



JACKSON HOLE AIRPORT FLY QUIET PROGRAM



1. Introduction

The Jackson Hole Airport's (Airport) Fly Quiet Program is an initiative implemented by the Jackson Hole Airport Board to encourage operators to utilize the quietest available fleet and to operate those aircraft as quietly as possible at the Airport. The program promotes a voluntary, participatory approach to complying with noise abatement procedures and objectives. This is done by grading an operator's performance and making the scores available to the users of the Airport and the public via newsletters, publications, and Board meetings.



The Program is intended to change as new procedures and new technologies for aircraft and airspace are available. The program applies to commercial service and general aviation jets. The Fly Quiet Program evaluates compliance with four categories:

1. **Noise Fleet Quality,**
2. **Minimize Violations of Voluntary Curfew,**
3. **Minimize High Noise Events, and**
4. **Flight Procedure Compliance.**

Both commercial service and general aviation jet operators are included in the Fly Quiet Program. Operators at the Airport are divided into five categories: 1) commercial service operators with more than eight (8) operations per year; 2) FAR Part 135 operators with more than 30 operations per year; 3) FAR Part 135 operators with less than 30 operations per year; 4) Non-Part 135 operators with more than 30 operations per year; and 5) Non-Part 135 operators with less than 30 operations per year. The grading system is based on a percentage of compliance, with 100% being the best possible score.

The Fly Quiet Program was an outgrowth of a 14 CFR Part 150 Program which resulted in a Record of Approval signed in 2018. The Jackson Hole Airport formally launched the Fly Quiet Program in January 2021, based on data collected from 2015 through 2020. This base period allowed the Airport to compare future Fly Quiet operations to measure historical and future improvements. Scores are computed and quarterly reports are generated with an annual Fly Quiet Report presented to the Board on a calendar year basis. The first annual Fly Quiet Report will be published at the end of 2021.

2. Program Overview and Goals

The goal of the Jackson Hole Airport's Fly Quiet Program is to reduce both single event and total noise levels around the Airport. This goal will be pursued by incentivizing aircraft operators to fly with the least possible impact on the environment, by utilizing the quietest available aircraft and adhering to the Airport's noise abatement programs. The Airport will be increasing its monitoring, collecting, and analyzing of comprehensive operational and noise data. This will highlight both Airport trends and individual operator performance for specific noise abatement issues. Fly Quiet data will be quantified and translated into annual reports or scorecards for commercial service operators, along with individual general aviation operators and fractional operators.

2.1 Definition

The purpose of the Fly Quiet Program is to communicate to aircraft operators, through positive enforcement, the recommended noise abatement procedures, and request that they be flown as efficiently as possible.

The Fly Quiet Program uses current available information and may be expanded to include additional information as the Program matures. Existing data sources include third party radar data, year-round noise monitoring, and observations of operations by Airport and consultant staff. This information is organized and analyzed in a software program to reveal a variety of comparative patterns showing the relative noise contribution of operators and aircraft types. These results are then processed into a 0-100% rating system that shows which operator is the best in each category and how each operator rates overall. A score of 100% is considered the best possible in each category, with the overall best score being the highest average of all four categories. A *top tier* rating is achieved by having a score of between 90-100%, a *compliant* rating is between 70-90% and a *non-compliant* rating is lower than 70%.

Currently, the Fly Quiet Program consists of four elements: fleet quality, minimize higher noise events, minimize violation of voluntary noise curfew, and flight procedure compliance. The following table provides the goal and compliance measure for each category.

Table 1: Jackson Hole Fly Quiet Program Elements

Category	Goal	Measure
Fleet Quality	Acknowledge/encourage operators to fly their quietest aircraft	<ul style="list-style-type: none"> • FAA Aircraft Certificated Stage Noise Level • Stage 5 is considered the highest score (100%)
Minimize Violation of Voluntary Curfew	Rated upon number of times an operation occurred during the voluntary curfew hours 11:30 pm to 6:00 am for arrivals 10:00 pm to 6:00 am for departures	<ul style="list-style-type: none"> • Number of flights in curfew hours • Low score based on higher number of curfew violations • Zero curfew operations is considered the highest score (100%)
Minimize Higher Noise Events	Minimize the highest aircraft noise events from individual overflights	<ul style="list-style-type: none"> • Track % higher noise events per total operations • Zero high noise events considered the highest score (100%)
Flight Path Compliance	Three flight paths evaluated with results combined into one score	<ul style="list-style-type: none"> • Rated on % of flights following procedure goal • Full compliance is considered the highest score (100%)

