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Technical Memorandum

To	Thai-Chau Le, (City of San José)
From	Aditi Joshi; Cheri Velzy, and Jill Quillin, (ERM)
Date	January 24, 2019
Reference	0426385
Subject	Noise Assessment, Recology Transfer Station, 1675 Rogers Avenue, San Jose, CA

1 Introduction

The proposed increase in utilization of the Recology Rogers Avenue Transfer Station will involve an increase in average daily vehicle trips of approximately 54 round trips as well as extended hours of operation of the Facility. This memo assesses the potential for noise impacts associated with the proposed Project.

As the proposed Project does not involve construction activity, this assessment focuses on potential operational phase impacts. This report does not assess impacts to existing vibration levels, as the Project does not involve the use of heavy equipment or machinery (e.g. pile drivers, jackhammers, drills) that would induce perceptible levels of groundborne vibration. With reference to the screening methodology outlined by the Federal Transit Authority in its Transit Noise and Vibration Impact Assessment guidance dated May 2006, the project does not involve the movement of trucks on uneven ground, or the operation of vehicles near, under or within vibration-sensitive buildings. Truck movements typically generate vibration at levels that do not cause a significant human response (FTA, 2006).

2 Background

Noise is undesirable sound that either disrupts daily life or minimizes the comfort, repose, or health of a recipient. Sound is composed of a pressure wave passing through a medium, usually air. The magnitude of sound is measured in decibels (dB), with the human hearing threshold sound level being zero dB. Since the range of sound levels detected by the human ear is quite large, sound is measured on a logarithmic scale. One important characteristic of sound is the frequency, which is the number of sound wave cycles that pass an object in one second. The frequency is measured in hertz (Hz). Although the audible human hearing frequency range is typically 20 to 20,000 Hz, not all frequencies elicit the same human hearing response. Since humans are less sensitive to very low and very high frequencies, sound measurements are typically adjusted such that more weight is assigned to the mid-range frequencies to which humans are most sensitive. The conventional weighting scale required by local, state, and federal agencies is the A-weighted sound level (dBA), and is thus used in this analysis.

Because environmental noise fluctuates over time, most descriptors average the sound level over the time of exposure, and some add “penalties” during the times of day when intrusive sounds would be more disruptive to listeners. The most commonly used descriptors are:

- Equivalent A-weighted noise level (Leq). The Leq is an average or constant sound level over a given period that would have the same sound energy as the time-varying, A-weighted sound over the same period.
- Maximum noise level (Lmax). The highest instantaneous noise level during a specified time period. In this report, it is presented as LAFmax, which is an A-weighted level measured using the fast time weighting response of the sound level meter.
- Statistical descriptors (e.g. L10 and L90). These descriptors represent the noise level exceeded for a given percentage of a specified time period. L10 is the level exceeded 10% of the time. L90 is the level exceeded 90% of the time, and is considered an indicator of ‘background’ noise levels.
- Day-night average noise level (DNL or Ldn). The DNL or Ldn is a 24-hour average sound level; however, for the night hours between 10:00 p.m. and 7:00 a.m., a penalty of 10 dBA is added to the average. This additional 10 dBA accounts for the tendency of people to perceive noise to be louder at night.
- Community noise equivalent level (CNEL). The CNEL is similar to the DNL, except that, in addition to the 10:00 p.m. to 7:00 a.m. 10 dBA penalties, a 5 dBA penalty is applied to noise levels occurring from 7:00 p.m. to 10:00 p.m. Typically, day-night average (DNL) noise levels are within 1 dBA of the CNEL.

2.1 Effects of Noise on People

The effects of noise on people can generally be divided into three categories:

- Interference with activities such as speech, sleep, and learning – The thresholds for speech interference indoors are generally considered to be about 45 dBA if the noise is steady, and above 55 dBA if the noise is fluctuating. Outdoors, the thresholds are about 15 dBA higher. Interior residential standards for multi-family dwellings are set by the State of California at 45 DNL. This standard is designed for sleep and speech protection, and most jurisdictions apply the same criterion for all residential uses.
- Subjective effects of annoyance, nuisance, and dissatisfaction – Based on attitude surveys used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas, the main causes for annoyance due to noise are interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure for noise is considered to provide a valid correlation of noise level and the percentage of people annoyed. Three aspects of a community noise are most important in determining subjective response – the level of sound, the frequency composition or spectrum of the sound, and the variation of sound level with time.
- Physiological effects such as hearing loss or sudden startling – While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within

a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event, such as an explosion. Natural hearing loss associated with aging may also be accelerated by chronic exposure to loud noise. The Occupational Safety and Health Administration (OSHA) has a standard which is set at the noise threshold where hearing loss may occur from long-term exposures. More specifically, the maximum allowable level is 85 dBA averaged over eight hours, and higher if the allowable exposure time is correspondingly shorter.

Environmental noise typically produces effects in the first two categories outlined above. Workers in industrial plants generally experience noise in the third category.

2.2 Noise Attenuation

Noise is dependent on the distance a receptor is from the noise source. Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA as the distance from the source doubles, depending on the topography of the area and environmental conditions (e.g. atmospheric conditions and noise barriers, vegetative or manually created). For example, if a stationary source 25 feet away from a receptor has a noise level of 60 dBA, the noise level would be approximately 52.5 to 54 dBA at twice the distance (50 feet).

Widely distributed noise, such as that from a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate; approximately 3 to 6 dBA per distance doubled. Natural and manmade barriers can sometimes achieve up to 15 dBA reduction in noise level depending on the characteristics of the barrier.

3 Methodology

The evaluation of potential noise impacts involves an assessment of the magnitude of noise levels against the relevant limits. These limits have been established in planning documents and municipal codes of the City of San José and implicitly take into account the sensitivity of receptors (see Section 1.3.1 below). Noise measurements were taken to understand ambient noise levels at the site.

A noise study was conducted at the site in 2010 by Charles M. Salter Associates Inc., (Recology Silicon Valley, Environmental Noise Assessment, 1675 Rogers Avenue – San Jose, California, dated 1 July 2010). The 2010 study measured noise levels from the main sources of noise associated with the Project, i.e., waste processing, transfer trailers and collection vehicles. The analysis summarized in this attachment uses the source noise levels from the 2010 study to predict noise from the proposed Project in conjunction with the increased vehicle numbers from the Project Description. Background noise levels and project activity noise levels were then combined to calculate the average day-night noise levels. These levels were then assessed against the applicable criteria for industrial facilities in the City of San José.

