3.15 Noise

3.15.1 Affected Environment

Sound is made up of tiny fluctuations in air pressure. Sound within the range of human hearing can vary in intensity by more than 1 million units; therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity and compress the scale to a more manageable range.

Sound is characterized by both its amplitude (how loud it is) and frequency (or pitch) measured in Hertz (Hz). The human ear does not hear all frequencies equally. In evaluating highway traffic noise, an A-weighted decibel scale (dBA) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies where human hearing is most sensitive, and less weight on those frequencies humans do not hear as well. FHWA uses the A-weighted decibel scale. A U.S. Fish and Wildlife Service (USFWS) study mentioned below (Section 3.15.1.4) uses unweighted decibels, which may be more suited to effects on wildlife (see also Section 3.22).

When noise levels change 3-dBA or less, the change is considered to be barely perceptible to an adult with normal hearing in an outdoor setting. A 5-dBA change in noise level is clearly noticeable. A 10-dBA change in noise levels is perceived as a doubling or halving of noise loudness, and a 20-dBA change is considered a dramatic change in loudness. Table 3.15-1 shows noise levels associated with common, everyday sources, and helps describe the magnitude of noise levels discussed in this section.

Table 3.15-1. Common noise sources and levels

Sound Pressure Level (dBA)	Typical Source
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Rau and Wooten **(1980)**.
Note: dBA = A-weighted decibels

3.15.1.1 Noise Regulations and Analysis Methods

Highway traffic noise was evaluated in compliance with the Federal Highway Administration (FHWA) *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772) and the Alaska Department of Transportation and Public Facilities (DOT&PF) *Noise Policy*

(DOT&PF 2011c), which describes the implementation of the FHWA noise regulations in Alaska.

Procedures for Abatement of Highway Traffic Noise and Construction Noise sets forth a system of assigning land uses in the vicinity of each alternative to an activity category based on the type of activities occurring in each respective land use (e.g., residences, recreational areas, churches, commercial land, and undeveloped land). Activity categories are then ordered based on their sensitivity to traffic noise levels. Noise Abatement Criteria, representing the maximum traffic noise levels that allow uninterrupted use, are assigned to each activity category. Table 3.15-2 lists the seven FHWA land use categories included in the Noise Abatement Criteria, and the hourly equivalent noise level (Leq[h] [1]) associated with each activity category.

Table 3.15-2. FHWA Noise Abatement Criteria

Activity Category	Leq (h)	Description of Activity Category
A	57 dBA (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B[a]	67 dBA (Exterior)	Residential
C	67 dBA (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 dBA (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 dBA (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F
F	None	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	None	Undeveloped lands that are not permitted

[a] Includes undeveloped lands permitted for this activity category.

Source: 23 CFR 772, Table 1

Note: Leq(h) = hourly noise equivalent level; dBA = A-weighted decibels

[1] Highway traffic noise levels vary over time because traffic volumes and the type and speed of vehicles that create the noise vary. Because of these time-related variations, it is useful to convert the varying noise levels into a single representative noise level. FHWA uses the Equivalent Sound Level or Leq to characterize the fluctuating noise levels. The Leq is defined as the equivalent steady-state sound level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same period. For FHWA traffic noise studies, Leq is evaluated over a one-hour time period and is denoted as Leq(h). Unless otherwise indicated, all noise levels discussed in this Supplemental Environmental Impact Statement (SEIS) are Leq(h) noise levels. Note that instantaneous sounds, such as when a truck passes and is then gone, may be much louder. Source: West Virginia Department of Transportation, http://www.wvcorridorh.com/engineer/definitions.html.

The FHWA definition of a traffic noise impact (23 CFR 772) contains two criteria. Only one criterion has to be met for an impact to occur. Traffic noise impacts are defined as impacts that occur when the predicted traffic noise levels:

- Approach or exceed the noise abatement criteria given on Table 3.15-2; or
- "Substantially exceed" the existing noise levels.

The DOT&PF *Noise Policy* defines noise levels that "approach" the Noise Abatement Criteria as those within 1 dBA of the Noise Abatement Criteria (DOT&PF 2011c). Consequently a traffic noise impact would occur when noise levels at Activity Category A land uses are greater than or equal to 56 dBA, Activity Category B and C land uses are greater than or equal to 66 dBA, etc. The DOT&PF guidance defines noise levels that "substantially exceed" existing levels as a 15-dBA increase over existing noise levels (DOT&PF 2011c).

3.15.1.2 Sensitive Noise Receptors

Land uses throughout the project area include Activity Category B (residential) and Activity Category E (commercial) land uses along the existing highway alignment, with Activity Category C (campgrounds, trails, and recreational areas) land uses farther from the existing highway alignment. Category G, designating "undeveloped" land uses, refers mostly to private developable lands that are vacant. While much of the project area is comprised of "vacant" or "undeveloped" Chugach National Forest and Kenai National Wildlife Refuge (KNWR) lands, as well as some State and Kenai Peninsula Borough lands, these lands are managed for recreation and wildlife habit, and for preservation of those qualities; they are not considered to be developable. Therefore, no lands in the project area were modeled as Category G land uses.

