

## **9.0 NOISE**

### **9.1 Introduction**

A comprehensive traffic noise impact and mitigation study has been conducted as part of the documentation requirement to satisfy the EIS for this project. The traffic noise study included consideration of existing noise measurement, 2030 No Build and Build noise level prediction, and noise impact evaluation and mitigation. This chapter includes the following sections: methodology and approach (Section 9.2); noise measurements and noise receptors (Section 9.3); noise impacts (Section 9.4); and noise mitigation (Section 9.5).

### **9.2 Methodology and Approach**

#### **9.2.1 Noise Characteristics**

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid and is capable of being detected by the hearing organs. Noise is defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants, and highway vehicles. Highway noise, or traffic noise, is usually a composite of noises from engine, exhaust and tire-roadway interaction. The magnitude of noise is usually described by its sound pressure. Because the range of sound pressure varies greatly, the logarithmic scale decibel (dB) is used to relate sound pressure. Sound pressures described in decibels are often defined in terms of frequency-weighted scales (A, B, C, or D).

The A-weighted decibel scale is used almost exclusively in vehicle noise measurements because it reflects the frequency range to which the human ear is most sensitive (1,000-6,000 Hertz). Sound levels measured using an A-weighted decibel scale are generally expressed as dBA. Throughout this chapter, all noise levels are expressed in dBAs. Several examples of sound pressure levels in dBA scale are listed in Table 9-1.

Table 9-1 indicates that most individuals in urbanized areas are exposed to fairly high noise levels from many sources as they go about their daily activities. The degree of disturbance or annoyance of unwanted sound depends essentially on three factors:

- The amount and nature of the intruding noise;
- The relationship between background noise and the intruding noise; and
- The type of activity occurring where the noise is heard.

Because sound is described in a logarithmic scale (i.e. dBA), sound levels cannot be added by ordinary arithmetic means. In fact, a doubling of the sound energy produces only a three dBA increase in the decibel level. Studies have shown that this increase is barely perceptible to the human ear, whereas a change of five dBA is readily perceptible. As a general rule, an increase or decrease of ten dBA in sound level is perceived by an observer to be a doubling or halving of the sound, respectively.

**Table 9-1**  
**Examples of Common Sounds (A-weighted (dBA) Sound Level in Decibels)**

<b>A-weighted</b>	<b>Overall Level</b>	<b>Noise Environment</b>
<b>120</b>	Uncomfortably loud (32 times as loud as 70 dBA)	Military jet airplane takeoff at 50 feet
<b>100</b>	Very loud (8 times as loud as 70 dBA)	Jet flyover at 1,000 feet Locomotive pass-by at 100 feet
<b>80</b>	Loud (2 times as loud as 70 dBA)	Propeller plane flyover at 1,000 feet. Diesel truck 40 mph at 50 feet
<b>70</b>	Moderately loud	Freeway at 50 feet from pavement edge at 10 AM Vacuum cleaner (indoor)
<b>60</b>	Relatively quiet (1/2 as loud as 70 dBA)	Air condition unit at 100 feet. Dish washer at 10 feet (indoor)
<b>50</b>	Quiet (1/4 as loud as 70 dBA)	Large transformers Small private office (indoor)
<b>40</b>	Very quiet (1/8 as loud as 70 dBA)	Birds calls. Lowest limit of urban ambient sound
<b>10</b>	Extremely quiet	Just audible (1/64 as loud as 70 dBA)
<b>0</b>		Threshold of hearing

Because the sound pressure level unit of dBA describes a sound level at just one moment and very few sounds are constant, other ways of describing sound over more extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating sound heard over specific periods as if it had been a steady, unchanging sound. For this condition, a descriptor called the “equivalent sound level,”  $L_{eq}$ , can be computed.  $L_{eq}$  is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by  $L_{eq(1)}$ , or 24 hours, denoted as  $L_{eq(24)}$ ), conveys the same sound energy as the actual time-varying sound. All sound pressure levels reported in this chapter will be  $L_{eq(1)}$ .

### **9.2.2 Federal and State Policies**

The Federal Aid Highway Act of 1970 required FHWA to develop noise standards for mitigating highway traffic noise. The law requires the promulgation of traffic noise level criteria for various land use activities.

The FHWA has developed traffic noise procedures and guidelines applicable to federally-aided highway projects. These procedures and guidelines are described in 23 C.F.R. § 772.7 and FHWA’s *Highway Traffic Noise Analysis and Abatement Policy and Guidance* (FHWA, June 1995). These documents specify the requirements that state highway agencies must meet, in order to protect public health and welfare, when using federal funds for highway projects. These requirements include:

- Identification of land uses or activities that may be affected by traffic noise under project operation.
- Determination of existing noise levels through measurement of current conditions.

- Prediction of traffic noise for the No Build and Build Alternatives.
- Identification of noise impacts.
- Examination and evaluation of noise abatement measures to reduce or eliminate noise impacts.
- A general analysis of construction noise.
- Information for local officials.

