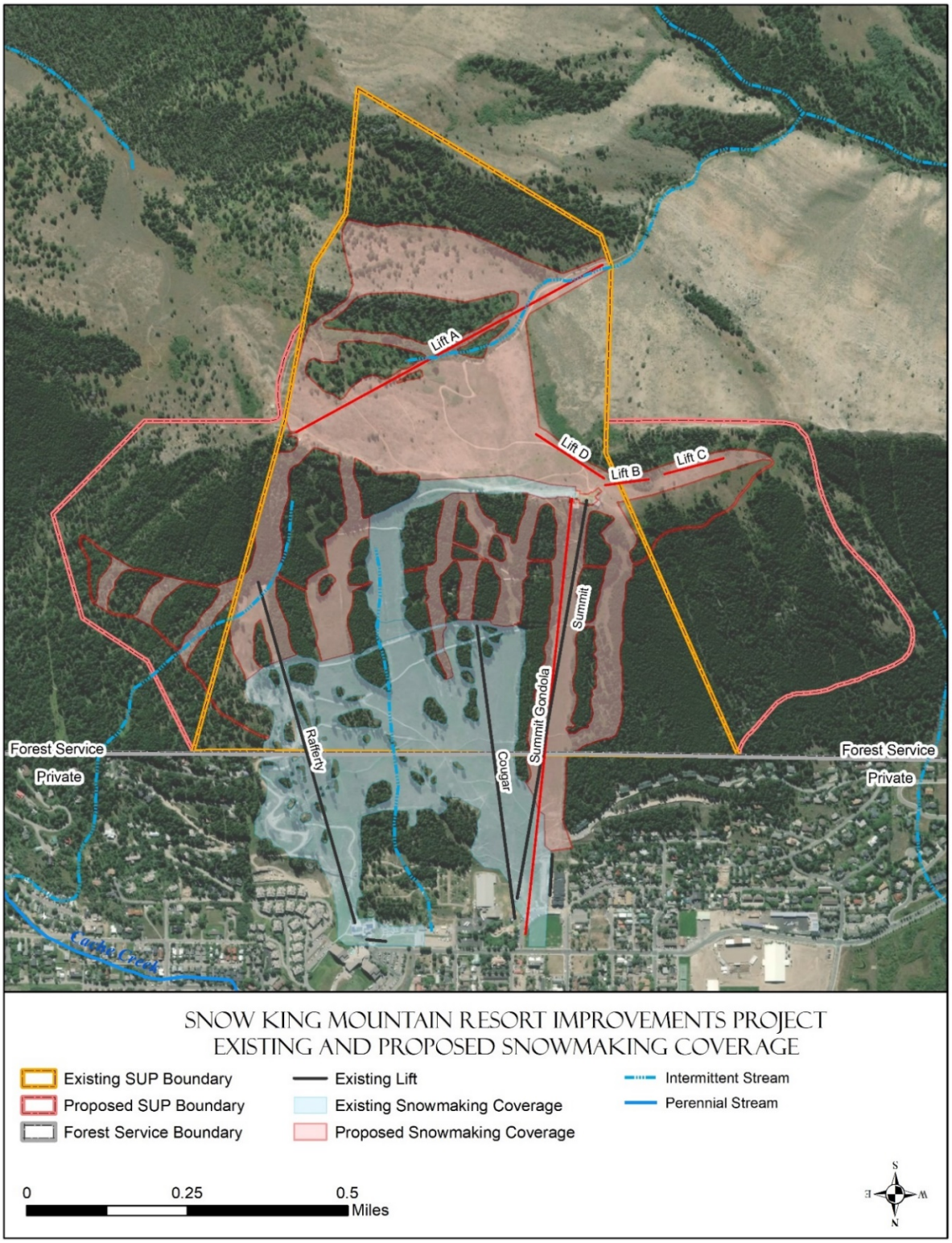

Figure 3-2. Existing and proposed snowmaking under Alternative 2.

3.4.2.1.3 Alternative 3

Changes in snowmaking coverage and tree cover under Alternative 3 would be the same as under Alternative 2. Impacts on snowmelt runoff, infiltration, and groundwater recharge would also be the same.

3.4.2.1.4 Alternative 4

New snowmaking coverage under Alternative 4 would be 135.7 acres, or 11.4 acres less than Alternative 2. These changes would occur primarily in the central portion of the front side. Changes in glading and thinning activities under Alternative 4 would also be minor, including 3.8 more acres of glading and 6.4 fewer acres of thinning compared to Alternative 3. Clearing activities under Alternative 4 would include 6.8 more acres compared to Alternative 3. Alternative 4 would include 6.0-7.2 more acres of clearing compared to Alternative 2 due to differences in clearing associated with Zipline Options 1 and 2, respectively. Similar to Alternatives 2 and 3, this alternative would not result in measurable impacts on runoff volumes or timing or on groundwater recharge compared to existing conditions.

3.4.3.2 Erosion and Slope Stability

3.4.3.2.1 Alternative 1

No development would occur under this alternative, and Snow King would continue to operate under its current design and capacity. Conditions that influence soil erosion and slope stability would generally remain as described in section 3.4.2.2. Erosion would continue to occur at existing rates, particularly in areas where soil surfaces were exposed to raindrop impact or concentrated flow. Potential sources of soil erosion would continue to be existing roads, trails, and areas where vegetation is sparse or absent. Erosion management would include standard practices currently used to manage soil erosion and slope stability including water bars, silt fences, erosion control blankets and mats, and wattles. (Stanley 2019c, Teton Conservation District 2014.)

3.4.3.2.2 Alternative 2

Connected Disturbed Area Approach

Natural erosion and sediment transport processes are part of soil development. However, prior to site rehabilitation, erosion from areas disturbed by construction can occur at an accelerated rate. The method used here to assess erosion and sedimentation hazard resulting from proposed development is based on the connected disturbed area (CDA) approach described by Furness et al. (2000) and the Forest Service (2006). We have adapted that methodology to provide a risk assessment rating for this project. Our methodology involves the following steps, applied to each proposed project element:

1. Determining the erosion potential prior to BMP implementation based on the erosion hazard of the affected soil types, the size of disturbance, the intensity of disturbance (i.e., clearing, grading, or excavation), the slope of the disturbed area, and the distance to the closest drainage channel or other runoff pathway (e.g., road or trail).
2. Identifying appropriate BMPs to reduce erosion and sedimentation hazard.
3. Assessing the erosion/sedimentation risk after BMP implementation based on the efficacy of the identified BMPs.

Based on the factors listed in point 1, project elements are assigned a pre-BMP risk rating of high, medium, or low for erosion and sedimentation. Generally, elements are assigned a high risk rating if they have two or more of the following attributes: large disturbance area (greater than 1 acre), steep slopes (greater than 50 percent), and proximity to a runoff pathway. Elements are assigned a moderate risk rating if they have one of these attributes and a low risk rating if they have none. Other factors including soil erosion hazard, intensity of disturbance, revegetation limitation, mass stability, and disturbance in historic landslides are considered to resolve border-line risk ratings.

This rating system is designed to be conservative – i.e., to indicate the maximum possible risk. For example, some elements with high risk ratings such as hiking/biking trails and utility trenches have a relatively large disturbance area but confined width throughout their length, which reduces actual risk. Similarly, while disturbance from a structure may exceed the 1-acre threshold, much of the projected disturbance is due to vehicle traffic and material storage, which are less intense and can be shifted to avoid runoff pathways during the construction period, alleviating the risk. Actual excavation would generally be limited to structure footings. Glading is assigned a high risk rating due to size and pathway intersections but poses less real risk because of the low intensity of disturbance.

The CDA approach prescribes "disconnecting" disturbed areas. If sediment sources are disconnected from the "easy pathways" down the mountain, the total sediment yield to runoff pathways can be greatly reduced (Furniss et al. 2000).

Specific BMPs to reduce erosion, disconnect disturbed areas from runoff and erosion pathways, and minimize the watershed and water quality impacts of each element are identified in the CDA analysis for this alternative. These measures are described in more detail in section 3.4.5, following the discussion of direct and indirect effects. Most of these BMPs are core measures recommended by state and federal agencies.

CDA Results

Table 3-7 summarizes results of the CDA analysis. Impacts of each project element are shown separately in the table. The total disturbed area for this alternative is included at the bottom of the table.

This alternative would affect four of the seven soil units in the permit area. With the exception of those located on soil unit 14, all project elements occur on soil units that have a high erosion hazard. The bottom terminals for the zip line and gondola would be located on soil unit 14 (low erosion hazard) at the Snow King base area.

Disturbance area for individual projects ranges from 38.2 acres for new and modified ski run clearing to <0.1 acre for trails or electrical utility lines. As shown in Table 3-7, Alternative 2 would affect a total of 144.5 acres. Many project elements would include excavation: the summit access road/novice skiway; utility trenches for water and power; and footings for buildings, towers, and terminals. A total of 35 acres would be disturbed through excavation, including 29.8 acres for the summit access road/novice skiway and trenches associated with snowmaking and lighting for night skiing.

Grading would affect 29.1 acres, of which 20.2 acres would occur as part of construction of the new and modified ski runs and the bike trails. The remaining grading would occur as part of construction for new hiking trails and to contour areas around buildings and other structures.

Clearing (approximately 47.7 acres) and glading (32.7 acres) would result in only minor erosion potential as surface disturbance would be limited to stump removal and skidding trees.

Elements of this alternative would occur on slopes ranging from 11 to 67 percent. Most project elements (115.5 acres of the 144.5 acres of total disturbance) occur on moderately steep slopes (i.e., maximum slopes within disturbance area greater than 50 percent). These steep slopes influence other ratings used to characterize soil properties and suitability for specific purposes.

Table 3-7. Connected Disturbed Area analysis results for the Alternative 2.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Terrain Development										
Teaching Center Terrain	391/High	6.1	Grading	43	Very Severe	Marginally Stable	–	Crosses trails and roads numerous times	Low	10, 11
New and Modified Ski Runs (clearing)	391/High	38.2	Clearing	67	Very Severe	Marginally Stable	>0.1/ms-mf	Crosses trails and roads numerous times	High	3, 11, 12, 13
Modified Ski Run (grading)	391/High	6.3	Grading	44	Very Severe	Marginally Stable	>0.1/ms-mf	Crosses road 1x and trail 4x	High	3, 9, 10, 13, 14, 17, 21, 23, 25, 27
Glading	391/High	32.7	Glading	58	Severe	Marginally Stable	4.4/ms-mf	Crosses road 1x and trails 1x	High	8, 11, 13
Summit Access Road/Novice Skiway	391/High	15.6	Excavation	63	Very Severe	Marginally Stable	1.5/ms-mf	Crosses trail 3x, crosses road 1x	High	3, 11, 12, 13, 15
Lifts										
Summit Gondola (corridor)	391/High	4.4	Clearing	54	Severe	Marginally Stable	0.8/mrs-mf	Crosses trail 12x, crosses road 1x	High	3, 11, 12, 13
Gondola (towers)	391/High	0.3	Excavation	46	Severe	Marginally Stable	>0.1/mrs-mf	Adjacent to trails, adjacent to road	Moderate	6, 8, 11, 12
Gondola (bottom terminal)	14/Low	0.2	Excavation	11	Slight	Stable	–	Crosses road 1x	Moderate	3, 4, 6, 9, 10, 12, 16, 29

Table 3-7 (cont'd). Connected Disturbed Area analysis results for the Alternative 2.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Lift A (corridor)	484/High	2.5	Clearing	45	Severe	Marginally Stable	–	Crosses road 2x, >600 ft. from trail	Moderate	3, 11, 12, 13
Lift A (power)	391/High	<0.1	Excavation	20	Very Severe	Marginally Stable	–	Crosses road 1x, >800 ft. from trail	Moderate	18
Lift A (terminals)	484/High	0.9	Excavation	53	Severe	Marginally Stable	–	Crosses road 2x, >700 ft. from trail	High	9, 10, 12, 16
Lift A (towers)	484/High	0.3	Excavation	47	Severe	Marginally Stable	–	Adjacent to trails, adjacent to road	Moderate	6, 8, 11, 12
Conveyor Lifts (B and C)	484/High	0.3	Excavation	19	Severe	Marginally Stable		Crosses trail 4x, and road 1x	Moderate	10, 11
Back-side Surface Tow - Lift D (corridor)	484/High	0.3	Clearing	34	Severe	Marginally Stable	–	Crosses trail 1x and road 2x	Moderate	3, 11, 12, 13
Back-side Surface Tow - Lift D (power)	484/High	<0.1	Excavation	11	Severe	Marginally Stable	–	Crosses trail 1x, >100 ft. from road	Moderate	18
Back-side Surface Tow - Lift D (terminals)	484/High	0.1	Excavation	26	Severe	Marginally Stable	–	Adjacent to trail, >50 ft. from road	Moderate	9, 10, 12, 16
Facilities										
Summit Building (facility)	391/High	1.8	Excavation	56	Very Severe	Marginally Stable	–	Crosses trail 1x, crosses road 2x	High	3, 6, 9, 11, 12, 16, 27

Table 3-7 (cont'd). Connected Disturbed Area analysis results for the Alternative 2.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Observatory (facility)	391/High	0.3	Excavation	17	Very Severe	Marginally Stable	–	Crosses trail 1x, <300 ft. from road	Moderate	3, 6, 9, 12, 27
Observatory (power)	391/High	0.1	Excavation	20	Very Severe	Marginally Stable	–	Crosses trail 1x, >100 ft. from road	Moderate	18
Temporary Ski Patrol (facility)	391/High	0.2	Grading	51	Very Severe	Marginally Stable	–	>200 ft. from trail, crosses road 2x	High	3, 6, 9
Temporary Ski Patrol (power)	391/High	<0.1	Excavation	49	Very Severe	Marginally Stable	–	>300 ft. from trail, crosses road 1x	Moderate	18
Yurt Trail	484/High	0.7	Grading	40	Severe	Marginally Stable	–	<100 ft. from trail, crosses road 1x	Low	13, 15
Yurt Camp	372/High	0.3	Grading	38	Severe	Marginally Stable	–	>1000 ft. from trails and road	Moderate	3, 6, 9, 27
Wedding Venue (facility)	391/High	0.4	Excavation	33	Very Severe	Marginally Stable	–	>100 ft. from trail	Low	3, 6, 9, 12, 27
Wedding Venue (access)	391/High	<0.1	Grading	24	Very Severe	Marginally Stable	–	>100 ft. from trail	Low	15
Night Skiing (power)	391/High	6.4	Excavation	54	Very Severe	Marginally Stable	0.4/ms-mf	Crosses trails and roads numerous times	High	10, 18

Table 3-7 (cont'd). Connected Disturbed Area analysis results for the Alternative 2.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Snowmaking	391/High	7.8	Excavation	65	Very Severe	Marginally Stable	0.1/mrs-mf/ms-mf	Crosses trails and roads numerous times	High	10, 18
Summer Activities										
Zip Line (corridor)	391/High	2.3	Clearing	53	Severe	Marginally Stable	0.4/mrs-mf	Crosses trail 16x, crosses road 2x	High	3, 11, 12, 13
Zip Line (bottom terminal)	14/Low	0.5	Excavation	11	Slight	Stable	–	<50 ft. from road	Low	6, 9, 12, 16
Mountain Bike Trails	391/High	13.9	Grading	56	Very Severe	Marginally Stable	1.4/mrs-mf/ms-mf	Crosses road 2x and trail 12x	High	13, 15, 26
Hiking Trails	391/High	1.6	Grading	67	Very Severe	Marginally Stable	>0.1/mrs-mf	Crosses trail 9x, adjacent to road	High	13, 15
Total disturbance Alternative 2 (ac)		144.5								

Elements of this alternative would occur on soils with a slight, severe, or very severe revegetation limitation, as defined by the Soil Conservation Service (SCS 1985):

- Slight: An acceptable response to revegetation efforts can be expected during the first year following revegetation.
- Severe: A slow response to revegetation can be expected. Special erosion control practices may be needed for soils with severe ratings and several years will be required to establish acceptable cover.
- Very Severe: A slow response can be expected, erosion control practices will be needed, and the site may not return to the pre-disturbance vegetative cover.

The bottom terminals for the gondola and the zip line would be located on soil with a slight limitation to revegetation. All other elements included under this alternative would disturb soils with severe and very severe revegetation limits. To return vegetation to pre-disturbance conditions, these projects will need erosion control measures and the benefit of mulch or other amendments and practices that enhance soil stability, seed germination, and vegetative growth. These practices are included for the applicable project elements in Table 3-7. Based on past success of revegetation efforts at Snow King (Stanley 2019c), these BMPs would restore disturbed areas to pre-disturbance conditions.

Mass stability is based on historical landslide activity and probability of mass movement (SCS 1985). Mass movement, whether accelerated by anthropogenic activities or not, can result in increased soil erosion and sedimentation resulting in lowered soil productivity. Mass stability ratings associated with elements of this alternative include (SCS 1985):

- Stable: Evidence of past mass movement is not discernable and land characteristics are not conducive to future mass movement.
- Marginally stable: Evidence of past mass movement has not been discerned but there are land characteristics which are conducive to mass movement. On-site evaluation and stabilization measures may make activity on these sites feasible without initiating mass movement.

Two elements located in areas with little to no slope have a stable rating. All other elements are found on soil units with a marginally stable rating due primarily to slope. These elements would require BMPs designed to minimize or eliminate the risk of instability during construction and rehabilitation. These practices are included for applicable project elements in Table 3-7.

This alternative includes 11 elements located on mapped landslide areas that total approximately 9.1 acres of disturbance. Most elements are located on slump/debris-flow or rockslide/debris-flow landslide types. The proposed bike trails cross both landslide types. Project elements disturbing more than 1 acre of mapped landslide areas under this alternative include: glading (4.4 acres), bike trails (1.4 acres), and the summit access road/novice skiway (1.5 acres). Surface disturbance would be minimal for glading activities. The bike trails have a narrow disturbance width that would include shallow disturbance (grading) in some areas. The summit access road/novice skiway would excavate a wider corridor and include cut and fill to create the road surface in areas with steep slopes.

Proximity to runoff pathways is noted for each project element in Table 3-7 including distance and number of crossings. Runoff pathways include roads and trails that could potentially transport surface runoff and suspended sediment to downslope areas, so surface disturbance on and near runoff pathways is a concern during runoff events. Disturbance from glading and clearing activities for ski runs, lifts, and zip lines would span runoff pathways but create minimal disturbance. Grading activities for larger projects such as modified ski runs, summit teaching center, and mountain bike trails would either create disturbance near runoff pathways or cross runoff pathways at trail intersections. Excavation would directly disturb runoff pathways at intersections with utility trenches for power and water. Excavation for structures would not occur in pathways, but heavy equipment may cross pathways during construction of footings or foundations.

Conclusions

The CDA approach was used to incorporate the variables of soil type, area and intensity of disturbance, surface slope, revegetation limits and mass stability, disturbance in historic landslide areas, and proximity to runoff channels. As discussed above under Connected Disturbed Area Approach and indicated in Table 3-7, each element of Alternative 2 is assigned a high, medium, or low risk rating for erosion, sedimentation, and instability prior to BMP implementation. This rating indicates the potential for individual elements to cause erosion, deliver sediment to downslope locations, or create instability during or following construction. Runoff pathways and steep slopes are a primary concern and, as noted in Table 3-7, virtually all elements are on marginally stable sites. Most elements of Alternative 2 have a moderate or high risk ratings prior to BMP implementation.

Elements with a high risk rating account for 13 of the 31 individual elements addressed in Table 3-7. Most of them involve large contiguous areas (greater than 10 acres), on steep slopes, with multiple crossings of runoff pathways. These include the steeper ski runs and the summit access road/novice skiway.

Elements with a moderate risk rating account for 13 of the 31 elements and include towers and terminals for the proposed gondola and ski lifts, corridor clearing, utility (electrical) trenches, observatory, and trail segments. Excavation for towers and terminals would be confined to the structure footprint, reducing the extent of intense disturbance. Corridor clearing would remove trees by felling and skidding, creating relatively minor disturbance. Holes created during stump removal would be filled to prepare the area for installing lift towers and winter grooming. Based on these considerations, elements with moderate risk ratings are not a serious concern.

The five project elements with low risk ratings do not cross runoff pathways created by roads and trails. They would generally include small disturbances located on low-moderate slopes. They are also not a serious concern.

Table 3-7 identifies BMPs that would minimize or reduce the potential for erosion, sedimentation, and slope instability. These BMPs are described in section 3.4.5. During construction Snow King would be required to comply with pollution control measures in a Storm Water Pollution Prevention Plans, enforced by Wyoming Department of Environmental Quality. This would provide additional assurance that potential sedimentation impacts were effectively minimized.

Impacts would be minimized prior to construction by following recommendations in Table 3-7 in regard to project design, location, and timing. Other BMPs in Table 3-7 are designed to manage runoff and promote infiltration during construction and through the project lifetime. Surface contouring, surface roughness, and water bars will disperse and infiltrate runoff before it can accumulate and create rill or gully erosion.

Long-term impacts from soil disturbance would be minimized by BMPs that promote successful rehabilitation such as preserving topsoil and using native plant species and soil amendments (e.g., fertilizer and mulch). Based on existing surface conditions, additional structures are not recommended in Table 3-7 to maintain slope stability, beyond what would be used to prevent erosion and restore disturbed areas. Protecting the soil surface from erosion will also maintain existing levels of stability and prevent conditions that contribute to rockfall or slope failure by landslides or soil creep.

With these BMPs in place, the erosion, sedimentation, and instability risk ratings for all project elements under this alternative would fall to low. While temporary impacts would occur during and immediately following construction on some projects, no measurable long-term impacts on erosion, sediment transport, or slope stability would result from implementation of this alternative. This conclusion is supported by previous experience with rehabilitation efforts in the permit area (Stanley 2019c) and existing levels of stability in the project area.

3.4.3.2.3 Alternative 3

Discussion of projected impacts under Alternative 3 focuses on differences from those described for Alternative 2, above. Alternative 3 includes different locations for some of the same projects under Alternative 2 including the gondola bottom terminal, zip line bottom terminal, and the new hiking trail. New project elements under Alternative 3 include intermediate towers for the zip line Option 2 and forest thinning.

Project elements under Alternative 3 (Table 3-8) are located on soils with a high erosion hazard with the exception of the new location for the gondola bottom terminal. The new location would be on soil unit 14 with a low erosion hazard, which is the same as for the gondola bottom terminal under Alternative 2.

Disturbance intensity for project elements under Alternative 3 includes thinning/glading, clearing, grading, and excavation. Forest thinning would involve 154.2 acres of forest cover where trees would be selectively removed, primarily to reduce fuel loads. Clearing activities could increase by up to 0.4 acre under Alternative 3. The minor differences between Alternative 2 and Alternative 3 in grading and excavation acreage are due to overlapping disturbance from nearby projects and are negligible. Total disturbance for all project elements under Alternative 3 would be 297 acres for Option 1 and 298.5 acres for Option 2. These totals are 152.5 and 154 acres more, respectively, than the 144.5 acres total disturbance under Alternative 2.

Maximum slope of disturbed areas would increase under Alternative 3 compared to Alternative 2 for several project elements including the gondola bottom terminal, (from 11 percent to 40 percent), zip line terminals (from 11 percent to 56 percent), and zip line corridor (from 53 percent to 66 percent). These changes are due to moving the gondola bottom terminal upslope and adding new zip line terminals. Maximum slope in areas of forest thinning would be 81 percent. Note that these slope measurements reflect the steepest portion of the disturbance footprint, which can exaggerate steepness.

Revegetation limits under Alternative 3 increase to very severe for Options 1 and 2 of the zip line corridor and bottom terminal. Forest stand thinning would also occur in areas with very severe revegetation limits. All other project elements under Alternative 3 would have the same revegetation limitation as under Alternative 2.

Mass stability under Alternative 3 would increase to marginally unstable for Options 1 and 2 of the zip line corridor and bottom terminal. Forest stand thinning would occur in areas that are marginally stable. All other project elements under Alternative 3 would have the same mass stability rating as under Alternative 2.

Landslide disturbance would decrease from 0.4 acres to 0.1 acres under Alternative 3 for both Option 1 and 2 zip line corridors. The Option 1 and 2 zip line terminals would also result in 0.1 ac of landslide disturbance each under Alternative 3. Forest stand thinning would create 14.4 acres of landslide disturbance.

Runoff pathways would be crossed by forest thinning as well as clearing for the gondola and zip line corridors. Disturbance from these activities would be minimal. Grading for hiking trails would connect with existing trails and roads at some locations. Excavation for terminals and lift tower footing would not occur in existing runoff pathways. Any disturbance from heavy equipment involved with these activities would be limited.

The same BMPs applied under Alternative 2 would minimize or eliminate the potential for erosion, sedimentation, and slope instability under Alternative 3. Similar to Alternative 2, BMPs under Alternative 3 would manage runoff, promote infiltration, and stabilize soil surfaces following construction. Some of the more important BMPs used would include surface contouring, surface roughness, water bars, staggering timing of construction projects, preserving topsoil, and using native plant species and soil amendments. All construction activities must comply with federal, state, and local codes related to construction disturbance and runoff from construction sites. Section 3.4.5 includes a full list of BMPs.

Table 3-8. Connected Disturbed Area analysis results for Alternative 3.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Lifts										
Summit Gondola (corridor)	391/High	4.2	Grading	54	Severe	Marginally Stable	0.9/mrs-mf	Crosses trail 9x, >300 ft. from road	High	3, 11, 12, 13
Gondola (towers)	391/High	0.3	Excavation	47	Severe	Marginally Stable	.0.1/mrs-mf	Adjacent to trail, >50 ft from road	High	6, 8, 11, 12
Gondola (bottom terminal)	14/Low	0.4	Excavation	40	Slight	Stable	-	Crosses trail 1x and road 1x	Moderate	9, 10, 12, 16
Summer Activities										
Zip Line Option 1 (corridor)	391/High	1.7	Clearing	52	Very Severe	Marginally Stable	0.1/ms-mf	Crosses trail 2x, crosses road 5x	High	3, 11, 12, 13
Zip Line Option 1 (terminal)	391/High	0.1	Excavation	25	Very Severe	Marginally Stable	0.1/ms-mf	Crosses trail 2x, crosses road 5x	Moderate	6, 9, 12, 16
Zip Line Option 2 (corridor)	391/High	2.9	Clearing	66	Very Severe	Marginally Unstable	0.1/ms-mf	Crosses trail 2x, crosses road 5x	High	3, 11, 12, 13
Zip Line Option 2 (terminal)	391/High	0.4	Excavation	56	Very Severe	Marginally Unstable	0.1/ms-mf	Crosses trail 2x, crosses road 5x	High	6, 9, 12, 16
Hiking Trail	391/High	0.6	Grading	47	Very Severe	Marginally Stable	-	Cross trail 1 x, >1,000 ft from road	Moderate	13, 15

Table 3-8 (cont'd). Connected Disturbed Area analysis results for Alternative 3.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Forest Stand Thinning	391/High	154.2	Glading	81	Very Severe	Marginally Stable	14.4/mrs-mf/ms-mf	Crosses trails and roads numerous times	High	8, 11, 13
Total Disturbance Alternative 3 - Option 1 (ac)		297.0								
Total Disturbance Alternative 3 - Option 2 (ac)		298.5								

With these BMPs in place, the erosion and sedimentation risk ratings for all project elements under Alternative 3 would fall to low. While temporary impacts would occur during and immediately following construction on some projects, no measurable long-term impacts on erosion or stability would result from implementation of this alternative. This conclusion is supported by previous experience with rehabilitation efforts in the permit area (Stanley 2019c) and existing levels of stability in the project area.

3.4.3.2.4 Alternative 4

Discussion of projected impacts under Alternative 4 focuses on differences from those described for Alternative 3, above. Alternative 4 project elements that have different CDA results from Alternative 3 include clearing and glading new ski runs, snowmaking, mountain bike trails, and forest stand thinning (Table 3-9). Although Table 2-1 shows no change in forest stand thinning between Alternative 3 and 4, Table 3-9 does show a decrease in acreage. This is due to overlap from clearing activities used to construct new ski runs under Alternative 4.

Other than the gondola bottom terminal that is the same as under Alternative 3, project elements under Alternative 4 are located on soil unit 391 with a high erosion hazard.

While overall disturbance decreased relative to Alternative 3 (Tables 3-8 and 3-9), under Alternative 4 the acres of clearing are 6.8 acres more than Alternative 3. Other differences include 2.6 acres less glading, 9.5 acres less grading, and 0.6 acres less disturbance for excavation.

Changes in maximum slope of disturbed areas under Alternative 4 would include bike trails (decrease from 56 to 51 percent). Maximum slope for other project elements would remain the same as under Alternative 3.

Relative to Alternative 3, revegetation limits for glading new ski run areas under Alternative 4 would increase from severe to very severe and decrease for both snowmaking and mountain bike trails from very severe to severe.

No changes would occur in mass stability between Alternatives 3 and 4.

Relative to Alternative 3, landslide disturbance under Alternative 4 would increase for mountain bike trails (1.5 acres) and glading (<0.1 ac). Landslide disturbance for forest thinning would be the same as under Alternative 3.

Glading and clearing activities under Alternative 4 would cross runoff pathways as part of developing new ski trails and developing other skiable terrain. Grading activities associated with developing mountain bike trails on the front of the permit area would merge with existing trails and roads. Excavation for snowmaking lines would temporarily disturb runoff pathways at intersections with existing trails and roads.

The same BMPs applied under Alternatives 2 and 3 would minimize or eliminate the potential for erosion, sedimentation, and slope instability under Alternative 4. The recommended BMPs would reduce potential for these impacts to occur by enhancing infiltration and stabilizing soil surfaces once construction and associated disturbance was finished. BMPs critical to mitigating these impacts under Alternative 4 are the same as under the other alternatives.

All construction activities must comply with federal, state, and local codes related to construction disturbance and runoff from construction sites. Section 3.4.5 includes a full list of BMPs.

The erosion, sedimentation, and instability risk ratings for all project elements under Alternative 4 would fall to low with these BMPs in place. No measurable long-term impacts on erosion or stability would result from implementation of Alternative 4. Similar to other alternatives, this conclusion is supported by previous experience with rehabilitation efforts in the permit area (Stanley 2019c) and existing levels of stability.

Table 3-9. CDA for Alternative 4.

Project	Soil Unit/Erosion Hazard	Project Disturbance Area (ac)	Intensity of Disturbance	Max Slope	Revegetation Limitation	Mass Stability	Landslide Disturbance (acres)/type	Proximity to Runoff Pathway	Pre-BMP Erosion/ Sedimentation Risk	BMPs
Terrain Development										
New Ski Runs (clearing)	391/High	45.0	Clearing	67	Very Severe	Marginally Stable	-	Crosses trail 2x, crosses road 2x	High	3, 11, 12, 13
Glading	391/High	36.5	Glading	58	Very Severe	Marginally Stable	<0.1/ms-mf	Crosses trails 1x and road 1x	High	8, 11, 13
Snowmaking	391/High	7.2	Excavation	65	Severe	Marginally Stable	-	Crosses trails and roads numerous times	High	10, 18
Summer Activities										
Mountain Bike Trails	391/High	4.4	Grading	51	Severe	Marginally Stable	1.5/ms-mf	Crosses trails and roads numerous times	High	13, 15, 26
Forest Stand Thinning	391/High	147.8	Glading	81	Very Severe	Marginally Stable	14.4/mrs-mf/ms-mf	Crosses trails and roads numerous times	High	8, 11, 13
Total Disturbance Alternative 4 - Option 1 (ac)		291.1								
Total Disturbance Alternative 4 - Option 2 (ac)		292.6								

3.4.3.3 Water Quality

3.4.3.3.1 Alternative 1

Under the no-action alternative, water quality in Flat Creek would be expected to continue to improve in response to water quality improvement projects and other efforts from the Flat Creek Watershed Committee. As described in section 3.4.2.1, no stream channels or other water features are located in the existing permit area. Current operations at Snow King Mountain Resort do not influence water quality in Cache Creek, Flat Creek, or the seasonal stream channel in lower Leeks Canyon.

3.4.3.3.2 Alternative 2

This alternative would involve construction activities that result in disturbance and short-term opportunities for erosion and surface runoff to occur. The two avenues for potential short-term impacts on water quality in Flat Creek are through Cache Creek and through stormwater collected on East Snow King Avenue and adjacent roads. Long-term potential impacts on water quality would not occur on Cache Creek, Flat Creek, or the seasonal stream channel in lower Leeks Canyon in response to project developments.

Under this alternative, the east and west boundary adjustment areas would extend the permit boundary outward. The east boundary adjustment area would include glading and clearing activities for new ski runs, and excavation for snowmaking lines and segments of the summit access road/novice skiway. All activities would occur more than 2,000 feet away from the main channel of Cache Creek. Opportunities for surface erosion and sedimentation following disturbance would be removed in the east boundary adjustment area by design criteria (section 3.4.5), naturally high infiltration rates (section 3.4.2.1.3), and distance between proposed disturbance and the creek channel.

Under this alternative, projects within 100 feet of East Snow King Avenue and adjacent roads are the gondola and zipline bottom terminals, the stairway trail improvement, and snowmaking lines. Design criteria would be used to minimize or eliminate erosion and prevent runoff from entering the municipal stormwater system during construction of these projects (section 3.4.5).

No long-term or short-term impacts on water quality in Cache Creek or Flat Creek would occur as a result of this alternative.

3.4.3.3.3 Alternative 3

Construction activities under Alternative 3 in the east boundary adjustment area would be the same as for Alternative 2 with the exception of forest stand thinning. All disturbance would be more than 2,000 feet away from Cache Creek. Opportunities for surface erosion and sedimentation following disturbance would be removed by design criteria, naturally high infiltration rates, and distance between proposed disturbance and Cache Creek, as discussed above for Alternative 3).

Projects near East Snow King Avenue and adjacent roads under Alternative 3 would include the same projects as Alternative 2, with the exception of the bottom gondola terminal. Under Alternative 3, the bottom terminal would be moved to the existing Cougar bottom terminal site. Design criteria would be used to minimize or eliminate erosion and prevent runoff from entering the municipal stormwater system during construction of these projects, as discussed above for Alternative 2.

No long-term or short-term impacts on water quality in Cache Creek or Flat Creek would occur as a result of Alternative 2.

3.4.3.3.4 Alternative 4

Construction activities under Alternative 4 in the east boundary adjustment area would include additional glading and clearing activities beyond what would occur under Alternative 3. Other minor differences would include snowmaking pipelines for the new ski runs and limited changes due to new alignment of mountain bike trails. These differences would not result in potential water quality impacts on Cache Creek, located more than 2,000 feet away from all project elements under Alternative 4.

Projects near East Snow King Avenue and adjacent roads and their effects under Alternative 4 would be the same as those discussed above under Alternative 3.

No long-term or short-term impacts on water quality in Cache Creek or Flat Creek would occur as a result of Alternative 4.

3.4.4 CUMULATIVE EFFECTS

As discussed in section 3.3, the cumulative actions considered in this analysis are any projects listed in the Bridger-Teton Schedule of Proposed Actions that would have temporally and spatially overlapping impacts on the same resources affected directly or indirectly by the alternatives. The Snow King Lower Elk Lighting project meets the spatial and temporal overlap requirements. A brief summary of this project is provided above in section 3.3.

3.4.4.1 Hydrology

As the alternatives addressed above would have no impact on surface runoff or groundwater, there is no potential for cumulative effects.

3.4.4.2 Erosion and Slope Stability

Snow King Lower Elk Lighting would disturb soil resources during installation of 15 light poles associated with this project. Impacts on erosion and slope stability would be limited to excavating the hole for the light pole footing. Excavation would be completed with hand tools or light mechanical equipment. Excavated soil would be used as backfill around the footing and any excess would be scattered or smoothed to match surrounding surface elevations.

Alternatives 2, 3, and 4 would also disturb soil resources and potentially create short-term erosion and instability. The risk of potential impacts under each alternative would be minimized through the use of appropriate BMPs discussed above that would reduce erosion and instability, disconnect disturbed areas from erosion pathways, and minimize the impacts of each project element.

The risk of soil erosion and instability is greatest when surfaces are recently disturbed and unprotected from raindrop impact and other erosive forces that can transport fine soil particles. This risk is short-term, and the cumulative effect is dependent on the timing of construction. The Snow King Lighting project will occur in fall of 2019, and soil surfaces will be stabilized and monitored per requirements in construction permits. Therefore, short-term impacts would not be cumulative with the impacts of this project. Long-term risks of soil erosion could be cumulative, depending on the success of BMPs.

3.4.4.3 Water Quality

As the alternatives addressed above would have no impact on Flat Creek water quality, there is no potential for cumulative effects.

3.4.5 DESIGN CRITERIA

Prepare a Storm Water Pollution Prevention Plan (SWPPP) that will apply to all authorized elements. The SWPPP is a condition of Wyoming's Pollutant Discharge Elimination System Permit and will include BMPs for erosion control, sediment control, site stabilization, operational controls, and provisions for maintenance and inspection.

Include in the SWPPP pertinent BMPs from *National Best Management Practices for Water-Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide* (Forest Service 2012a) and *Ski Area BMPs (Best Management Practices) Guidelines for Planning, Erosion Control, and Reclamation* (Forest Service 2001), which include the following:

Pre-Construction

1. Conduct appropriate soil and water studies, including modeling, to support design of runoff and erosion control structures. Provide documentation to justify the design life.
2. Develop engineering drawings for each runoff and erosion control structure described in a project plan. Include plan and profile views of structures as appropriate.
3. Comply with all federal, state and local codes related to construction disturbance and runoff from construction sites. As required, develop and implement an erosion control and sediment plan that covers all disturbed areas, including borrow, stockpile, skid trails, roads, or any areas disturbed by development activities.
4. Design and locate parking, staging, and stockpiling areas of appropriate size and configuration to accommodate expected vehicles and avoid or minimize adverse effects to adjacent soil, water quality, and riparian resources.
5. Coordinate all phases of sanitation system management (planning, design, field surveys and testing, installation, inspection, operation, and maintenance) with appropriate agencies to ensure compliance with applicable regulations.
6. Locate ski area facilities (including buildings, runs, and lifts) on stable geology and soils to minimize risk of slope failures.
7. Develop an erosion structure maintenance schedule showing structures needing annual maintenance and those where non-recurring maintenance is expected. Display hand-crew or machine maintenance if appropriate.
8. Plan projects to minimize re-entry after the site is stabilized.

Construction

9. Limit the amount of exposed or disturbed soil at any one time to the minimum necessary. Define outer boundaries of disturbance with markers. Install sediment and stormwater controls prior to disturbance where practicable.
10. When topsoil is present or can be salvaged, remove and stockpile with appropriate cover and erosion control methods. Consult Forest Service soil scientist for determination of presence of viable topsoil. Revegetation specifications and seed mixes must be approved by the Forest Service.
11. Limit operation of equipment when ground conditions could result in excessive rutting, soil puddling, or runoff of sediments.
12. Confine all light vehicle traffic, parking, staging, and stockpiling materials to designated areas to minimize ground disturbance. Heavy equipment (e.g. feller buncher, dozer, etc.) will be used but also rely on helicopters to deliver lift towers and place equipment.
13. If tree removal is necessary, consider over the snow removal when conditions allow. Small trees, branches and other small residue created during clearing or glading activity will be chipped, mulched, burned, or moved off site. Avoid damage to remaining trees and root systems adjacent to cut slopes and cleared areas.
14. Prevent water from running down ski run prism particularly on steep grades (20 to 40 percent) and from accumulating on gentle slopes (0 to 30 percent). Water bar spacing will account for slope as follows:

Slope (%)	Spacing (feet)
2%	250

5%	150
10–30%	100
>30%	75

15. Prevent water from running down roads and trails using water bars and rolling dips with a cross-slope of 2 to 5 percent. Minimize cross slopes in areas where infiltration is a possible method to reduce runoff. Water bars, rolling dips and culverts will be inspected and repaired on a weekly basis during construction. Ruts will be repaired immediately.
16. Infiltration trenches shall be installed to intercept runoff from loading and unloading areas for ski lifts, zip lines, mountain coasters and any outdoor locations where people will gather. Where soil conditions permit (i.e. areas where soils are not cobbly or rocky) use erosion control mat to protect any cut and fill areas associated with these locations.
17. Construct modified water bars across existing ski slopes to prevent the concentration of water flow, act as micro-infiltration ditches and divert runoff to undisturbed terrain. Where feasible, use a horseshoe design concept for waterbars and ditches with the tailing off ends of the structures at a 5 to 7 percent slope into the naturally vegetated areas.
18. Whenever possible, place excavated material on the uphill side of trenches and water bars. Manage material placement to avoid trapping or concentrating water flow during construction. Fill trenches with a 2-inch surcharge / berm to allow for settlement. Construct water bars over trenched areas as in ski runs.
19. Use correctly installed silt fence or straw wattle to prevent sediment from entering existing drainage channels, for projects within 50 feet of existing channels.
20. Use a lined ditch to transport water away from structures or areas where standard strategies are not possible due to slope.
21. Use diversions ditches as needed to divert water away from ski run segments where both sides of the run slope inward and prevent discharge from modified water bars. A mid-slope diversion ditch may also be necessary to move runoff away from the ski run.
22. Protect any point of water discharge (e.g. trenches, ditches, water bars) with riprap or other methods to slow water velocity and disperse runoff.

