Report VA2752.191211.NIA

10-12 Old Station Business Park, Compton

Noise Impact Assessment

11 December 2019

Carbosynth
Axis House
High Street
Compton
Newbury
Berkshire
RG20 6NL

VENTA ACOUSTICS

01962 461016
0203 8650332
mail@ventaacoustics.com

registered company no. 10139494

Contents

Attachments

1. Introduction

It is proposed to install a new air handling unit, chiller unit, extract fans and solvent storage tanks at 10-12 Old Station Business Park, Compton.

Venta Acoustics has been commissioned by Carbosynth to undertake an assessment of the potential noise impact of these proposals in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the background noise levels at the most affected noise sensitive receptors. These levels are used to undertake an assessment of the likely impact with reference to the planning requirements of West Berkshire Council.

2. Design Criterion and Assessment Methodology

2.1 Requirements of the Local Authority

It is understood that West Berkshire Council's planning policy requirements that noise emissions from plant is at least 5dB below the local background noise level or 10dB below where tonal elements are expected as assessed at the most affected noise sensitive receivers.

2.2 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to suitable internal noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining Room	40 dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ hour}$	30 dB $L_{Aeq,\ 8\ hour}$

Table 2.1 - Excerpt from BS8233: 2014 **[dB ref. 20µPa]**

3. Site Description

As illustrated on attached site plan VA2752/SP1, the site building is located in a business park on the edge of Compton surrounding by agricultural fields with dwellings at a distance of approximately 125m to the west.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Tuesday 7th and Thursday 9th May 2019 at the location shown in site plan VA2752/SP1.

This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-11461-E0	UCRT18/1681	5/7/18
Larson Davis calibrator	CAL200	13049	UCRT19/1501	18/4/19

Table 4.1 – Equipment used for the survey

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA2752/TH1-2.

The background noise level is determined by distant traffic and the general rural soundscape.

The typical background noise levels measured were:

Monitoring Period	Typical[1] $L_{A90,5min}$
07:00 – 19:00 hours	41 dB
23:00 – 07:00 hours	32 dB

Table 4.2 – Typical background noise levels **[dB ref. 20 µPa]**

[1] The typical L_{A90} value is taken as the 90th percentile of all L_{A90} values measured during the relevant period.

4.3 Plant Noise Emission Limits

On the basis of the measured noise levels and the planning requirements of the Local Authority, and considering that it is not expected that tonal noise will be generated by the proposed plant units, the following plant specific sound levels should not be exceeded at the most affected noise sensitive receivers:

Monitoring Period	Design Criterion (L_{Aeq})
07:00 – 19::00 hours	36 dB
19:00 – 07:00 hours	27 dB

Table 4.3 – Specific sound pressure levels not to be exceeded at most affected noise sensitive receivers

5. Predicted Noise Impact

5.1 Proposed plant

The following plant is proposed for installation at the locations indicated on site plan VA2752/SP1.

Plant Item	Quantity	Proposed Model	Notes
Chiller	1	Bluebox Zeta Rev 8.2	In plant area
AHU	1	Swegon Gold F SD 80	In plant area
Solvent Storage Fans	2	Rosenberg DQ 315-4 Ex	
Extract Fans	6	Central Fans Colasist Ltd Various	Set to 80% duty during the day and 20% duty at night

Table 5.1 – Indicative plant selections assumed for this assessment.

Consulting the manufacturer's datasheets, the following noise emissions levels are attributed to the proposed plant items:

Plant Item	Octave Band Centre Frequency (Hz) Sound Pressure/Power Level, L_p@1m, L_w (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Chiller – L_p @10m	49	48	39	43	44	45	41	36	50
AHU – induct - L_w	80	80	82	69	62	60	55	58	75
Solvent Storage Fans- L_p @1m	31	31	43	46	44	44	41	33	50
EF1 - L_w & dB(A) @ 1m	98	95	94	92	83	80	75	97	88
EF2- L_w & dB(A) @ 1m	71	75	77	75	76	69	62	55	66
EF3- L_w & dB(A) @ 1m	71	75	77	75	76	69	62	55	65
EF4- L_w & dB(A) @ 1m	62	66	68	66	67	60	53	46	65
EF5- L_w & dB(A) @ 1m	90	93	93	89	82	77	73	69	85
EF6- L_w & dB(A) @ 1m	59	64	65	62	65	63	55	45	58

Table 5.2 – Advised plant noise data used for the assessment.

5.2 Recommended Mitigation Measures

The following mitigation is recommended and has been assumed in the calculations.