It is important to emphasize that the primary purpose of the Fly Quiet Program is to incentivize operators by rewarding adherence with voluntary noise abatement procedures, thus reducing noise intrusion. By providing this information publicly, Fly Quiet enables operators to engage in informed self-evaluation and improvement. Positive reinforcement and public acknowledgements are expected to be strong incentives for operator performance. Public recognition and individual letters will be sent to the best and worst operators in each of the three categories below, along with the most improved over the previous Fly Quiet period.

Table 2: Jackson Hole Fly Quiet Operator Categories

Category of Jet Operator	Classification by Number of Annual Operations
Commercial and Regional Jet Airlines	<ul style="list-style-type: none">• Minimum of 8 operations
Part 135 Business Jets (fleets, fractional ownership)	<ul style="list-style-type: none">• Operators with 30 or more flights• Operators with less than 30
Single Jet Owner/Operator (i.e., N1234)	<ul style="list-style-type: none">• Operators with 30 or more flights• Operators with less than 30

2.2 Program Elements

Currently, the Fly Quiet Program consists of four elements as presented in the following sections. The initial period of reporting is calendar year 2021. All subsequent annual Fly Quiet reports will be compared to this initial reporting period to determine the effectiveness of the program.

2.2.1 Fleet Noise Quality Rating Methodology

Goal

The goal of fleet noise quality rating is to have aircraft operators schedule their quietest aircraft at the Airport and be acknowledged for doing so. The Fly Quiet Program Fleet Noise Quality Rating (FNQ) evaluates the noise contribution of each operator’s fleet as it operates at Jackson Hole Airport and includes both commercial service operators and general aviation operators.

Methodology

The method for quantifying a fleet noise quality rating at Jackson Hole is based on established federal noise certification data for each aircraft. Stages 2, 3, 4 and 5 were established by Federal Aviation Regulation Part 36, which mandated the allowable noise levels for the manufacture of aircraft at measurement locations. For each aircraft type, Part 36 specifies allowable noise levels at measurement locations: approach, departure, and sideline. Stage 2 is the loudest, oldest type of aircraft; there are no Stage 2 aircraft operating. There are some built Stage 2 aircraft in the nationwide fleet that are certificated to operate as Stage 3 with modifications. These aircraft still generate noise similar to a Stage 2 aircraft and, for the purposes of the Fly Quiet Program, are considered Stage 2. For example, the Gulfstream III business jet is in this category. Stage 5 is the newest generation of aircraft which provide a cumulative reduction of 17 dB over Stage 3; the cumulative reduction is the total reduction at the three measurement locations described above.

The majority of commercial and business jet aircraft in the current fleet are Stage 3. Any newly designed aircraft must be type certificated to meet the Stage restrictions in place at the time of the

original type certification. The newly published Stage 5 represents the most technologically advanced and quietest aircraft with some of the newer business jet aircraft meeting these Stage 5 levels. Any aircraft that are type certificated after 2018 need to meet the Stage 5 standard. Note that the only regulation regarding the retirement of aircraft Stages apply to Stage 1 and 2; there are no regulations or phases for retirement of Stage 3 and newer aircraft.

The FNQ rating uses third party radar data to determine the aircraft type for each operation at Jackson Hole. The radar data provides a list of each operation that occurs at the Airport, including the aircraft type, time of operation, and type of operation (visual or instrument flight rules) and usually the registration number. The aircraft information is used to determine the type of aircraft and FAR Part 36 Stage.

