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) typically 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 is 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 Environmental Impact Statement (EIS) 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 a traffic noise 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).

Comments on the Draft Supplemental Environmental Impact Statement (SEIS) expressed concern that impacts of highway traffic noise were understated. Additional receptors were added to improve the characterization of traffic noise changes near residences on the north side of the Kenai River for this EIS. The FHWA model uses an averaged noise level to evaluate and compare acoustic energy, which does not account well for the interruption or irritation of high-intensity, short-duration noises such as a heavy truck passing. Also, FHWA's noise analysis methods focus on the human experience of sound, mostly in developed settings. However, additional information has been added regarding wildlife and Wilderness based on the noise levels anticipated.

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 habitat and—on KNWR—as federal Wilderness, 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 186 receptors broken down by type as follows: 123 residential receptors (Category B); 10 campground receptors, 11 recreation area and Wilderness receptors (Category C), 7 trail receptors (Category C); and 6 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 average hourly 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, including grades; 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 187 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 Traffic 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 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, within approximately 150 feet of the existing highway centerline. 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 ridge tops on either side of the existing Sterling Highway, which are in Wilderness, traffic likely is audible under certain atmospheric conditions.

3.15.1.5 Wildlife and Noise

The current highway alignment, which has been a fixture on the landscape since 1950, creates noise that is presumed to affect wildlife as described in the paragraphs below. Other anthropogenic (human-caused) noise results from residential or commercial development and recreationists. As described below, research shows that most wildlife exhibit some degree of avoidance of roads based on noise, but some species will tolerate the disturbance for short

[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 or Wilderness character (see Section 3.22 for additional discussion of wildlife).

periods to access valuable resources or pass through as a result of normal foraging patterns or during seasonal migration.

The effect of noise on wildlife can be difficult to distinguish from other impacts from the same source. Roads passing through wildlife habitat create edges between habitat and non-habitat. Edge effects are the extension of impacts beyond the road into wildlife habitat that cause a gradient of disturbance well beyond the road surface (Forman and Alexander 1998). While these impacts can also be visual or physical, or can result from changes in other wildlife patterns, noise is the impact that generally extends the farthest from a road. The distance that noise impacts occur away from the source is dependent on numerous variables, including topography, vegetation, ambient sound levels, weather conditions, type of noise (i.e., continuous or impulse), and the sensitivity of the species. In the KNWR, the USFWS has indicated that sounds from traffic can be audible up to 0.5 mile (2,640 feet) from the source, and have been measured up to 2 miles from the source in winter. An existing highway noise effect zone in the project area (using a 0.5-mile zone along either side of the highway) extends across approximately 9,500 acres.

Human-caused noise above the ambient or background conditions of a natural environment can have two general impacts on wildlife: displacement and masking. Both are assumed to occur within proximity of the existing Sterling Highway. While displacement results in the avoidance of habitat, masking inhibits the perception of other sounds. Noise can inhibit an animal's ability to sense prey or predators by masking their auditory cues, and interfering with the detection and discrimination of crucial signals as well as prevent communication between territorial males, potential mates, or family groups (Barber, Crooks and Fristrup 2009, Laiolo 2010). Chronic noise exposure can cause elevated stress levels, hypertension, or even hearing loss (Dooling and Popper 2007, Babisch 2003, Jarup et al. 2008).

The effects of noise vary by species or species group. Species that rely on acoustic communication, such as birds, or that use echolocation, such as bats, are more sensitive to human-caused noise. Instantaneous noises, such as sudden acceleration/deceleration, the buzz of rumble strips, or the passing of a loud motorcycle, can cause rapid changes in animal behavior such as escape responses. It is presumed that these types of noise impacts are currently occurring in the project area at varying magnitudes.

