

CooperVision

Nitrogen Generation Plant, CooperVision Speedwell Close
Post Remedial Work Noise Assessment

Report No. 25-0043-2 R02

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Close

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Report No.:
25-0043-2 R02

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1 Introduction

Remedial works have been completed to reduce noise from the nitrogen generation plant installed at CooperVision Speedwell Close. A noise survey was undertaken by Sustainable Acoustics between 10th and 11th June 2026 to quantify noise levels. This report provides a summary of the findings of the noise survey and assessment.

1.1 Background

Details of the original noise survey and assessment undertaken in February 2026 can be found in the Sustainable Acoustics report 25-0043-1 R01a, dated 27th February 2026. A further assessment of temporary mitigation works undertaken in April can also be found in Sustainable Acoustics report 25-0043-2 R01 dated 2nd April 2026.

Details of the noise assessment submitted with planning application F/25/99212 can be found in Sustainable Acoustics report 25-0034-0 R01, dated 4th April 2025.

The works include:

- an absorptive noise barrier around the ground floor louvre in the east façade (replacing the temporary barrier),
- blocking off the upper louvre in the east façade from the inside,
- attenuators fitted to the internal discharge,
- door seals improved to the acoustic doors in the south façade,
- and sound absorptive material added inside the plant enclosure.

1.2 Nitrogen plant operation

There are effectively two sets of nitrogen generation plant within the enclosure, with the intention being that one is normally sufficient to supply the demand for nitrogen. When there is excess nitrogen that cannot be used, or purity is too low, it must discharge to atmosphere.

It is understood that while recent investigations and commissioning works were being undertaken over the weekend prior to the survey starting on the 10th, the nitrogen supply was switched back to the previous source and plant was discharging externally. This resulted in much louder discharge noise, which is not part of the normal operation.

It is understood that during the survey the plant was operating in a worst case, with both sets of nitrogen generation plant operating, and due to the excess nitrogen produced, discharging more frequently than should normally be required.



1.3 Context

The site location is shown in Figure 1 below:



Figure 1: Site location plan

2 Assessment criteria

The noise assessment report submitted with the planning application took account the methodology in BS 4142: 2014 and advice from Eastleigh Borough Council that the local authority generally request to design to Rating Levels of 5dB below the background noise level, and that in cases where background noise levels are low it may be acceptable to design to equal to or below the background noise level.

3 Survey Methodology

Sound levels were monitored continuously at three positions used in previous assessments between approximately 21:30 on 10th June 2026 and 05:30 on 11th June 2026; these were MP0 at the site boundary near to the nitrogen generation plant, at MP1 representing Thirlstone Firs and at MP2 representing Castle Lane. The monitor at MP0 is to correlate activity with measurements off-site. Attended observations were made at positions MP1 and MP2 during setup and collection, and

for periods between 00:30 and 02:00 during the early morning of the 11th. The microphones at MP0 and MP1 were approximately 3.5m above ground level, and at MP2 at approximately 2m above the top of an earth mound. MP1 and MP2 are intended to be indicative of first floor level at the nearest residential properties.

Attended measurements and observations were also made in the early morning of the 11th in a series of 5m periods at positions A-C used in the previous assessments, and also at position D near to plant at Warrior Close, and position E near to the Greencore depot on School Lane. These measurements were taken with the microphone at approximately 1.5m above ground level.

5 minute measurements were also taken at MP1 and Position C with logging at a fine resolution of 10ms for determination of impulsivity correction with respect to the objective method in BS 4142: 2014 (derived from Nordtest Method NT ACOU 112).

The positions are shown in Figure 2. Details of the measurement instrumentation used is provided in Appendix 1. The calibration of the sound level meters was checked prior to and on completion of measurements and a drift of less than 0.2dB observed.