Traffic noise was modeled at a total of 154 receptors broken down by type as follows: 123 residential receptors (Category B); 10 campground receptors, 11 recreation area receptors (Category C), 5 trail receptors (Category C); and 5 commercial receptors (Category E). Four receptors were modeled within KNWR, two in designated Wilderness and two associated with the popular Russian River Ferry site. Map 3.15-1 shows the locations of all modeled receptors. The *Highway Traffic Noise Assessment* (Appendix D) prepared for this project provides additional detail on receptor location and type.

3.15.1.3 Existing Noise Levels

Existing traffic noise levels at representative receptor points were evaluated using the FHWA-approved traffic noise model. The traffic noise model takes into account traffic volume, vehicle types and speeds, roadway geometry, receptor locations, ground cover, and topographic terrain.

The traffic noise model for the project was validated using existing noise level data collected at 11 noise monitoring (NM) locations in the project area on July 13, 15, and 20, 2001 (see sites on Map 3.15-1). Existing traffic noise levels were measured at 8 sites (sites NM1 through NM8) close to the existing highway to verify the accuracy of the noise model. Noise measurements also were taken at 3 remote sites (A, B, and C) to determine ambient background levels at locations where existing highway noise is not a significant source of ambient noise. Measured noise levels for the noise monitoring locations are presented in Table 3.15-3.

Table 3.15-3. Ambient noise levels measured away from the Sterling Highway

Noise Monitoring Location	Location	Noise Level Leq(h) (dBA)
NM1	Russian River Ferry Parking Lot	56
NM2	Upper Russian R. Campground parking lot	42
NM3	Russian R. Campground overflow lot	62
NM4	Across road from Gwin's Lodge	63
NM5	Upper Caribou Heights Road	41
NM6	Access trail below private residence	44
NM7	D. Young Ballfield, Cooper Landing	43
NM8	Kenai River boat ramp parking lot	56
A	West Juneau Creek Road	40
B	Resurrection Trail, Juneau Creek bridge	65
C	Opposite Cooper Creek South Campground	61

Note: NM = noise monitoring; Leq(h) = hourly noise equivalent level; dBA = A-weighted decibels

For modeling purposes, an existing Leq(h) noise level of 40 dBA, the most conservative noise level monitored (see Table 3.15-3), was assumed for sites located more than 1,000 feet from an existing or proposed highway alignment.

The measured sound levels were used to calibrate the noise model. Current sound levels are represented by a 2012 modeling effort at 154 identified receptors (the same modeling effort used to predict sound levels for alternatives in the project design year, 2043). The results of the traffic noise modeling for existing conditions indicated that peak noise levels at the modeled receptors ranged from 43 to 69 dBA. One residence (Receptor 106) and one recreation receptor in the Kenai River Recreation Area (Receptor KRRA 2) currently experience highway traffic noise equal to or above the DOT&PF noise impact thresholds. The *Highway Traffic Noise Assessment* (Appendix D) details existing noise levels for all modeled receptors.

3.15.1.4 KNWR and Wilderness

The KNWR manages the Mystery Creek and Andrew Simons Wilderness units, which partially overlap the project area, to protect natural quiet. In its role as a cooperating agency for this project, USFWS provided information on sound levels in the KNWR. Sound levels, measured at 5-kilometer intervals across KNWR in 2004 and 2006, revealed that the mean sound level, averaged from 257 sites across 2 million acres, was 45.1 dB.[2] This value is similar to background noise levels typically measured in Wilderness across the country. Sound measurements in December 2011 and April 2012 to map the distribution of natural and machine-related sounds in the KNWR found that natural quiet dominated more than 60 percent of the KNWR, predominantly in Wilderness. This study indicated that road traffic was the largest

[2] The USFWS study used standard decibels (dB), not decibels weighted for the range of human hearing (dBA). The FHWA modeling effort undertaken for this project uses decibels weighted for human ear sensitivities. The USFWS study measured instantaneous sounds. The FHWA modeling effort predicts noise levels based on hourly averages. The FHWA methods are designed for assessing impacts to the human environment, not necessarily impacts to wildlife (see Section 3.22 for discussion of wildlife).

contributor of noise to non-Wilderness areas and that road noise had an effect zone of more than 0.5 mile from the source, with road noise in winter audible up to 2 miles from the Sterling Highway. Based on information compiled for USFWS's June 2010 *Comprehensive Conservation Plan*, motor vehicles traveling on the Sterling Highway represent an eightfold increase in noise over typical background sound levels. In some areas across the KNWR, values can range from 32 to 95 dB.

The modeling effort undertaken for this project (Appendix D) included four receptors in KNWR:

- KNWR 1, on Fuller Lakes Trail just inside the Mystery Creek Wilderness boundary (2012 sound level 40 dBA).
- KNWR 2, in the southeast corner of the Mystery Creek Wilderness near MP 55 (48 dBA in 2012).
- KNWR 3, at the parking lot for the popular Russian River Ferry (45 dBA in 2012).
- RR, located in the wooded area north of the Russian River Ferry parking lot (52 dBA in 2012).

