

4.0 ENVIRONMENTAL IMPACT ANALYSIS

J. NOISE

INTRODUCTION

The section analyzes potential noise and vibration impacts that could result from Project implementation. The analysis describes the existing noise environment within the Project Area, estimates future noise and vibration levels at surrounding land uses resulting from construction and operation of the proposed TSMP, identifies the potential for significant impacts, and provides, where feasible, mitigation measures to address significant impacts. Noise calculation and data sheets for the Project are included in Appendix H of this Draft EIR.

1. ENVIRONMENTAL SETTING

a. Noise and Vibration Basics

(1) Noise

Noise is usually defined as sound that is undesirable because it interferes with speech/communication and hearing, or is otherwise annoying (unwanted sound). The decibel (dB) is a conventional unit for measuring the amplitude of sound because it accounts for the large variations in sound pressure amplitude and reflects the way people perceive changes in sound amplitude.¹ The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate this human frequency-dependent response, the A-weighted system is used to adjust measured sound levels (dBA). The term “A-weighted” refers to a filtering of the noise signal in a manner corresponding to the way the human ear perceives sound.

People judge the relative magnitude of sound sensation by subjective terms such as “loudness” or “noisiness.” A change in sound level of 3 dB is considered “just perceptible,” a change in sound level of 5 dB is considered “clearly noticeable,” and a change of 10 dB is recognized as “twice as loud.”²

Community noise levels usually change continuously during the day. The equivalent sound level (Leq) is normally used to describe community noise. The Leq is the equivalent steady-state A-weighted sound level that would contain the same acoustical energy as the time-varying A-weighted sound level during the same time interval. For intermittent noise sources, the maximum noise level (Lmax) is normally used to represent the maximum noise level measured during the measurement.

To assess noise levels over a given 24-hour time period, the Community Noise Equivalent Level (CNEL) descriptor is used. CNEL is the time average of all A-weighted sound levels for a 24-hour period with a 10 dBA adjustment (upward) added to the sound levels which occur in the night (10 P.M. to 7 A.M.) and a 5 dBA adjustment (upward) added to the sound levels which occur in the evening (7 P.M. to 10 P.M.). These penalties attempt to account for increased human sensitivity to noise during the quieter nighttime periods,

¹ All sound levels, measured in decibel (dB), in this study are relative to $2 \times 10^{-5} \text{ N/m}^2$.

² *Engineering Noise Control*, Bies & Hansen, 1988.

particularly where sleep is the most probable activity. CNEL has been adopted by the State of California for development of the community noise element of general plans.³

(2) Ground-Borne Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration.⁴ Vibration amplitudes are usually described as either peak, as in peak particle velocity (PPV) or root-mean-square (RMS). The peak level represents the maximum instantaneous peak of the vibration signal and the RMS represents the average of the squared amplitude of the vibration signal. In addition, vibrations can be measured in the vertical, horizontal longitudinal, or horizontal transverse directions. Ground vibrations are most often greatest in the vertical direction.⁵ Therefore, the analysis of ground-borne vibration associated with the Project is addressed in the vertical direction.

b. Regulatory Framework

Many government agencies have established noise regulations and policies to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and ground-borne vibration. The Town has adopted a number of policies, which are based in part on federal and State regulations and are intended to control, minimize or mitigate environmental noise effects. The regulations and policies that are relevant to Project construction and operation noise are discussed below.

(1) Applicable Town Regulations and Policies

(a) Town of Mammoth Lakes Noise Ordinance

Chapter 8.16 of the Mammoth Lakes Municipal Code (Town Noise Ordinance) controls unnecessary, excessive and annoying noise in the Town. However, this chapter does not control noise sources that are preempted by other jurisdictions including in-flight aircraft and motor vehicles operating on public rights-of-way. According to Section 8.16.020 of the Town Noise Ordinance, "vibration perception threshold" means the minimum ground-borne or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such direct means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be a motion velocity of 0.01 inches per second (RMS) over the range of one to one hundred Hz. The vibration perception threshold of 0.01 inches per second RMS would be 0.04 inches per second PPV. As outlined in Section 8.16.070 of the Town Noise Ordinance and presented in **Table 4.J-1, Town Exterior Noise Ordinance Standards**, the Town has established maximum exterior noise levels based on land use zones. Noise levels in excess of the levels indicated in Table 4.J-1 are conditionally permitted, depending on the intensity of the noise and the duration of exposure.⁶ The Town Noise Ordinance also states that interior noise levels resulting from outside sources

³ State of California, *General Plan Guidelines, 2002*.

⁴ Federal Transit Authority, *Transit Noise and Vibration Impact Assessment, Final Report, page 7-3, April 1995*.

⁵ California Department of Transportation (Caltrans), *Transportation Related Earthborne Vibrations, page 4, February 2002*.

⁶ Noise levels may not exceed the exterior noise standard for a cumulative period of more than thirty minutes in any hour; or plus five decibels for a combined period of more than fifteen minutes in any hour; or plus ten decibels for a combined period of more than five (Footnote continued on next page)

Table 4.J-1

Town Exterior Noise Ordinance Standards

Receiving Land Use	Time Period	Noise Zone Classification ^a Maximum Noise Levels (dBA) L50		
		Rural/ Suburban	Suburban	Urban
One and Two Family Residential	10 P.M. to 7 A.M.	40	45	50
	7 A.M. to 10 P.M.	50	55	60
Multiple Dwelling Residential/Public Space	10 P.M. to 7 A.M.	45	50	55
	7 A.M. to 10 P.M.	50	55	60
Limited Commercial/Some Multiple Dwellings	10 P.M. to 7 A.M.		55	
	7 A.M. to 10 P.M.		60	
Commercial	10 P.M. to 7 A.M.		60	
	7 A.M. to 10 P.M.		65	
Light Industrial	Anytime		70	
Industrial	Anytime		75	

^a The classification of different areas of the community in terms of environmental noise zones shall be determined by the noise control officer, based upon assessment of community noise survey data. Additional area classifications should be used as appropriate to reflect both lower and higher existing ambient levels than those shown. Industrial noise limits are intended primarily for use at the boundary of industrial zones rather than for noise reduction within the zone.

^b Noise levels may not exceed the interior noise standard for a cumulative period of more than five minutes in any hour; or plus five decibels for a combined period of more than one minute in any hour; or plus ten decibels for any period of time (maximum noise level).