For motor vehicle noise, FHWA has developed Noise Abatement Criteria (NAC) based on the noise sensitivity of various land uses. These criteria are presented in Table 9-2.

**Table 9-2  
Threshold for Noise Interference and Noise Abatement Criteria (NAC)**

Activity Category	Noise Abatement Criteria $L_{eq}$ (dBA)	Description of Activity Category
A (Exterior)	57	Tracts of land for 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. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B (Exterior)	67	Picnic areas, recreation areas, playgrounds, active sports areas, and parks that is not included in Category A; and residences, motels, hotels, public meeting rooms, schools, churches, libraries and hospitals.
C (Exterior)	72	Developed lands, properties or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E (Interior)	52	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: 23 C.F.R. Part 772 Table 1

A project is defined as having a noise impact when:

- Projected future traffic sound levels approach or exceed the NAC shown in Table 9-2 (noise levels that approach the criteria as defined by the State DOT); or
- Projected future traffic sound levels substantially exceed existing sound levels.

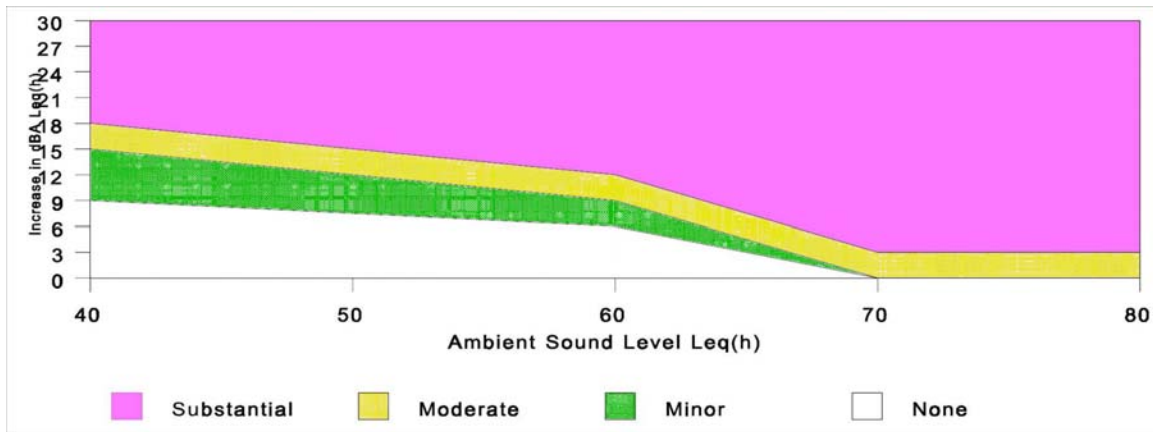
For example, the FHWA NAC for Category B land uses, including residences, is sixty-seven dBA. Noise levels that approach the NAC are defined as one dBA less than the criterion level, or sixty-six dBA for Category B land uses.

Where noise impact assessment shows impact, mitigation measures, as specified in 23 C.F.R. § 772.13, may be considered either at the roadway, along the path of the noise or, in limited situations, at the noise receptor. More specifically, these measures may include:

- Physical barriers, typically in the form of noise walls between the roadway (noise source) and the receptor locations.
- Traffic management measures that alter vehicle type, speed, volume, and/or time of operations may be effective noise abatement measures.
- Highway alignment alterations, such as shifting the roadway away from noise receptors or depressing the roadway into the ground, can potentially reduce noise impacts.
- Establishment of buffer zones for mitigation purposes requires the acquisition of property.
- Noise insulation is an additional type of mitigation that applies to public buildings, such as schools, and includes the installation of improved acoustical windows and doors to reduce interior noise levels only.

The noise impact evaluation criteria for this project are in agreement with the NAC established by the FHWA in 23 C.F.R. § 772.3 and criteria developed by VTrans in its Transportation Noise Analysis and Abatement Policy, (VTrans, 1997). In accordance with FHWA requirements, VTrans established its Noise Analysis and Abatement Policy in July 1997 for the purpose of providing a basis for statewide uniformity in the analysis of transportation-generated sound, the identification of potential transportation project impacts, and the implementation of noise abatement measures determined to be reasonable and feasible. Under the VTrans policy, future traffic noise levels will be considered as an impact if they approach or exceed the NAC established in 23 C.F.R. § 772.3 or substantially exceed the existing ambient sound levels. Under this policy, approach has been defined as commencing at one dBA below an NAC; "substantially exceed existing noise levels" has been defined as an increase relative to existing ambient sound levels which has substantial effect (see Figure 9.2-1).

**Figure 9.2-1  
Effects of Increase  
Relative to Ambient Sound Levels**



Source: VTrans. August 2001.