Congress designated Wilderness in KNWR in 1980. At that time, the Sterling Highway and its associated traffic noise had existed for about 30 years. The Wilderness boundary that Congress approved follows the edge of power transmission line easements that parallel the Sterling Highway in the project area, and in one location near MP 55 the Wilderness boundary is the highway right-of-way. As indicated by existing sound levels at KNWR 2, traffic noise already affects designated Wilderness but typically is not expected to carry more than about 1,000 feet in forested environments. As indicated in the USFWS study, it is likely that direct sound propagation in areas without obstructions (vegetation or terrain) is audible over much longer distances. That is, from alpine ridgetops in Wilderness, traffic likely is audible under certain atmospheric conditions).

3.15.2 Environmental Consequences

This section describes the potential effects of each project alternative on noise levels at modeled receptors. Other than construction-related noise, the primary noise source associated with all four build alternatives as well as the No Build Alternative is vehicle traffic. Traffic volumes (numbers of vehicles) are projected to increase as both local and regional populations grow. As a result of increased traffic, future traffic noise is expected to increase with or without the project.

Traffic noise levels estimated for this study reflect the "peak hour" traffic volume. The *Highway Traffic Noise Assessment* (Appendix D) prepared for this project provides a more detailed discussion of the model and traffic parameters used to predict traffic noise for all project alternatives. Traffic noise analysis uses frequencies weighted for human ear sensitivities. It predicts noise levels based on hourly averages. This method is designed for assessing impacts to the human environment, not necessarily impacts to wildlife (see Section 3.22).

3.15.2.1 No Build Alternative

Direct and Indirect Impacts

Under the No Build Alternative, the existing highway corridor would be affected by modest increases in traffic noise between 2012 and 2043 due to annual increases in traffic volumes. The

results of the analysis for the 2043 No Build Alternative predict that peak noise levels at modeled receptors would range from 45 to 70 dBA. Changes in noise levels between the existing condition and the No Build Alternative at specific receptors range from no change to an increase of 3 dBA due to changes in traffic volumes predicted to occur between 2012 and 2043.

Table 3.15-4 identifies the four residential receptors and one recreational receptor in the Kenai River Recreation Area that are predicted to have noise impacts under the No Build Alternative. The recreational receptor (KRRA 2) and one of the residences (Receptor 106) currently experience highway traffic noise above the DOT&PF noise impact thresholds. The *Highway Traffic Noise Assessment* (Appendix D) provides additional information on predicted noise levels at all modeled receptors for the No Build Alternative.

Table 3.15-4. No Build Alternative noise analysis results

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Noise Impact Threshold (dBA)	2012 Existing Noise Level (dBA)	2043 No Build Noise Level (dBA)	Change (dBA)
21	Residential (B)	66	65	66	1
105	Residential (B)	66	64	66	2
106	Residential (B)	66	69	70	1
119	Residential (B)	66	65	66	1
KRRA 2	Recreation Area (C)	66	67	68	1

Note: Shaded rows indicate receptors that currently exceed the DOT&PF noise impact threshold.
FHWA = Federal Highway Administration; dBA = A-weighted decibels

Noise increases may occur during periodic highway maintenance activities, which would eventually include repaving and bridge replacement. Impacts associated with scheduled maintenance activities are discussed in Section 3.27, Cumulative Impacts.

Mitigation

Retrofitting an existing State highway with noise abatement measures would be classified as a Type II Federal project.[3] For a Type II project to be eligible for Federal-aid funding, the State highway agency must develop and implement a Type II program in accordance with 23 CFR 772.7(e). DOT&PF has elected not to participate in the voluntary Type II program at this time. As a result, no mitigation is proposed for receptors impacted under the No Build Alternative.

3.15.2.2 Issues Applicable to the Build Alternatives

This section presents a summary of impacts of the build alternatives and discusses impact issues that apply to all build alternatives. The No Build Alternative is included for reference. More specific impact measures appear in the following sections devoted to each of the build alternatives.

[3] A Type II Federal project is defined as a Federal or Federal-aid highway project for noise abatement on an existing highway.

The primary noise source associated with all four build alternatives is vehicle traffic. Table 3.15-5 summarizes the number of modeled receptors impacted by each alternative. Receptors predicted to experience impacts are also shown on Map 3.15-2. There were no noise impacts at any of the modeled KNWR receptors. See further discussion under each alternative, below. Additional detail and discussion of noise levels at all modeled receptors can be found in the *Highway Traffic Noise Assessment* (Appendix D). Where traffic noise impacts are identified, noise abatement is considered and evaluated for acoustic feasibility and reasonableness as outlined by the DOT&PF *Noise Policy*.