^c If the existing interior or exterior ambient noise level exceeds that permissible within the noise limit categories above, the allowable noise exposure standard is increased in five dBA increments in each category as appropriate to encompass or reflect the ambient noise level.

Source: Town Noise Ordinance, Municipal Code Section 8.16.070

within residential units shall not exceed 45 dBA L50 between 7 A.M. and 10 P.M., and 35 dBA L50 between 10 P.M. and 7 A.M.⁷ If the existing interior or exterior ambient noise level exceeds that permissible within the noise limit categories, the allowable noise exposure standard is increased in five dBA increments in each category as appropriate to encompass or reflect the ambient noise level (Section 8.16.070 and 8.16.080 of the Town Noise Ordinance).

The Town Noise Ordinance identifies specific restrictions regarding construction noise. As outlined in Section 8.16.090 of the Town Noise Ordinance and presented in **Table 4.J-2, Town Construction Noise**

minutes in any hour; or plus fifteen decibels for a combined period of more than one minute in any hour; or plus twenty decibels for any period of time (maximum noise level).

⁷ *Noise levels may not exceed the interior noise standard for a cumulative period of more than five minutes in any hour; or plus five decibels for a combined period of more than one minute in any hour; or plus ten decibels for any period of time (maximum noise level).*

Table 4.J-2

Town Construction Noise Standards				
Construction Equipment ^a	Type I Areas Single-Family Residential	Type II Areas Multi- Family Residential	Type III Areas Semi-Residential Commercial ^a	Business Properties
Mobile Equipment ^b				
Daily, except Sundays and legal holidays; 7:00 A.M. to 8:00 P.M.	75 dBA L ₅₀	80 dBA L ₅₀	85 dBA L ₅₀	----
Daily, 8:00 P.M. to 7:00 A.M. and all day Sunday and legal holidays	60 dBA L ₅₀	64 dBA L ₅₀	70 dBA L ₅₀	----
Daily, including Sunday and legal holidays, all hours	----	----	----	85 dBA L ₅₀
Stationary Equipment ^c				
Daily, except Sundays and legal holidays; 7:00 A.M. to 8:00 P.M.	60 dBA L _{eq}	65 dBA L _{eq}	70 dBA L _{eq}	----
Daily, 8:00 P.M. to 7:00 A.M. and all day Sunday and legal holidays	50 dBA L _{eq}	55 dBA L _{eq}	60 dBA L _{eq}	----
Daily, including Sunday and legal holidays, all hours	----	----	----	75 dBA L ₅₀

^a All mobile or stationary internal combustion engine-powered equipment or machinery shall be equipped with suitable exhaust and air intake silencers in proper working order.

^b Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment (e.g., excavator, backhoe, dozer, etc.).

^c Maximum noise levels for repetitively scheduled and relatively long-term operation (periods of 10 days or more) of stationary equipment (e.g., generators, compressors, etc.).

Source: Town Noise Ordinance, Municipal Code Section 8.16.090.

Standards, the Town has established maximum exterior noise levels from the operation of equipment used in construction, drilling, repair, alteration or demolition work. All mobile and stationary internal-combustion-powered equipment and machinery is also required to be equipped with suitable exhaust and air-intake silencers in proper working order. Chapter 15.08 of the Municipal Code sets limits on construction hours. Operations permitted under a building permit shall be limited to the hours between seven A.M. and eight P.M., Monday through Saturday. Work hours on Sundays and town recognized holidays shall be limited to the hours between nine A.M. and five P.M. and permitted only with the approval of the building official or designee.

(2) Ground-Borne Vibration

The Town has established a vibration threshold within the Noise Ordinance. According to Section 8.16.090 of the Ordinance, operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (forty-six meters) from the source if on a public space or public right-of-way.

c. Existing Conditions

(1) Noise-Sensitive Receptor Locations

Some land uses are considered more sensitive to intrusive noise than others due to the amount of noise exposure and the types of activities typically involved at the receptor location. Specifically, residences, schools, libraries, religious institutions, hospitals and nursing homes are generally more sensitive to noise than are commercial and industrial land uses. The Project consists of several construction sites spread throughout the TSMP Project area; due to the long-range scope of the TSMP, it is unlikely that construction activities would be occurring simultaneously on a multiple sites at any given time. Sensitive land uses exist in the general vicinity of many of the trails and system amenities.

Implementation of the proposed TSMP is expected to result in potential short-term or long-term increases in emissions at a number of specific locations. The nearest sensitive populations to the TSMP Priority Projects are listed below:

- The nearest sensitive receptors to the SHARP Priority Project #1, Borrow Pit/Staging Area, are existing residential uses located approximately 2,345 feet to the northwest, along Meadow Lane. Additional existing residential sensitive receptors are also located 2,485 feet to the west of the Project site, along Fairway Court. Future single family residences within the Snowcreek VIII Tract are expected to be occupied by 2017, located along Fairway Drive and Old Mammoth Road, 1,050 feet west of the proposed staging area improvement.
- The nearest sensitive receptor to the future Multi-Use Path (MUP) 2-1, Town Loop (4a), which starts from Mammoth Creek Park to Minaret Road are the multi-family residential units located on Meadow Lane, 135 feet north of the proposed path improvement.
- The nearest sensitive receptor to the future MUP 3-1, College Connector, which starts from Sierra Park Road to the Town Loop are the Cerro Coso Community College Dorms located on College Parkway, 55 feet south of the proposed path improvement.

The nearest noise sensitive receptor to a Trail Improvement Project under the TSMP not identified as a Priority Project is listed below:

- The nearest sensitive receptors to the proposed Recreation Node, GIC 64 (Trailhead), Sierra Boulevard at Forest Trail are the single-family residential units located on Sierra Boulevard and Forest Trail, approximately 80 feet south of the proposed trailhead improvement.

Other trails segments and facilities are located outside of the urbanized area, at significant distances from any uses considered to be sensitive.