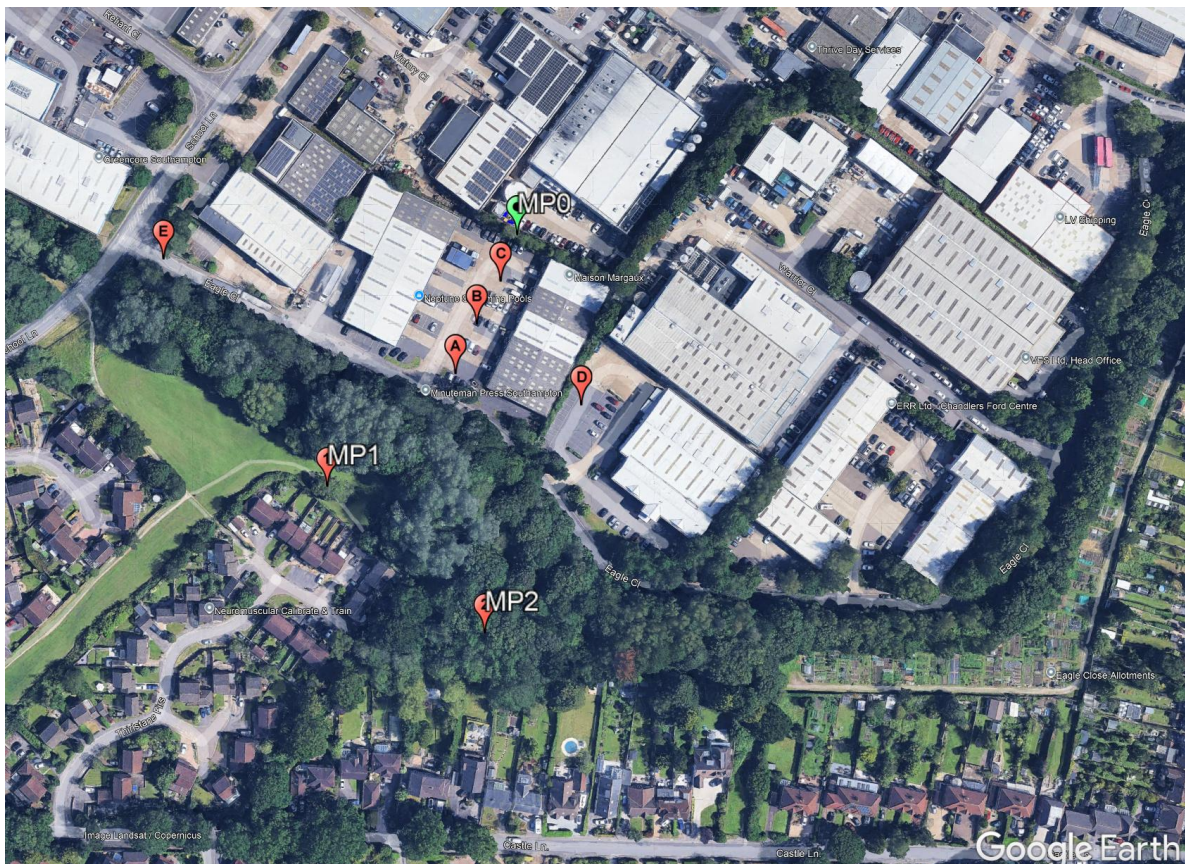


Figure 2: Measurement positions.

The plant was operating continuously at what is considered to be worst case (see section 1.2). It was decided not to attempt turning the plant off and on during the survey, as this affects the operation of the plant. It has already been established during the commissioning survey in February 2026 that the ambient and background noise levels did not detectably change at receptor positions off site as the continuous level is below the background noise level.

3.1 Weather conditions during survey period

The wind speeds were calm to less than 1m/s from a Westerly direction, which is likely to result in the lowest background noise levels; the prevailing wind direction is South-Westerly and the M27 is to the South and M3 to the East. The temperature was approximately 9°C during attended measurements. The ground was dry before and during the survey and there was no precipitation during the survey.

4 Measured Sound Levels and Observations Off Site

Measured sound levels are provided in Appendix 2.

A fine 1-second time-history of the measured sound levels at MP1 and MP2 has been correlated with the measurements at MP0, and these can be compared with the previous measurements in February and April 2026. A full time-history of the measurement period is shown in Figure A 1. Examples 5-minute time histories are shown in Figure A 2 for the late evening at 23:00, in Figure A 3 at a period with the lowest background noise level in the middle of the night, and Figure A 4 at the end of the measurement at 05:25 (shortly after the dawn chorus).