- The extract fans will be set to 80% duty during the day and 20% duty at night
- A screen will be formed along the eastern side of the chiller. This should be at least 500mm higher than the top of the chiller fans and formed of an imperforate material with a minimum mass per unit area of 8kg/m^2. A gap (nominally 300mm) may be left below the screen for ventilation if required.
- Attenuators with the following insertion losses will be used on the various items of plant:

Plant Item	Octave Band Centre Frequency (Hz) Attenuator Insertion Loss (dB)							
	63	125	250	500	1k	2k	4k	8k
AHU	4	5	13	33	13	10	8	6
EF 2, EF 3, EF 4	2	3	6	15	19	14	13	10
EF 1, EF 5	1	2	6	15	20	15	14	13
EF 6	2	3	6	15	19	14	13	10

Table 5.3 – Attenuator insertion losses

Please note that the above recommendations relate to acoustic issues only. It is recommended that professional advice confirming the suitability of these measures be sought from others with regards to issues such as airflow, structural stability and visual impact.

5.3 Predicted noise levels

The cumulative noise level at the most affected noise sensitive receiver, some 125 meters away, has been calculated on the basis of the above information and assuming the recommended mitigation measures, with reference to the guidelines set out in ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation.*

A summary of the calculations are shown in Appendix B.

Time Period	Predicted Cumulative Noise Level	Design Criterion
07:00-19:00 hours	L_{Aeq} 31dB	L_{Aeq} 36 dB
19:00hour – 07:00 hours	L_{Aeq} 26dB	L_{Aeq} 27 dB

Table 5.4 – Predicted cumulative noise level at most affected noise sensitive receiver and design criterion.

All other air handling and extract plant will be fitted with acoustically specified splitter silencers in order that the cumulative noise level does not exceed the 24-hour design noise criterion.

5.4 Comparison to BS8233:2014 Criteria

BS8233 assumes a loss of approximately 15dB for a partially open window. The external noise level shown in Table 5.4 would result in internal noise levels that achieve the guidelines shown in Table 2.1.

6. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of 10-12 Old Station Business Park, Compton in support of a planning application for the proposed introduction of new building services plant.

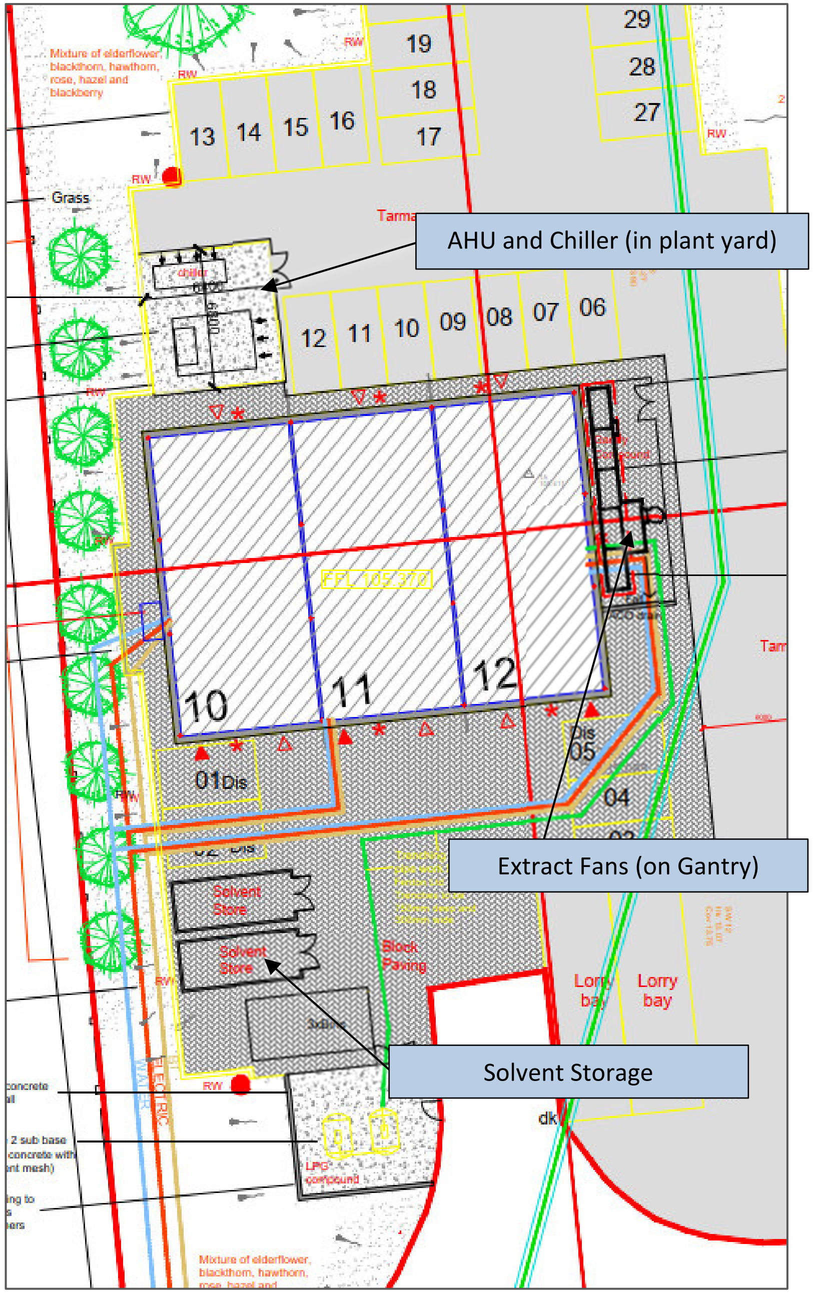
This has enabled noise emission limits to be set at the most affected noise sensitive receiver such that the proposed installation meets the requirements of West Berkshire Council.

