FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CATSKILL/DELAWARE UV FACILITY METHODOLOGIES

3.11. NOISE 1
3.11.1. Introduction 1
3.11.1.1. Noise Descriptors 2
3.11.1.2. Applicable Noise Standards and Criteria 2
3.11.1.3. New York City Environmental Quality Review Standards and Criteria 3
3.11.1.3.1. Town of Mount Pleasant Noise Ordinance 5
3.11.1.3.2. Town of Greenburgh Noise Ordinance 5
3.11.2. Baseline Conditions 5
3.11.2.1. Existing Conditions 5
3.11.2.1.1. Mobile Source Noise 5
3.11.2.1.2. Stationary Source Noise 5
3.11.2.2. Future Without the Project 5
3.11.2.2.1. Mobile Source Noise 5
3.11.2.2.2. Stationary Source Noise 5
3.11.3. Potential Impacts 5
3.11.3.1. Potential Project Impacts 5
3.11.3.1.1. Mobile Source Noise 5
3.11.3.1.2. Stationary Source Noise 5
3.11.3.2. Potential Construction Impacts 5
3.11.3.2.1. Construction-Related Mobile Source Noise 5
3.11.3.2.2. Construction-Related Stationary Source Noise 5
3.11.3.2.3. Vibration from Construction-Related Activities 5
3.11.4. Mitigation 5

TABLE 3.11-1. NOISE LEVELS OF COMMON SOURCES 1
TABLE 3.11-2. CEQR NOISE EXPOSURE GUIDELINES FOR USE IN NEW YORK CITY ENVIRONMENTAL IMPACT REVIEWS 4
TABLE 3.11-3. CEQR REQUIRED ATTENUATION VALUES TO ACHIEVE ACCEPTABLE INTERIOR NOISE LEVELS 5
TABLE 3.11-4. NOISE LIMITS FOR OPERATIONS IN TOWN OF MOUNT PLEASANT[1] (LEQ, DBA) 5
TABLE 3.11-5. NOISE LIMITS[1] FOR CONSTRUCTION ACTIVITY IN TOWN OF MOUNT PLEASANT[2] (L10, dBA) 5
TABLE 3.11-6. NOISE LIMITS FOR OPERATIONS IN TOWN OF GREENBURGH[1] (LEQ, DBA) 5
TABLE 3.11-7. PASSENGER CAR EQUIVALENCE (PCE) VALUES 5
TABLE 3.11-8. A-WEIGHTED SOUND PRESSURE LEVELS AND USAGE FACTORS FOR CONSTRUCTION EQUIPMENT (VALUES ARE IN DBA AT 50 FEET) 5

3.11. NOISE

3.11.1. Introduction

Noise can be generated by both stationary (i.e., fixed location) sources, such as mechanical equipment and construction equipment, and mobile (i.e., moving) sources, such as cars, airplanes, trucks, buses and construction-related vehicles. Both types of noise sources have been considered in this analysis. For the proposed UV Facility, stationary source noise levels during construction activity were analyzed for the entire duration of construction (i.e., April 2005 through September 2009), and stationary source noise levels from operation of the proposed facility were analyzed for 2010, the first full year of operation. Mobile source noise levels due to construction-related traffic were analyzed for the year 2006 (i.e., when the peak number of truck trips would be generated) and the year 2008 (i.e., when the overall peak number of vehicle trips would be generated, including both passenger vehicles and trucks). Mobile source noise levels from operation of the proposed facility were analyzed for 2010, the first full year of operation.

The potential impact of noise depends on the sound pressure levels and frequency content of the source sound emissions, the spatial relationship between the source of the noise and the sensitive receptors (i.e., people in their homes, schools, etc.), the time of day the noise source is in operation, and the existing noise levels at the sensitive receptors. The methodologies selected to measure and analyze the noise related to proposed facility considered all of these factors.

Noise levels are measured in logarithmic units called decibels (dB). An overall measurement of sound results in a single decibel value that describes the noise environment, taking all frequencies into account. The human ear, however, does not sense all frequencies in the same manner; it is more sensitive to middle and high frequency noise than it is to low frequency noise. Therefore, noise measurements are often adjusted or weighted to account for human perception and sensitivities. The "A"-weighted scale, expressed in units called dBA, is the most common weighting network used in environmental noise assessments because it closely approximates the human sensory response.