The discharge events are easily identified at the position close to the plant at MP0, where it is identified that there are up to 10 events in any 5-minute period (up to 30 events in 15 minutes). This frequency of events is higher than found in the assessment of temporary mitigation works (20 events in 15 minutes), but similar to that found in February: Note the comments at section 1.2 that the plant was considered to be operating at the worst-case condition.

These events are just identifiable in the time traces in the late evening/early morning periods at MP1, but not identifiable at MP2, as discussed in the following sections.

4.1 MP1 – Representing Thirlstane Firs

The discharge events were just perceptible at MP1 near Thirlstane Firs in the middle of the night when the background level is at its lowest, but were not easily identifiable at approximately 21:30, or at approximately 05:30. Subjectively this is similar to observations in April after the temporary mitigation works, but noticeably less prominent than observed in February 2026.

By inspection of the measure levels between 01:00 and 01:30, the log average absolute level at MP1 during identifiable discharge events was 40.8dB $L_{Aeq, 1 \text{ sec}}$ with an ambient level of 39.3 dB L_{Aeq}

(determined from the log average of the level just before each event). When the ambient level is subtracted this results in a level during discharge events at MP1 of 35.5 dB $L_{Aeq, 1 \text{ sec}}$. *Note the uncertainty of decibel subtraction increases where close to the ambient level; change of +/- 0.5dB in both specific and ambient level, could result in a range of 30.7 to 37.7 dB.*

Continuous plant noise was audible throughout the attended periods at night, together with distance road traffic noise. Other than the discharge events, it was not considered possible to distinguish the nitrogen plant from other existing plant noise sources. The 1/3 octave frequency spectrum of the plant at MP0 is shown in Figure A 5 and compared with the typical spectrum at MP1 in the middle of the night at Figure A 7. Close to the plant there is a peak in the 80Hz, though even close to the plant is less than that normally considered to be tonal. At MP1 this peak is no longer clearly identifiable. There was a higher frequency tone at approximately 1.2kHz which was just perceptible and can be seen in the 1/3 octave spectrum at MP1, however this is not connected with the nitrogen plant, and the source was not identified. It is considered that the underlying plant noise is significantly below the background noise level at MP1.

From the above findings, the estimated specific sound level is as shown in the table below. Note the difference between the level of impulse events and for the remaining period, has also reduced to approximately to approximately 7 dB from inspection of the levels measured near to the plant at MP0 and Position C as a result of the further attenuation of discharge events (the difference was identified as approximately 15 dB in February prior to mitigation and 8 dB in April after temporary mitigation works).

Description	Measured peaks, dB $L_{Aeq, 1 \text{ sec}}$	Background level, dB L_{A90}	Corrected source level, dB $L_{Aeq, 1 \text{ sec}}$	Duration, seconds
Discharge events	~40.8	~39.3	~35.5	30
Between events			$35.5 - 7 = 28.5$	870
Approximate 15minute level = 29 dB $L_{Aeq, 15 \text{ min}}$ (with significant uncertainty)				

Table 1: Estimate specific sound level $L_{Aeq, 15 \text{ min}}$ from peaks measured at MP1

From measurements and observations at MP1, it is considered that the noise level from the nitrogen plant is approximately the same as that found during the temporary works, noting that it was operating in a worst-case scenario and the uncertainty where measured levels are very close to the ambient level.

4.2 MP2 – Representing Castle Lane

The lowest background sound level at MP2 was 35 dB $L_{A90, 15 \text{ min}}$ at 01:30 (measured at approximately 2m above the top of an earth mound). There is no identifiable correlation between the measured sound levels near to the plant and those at MP2, as shown in the examples at Figure A 2 to Figure A 4.

No discharge events were audibly identified during attended periods in the middle of the night.

There is no correlation between the 1/3 octave frequency spectrum measured near to the nitrogen plant at MP0 and that at MP2.

The specific level at Castle Lane is considered to be significantly below the background sound level and was not measurable.

4.3 Measured levels at positions A to C

The measured levels at position A to C are shown in Table A 3 and example 1 second time histories of are shown at Figure A 9.

The L_{Aeq} and L_{A90} parameters have similar levels to those previously measured, however, these are primarily controlled by continuous plant noise sources. It was observed that high level plant at CooperVision Warrior Close is contributing significantly to measurements at these positions. The L_{A1} parameter is influenced by the impulse events and found to be essentially the same as that measured in April during temporary works; note however, that this parameter is also sensitive to any other short term events unrelated to the specific source.