The cumulative noise emission levels from the proposed plant have been assessed to be compliant with the plant noise emission limits, with necessary mitigation measures specified.

The proposed scheme is not expected to have a significant adverse noise impact and the relevant planning requirements have been shown to be met.

Steven Liddell MIOA


Noise monitoring location
Most Affected Receiver
Proposed New development

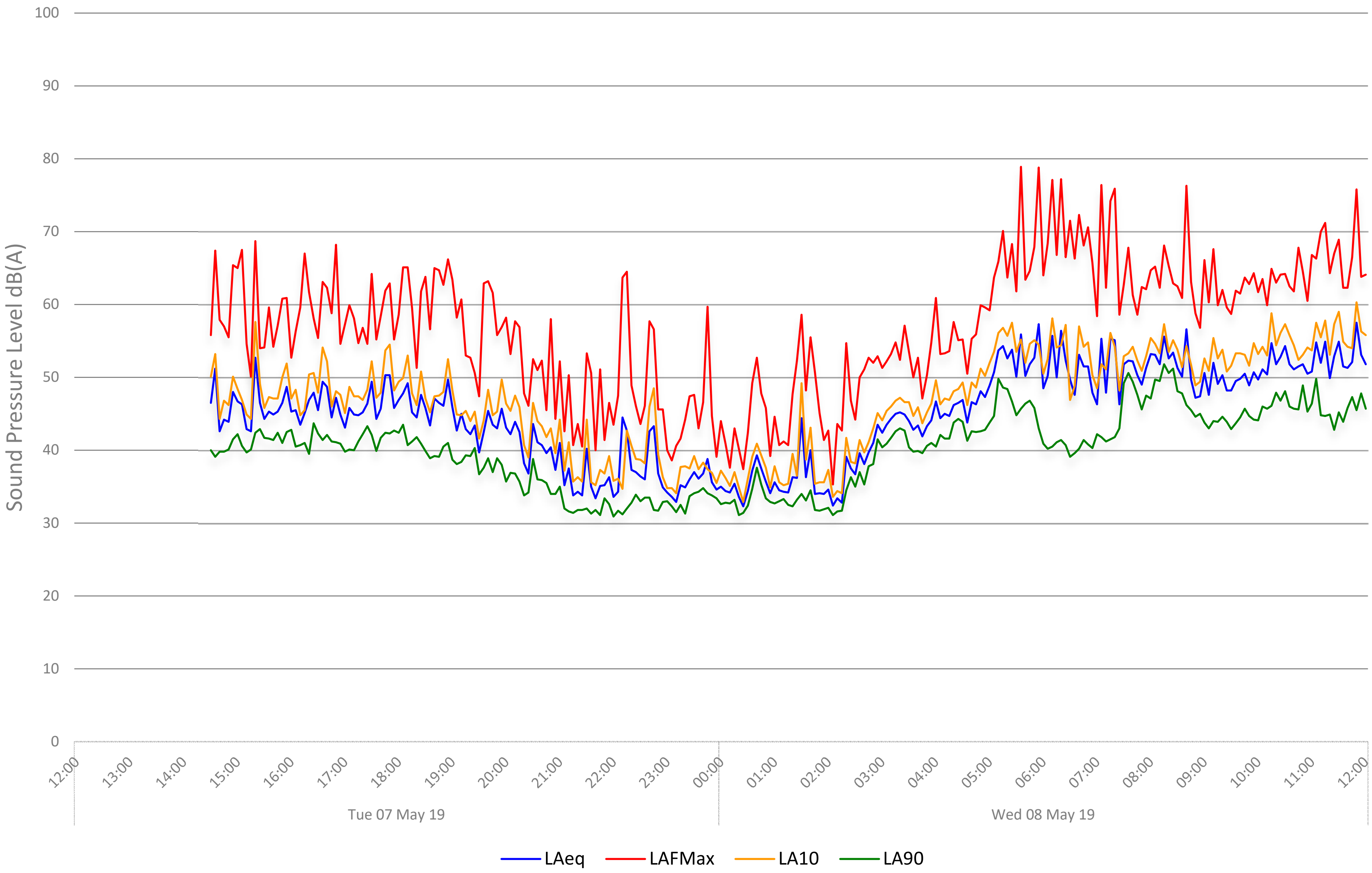

AHU and Chiller (in plant yard)
Extract Fans (on Gantry)
Solvent Storage
Grass
Mixture of elderflower, blackthorn, hawthorn, rose, hazel and blackberry
Solvent Store
Solvent Store
Block Paving
Lorry bay
Lorry bay
LPG compound
10
11
12