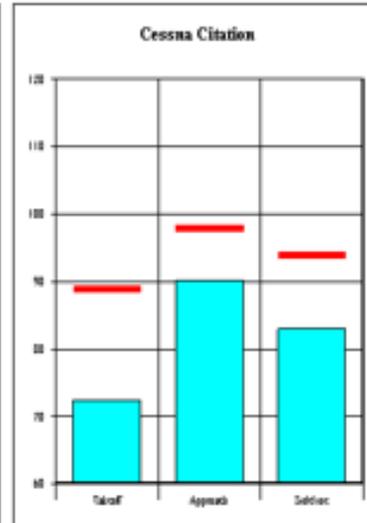
The following figure depicts the noise characteristics of two aircraft types: a Beech Jet and a Cessna Citation X. Both aircraft are certified as Stage 3 or better, yet the combined noise levels at all three Part 36 measuring points for the Cessna Citation X is 35.5 dB lower than the Stage 3 requirements, while the Beech Jet falls only 7.3 dB below the requirements. The red line at the top of each column represents Stage 3 limits; the blue portions of the columns indicate actual monitored certificated noise values. Because there is a range of aircraft noise levels within each certificated Stage, the Fly Quiet Report methodology includes organizing aircraft types into each Stage as well as a “half” Stage; i.e. Stage 4 and 4.5 to recognize aircraft that are quieter than the minimum Stage requirements.

FAR Stage 3 Limits and Certificated Noise Levels

Jackson Hole Airport Fly Quiet Program

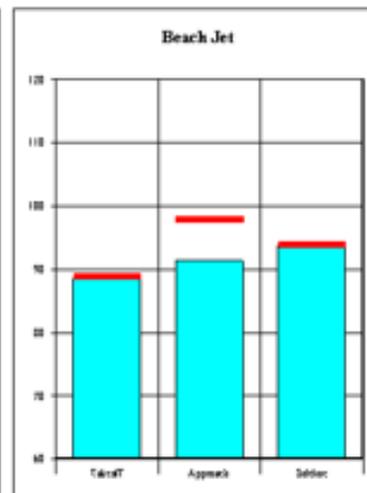
Cessna Citation X C750

AIRCRAFT DESCRIPTION			
Aircraft: Cessna Citation			
Manufacturer: CESSNA			
ARTS Name: C750			
No. of Engines: 2			
Type: J			
AIRCRAFT SERIES DESCRIPTION			
Series: 750 CITATION X	Weight	Flaps	
Engines: AE3007C	Takeoff: 35,700	15	
Bypass Ratio: 5.3	Approach: 31,800	35	
Thrust: 5,000			
FAR 36 NOISE LEVELS			
	Takeoff	Approach	Sideline
FAR 36 Limit (EPNdB):	89	98	94
Aircraft Level (EPNdB):	72.3	90.2	83
FAR 36 Stage:	3		



Beech Jet BE40

AIRCRAFT DESCRIPTION			
Aircraft: Beech Jet			
Manufacturer: BEECH			
ARTS Name: BE40			
No. of Engines: 2			
Type: J			
AIRCRAFT SERIES DESCRIPTION			
Series: BEECHJET 400	Weight	Flaps	
Engines: JT15D-5	Takeoff: 15,780	10	
Bypass Ratio: 2.1	Approach: 14,220	30	
Thrust: 2,900			
FAR 36 NOISE LEVELS			
	Takeoff	Approach	Sideline
FAR 36 Limit (EPNdB):	89	98	94
Aircraft Level (EPNdB):	88.6	91.4	93.7
FAR 36 Stage:	3		



Source: BridgeNet International, 2021

NOTE: Military, turbo propeller, propeller aircraft and helicopters do not fall under this regulation and are also not measured as part of the Fleet Noise Quality Rating. Military aircraft are exempt from aircraft Stage regulations.

2.2.3 Minimize Violation of Voluntary Curfew

Goal

The goal is to minimize or eliminate any operations that violate the Airport's voluntary curfew hours. The Airport's voluntary curfew hours are between 11:30 pm to 6:00 am for departures and between 10:00 pm and 6:00 am for arrivals. This category tracks the number of flights an operator has during the curfew hours. A low score (i.e. 70% or lower) is based on a greater number of curfew violations, with zero violations receiving a score of 100%.

Methodology

This category tracks aircraft operators that violate the voluntary curfew hours utilizing the third-party radar and the Airport's permanent noise monitoring system. Violations are tallied and compiled for each quarter and reported annually. Zero violations, or a small number, will result in the highest overall score of 100%.

2.2.2 Minimize Higher Noise Events

Goal

The goal of the loudest noise event category is to reduce the highest single event noise levels of aircraft operating at Jackson Hole. This category tracks the percent of higher noise events per total number of operations. Zero high noise events receive the highest score of 100%.