The ambient average hourly noise level in areas greater than 1,000 feet from the Sterling Highway is assumed to be 40 dBA based on noise measurements conducted in July 2001. Other monitoring locations and modeled receptors were primarily located within 1,000 feet of the Sterling Highway, generally at sites used by people (Activity Categories B and C). As mentioned above, numerous factors may influence the propagation of traffic noise through wildlife habitat and may regularly extend beyond 1,000 feet from the highway, in particular instantaneous noise at high intensity levels. Therefore, current traffic noise conditions within wildlife habitat in the project area may average around 40 dBA but are assumed to be regularly influenced by instantaneous noises.

3.15.2 Environmental Consequences

This section describes the potential effects of each project alternative on noise levels at modeled receptors. Noise effects to campgrounds and trails that are protected under Section 4(f) are also addressed in Chapter 4, Final Section 4(f) Evaluation, in Section 4.5 (Impacts of the Build

Alternatives on Section 4(f) Resources). For alternatives that would use portions of the Resurrection Pass Trail, effects of noise appear in Section 4.5.4.2.

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 traffic noise impacts to the human environment, not necessarily impacts to wildlife. Wildlife effects are discussed under separate subheadings (see also Section 3.22 for more description about wildlife impacts in general).

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 traffic 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 Traffic 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 Traffic 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 Traffic 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.

KNWR and Wilderness

The KNWR and its Mystery Creek and Andrew Simons Wilderness units would be affected in small ways by the projected increase in traffic under the No Build Alternative. The type and magnitude of the effects on wildlife, KNWR recreation, and Wilderness character from highway noise would be similar to the effects of the highway today. Similar to the existing condition, locations near the existing highway would be affected most, including Wilderness that shares a boundary with the existing highway right-of-way in the MP 55.0 to 55.5 area near receptor KNWR 2. The modeling effort undertaken for this project (Appendix D) included four receptors in KNWR, with the following predicted noise levels:

- KNWR 1, on Fuller Lakes Trail just inside the Mystery Creek Wilderness boundary: 2043 noise level 40 dBA, no change from existing.
- KNWR 2, in the southeast corner of the Mystery Creek Wilderness near MP 55: 2043 noise level 50 dBA, up 2 dBA from existing.
- KNWR 3, at the parking lot for the Russian River Ferry: 2043 noise level 47 dBA, up 2 dBA from existing.
- RR, located in the wooded area north of the Russian River Ferry parking lot: 2043 noise level 53 dBA, up 1 dBA from existing.

Instantaneous sound levels would be higher than the hourly equivalent noise level (Leq[h]) as explained for Table 3.15-2, and it is likely that sound propagation in areas without obstructions (vegetation or terrain) would be audible over long distances, detracting from the Wilderness character of these otherwise remote areas.

Wildlife and Noise

Under the No Build Alternative, modest increases in traffic noise would result from increases in traffic volume. Increases of 0 to 2 dBA would have negligible impacts on wildlife behavior and would not likely change their current reactions to existing noise conditions. The location of traffic noise sources would not change, and the amount of wildlife habitat affected by traffic noise would not change noticeably.

Mitigation

The expected difference in traffic noise levels is expected to be 1 to 2 dBA, a level considered not discernable, although the absolute sound level would be above traffic noise impact thresholds in five locations (two exceed the thresholds in 2012 existing conditions). 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 under the No Build Alternative that indicate a traffic noise impact.

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

3.15.2.2 Issues Applicable to the Build Alternatives

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

The primary noise source associated with all four build alternatives is vehicle traffic. Table 3.15-5 summarizes the number of modeled receptors that would have a traffic noise impact, by alternative. Receptors predicted to experience traffic noise impacts are also shown on Map 3.15-2. There were no traffic 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 traffic noise impacts

NAC[a] Class	Land Use 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 (including Wilderness)	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.

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.

Other sources of intermittant instantaneous noises related to traffic that could be annoying under any alternative would include air compression brakes on trucks, loud motorcycles or vehicles with broken mufflers, tires thumping on bridge thresholds, and car horns. These are impacts that are expected on most roads, some of which are not captured in the noise modeling software. Compression brakes (also known as exhaust or engine brakes or "jake" brakes) are used by some truck drivers to reduce speeds on relatively steep grades (i.e., above 5 percent). These brakes are considered a safety feature on trucks and, as such, the State of Alaska permits their use (local jurisdictions in some locations prohibit use of compression brakes). The noise model calculations include vehicle type (to account for heavy trucks and buses) and deceleration but do not account for the use of compression brakes, which are louder. Noise from compression brakes is addressed under each alternative below.

