



Venta Acoustics

Report VA1832.170922.R2

Concrete Mouldings, Littlehampton

Noise Survey Report

25 September 2017

Concrete Mouldings
Hobbs New Farm
Grevatts Lane
Climping
Littlehampton
West Sussex
BN17 5RE

Registered company no. 10132424

Contents

1. Introduction.....	1
2. Site Description.....	1
3. Typical Operation.....	1
4. Noise Survey	3
5. Noise Measurement Results.....	3
6. Predicted Source Levels at 30m.....	5
7. Discussion	7
8. Mitigation	7
9. Conclusion	8

Attachments

VA1832/SP1	Indicative Site Plan
VA1832/TH1 - TH3	Environmental Noise Time Histories
Appendix A	Acoustic Terminology

1. Introduction

Concrete Mouldings propose to relocate their concrete moulding facility from its current site on Hobbs New Farm, to a plot on Rudfield Industrial Estate.

Following a planning application for industrial use at the site, Arun District Council have requested a survey of the noise emissions from the concrete moulding operation. Venta Acoustics has been appointed by Concrete Mouldings to undertake a survey of the noise emissions from their operation on Hobbs New Farm.

The concrete moulding operation has a defined process that repeats on a daily basis with little variation.

Automated and attended survey measurements were undertaken at the current operation over a full working day to capture noise emissions of each stage of the production process.

2. Site Description

The current Concrete Mouldings facility on Hobbs New Farm operates out of an agricultural barn and containers on the surrounding land, with in a location surrounding by fields. There are residential dwellings 280m to the south-east, 200m to the north-west and 270m to the north-east.

The locality is relatively quiet with the A259 500m to the north being the primary source controlling background noise levels. No complaints of noise from the Concrete Mouldings facility have been reported in this setting.

The proposed new site is located on the north-east side of Rudfield Industrial Estate. A single dwelling is located some 50m to the east of this plot on Church Ln. Rudfield Industrial Estate includes South Coast Skips, a waste material recycling plant.

The production Concrete Mouldings facility currently operates between 07:00hours and 17:00hours Monday – Friday. It is intended to continue operating within these hours.

3. Typical Operation

Operations are generally undertaken by two operatives, with a manager providing supervision and undertaking office work. Most activities are done by hand with two forklift trucks, a Caterpillar 35 and a Daewoo. Other machinery on site includes a concrete mixer, air compressors (operated for no more than 30 minutes throughout the day) and a clipper to cut steel bar (operated for approximately 30 minutes per day within the barn).

The standard operations that take place on a daily basis can be grouped into the following broad procedures:

Preparation

- Starting forklift trucks
- Load sand and stone into the concrete mixer hopper bin (with forklift)

Empty Moulds

- Mostly by hand. Larger products lifted out of moulds by chain on the forklifts.
- Move product into the yard areas for stacking (with forklifts)

Clean Moulds and Reset for Days Production

- Scrape dried concrete off moulds
- Set moulds to correct sizes
- Spray moulds with mould release oil (use of compressor)
- Cut re-bar to required length for days production

Fill Moulds

- Fill cement hopper (empty bags of cement by hand)
- Check mixing machine screw and belts and start
- Place tray onto forklift
- Fill tray with concrete
- Drive concrete to moulds and fill (either by bucket or directly from the tray into the moulds)

Clean up

- Stop mixer, wash down and close up
- Clean off forklift
- Arrange product in yard for orders to be collected the following day
- Return all equipment and lock up.

Deliveries / Collections

Deliveries and collections occur infrequently throughout the day. These may be by car, van or lorry. Product is loaded by hand or by forklift truck. There is large variation in the numbers of deliveries and collections, but it is very unusual for more than two in an hour.

4. Noise Survey

A noise survey was carried out at Concrete Mouldings between 07:00 hours and 16:00 hours on Wednesday 31st May 2017. The weather during the survey was dry and warm with light winds.

