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Using the Federal Highway Administration Roadway Construction Noise Model for the Jerome Park Reservoir construction project

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ABSTRACT

The new Jerome Park Reservoir in the Bronx, NY, is a critical water supply source for the residents and businesses of New York City. This paper will describe the noise modeling work done in support of the project as well as an odd bug found in the FHWA's RCNM model. Noise associated with the various construction phases and equipment for the project was analyzed to evaluate the potential loudest hour during each month of work for the project's 50-month duration. Noise analyses were performed for expected weekday work conditions and Saturday work conditions at several receptor locations surrounding the reservoir using the FHWA's Roadway Construction Noise Model (RCNM), Version 1.0. During the analysis an error was found with the output function of RCNM when exporting results for multiple receptors into CSV and TXT output files. The total Leq and Lmax levels were being reported as zeros even though the correct total noise levels were displayed on screen. This error was submitted to FHWA for review, and as a result, RCNM Version 1.1 was soon released addressing the problem. More importantly, the project was performed to the client's satisfaction and has allowed the necessary construction work to proceed.

1. INTRODUCTION

A construction noise analysis was performed on the proposed modification plans for the Croton Water Treatment Plant (CWTP) Jerome Park Reservoir project in the Bronx, NY. Noise associated with the construction phases and equipment was analyzed in accordance with the New York City Environmental Quality Review (CEQR) noise guidelines. The potential affects of blasting noise were also evaluated in accordance with the Occupational Safety and Health Administration (OSHA) hearing conservation guidelines and other criteria intended to avoid window breakage.

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Ambient noise levels were measured at several monitoring locations to establish baseline conditions above which noise impacts would be defined as occurring in accordance with CEQR guidelines. Potential noise impacts were evaluated at several receptor locations using the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) for point sources.

For the period of the project's 50-month duration, potential worst-case noise conditions were analyzed to evaluate the potential loudest hour during each month of work. Noise analyses were performed for expected weekday work conditions as well as for Saturday conditions.

During the construction noise analysis a bug was identified with the output function of RCNM Version 1.0. The total Leq and Lmax levels were being reported as zeros on the output CSV and TXT files even though the correct total noise levels were displayed on the input screen of RCNM Version 1.0. This error was submitted to FHWA for review, and as a result, RCNM Version 1.1 was soon released addressing the problem.

2. AMBIENT NOISE LEVELS

Ambient noise levels were measured at three receptor locations in order to evaluate noise from on-site construction activities at various locations surrounding the reservoir. Each receptor represented larger areas of similarly affected community land-use. A summary of the receptor locations are listed in Table 1 and shown in Figure 1.

For monitoring site JPR-S1, closest to Gate House 5 (GH5), weekday and Saturday noise data were taken from the semi-permanent noise monitor operated by Wang Engineering. During the weekday time periods there was little or no construction activities occurring at the Shaft & Meter Chamber site. For the monitoring sites JPR-S2 and JPR-S6, closest to Gate House 3 (GH3) and Gate House 6 (GH6), two Larson Davis Model 720 Environmental Noise Monitors were deployed by PB. Noise from on-going work at the Shaft & Meter Chamber could not be heard at the monitoring locations at Gate Houses 3 or 6 so the data could be considered representative of ambient noise conditions without the influence of construction activities.

The resulting ambient noise levels at the three monitoring locations, JPR-S1, JPR-S2 and JPR-S6, expressed as hourly A-weighted Leq levels averaged over a nominal 24-hour period, are summarized in Table 2 and are shown in Figures 2 and 3 for weekday and Saturday conditions, respectively. The results from the ambient noise levels were used to determine applicable construction noise limits at receptor locations in accordance with the CEQR noise guidelines, which are also shown in Table 2.

3. CEQR NOISE CRITERIA

The relevant criteria to evaluate noise at receptor locations from on-site construction equipment came from the *New York City Environmental Quality Review (CEQR) Manual*, Chapter 3R, Sections 335, 410 and 423. The construction noise criteria allowed for an increase of 3, 4 or 5 decibels above the existing noise conditions depending on the measured ambient hourly Leq noise levels at each receptor.

In addition, it was the client's preference to logarithmically add the predicted project-generated construction noise levels together with the existing measured noise levels in order to determine total noise at each receptor location. Per client preferences, the total noise is then considered when applying the CEQR criteria rather than just the noise contribution from the construction work itself.

In brief summary, the CEQR construction noise guidelines state that during the daytime hours of 7 AM to 10 PM, if the existing ambient noise level is 60 dBA Leq(h) or less, a 5 dBA or greater change would be considered to be an exceedance. If the ambient noise level is 61 dBA

Leq(h), the maximum incremental increase would be 4 dBA. If the ambient noise level is 62 dBA Leq(h) or more, a 3 dBA or greater change would be considered to be an exceedance. During the night hours of 10 PM to 7 AM, a change of 3 dBA would be considered to be an exceedance regardless of the ambient level.

4. ON-SITE CONSTRUCTION NOISE

The on-site construction work was expected to take place in fixed locations with the majority of the work concentrated in the Shaft & Meter Chamber site on the east side of the reservoir along Goulden Avenue. Several work zones were indentified at the Shaft & Meter Chamber, inside and near Gate Houses 2, 3, 5, 6 and 7 at the new South Basin Ramp area, and along Goulden Avenue and Sedgwick Avenue.

