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Noise Assessment

Hudson Valley Wine Village

Town of Lloyd, Ulster County, New York

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1.0 INTRODUCTION

Hudson Valley Wine Village, Inc. proposes to build a 429± acre integrated development project at the intersection of NYS Route 9W and Blue Point Road in the Town of Lloyd, Ulster County. The project would include:

- A maximum of 916 residential housing units including up to 584 apartments, 282 townhouses, and 50 single-family homes
- 51,727 square feet (SF) of renovated commercial and office space and 50,000 SF of new commercial and office space
- 450,000 SF of light industrial, manufacturing, and/or institutional space
- A 34,048 SF conference center with an associated 8,222 SF restaurant
- A 103-room suite hotel overlooking the Hudson River

This report discusses existing sound levels on the subject property. Surrounding land uses are a mix of residential, agricultural, commercial, open space, and parkland. Due to the relatively rural nature of the area surrounding the project site there are few locations to be considered sensitive noise receptors. Area land use maps were reviewed for the Noise Impact Assessment to identify sensitive noise receptors in the vicinity of the project site as defined by Noise Policy Guidelines defined by HUD. Residential receptors were identified to the north of the project site along Macks Lane and to the west of the project site along Blue Point Road and NYS Route 9W. Franny Reese State Park, north of the project site, was also identified as a sensitive noise receptor.

The Scoping Document, adopted by the Town of Lloyd, the Lead Agency for the proposed HVWV requires that the existing sources of noise in and around the project site be described including the effect of topography and vegetation on noise transmission. The purpose of this assessment is to establish baseline conditions at the project site.

2.0 CHARACTERISTICS OF SOUND

Description of Sound

Sound is any pressure variation (in air, water, or other medium) that the human ear can detect. The number of pressure variations per second is called the frequency of the sound and is measured in cycles per second, or Hertz (Hz). Human hearing detects sounds in the range of 20Hz to 20,000Hz, or 20 kHz. The speed of sound is measured to be about 765 miles per hour (1,224 Km/hour). The wavelength of a sound is a function of the speed of sound over the frequency. The amplitude of a sound wave is equivalent to the sound pressure. The loudness of a sound increases as the pressure increases.

Description of Noise

Most sounds are mixtures of frequencies and amplitudes. The mixture of frequencies and amplitudes contributes to a particular sound having a characteristic "signature" and being clearly distinguishable from other sounds. Sounds which are considered annoying and unwanted are termed "Noise". How much a noise annoys depends not only on its quality, but also on the attitudes towards that particular noise in a particular setting, at a particular time. This aspect of noise is not easily measured as a particular noise does not have to be loud to be annoying or considered a nuisance by a receptor.

Another characteristic of sound is its ability to damage and destroy. Sounds that jeopardize health, safety and welfare can be measured and regulated. The most obvious damaging sounds are those which cause visible damage to the environment, such as the shattering of glass due to a sonic boom. However, it is the damage to the human ear that is most critical in land use decision making.

Decibel Equivalency

Sound measurement gives a clear indication of when a sound may cause hearing damage. As such, it is the primary diagnostic tool used in evaluating requirements for noise reduction programs. Sound pressure levels perceivable by the human ear fall within a very large range which are difficult to manage due to the large numbers involved. The decibel scale simplifies this condition by compressing the million to one audible range into a 140dB (decibel) range. The decibel scale uses the hearing threshold of 20 micro pascals as its starting point or reference pressure. This is defined as 0 dB. Each time the sound pressure in pascals is multiplied by 10, 20 dB are added to the decibel level.

Sound Level Measurement and Meter

The factors that determine the apparent loudness of a sound are complex. The human ear is not equally sensitive at all frequency levels, but is most sensitive in the 2 kHz to 5 kHz range and least sensitive at extremely high or low frequency levels. The condition is further pronounced at lower sound pressure levels than at higher levels.

Sound level meters have electronic circuitry designed to be sensitive to varying frequencies in similar fashions to those of the human ear. Typical meters consist of a microphone, amplifier and a meter. The microphone converts acoustical energy into an electrical signal that the amplifier boosts so that it will operate the meter. The meter allows the sound pressure level to be read directly from the scale in decibels.

