M E M O R A N D U M

Date: August 18, 2008

To: Lee Ecker, Clough Harbour Associates

From: Damien Bell, Epsilon Associates, Inc.

Subject: Albany Landfill Alarm Noise Issue

The purpose of this memorandum is to answer the NYSDEC comment regarding the Albany Landfill alarm-noise report completed by Epsilon. The report was dated July 3, 2008.

The noise prediction results in the Epsilon report assumed that a specific type of alarm would be used within the future expansion, that being the same alarm currently used on the mobile crusher/compactor used at the landfill. The operational noise level from that particular mobile-crusher alarm was measured to be 81 dBA from 50 feet away. The Epsilon report showed that using the mobile-crusher alarm within the expansion area would increase alarm sound levels by 3 to 11 dBA above current levels, and that it would create a "prominent discrete tone" condition at several residential locations. The Epsilon report also showed that using a different alarm, such as the "Preco 270", would only increase alarm sound levels by 0 to 2 dBA above existing conditions. Using the Preco 270 would also eliminate the "prominent discrete tone" condition at all nearby residential locations, except for the horsefarm (Location 2).

The reviewer asked if using an even quieter alarm, such as the Preco Model 1028, would also achieve a reduction in the "discrete tone" sound level. Epsilon does not have access to detailed noise data for the Preco 1028. However, Preco's product brochure states that the 1028 sound output is 10 dBA lower than the Preco 270 mentioned in the Epsilon report. Assuming that the Model 1028 emits noise at the same audible frequency as the Model 270, it would definitely achieve at least the same sound level reduction as the Model 270. The Model 1028 would also prevent the existence of a "prominent discrete tone" condition at all of the nearest residences, including the horsefarm location.

The reviewer also asked why alarms from other vehicles cited in Section 3 of the DEIS were not mentioned in the Epsilon alarm noise report. The DEIS cited a compactor, a bulldozer, an excavator, and a waste shredder. Epsilon measured alarm sound levels from the compactor (i.e., mobile crusher), and this is clearly described in the Epsilon report. The sound output for the crusher/compactor alarm (at the actual alarm source) was determined to be approximately 112 dBA. For comparison, the loudest back-up alarm made by Preco has a source sound level of 112 dBA.

It is believed that the alarm on the compactor/crusher represents worst-case alarm sound levels. Alarm sound levels for the other machines were assumed to be practically identical to the compactor/crusher alarm (and certainly no louder), so there would have been no added benefit to measuring alarms for those machines. The alarm sound level used in the Epsilon report was assumed to represent worst-case conditions (i.e., loudest).

The back-up alarms for the other large on-site machines (bulldozer, excavator, etc.) would also have to be replaced with either Preco 270 or Preco 1028, in order to avoid possible noise impacts or a “prominent discrete tone” condition. This may not have been clearly stated in the July 3, 2008 report.

Epsilon
ASSOCIATES INC.

September 22, 2008 Ref. 2469

Mr. Lee Ecker
Clough, Harbour, & Associates LLP
3 Winners Circle
Albany, NY 12205

Re: Rapp Road Landfill Expansion: Evaluation of Equipment Noise Mitigation

This letter describes discusses noise mitigation options for three pieces of large mobile equipment within the Rapp Road Landfill in Albany, NY. Sound level measurements for a bulldozer, excavator, and a compactor were conducted. The primary goal was to determine the frequency content for each machine, so as to determine the possible effectiveness of a retrofitted sound-suppression package. Modified sound levels were then calculated to reflect the attenuation provided by the package.

Equipment Measurements

The original DEIS sound levels are presented below in Table 1, showing three primary mobile machines of interest, a compactor (Caterpillar 836H), a bulldozer (Caterpillar D6R), and an excavator (Caterpillar 330C).

Table 1: DEIS Measured Operational Equipment Noise Levels

Equipment Type	Machine Make/Model	L_{eq} (dBA)
Compactor	Caterpillar 836H	82
Bulldozer	Caterpillar D6R	80
Excavator	Caterpillar 330C	73

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Noise sources are often described in terms of octave or one-third octave band sound pressure levels, in dB, with the octave frequency bands being those established by standard (ANSI S1.11, 1986). The noise section of the landfill expansion DEIS listed measured overall A-weighted operational equipment noise levels, but no octave-band measurements were made. In the design of noise control treatments, it is often very useful to know something about the frequency spectrum of the source.

Epsilon measured the same three pieces of equipment, simultaneously collecting broadband (A-weighted) and one-third-octave band data (12.5 hertz to 20,000 hertz center frequencies). Sound levels were measured with a Norsonic Model Nor140 precision sound analyzer, equipped with a Norsonic-1209 Type 1 Preamplifier, a Norsonic-1225 half-inch microphone and a foam windscreen. The instrumentation meets the "Type 1 - Precision" requirements set forth in American National Standards Institute (ANSI) S1.4 for acoustical measuring devices. The microphone was tripod-mounted at a height of five feet above ground. Sound levels were measured from 50-feet away during non-operating hours for the landfill, so as to avoid contamination from competing noise sources. The compactor was measured at high idle but remained stationary. The bulldozer and excavator were measured while moving in a straight line (parallel to the microphone). The measured sound levels are shown in Table 2 (attached).