Under normal conditions, a change in noise level of 3 dBA is required for the average person to perceive a difference in noise levels. A decrease of 10 decibels appears to the listener to be a halving of noise levels, while an increase of 10 decibels appears to be a doubling of the noise. Typically, public reaction to noise levels is a function of location (urban, suburban, rural), time of day, fluctuation of noise levels, duration, and the individual judgment of the listener. A list of common noise sources and their associated sound levels is presented in Table 3.11-1.

TABLE 3.11-1. NOISE LEVELS OF COMMON SOURCES

SOUND SOURCE	Sound Pressure Level (SPL) DBA
Air Raid Siren at 50 Feet	120
Maximum Levels at Rock Concerts (Rear Seats)	110
On Platform by Passing Subway Train	100

TABLE 3.11-1. NOISE LEVELS OF COMMON SOURCES

SOUND SOURCE	Sound Pressure Level (SPL) DBA
On Platform by Passing Heavy Truck or Bus	90
On Sidewalk by Typical Highway	80
On Sidewalk by Passing Automobiles with Mufflers	70
Typical Urban Area	60-70
Typical Suburban Area	50-60
Quiet Suburban Area at Night	40-50
Typical Rural Area at Night	30-40
Isolated Broadcast Studio	20
Audiometric (Hearing Testing) Booth	10
Threshold of Hearing	0

Notes: A change in 3 dBA is a just noticeable change in SPL. A change in 10 dBA is perceived as a doubling or halving in SPL.
Source*:* *CEQR Technical Manual*, Table 3R-1

3.11.1.1. Noise Descriptors

In order to describe fluctuating noise over a specific period, statistical noise descriptors were used. The most commonly used noise descriptors are the L_{10} and L_{eq}. L_{10} is the sound pressure level (SPL) exceeded 10 percent of the measurement time period. L_{eq} is the equivalent steady-state noise level, which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the time period; it accounts for both the duration and the magnitude of a noise. L_{eq} is the recommended noise descriptor used for stationary source noise analysis. However, for the purposes of developing noise attenuation measures for mechanical equipment, the maximum instantaneous octave band SPL noise descriptor is used to evaluate the high, low and mid-range frequency tones emitted from the mechanical equipment. The octave band SPLs are unweighted sound measurements that are usually provided by the equipment manufacturer at octave band center frequencies (i.e., 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 hertz [Hz]) and expressed as a decibel. For the mobile source noise analysis, L_{eq} and L_{10} are used to measure ambient noise levels and to make noise impact determinations.

3.11.1.2. Applicable Noise Standards and Criteria

Noise levels associated with the construction and operation within New York City are subject to *City Environmental Quality Review (CEQR)* Standards and Criteria and to the New York City Noise Code. Since the project site is located outside of New York City, specific local standards may also be applicable, including those promulgated by the Town of Mount Pleasant and Town of Greenburgh. Both local and CEQR standards were examined, but the more stringent standard was applied in the impact assessment.

3.11.1.3. New York City Environmental Quality Review Standards and Criteria

The NYCDEP has established four categories of acceptability based on receptor type and land use. The categories include "generally acceptable," "marginally acceptable," "marginally unacceptable," and "clearly unacceptable." These category definitions are shown in Tables 3.11-2 and 3.11-3. For most sensitive receptors, acceptable daytime noise levels (L_{10}) are less than or equal to 65 dBA and nighttime noise levels are less than or equal to 55 dBA. In addition, under CEQR, a project-generated increase of 3 to 5 dBA (sliding scale) at a noise-sensitive location that is not temporary in nature is considered a significant adverse impact. During daytime hours, 65 dBA $L_{eq(1)}$ is the absolute ambient noise level for an hour that, if increased by 3 dBA, is anticipated to result in a significant adverse impact on sensitive receptors. If the ambient noise level is less than or equal to 60 dBA $L_{eq(1)}$, then a 5 dBA increase is used to define a significant adverse impact (at 61 dBA $L_{eq(1)}$, a 4 dBA increase is tolerated). During nighttime hours (10 PM to 7 AM), a 3 dBA increase defines a significant adverse impact regardless of the baseline ambient noise level.