Table 3.15-5. Summary of noise impacts

NAC[a] Class	Receptor Type		2012 Existing	2043 No Build	2043 Cooper Creek	2043 G South	2043 Juneau Creek	2043 Juneau Creek Variant
B	Residential	Approaches or Exceeds NAC[a]	1	4	4	0	0	0
		Substantial Increase	-	0	0	0	0	0
C	Campsite, Recreational areas, trails	Approaches or Exceeds NAC[a]	1	1	1	1	0	0
		Substantial Increase	-	0	1	1	1	1
E	Commercial	Approaches or Exceeds NAC[a]	0	0	1	0	0	0
		Substantial Increase	-	0	0	0	0	0
		Total	**2**	**5**	**7**	**2**	**1**	**1**

[a] NAC = Noise Abatement Criteria.
[b] Applies to Wilderness areas located farther from the highway and with well-established human use.

Rumble strips, installed in compliance with the DOT&PF's highway safety policies, may add additional noise to any of the build alternatives. A noise study conducted by the Texas Transportation Institute (Finley and Miles 2006) concluded that overall exterior noise was increased by vehicles driving over rumble strips, but the increase in noise was not significant. The noise of a road vehicle traveling at 55 miles per hour over rumble strips was measured to be less than the noise of a commercial vehicle (such as a large truck) traveling on the same road without driving over the rumble strips. Furthermore, additional highway noise from drivers hitting rumble strips is intermittent and random, rather than sustained. It adds to the overall acoustic energy generated in a unit of time but is not as predictable as passing traffic. As a result, it is not anticipated that periodic rumble strip noise would cause predicted noise levels to approach or exceed the NAC or reach substantial increase levels, but likely would cause occasional irritation to some people nearby.

Noise effects may also occur under all build alternatives during future periodic highway maintenance activities, such as repaving.

Construction Impacts

A major source of noise during construction for any of the build alternatives would come from heavy machinery. In addition, some blasting is likely under all alternatives, which would create short-duration loud noise. Under all build alternatives, blasting would occur at a curve slated for reconstruction, near Milepost (MP) 45, and could occur at other locations if bedrock were encountered. Pile driving also is noisy and likely would occur for bridge construction under all build alternatives. Minor pile driving would occur during placement of guardrails.

Construction is expected to occur principally during daytime hours when occasional loud noises are more acceptable. In addition, no single receptor is located adjacent to a staging area, and therefore, the concentrated activity at staging areas is unlikely to create substantial noise increase. Most construction noise is expected to be intermittant. As a result, extended disruption of normal activities by noise is not anticipated (see Appendix D, the Highway Traffic Noise Assessment). Specific issues are discussed by alternative in the sections below.

Mitigation

Mitigation measures common to all build alternatives would include implementation of measures needed to minimize or eliminate adverse construction noise impacts. Construction noise abatement measures are determined in final project plans and specifications, which include consideration of overall benefits, adverse effects, and costs (DOT&PF 2011c). Abatement measures may include scheduling pile driving or blasting to avoid periods of noise annoyance or adverse impacts to fish and wildlife, routing trucks and heavy equipment entering and exiting the project site away from residential areas to the extent practicable, and maintaining muffler systems on construction equipment. The public and land managers would be notified in advance about the hours of operation for particularly loud construction activities such as blasting and pile driving.

When no alternatives to conducting constuction activities during nights, weekends, or on holidays exist, DOT&PF would notify the public prior to conducting these activities and facilitiate public involvement throughout constuction.

Mitigation for impacts specific to each build alternative is discussed by alternative in the sections below.

3.15.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

Under the Cooper Creek Alternative, noise levels at modeled receptors are predicted to be between 33 and 72 dBA in 2043. Changes in noise levels between the existing condition and the Cooper Creek Alternative at specific receptors range from a decrease of 7 dBA to an increase of 16 dBA. Changes in noise levels between the No Build Alternative and the Cooper Creek Alternative at specific receptors also range from a decrease of 7 dBA to an increase of 16 dBA. Changes in noise levels between the No Build and Cooper Creek alternatives are due to changes in traffic volumes, changes in roadway alignments, and changes in shielding.

Four residential properties, one commercial property, and one recreational site in the Kenai River Recreation Area are predicted to have 2043 noise levels approaching, equal to, or above the Noise Abatement Criteria under the Cooper Creek Alternative. One trail site on the Stetson Trail is predicted to experience a 16 dBA increase in noise by 2043.

Table 3.15-6 identifies the noise impacts under the Cooper Creek Alternative. Impacted receptors also are shown on Map 3.15-2. KNWR receptors showed small changes from 2012 conditions—3 dBA or less, which is barely perceptible by the normal human ear. The *Highway Traffic Noise Assessment* (Appendix D) provides additional information on the predicted noise levels at all modeled receptors.

Table 3.15-6. Receptors with predicted noise impacts, Cooper Creek Alternative

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Noise Impact Threshold (dBA)	2012 Existing Noise Level (dBA)	2043 No Build Noise Level (dBA)	2043 Cooper Creek Noise Level (dBA)	Change Between 2043 No Build and 2043 Build	Change Between 2012 Existing and 2043 Build
87	Residential (B)	66	56	58	67	9	11
105	Residential (B)	66	64	66	68	2	4
106	Residential (B)	66	69	70	72	2	3
107	Commercial (E)	71	66	68	71	3	5
119	Residential (B)	66	65	66	66	0	1
KRRA 2	Recreation Area (C)	66	67	68	68	0	1
ST 1	Trail (C)	66	40 [a]	40 [a]	56	16	16

[a] Existing noise levels for sites more than 1,000 feet from the existing highway were identified as 40 dBA, the minimum level measured during model validation (see Section 3.15.1.3).