The construction equipment expected at these work zones included typical heavy equipment such as hydraulic impact pile drivers, hoe rams, rock drills, jackhammers, auger drills, excavators, front-end loaders, cranes, backhoes, chipping guns, concrete mixer trucks, concrete pumps, dump trucks, delivery trucks, and air compressors. At the Shaft & Meter Chamber site for the new South Basin Access Ramp some blasting below ground for excavation and yard piping was expected as part as the construction operations.

Construction work was scheduled to be finish by August 2012. Work shifts were expected during the weekdays and occasionally on Saturdays. Eight-hour daytime work shifts would typically occur from 7 AM to 3 PM. Work during nighttime hours was not anticipated.

5. RCNM MODELING RESULTS

The noise model selected for use in this project to evaluate noise from on-site construction equipment was the FHWA-approved Roadway Noise Construction Noise Model (RCNM). The RCNM model assumes that all construction equipment are operating simultaneously and does not account for excess ground attenuation or atmospheric absorption, so the resulting predicted noise levels are conservatively estimated.

Attenuation factors of 10 to 15 decibels were used in the noise model for any construction work to be performed behind a required 20 foot tall noise barrier, made out of double-stacked Conex container boxes with a jersey barrier placed along the top, located along the perimeter of the Shaft & Meter Chamber. To substantiate this assumption, the insertion loss (IL) of the noise barrier was measured while a caisson drill was being operated. The noise measurement results indicated an insertion loss of 14.5 decibels. In addition, attenuation factors of up to 20 decibels were assumed in the noise model for the work tasks scheduled to occur inside (i.e. enclosed within) the various Gate Houses.

The results of the on-site construction noise analysis using the RCNM model for the three receptor locations: JPR-S1, JPR-S2 and JPR-S3, for both weekday and Saturday time periods are summarized in Table 3. The reported results show the range of predicted worst-case Leq(h) noise levels in any given month over the project's 50-month duration assuming all equipment to be operating simultaneously during all phases of work. Per client preferences, these predicted exceedances are for the worst-case loudest hour of each month. Noise conditions during the majority of each month will be significantly quieter than the levels reported in this study.

5.1 Weekday Results at Site JPR-S1

The results for worst-case weekday noise levels at receptor JPR-S1 are expected to range from 49 to 73 dBA Leq(h) during the project's 50-month duration, as shown in Figure 4. The results indicate general compliance with the CEQR construction noise guidelines, noise limit of 65 dBA Leq(h), for the weekdays, except under worst-case loudest hour conditions during seven months out of the 50-month project duration. During the months of February 2009 and March 2009 noise

levels are expected to barely exceed the CEQR noise limit at receptor JPR-S1. The moderately exceedances of 7 to 8 decibels during the months of August 2010 and September 2010 are due to work associated with street piping at the Shaft & Meter Chamber in Goulden Avenue, and the use of three jackhammers at the same time. The minor exceedances of 3 to 4 decibels during the months of May 2012, June 2012 and July 2012 are due to work associated with removal of the chlorine/corrosion equipment and acid tanks at Gate House 5.

Noise control measures to consider would include using fewer jackhammers at one time, using quieter-type jackhammers with highly effective exhaust mufflers, using electric jackhammers, placing portable noise enclosures around each jackhammer operator, positioning the noisy equipment behind the Gate House building, or schedule all the work during the summer months when the Bronx Science High School, will not be in use. Depending on the combination of these reduction measures, overall noise levels could be attenuated by 5 to 10 decibels at this receptor location.

5.2 Weekday Results at Site JPR-S2

For receptor location JPR-S2, the results for worst-case weekday noise levels at receptor are expected to range from 43 to 65 dBA Leq(h) during the project's 50-month duration, as shown in Figure 5. The noise levels results for weekday timeframes are expected to comply with the CEQR construction noise guidelines, noise limit of 67 dBA Leq(h), during the entire project.

5.3 Weekday Results at Site JPR-S6

For receptor location JPR-S6, the results for worst-case loudest weekday noise levels are expected to range from 37 to 79 dBA Leq(h) during the project's 50-month duration, as shown in Figure 6. The results indicate moderate exceedances of the CEQR noise limit of 67 dBA Leq(h) by approximately 9 decibels at receptor JPR-S6 during the months of May 2009, June 2009 and July 2009 due to work associated with the demolition of the micro-strainer building near Gate House 6 and the use of three jackhammers simultaneously. Noise control measures to consider would include using fewer jackhammers at once, using quieter-type jackhammers with effective exhaust mufflers, using electric jackhammers or placing portable noise enclosures around each jackhammer operator. Depending on the combination of these reduction measures, overall noise levels could be attenuated by 5 to 10 decibels at this receptor location.

The exceedance of approximately 12 decibels at receptor JPR-S6 during the month of May 2011 will be primarily due to work associated with soil excavation of the South Basin Access Ramp using an impact pile driver. Noise control measures to consider for a pile driver would include the use of a hydraulic pile-pusher, pre-augering the piles, or using an alternative earth retention method such as drilled caissons or slurry walls. These measures can reduce pile driving noise by 10 decibels if implemented properly.