Sample measurements were undertaken with a hand-held meter of each activity at representative distances. Notes were made of the acoustic character of the sound.

In addition, continuous measurements were undertaken by sound level meters at a distance of 100m to the east and west of the facility. These were complemented by continuous synchronised measurements at a point next to the barn to show levels of activity at the facility.

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-11586-E0	42530-A2A-11586-E0	9/6/16
Svante Class 1 Integrating SLM	958A	59177	None provided	10/1/17
Convergence Instruments MEMs Microphone	Noise Sentry	CNHeBVUaU9W fgJFSy+D5tD	None provided	-
Convergence Instruments MEMs Microphone	Noise Sentry	CIP+r106U1WV lJtQa4JRnD	None provided	-
Larson Davis calibrator	CAL200	13069	42530-13069	9/6/16

Table 4.1 -- Equipment used for the survey

The MEMs microphone is solid state sound level meter which would equate to a type 2 meter, but due to the test standard procedure, cannot be given formal certification as the microphone cannot be tested to failure as it has no diaphragm. These were used to complement the measurements taken with Type 1 sound level meters (hand held measurements and 100m to the west).

To provide an indicative assessment at the new location, a brief survey of the noise levels at a position representative of the nearest residential dwelling was undertaken between 11:20 hours and 11:50 hours.

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

5. Noise Measurement Results

The following is a summary of the hand held measurements taken on site:

Activity	Measurement Distance (m)	Measured level (L _{eq})	Notes
Preparation			
Forklifts starting and driving past	2	72dB	Some squeaking of suspension
Filling bin with sand	7	68dB	Mostly engine noise
Filling bin with gravel	7	68dB	
Removing shovel off forklift	7	69dB	Mostly engine noise. Slightly impulsive
Empty Moulds			
Forklift moving moulds out of barn	5	72dB	
Emptying mould by hand in yard	7	51dB	Some dull thudding whilst loosening mould by hand
Lifting base plates out of mould with a chain on forklift (in yard)	10	64dB	
Forklift lifting product out of moulds in barn (measurement directly in front of open barn door)	20	57dB	
Forklift moving product	25	52 dB	
Wrapping product on pallet in plastic wrap	10	68dB	Screech of plastic pulling off roll
Clean Moulds and Reset for Days Production			
Cleaning and resetting moulds (measured in barn)	10	60dB	Scraping dry concrete off moulds. Occasional hammering
Spraying release oil on moulds (in barn – measured outside)	20	50dB	Compressor running
Spraying release oil on moulds – in yard	10	61dB	
Dragging steel re-bar (measured in barn)	3	69dB	
Cropping Metal (measured in barn)	5	80dB	Impulsive
Cropping Metal (measured outside of barn)	20	39dB	Slight impulsive sound
Fill Moulds			
Load cement into hopper by hand	9	56dB	Dull thudding
Turn Mixer on	5	61dB	Slightly tonal
Mixer running	50	39dB	Almost inaudible
Mixer pouring concrete into sled	15	57dB	
Pouring concrete into moulds by bucket	20	52dB	Some knocking to settle concrete
Pouring concrete into moulds from sled	20	55dB	Scrapping
Filling moulds in container	10	53dB	
Forklift manoeuvring	15	60dB	
Clean up			
Concrete mixer screw with no concrete	10	58dB	
Washing down sled	10	57dB	
Spray down forklift	10	44dB	
Closing lid on mixer	10	59dB	
Forklift moving product	15	66dB	
Deliveries / Collections			
Lorry manoeuvring	Library data, 8m	73dB	
Lorry loading/ unloading	Library data, 5m	61dB	

Table S.1 – Noise data of operations

The automated measurements at 100m are shown as time-history plots on the attached charts VA1832/TH1-2. Due to the low noise levels from Concrete Mouldings at these locations, the measurements are dominated almost entirely by birdsong and overhead aircraft and show little correlation to Concrete Mould activities. VA1832/TH3 shows the trace of the monitor next to the yard, confirming activity at the yard. All three time histories share the same time axis and have been labelled to indicate approximate times of the different activities.