TABLE 3.11-2. CEQR NOISE EXPOSURE GUIDELINES FOR USE IN NEW YORK CITY ENVIRONMENTAL IMPACT REVIEWS

Receptor Type	Time Period (1)	Acceptable General External Exposure	Airport(3) Exposure	Marginally Acceptable General External Exposure	Airport(3) Exposure	Marginally Unacceptable General External Exposure	Airport(3) Exposure	Clearly Unacceptable General External Exposure	Airport(3) Exposure
1. Outdoor area requiring serenity and quiet(2)		$L_{10} \leq 55$ dBA	$L_{dn} \leq 60$ dBA		60 dB(A) $< L_{dn} < 65$ dBA		(I) $65 < L_{dn} \leq 70$ dBA, (II) $70 \leq L_{dn}$		$L_{dn} \leq 75$ dBA
2. Hospital, nursing home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$dBA		$65 < L_{10} \leq 80$dBA		$L_{10} > 80$ dBA	
3. Residence, residential hotel or motel	7am – 10pm	$L_{10} \leq 65$dBA		$65 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$dBA	
	10pm – 7am	$L_{10} \leq 55$dBA		$55 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
4. School, museum, library, court, house of worship, transient hotel or motel, public meeting room auditorium out-patient public health facility		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)	
5. Commercial or Office		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)		Same as Residential Day (7am – 10pm)	
6. Industrial, public areas only (4)	Note 4	Note 4		Note 4		Note 4		Note 4	

Source: New York City Department of Environmental Protection (adopted by NYCDEP for use in CEQR-2001 – Table 3R-3).(In addition, any new activity shall not increase the ambient noise level by 3 dBA or more

Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by ANSI standards; all values are for the worst hour in the time period.

Tracts of land where serenity and quiet are extraordinarily important and serve an important public need, and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and old-age homes.

One may use the FAA-approved Ldn contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.

External noise exposure standards for industrial areas of sound produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Section 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).

TABLE 3.11-3. CEQR REQUIRED ATTENUATION VALUES TO ACHIEVE ACCEPTABLE INTERIOR NOISE LEVELS

Noise Category	Marginally Acceptable	Marginally Unacceptable		Cleary Unacceptable		
Noise Level With Proposed Action	$65 < L_{10} \leq 70$	$70 < L_{10} \leq 75$	$75 < L_{10} \leq 80$	$80 < L_{10} \leq 85$	$85 < L_{10} \leq 90$	$90 < L_{10} \leq 95$
Attenuation	25 dB(A)	(I) 30 dB(A)	(II) 35 dB(A)	(I) 40 dB(A)	(II) 45 dB(A)	(III) 50 dB(A)

Source: *CEQR Technical Manual*, Table 3R-4.

3.11.1.3.1. Town of Mount Pleasant Noise Ordinance

Table 3.11-4 presents limitations to noise levels from operations as presented in the Code of the Town of Mount Pleasant. The ordinance states that no device shall operate that produces a sound level exceeding the limitations stated below. As opposed to the CEQR incremental threshold, Mount Pleasant's noise level limits are absolute values that limit the amount of noise that the proposed facility may generate. In addition to the 3 to 5 dBA impact threshold established under CEQR, the future operations-induced noise levels were compared to these sound level limits. The north parcel of the Eastview Site lies within the "Public Utility/Office Building" (OB-2) zoning district. Receptors surrounding the site are in areas zoned as residential (R-20 and R-40). As prescribed in the Town of Mount Pleasant Code, noise levels within any residentially-zoned district shall not exceed the noise levels resulting from operations presented below.

TABLE 3.11-4. NOISE LIMITS FOR OPERATIONS IN TOWN OF MOUNT PLEASANT[1] (LEQ, DBA)

Daytime (8:00 AM – 6:00 PM)		Nighttime (6:00 PM – 8:00 AM)	
Residential	**Commercial**	**Residential**	**Commercial**
65	65	55	65

Notes:
[1]Source: Code of the Town of Mount Pleasant, New York, Part II, Chapter 139 (Noise), Article IV.