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 traffic noise impacts specific to each build alternative is discussed by alternative in the sections below. Note that the USFWS requested examination of "quiet pavement" as a way to minimize impacts to wildlife, Wilderness, and other KNWR resources. DOT&PF examined the issue (HDR 2015a) and determined:

- Quiet pavement typically refers to Next Generation Concrete, a technique for providing grooves for traction and automobile control on concrete that is also designed to minimize tire noise. It does not refer to asphalt pavements, which is the typical surface treatment on Alaska highways, including the surface type in the project area.
- Asphalt is generally quieter that concrete, so the sound level is already similar to a Next Generation Concrete surface.
- DOT&PF has been experimenting with rubberized asphalt as a way to increase durability to wear from studded tires, and a benefit is sound reduction. Efforts to date have had mixed results. DOT&PF has placed a moratorium on using rubberized asphalt until researchers from DOT&PF and the University of Alaska have determined the problems and have perfected the technique. DOT&PF will consider using rubberized asphalt on the Sterling Highway MP 45–60 project if the moratorium is lifted.

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 40 and 72 dBA in 2043. Changes in noise levels between the 2012 existing condition and the 2043 Cooper Creek Alternative at specific receptors range from a decrease of 6 dBA to an increase of 17 dBA. Changes in 2043 noise levels between the No Build Alternative and the Cooper Creek Alternative at specific receptors also range from a decrease of 4 dBA to an increase of 17 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 17 dBA increase in noise by 2043.

Table 3.15-6 identifies the traffic 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.

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. The Cooper Creek Alternative's high elevation is above the south side of the Cooper Landing community. Some trucks descending from this high point may use compression brakes, causing additional

noise as eastbound trucks descend to the community at Cooper Landing Bridge and as westbound trucks descend south and west of Cooper Creek Campground.

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

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Traffic 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]	57	17	17

[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

KNWR and Wilderness

The type and magnitude of the effects on wildlife, recreation, and Wilderness character within the KNWR and its Mystery Creek and Andrew Simons Wilderness units from highway noise would be similar to the effects of the highway today. As in the existing condition, locations near the existing highway would be affected most, including Wilderness that shares a boundary with the existing highway right-of-way in the MP 55.0 to 55.5 area near receptor KNWR 2. The modeling effort undertaken for this project (Appendix D) included four receptors in KNWR, with the following predicted noise levels:

- KNWR 1, on Fuller Lakes Trail just inside the Mystery Creek Wilderness boundary: 2043 noise level 40 dBA, no change from existing.
- KNWR 2, in the southeast corner of the Mystery Creek Wilderness near MP 55: 2043 noise level 50 dBA, up 2 dBA from existing, same as the No Build Alternative.
- KNWR 3, at the parking lot for the Russian River Ferry: 2043 noise level 47 dBA, up 2 dBA from existing, same as the No Build Alternative.
- RR, located in the wooded area north of the Russian River Ferry parking lot: 2043 noise level 55 dBA, up 2 dBA from the No Build Alternative and up 3 dBA from existing.

As indicated in the USFWS study, instantaneous sound levels would be higher, and it is likely that direct sound propagation in areas without obstructions (vegetation or terrain) would be

audible over long distances, detracting from the Wilderness character of these otherwise remote areas.