For the compactor, the overall A-weighted sound levels shown in Table 1 are considerably higher than those presented in Table 2 (L_{eq} is 82 dBA versus 70 dBA). Also, the bulldozer sound levels in Table 1 are slightly higher than in Table 2 (L_{eq} is 80 dBA versus 76 dBA). The sound levels for the excavator are practically identical. This suggests that the measured sound levels presented in the DEIS are likely worst case, particularly for the compactor and bulldozer. The operational conditions of a machine (idling versus moving, etc.) can significantly change the noise output. The Epsilon measurements for the compactor were taken at high idle and facing the engine, but the machine was stationary. The sound levels in the DEIS reflect a moving machine. The L_{eq} sound level of 82 dBA is more conservative, because the compactor will not be moving at all times during the day. Furthermore, the engine-end of the compactor (which emits most of the noise) will not always face the noise-sensitive receptors. The bulldozer and excavator were measured while the machines were moving, so the Table 1 and Table 2 sound levels do not differ as much.

Modified Sound Levels and Sound Suppression Package

When installed on the compactor or the bulldozer, the Caterpillar "Sound Suppression Package" provides 3-dB of sound level reduction at frequencies above 300 hertz. For noise-modeling purposes, it is acceptable to subtract 3-dB from the measured frequency-band data for both the bulldozer and the compactor, but only within the 500 through 16,000-hertz octave bands. Modified sound levels reflecting the contribution of the sound suppression package were calculated using the measured octave-band data. 3 decibels were subtracted to sound levels in the 500-hertz through 16,000-hertz octave bands. The sound levels for the compactor and bulldozer were then increased by 12 decibels and 4 decibels within all octave bands, respectively, so that the sound levels would reflect worst-case operating conditions. This is a very conservative assumption.

Table 3 (attached) presents the overall A-weighted and octave-band sound levels for each piece of equipment, at a distance of 50 feet away. The excavator sound level did not change, but the resulting sound level is 80 dBA for the compactor and 78 dBA for the bulldozer. The bulldozer and compactor sound levels decreased by 2 dBA, not 3-dBA, because the sound suppression package only applies to frequencies above 300 hertz. Overall A-weighted sound levels are calculated by accounting for sound levels at all frequencies.

The modified sound levels in Table 3 are conservative, because they reflect higher sound levels due to mobile operating conditions and worst-case orientation (i.e., with the compactor engine directly facing noise-sensitive receptors). Actual operating conditions will likely result in lower sound levels at the receptor locations. This is because the machines will often be stationary (at idle), and the engines will not always point towards the noise-sensitive receptors.

If you have any questions about this letter, please call me at (978) 461-6265.

Sincerely,
EPSILON ASSOCIATES, Inc.

Damien Bell

Damien Bell
Project Engineer

Table 2 Measured Sound Pressure Levels at 50 Feet, August 27, 2008

Equipment	Sound Pressure Level (dBA) (L_{eq})	L_{max} Level (dBA)	Sound Pressure Level per Octave-Band Center Frequency (Hz)									
			31.5 L_{eq} (dB)	63 L_{eq} (dB)	125 L_{eq} (dB)	250 L_{eq} (dB)	500 L_{eq} (dB)	1k L_{eq} (dB)	2k L_{eq} (dB)	4k L_{eq} (dB)	8k L_{eq} (dB)	16k L_{eq} (dB)
CAT 836H Compactor	70	71	68	67	73	65	68	66	62	54	48	36
CAT D6R Bulldozer	76	81	66	73	80	76	74	71	67	64	59	50
CAT 330C Excavator	74	78	66	80	76	71	69	71	61	57	57	50

Table 3 Modified Sound Levels at 50 Feet

Equipment	Sound Pressure Level (dBA) (L_{eq})	Sound Pressure Level per Octave-Band Center Frequency (Hz)									
		31.5 L_{eq} (dB)	63 L_{eq} (dB)	125 L_{eq} (dB)	250 L_{eq} (dB)	500 L_{eq} (dB)	1k L_{eq} (dB)	2k L_{eq} (dB)	4k L_{eq} (dB)	8k L_{eq} (dB)	16k L_{eq} (dB)
CAT 836H Compactor	80	80	79	85	77	77	75	71	63	57	45
CAT D6R Bulldozer	78	70	77	84	80	75	72	68	65	60	51
CAT 330C Excavator	74	66	80	76	71	69	71	61	57	57	50

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July 3, 2008 Ref. 2469

Mr. Kevin Hajos
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Albany, NY 12205

Re: Rapp Road Landfill Expansion: Back-up Alarm Noise Analysis

Dear Mr. Hajos:

This letter describes a noise impact evaluation of back-up alarms for the Rapp Road Landfill expansion in Albany, NY. Existing sound levels were measured at community locations surrounding the landfill during periods when a back-up alarm was operating. Two separate alarms were also measured at a close-in distance of 50 feet away, so as to determine alarm reference sound levels. The alarm reference sound levels were then used to conduct predictive noise modeling, to determine the alarm sound levels in the community after the landfill expansion. The predicted sound levels were then compared against existing alarm sound levels. A determination was also made as to whether the landfill expansion could result in "prominent discrete tone" conditions in the community.

Impact Assessment Criteria

Overall Sound Level Increases

The NYS DEC has published a guidance document for assessing noise impacts (NYS DEC, 2001). The guidance document states that the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dBA. Ambient sound levels in industrial or commercial areas may exceed 65 dBA with a high end of approximately 79 dBA. In these instances, mitigation measures utilizing best management practices should be used in an effort to ensure minimum impacts.