Post Construction Restoration/Maintenance

23. Routinely monitor new and modified ski run surfaces for a minimum of 2 years following construction. If coarse grooming is needed to fill eroded areas, use subsoil from nearby excavations (e.g. stockpiled from past construction) and cover with salvaged topsoil for a finished slope grade.
24. Ensure that permit holder-owned and other authorized drinking water systems on NFS lands are operated and maintained according to direction in FSM 7423.
25. Consider amending soil with mulch (e.g. wood chips), compost, mycorrhizal fungi inoculants and other products to provide added nutrients, promote revegetation success, and increase infiltration. Utilize irrigation where appropriate.
26. Use and maintain surfacing materials suitable to the trail site and use to withstand traffic and minimize runoff and erosion. For biking trails, pay attention to areas where high wheel slip (curves, acceleration, and braking) during motorized use generates loose soil material.
27. Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways before seasonal shutdown of project operations or when severe or successive storms are expected.

28. Maintain the natural drainage pattern of the area wherever practicable.
29. Use and maintain suitable measures to collect and contain oil and grease in parking areas with high use and where drainage discharges directly to channels or stormwater collection systems.

3.5 VEGETATION

3.5.1 SCOPE OF ANALYSIS

3.5.1.1 Noxious Weeds

- *How would construction and use of the proposed infrastructure affect the introduction and spread of noxious weeds?*

The project area supports plant species that are included on the list of noxious weeds maintained by the Wyoming Department of Agriculture, and construction, maintenance, and use of proposed infrastructure could introduce new weed species or spread existing infestations.

Indicator: Identification of weed species that may occur at Snow King based on past observations and reconnaissance completed for this analysis, then assessment of the risk of spreading those species and introducing new ones based on characteristics of each proposed element.

3.5.2 AFFECTED ENVIRONMENT

Noxious weeds are harmful to agriculture, the general public, and the environment because they tend to displace native plants, degrade wildlife habitat, alter nutrient cycling and fire behavior, contribute to soil erosion, and potentially reduce recreational values. They have developed many characteristics, such as rapid growth rates, high seed production, and extended growing periods that give them competitive advantages over native plants (Sheley et al. 1996).

The Forest Service must consider the risk of introducing or spreading noxious weeds at Snow King through ground-disturbance associated with construction and maintenance and through subsequent recreational use. Weeds may be introduced if construction or recreation equipment has operated previously in an area with infestations. Disturbing soil creates conditions for establishment of weeds, and disturbance adjacent to existing infestations may facilitate the spread of the infestation. Foot and bicycle traffic may also bring in seed from outside sources or spread existing infestations.

3.5.2.1 Management Direction

Management direction regarding noxious weeds includes Executive Order 13112, issued in February 1999, which directs federal agencies to "…prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause…" The Forest Service Manual sets objectives, policies, and responsibilities for weed management on National Forest System lands and specifies the use of an integrated approach including prevention, control, cooperation, and education. Specific guidance is provided in the *Guide to Noxious Weed Prevention Practices* (Forest Service 2001b) that establishes Forest policy for noxious weed procedures (i.e., best management practices or BMPs). The Bridger-Teton Forest Plan specifies following the guidelines set forth in the *Intermountain Region Noxious Weed and Poisonous Plant Control Program* (1986), which also suggests the use of integrated pest management to control noxious weeds.

In accordance with the National Forest Ski Area Special Use Permit Act of 1986, permitted ski areas must maintain a vegetation management plan detailing effective procedures for maintaining healthy forest vegetation within their permit boundaries. Snow King's vegetation management plan (Western Bionomics 2016) reflects Forest Plan direction, and one of its objectives is to "Reduce or eliminate populations of invasive weeds" (p. 1). It goes on to identify weed species encountered during plan preparation (p. 2) and

to identify measures to control weeds (pp. 26 and 30). These measures are addressed in the effects analysis below (section 3.5.3). In addition to the vegetation management plan, Snow King also worked with the Teton County Weed and Pest District to develop a weed management plan. The identifies noxious weeds located within the ski area boundary and provides management suggestions for each species (Cauffman 2008).

3.5.2.2 Local Conditions

Wyoming state law mandates the control of noxious weeds on public and private property throughout the state. The Teton County Weed and Pest District was established by Wyoming State Statutes (W.S. 11-5-101 through 119) to implement an effective program for the control of noxious weeds in Teton County. Teton County considers noxious weed management to be a high priority, and the Teton County Weed and Pest District works with both public and private landowners to eradicate or prevent the spread of noxious weeds.

To facilitate state-wide and local management, the Wyoming Department of Agriculture maintains two lists: one which identifies weeds that are common throughout the state, and a second that identifies weeds specific to each county (Table 3-10). However, the dynamic nature of noxious weeds and continued management of known infestations requires a constant re-assessment and prioritization of noxious weeds and continued effort to manage infestations by the Teton County Weed and Pest District.

For the past 5 years, weed management efforts at Snow King have followed the direction outlined in their vegetation and weed management plans. In early and mid-summer, a crew of three employees travels through the permit area treating noxious weeds identified by the Teton County Weed and Pest District. However, at present, Snow King has numerous user-created hiking and biking trails that are not maintained. This increases the total area of disturbance at the ski area and also creates additional dispersal pathways which facilitate the spread of noxious weed seeds and limit the effectiveness of weed management efforts.

The dynamic nature of noxious weeds requires the continued monitoring and control of new and existing infestations. Snow King remains actively engaged in the ongoing effort.

As to specific noxious weed species of concern in this analysis, the first thing to note is that many of the species identified in Table 3-10 could become a concern at Snow King. Weeds are known as invasive species because of their high seed production, effective seed transport mechanisms, and rapid establishment and spread. That is why weed management efforts must be collaborative, flexible, and sustained. While the risk assessment reported here addresses species that have been identified on the basis of previous observations and more recent reconnaissance, the design criteria and BMPs discussed below (section 3.5.5) are appropriate to any weed species potentially occurring in the project area.

No comprehensive weed inventory has been completed at Snow King, but noxious weeds were identified in the course of developing the ski area's vegetation management and weed management plans as well as during routine Bridger-Teton fieldwork. In addition, as part of preparing this EIS, botanists noted any noxious weeds observed during field reconnaissance (Cirrus 2019). All species of noxious weeds identified to date at Snow King are included in the target species' summaries below (section 3.5.2.3) but, as noted above, the weed situation is inherently dynamic.

Table 3-10. Noxious weeds for Wyoming and Teton County as reported by the Wyoming Department of Agriculture.

Species	Comments[1,2]
Absinth wormwood (*Artemisia absinthium*)	Can tolerate both wet and dry soils, but generally found in well-drained soils. Establishes quickly in disturbed or overgrazed areas.
Austrian fieldcress (*Rorippa austriaca*)	Found in disturbed soils along roadsides, fields, and mud flats. Usually associated with moist soil.
Baby's breath (*Gypsophila paniculate*)	Found in dry, sandy soil along roadsides, fencerows, and disturbed areas.
Black henbane (*Hyoscyamus niger*)	Prefers disturbed soils such as pastures, roadsides, and fence rows.
Bohemian knotweed (*Fallopia bohemica)*	A large plant that can grow 6-12 feet tall, common along rivers and riparian areas.
Bull thistle (*Cirsium vulgare*)	Prefers open, sunny areas. Can tolerate wet or dry soils and is typically found in disturbed areas.
Canada thistle (*Cirsium arvense*)	Found in disturbed soils including pastures, crops, roadsides and other open areas.
Cheatgreass/downy brome (*Bromus tectorum*)	One of the most widespread annual grasses in North America, it can tolerate a range of soil conditions and elevations.
Chicory (*Cichorium intybus*)	Found along roadsides and disturbed sites with well-drained soils.
Common burdock (*Arctium minus*)	Prefers open, disturbed soils in pastures, hay fields, and grasslands.
Common mullein (*Verbascum thapsus*)	Forms a dense ground cover that displaces native species. Prefers dry, sandy soils in open areas.
Common St. Johnswort (*Hypericum perforatum*)	Found in disturbed soils in open areas, including forest clearings.
Common tansy (*Tanacetum vulgare*)	Typically found in disturbed areas, especially in the wet soil conditions of riparian areas.
Cypress spurge (*Euphorbia cyparissias*)	Prefers open habitats that have been disturbed, typically in dry soil.
Dalmation toadflax (*Linaria dalmatica*)	Typically found in well-drained soils but tolerates a wide range of soil conditions. Generally found in open areas such as pastures and roadsides.
Dames rocket (*Hesperis matronalis*)	Typically found in moist soil along forest edges, roadsides, and open areas.
Diffuse knapweed (*Centaurea diffusa*)	Prefers well-drained soils in pastures, roadsides, trails, and gravel pits.
Dyers woad (*Isatis tinctorial*)	Does well in poor soil conditions along roadsides and rangelands. Can also be found in forest openings.
Field bindweed (*Convolvulus arvensis*)	Can be found along roadsides, in grasslands, and near streams.
Field scabious (*Knautia arvensis*)	Tends to invade pastures and disturbed areas in a variety of soil types.
Giant knotweed (*Fallopia sachalinensis*)	Prefers moist soil along rivers, streams, and ditches. Can grow to 12 feet in height.

Table 3-10 (cont'd). Noxious weeds for Wyoming and Teton County as reported by the Wyoming Department of Agriculture.

Species	Comments[1,2]
Himalayan knotweed (*Polygonum polystachyum*)	Similar to giant knotweed.
Hoary alyssum (*Berteroa incana*)	Common in fields and disturbed areas and tolerates a range of soil conditions.
Hoary cress (whitetop) (*Cardaria draba* and *Cardaria pubsecens*)	Often found in open areas in pastures, rangelands, and forest openings. Can also be found along streambanks.
Houndstongue (*Cynoglossum officinale*)	Found in disturbed areas, forest edges, and riparian areas.
Japanese knotweed (*Fallopia japonica*)	Occurs in many habitats and a variety of soil conditions, often in disturbed areas.
Leafy spurge (*Euphorbia esula*)	Prefers open areas with disturbed soils including pastures and prairies.
Meadow knapweed (*Centaurea pratensis)*	Typically found in moist soils within forest openings and along rivers and streams.
Medusahead rye (*Taeniatherum caput-medusae*)	Typically found in dry, open areas with disturbed soils.
Moth mullein (*Verbascum blattaria*)	Tends to invade pastures and meadows, can be found in open woodlands.
Musk thistle (*Carduus nutans*)	Spreads rapidly in disturbed soils. Prefers open meadows and pastures, but can colonize dense forests.
Orange hawkweed (*Hieracium aurantiacum*)	Commonly found on disturbed sites in pastures, meadows, and roadsides.
Ox-eye daisy (*Chrysanthemum leucanthemum*)	Tolerates a wide variety of light conditions, growing in open and partially shaded areas.
Perennial pepperweed (*Lepidium latifolium*)	Common in disturbed areas in a wide variety of soil conditions, from rangelands to coastal wetlands, riverbanks, and marshes.
Perennial sowthistle (*Sonchus arvensis*)	Often found in disturbed soils along roadsides and railroads.
Plumeless thistle (*Carduus acanthoides*)	Tends to invade disturbed soils in open habitat, typically along roadsides and railroads.
Poison hemlock (*Conium maculatum*)	Prefers moist soil near riparian habitat.
Puncturevine (T*ribulus terrestris*)	Often found in disturbed areas with sandy or gravelly soils.
Purple loosestrife (*Lythrum salicaria*)	An aggressive invader of wet soils, often found in wetlands, wet meadows, riverbanks and streambanks.
Quackgrass (*Agrioyron repens*)	Prefers disturbed soils in open areas.
Rush skeltonweed (*Chondrilla juncea*)	Can grow in both wet and dry habitats, often in disturbed areas.
Russian knapweed (*Centaurea repens*)	Prefers moist soil in disturbed areas.

Table 3-10 (cont'd). Noxious weeds for Wyoming and Teton County as reported by the Wyoming Department of Agriculture.

Species	Comments[1,2]
Russian olive (*Elaeagnus angustifolia*)	Tolerates a wide range of soils in open areas, typically found in pastures and roadsides.
Saltcedar (*Tamarix spp*)	Invades wet soils along streambanks, wetlands, and moist rangelands.
Scentless chamomile (*Matricaria perforata*)	Common in disturbed areas such as roadsides, fields, and meadows.
Scotch thistle (*Onopordum acanthium*)	Often found in disturbed soils in pastures.
Skeletonleaf bursage (*Franseria discolor*)	Prefers dry soils in disturbed areas such as pastures, prairies, and roadsides.
Spotted knapweed (*Centaurea maculosa*)	Invades disturbed areas such as pastures and meadows as well as forest openings.
Squarrose knapweed (*Centaurea virgata*)	Found in disturbed fields and pasturelands with degraded soils.
Sulfur cinquefoil (*Potentilla recta*)	Can occur in open habitat or forest and tolerates a wide range of soil conditions.
Tall buttercup (*Ranunculus acris*)	Common in forests, meadows, and disturbed sites. Tolerates a wide range of soil conditions.
Ventenata (*Venenata dubia*)	Prefers disturbed soils in open areas.
Yellow starthistle (*Centaurea solstitalis*)	Found in disturbed areas such as pastures, forest openings, and roadsides.
Yellow toadflax (*Linaria vulgaris*)	Can invade a wide range of habitat conditions, including pastures and roadsides as well as undisturbed prairies.

[1]Whitson 2006
[2] Invasive Plant Atlas 2019

3.5.2.3 Target Species

Eighteen noxious weeds have been reported over time as occurring at Snow King and are discussed below. Where available, the location of each infestation is provided.

3.5.2.3.1 Black Henbane

Black henbane is native to Europe but is now common across much of the northern US. This plant is an annual or biennial that can grow up to 6 feet tall. It can grow in a wide variety of habitats but prefers moist soils that have been disturbed. It reproduces only by seed, and a single plant can produce up to 500,000 seeds. Management efforts typically focus on early detection and prevention of seed production and spread (Cauffman 2008, Pokorny et al. 2017).

3.5.2.3.2 Bull Thistle

Bull thistle is native to Europe, western Asia, and northern Africa, but is now common across the northern and southwestern US. This plant is an annual or biennial that can grow up to 7 feet tall in ideal conditions. It can thrive in a wide variety of soil conditions and typically occurs in disturbed areas such as roadsides, pastures, and forest clearcuts. Once established, it often grows in dense thickets that displace native

vegetation (Invasive Plant Atlas 2018). Bull thistle can only reproduce by seed and thus can be managed over time by reducing seed production and spread (Cauffman 2008, King County 2014).

Bull thistle was noted in the northwest portion of the existing permit boundary area along the Sink or Swim hiking trail (Western Bionomics 2016).

3.5.2.3.3 Canada Thistle

Canada thistle is native to southeastern Eurasia but is now common throughout much of the US. This plant is a perennial that can grow up to 4 feet tall in ideal conditions. It often forms dense patches once it becomes established in an area. It is highly competitive with native plants but can be vulnerable to competition during the seedling stage. Compared to other noxious weeds, Canada thistle tolerates a more limited range of soil conditions. This species reproduces by seeds as well as root buds. Management efforts typically target early detection, removal of live plants, and disruption of seed production (Cauffman 2008, Forest Service 2014a).

Canada thistle was noted along the Summit trail (Teton County Weed and Pest District 2018).

3.5.2.3.4 Cheatgrass

Cheatgrass is native to Eurasia but is now common across much of the US. This plant is an annual grass that can grow up to 2 feet tall. It often displaces native plants by emerging earlier in the spring and outcompeting other plants for water in the soil. One of the impacts of cheatgrass is the influence it has on local fire regimes; the structure and life cycle of the plant promotes larger and more frequent fires. This plant reproduces entirely by seed, but the seeds do not remain viable in the soil for more than 2 to 3 years. Therefore, management of this plant often focuses on preventing seed production and establishment, as well as persistent treatments of existing infestations.

Cheatgrass was noted along the Summit trail (Teton County Weed and Pest District 2018).

3.5.2.3.5 Common Mullein

Common mullein is native to Europe, Africa, and Asia but is now common across much of the US. This plant is a biennial that can reach up to 7 feet tall in idea conditions. It is highly adaptable and can invade a wide variety of habitat types. It reproduces by seeds, and its seeds can remain viable in the soil for up to 100 years. However, the seeds require sunlight for germination, which restricts germination to bare, often disturbed soil. Management typically targets minimizing disturbance, early detection, and persistent removal of plants before seeding (Cauffman 2008, Gucker 2008).

3.5.2.3.6 Common Tansy

Common tansy is native to Eurasia but is now common across much of the US. This plant is a perennial that can reach up to 7 feet tall in idea conditions. It is often found on disturbed sites and can tolerate a wide range of soil conditions. This species reproduces mainly by seed but can form dense stands through rhizomatous reproduction. Management typically targets early detection and control of established colonies with herbicides (Cauffman 2008, LeCain and Sheley 2014).

Common tansy was noted along the Summit trail (Forest Service 2019a, Teton County Weed and Pest District 2018).

3.5.2.3.7 Dalmatian Toadflax

Dalmatian toadflax is native to the Mediterranean region but is now common in the western US. This plant is a short-lived perennial that averages 3 feet in height with long, yellow, two-lipped flowers with an orange bearded throat. It is highly adaptable and typically invades disturbed soils. This species reproduces mainly by seed but can also spread through root buds. A single plant can produce up to 500,000 seeds in a year. While smaller infestations can be managed through early detection and reducing seeding and the spread of seeds, larger infestations are difficult to manage and can take 10–15 years of repeated treatments and follow up management to control (Cauffman 2008, Forest Service 2014b).

Dalmatian toadflax was noted near the top of the Summit lift (Cirrus 2018) and along the Summit trail (Forest Service 2019a, Teton County Weed and Pest District 2018).

3.5.2.3.8 Diffuse Knapweed

Diffuse knapweed is native to the eastern Mediterranean region and western Asia but is now common across the western and central US. This plant can be an annual, biennial, or short-lived perennial that can grow up to 2 feet tall. The flowers are usually white but occasionally light purple. Diffuse knapweed can tolerate a wide range of soil conditions, including forest openings. It reproduces by seed, and a single plant can produce up to 1,200 seeds. Human activities are one of the main sources of seed distribution for this species. Management of this species typically includes early detection and removal of plants, particularly before seeding (Parkinson and Mangold 2017).

3.5.2.3.9 Field Scabious

Field scabious is native to Europe but is now common across the northern US. This plant is a perennial with a deep taproot. Each plant has multiple long, slender flower stems that can reach up to 5 feet tall, with a single light purple flower at the end. Field scabious is considered a relatively new invader to Teton County (Teton County Weed and Pest District 2019). It can only reproduce by seeds, and thus can be managed over time by reducing seed production and spread (Montana State University Extension 2014).

3.5.2.3.10 Houndstongue

Houndstongue is native to western Asia and eastern Europe but is now common across the northern US. This plant is biennial, remaining in a vegetative state for the first year of growth and flowering in its second year. It is capable of delaying flowering until conditions are ideal. Houndstongue typically invades disturbed sites, including woodlands and forest clearings. Once established, it typically grows in dense thickets, especially in disturbed forest areas (Zouhar 2002a). It can only reproduce by seed, and thus can be managed over time by reducing seed production and spread. Houndstongue seeds do not remain viable in the seedbank for more than a few years, so persistent management can yield positive results (Cauffman 2008, Kedzie-Webb and Sheley 2017).

Houndstongue was noted in the eastern boundary adjustment area along the Hagen trail (Western Bionomics 2016).

3.5.2.3.11 Leafy Spurge

Leafy spurge is native to Eurasia but is now common across much of the US. This plant is a long-lived perennial that can grow up to 3 feet tall. This plant can grow in a variety of habitats, from riverbanks and flood plains to grasslands and mountain slopes. It can often grow quite aggressively in disturbed soils. While this plant can and does reproduce by seed, it can also reproduce through rhizomes below ground, making management difficult (Goodwin et al. 2003).

3.5.2.3.12 Musk Thistle

Musk thistle is native to western and central Europe but is now common throughout the US. This plant is biennial, remaining in a vegetative state for the first year of growth and flowering in its second year. It tolerates a wide variety of soil conditions and is typically found in disturbed sites in pastures and forested areas, occurring in dense stands in highly disturbed sites (Zouhar 2002b). Musk thistle can only reproduce by seed, and thus can be managed over time by reducing seed production and spread (Cauffman 2008, Beck 2013).

Musk thistle was noted along the western border of the western boundary adjustment area (Western Bionomics 2016) and along the Summit trail (Forest Service 2019a, Teton County Weed and Pest District 2018).

3.5.2.3.13 Oxeye Daisy

Oxeye daisy is native to Europe but is now common throughout the US. This plant is a perennial that has multiple long slender stems with a single white flower on top. It can grow in a variety of soil conditions and is commonly found in disturbed soils. Oxeye daisy reproduces by seed but can also spread using underground rhizomes. A single plant can produce up to 26,000 seeds. Management of this species typically includes reducing seed production and spread (Cauffman 2008, Mangold et al 2017).

3.5.2.3.14 Rush Skeletonweed

Rush skeletonweed is native to Eurasia but is now common in the western and central US. This plant is a biennial, remaining in a vegetative state in its first year of growth and flowering in its second year. It can grow up to 4 feet tall, with a slim flowering stem with many branches. It reproduces by seed but can regenerate from roots deep in the soil if the aboveground portion is removed (Jacobs et al. 2009). Once established, this plant can be difficult to manage. Management typically includes early detection and follow-up treatments of infested areas.

3.5.2.3.15 Russian Knapweed

Russian knapweed is native to Eurasia but is now common across the western and central US. It is a long-lived creeping perennial that can reach up to 3 feet tall. Its flowers range from pink to lavender and resemble thistles. While this plant can reproduce through seeds, most often it produces dense stands through rhizomatous reproduction. Once established, Russian knapweed can be difficult to control. Management of this species typically includes early detection and eradication through repeated treatments (Cauffman 2008, Forest Service 2015a).

3.5.2.3.16 Scentless Chamomile

Scentless chamomile is native to Europe but is now common throughout much of the US. This plant can be an annual, perennial, or biennial. It typically grows 6–24 inches tall, with many daisy-like flowers on a single plant. It is found in a variety of habitats but often occurs in disturbed soils (Colorado Department of Agriculture 2019). It reproduces by seeds and thus can be managed over time by reducing seed production and spread.

Scentless chamomile was noted near the top of the Summit lift (Cirrus 2018).

3.5.2.3.17 Spotted Knapweed

Spotted knapweed is native to Europe but is now common throughout much of the US. This plant is a perennial or biennial that typically grows 2–4 feet tall. It has purple to pink flowers, with many small flowers per head. It can be found in a variety of habitats but often occurs on disturbed soils (Colorado Department of Agriculture 2015). It reproduces by seeds and thus can be managed over time by reducing seed production and spread (Cauffman 2008).

Spotted knapweed was noted along the Summit trail (Teton County Weed and Pest District 2018).

3.5.2.3.18 Yellow Toadflax

Yellow toadflax is native to the Mediterranean region but is now common across the US. This plant is a perennial that average 1 to 3 feet in height. It is highly adaptable to a wide range of soil conditions and is often found in disturbed areas. In contrast to Dalmatian toadflax, yellow toadflax reproduces mainly through root buds, which can produce a plant up to 10 feet away from the parent plant. Established yellow toadflax infestations are difficult to control and can take 10–15 years of repeated treatments and follow up management to eradicate (Cauffman 2008, Forest Service 2014b).

Yellow toadflax was noted along the Summit trail (Teton County Weed and Pest District 2018).

3.5.2.4 Spread Vectors

Noxious weed seeds can be dispersed in a variety of ways depending on each species' seed dispersal mechanisms. Some plants utilize gravity and wind to disperse their seeds, often having specialized seeds made to catch a gust of wind. Other seeds attach to a passing animal, human, or vehicle to disperse from the parent plant. These seeds typically have barbs or hooks. Some species require the ingestion of seeds by wildlife and are fruity or otherwise palatable to encourage consumption. The operation of construction equipment, transfer of soils, use of straw for site rehabilitation, and increased recreational use can increase noxious weed seed dispersal.

Construction equipment can lead to seed dispersal through the disturbance of plants with wind-dispersed seeds, which can release the seeds into the air, or through the attachment of seeds to the wheels and underside of the vehicles, which can result in seeds being directly moved to new areas by the equipment. Soil transfer can lead to seed dispersal through the movement of seeds already in the soil. This can result from the use of excess soil in one area as fill in another, from importation of fill material from off site, or from the movement of soil on construction equipment. Weed seeds can also be present in rehabilitation materials, such as straw or seed mixes from off-site locations. If straw mulch or seed mixes are contaminated with noxious weeds, they can be a vector for seed dispersal.

Increased recreational use can lead to an increase in weed seed dispersal through the disturbance of plants with wind-dispersed seeds or through the attachment of seeds to shoes, clothing, and equipment, including bicycles. Recreationists can also introduce seeds from off-site locations.

3.5.2.5 Risk Assessment

This assessment of the risk of introducing or spreading weeds assumes that the target species discussed above could occur anywhere in or adjacent to the permit area over the term of the project (estimated 5 years, section 1.1). Accordingly, the risk of weed introduction to new locations or spread of infestations depends on certain characteristics of each proposed element, and those element-specific effects combine to indicate the relative effect of each alternative. The characteristics assessed for each element are as follows:

1. Disturbance type: Section 3.1.1 describes the disturbance type associated with each of the proposed elements, either glading, clearing, grading, or excavation. Clearing and glading entail little or no soil disturbance, while grading and excavation create more favorable conditions for weed establishment.
2. Disturbance size: Section 3.1.1 also provides the acreage of disturbance for each proposed element. In general, the greater the area, the greater the potential for weed establishment and spread.
3. Disturbance shape: Linear elements, particularly trails, have more potential to serve as vectors for weed introduction and spread as they generally intersect more diverse areas than do elements with consolidated disturbance footprints.
4. Disturbance duration: The disturbed areas associated with most proposed elements would be rehabilitated and revegetated after construction, limiting the time they were susceptible to weed infestation. Other elements, particularly trails, would remain disturbed, and thus potential infestation sites and vectors, as long as they were in use.

If other weed species were found to occur in the permit area over the term of the project, the risk of spread would generally be similar as for these target species, as would the responsive actions discussed below (section 3.5.5).

3.5.3 Direct and Indirect Effects

The analysis below considers the current level of weed management (section 3.5.2.2), the known species present (section 3.5.2.3), spread vectors for those species (section 3.5.2.4), and the risk assessment (section

3.5.2.5) in determining what impacts the alternatives may have regarding weeds. All of these factors are also used to inform an integrated weed-management strategy presented in section 3.5.5.

3.5.3.1 Alternative 1

There would be no new disturbance of the existing habitat since elements proposed under other alternatives would not be developed. There would be no notable change in recreational use, and noxious weed conditions would remain as described above in the affected environment section. Given the nature of the noxious weeds present in the area, there is a moderate risk that the species currently present in the area may continue to expand. Off-trail hiking and user-created hiking and biking trails would continue to serve as vectors for weed introduction and spread. The ski area would continue to treat existing and new weed infestations, consistent with the terms of their vegetation management and weed management plans.

3.5.3.2 Alternative 2

This alternative would result in 80 acres of glading and clearing, with limited potential to increase weed introduction or spread. It would also entail 64 acres of grading and excavation, with higher potential to create conditions favorable to weeds due to high levels of soil disturbance and equipment operation. Of these total disturbance acres, 83 would be associated with development of new ski terrain, creating large expanses susceptible to weed establishment.

The increase in recreational infrastructure would likely increase recreational use of Snow King during the spring, summer, and fall months. This could increase the spread of noxious weeds compared to current conditions.

In terms of disturbance shape, 15.5 miles of hiking and front-side mountain biking trails would be constructed, and development of the mountain bike zone on the back side would increase trail mileage. These trails would create extensive disturbed corridors passing through virtually all vegetation communities in the ski area and providing potential vectors for weed introduction and spread.

Under this alternative, mountain bike use could occur on both the new downhill trail system as well as on the existing Cache Creek/Game Creek cross-country trail system. Intermingling use on the two trail systems would increase the potential for weed introduction and spread via mountain bikes and riders.

On the other hand, one of the reasons for creating new and improved hiking and biking trails is to concentrate use and avoid the many problems associated with off-trail use and user-created trails, including the introduction and spread of weeds. Toward that end, this alternative would also obliterate 1.1 miles of existing service roads and user-created trails.

In addition to the mountain bike zone, Alternative 2 would establish the yurt camp and associated recreational use on the back-side of the mountain. This activity could introduce noxious weeds or spread existing infestations of noxious weeds.

Overall, this alternative would have the most grading and excavation, the most miles of trail, intermingling of use with the Cache Creek/Game Creek trail system, and the fewest miles of road and trail obliteration. Accordingly, it would pose the greatest risk of weed introduction and spread.

This risk would be reduced by Snow King's ongoing weed management efforts, described above (section 3.5.2.2). However, development at this scale warrants more comprehensive and systematic efforts to avoid weed introduction, identify and treat new and existing weed infestations, monitor success, and re-treat as necessary. Accordingly, the design criteria section (3.5.5) requires implementation of an integrated weed-management strategy. The weed management BMPs that comprise that strategy are drawn primarily from the *Guide to Noxious Weed Prevention Practices* (Forest Service 2001b) and should be implemented to augment ongoing efforts at Snow King. These measures should preclude any substantial increase in weed introduction and spread from occurring as a result of this alternative.

3.5.3.3 Alternative 3

To provide a clear contrast, this discussion addresses only differences in effects between Alternative 3 and Alternative 2, described above.

Alternative 3 increases the total area of disturbance compared to Alternative 2 by 154 acres. A majority of this increase in disturbance is attributed to proposed thinning of 154.2 acres in an effort to reduce fuels in the wildland urban interface. This would have minimal impact on noxious weeds. Alternative 3 would have 1 less mile of hiking trail and would obliterate 0.9 more miles of roads and user-created trails compared to Alternative 2. This would focus recreation on established roads and trails, allowing for better noxious weed management and limiting the spread and establishment of noxious weeds. Any differences in the construction footprint would be negligible in terms of the risk of noxious weed spread and establishment.

As with Alternative 2, the integrated weed-management strategy should preclude any substantial increase in weed introduction and spread from occurring as a result of this alternative.

3.5.3.4 Alternative 4

To provide a clear contrast, this discussion addresses only differences in effects between Alternative 4 and Alternatives 3, described above.

Compared to Alternative 3, Alternative 4 would increase the total acres gladed and cleared by just under 4.2 acres, which could increase weed introduction or spread; however, glading and clearing activities do not pose as great a risk of weed spread as grading and excavation. Alternative 4 would decrease the total acres graded and excavated by 10.1 acres, relative to Alternative 3. This decrease would reduce the risk of spreading noxious weeds.

Compared to both Alternative 3, Alternative 4 would decrease the total miles of mountain bike trails substantially due to the elimination of the back-side mountain bike zone and a decrease in the front-side trail network to 5.6 miles compared to 6.5 miles of front-side trail in Alternatives 3. This decrease in linear trail distance and elimination of the back-side mountain bike zone would reduce the risk of spreading noxious weeds by reducing spread vectors.

Overall, Alternative 4 would have the least potential for the introduction and spread of noxious weeds. As with Alternatives 3, implementation of an integrated weed-management strategy should preclude any substantial increase in weed introduction and spread from occurring as a result of this alternative.

3.5.4 Cumulative Effects

Of the cumulative actions listed in section 3.3, one would have impacts that overlap the direct and indirect effects of the three action alternatives discussed above. The Snow King Lower Elk Lighting project is located in the existing permit boundary area, and the disturbance associated with installing 15 new light structures could create new sites susceptible to encroachment. However, this potential is very low due to the small, discrete areas of disturbance and the ongoing weed management effort at Snow King. No notable cumulative effect is anticipated.

3.5.5 Design Criteria

Prior to construction, implement an integrated weed-management strategy that incorporates the following BMPs (Forest Service 2001b):

Construction Planning

1. Minimize soil disturbance associated with authorized project elements.

Pre-construction Surveys

2. Before ground-disturbing activities begin, inventory and prioritize weed infestations for treatment in project operating areas and along access routes. Record all survey data using Mobile-IS.

Minimizing the Introduction of Noxious Weeds

3. Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas or restrict to those periods when spread of seed or propagules are least likely.
4. Determine the need for, and when appropriate, identify sites where equipment can be cleaned. Clean equipment before entering National Forest System lands; a Forest Officer, in coordination with the Unit Invasive Species Coordinator, needs to approve use of on-Forest cleaning sites in advance. This practice does not apply to service vehicles traveling frequently in and out of the project area that will remain on the roadway. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from project equipment before moving it into a project area.

Minimizing the Spread of Noxious Weeds.

5. Clean all equipment, before leaving the project site, if operating in areas infested with weeds. Determine the need for, and when appropriate, identify sites where equipment can be cleaned. Seeds and plant parts need to be collected when practical and incinerated.
6. Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal means bagging the seeds and plant parts and incinerating them.
7. Maintain stockpiled, uninfested material in a weed-free condition.
8. Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives.
9. Minimize soil disturbance to the extent practical, consistent with project objectives.
10. Maintain trailhead and other areas of concentrated public use in a weed-free condition. High use recreation areas are a high priority for weed eradication.
11. Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and forest portals.
12. Install a bike wash station to remove any noxious weed seeds from bikes prior to entering the mountain bike trail system.

Restoration

13. Follow Forest Service policy (FSM 2070) and use genetically appropriate native materials for any rehabilitation and restoration. Involve a qualified Forest Service botanist in development, review, and/or approval of plant materials selected for use in site rehabilitation and restoration.
14. Revegetate disturbed soil (except travelways on surfaced projects) in a manner that optimizes plant establishment for that specific site. Define for each project what constitutes disturbed soil and objectives for plant cover revegetation.
15. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. Always use certified materials in areas closed by administrative order.

Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g. road embankments or landings).

16. Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed contamination, a certified seed laboratory needs to test each lot against the all-state noxious weed list to Association of Seed Technologists and Analysts (AOSTA) standards and provide documentation of the seed inspection test. There are plant species not on state and federal noxious weed lists that the Forest Service would consider non-native invasive weeds. Check state and federal lists to see if any local weeds need to be added prior to testing. Seed lots labeled as certified weed free at time of sale may still contain some weed seed contamination. Non-certified seed should first be tested before use.

Effectiveness Monitoring

17. Inspect and document all limited-term ground-disturbing operations in noxious weed infested areas for at least three growing seasons following completion of the project. For on-going projects, continue to monitor until reasonable certainty is obtained that no weeds have occurred. Provide for follow-up treatments based on inspection results.

Reporting

18. Record all pre-construction and post-construction surveys and data using approved agency protocols and Mobile-IS, as instructed by the Forest Service.

3.6 WILDLIFE

3.6.1 SCOPE OF ANALYSIS

3.6.1.1 Special-status Species

- *How would construction and use of the proposed infrastructure affect special-status wildlife species?*

The US Fish and Wildlife Service Information for Planning and Consultation database indicates that several wildlife species listed under the Endangered Species Act of 1973 may occur in the project area, and the Forest Service's list of sensitive species in the Intermountain Region also includes several species potentially found in the area. The Migratory Bird Species Act of 1918 provides protections to some bird species that may frequent the project area. Construction and use of the proposed infrastructure could affect these special-status species through disturbance, displacement, or habitat impacts.

Indicators: Survey of areas that would be disturbed by construction and subsequent use for appropriate species and habitat-based assessments for more reclusive species, then assessment of impacts on special-status species based on occurrence and type, extent, and timing of disturbance of individuals or habitat. Conclusions determined and expressed as called for in the protocols for federally listed, Forest Service sensitive, migratory bird species.

3.6.1.2 Specialized Habitats

- *How would construction and use of the proposed infrastructure affect elk or mule deer winter use?*

Parts of Leeks Canyon and adjacent areas include winter range for elk and mule deer, and there are wildlife migration corridors in the area. To protect these specialized habitats, winter wildlife closure areas have been established around Snow King. Construction and use of the proposed infrastructure could affect these habitats through disturbance, displacement, or fragmentation.

Indicators: Review of existing data on these specialized habitats, then assessment of potential effects based on the type, extent, and timing of disturbance of individual animals or habitat.

3.6.2 Affected Environment

Table 3-11 identifies all special-status species known, or suspected, to occur on the Jackson Ranger District of the Bridger-Teton (Forest Service 2019a). Fourteen of these species are either known to occur or have habitat in the project area and are discussed in detail below. The remaining species have no habitat in the project area and are not addressed further.

3.6.2.1 Threatened and Endangered Species

The Endangered Species Act of 1973, as amended (FWS 1973), is administrated by the Fish and Wildlife Service and the National Marine Fisheries Service. The act requires federal agencies to ensure that any activities they authorize, fund, or carry out do not jeopardize the continued existence of any federally listed threatened, endangered, or proposed species. Compliance with this direction will be documented in a biological assessment. The analysis for these species is presented below.

3.6.2.1.1 Canada Lynx

The Canada lynx (lynx) was listed as threatened in the contiguous US in March 2000 (FWS 2000). Critical habitat for lynx was designated in September 2014 (FWS 2014). Threats to lynx include habitat loss, alteration, and fragmentation; competition from other predators such as coyotes, mountain lions, or bobcats; and trapping.

Table 3-11. Special-status species (threatened, endangered, and sensitive) on the Bridger-Teton and their status in the project area.

Species Name	Habitat Description	Status	Known Occurrences in the Project Area	Habitat Present in Project Area
Mammals				
Bighorn sheep (*Ovis Canadensis*)	Rugged terrain and areas near rugged terrain with grasses and forbs.[1]	Region 4 Sensitive	No	Yes
Canada lynx (*Lynx canadensis*)	Coniferous or mixed forests, thick undergrowth for hunting, old growth with deadfall for denning and resting. [1]	Threatened	No	Yes
Fisher (*Martes pennant*)	Mid-to-low elevation coniferous or mixed forests with dense canopies, large trees, abundant snags, and downed logs. Avoids areas of high human activity.[1]	Region 4 Sensitive	No	Yes
Grizzly bear (*Ursus arctos horribillis*)	Diverse habitats that provide relative solitude, ungulate prey and carrion, herbaceous vegetation and mast cops such as whitebark pine. [1]	Threatened	No	Yes

Table 3-11 (cont'd). Special-status species (threatened, endangered, and sensitive) on the Bridger-Teton and their status in the project area.

Species Name	Habitat Description	Status	Known Occurrences in the Project Area	Habitat Present in Project Area
Spotted bat (*Euderma maculatum*)	Associated with cliffs and a variety of habitats, including openings in high-elevation conifer and aspen communities.[1]	Region 4 Sensitive	No	Yes
Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*)	Uses a wide variety of roosting and foraging habitats, including caves and mines for roosting and open areas for foraging.[1]	Region 4 Sensitive	No	Yes
Wolverine (*Gulo gulo*)	Wide ranging species that uses a variety of montane habitats.[1]	Region 4 Sensitive	No	Yes
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	Roosts in large trees. Generally nests in mature, old-growth trees within 2 kilometers of water.[2]	Region 4 Sensitive	Yes	Yes
Boreal owl (*Aegolius funereus*)	High-elevation spruce/fir or mixed forests. Requires cavities for nesting. Cavities generally found in older trees and snags.[2]	Region 4 Sensitive	No	Yes
Common loon (*Gavia immer*)	Large water bodies with islands and fish.[2]	Region 4 Sensitive	No	No
Flammulated owl (*Psiloscops flammeolus*)	Dry upland ponderosa pine; sometimes Douglas fir or aspen forests with brushy understory.[2]	Region 4 Sensitive	Yes	Yes
Great gray owl (*Strix nebulosi*)	Mixed lodgepole pine, Douglas fir, or aspen forests. Commonly nests in large broken-toped snags.[2]	Region 4 Sensitive	Yes	Yes
Greater sage-grouse (*Centrocercus urophasianus*)	Sagebrush obligate. Requires expansive areas dominated by sagebrush of varying densities and age classes.[2]	Region 4 Sensitive	No	No
Harlequin duck (*Histrionicus histrionicus*)	Large, fast-flowing rivers with forested banks for nesting.[2]	Region 4 Sensitive	No	No

Table 3-11 (cont'd). Special-status species (threatened, endangered, and sensitive) on the Bridger-Teton and their status in the project area.

Species Name	Habitat Description	Status	Known Occurrences in the Project Area	Habitat Present in Project Area
Northern goshawk (*Accipiter gentilis*)	Coniferous or mixed, old-growth forests. Often nests in small (~10-acre) patches of trees, such as those present in the project area.[2]	Region 4 Sensitive	Yes	Yes
Peregrine falcon (*Falco peregrinus anatum*)	Habitat varies widely. Nesting habitat most commonly associated with cliffs.[2]	Region 4 Sensitive	No	Yes
Three-toed woodpecker (*Picoides dorsalis*)	Coniferous or mixed forests, generally with abundant beetle-killed snags.[2]	Region 4 Sensitive	Yes	Yes
Trumpeter swan (*Cygnus buccinators*)	Freshwater ponds, lakes, or marshes with abundant aquatic vegetation.[2]	Region 4 Sensitive	No	No
Yellow-billed cuckoo (*Coccyzus americanus*)	Large stands of riparian woodlands greater than 25 contiguous acres at least 330 feet wide below 7,000 feet.[2]	Threatened	No	No
Amphibians				
Boreal toad (*Bufo boreas*)	Requires perennial, slow-moving, or standing water, generally with emergent vegetation.[1]	Region 4 Sensitive	No	No
Columbia spotted frog (*Rana luteiventris*)	Requires perennial, slow-moving, or standing water, generally with emergent vegetation.[1]	Region 4 Sensitive	No	No
Fish				
Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*)	Cold-water perennial streams or lakes and ponds with suitable substrate for spawning and sufficient food source.[1]	Region 4 Sensitive	No	No

[1] Natureserve 2019. http://explorer.natureserve.org/index.htm

[2] Birds of North America. http://bna.birds.cornell.edu/bna

Lynx distribution includes Alaska and Canada, down into the Rocky Mountains, the northern Great Lakes region, and northern New England. In the Rocky Mountains, they typically occur in subalpine (boreal) conifer forests with cold snowy winters (Ruediger et al. 2013). Lynx denning habitat is characterized by the presence of large woody debris and usually consists of older successional or mature stands (Ruediger et al. 2013).