Additionally, work at receptor JPR-S6 will include the use of two hoe rams during the rock excavation of the South Basin Access Ramp. Hoe ram noise levels could be reduced by 5 to 10 decibels using a combination of reduction measures such as using smaller hoe ram, covering the hoe ram chisel with a noise shroud, or using a chemical expansion as an alternative quieter method. The exceedance of approximately 7 decibels at receptor JPR-S6 during the month of June 2011 is due to work associated with rock excavation of the South Basin Access Ramp. Two scenarios were evaluated for this task, the first involving blasting and the second using traditional mechanical methods. Both scenarios are expected to cause noise levels that exceed the CEQR noise limit of 67 dBA Leq(h) for this receptor. In both cases the dominant noise source is expected to be the hoe ram(s). The use of a single hoe ram is expected under the blasting scenario, the quieter of the two options, whereas two hoe rams are expected for use under the mechanical method.

5.4 Saturday Results at Sites JPR-S1, JPR-S2 and JPR-S6

The results for Saturday timeframes indicate complete compliance with applicable CEQR noise criteria limits under worst-case potential conditions at all receptor locations. The predicted monthly loudest hour noise condition at receptor locations JPR-S1, JPR-S2 and JPR-S6 are shown in Figures 7, 8 and 9.

6. BLASTING NOISE

The noise contributions associated with blasting for excavation at the Shaft & Meter Chamber for Yard Piping, and for excavation of the South Basin Ramp, were evaluated at the three receptor locations: JPR-S1, JPR-S2 and JPR-S6. The RCNM model establishes an emission level of 94 dBA Lmax slow at a reference distance of 50 feet for modeling blast noise. Additional noise criteria were considered in this study to evaluate the effects of the blast noise on people and properties.

The Occupational Safety and Health Administration has promulgated regulations in 29 CFR Part 1910.95 which limits noise exposure for laborers not to exceed 115 dBA Lmax slow or 140 dB Peak for hearing conservation purposes. The US Bureau of Mines, the US Army, and other industrial standards suggest that overpressures from explosions should not exceed 136 to 154 dB Peak (or an average of 145 dB Peak) in order to avoid breaking nearby windows. At all three receptor locations, the noise contributions associated with the blast is expected to comply with the selected criteria limits for both hearing damage as well as window breakage as shown in Table 4.

7. OUTPUT FUNCTION BUG FOUND IN RCNM

Noise analyses were performed for expected weekday work conditions and Saturday work conditions for several receptor locations surrounding the reservoir using the FHWA's Roadway Construction Noise Model (RCNM), Version 1.0.

During the construction noise analysis the RCNM result files for each scenario analyzed were exported as CSV and TXT output files using the output function of RCNM. A reviewed of the output files indicated that the total Leq and Lmax levels were being reported as zeros on the CSV and TXT output tables even though the correct total noise levels were displayed on the input screen of RCNM.

This error was submitted to FHWA for review, and as a result, RCNM Version 1.1 was soon released addressing the problem. Table 5 shows an example of a CSV export file from one of the scenarios, rock excavation – blasting method, which illustrates the bug. It can be observed in Table 5 that the CSV output file of RCNM Version 1.0 reported the row showing the total Lmax and Leq levels as zeros, obviously indicting a problem. After FHWA corrected the bug, the same configuration file was re-run using the newly available RCNM Version 1.1. It can be observed in Table 6 that the updated CSV output file now reports the correct values for total Lmax and Leq levels.

Table 1. Noise Receptor Description

Site	Receptor Description	Location	Side of Reservoir	Closest Gate House
JPR-S1	Bronx Science High School	75 W 205th Street (Goulden Avenue)	Eastern side	Gate House 5
JPR-S2	Residences on Sedgwick Ave	Sedgwick Avenue	Western side	Gate House 3
JPR-S6	Schools and residences along Goulden Ave and Reservoir Ave	Goulden Avenue	Southern side	Gate House 6

Table 2. Receptor City Environmental Quality Review Construction Noise Criteria Limits

Site	Receptor Description	Average Background Leq Noise Level	CEQR Leq(h) Noise Criteria Limit
JPR-S1	Bronx Science High School	62 dBA (weekday)	65 dBA (weekday)
		59 dBA (Saturday)	64 dBA (Saturday)
JPR-S2	Residences on Sedgwick Ave	64 dBA (weekday)	67 dBA (weekday)
		62 dBA (Saturday)	65 dBA (Saturday)
JPR-S6	Schools and residences along Goulden Ave and Reservoir Ave	64 dBA (weekday)	67 dBA (weekday)
		62 dBA (Saturday)	65 dBA (Saturday)