This guidance document also states that sound level increases from 0-3 dBA should have no appreciable effect on receptors, increases from 3-6 dBA may have potential for adverse noise impact only in cases where the most sensitive of receptors are present, and increases of more than 6 dBA may require a closer analysis of impact potential depending on existing sound levels and the character of surrounding land use and receptors. An increase of 10 dBA deserves consideration of avoidance and mitigation measures in most cases. The typical ability of an individual to perceive changes in noise levels is summarized in Table 1. These guidelines allow direct estimation of an individual's probable perception of a change in community noise levels.

Table 1 Thresholds for Sound Pressure Level Increases

Increase in Sound Pressure (dBA)	Reaction
0-3	No appreciable effect
3-6	Potential effect for sensitive receptors
Over 6	Closer analysis required
Source: NYS DEC, "Assessing and Mitigating Noise Impacts", Division of Environmental Permits, February 2, 2001.	

Tonal Noise Considerations

The other impact criterion relates to the tonal nature (i.e., frequency content) of the noise in question. The NYS DEC Noise Policy does not address tonal noise, so it is necessary to cite an American National Standards Institute (ANSI) Standard[1]. In the high-frequency noise region (above 450-500 hertz) a "prominent discrete tone" exists when the noise level within any one-third-octave band is 5 dB above the arithmetic average of the sound levels in the two adjacent one-third-octave bands. Many environmental standards have used the threshold of "prominence" as an indicator of annoyance, because a tone may be audible but not necessarily annoying. The "prominent discrete tone" concept provides an objective means of determining the likelihood than a tonal noise may be annoying.

The "prominent discrete tone" definition is best explained with an image. Figure 1 (attached) shows a bar graph of one-third-octave band sound levels. The red bar represents a "prominent discrete tone", and the blue bars represent the background sound level when the tone source is off. The sound level in the 1,000 hertz band

[1] American National Standards Institute (ANSI) S12.9 Part 3, "Quantities and Procedures For Description and Measurement of Environmental Sound. Part 3: Short-term Measurements With An Observer Present"

(the red section of the bar) is 76 dB, and the arithmetic average in the two adjacent bands (800 Hz and 1,250 Hz) is 62 dB. This is a clear example of a "prominent discrete tone".

Community Sound Level Measurements

Sound level measurements were conducted on Wednesday June 25, 2008 at six (6) locations in the vicinity surrounding the landfill. The measurements occurred while the back-up alarm for a mobile crusher was activated (constantly on). The crusher stayed in the same location during the community measurements. The locations are very similar to locations cited in the April 2008 Clough Harbour report (the fourth Supplemental DEIS). However, a new location within the Fox Run Estates called "Location A" was measured.

The six locations are described below. Figure 2 shows the measurement locations overlaid upon an aerial photograph. To maintain consistency and continuity, the numbering system used in the DEIS will be used in this letter. The measurement locations are described as follows:

- Location 1/15: On Br'er Fox Boulevard within the Fox Run Estates, located approximately between the Locations 1 and 15 cited in the April 2008 Fourth Supplemental DEIS. The back-up alarm was audible here, but not much louder than the truck engine noise coming from the landfill.

- Location A: This location was not used in the DEIS, but it was deemed representative of sound levels in that section of Fox Run Estates. It is along Tallyho Drive. Back-up alarms were audible at this location, but they were intermittent (not constant).

- Location 2: Residence/Horse Farm along Rapp Road/Lincoln Avenue. Landfill activity was audible here, and the back-up alarm was also audible. The June 25 measurement location used was 300 feet closer to the main house than the DEIS Location 2. The original location was not accessible at the time of the June 25 measurements.

- Location 14: Along Rapp Road, approximately 300 feet southwest of the DEIS Location 14. Landfill activity was audible here, but the back-up alarm was not clearly audible. The primary source of noise here was vehicular traffic along Rapp Road (one vehicle every 10 to 15 seconds). The original location was not used because of a utility crew working very close by.

- Location 4/5: Practically identical to the DEIS locations, 200 feet northwest of the landfill along a trail within the Pine Bush. The back-up alarm was audible at this location, but it was not much louder than truck engine noise coming from the landfill. Because Locations 4 and 5 are so close together, they are considered here as one.

- Location 6: Approximately 700 feet west of the landfill. Landfill activity (including the back-up alarm) was practically inaudible at this location. The primary sources of noise here were the New York State Thruway and birds.

Sound levels were measured at each location with a Norsonic Model Nor140 precision sound analyzer, equipped with a Norsonic-1209 Type 1 Preamplifier, a Norsonic-1225 half-inch microphone and a foam windscreen. The instrumentation meets the "Type 1 - Precision" requirements set forth in American National Standards Institute (ANSI) S1.4 for acoustical measuring devices. The microphone was tripod-mounted at a height of five feet above ground. The measurements included simultaneous collection of broadband (A-weighted) and one-third-octave band data (25 hertz to 10,000 hertz). Each measurement lasted between 1 and 3 minutes.