This allows for a progressive scale for dBA increase over existing sound levels for determining substantial noise increases at noise receptors. For example if the existing sound level for a noise receptor is forty dBA , the future sound level according to VTrans' chart in Figure 9.2-1 must increase by eighteen dBA to fifty-eight dBA to be considered a substantial increase over the existing sound level. However, if the existing sound level for a noise receptor is fifty dBA, the future sound level need only increase by fifteen dBA to sixty-five dBA to be considered a substantial increase over the existing sound level.

When potential impacts are identified, VTrans will consider noise abatement measures and make a determination regarding the feasibility and reasonableness of such measures. VTrans policies provide that only abatement measures which have been determined to be feasible and reasonable will be incorporated in projects. Feasibility depends primarily on engineering considerations, such as the local topography, safety, road maintenance requirements, or the ability to achieve at least a five dBA reduction in noise at an impacted receptor. Findings based upon common sense and good judgment should be cited in the determination of reasonableness. Factors such as the ability to achieve at least a ten dBA reduction in noise for at least one first row receptor, the number of receptors that will benefit from the noise barrier, the cost of the noise barrier per benefited receptor, neighborhood opinions, and environmental effects are considered when determining reasonableness.

VTrans coordinates with local governments to support compatible land use development. VTrans will identify noise receptors within project corridors which are on or along developed land. VTrans will also identify noise receptors on undeveloped land for which development is planned, provided such development includes activity sites of the types described in the NAC and provided that state and local permits for the development have been acquired or applied for on or before commencement of the noise analysis. VTrans policy addresses the responsibility of local governments and district environmental commissions under Act 250, to regulate development in such a way that developments involving noise sensitive land uses adjacent to highways are planned, designed and constructed so as to eliminate or minimize noise effects.

The date of public knowledge for a Federal-aid highway project is the date of approval of the Record of Decision for that project. Developments which occurred in the vicinity of an existing highway improvement project or a new highway project after the date of public knowledge will not be provided noise abatement by FHWA.

### **Vermont Act 250**

Noise is conveyed under Criterion 1 (Undue Water and Air Pollution) and Criterion 8 (Aesthetics) under Vermont Act 250. The Vermont Environmental Board has established that noise will be considered under Criterion 1 when it may cause adverse health effects (primarily hearing loss), and under Criterion 8 when it may create aesthetic impacts (out-of-context noise and long-term exposure to noise). (10 V.S.A. § 6086)

#### **9.2.3 Noise Model**

The FHWA traffic noise model, TNM 2.5, was used for the noise computations as required for all federally funded highway projects that begin after October 14, 2004 (FHWA, 2004). TNM 2.5 input is based on a three-dimensional model created for the terrain of the study area being modeled. All roadway, barrier and receiver points are defined by their x, y, and z coordinates. Roadways and barriers are coded into TNM 2.5 as line segments defined by their end points. Receivers, defined as single points, are typically located at noise receptors such as residences, schools, and recreational areas. Receivers were modeled at a height of five feet above ground elevation.

PM peak hour traffic volumes were used in the noise model because the future traffic volumes for the PM were in most cases larger than the future traffic volumes for the AM. The highest traffic noise levels occur when traffic is heavy but remains free-flowing. Where future traffic PM peak hour traffic volumes were not available, level of service (LOS) C was used to represent the worst-case future noise condition.

### **9.3 Noise Measurements and Receptors**

Noise measurements were taken to determine existing noise levels. Noise receptors were identified within the project area in accordance with 23 C.F.R. § 772.9. Noise receptors are those receptors for which exposure to excessive sound levels might be detrimental. Typically, the type of land use defines what range of sound levels is considered acceptable. Noise receptors typically include residences, schools, churches, hospitals, nursing homes, hotels, motels, libraries, picnic areas, outdoor recreational areas, playgrounds, and parks. Specific concern is given to the receptor's outdoor use area, as is the case with residential dwellings with yards or motels and hotels with swimming pools.

The selection of representative receptors for measurement was designed to maximize the understanding of the variety of roadway-receptor configurations that currently exist (e.g., topography, distance, traffic volumes, etc.). An objective of the receptor selection was to select at least one receptor point in each of the major residential areas along the project corridors and to include the worst-case receptor sites (worst noise exposure) wherever possible.

Short-term sound levels during the AM period peak (7:15-8:15), Midday hours (8:15AM-4:30PM), and PM period peak (4:30-5:30) were measured at twelve noise receptor

locations, and long-term (twenty-four hour) noise measurements were conducted at three locations. Noise measurements were collected during the week of November 14, 2005 but due to winter precipitation, some of the sites did not have complete measurements for all peak hours. Measurements were later collected on March 28<sup>th</sup> and 29<sup>th</sup> of 2006 for those sites located on VT 2A which had incomplete PM data. All noise measurement locations are depicted in Figure 9.3-1. The noise measurement results at short-term sites are presented in Table 9-3.