Methodology

The score for loudest noise events evaluates arriving and departing aircraft for excessive single event noise levels expressed in the Maximum Noise Level (L_{max}), which is a convenient method for describing noise from individual aircraft events. The L_{max} is the highest noise level that is produced by an aircraft flyover and can occur as either a takeoff or landing for the purpose of the Fly Quiet Program.

Whenever an aircraft operation surpasses a high noise event threshold established for a remote noise monitoring site (RMS), a "loud single event" occurs. Loud noise events are measured by the Airport's RMS's situated at Moose (north of the Airport and in Grand Teton National Park) and at the Jackson Hole Golf and Tennis Club (south of the Airport). The high noise event threshold is not a static number but represents loudest 5 to 10% of all operations. As the program matures, the intent is for that percent of operations to represent a lower L_{max} threshold.

These remote monitoring sites have been in place, along with other remote sites, since 2008 and are capable of year-round monitoring; this data is used in the Fly Quiet Program to determine when high noise events occur anytime throughout the year, not just the peak summer and winter monitoring period.

Whenever an aircraft overflight produces noise levels higher than the maximum allowable decibel value established for a particular monitoring site, the noise threshold is surpassed, and a high noise event occurs. This category will be expanded over time to include additional RMS measurements of high noise events. Zero high noise events represent the highest score (100%) in this category. The least number of high events the better the score which is obtained by flying quieter aircraft.

2.2.4 Flight Procedure Compliance

Goal

The goal is to encourage the use of the recommended noise abatement procedures whenever possible to avoid flying over sensitive areas of Grand Teton National Park (GTNP) and residential areas southwest of the Airport. The Airport has asked the FAA to design approach and departure procedures that may alter the current paths that aircraft fly and, if they do, will be incorporated into future Fly Quiet reports.

Methodology

This category tracks aircraft operators that fly the preferred noise abatement procedures both on arrival and departure. As these are new procedures and require advanced navigational equipment, not all operators will be able to fly the procedures immediately. The three procedures are evaluated separately with the results combined into one score. They are rated on the percent of flights following the procedure with full compliance receiving the highest score of 100%.

The Fly Quiet Program has three flight procedure measures that follow desired flight paths that minimize the noise impacts to the Park and the community. The three measures are averaged into one Flight Procedure compliance score. Each of the measures are described below.

1. Flight Path Measure 1 (Fly GPS vs. Historical ILS). When landing using an instrument procedure on Runway 19, the goal of this measure is to fly one of the procedures that follow a path that avoids a long straight-in arrival north over areas of the Park, including Jackson Lake. Flying either the *ILS Z OR LOC Z RWY 19*, *RNAV (GPS) Z RWY 19* or the *RNAV (RNP) Y RWY 19* meet the goals of this measure. This path is shown as the green line in **Figure 1**, and for the purposes of the Fly Quiet program is referred to as the GPS arrival procedure path. Flying the *ILS Y OR LOC RWY 19* is the old conventional ILS straight in path from 17 miles north of the Airport and is discouraged as part of this Fly Quiet measure. Flying this path is considered non-compliant with this measure. This is shown as the yellow line in **Figure 1**. The goal of this measure is to fly procedures that follow the green path and not procedures that follow the yellow path that are shown in **Figure 1**.

2. Flight Path Measure 2 (Fly east of core area of the Park). This measure is intended to encourage operators when landing to the south on Runway 19 to avoid core active areas that are generally on or west of the Snake River. For the purposes of Fly Quiet, it is desired that aircraft, when flying visually, fly on or east of the GPS flight path. Those aircraft that fly west of the GPS flight path are discouraged. **Figure 1** shows the GPS flight path as the green line, and the areas of the Park west of that are identified by the red dots. Those aircraft on the GPS procedure path or to the east are meeting the goals of this measure. Those that are west of the green GPS procedure path or considered non-compliant.

3. Flight Path Measure 3 (Minimize West Drift). This measure is for aircraft that depart to the south on Runway 19 on the ALPIN departure. The intent is to minimize drifting to the west or turning early to the west prior to exiting the valley. This is illustrated in **Figure 2** which shows the general ALPIN flight path in orange and the area to avoid in the red dots.