Snowshoe hares (*Lepus americanus*) are the primary prey of lynx, while red squirrels (*Tamiasciurus hudsonicus*) are an important alternate prey species in more southern latitudes where snowshoe hare densities are lower. Early to advanced successional stands with a dense, multi-layered understory are optimal for snowshoe hares, and thus important as lynx foraging habitat (Ruediger et al. 2013). Snowshoe hares are found throughout the Bridger-Teton in suitable habitat.

Based on Bridger-Teton habitat modeling, the Flat Creek Lynx Analysis Unit (LAU), which includes Snow King, covers 72,949 acres and contains 45,296 acres of suitable lynx habitat. While lynx habitat overlaps the project area, there are no records of lynx occurrences at or near Snow King (Figure 3-3; WNHD 2018). Surveys for lynx have been completed on other areas of the Bridger-Teton with positive results (Holden 2004). According to the *Canada Lynx Conservation Agreement* (FWS 2006) between the Forest Service and the Fish and Wildlife Service, all mapped lynx habitat on the Bridger-Teton must be considered "occupied" because lynx have been found on the Forest.

The Endangered Species Act defines critical habitat for threatened and endangered species. Critical habitat is an area that provides features that are important for the conservation of a species that may require special management practices or protection (FWS 1973). There are five main geographical areas of designated lynx critical habitat: 1) New England; 2) the Great Lakes region; 3) northern Idaho and western Montana; 4) Washington; and 5) southwestern Montana and western Wyoming. The Wyoming/Montana critical habitat designation extends from southwestern Montana to Cokeville, Wyoming. The existing permit boundary area and proposed boundary adjustments overlap with this designated critical habitat (Figure 3-4). The project does not fall within a designated linkage area.

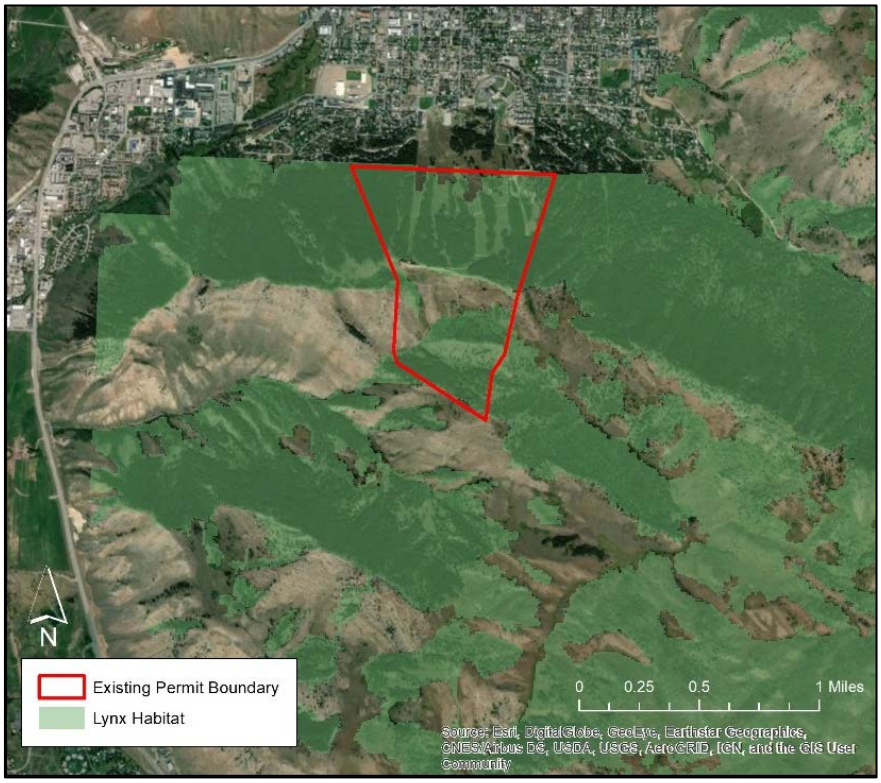

Figure 3-3. Suitable lynx habitat in relation to the existing permit boundary area.

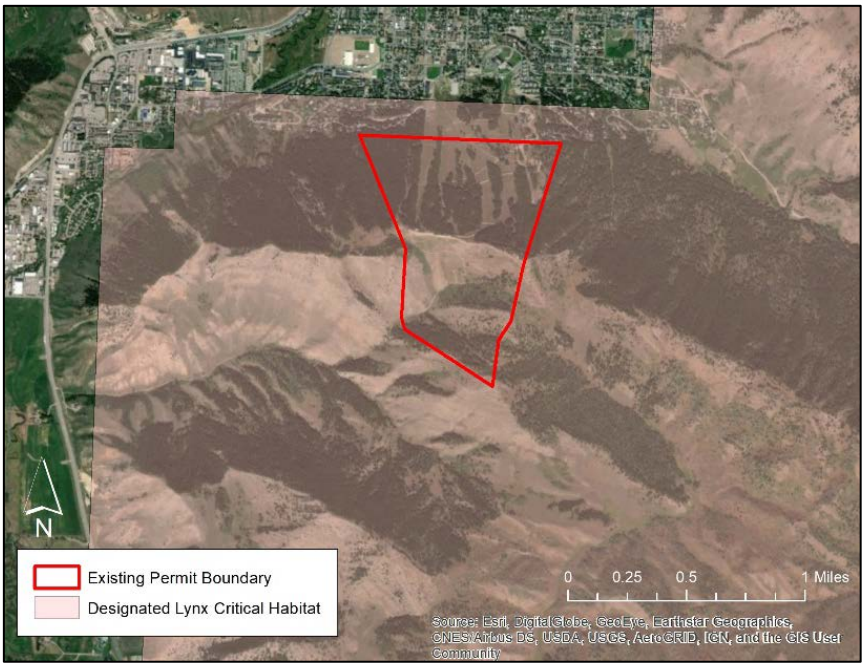

Figure 3-4. Designated lynx critical habitat in relation to the existing permit boundary area.

Applicable objectives, standards, and guidelines for lynx management from the *Northern Rockies Lynx Management Direction Record of Decision* (Northern Rockies Lynx Management Direction; Forest Service 2007) guided this analysis of potential effects on lynx and lynx habitat, as discussed below.

Habitat Linkage and Movement

- Objective ALL O1: Maintain or restore lynx habitat connectivity in and between LAUs and/or linkage areas.
- Standard ALL S1: New or expanded permanent development and vegetation management projects must maintain habitat connectivity in LAU and/or linkage area.
- Objective HU O2: Manage recreational activities to maintain lynx habitat and connectivity.
- Objective HU O4: Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation sites or ski areas.
- Guideline HU G3: Recreation development and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.

Habitat Quality and Effectiveness

- Objective HU O3: Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.
- Guideline HU G1: When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained.
- Guideline HU G2: When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

- Guideline HU G3: Recreation development and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.
- Guideline HU G10: When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat, if it has been identified as a need.

3.6.2.1.2 Grizzly Bear

The grizzly bear was listed as threatened in the lower 48 states in July of 1975 (FWS 1975). Since that time, it has been delisted and relisted several times. As of July 31, 2019, the species is again listed as threatened (FWS 2019). Critical habitat for grizzly bears has not been designated. Grizzly bears occur in forest environments, grasslands, and shrublands, particularly riparian zones. They prefer habitats that provide relative solitude, support animal prey, and provide herbaceous vegetation or mast crops such as berries or nuts.

The project area is within the Demographic Monitoring Area for the Greater Yellowstone Ecosystem bear population. Recent research by the Interagency Grizzly Bear Study Team indicates that the trend of female grizzly bears with cubs of the year was up for the period between 1983 and 2018 (IGBST 2018). This does not necessarily indicate that the population has increased over the same period, but it is suggestive of an upward population trend for grizzly bears in the monitoring area. Since no Bridger-Teton-specific information for this species is available, for the purposes of this analysis we will treat the upward trend on the monitoring area as indicative of the trend on the Bridger-Teton.

There are three Wyoming Natural Heritage database records for grizzly bears within 5 miles of the project area but no records within 2 miles of the project area (WNHD 2018). Given the historic sightings, it is possible that a grizzly bear could be in the area during project implementation, attracted to mast crops (e.g., huckleberries) and occasional ungulate carcasses in the area.

3.6.2.1.3 Wolverine

Wolverines are currently proposed for listing as threatened under the ESA (FWS 2016). Although proposed species do not receive protections under the ESA until their listing is finalized, the wolverine is discussed in this section since their status is in flux. In North America, wolverines occur in a wide variety of alpine, boreal, and arctic habitats, including boreal forest, tundra, and montane forests throughout much of Alaska and Canada. The southern portion of the species' range extends into the contiguous US, including high-elevation alpine portions of Washington, Idaho, Montana, Wyoming, California, and Colorado (Copeland et al. 2010). This species' requirement for cold, snowy conditions means that in the southern portion of its range where ambient temperatures are warmest (like Wyoming) wolverines occur principally at high (greater than 8,000 feet) elevations (Murphy et al. 2011, Inman et al. 2012). Deep snow is required for successful wolverine reproduction because female wolverines dig elaborate natal dens in the snow.

Wolverines are opportunistic feeders and consume a variety of foods depending on availability. Home ranges of wolverines are large and vary greatly in size depending on availability of food, gender, age, and differences in habitat quality. Wolverines in the Greater Yellowstone Area had average adult male home ranges of 311 square miles and average adult female home ranges of 128 square miles (Inman et al. 2012).

No records of wolverines exist in the Wyoming Natural Heritage Database within 2 miles of the project area (WNHD 2018). They generally avoid high levels of human disturbance; however, they appear to tolerate low to moderate levels of human recreational activity (Heinemeyer and Squires 2014). No surveys for this species were conducted in the project area.

3.6.2.2 Forest Service Sensitive Species

The population trend and viability of sensitive species is a concern. They are managed under the authority of the National Forest Management Act (PL 94-588) and are administratively designated by the Regional

Forester (FSM 2670). Table 3-11 shows which sensitive wildlife species and associated habitats occur in the project area.

3.6.2.2.1 Bighorn Sheep

Bighorn sheep are a widely distributed species, ranging from the northern Rockies south to the Baja peninsula. The subspecies present in the project area is the Rocky Mountain bighorn. Rocky Mountain bighorn are found in and around rugged areas they use as escape terrain where their adaptations allow them to outrun and outmaneuver potential predators. This dependence on escape terrain limits potential habitat. Human activity is known to impact this species by causing avoidance of otherwise suitable habitat (Longshore and Thompson 2013, Courtemanch 2014). Nearby populations of Rocky Mountain bighorn have been shown to avoid habitat used by winter recreationists (Courtemanch 2014).

Hiking trails have been shown to be avoided by desert bighorn sheep but to have no effect on Sierra Nevada bighorn sheep, both closely related to Rocky Mountain bighorn sheep (Hicks and Elder 1979, Longshore and Thompson 2013). Trail avoidance by desert bighorn sheep was very short lived. Sheep avoided trails during high-use weekends and returned during weekdays (Longshore and Thompson 2013).

The bighorn sheep population around Snow King is a part of the Jackson herd unit (WGFD 2018a). The population is currently estimated to be 363, which is within 20 percent of the population objective of 400. The 3-year mid-winter trend average (2016–2018) is 378 (WGFD 2018a).

3.6.2.2.2 Fisher

In June 2011, it was determined that listing the fisher as threatened or endangered was not warranted (FWS 2011). The northern Rockies fisher distinct population segment was again petitioned for listing in 2013 (Curry 2013) and found not warranted in 2017 (FWS 2017). As of now, fishers remain a Region 4 sensitive species.

Fishers evolved in forest types with common windthrow events and mixed fire frequency and intensity (Jones 1991). These disturbances resulted in complex and intricate landscape mosaics of young, mixed-age, and late-seral components that fishers require for breeding and foraging (Jones 1991). Fishers select landscapes where there are highly connected patches of mature forest (≥ 50 percent) with small (≤ 5 percent) open areas (Sauder 2014). However, fisher prey on species associated with non-forest types (Jones and Garton 1994). Fishers avoid open areas (Buskirk and Powell 1994, Powell and Zielinski 1994), and increasing the amount of open areas can have large effects on the probability of fisher occupying an area (Sauder 2014, Buskirk and Powell 1994, Powel and Zielinski 1994). Fishers have avoided open areas 25 meters across and less in the Midwest (Powell 1979). Reduction of understory vegetation may decrease fisher prey availability, disrupt daily movements, and increase predation vulnerability (Naney et al. 2012).

The forested habitat within the current permit boundary area is highly fragmented due to past ski area development. The lack of continuous canopy cover and extensive openings likely prohibits use by fishers. However, the small islands of forested habitat may allow fishers to move through the project area. No records exist in the Wyoming Natural Heritage Database within 2 miles of the project area (WNHD 2018).

3.6.2.2.3 Spotted Bat

Spotted bats are found throughout the west in a wide variety of habitats. In Wyoming they are found in the western third of the state and have been recorded at elevations up to 9,000 feet in caves and rock crevices (Watkins 1977, Priday and Luce 1999, Luce et al. 2004). In general, spotted bats are found within 6 miles of cliffs with nearby permanent water (Priday and Luce 1999).

Little is known about spotted bat populations in western Wyoming (Priday and Luce 1999, Luce et al. 2004). No records exist in the Wyoming Natural Heritage Database within 2 miles of the project area (WNHD 2018). No bat surveys were completed in the project area. However, given the habitat and terrain within and surrounding the project area, it is assumed spotted bats could be present.

3.6.2.2.4 Townsend's Western Big-eared Bat

There is some disagreement and ambiguity as to whether the western subspecies of Townsend's big-eared bat, the subspecies listed as sensitive in Region 4, are found in Wyoming. However, Townsend's big-eared bats do occur in Wyoming, and for purposes of this analysis it is assumed they are of the western subspecies (Handley 1959, Piaggio and Perkins 2005). During spring, summer, and fall, Townsend's big-eared bats roost in buildings, mines, and caves at elevations up to 11,000 feet. Hibernacula used in winter are almost exclusively mines or caves and can be up to 20 miles away from summer-use sites. Townsend's big-eared bats eat moths and other flying insects that they take on the wing, generally at the margins of forest patches (Kunz and Martin 1982).

No records for this species exist in the Wyoming Natural Heritage Database within 2 miles of the project area (WNHD 2018). No bat surveys were completed in the project area. However, given the habitat and terrain surrounding and within the project area, it is assumed this species could be present.

3.6.2.2.5 Bald Eagle

Bald eagles are closely associated with water, and their nest sites are commonly found less than 1 mile from a lakeshore or riverbank. Large trees are necessary to support eagle nests. Old-growth stands, with their structural diversity and open canopies, provide important habitat for eagles because snags and open-canopied trees located near the nest site and foraging areas offer favorable perches. Bald eagles with access to open water or alternate food sources near their nesting territories may not migrate in winter; however, many eagles migrate southward to areas with available prey (Buehler 2000).

Bald eagles are common in and around the project area. Several records for this species exist in the Wyoming Natural Heritage Database, and additional records exist on eBird (eBird 2015, WNHD 2018). No surveys for this species were conducted in the project area.

3.6.2.2.6 Boreal Owl

Boreal owls are generally associated with dense, mature, and old growth subalpine forests dominated by subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmanni*; Hayward and Hayward 1993). They also often occur in other conifer and mixed-conifer aspen stands that support inclusions of mature subalpine forests and may forage in forest openings. In western Wyoming, subalpine forests typically occur above 8,000 feet in elevation, with stringers extending to low elevations along stream courses. They are often bordered by Douglas fir and/or lodgepole pine forests, sagebrush steppe, or grassland steppe at low elevations, and by alpine habitats and white-bark pine (*Pinus albicaulis*) at high (9,500 feet) elevations. Prey species include voles, mice, shrews, pocket gophers, squirrels, chipmunks and, less frequently, small birds and insects (Hayward and Hayward 1993).

No records exist for boreal owls within 2 miles of the project area (WNHD 2018). Two rounds of surveys were conducted in the project area in March and April 2018. No boreal owls were detected during these surveys. However, boreal owls could potentially utilize the project area as some marginal quality habitat is present. Boreal owls are common in other areas of the Bridger-Teton.

3.6.2.2.7 Flammulated Owl

Flammulated owls typically occur in mixed coniferous forests of pine, spruce, and fir at higher elevations, as well as oak and pinyon pine at lower elevations. They are secondary cavity nesters, nesting in relatively open stands of large-diameter (greater than 21-inch) ponderosa pine, Jeffrey pine (*Pinus jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*), and aspen (*Populus tremuloides;* Linkhart and McCallum 2013).

This species is an insectivorous, cavity nesting, neotropical migrant. Territories are established in early May and eggs are typically laid in early June. The young fledge in late July and disperse by September. Threats include loss of habitat, habitat fragmentation, and nest disturbance (Linkhart and McCallum 2013).

There is one record of flammulated owl within 2 miles of the project area, but no records within the project area (WNHD 2018). Two rounds of surveys were conducted in the project area in early June and late June

2018. No flammulated owls were detected during these surveys. However, flammulated owls could potentially utilize the project area as some marginal quality habitat is present.

3.6.2.2.8 Great Gray Owl

This species inhabits mixed coniferous forests usually bordering small openings or meadows. It is generally associated with lodgepole pine, Douglas fir, spruce fir, and aspen forests. Semi-open areas where small rodents are abundant, and that occur near dense coniferous forests for roosting and nesting, are optimum habitat for great gray owls. These owls prefer mature or old growth forests on flat or moderate slopes for nesting and high crown cover for security, using broken top snags, stumps, dwarf-mistletoe platforms, or old hawk and raven nests as nesting structures. Dense stands of smaller diameter trees are also used for roosting by adults and their young. They forage primarily in wet montane meadows and older open forest stands with a high density of pocket gophers and voles (Duncan 1997).

The Teton Raptor Center has a records of call response in Wilson Canyon to the southeast and records of one GPS tagged individual that has recorded one location within the permit boundary (Teton Raptor Center 2015; Teton Raptor Center 2018). Two rounds of surveys were conducted in the project area in March and April 2018. No great gray owls were detected during these surveys. However, as documented by the Teton Raptor Center, they do occasionally utilize the project area.

3.6.2.2.9 Northern Goshawk

Average goshawk home range sizes during nesting are 1,400–8,600 acres in North America, depending on sex and habitat characteristics (Squires and Reynolds 1997). Within a home range, northern goshawks typically have three levels of habitat: the nest area, post-fledgling area, and foraging habitat (Northern Goshawk Working Group 2009). Goshawks typically nest in mature to old-growth forests composed primarily of large trees with high (60–90 percent) canopy closure (Squires and Reynolds 1997). High canopy closure is one of the most uniform habitat characteristics of goshawk nest stands (Hayward and Escano 1989). The post-fledgling area typically surrounds the nesting stand and serves as the area where fledgling goshawks develop their flying and hunting skills (Squires and Kennedy 2006). Although the habitat-use and preferences of foraging goshawks are poorly understood for North American populations, they generally forage in diverse habitats ranging from open-sage steppes to dense forests, including riparian areas (Squires and Reynolds 1997).

This species has been documented within and around the project area (Teton Raptor Center 2019; WNHD 2018). Four rounds of surveys were conducted in the project area in March, April, early June, and late June 2018. Wildlife recording devices were deployed to detect any northern goshawk calls. Once a call was identified, personnel were deployed to try to locate the nest. This survey protocol is considered to be extremely effective in detecting nesting goshawks if they are present (Woodbridge and Hargis 2006). One goshawk call was recorded, but no nest location was found. The Teton Raptor Center located a nest in 2019 outside of the existing permit boundary (Figure 3-5). This nest was active with three young at the time of the survey. Additional alternative nests have also been located in the vicinity.

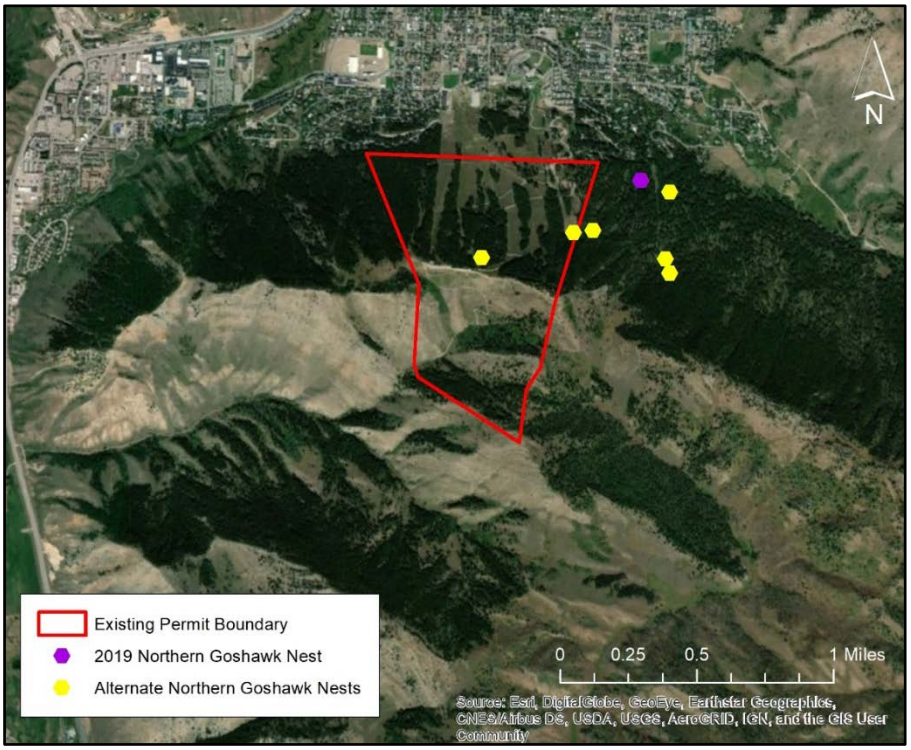

Figure 3-5. Active and alternate northern goshawk nests in relation to the existing permit boundary area.

The *Bridger-Teton National Forest Sensitive Species Conservation Assessment for Northern Goshawks* (Forest Service 2019c) provides a list of conservation goals for the northern goshawk. These goals may be used to provide potential design criteria in project-level analyses.

- Goal 1: Provide suitable nesting, post-fledgling, and foraging habitat within active and inactive (occupied within past 10 years) goshawk home ranges.
- Goal 2: Conserve existing conditions in the core nest areas because desired conditions are assumed present around recently occupied nest areas in each foraging area.
- Goal 3: Provide habitat for hiding/escape cover for goshawk fledglings and goshawk prey, and foraging opportunities for adults and fledglings during the fledgling-dependency period. Maintain an interspersed mosaic of structural stages, young to old forest, to increase the diversity of habitat for goshawks and their many prey species.
- Goal 4: Where roads and trails pass through active or inactive goshawk nesting areas, maintain security for breeding pairs, nesting, and nestling/fledgling goshawks.

In addition to these goals, regional precedent protects active northern goshawk nests by establishing a 30-acre buffer around any active nests, within which no adverse management activities should occur (Forest Service 2017).

3.6.2.2.10 Peregrine Falcon

Peregrine falcons occupy a wide range of habitats. They are typically found in open country near rivers, marshes, and coasts. Cliffs are preferred nesting sites, although reintroduced birds now regularly nest on man-made structures such as towers and high-rise buildings. Peregrines may travel more than 15 miles from the nest site to hunt for ducks, shorebirds, or songbirds. However a 5-mile radius around the nest is an average hunting area, with 60 percent of foraging occurring within this distance (White et al. 2002).

Two records for peregrine falcons exists within 2 miles of the study area (WNHD 2018). No surveys for this species were conducted in the project area.

3.6.2.2.11 Three-toed Woodpecker

Three-toed woodpeckers require coniferous forest with snags that are used for nesting and feeding. They are primarily associated with recent coniferous forest burns and bark beetle infestations, foraging on insects in recently dead and dying trees. They excavate a new cavity annually for nesting (Leonard 2001).

No records for three-toed woodpeckers exist within 2 miles of the project area (WNHD 2018). While there has been some beetle kill at Snow King, some of the snags are cut down for skier safety. When compared with the surrounding forest, the snag density at Snow King is very low. No surveys have been conducted for this species in the project area.

3.6.2.3 Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act of 1918. Executive Order 13186 details the responsibilities of federal agencies to protect bald and golden eagles and other migratory birds. In December 2008, the Forest Service and the Fish and Wildlife Service signed an MOU to promote the conservation of migratory birds (Forest Service 2008). Pursuant to the Executive Order and the MOU, the Forest Service ensures that environmental analyses of federal actions required by NEPA evaluate the effects of actions and agency plans on migratory birds, with emphasis on: 1) species of management concern along with their priority habitats; and 2) species of conservation concern.

A list of birds of conservation concern is published and maintained by the Fish and Wildlife Service, Division of Migratory Bird Management (FWS 2008). The current list is available at http://www.fws.gov/migratorybirds. The project area is located within the Northern Rockies Bird Conservation Region (BCR 10).

There are a total of 22 Fish and Wildlife Service birds of conservation concern for BCR 10. Three of these species are also Forest Service sensitive species, one is a threatened species under the Endangered Species Act, and one is a Bridger-Teton management indicator species. The Endangered Species Act-listed and Forest Service sensitive species are discussed above. These species are described in Table 3-12 below.

3.6.2.4 Specialized Habitat

3.6.2.4.1 Winter Range

There are two species for which winter range is a concern at Snow King: Rocky Mountain elk, and mule deer, hereafter referred to collectively as big game.

Elk are habitat generalists. During the summer, they spend the majority of their time in montane, subalpine, and alpine habitats. During the winter, elk movements are restricted by forage availability and snow conditions. Elk migrate to lower elevations with shallow snow, and typically inhabit coniferous forests interspersed with riparian areas, as well as south-facing slopes with aspen, sagebrush and other shrubs, and grasslands.

The elk population around Snow King is located along the border of the Fall Creek and Jackson herd units (WGFD 2018b). It is estimated that there are 9,627 elk in the Jackson population. The population objective is 11,000 +/- 20 percent. This population is meeting objectives and has remained fairly stable in the last 6 years. It is estimated there are 4,090 elk in the Fall Creek population. The population objective is 4,400 +/- 20 percent. This population is meeting objectives.

Mule deer are also habitat generalists. They are often associated with early-successional vegetation and use sagebrush grasslands, mixed-mountain shrublands, quaking aspen forests, various types of conifer forests, and recent burns. Mule deer in mountainous regions migrate to lower elevations when winter snowpack is deep.

Table 3-12. Northern Rockies Bird Conservation Region (BCR 10) Birds of Conservation Concern, their habitat, and their presence in the project area.

Species Name	Habitat Description	Known Occurrences in the Project Area	Habitat Present in Project Area
Bald eagle	See sensitive species section.	Yes	Yes
Swainson's hawk (*Buteo swainsoni*)	Most habitats below 9,000 feet with open areas for foraging. Nests in trees, occasionally on cliffs. Feeds mostly on small mammals.	Yes	Yes
Ferruginous hawk (*Buteo regalis*)	Basin prairie shrublands, mountain foothills grasslands, cottonwood-riparian. Nests on rock outcrops, the ground, banks, or in trees. Feeds mostly on small mammals.	No	No
Peregrine falcon	See sensitive species section.	No	Yes
Upland sandpiper (*Bartramia longicauda*)	Eastern great plains grasslands, dry-land grass pastures. Nests in depressions on open ground, usually concealed by grass. Feeds on insects, terrestrial invertebrates, seeds.	No	No
Long-billed curlew (*Numenius americanus*)	Sagebrush-grasslands, meadow grasslands, irrigated meadows. Nests on the ground near water. Feeds on insects, aquatic invertebrates.	Yes	Yes
Yellow-billed cuckoo (*Coccyzus americanus*)	See Table 3-11.	No	No
Flammulated owl	See sensitive species section.	Yes	Yes
Black swift (*Cypseloides niger*)	Small islands of breeding populations in Intermountain West. Nests on ledges or shallow caves in steep rock faces and canyons, usually near or behind waterfalls, and in sea caves.	No	No
Calliope hummingbird (*Selasphorus calliope*)	Coniferous forests, woodland chaparral, mountain-foothills, shrublands, riparian shrub, mountain park-meadows, alpine grasslands. Uses many habitats during migration. Nests on limbs or conifer cones. Feeds on nectar, insects.	No	Yes
Lewis's woodpecker (*Melanerpes lewis*)	Ponderosa pine savannah, pine-juniper, other coniferous forests, aspen, cottonwood-riparian, below 8,500 ft. Nests in cavities in dead or live trees or poles. Feeds on insects, nuts, and berries.	No	Yes
Williamson's sapsucker (*Sphyrapicus thyroideus*)	Coniferous forests, especially those that have burned. Also aspen. Nests in cavities in aspen, pine, or fir. Feeds on insects, tree sap.	No	Yes
White-headed woodpecker (*Picoides albolarvatus*)	Coniferous forests from 4,000 to 9,000 feet. Feeds on insects, conifer seeds. Wyoming is considered out of this species geographical range.	No	No

Table 3-12 (cont'd). Northern Rockies Bird Conservation Region (BCR 10) Birds of Conservation Concern, their habitat, and their presence in the project area.

Species Name	Habitat Description	Known Occurrences in the Project Area	Habitat Present in Project Area
Olive-sided flycatcher (*Contopus cooperi*)	Coniferous forests from 8,000 feet to timberline, aspen-riparian. Nests often high in conifer on horizontal branches. Feeds exclusively on insects that can be caught in the air.	No	Yes
Willow flycatcher (*Empidonax traillii*)	Riparian shrub including willow, hawthorn, water birch, and alder below 9,000 feet. Nests in upright or slanting fork in a shrub. Feeds primarily on insects, occasionally berries.	No	Yes
Loggerhead shrike (*Lanius ludovicianus*)	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nest is usually hidden below the crown in the crotch or on a large branch of a deciduous tree or shrub. Feeds on insects, small vertebrates, carrion.	No	No
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie and mountain-foothills shrublands. Nest is concealed in or beneath a sagebrush shrub. Feeds on insects, some fruit.	No	Yes
Brewer's sparrow	Associated with sagebrush shrublands. Requires areas of tall, dense sagebrush for nesting.	No	Yes
Sagebrush sparrow (formerly sage sparrow) (*Artemisiospiza nevadensis*)	Basin-prairie and mountain-foothills shrublands. Usually nests in or under sagebrush. Feeds on insects, seeds.	No	Yes
McCown's longspur (*Rhynchophanes mccownii*)	Eastern great plains and great basin foothills, grasslands, basin-prairie shrublands, agricultural areas. Nests on the ground in a shallow, natural or scraped depression. Feeds on seeds, insects.	No	No
Black rosy-finch (*Leucosticte atrata*)	Alpine grasslands, alpine moss-lichen-forb, barren ground, fallow agricultural areas. A variety of habitats during the winter. Nests on the ground or on a cliff. Feeds on seeds, insects.	No	Yes
Cassin's finch (*Haemorhous cassinii*)	Coniferous forests up to timberline, including burns. Lower habitats during the winter, especially urban areas. Nests in conifers; nest is usually placed near the end of a large limb. Feeds on buds, berries, and conifer seeds.	No	Yes

Mule deer occur at lower elevations in the project area on a yearlong basis. The mule deer population around Snow King is a part is of the Sublette herd (WGFD 2018c). It is estimated that there are 19,838 mule deer in this population. The population objective is 32,000 +/- 20 percent. This population is below objectives, and no clear trend is apparent as the population has been fluctuating for the last 6 years.

Big game species are forced into lower elevations and smaller ranges during the winter months when forage availability is reduced (Sawyer et al. 2006, Mule Deer Working Group 2018). Mortality associated with severe weather conditions on winter ranges often drives the annual population cycles of big game (WGFD 2011). Displacement from optimal winter range due to disturbance can result in individuals utilizing sub-optimal habitat, which may increase mortality rates (Sawyer et al. 2006). Thus, winter range can act as a limiting resource for big game and as an important driver of local populations.

Certain areas are designated as crucial range by the Wyoming Game and Fish Department for the important role these areas play in providing functioning habitat within a herd unit (WGFD 2019a). Approximately 32 acres of crucial elk winter range overlaps with the existing permit boundary (Figure 3-6). This habitat is in the northeast corner of the existing boundary, which is highly disturbed due to current ski area operations. This area is not often utilized by elk due to the high levels of disturbance. Non-crucial elk winter range has been delineated in close proximity to the back side of the permit area (Figure 3-6).

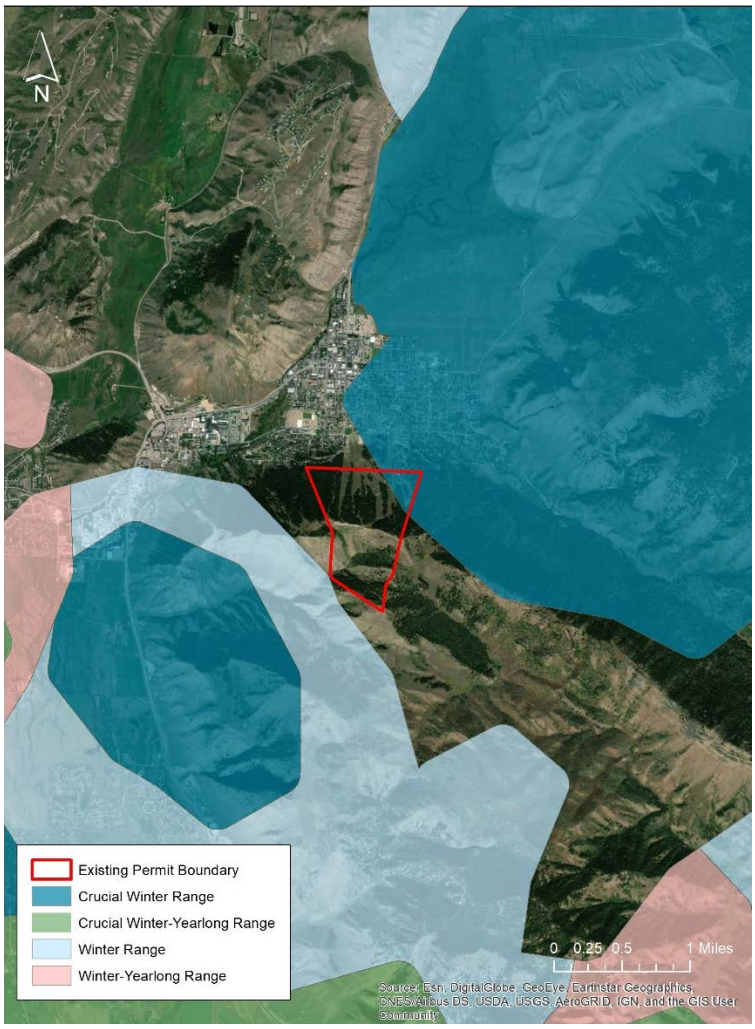

Figure 3-6. Elk winter range in relation to the existing permit boundary (habitat mapping WGFD 2019a).

Mule deer do not have any crucial range within the existing permit boundary. However, crucial winter-yearlong range is located within close proximity to the back side of the permit boundary (Figure 3-7).

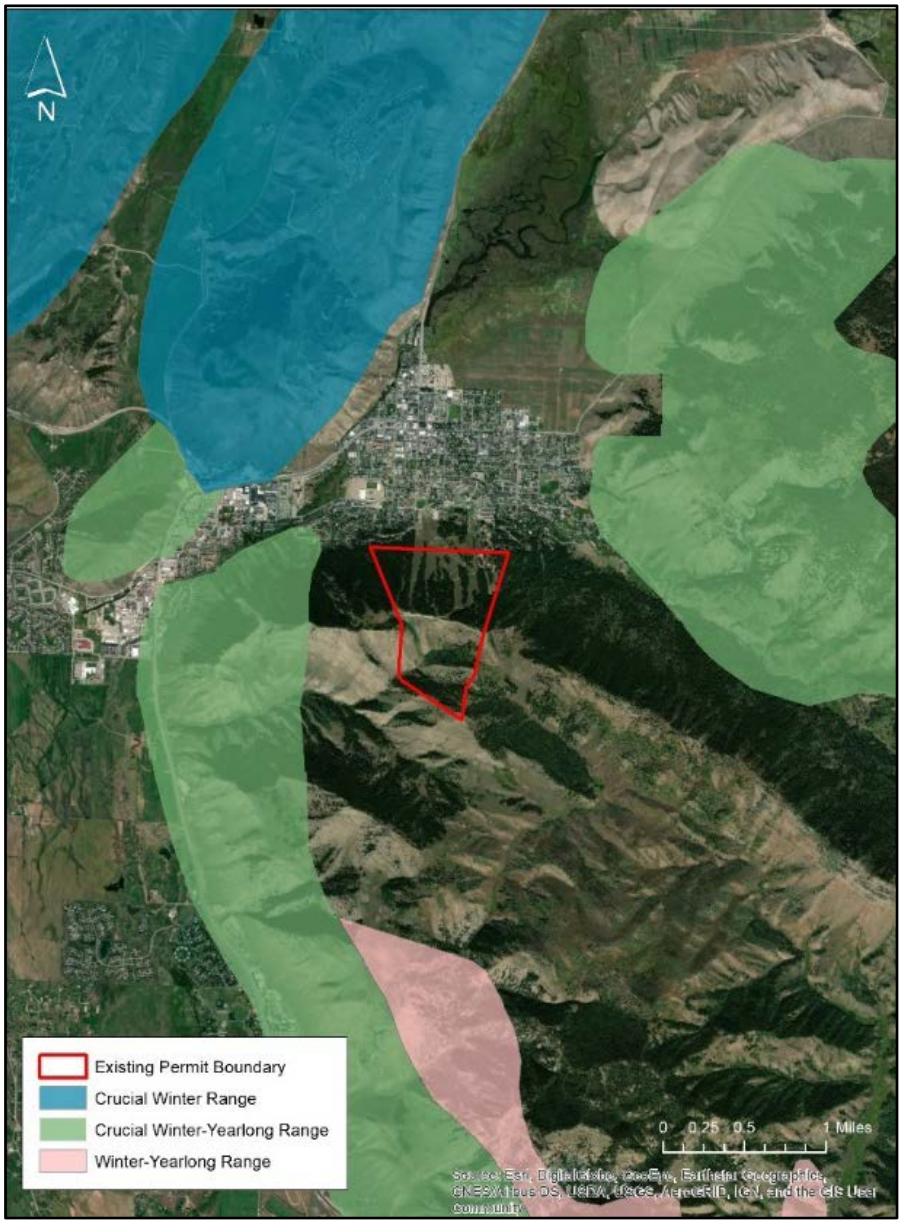

Figure 3-7. Mule deer winter range in relation to the existing permit boundary (habitat mapping WGFD 2019a).

Big game species typically re-treat from high levels of disturbance, creating a "zone of influence" around the footprint of a given disturbance (Gaines et al. 2003). The distance that big game re-treat from a given disturbance varies based on season, sex, and type of disturbance (Montgomery et al. 2013, Lyon 1979). While Morrison et al. (1995) evaluated the impacts of ski resorts on elk, this study focused on summer range and low-impact recreation use. However, Lyon (1985) noted that elk typically re-treated the minimum distance required to no longer be in direct line-of-sight of a given disturbance.

To determine the area from which big game would likely be displaced due to disturbance from the proposed activities on the back side of Snow King, we utilized a viewshed analysis to identify the zone of influence. Back-side activities were the focus of this analysis since that is the portion of the existing permit boundary that does not currently have any development, and it is also the area biologists from the Wyoming Game

and Fish Department expressed concern over. For this analysis, we assumed mule deer, like elk, would retreat the minimum distance required to no longer be in direct line-of-sight of a given disturbance.

To complete this analysis, we assumed that elk and mule deer would move to avoid a visual disturbance within 2 kilometers (Edge 1982). We then projected a 2-kilometer radius around the proposed Lift A, the central feature of proposed back-side development. We then ran the viewshed model to eliminate areas within the 2-kilometer radius that would be visually blocked from Lift A by intervening terrain. The remaining space within the radius was defined as the area within which elk and deer could be displaced by human activity, moving to areas where the activity was no longer visible. The maps generated by this viewshed analysis were then overlaid on winter range maps to determine the amount of winter range that would be affected.

3.6.2.4.2 Parturition Areas

In early spring, female elk move to parturition areas several days prior to giving birth. They remain in these areas, separated from the main herd, for several days to several weeks. Parturition areas are selected for their nutritional value, often along receding snow lines. Given sufficient nutritional potential, parturition areas can be in open grasslands, shrublands, or forested habitat. Often, females return to the same parturition areas each year (Innes 2011).

Human disturbance in parturition habitat during the calving season can reduce calf survival (Phillips and Alldredge 2000). However, removal of disturbance during calving season within parturition areas can return productivity to pre-disturbance levels (Shively et al. 2005).

There are no habitats designated as elk parturition areas by Wyoming Game and Fish Department within or near the permit boundary (WGFD 2018d; Figure 3-8). However, anecdotal evidence based on personal experience of some Wyoming Game and Fish Department biologists suggests there may be some calving habitat in and near the permit boundary, including around the Game Creek saddle and Leeks Canyon.

3.6.3 DIRECT AND INDIRECT EFFECTS

3.6.3.1 Alternative 1

3.6.3.1.1 Threatened and Endangered Species

Canada Lynx

Regional habitat connectivity for lynx would not be impacted by Alternative 1 as no barriers to lynx travel would be created. Habitat in the project area is currently highly fragmented as a result of past ski area development and operations as well as high levels of development and activity in and around Jackson. Alternative 1 would not create any additional fragmentation or result in barriers to lynx travel.