To verify existing noise conditions in the project corridors, existing A-weighted noise levels were measured in accordance with VTrans *Traffic Noise and Abatement Policy*, and FHWA's *Measurement of Highway-Related Noise: Final Report* (FHWA-PD-96-046). Measurements at each identified site were conducted in order to verify the baseline noise environment of the project area. Bruel & Kjaer 2236, 2260, and Rion NL-21 Precision Sound Level Meters (SLM) were utilized for field measurement. The SLMs meet or exceed the requirements set forth in the ANSI S1.4-1983 Standards for Type 1 and 2 quality and accuracy. Acoustical calibrators (Bruel & Kjaer 4230 and 4231) were used to calibrate the SLMs for each measurement interval.


The SLMs were operated on the A-weighting network and slow-meter response, as recommended by FHWA. Measurements were not collected if roadway pavement was wet, or if wind speed exceeded twelve miles per hour. A porous windscreen was used on each SLM during all measurement periods. All of the measurements were taken by mounting the SLMs approximately five feet above the sidewalk or ground surface at each receptor. This height is generally considered representative of ear level of an average person. Wherever possible, measurement sites were located in open areas away from buildings or other potentially reflective surfaces, but which were representative of the outdoor use area of a given receptor.

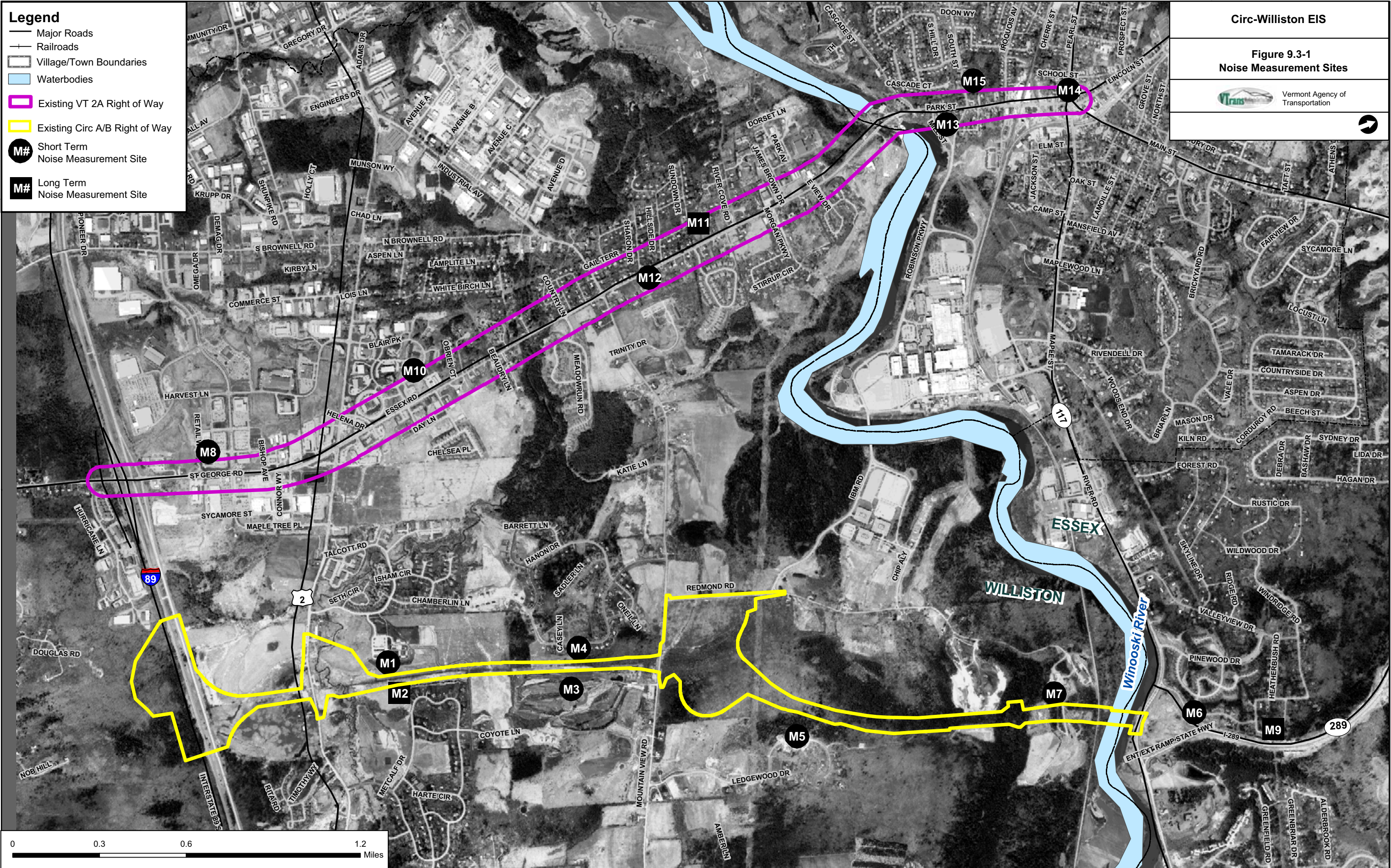
**Legend**

- Major Roads
- Railroads
- ▭ Village/Town Boundaries
- ▭ Waterbodies
- ▭ Existing VT 2A Right of Way
- ▭ Existing Circ A/B Right of Way
- M# Short Term Noise Measurement Site
- M# Long Term Noise Measurement Site