As stated in the Code of the Town of Mount Pleasant, noise levels from a construction site shall not exceed the noise limits presented in Table 3.11-5. In addition, the Town of Mount Pleasant prohibits construction activity between the hours of 9:00 PM and 7:00 AM.

TABLE 3.11-5. NOISE LIMITS[1] FOR CONSTRUCTION ACTIVITY IN TOWN OF MOUNT PLEASANT[2] (L10, DBA)

Daytime (8:00 AM – 6:00 PM)		Nighttime (6:00 PM – 8:00 AM)	
Residential Zones	Commercial Zones	Residential Zones	Commercial Zones
70	75	55	80

Notes:
[1]Noise levels as measured from 400 feet from construction site.
[2]Source: Code of the Town of Mount Pleasant, New York, Part II, Chapter 139 (Noise), Article IV

3.11.1.3.2. Town of Greenburgh Noise Ordinance

As stated in the Code of the Town of Greenburgh, any "unreasonably intrusive noise" (defined as any sound which would annoy, disturb or irritate a reasonable person of normal sensitivities under the same circumstances) shall not exceed the noise limits presented in Table 3.11-6. (The south parcel of the Eastview Site lies within a residential zone.) In addition, the Code prohibits construction work (including the operation of mechanical machinery or equipment, blasting, grading, leveling, and excavating) between 8:00 PM and 7:00 AM Monday through Friday; before 9:00 AM or after 6:00 PM Saturday; and between 12:01 AM and 11:59 PM on any Sunday or recognized holiday.

TABLE 3.11-6. NOISE LIMITS FOR OPERATIONS IN TOWN OF GREENBURGH[1] (LEQ, DBA)

Residential Zone (Daytime and Nighttime)	Other Zoning Districts		
	8:00 pm – 8:00 am (Sunday – Saturday)	5:00 pm Saturday – 10:00 am Sunday	12:01 am and 11:59 pm on Holidays
65	70	65	65

[1]Source: Code of the Town of Greenburgh, New York, Volume 12, Chapter 380 (Noise).

3.11.2. Baseline Conditions

3.11.2.1. Existing Conditions

3.11.2.1.1. Mobile Source Noise

Included as part of the traffic and transportation analyses, major thoroughfares in the vicinity of the project site were identified. Major thoroughfares are those major roads (such as expressways, parkways, and major regional routes) that already experience large volumes of traffic and that are anticipated to provide the primary vehicular access to the project site. The proposed transportation routes are the local roadways that connect the major thoroughfares to the project site. It is the proposed facility transportation routes that were considered in the noise analysis.

Noise-sensitive receptor locations for monitoring and analysis were selected based on the existing land uses adjacent to the roadways anticipated to experience an increase in traffic volume as a result of the proposed facility. Land uses considered sensitive to noise included residences, schools and parks (daytime only), churches, and hospitals. Route segments that did not contain sensitive receptors along them were not considered for further noise analysis.

The passenger car equivalence (PCE) concept, as outlined in the *CEQR Technical Manual,* was used to compare the existing baseline traffic with the future traffic anticipated as a result of the proposed facility. Based on this comparative analysis, a listing of route segments whose PCE values doubled or more as a result of the proposed facility was compiled and recommended for more detailed analyses. All other route segments were screened out because the incremental change in noise level would be less than 3 dBA. Vehicle classification information compiled during the traffic study for the proposed facility was converted to PCEs using the standards established in the *CEQR Technical Manual* and as shown in Table 3.11-7. For example, the introduction of one medium size truck is the equivalent of introducing thirteen passenger cars.

TABLE 3.11-7. PASSENGER CAR EQUIVALENCE (PCE) VALUES

Vehicle Type	PCE
Each Automobile or Light truck	1 PCE
Each Medium Truck	13 PCE
Each Bus	18 PCE
Each Heavy Truck	47 PCE

Following a determination that a particular route segment required a detailed analysis to determine if an impact would occur (on the basis of the PCE concept described above), existing mobile source noise levels were determined for that location. Field measurements were conducted during those hours that required a detailed analysis. A 20-minute measurement was taken at a representative receptor location for each noise study route segment that required a detailed analysis. To be conservative, the receptor closest to the roadway along each noise study route segment was selected as the representative receptor location. Noise measurements were taken in front of the selected representative location at each noise study route segment in accordance with the noise monitoring protocols outlined in the *CEQR Technical Manual* and other applicable local regulations. Traffic data were collected simultaneously with the noise measurements. Traffic volume, vehicle classification, roadway geometry, and data collection time and duration were recorded.