(2) Ambient Noise Levels

Ambient noise measurements were conducted at twelve locations within the Project Area. Ambient sound measurements were conducted on Friday, November 19, 2010, to characterize the existing noise environment in the Project Area. The noise measurements, which were made at twelve locations, represent sites at which improvements are likely to occur near existing noise receptors under the TSMP and Priority Projects. Measurement sites are identified in **Figure 4.J-1, Noise Measurement Locations**, as Locations R1

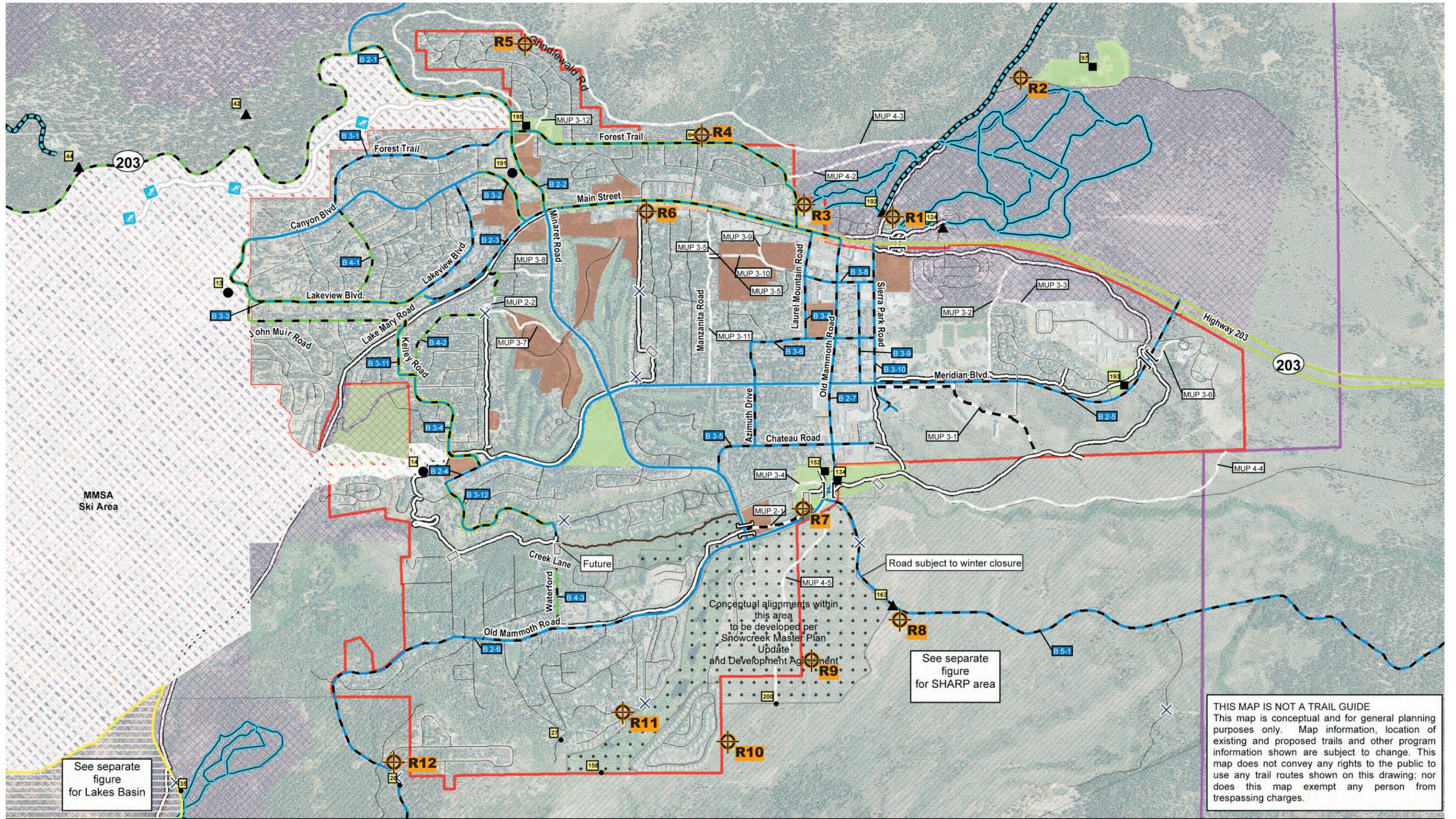
through R12. Locations R1 through R6 involve non-priority projects and Locations R7 through R12 are located in Priority Project areas.

Descriptions of the measurement locations for the Trail Improvement Projects are described below:

- Measurement Location R1: This measurement was taken at approximately 500 feet north from northwest corner of Sawmill Cutoff and Main Street. The measurement is reflective of the noise environment of the residential uses along Sawmill Cutoff.
- Measurement Location R2: This measurement was taken at approximately 15 feet west of the parking lot boundary at Shady Rest Park (west of the Ballpark). The measurement is reflective of the noise environment of the Shady Rest area along Sawmill Road.
- Measurement Location R3: This measurement was taken at approximately 250 feet south from southwest corner of Forest Trail and Pinecrest Avenue. The measurement is reflective of the noise environment of residential uses along Forest Trail.
- Measurement Location R4: This measurement was taken at approximately 100 feet northeast from southwest corner of Forest Trail and Sierra Boulevard. The measurement is reflective of the noise environment of single-family residential uses along Forest Trail near the proposed Recreation Node, GIC 64 (Trailhead).
- Measurement Location R5: This measurement was taken at approximately 100 feet north from northwest corner of Grindlewald Road and Megeve Way. The measurement is reflective of the noise environment of residential uses along Grindlewald Road.
- Measurement Location R6: This measurement was taken at the southwest corner of Frontage Road and Joaquin Road. The measurement is reflective of the noise environment of residential uses along Frontage Road.

Descriptions of the measurement locations for the Priority Projects are described below:

- Measurement Location R7: This measurement was taken near Old Mammoth Road approximately 200 feet west of southwest corner of Old Mammoth Road and Sherwin Creek Road. The measurement is reflective of the noise environment of multi-family residential uses along Meadow Lane.
- Measurement Location R8: This measurement was taken near Sherwin Creek Road at the Borrow Pit site. The measurement is reflective of the noise environment of the future Snowcreek VIII.
- Measurement Location R9: The sound meter was located along Motocross Access.
- Measurement Location R10: The sound meter was located near east boundary of the Snowcreek V. The measurement is reflective of the noise environment of the Snow Creek V.



See separate figure for Lakes Basin

Conceptual alignments within this area to be developed per Snowcreek Master Plan Update and Development Agreement

See separate figure for SHARP area

THIS MAP IS NOT A TRAIL GUIDE
 This map is conceptual and for general planning purposes only. Map information, location of existing and proposed trails and other program information shown are subject to change. This map does not convey any rights to the public to use any trail routes shown on this drawing; nor does this map exempt any person from trespassing charges.