The measured L_{eq} sound levels at each location are presented in Table 2, attached. The data indicate that sounds levels in the back-up alarm frequency region (1,000 hertz, 1,250 hertz, and 1,600 hertz) did not exhibit any "prominent discrete tones". Sound levels in that frequency range were between 32 and 36 dB within the Pine Bush, while sound levels at other locations ranged between 39 and 47 dB in that frequency range. Overall A-weighted sound levels ranged from 47 dBA to 57 dBA for all locations.

Reference Sound Levels

One-third-octave band measurements were conducted for two back-up alarms during the same visit to the landfill (June 25). Measurements were taken fifty (50) feet from the rear and side of a mobile crusher, and fifty feet from a water truck. Both measurements confirmed that the back-up alarm noise occurs within the 1,000 to 2,000 hertz region. The water truck was equipped with a Preco Model 270 Type B alarm, with a rated sound level of 107 dBA at a distance of 4 feet from the alarm (+/- 4 dBA). The 107 dBA level can vary depending upon voltage. At fifty feet away, the Model 270 alarm was measured to be 78 dB in the 1,000 hertz band. Noise from the Model 270 was non-existent in all other frequency bands.

It was not possible to easily determine the manufacturer and model of the crusher alarm, because it was difficult to access. Sound levels for the crusher alarm were measured to be 75 dB in the 1,250-hertz band and 80 dB in the 1,600 hertz band. Crusher alarm noise was non-existent in all other frequency bands. Table 3 summarizes the measurements. The background sound levels (with the alarms off) are also provided, to show that the alarms were considerably louder in those particular frequency bands.

Table 3: Close-In Alarm Measurements, A-Weighted L_{eq} Sound Levels

Measurement	Distance (feet)	Direction	One-Third-Octave Band (Center Frequency, hertz)		
			1,000 Hz (dB)	1,250 Hz (dB)	1,600 Hz (dB)
Water Truck Alarm	50	On-Axis (directly behind)	78	NA	NA
Water Truck Alarm	50	90 degrees to side	63	NA	NA
Alarm Off	50	-	48	NA	NA
Crusher Alarm	50	On-Axis (directly behind)	NA	75	80
Crusher Alarm	50	90 degrees to side	NA	65	67
Alarm Off	50	-	NA	61	59

NA – Negligible sound levels

Note that the alarm noise is very directional. As Table 3 shows, the measurements taken 90 degrees off-axis from the rear of each vehicle are considerably quieter than the straight on-axis measurements. The alarms primarily emit noise in one direction, not omni-directionally.

The sound pressure levels were then converted into sound power levels for use in the noise prediction model (described in the next section). A calibration model was created, and it was determined that the worst-case sound power level in the 1,000-hertz frequency band was approximately 110 dB, which would correspond to the Preco 107 dBA alarm. The worst-case sound power level in the 1,250-hertz band was determined to be approximately 107 dB. The worst-case sound power level for the 1,600-hertz band was determined to be 112 dB. The 1,250-hertz and 1,600-hertz sound power levels correspond to the mobile crusher back-up alarm.

Predictive Modeling Methodology

A site-wide noise model was developed, and alarm noise impacts associated with the proposed landfill expansion were predicted using the Cadna/A (Computer Aided Noise Abatement) noise calculation model (DataKustik Corporation, 2005). This model uses the ISO 9613-2 industrial standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this modeling are a more refined set of computations as compared to spreadsheet calculations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption.

The Cadna/A model allows for octave band calculation of noise from multiple noise sources, as well as computation of diffraction, and multiple reflections off parallel buildings and solid ground areas. The landfill layout and terrain height contour elevations were imported into Cadna/A using an electronic AutoCAD drawing provided by Clough, Harbour & Associates. This allowed for consideration of terrain shielding where appropriate. In this manner, all significant geometric propagation effects are accounted for in the noise modeling. Ground attenuation credit was taken by the model where appropriate in accordance with ISO 9613-2. No shielding credit was taken for trees, which would make the Pine Bush predictions conservative.

The AutoCAD drawing also made it possible to identify the limits of the proposed landfill expansion. With this information, a back-up alarm was modeled at various locations within the new expansion region. The intention was to model worst-case conditions, so that the alarms would be as close as possible to the community locations in question. The alarms were modeled at an elevation of approximately 400 feet, which is 10 feet above the landfill's highest possible future ground elevation.

Figure 3 shows the Cadna/A predictive-modeling "receptor" locations, the approximate limits of the expansion, and the three different modeling locations for the back-up alarm. The Cadna/A modeled locations are identical to those cited in the DEIS. Note that the Cadna/A (i.e., DEIS) locations are not identical to the June 25, 2008 measurement locations shown in Figure 2. This was primarily because the exact DEIS location were not accessible on June 25. However, for the purposes of the predictive modeling and noise impact determination, the slight differences between the Figure 2 and Figure 3 locations do not negate the overall findings.

Specific Noise Model Assumptions

Community noise studies rarely determine noise impact on the basis of an absolute worst-case (i.e., loudest) sound level that might occur for some brief period of time. Noise studies typically use the "average hourly sound level" to determine noise impact. For intermittent noise sources (such as a back-up alarm), the noise impact is determined by considering the amount of time the device is expected to operate over the course of any given hour. Back-up alarms do not operate for all 60 minutes within an hour. Furthermore, because the alarm noise is very directional (90 degrees versus on-axis), a given listener in the community is not always going to hear the alarm, even when the alarm is on. This is because the vehicle will make frequent turns as it operates.