The instrumentation used for the 20-minute measurements of mobile source noise was a Brüel & KjFr Type 4176 ½-inch microphone connected to a Larson Davis Laboratories (LDL) preamplifier attached to an LDL Model 700 Type 1 (according to ANSI Standard S1.4-1983) sound level meter. This assembly was mounted at a height of 5 feet above the ground surface on a tripod and at least 6 feet away from any large sound-reflecting surface to avoid major interference with sound propagation. The meter was calibrated before and after readings with a Brüel & KjFr Type 4231 sound-level calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA) using the "slow" meter response. The data were digitally recorded by the sound level meter and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. A windscreen was used during all sound measurements except for calibration. Only traffic related noise was measured; noise from other sources (e.g., emergency sirens, aircraft flyovers, etc.) was excluded from the measured noise levels, such that the monitoring instrument was paused to exclude the extraneous noise. In cases where it was not feasible to pause the instrument, the field notes stated the fact and the measurement was retaken. Weather conditions were noted to ensure a true reading. Recommended meteorological conditions (as specified by the manufacturer) were:

- Wind speed under 12 mph
- Relative humidity under 90 percent
- Temperature above 14°F and below 122°F
- No precipitation

Each of the route segments requiring further analysis were modeled using the Federal Highway Administration (FHWA) approved Traffic Noise Model Version 2.1 (TNM). TNM uses traffic volumes, speed, and roadway alignment and geometry to predict the noise levels for designated monitoring locations. Route segments requiring detailed analysis using TNM were field measured, as described above, using the noise analyzer in order to verify that a good correlation existed between field-measured and the model-predicted existing noise levels. Noise measurements collected at the monitoring locations were compared with modeled results in order to verify that the two values were within 3 dBA of each other.

For each route segment, field observations were conducted to verify that vehicular traffic was the dominant noise source. Varying traffic volumes, therefore, dictated noisiest and quietest periods at each receptor, i.e., traffic peak times correspond with the noisiest periods, and lowest traffic-volume periods correspond to quietest periods.

3.11.2.1.2. Stationary Source Noise

Stationary sources of noise include construction activities at the project site and operations at the proposed facility. Potential noise sources included construction equipment and machinery associated with industrial and manufacturing operations, and heating, ventilating, and air-conditioning systems. A monitoring program was conducted to identify and determine the existing ambient conditions at the various sites. Baseline monitoring was performed for 10 to 24 hours at the northern and southern property boundaries closest to the nearest noise-sensitive receptor identified at the Eastview Site. Monitoring durations corresponded to future construction hours and times of operations of the local receptors at each site.

Following baseline measurements, 20-minute measurements were taken at sensitive receptors proximate to the Eastview Site and associated off-site work locations near the Taconic State Parkway and Kensico Reservoir. Measurements were taken during the quietest and noisiest time periods as determined by the baseline monitoring.

Noise from adjacent stationary sources was included as part of the ambient background noise levels, but monitoring locations were chosen to minimize the contribution from adjacent roadways.

3.11.2.2. Future Without the Project

3.11.2.2.1. Mobile Source Noise

Future baseline noise levels for the Future Without the Project year were predicted using TNM for those mobile source receptors that required further analyses. The year 2010 was used for operations analysis at the Eastview Site and associated off-site work locations. The year 2006 was used for peak construction analysis. However, although the peak construction-related traffic year was 2008 for the Eastview Site, the 2008 traffic noise values were used to obtain a combined worse case effect in 2006. The peak construction year at the off-site facilities would be 2006.

For those route segments that were analyzed in greater detail, future noise levels were predicted at each of the mobile source sensitive receptor sites using TNM. The total traffic volume and vehicle mix for route segments being analyzed for the Future Without the Project year was predicted by adding a growth factor plus the incremental change from soft sites (if applicable) to the existing traffic data collected during the traffic count program. The growth factor was established by entering traffic data for the future condition into TNM in order to predict a future baseline noise level. The incremental change between the TNM-calculated Existing Condition and the TNM-calculated Future Without the Project then was established. This incremental change then was added to the measured Existing Condition noise value already established during existing conditions analyzed in order to predict a Future Without the Project value. The predicted and TNM-calculated Future Without the Project values were compared to each other to establish that a good correlation existed between TNM and actual measurements.

