Acoustic Consultancy Report

04222/3/2/4

Background Noise Survey

Report Prepared For

Weston Super Mare Town Council
The Blakehay
30 March 2022

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Contents

i) Executive Summary

New mechanical plant has been installed at The Blakehay, Weston-super-Mare, 20 Wadham St, Weston-super-Mare, BS23 1JZ.

LCP has been commissioned by Weston-super-Mare Town Council to carry out a post-works acoustic environment survey and to compare the results to the previous additional pre-works survey undertaken by LCP (report reference 04222/3/2/2) to evaluate the impact of the plant installation on surrounding noise sensitive receptors.

There has been a decrease of 1 dB in the representative background sound levels. The results from the post-works survey indicate that the design criteria have been achieved. There is no significant observable change in noise levels due to the new plant installation.

ii) Document History

Issue	Date	Issue Details	Issued By	Checked By
1	30/03/22	Initial Issue	SL	JT

1 Introduction

New mechanical plant has been installed at The Blakehay, Weston-super-Mare, 20 Wadham St, Weston-super-Mare, BS23 1JZ.

LCP has been commissioned by Weston-super-Mare Town Council to carry out a post-works acoustic environment survey. This has been compared to the previous additional pre-works noise survey.

The guidance in this report is on the basis that the operational period of the plant may potentially be continuous between 09:00 and 22:30.

2 Survey

2.1 Site Description

The site layout together with the measurement position is shown in the drawing contained within Appendix A.

2.2 Receiver Location

The site was surveyed to determine the location of the most affected receiver.

The nearest residential receivers to the plant area are 7m to the East, 2m to the North, 13m to the South, 9m to the West of the site. The measurement position MP1 is shown in both the site plan in Appendix A.

2.3 Local Noise Climate

The predominant local noise sources were residents of the University Accommodation, pedestrians and local transportation noise.

2.4 Measurements

The pre-works noise monitoring took place on 22nd April 2021 and the post-works noise monitoring took place on the 17th March 2022. The measurement period was considered sufficient to establish the representative background sound levels corresponding to the operational period of the plant.

The weather conditions monitored during the survey are shown in the following table.

Table 1: Weather Conditions at Measurement Location

Weather	Pre-works	Post-works
Average Wind Speed	4 m/s	4 m/s
Wind Direction	E	WSW
Cloud Cover	60%	76%
Temperature	11°C	11°C
Precipitation	None	None

3 Measurement Results

The measured statistical broad-band sound pressure levels for both pre-works and post works noise surveys are shown within Appendix B along with all the measured data in descending order for comparison. The table below shows a summary of the measured noise levels:

Table 2: Representative sound levels, dB re $2x10^{-5}$ Pa

Measurement Position	$L_{A90,\ 15\ mins}$ Day*
MP1 Pre-works	42
MP1 Post-works	41

* Day periods are defined as between 07:00 - 23.00.