The switching on and off of the compressor fan discharge in the south façade is apparent at position C, becoming less obvious at position A. From inspection of the time histories, the typical 1 sec L_{Aeq} during discharge events is approximately 56 dB at position C, which is approximately the same as that found in the April assessment of temporary mitigation works.

4.4 Other observations

Note that there was a road closure on School Lane close to the junction with Eagle Close at the time of the survey, such that no traffic could pass to or from the industrial estate from school lane to the west. Consequently, there are fewer local car pass-by events observed.

It was observed that there was activity at the Greencore depot on School Lane (near the junctions with Eagle Close and Reliant close) from approximately 02:00 which is noticeable at MP1, raising the ambient and background noise levels, and perceptible at MP2. This had significant low frequency contribution in the 50Hz and 100Hz 1/3 octave bands, as identified from an additional short term measurement close to the depot at position E, which can be seen in Figure A 6. This has been used to identify the periods of raised noise levels in the time-history at Figure A 1.

5 Analysis of Measured Noise Levels On Site (MP0)

A comparison of the measured levels at position MP0 with those previously measured in February and April is shown in Figure 3 and Figure 4 below:

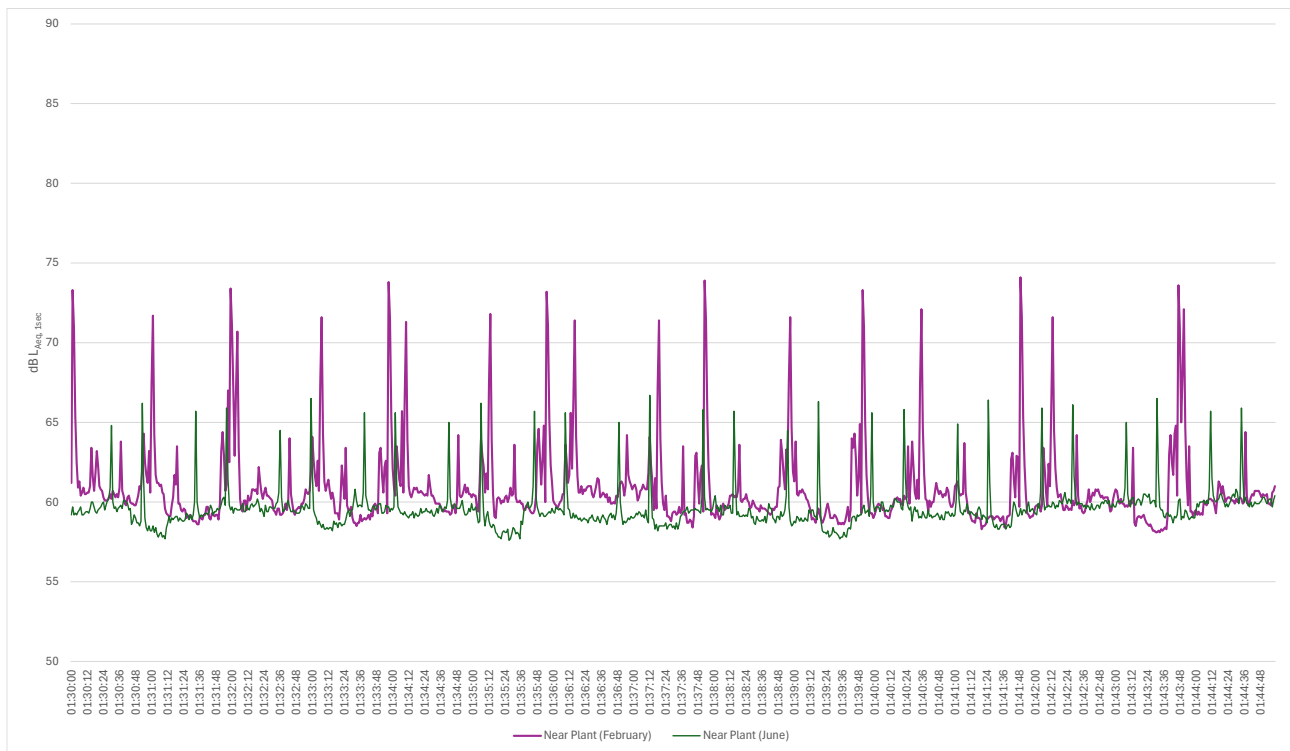


Figure 3: Comparison of measured sound level at MP0 between *February* (pre mitigation) and *June*