During the indicative measurement undertaken at Rudfield Industrial Estate, noise from the industrial estate dominated the measurements. The minimum background noise level measured was L_{A90} 52dB with an ambient noise level of L_{Aeq} 57dB.

6. Predicted Source Levels at 30m

As requested by Arun District Council, this section considered the noise levels of all activities calculated to a distance of 30m (the distance from the boundary of the proposed new yard to the nearest dwelling). This assumes that all activity takes place on this boundary. In reality, most activity is going to be centred around the building towards the centre of the site, at a distance of approximately 50m from the dwellings. The boundary area is likely to be used for storage with forklifts only occasionally moving towards the boundary when goods are being placed in storage or retrieved. Additionally, the storage containers and concrete mouldings along the boundary would likely provide some degree of acoustic screening of the site to the dwellings, which has not been taken into account in the following calculations. This assessment therefore provides a very pessimistic and hence robust indication of the impact on the dwellings.

Table 6.1 shows the measured source levels are corrected to a distance of 30m. Where the measurements were of activities in the barn measured at 20m directly in front of the open doors, a correction has been allowed for directivity.

The levels are corrected to a typical 1-hour assessment period and have been given acoustic character corrections, as described in BS4142: 2014 *Methods for rating and assessing industrial and commercial sound*. The penalties have been awarded based upon the subjective method and observations of the processes.

Activity	Predicted level at 30m (L_{Aeq})	Typical on-time (mins/hr)	Level corrected to 1 hour L_{Aeq}	Suggested BS4142 Character Corrections
Preparation (approx. 1hr)				
Forklifts starting and driving past	48	2	34	Intermittency +3
Filling bin with sand	55	8	47	Other Character +3
Filling bin with gravel	55	8	47	Other Character +3
Removing shovel off forklift	56	2	42	Impulsivity +3
Empty Moulds (approx. 1hr)				
Forklift moving moulds out of barn	56	10	49	Other Character +3
Emptying mould by hand in yard	38	60	38	
Lifting base plates out of mould with a chain on forklift (in yard)	54	10	47	
Forklift lifting product out of moulds (in barn)	46	60	46	
Forklift moving product	50	20	46	Other Character +3
Wrapping product on pallet in plastic wrap	58	3	45	Other Character +3
Clean Moulds and Reset for Days Production (approx. 2hr)				
Cleaning and resetting moulds (measured in barn)	43	60	43	Impulsivity +3
Spraying release oil on moulds (in barn – measured outside)	39	10	32	Intermittency +3
Spraying release oil on moulds – in yard	51	5	41	Intermittency +3
Dragging steel re-bar (in barn)	49	10	41	Other Character +3
Cropping Metal	35	20	31	Impulsivity +6
Fill Moulds (approx. 3hr)				
Load cement into hopper by hand	46	10	38	
Turn Mixer on	45	1	28	
Mixer running	43	60	43	Tonality +4
Mixer pouring concrete into sled	51	5	40	Intermittency +3
Pouring concrete into moulds by bucket	41	55	41	
Pouring concrete into moulds from sled	44	55	44	
Filling moulds in container	43	45	42	
Forklift manoeuvring	54	15	48	Other Character +3
Clean up (approx. 1hr)				
Concrete mixer screw with no concrete	48	30	45	Tonality +4
Washing down sled	47	5	37	Intermittency +3
Spray down forklift	34	5	24	Intermittency +3
Closing lid on mixer	49	2	35	
Forklift moving product	60	60	60	Other Character +3
Deliveries / Collections (occasionally throughout the day)				
Lorry manoeuvring	62	5	51	Intermittency +3
Lorry loading/ unloading	45	10	38	Intermittency +3

Table 6.1 – Noise data of operations

The following table provides a summary BS4142 assessment of the different processes during a typical day, as calculated at the nearest residential receiver. These assume all activities take place on the boundary of the site nearest the dwellings. In practice, most activities will be towards the centre of the site, with some at the nearer and some at the further boundary. A reduction of 3-6dB from these levels is expected when the location of works is considered.