**Circ-Williston EIS**

**Figure 9.3-1**  
**Noise Measurement Sites**

 Vermont Agency of Transportation



Source: Vermont Agency of Natural Resources, and Vermont Center for Geographic Information.

**Table 9-3  
Short-Term Hourly Sound Levels**

Project Corridor	Site	Address	Date	Time	Period	Average Leq (dBA)
CIRC A/B	M1	Allen Brook School	11/15/2005	7:20 AM	AM	49.6
			11/14/2005	3:00 PM	MD	46.6
			11/14/2005	4:29 PM	PM	47.7
	M2	387 Metcalf Drive	11/14/2005	12:36 PM	24 hour	N/A <sup>1</sup>
	M3	Catamount Golf Club	11/15/2005	7:20 AM	AM	50.5
			11/14/2005	3:00 PM	MD	46.1
			11/14/2005	4:30 PM	PM	49.8
	M4	481 Brenna Woods Drive	11/15/2005	7:20 AM	AM	47.7
			11/14/2005	3:21 PM	MD	41.7
			11/14/2005	4:30 PM	PM	46.1
	M5	868 Ledgewood Drive	11/15/2005	7:20 AM	AM	39.4
			11/14/2005	3:00 PM	MD	40.6
			11/14/2005	4:30 PM	PM	42.6
	M6	1 Raymond Drive	11/15/2005	7:19 AM	AM	52
			11/14/2005	3:00 PM	MD	50.7
11/14/2005			4:29 PM	PM	53.5	
M7	CSWD Transfer Station	11/15/2005	7:20 AM	AM	53.2	
		11/14/2005	3:02 PM	MD	55.8	
		11/14/2005	4:30 PM	PM	54.3	
VT 2A	M8	Taft Corner Park Shopping Center	11/16/2005	7:16 AM	AM	74.4
			11/15/2005	9:40 AM	MD	73.3
			3/28/2006	4:00 PM	PM	72.4
	M9	11 Winterlane Circle	11/14/2005	12:25 PM	24 hour	N/A <sup>1</sup>
	M10	letcher Allen Health Center	11/16/2005	7:41 AM	AM	71.2
			11/15/2005	9:40 AM	MD	70.1
			3/28/2006	5:01 PM	PM	72
	M11	890 Essex Road	11/14/2005	12:28 PM	24 hour	N/A <sup>1</sup>
	M12	Christ Memorial Church	11/16/2005	7:40 AM	AM	67.3
			11/15/2005	9:40 AM	MD	67.3
			3/29/2006	4:30 PM	PM	65.5
	M13	88 Park Street	11/16/2005	7:15 AM	AM	70.6
			11/17/2005	9:02 AM	MD	71.2
			3/29/2006	4:30 PM	PM	69.3
	M14	Brownell Library	11/16/2005	7:32 AM	AM	64.6
11/16/2005			9:03 AM	MD	65.6	
3/28/2006			5:08 PM	PM	63.2	
M15	Park Street School	11/16/2005	7:15 AM	AM	62.3	
		11/15/2005	9:40 AM	MD	61.9	
		3/28/2006	4:00 PM	PM	62.6	

1- M2, M9, and M11 are long term measurement sites and the results are not applicable to the Short Term Hourly Sound Levels Table

### 9.3.1 VT 2A Corridor Noise Conditions

The land uses along the existing VT 2A include mixed uses of commercial, residential and public use areas. A total of six representative receptors were selected for noise measurement along this corridor. They include one shopping center, one office/health center, two residences, one church, one school, and one public library. Existing sound levels measured along this corridor were between fifty-three and seventy-five dBA and primarily due to traffic along VT 2A.

Short-term sound levels were measured at Site M8, located at the Taft Corners Park Shopping Center. Sound levels ranged between 72.4 and 74.4 dBA for the measured time periods. The predominant noise sources were vehicular traffic on VT 2A and US 2.

Short-term sound levels were measured at Site M10, located at the Health Center located at 353 Blair Park. Sound levels ranged between 70.1 and 72.0 dBA for the measured time periods. The predominant noise sources were vehicular traffic on VT 2A and US 2.

Site M11 was measured for twenty-four hours at the residence on 890 Essex Road (VT 2A). Sound levels ranged between 53.3 and 70.1 dBA for the twenty-four-hour time period. The predominant noise source was vehicular traffic on VT 2A.