10-12 Old Station Business Park, Compton

Environmental Noise Time History: 1

Venta Acoustics

Figure VA2752/TH1

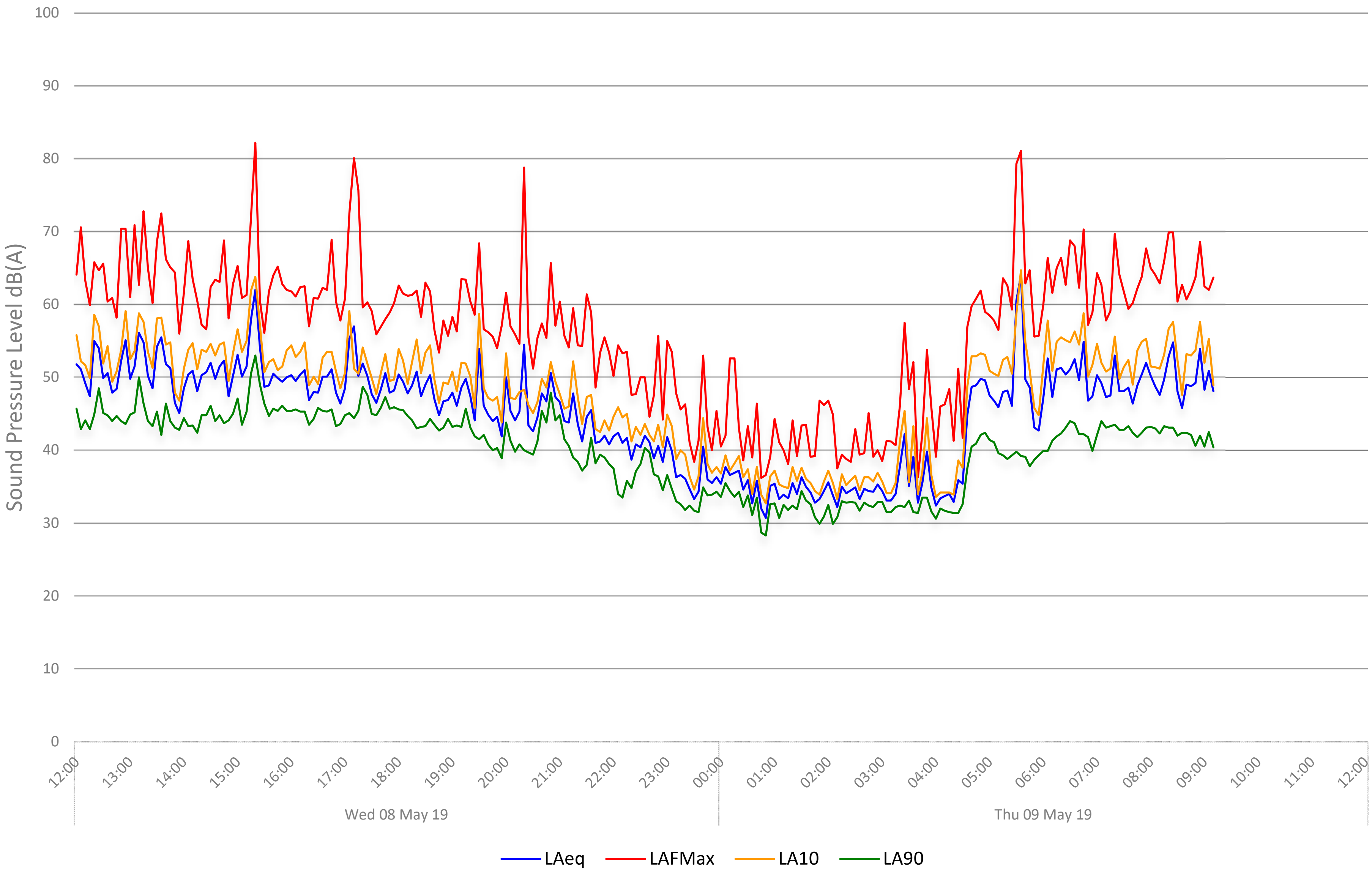


10-12 Old Station Business Park, Compton

Environmental Noise Time History: 2

Venta Acoustics

Figure VA2752/TH2



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as ‘loudness’, its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of ‘pitch’, with low frequencies producing low ‘notes’ and higher frequencies producing high ‘notes’.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the ‘A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated ‘A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B

VA2752 - 10-12 Old Station Business Park, Compton

Noise Impact Assessment - Daytime

Extract Fans - Discharge		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
EF 1	Lw	98	95	94	92	83	80	75	97	97
EF 1 - Attenuator		-1	-2	-6	-15	-20	-15	-14	-13	
EF 1 Sound Power at discharge		97	93	88	77	63	65	61	84	
EF 2	Lw	71	75	77	75	76	69	62	55	79
EF 2 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 2 Sound Power at discharge		69	72	71	60	57	55	49	45	
EF 3	Lw	71	75	77	75	76	69	62	55	79
EF 3 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 3 Sound Power at discharge		69	72	71	60	57	55	49	45	
EF 4	Lw	62	66	68	66	67	60	53	46	70
EF 4 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 4 Sound Power at discharge		60	63	62	51	48	46	40	36	
EF 5	Lw	90	93	93	89	82	77	73	69	90