3.11.2.2.2. Stationary Source Noise

Future conditions without the project were predicted based upon the anticipated changes in land use. Changes in land use could be triggered by new projects that may be completed on the Eastview Site or in the study area in the absence of the proposed facility, as specified in the analysis of Land Use, Zoning and Public Policy. If new projects were anticipated, the estimated future noise levels at any receptor site due to proposed changes were either added to or subtracted from the existing measurements using the following formula:

Future Noise Levels (FNL) = $10 \text{ Log } (10^{\text{Existing noise level}/10} + 10^{\text{Noise level of changes}/10})$

3.11.3. Potential Impacts

3.11.3.1. Potential Project Impacts

Potential noise impacts from future operations of the UV Facility at the Eastview Site and associated off-site work locations were analyzed. Additional noise contributions from off-site facilities following construction activities were not anticipated.

3.11.3.1.1. Mobile Source Noise

Future mobile source noise levels associated with the proposed facility were predicted using the same methodology as for the Future Without the Project analysis, except that project-induced traffic noise for the build year was added to the noise level established for Future Without the Project. The resultant levels were compared to CEQR thresholds in addition to relevant local, county, and state standards, if applicable.

3.11.3.1.2. Stationary Source Noise

Noise levels due to the operation of the proposed UV Facility were estimated. Mechanical equipment anticipated to be major sources of noise at the proposed facility was identified. The manufacturer's noise specifications for the equipment were obtained and a plan of the proposed facility's layout was used to develop an accurate representation of where the various pieces of equipment would be situated. Projected noise levels at noise-sensitive receptors were then calculated using a logarithmic noise equation that accounts for barrier and distance attenuation. The equation is presented below. These calculated noise levels were compared to applicable noise ordinances and criteria.

$L_{eq} = E.L. - 20\log(D_1/D_2) - A_e$, where:

L_{eq}	=	average noise level at a noise sensitive receptor due to a single equipment unit throughout the day
E.L.	=	equipment noise level at a reference distance of D_2
D_1	=	distance from the receptor to the unit of equipment
D_2	=	distance at which equipment noise level data is known (reference distance)
A_e	=	attenuation factors. Attenuation factors considered in this analysis were attenuation due to physical barriers ($A_{barrier}$), usually from the interior and exterior walls of the UV Facility.

Once the average noise level for each individual unit of equipment was computed, the contribution of all the equipment on site was summed to provide a total noise level at each noise sensitive receptor.

The above analysis considered three operating conditions which are as follows: normal weekday operating conditions; weekday testing maintenance conditions, and; normal weekend operating conditions. Emergency generators are requisite to maintaining and restoring public utilities during an emergency situation, and are usually limited in operational duration. Their use during an emergency, therefore, is generally exempt from most noise regulations. However, the testing of this equipment, although infrequent, is not exempt. The noise levels of the equipment during testing were estimated using point source extrapolation. The UV Facility would have four emergency diesel generators, each rated 1500 kW, 480 volts, and each generator would be exercised for four hours per month. In the event of a power failure, all four generators would be running simultaneously until power is restored. Acoustical absorptive material and silencers are included in the design of the enclosure and openings.

3.11.3.2. Potential Construction Impacts

Noise impacts during the construction phase include contributions from construction equipment and construction-related vehicles. Noise impacts at sensitive receptor locations were evaluated for the appropriate peak construction year and based upon the type and quantity of construction equipment utilized, as well as distance from the construction site to the sensitive receptor. The Eastview Site, as well as each of the associated off-site work locations, was analyzed for potential impacts from mobile and stationary construction noise.

3.11.3.2.1. Construction-Related Mobile Source Noise

Construction-related noise levels for vehicles approaching and leaving the site was determined utilizing the methodology employed for determining mobile source noise impacts during facility operation. Future noise levels were modeled to identify potential construction impacts using TNM. The modeling with TNM was conducted using the same methodology as that used for the Future With the Project impact analyses during operation of the UV Facility.