The Cadna/A modeling utilized the following assumptions for determining alarm noise impact for any given hour:

- The alarm was modeled as an omni-directional point source. This is a very conservative assumption, since the alarm is actually very directional. This was shown earlier.

- Within any given hour, an alarm was assumed to operate constantly for 20 minutes at each of the three "alarm source locations" shown in Figure 3. 20 minutes was also considered to be a conservative assumption.

- The alarm was modeled at the maximum future height (400 feet) of the proposed expansion. The actual ground elevation will be 390 feet, but the alarm will sit approximately 10 feet above ground while on the vehicle. This results in worst-case sound exposure conditions for the community receptors. In reality, it will take several years for the landfill to reach its final height.

Results and Comparison with Criteria

The Cadna/A sound model predicts sound levels within octave bands. However, Cadna/A can be used to predict one-third-octave band sound levels in certain cases, such as when the sound in question is very tonal. Recall that an octave band can be "split up" into three individual one-third-octave bands. Consider a situation were the sound energy within the 1,000-Hz octave band is entirely due to sound energy centered within the 1,000-Hz one-third-octave band. In this case, the Cadna/A results are still valid, because the octave-band sound levels are essentially the same at the one-third-octave band levels.

Predicted worst-case alarm sound levels within the 1,600-Hz band are shown in Table 4. Those levels are compared with the "Existing L_{eq} Sound Levels" in the 1,600-Hz band, which were measured on June 25, 2008. The predicted levels reflect the contribution from the mobile crusher alarm, which was considerably louder than the water truck. Predictions are only provided for the locations that were measured on June 25, 2008. Note that the existing levels reflect the contribution of all sound sources: trucks, public-road vehicular traffic, etc. The "Future Alarm-Only L_{eq} Sound Levels" only reflect the contribution of the alarm.

Table 4: Predicted Future Worst-Case Alarm Sound Levels – Crusher Alarm within 1,600-Hz Band

Location	Future Alarm-Only L_{eq} Sound Level (dB)	Existing L_{eq} Sound Level with Alarm On, (dBA)	Increase Over Existing (dB)
Near 1 and 15 (Fox Run Estates)	47	44	3
A (Fox Run Estates)	46	43	3
2 (Horse Farm)	47	36	11
14 (Rapp Road)	40	41	0
4/5 (Pine Bush Closer to Landfill)	38	32	6
6 (Pine Bush – 700 Feet West)	40	35	5

The modeling results indicate that crusher alarm sound levels within the 1,600-Hz band are predicted to exceed the existing "alarm on" sound levels at five of the six measured locations.

Table 5 shows prediction modeling results for the water truck alarm. Recall that the Preco Model 270 alarm (water truck) only emitted sound in the 1,000-Hz band. Table 5 shows that the water truck alarm levels are predicted to be considerably lower than the crusher alarm levels. The largest increase (of 5 dB) is predicted at Location 2.

Table 5: Predicted Future Worst-Case Alarm Sound Levels – Preco Model 270 Alarm within 1,000-hertz Band

Location	Future Alarm-Only L_{eq} Sound Level (dB)	Existing L_{eq} Sound Level with Alarm On, (dBA)	Increase Over Existing (dB)
Near 1 and 15 (Fox Run Estates)	45	47	0
A (Fox Run Estates)	44	47	0
2 (Horse Farm)	45	40	5
14 (Rapp Road)	38	47	0
4/5 (Pine Bush Closer to Landfill)	36	35	1
6 (Pine Bush – 700 Feet West)	38	36	2

"Prominent Discrete Tone" Determination

The Cadna/A results were used to estimate the likelihood of "prominent discrete tones". Table 6 (attached) shows the worst-case predicted sound levels in the 1,000-Hz, 1,250-Hz, and 1,600-Hz one-third-octave bands. For each one-third-octave band, the predicted sound levels are shown side-by-side with the sound levels measured on June 25, 2008. The likelihood of a "prominent discrete tone" is also shown.

1,000-Hz One-Third-Octave Band:

At Location 2, there is a possibility that a "prominent discrete tone" condition could arise within the 1,000-hertz one-third-octave band, provided that the water truck operates near the limits of the proposed expansion. This would only occur if the water truck were to operate frequently near the far corner of the expansion limits (closest to Location 2). Of course, the water truck is probably very unlikely to back-up with such frequency, so the "prominent discrete tone" prediction for Location 2 within the 1,000-hertz one-third-octave band is unlikely. The prediction is representative of absolute worst-case conditions. This will probably not be the norm.

1,250-Hz One-Third-Octave Band:

There were no "prominent discrete tones" predicted within the 1,250-hz one-third-octave band.

1,600-Hz One-Third-Octave Band:

"Prominent Discrete Tones" were predicted in the 1,600-Hz one-third-octave band for all locations. This is because the crusher back-up alarm was considerably louder than the water truck alarm. Table 6 shows a 5-dB discrete tone for locations within Fox Run Estates and for the residence near Location 14 along Rapp Road. Location 2, located very close to the limits of the expansion, is predicted to have a 9-dB discrete tone. Locations within the Pine Bush are predicted to have 6 to 7-dB discrete tones due to the crusher alarm.

These worst-case conditions only apply if the crusher alarm were to operate constantly, for 20 minutes within a given hour at a single location.