Short-term sound levels were measured at Site M12, located at the Christ Memorial Church. Sound levels ranged between 65.5 and 67.3 dBA for the measured time periods. The predominant noise source was vehicular traffic on VT 2A.

Short-term sound levels were measured at Site M13, located at the residence on 88 Park Street. Sound levels ranged between 69.3 and 71.2 dBA for the measured time periods. The predominant noise source was vehicular traffic on VT 2A.

Short-term sound levels were measured at Site M14, located at the Brownell Library. Sound levels ranged between 63.2 and 65.6 dBA for the measured time periods. The predominant noise sources were vehicular traffic on VT 2A and at Five Corners.

Short-term sound levels were measured at Site M15, located at Park Street School. Sound levels ranged between 61.9 and 62.6 dBA for the measured time periods. The predominant noise source was vehicular traffic on VT 2A.

### **9.3.2 Circ A/B Corridor Noise Conditions**

Land uses along the Circ A/B corridor include residential areas, a golf course, commercial, and large undeveloped areas. A total of eight sites, including five residences, a golf course, a school, and a transfer station, were identified to be representative noise receptors. Sound levels measured at receptors along this corridor were mostly in the middle to low fifty dBA range, and are considered to be typical for rural and/or suburban environments.

Short-term sound levels were measured at Site M1, located at the Allen Brook School east of Talcott Road. Sound levels ranged between 46.6 and 49.6 dBA for the measured time periods. The predominant noise sources were overhead airplanes, occasional bird noises, school buses entering and exiting the school parking lot and vehicular traffic on US 2 and Talcott Road.

Site M2 was measured for twenty-four hours at the residence on 387 Metcalf Drive in the Southridge Development. Sound levels ranged between 37.4 and 55.9 dBA for the twenty-four hour time period. The predominant noise sources were overhead airplanes, occasional bird noises, and occasional vehicles on Metcalf Drive.

Short-term sound levels were measured at Site M3, located at the Catamount Golf Club on Mountain View Road. Sound levels ranged between 46.1 and 50.5 dBA for the measured time periods. The predominant noise sources were overhead airplanes, occasional bird noises, vehicles entering and exiting the parking lot, and vehicles on Mountain View Road.

Short-term sound levels were measured at Site M4, located at the residence at 481 Brennan Woods Drive in the Brennan Wood Neighborhood. Sound levels ranged between 41.7 and 47.7 dBA for the measured time periods. The predominant noise sources were overhead airplanes, occasional bird noises, and vehicles on Brennan Woods Drive.

Short-term sound levels were measured at Site M5, located at the residence at 868 Ledgewood Drive. Sound levels ranged between 39.4 and 42.6 dBA for the measured time periods. The Predominant noise sources were overhead airplanes, occasional bird noises, and school buses and vehicles on Ledgewood Drive.

Short-term sound levels were measured at Site M6, located at 1 Raymond Drive. Sound levels ranged between 50.7 and 53.5 dBA for the measured time periods. Predominant noise sources were overhead airplanes, occasional bird noises, distant trains, and vehicular traffic on VT 289 and VT 117.

Short-term sound levels were measured at Site M7, located at the CSWD Transfer Station. Sound levels ranged between 53.2 and 55.8 dBA for the measured time periods. Predominant noise sources were CSWD Transfer Station operations and trains passing by.

Site M9 was measured for twenty-four hours at a residence located on 11 Winterlane Circle. Sound levels ranged between 32.2 and 53.2 dBA for the twenty-four hour time period. Predominant noise sources were occasional bird noises, and distant vehicular traffic on VT 289 and Winterlane Circle.

### 9.3.3 Comparison of Existing Measured and Modeled Sound Levels

Sound level comparisons between existing measured and modeled sites for VT 2A were conducted at three short-term measurement sites and one long-term site. Typically, if the modeled and measured values are comparable within one and two dBA, there is good confidence in the accuracy and results of the modeled sound levels. Table 9-4 shows comparisons between measured and modeled sites that did not have major arterial crossroads, such as I-89 or US 2 and VT117, near the measurement area. Detailed information regarding the short-term and long-term noise measurements and the twenty-four-hour noise monitoring results is provided in DEIS Appendix L: *Noise Technical Report*.

**Table 9-4  
Comparisons: Existing Measurements and Model Sound Level**

Site No.	Date	Start Time	Noise Levels, Leq(h), dBA		Deviation, dB
			Measured	Modeled	
M11	11/14/05	12:25	67.0	64.1	-2.9
M12	3/29/06	16:30	65.5	64.4	-1.1
M13	3/29/06	16:30	69.3	67.4	-1.9
M15	3/28/06	16:00	62.9	62.9	0.0

## **9.4 Noise Impacts**

This section summarizes the results of the noise impact analysis for the No Build and Build Alternatives. Table 9-5 provides the total number of impacted receptors for each alternative. For more detailed information, including tables of noise impacts for each measurement site/modeling receptor, refer to DEIS Appendix L: *Noise Technical Report*.