Alternative 1 would maintain lynx habitat quality and effectiveness at current levels. Ski area activities would remain in the existing developed area. The patches of forest located among the existing ski areas could provide potential hunting opportunities and facilitate movement through Snow King. However, given the high levels of disturbance and recreation in the area and the proximity of Jackson, it is unlikely lynx would choose to occupy the project area.

For the reasons discussed above, Alternative 1 is consistent with the cited objectives, standards, and guidelines. Therefore, Alternative 1 is anticipated to have no impact on the Canada lynx.

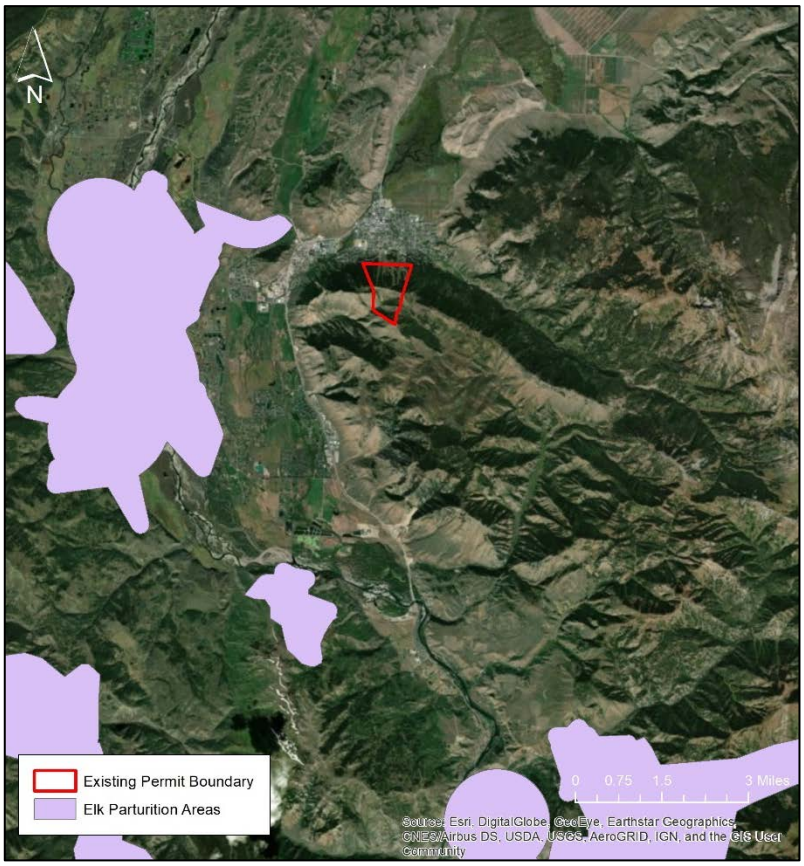

Figure 3-8. Elk parturition areas in relation to the existing permit boundary (habitat mapping WGFD 2018d).

Grizzly Bear

Alternative 1 is anticipated to have no impact on grizzly bears since human disturbance in the area would remain at present levels, which likely discourages use of the project area. This alternative is consistent with the standards for managing grizzly bear/human interaction and grizzly bear habitat in the Forest Plan. This includes the use of bear-proof garbage containers and regular collections from these containers.

3.6.3.1.2 Forest Service Sensitive Species

Alternative 1 is anticipated to have no impact on any Forest Service sensitive species, as there would be no change in the existing levels of human disturbance or habitat availability.

3.6.3.1.3 Migratory Birds

Alternative 1 is anticipated to have no impact on migratory birds, as foraging and nesting habitat would remain at its current availability.

3.6.3.1.4 Specialized Habitat

Alternative 1 is anticipated to have no impact on specialized habitat. No additional habitat would be impacted, and there would be no changes in disturbance within and around the permit boundary area. Any avoidance of the ski area by elk or mule deer that currently occurs would continue.

3.6.3.2 Alternative 2

In order to provide a clear contrast between Alternative 2 and Alternative 1, the following discussion focuses on how the impacts of Alternative 2 would differ from Alternative 1, described above.

3.6.3.2.1 Threatened and Endangered Species

Canada Lynx

Alternative 2 has the potential to negatively impact Canada lynx through the removal of forested habitat (and thus changes in prey abundance and distribution), and disturbance from recreational activities. The proposed boundary adjustment overlaps with the Flat Creek LAU, suitable habitat, and designated critical habitat (Figures 3-9 and 3-10). A total of about 133 acres would be disturbed for the construction and maintenance of the elements proposed under this alternative.

As noted above in section 3.6.2.1, the Northern Rockies Lynx Management Direction provides guidance for management of lynx habitat to address the risks posed by ski areas. Applicable objectives, standards, and guidelines are listed above (section 3.6.2.1). Compliance under Alternative 2 is discussed below.

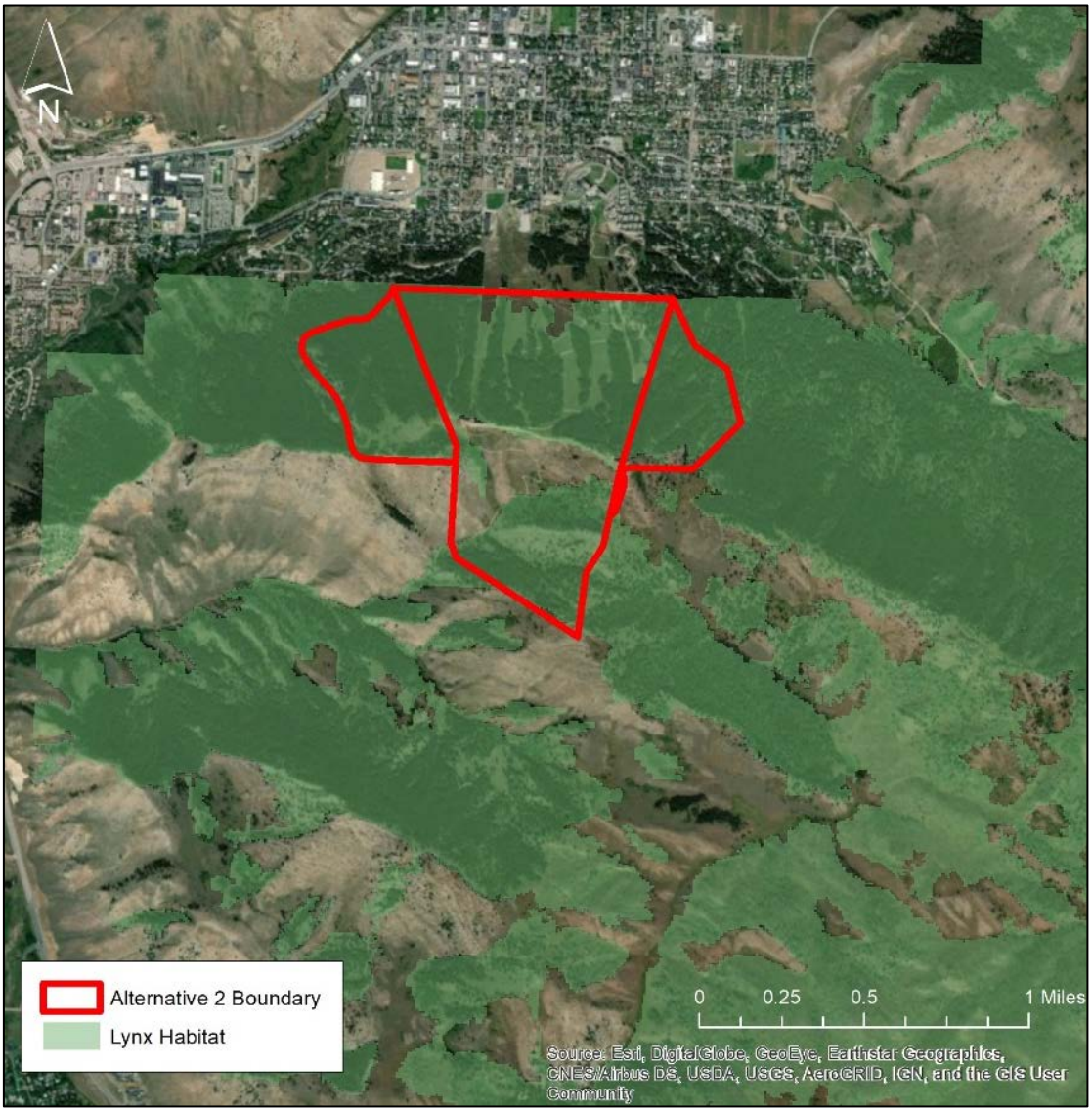

Figure 3-9. Suitable lynx habitat in relation to the Alternative 2 boundary area.

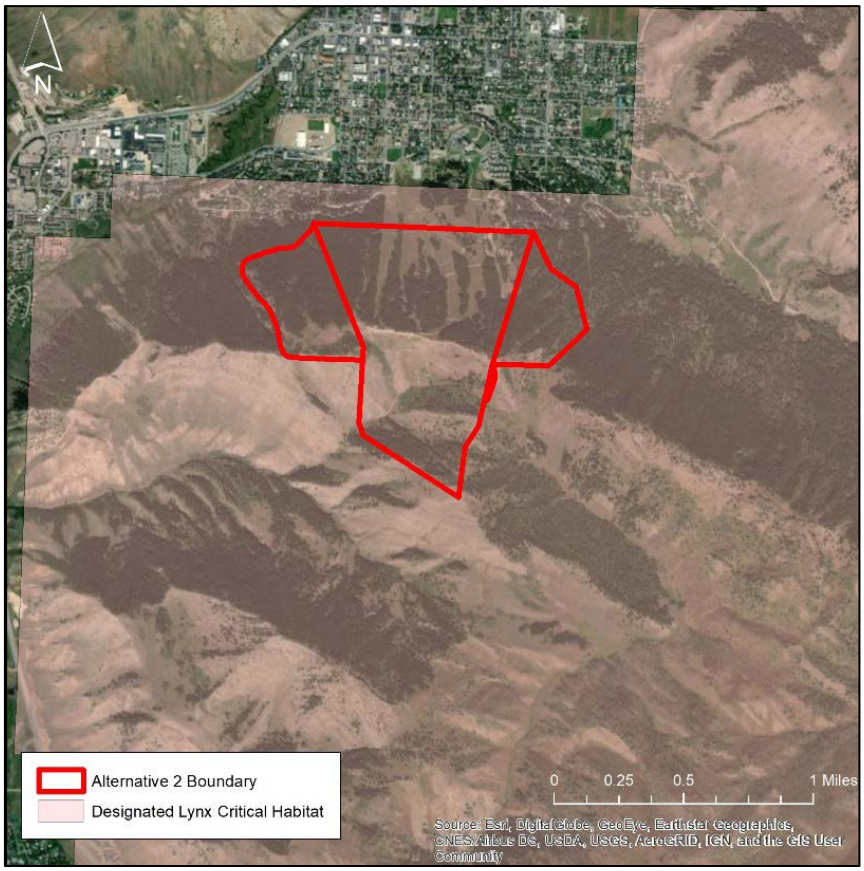

Figure 3-10. Designated lynx critical habitat in relation to the Alternative 2 boundary area.

Habitat Linkage and Movement

Regional habitat connectivity for lynx would not be impacted by Alternative 2 as no barriers to lynx travel would be created, and the project area does not fall within a linkage area. Habitat in the project area is currently highly fragmented as a result of past ski area development and operations. While most of the proposed disturbance under Alternative 2 would be located within the existing ski area boundary, the proposed boundary adjustments would increase the level of fragmentation adjacent to current ski area operations. However, the existing ski area and proposed boundary adjustments would maintain small islands of forested habitat that may facilitate movement through the project area. Given sufficient hiding cover interspersed with openings, lynx have been documented crossing ski trails and roads (Ruediger et al. 2013).

As described in Chapter 2, Alternative 2 would not comply with HU O4 (section 3.6.2.1) because glading between ski runs in the eastern boundary adjustment area (runs 4, 5, and 7) would reduce the habitat quality in those forested islands, potentially impacting connectivity in an expansion of an existing ski area. In order to comply with this objective, a design criterion was added that eliminates glading in the forested areas between runs in the eastern expansion area (section 3.6.5).

Habitat Quality and Effectiveness

Alternative 2 would impact approximately about 122 acres of suitable lynx habitat, representing 25 percent of suitable habitat within the adjusted boundary, and less than 0.1 percent of the suitable lynx habitat within the Flat Creek LAU (Table 3-13). However, islands of forested habitat would remain undisturbed within Snow King, providing potential lynx foraging habitat. Ample security habitat is available outside of the

adjusted permit area boundary to provide refuge for lynx during the daylight hours when peak recreational activity occurs.

Table 3-13. Total acres of lynx habitat disturbance under Alternative 2.

Habitat Type	Acres
Suitable Habitat	122
Critical Habitat	133

Critical Habitat

The adjusted boundary overlaps designated lynx critical habitat (Table 3-13). Approximately 133 acres of critical habitat would be disturbed, representing less than 0.01 percent of the approximately 6 million acres of continuous designated critical habitat in the southwestern Montana and western Wyoming critical habitat area.

Expanded Lighting Area

Snow King currently allows night skiing on the front side of the mountain until 7 pm. Alternative 2 would extend the lighted area on the front side, as well as the ridgetop teaching center on Snow King Mountain. The operating hours would not change. Lynx are generally active at night and have been documented using ski areas when no skiers are present (Ruediger et al. 2000). The increase in lighted areas may increase the area of avoidance before 7 pm, but normal use and activity patterns would likely commence after the lights were turned off and skiers were absent. There would be no night skiing on the back side of the mountain.

On the basis of this analysis, Alternative 2 is consistent with the objectives, standards, and guidelines found in the Northern Rockies Lynx Management Direction. In accordance with the *Canada Lynx Conservation Agreement* between the Forest Service and the Fish and Wildlife Service, suitable lynx habitat on the Bridger-Teton must be considered "occupied." Under this alternative, suitable habitat would be impacted. Therefore, Alternative 2 may impact the Canada lynx but is consistent with the Northern Rockies Lynx Management Direction and its amendment to the Forest Plan.

Grizzly Bear

The project area occurs in occupied grizzly bear range and in biologically suitable habitat identified by the Fish and Wildlife Service. However, the project area is not in the Primary Conservation Area. The potential for conflicts with grizzly bears would be reduced because Bridger-Teton food storage regulations (in effect March 1 to December 1) would be enforced during construction and subsequent recreational use. Human activity generally keeps this species at a safe distance should bears be present during project implementation. Any displacement due to construction would be short-term and would not measurably impact individual fitness. Ungulates that serve as prey and a source of carrion would continue to occur in the project area.

For these reasons, Alternative 2 is anticipated to have no impact on the grizzly bear and therefore is consistent with the Forest Plan goal of contributing to the recovery of the species. This alternative is consistent with the standards for grizzly bear/human management and grizzly bear habitat management in the Forest Plan.

Wolverine

Wolverines may be present in the habitat surrounding the project area as part of a larger home range. Areas with high levels of recreational activity are generally avoided by wolverines (Heinemeyer and Squires 2014), so it is unlikely that Snow King is frequently utilized. Additionally, the elevation of Snow King (7,808 feet at the highest point) is likely too low for wolverines at this latitude.

Wolverines use a variety of habitats for foraging, including openings where ungulates and carrion may be available. Openings do not limit movement or dispersal of wolverines through a landscape. The reduction in forested habitat and increase in openings would not negatively impact wolverines. Based on this analysis, Alternative 2 is anticipated to have no effect on wolverines.

3.6.3.2.2 Forest Service Sensitive Species

Bighorn Sheep

Rock and cliff habitat are available within the eastern permit boundary adjustment area on the north facing slopes. Data from the Wyoming Game and Fish Department Wildlife Observation System (1996–2018) indicates that the area within the adjusted permit boundary is not an important area of use for bighorn sheep.

While local displacement from the area is possible due to disturbance from expanded recreation, there is an abundance of suitable habitat in the surrounding landscape. Given the relatively low level of habitat loss and low levels of bighorn sheep use in the project area, the habitat impacts described may impact individuals but is not likely to result in a measurable impact on bighorn sheep population numbers.

Fisher

Table 3-14 shows the amount of forest disturbance under Alternative 2. This alternative would shift the permit boundary to include forested habitat that may provide foraging, denning, and resting habitat for fishers. Habitat in the permit area is currently highly fragmented as a result of past ski area development and operations. Most of the proposed development is within this highly disturbed area, but the permit boundary adjustments would increase the level of fragmentation adjacent to current ski area operations. The existing permit area and proposed boundary adjustments would maintain small islands of forested habitat that may provide for movement through the project area. However, the reduction in structural diversity, opening of the canopy, and reduction in forest continuity that would result from the proposed activities would reduce habitat suitability for fisher.

Table 3-14. Total acres of forested habitat disturbed under Alternative 2.

	Alternative 2
Total Acres	92

Given fishers' sensitivity to human disturbance, it is likely any fisher in the area would avoid the town and surrounding high-use area and utilize more distant, undisturbed forested habitat. However, this does not preclude the possibility that fisher use could occur in the forested areas that would be removed by Alternative 2. Therefore, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Spotted Bat

Alternative 2 would shift the permit boundary to include additional forested habitat that may provide snags for roosting spotted bats, so tree clearing would reduce the amount of habitat that may be used for roosting. While there are snags at Snow King, many are cut down for skier safety. When compared with the surrounding forest, the snag density at Snow King is very low.

On the other hand, the openings created through proposed clearing and glading would likely increase forage availability. Given the large amount of forested habitat that would remain outside of, but adjacent to, the adjusted permit boundary, spotted bats would likely be able to utilize the surrounding habitat for roosting and the habitat within the permit boundary for foraging. Alternative 2 would not impact any roosting caves.

The increase in lighted night skiing would have minimal impact on spotted bat foraging behavior. While it is not clear whether spotted bats migrate locally, hibernate, or migrate long-distances, in Wyoming the winter conditions are too cold to support bat activity during the ski season (Luce and Keinath 2007), but it

is possible that night skiing could overlap with the spring emergence of spotted bats (late March). This species generally forages during early dawn and dusk, often emerging from the roost just after sunset (Rabe et al. 1998, Rodhouse et al. 2005), overlapping with lighted night skiing hours.

It is unclear whether the potential impact on spotted bats would be positive or negative under this scenario. Bats may be attracted to the increased prey availability near the lighting or may avoid the area due to increased human activity. If bats were displaced from the area due to increased human activity, they are capable of travelling long distances between roosting and foraging sites. Spotted bats have been documented flying from 6 to 40 kilometers to foraging sites from the roosting site (Rabe et al. 1998, Wai-Ping and Fenton 1989), and abundant open foraging habitat is available in the surrounding landscape outside of Snow King.

Based on these considerations, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Townsend's Western Big-eared Bat

Potential effects on this species would be similar to those outlined above for the spotted bat. The increase in lighted night skiing would have a limited impact on Townsend's western big-eared bats as this species arouses from hibernation in late spring depending on weather conditions (Dobkin et al. 1995, Gruver and Keinath 2003). It is possible some lighted night skiing could overlap with early emergence, but this species is generally a late-night flyer (Kunz and Martin 1982). Since Snow King's nighttime skiing does not extend beyond 7 pm, the likelihood of impact is low. Therefore, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Bald Eagle

Alternative 2 would shift the permit boundary to include additional forested areas that may provide roosting habitat for bald eagles. Bald eagles may sporadically enter the project area in search of carrion, but no nesting is expected to occur due to the distance from water that supports fish, the bald eagle's primary prey. Roosting habitat is generic and is not limited in the project area or surrounding area, so the loss of roosting habitat would be negligible. Therefore, Alternative 2 is anticipated to have no impact on bald eagles.

Boreal Owl

While no boreal owls were detected during surveys conducted for this project, some patches of habitat for this species exists in the areas that would be disturbed within the adjusted permit boundary (Table 3-14). The reduction in structural diversity, opening of the canopy, and reduction in forest continuity that would result from the proposed activities would reduce habitat suitability for nesting boreal owls. However, the openings created for these activities would likely increase forage availability. Given the large amount of forested habitat that would remain outside of but adjacent to the permit boundary, boreal owls would likely be able to utilize the surrounding habitat for nesting and the habitat within the permit boundary for foraging.

The substantial amount of nesting habitat elsewhere does not preclude the possibility that an individual could choose to nest within the permit area boundary. It would likely not be impacted since boreal owls are generally not sensitive to disturbance by humans (Hayward and Hayward 1993).

Nevertheless, removal of forest vegetation under Alternative 2 would reduce nesting habitat to a minor degree. As a result, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Flammulated Owl

While no flammulated owls were detected during surveys conducted for this project, some patches of habitat for this species exist in the areas to be disturbed (Table 3-14). Of the 92 acres of forested habitat disturbance, 32 acres would be gladed. Glading would maintain a forested structure, but with limited

understory and structural diversity. Glading may improve foraging opportunities for flammulated owls, which prefer open grass and shrub understories for foraging.

On the other hand, forests in the area include some of the old-growth characteristics preferred by nesting flammulated owls. Some of this habitat falls within the adjusted permit boundary on the east side and would be impacted by activities in this area.

Given this minor impact on potential nesting habitat, offset at least in part by the potential increase in foraging habitat due to glading, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Great Gray Owl

While no great gray owls were detected during surveys conducted for this project, some patches of nesting habitat for this species exist in areas to be disturbed in the boundary adjustment areas (Table 3-14). The reduction in structural diversity, opening of the canopy, and reduction in forest continuity that would result from the proposed activities would reduce habitat suitability for nesting great gray owls. However, the openings created for these activities would likely increase forage availability. Given the large amount of forested habitat that would remain outside of, but adjacent to, the adjusted permit boundary, great gray owls would likely be able to utilize the surrounding habitat for nesting and the habitat within the permit boundary for foraging.

Should a great gray owl choose to locate its nest in an area within the adjusted permit area boundary, it is not likely that summer hiking and biking activities would negatively impact it since the period of high use (June through September) would not coincide with the nesting period (March through May; Duncan and Franklin 1993).

Given the minor loss of potential nesting habitat, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Northern Goshawk

Suitable northern goshawk nesting habitat occurs within and adjacent to the proposed boundary adjustment areas and would be disturbed by proposed development (Table 3-14). The reduction in structural diversity, opening of the canopy, and reduction in forest continuity that would result from the proposed activities would reduce habitat suitability for nesting northern goshawks. However, the openings created for these activities would likely increase forage availability. Given the large amount of forested habitat that would remain outside of, but adjacent to, the proposed permit boundary, northern goshawks would likely be able to utilize the surrounding habitat for nesting and the habitat within the permit boundary for foraging.

Should a northern goshawk choose to locate a nest within the proposed permit area boundary, it is not likely that summer hiking and biking activities would negatively impact this species because they are not usually affected by short-duration disturbance near nests. While goshawks may produce alarm calls and even attempt to drive off intruders, sporadic activities generally do not produce nest desertion or failure (Squires and Reynolds 1997).

Two known alternative nest sites are located within the proposed boundary area (Figure 3-11). The alternate site overlapped by proposed grading would be removed, while the nest overlapped by proposed glading activities may or may not be removed. It is possible that this nest would be abandoned and no longer used by the nesting pair even if the nest tree were not removed. However, goshawks construct multiple alternate nests, and the loss of one alternate nest does not eliminate the possibility of a goshawk nesting in the area (Mahon and Doyle 2005).

The active nest identified in 2019 is located outside of the eastern boundary adjustment area (Figure 3-11). The 30-acre buffer zone around the active nest (Forest Service 2017) would slightly overlap the eastern expansion area under Alternative 2 (Figure 3-11). However, there would be no proposed disturbance or adverse management activities within this overlap area.

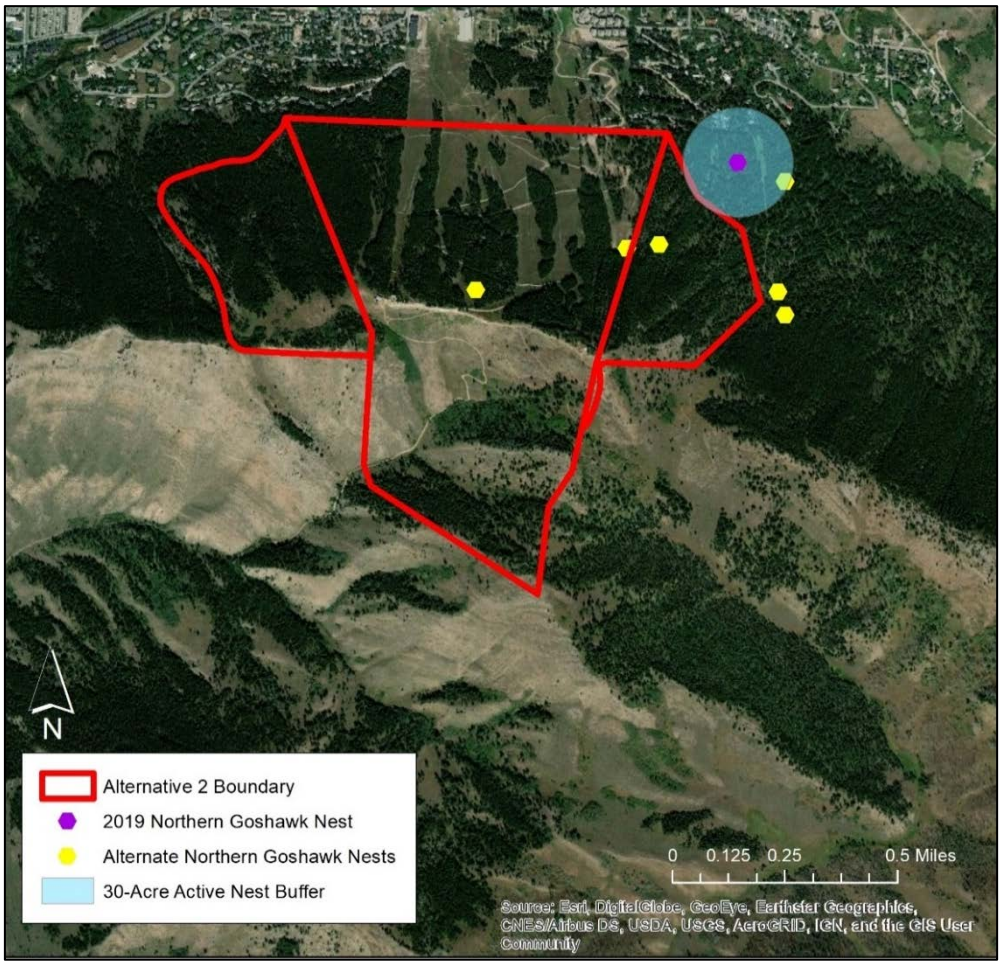

Figure 3-11. Active and alternative northern goshawk nests in relation to the Alternative 2 boundary area.

A bike trail proposed under Alternative 2 would cross near two known alternative nests. The exact alignment of the trail would not be determined until final design prior to construction. To avoid destruction of a nest tree, a design criterion is in place requiring a survey to ensure that no trees supporting goshawk nests are removed (section 3.6.5).

Two of the four conservation goals outlined in the existing conditions section would be met. Goal 1 and Goal 3 would be met by maintaining suitable nesting, post-fledgling and foraging habitat around the active and alternative goshawks nests. While habitat modifications within the permit boundary area may reduce potential nesting habitat, forested areas outside of the permit boundary would remain suitable for nesting, and habitat within the boundary area would remain suitable for foraging and fledgling northern goshawks.

Goal 2 and Goal 4 would not likely be met, as elements proposed in Alternative 2 would likely disturb the core nesting area of two alternative nests. Given the importance of quality nesting habitat for nest success, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Peregrine Falcon

Alternative 2 would not impact any cliff or rocky terrain that may act as nesting habitat for peregrine falcons. Open foraging habitat would increase due to the reduction in forested habitat in the proposed permit

boundary area. Given the limited potential for impacts on peregrine falcon habitat, Alternative 2 is anticipated to have no impact on this species.

Three-toed Woodpecker

A few snags that could potentially be used by three-toed woodpeckers may be removed under Alternative 2. Such snag removals would typically occur in areas cleared for ski run development. Snags are already periodically removed throughout the resort for skier safety. Given the already low density of snags, the general absence of three-toed woodpeckers in the project area, and large amount of suitable habitat in areas adjacent to the project area, Alternative 2 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

3.6.3.2.3 Migratory Birds

Most of the migratory birds listed in Table 3-12 use habitats that are common at Snow King and in the surrounding areas. Forest nesters would be impacted by Alternative 2 through habitat loss; however, design criteria required for this project would prevent tree cutting and other potential disturbance during the nesting season unless surveys of affected habitat identified no nesting activity prior to construction. This would eliminate direct impacts on nesting (section 3.6.5). The impacts on these species from habitat loss would not be substantial given the large amount of alternative habitat available at Snow King and on adjacent lands, and the relatively small amount of habitat lost.

Species such as Lewis's woodpecker, Williamson's sapsucker, willow flycatcher, and black rosy-finch use habitats that are less common at Snow King and in the surrounding areas. Both Lewis's woodpeckers and Williamson's sapsuckers use snag habitats similar to those of the three-toed woodpecker, discussed above. Impacts on these two species would be similar to those discussed for three-toed woodpeckers.

3.6.3.2.4 Specialized Habitat

Elk

Winter Range

The first thing to note in assessing potential impacts on elk winter range is that the project area does not support much winter elk use. Elk collar data from Wyoming Game and Fish Department (WGFD 2019b) indicates that elk use of the project area is low compared to the surrounding landscape (Figure 3-12), suggesting that the potential for the proposed recreational development and use to cause notable impacts is correspondingly low. That conclusion puts the following discussion of habitat-based effects in proper perspective.

Alternative 2 would overlap and directly affect crucial winter range for elk on the front side of Snow King, in the eastern boundary adjustment area (Table 3-15; Figure 3-13). Within this area of crucial winter range, Alternative 2 proposes glading, grading, excavation, and clearing. These activities would reduce the forested cover in the area, potentially reducing the value of thermal cover and security for elk. As this area is in close proximity to residences in Jackson and experiences little elk use, no notable direct impact is anticipated.

Table 3-15. Total acres of winter and crucial winter range that overlap the existing permit boundary and the boundary proposed under Alternative 2.

Range Type	Existing	Alternative 2
Winter Range	0	0
Crucial Winter Range	32	81

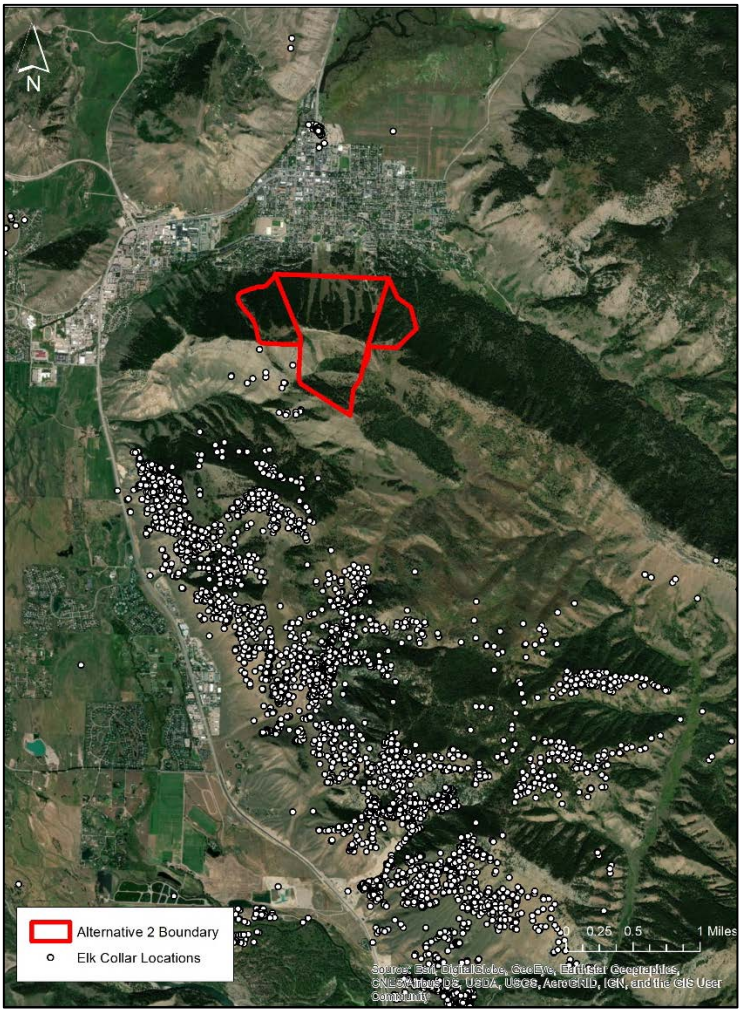

Figure 3-12. Elk use near Snow King, January through June, 2019 (WGFD 2019b). Points indicate recorded locations of radio-collared elk.

The viewshed analysis conducted to identify what areas elk may be displaced from under Alternative 2 (section 3.6.2.4) indicated that the zone of influence, the area where elk would likely be displaced as a result of seeing human activity, would overlap approximately 417 acres of crucial winter range and 141 acres of winter range (Figure 3-14). A large portion of the overlap area occurs to the northeast, within the Town of Jackson. Any avoidance of these areas would be due to disturbance within the town and not due to human activity at the ski area.

The crucial winter range overlapping the zone of visual influence associated with proposed back-side development is located over 1 kilometer away from the ski area permit boundary. While it is possible that elk may re-treat from some of this crucial winter range, the long distance from the disturbance may allow elk to habituate to the disturbance and utilize the area at current levels (Figure 3-12).

Elk collar data from Wyoming Game and Fish Department (2019b) indicates that winter elk use of the ski area permit area and its zone of visual influence is low (Figure 3-15). However, elk use of the south-facing slopes west of the ski area has been reported by several observers. As shown in Figure 3-15, these areas are shielded from view of the ski area by intervening topography and are thus outside the zone of visual influence.

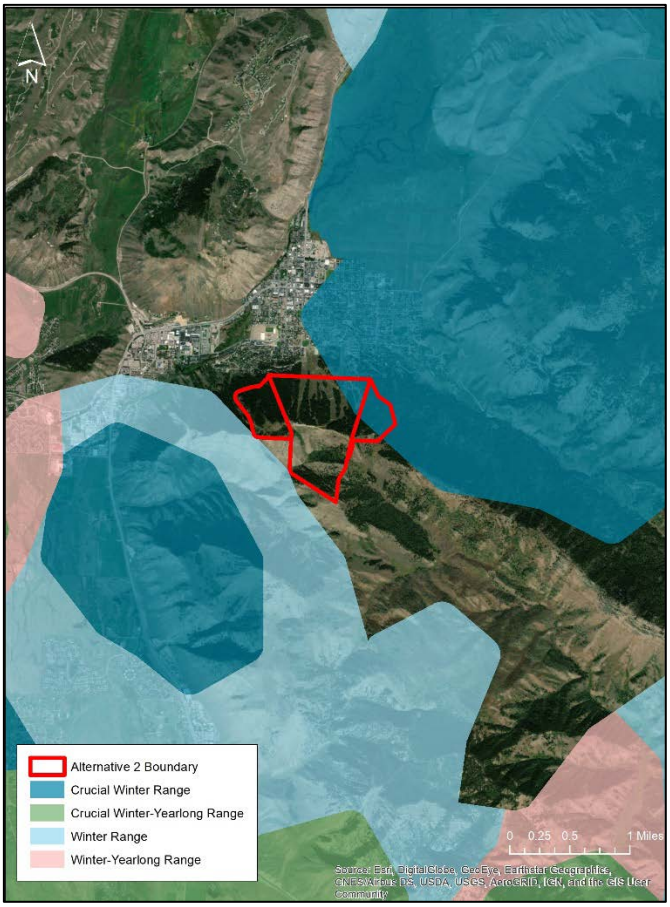

Figure 3-13. Winter ranges for elk in relation to the permit boundary adjustment under Alternative 2 (habitat mapping WGFD 2019a).

To minimize the potential to impact any elk that did use habitat adjacent to the proposed back-side development in winter, active skiing hours on the back side would be limited to 9 am – 4 pm. The later start would allow any elk in the area to move to suitable security or foraging areas out of the zone of influence. Terminating skiing at 4 pm would promote elk use of slopes within the zone of the influence during hours of darkness.

Based on this analysis, while localized displacement of elk in and around the project area is possible due to disturbance from expanded recreation, there is an abundance of suitable habitat in the surrounding landscape that could provide foraging, thermal cover, and security habitat for the animals affected. Given the relatively low level of habitat loss, the low levels of elk use in both the proposed ski area boundary and the zone of visual influence, and the suggested design criteria (section 3.6.5), the impacts described above may impact individuals but are not likely to result in a measurable impact on elk population numbers.

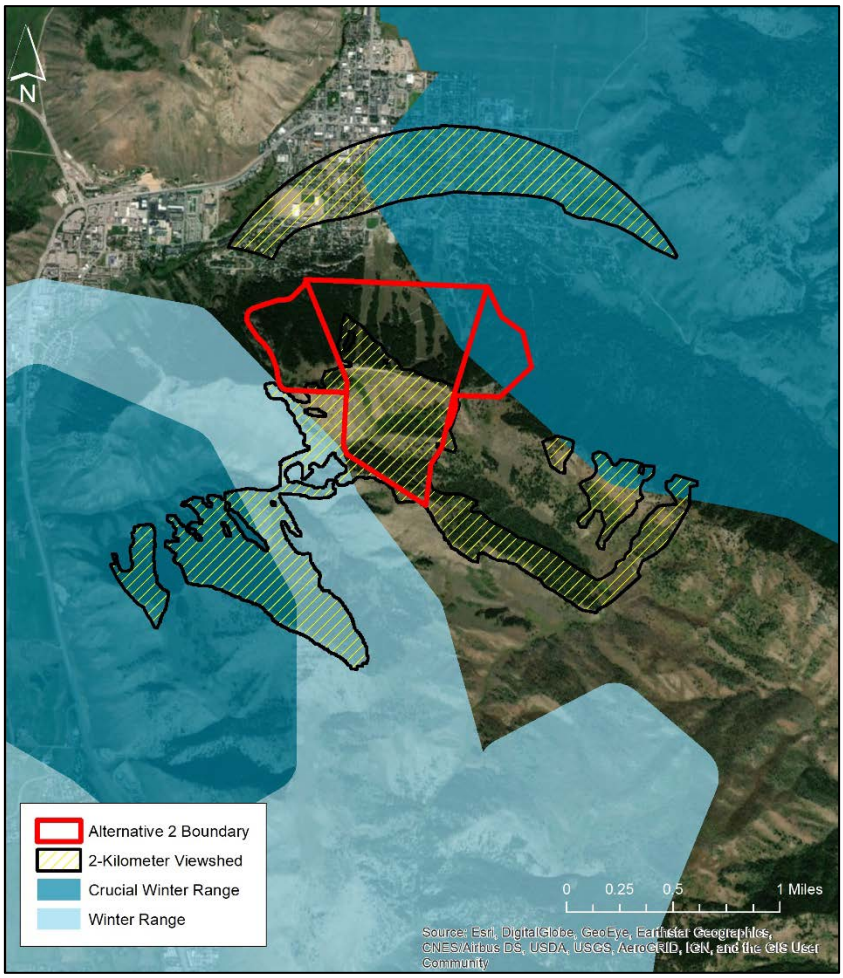

Figure 3-14. Viewshed analysis with winter range for elk in relation to the ski area boundary adjustment under Alternative 2 (habitat mapping WGFD 2019a).

Parturition Areas

While there is no designated elk parturition habitat located near the proposed permit boundary (Figure 3-8), anecdotal accounts and personal experience suggest that there may be some calving habitat in Leeks Canyon. Some of this calving habitat in upper Leeks Canyon, Wilson Canyon, and Game Creek would be impacted by construction and operation of the mountain bike zone and Lift A. The proposed biking plan under Alternative 2 allows lift-served bikers to use the existing cross-country trail system, possibly disturbing potential elk parturition habitat in Leeks Canyon, and in Wilson Canyon and Game Creek beyond the permit boundary, likely reducing elk calf survival. To address these concerns, a design criterion was added to prohibit bikers using the lift from traveling down Leeks Canyon road beyond the permit boundary, or using upper Skyline trail until July 1, reducing the potential for disturbance of elk calving that may be occurring outside the permit area. Skyline trail is already closed to biking until July 1 to protect calving habitat east of the ski area. Any parturition occurring within the ski area boundary could be impacted, but impacts would be small in the context of the amount of parturition habitat available to the Fall Creek or Jackson elk herds.