Wildlife and Noise

Under the Cooper Creek Alternative, noise levels in some areas would decrease 7 dBA and would increase 17 dBA in other areas compared to existing conditions. The alignment would be located at higher elevation, which if not shielded by topography generally would result in less restriction on noise propagation. The greatest impact to wildlife habitat would occur between Cooper Creek and Kenai Lake/Cooper Landing Bridge, where the highway would be routed to the south of the existing alignment. The Cooper Creek valley serves as a north-south wildlife movement corridor as it connects with Juneau Creek to the north (Map 3.22-1). Traffic noises would be introduced to an area that is currently not influenced by highway noise. Modeled receptors along the Stetson Creek Trail and higher in the Cooper Creek valley in this area predict increases of 7 to 17 dBA, which would result in a doubling of the noise intensity in wildlife habitat south of the new alignment. The introduction and/or increase in noise in this area would degrade the value of wildlife habitat, likely resulting in avoidance within 0.5 mile of the highway, and could reduce the effectiveness of this area as a wildlife movement corridor. Where the Cooper Creek Alternative follows the existing Sterling Highway alignment, traffic noise changes in these areas would be similar to those of the No Build Alternative and similar to existing impacts described in Section 3.15.1.5. These effects would continue to occur or worsen as traffic volumes increased.

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 have traffic noise impacts 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 typical waking hours (e.g., 8 am–8 pm) 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 40 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 traffic noise impacts under the G South Alternative. Receptors predicted to experience traffic noise 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 traffic noise impacts, G South Alternative

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Traffic 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. The G South Alternative's high elevation is above the north side of the Cooper Landing community. Some trucks descending from this high point may use compression brakes, causing additional noise as eastbound trucks descend toward Kenai Lake and particularly as westbound trucks descend across the Juneau Creek drainage to the Kenai River.

While sound from the G South Alternative would be likely to reach the Resurrection Pass Trail, where the highway would pass through lower Juneau Creek Valley and the trail is located on the bluff edge above, the separation (1,900 feet horizontally and approximately 300 feet in elevation) means there would be no traffic noise impact as defined in noise policy. Nonetheless, the sounds of traffic would be discernible and possibly distracting to some trail users who were expecting natural sounds only. The existing highway is audible from the Resurrection Pass Trail at some points. See also Chapter 3.8, Parks and Recreation.

KNWR and Wilderness

The magnitude and type of effects on wildlife, recreation, and Wilderness character within the KNWR and its Mystery Creek and Andrew Simons Wilderness units from highway noise would be substantially similar to noise effects today. Similar to the existing condition, locations near the existing highway would be affected most, including Wilderness that shares a boundary with the existing highway right-of-way in the MP 55.0 to 55.5 area near receptor KNWR 2. The modeling effort undertaken for this project (Appendix D) included four receptors in KNWR, with the following predicted noise levels:

- KNWR 1, on Fuller Lakes Trail just inside the Mystery Creek Wilderness boundary: 2043 noise level 40 dBA, no change from existing, same as the No Build Alternative.
- KNWR 2, in the southeast corner of the Mystery Creek Wilderness near MP 55: 2043 noise level 50 dBA, up 2 dBA from existing, same as the No Build Alternative.
- KNWR 3, at the parking lot for the Russian River Ferry: 2043 noise level 47 dBA, up 2 dBA from existing, same as the No Build Alternative.
- RR, located in the wooded area north of the Russian River Ferry parking lot: 2043 noise level 55 dBA, up 2 dBA from the No Build Alternative and up 3 dBA from existing.

As indicated in the USFWS study, instantaneous sound levels would be higher, and it is likely that direct sound propagation in areas without obstructions (vegetation or terrain) would be audible over long distances, detracting from the Wilderness character of these otherwise remote areas.

Wildlife and Noise

Under the G South Alternative, noise levels would decrease up to 6 dBA and increase as much as 21 dBA in some areas. This alternative also would be positioned at a higher elevation than the existing alignment, which, where not shielded by topography and vegetation, generally would result in less restriction on noise propagation. Of the receptors modeled, the largest increase in noise level is predicted at the trailhead for Bean Creek Trail (receptor BCT 2; Map 3.15-2). Realignment of the highway north of the existing alignment would result in increased noise levels in the lower Juneau Creek drainage and a greater area of wildlife habitat degraded by human-caused noise. Some instantaneous or high-intensity noises may be audible upstream in the Juneau Falls vicinity. The Juneau Creek drainage is a wildlife movement corridor and provides wildlife habitat for brown and black bear, moose, and other wildlife. At higher elevations there is Dall sheep habitat (Map 3.22-1).