3.1 Criteria

The City of San José Municipal Code limits noise levels at the property line of residential, commercial, or industrial properties (City of San José, 2002). For industrial sources adjacent to property zoned for industrial use, this limit is 70 dBA at the property line, except under a special use permit.

Community noise criteria are established in the San José 2040 General Plan (General Plan), dated November 2011. The General Plan established objectives for acceptable levels of noise development projects in San José (City of San José, 2011). The acceptable level for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Of relevance to this study are the City's acceptable exterior noise level objectives, which are presented in Figure 1.

Figure 1: Community Noise Level Criteria for San José

Table EC-1: Land Use Compatibility Guidelines for Community Noise in San José

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55	60	65	70	75	80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]						
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
3. Schools, Libraries, Museums, Meeting Halls, Churches						
4. Office Buildings, Business Commercial, and Professional Offices						
5. Sports Arena, Outdoor Spectator Sports						
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters						

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable:

- Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Source: Table EC-1 of San José 2040 General Plan (City of San José, 2011)

3.2 Receptors

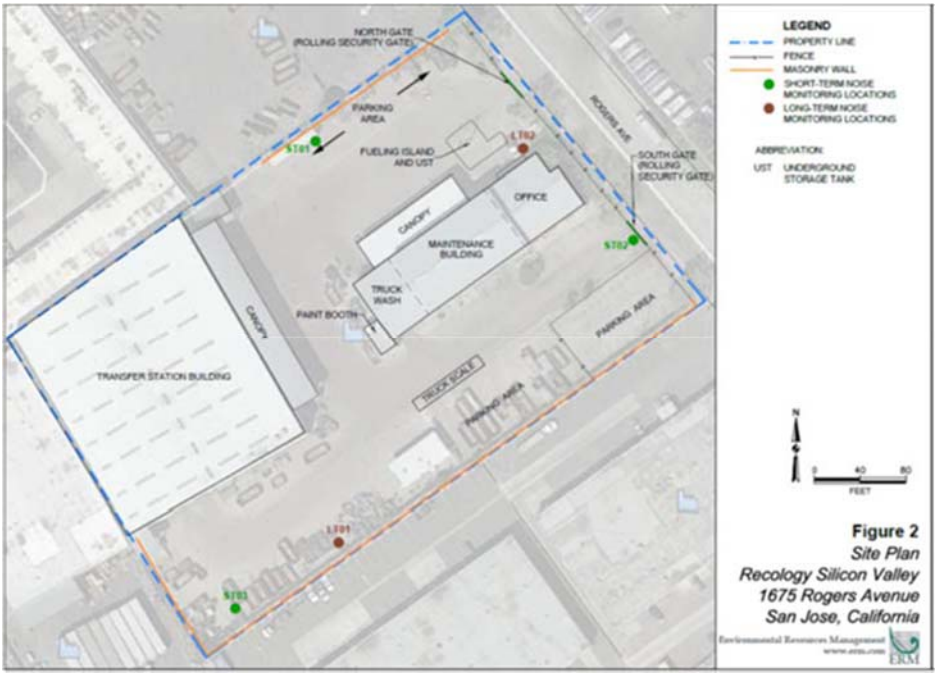
The facility is located in an area zoned for industrial land use, and as such does not have any neighboring facilities that fall within a sensitive land use classification. The nearest residential receptor is a hotel located approximately 1,100 feet to the northeast of the facility. It is separated from the facility by other industrial and commercial properties. Industrial receptors are located adjacent to the Facility to the south and west. Industrial receptors to the east are separated from the facility by Rogers Avenue. A parking lot is located to the north of the site boundary.

4 Baseline Noise Levels

Ambient noise levels at boundaries of the Facility were measured at 5 locations within the site between July 24 and July 27, 2018 (see Figure 2). Long term measurements were collected at two

locations along the site boundaries from approximately 5 pm on July 24, 2018 through 10:30 am on July 26, 2018. ERM selected the monitoring points based on site conditions, i.e. accessibility and locations that were a safe distance from truck paths and would not interfere with site activities. LT01 was placed along the southern site boundary, within a landscape feature in the employee parking area. LT02 was placed along the western site boundary, also near a small employee parking area. Noise measurements were collected over a 48-hour period at location LT02. Due to an instrument error, measurements were terminated earlier than intended at LT01; 40 hours of data were collected at this location.

Figure 2: Noise Measurement Locations



The results of long-term monitoring are summarized in Table 1. Community noise levels at the boundary are expressed in terms of Day-Night Noise Levels (DNL), as described in Section 1.2 of this document. Recology confirmed that operations at the facility were consistent over the monitoring period; therefore, for LT01, 8 hours from the same time on the previous day were used to calculate the DNL at this location for the second 24-hour period. Reports from the sound level monitors are attached in Appendix A.

Table 1: Long-Term Noise Monitoring Results

Location	DNL dBA	LAFmax dBA
LT01	57 to 59	94.9 at 05:32 on July 26 2018
LT02	63 to 69	109.6 at 09:33 on July 25 2018

Noise levels at LT01 are primarily from employee vehicles, waste processing activities and truck and trailer movements within the site. It was observed that the roll-up doors of the building were generally closed. Based on site observations, the higher noise levels at LT02 are likely to be the result of truck and trailer movements passing in closer proximity to the noise meter through the nearest gate; as well as noise from transportation along Rogers Avenue outside the site. Trains passing along the railway line running along Rogers Avenue and are expected to have contributed to noise levels at LT02. The measured levels at LT02 are consistent with the DNL of 67 to 71 dBA for the North Planning Area presented in the Environmental Noise Assessment of the Envision San Jose 2040 General Plan Comprehensive Update (City of San José, 2010).

The long-term readings were supplemented by short-term (15 minute) measurements at 3 locations on the morning of July 27, 2018. Three consecutive readings of 5 minutes were taken at each location. The range of values obtained is shown in Table 2, along with observations of onsite and off-site activities contributing to noise levels during the measurement period. It is noted that transfer operations at the site had ceased prior to the short term measurement period.