The meter used in this study was a Bruel & Kjaer, Precision Integrated Sound Level Meter Type 2238 Mediator for ambient data recording. This meter is a Type 1 sound level meter which

complies with the IEC 1672 Class 1 Standard. The meter is designed to automatically calculate and record the following parameters:

MaxL: maximum sound pressure levels (SPL)
MinL: minimum SPL during recording period
MaxP: maximum Peak level during recording period
Leq: equivalent continuous sound level (Leq according to IEC 804).
L90 RMS level (A-weighting used) sound level exceeded 90% of the measurement period.
L50 RMS level (A-weighting used) sound level exceeded 50% of the measurement period.
L10 RMS level (A-weighting used) sound level exceeded 10% of the measurement period.

The meter has four RMS frequency weighting scales. A-weighting setting was used for this study as it most successfully represents human hearing at normal sound levels.

Sound Propagation

The intensity of a sound wave diminishes (attenuates) exponentially with distance from the sound source. This attenuation is due to a combination of factors: distance, or the length of transmission path, absorption by surfaces such as vegetation, buildings, earth formations etc.; atmospheric conditions such as fog, rain and snow; and the nature of the ground over which the transmission occurs. Industry standards have documented that the intensity of an unobstructed sound wave drops by roughly six decibels 6dB each time the distance from a stationary source is doubled. Decibel level attenuation from linear sources, such as continuous flowing highway traffic, drops by about three decibels 3dB each time the distance from the source is doubled.

Objects placed between a source and a receiver modify sound pressure waves through reflection, absorption and transmission. How much sound is reflected, absorbed or transmitted depends on the absorbing properties of the object, the size of the object and the wavelength(s) of the sound. In general, the object must be larger than one wavelength of the sound in order to significantly disturb the sound.

In addition to reflection, absorption and transmission, sound bends or is "diffracted" over objects. Because of this phenomenon, barriers will not completely block out sounds from a source generated at an elevation lower than the barrier. Higher frequency sound waves tend to bend less than low frequency sound waves. As the ear is more sensitive to higher frequencies, proper placement of barriers can be effective in reducing apparent loudness. In addition, as sound waves bend over a barrier, a longer path is generated adding to attenuation through "distance decay."

Sound Levels from Two or More Sources

NYSDEC Guidelines identify that Future Noise, i.e., the sound levels that can be predicted from a new or proposed source, should be evaluated as part of a noise impact assessment. Future noise is considered the ambient noise level plus the noise level from the new or proposed source. Combining sound levels however is not determined by adding sound levels directly because of the logarithmic nature of decibel scale. It is however possible, by knowing the sound levels of the two or more sources, to calculate the level of the combined sound. NYSDEC Program Policy DEP-00-1 provides a simple table for calculating the added decibel levels that are added to the higher of the two sounds to obtain the combined sound levels. Table 1 below identifies these values:

Table 1 – Approximate Addition of Sound Levels	
Difference Between Two Sound Levels	**Add to the Higher of the Two Sound Levels**
1 dBA or less	3 dBA
2 to 3 dBA	2 dBA
4 to 9 dBA	1 dBA
10 dBA or more	0 dBA

Source: USEPA, Protective Noise Levels, 1978

Noise Attenuation from Distance, Topography, and Vegetation

The NYSDEC Guidelines also describes additional noise attenuation provided by existing topography, structures, or vegetation located between the point of noise generation and noise reception.

Distance, topography and vegetation can reduce impacts from noise generation as they absorb and deflect noise depending on the extent of site features related to the proposed HVWV Project. According to the Noise Policy, noise from stationary sources attenuates at a rate of 6 dB(A) per doubling distance. Therefore, a 90 dB(A) noise level at 50 ft from the source would be reduced to 84 dB(A) at 100 ft, 78 dB(A) at 200 ft, and so forth.

Topography on the project site also results in noise attenuation, as topography acts as a natural screen. The closer a hill or other barrier is to the noise source or the receptor the larger the sound shadow will be on the side opposite the noise source.