### **9.4.1 No Build Alternative**

#### **VT 2A Corridor**

Under the No Build Alternative, forty-six noise receptors in the VT 2A corridor would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit.

#### **Circ A/B Corridor**

The Circ A/B corridor was not assessed for the No Build Alternative because the No Build traffic noise levels would be similar to the measured existing noise levels.

### **9.4.2 VT 2A Alternatives**

The Circ A/B corridor was not assessed for the VT 2A Alternatives because the traffic noise levels under the VT 2A Alternatives would be similar to the measured existing noise levels.

#### **Alternative 2**

Under Alternative 2, seventy-five VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of twenty-nine impacted receptors over the No Build Alternative. Seven impacted receptors (M14, Brownell Library and R35, residences on the east side of VT 2A between South Street and Iroquois Avenue) would experience peak period sound levels five dBA higher than the No Build condition under Alternative 2. Two impacted receptors in a residential area west of VT 2A between South Street and Iroquois Avenue would experience peak period leq sound levels four dBA higher than the No Build condition.

#### **Alternative 3**

Under Alternative 3, eighty-four VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of thirty-eight impacted receptors over the No Build Alternative. One impacted receptor (M14, Brownell Library) would experience peak period sound levels five dBA higher than the No Build condition under Alternative 3. Forty-three impacted receptors would experience peak period sound levels four dBA higher than the No Build under Alternative 3. The majority of these receptors are located in residential areas adjacent to VT 2A north of the Mountain View Road intersection and along the Park Street corridor in Essex Junction.

## **Alternative 22**

Under Alternative 22, sixty VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of fourteen impacted receptors over the No Build Alternative. Four impacted receptors (R14, residences on the west side of VT 2A between Hickory Hill Road and Mountain View Road) would experience peak period sound levels four dBA higher than the No Build condition under Alternative 22.

### **9.4.3 Circ A/B Alternatives**

#### **VT 2A Corridor**

##### ***Alternative 16a and the Preferred Alternative***

Under Alternative 16a and the Preferred Alternative, fifty-two VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of six impacted receptors over the No Build Alternative. These alternatives would increase peak period sound levels by two dBA or less over the No Build condition at all of the impacted receptors.

##### ***Alternatives 16b and 16c***

Under Alternatives 16b and 16c, thirty-nine VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, a decrease of seven impacted receptors compared to the No Build Alternative. Alternatives 16b and 16c would decrease or increase peak period sound levels by one dBA or less compared to the No Build condition at all of the impacted receptors.

#### **Circ A/B Corridor**

##### ***Alternative 16a and Alternative 16b***

Under Alternatives 16a and 16b, fourteen Circ A/B noise receptors would experience 2030 traffic sound levels approaching or exceeding the sixty-seven dBA standard NAC limits and twenty noise receptors would experience 2030 traffic sound levels equal to or exceeding the VTrans' substantially exceed existing sound level chart, for a total of thirty-four noise impacts in the Circ A/B corridor. The impacted receptors would experience peak period sound levels between eleven and twenty-one dBA higher than existing conditions. The majority of the impacted receptors are located in the portions of the Raven Circle, Brennan Woods Drive and Ledgewood Drive subdivisions closest to the Circ A/B corridor.

##### ***Alternative 16c***

Under Alternative 16c, fourteen noise receptors would experience 2030 traffic sound levels approaching or exceeding the sixty-seven dBA standard NAC limits and nineteen noise receptors would experience 2030 traffic sound levels equal to or exceeding the VTrans' substantially exceed existing sound level chart, for a total of thirty-three noise

impacts in the Circ A/B corridor. The impacted receptors would experience peak period sound levels between eleven and twenty-one dBA higher than existing conditions under Alternative 16c. The majority of the impacted receptors are located in the portions of the Raven Circle, Brennan Woods Drive and Ledgewood Drive subdivisions closest to the Circ A/B corridor.

### ***Preferred Alternative***

Under the Preferred Alternative, the predicted 2030 sound levels along the Circ A/B corridor would not impact any receptors. Peak period sound levels would increase up to 14 dBA over existing conditions at some receptors near the corridor, but the total sound levels would not approach or exceed the NAC and would not substantially exceed existing sound levels as defined by VTrans noise policy.

The DEIS noise impact assessment of Alternative 17 was not revised to account for the design changes incorporated into the Preferred Alternative for the FEIS. For residential receptors in the Circ A/B corridor, the noise level increases under the modified Alternative 17 design would likely be less than under the Alternative 17 base design analyzed in the DEIS. The Preferred Alternative reduces the roadway median width from the sixteen feet originally proposed to eight feet in order to minimize wetland impacts between US 2 and Mountain View Road. This design change would increase the distance between the roadway and residential receptors, thereby reducing noise levels. In addition, the easterly alignment shift introduced at Mountain View Road would increase the distance between residences and the roadway for some receptors at the northern end of the Brennan Woods development.