The introduction of highway noise along the new alignment would result in changes in the quality of wildlife habitat within 0.5 mile of the alternative. Existing impacts as described in Section 3.15.1.5 (Wildlife and Noise) would continue to occur throughout the project area, but at greater magnitudes where the new alignment would transect important wildlife habitat. Increases in noise levels may result in habitat avoidance, changes in behavior, or increased stress levels for wildlife attempting to use movement corridors to access resources or migrate north-south. Where the G South Alternative follows the existing Sterling Highway alignment, noise impacts would be approximately equivalent to those of the No Build Alternative. These effects would continue to occur or worsen as traffic volumes increased.

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 have traffic noise impacts 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 typical waking hours (e.g., 8 am–8 pm) 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 out-migrating salmon smolt.

3.15.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Under the Juneau Creek Alternative (preferred alternative), noise levels at modeled receptors are predicted to be between 40 and 65 dBA in 2043. Under the Juneau Creek Variant alternative, noise levels at modeled receptors are predicted to be between 40 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 traffic noise impacts

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

The receptor locations modeled on the Resurrection Pass Trail are not expected to have a substantial noise increase, as defined by FHWA's methodology, but the character of the audible experience along the trail in the Juneau Falls area would change (a 12 dBA increase at the point modeled). See also Section 4.5.4.2.

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 traffic noise impacts, Juneau Creek and Juneau Creek Variant alternatives

Receptor ID	Existing Land Use (FHWA Activity Category)	DOT&PF Traffic 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

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. The Juneau Creek alternatives' high elevation is just west of the proposed bridge over Juneau Creek Canyon. Some trucks descending from this high point may use compression brakes, causing additional noise as eastbound trucks descend toward Bean Creek and the northern part of the community of Cooper Landing and as westbound trucks descend across State Unit 395 and CNF land toward Sportsman's Landing, the Kenai River, and the KNWR's Mystery Creek Wilderness unit. For the Juneau Creek Alternative, the bottom of the grade would occur within land that is currently designated Wilderness. Under the Juneau Creek Variant Alternative, the bottom of the grade would occur just east of the existing KNWR/Wilderness boundary. This descending stretch of road for the Juneau Creek alternatives is adjacent to and/or close to the Mystery Creek Wilderness Area.

KNWR and Wilderness

The KNWR and its Mystery Creek and Andrew Simons Wilderness units would be affected in different ways under the two Juneau Creek alternatives. In its role as a Cooperating Agency, USFWS expressed concerns related to noise effects on its resources. 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 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 Wildlife and Noise, below, and Section 3.22, Wildlife.

Under the Juneau Creek Alternative, the southeast corner of the Mystery Creek Wilderness would be affected by locating the noise source across this corner of designated Wilderness. While this area already is within audible range of the highway, any human or animal use of this corner of the KNWR would change substantially, in part because vehicle noise now would be generated within this area. In effect, the zone of highest noise that coincides with the highway corridor would be moved uphill approximately 800 feet north of the existing centerline at the KNWR boundary. Heading west, the separation would taper to zero over about 0.6 mile as the two alignments merged. With the existing highway continuing to function in its current location (albeit with substantially lower traffic than occurs today), two highways would exist on the landscape and would cause highway noise throughout the triangular area between the two highways. This is the area in which receptor KNWR 2 is located. While noise at the four modeled KNWR receptors would not approach or exceed the Noise Abatement Criteria, this addition of a second, separated road would bring greater noise effects to this area. The predicted 10 dBA increase inside this triangle of designated Wilderness area would degrade the Wilderness qualities.

As noted in the previous subsection, to the extent that truck drivers employed compression brakes ("jake" brakes) while descending westward toward the KNWR, the noise under either alternative would detract from wilderness values of natural quiet in the Wilderness area. Some of this noise also may be audible from points in the Andrew Simons Wilderness unit located south of the Kenai River in this area.