Table 2: Short-Term Noise Monitoring Results

Location	Leq 5 min dBA	LAFmax dBA	LA10 dBA	LA90 dBA	Observations
ST01	66 to 72	82 to 85	70 to 77	57 to 61	Truck movements within site - backing up, idling, driving into site, leaving transfer area. Forklift movement within site. Trucks passing along Rogers Avenue.
ST02	67 to 75	78 to 103	69 to 73	63 to 65	Trucks entering the site through gate. Vehicles including large trucks passing along Rogers Avenue. Concrete batch plant operations across the street.
ST03	58 to 60	72 to 73	58 to 64	56 to 57	Machinery operating at adjacent site (audible but not visible), traffic along Rogers Avenue

Noise levels at ST01 were primarily from truck movements and truck parking along the northern boundary. Noise from vehicle and truck movements along Rogers Avenue, including trucks from the cement plant across the street, were identified as the main contributors to environmental noise levels at ST02. Monitoring at ST03 was undertaken at a time at which loading operations had ceased for

the day; therefore it is considered representative of daytime background levels. The results are very similar to the long-term results obtained along the southern boundary (LT01).

5 Predicted Project Noise Levels

Noise levels from various sources at the facility were established during a 2010 noise study for the site (Table 3). Waste handling and processing activities were measured in a simulation which involved waste being dropped off to the building by trucks and moved by forklift onto the conveyer from where it was sorted and dropped into large metal bins. The measured outdoor noise levels are shown below.

Table 3: Measured Source Noise Levels

Source	Noise Levels
Waste handling and processing inside building	60 to 70 dBA at boundary (with doors open) 60 to 65 dBA at boundary (with doors closed)
Transfer trailers	74 – 79 dBA at 25 feet (66 – 71 dBA at boundary)
Collection trucks (weighing and traveling to building)	77 dBA at 25 feet (69 dBA at boundary)

Source: Charles M. Salter Associates, Inc., July 2010. *SP09-065 Initial Study - Recology Silicon Valley Environmental Noise Assessment*

5.1 Processing

For waste handling and processing, as no new equipment is to be installed for the Project, it is expected that the noise levels generated will be similar to the value presented above, but will be generated over a longer period of operation (4 am to 6 pm). The increased hours of operation may have an impact on the DNL at the boundary; however, this change reflects a limited extension of operating hours (4 hours) that would occur during normal working hours, which limits the potential for nuisance impacts. As noise levels at the boundary approach 70 dBA due to waste processing, it is recommended that the facility continue its practice of keeping the doors of the processing building closed whenever possible to limit boundary noise impacts.

5.2 Transfer trailers and collection vehicles

The noise levels from each of these sources was calculated at the nearest boundary. For transfer trailers and collection trucks, this distance is approximately 65 feet from the northern and southern boundaries. At this distance, noise levels from each of the transfer trailers and collection vehicles will attenuate to up to 71 dBA and 69 dBA respectively at the north and south boundaries. According to Recology the maximum number of truck movements would occur between 4 am and 7 am, with approximately 20 vehicles leaving the site each hour over a 15- minute period, i.e. up to two trucks in a 5 minute period. The predicted noise levels at the north, south, and east boundaries are estimated to be up to 73 dBA during this time of peak truck movements. Outside of the hours of 4 am to 7 am, collection truck and transfer trailer movements will be staggered over the rest of the day. A value of

69 dBA is therefore used to represent the hourly noise levels at the north and south boundaries due to truck and transfer trailer movements for operational hours other than 4 am – 7 am. During these off-peak hours, a value of 72 dBA (assuming 2 trucks per five minutes) is used for the eastern boundary, as this is the boundary along which the facility gates are located.

5.3 Employee and other vehicles

In addition to the main waste transfer activities, some noise will be generated from employee vehicles entering and traveling within the site. Short-term measurements at the site indicated noise levels of around 68 dBA at 25 feet from passing vehicles. Noise levels for the number of vehicles associated with the project are estimated to be around 64 dBA at the boundaries. These vehicle movements will generally occur around shift change and office start/ end times. Based on traffic flow within the site and the size of the site, it is estimated that such vehicles will be driven for a very short time (a minute or two) within the site before being parked. Therefore, the contribution of employee and other vehicles to boundary noise levels is expected to be limited in terms of both magnitude and duration.

5.4 DNL at Site Boundaries and Nearest Residential Receptor

Noise levels at the western boundary are dominated by waste processing, while at other boundaries, transfer trailer and collection vehicles movements are likely to dominate. The estimates below conservatively assume that the noise from the project activities is emitted constantly over the 14-hour operation period; in reality, noise levels will fluctuate and are likely to be below these values. A level of 57 dBA was used for nighttime noise at the South and West boundaries, and a level of 58 dBA was used for the North and East boundaries, using the highest hourly noise levels measured between 10 pm and 4 am during the monitoring survey. For the evening hours between 6pm and 10pm, a value of 59 dBA was used at all boundaries, which is also based on the highest hourly noise level measured during that period. The predicted DNL values at each site boundary are shown below.

Table 4: Boundary Noise Levels

Boundary	Estimated Post-Project DNL (dBA) at Recology Site Boundary
North	69
South	69
East	70
West	68

It is noted that noise levels at the industrial receptors located on the other side of the southern and western boundary are likely to be below these values due to the concrete walls separating the

facilities. Noise at the property lines of receptors to the east of the site will also be lower than these values, as the receptors are separated from the site by a distance of approximately 70 feet.

Noise from the Project is estimated to result in a DNL of approximately 30 dBA at the nearest residential receptor (i.e. the hotel located 1,100 feet from the site), which is unlikely to be audible.

6 Conclusion

Long-term and short-term measurements at the Recology site showed that current noise levels are within the acceptable level of 70 dBA prescribed by the City of San José. Exterior DNL levels at the site boundaries from project activities were predicted to range from 68 to 70 dBA. The DNL at the nearest residential receptor from Project activities was estimated to be 30 dBA; therefore noise from the Project is unlikely to be audible at this location. It is recommended that the facility continue its practice of keeping the doors of the transfer station building closed whenever possible to limit noise impacts to other industrial facilities.

7 References

City of San José, 2002. City of San José Municipal Code – Chapter 20.50 Industrial Zoning Districts, Part 5 – Performance Standards, Section 20.50.300. https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT20ZO_CH20.50INZODI_PT5PEST

City of San José, 2011. Envision San José 2040 – General Plan. Nov 2011. http://www.sanjoseca.gov/index.aspx?NID=1737

Charles M. Salter Associates, Inc, 2010. Recology Silicon Valley, Environmental Noise Assessment, 1675 Rogers Avenue – San Jose, California. July 2010.