Note: FHWA = Federal Highway Administration; dBA = A-weighted decibels

Additional noise from periodic highway maintenance and rumble strips under the Cooper Creek Alternative would be similar to those described for all build alternatives above.

Construction Impacts

In addition to the general noise effects common to all build alternatives (Section 3.15.2.2, above), pile driving would occur at the Cooper Landing Bridge replacement site in the heart of the Cooper Landing community. Driving or drilling pilings for the temporary construction bridge and for the permanent new bridge would create intermittent, substantial noise events for multiple days.

Pile driving would also occur at the Schooner Bend Bridge replacement site about one-half mile from Russian River Campground and within about 500 feet of the trailhead for Resurrection Pass Trail. The Cooper Creek Alternative also would involve considerable use of construction equipment in and immediately adjacent to the community of Cooper Landing, because the

alternative would rebuild the existing alignment in the portion of Cooper Landing north and east of the Snug Harbor Road intersection.

Blasting would occur near MP 45. Blasting noise would be an impact to local residents and patrons of a nearby lodge/store/gas station.

Mitigation

Traffic noise abatement was considered at each of the receptors predicted to be impacted in 2043 under the Cooper Creek Alternative. Noise mitigation was considered following the DOT&PF *Noise Policy* (DOT&PF 2011c), but is not proposed for the following reasons:

- Receptor 87 is a residential property but is assumed to be acquired under the Cooper Creek Alternative, given its location relative to the alignment footprint. Mitigation is not recommended for this receptor.
- Receptor 105 is located on a residential parcel (the same parcel occupied by Receptor 106) but represents a non-residential structure. Receptor 105 is a garage and is not considered a land use sensitive to highway noise (DOT&PF 2011c). Mitigation is not recommended for this receptor.
- Receptors 106 and 119 are residences with direct driveway access onto the Sterling Highway. Noise walls for single, isolated residences are not typically able to meet cost-effectiveness (reasonableness) criteria because of the length of wall needed to meet the DOT&PF noise reduction goal. In addition, the ability of noise walls to achieve acceptable noise reduction is greatly reduced by the need for gaps in noise walls for driveway access. Consequently, noise barriers were determined not to be feasible and are not recommended for these receptors.
- Receptor 107 is a commercial property; DOT&PF does not provide noise mitigation for commercial properties or undeveloped lands. Mitigation is not recommended for this receptor.
- Receptor KRRA 2 is a representative location in the Kenai River Recreation Area used to evaluate noise levels at locations near to the highway in this section of the recreation area. It does not represent a specific, discrete use area, such as a campground, picnic site, etc., that can be shielded by noise barriers. Noise abatement barriers cannot typically provide adequate noise reductions over large recreational areas representing dispersed use in a cost-effective manner. Therefore, mitigation is not recommended for this receptor.
- Receptor ST 1 is a representative location on the Stetson Trail used to evaluate noise levels at locations near to the highway in this section of the project area. It does not represent a specific, discrete use area, such as a campground, picnic site, etc. that can be shielded by noise barriers. Noise abatement barriers cannot typically provide adequate noise reductions over large recreational areas representing dispersed use in a cost-effective manner. Therefore, mitigation is not recommended for this receptor.

The primary construction noise impact associated with the Cooper Creek Alternative would result from pile driving for the Cooper Landing Bridge and Schooner Bend Bridge pilings. To minimize this impact, pile driving would be limited to daytime hours to avoid disrupting residents and campers at night, and conducted with a vibratory hammer (to the maximum extent possible) to minimize effects to outmigrating salmon smolt.

3.15.2.4 G South Alternative

Direct and Indirect Impacts

Under the G South Alternative, noise levels at modeled receptors are predicted to be between 34 and 68 dBA in 2043. Changes in noise levels between the existing condition and the G South Alternative at specific receptors range from a decrease of 6 dBA to an increase of 21 dBA. Changes in noise levels between the No Build Alternative and the G South Alternative at specific receptors range from a decrease of 6 dBA to an increase of 21 dBA. Changes in noise levels between the No Build and G South alternatives are due to changes in traffic volumes, changes in roadway alignments, and changes in shielding.

One recreational site in the Kenai River Recreation Area is predicted to have 2043 noise levels above the Noise Abatement Criteria under the G South Alternative. One trail site (on the Bean Creek Trail) is predicted to have a substantial increase impact (21 dBA above existing levels) in 2043.

Table 3.15-7 identifies the receptors anticipated to experience noise impacts under the G South Alternative. Receptors predicted to experience impacts are also shown on Map 3.15-2. KNWR receptors showed small changes from 2012 conditions—3 dBA or less, which is barely perceptible by the normal human ear. The *Highway Traffic Noise Assessment* (Appendix D) provides additional information on the predicted noise levels at all modeled receptors.