Measurement Location

Winter Recreation Nodes

- Portal
- Park
- ▲ Trailhead
- Access/Egress Point
- Key GIC Point

Bicycle Facilities

- ✕ Gates, Barriers, Closures
- ⌋ Bridges
- ⌋ Tunnel Proposed
- ⌋ Tunnel Existing

Paved Off-Road Facilities

- Existing Paved Multi-Use Paths (Class I)
- Planned MUP
- Planned MUPS - Long Term (Conceptual Alignment)
- Existing Promenade (10' Sidewalk)
- Near-Term Promenade (10' Sidewalk)

Winter Use_Rebuild

- Groomed: Non-Motorized
- Snowmobile / Ski
- Ski Back Trail
- ✕ Closed to Motorized

Other Features

- Parks & Open Space
- Planned Development
- Snowcreek 8 Master Plan
- Urban Limit
- Town Boundary
- SHARP Study Area
- Lakes Basin Study Area



Noise Measurement Locations

FIGURE 4.J-1



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- Measurement Location R11: The sound meter was located at approximately 200 feet west of southwest corner of Woodcrest Trail and Ranch Road. The measurement is reflective of the noise environment of residence along Woodcrest Trail.
- Measurement Location R12: The sound meter was located at the northeast corner of Old Mammoth Road and Le Verne Street. The measurement is reflective of the noise environment of residences along Le Verne Street.

The ambient noise measurements were conducted using Larson-Davis 820 Precision Integrated Sound Level Meter (SLM). The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute (ANSI) S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. In accordance with the Town Noise Ordinance (Section 8.16.060) and with industry practice, the microphone was placed at a height of 5 feet above the local grade.

A summary of noise measurement data is provided in **Table 4.J-3, Summary of Ambient Noise Measurements**. As shown in Table 4.J-3, the existing ambient noise levels at the noise sensitive receptors R3, R4, R8, R10, and R11, single- and multi-family residential units exceed the Town's exterior noise limits presented above in the Table 4.J-1 during the day. Because no construction and no significant use of the trails is expected to occur at night, analysis of ambient noise levels during the night time hours is not needed.

2. ENVIRONMENTAL IMPACTS

The following thresholds of significance were developed based on industry standards and the Town Noise Ordinance and guidelines described above.

a. Significance Thresholds

Appendix G of the *CEQA Guidelines* contains the Initial Study Environmental Checklist form used during preparation of the Project Initial Study, which is contained in Appendix A of this EIR. The Initial Study Environmental Checklist questions relating to noise have been utilized as the thresholds of significance in this section. Accordingly, a project may create a significant environmental impact if it would result in one or more of the following:

- Threshold 1: Exposure of persons to or generation of noise level in excess of standards presumed in the local general plan or noise ordinance, or applicable standards of other agencies (*refer to Impact Statement 4.J-3*).
- Threshold 2: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels (*refer to Impact Statements 4.J-2 and 4.J-4*)
- Threshold 3: A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project (*refer to Impact Statement 4.J-3*).
- Threshold 4: A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project (*refer to Impact Statement 4.J-1*).

Table 4.J-3

Summary of Ambient Noise Measurements

	Measurement Location	Measurement Date / Start Time	Measured Ambient Noise Levels, dBA (Leq)
R1	Northwest corner of Sawmill Cutoff and Main Street	11/19/10 Friday (9:42 A.M.)	54
R2	Parking lot boundary at Shady Rest Park (west of the Ballpark)	11/19/10 Friday (9:55 A.M.)	50
R3	Southwest corner of Forest Trail and Pinecrest Avenue	11/19/10 Friday (10:12 A.M.)	57
R4	Northeast from southwest corner of Forest Trail and Sierra Boulevard	11/19/10 Friday (10:21 A.M.)	57
R5	Northwest corner of Grindlewald Road and Megeve Way	11/19/10 Friday (10:29 A.M.)	51
R6	Southwest corner of Frontage Road and Joaquin Road	11/19/10 Friday (11:05 A.M.)	55
R7	Southwest corner of Old Mammoth Road and Sherwin Creek Road	11/19/10 Friday (11:18 A.M.)	54
R8	Sherwin Creek Road at the Borrow Pit site	11/19/10 Friday (11:27 A.M.)	62
R9	Motocross Access	11/19/10 Friday (11:40 A.M.)	55
R10	East boundary of the Snowcreek V	11/19/10 Friday (11:53 A.M.)	58
R11	Southwest corner of Woodcrest Trail and Ranch Road	11/19/10 Friday (12:17 P.M.)	58
R12	Northeast corner of Old Mammoth Road and Le Verne Street	11/19/10 Friday (12:47 P.M.)	55

Source: PCR Services Corporation, 2011.

Threshold 5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? (refer to Section 6, *Other Mandatory CEQA Considerations*, and the Initial Study contained in Appendix A. No impact would occur in this regard)

Threshold 6: For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? (refer to Section 6, *Other Mandatory CEQA Considerations*, and the Initial Study contained in Appendix A. No impact would occur in this regard).

b. Methodology

(1) Construction Noise and Vibration

(a) Construction Noise

On-site construction noise impacts were evaluated by determining the noise levels generated by the different types of construction activity, calculating the construction-related noise level at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise). More specifically, the following steps were undertaken to determine construction-period noise impacts.

1. Ambient noise levels at surrounding sensitive receptor locations were estimated based on field measurement data (see Table 4.J-3);
2. Typical noise levels for each type of construction equipment were obtained from the Federal Highway Administration (FHWA) roadway construction noise model (RCNM);
3. Distances between construction site locations (noise source) and surrounding sensitive receptors were measured using Google Earth and figures included in Section 2.0, *Project Description*; and
4. Construction noise levels were then calculated in terms of hourly L_{eq} for sensitive receptor locations based on the standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance.

The threshold for construction noise impacts is based on the Town noise ordinance. Therefore, the project would have a significant impact on noise levels, during construction if:

- *For single-family residential uses, construction activity related noise levels would exceed 75 dBA L_{eq} during the daily hours of 7:00 A.M. to 8:00 P.M. except Sundays and legal holidays.*
- *For multi-family residential uses, construction activity related noise levels would exceed 80 dBA L_{eq} during the daily hours of 7:00 A.M. to 8:00 P.M. except Sundays and legal holidays.*

(b) Construction Vibration

As described earlier, the Town's vibration perception threshold is 0.01 inches per second (RMS) over the range of one to one hundred Hz. The vibration perception threshold of 0.01 inches per second RMS would be equal to 0.04 inches per second PPV. Therefore, impacts relative to ground-borne vibration would be considered significant future event were to occur:

- Project construction activities cause a PPV ground-borne vibration level to exceed 0.04 inches per second at any off-site residential uses.