The peak construction-related years for noise from mobile sources were those periods with the highest volume of project-generated truck traffic. The peak year is anticipated to be 2008 for the Eastview Site; however, the 2008 projected mobile related noise was combined with the stationary peak year of 2006, and analyzed as a 2006 worse case scenario.

Construction activity at the off-site facilities was examined for the Kensico Reservoir work sites in 2006, when fill would be trucked from the Eastview Site to Kensico Reservoir to fill the Delaware aerator.

Construction activities at the Eastview Site were anticipated to be limited to weekdays between 7:00 AM to 4:00 PM. This analysis determined the highest predicted overall noise levels that would occur during construction of the proposed facility. Because of the potential increased perception of noise impacts when background noise is low, an additional screening level analysis was performed to account for off-peak hours during the weekday. This analysis preliminarily identified the greatest incremental change in noise levels that would occur during construction. The existing traffic volumes were lower during these off-peak hours than the peak hours studied, thus resulting in lower baseline noise levels. For lower baseline sound levels, the same traffic volume increase would cause a greater incremental noise level increase. This method compares the predicted incremental construction traffic to the existing traffic values using PCEs.

3.11.3.2.2. Construction-Related Stationary Source Noise

The future noise levels associated with on-site construction activities were assessed using a logarithmic noise equation designed to calculate noise levels generated by construction equipment and activities at construction sites. The equation uses equipment noise levels and "usage factors" to calculate average noise levels for each month of construction, using the following equation:

L_{eq} = E.L. + 10log(U.F.) - 20log(D/50) -10(G)log(D/50)- A_e, where:

L_{eq} = average noise level at a noise sensitive receptor due to a single equipment unit throughout the day

E.L. = equipment noise level at a reference distance (D_2)

G = a constant accounting for topography and ground effects

D_1 = distance from the receiver to the unit of equipment

D_2 = distance at which equipment noise level data is known (reference distance)

U.F. = a usage factor that accounts for the fraction of time that a piece equipment is in use throughout the day.

A_e = attenuation factors. Attenuation factors considered in this analysis were attenuation due to ground effects (A_{env}) and attenuation due to physical barriers ($A_{barrier}$).

Once the average noise level for the individual unit of equipment was computed, the contribution of all the equipment on site was summed to provide a total noise level at the noise-sensitive receptor.

A-weighted sound pressure levels and usage factors for the different equipment used in the construction phases are summarized in Table 3.11-8.

TABLE 3.11-8. A-WEIGHTED SOUND PRESSURE LEVELS AND USAGE FACTORS FOR CONSTRUCTION EQUIPMENT (VALUES ARE IN DBA AT 50 FEET)

Equipment Type	Equipment Noise Level (dBA)	Reference Distance (feet)	Usage Factor				
			Clearing	Excavation	Foundation	Erection	Finishing
Grader	85	50	0.08				0.02
Crane 50-Ton Hydraulic	83	50	[3]			0.16	0.04
Wood Chipper[2]	93	50	0.08				
Backhoe	85	50	0.04	0.16			0.04
Loader	84	50	0.16	0.4			0.16
Dump Truck	80	50	0.16	0.4			0.16
Pick-up Truck	75	50	0.16	0.4			0.16
Air Compressor- 600C	81	50		1.0	0.4	0.4	0.4
Rock Drill	98	50		0.04			0.005
Rock Crusher[2]	93	50		0.04			0.005
Tree Shear[2]	78	50	0.08				
Tree Hauler[2]	91	50	0.16	0.16			0.16
Hydraulic Excavator	80	50	0.04	0.16			0.04
Scaper	88	50	0.14				0.08
Large Dozer[2]	85	50	0.04	0.16			0.04

TABLE 3.11-8. A-WEIGHTED SOUND PRESSURE LEVELS AND USAGE FACTORS FOR CONSTRUCTION EQUIPMENT (VALUES ARE IN DBA AT 50 FEET)

Equipment Type	Equipment Noise Level (dBA)	Reference Distance (feet)	Usage Factor				
			Clearing	Excavation	Foundation	Erection	Finishing
Medium Dozer	80	50	0.04	0.16			0.04
Small Dozer	80	50	0.04	0.16			0.04
Boom Cranes[2]	83	50				0.08	0.04

Sources:

[1] Bolt, Beranek, and Newman, Inc. December 1971. Noise from Construction Equipment and Operations, Buildings Equipment and Home Appliances.