Table 3. On-Site Construction Noise Results

Site	Receptor Description	Predicted On-site Construction Leq(h) Noise Level	CEQR Leq(h) Noise Criteria Limit	Exceedance Or Compliance
JPR-S1	Bronx Science High School	49 to 73 dBA (weekday)	65 dBA (weekday)	Exceeds during 7 months
		54 to 61 dBA (Saturday)	64 dBA (Saturday)	Complies
JPR-S2	Residences on Sedgwick Ave	43 to 65 dBA (weekday)	67 dBA (weekday)	Complies
		43 to 50 dBA (Saturday)	65 dBA (Saturday)	Complies
JPR-S6	Schools and residences along Goulden Ave and Reservoir Ave	37 to 79 dBA (weekday)	67 dBA (weekday)	Exceeds during 5 months
		37 to 44 dBA (Saturday)	65 dBA (Saturday)	Complies

Table 4. Blasting Noise Evaluation

Blasting for Work Phase	Site	Receptor Description	Distance	Estimated Barrier Insertion Loss	Blast Noise dBA Lmax	Blast Noise dB Peak	OSHA Hearing Conservation Noise Limits dBA Lmax dB Peak		Window Breakage Noise Limit dB Peak	Exceedance or Compliance
Excavation at Shaft & Meter Chamber -- and -- Excavation for Yard Piping	JPR-S1	Bronx Science High School (closest point)	200 feet	20 dBIL(*)	62 dBA	109 dB	115 dBA	140 dB	145 dB	Complies
	JPR-S2	Residences on Sedgwick Ave	1490 feet	20 dBIL(*)	45 dBA	92 dB	115 dBA	140 dB	145 dB	Complies
	JPR-S6	Schools and residences along Goulden Ave and Reservoir Ave	3130 feet	20 dBIL(*)	38 dBA	85 dB	115 dBA	140 dB	145 dB	Complies
Excavation at South Basin Access Ramp	JPR-S1	Bronx Science High School	2510 feet	None	60 dBA	107 dB	115 dBA	140 dB	145 dB	Complies
	JPR-S2	Residences on Sedgwick Ave	2570 feet	None	60 dBA	107 dB	115 dBA	140 dB	145 dB	Complies
	JPR-S6	Schools and residences along Goulden Ave and Reservoir Ave	360 feet	10 dBIL(**)	67 dBA	114 dB	115 dBA	140 dB	145 dB	Complies

Notes: (*) Insertion loss at Shaft & Meter Chamber and Yard Piping due to blast being 20 feet below grade and located behind a 20 foot tall noise barrier.
(**) Insertion loss for blasting at the South Basin Ramp due to blast being conducted 5 feet below the basin floor adjacent to the reservoir wall.

Table 5. CSV Output Table – RCNM Version 1.0

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 8/20/2008
Case Description: JPR Phase 2 - ROCK EXCAVATION_Blasting Method_Sep-08

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
JRP-S7	Residential	62	1	1

---- Receptor #7 ----

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	2648	0
Compressor (air)	No	40		77.7	2648	0
Compressor (air)	No	40		77.7	2648	0
Backhoe	No	40		77.6	2648	0
Crane	No	16		80.6	2648	0
Blasting	Yes	1	94		2648	0
Dump Truck - 5	No	40		83.5	2648	0
Front End Loader	No	40		79.1	2648	0
Mounted Impact Hammer (hoe	Yes	20		90.3	2648	0
Pickup Truck	No	40		75	2648	0
Pickup Truck	No	40		75	2648	0
Rock Drill	No	20		81	2648	0
Rock Drill	No	20		81	2648	0
Rock Drill	No	20		81	2648	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	43.2	39.2	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Compressor (air)	43.2	39.2	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Compressor (air)	43.2	39.2	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Backhoe	43.1	39.1	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Crane	46.1	38.1	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Blasting	59.5	39.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Dump Truck - 5	49	45	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Front End Loader	44.6	40.7	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe	55.8	48.8	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Pickup Truck	40.5	36.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Pickup Truck	40.5	36.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	70	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Total	0	0		0		0		0		0		0		0

*Calculated Lmax is the Loudest value.

Table 6. CSV Output Table – RCNM Version 1.1

Roadway Construction Noise Model (RCNM),Version 1.01

Report date: 8/20/2008
Case Description: JPR Phase 2 - ROCK EXCAVATION_Blasting Method_Sep-08

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
JRP-S7	Residential	62	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	2648	0
Compressor (air)	No	40		77.7	2648	0
Compressor (air)	No	40		77.7	2648	0
Backhoe	No	40		77.6	2648	0
Crane	No	16		80.6	2648	0
Blasting	Yes	1	94		2648	0
Dump Truck - 5	No	40		83.5	2648	0
Front End Loader	No	40		79.1	2648	0
Mounted Impact Hammer (hoe	Yes	20		90.3	2648	0
Pickup Truck	No	40		75	2648	0
Pickup Truck	No	40		75	2648	0
Rock Drill	No	20		81	2648	0
Rock Drill	No	20		81	2648	0
Rock Drill	No	20		81	2648	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	43.2	39.2	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Compressor (air)	43.2	39.2	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Compressor (air)	43.2	39.2	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Backhoe	43.1	39.1	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Crane	46.1	38.1	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Blasting	59.5	39.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Dump Truck - 5	49	45	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Front End Loader	44.6	40.7	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe	55.8	48.8	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Pickup Truck	40.5	36.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Pickup Truck	40.5	36.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Rock Drill	46.5	39.5	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A
Total	59.5	53.1	N/A	65	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