The Noise Policy also indicates that dense vegetation that is at least 100 feet in depth will reduce the sound levels by three (3) to seven (7) dB(A). The 100 foot natural landscaped buffer surrounding the property will provide a reduction in sound levels between adjoining properties during construction and operation of the proposed HVWV Project.

3.0 REGULATORY SETTING

Town of Lloyd - Town Code, Chapter 75 Noise

The Town of Lloyd regulates noise in Chapter 75 of the Town Code. The HVWV project is subject to this resolution which prohibits various actions that that may produce unreasonably loud, disturbing and unnecessary noise levels within the Town. It generally prohibits "any person to make, continue, aid, countenance, cause to be made or assist in making any unreasonably loud, disturbing and unnecessary noise between the hours of 8:00 p.m. and 7:00 a.m. during any weekday and between the hours of 8:00 p.m. and 9:00 a.m. on any Sunday or holiday."

In regards to demolition work, the policy restricts the erection, including excavation, demolition, alteration or repair of any building between 9:00 p.m. and 7:00 a.m. Construction work is prohibited from 8:00 p.m. to 7:00 a.m. The code does not define acceptable daytime or nighttime noise levels.

USEPA – Protective Noise Levels Guidance

The United States Environmental Protection Agency's (USEPA) Protective Noise Levels guidance found that a noise level of 55 dBA was generally considered sufficient to protect public health and welfare. In areas with mixed land uses, a higher level of 65 dBA is considered acceptable. It also states "the addition of any noise source in a non-industrial setting should not raise the ambient noise level above a maximum of 65 dBA." The USEPA policy further notes common sound levels for comparison.

Table 2 - Common Sound Levels

Activity	dBA
Threshold of pain	130
Chipping on metal	120
Loud rock band	110
Jack hammer	100
Jet airliner ½ mile away	95
Threshold of hearing damage	90
Freeway traffic – downtown streets	80
Urban residential area	70
Normal conversation	60
Normal suburban area	50
Quiet suburban area	40
Rural area	30
Wilderness area	25

Threshold of audibility	0

Source: U.S. EPA, Information on levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Publications EPA-550/9-74-004, 1974; and Charles M. Salter Associates, inc. , Acoustics, Architecture, Engineering and the Environment, Wm. Stout Publisher, 1998.

NYSDEC – Environmental Regulations, Thresholds for Significant Sound Pressure Level Increases

As noted in the NYSDEC Program Policy for Assessing and Mitigating Noise Impacts, a sound level of "65 dB(A) allows for undisturbed speech at a distance of approximately three feet." This policy further notes such typical sound levels for comparison[1]:

- Living Room/Bedroom – 40 dBA
- Light Auto Traffic at 50 feet – 50 dBA
- Typical Suburban Daytime – 50 dBA
- Air Conditioning Unit at 20 feet – 60 dBA
- Garbage Truck at 50 feet – 71 to 83 dBA
- Commercial Truck at 50 feet – 91 dBA

Regarding sound level reduction over a distance, the NYSDEC guideline states that at distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dBA reduction in the sound. Noise from lightly traveled roads typically attenuates at 4.5 dB for every doubling of distance, while noise from heavily traveled roads diminishes at a rate of 3 dB per doubling of distance. In addition, the guidelines indicate that dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dBA.

4.0 METHODOLOGY AND MONITORING LOCATIONS

Chazen took initial daytime and evening noise measurements on Wednesday August 29th, 2012. The Scoping Document specified that two (2) sets of noise measurements be taken at up to eight (8) pre-selected locations along the boundaries of the site. The Scoping Document specified that one set of measurements be taken during the day between 7:00 a.m. and 5:00 p.m. and a second set of measurements be taken after 7:00 p.m.

During these readings there was a significant amount of insect noise at each of the locations which appeared to have affected the results. Therefore, it was determined to take a second set of measurements on October 24, 2012 to ensure the results would accurately reflect noise levels currently on the HVWV project site.

[1] *Assessing and Mitigating Noise Impacts*, New York State Department of Environmental Conservation, Revised February 2, 2001.