EF 5 - Attenuator		-1	-2	-6	-15	-20	-15	-14	-13	
EF 5 Sound Power at discharge		89	91	87	74	62	62	59	56	
EF 6	Lw	59	64	65	62	65	63	55	45	69
EF 6 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 6 Sound Power at discharge		57	61	59	47	46	49	42	35	
Cumulative Sound Power	Lw	98	95	90	79	67	67	64	84	**87**
Fans set to 80% speed		-1	-1	-1	-1	-1	-1	-1	-1	
End Reflection		-9	-5	-2	-1	0	0	0	0	
Directivity (Hor:100,Vert:0)		0	0	0	-2	-7	-8	-8	-8	
Distance Loss	To 150m	-44	-44	-44	-44	-44	-44	-44	-44	
Hemispherical Propogation		-11	-11	-11	-11	-11	-11	-11	-11	
Level at receiver		**33**	**35**	**33**	**22**	**4**	**4**	**0**	**21**	**27**

Extract Fans - Breakout		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
LP1	Lp @ 1m									88
LP2	Lp @ 1m									66
LP3	Lp @ 1m									65
LP4	Lp @ 1m									65
LP5	Lp @ 1m									85
LP6	Lp @ 1m									58
Cumulative										**90**
Fans set to 80% speed		-1	-1	-1	-1	-1	-1	-1	-1	-1
Distance Loss	To 150m									-44
Screening loss										-17
Level at receiver										**28**

AHU		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Power (atmosphere side)	Lw	80	80	82	69	62	60	55	58	**75**
Attenuator		-4	-5	-13	-33	-13	-10	-8	-6	
Geometric propogation	Q=2	-8	-8	-8	-8	-8	-8	-8	-8	
Distance Loss	To 125m	-42	-42	-42	-42	-42	-42	-42	-42	
Directivity (Hor:100,Vert:0)		-2	-3	-7	-9	-8	-8	-8	-8	
Level at receiver		**25**	**22**	**12**	**-22**	**-9**	**-8**	**-11**	**-6**	**9**