The overall traffic projected to use the two highways would be the same as projected to use the existing highway under the No Build Alternative, so the total noise generated would be similar to current conditions. The new alignment would have fairly steep uphill grades heading east, which would create somewhat more noise of laboring engines compared to the flat existing highway in this area. This also would expand the area within KNWR affected by traffic noise. As in the existing condition, locations near the existing highway would be affected most, including Wilderness that shares a boundary with the existing highway right-of-way in the MP 55.0 to 55.5 area near receptor KNWR 2, as shown below.

For the Juneau Creek Variant Alternative, the KNWR would be affected in relatively small ways by the projected increase in traffic. The same type of split between the existing and new alignments would occur, but the split would occur immediately east of the KNWR boundary, and most of the additional noise effects described above for the Juneau Creek Alternative would occur on Chugach National Forest and not on KNWR or the Mystery Creek Wilderness. The highway split would be expected to generate noise in a slightly different location, which would propagate into the KNWR in a different pattern than it does today. Noise modeling indicates no difference in average sound levels at KNWR 2, the Wilderness receptor closest to the new alignment, than under the No Build Alternative. The type and magnitude of the effects on wildlife, KNWR recreation, and Wilderness character from highway noise would be substantially similar to current conditions, with possible increased noise disturbance because this would be a second road on the landscape in proximity to the KNWR.

The modeling effort undertaken for this project (Appendix D) included four receptors in KNWR, with the following predicted noise levels:

- KNWR 1, on Fuller Lakes Trail just inside the Mystery Creek Wilderness boundary:
    - Juneau Creek and Juneau Creek Variant Alternatives: 2043 noise level 40 dBA, no change from existing, same as the No Build Alternative.
- KNWR 2, in the southeast corner of the Mystery Creek Wilderness near MP 55:
    - Juneau Creek Alternative: 2043 noise level 58 dBA, 8 dBA higher than the No Build Alternative and a 10 dBA increase from existing.
    - Juneau Creek Variant Alternative: 2043 noise level 50 dBA, same as the No Build Alternative and up 2 dBA from existing.
- KNWR 3, at the parking lot for the Russian River Ferry:
    - Juneau Creek Alternative: 2043 noise level 49 dBA, an increase of 2 dBA from the No Build Alternative and 4 dBA from existing.
    - Juneau Creek Variant Alternative: 2043 noise level 50 dBA, 3 dBA higher than the No Build Alternative, 5 dBA higher than existing.
- RR, located in the wooded area north of the Russian River Ferry parking lot:
    - Juneau Creek Alternative: 2043 noise level 53 dBA, an increase of 1 dBA from existing, same as the No Build Alternative.
    - Juneau Creek Variant Alternative: 2043 noise level 56 dBA, 3 dBA more than the No Build Alternative and up 4 dBA from existing.

As indicated in the USFWS study, instantaneous sound levels would be higher, and it is likely that direct sound propagation in areas without obstructions (vegetation or terrain) would be audible over long distances, detracting from the Wilderness character of these otherwise remote areas.

Wildlife and Noise

The Juneau Creek and Juneau Creek Variant alternatives would result in noise level decreases of up to 7 dBA and increases of 21 dBA in some areas as compared to the No Build Alternative. These alternatives would be placed at a higher elevation than the existing alignment, which, where not shielded by topography and vegetation, would result in less restriction on noise propagation. Of the receptors modeled, the largest increase in noise level is predicted along the Bean Creek Trail (receptor BCT-1; Map 3.15-2) in the vicinity of Juneau Creek. The Juneau Creek drainage and sides of the Juneau Creek canyon serve as a wildlife movement corridor and provide habitat for brown and black bear, moose, and other wildlife. At higher elevations, there is Dall sheep habitat (Map 3.22-1). The introduction of highway noise along the new alignment would result in changes in the quality of wildlife habitat within 0.5 mile of the alternative.