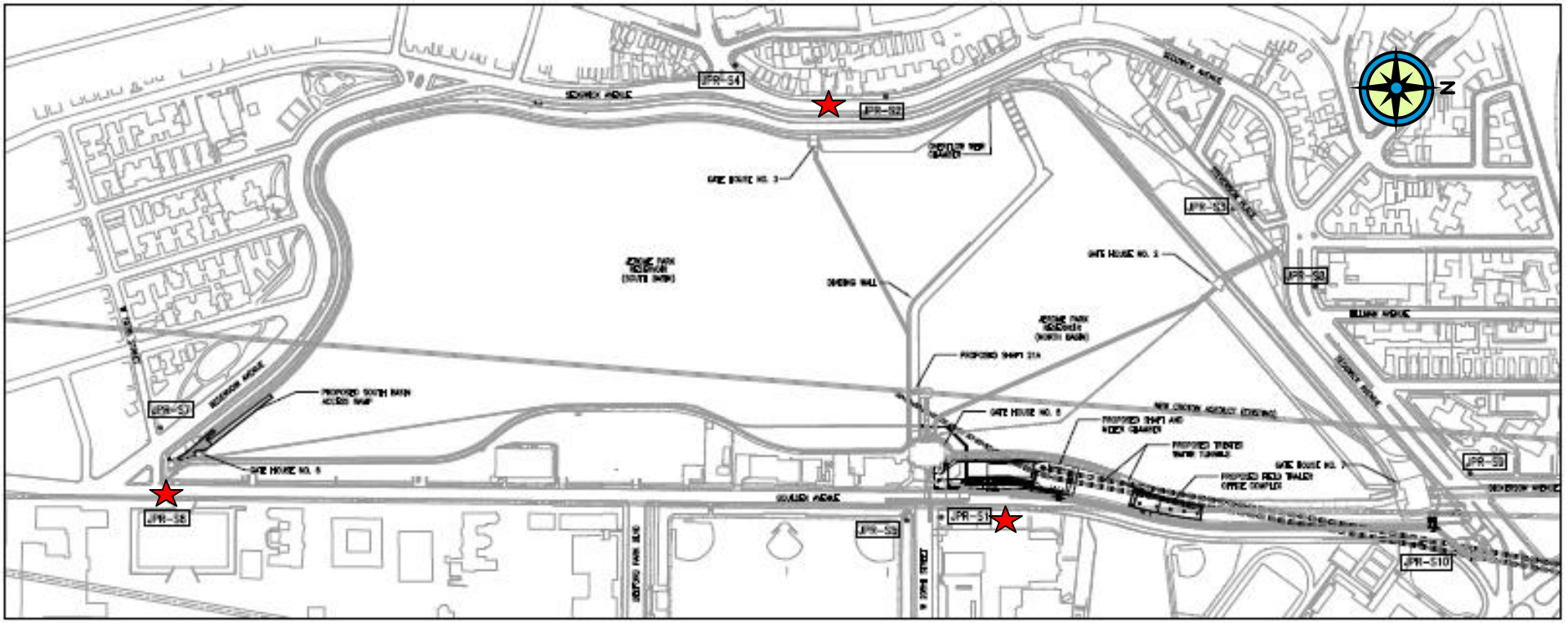

Figure 1 - Jerome Park Reservoir, Receptor Locations Site Map

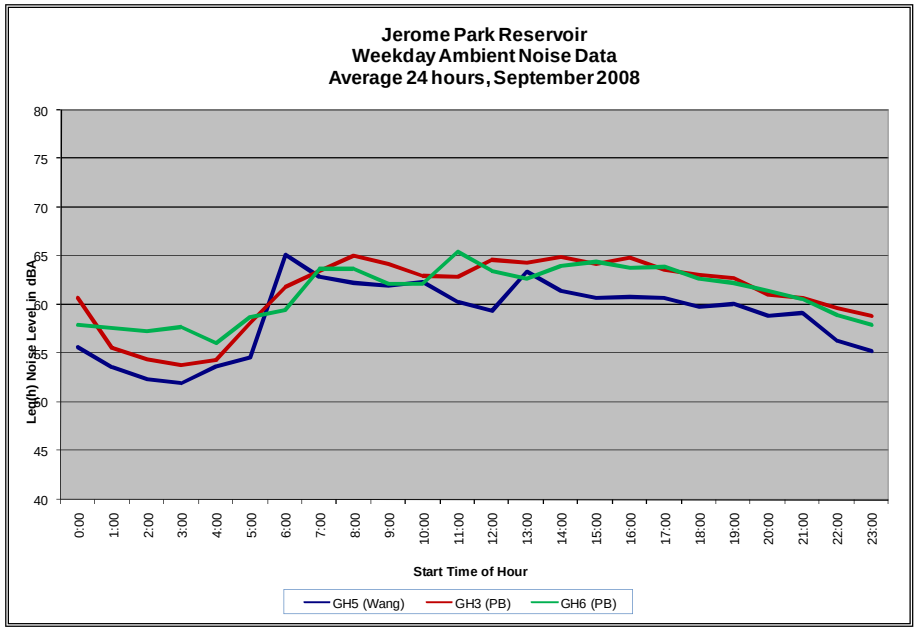

Figure 2 - Weekday Ambient Noise Level

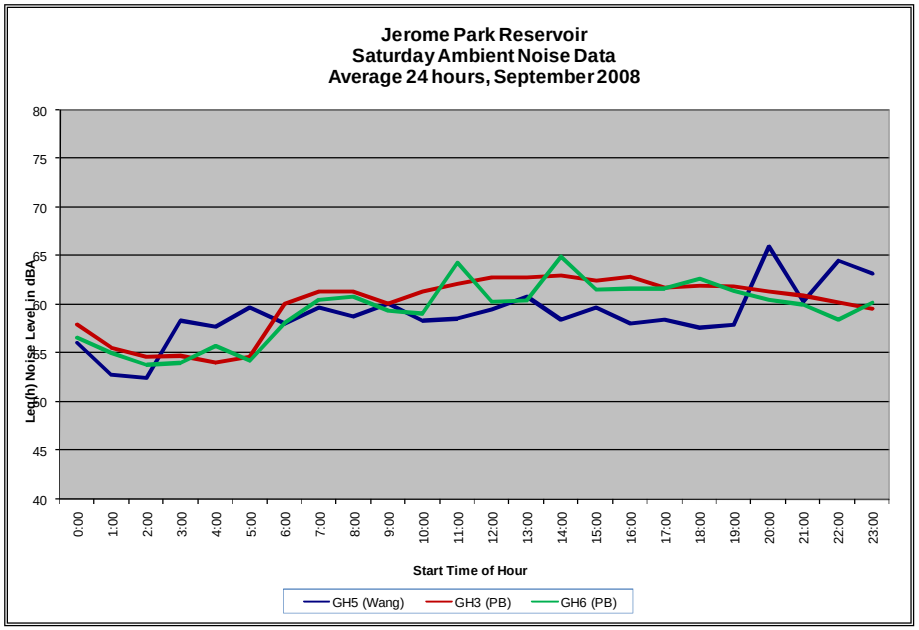

Figure 3 - Saturday Ambient Noise Level

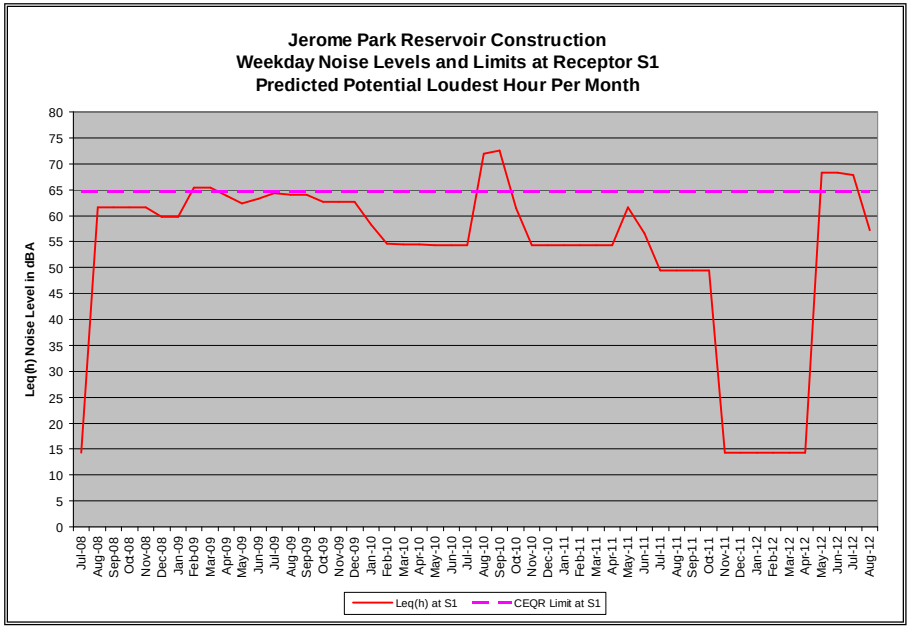

Figure 4-Predicted Weekday Construction Noise at JPR-S1

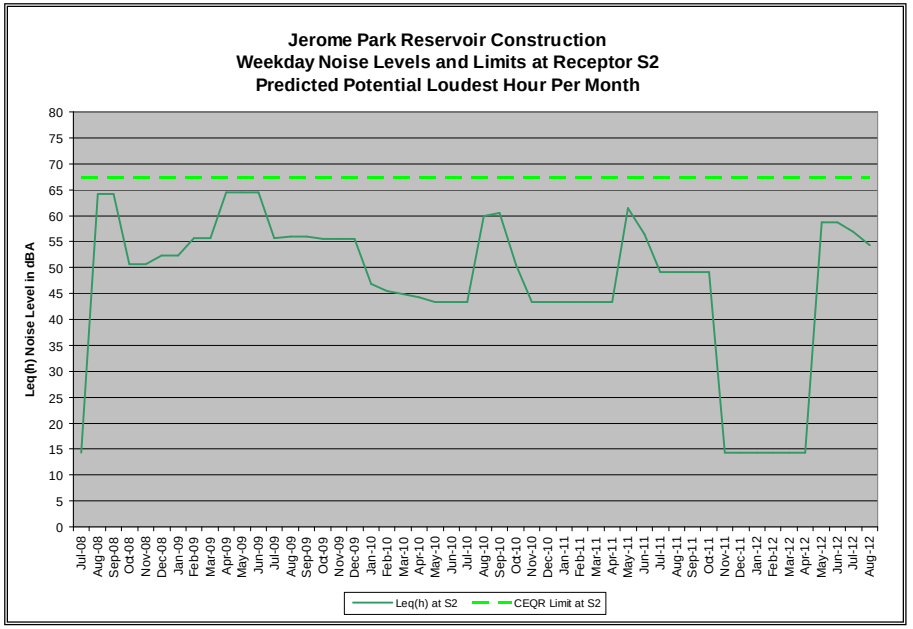

Figure 5-Predicted Weekday Construction Noise at JPR-S2

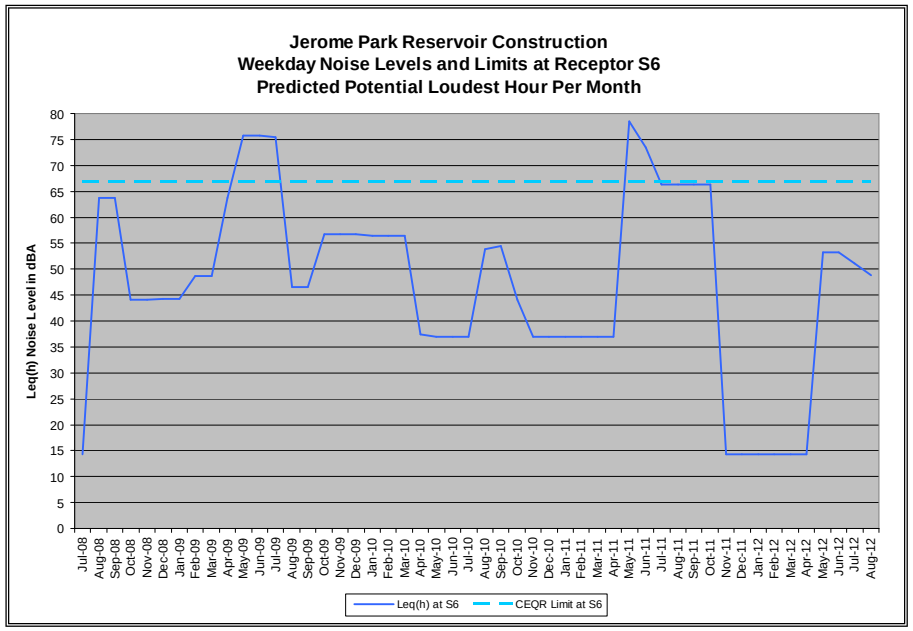

Figure 6-Predicted Weekday Construction Noise at JPR-S6

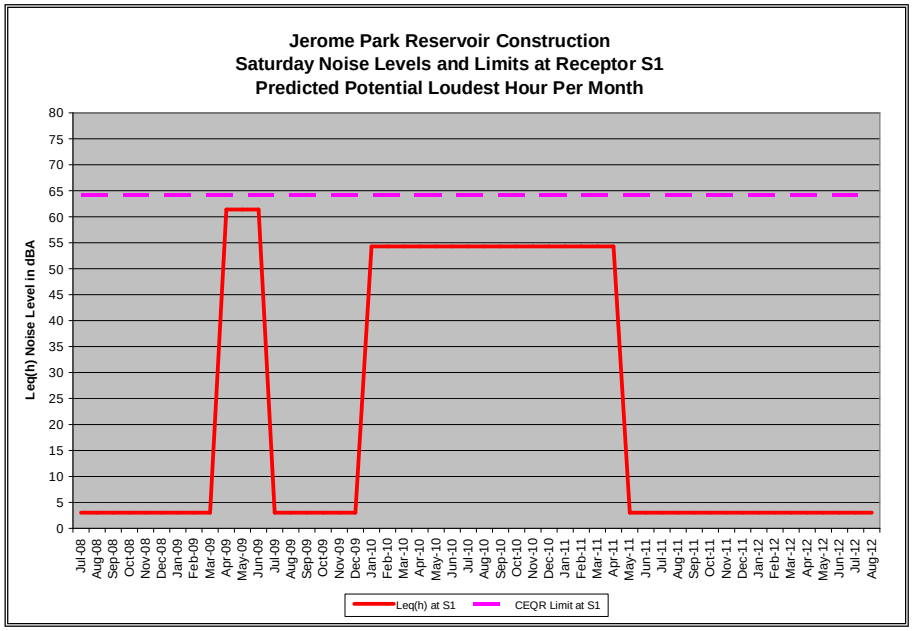

Figure 7-Predicted Saturday Construction Noise at JPR-S1

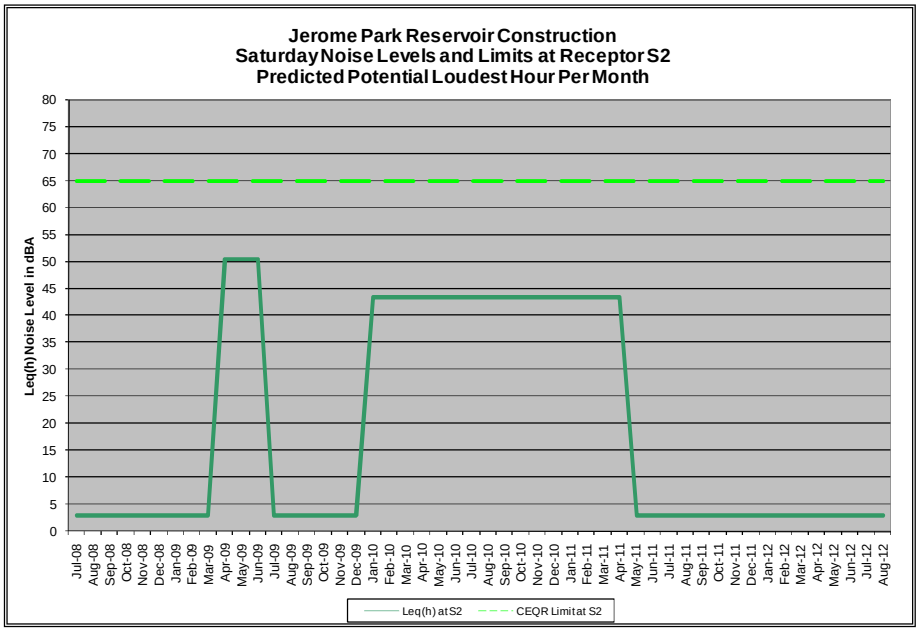