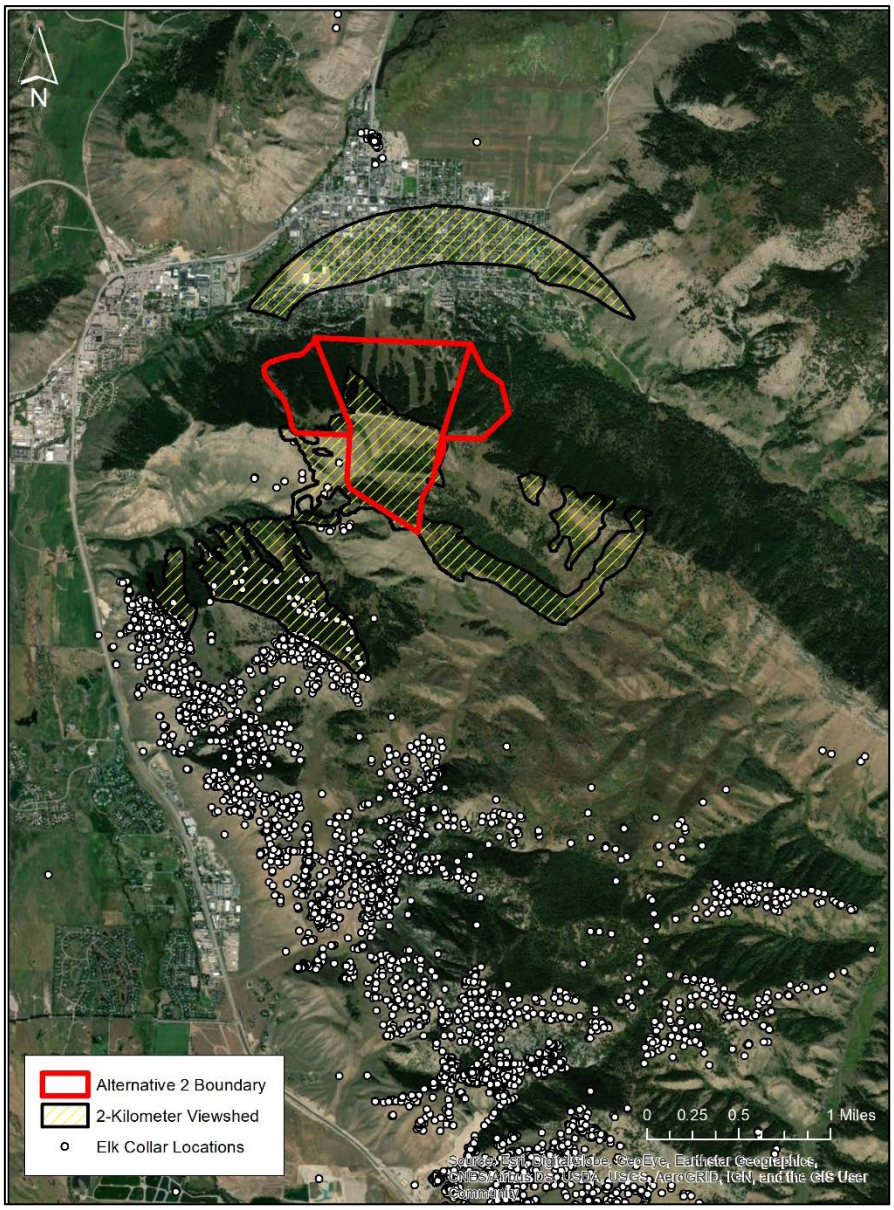

Figure 3-15. Elk use near Snow King, January through June, 2019 (WGFD 2019b), in relation to the viewshed analysis.

Mule Deer

The first thing to note in assessing potential impacts on mule deer winter range is that the project area does not support much mule deer use. Information from the Teton Science School (2013) indicates that mule deer use of the project area is low compared to the surrounding landscape (Figure 3-16), suggesting that the potential for the proposed recreational development and use to cause notable impacts is correspondingly low. That conclusion puts the following discussion of habitat-based effects in proper perspective.

The Alternative 2 boundary adjustment areas and back-side development would not overlap with any winter or crucial range (Figure 3-17).

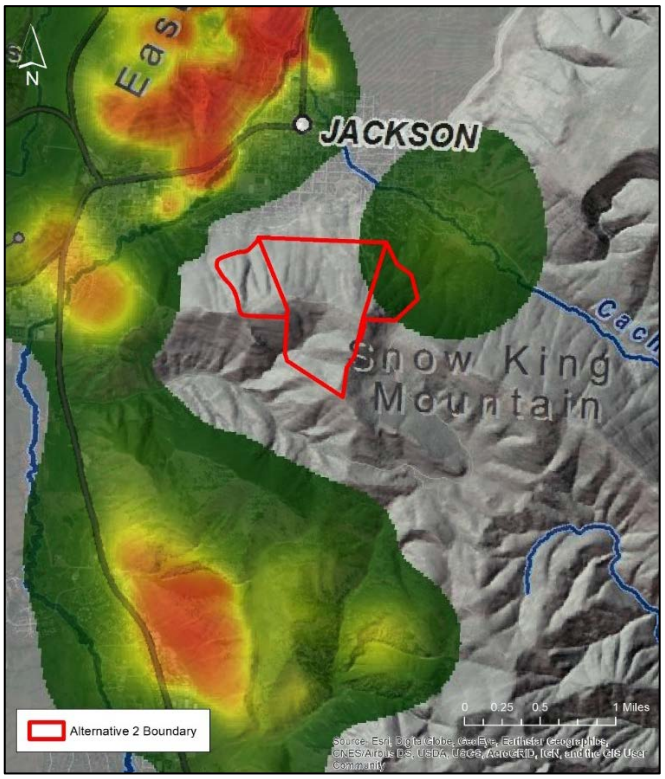

Figure 3-16. Winter usage by mule deer indicating high areas of use in red and lower areas of use in green (Teton Science School 2013) in relation to the proposed boundary under Alternative 2.

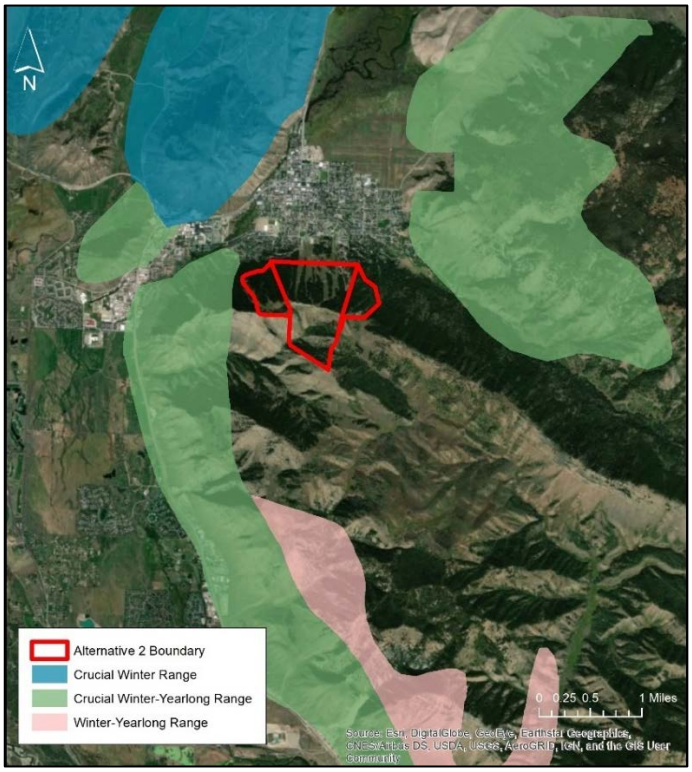

Figure 3-17. Winter range for mule deer in relation to the permit boundary adjustment under Alternative 2 (habitat mapping WGFD 2019a).

The viewshed analysis conducted to identify the areas that mule deer may be displaced from under Alternative 2 (section 3.6.2.4) indicated that the zone of influence, the area where mule deer would be displaced as a result of seeing human activity, would overlap with approximately 118 acres of crucial winter-yearlong range (Figure 3-18). A portion of the overlap occurs to the northeast, within the Town of Jackson. Any avoidance of this area would be due to disturbance within the town and not due to human activity at the ski area.

The crucial winter-yearlong range overlapping the zone of visual influence associated with proposed back-side development is located over 1 kilometer away from the ski area permit boundary. While it is possible that mule deer may re-treat from some of this crucial winter-yearlong range, the long distance from the disturbance may allow mule deer to habituate to the disturbance and utilize the area at current levels (Figure 3-16).

Data from the Teton Science School (2013) indicates that mule deer use of the area of overlap between the ski area permit boundary and its zone of influence visual influence is low (Figure 3-19). However, mule deer use of the south-facing slopes west of the ski area has been reported by several observers. As shown in Figure 3-19, these areas are shielded from view of the ski area by intervening topography and are thus outside the zone of visual influence.

To minimize the potential to impact any mule deer that did use habitat adjacent to the proposed back-side development in winter, active skiing hours on the back side would be limited to 9 am – 4 pm. The later start would allow any mule deer in the area to move to suitable security or foraging areas out of zone of influence. Terminating skiing at 4 pm would promote mule deer use of slopes within the zone of the influence during hours of darkness.

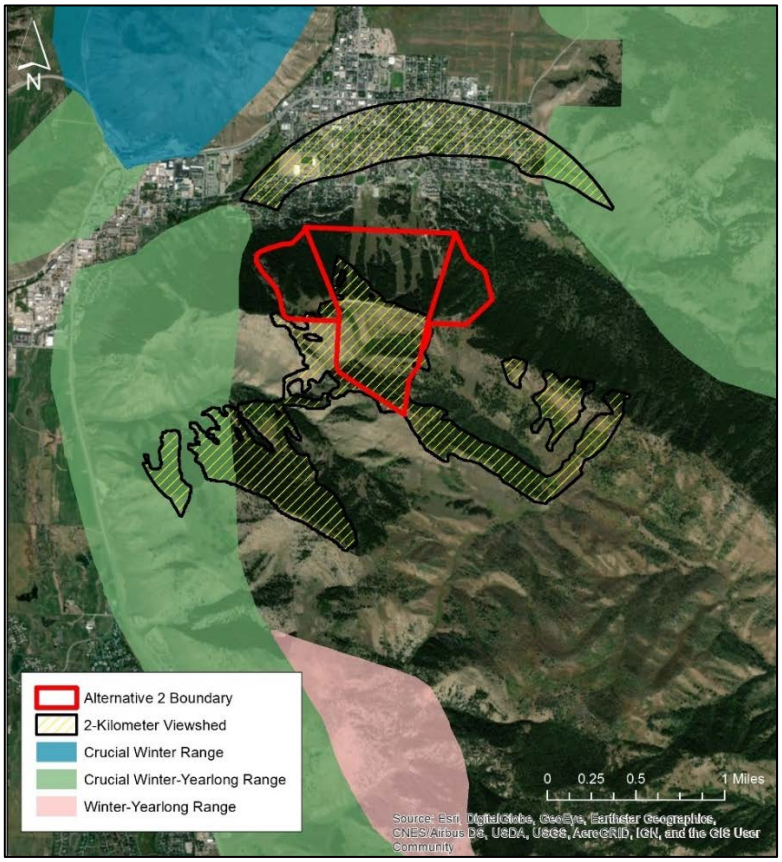

Figure 3-18. Viewshed analysis with seasonal ranges for mule deer in relation to the permit boundary adjustment under Alternative 2 (habitat mapping WGFD 2019a).

Based on this analysis, while localized displacement of mule deer in and around the project area is possible due to disturbance from expanded recreation, there is an abundance of suitable habitat in the surrounding landscape that could provide foraging, thermal cover, and security habitat. Given the relatively low level of habitat loss, the low level of mule deer use in both the ski area permit boundary and its zone of visual influence, and the suggested design criteria (section 3.6.5), the impacts described above may impact individuals but are not likely to result in a measurable impact on mule deer population numbers.

3.6.3.3 Alternative 3

In order to provide a clear contrast between Alternative 3 and Alternative 2, the following discussion focuses on how the impacts of Alternative 3 would differ from Alternative 2, described above.

3.6.3.3.1 Threatened and Endangered Species

Impacts grizzly bear and wolverines would be the same as under Alternative 2.

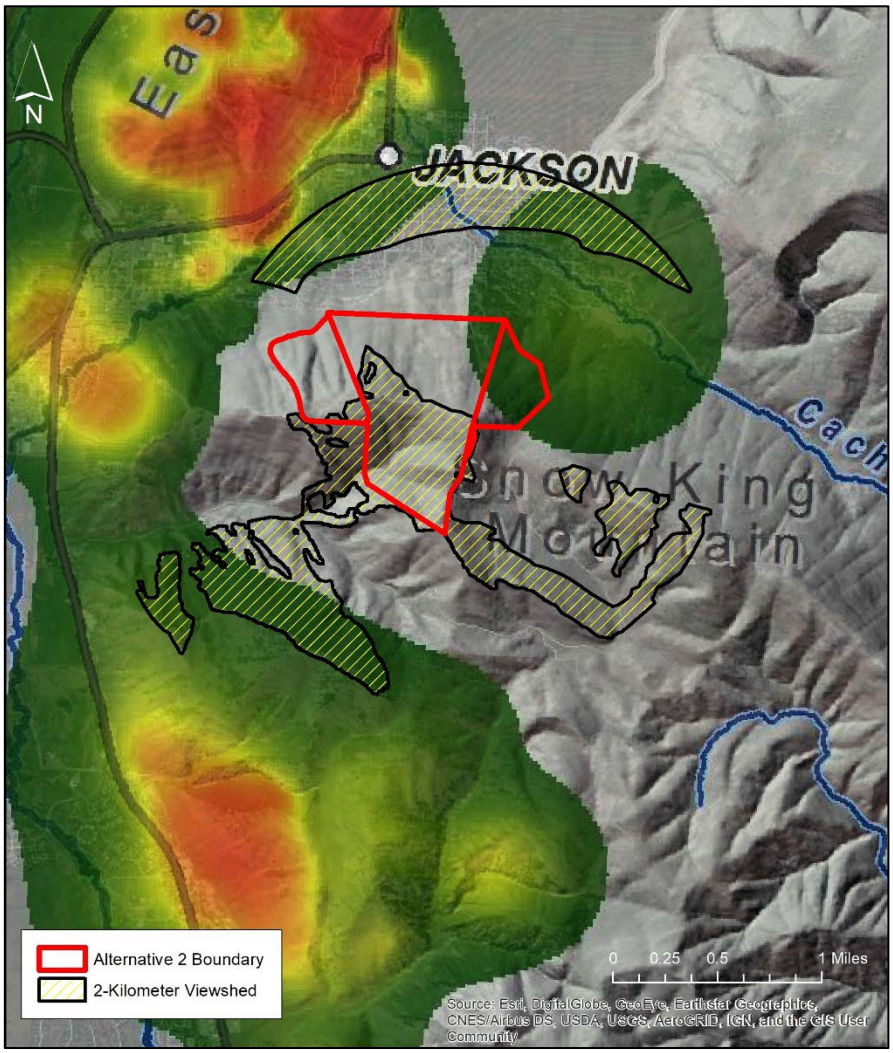

Figure 3-19. Winter usage by mule deer indicating areas of high use in red and areas of lower use in green (Teton Science School 2013) in relation to the viewshed analysis.

Canada Lynx

There would be an increase in disturbance of suitable lynx habitat and critical lynx habitat (Table 3-16). The increase is mostly attributed to an additional 154.2 acres of forest thinning. The thinning included in this alternative is a vegetation treatment but is exempt from the Northern Rockies Lynx Management Direction vegetation standards because it is within a wildland/urban interface zone as defined by the *Teton County Wildfire Protection Plan* (Teton Area Wildfire Protection Coalition 2014). The proposed thinning includes the islands of forested habitat within the existing boundary area that may provide lynx foraging opportunities. Thinning these stands would reduce such opportunities compared to Alternative 2.

Table 3-16. Total acres of lynx habitat disturbance under Alternative 2 and Alternative 3.

Habitat Type	Alternative 2	Alternative 3
Suitable Habitat	122	288
Critical Habitat	133	285

The total acreage differs by approximately 1 acre between the first and second options for the bottom terminal of the zip line proposed under Alternative 3. That negligible difference will not be discussed further in this wildlife analysis.

Similar to Alternative 2, Alternative 3 would not be compliant with HU O4 (section 3.6.2.1). Design criterion was added to address this concern (section 3.6.5), which restricts glading between ski runs in the eastern boundary adjustment area.

The increase in habitat disturbance acreage would not change the effect determination for lynx. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 3 is consistent with the objectives, standards, and guidelines found in the *Northern Rockies Lynx Management Direction*. In accordance with the *Canada Lynx Conservation Agreement* between the Forest Service and the Fish and Wildlife Service, suitable lynx habitat on the Bridger-Teton must be considered "occupied." Under this alternative, suitable habitat would be impacted. Therefore, Alternative 3 may impact the Canada lynx but is consistent with the *Northern Rockies Lynx Management Direction* and its amendment to the Forest Plan.

3.6.3.3.2 Forest Service Sensitive Species

Impacts on bighorn sheep, spotted bat, Townsend's western big-eared bat, bald eagle, peregrine falcon, and three-toed woodpecker would be the same as under Alternative 2 (section 3.6.3.2).

Fisher

Compared to Alternative 2, there would be an increase in the total acreage of forested habitat disturbed under Alternative 3 (Table 3-17).

Table 3-17. Total acres of forested habitat disturbed under Alternative 2 and Alternative 3.

	Alternative 2	Alternative 3
Total Acres	92	229

The increase in disturbance is mostly attributed to an additional 154.2 acres of forest thinning. The additional impacts in the thinning area would be reduced canopy cover as well as increased human activity. This would reduce habitat suitability for fishers compared to Alternative 2.

This reduction in habitat suitability would not change the effect determination for the fisher. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 3 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Boreal, Flammulated, and Great Gray Owl and Northern Goshawk

Compared to Alternative 2, there would be an increase in the total acreage of forested habitat disturbed under Alternative 3 (Table 3-17). The increase in disturbance is mostly attributed to an additional 154.2 acres of forest thinning. The reduced canopy cover from forest thinning would reduce the amount of nesting habitat for these raptors compared to Alternative 2.

The decrease in nesting habitat would not change the effect determination for these raptors. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 3 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

3.6.3.3.3 Specialized Habitat

Elk

Winter Range

Under this alternative the southern boundary of the western boundary adjustment area would be shifted about 100 feet north to the actual ridgeline. This would provide additional visual screening for any elk using the south-facing slope west of the back-side ski area expansion.

This change would be positive but would not change the impact determination for elk. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 3 may impact individuals but is not likely to result in a measurable impact on elk population numbers.

Parturition Areas

Under this alternative, lift-served bikers would not be allowed to leave the dedicated downhill mountain bike system, as stipulated in section 2.5.4.2. Therefore, there would be no impacts on any potential parturition in the area of the Fall Creek or Jackson elk herds.

Mule Deer

The boundary shift described above would provide the same minor benefit to mule deer as to elk. This would not change the effect determination for mule deer. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 3 may impact individuals but is not likely to result in a measurable impact on mule deer population numbers.

3.6.3.4 Alternative 4

In order to provide a clear contrast between Alternative 4 and Alternatives 2 and 3, the following discussion focuses on how the impacts of Alternative 4 would differ from those alternatives, as described above.

3.6.3.4.1 Threatened and Endangered Species

Canada Lynx

There would be an increase in disturbance of both suitable and critical lynx habitat compared to Alternative 2 (Table 3-18). The differences between Alternative 4 and Alternative 3 would be negligible and will not be discussed further.

The increase in disturbance of both suitable and critical habitat relative to Alternative 2 is mostly attributed to an additional 147.8 acres of forest thinning. The proposed thinning includes the islands of forested habitat within the existing boundary area that may provide lynx foraging opportunities. Thinning these stands may reduce the foraging opportunities for lynx within the permit boundary area compared to Alternative 2;

however, as described under Alternative 3, thinning projects in the WUI are exempt from *Northern Rockies Lynx Management Direction* standards and are therefore in compliance with said standards.

Table 3-18. Total acres of disturbance to lynx habitat under Alternative 2, Alternative 3, and Alternative 4.

Habitat Type	Alternative 2	Alternative 3	Alternative 4
Suitable Habitat	122	261	263
Critical Habitat	133	285	289

Similar to Alternatives 2 and 3, Alternative 4 would not be compliant with HU O4 (section 3.6.2.1). Design criterion was added to address this concern (section 3.6.5), which restricts glading between ski runs in the eastern boundary adjustment area.

The increase in habitat disturbance acreage would not change the effect determination for lynx. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 4 is consistent with the objectives, standards, and guidelines found in the *Northern Rockies Lynx Management Direction*. In accordance with the *Canada Lynx Conservation Agreement* between the Forest Service and the Fish and Wildlife Service, mapped lynx habitat on the Bridger-Teton must be considered "occupied." Under this alternative, suitable habitat would be impacted. Therefore, Alternative 4 may impact the Canada lynx but is consistent with the *Northern Rockies Lynx Management Direction* and its amendment to the Forest Plan.

3.6.3.4.2 Forest Service Sensitive Species

Fisher

Alternative 4 would impact the highest total acreage of forested habitat compared to Alternatives 2 and 3 (Table 3-19). The differences between Alternative 4 and Alternative 3 would be negligible and will not be discussed further.

Table 3-19. Total acres of forested habitat disturbed for each alternative.

	Alternative 2	Alternative 3	Alternative 4
Total Acres	92	229	232

The increase in disturbance from Alternative 2 to Alternative 4 is mostly attributed to an additional 147.8 acres of forest thinning, which would result in decreased structural diversity, increased opening of the canopy, and reduced forest continuity (due to runs 1, 2, and 15).

These impacts would not change the effect determination for the fisher due to the large amount of habitat available and the relatively low amount of habitat impacted. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 4 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Boreal, Flammulated, and Great Gray Owls

Alternative 4 would impact the highest total acreage of forested habitat compared to Alternative 2 and Alternative 3 (Table 3-19). The increase in disturbance from Alternative 2 to Alternative 4 is mostly attributed to an additional 147.8 acres of forest thinning. The reduced canopy cover from forest thinning would reduce the amount of nesting habitat for these owls compared to Alternative 2.

The decrease in nesting habitat would not change the effect determination for these owls. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 4 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

Northern Goshawk

Alternative 4 would impact the highest total acreage of forested habitat compared to Alternative 2 and Alternative 3 (Table 3-19). The increase in disturbance from Alternative 2 to Alternative 4 is mostly attributed to an additional 147.8 acres of forest thinning. The reduced canopy cover from forest thinning would reduce the amount of nesting habitat for goshawks compared to Alternative 2. However, in contrast to Alternative 3, Alternative 4 proposes glading of runs 4, 5, and 7 instead of clearing. This would provide better goshawk post-fledgling habitat around known nests and alternate nests compared to Alternative 3.

Neither the decrease in nesting habitat, the increase in post-fledgling habitat, nor the protective measure for nest trees would change the effect determination for these raptors. For the same reasons discussed under Alternative 2 (section 3.6.3.2), Alternative 4 may impact individuals but is not likely to cause a trend toward federal listing or loss of viability.

3.6.3.4.3 Specialized Habitat

Winter Range

Impacts on elk and mule deer winter habitat would be the same under Alternative 4 as under Alternative 3 (section 3.6.3.3).

Parturition Areas

All mountain biking trails in Alternative 4 would be located on the front side of the mountain, and there would be no mountain biking zone on the back side. Therefore, there would be no potential for disturbance of elk parturition habitat.

3.6.4 Cumulative Effects

The cumulative effects section addresses those species discussed above that had potential direct or indirect effects from elements proposed in Alternatives 2–4. The size of the cumulative effects area for each species is dependent upon its typical home range size. Due to the long distances travelled by both bat species between their roosting and foraging sites, the analysis area includes the entire Bridger-Teton National Forest. The analysis area for Canada lynx was expanded to include the Lynx Analysis Unit.

As discussed in section 3.3, the cumulative actions considered in this analysis are any projects listed in the Bridger-Teton Schedule of Proposed Actions that would have temporally and spatially overlapping impact on the same resources affected directly or indirectly by these alternatives. Impacts were determined based on our professional judgement regarding the interaction between the proposed alternatives and the cumulative actions. Table 3-20 identifies these projects and summarizes their cumulative effects on wildlife.

Table 3-20. Cumulative effects on wildlife species affected by Alternatives 2–4.	
Cumulative Action	**Cumulative Effects**
Canada lynx (Analysis area: Flat Creek LAU)	
Invasive Plant Management	These projects would not impact denning or foraging habitat, the sensitive portion of Canada lynx habitat. As a result, there is no potential for cumulative effects.
Wyoming Game and Fish Department Game Creek Ditch Permit	
Snow King Lower Elk Lighting	
Fisher (Analysis Area: Individual home range defined as 2 mi. from permit area)	
Invasive Plant Management	These projects would not impact denning, resting, or foraging habitat, the sensitive portion of fisher habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	
Spotted bat and Townsend's Western Big-eared Bat (Analysis area: Bridger-Teton National Forest)	
All projects listed in Table 3-5.	These projects would not impact cliff areas, mines, or caves, the sensitive portion of bat habitat. As a result, there is no potential for cumulative effects.
Boreal owl (Analysis area: Individual home range defined as 1.5 mi. from permit area)	
Invasive Plant Management	These projects would not impact nesting or foraging habitat, the sensitive portion of boreal owl habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	
Flammulated Owl (Analysis Area: Individual home range defined as 0.25 mi. from permit area)	
Invasive Plant Management	These projects would not impact nesting or foraging habitat, the sensitive portion of flammulated owl habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	
Great gray owl (Analysis area: Individual home range defined as 2.75 mi. from permit area)	
Invasive Plant Management	These projects would not impact nesting or foraging habitat, the sensitive portion of great gray owl habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	
Northern goshawk (Analysis area: Individual home range defined as 2 mi. from permit area)	
Invasive Plant Management	These projects would not impact nesting, foraging, or post-fledgling areas, the sensitive portion of northern goshawk habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	
Three-toed woodpecker (Analysis area: Individual home range defined as 0.25 mi. from permit)	
Invasive Plant Management	These projects would not impact nesting or foraging habitat, the sensitive portion of three-toed woodpecker habitat. As a result, there is no potential for cumulative effects.
Snow King Lower Elk Lighting	

3.6.5 DESIGN CRITERIA

1. Do not clear, cut, burn, drive on, or park equipment on vegetation that may harbor nesting birds during the breeding season (May 15–July 15). If this is not possible, survey for nesting birds no more than 10 days prior to beginning work. If no nests are found, project activities may proceed. If nests are found, notify the Forest Service permit administrator.
2. Construct mountain biking trails in a way that does not require the removal of any northern goshawk nest trees.
3. Limit the active skiing hours for Leeks Canyon to 9 am–4 pm.
4. Prohibit bikers using the lift from traveling down Leeks Canyon beyond the permit boundary or on the Upper Skyline trail until July 1 to protect potential elk parturition areas.
5. Do not glade the islands of forested habitat between runs 4, 5, and 7 in the eastern boundary adjustment area.

3.7 CULTURAL

3.7.1 SCOPE OF ANALYSIS

3.7.1.1 Historic Landscape

- *How would construction and use of the proposed infrastructure affect Snow King's historic landscape?*

Snow King is one of the oldest ski areas in the US, with its roots in the 1920s when Jackson residents climbed the "town hill" under their own power. The first lift, a rope tow, was constructed in 1939. While most historic infrastructure has been demolished or upgraded, some evidence of the ski area's history remains. In 2014, part of the ski area was recommended as eligible for listing on the National Register of Historic Places as a historic landscape. The Wyoming State Historic Preservation Office concurred with that determination, but the site has not been formally nominated for listing. Construction of the proposed infrastructure could affect the historic resources on which this recommendation was based.

Indicator: Assessment of potential impacts on the resources supporting the eligibility recommendation. Consultation under Section 106 of the National Historic Preservation Act is an ongoing, parallel process.

3.7.1.2 Native American Concerns

- *How would construction and use of the proposed infrastructure affect Traditional Cultural Places or other Native American tribal resources?*

The Jackson Hole area has been used for various purposes by Native Americans for millennia. Tribes who frequented the area include the Crow, Eastern Shoshone, Gros Ventre and Assiniboine, Northern Arapaho, and Shoshone-Bannock. Construction and use of new facilities at Snow King could impact resources or uses important to area tribal groups.

Indicator: Government-to-government consultation with tribal groups with interest in area resources, in accordance with Executive Order 13175.

3.7.2 AFFECTED ENVIRONMENT

3.7.2.1 Historic Landscape

Since the 1920s, the Snow King ski area has played an important role in recreation, commerce and community development in Wyoming and Jackson Hole. As Wyoming's first ski area, Snow King paved the way for similar winter resorts on Forest Service land across the state. Within Jackson Hole, the

development of Snow King fostered a community culture built around the enjoyment and skill of winter sports, which eventually made Jackson Hole an international ski destination. Snow King first established Jackson's reputation as a ski town.

Extensive documentation of the ski area has been conducted and includes a full historical context and analysis of the historic integrity and National Register eligibility of the resort (Humstone 2012, Davis 2014). In 2018, a third study was conducted to assess the historic landscape and contributing properties associated with the current improvement plans to the ski mountain and its associated facilities (Sladek 2019). The following summary is drawn from those studies.

3.7.2.1.1 Early History

Skiing has been part of Jackson Hole culture for more than 100 years. Historic photographs and local histories show that by the early 1900s skiing was established as a means of getting around the valley during the long winter months, and a necessity for carrying the mail. As transportation improved, skiing changed from a necessity to winter recreation. The mountain now known as Snow King offered an ideal location for skiing. It was conveniently located, and its lower slopes were sparsely forested due to a forest fire in 1879, making skiing down viable – if not exactly easy. Starting in the 1920s, skiers began hiking up the mountain – sometimes called Kelly's Hill or simply "the town hill" – and enjoying the steep downhill run. Around this same time, ski jumping became a popular sport on the hill. Mike O'Neil, who moved to Jackson during the winter of 1925-1926 with the Forest Service, built one of the first ski jumps on Snow King.

In 1936, the Civilian Conservation Corps (CCC) constructed a horse and hiking trail to the top of Snow King for the Forest Service, thus making the first of many physical changes to the hill to facilitate its use for recreation. The CCC trail became the first "official" ski run on the mountain. The following year, mountaineer and skier Fred Brown helped to form the Jackson Hole Ski Association which launched a national campaign to promote skiing in Jackson Hole. The ski club was responsible for changing the name of the hill to Snow King in the 1930s.

Neil Rafferty, who came to Jackson in 1930, was instrumental in developing and running the ski area at Snow King for 35 years, earning the moniker "Father of Snow King." In 1939 he won a contract with the Jackson Hole Club, an early chamber of commerce, to build an "uphill" facility on Snow King. He secured a permit from the Forest Service to run the lift to Old Man's Flats, and a new ski era in Jackson began. The lift increased popularity of the mountain which included regular races and other events sponsored ty the Jackson Hole Ski Club. By 1945 Rafferty had added two rope tows and was operating the ski area Wednesday and Thursday afternoons, and weekends from 11 am to 6 PM. Lights were added that allowed for night skiing.

Snow King was one of the first ski areas to be permitted on Forest Service land, and its success laid the foundation for later development of other Forest Service ski areas. The 1939 Teton National Forest "Recreation Master Plan" makes a brief mention of skiing and other winter sports, identifying the "Jackson Winter Sports area" (Snow King) as "easily accessible to school children and local residents."

In 1946 the Jackson Hole Winter Sports Association was formed with its immediate purpose being to take advantage of the post-war boom in the ski industry. With the support of local investors, the association was able to purchase an old tramway which had been used in a gold mining operation near Salida, Colorado, and hired a Denver contractor to construct a lift from it. The lift was installed in 1946–1947 and was an instant sensation; in its first full year of operation (1948–1949), more than 8,500 people rode the lift to the top of the mountain.

The 3,800-foot-long lift rose 1,400 feet through a narrow cut in the trees to the summit of Snow King, and serviced runs such as Belly Roll and Elk Run. Both of these runs still exist today, although somewhat wider than they were 60 years ago. The run called Exhibition today was a winding trail through the trees known as Screwy Schuss; today's Cougar was called The Funnel. There were also two rope tows of 1,000 and 600

feet, respectively, which serviced open slopes, and two jumps. Warming lodges were available at both the top and bottom of the ski area, with a snack shop at the top.

When the lift opened, the upper part of the mountain was quite heavily wooded. Throughout the 1940s and 1950s improvements were made to the runs on the hill, which gradually went from narrow cuts through the forest to bona fide ski runs.

Although the new lift was popular, the ski area was not an immediate financial success. In order to increase use of the lift, the association added a half-way station to enable novice skiers to access suitable terrain without resorting to a rope tow. They also began serious promotion of summer lift rides to the top of Snow King.

By the late 1950s, the single chairlift was decidedly outdated, and the Winter Sports Association began making plans to upgrade it to a double chair. Work began in fall 1958, and it opened in 1959. The old cable was replaced with an 8,800-pound track cable and a new break-over tower was constructed at the top of the lift for unloading the double chairs. By 1961, Snow King had a summer business that included an alpine slide and chairlift rides to the summit, where one could get a snack and take in the view at the glass-walled restaurant known as the Panorama House.

The upper bull wheel was likely housed in what is now the ski patrol building. The unloading platform was constructed of steel posts and girders, with board decking, ramps and stairs. It still exists in much the same configuration today and is used as an observation deck. On the deck were two small, gable-roofed buildings, a lift service building and the Snack Shack, which sported a sign reading “Order Picnics Here.” It appears that the small lift service building was of half-log construction and dated from the earlier lift.

3.7.2.1.2 Recent History

In 1971, Western Standard Corporation of Riverton, Wyoming, purchased the Snow King ski area operation along with 60 acres at the base of the mountain. The corporation’s main interest was developing a resort hotel and convention center. At the time of purchase, Western Standard also secured a lease from the town of Jackson on 27 contiguous acres on the mountain and a 20-year Forest Service special use permit for approximately 375 acres of National Forest System land on the mountain above. The double chairlift, the log ski shelter building at the base, and the warming building with a Snack Shack at the summit, as well as the log house known as the Kelly-Murie house and the Alphorn Motel at the base of the mountain were part of the purchase.

In 1976 Western Standard built the current Snow King Lodge and developed the ski area, including a new lift named after Neil Rafferty on the east side (1978). Corporate consolidation of the lodge and ski area occurred in 1979. Other corporate changes occurred over the next 20 years including the partial purchase by Americana Hotels (1981); a repurchase by Snow King Resort (1987) and the corporate restructuring as Snow King Resort, Inc. (1992).

Over the next two decades Western Standard continued to improve the ski area including the expansion of ski runs, night skiing (1980), a double chairlift (1980) and the triple-chair Cougar lift (1994) which provided better access to intermediate terrain.

Over the years, Snow King has played an integral role in the development of Jackson’s skiing and outdoor recreation culture, a culture that has valued winter sport competition. Snow King hosted slalom and ski jumping competitions in the 1930s and the Junior Nationals in 1953. The ski area maintains local and national importance as a ski racing venue and in March 2019 hosted its 43nd Annual World Championship Snowmobile Hill Climb.

3.7.2.1.3 Contributing Resources

Figure 3-20 shows the boundary of the Snow King’s historic landscape and the area of potential effects on that landscape, defined as the proposed adjusted special use permit boundary. Resources contributing to the historic landscape’s eligibility for listing on the National Register are found within the historic landscape

boundary. Actions outside that boundary, but within the area of potential effect, could also affect eligibility by altering its setting.

The north face of the mountain overlooking the town of Jackson has been used as a recreational ski area since the 1920s, but no landscape features remain from this early period. Because of extensive development that occurred during the post-World War II era, the only contributing features dating from that early period are the mid-1930s CCC trail and Summit Shelter. Most of the contributing historic resources associated with the ski area were built between 1946 and the mid-1960s, marking the resort's most intensive period of development. These include 12 of the ski trails, a building (the Panorama House), and a structure (the old Snow King double chairlift unloading platform, now converted to an observation deck). All of these features are within the historic landscape boundaries and contribute to its eligibility.

In her 2014 study, Davis argued that more than 75 percent of the individual component resources on the mountain contributed to the ski area's eligibility and that this number was higher when the ski area was looked at from a spatial perspective. What she found was that the ski area consisted of 19 contributing resources that included 14 sites, four buildings, and one structure. Among the noncontributing resources, she found three sites, one building, and three structures, for a total of seven. Considering that balance, Davis concluded that the non-contributing resources failed to significantly impact the ski area's overall visual and functional cohesiveness, and that it continued to read as a historic recreational landscape.

During the 5 years that have passed since the 2014 study was completed, additional changes have occurred at the ski area. These include the demolition of a few historic resources and the construction of some new features. All the resources on the site were reevaluated in Sladek's (2019) study, resulting in a revised resource count that includes 12 sites (ski runs), two buildings (Panorama House and CCC Summit Shelter), and one structure (Summit lift unloading platform/observation deck). The total number of individually contributing resources has decreased by 22 percent due to demolition of the old Summit lift base drive shelter and Snack Shack along with the re-categorization of the CCC trail and windbreak terrace as noncontributing resources, according to Sladek. The Bridger-Teton has not confirmed this conclusion regarding the CCC trail. The number of noncontributing resources has increased to 16, more than the 15 contributing resources.

Sladek concluded that despite the negative trend of the resource count, Snow King retains its integrity and National Register of Historic Places eligibility because the mountain still reads as a cohesive historic landscape and exhibits much of its historic character from a spatial perspective. The historic landscape continues to be dominated by the broad spatial array of groomed ski runs and forest, features that shape most of the mountain face. That particular arrangement laid out across the landscape remains visible from Jackson and its environs, and it continues to convey the history of the resource as a whole.

The following list provides information on each remaining, contributing resource located within the Snow King historic district drawn from Sladek's 2019 study. The list is grouped by resource type, date of construction, and geographic location. The discussion of direct and indirect effects below (section 3.7.3.1) will assess impacts on these resources.

Ski Runs

- Tow Slope/Holy Land – This intermediate trail was constructed around 1946. It has not experienced any alterations since it was last recorded in 2014.
- Old Man's Flats/Old Lady's Flats – This intermediate run was constructed around 1947. The only change that has taken place there since 2014 has involved grading to decrease the angle of the slope.
- Elk & Lower Elk – This advanced to intermediate run was constructed around 1948. Since 2014, the only change to Elk and Lower Elk has involved the installation of a pump house for the snowmaking waterline located at an approximate midpoint along the run adjacent to the western tree line. Although visible from the base, the building is not readily apparent unless its location is pointed out.

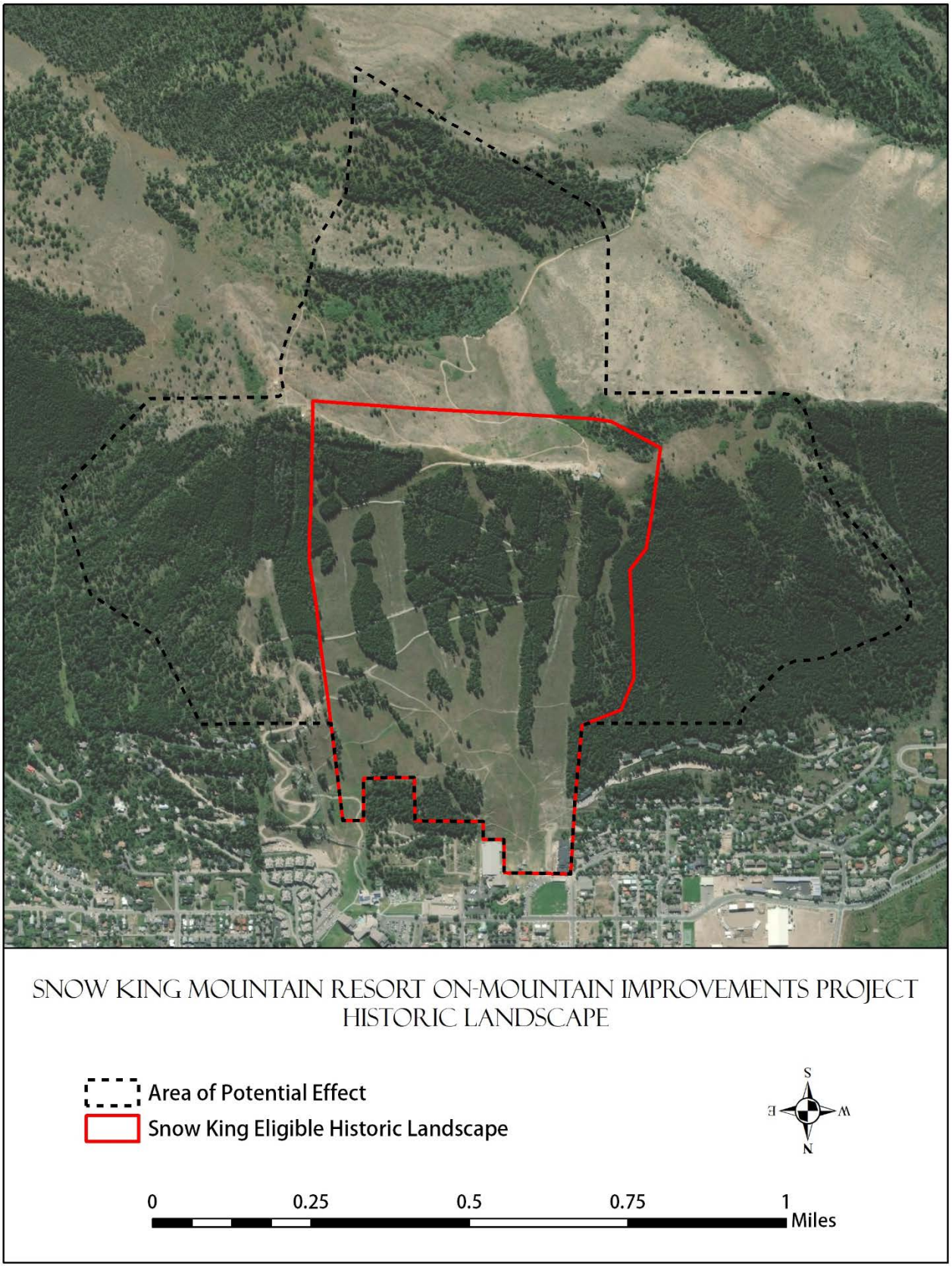

Figure 3-20. Snow King historic landscape and area of potential effect.