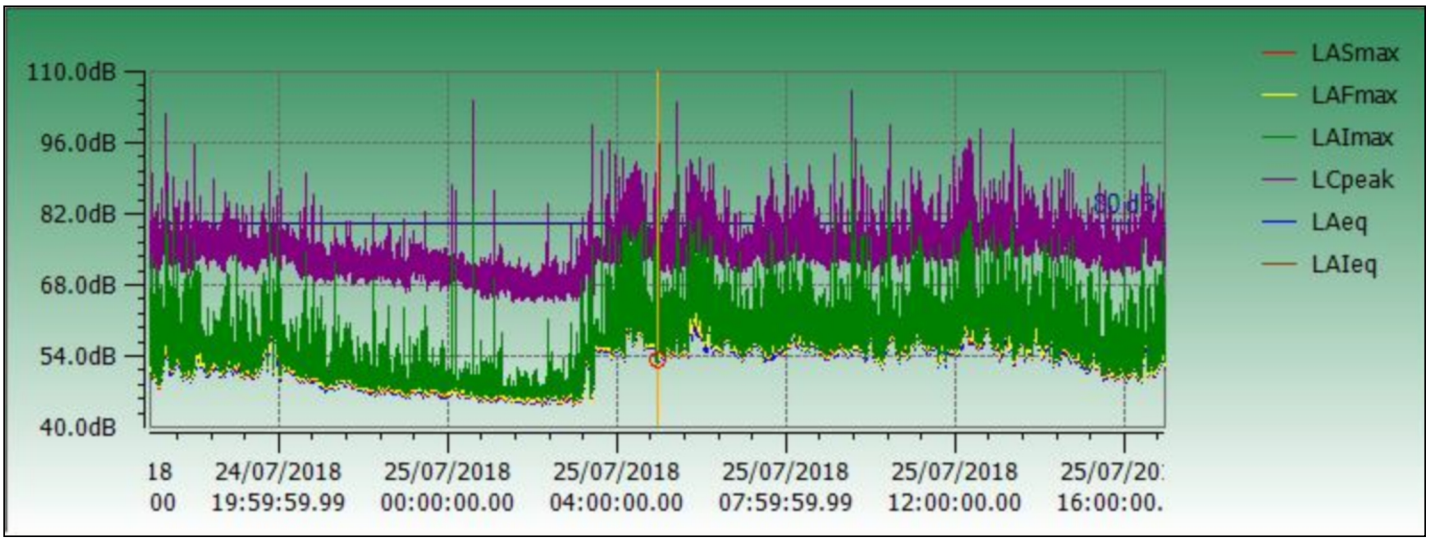
FTA, 2006. Transit Noise and Vibration Impact Assessment. May 2006. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf

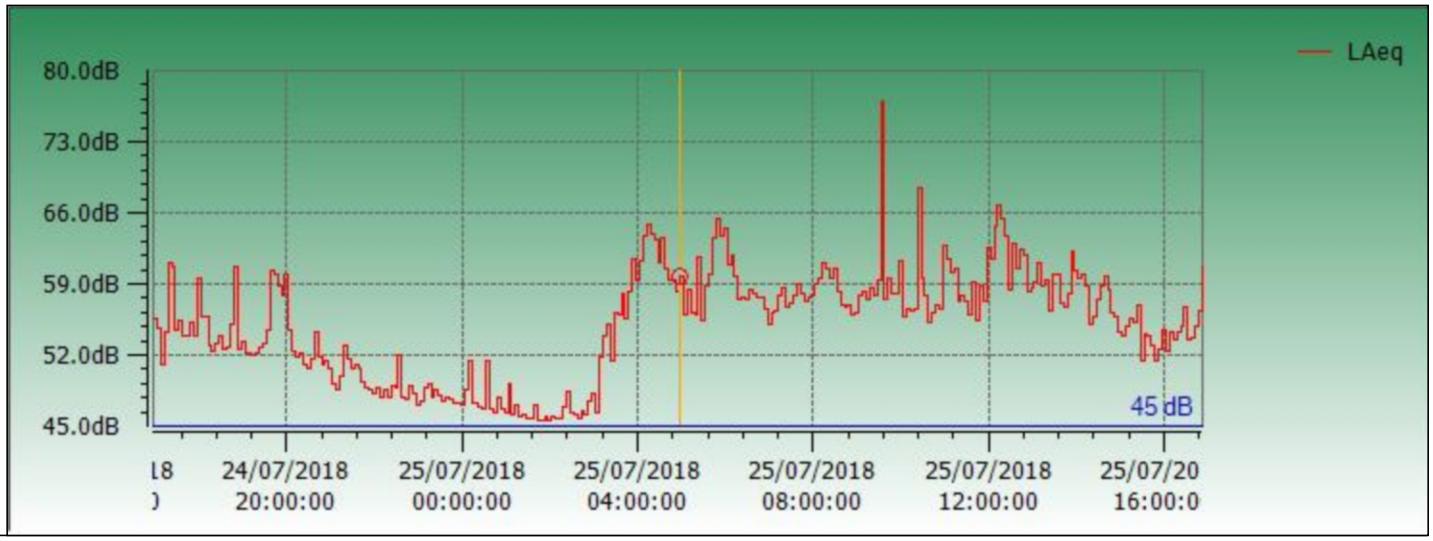
Appendix A Noise Monitoring Results

Casella CEL Ltd.

Report On Recology

Instrument Model	**CEL-633C**		
Serial Number	4637969	End Date & Time	7/25/2018 4:57:42 PM
Start Date & Time	7/24/2018 4:57:42 PM	Calibration (Before) Date	7/24/2018 4:49:35 PM
Duration	24:00:00 HH:MM:SS	Calibration (Before) SPL	114 dB
LAeq	58.8 dB	Calibration (After) Date	7/27/2018 12:28:23 PM
LAFmax with Time	94.9 dB (7/25/2018 9:33:04 AM)	Calibration Drift	-3.2 dB
LAFmin with Time	43.6 dB (7/25/2018 2:37:45 AM)	Result	Period
Response	Random		





Casella CEL Ltd.