Conclusion

Existing noise levels at the nearest residences were surveyed while a mobile-crusher back-up alarm operated within the landfill. For the proposed landfill expansion, predicted sound levels for the crusher alarm are predicted to be 3 to 11 dB higher than existing alarm sound levels. Sound levels from the crusher alarm would not exceed the NYS DEC guidance maximum of 65 dBA. However, the crusher alarm could result in an increase above existing levels that could create a noise impact. Furthermore, "prominent discrete tone" conditions are predicted to arise during operation of the current mobile crusher alarm within the proposed expansion.

A mitigation option would be to equip the crusher with a Preco Model 270 alarm, which is currently used on the water truck. Sound levels for the water truck alarm are predicted to be 0 to 2 dB higher than existing alarm sound levels for all locations except Location 2. The Location 2 increase is predicted to be 5 dB. The 5-dB prediction is based on extremely conservative, worst-case modeling assumptions. The actual increase would probably be considerably less.

The analysis also shows that "prominent discrete tone" conditions could be avoided at five of the six measurement locations, provided that the mobile crusher is equipped with a Preco Model 270 alarm. Although Location 2 might still experience "prominent discrete tone" conditions, it is likely that actual operating conditions would likely avoid this outcome. It is very unlikely that the alarm would point directly towards Location 2 for more than 20 minutes within an hour.

If you have any questions about this letter, please call me at (978) 461-6265.

Sincerely,
EPSILON ASSOCIATES, Inc.