- Belly Roll – This steep, expert run, constructed in 1946, is located toward the top of the mountain, running for a distance of about 1,200 feet from the ridgeline toward the northwest. It eventually merges into the Cougar run. No changes have taken place along this run since 2014.
- Jump Run – This advanced run, constructed around 1950, is located on the lower flank of the mountain. It runs through the trees on a diagonal for a distance of 600 feet from Old Man's Flats and Turnpike down to the Cougar lift and the Snow King Sports and Events Center. Since 2014, a horse trail was developed along and across this ski run, but this trail is no longer used. Although visible when the site is free of snow, it is being erased by vegetation. In addition, some trees along the run have been thinned, although larger ones have not been removed.
- East and West "S" Chutes – Treated as a single resource, these two steep, curved, parallel expert runs are separated by a stand of trees. Constructed around 1952 and 1959, they are located toward the eastern top of the mountain and run from the ridgeline for a distance of 1,450 feet down to the top of the Grizzly run. No changes have been made to the two runs since 2014.
- Grizzly & Lower Grizzly – This advanced run, constructed around 1958, is in the upper eastern area of the mountain, heading north and then curving to the northwest. It starts at the lower end of the West "S" Chute and runs for a distance of 1,370 feet parallel to Elk and Lower Elk. Lower Grizzly eventually merges into Old Man's Flats. No changes have been made to the run since 2014.
- Cut Off – This short, advanced run, just 400 feet in length, is located in the upper eastern area of the mountain. Constructed around 1959, it starts at the lower end of the East "S" Chute and ends where it merges into the upper Grizzly run. No changes have been made to the run since 2014.
- Cougar – This advanced run is predominantly located in the lower half of the mountain, directly above the Cougar lift. Constructed around 1958, it starts at the lower end of Belly Roll, extending for a distance of 2,475 feet to where it merges into Tow Slope/Holy Land. The Cougar run is aligned on a north-south axis and is bordered by trees to the west and the short, non-historic Bighorn run to the east. Since 2014, the only change has involved the installation of snow guns along its western tree line.
- Exhibition – This advanced run was built around 1947. It starts at the lower end of the non-contributing run known as Upper Exhibition run, constructed in the 1980s. Although there is no visible demarcation between Upper Exhibition and Exhibition, they were treated in the 2012 and 2014 studies as separate runs, and Upper Exhibition is non-historic. Changes made to Exhibition since 2014 have been limited to the installation of lighting along with snowmaking guns.
- Bearcat – This narrow expert run, constructed around 1959, is located toward the top of the mountain, where it starts along the ridgeline west of the Panorama House. From there it drops down 1,200 feet to eventually merge with the Bearcat Glades run. A short connection also diverges to the east to meet the Exhibition run. No changes have been made to the run since 2014.
- Bearcat Glades – This advanced run, built around 1965, is located below the Bearcat run and proceeds through a thinned stand of trees for 1,100 feet before merging with the Exhibition run. No changes have been made to the run since 2014.

Buildings and Structures

- Panorama House – This building, constructed around 1960, is located along the western ridgeline of Snow King Mountain, just west of the unloading station for the Summit lift. It is a manufactured building that was purchased by the ski area and then customized for use in this location. By 2014, the building had experienced alterations that included the introduction of a three-light fixed window in the southeast elevation, an exterior mechanical unit, and rooftop antennas.

  Since 2014, the Panorama House has experienced additional modifications, including replacement of all windows, opening of a few new windows (one used as a ticket window), installation of some wood siding, complete remodeling of the interior, and placement of additional antennas on the

rooftop. Despite these alterations, the building is in its original location, and enough of it remains that it continues to convey much about its original design, use, and construction.

- CCC Summit Shelter – This small wood-frame building is located among the trees a short distance southwest of the Panorama House. Although its origins and history could not be confirmed through archival research, it appears to have been constructed during the mid-1930s and used by the CCC. Mounted on skids, it was designed to be moved as needed. No changes have been made to the building since 2014.
- Old Snow King Double Chairlift Unloading Platform – This structure, built in 1959, is located on the ridgeline at the top of the mountain, just northeast of the unloading station for the Summit lift. While the platform remains standing, several historic features were removed in the 1980s after the new Summit lift was constructed. Non-historic chain link fencing has been added between the original pipe railings that run along the platform's perimeter as a safety measure. No changes have been made to the structure since 2014. Despite these alterations, the platform is in its original location and enough of the structure remains that it continues to convey much about its original design, use and construction.

3.7.2.2 Native American Concerns

Native Americans have been on this landscape for 12,000 years. Over the past few decades several publications have discussed their presence in the Greater Yellowstone area in general (Nabokov and Loendorf 2004, Hughes 2000) and Jackson Hole in particular (Wright 1984, Crockett 1999, Walker and Graves 2007). Other earlier studies include Shimkin (1947), Hultkrantz (1961) and Trenholm and Carley (1964). Much of the following section is condensed from these earlier studies which should be consulted for a greater in depth understanding of historic Native American occupation of the region.

Contact between Euroamericans and regional tribes began in August of 1806 with the arrival of the Corps of Discovery (Moulton 1993). A member of Lewis and Clark's expedition, John Coulter, provided tales of sulphur beds, geysers, and thermal pools that led to the naming of this region Colter's Hell when he ventured into Yellowstone in the fall of 1807. Coulter is also reported to have later explored Jackson Hole.

The mountain-dwelling people encountered by the early trappers and explorers were generally referred to as the Sheepeaters and were said to have spoken the Snake language. These people were part of the Shoshone Nation whose language is part of a large linguistic group known as Uto-Aztecan. Members of this group ranged as far north as the Northern Plains and Cascade Mountains south to the western Great Basin and Mexico. The origin of the term Snake is not known but has been argued was a misinterpretation of serpentine hand gesture used to describe their method of constructing grass and brush shelters.

The various terms applied to the Shoshone, such as Sheepeaters, described members of the Eastern Shoshone whose main source of subsistence, at least seasonally, was the mountain sheep. The Tukudika remained high in the mountains and were largely pedestrian until they were forced to the Wind River Reservation around 1868. Other names they called themselves also applied to subsistence patterns. For example, the Kucundicka, buffalo hunters of the Plains; Pa'Iahiadika or elk eaters who hunted on the western slopes of the Tetons; the Do'yia or mountain dwellers of the Yellowstone region (Trenholm and Carley 1964).

For the Shoshone these names did not define rigid political divisions, all were members of the Shoshone nation, but was a means to define an ecological niche that a particular group inhabited. This information was used to convey important information concerning the ecosystem in which they lived, as well as providing clues about the vast and intimate knowledge these people held about these ecosystems. For the Shoshone and other native groups, the separation of the cultural and spiritual with the land does not exist and all is interrelated and connected. (Crockett 1999)

Demographics and group organization were seasonal. During the early 1800s the Wind River Shoshone comprised of between 2,000 and 3,000 individuals. In the winter and spring, they split into three to five smaller groups or bands. Each band consisted of 100 to 200 people with each occupying a different portion of the Shoshone territory. In the summer months each band divided further into family groups of 10 to 30 people.

With the coming of autumn, individual family groups reunited for the annual communal bison hunt in the intermontane basins and plains. This hunt allowed for these groups to obtain and prepare food and hides for the upcoming winter. With winter came a further division into smaller bands that resided in different portions of the vast Shoshone territory.

In the 1820s and 1830s, it was fur that initially brought Euroamericans to the region. Later, in the 1850s and 1860s, gold strikes in Idaho and Montana brought more, which resulted in the organization of the territories of Idaho (1863), Montana (1864), and Wyoming (1868). In the 1860s, mining expeditions, and later (1870), the first scientific expedition was mounted to explore the region.

Between 1860 and 1877 a series of treaties established reservations for the confinement of regional tribes. These included the Fort Bridger Treaty (1868) which established the Fort Hall Reservation for the Northern Shoshone and Bannock and the Wind River Reservation for the Eastern Shoshone. An executive order by President Ulysses S. Grant (1875) established the short-lived Lemhi Reservation for the Lemhi Shoshone, as well as the Sheepeater Indians (also Shoshone) and Bannocks.

On 1 March 1873, President Grant signed the Organic Act that set aside “the tract of land in the Territories of Montana and Wyoming, lying near the head-waters of the Yellowstone River…as a public park or pleasuring-ground for the benefit and enjoyment of the people…” This desire to establish Yellowstone National Park, despite the nobility of the idea, was tied inextricably to the expansion of the western territories and the resettlement of native groups.

Although the Fort Bridger Treaty permitted the Shoshone and Bannocks access to hunting grounds off the reservation on all unoccupied lands, by the mid-1890s sentiment against the Indians was growing and complaints were being leveled by whites. Theodore Roosevelt may have provided the loudest voice when he published an account of a hunting trip to the Two-Ocean Pass area blaming the Shoshone for his lack of hunting success.

By the turn of the twentieth century, the Shoshone had been on the reservation for over three decades, and their culture had changed considerably. Local interests were encroaching on the reservations, and continued attempts were made to abolish the Lemhi and Fort Hall reservations. The Dawes Severalty Act of 1887 pacified some of the local interests, but reservation lands were continually being eaten away by the allotment, alienation, and homesteading processes. Reduction of the lands into farming plots between 1887 and 1933 was disastrous, since it restricted the Indians to farming plots that were too small to support them adequately. The inadequate water supply saved the Wind River Reservation from encroachment.

While the establishment of Yellowstone National Park was not the sole cause of the decline of the Shoshone who once called it home, it was part of the larger and more complex processes that resulted in this devastation. During the 20th century, an increased awareness of reservation problems, and the increasing presence of Native Americans in the national political debate, made for some improvements in the lives of these groups, although still largely lacking. While tribal leaders continue to wrestle with issues of treaty and agreement rights, along with social and economic issues, they are now frequently consulted on issues of public land policy in the Greater Yellowstone area, a tract of land from which they were forcibly expelled.

Currently many tribes are considered associated with Jackson Hole and consulted by federal land managing agencies on various projects. For this analysis, the Bridger-Teton sent consultation letters to the following tribes: Crow, Eastern Shoshone, Gros Ventre and Assiniboine, Northern Arapaho, and Shoshone-Bannock. No Native American concerns were identified.

Since 1980, 25 cultural resource surveys have been conducted in the Snow King area in compliance with Section 106 of the National Historic Preservation Act, including the most recent in 2018 that was specific to this project (Cannon Heritage Consultants, Inc. 2018). In accordance with the Section 106 Process, all of these reports have been submitted to the Wyoming SHPO for review and concurrence. No significant Native American sites have been identified within the project area.

3.7.3 DIRECT AND INDIRECT EFFECTS

3.7.3.1 Historic Landscape

3.7.3.1.1 Alternative 1

Under the no-action scenario, the remaining resources contributing to the eligibility of Snow King's historic landscape would be unaffected.

3.7.3.1.2 Alternative 2

Previous studies discussed above (section 3.7.2.1) identified the 12 historic ski runs as the main character defining features of the historic landscape as they are most visible from Jackson and its environs and have changed little over the past 50 years. This alternative includes widening of historic runs Belly Roll, Upper Exhibition, and Bearcat/Bearcat Glades, and addition of new runs 8–14 interspersed among the historic runs within the historic landscape boundary. Sladek (2019) assessed these changes as a direct adverse effect on the historic landscape because of their obvious visual impact.

This alternative would also add runs 3–7 east of the historic landscape boundary. Sladek concluded that while run 3 would be screened by trees from the historic landscape, it would be high on the slope and visible from Jackson and northern viewpoints and thus an indirect adverse effect affecting the setting of the historic landscape. The remaining trails would be lower on the mountain, screened by trees, and in an area already subject to non-historic development. As a result, they would have no effect. As indicated by the scenic analysis completed for this EIS (section 3.12, Figure 3-23), runs 4–7 would be difficult to discern from Jackson.

In regard to contributing buildings and structures, construction of the proposed summit building would require removal of the Panorama House and the old Summit lift unloading platform/observation deck as they lie within the proposed building footprint. Sladek identified removal of the Panorama House as loss of a contributing resource and a potential direct adverse effect, pending State Historic Preservation Office concurrence that it is still contributing despite recent modifications. The same conclusion would likely hold for the lift unloading platform/observation deck.

Sladek also noted that collectively the proposed development on the summit could adversely affect the historic district if it were not designed and built in a way that minimized its visual impact. As discussed in the scenic resources analysis (section 3.12.3.1.2), design criteria would be in place to avoid this potential adverse effect, and these new features would not be visually discernible from the base area, the historic landscape area, or Jackson.

The back side of Snow King is outside the Jackson viewshed. While proposed development there would be within the area of potential effect, it would have no impact on the historic landscape.

In summary, implementation of Alternative 2 would have the potential to adversely affect 14 of the 15 contributing resources: the 12 historic ski runs by modification and/or alteration of their visual signature through construction of intermingled new runs, and the Panorama House and unloading platform/observation deck by removal. The CCC Summit Shelter would not be affected.

3.7.3.1.3 Alternative 3

The effects of this alternative on the historic landscape would be the same as those discussed above for Alternative 2 with one exception. Under Alternative 3, Snow King would develop an interpretive program

focusing on the history of the ski area. The CCC Summit Shelter would house interpretive displays, and more interpretive information may be provided in the summit building. This is intended to offset the adverse effects of other elements of this alternative.

3.7.3.1.4 Alternative 4

Reducing impacts on Snow King's historic landscape was one of the objectives in developing Alternative 4 (sections 2.2 and 2.6). The difference from Alternatives 2 and 3 in this regard is the elimination of most proposed new ski runs in and adjacent to the historic landscape to protect the visual integrity of the 12 historic ski runs. Runs 3 and 8–12 would not be developed, leaving only the widening of Belly Roll and Bearcat and clearing of new run 13 within or adjacent to the historic landscape boundary.

To provide downhill capacity in balance with the increased uphill capacity provided by the proposed Summit gondola, Alternative 4 also includes development of new runs 1, 2, and 15. Runs 1 and 2 would be on the east side of a sub-ridge that would provide a visual buffer for the historic landscape and largely block views from Jackson (see Figure 3-25). Similarly, run 15 would be relatively narrow, screened by tree canopy, and distant from the historic landscape. These factors would preclude adverse effects on the setting of the historic landscape.

Under this alternative, runs 4, 5, and 7 would be gladed rather than cleared. This measure was included in part to protect the setting of the historic landscape but, as explained above, those runs would be difficult to discern from Jackson in any case. As a result, the effect of this measure would be negligible.

Overall, this alternative would reduce the adverse effects on the signature historic ski runs and thus on the historic landscape. Impacts on the contributing buildings and structures would be the same as under Alternatives 2 and 3.

3.7.3.2 Native American Concerns

3.7.3.2.1 Alternative 1

As discussed above 3.7.2.2, Tribal consultation for this project identified no Native American concerns, and no significant Native American sites have been identified within the project area. As a result, no impacts on this resource are anticipated under this alternative.

3.7.3.2.2 Alternative 2

As discussed above 3.7.2.2, Tribal consultation for this project identified no Native American concerns, and no significant Native American sites have been identified within the project area. Design criteria 1–3 (section 3.7.5) would protect any undiscovered heritage resources or sites encountered during construction. Based on these considerations, no impacts on this resource are anticipated under this alternative.

3.7.3.2.3 Alternative 3

Same conclusion discussed above under Alternative 2.

3.7.3.2.4 Alternative 4

Same conclusion discussed above under Alternative 2.

3.7.4 Cumulative Effects

Of the cumulative actions identified in section 3.1.2, only one has the potential to effect Snow Kings historic landscape in a cumulative way, overlapping the direct and indirect effects of the alternatives considered here. That is the Snow King Lower Elk Lighting project, which will complete the effort begun in 2015 to reduce light pollution in the sky with energy efficient magnetic induction lights. As night skiing has long been a part of Snow King (since 1980), this would not constitute an adverse impact. (See section 3.12 for a detailed discussion of night lighting effects.)

As this analysis identified no direct or indirect effects on Native American concerns, there is no potential for cumulative effects on this resource.

3.7.5 Design Criteria

This analysis does not identify the need for any design criteria to avoid or reduce potential impacts on Snow King's historic landscape beyond those inherent in the alternatives addressed or identified in the scenic resources analysis (section 3.12.5). However, in compliance with Section 106 of the National Historic Preservation Act, the Bridger-Teton will consult with the Wyoming State Historic Preservation Office as part of this environmental review process, and that consultation may identify mitigation measures to protect this resource. Any such measures may be included in the Bridger-Teton's decision regarding this project as conditions of approval for any authorized actions.

In regard to Native American concerns, the following design criteria should be implemented to protect any undiscovered heritage resources:

1. If any previously unidentified prehistoric or historic cultural resources are identified or encountered at any time during construction, protect the resource(s) until the Forest Service permit administrator is notified and the Forest Service fulfills its consultation requirements, including consultation with the appropriate Tribal representatives.
2. If unmarked human remains are encountered at any time during construction, stop all work in the vicinity of the find, notify the County Sheriff shall, protect the remains, and notify the Forest Service permit administrator immediately to begin proper notification and consultation procedures with the Wyoming State Historic Preservation Office, Native American Tribes, and other local officials as needed (e.g., County Coroner) to determine to what time period and ethnic group the skeletal material may be ascribed and the appropriate treatment.
3. If any previously unidentified Traditional Cultural Places or sacred sites are identified or encountered at any time during construction, protect the resource until the Forest Service permit administrator is notified and the Forest Service fulfills its consultation requirements, including consultation with the appropriate Tribal representatives.

3.8 LAND USE

3.8.1 Scope of Analysis

- *How would construction and use of the proposed infrastructure affect grazing?*

The southern expansion area, which is within Snow King's current ski area special use permit boundary, is overlapped by an active grazing allotment, which is also permitted by the Bridger-Teton. Construction and use of the proposed summer infrastructure could affect forage availability, disturb or displace livestock, or otherwise impact the grazing permittee's operation.

Indicator: Review of utilization levels and patterns of livestock use to assess how proposed activities would impact forage availability and grazing operations.

3.8.2 Affected Environment

The southern portion (back side, south of the ridgeline) of Snow King's permit area lies within the Leeks Canyon Allotment (allotment). The allotment was closed to livestock grazing by the Forest Supervisor in 1918 to protect big game winter range. More recently, permits authorizing livestock use of the allotment have been in effect since 1981 (Forest Service 1981), with the first 10-year permit being issued in 1985 (Forest Service 1985).

The current permit for the allotment allows for 12 saddle horses with a season of use from June 11 through October 16 (128 days or approximately 51 head months), annually. While there have been periods when use did not occur, in recent years livestock use has been at the permitted level. The allotment includes approximately 1,554 acres. Steep terrain combined with limited water sources restrict use of much of the allotment by horses, as discussed below. Note that neither the grazing permit nor the ski area special use permit grant the holder exclusive use rights.

The allotment contains steep canyon terrain with riparian areas in the canyon bottoms, uplands supporting primarily grasses and sagebrush on the south-facing slopes, and aspen and conifers on the north-facing slopes. Permitted forage utilization levels for riparian areas and uplands in the allotment are currently limited to 50 percent with a residual stubble height of 4 inches (Forest Service 2019d).

Two water sources (lower Leeks Canyon and upper Smith Canyon) provide drinking water for the horses. Streams in the main canyons within the allotment are listed as intermittent and do not provide surface water during the grazing season.

The permittee is required to keep livestock contained within the allotment as livestock have been known to enter the Wilson Canyon area due to lack of fencing or terrain barriers. Fencing limits egress of the livestock from the canyon to the west, but much of the allotment boundary is unfenced. Salt and herding as required are also used to contain horses and manage proper utilization rates.

Reflecting these constraints, livestock use occurs primarily along the bottom of Leeks Canyon and in various flatter areas to the south and west. Forage utilization in these areas is light to moderate (35 percent or less). Steeper slopes and areas higher in the watershed exhibit little to no forage utilization (Forest Service 1986a).

The portion of the Snow King permit area contained within the allotment is approximately 135 acres (about 9 percent of the allotment) and is in the northeast corner of the allotment. It abuts the allotment boundary in the extreme northeastern corner, at the top of Leeks Canyon. During a site visit in the fall of 2018, vegetation within the ski area permit boundary showed no sign of livestock use; however, some older horse manure was observed on the Leeks Canyon Road near the ski area permit boundary.

Recreational activities also occur in the allotment. Access into the allotment is restricted from US Highway 26 (Highway 89/187) where the mouth of the canyon is private property and closed to the public. The access road from US Highway 26 extends into the Snow King permit area and up to the Snow King ridgeline. Mountain bikers ride along the allotment boundary between the summit and Josie's Ridge to the west. An additional road in the northeast corner of the allotment, within the Snow King permit area, provides access to cellular towers near the summit. This road is also used by mountain bikers entering or exiting the permit area and Wilson Canyon (section 3.10). Some mountain bikers ride down Leeks Canyon on the existing road, but the road is steep and dead ends at a locked gate at the private property line, so the way out is back up the canyon on the same road. This reduces the attraction of the route and currently receives very light use.

3.8.3 Direct and Indirect Effects

3.8.3.1 Alternative 1

Under Alternative 1, no improvements would be authorized within the southern portion of the Snow King permit area. Therefore, no new impacts on the grazing allotment would occur as a result of ski area activity and utilization rates would be unchanged.

3.8.3.2 Alternative 2

Under Alternative 2, two new lifts, new ski runs (with and without clearing), snowmaking, glading, a yurt camp, an ADA yurt trail, and the mountain bike zone would be added within the southern portion of the

Snow King permit boundary. Except for some of the new ski runs, these improvements would temporarily disturb the soil and vegetation to varying extents. Construction activities would occur during the summer months, and recreational activity would be basically year-round, with short gaps during the shoulder seasons. Access to and egress from the improvements would occur from the summit and not via Leeks Canyon Road.

Potential impacts on livestock grazing include forage reduction and disturbance or displacement of livestock which could affect utilization rates in some areas. Effects on forage availability would likely be negligible due to the low level of livestock use that high in the watershed. Beyond that, any forage impact that did occur would be temporary, lasting only until disturbed areas were revegetated naturally or through reseeding.

Livestock disturbance and displacement would potentially be more important issues. Summer activities including construction, mountain biking, and use of the yurt camp could displace livestock from the Snow King permit area. However, the low level of livestock use would make any such displacement a minor impact. In fact, summer infrastructure and activity could constitute an effective barrier to livestock leaving the Leeks Canyon Allotment and crossing into Wilson Canyon through the Snow King permit area.

Potential livestock disturbance or displacement outside the permit area would be a more important matter. Under Alternative 2, lift-served mountain bikers would be free to leave the dedicated downhill trail system and use existing trails and roads. They could ride down Leeks Canyon on the existing road into areas where grazing is concentrated. The allotment is currently permitted for horses, which are typically not disturbed by human activity. However, the horses could become startled when approached by mountain bikers, and continual exposure could cause them to avoid the area, thereby potentially increasing utilization rates in other portions of the allotment.

As discussed above (section 3.8.2), mountain bikers who venture down the Leeks Canyon Road are stopped by a locked gate at the private property line and must retrace their route back up the canyon or trespass to get out. Under current conditions, this entails riding clear back up the canyon, likely to Ferrin's trail, and back to Jackson. However, under Alternative 2, not only would there be many more bikers on the back side relative to Alternative 1, but the A Lift would provide access back to the summit. This would increase the appeal of a trip down-canyon.

As discussed in the recreation analysis (section 3.10), most lift-served bikers would be riding the new dedicated downhill bike trails and not be interested in going down Leeks Canyon for a number of reasons (e.g., their heavy, downhill bikes and safety equipment, and the fact that they had paid to ride high-quality, purpose-built flow trails not two track roads). However, given this alternative's free access to trails outside the permit area, some cross-country bikers might opt to ride the lift specifically for easier access to the existing road and trail system.

Based on these offsetting considerations, it seems likely that there would be additional mountain bike traffic down Leeks Canyon Road under Alternative 2 than Alternative 1, and therefore more potential to disturb and displace horses in the lower portion of the canyon which could result in higher utilization rates in other portions of the allotment. However, additional mountain bike use would be limited due to the steepness of the road and the dead end at the bottom.

Hikers from the yurt camp could also venture down Leeks Canyon, but they would pose less risk of disturbing livestock for three main reasons. First, the camp would host primarily organized activities, often involving groups, so informal walks down the road would be less likely. Second, walkers would move more slowly and be less likely to startle horses. Third, walkers generally do not travel as far as bikers, limiting the extent of any impact they might cause.

To put these potential effects in context, the allotment is of sufficient size to ensure adequate amounts of forage for the number of livestock involved, even if some displacement of animals occurred. This could

incrementally increase the level of management required of the permittee to comply with the terms of the grazing permit ensuring utilization rates would meet the annual standard.

3.8.3.3 Alternative 3

Under Alternative 3, changes in infrastructure and activities in the southern portion of the ski permit area would be the same as under Alternative 2, so projected impacts would also be the same. The exception would be mountain biking. Under Alternative 3, mountain bikers would be restricted to the dedicated downhill mountain bike trail system. They would not be allowed to travel down Leeks Canyon Road. This would preclude any new impact on livestock or management of the allotment and reduce the potential to affect utilization rates outside the ski area.

3.8.3.4 Alternative 4

Under Alternative 4, changes in infrastructure and activities in the southern portion of the permit area would be the same as under Alternatives 2 and 3, so projected impacts would also be the same. Again, the exception would be mountain biking. Under this alternative, the mountain bike zone would not be developed. This would eliminate the potential for more bike traffic down Leeks Canyon, precluding any new impact on livestock or management of the allotment as well as utilization levels.

3.8.4 Cumulative Effects

The cumulative effects analysis area is defined as the Leeks Canyon Allotment. Of the cumulative actions listed in section 3.3, only the Invasive Plant Management project would have impacts on the allotment that overlap the direct and indirect effects of the three action alternatives discussed above.

The purpose of the Invasive Plant Management project is to reduce noxious weeds and invasive species on the Bridger-Teton. When combined with the control efforts discussed in vegetation analysis above (section 3.5) and efforts made by the grazing permittee, the Invasive Plant Management project would essentially remain unchanged from current conditions.

3.8.5 Design Criteria

This analysis of potential impacts on grazing did not identify the need for any design criteria, beyond the terms of the alternatives, to avoid or reduce adverse effects.

3.9 NOISE

3.9.1 Scope of Analysis

- *How would construction and use of the proposed infrastructure affect noise levels around the ski area?*

Snowmaking, explosive avalanche control, and summer activities such as the mountain coaster generate noise that is audible to visitors and residents in areas adjacent to the resort. While some may accept increased noise levels as a consequence of being close to a mountain resort, the noise associated with the proposed snowmaking expansion, zip line, and increased avalanche control activities may be an annoyance to some.

Indicators: Review of noise levels associated with these activities, then a largely qualitative assessment of impacts on area visitors and residents based on the projected noise levels, timing, duration, and frequency.

3.9.2 AFFECTED ENVIRONMENT

Noise is a concern for Jackson residents, particularly those near Snow King. A variety of activities at the ski area currently produce noise including snowmaking, explosive avalanche control, and noise from summer activities. At times, all of these can be heard beyond the boundaries of the ski area, depending on the ambient noise level and the distance from the source.

Noise levels are measured in A-weighted decibels (dBa) since that weighting of sound pressure best represents the range of human hearing. Sound pressure dissipates according to the inverse square law at a rate of roughly 6 dBa per doubling of distance. For example, if a sound is measured at 70 dBa at a distance of 50 feet, by 100 feet it will have diminished to 64 dBa, and at 200 feet to 58 dBa, and so on. The Town of Jackson has a noise ordinance (Ordinance 1196 [L]) that stipulates noise levels must not exceed 65 dBa at the property line for commercial operations such as Snow King. This limitation does not apply to National Forest System land, but it is used as a threshold in this analysis because the Bridger-Teton strives to be a good neighbor.

Another important property of noise is that it is not additive. For example, if a noise source of 70 dBa occurs as the same time as a noise source of 60 dBa, the resulting noise measurement would be 70 dBa since the louder noise overwhelms the softer one.

As discussed in detail in section 3.4.2.1, snowmaking at Snow King generally begins the first week of November at lower elevations and ends early in January. The opportunity to begin making machine-made snow depends largely on daily air temperature. If air temperatures are low and natural snow is plentiful, then ski runs are covered quickly, and snowmaking ends earlier compared to a relatively warm and dry winter. During a high snowfall year, little snowmaking occurs above the top of Cougar lift.

In general, machine-made snow is first applied to areas below the top of the Cougar lift and downslope of Slow Trail, including beginner terrain, terrain parks, and the Tube Park. Priority areas for snowmaking during the season include the lower Elk ski run, Cougar lift pod to the base, Rafferty lift pod from mid-station to base, and the Tube Park.

Snowmaking machines of the type used at Snow King produce a maximum of 70 dBa measured at a distance of 20 meters (65.6 feet) from the machine, dropping below 65 dBa at a distance of 35 meters (114.8 feet; TechnoAlpin 2019). Noise from snowmaking occurs at a continuous level while machines are operating. Current Snow King snowmaking operations on private land have been tested by authorities on several occasions and found to be in compliance with applicable Town of Jackson ordinances (Stanley 2019a).

Explosive avalanche control takes place at Snow King 5 days a year, on average (Stanley 2019a). On those days, approximately 15, 5-pound hand charges are detonated early in the morning on the upper portions of the mountain. No precise measurements of decibel levels for hand charges are available, but it is likely that some charges momentarily exceed the 65-dBa threshold at the property line.

Noise from summer activities at Snow King is centered around the Rafferty lift in the eastern portion of the ski area. Noise levels in this area vary from day to day, and over the course of a day, and no precise measurements are available. Some noise arises from guests yelling or screaming, but the primary source of is from the alpine slide when the sleds hit the joints in the track. This produces a “clack” noise that can be heard beyond the ski area boundaries.

3.9.3 DIRECT AND INDIRECT EFFECTS

3.9.3.1 Alternative 1

Under this alternative, there would be no change with regard to the level of noise at Snow King relative to the conditions described in section 3.9.2.

3.9.3.2 Alternative 2

Under alternative 2, there would be additional noise due to several project elements. The first would be the additional noise caused during construction of the proposed infrastructure. Most of the time, construction noise would not be noticeable above ambient levels for Jackson in the summer. However, any blasting needed for construction of the summit access road/novice skiway would be noticeable, likely as momentary exceedances of Town of Jackson noise ordinance. Also, helicopter noise from the installation of the gondola towers would be noticeable during the short period where such work was taking place. In the loading area where towers where attached to the helicopter line, the Town of Jackson noise ordinance would likely be exceeded.

With regard to snowmaking noise, under this alternative all new snowmaking would be higher on the mountain than existing snowmaking and therefore would generally not lead to increased noise, since the machines on the lower portions of the mountain would be perceived as louder and noise levels are not additive.

Explosive avalanche control would still be needed under this alternative. The number of days this work would be needed would generally remain the same, but the number of explosives used could double to approximately 30 per day. The timeframe in which explosives were used during the morning would likely remain the same as well, with a lower time interval between explosions. As under the existing scenario, these explosions could momentarily exceed the limit imposed by the Town of Jackson.

Under this alternative, the landing of the zip line in Phil Baux park would add substantially to the summer recreation-related noise on the western side of the ski area. This would be primarily due to the mechanical noise of the zip line trolley moving along the cable but would also likely include exuberant shouts of riders, considering the slope and speed of the zip line.

3.9.3.3 Alternative 3

With regard to construction, snowmaking, and avalanche control noise, this alternative would be the same as Alternative 2. Under this alternative, the zip line noise would be shifted more toward the Rafferty lift area, where noise of summer activities is already present. The launch location of the top of the Summit gondola would remain the same, but noise from that distance would diminish substantially before it reached the property line. Furthermore, the slope and speed of the zip line under this alternative would be greatly reduced, making it less likely to elicit the same level of noise as the zip line proposed under Alternative 2. The Option 2 zip line alignment would further reduce noise levels, as it would be even lower slope and speed.

3.9.3.4 Alternative 4

With regard to avalanche control and summer activity noise, this alternative would be the same as Alternatives 2 and 3. The addition of run 15 in this alternative would change the situation with regard to construction and snowmaking noise. The operation of chainsaws to clear trees for run 15 would take place within 200 feet of houses adjacent to the ski area. A typical chainsaw, while cutting, produces 95 dBa measured at 8 feet from the saw (Forest Service 2010). By the time the sound reached property line at the nearest point of run 15 to the property line, the sound of the chainsaw would be reduced to approximately 63 dBa. This would be due to an approximately 27-dBa reduction due to distance, and a 5-dBa reduction due to vegetation screening (Peng et al. 2014).

Snowmaking noise would be similarly reduced. By the time the noise reached the property line the 70-dBa noise, measured at 20 meters (65.6 feet), would be reduced to approximately 57 dBa. This would be due to an approximately 8 dBa reduction due to distance, and a 5-dBa reduction due to vegetation screening (Peng et al. 2014).

3.9.4 CUMULATIVE EFFECTS

There would be no cumulative effects of other projects with regard to noise, as no other projects overlap temporally and spatially with the effects of these alternatives, and as discussed in section 3.9.2, noise levels are not additive.

3.9.5 DESIGN CRITERIA

This analysis of potential noise impacts did not identify the need for any design criteria, beyond the terms of the alternatives, to avoid or reduce adverse effects.

3.10 RECREATION

3.10.1 SCOPE OF ANALYSIS

3.10.1.1 Terrain Mix

- *How would the proposed ski terrain development affect Snow King's terrain mix?*

Most ski terrain at Snow King is steep, which limits use to advanced or expert skiers. Accordingly, a central element of the purpose and need for action is to develop terrain accessible to lower ability level skiers. This would be conducive to integrating beginning skiers into the sport and to accommodating families and groups with varying ability levels.

Indicator: Comparison of the terrain mix resulting from proposed development to the mix of ability levels in the skier market.

3.10.1.2 Existing Ski Runs

- *How would the proposed summit access road/novice skiway affect existing ski runs?*

The proposed access road/ novice skiway crosses the major front-side ski runs high on the steeper portions of the slope where substantial cut and fill would be required. Existing access roads/novice skiways including Fast Trail, Slow Trail, and Elkhorn Trail also cross these ski runs, so the added access road/novice skiway would potentially constitute and additional impediment to smooth skier flow on these runs.

Indicator: Review of preliminary design of the access road/novice skiway, then largely qualitative assessment of its potential impact on skier flow, in conjunction with other features crossing these runs.

3.10.1.3 Existing Trail System

- *How would the proposed downhill mountain bike trails and zone affect the existing Cache Creek/Game Creek trail system and its users?*

The popular, well-developed and maintained Cache Creek/Game Creek multi-use trail system includes trails that cross or pass near Snow King's permit area. The proposed lift-served mountain biking could adversely affect this trail system and its users by increasing bike traffic inside or outside the permit boundary.

Indicators: Assessment of the likely number of lift-served mountain bikers that would use the existing trail system, the existing system's capacity to absorb any additional use, and the effects of that use on cross-country bikers and hikers. Some variables, such as the number of intersections of proposed and existing trails, will be quantified.

3.10.1.4 Phil Baux Park

- *How would the proposed summit gondola and zip line affect users of Phil Baux Park?*

Phil Baux Park is an old, well established and well used town park adjacent to Snow King's private-land base area. Under the proposed action, the bottom terminals of the proposed summit gondola and zip line would be located in the park, eliminating the parking lot.

Indicator: Primarily qualitative assessment of the impact of siting these facilities in the park on the recreational uses and users of the park.

3.10.2 AFFECTED ENVIRONMENT

3.10.2.1 Terrain Mix

As indicated in Table 3-21, only 12 percent of Snow King's currently developed ski terrain falls into the beginner, novice, and low intermediate skier ability categories. This reflects primarily the ski area's topography, which cannot be altered, but it limits Snow King's ability to meet the needs of the broad skier market. This, in part, explains the low skier-visit numbers relative to capacity that are the norm at Snow King. In particular, the lack of lower ability-level terrain impedes the ski area's function in bringing new skiers into the sport, which is especially important for a "town hill," where children and families are a large part of the potential user group.

Table 3-21. Current terrain mix compared to skier market.

Skier Ability Level	Trail Area (acres)	Trail Area (%)	Skier Market (%)
Beginner	0.5	0%	5%
Novice	5.1	4%	15%
Low Intermediate	11.5	8%	25%
Intermediate	42.9	32%	35%
Advanced	17.3	13%	15%
Expert	58.4	43%	5%
Total	**135.6**	**100%**	**100%**

The ability level of a ski run is mostly on the basis of its steepness, and there is very little low angle terrain within the ski area's current operating boundary. At this point, there is very little Snow King can do to provide more opportunity for lower ability-level skiers without adding new terrain.

3.10.2.2 Existing Ski Runs

The issue here is how access road/novice skiway crossings affect the recreational experience of skiers on developed ski runs. Six existing upper-mountain ski runs would be crossed by the proposed summit access road/novice skiway, including three black diamond ski runs (Cut Off, Grizzly, and Elk), and three double black diamond ski runs (Belly Roll, Upper Exhibition, and Bearcat).

Grizzly and Elk are two of the most popular runs at Snow King and are currently crossed by two and three sections of skiways, respectively. Grizzly is crossed by Slow Trail and Fast Trail. Elk is crossed by Elkhorn Trail, Slow Trail, and Fast Trail. Of the double black diamond runs, Upper Exhibition receives the most use followed by Bearcat and Belly Roll. Upper Exhibition and Bearcat are currently not crossed by any sections of skiway, and Belly Roll is crossed by four: Elkhorn Trail (twice) then Slow and Fast trails.

These skiway crossings are managed by Snow King using a combination of engineering and design (e.g., creating appropriately graded cut and fill slopes above and below the skiways), maintenance (e.g., grooming to ensure there are no berms or other obstacles to skier passage), and warnings to skiers of the approaching hazard on both the run and the skiway (e.g., signage, flags, and rope lines, as appropriate).

Skiways crossing ski runs are a common situation, occurring at most ski areas and often unavoidable. As a local example, Gros Ventre run at Jackson Hole Mountain Resort crosses skiways four times, and most runs on the upper mountain cross skiways at least once. Measures similar to those noted above are implemented to minimize the impact on skiers' experience and safety (section 3.11.3.2), but these interruptions in ski runs, particularly those in more advanced ability-level categories, are an adverse recreational impact.

3.10.2.3 Existing Trail System

The issue here is how the proposed lift-served, downhill mountain bike program would affect the Cache Creek/Game Creek trail system and its users. Snow King lies within, and is intersected by, an extensive and highly used system of multi-use, non-motorized trails referred to as the Cache Creek/Game Creek trail system. It can be conveniently accessed from several trailheads in or near town, and it is valued for its scenery and the opportunity it provides to observe wildlife, birds, flowers, and other natural features (Forest Service 2002).

The system currently includes approximately 53 miles of non-motorized trail. Overall use is estimated at 1,526 people per day between June 1 and August 31 (Friends of Pathways 2019a). Trails are actively maintained and managed to a high-quality standard with very active community involvement. Considerable trail work has been done since 2002. Several trails have been rerouted to more sustainable locations. All existing trail structures have been replaced or modified within the last 10 years, and many new structures have been built. New signage and several new kiosks have been constructed at junctions and trailheads. Several new trails have been constructed to improve the experience and reduce conflicts. In 2015-2016, the Skyline trail, Nelson Knoll trail, bike/hike-specific Putt trail, horse/hike-specific Woods Canyon trail, and Kelly's hiking loop were built or re-designed. Figure 3-21 shows the central portion of the trail system.

Trailhead counter data (Friends of Pathways 2019b) indicates that pedestrian use (i.e., hikers, runners, and dog walkers) accounts for about 60 percent of the traffic entering and leaving the trail system. Bicycle use accounts for roughly 25 percent, and horse use another 1–2 percent. The chuck wagon dinner operation offered by Bar J accounts for most of the balance, all on the Cache Creek/Game Creek trail. Bridger-Teton trail patrol figures for 5 years between 2007 and 2014 indicate a higher percentage of bike use than the Friends of Pathways data, with 54 percent of total users being bikers (Forest Service 2019e).

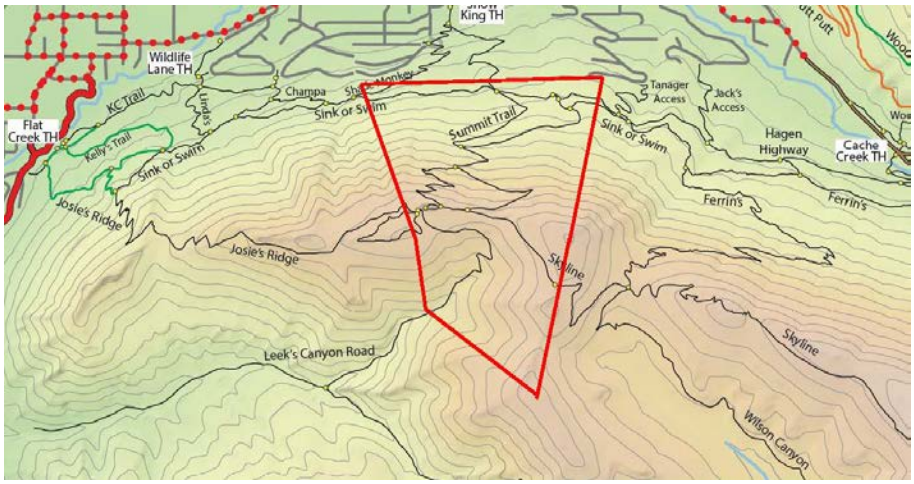

Figure 3-21. Central portion of the Cache Creek/Game Creek trail system (Snow King permit boundary in red).