[2] No usage factors available. Usage factors from similar equipment were applied (e.g., wood chipper, rock crusher).

[3] Blanks indicate no or very rare usage.

[4] Bolt, Beranek, and Newman, Inc. December 1971. Noise from Construction Equipment and Operations, Buildings Equipment and Home Appliances with attenuation for exhaust mufflers applied.

[5] Off Road Truck = Dump Truck

[6] Utility Vehicle = Pickup Truck

Because of the size of the Eastview Site, the exact location of the various equipment units at any time in the future would vary. A random number generator was utilized to approximate the variable location of construction equipment throughout the areas of the site and over the course of the construction period. This methodology placed construction equipment in a random fashion for each month throughout the construction area. Noise levels then were calculated for each receptor for each month of construction.

Noise levels were calculated at a distance of 400 ft. from the construction boundary limits for comparison to the Town of Mount Pleasant noise ordinance. Based on the 10 to 24 hour baseline noise monitoring, existing levels were assumed to remain steady throughout a typical day. Existing noise levels at the north, south, east and west construction site boundary limits were assumed similar to the existing noise levels measured at the nearest north, south or east receptor. At the west construction boundary limit, existing noise levels were assumed similar to noise levels monitored at the north receptor (EV-S1). Since existing noise levels do not fluctuate greatly, locations where 10 to 24 hour noise monitoring was not conducted, the 2:00 PM – 4:00 PM baseline existing noise level data was represented for typical existing noise levels expected during the 7:00 AM – 8:00 AM time period.

The total noise level for construction (both stationary and mobile sources) were identified and compared to Future Without the Project conditions. Because construction activities at the off-site facilities are anticipated to be steady state, such that the noise levels would not vary considerably month to month during the construction activities, noise levels experienced at sensitive receptors were calculated for a single representative month.

3.11.3.2.3. Vibration from Construction-Related Activities

Due to the magnitude of the proposed facility, it is possible that excavation activities may cause vibrations. Excessive vibration is defined as the generation of vibrations of such intensity, duration, frequency or character which annoy, disturb, or cause or tend to cause adverse psychological or physiological effects on persons, or damage or tend to damage personal or real property. Although tunnel-boring machines have been used on a number of projects within the City of New York and vibration has seldom caused any impacts during these operations, any potential impacts on people or property due to vibration would be addressed for the proposed facility. The impact of the vibrations would be reduced to levels permitted by applicable local regulations and codes.

Vibrations could occur due to rock blasting activities and from tunnel-boring machines (TBMs). These activities may occur on the Eastview Site and associated off-site work locations as part of the Catskill Aqueduct pressurization work. The main factors in rock blasting that affect vibration levels are charge weight and distance from blast area to sensitive receptor. Whereas distance cannot be altered, the charge weight may effectively be controlled through the use of delays. Delays divide a charge into many smaller individual blasts, thereby reducing charge weight and consequently associated vibrations.

Vibrations from advancing TBMs may affect sensitive electronic equipment. The tunneling subcontractor would perform a study during the engineering phase of the project that would determine effects of TBMs on sensitive equipment and effective methods to mitigate vibration.

The tunneling subcontractor would develop a vibration monitoring program during the engineering phase of the project. Prior to any boring activities, the location of the bore path would be reviewed to identify any businesses, hospitals, residences, or other facilities located in the vicinity of the planned boring.

Once excavation activities have commenced, facilities identified as sensitive receptors would be notified ahead of blasting activities. Monitoring would be conducted by a specialty contractor adjacent to the receptor during boring activities. All complaints received would be investigated thoroughly.

3.11.4. Mitigation

Mitigation measures were investigated for potential impacts caused by operation and construction noise. The feasibility of each mitigation measure was considered and identified. The effects of mitigation measures, such as portable or fixed-location noise barriers, were estimated. Specific mitigation measures are discussed in the "Mitigation" section for each site.