Damien Bell

Damien Bell
Project Engineer

Figure 1: Prominent Discrete Tone

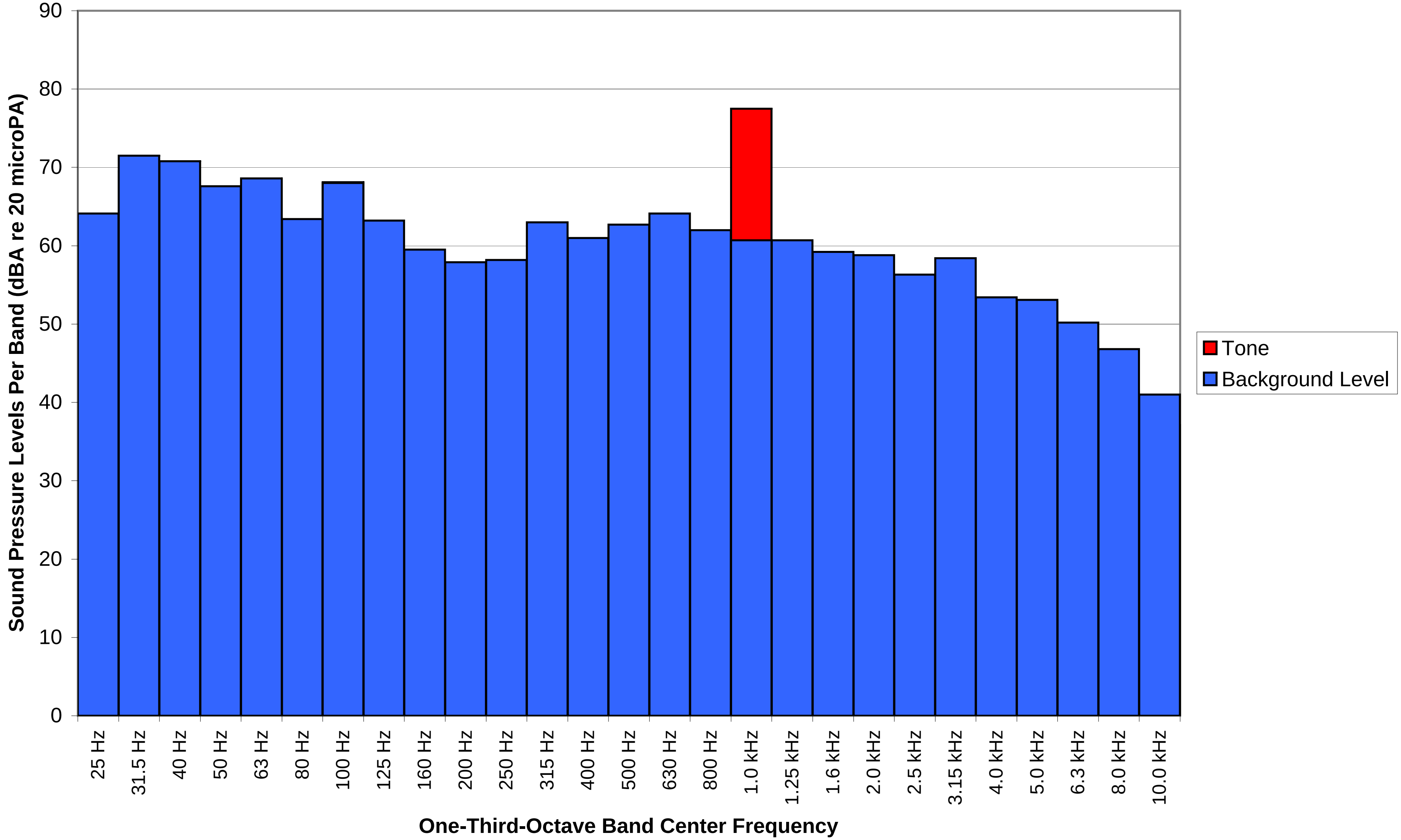
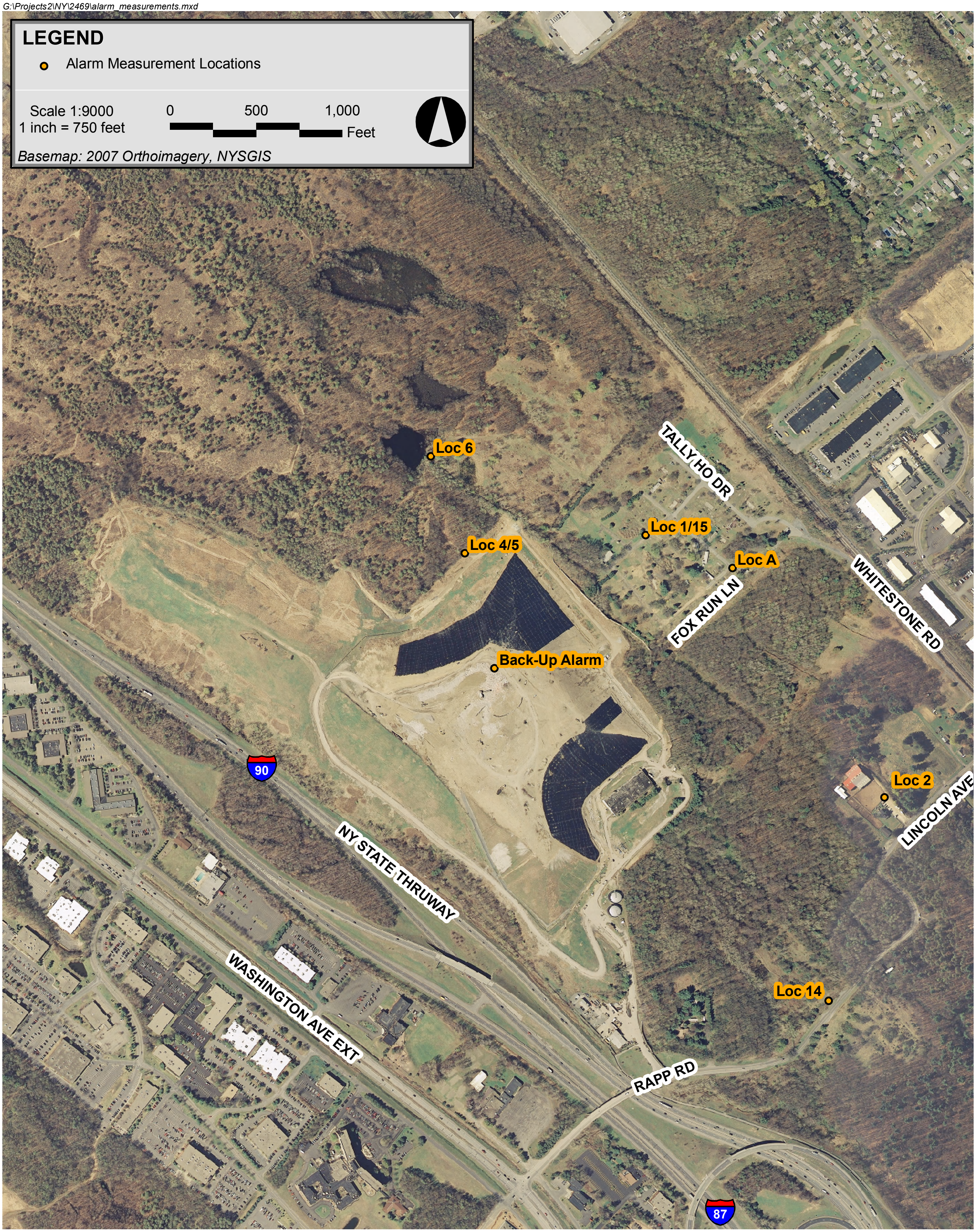


Table 2

Rapp Road Landfill Back-Up Alarm Measurements
Albany, NY
25-Jun-08

Loc.	Overall L_{eq} Sound Level	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8.0 kHz	10.0 kHz
	(dBA)	(dB)	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
1/15	57	59	59	57	56	62	53	55	58	65	54	46	51	48	50	48	48	47	46	44	42	39	37	35	33	29	26	23
A	55	53	54	52	51	54	50	52	56	60	51	45	50	46	48	46	46	47	46	43	40	37	33	31	34	26	19	16
2	52	56	56	55	56	56	56	57	57	59	49	43	44	43	44	45	41	40	39	36	33	33	34	33	29	26	23	19
14	54	60	61	60	58	58	61	54	51	49	47	45	46	47	48	46	47	47	44	41	36	32	28	25	25	20	16	20
4/5	48	52	56	56	54	61	50	50	48	48	42	39	41	37	37	35	36	35	33	32	31	31	34	32	42	31	25	24
6	47	53	52	50	47	52	46	48	41	42	39	34	39	37	40	39	36	36	36	35	31	32	34	34	32	30	28	25