Table 3.15-7. Receptors with predicted noise impacts, G South Alternative

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Noise Impact Threshold (dBA)	2012 Existing Noise Level (dBA)	2043 No Build Noise Level (dBA)	2043 G South Noise Level (dBA)	Change Between 2043 No Build and 2043 Build	Change Between 2012 Existing and 2043 Build
KRRA 2	Recreation Area (C)	66	67	68	68	0	1
BCT 2	Trail (C)	66	40 [a]	40 [a]	61	21	21

[a] Existing noise levels for sites more than 1,000 feet from the existing highway were identified as 40 dBA, the minimum level measured during model validation (see Section 3.15.1.3).

Note: FHWA = Federal Highway Administration; dBA = A-weighted decibels

Additional noise from periodic highway maintenance and rumble strips under the G South Alternative would be similar to those described for all build alternatives in Section 3.15.2.2, above.

Construction Impacts

In addition to the general noise effects common to all build alternatives (above), pile driving would occur for bridge construction at a new location on the Kenai River. Noise of pile driving could affect river users passing by. The river may be partially or fully closed to navigation by boats and rafts during pile driving for safety as well as noise. If all or part of the river remained open at any given time during piling driving, the sound could be loud for boaters floating past, but would be of short duration. While there is no development adjacent to the new bridge site,

pile driving likely could be heard at Gwin's Lodge and Cooper Creek Campground, each about 3,500 feet away to the west and east, respectively.

Pile driving also would occur for the Schooner Bend Bridge replacement about 0.5 mile from Russian River Campground and within about 500 feet of the trailhead for Resurrection Pass Trail. These distances indicate potential for disturbing and disrupting campground and recreation activities but likely would not curtail use.

Mitigation

Traffic noise abatement was considered at each of the receptors predicted to be impacted in 2043 under the G South Alternative. Noise mitigation will comply with the DOT&PF *Noise Policy* (DOT&PF 2011c). Noise mitigation was considered but not proposed for the following reasons:

- Receptor KRRA 2 is a representative location in the Kenai River Recreation Area used to evaluate noise levels at locations near to the highway in this section of the recreation area. It does not represent a specific, discrete use area, such as a campground, picnic site, etc., which can be shielded by noise barriers. Noise abatement barriers cannot typically provide adequate noise reductions over large recreational areas representing dispersed use in a cost-effective manner, and therefore, mitigation is not recommended for this receptor.
- Receptor BCT 2 is a representative location on the Bean Creek Trail used to evaluate noise levels at locations near to the highway in this section of the project area. It does not represent a specific, discrete use area, such as a campground, picnic site, etc., which can be shielded by noise barriers. Noise abatement barriers cannot typically provide adequate noise reduction over large recreational areas representing dispersed use in a cost-effective manner. Therefore, mitigation is not recommended for this receptor.

The primary construction noise impact associated with the G South Alternative would result from pile driving for the new Kenai River and Schooner Bend bridges. To minimize this impact, pile driving would be limited to daytime hours to avoid disrupting residents, lodge guests, and campers at night, and conducted with a vibratory hammer (to the maximum extent possible) to minimize effects to outmigrating salmon smolt.

3.15.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Under the Juneau Creek Alternative, noise levels at modeled receptors are predicted to be between 36 and 65 dBA in 2043. Under the Juneau Creek Variant alternative, noise levels at modeled receptors are predicted to be between 35 and 63 dBA in 2043.

Changes in noise levels between the existing condition and the Juneau Creek and Juneau Creek Variant alternatives at specific receptors range from a decrease of 6 dBA to an increase of 21 dBA. Changes in noise levels between the No Build Alternative and the Juneau Creek and Juneau Creek Variant alternatives at specific receptors range from a decrease of 7 dBA to an increase of 21 dBA. Changes in noise levels between the No Build Alternative and the Juneau Creek or Juneau Creek Variant alternative are due to changes in traffic volumes, changes in roadway alignments, and changes in shielding.

One trail site (on the Bean Creek Trail) is predicted to have a substantial increase in noise levels (21 dBA above existing levels) in 2043 under both the Juneau Creek and Juneau Creek Variant alternatives.

Table 3.15-8 identifies the receptor anticipated to experience noise impacts under the Juneau Creek and Juneau Creek Variant alternatives. The BCT 1 receptor predicted to experience impacts is shown on Map 3.15-2.

Most of the KNWR receptors showed small changes from 2012 conditions for both alternatives—generally 4 dBA or less, which is barely perceptible by the normal human ear. An exception would occur where the new alignment of the Juneau Creek Alternative would pass through the southeast corner of the Mystery Creek Wilderness unit, near a modeled noise receptor. The modeled change was a 10 dBA increase from 2012 conditions to 58 dBA. Also, the Juneau Creek Variant Alternative would result in 4 and 5 dBA increases over 2012 levels at the two Russian River Ferry receptors, but 3 dBA above 2043 No Build levels (barely perceptible) at both of these receptors. None of these KNWR noise levels would approach or exceed the Noise Abatement Criteria. However, although traffic noise from the existing highway affects the Wilderness receptor today, the 10 dBA increase inside this designated Wilderness area would further erode Wilderness qualities, opportunities for solitude and spiritual renewal, and unconfined and primitive recreation. This alternative would transmit highway traffic noise farther into the Mystery Creek Wilderness unit. The *Highway Traffic Noise Assessment* (Appendix D) provides additional information on the predicted noise levels at all modeled receptors.