Report On Recology

Instrument Model	**CEL-633C**		
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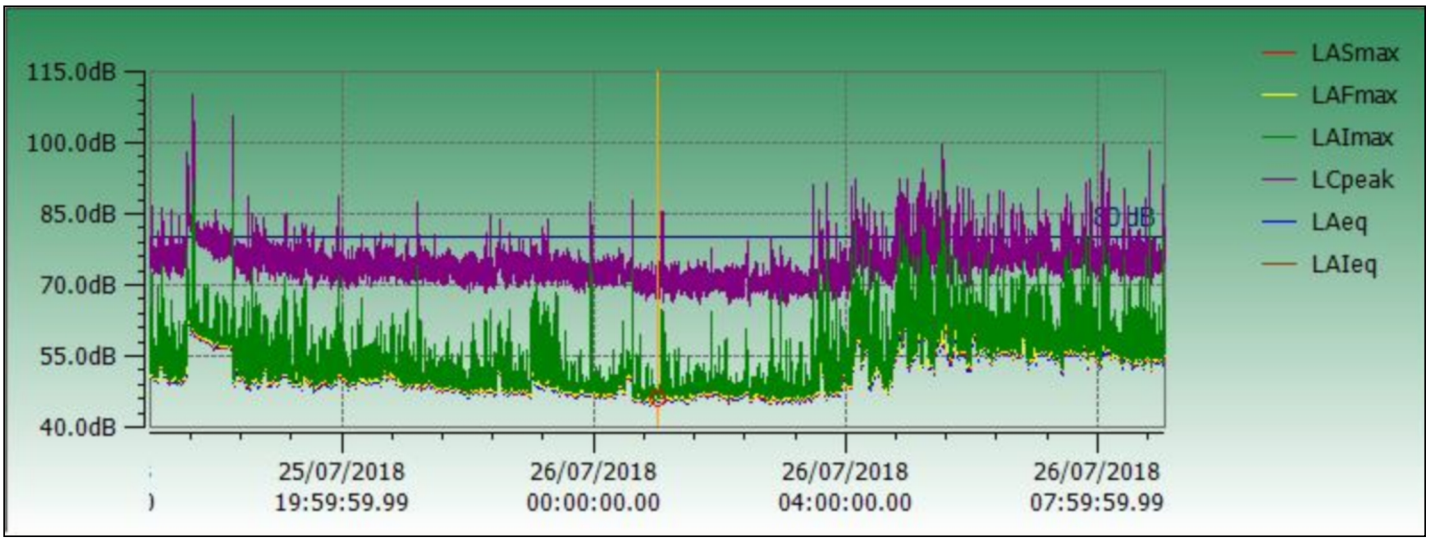
Duration	16:06:35 HH:MM:SS	Calibration (Before) SPL	114 dB
LAeq	56.3 dB	Calibration (After) Date	7/27/2018 12:28:23 PM
LAFmax with Time	92.6 dB (7/26/2018 5:32:32 AM)	Calibration Drift	-3.2 dB
LAFmin with Time	44.1 dB (7/26/2018 12:52:56 AM)	Result	Period
Response	Random		



Report On Recology

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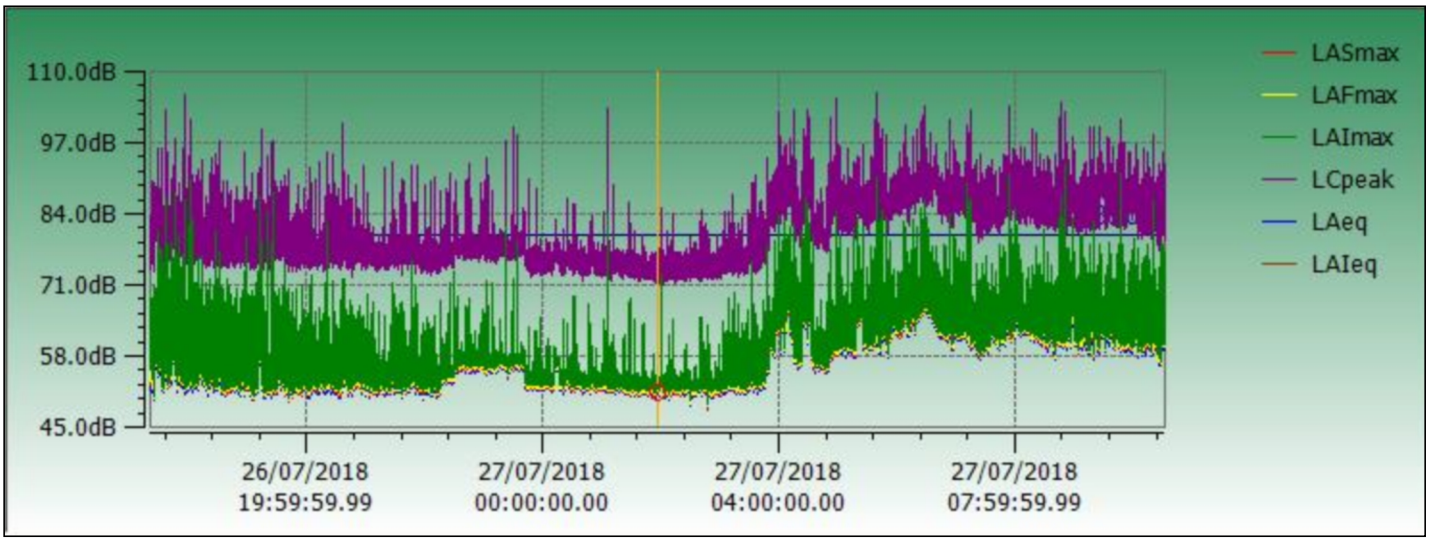
Duration	17:11:55 HH:MM:SS	Calibration (Before) SPL	114 dB
LAeq	62.1 dB	Calibration (After) Date	
LAFmax with Time	91.6 dB (7/27/2018 8:51:56 AM)	Calibration Drift	-0.4 dB
LAFmin with Time	47.7 dB (7/27/2018 2:48:03 AM)	Result	Period
Response	Random		



Casella CEL Ltd.