(2) Operation Noise and Vibration

(a) On-Site Noise Sources

For noise sensitive receptors, based on the Town noise ordinance described above, the project would have a significant noise impact if:

- *Project-related activities result in noise levels at an offsite sensitive receptor to exceed the presumed ambient noise levels indicated in Table 4.J-1 (if the exterior ambient noise level exceeds the permissible level within the noise limit category, the allowable noise exposure standard is increased in five (5) dBA increments in each category as appropriate to encompass or reflect the ambient noise level), or*
- *Project-related activities result in noise increases at an offsite sensitive receptor in excess of the standards in Section 8.16.070 of the Town Noise Ordinance (refer to Table 4.J-1).*

(b) Off-Site Roadway Noise

The Project related traffic would cause ambient noise levels to increase by 3 dBA CNEL or more.⁸

(c) Vibration

Ground-borne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a significance determination. As described earlier, the Town's vibration perception threshold is 0.01 inches per second (RMS) over the range of one to one hundred Hz, or 0.04 inches per second PPV. Therefore, impacts relative to ground-borne vibration would be considered significant future event were to occur:

- Project operational activities generate a ground-borne vibration level equivalent to or exceeding the perception threshold of 0.04 inches per second PPV at any off-site uses.

c. Project Features

Project features are requirements or components incorporated into the Project that serve to reduce or avoid impacts. Other than the Project being subject to Town code requirements related to noise, the proposed TSMP does not include noise related project features, such as specific policies or guidelines.

d. Analysis of Project Impacts

The analysis of noise impacts below applies to all future trail components associated with the Project, including the Priority Projects, unless stated otherwise.

⁸ *The Town does not have a noise threshold for traffic noise impacts. Thus, a conservative threshold of an increase in 3dBA CNEL or more is utilized as a threshold, as this increase would represent a perceivable increase to humans over the existing ambient noise level.*

(1) Construction Activities

(a) On-site Construction Noise

4.J-1 *Construction activities associated with Project implementation would be conducted within the daytime hours specified in the Town's noise ordinance. Construction noise impacts would be less than significant for the Priority Projects but would be potentially significant for the Recreation Nodes and Trail Enhancements.*

Construction activities for individual projects would be completed over the course of 10 years or greater. In order to provide a conservative but realistic analysis, it is assumed that construction activities would be completed in approximately 6 months per Project component. Construction on at least some projects could begin as early as summer 2011, though ultimately would be contingent on funding. For other Project-related trail components, construction of individual projects would occur as funding and resources become available over time with the duration of construction dependent on individual project types.

Noise from construction activities would be generated by vehicles and equipment involved during various stages of construction operations: grading, paving, building construction, and paving. The noise levels created by construction equipment will vary depending on factors such as the type of equipment, the specific model, the operation being performed and the condition of the equipment. Construction noise associated with the Project was analyzed using a mix of typical construction equipment, estimated durations and construction phasing for the Borrow Pit/Staging Area and the Recreation Node 64, which represent a worst-case construction scenario since it is located closest to sensitive receptors. The project construction noise model is based on construction equipment noise levels as published by the FHWA⁹.

In an outdoor environment, sound levels attenuate through the air as a function of distance. Such attenuation is called "distance loss" or "geometric spreading" and is based on the source configuration, point source or line source. For a point source such as construction equipment, the rate of sound attenuation is 6 dB per doubling of distance from the noise source. For example a noise level of 85 dBA at a reference distance of 50 feet from the equipment would attenuate to 79 dBA at 100 feet, and 73 dBA at 200 feet.

In order to construct TSMP projects, portions of the some existing sites would be graded. Site preparation activities typically involve the use of heavy equipment, such as dozers, tractors, loaders, paver etc. Trucks would also be used to deliver equipment and building materials, and to haul away landscape and construction debris. Smaller equipment, such as a trencher and/or a forklift could also be used during the construction phases. This equipment would generate both steady-state and episodic noise that could be heard both on and off the project site.

Priority Projects: Individual pieces of construction equipment that would likely be used for construction of the Borrow Pit/Staging Area produce maximum noise levels of 77 dBA to 85 dBA at a reference distance of 50 feet from the noise source, as shown in **Table 4.J-4, Construction Equipment Noise Levels**, below. This would be representative of a worst case scenario since the Borrow Pit/Staging Area would be the largest and most construction intensive of the Priority Projects. These maximum noise levels would occur when equipment is operating under full power conditions. However, equipment used on construction sites often

⁹ *Roadway Construction Noise Model, Federal Highway Administration, 2006*

Table 4.J-4

Construction Equipment Noise Levels

Equipment	Estimated Usage Factor, %	Typical Noise Level at 50 feet from Equipment, dBA (L_{max})
Crane	40	81
Dozer	40	82
Forklift	10	75
Graders	40	85
Other Equipment	50	85
Paver	50	77
Tractors/Loaders/Backhoes	25	80
Water Trucks	10	80

Source: FHWA Roadway Construction Noise Model, 2005.

operates under less than full power condition, or partial power. To more accurately characterize construction-period noise levels, the average (L_{eq}) noise level associated with each construction stage is provided in **Table 4.J-5**, *Estimate of the Borrow Pit/Staging Area Construction Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations*, below. These average noise levels are based on the quantity, type, and usage factors for each type of equipment that would be used during each construction stage, and is typically attributable to multiple pieces of equipment operating simultaneously. As shown in Table 4.J-5, the average construction-period (i.e., various construction stages) noise level is expected to range from 41 dBA to 53 dBA.

Table 4.J-5 provides the estimated worst-case construction noise levels at nearby noise sensitive receptors. Detailed noise calculations for construction activities are provided in Appendix H. The estimated noise levels represent a conservative scenario because construction activities are analyzed as if occurring along the perimeter of the construction area; whereas, construction would typically occur throughout the site, farther from noise-sensitive receptors. As shown therein, construction noise levels at the nearest noise sensitive receptor location (Location R7, approximately 2,345 feet from the Borrow Pit area) would range from 41 to 53 dBA Leq. Because this would be less than the significance threshold of 75 dBA Leq for single-family residences, construction noise impacts at the single-family neighborhood along Meadow Lane (Location R7) would be less than significant.