Use is heavily concentrated in the first mile from trailheads, where walker and dog walker use are highest. More distant trails within the system see much lighter use, with the majority by bikers. The trail system is maintained in generally good condition, in part with the assistance of a large cadre of local volunteers. Mountain bikes have the least impact on trail surfaces and horses have the most. Damage associated with bikes is generally widening of trails, particularly at turns. Pedestrian use tends to generate more corner cutting and creation of shortcuts. The greatest impact from all types of use occurs when soils are wet. Varying degrees of social conflict and wildlife impact are also associated with trail use (Hennings, 2017). Trail realignments and other improvements over the past 10 years have facilitated trail maintenance. (Friends of Pathways 2019b)

The 2015 decision approving Cache Creek/Game Creek trail system improvements described the following desired condition for the system (Forest Service 2015b, Appendix A):

> A sustainable, well-developed, maintained trail network with associated trailhead facilities are provided to concentrate visitor use and visitor impact and visually blend with the environment. Shared use occurs on the majority of the trail system; however, some use separation may occur in congested areas. Access to the trail system is encouraged through town portals that allow people to walk or bike without driving to the extent possible. Although recreation use is high compared with other areas in the Bridger-Teton National Forest, a diversity of experiences is still available ranging from places where social interaction predominates to places where interaction with other people is less frequent and the area feels somewhat remote. Visitors have opportunities to connect with nature through natural sounds and smells, and viewing largely undeveloped natural landscapes, especially in those areas further away from town and trailheads. Interactions among trail users are positive with a sense of mutual enjoyment and unity in the privilege of having access to a beautiful natural place. Opportunities to learn about nature and participate in the care of the area are readily available and visitors act in a way that conveys respect for wildlife and the land. Wildlife populations continue to thrive and conflicts with lions, bears, and moose are avoided so that animals and people are not harmed. Plant communities retain natural integrity with the presence of weeds is confined to small localized spots that can be readily treated. Streams are free-flowing and are relatively free from human sources of sediment or pollutants.

Only about 5 percent of the Cache Creek/Game Creek trail network is within the ski area boundary. Trails located within the boundary include the Summit trail and about 0.5 mile of the Sink or Swim trail. Small portions of the Hagen trail, Nature trail, and Shade Monkey trail are also within the ski area boundary. A service road connecting the summit to the saddle leading to Ferrin's, Skyline, and Wilson Canyon provides a critical connection (see map). The Leeks Canyon road is lightly used due to the presence of private land at the mouth that restricts public access. During the winter, the Hagen trail provides a historically important groomed ski connection between the resort and Cache Creek. More detailed information on key trails follows. (Use figures from Friends of Pathways 2019a.)

- Snow King Summit trail – this is actually the current ski area service road accessing the summit of Snow King Mountain, with some user-created shortcuts. It is the only trail that is located entirely within the ski area boundary and is a popular workout trail that people use for daily exercise. The estimated summer use is 216 people per day, dominated by people hiking, often with dogs. Other user-created foot trails to the summit have been created (notably the "stairway") but to date these trails have not been maintained or managed.
- Sink or Swim trail – this is an important east-west single-track trail that connects the network of trails in the Cache Creek drainage with the network of trails in the Josie's Ridge area. The trail is heavily used by bikers, runners, and hikers. No trail counter data is available for this trail since it

is an "interior" trail. It connects Ferrin's at its east end and Josie's Ridge at its west end, with several other access points in between.

- Shade Monkey trail – this trail is located largely below the National Forest boundary on Snow King property. Estimated use for this trail is 45 people per day. It was originally constructed in 2011 to offer a bike-friendly trail connection directly from town. The beginning of the trail was later re-located so that the entry point was at the base of Snow King.

In addition, three primary trails extend beyond the resort permit boundary from the summit of Snow King: Josie's Ridge trail to the west, Skyline trail to the east, and the short nature trail at the summit. Skyline trail accesses the Ferrin's and Wilson Canyon trails.

- Nature trail – this is a short interpretive nature trail designed to offer an easy walk for people taking the chairlift up to the summit of Snow King. The trail was improved in 2010. It is managed for hiking, and estimated use is unknown. Various interpretive brochures have been developed for the trail, but full development as an interpretive trail has not occurred. No signage is present to direct people to the trail.

- Josie's Ridge – This is a steep switchback trail that is very popular with those looking for a strenuous climb after work. The estimated summer use is 158 people per day. It is designed and used primarily by hikers, often with dogs. The upper section is open to mountain biking with the lower portion open only for hiking (mountain bikes are diverted onto the Sink or Swim trail). Significant work is currently underway to stabilize the trail and reduce erosion. The entire trail is closed to all human use December 1 – April 30 to reduce disturbance to wintering wildlife.

- Skyline trail – This trail connects Ferrin's saddle with Game Creek saddle. The trail section from Ferrin's Saddle up to the Snow King permit boundary, where it ties into the existing service road to the communications towers on the summit, is referred to as upper Skyline. It is also known as the Connector trail and existed prior to development of the rest of Skyline. Public review of the Skyline trail proposal in 2011 indicated considerable public support but also raised significant issues, primarily related to the potential for wildlife disturbance and expansion of recreation use into new areas. Following further analysis and discussion, the trail was authorized in May 28, 2015, and completed with substantial community funding and labor support over the next three seasons. The following three stipulations were among the conditions of approval:

  (a) The trail is closed to all human use May 1–July 1 to reduce human disturbance during the calving season for elk, deer, and other wildlife.

  (b) Lift-served bike access from the summit of Snow King is not permitted.

  (c) The trail is designed for shared use. As a highly scenic ridge trail, the trail is designed in a way to take advantage of viewpoints, encourage slow bike speed and promote people taking the time to absorb the scenic beauty.

  No trail counter data is available since it is an "interior" trail. Field-based monitoring indicates that 15–25 people use the trail per day, with use dominated by a mix of trail runners and bicyclists (with some hiking use).

- Ferrin's trail – This trail connects Snow King and the Cache Creek trailhead (via the Hagen trail) with the Ferrin's saddle located just east of the radio towers on Snow King Mountain. Trail planning and construction occurred in 2005, with community funding and labor support. The trail was designed as an uphill route for mountain biking to reduce the potential for conflict on the primary uphill hiking trails (Summit and Josie's Ridge), to provide a connection to the base of Snow King and reduce vehicle traffic to the Cache Creek trailhead, and to provide a sustainable replacement for old fall-line, user-created trails. No trail counter data is available since it is an "interior" trail. Field-based monitoring indicates that 25–40 people use the trail per day, with use dominated by

bicyclists. The trail has become popular for both uphill and downhill riding. The steep side slopes make passing difficult which has led to some conflicts due to near-miss collisions.

- Wilson Canyon trail – this trail connects Ferrin's saddle with the pathway south of Jackson. The West Game trail splits from Wilson Creek providing access to the Game Creek drainage. The upper portion of the Wilson Canyon trail was reconstructed in 2003 with high-school volunteers. Following the Horsethief Fire in 2012, the bulk of the upper section was reconstructed entirely through a series of volunteer events. The lower portion of Wilson Canyon is managed as a more primitive trail catering to a mix of hike, horse, and bike use since it is very steep and rocky. West Game Creek is less technical and receives mostly bike use. These are both popular trails but receive less use than trails in the lower Cache drainage and west face of Snow King. The lower portion of Wilson Canyon is closed to all human use December 1–April 30.

The Forest Service Recreational Opportunity Spectrum (ROS) provides a framework for stratifying and defining different classes of outdoor recreational environments, activities, and experience opportunities. The Forest Plan assigns Snow King permit boundary and its surroundings, including most of the Cache Creek/Game Creek trail system area, an ROS classification of Roaded Natural, defined as follows (Forest Service 1986b):

> Area is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interactions between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilizations practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Section 3.10.3.3 employs the ROS framework to assess the direct and indirect effects of the alternatives on the Cache Creek/Game Creek trail system and its users.

3.10.2.4 Phil Baux Park

Phil Baux Park is a municipal recreation facility operated by the Teton County/Jackson Parks and Recreation Department at the base of Snow King. Amenities include a baseball field; playground; picnic shelter and tables; bouldering walls; horseshoe pits; open space used for concerts, the People's Market, and other activities; and a parking lot. Use figures have not been compiled, but the park is consistently used through the summer and at capacity during events such as the People's Market and concerts.

The Snow King Sports and Events Center and ski slopes adjoin the park to the south. Mixed residential and commercial properties lie to the west and north, across Snow King Avenue. Snow King recreational developments adjoin the park to the east. The park is an island of well-used public land surrounded by private land that, with the exception of ski slopes to the south, is developed.

3.10.3 Direct and Indirect Effects

3.10.3.1 Terrain Mix

3.10.3.1.1 Alternative 1

Under the no-action alternative, no new ski terrain would be developed, and Snow King's terrain mix would remain as described above, with only 12 percent in the beginner, novice, and low intermediate categories. The ski area's ability to meet the needs of the broader skier market and to bring new skiers into the sport would remain limited.

3.10.3.1.2 Alternative 2

Under Alternative 2, Snow King would develop an additional 117.8 acres of new ski terrain, roughly a third of it (39.8 acres) in in the beginner, novice, and low intermediate categories. Most of the lower ability-level terrain would be associated with the teaching center, on top of Snow King Mountain or on the back side. The three new runs in the eastern boundary adjustment area would provide low intermediate terrain accessible from either the summit (via the summit access road/novice skiway) or the Rafferty lift. These additions would increase lower ability-level terrain at the ski from the current 12 percent to 22 percent.

Intermediate terrain would also increase by 20.8 acres, primarily in the back-side bowls. This terrain would be accessible from the teaching center, making an easy step up for skiers advancing in ability there.

Snow King's terrain mix would remain heavily skewed toward advanced and expert terrain, but these additions would bring it substantially closer to the skier market profile and provide a better progression in terrain categories for people learning the sport (Table 3-22).

Table 3-22. Alternative 2 terrain mix compared to skier market.

Skier Ability Level	Trail Area (acres)	Trail Area (%)	Skier Market (%)
Beginner	4.4	2%	5%
Novice	38.7	15%	15%
Low Intermediate	13.8	5%	25%
Intermediate	63.7	25%	35%
Advanced	43.8	17%	15%
Expert	89.1	35%	5%
Total	**253.4**	**100%**	**100%**

3.10.3.1.3 Alternative 3

In terms or terrain mix, Alternative 3 would be the same as Alternative 2.

3.10.3.1.4 Alternative 4

In regard to beginner, novice, and low intermediate terrain, Alternative 4 would closely match Alternatives 2 and 3 since most of the proposed lower ability-level terrain is on the summit and back side. The only notable change in those categories is the shift from clearing to glading runs 4, 5, and 7 in the eastern boundary adjustment area. Gladed terrain is not groomed, which increases its ability rating. This would drop the percentage of beginner, novice, and low intermediate terrain to 21 as opposed to 22 under Alternatives 2 and 3 (Table 3-23).

Alternative 4 also changes the configuration of advanced and expert runs on the front side, but these changes do not notably alter the terrain mix.

3.10.3.2 Existing Ski Runs

3.10.3.2.1 Alternative 1

Under the no-action alternative, no new ski runs or skiways would be constructed. As discussed above (section 3.10.2.2), Grizzly would be crossed by Slow Trail and Fast Trail. Elk would be crossed by Elkhorn Trail, Slow Trail, and Fast Trail. Upper Exhibition and Bearcat would not be crossed by any skiways, and Belly Roll would be crossed by Elkhorn Trail (twice) then Slow and Fast trails. That is a total of nine skiway crossings on the upper portion of the mountain. These crossings would continue to be managed to minimize their impact on skier flow, but there would still be an impact.

Table 3-23. Alternative 4 terrain mix compared to skier market.

Skier Ability Level	Trail Area (acres)	Trail Area (%)	Skier Market (%)
Beginner	4.4	2%	5%
Novice	38.7	15%	15%
Low Intermediate	11.5	4%	25%
Intermediate	61.9	24%	35%
Advanced	43.8	17%	15%
Expert	97.6	38%	5%
Total	**257.8**	**100%**	**100%**

3.10.3.2.2 Alternative 2

Under Alternative 2, most of Elkhorn Trail would be obliterated, leaving the top segment, and the new summit access road/novice skiway would be built. In terms of existing runs, this would add a crossing to Grizzly, Upper Exhibition, and Bearcat; maintain the same number of crossings on Elk; and reduce the crossings on Belly Roll by one. This would be a net increase of two crossings of existing runs. The crossings of Belly Roll and Upper Exhibition would be longer due to proposed widening of these runs. The new summit access road/novice skiway would also cross new runs 3 and 13, and the new run 11 would be crossed once by Slow Trail and once by Fast Trail, bringing the skiway crossing total to 15.

The impact on skier flow on existing runs would vary by run. A skiway crossing of the steep, uninterrupted portion of Grizzly would be added. Skier traffic on Upper Exhibition and Bearcat would be interrupted by a crossing when it has not been before. The single crossing of Elk's steep upper section would shift further down the slope. Belly Roll would be improved by having one crossing removed. All in all, this would be a marginal adverse effect on skier flow on existing runs, slightly increasing the impacts discussed above (section 3.10.2.2). Those conditions would be replicated on new runs 3 and 13.

The situation would not be ideal but, again, skiway crossings are a common and manageable issue at ski areas.

3.10.3.2.3 Alternative 3

The situation under Alternative 3 would be the same as described for Alternative 2 except removal of Cougar lift would allow obliteration of two additional skiways, Slow Trail and Fast Trail. For existing runs, this would eliminate two crossings each on Grizzly, Elk, and Belly Roll, or six crossings less than Alternatives 1 and 2 (resulting in three and five total crossings of existing runs, respectively, for these two alternatives). That would be a notable improvement in skier flow on existing runs. The scenario for new runs would not change.

3.10.3.2.4 Alternative 4

Skier flow on existing runs under this alternative would be affected as described above for Alternative 3. New trails would also be the same except that run 3 would not exist to be crossed by the new summit access road/novice skiway and run 2 may merge onto run 4, creating a new crossing of the summit access road/novice skiway.

3.10.3.3 Existing Trail System

3.10.3.3.1 Alternative 1

Under the no-action alternative, no lift-served, downhill mountain bike trails would be developed. Use levels would increase at roughly the rate of local population growth (1–3 percent), and there would be no potential created for adverse effects on the Cache Creek/Game Creek trail system or its users.

3.10.3.3.2 Alternative 2

This alternative would provide summit access for bikers via the Summit gondola. The primary reason for providing this access is to support dedicated downhill mountain bike trails on the front side and the mountain bike zone on the backside. However, access to the existing Cache Creek/Game Creek trail system from the summit would be allowed. As a result, both downhill and cross-country bikers would likely take advantage of lift access to the summit. The question is how many bikers of both types, and from the several hybrid types in between, would likely opt to use the existing Cache Creek/Game Creek trail system.

First, downhill mountain biking is a specialized activity, involving heavy, full-suspension bicycles (roughly 40 pounds) that are difficult to ride uphill or even across flats. Riders typically wear full-face helmets, gloves, protective arm and leg pads, and often neck braces, which further hamper cross-country riding. Participants pay for lift access in order to ride purpose-built downhill trails designed and built by specialists to provide a thrilling experience keyed to the ability level of the rider. A good run is said to involve neither pedaling nor braking.

Because of these differences in equipment and desired experience, downhill bikers generally have little interest in cross-country trails. Downhill bike parks are common at ski resorts, and more are being developed every year. Most of these parks overlap to some degree with cross-country trails, but little overlap in use occurs. In some instances, a cross-country trail that maintains a good downhill grade may be used by downhill bikers to leave the bike park and get home or back to a car parked at a trailhead. The Mill Creek trail at Grand Targhee is a good example of this scenario. The Cache Creek/Game Creek trails accessible from the Snow King summit may have added appeal, since Ferrin's, Josie's Ridge, and Skyline have generally downhill grades and would return riders back to town and the base of the resort, so no vehicle shuttle would be required.

Snow King projects that the proposed front-side trails and back-side mountain bike zone will attract 6,000 riders per season within 5 years of completing the proposed trails and bike zone. To ensure a conservative analysis, we will address 10,000 downhill bikers per season, or an average of 109 per day for a June 1–August 31 season. Grand Targhee Resort estimates that up to 20 percent of park riders may leave their downhill trail system to ride a cross-country trail (Williams 2019). If that figure held at Snow King, it would equate to 22 new riders per day on Cache Creek/Game Creek trails.

Second, most cross-country bikers who used the gondola to access the summit would do so to access the Cache Creek/Game Creek trail system via upper Skyline trail to the east or Josie's Ridge the west. Initially, in the first few seasons following construction of the lift, most of these riders are anticipated to be locals looking for an alternative way to enjoy the Cache Creek/Game Creek trail system and perhaps try some downhill trails in the mountain bike zone as well. Since these local cyclists would be using the trail system already, without summit lift access, this would not equate initially to an increase in use of the Cache Creek/Game Creek trail system as a whole.

Third, over time, it is likely that this opportunity for lift-served access to the Cache Creek/Game Creek trail system would become better known, attracting more riders from outside the community. This opportunity could become a destination attraction in itself, but it would not likely equal the draw of the downhill trails and mountain bike zone. Evolving technology is also a factor. For example, while the use of e-bikes is currently not permitted on non-motorized trails within the National Forest, there is increasing pressure to provide more opportunities for e-bike travel. Mountain resorts with bike trails are likely to be one of the first places where this use is considered appropriate. Conservatively, this analysis assumes that this new

opportunity might attract a third the number of bikers as the downhill system, roughly 3,300 per season or 36 per day.

Based on these calculations, Alternative 2 is projected to add 58 bicyclists per day to the Cache Creek/Game Creek trail system, 22 leaving the downhill system and 36 new cross-country riders. Compared to the current average of 1,526 users per day (section 3.10.2.3), this would be about a 4 percent increase, well within the overall capacity of the trail system.

However, despite this minor effect on the number of trail users, provision of lift access to the summit would likely generate a significant shift in use patterns. It would make the higher-elevation, more distant trails much more accessible to new and existing cross-country users alike. All 58 of those new riders would access the Cache Creek/Game Creek trail system from the top rather than the bottom and ride trails such as Skyline, Ferrin's, Wilson Canyon (via Lift A), and Josie's Ridge (via the gondola). This would be a significant increase in use of these currently lightly used trails. For example, if 25 percent of this use was on Ferrin's, that would equate to 2.7 to 4.3 times current estimated use (i.e., 25–40 users per day; section 3.10.2.3).

Josie's Ridge trail is not designed for bike use but is sometimes ridden by those seeking a technical downhill trail or a strenuous uphill training ride. Current bike use is minimal on this trail, so any increase in downhill bike use would create conflict with hiking use.

This change in use patterns would alter the recreational experience provided by the Cache Creek/Game Creek trail system substantially. Relative to the stated desired condition of the system (section 3.10.2.3), the shift could benefit recreationists accessing the trail system from Jackson trailheads. Bicycle traffic on those heavily used lower trail segments would be reduced, decreasing crowding and trail damage.

However, increased mountain bike use of more remote trails and trail segments would grow proportionally. This would increase human interactions, reduce the sense of remoteness and the associated sounds, smells, and views of undisturbed nature. Disturbance of wildlife would increase, as would the potential for negative encounters with bears and lions. The possibility of damage to plant communities and water bodies would also increase in proportion to increased use. As discussed above (section 3.10.2.3), the Cache Creek/Game Creek trail system is generally well maintained now, and this increase in use would not necessarily change that assessment in terms of resource conditions. Higher levels of use would, however, affect the recreational experience.

Ferrin's, Skyline, Wilson Canyon, and Josie's Ridge would be most affected. Conflicts between uphill hiking and biking use and increased downhill traffic would be the main issues, particularly on Ferrin's due to the popularity and narrow width of the trail, and on Josie's Ridge, which currently supports limited bicycle use. These impacts could make substantial changes necessary, such as separating uses, allowing use in only one direction, or creation of new trails.

To avoid or minimize resource impacts and user conflicts, Snow King would develop a trail management plan detailing their efforts to monitor and address resource impacts and user conflicts on Cache Creek/Game Creek trails prior to constructing the back-side mountain bike zone.

Overall, these changes would remain consistent with the Roaded Natural Recreational Opportunity Spectrum classification (section 3.10.2.3), but they would constitute a notable degradation in the recreational opportunity provided by the Cache Creek/Game Creek trail system in the eyes of many users.

3.10.3.3.3 Alternative 3

The main change in terms of effects on the Cache Creek/Game Creek trail system and its users is that lift-served mountain bikers would not be allowed access to the existing trail system. The Sink or Swim trail would still be open to mountain bikers seeking to connect trails in the Cache Creek area with trails such as Shade Monkey, Linda's, and K-C but would not be open to lift-served bikers. Section 2.5.4.2 describes the combination of rider information, trail design, enforcement, and changes to allowed use of existing trails

that would be employed under this alternative to restrict lift-served bike use to the dedicated downhill trail system and mountain bike zone. Closure of upper Skyline and Josie's Ridge trails to bicycle use would provide a clear separation between the intensive bike activity within the ski area and the desired less-intensive, more nature-based experience outside of the ski area.

The main focus of these efforts would be bikers leaving the lifts, both the Summit gondola and Lift A. These people will already have been thoroughly informed of the prohibition on using the existing cross-country trail system. At the tops of the lifts, cyclists would be congregated at locations where the tops of both the downhill and cross-country trail systems were readily accessible (via the communications tower service road in the case of access to the eastern portion of the cross-country network at the Skyline trailhead). Tickets would be checked, and lift-served bikers would be directed through signage, barriers, and staff direction to the dedicated downhill trails. Only one downhill trail would leave the summit on the front side, near the gondola terminal, making that access point easy to observe and control. This would be similar to in-bounds terrain closures for skiers at Forest Service permitted ski areas, which are a common and effective practice.

The other focus for maintaining the restriction of lift-served bikers to the downhill trail system would be where downhill trails crossed popular front-side cross-country trails such as Sink or Swim, or where downhill trails off Lift A crossed the communication tower service road in the backside mountain bike zone, which would provide access to the Skyline trailhead. Depending on final trail design, there would be several such crossings.

As discussed above (section 2.5.4.2), intersections with cross-country trails would be designed with approach angles and grades that made it difficult to leave the downhill trail. Intersections would be located in open, visible areas so infractions were more easily detected, and bridges or underpasses would be used as necessary to physically separate downhill trails at intersections. Given the desire of most downhill mountain bikers to stay on high-quality, purpose-built downhill trails, these basic design criteria for intersections are anticipated to be effective in keeping the large majority of lift-served bikers from leaving the downhill system by accident or intentionally. Closing upper Skyline and Josie's Ridge to bike use would eliminate the attraction of using the lift to access the larger Cache Creek/Game Creek trail system. Doing it proactively, as soon as the new gondola was in operation, would avoid the risk of riders establishing a pattern of use in ignoring the prohibition on lift-served bikers leaving the dedicated downhill trail system.

Overall, the two main questions here are whether the closure of the Cache Creek/Game Creek trail system to lift-served bikers, implemented through rider information, trail design, enforcement, and proactive change in allowed use of upper Skyline and Josie's Ridge trails would avoid an increase in use of the Cache Creek/Game Creek trails sufficient to violate the desired condition for the Cache Creek/Game Creek system. This analysis suggests that the four-tiered approach would be sufficient to manage use and avoid user conflicts and resource impacts that could occur under Alternative 2. This scenario would be consistent with the Roaded Natural ROS designation of the area as well as the desired condition and trail objectives for the Cache Creek/Game Creek trail system.

Nevertheless, monitoring would be necessary to bear that conclusion out. Monitoring is an important part of management of the Cache Creek/Game Creek trail system, carried out by the Forest Service and community partners. Monitored variables include user conflicts and various resource impacts. If this monitoring indicated that additional action was necessary to avoid notable conflicts or resource impacts, the Bridger-Teton could implement additional administrative changes to trail management, both within and outside the permit boundary.

3.10.3.3.4 Alternative 4

Alternative 4 would provide additional assurance that adverse impacts on the Cache Creek/Game Creek trail system and its users would be avoided by eliminating the proposed mountain bike zone on the back side and restricting the downhill mountain bike trail system to a smaller portion of the front side, generally in the Rafferty area. Access would still be from the Summit gondola, via a single beginner downhill trail

off the summit. An advanced trail would spur off of the beginner trail below the summit ridge. The trail system would terminate near the gondola bottom terminal. This trail system would be about 14 percent shorter than that proposed under Alternatives 2 and 3. It would be mostly on lower-angled terrain with more beginner terrain. See section 2.6.3 for a more detailed description.

One effect of these changes would be a reduction in the appeal of Snow King's downhill mountain bike program. It is difficult to accurately project the impact on visitation, but it is unlikely that half of the projected use under Alternatives 2 and 3 (i.e., 10,000 riders per season) would be realized. However, as discussed above (section 3.10.3.3.2), downhill bikers are not really the issue, as they would account for only a small fraction of the current user population of the Cache Creek/Game Creek trail system even if they all chose to ride those trails – and only an estimated 20 percent would.

Three of the four types of measures described above under Alternative 3 (section 3.10.3.3.3) to keep lift-served bikers off the Cache Creek/Game Creek trail system would be in place, but there would be no change in allowed use on upper Skyline and Josie's Ridge. The three-tiered approach of rider information, trail design/barriers, and enforcement would likely be effective in avoiding any major illegal use since there would only be one access point to control (top of gondola) which would simplify information and enforcement efforts.

In terms of preventing lift-served riders from accessing existing front-side trails, the reconfigured downhill trail system would result in a single crossing of Sink or Swim trail, and it would be in the highly visible Rafferty mid-station area. This would simplify enforcement of the closure.

Overall, this alternative is projected to be slightly more effective in protecting the Cache Creek/Game Creek trail system and users than Alternative 3, mostly due to its elimination of the back-side mountain bike zone, its reduced size and concentrated location. It would also provide substantially less opportunity for downhill mountain biking.

Other benefits under this alternative would be that it would reduce construction and maintenance costs as well as visual impact relative to the Alternative 2 and 3 trail system due to its reduced size and location in a lower-angle, more forested part of the permit area. This variation too would be consistent with the Roaded Natural ROS classification of the project area.

3.10.3.4 Phil Baux Park

3.10.3.4.1 Alternative 1

Under the no-action alternative, there would be no impact on Phil Baux Park or park users associated with ski area. The park, including its parking lot, would continue to be integrated into the recreation-oriented zone at the base of Snow King.

3.10.3.4.2 Alternative 2

Under this alternative, the bottom terminals of the proposed Summit gondola and zip line would be built in what is now the parks' parking lot. This would result in elimination of the parking lot, so parking needs would have to be met elsewhere. This would result in a net increase in open green space available for recreational activities in the former parking lot area. However, when the gondola and zip line were in operation, the lift maze and bystanders might occupy a substantial amount of the additional space.

The gondola would also provide uphill access for mountain bikers using the new front- and back-side trails, and the front-side trails would also end at the gondola terminal. This would bring an added level of bustle and energy to the area.

Collectively, these high-profile facilities would fundamentally change the recreational opportunities the park currently provides. The level of activity, excitement, and noise (section 3.9) would overshadow the quieter, more and relaxed atmosphere that is currently characteristic of the park.

3.10.3.4.3 Alternative 3

Under this alternative, no new infrastructure would be sited in Phil Baux Park. Cougar lift would be removed, and the bottom terminal of the gondola, with all its associated activity, would be shifted to the site of the Cougar bottom terminal. The zip line bottom terminals would be moved to the Rafferty mid-station area.

These changes would eliminate the main adverse effects on the park. The parking lot would remain intact, avoiding the indirect effects of parking elsewhere. While the gondola terminal would not be far away, shifting it up the slope and moving the zip line terminal to the Rafferty area would help maintain the park as an island of relative calm.

3.10.3.4.4 Alternative 4

Effects on Phil Baux Park under this alternative would be basically the same as discussed above under Alternative 3. The minor exception would be that no back-side mountain bike zone would be developed, so the level of bike-related activity around the nearby gondola bottom terminal would be less.

3.10.4 CUMULATIVE EFFECTS

None of the cumulative actions outlined in section 3.1.2 have the potential to affect any of the recreational resources impacted directly or indirectly by these alternatives. As a result, there is no potential for cumulative effects.

3.10.5 DESIGN CRITERIA

1. Design and construct all buildings in accordance with the *Accessibility Guidebook for Ski Areas Operating on Public Lands – 2012 Update* (Forest Service 2012b). Confirm compliance through Forest Service engineering review prior to construction.
2. Prepare and submit to the Bridger-Teton a trail management plan addressing trail maintenance and management of user conflicts prior to development of the back-side mountain bike zone.

3.11 SAFETY

3.11.1 SCOPE OF ANALYSIS

3.11.1.1 Safety of Summer Visitors

- *How would the proposed mountain bike trails and mountain bike zone affect the safety of other summer visitors?*

Snow King's permit area supports summer recreational use of various types, including resort infrastructure such as the mountain coaster, alpine slide, and ropes course accessed from the Rafferty lift mid station, as well as numerous formal and user-created hiking and biking trails throughout the permit area. The proposed mountain bike zone and trail network overlaying these other recreational uses could create collision risks and other safety issues.

Indicator: Review of the integration of existing and proposed summer recreation infrastructure with proposed mountain bike park and trails network to qualitatively assess safety risks.

3.11.1.2 Skier Safety

- *How would the proposed summit access road/novice skiway affect skier safety?*

This issue has two aspects, the safety of skiers using the skiway, and the safety of skiers crossing the skiway on the front-side runs. In the first case, the steepness of the slope adjacent to the skiway could make it

dangerous for beginners or others who skied off the skiway. They could slide down the groomed runs or be trapped in deep snow in the forested patches. For skiers crossing the skiway, the cut and fill slopes necessary to construct it could block smooth skier flow and pose a hazard to skiers attempting to cross it at speed.

Indicator: Generally qualitative assessment of the design of the skiway and the efficacy of measures to minimize these risks, based on experience at Snow King and elsewhere.

3.11.1.3 Avalanche

- *How would the proposed ski run clearing and summit access road/novice skiway affect avalanche hazard?*

Snow King's steep slopes lie directly above the base area and adjacent commercial and residential development, making avalanches an important concern. The proposed expansion and associated ski run clearing could increase this hazard and the level of effort required to manage it. The steep cut and fill slopes along the proposed summit access road/novice skiway could create new starting zones and add to the problem.

Indicator: Qualitative assessment of the current avalanche situation and snow safety program, followed by analysis of the impact of proposed infrastructure on the hazard level and the effectiveness of the snow safety program to manage it.

3.11.2 AFFECTED ENVIRONMENT

3.11.2.1 Safety of Summer Visitors

A substantial number of summer visitors currently recreate at Snow King. Records or estimates of visitor numbers exist for two somewhat overlapping but generally separate user groups. The first is recreating members of the public using trails in the Cache Creek/Game Creek system that intersect, or lie within, the Snow King special use permit boundary. The second is paying visitors using Snow King's summer recreation amenities. According to estimates of users in the first group, provided in section 3.10.2.4, there are approximately 140,000 recreating members of the general public using the Cache Creek/Game Creek trail system each year between June 1 and August 31. These include both hikers, runners, dog walkers, and mountain bikers. Some are traversing the ski area on popular trails such as Sink or Swim, and some are recreating entirely within the ski area, such as those using the Summit and Stairway trails. Currently, a high density of trails, and trail users, meet and diverge in the area above the Rafferty mid-station. The Skyline trail passes through the permit area on the back side and supports light but consistent use.

With regard to paying visitors using Snow King's summer recreation amenities, records from previous years indicate that approximately 85,000 people per season use the mountain coaster, alpine slide, ropes course, and Summit chairlift. Scenic rides are offered on the Summit lift, but the majority of paying summer visitors use the facilities around and below the Rafferty mid-station. Currently there is almost no use by paying visitors in the back-side portion of the permit area. A few Summit lift riders hike on a nature trail loop on the ridgetop to the west of the Summit lift top terminal, but other trails off the summit are very lightly used by this group.

In the concentrated use area around the Rafferty mid-station, the minimal existing signage is focused on directing visitors to various activities. This signage is intended to keep visitors engaged in different activities separated. There is currently no signage notifying trail users of trail intersections or advising caution in these areas. However, most visitors in this area are on foot, or are bikers traveling at low speeds due to flat and rough terrain, so the level of collision risk in this area is fairly low, despite the lack of signage at trail intersections and number of visitors using the area.

3.11.2.2 Skier Safety

Currently beginner-level skiers do not access the summit of Snow King since there is no easy way for them to get down, as clearly indicated by signage in the loading area. The existing skiway off the summit is steep, narrow, and turns enough that it is primarily used by more advanced skiers to reach various parts of the mountain and serves very little utility for lower ability-level skiers.

Six existing upper-mountain ski runs could be crossed by the proposed summit access road/novice skiway, three black diamond runs (Cut Off, Grizzly, and Elk), and three double black diamond runs (Belly Roll, Upper Exhibition, and Bearcat). Grizzly and Elk are two of the most used runs at Snow King and are currently crossed by one and two skiways (or sections of the same skiways), respectively. Of the double black diamond runs, Upper Exhibition receives the most use followed by Bearcat and Belly Roll. Upper Exhibition and Bearcat are currently not crossed by any skiways, and Belly Roll is crossed by four.

3.11.2.3 Avalanche

Avalanche risk at Snow King is generally low due to low elevation and low average snowfall, even though the slopes are generally steep. Over the past decade the ski area has averaged 5 days a year when explosives, typically 5-pound hand charges, are used for avalanche control. The remaining days, avalanche hazard is reduced by ski cutting (i.e., ski patrol cross cutting starting zones to release small instabilities in the snowpack) and skier compaction preventing the formation of slabs.

There have been two notable in-bounds avalanche events in recent years, both occurring under similar weather conditions. In 2015 and 2017 there were point-break, wet-slide avalanches triggered by skiers on Belly Roll and Upper Exhibition, respectively. In each case, the slow-moving slides ran a short distance, approximately 100 feet on Belly Roll, and approximately 140 feet on Upper Exhibition. Weather conditions leading up to these events were rainy and warm, causing the normally stable snowpack to slide under the increased weight of water-saturated snow and skiers. Since these events, standard procedure is to close the steep slopes on the upper mountain during, and immediately after, prolonged rainy and warm conditions, thereby substantially reducing the likelihood of a slide.

Despite a lack of avalanche control work on the back side, in the southern portion of the permit area, no significant avalanche events have been observed there in the last decade. This is due to the predominately low slope angle of that terrain and the up-canyon winds that generally promote stable snow conditions in this area.

3.11.3 Direct and Indirect Effects

3.11.3.1 Safety of Summer Visitors

3.11.3.1.1 Alternative 1

Under this alternative, there would be no development of additional mountain bike trails at Snow King. As a result, the situation with regard to safety of summer visitors would remain as described in the affected environment section (3.11.2.1).

3.11.3.1.2 Alternative 2

As described in section 3.10.3.4.2, it is estimated that up to 10,000 people per season (roughly June 1 through August 31) would use the lift-served mountain bike trails at Snow King, representing a 7 percent increase over current levels of trail use in and around the ski area. The vast majority of this use would occur on new designated downhill trails maintained by the ski area.

As discussed in section 2.4.8.2, trail alignments and difficulty levels are conceptual at this point and have not been optimized for the terrain or for minimizing crossings with existing trails. However, as currently

laid out, the proposed trails cross existing trails multiple times. While intersections would likely be reduced in final design, some crossings of existing trails would remain.

Unmanaged, some crossings could present a substantial collision risk due to the high speed of bikers on the new downhill-biking trails and the high density of pedestrian users and bikers on the existing trails being crossed. Design criteria would be required to reduce this risk to an acceptable level.

Design criteria would include a combination of signage warning users of both trails that they were approaching an intersection, and features designed to slow riders would be added on the downhill trails. Multiple signs would be used, and each successive sign would indicate the distance to the crossing. Slowing features on the downhill bike trails could include narrowing of the trail, sharp turns, obstacles, less steep grades, or turning the trail uphill and paralleling the existing trail for a short period. The type of slowing feature used would be based on the characteristics of the crossing, as not every measure would be appropriate for each crossing.

Trail design would ensure that the intersection was visible from an adequate distance and that mountain bikers on the new downhill trails could see up and down the existing trail before arriving at the intersection. If no appropriate slowing feature was feasible and good sightlines could not be achieved, bridges or underpasses could be utilized to take users of the new downhill trail over the top of the existing trail without risking a collision. With the design criteria detailed in section 3.11.5 in place, the collision risk for summer visitors under this alternative would remain low.

3.11.3.1.3 Alternative 3

With regard to the safety of summer visitors, impacts of this alternative would be the same as those described above for Alternative 2.

3.11.3.1.4 Alternative 4

While this alternative would reduce the number of trail crossings, the design criteria discussed above (section 3.11.3.1.2) would reduce collision risk to a negligible level, and the number of trail crossings would be less relevant from a safety perspective. Impacts of this alternative would be marginally less than those described above for Alternative 2 due to the reduced number of crossings. No trail crossings would be created on the back side as the mountain bike zone would not be developed.

3.11.3.2 Skier Safety

3.11.3.2.1 Alternative 1

Under this alternative, the summit access road/novice skiway would not be constructed, and the situation regarding safety of lower ability-level skiers on existing skiways and skiers crossing the existing skiways would be as described above under affected environment (section 3.11.2.2).

3.11.3.2.2 Alternative 2

Under this alternative, lower ability-level skiers would be accessing the summit area using the Summit gondola, and the novice skiway would provide emergency egress in the event of the gondola being closed for unforeseen reasons. Typically, true beginner skiers who were not ready to advance from Lift B and C terrain to Lift D terrain would download the gondola to return to the base, while skiers who had gained basic skills would likely take the skiway.

The layout of the skiway and the beginner terrain area would generally prevent skiers who were not ready for the skiway from entering, since the top of the skiway is 1,200 feet from the bottom of Lift B. A skier capable of skiing 1,200 feet of beginner terrain and making the turn at the bottom of the beginner terrain to enter the skiway should have the skill necessary to navigate the skiway, since it was designed at a maximum 10 percent grade suitable for novices and has only one sharp corner. Signage at the bottom of Lift C would advise beginners to take the carpet lifts back to the gondola.

It is to be expected that signage would sometimes be ignored, and skiers of very low ability level would end up on the skiway. While there is steep terrain adjacent to it, the skiway would be wide enough at 16 feet for a multiple skier-width margin on the downhill side that a skier would have to cross to leave the skiway. Techniques such as slightly angling the skiway toward the slope could also help keep beginners on the skiway.

As described in section 3.10.3.3, this alternative would generally represent an improvement over the existing conditions with regard to the number of skiway crossings at Snow King. Ski runs crossing skiways are ubiquitous at ski areas throughout the world, and proper construction and signage practices have been well established as industry standards. While skiways crossing ski runs do present a safety issue, it is well in line with the inherent risks of skiing as a sport.

With regard to skier safety, this alternative would create more risk than Alternative 1. However, the circumstances of lower ability-level skiers using skiways that cross steep terrain and advanced skiers needing to cross skiways are not unique to Snow King or this alternative, and do not present safety hazards beyond the industry norm, with standard safety practices in place.

3.11.3.2.3 Alternative 3

With regard to the safety of beginner skiway users and skiers crossing the skiway, impacts of this alternative would be the same as those described above for Alternative 2.

3.11.3.2.4 Alternative 4

With regard to the safety of beginner skiway users and skiers crossing the skiway, impacts of this alternative would be the same as those described above for Alternative 2.

3.11.3.3 Avalanche

3.11.3.3.1 Alternative 1

Under this alternative, no additional ski runs would be developed at Snow King. As a result, the situation with regard to avalanche hazard would largely remain as described in the affected environment section (3.11.2.3). Over the long term, climate change may lead more often to conditions that have caused in-bounds avalanches in the past. No avalanche control would take place on slopes above residential areas immediately east and west of the current permit boundary.

3.11.3.3.2 Alternative 2

Under this alternative, all new terrain would be subject to the avalanche hazard reduction practices in place for existing ski runs, as described in section 3.11.2.3. The only difference with regard to control practices would be that more charges would be necessary on days when explosives were used due to the increased area subject to avalanche control.

With Snow King's standard avalanche hazard reduction practices in place, small wet-slide avalanches would likely continue to occur with roughly the same frequency as they have in the past. Avalanche starting zones associated with new terrain or the summit access road/novice skiway would be at least 1,500 feet away from any structures below the ski area. This represents an unprecedented movement distance for an avalanche at Snow King and is highly unlikely to occur since the slope, aspect, elevation, and precipitation levels for any new starting zones above structures would be similar to those already existing at Snow King. Avalanche control activities, including skier compaction, would be extended into the east and west boundary adjustment areas, including the Ferrin's slide path, providing additional protection to structures below.

As discussed in more detail in section 3.10.3.2.2, the number of skiway crossings of runs on the upper mountain would be reduced due to closure and obliteration of existing skiways made unnecessary by the new summit access road/novice skiway and removal of Cougar lift. This would reduce the potential for creation of unsupported slabs relative to current conditions. Transitional grading upslope of the summit

access road/novice skiway would be done to reduce the formation of unsupported slabs. Finally, Forest Service review of Snow King's winter operations plan would include review and approval of the ski area's avalanche hazard management program, and any deficiencies would be addressed in that review.

Avalanche hazard on the back side would be lower than under Alternative 1 due to additional hazard reduction practices as well as a higher level of skier compaction.

Overall, this alternative represents a slight increase in avalanche hazard relative to Alternative 1 simply due to the increase of skiable terrain where avalanches could occur in proximity to in-bounds skiers at the ski area.

3.11.3.3.3 Alternative 3

With regard to avalanche hazard, impacts of this alternative would be essentially the same as those described above for Alternative 2. Obliteration of the Slow and Fast trail skiways would marginally decrease the risk associated with unsupported slabs forming above skiways.

3.11.3.3.4 Alternative 4

With regard to avalanche hazard, impacts of this alternative would be the similar to those described above for Alternative 2. The only difference would be where the new front-side ski runs would be cut. These different locations would not substantially change the level of avalanche hazard relative to Alternative 2. Therefore, as in Alternative 2, this alternative represents a slight increase in avalanche hazard relative to Alternative 1, simply due to the increase of skiable terrain where avalanches could occur in proximity to in-bounds skiers at the ski area.