Report On Recology

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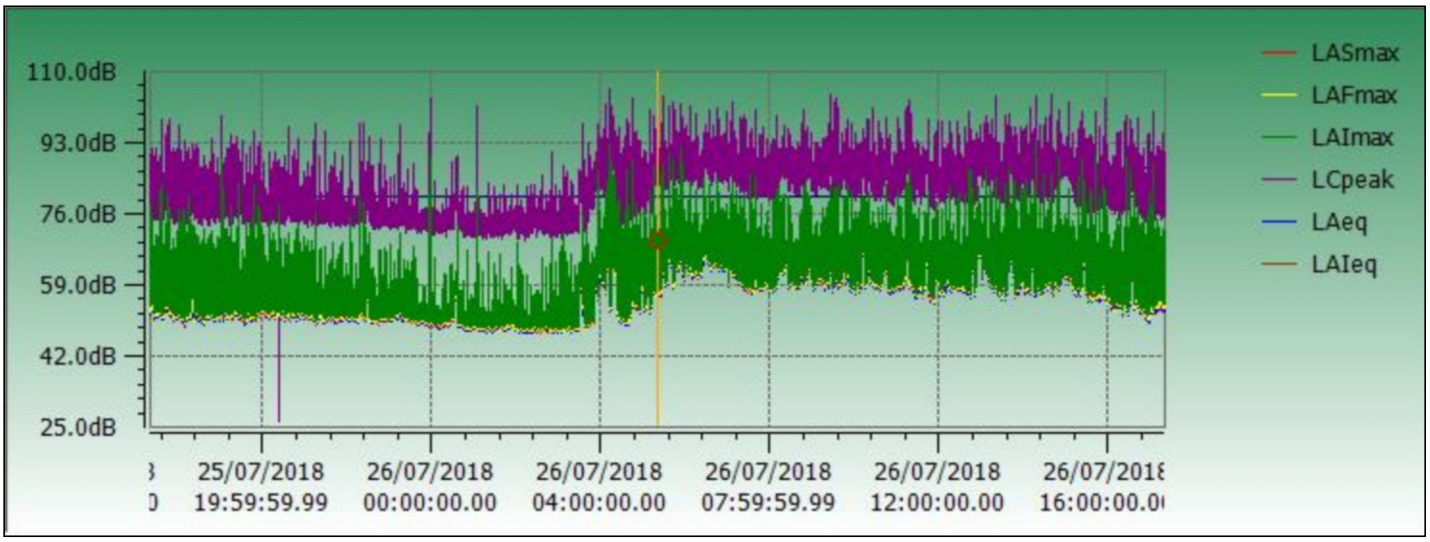
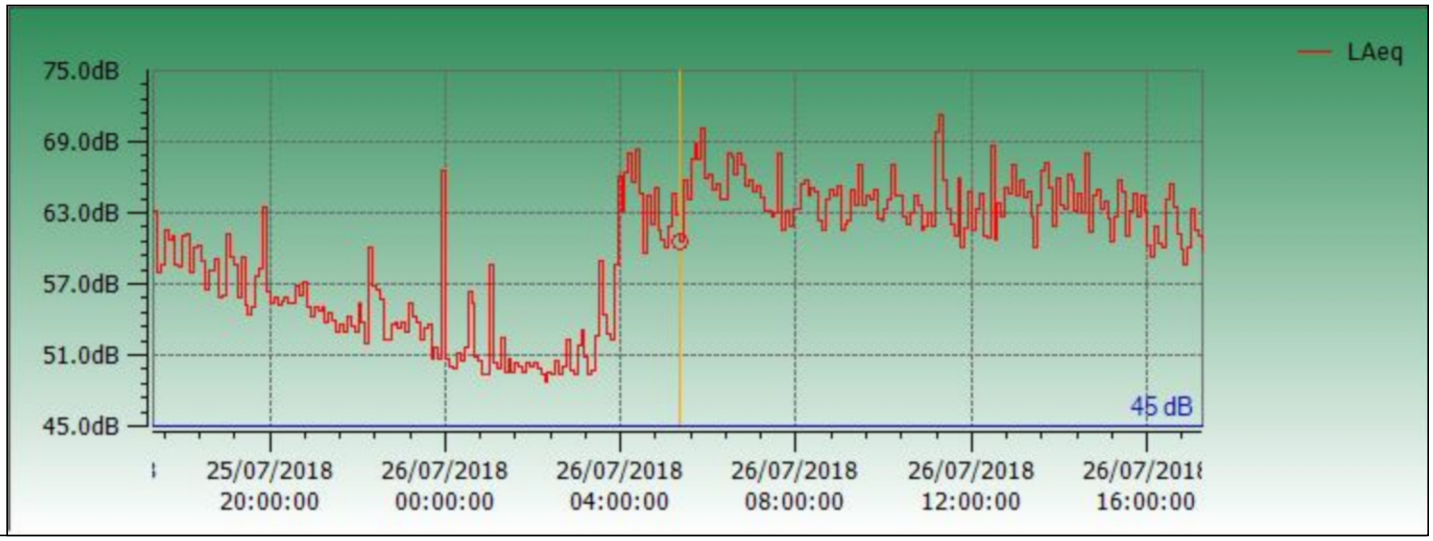
Duration	24:00:00 HH:MM:SS	Calibration (Before) SPL	114 dB
LAeq	62.5 dB	Calibration (After) Date	
LAFmax with Time	92.2 dB (7/26/2018 2:17:47 PM)	Calibration Drift	-0.4 dB
LAFmin with Time	46.8 dB (7/26/2018 2:33:40 AM)	Result	Period
Response	Random		





Casella CEL Ltd.