Works Stage	Cumulative level	Penalty	Rating level	Relative to Background (52dB)	Notional Impact
Preparation	50dB	3dB	53dB	+1dB	Tending towards low impact
Emptying Moulds	54dB	3dB	57dB	+6dB	Marginal impact
Clean Moulds & Reset	47dB	3dB	50dB	-2dB	Low impact
Fill Moulds	52dB	4dB	56dB	+4dB	Marginal impact
Clean up	60dB	3dB	63dB	+9dB	Tending towards a significant impact
Deliveries / Collections	51dB	3dB	54dB	+2dB	Tending towards low impact

Table 6.2 – Summary BS4142 Assessment

7. Discussion

The greatest risk of noise impact is from the forklifts manoeuvring. The majority of other activities are of a very limited duration or are relatively quiet. This is supported by observations on site where most activities were barely audible at a distance from the site, despite the relatively low local background noise levels.

The background noise levels at the proposed new site are relatively high, being measured as 52dB(A) during the indicative measurements.

Assuming all activities take place on the boundary nearest the adjacent dwellings, the impact of the proposed activities vary from no significant impact to a significant impact depending on context. However, if the likely distribution of noise sources across the site is considered, the impact is likely to be marginal, due to forklifts, or lower for all activities.

In the context of the site, on the edge of a busy industrial estate, Concrete Mouldings would not be introducing new types of sound to the locality and would not change the acoustic environment. All activities would be quieter than the existing industrial noise present at the adjacent dwelling.

Given the inconspicuous nature of most activities that take place on a daily basis, it is not expected that Concrete Mouldings would have a significant adverse impact in the context of an existing industrial estate.

8. Mitigation

Most activities are already undertaken within the barn, and are proposed to continue to be undertaken within a factory building or containers at the new site. This is effective in limiting noise propagation to surrounds.

The primary exception is the use of forklifts which necessarily move around the yard, albeit generally over limited distances and for brief periods of time (with the exception of arranging product around the yard). Maintaining the forklifts in a good state of repair to minimise rattles and squeaking suspension would reduce the potential for the forklifts to draw attention and so reduce the potential noise impact.

9. Conclusion

Venta Acoustics have been appointed by Concrete Mouldings to undertake a survey of noise levels generated by the processes involved in their operation.

Measurements of noise emissions were undertaken at various distanced of the numerous processes that take place on a daily basis.

In general, most processes are discrete, with few examples of 'traditional' industrial noise characteristics, such as hammering, grinding, etc, observed. The greatest noise source was identified to be the two forklifts that operate for brief periods throughout the day.

Calculations of the noise emissions to 30m have been undertaken and acoustic character corrections, as described in BS4142:2014, have been suggested.

An indicative assessment of the likely noise impact of the operation in the context of a proposed new site on an industrial estate has been provided. This suggests that the operation would generally have a low impact on the surroundings, with moderate or occasional significant impacts occurring in the worst case scenarios. However, in the context of the site, the proposals are not expected to cause a significant loss of amenity to the neighbouring dwellings.