Table 3.15-8. Receptors with predicted noise impacts, Juneau Creek and Juneau Creek Variant alternatives

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Noise Impact Threshold (dBA)	2012 Existing Noise Level (dBA)	2043 No Build Noise Level (dBA)	2043 Juneau Creek Noise Level (dBA)	Change Between 2043 No Build and 2043 Build	Change Between 2012 Existing and 2043 Build
BCT 1	Trail (C)	66	40 [a]	40 [a]	61	21	21

[a] Existing noise levels for sites more than 1,000 feet from the existing highway were identified as 40 dBA, the minimum level measured during model validation (see Section 3.15.1.3).

Note: FHWA = Federal Highway Administration; dBA = A-weighted decibels

In its role as a Cooperating Agency, USFWS expressed concerns related to noise effects on its resources. Under either of the Juneau Creek alternatives, traffic noise would increase in the Mystery Creek Wilderness area because of a second road. The additional roadway noise could affect Wilderness character and wildlife, as there would then be two highways on the landscape, both in proximity to Wilderness units. USFWS indicated that public use on the Kenai River and the many trail systems throughout the Kenai River valley, as well as a multitude of wildlife species (including but not limited to lynx, wolverine, wolf, brown bear, and Dall's sheep, as well as migratory birds that have likely already established breeding territories), likely would be affected by the increased noise levels from either of these alternatives. See Section 3.22, Wildlife.

Additional noise from periodic highway maintenance and rumble strips would be similar to those described for all build alternatives in Section 3.15.2.2 above.