Report On Recology

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LAeq	69.3 dB	Calibration (After) Date	
LAFmax with Time	109.6 dB (7/25/2018 9:33:11 AM)	Calibration Drift	-0.4 dB
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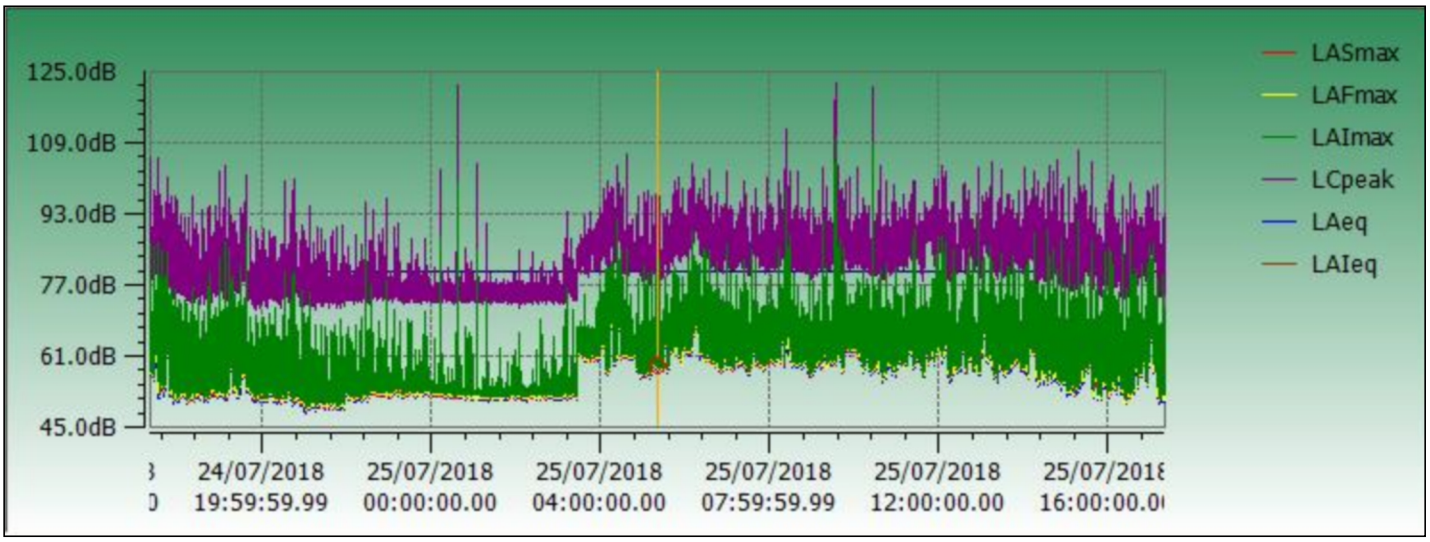
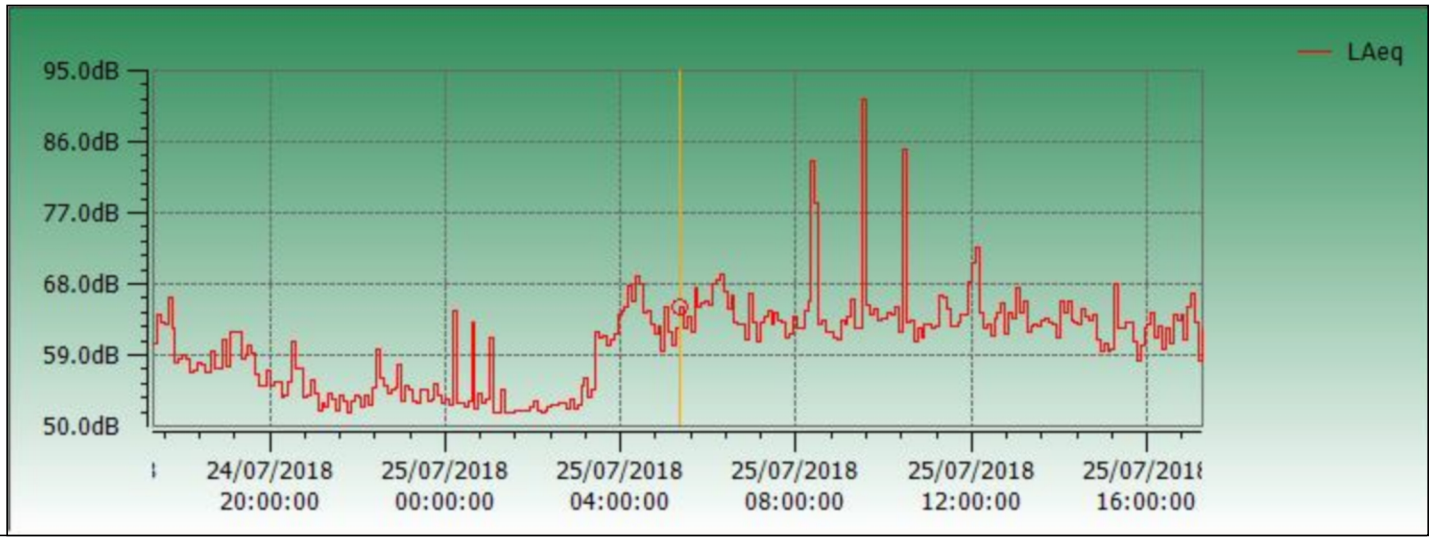
Response	Random		