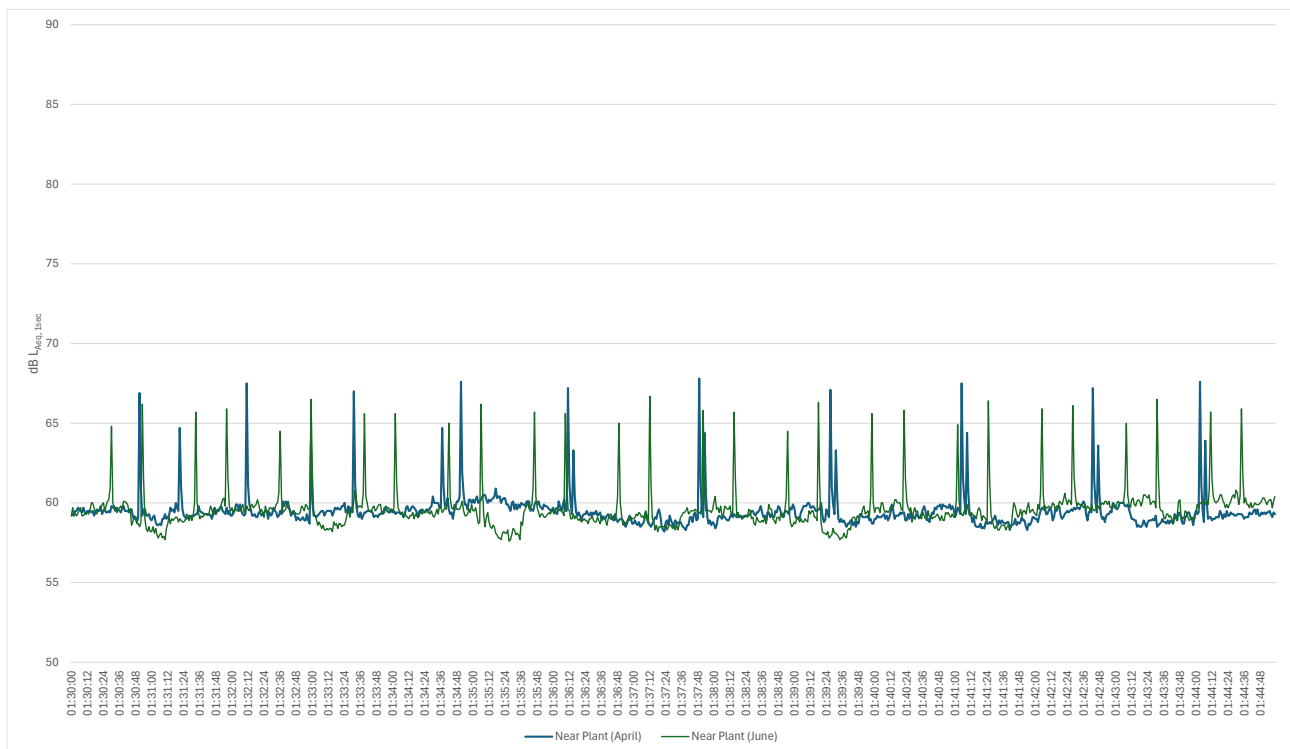


Figure 4: Comparison of measured sound level at MP0 between *April* (temporary mitigation) and *June*



It can be seen that the highest discharge events reduce by around 7dB (from approximately 73 to 66 dB $L_{Aeq, 1 \text{ second}}$) from the February survey, and by approximately 1 dB further from the April survey.

6 Updated noise model

The previous noise model generated using IMMI to implement the methodology in ISO 9613-2: 2014 has been updated to reflect the noise mitigation works and adjusted to match the measured levels at MP0 and estimated levels at MP1 for the worst-case use. The results are shown in Figure 5 below.