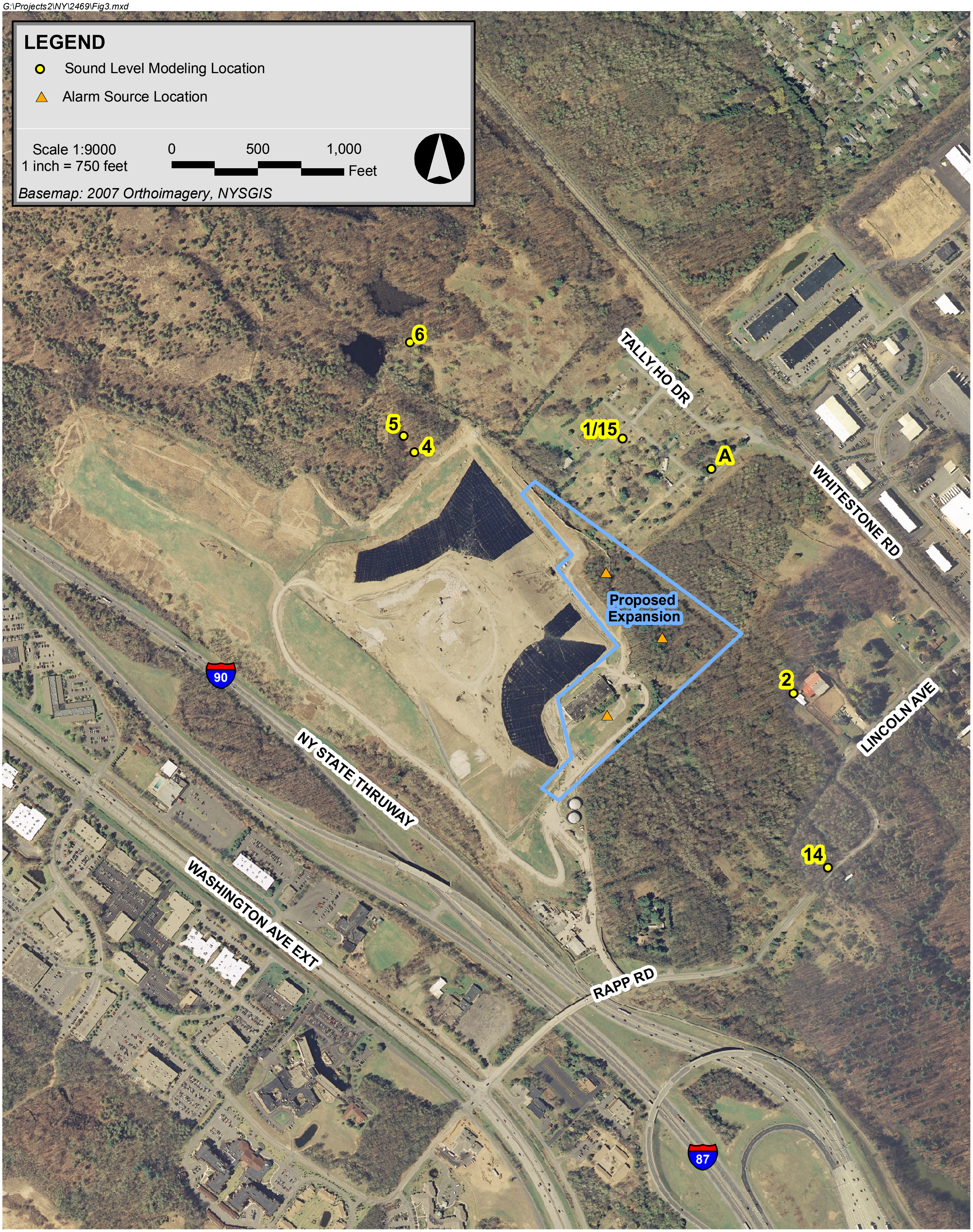
Albany Landfill **Albany, NY**

Epsilon ASSOCIATES INC.

Figure 2

Rapp Road Landfill Back-Up Alarm Measurements

G:\Projects2\NY\2469\Fig3.mxd



Albany Landfill **Albany, NY**

Epsilon ASSOCIATES INC.

Figure 3
Cadna/A Noise Modeling Locations

Table 6

"Prominent Discrete Tone" Calculation for Three One-Third-Octave Bands

Loc.	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	Sound Level Relative to Adjacent Bands	Prominent Discrete Tone?
	dB	dB	dB	dB	dB		
1/15	48	45	46	44	42	-1	No
A	46	44	46	43	40	-2	No
2	41	45	39	36	33	5	Yes
14	47	38	44	41	36	-7	No
4/5	36	36	33	32	31	1	No
6	36	38	36	35	31	1	No

Loc.	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	Sound Level Relative to Adjacent Bands	Prominent Discrete Tone?
	dB	dB	dB	dB	dB		
1/15	48	47	42	47	42	-5	No
A	46	47	41	46	40	-6	No
2	41	40	42	47	33	-2	No
14	47	47	35	40	36	-8	No
4/5	36	35	33	38	31	-3	No
6	36	36	35	40	31	-3	No

Loc.	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	Sound Level Relative to Adjacent Bands	Prominent Discrete Tone?
	dB	dB	dB	dB	dB		
1/15	48	47	42	47	42	5	Yes
A	46	47	41	46	40	5	Yes
2	41	40	42	47	33	9	Yes
14	47	47	35	40	36	5	Yes
4/5	36	35	33	38	31	6	Yes
6	36	36	35	40	31	7	Yes