Recreation Nodes: Construction of improvements at recreation nodes would not occur simultaneously since construction of the various components of the TSMP would occur over an approximate 10 year period, contingent on funding and Town planning priorities. However, construction noise from improvements at Recreation Nodes would be localized, potentially affecting areas within 500 feet of the construction sites. As shown above in Table 4.J-4, noise levels generated by construction equipment would range from 75 to 85 dBA Leq at a distance of 50 feet from construction equipment. Recreation Node GIC 64, which is located approximately 80 feet from residential uses, is the nearest to sensitive uses among the Project's Recreation Nodes. It is estimated that the maximum construction related noise levels at the nearest residential receptors in the vicinity of Recreation Node 64 would range from 73 dBA to 81 dBA.

Table 4.J-5

Estimate of the Borrow Pit/Staging Area Construction Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations

Receptors	Construction Phase	Sound Level in dBA (L _{eq}) at Indicated Distance			
		Nearest Distance between receptor and Construction Site, feet	Estimated Construction Noise Levels at the Noise Sensitive Receptor by Construction Phase, L _{eq} (dBA)	Significance Threshold	Exceeds Significance Threshold?
R7	Mass Grading	2,345	51	80 dBA	No
	Fine Grading	2,345	53		No
	Paving	2,345	41		No
	Construction	2,345	50		No

Source: PCR Services Corporation, 2011.

Noise levels usually diminish at a rate of approximately 6 dBA per doubling of distance. Thus, a noise level of 81 dBA at 80 feet to the nearest residential uses would be about 75 dBA at 160 feet at the center of the Recreation Node 64 construction site. As heavy equipment passes near the project boundary of the construction site, the peak construction noise level at a given moment in time could reach 81 dBA; however, as the equipment travels near the center of the project site, it would be approximately 160 feet from the closest residential uses and generate a lower noise level of approximately 75 dBA.

Construction activities are expected to occur only during daytime hours as described by Section 8.16.090 of the Town Noise Ordinance. However, without incorporation of mitigation measures, the construction-period noise levels at Recreation Node 64 would likely exceed 75 dBA at the nearest single-family residential uses. This is considered a short-term potentially significant impact. Implementation of Mitigation Measures 4.J-1.A, 4.J-1.B, and 4.J-1.C would ensure that potentially significant construction noise impacts are reduced to a less than significant level when noise sensitive receptors are located within 160 feet of any Recreation Node construction site.

Trail Enhancements: Single-family residential uses would be located within 50 feet of certain of the proposed Multi-Use Paths (MUPs). For future MUPs, construction activities would be generally limited to clearing and grubbing of vegetation, and paving. Equipment used for these activities would result in construction related noise levels up to 77 dBA at the residential uses in proximity to Future MUP construction sites. The construction noise levels would be up to approximately 2 dBA above the allowable 75 dBA noise standard. Therefore, construction noise impacts, while temporary, would be potentially significant at noise sensitive receptor locations in close proximity to proposed MUPs. Therefore, Mitigation Measures 4.J-1.A, A.J-1.B, and A.J-1.C are recommended to reduce potential significant noise impacts to less than significant when any noise sensitive receptors are located within 80 feet of a MUP construction site.

(b) Ground-Borne Vibration during Construction

4.J-2 Construction activities would have a minimal effect on the existing vibration environment within and adjacent to the Project Area. Thus, construction vibration impacts would be less than significant.

Construction activities can generate varying degrees of ground vibration, depending on the construction procedures and the construction equipment used. The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Ground-borne vibrations from construction activities rarely reach the levels that damage structures. The Federal Transit Administration (FTA) has published standard vibration velocities for construction equipment operations. The peak particle velocities for construction equipment pieces anticipated to be used during project construction are listed in **Table 4.J-6, Typical Vibration Velocities for Potential Project Construction Equipment.**

Table 4.J-6

Typical Vibration Velocities for Potential Project Construction Equipment

Equipment	Reference Vibration Velocity Levels at 25 ft, inch/second
	PPV ^a
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003

^a FTA's "Transit Noise and Vibration Impact Assessment", Table 12-2.

Source: USDOT Federal Transit Administration, 1995

Project construction activities would generate ground-borne vibration during site clearing and grading activities or large bulldozer operation where heavy construction equipment would be required. Based on the vibration data provided in Table 4.J-6, vibration velocities from the operation of project construction equipment would range from approximately 0.003 to 0.089 inches per second PPV at 25 feet from the source of activity. Recreation Node GIC 64, which is located approximately 80 feet from residential uses, is the nearest of the Recreation Nodes to sensitive uses and represents a worst case vibration scenario. At Recreation Node 64 then nearest sensitive uses could be exposed to vibration velocities ranging from 0.001 to 0.016 inches per second PPV. Since this value is below the 0.04 inches per second (PPV) threshold, vibration impacts during construction would be less than significant.

(2) Operational

(a) Operational Noise

4.J-3 Project implementation would have a minimal effect on the existing noise environment within and adjacent to the Project Area. Thus, long-term noise impacts would be less than significant.

Potential new sources of long-term noise associated with Project implementation include: increased activity on trails and at staging areas, recreational nodes and related facilities within the Project Area; and long-term maintenance activities. These potential noise sources are discussed below.

Priority Projects: The nearest sensitive receptors to the Priority Projects are residential uses located along Meadow Lane, approximately 2,345 feet to the northwest of the Borrow Pit site. Existing residential sensitive receptors are also located 2,485 feet to the west of the Borrow Pit site, along Fairway Court. Future single family residences within the Snowcreek VIII Tract on Fairway Drive and Old Mammoth Road located 1,050 feet to the west of the Borrow Pit site. Occupancy of Snowcreek VIII is projected for 2017. Because other priority projects are not located close to sensitive receptors, noise impacts associated with implementation of these projects would not be significant.

The Borrow Pit Site's contemplated improvements include parking, bathrooms, an education/interpretive area. The education/interpretive related activities at the Borrow Pit Site are likely to be similar to that of educational uses such as lectures or instruction of expanded environmental curriculum programs. This equates to a noise level of 14 dBA at 1,050 feet. Therefore, the operational noise levels related to the education/interpretive area would not exceed noise threshold in Table 4.J-1 at the future Snowcreek VIII since the future Snowcreek VIII would be located 1,050 feet away from the proposed education/interpretive area. Therefore, operational noise impacts related to the education/interpretive area would be less than significant.