4 Conclusion

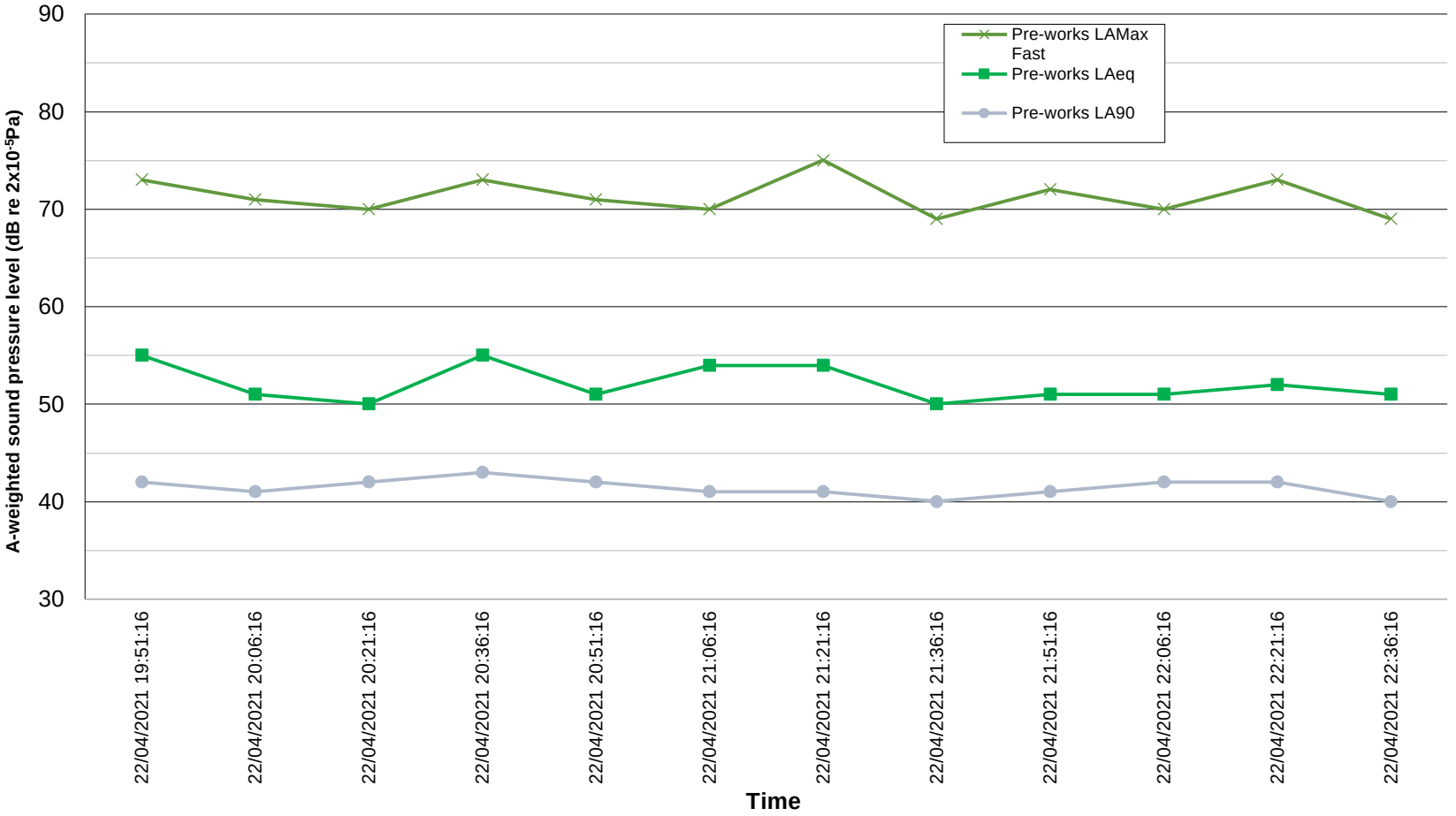
LCP has been commissioned by Weston-super-Mare Town Council to carry out a post-works acoustic environment survey and to compare the results to the previous additional pre-works survey undertaken by LCP (report reference 04222/3/2/2).

There has been a decrease of 1 dB in the representative background sound levels. The results from the post-works survey indicate that the design criteria have been achieved. There is no significant observable change in noise levels due to the new plant installation.