Existing impacts, as described in Section 3.15.1.5, would continue to occur throughout the project area, but at greater magnitudes where the new alignment was repositioned and would transect wildlife habitat. Increases in noise levels may result in habitat avoidance, changes in behavior, or increased stress levels for wildlife attempting to use movement corridors to access resources or migrate north-south. The higher elevations of the Juneau Creek and Juneau Creek

Variant alternatives could result in increased impacts on subalpine and alpine areas just outside the project area to the north, which may be important areas for brown bear denning (Section 3.22.3.2), and are important for Dall sheep, wolverine, and Canada lynx, among other species. Where the Juneau Creek and Juneau Creek Variant alternatives follow the existing Sterling Highway alignment, noise impacts would be approximately equivalent to those of the No Build Alternative.

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 have traffic noise impacts 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.

Construction noise impacts associated with blasting and pile driving would be limited to typical waking hours (e.g., 8 am–8 pm).

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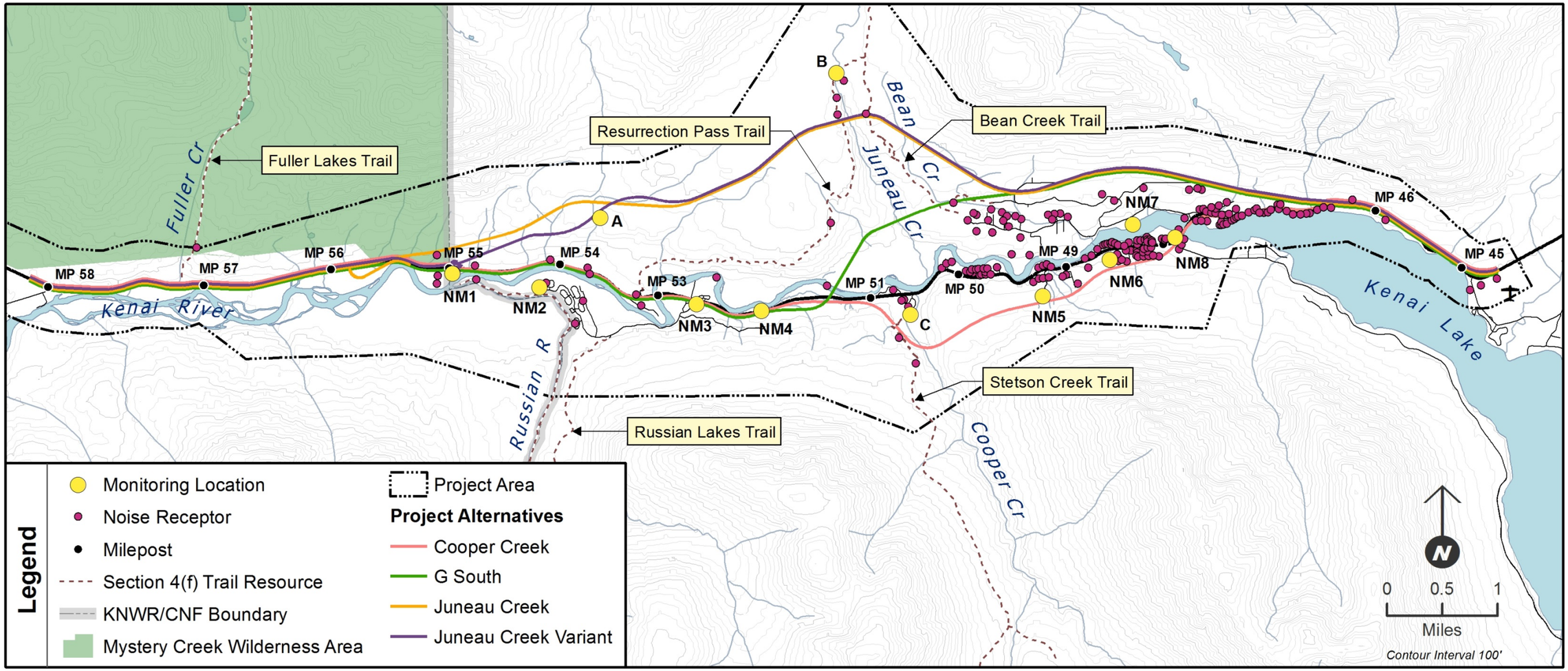