Measurements were taken using a Bruel & Kjaer, Precision Integrated Sound Level Meter Type 2238 Mediator. The noise readings were completed using the 1/3 octave bandwidth setting. Measurements were taken for 15-minute intervals, which is sufficient to characterize an average sound level, particularly where the sound source is constant and steady. Readings were taken at a height of approximately 1.5 meters above grade, with the microphone parallel to the ground surface, facing away from the project site. The following measures of sound pressure level are based on the A-weighted decibel and are typically used when evaluating sound measurement data.

- L_{eq}, or Equivalent Level, is the steady-state sound level during a given amount of time that has the same acoustic energy as the fluctuating noise levels during that same period.
- L_{max}, or Maximum Level, represents the maximum sound level during a given time period.
- L_{min}, or Minimum Level, represents the minimum sound level during a given time period.

L_{eq} is the most widely used noise metric for environmental noise, as it gives a comprehensive snapshot of noise levels in one measurement. For this reason, L_{eq} is the most important measurement type for evaluating long term environmental noise and will be the focus of this assessment.

Noise Measurement Locations

The Scoping Document required noise screening assessments to be completed at up to eight pre-selected locations along the boundaries of the site. Two are along the northern property line adjacent to Franny Reese State Park; two along the bluff on the eastern side of the property; two along the south near the property line; and two are on the western portion of the property adjacent to residences along Blue Point Road and at 9W at the location of the planned industrial component.

The Town's planning consultant and the property's caretaker accompanied Chazen during the noise screening assessments. During the assessment, it was determined that noise conditions were uniform across the site. Therefore, conducting multiple noise screening assessments along each property line was redundant and would not provide any additional information that would assist the Town Board in evaluating noise impacts of the proposed development in relation to the site and its context. As a result, three of the proposed noise measurement locations were removed from consideration. Noise measurements in both August and October were taken at a total of five sites on the HVWV project site (See *Figure 1 Noise Measurement Locations Map*). These locations include:

- Noise Point 1 – The measurement location was an open lawn located along the bluff on the east side of the most eastern building on the winery site. The ground level elevation from the measurement point drops significantly towards the Hudson River to the east. This site was chosen due to its location between the proposed Tuscan Village Conference Center and the bluff along the Hudson River and is characteristic of noise levels along the eastern property line.
- Noise Point 2 – The measurement location was heavily wooded and directly adjacent to property boundary with Franny Reese State Park to the north. This site was chosen to provide a baseline for noise levels near the state park.
- Noise Point 3 – The measurement location was adjacent to residences at the forest edge, approximately 100' from Blue Point Road. This location was chosen in relation to proposed apartment buildings that would be constructed near single family homes along Blue Point Road.
- Noise Point 4 – The measurement location was approximately 125' from property line along western edge of HVWV project site near NYS Route 9W. This location was heavily wooded. This location was selected due to the proposed proximity of the planned industrial component to the western property line.
- Noise Point 5 – The measurement location was approximately 100' from southern property line approximately 800' east of NYS Route 9W near the proposed planned industrial component. This location was selected due to the proposed proximity of the planned industrial component to the southern property line.

5.0 NOISE SCREENING ASSESSMENT RESULTS

Noise Measurements - August 29, 2012

Measurements were obtained from each of the five locations to record existing noise levels generated near the project site. Weather conditions at the project site were clear and relatively breezy with wind speeds ranging from approximately 10-15 mph at open locations and calm with little to no wind at locations within forested areas. Temperatures were in the 60 to 70 degree range during all measurements.

At the time of the measurements the primary source of noise on the project site was insects, primarily cicadas during the daytime readings and crickets during the nighttime readings. The noise environment was secondarily dominated by noise created from the surrounding transportation network, primarily NYS Route 9W in Lloyd and NYS Route 9 in Poughkeepsie. The cumulative effect of numerous vehicles, ranging from passenger cars to busses and trucks traveling at high speeds, generates significant noise levels on and within the vicinity of the site. In addition, trains passing on the east along the Hudson River and aircrafts passing overhead provided additional noise disturbances.

The daytime readings were taken between 11:00 a.m. and 2:30 p.m. and the overall sound levels (L_{eq}) ranged from 57.3 dBA to 69.3 dBA (See Table 3). The evening readings were taken from 7:00 p.m. 9:45 p.m. and measured overall noise levels (L_{eq}) that ranged from 58.3 dBA to 67.6 dBA. These measurements were considerably higher than would be expected from a quiet, rural site and were determined to be the result of cicadas in the daytime and crickets in the evening.