Chiller		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Pressure	Lp @ 10m	49	48	39	43	44	45	41	36	**50**
Screening		-5	-6	-7	-8	-10	-12	-15	-17	
Distance Loss	To 125m	-22	-22	-22	-22	-22	-22	-22	-22	
Level at receiver		**22**	**20**	**10**	**13**	**12**	**11**	**4**	**-3**	**17**

Solvent Storage Fans		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Power (atmosphere side)	Lp @ 1m	31	31	43	46	44	44	41	33	**50**
Number of Plant	2	3	3	3	3	3	3	3	3	
Distance Loss	To 125m	-42	-42	-42	-42	-42	-42	-42	-42	
Level at receiver		**-8**	**-8**	**4**	**7**	**5**	**5**	**2**	**-6**	**11**

Cumulative Level at recievers 31dB(A)

APPENDIX B

VA2752 - 10-12 Old Station Business Park, Compton

Noise Impact Assessment - Night Time

Extract Fans - Discharge		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
EF 1	Lw	98	95	94	92	83	80	75	97	97
EF 1 - Attenuator		-1	-2	-6	-15	-20	-15	-14	-13	
EF 1 Sound Power at discharge		97	93	88	77	63	65	61	84	
EF 2	Lw	71	75	77	75	76	69	62	55	79
EF 2 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 2 Sound Power at discharge		69	72	71	60	57	55	49	45	
EF 3	Lw	71	75	77	75	76	69	62	55	79
EF 3 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 3 Sound Power at discharge		69	72	71	60	57	55	49	45	
EF 4	Lw	62								36
EF 4 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 4 Sound Power at discharge		60	-3	-6	-15	-19	-14	-13	-10	
EF 5	Lw	90	93	93	89	82	77	73	69	90
EF 5 - Attenuator		-1	-2	-6	-15	-20	-15	-14	-13	
EF 5 Sound Power at discharge		89	91	87	74	62	62	59	56	
EF 6	Lw	59	64	65	62	65	63	55	45	69
EF 6 - Attenuator		-2	-3	-6	-15	-19	-14	-13	-10	
EF 6 Sound Power at discharge		57	61	59	47	46	49	42	35	
Cumulative Sound Power	Lw	98	95	90	79	67	67	64	84	**87**
Fans set to 20% speed		-7	-7	-7	-7	-7	-7	-7	-7	
End Reflection		-9	-5	-2	-1	0	0	0	0	
Directivity (Hor:100,Vert:0)		0	0	0	-2	-7	-8	-8	-8	
Distance Loss	To 150m	-44	-44	-44	-44	-44	-44	-44	-44	
Hemispherical Propogation		-11	-11	-11	-11	-11	-11	-11	-11	
Level at receiver		**27**	**29**	**27**	**16**	**-2**	**-2**	**-6**	**15**	**21**

Extract Fans - Breakout		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
LP1	Lp @ 1m									88
LP2	Lp @ 1m									66
LP3	Lp @ 1m									65
LP4	Lp @ 1m									65
LP5	Lp @ 1m									85
LP6	Lp @ 1m									58
Cumulative										**90**
Fans set to 20% speed										-7
Distance Loss	To 150m									-44
Screening loss										-17
Level at receiver										**22**

AHU		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Power (atmosphere side)	Lw	80	80	82	69	62	60	55	58	**75**
Attenuator		-4	-5	-13	-33	-13	-10	-8	-6	
Geometric propogation	Q=2	-8	-8	-8	-8	-8	-8	-8	-8	
Distance Loss	To 125m	-42	-42	-42	-42	-42	-42	-42	-42	
Directivity (Hor:100,Vert:0)		-2	-3	-7	-9	-8	-8	-8	-8	
Level at receiver		**25**	**22**	**12**	**-22**	**-9**	**-8**	**-11**	**-6**	**9**

Chiller		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Pressure	Lp @ 10m	49	48	39	43	44	45	41	36	**50**
Screening		-5	-6	-7	-8	-10	-12	-15	-17	
Distance Loss	To 125m	-22	-22	-22	-22	-22	-22	-22	-22	
Level at receiver		**22**	**20**	**10**	**13**	**12**	**11**	**4**	**-3**	**17**

Solvent Storage Fans		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Sound Power (atmosphere side)	Lp @ 1m	0	31	43	46	44	44	41	33	**50**
Number of Plant	2	3	3	3	3	3	3	3	3	
Distance Loss	To 125m	-42	-42	-42	-42	-42	-42	-42	-42	
Level at receiver		**-39**	**-8**	**4**	**7**	**5**	**5**	**2**	**-6**	**11**

Cumulative Level at recievers 26dB(A)