Figure 8-Predicted Saturday Construction Noise at JPR-S2

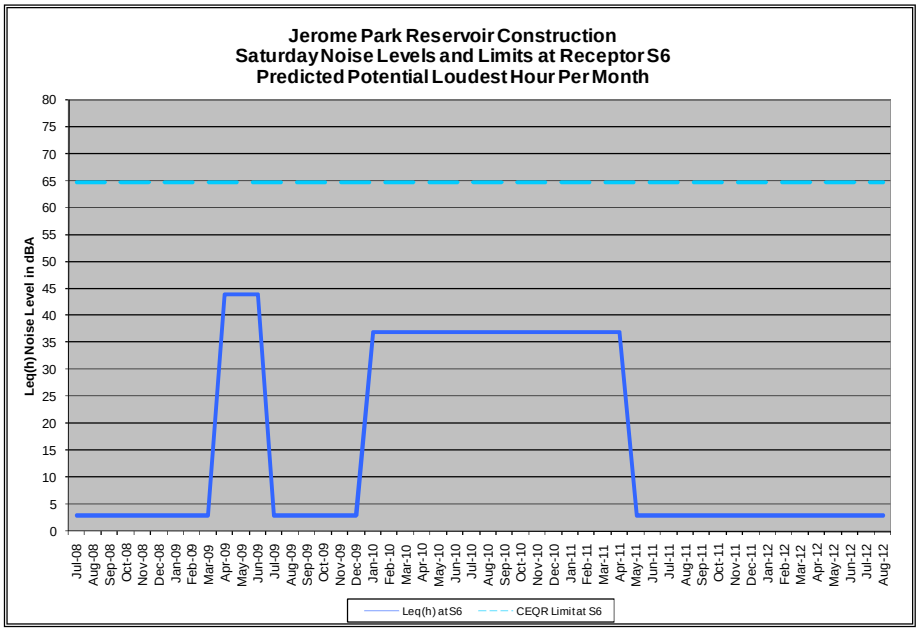

Figure 9-Predicted Saturday Construction Noise at JPR-S6

8. SUMMARY

Potential construction noise impacts were evaluated for a critical water treatment plant project at several receptor locations surrounding the Jerome Park Reservoir in the Bronx, NY, using the FHWA's Roadway Construction Noise Model (RCNM). Ambient noise levels were also measured at several receptor locations to establish baseline conditions above which noise impacts would be defined as occurring in accordance with CEQR guidelines. The findings of this study indicated that the on-site construction noise levels associated with weekday work are expected to generally comply with the CEQR construction noise guidelines during the 50-month duration of this project except under worst-case conditions occurring sporadically during seven months at receptor location JPR-S1 (Bronx Science High School) and during five months at receptor location JPR-S6 (schools and residences at the southern end of the reservoir). Construction noise levels associated with Saturday work are expected to comply with CEQR construction noise guidelines at all of the receptor locations throughout the project's 50-month duration. Noise levels associated with the potential use of blasting at the Shaft & Meter Chamber and the South Basin Access Ramp work sites are expected to comply with OSHA and other impulsive noise criteria with respect to avoidance of hearing damage and window breakage at all receptor locations.

The error identified with the output function of RCNM Version 1.0 when exporting results for multiple receptors into CSV and TXT output files - namely reporting the total Leq and Lmax levels as zeros even though the correct total noise levels were displayed on screen - was submitted to FHWA for review. As a result, RCNM Version 1.1 was soon released addressing the problem.

More importantly, the construction noise analysis described in this paper was performed to the client's satisfaction, and therefore allowed for a critical water treatment plant project to proceed on schedule.