Appendix A: Site Plan

Appendix B: Measurement Data

Pre-works survey



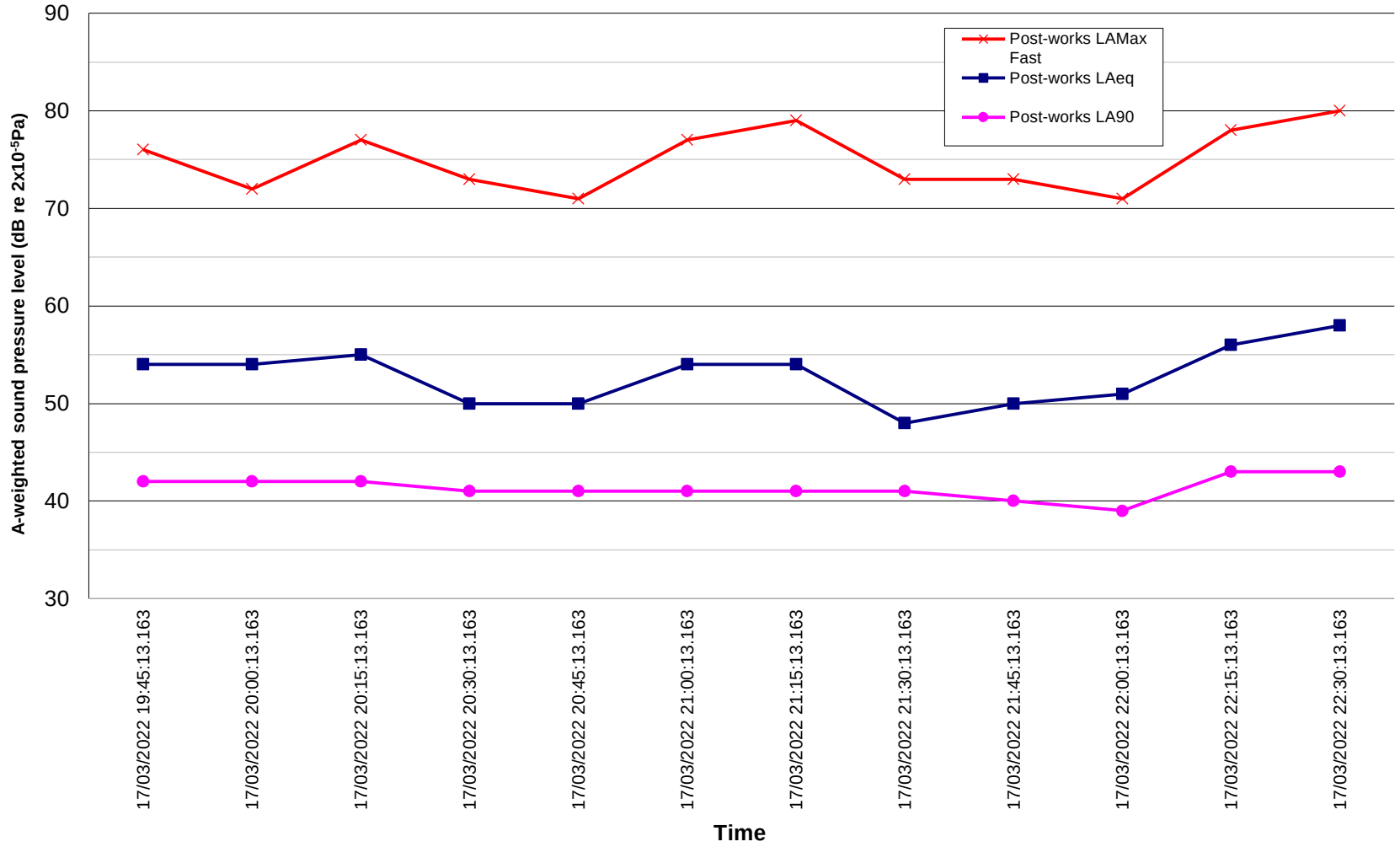
Sound pressure level measurements were obtained using the following instrumentation complying with the Class 1 specification of BS EN 61672:2003

Svantek 959 Sound Level Meter S/N: 11207 (next cal due 09/04/21) Start gain 2.09 End gain 2.04

Svantek pre-amplifier SV12L S/N: 49860 with GRAS microphone capsule 40AE S/N: 215511

Calibration checks were made prior to and after completion of measurements using a Svantek SV30A calibrator, S/N: 43066 (next cal due 04/02/22) complying with Class 1 specification of BS EN 60942:2003, calibration level 94.0 dB @ 1.0 kHz. All acoustic instrumentation carried current manufacturer's certificates of conformance.