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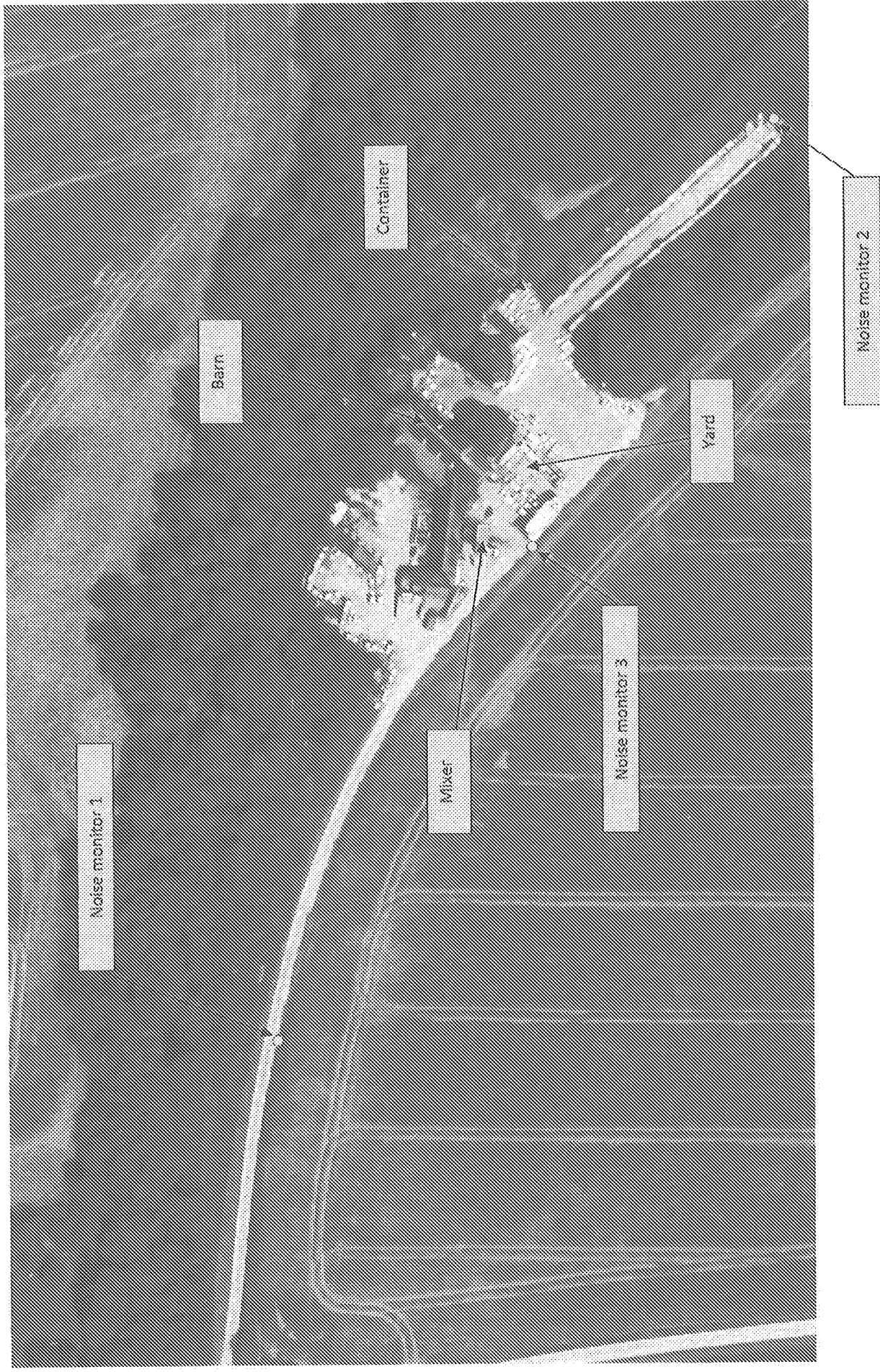
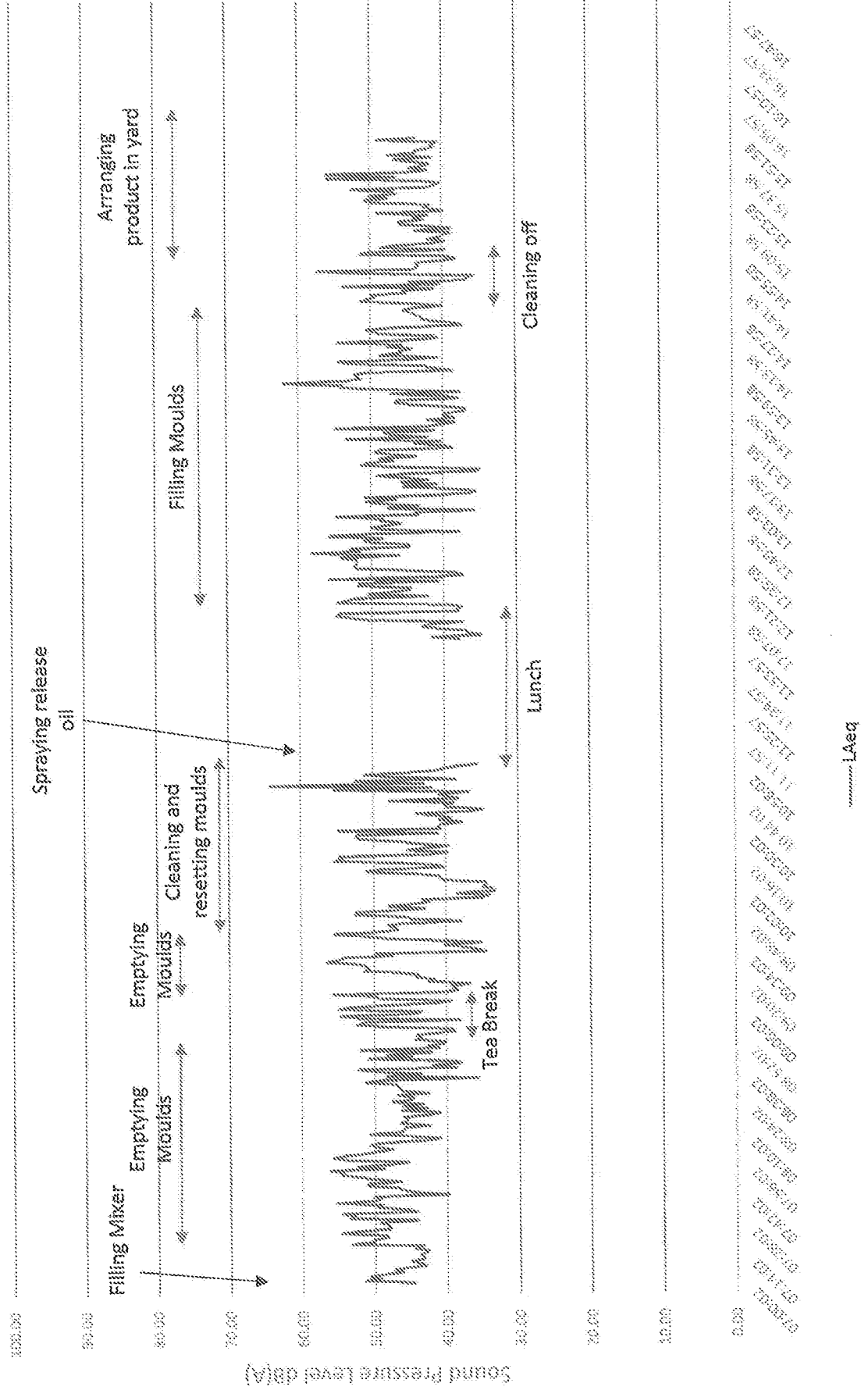