Table 3 – August Noise Measurement Readings (dBA)

	L_{eq}	L_{min}	L_{max}
Noise Point 1 – Eastern property line along bluff			
Daytime	69.3	56.0	91.0
Evening	67.6	54.2	90.2
Noise Point 2 – Northern property line near Franny Reese			
Daytime	65.3	51.7	83.0
Evening	60.4	51.7	73.8
Noise Point 3 – Along Blue Point Rd.			
Daytime	65.2	53.4	83.1
Evening	63.2	57.3	77.6
Noise Point 4 – Western property line near NYS Route 9W			
Daytime	66.7	51.9	81.0
Evening	62.2	50.9	77.8
Noise Point 5 – Southern Property line			
Daytime	57.3	48.4	74.6

Evening	58.3	51.0	70.9

Noise Measurements – October 24, 2012

Measurements were taken from each of the five locations to record existing noise levels. Weather conditions at the project site were overcast with no wind. Temperatures were in the 50 to 60 degree range during all measurements.

During the October measurements, the primary source of noise on the project site was from the surrounding transportation network, primarily NYS Route 9W in Lloyd and NYS Route 9 in Poughkeepsie. It was observed that noise coming from the surrounding roadways was much higher than the measurements taken in August. This is primarily a result of the lack of foliage on the trees screening noise as it travelled across the site. Consistent with the August noise measurements, several planes flew overhead and trains were heard passing. There was no insect noise observed during the measurements.

Table 4 summarizes the measured noise levels. The daytime readings were taken between 2:00 p.m. and 4:00 p.m. and the overall sound levels (L_{eq}) ranged from 36.4 dBA to 57.4 dBA. The evening readings were taken from 5:30 p.m. to 7:30 p.m. and measured overall noise levels (L_{eq}) that ranged from 40.9 dBA to 58.2 dBA.

Table 4 – October Noise Measurement Readings (dBA)			
	L_{eq}	**L_{min}**	**L_{max}**
Noise Point 1 – Eastern property line along bluff			
Daytime	47.5	44.3	66.3
Evening	45.0	39.3	59.8
Noise Point 2 – Northern property line near Franny Reese			
Daytime	39.6	33.0	68.3
Evening	40.9	36.6	54.8
Noise Point 3 – Along Blue Point Rd.			
Daytime	51.6	42.8	66.8
Evening	52.2	45.4	70.7
Noise Point 4 – Western property line near NYS Route 9W			
Daytime	57.4	44.0	65.1
Evening	58.2	45.2	66.3
Noise Point 5 – Southern Property line			
Daytime	36.4	31.6	61.0
Evening	42.7	33.9	73.2

Comparison of Results

The daytime noise measurements produced a range of 57.3 dBA to 69.3 dBA in August and a range of 36.4 dBA to 57.4 dBA in October. The difference between the two lowest daytime noise measurements was 20.9 dBA whereas the difference between the two highest daytime measurements was 11.9 dBA.

The evening noise measurements produced a range of 58.3 dBA to 67.6 dBA in August and a range of 40.9 dBA to 58.2 dBA in October. The difference between the two lowest evening noise measurements was 17.4 dBA whereas the difference between the two highest evening measurements was 9.4 dBA.

The October noise measurements found significantly lower levels of noise. This is primarily a result of the lack of noise produced from the insects during the late summer season. These lower noise levels were found despite an observed increase in noise levels from surrounding roadways resulting from limited foliage on the trees.

6.0 CONCLUSION

As demonstrated by noise measurements taken onsite in October, the average sound level experienced within the project site during the daytime period ranges from 36.4 dBA to 57.4 dBA during normal conditions. The average sound level experienced within the project site during the evening period ranges from 40.9 dBA to 58.2 dBA. Based on guidelines accepted by USEPA and the NYSDEC, which set a goal that exterior noise levels not exceed 65 decibels in mixed land use areas, noise levels on the HVWV project site are currently within an acceptable range.