Post-works survey



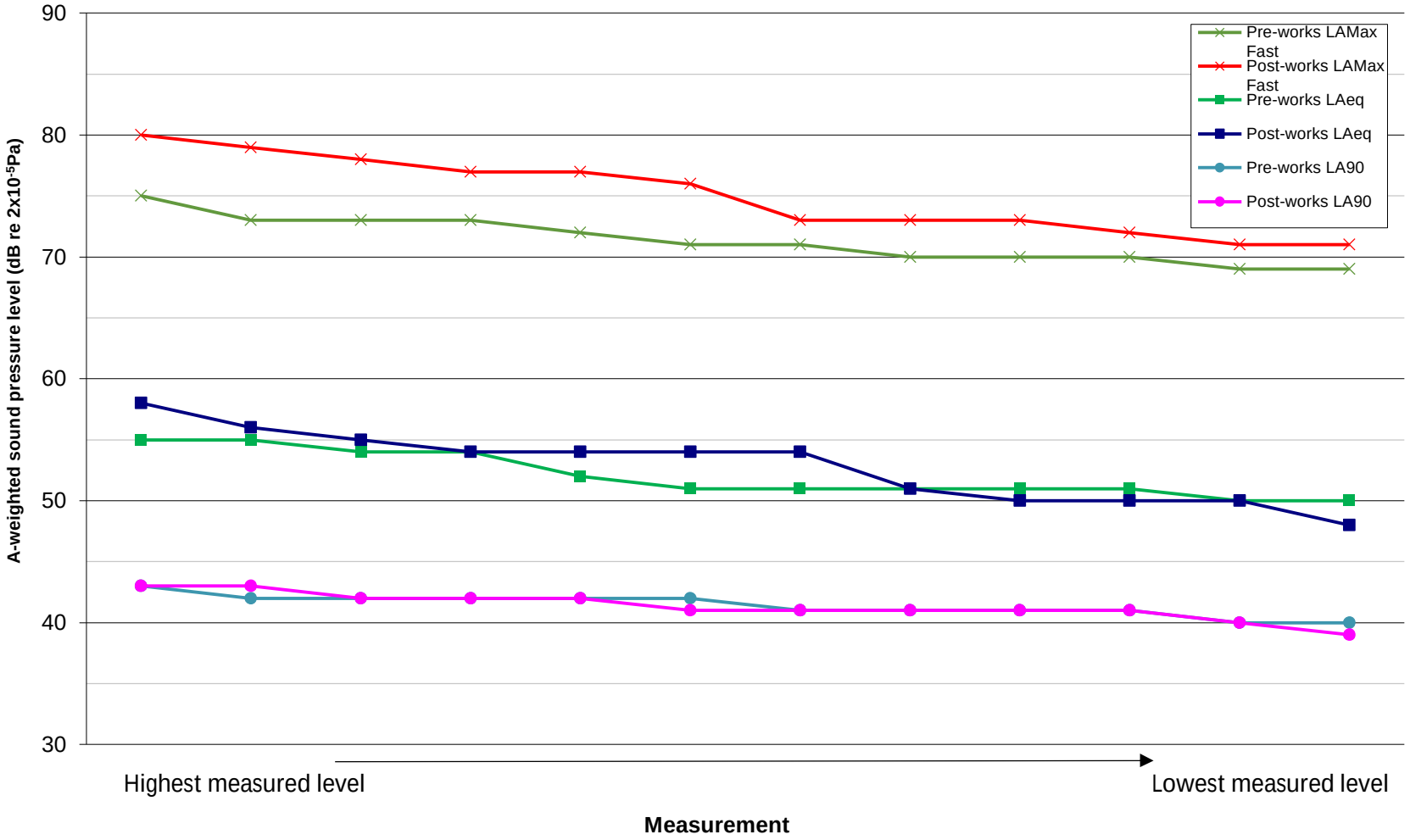
Sound pressure level measurements were obtained using the following instrumentation complying with the Class 1 specification of BS EN 61672:2003

Svantek 979 Sound Level Meter S/N: 92925 (next cal due 06/16/23) Start gain -0.71 End gain -0.41

Svantek pre-amplifier SV17 S/N: 106525 with GRAS microphone capsule 40AE S/N: 376416

Calibration checks were made prior to and after completion of measurements using a Svantek SV30A calibrator, S/N: 10890 (next cal due 01/05/23) complying with Class 1 specification of BS EN 60942:2003, calibration level 94.0 dB @ 1.0 kHz. All acoustic instrumentation carried current manufacturer's certificates of conformance.