Measurement site M3 is located in the Catamount Golf Club property and has an existing noise level 51 dBA. The noise analysis of the Alternative 17 base design in the DEIS predicted that noise levels at M3 would increase to 58 dBA in the Build condition, 9 dBA less than the 67 NAC. Under the Preferred Alternative, the portion of the golf course where site M3 is located would be acquired by VTrans in order to expand the Circ A/B right-of-way. Therefore, site M3 would not be an appropriate location to assess the noise effects of the Preferred Alternative. The remaining area of the golf course property would remain approximately the same distance from the roadway as under the Alternative 17 base design. In addition, traffic volumes on the Circ A/B Boulevard would be expected to be the same under the Preferred Alternative as with the Alternative 17 base design. Therefore, noise levels at the remaining portion of the golf course property would not be expected to be any higher than the 7 dBA noise increase predicted for the Alternative 17 base design and no noise impacts would occur.

## **9.4.4 Hybrid Alternatives**

### **VT 2A Corridor**

#### ***Alternative 18***

Under Alternative 18, seventy-two VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of twenty-six impacted receptors over the No Build Alternative. Seven impacted receptors (M14, Brownell Library and R35, residences on the east side of VT

2A between South Street and Iroquois Avenue) would experience peak period leq sound levels five dBA higher than the No Build.

### ***Alternative 19***

Under Alternative 19, seventy-two VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of twenty-six impacted receptors over the No Build Alternative. One impacted receptor (M14, Brownell Library) would experience peak period leq sound levels five dBA higher than the No Build. Two impacted receptors in a residential area west of VT 2A between South Street and Iroquois Avenue would experience peak period leq sound levels four dBA higher than the No Build under Alternative 19.

### ***Alternative 23***

Under Alternative 23, fifty-nine VT 2A corridor noise receptors would experience sound levels approaching or exceeding the sixty-seven dBA standard NAC limit, an increase of thirteen impacted receptors over the No Build Alternative. One impacted receptor (M14, Brownell Library) would experience peak period leq sound levels four dBA higher than the No Build.

### **Circ A/B Corridor**

Under all of the Hybrid Alternatives, the predicted 2030 sound levels along the Circ A corridor would not impact any receptors. Sound levels would increase up 8 dBA over existing conditions at some receptors near the corridor, but the total sound levels would not approach or exceed the NAC and would not substantially exceed existing sound levels as defined by VTrans noise policy.

## **9.4.5 Summary of Impacts**

Table 9-5 summarizes the total number of impacted receptors under each of the alternatives. The Preferred Alternative would have no noise impacts in the Circ A/B corridor and 52 impacted receptors in the VT 2A corridor (an increase of six impacted receptors over the No Build).

**Table 9-5  
Summary of Noise Impacts**

	Number of Impacted Receptors		
	VT 2A Corridor	Circ A/B Corridor	Total
Existing Conditions	14	0	14
No Build	46	0	46
Alternative 2	75	0	75
Alternative 3	84	0	84
Alternative 22	60	0	60
Alternative 16a	52	34	86
Alternative 16b	39	34	73
Alternative 16c	39	33	72
<b>Alternative 17*</b>	<b>52</b>	<b>0</b>	<b>52</b>
Alternative 18	72	0	72
Alternative 19	72	0	72
Alternative 23	59	0	59

\*Preferred Alternative

## **9.5 Noise Mitigation**

### **VT 2A Corridor**

Although a number of receptors along VT 2A are expected to experience future noise impacts under the Preferred Alternative, noise mitigation barrier modeling was not performed because the locations where impacts would occur would require abatement measures that would not be feasible. Specifically, the VT 2A corridor consists of several residential areas that are separated by local streets and arterial roads that intersect with VT 2A and many of these residences have driveways that provide direct access to VT2A, thereby resulting in issues of noise barrier discontinuity. For a noise barrier to provide sufficient noise reduction, it must be high enough and long enough to shield the receptor from the highway. Access openings in the barrier for streets, driveways, maintenance and general safety, severely reduce the effectiveness of the barrier to the point that it becomes infeasible to construct a barrier. Alternate abatement measures such as noise insulation are not pertinent to the outdoor use areas for which analysis is conducted and would only be considered for indoor impacts in public use or nonprofit institutional structures of particular sensitivity, such as churches, libraries and schools. FHWA does not provide funding for noise insulation of residential properties.

### **Circ A/B Corridor**

Noise barriers in the Circ A/B corridor were not evaluated for the Preferred Alternative because it would not result in any noise impacts in the Circ A/B corridor. For information on the noise barriers considered for other Circ A/B Alternatives, refer to DEIS Appendix L: *Noise Technical Report*.