Changing the USFS Maintenance Level on Sherwin Creek Road would allow off-highway vehicle (OHV) users to ride directly from the Borrow Pit staging area and then along Sherwin Creek Road to routes open to the east, without needing to stage farther down the road. The OHV staging area would be located approximately 1,050 feet from the future Snowcreek VIII, which would be the nearest sensitive use to the OHV staging area. Noise level generated by OHV would be approximately 94 dBA Leq at a distance of 6 feet from an OHV. The noise level of 94 dBA at a reference distance of 6 feet would attenuate to 49 dBA at 1,050 feet from OHV users, which would not exceed the noise threshold in Table 4.J-1 at the future Snowcreek VIII. In addition, noise sensitive receptors are not located along Sherwin Creek Road. Therefore, OHV related noise impacts would be less than significant.

During the winter, this area would allow for a separate parking area for over-snow vehicles (OSVs). The OSV parking area could increase the frequency of noise levels along the trail system. However, based on analysis provided in the traffic report, increased OSV volumes would not be significant and the trails are currently being used for OSV. Accordingly, the incremental increase in trail usage related noise levels associated with OSVs would not be substantial enough to exceed noise the threshold in Table 4.J-1 at the future Snow Creek VIII. As such, impacts would be less than significant.

As discussed above, the OHV staging area and the OSV parking area could increase the frequency of noise levels along the trail system audible to non-motorized trail users. Although no specific quantitative

threshold is in place to determine impacts to these users, noise from motorized vehicles can be disruptive to the experience and enjoyment of recreation areas. However, the trails are currently being used by OHVs and OSVs and, based on analysis provided in the traffic report, increased OHV and OSV volumes would not be significant. The TSMP does not propose to expand areas open to motorized vehicle use, or to designate additional trails or roadways for motorized use.¹⁰ Accordingly, the incremental increase in trail usage related noise levels associated with OHVs and OSVs would not be substantial enough to exceed noise thresholds in Table 4.J-1. As such, impacts would be less than significant.

The major Multi-Use Staging Area at the Borrow Pit is currently used for parking. However, the improved parking area could increase the activity and respective noise levels in the vicinity of the parking lot area. According to the Traffic Study, the increase in parking demand generated by the proposed soft-surface trails is expected to be minimal. Therefore, the improved parking area would have a minimal effect on the existing noise environment within the local vicinity. The nearest future residential uses, Snow Creek VIII, would be located approximately 1,050 feet from the parking area. A slamming car door would generate an intermittent noise level of approximately 70 dBA at a distance of 25 feet, which equates to a noise level of 38 dBA at 1,050 feet. Because this would not exceed the noise impact threshold at the nearest sensitive receptor location, impacts would be less than significant.

Recreation Nodes: Many of the trail and bikeway projects would increase access and use of the Town's activity centers and recreation nodes. Thus, the TSMP recommends improvements and projects that are specific to individual recreation nodes. Improvements at specific recreation nodes include amenities such as signage, parking, and restroom facilities. Various noise events would occur periodically from the parking lots. Such periodic events may include activation of car alarms, sounding of car horns, slamming of car doors, engine revs, and tire squeals. Moving automobile noise would comprise the highest continuous noise source and would generate a noise level of approximately 65 dBA at a distance of 25 feet.¹¹ This equates to a noise level of 55 dBA at 80 feet at the nearest noise sensitive receptor locations at the proposed Recreation Node, GIC 64. A noise level of 55 dBA at 80 feet would be below the significance threshold of 65 dBA for automobile noise.¹²

A slamming car door would generate an intermittent noise level of approximately 70 dBA at a distance of 25 feet.¹³ This equates to a noise level of 60 dBA at 80 feet. A noise level of 60 dBA at 80 feet would be below the significance threshold of 75 dBA.¹⁴ Since all new facilities, including parking lot facilities, would be located at least 80 feet from the nearest residence, less than significant parking lot related noise impacts would occur to nearby noise sensitive receptors (i.e., single-family residences).

¹⁰ *Sherwin Creek Road is open to motorized vehicles other than OHV/OSVs.*

¹¹ *Noise measurements conducted for a moving automobile in a parking lot, PCR, May 1998.*

¹² *The 65 dBA noise threshold is based upon the allowable noise levels in Table 4.J-1. It is assumed that moving automobile noise would occur for approximately 5 minutes per hour in the parking lot of the Node, GIC 64. Thus, the permitted noise increase would be 10 dBA over the allowable noise level of 55 dBA for daytime hours (refer to Table 4.J-1).*

¹³ *Noise measurements conducted for a car door slamming in a parking lot, PCR, May 1998*

¹⁴ *The 75 dBA noise threshold is based upon the allowable noise levels in Table 4.J-1. Since it is assumed that car door noise would occur for less than one minute per hour in the parking lot of the Node, GIC 64, the permitted noise increase is 20 dBA over the allowable noise level of 55 dBA for daytime hours (refer to Table 4.J-1).*

Trail Enhancements: Trail activity related noise could be generated from enhanced trail system. As indicated above, the ambient noise levels in the Project Area (measurement locations R1 through R12) range from 50 to 62 dBA. The TSMP implementation would not increase trail use by non-motorized users. Therefore, future trail activity related maximum noise levels along trails network would be similar to the current ambient noise levels ranging from 50 to 62 dBA. Therefore, trail related activity noise levels would not exceed the noise threshold in Table 4.J-1. As such, trail activity related noise impacts would be less than significant.

The TSMP identifies a number of bike lane projects on arterial, collector and local streets to be included as part of the trail system network. Increased bike lanes use could increase the frequency of noise levels along the bike lanes. However, bicycles do not generate significant amounts of noise, and increased bike lane usage would be expected to change the ambient noise levels by less than 1 dBA. Therefore, impacts would be less than significant.

As discussed in the Mammoth Trail System Master Plan Transportation Considerations Technical Memorandum, the Project would not significantly change traffic volumes at any one location.¹⁵ Although traffic volumes in Mammoth are generally expected to increase in the future, the Project is not expected to result in a significant impact on traffic operations under future cumulative conditions. The maximum increase in project-related traffic noise levels would be less than 1 dBA, which fall below the conservative 3 dBA CNEL significance threshold and, as such, would result in a less than significant impact. The traffic analysis also projects potential beneficial impacts to traffic volumes town-wide by offering alternatives to private automobile use through a better integrated and functioning trail network; this may result in an improvement to projected noise levels from traffic.