Map 3.15-1. Noise monitoring locations in the project area

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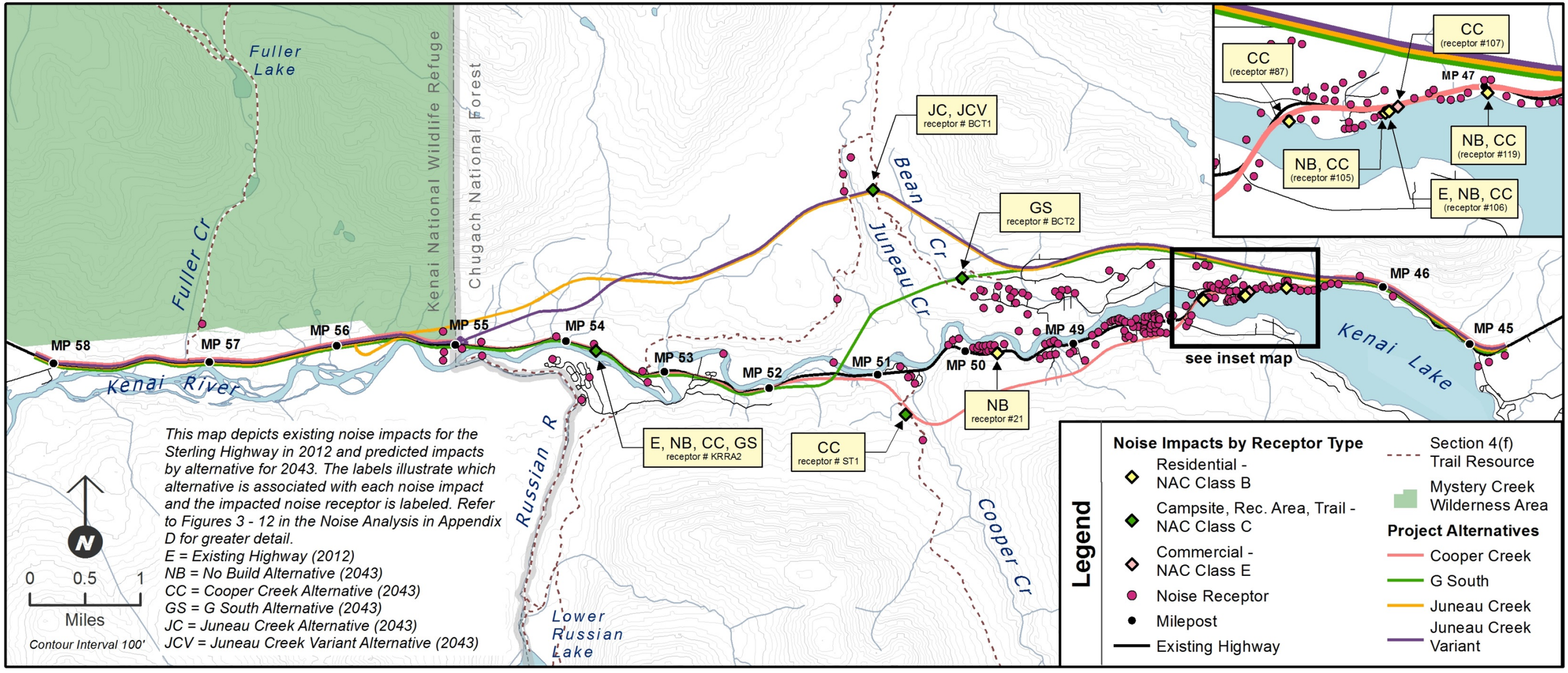

Map 3.15-2. Traffic noise impacts in the project area [Updated]

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