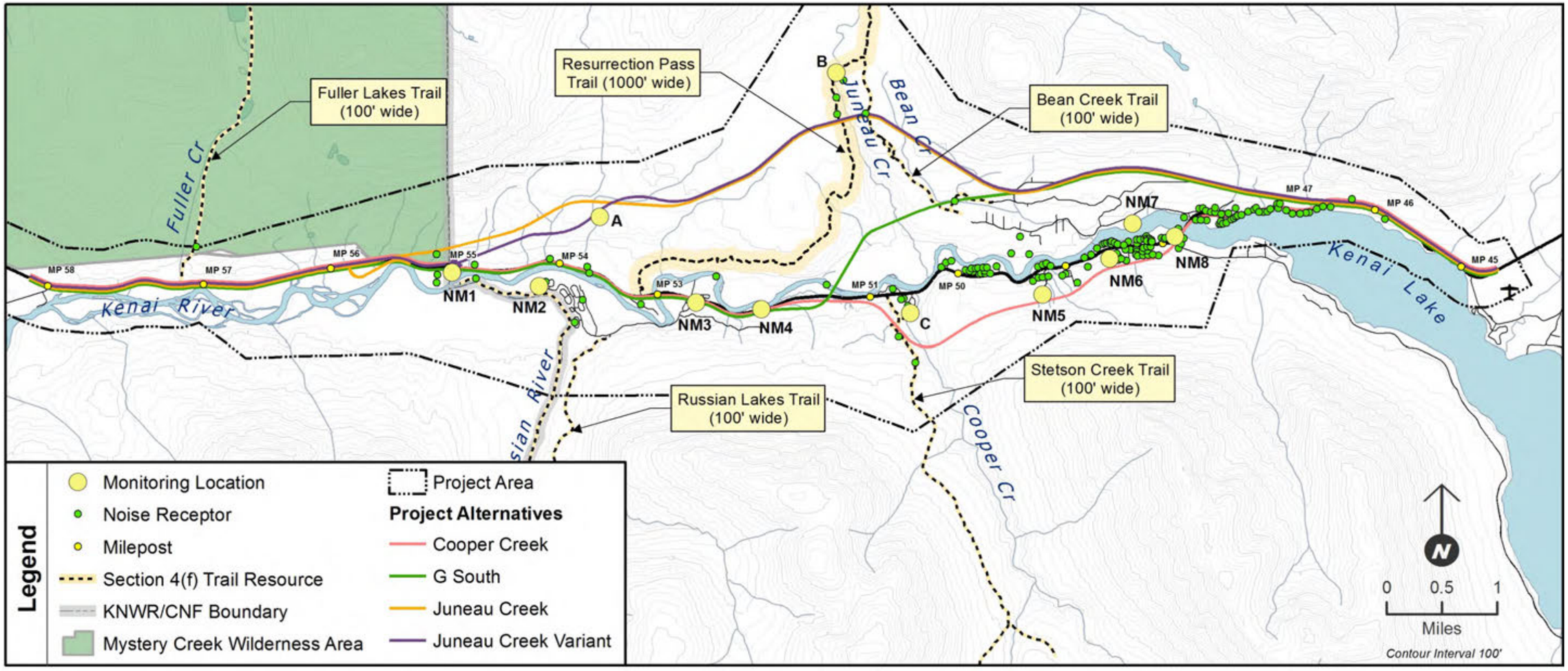
Construction Impacts

In addition to the general noise effects common to all build alternatives (above), the Juneau Creek and Juneau Creek Variant alternatives likely would involve blasting or pile driving or both for construction of the abutments for a new Juneau Creek Bridge over Juneau Creek Canyon. As a clear span bridge, no work would occur within the canyon, but noise on the canyon rims would potentially disturb and disrupt trail users on both the Resurrection Pass Trail (west rim) and Bean Creek Trail (east rim). In addition, construction of the overpass bridge adjacent to Sportsman's Landing under the Juneau Creek Variant Alternative would create general construction noise for adjacent Sportsman's Landing recreational users, but would be unlikely to require any pile driving or blasting.

Mitigation

Traffic noise abatement was considered at receptor BCT 1, which was predicted to be impacted in 2043 under the Juneau Creek and Juneau Creek Variant alternatives. Noise mitigation was considered but not proposed for the following reasons:

- Receptor BCT 1 is a representative location on the Bean Creek Trail used to evaluate noise levels at locations near to the highway in this section of the project area. It does not represent a specific, discrete use area, such as a campground, picnic site, etc., that can be shielded by noise barriers. Noise abatement barriers cannot typically provide adequate noise reductions over large recreational areas representing dispersed use in a cost-effective manner. Therefore, mitigation is not recommended for this receptor.



Map 3.15-1. Noise monitoring locations in the project area

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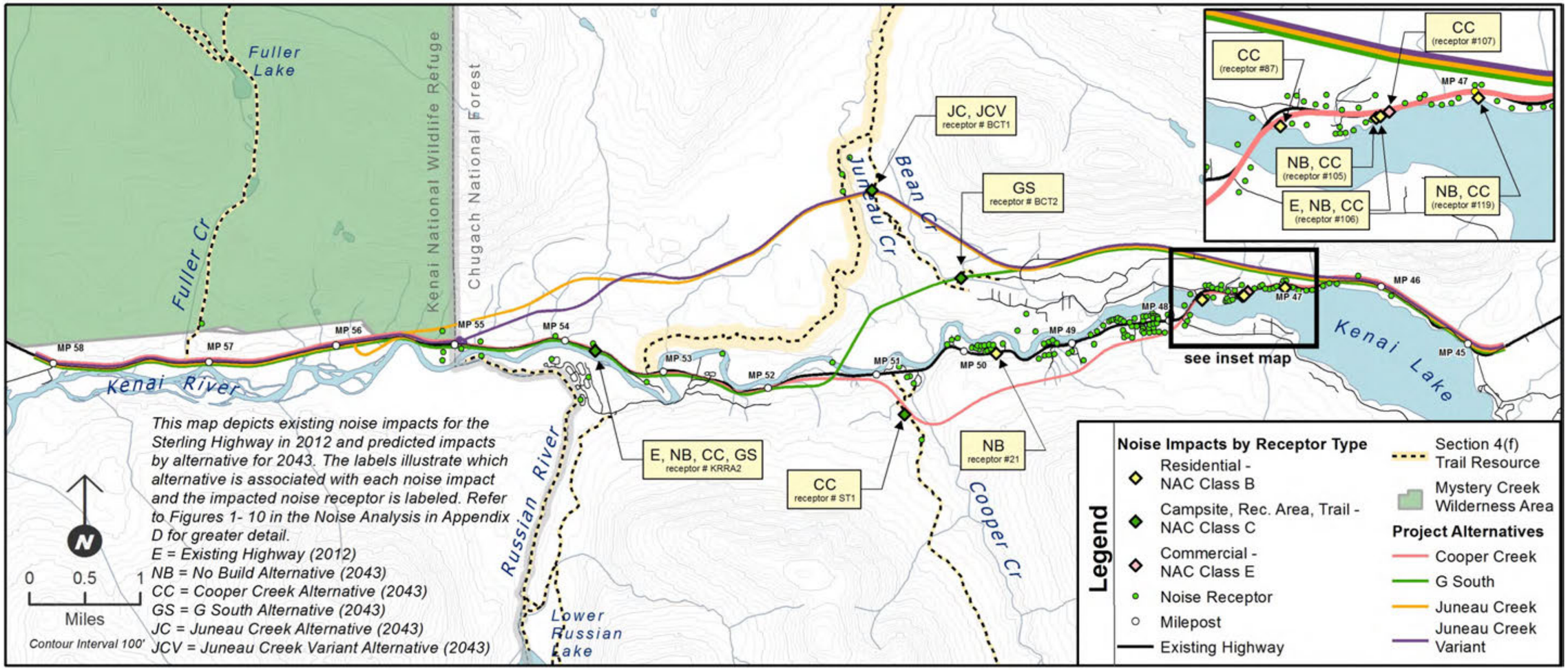

Map 3.15-2. Noise impacts in the project area

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