Maintenance Activities: Management and maintenance activities may include activities such as vegetation clearing, sweeping, surface repair, and winter grooming or clearing of existing and proposed trails. It is generally assumed that trails, bike facilities and MUPs located within the Urban Growth Boundary, and within Town rights-of-way on easements within private property would be managed and maintained by the Town of Mammoth Lakes. These activities would result in short-term noise similar to noise generated by existing, on-going maintenance activities in the Town of Mammoth Lakes that are subject to the limitations set forth in the Town's Noise Ordinance. As with other on-going activities within the Town of Mammoth Lakes, it is presumed that maintenance activities associated with the Project would be subject to the same regulatory constraints and would not be permitted to exceed the Town's noise limits or substantially change existing ambient noise levels. Maintenance activities on trails segments within National forest lands would be subject to applicable USFS standards and guidelines for noise, consistent with use permit or other requirements imposed by USFS. Therefore, impacts would less than significant.

(b) Operational Vibration

4.J-4 *Project implementation would not generate excessive vibration levels to nearby sensitive receptors. Thus, long-term vibration impacts would be less than significant.*

¹⁵ Mammoth Trail System Master Plan Transportation Considerations Technical Memorandum, LSC Transportation Consultants, Inc., March 4, 2011.

The Project includes an enhanced in-town network of multi-use paths, trails and bikeways and improved access to trails and backcountry experiences beyond the Town's UGB. The primary sources of transient vibration would include passenger vehicle circulation within the proposed parking lots. Ground-borne vibration generated by each of the above-mentioned activities would be similar to the existing sources (i.e., traffic on adjacent roadways and existing parking along streets) within the Project Area. The potential vibration impacts from all future individual project sources at the nearest sensitive receptor locations would be less than the significance threshold of 0.04 inches per second PPV for perceptibility since ground-borne vibration generated by each of the above-mentioned activities would be similar to the existing sources. As such, vibration impacts associated with operation of the Project would not exceed the significance threshold and impacts would be less than significant.

3. MITIGATION MEASURES

The following mitigation measures address the potentially significant noise impacts from the Project.

a. Construction Noise and Vibration

As noise associated with on-site construction activity would have the potential to result in a significant impact at noise sensitive receptor uses located within 160 feet from Recreation Nodes and 80 feet from MUPS construction sites, the following measures are prescribed to minimize construction-related noise impacts.

Noise

Mitigation Measure 4.J-1.A: Engine idling from construction equipment such as bulldozers and haul trucks shall be limited, to the extent feasible.

Mitigation Measure 4.J-1.B: The construction staging areas shall be located as far as feasible from sensitive receptors.

Mitigation Measure 4.J-1.C: All construction activities shall comply with the Town's Noise Ordinance.

Vibration

No mitigation measures are necessary.

b. Operational Noise and Vibration

No mitigation measures are necessary.

4. CUMULATIVE IMPACTS

4.J-7 *The project combined with cumulative projects would not impact noise sensitive uses in the vicinity of the project area.*

As discussed above, the Snow Creek VIII is expected to be occupied by 2017, located 1,050 feet west of the Major Multi-Use Staging Area at the Borrow Pit. Noise from construction of the Project and the Snowcreek VIII would be localized, thereby potentially affecting areas immediately within 500 feet from the construction site. Due to distance attenuation (more than 2,300 feet away), construction noise from one site would not result in a noticeable increase in noise at sensitive receptors near the other site, which would preclude a cumulative noise impact.

Noise from on-site construction activities are localized and would normally only affect areas within 500 feet from individual construction sites. Since the timing of the construction activities for related projects cannot be defined and are beyond the control of the Town, any quantitative analysis that assumes multiple, concurrent construction projects would be speculative. However, short-term cumulative impacts could occur at the noise sensitive receptors where trucks from the Project Area and related projects are using the same roadways that have adjacent sensitive uses. Thus, even with proposed mitigation measures, if nearby related projects were to be constructed concurrently with the Project Area, significant and unavoidable cumulative construction noise impacts could result. However, those noise levels would be intermittent, temporary and would cease at the end of the construction phase. In addition, activities associated with related projects would be required to comply with time restrictions and other relevant provisions in the Town's noise ordinance. Noise associated with cumulative construction activities would be reduced to the degree reasonably and technically feasible through proposed mitigation measures for each individual project and compliance with the Town's noise ordinances. As such, cumulative impacts associated with construction noise would be less than significant.

Due to the rapid attenuation characteristics of ground-borne vibration and distance of the related projects to the Project Area, there is no potential for a cumulative construction - or operational-period impact with respect to ground-borne vibration.

Urbanized portions of the project area have been developed with uses that generate noise from lawn maintenance activities, mechanical equipment (e.g., air conditioning, heating, and ventilation systems), and vehicle movements, among other community noise sources. Outside of the urbanized area, noise from motorized vehicles, including OHV and OSVs, is generated under existing conditions, since these uses are permitted and common throughout the study area. As demonstrated above in operational noise analysis, noise impacts related to the Project Area from the Project would be less than significant. Each of the related projects within the Project Area would generate stationary-source and mobile-source noise due to on-going day-to-day operations. The related projects would be consistent with the existing land uses in the vicinity of the Project Area and not typically associated with excessive exterior noise. Due to the Town's provisions that limit exterior noise levels, noise levels would be less than significant at the property line for each related project. For this reason, on-site noise produced by any related project would not be additive to the Project-related noise levels. In addition, the Snowcreek VIII is of sufficient distance approximately 1,050 feet from the proposed project such that operational noise levels from these projects would not be audible noise at the project site. As such, cumulative noise impacts related to long-term project operations would be less than significant.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

Noise level reductions attributable to mitigation measures Mitigation Measure 4.J-1.A, Mitigation Measure 4.J-1.B, and Mitigation Measure 4.J-1.C are not easily quantifiable. However, implementation of such

measures would reduce construction noise impacts associated with development of TSMP and SHARP projects to the extent practicable. Although the 75 dBA noise level may be exceeded at points in the construction process of Recreational Nodes and trail improvements, it may not be considered feasible to maintain noise below this level throughout construction for every individual project, even with incorporation of noise reduction measures. While construction noise levels could exceed allowable noise standards, such noise would be short-term and would occur only on an intermittent basis during project construction. Further construction activities would be expected to occur only during daytime hours as described by Section 8.16.090 of the Town Noise Ordinance. Based on these considerations, construction-related noise impacts are concluded to be less than significant for the construction of Recreational Nodes and trail improvements.

Noise and vibration impacts associated with project operations would be less than significant and no mitigation measures would be required.