Data from pre-works and post-works measurements in descending order for comparison



Appendix C: Glossary

The list below details the major acoustical terms and descriptors, with brief definitions:

'A' Weighting
Weighting applied to the level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The letter 'A' will follow a descriptor, indicating the value has been 'A' weighted. An 'A' weighted noise level may also be written as dB(A).
Airborne Noise
Noise transmitted through air.
Ambient Noise
The total noise level including all 'normally experienced' noise sources.
dB or Decibel
Literally meaning 'a tenth of a bel', the bel being a unit devised by the Bell Laboratory and named after Alexander Graham Bell. A logarithmically based descriptor to compare a level to a reference level. Decibel arithmetic is not linear, due to the logarithmic base. For example:

30 dB + 30 dB ≠ 60 dB	30 dB + 30 dB = 33 dB

$D_{nTw}+C_{tr}$	
The weighted, normalised difference in airborne noise levels measured in a source room (L1) and a receive room (L2) due to a separating partition.	
D	Is simply L1 – L2.
D_{nT}	Is the normalisation of the measured level difference to the expected (in comparison to the measured) reverberation time in the receiving room.
D_{nTw}	Is the weighted and normalised level difference. This value is the result of applying a known octave band weighting curve to the measured result.

C_{tr}	Is a correction factor applied to the D_{nTw} to account for the known effects of particular types of noise, such as loud stereo music or traffic noise.

Frequency (Hz)

Measured in Hertz (after Heinrich Hertz), and represents the number of cycles per second of a sound or tone.

Insertion Loss, dB

The amount of sound reduction offered by an attenuator or louvre once placed in the path of a noise level.

$L_{A90, T}$

The ‘A’ weighted noise level exceeded for 90% of the time period T, described or measured. The ‘90’ can be substituted for any value between 1 and 99 to indicate the noise level exceeded for the corresponding percentage of time described or measured.

$L_{Aeq, T}$

The ‘A’ weighted ‘equivalent’ noise level, or the average noise level over the time period T, described or measured.

L_{Amax}

The ‘A’ weighted maximum measured noise level. Can be measured with a ‘slow’ (1 sec) or ‘fast’ (0.125 sec) time weighting.

L_{Amin}

The ‘A’ weighted minimum measured noise level.

NR

Noise Rating (NR) level. A frequency dependent system of noise level curves developed by the International Organisation for Standardisation (ISO). NR is used to categorise and determine the acceptable indoor environment in terms of hearing preservation, speech communication and annoyance in any given application as a single figure level. The US predominantly uses the Noise Criterion (NC) system.

Octave

The interval between a frequency in Hz (f) and either half or double that frequency (0.5f or 2f).

Pa

Pascals, the SI unit to describe pressure, after physicist Blaise Pascal.

Reverberation Time, T_{mf}, RT60, RT30 or RT20

The time taken in seconds for a sound to diminish within a room by 1,000 times its original level, corresponding to a drop in sound pressure of 60 dB. When taking field measurements and where background noise levels are high, the units RT20 or RT30 are used (measuring drops of 20 or 30 dB respectively). Sometimes given as a mid-frequency reverberation time, T_{mf} which is the average of reverberation time values at 500Hz, 1kHz and 2kHz.

R_w

The sound reduction value(s) of a constructional element such as a door, as measured in a laboratory, with a known octave band weighting curve applied to the result.

Sound Power Level

A noise level obtained by calculation from measurement data, given at the face of an item of plant or machinery. Referenced to 10^{-12} W or 1pW.

Sound Pressure Level

A noise level measured or given at a distance from a source or a number of sources. Referenced to $2x10^{-5}$ Pa.

Subjective Effect of Changes in Sound Pressure Level

The table below details the subjective effects of variations in sound pressures (adapted from Bies and Hansen).

Difference between background noise and rating levels	Increase in ambient noise level in 'real terms'	Change in apparent loudness
+ 10 dB	+ 10 dB	Twice as loud
+ 5 dB	+ 6 dB	Clearly noticeable
0 dB	+ 3 dB	Just perceptible
-10 dB	0 dB	No change

W

Watts, the SI unit to describe power, after engineer James Watt.