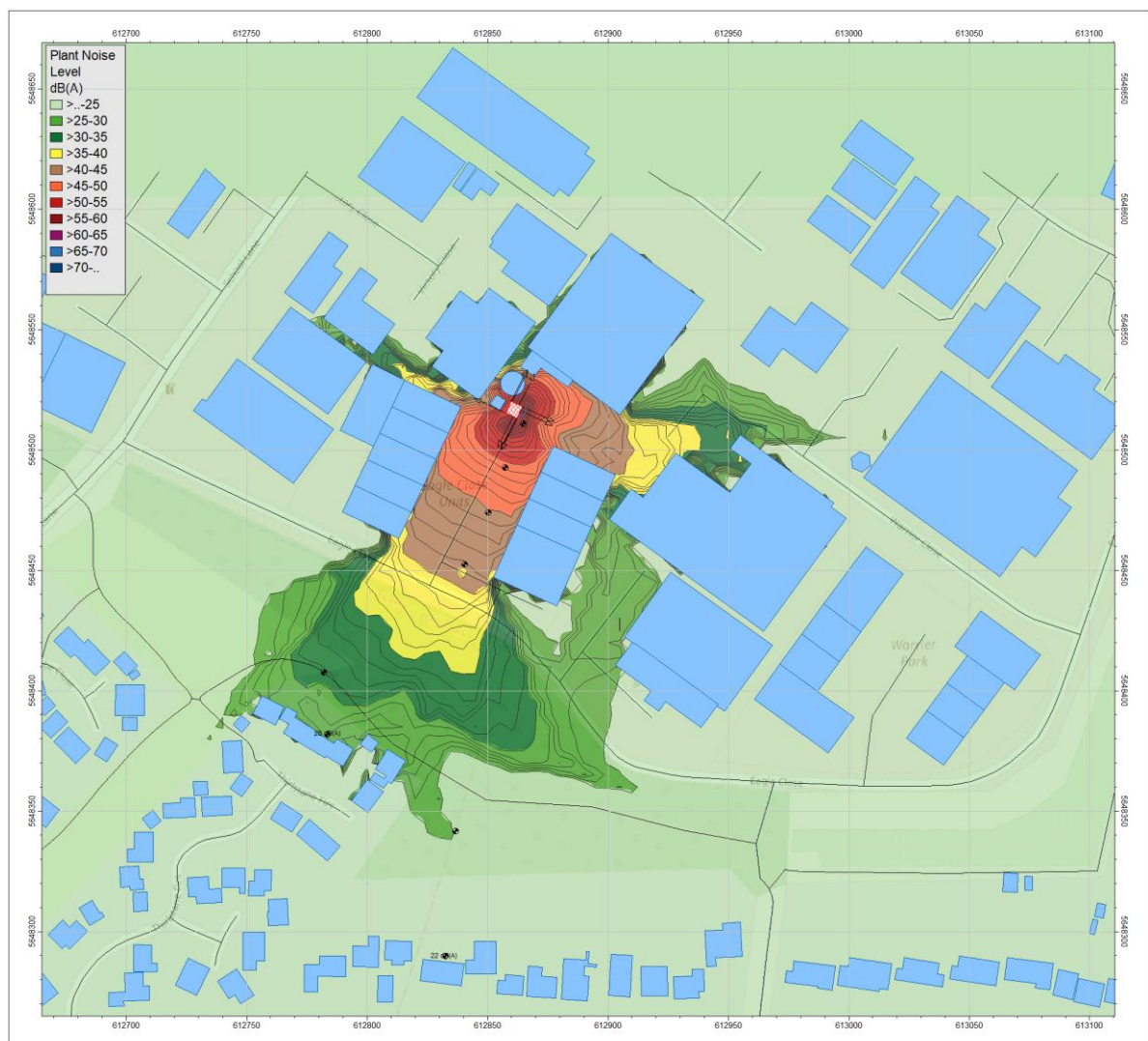


Figure 5: Update noise contour model using estimated sound power levels at source

The model shows a noise level of 28 dB L_{Aeq} at Thirlstane Firs and 22 dB L_{Aeq} at Castle Lane.