Report On Recology

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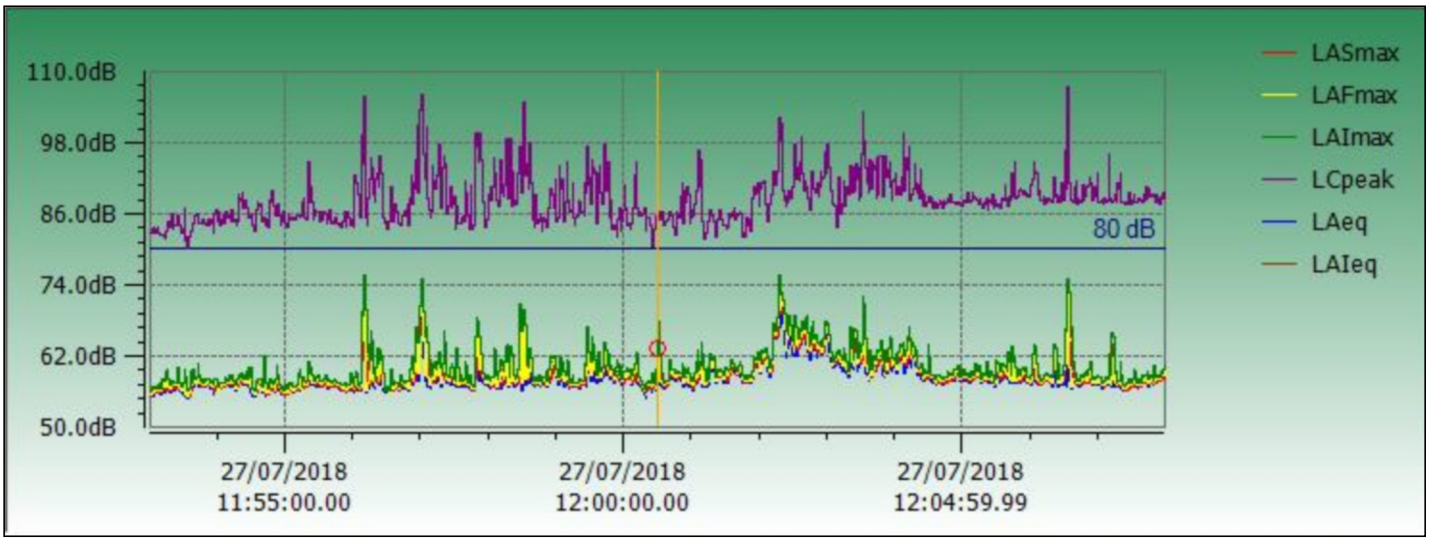
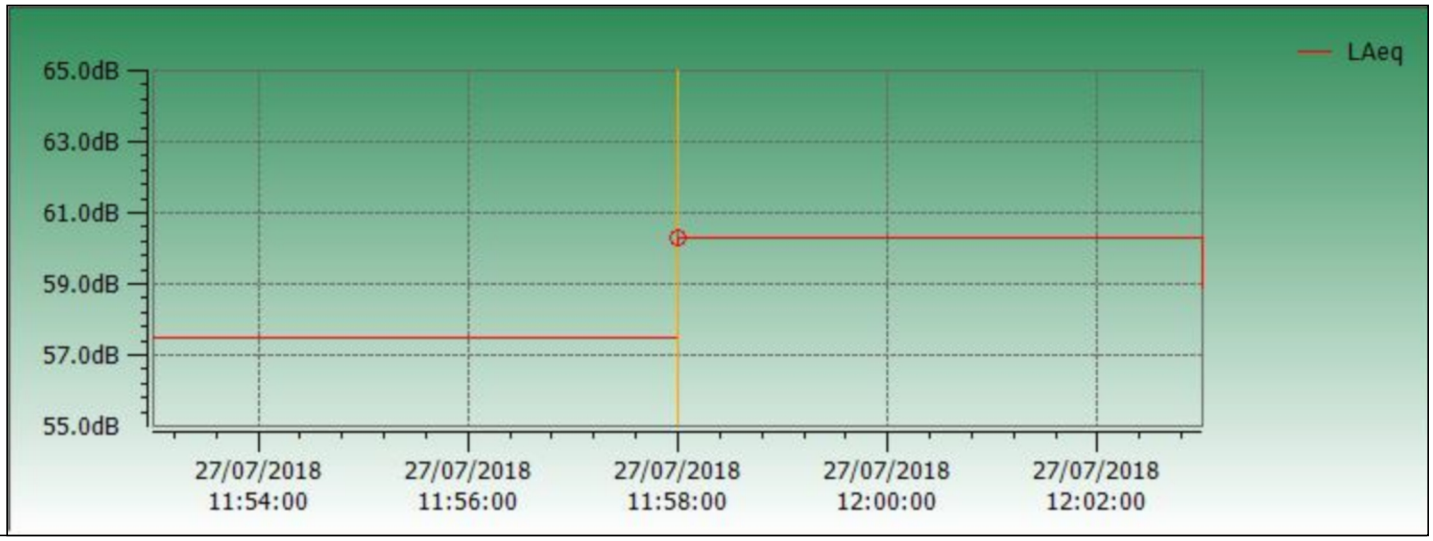
Duration	00:15:00 HH:MM:SS	Calibration (Before) SPL	114 dB
LAeq	59 dB	Calibration (After) Date	
LAFmax with Time	73.2 dB (7/27/2018 12:02:17 PM)	Calibration Drift	-0.4 dB
LAFmin with Time	54.5 dB (7/27/2018 11:53:34 AM)	Result	Period
Response	Random		





Report On Recology

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LAeq	71.8 dB	Calibration (After) Date	
LAFmax with Time	102.7 dB (7/27/2018 11:33:39 AM)	Calibration Drift	-0.4 dB
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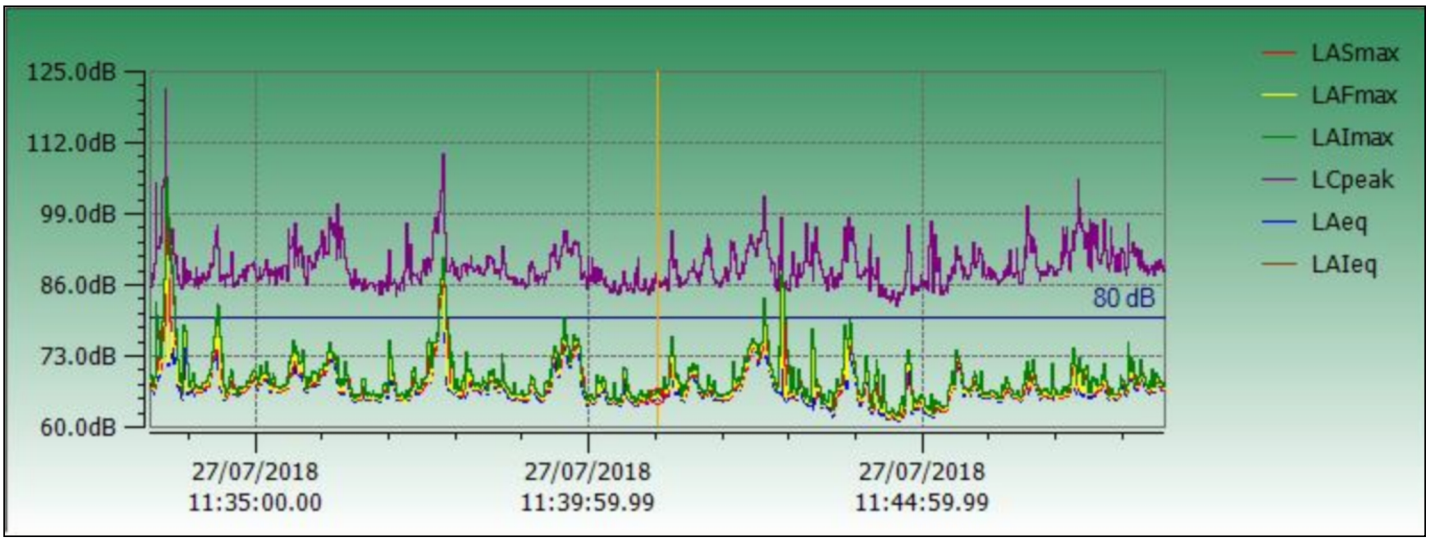
Response	Random		



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LAeq	69.3 dB	Calibration (After) Date	
LAFmax with Time	85.2 dB (7/27/2018 11:20:38 AM)	Calibration Drift	-0.4 dB
LAFmin with Time	53.5 dB (7/27/2018 11:28:07 AM)	Result	Period
Response	Random