NOTE: A voluntary Airport noise abatement procedure is to perform an early left turn, if possible, when departing Runway 19 to the south. See Airport Noise Abatement Procedures which may be found at <http://www.jacksonholeairport.com/wp-content/uploads/2017/09/Noise-Abatement-Procuedures-Sht1-and-2.pdf> However, this turn is not an FAA-approved departure procedure and it may only be undertaken in certain conditions when determined to be safe by the pilot in command. It is therefore not a part of this Fly Quiet Program. It may become part of this Program if approved by the FAA in the future.

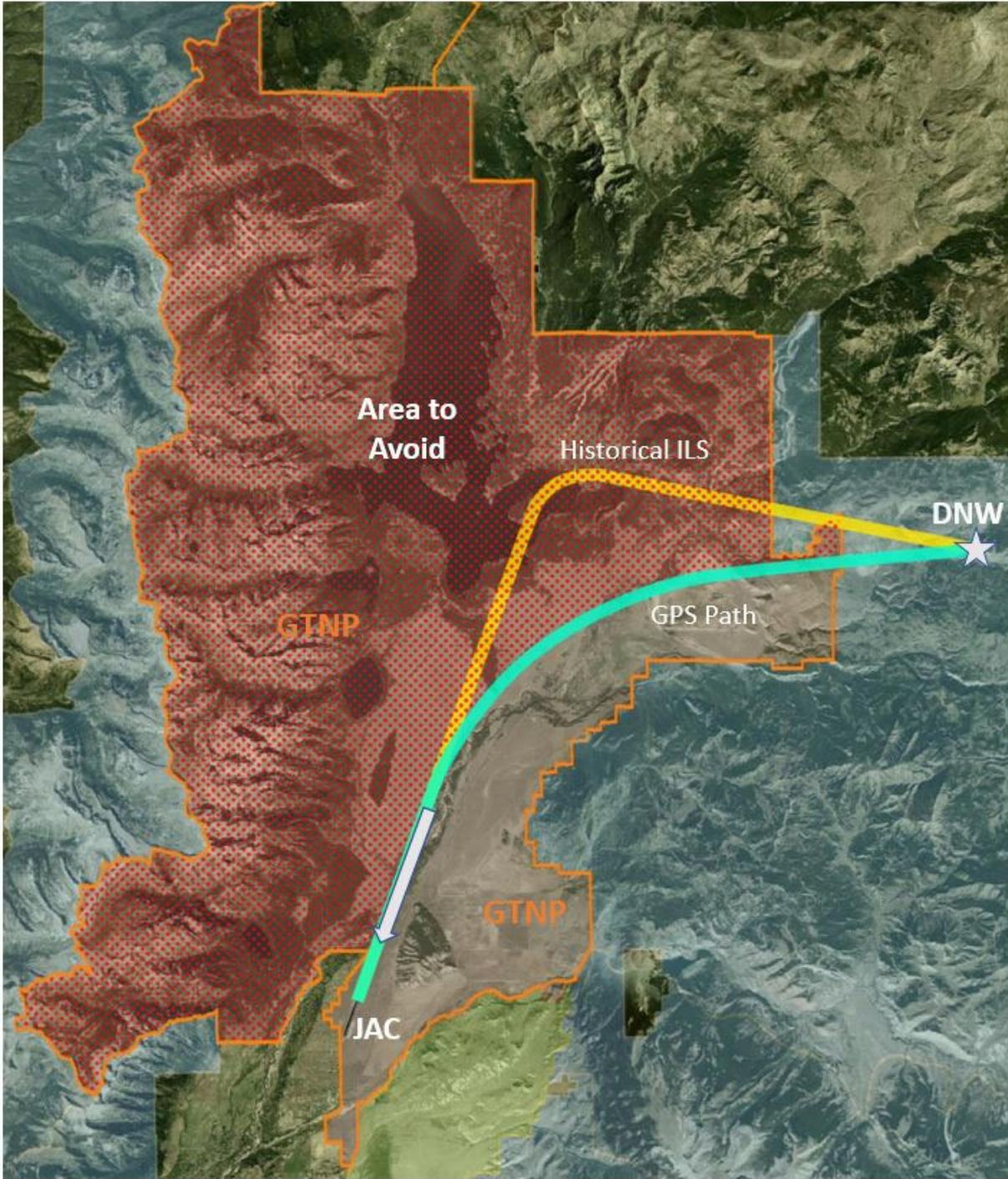


FIGURE 1. Approaches from the North

BRIDGENET INTERNATIONAL, 2021

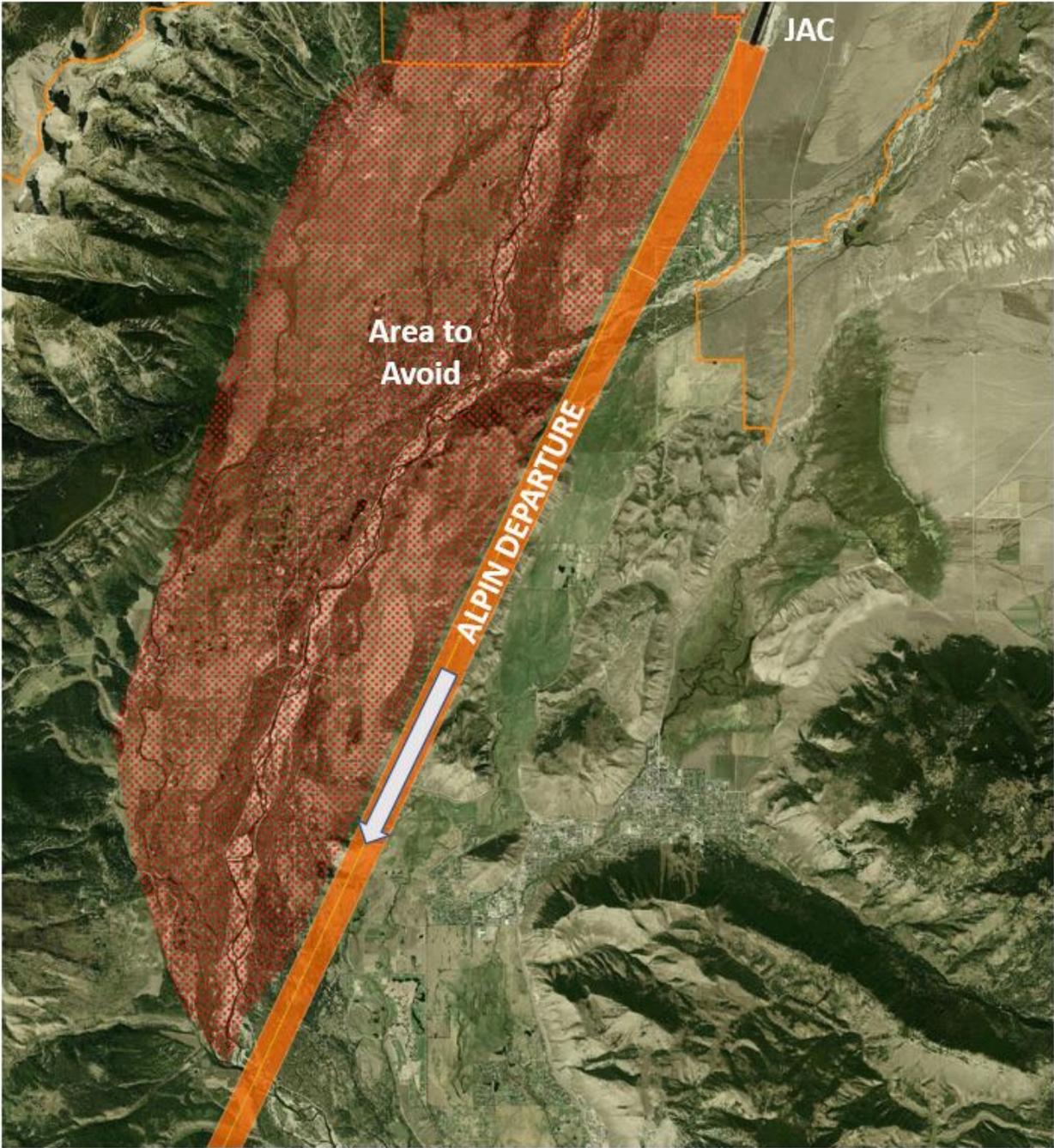


FIGURE 2. Southern Departure

BRIDGENET INTERNATIONAL, 2021