Figure VA1832/TH1





Concrete Moulding, Littlehampton
Environmental Noise Time History: 2
Location 2 - 100m East

Figure VA1832/TH2

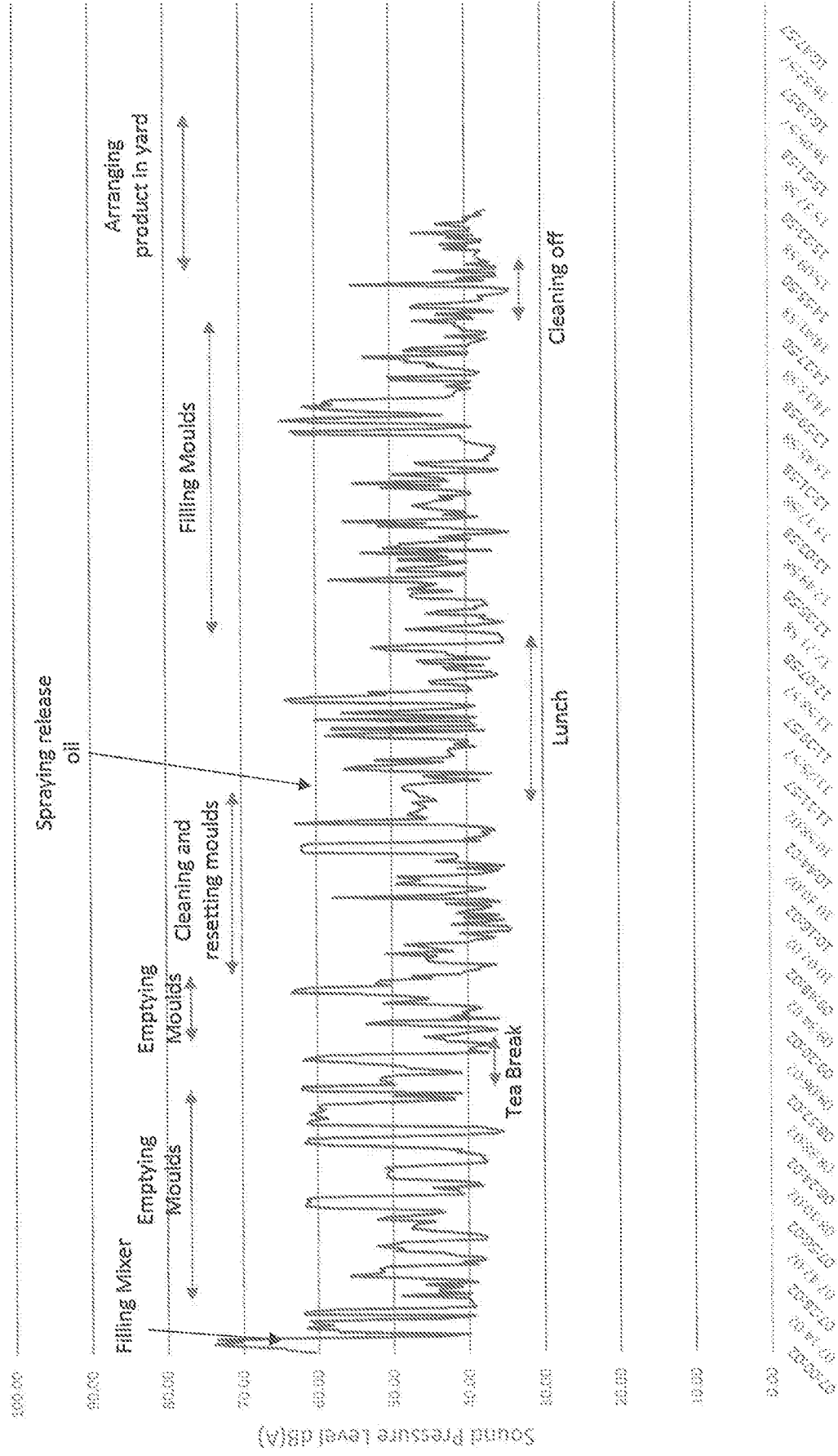
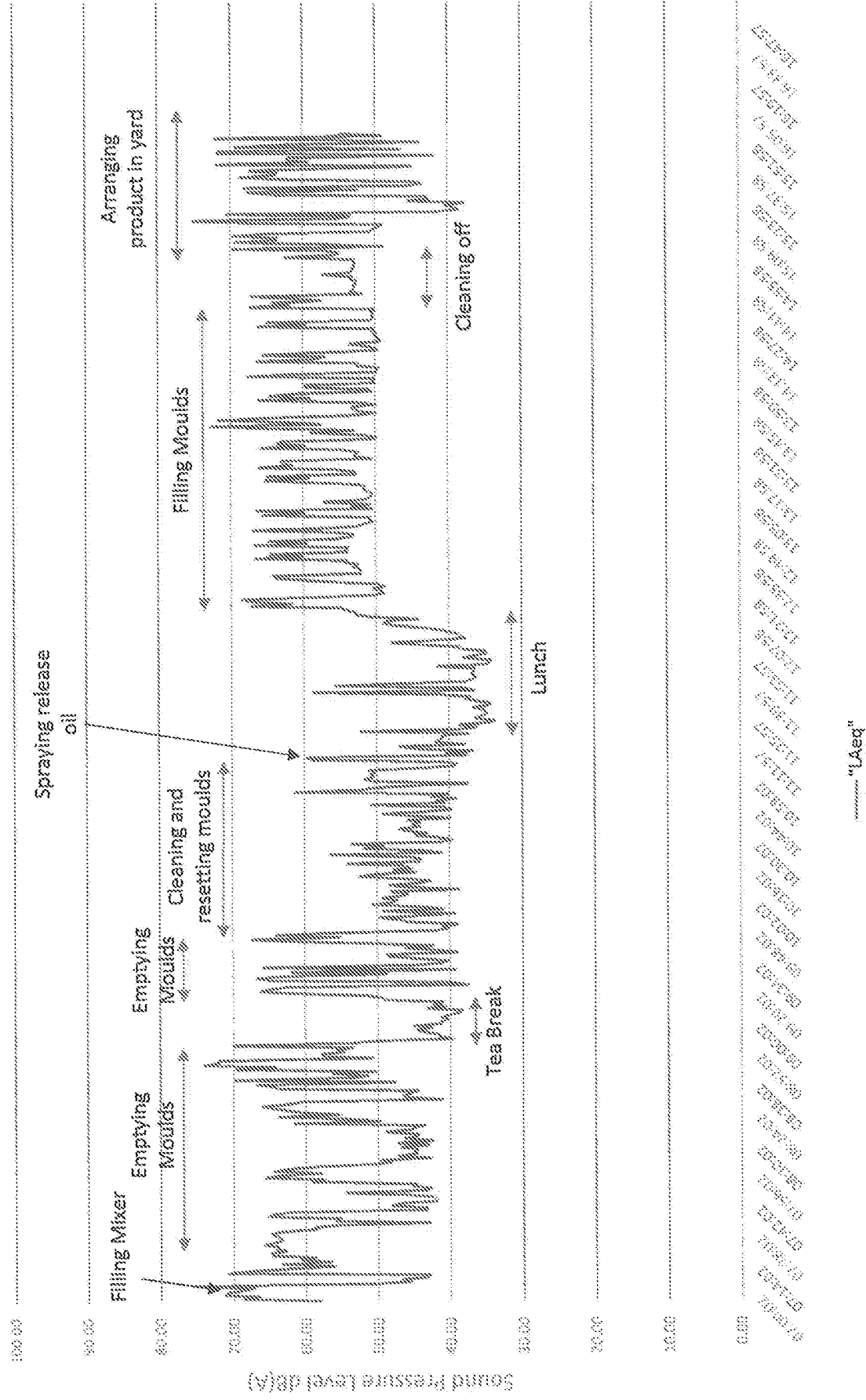


Figure VA1832/TH3



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 LA.
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
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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.