3.11.4 Cumulative Effects

There are no past, present, or reasonably foreseeable actions that have the potential to overlap with the direct and indirect effects of this action in a way that could produce significant cumulative effects.

3.11.5 Design Criteria

1. Use at least four signs on the downhill trails to notify riders of each intersection of a downhill trial with an existing trail. Space signs approximately 100, 50, 25, and 0 feet from the intersection. Additional signs may be used if deemed necessary.
2. For each intersection, use two signs on the existing trail, one facing each direction, to notify users of the existing trail of the intersection.
3. Where appropriate, use slowing features to reduce the speed of downhill trail users at intersections with existing trails.
4. When determining the final layout of downhill trails, ensure that users of the trail can see at least 20 feet up and down the existing trail from a distance of 30 feet away from the intersection.
5. In circumstances where the design criteria above cannot be implemented, use bridges, or underpasses, to take users of the new downhill trail over, or under, the existing trail without risking a collision.

3.12 SCENERY

3.12.1 Scope of Analysis

3.12.1.1 Scenic Quality

- *How would the proposed infrastructure affect the scenic quality of Snow King Mountain?*

The front side of Snow King is the southern backdrop of the town, where scenic quality is a widely held value. While the resort is already part of that backdrop, additional infrastructure, individually and collectively, on the front side and the summit could result in an even less natural appearing view from the town.

Indicator: Assessment of the impact of the proposed infrastructure using the methodology established in the Forest Service's Visual Management System (Forest Service 1974).

3.12.1.2 Lighting

- *How would the proposed lighting for night skiing and operation of summit facilities affect the nighttime view and dark sky?*

While lighting for night skiing, grooming, and other on-mountain activities has been part of the nighttime setting on the mountain for some time, the proposed expansion of night lighting and addition of summit lighting would constitute a greater departure from the natural setting.

Indicator: Review of the current setting and applicable local regulations regarding lighting, then assessment of the extent, intensity, and duration of the proposed change, in the context of those local regulations. (While local regulations do not apply to National Forest System lands, we consider them in this analysis in our efforts to be a good neighbor.)

3.12.2 AFFECTED ENVIRONMENT

3.12.2.1 Scenic Quality

3.12.2.1.1 Management Direction

The goal of landscape management on all National Forest System lands is to maintain the highest possible scenic quality, commensurate with other appropriate public uses, costs, and benefits. Since the mid-1970s, the Forest Service has operated under the guidance of the Visual Management System (AH-462, National Forest Landscape Management, Volume 2, Chapter 1, issued April 1974) for inventorying, evaluating, and managing scenic resources on National Forest System lands. The Visual Management System provides a system for measuring the inherent scenic quality of any forest landscape and the degree of alteration for use in inventory and management.

Under this system, Visual Quality Objectives (VQOs) are based on the physical characteristics of the landscape and the sensitivity of the setting as viewed by humans. VQOs define how the landscape will be managed, the level of acceptable changes to the landscape character permitted in the area, and under what circumstances management activities or recreational development may be allowed.

Different VQOs may apply to different distance zones. Applicable VQOs are based on land allocations established by the Forest Plan. The Bridger-Teton Forest Plan assigns the VQOs of modification and partial retention to the Desired Future Condition 9B, Special Use Recreation Area, zone that includes Snow King (p. 306). Those VQOs are defined as follows:

> Modification: Under the modification visual quality objective management activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional parts of these activities such as structures, roads, slash, root wads, etc., must remain visually subordinate to the proposed composition.

Activities which are predominately introduction of facilities such as buildings, signs, roads, etc., should borrow naturally established form, line, color and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

Partial Retention: Management activities remain *visually subordinate* to the characteristic landscape when managed according to the partial retention visual quality objective.

Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.

Landscapes can also be described in terms of their existing visual condition (EVC). EVC describes the visual appearance of the landscape at the time the project area scenery assessment is conducted. It excludes the context of whether the landscape is seen or not seen from sensitive roads, trails or recreation use areas. EVC indicates the amount of change that has occurred in the past, and what level of change may be acceptable in the future.

The relevance of EVC for this analysis is to use the present visual condition of the project area as a baseline to evaluate the acceptable desired future condition and cumulative effects outlined in the Forest Plan management prescription criteria. Six levels are used to describe the landscapes existing visual condition ranging from pristine to intensively modified:

Type I: Landscapes where only ecological change has occurred, except for trails needed for access. Landscapes appear to be untouched by human activities.

Type II: Landscapes where change is not noticed by the average forest visitor unless pointed out. These landscapes have been altered but changes are not perceptible.

Type III: Landscapes where changes are noticeable by the average forest visitor, but they do not attract attention. Changes appear to be minor disturbances.

Type IV: Landscapes where changes are easily noticed by the average forest visitor and may attract attention. Changes appear as disturbances but resemble natural patterns in the landscape.

Type V: Landscapes where changes are very noticeable and would be obvious to the average forest visitor. Changes tend to stand out, dominating the view of the landscape, but are shaped to resemble natural patterns.

Type VI: Landscapes where changes are in glaring contrast to the landscape's natural appearance. Changes appear as dramatic, large scale disturbances that strongly affect the average forest visitor.

In regard to building aesthetics, agency direction is provided in *The Built Environment Image Guide for the National Forests and Grasslands* (BEIG; Forest Service 2001c). The BEIG was prepared by the Forest Service for use by those involved in planning, designing, constructing, repairing, maintaining, and authorizing facilities on National Forest System lands, including architects and landscape architects. An important aspect of the BEIG is that it considers not only the natural environment but also the cultural and economic contexts:

> The proper fit of Forest Service facilities into their natural, cultural, and economic contexts requires careful consideration of many aspects of design, including scale, proportion, and selection of building materials. (p.5.)
>
> The built environment should reflect the context of its surroundings, including its physical setting, social context, and long-term economic effects… (p.6.)

Snow King lies in the BEIG's Rocky Mountain province, and the BEIG provides specific guidelines regarding siting, design, and materials specific to this province that are to be considered in engineering review of final building plans prior to construction.

The final point of management direction to note is the provisions of the *Jackson/Teton County Comprehensive Plan* dealing with scenic quality. While National Forest System land does not fall under the purview of this plan, the Bridger-Teton strives to be a good neighbor and accommodate local planning goals and objectives, and protection of scenic resources is component of the comprehensive plan, including the Snow King Slope subarea.

Most relevant to this analysis is the plan's direction regarding construction on skylines, given current and proposed facilities on the top on Snow King Mountain. Policy 1.3.a of the plan states "Buttes, ridgelines, and mountains are the most prominent aspects of our landscape. Development along butte tops and ridgelines will be avoided or minimized so that key skyline viewsheds retain a natural appearance uninterrupted by built forms."

3.12.2.1.2 Current Setting

This analysis focuses on the front side of Snow King, as the backside is not visible from any sensitive viewpoints. The modification VQO is applicable to foreground views of the ski area, adjacent to the base area at Snow King, around the National Forest boundary land. Partial retention describes the higher reaches of Snow King Mountain, viewed in the middle ground and background from Jackson. In the modification zone, the area around the Rafferty mid-station has been developed for summer as well as winter recreation, with summer infrastructure the most visible variation from the natural landscape. In addition to the mid-station of Rafferty lift itself, the tops of the alpine slide and mountain coaster lie on or just below National Forest System land, as does the ropes course.

In terms of winter infrastructure, there are several ski runs that roughly parallel the Rafferty lift, and other runs are arranged across the front side of the mountain, running together in the generally open toe of the slope near and below the National Forest boundary. They comprise about 135.6 acres of cleared ski terrain. The Rafferty and Cougar lifts cross from the private base area onto National Forest System land and end mid-way up the slope. The Summit lift runs to top of the mountain from the western base area. The ski runs are the most visible feature in the partial retention zone. The lifts, lift terminals, and access roads are less visible from vantage points at the base area, in the town, and to a lesser degree on highways approaching the town.

Overall, Snow King maintains the visual aesthetics that viewers expect from one of the first ski areas permitted by the Forest Service in the US. That permit has been in effect since 1936, and Snow King is a widely recognized and appreciated feature of the local landscape. It has even been identified as eligible for listing on the National Register of Historic Places as an historic landscape (section 3.7).

In terms of compliance with the VQOs assigned by the Forest Plan, the permit area from the National Forest boundary to the summit of Snow King is clearly identifiable as a ski area. No major land-form alteration has occurred, but vegetation alteration in the form of ski run development is a departure from the natural setting. While naturally occurring avalanche chutes are not evident in the permit boundary, the ski runs exhibit some of their characteristics in terms of line, color, and texture. The ski runs are vertical features that follow the fall line down the mountain. Their alignments and widths are variable, reflecting variation in the existing topography. Their edges have been "feathered," or cut unevenly to appear more natural.

Stringers and islands of forested vegetation have been left intact to break up their pattern. As a result of natural and seeded revegetation, ski run vegetation matches fairly well in terms of color and texture with vegetation in natural openings.

Ski area infrastructure has also added elements to the landscape that are rare or infrequent in nature, particularly the straight lines associated with ski lifts, service roads, and buildings. However, the lifts are vertical features which helps them blend, and they are fine textured, few in number, and difficult to discern at distance. Service roads by necessity exhibit unnatural alignments and angles, but again they are relatively fine in texture and few in number, and their colors are natural. Few buildings have been constructed above the National Forest boundary, and those are generally screened by vegetation or, in the case of the summit buildings, by topography and distance.

In summary, while Snow King is readily identifiable visually as a ski area, it remains visually subordinate to the forested mass of Snow King and the adjacent peaks. Considering its setting and its history, the ski area is consistent with assigned VQOs and with what viewers expect to see.

Based on these considerations, the EVC of the project area landscape is Type V. Landscape changes are very noticeable and would be obvious to the average Forest visitor. Changes tend to stand out, dominating the view of the landscape, but are shaped to resemble natural patterns.

In terms of compliance with the BEIG, Snow King has few buildings of National Forest System land. As discussed in more detail in the cultural resources analysis (section 3.10), most structures outside the private base area are on the summit. They include the Panorama House (a warming hut with basic food and beverage service and a viewing deck), the top terminal of the original Summit lift (the unloading platform converted to a observation deck and the mechanical building used as a ski patrol shack), and an old, unused Civilian Conservation Corps cabin dating back to the 1930s. The only other building on National Forest System land is a small snowmaking pump house on the edge of Elk ski run built in 2014. These few structures were built over a period of more than 80 years, predating the BEIG, and they reflect no cohesive architectural style of design elements.

Finally, in regard to comprehensive plan direction on skyline protection, the buildings on the summit are too small and/or set back from the skyline as viewed from Jackson to be readily visible. While a number of communications towers are clearly visible on the Snow King ridgeline, the ski area buildings themselves do not interrupt the skyline viewshed.

3.12.2.2. Lighting

3.12.2.2.1 Background

The *Jackson/Teton County Comprehensive Plan* also includes the following direction regarding lighting and protection of dark skies: “The prominence of nature over the built environment should extend beyond daytime viewsheds. Lighting of individual developments cumulatively impacts the ability to see dark and starry night skies. Although lighting is required for public safety, especially along pedestrian corridors, non-essential lighting will be limited, and all lighting will be designed to meet dark skies best practices.” While National Forest System land does not fall under the purview of this plan, the Bridger-Teton strives to be a good neighbor and accommodate local planning goals and objectives, and protection of scenic resources is component of the comprehensive plan, including the Snow King Slope subarea.

3.12.2.2.2 Current Setting

The ski area can be a fairly active place at night, with light generated by night skiing, grooming of ski runs, and snowmaking. These are currently all winter activities, so the area is generally dark from the end of one ski season till the beginning of the next.

Night skiing has been offered on approximately 73.8 acres on the lower two-thirds of the mountain, in the Rafferty and Cougar pods. The schedule has varied, reflecting primarily the needs of the Jackson Hole Ski

and Snowboard Club or other ski training organizations. Night skiing currently runs from 4–6:30 PM but has run later in the past. As discussed in section 2.4.6, a general lighting system upgrade was implemented in 2015 and remains underway, replacing lighting fixtures with more efficient models designed to increase lighting of the snow surface but reduce light pollution in the form of glare (i.e., direct view of lighting elements) and sky glow (i.e., illumination of dust, water vapor, and other material in the sky).

Grooming has become an increasingly important aspect of ski area management because skier expectations for smooth snow surfaces and the need to "farm" snow to preserve the snowpack in good condition as long as possible. Snow King grooms all its permit area terrain, currently using two snowcats making vertical passes up and down the runs. The snowcats use headlights and spotlights to guide their work. Grooming operations generally continue through the night.

For similar reasons, snowmaking has become more important to ski areas industry wide, to maintain coverage and high-quality snow surfaces in an era of more variable natural snowfall. Snow King currently employs 30–40 snowmaking guns in a system covering about 90 acres in the Rafferty and Cougar pods and extending up Elk run. Each snowmaking gun has a light that is illuminated while it is operating, and operations generally run all night for roughly the first 60 days of the season.

Night skiing generates the most light but for the shortest period of the evening. Grooming generally occurs season-long and night-long, making it the most persistent source of light. However, it involves the smallest number of lights. Snowmaking falls somewhere between these limits. Collectively, this lighting is consistent with ski area operations anywhere and is a small fraction of the glare and sky glow generated by Jackson and surrounding communities. However, light occurring on the steep slope overlooking the town is more visually striking. Snow King's ongoing effort to upgrade the lighting technology for night skiing has notably decreased both sky glow and glare.

3.12.3 Direct and Indirect Effects

3.12.3.1 Scenic Quality

3.12.3.1.1 Alternative 1

Under the no-action scenario, Snow King's effect on scenic quality would remain as described above (section 3.12.2.1.2). Routine operations and maintenance would not alter the current viewshed, which is illustrated in Figure 3-22.

3.12.3.1.2 Alternative 2

Under this alternative, 11 new front-side ski runs, some in the eastern and western boundary adjustment areas, and modification of four existing runs would require an additional 117.8 acres of run development, 53.3 of which would be on the visible front side. The most visible changes from current conditions would be associated with the following runs: run 3 from the true summit of Snow King down to the top of Rafferty; run 8 from the summit ridge down to connect with Grizzly; runs 10, 11, 12, and 13 and modification of Belly Roll in the large forested patch between Elk and Exhibition; and modification of Bearcat. These runs would be more visible than others due to their elevation on the mountain and their alignment facing Jackson, making them highly visible. Conversely, runs such as 4, 5, and 7 would be much less visible since they are lower on the mountain and angled away from important viewpoints.

The same design and construction measures outlined above (section 3.12.2.1.2) would be employed to make new and modified runs as natural appearing as possible in terms of line, color, and texture. See Figure 3-23.

The upper section of the proposed summit access road/novice skiway (run 14), would be a less visible new element, although the profile would be more discernible in summer, crossing cleared ski runs, and year round as a break in canopy cover where it passed through forested patches. This would be an unnatural

appearing, nearly horizontal line. However, obliteration of all but the top section of Elkhorn Trail (which is the existing summit access road) and an unnamed service road and user-created hiking trail on the lower front side would reduce the net number of such unnatural features in the viewshed.

Replacing the existing Summit chair with a gondola in the same alignment would increase the visual impact of the lift slightly due to the larger cabins. The lift would remain an unnatural, linear feature on the landscape but would not stand out due to its fine scale. The backside and summit carpet lifts would not be visible from Jackson.

Summer infrastructure on the front side would include the zip line from the summit to near the gondola bottom terminal, about 6.5 miles of mountain bike trails, and about 2.1 miles of new or reconstructed hiking trails. The zip line would have no intervening towers, and the cable diameter would be too small to be visible from Jackson. Since most existing hiking and biking trails are not visible from Jackson viewpoints (see Figure 3-22), the proposed ones would likely not be discernible either, particularly following required rehabilitation of disturbed areas (section 3.4).

In terms of buildings, the existing Panorama House, unloading platform/observation deck, and ski patrol shack would be removed and replaced with the proposed multi-functional summit building. In Figure 3-22, the existing buildings are not discernible. In light of design requirements discussed in more detail below under BEIG compliance, the new summit building would not be seen during the day either. Night lighting is discussed below (section 3.12.3.2.2). The CCC cabin and observatory would be beyond the skyline, and the wedding venue – a natural-appearing excavated feature – would be obscured by vegetation and topography.

The other building proposed under this alternative is the temporary ski patrol building at the top of Cougar lift. It would be a small, pull-on structure set at the edge of the trees above the top lift terminal. That terminal is a larger structure than the building would be, and it is barely discernible from Jackson (Figure 3-23). The patrol building would not be a notable visual impact.

Obliteration of all but the top section of Elkhorn Trail and an unnamed service road and user-created hiking trail on the lower front side would contribute marginally to a more natural visual character.

Overall, in terms of complying with the assigned VQOs of modification and partial retention, this alternative would be more of the same – a quantitative change rather than a qualitative one. The area would still appear as a basic small ski area, meeting viewers' expectations in that regard. However, the new ski terrain would occupy substantially more of the viewscape, making the ski area marginally less visually subordinate to the forested mass of Snow King and the adjacent peaks.

The cultural resource analysis addresses the impact of these changes to the viewshed on Snow King's historic landscape (section 3.7).

Based on these considerations, the changes under Alternative 2 would be consistent with the Type V EVC.

Compliance with the BEIG would become a consideration under this alternative. As described in Chapter 2's description of the proposed summit building and Cougar ski patrol building (section 2.4.5), both would be built in compliance with the BEIG's guidelines for the Rocky Mountain Province. Those guidelines are summarized as, "include overscaled building elements, such as oversized doors and windows, heavy timber structures, and boulders incorporated into the building base…" to "help humans relate to the overpowering scale of the landscape," and "make the scale, color, and texture of materials correspond to the setting." Any given developed site should reflect a consistent architectural theme. As discussed in section 2.4.5, these buildings have not yet been designed, but pre-construction engineering review of final plans by the Bridger-Teton would ensure compliance with these guidelines. Compliance, in turn, would ensure that the buildings blended with the natural setting and shared and established architectural theme.

The last issue is the proposed summit building's compliance with *Jackson/Teton County Comprehensive Plan* (Town of Jackson and Teton County 2012) direction regarding construction on skylines, though as noted above compliance is not required on National Forest System land. That direction is, "Development along butte tops and ridgelines will be avoided or minimized so that key skyline viewsheds retain a natural appearance uninterrupted by built forms." As discussed in section 2.4.5.1, the building would be a single-story and set back from the ridgeline. It would comply with plan direction that the roof line be broken up to include multiple levels rather than forming a single, unnatural straight line. As noted above (section 3.12.2.1.2), the Snow King ridgeline is already punctuated by a number of visible communication towers. Based on these considerations, coupled with the fact that the building would be nearly 2 miles in slope distance from viewpoint on the north end of Jackson used in our visual simulations, the summit building would comply with comprehensive plan direction regarding skyline construction.

3.12.3.1.3 Alternative 3

The main new element with potential visual effects under this alternative would be the thinning or glading of about 190 acres, mostly on the visible front side of Snow King. These treatments would be similar in terms of what was done on the ground, with both involving removal of dead, unhealthy, poorly formed, or overly crowded trees, resulting in a spacing of 10 to 18 feet between trees. Dead and down material would also be removed. In many areas, this would not entail the removal of many trees.

In terms of visual impact, thinning and glading have been going on at Snow King for a number of years, with the objective of reducing fuel loads at the wildland/urban interface and improving skiing. However, given the variability in cover and texture of the forest canopy on Snow King Mountain, the thinned areas are not visually discernible. As a result, the impact of this activity on scenic quality is projected to be negligible.

This alternative includes several other changes relative to Alternative 2 with potential minor visual impacts (Figure 3-24). The Cougar lift would be removed, making the Slow Trail and Fast Trail access road/novice skiways unnecessary. These features would be obliterated. These changes would reduce the human-created visual clutter on the front side of Snow King.

Alignments of the Summit gondola, zip line, and summit hiking trail would be altered, but these changes would have negligible effects on visual impacts. The Cougar ski patrol building would no longer be necessary and would not be built.

Based on these considerations, Alternative 3 would be consistent with the VQOs of modification and partial retention and with Type V EVC. This alternative would be the same as Alternative 2 in terms of compliance with BEIG guidelines and skyline construction direction.

3.12.3.1.4 Alternative 4

The primary change under this alternative would be reconfiguration of front-side ski runs. To protect the historic landscape, several proposed runs in the central part of the ski area would be eliminated (runs 8–12) and runs 4, 5, and 7 in the eastern boundary adjustment area would be gladed rather than cleared. Runs 1, 2, and 15 would be added in the east and west boundary adjustment areas to offset the resulting loss in trail capacity in balance with the new gondola. Total new terrain would be 122.2 acres.

New runs would be constructed using the same design and construction measures outlined above (section 3.12.2.1.2) to make them as natural appearing as possible in terms of line, color, and texture. See Figure 3-25. The acreage of increased ski terrain would be somewhat higher than Alternatives 2 and 3, but terrain development would be shifted from the central part of the ski area to the east and west boundary expansion areas. These areas are less visible from most perspectives in Jackson, but they are previously unaffected visually by ski area activities.

Figure 3-22. View from turnout on US Highway 26 entering Jackson from the north under Alternative 1 (actual current condition).

Figure 3-23. View from turnout on US Highway 26 entering Jackson from the north under Alternative 2 (simulation).

Figure 3-24. View from turnout on US Highway 26 entering Jackson from the north under Alternative 3 (simulation).

Figure 3-25. View from turnout on US Highway 26 entering Jackson from the north under Alternative 4 (simulation).

The other change from the previous alternatives is in the design of the front-side mountain bike trail system. The length of trails would be reduced by roughly a third, and the bulk of trails would be shifted down slope and to the east into the eastern boundary adjustment area and the Rafferty pod. As noted above (section 3.12.3.1.2), bike trails are not generally visible, so this change is likely negligible in terms of scenic impact. However, the trails would generally be in a more heavily forested area, lower on the mountain, and on a less direct exposure to Jackson viewpoints.

Based on these considerations, the same conclusions regarding compliance with assigned VQOs, Type V EVC, BEIG guidelines, and skyline construction direction would hold for this alternative as for Alternatives 2 and 3.

3.12.3.2 Lighting

3.12.3.2.1 Alternative 1

Under the no-action scenario, the night-lighting situation would remain as described above (3.12.2.2) in terms of lighting for night skiing, operation of grooming equipment, and snowmaking.

3.12.3.2.2 Alternative 2

Under Alternative 2, the area illuminated for night skiing would increase by 27.3 acres, or 37 percent. Additional lighting would be provided on the racing lanes in the Cougar pod, and lighting would be extended to the top of the Rafferty pod (Flying Squirrel and Moose runs), the top of Upper Elk run, Lift B and C terrain, and the proposed summit access road/novice skiway. The hours night skiing was offered could be extended to as late as 9 PM. The lighting equipment would incorporate modern technology to provide more uniform and effective lighting to the snow surface while generating less glare and sky glow. This technology includes energy efficient magnetic induction lights and downcast reflectors.

In regard to grooming, Alternative 2 would add 117.8 acres of new ski runs, 53.3 of which would be on the visible front side. Snow King projects that the same two snowcats currently used for grooming would sufficient to cover the additional terrain, though intensity of grooming might decrease somewhat. As a result, the light generated by grooming would not change.

As to snowmaking, this alternative would add 147.1 acres of new snowmaking system coverage, 82.6 acres of which would be on the front side. Snow King projects that this might increase the number of lighted snowmaking guns by 20, most of which could be operating on the front side depending on conditions. That would be a 50 to 67 percent increase over the current operation.

Alternative 2 would introduce a new light source as well, the summit building described in section 2.4.5.1. In addition to its daytime functions, this building would include a restaurant open during the evening, and it would be a venue for evening events. As discussed above (section 3.12.3.1.2), the building would be a low structure, set back from the ridgeline and at least a mile distant from viewpoints in Jackson. It would also be LEED-certified for energy efficiency and would employ dark sky designs and operating practices such as minimal exterior lighting, appropriate bulbs and downcast reflectors, no exterior lights on after operating hours, and non-reflective glass (section 2.4.5.1).

Hours of operation would likely vary, with a normal restaurant closing time of 10 PM and most special events over by midnight. Once operations ended, lighting would be extinguished.

Overall, the changes in lighting associated with night skiing, grooming, and snowmaking would be quantitative rather than qualitative, commensurate with growth and development in the community. The summit building would be a new light source, but the stated design and operating parameters would minimize its visual impact. All in all, this alternative would comply with the county's comprehensive plan direction to limit lighting to what is required for public safety, especially along pedestrian corridors, limiting non-essential lighting, and designing lighting to meet dark skies best practices.

3.12.3.2.3 Alternative 3

None of the changes incorporated into Alternative 3 would alter the lighting impacts identified under Alternative 2 above.

3.12.3.2.4 Alternative 4

None of the changes incorporated into Alternative 4 would substantially alter the lighting impacts identified under Alternative 2 above. The altered ski run configuration would result in less grooming and snowmaking concentrated in the central portion of Snow King's front side, and more dispersion of these activities into the east and west boundary adjustment areas.

3.12.4 CUMULATIVE EFFECTS

Of the cumulative actions identified in section 3.1.2, only one has the potential to effect scenic resources in a cumulative way, overlapping the direct and indirect effects of the alternatives considered here. That is the Snow King Lower Elk Lighting project, which will complete the effort begun in 2015 to reduce light pollution in the sky with energy efficient magnetic induction lights that are also less impactful on wildlife. It includes additional 80 lights and 15 poles, replacing existing lighting on lower Elk. By reducing existing glare and sky glow, it would have a positive cumulative effect.

3.12.5 DESIGN CRITERIA

1. Design and build permanent structures in compliance with the Forest Service's *Built Environment Image Guide* (https://www.fs.fed.us/recreation/programs/beig/), ensuring that architectural style, building materials, size, and color are consistent and meet the adopted scenery objectives. Confirm compliance through Forest Service engineering review prior to construction.
2. Feather the edges of cleared ski runs to appear more like natural openings in forest cover, flowing with the topography and blending with the natural vegetation.
3. Acid dip or otherwise treat lift towers to reduce reflectivity and visual impact.
4. Consider pertinent Teton County and Town of Jackson development regulations regarding dark sky maintenance and ridgeline construction, as appropriate.
5. Obliterate all roads and trails identified for obliteration that lie below the upper leg of the proposed summit access road/novice skiway within 1 year following completion of the proposed summit access road/novice skiway.
6. Obliterate the first segment of Elkhorn Trail above the upper leg of the proposed summit access road/novice skiway within 1 year following completion of Lift D.

3.13 OTHER DISCLOSURES

3.13.1 HEALTHY FOREST RESTORATION ACT

This action would implement a land management plan and is not authorized under the Healthy Forest Restoration Act. As a result, it is subject to subparts A and B of the Project-level Predecisional Administrative Review Process (36 CFR 218).

3.13.2 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires that an EIS considers "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to

foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and to fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA, Section 101).

Snow King's permit allocates the National Forest System lands occupied by the ski area to provision of recreation opportunities through the term of the permit. This land use has some inherent impacts. This analysis identifies several adverse environmental effects, but few have important implications for the long-term productivity of the site. Surface and subsurface water systems would not be notably affected (see section 3.4.3.1). Changes in soil loss and fertility would be minimal (see section 3.4.3.2). Vegetation changes would be reversible through succession. The question here is whether this land use justifies any loss in long-term productivity of the resources involved.

Through issuance of ski area permits, the Forest Service helps provide outdoor recreation for a high number of visitors on a relatively small proportion of our National Forest System lands. The Bridger-Teton is no exception. The ski areas on the Bridger-Teton account for the majority of the total visitor use on the Forest while accounting for only a small fraction of the Forest's area.

In short, the potential impacts of this proposal on the long-term productivity of the ski area are minimal, especially in relation to the value of the short-term use. No important distinction among the alternatives can be drawn.

3.13.3 Unavoidable Adverse Effects

This analysis identifies a number of adverse effects which are either minor or would be avoided through implementation of design criteria. This discussion focuses on more substantial adverse effects that would not be fully avoided by design criteria. By resource, these are as follows:

Climate Change (section 3.2) – No unavoidable adverse effects.

Air Quality (section 3.3) – No unavoidable adverse effects.

Water, Soils, and Watershed (section 3.4) – No unavoidable adverse effects.

Vegetation (section 3.5) – No unavoidable adverse effects.

Wildlife (section 3.6) – No unavoidable adverse effects.

Cultural (section 3.7) – All action-alternatives would have unavoidable adverse effects on resources that are contributing to the historic landscape at Snow King. Section 106 consultation (section 3.7.5) will determine if and how these impacts would be minimized.

Land Use (section 3.8) – No unavoidable adverse effects.

Noise (section 3.9) – Under Alternative 2 there would be unavoidable impacts due to the summer recreation-related noise on the western side of the ski area.

Recreation (section 3.10) – Increased mountain bike use on existing cross-country trails under Alternative 2 could increase user conflicts, trail damage, and resource impacts in the Cache Creek/Game Creek trail system.

Safety (section 3.11) – No unavoidable adverse effects.

Scenery (section 3.12) – No unavoidable adverse effects.

3.13.4 Irreversible and Irretrievable Commitments of Resources

Irreversible commitment of a resource means that, once committed to a given use, the resource is lost to other uses. In general, this term applies to non-renewable resources (e.g., minerals, geologic features, or historic sites) or to resources which are renewable only over a very long period of time (e.g., soil fertility or perhaps old-growth forests). Most of the impacts identified in this analysis do not fall in this category.

If the decision were made to terminate the resort's permit, the site could be reclaimed, and most resource functions could be returned to their previous levels. However, there may be some exceptions:

- Soil productivity at some of the larger grading or excavation areas, such as the teaching center terrain and the access road/novice skiway, would likely not return to previous levels for a long time, if ever.
- Succession to pre-disturbance vegetation types would also be a slow process, particularly for older forest stands.
- Restoration of impacts associated with the historic landscape would be either not possible, as with removed structures such as the panorama house, or would be a very slow process, as with trees growing into cut runs to restore the historic run pattern.

Irretrievable commitments of resources involve lost use or productivity of resources. Any lost use or production resulting from this proposal's commitment of resources to recreation development would fall in this category. This could include the timber production lost to maintenance of open ski runs, access roads, and trails. However, ski areas are not typically managed for sustainable timber production.

While this proposal involves both irreversible and irretrievable commitments of resources, most of the commitments were made decades ago when the ski area was developed, and they are likely to continue. The incremental impact of this proposal would be minimal, and no important distinctions can be made among the alternatives in this regard.

3.13.5 Incomplete and Unavailable Information

No information necessary to appropriate analysis and disclosure of the environmental effects of the alternatives was incomplete or unavailable.

3.13.6 Energy Requirements and Conservation

Implementation of any action alternative would increase the ski area's energy demands in the short-term due to the need for construction vehicles and machinery. In the longer term, the additional ski lifts and buildings would consume energy, but the increase would be offset by removal of less efficient, older facilities with modern, high-efficiency technology. Energy use and conservation would be similar under all action alternatives.

3.13.7 Pollinators

A Presidential Memorandum was signed June 20, 2014, establishing the Pollinator Heath Task Force (PHTF), calling for the creation of a national pollinator health strategy, and directing federal land management agencies to review any new or renewing land management contracts and grants for the opportunity to include requirements for enhancing pollinator habitat (Obama 2014). The resulting 2015 *National Strategy to Promote the Health of Honey Bees and Other Pollinators* discusses Forest Service efforts to, among other things, restore pollinator habitat through prescribed fire and silvicultural thinning of forested stands and educate the public about pollinators (PHTF 2015).

Pollinators inhabiting the area likely include birds, bats, and other insects. This diverse group pollinates a wide number of plant species. All action alternatives would decrease tree cover in forested stands on proposed ski runs, lift alignments, and in gladed or thinned areas. Those treatments would likely increase plant species diversity, especially in densely forested areas, and likely benefit pollinator species.

Climate change could temper this positive conclusion. Recent research on climate change effects on western lands managed by the Forest Service and the National Park Service indicates several relevant conclusions (Halofsky et al 2018). First, in alpine ecosystems forbs are important for bees and other pollinators. Second,

changes in the winter climate can expose alpine and subalpine plants and seeds to frost damage, disease outbreaks, and habitat fragmentation, and can result in plant phenology that is out of sequence with pollinators. Third, these effects may favor generalist pollinators over alpine specialist pollinators.

3.14 CONSISTENCE WITH LAWS, REGULATIONS, POLICIES, AND PROCEDURES

3.14.1 ENDANGERED SPECIES ACT

The analysis of potential impacts on federally listed wildlife species is documented in section 3.6. There are no federally listed plants in the area. A Biological Assessment (BA) will be prepared for this analysis to document compliance with the ESA once a preferred alternative has been identified. The BA will be submitted to the FWS, initiating formal consultation, and a Biological Opinion will be prepared by the FWS in response. All consultation with the FWS will be completed before a Record of Decision is signed for this project.

3.14.2 CLEAN WATER ACT

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of all waters of the US in order to protect their beneficial uses – in this case, those assigned by the Wyoming Department of Environmental Quality (WDEQ). Beneficial uses reflect resources or activities that would be directly affected by a change in water quality or quantity.

As discussed in the water, soils, and watershed resources analysis (section 3.4), the project area includes no live water and has no surface hydrologic connectivity with waters outside the project area, except stormwater runoff collected on East Snow King Avenue. These factors limit the scope of potential impacts on water quality. The design criteria for the water, soils, and watershed resource (section 3.4.5) include many BMPs, including those described in *Ski Area BMPs: Guidelines for Planning, Erosion Control, and Reclamation* (Forest Service 2001). These design criteria would eliminate the potential for substantial water quality impacts associated with any alternative (see section 3.4.3.3).

3.14.3 AMERICANS WITH DISABILITIES ACT

In accordance with Forest Service regulations, compliance with the accessibility guidelines of the Americans with Disabilities Act of 1990 (ADA) and Uniform Federal Accessibility Standards (UFAS) of Section 504 of the Rehabilitation Act of 1973 apply to the design of structures proposed as part of this project. The ADA applies because Snow King operates as a "public accommodation," that is, it is a business open to the public. Section 504 applies because the ski area operates under a special-use permit authorized by a federal agency, the Forest Service. Implementation guidelines for Section 504 that apply to recreation special-use permit holders are located in 7 CFR 15b.

UFAS and ADA accessibility guidelines were combined in November 8, 2005, and are now known as the Architectural Barriers Act Accessibility Standard (ABAAS). The ABAAS replaces the former guidelines as the current standard for federal agencies, including the Forest Service. These guidelines are included in the *Accessibility Guidebook for Ski Areas Operating on Public Lands – 2012 Update* (Forest Service 2012b). Design criterion 1 in section 3.10.5 directs that design and construction of new structures will comply with this document. Bridger-Teton engineering review of construction plans prior to notification to proceed will ensure compliance with ABAAS.

3.14.4 Executive Order 11644 - Use of Off-Road Vehicles on Public Lands

Public use of off-road vehicles is not authorized within Snow King's permit area. Only the ski area may use such vehicles in conducting authorized activities. None of the alternatives would alter this.

3.14.5 Executive Orders 11988 and 11990 - Protection of Floodplains and Wetlands

As discussed in the issues considered but not carried into detailed analysis section (section 1.7.2.1), there are no wetlands in the project area and thus no potential for direct effects. The analysis in this section states that there are also no surface waters and thus no floodplains subject to direct effects. The lack of surface hydrologic connectivity effectively eliminates the potential for indirect impacts on these resources.

3.14.6 Executive Order 13186 - Protection of Migratory Birds

This order and the protection it affords to migratory birds is discussed in the wildlife analysis (section 3.6.2.3). That analysis concludes that potential impacts on migratory birds would be eliminated by the addition of design criterion 1 in section 3.6.5, which requires trees to be cut outside of the nesting season unless they are specifically determined to be free of nesting birds. A small fraction of available habitat for forest nesting species would be lost under either alternative, but populations would not be impacted given the large amount of habitat in the area.

3.14.7 Executive Order 12898 - Environmental Justice

None of the alternatives would have a disproportionately high or adverse effect on minority or low-income populations. Some scoping commenters were concerned that potential ticket price increases would be beyond the means of lower-income people. However, no ticket price increase has been proposed at this time. Ticket pricing is determined by the permittee's business model and is generally not subject to Forest Service authority. Snow King currently works with organizations such as Coombs Outdoors to provide access to skiing for lower income kids. This partnership is expected to continue under any alternative. Beyond that, no adverse effects on minority or low-income populations have been identified.

3.14.8 USDA Civil Rights Policy

None of the alternatives would result in any civil rights impacts on Forest Service employees, visitors to Snow King, or the general public. All would be free from reprisal or discrimination based on race, color, national origin, sex, religion, age, disability, sexual orientation, marital or familial status, political beliefs, parental status, receipt of public assistance, or protected genetic information.

3.14.9 Prime Farmland, Rangeland, and Forest Land

None of the alternatives include any use of prime farmland or rangelands, and the term "prime forest land" does not apply to NFS lands. Under these alternatives, NFS lands would be managed with sensitivity to the effects on adjacent lands.

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CHAPTER 4: CONSULTATION AND COORDINATION

4.1 PUBLIC SCOPING

On August 3, 2018, the Bridger-Teton issued a public scoping notice summarizing Snow King's proposed improvements project and inviting comments regarding the scope of the associated NEPA review. The projects included in the proposed action are included in Snow King's current master development plan, accepted by the Bridger-Teton.

Information regarding the scoping period and available materials for review was sent to the agencies, organizations, and individuals on the Bridger-Teton mailing list. The scoping notice was posted on the Bridger-Teton website at https://www.fs.usda.gov/project/?project=54201 and made available on CD or in hard-copy form to anyone requesting it.

The scoping period formally began on August 3, 2018, when a Notice of Intent to Prepare an Environmental Impact Statement was published in the Federal Register (Vol. 83, No. 150, pp. 38117-38118). The scoping period was scheduled to close 30 days later on September 2, 2018. A correction to the project website address and extension of the scoping comment period to September 13, 2018, was published in the Federal Register on August 14, 2018 (Vol. 83, No. 157, pp. 40215-40216). A news release was circulated August 14, 2018, notifying the public of the comment period extension. On September 14, 2018, notice of a second extension of the scoping period was published in the Federal Register (Vol. 83, No. 179, p. 46701), allowing submittal of comments until October 4, 2018.

Comment letters were received from 10 agencies, 11 organizations, and 419 individuals. The scoping notice, comment letters, and scoping report are included in the project record.

4.2 OTHER CONSULTATION

4.2.1 ENDANGERED SPECIES ACT SECTION 7

As discussed in section 3.6.2.1, Snow King lies within a Lynx Analysis Unit. As a result, this project could potentially affect the federally listed (endangered) Canada lynx. As a result, the Bridger-Teton is consulting with the US Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act.

4.2.2 NATIONAL HISTORIC PRESERVATION ACT SECTION 106

As discussed in section 3.7.2.1, part of Snow King has been identified as eligible for listing on the National Register of Historic Places as an historic landscape. This project could affect the historic landscape. As a result, the Bridger-Teton is consulting with the Wyoming State Historic Preservation Office in accordance with Section 106 of the National Historic Preservation Act.

4.2.3 TRIBAL CONSULTATION

As discussed in section 3.7.2.2, the Jackson Hole area, including Snow King, has been used by Native Americans for roughly 12,000 years. As a result, the project has the potential to affect Traditional Cultural Places or other Native American tribal resources. Therefore, the Bridger-Teton initiated consultation with the following tribes in September 2019, in accordance with Executive Order 13175: Crow, Eastern Shoshone, Gros Ventre and Assiniboine, Northern Arapaho, and Shoshone-Bannock. No tribal concerns have been identified.

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CHAPTER 5: LIST OF PREPARERS

Name	Position	Contribution
Forest Service Team		
Mary Moore	District Ranger	Project oversight.
Janine Prout	ID Team Leader	Initial project management.
Sean McGinness	ID Team Leader/Mountain Resorts Coordinator	Subsequent project management and climate change/snow quantity, air quality, safety, and noise review and oversight.
Anita DeLong	Environmental Coordinator	Project NEPA Lead.
Kelly Owens	Forest Hydrologist	Water and watershed resources review and oversight.
Dave Marr	Forest Soil Scientist	Soils review and oversight.
Martina Keil	Forest Botanist, North Zone Range and Invasive Species Manager	Vegetation and land use review and oversight.
Jason Wilmot	Wildlife Biologist, Jackson and Blackrock Ranger Districts	Wildlife resources review and oversight.
J.P. Schubert	Forest Archaeologist/Heritage Program Manager	Cultural resources review and oversight.
Linda Merigliano	Recreation/Wilderness Program Coordinator	Recreation review and oversight.
Paul Valcarce	Forest Landscape Architect	Scenery review and oversight.
Cirrus Ecological Solutions, LC Team		
Neal Artz	Project Manager	Project management, NEPA oversight, QA/QC review, and preparation of scenery and recreation analyses.
Matt Westover	Assistant Project Manager/Wildlife Biologist	Project management and preparation of wildlife, safety, and noise analyses.
Tim Royer and Stephanie Trapp	Botanist and Wetland Specialist	Preparation of vegetation and climate change/snow quantity analyses.
Justin Barker	Environmental Analyst	Preparation of air quality analysis.
Eric Duffin	Hydrologist	Preparation of water, soils, and watershed analysis.

Name	Position	Contribution
Scott Evans	Range Scientist	Preparation of land use analysis.
Jose Pacheco	Environmental Technician	GIS and cartography.
Judy Seamons	Document Production Specialist	Document production and preparation of the project record.
Cannon Heritage Consultants, Inc.		
Ken Cannon	Archeologist	Completion of cultural resources survey and report and cultural resource analysis.
Tatanka Historical Associates, Inc.		
Ron Sladek	Historian and Historic Preservation Consultant	Completion of historical landscape survey and report.

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