7 Updated Assessment

7.1 BS 4142:2014 Assessment

An updated assessment following the methodology in BS 4142: 2014 is shown in Table 2 below, for the estimated specific source levels. The background levels used in the assessment are the same as those used in each of the three previous assessments (with the planning application, during the commissioning survey assessment, and for the temporary mitigation works assessment).

Location	Estimated Specific level, dB LAeq	Character penalty	Approximate Rating level, dB LAeq	Background level, dB LA90	Initial Assessment level (rating - background)	Assessment of impact
Daytime	28	+0	28	44	-16	Low
Night-time	28	+3	30	38	-8	Low

Table 2: Estimated BS4142 assessment – Thirlstane Firs

Location	Estimated Specific level, dB LAeq	Character penalty	Approximate Rating level, dB LAeq	Background level, dB LA90	Initial Assessment level (rating - background)	Assessment of impact
Daytime	23	+0	23	41	-21	Low
Night-time	23	+0 to +3*	23 to 26	34	-11 to -8	Low

Table 3: Estimated BS4142 assessment – Castle Lane

The nitrogen plant was not audible at MP2 representing Castle Lane, however, during the previous survey following temporary mitigation works it was considered that it might just be perceptible on rare occasions, and it is acknowledged that observations have not been made directly at the rear of Castle Lane; A 3dB character penalty is therefore considered. As the discharge events were just perceptible at Thirlstane Firs, a penalty of 3dB for has been applied. It should be noted that the discharge events were just perceptible during periods with low background sound level but are not prominent in the residual environment.

Using the objective method for assessing the prominence of impulsive sound in Annex E of BS 4142:2014, the discharge events would have 0dB character correction K_i ; at MP1 the onset rate is normally below 10dB/s^{-1} leading to adjustment factors of 0dB, and even at position C, with onset rates of up to approximately 20dB/s^{-1} and prominence values of up to approximately 5, the adjustment factor is still 0dB. The character penalty of 3dB is considered appropriate on the basis that the discharge events may be just perceptible and therefore ‘distinctive against the residual acoustic environment’.

The estimated rating levels are below the background sound level, and the assessment indicates that they should have a low impact depending on the context. The assessment also indicates the

estimated rating levels are likely to meet the criterion of 5 dB below background preferred by Eastleigh Borough Council.

7.2 Assessment of Absolute Levels in Context

The estimated overall L_{Aeq} levels of up to 28 dB for Thirlstane Firs at night would result in internal levels of around 15 dB L_{Aeq} assuming approximately 13 dB attenuation through a partially open windowⁱ, which is significantly below the desirable criterion in BS 8233:2014 for sleeping conditions of 30 dB L_{Aeq} . When considering it as a rating level (if a character penalty of 3dB is included) this would be approximately 18 dB(A), which is still well below the 'anonymous' noise level criterion by 12dB. This provides confidence that the impact may be observable but of a low level likely not sufficient to cause adverse impact.

It is relevant to note that the level of the discharge events is only just detectable above the background sound level during the quietest periods and significantly below that of other short-term events, such as motorbikes and individual vehicles, and other activities observed on the industrial estate.

The event maximum level of around 42 dB $L_{Amax, f}$ externally would be approximately 29 dB $L_{Amax, f}$ internally, which is below the threshold for detectability of 'motility' and significantly (13dB) below that associated with adverse effects on sleep qualityⁱⁱ. It is noted that the events are frequent, but consistent in terms of level.

The absolute levels would therefore not normally be regarded to be likely to result in an observable adverse effect and as such would be a NOAEL (No Observable Adverse Effect Level).

8 Summary and Conclusion

The completed noise mitigation works provide a similar level of reduction as the temporary mitigation works completed in April 2026.

An updated assessment following the methodology in BS4142 indicates that rating noise levels are likely to be significantly below the existing background noise level and are likely to meet the Eastleigh Borough Council criterion of at least 5 dB below the background sound level. An assessment in context indicates there is likely to be NOAEL (No Observed Adverse Effect Level) during both daytime and night-time periods.

ⁱ *Acoustics, Ventilation and Overheating, Residential Design Guide (2020 Version 1.1)* suggests 13 dB in Appendix C.

ⁱⁱ Night Noise Guidelines for Europe, WHO 2009 and ProPG: Planning and Noise (2017), Appendix A



Appendix 1 Instrumentation

Equipment	Type	Serial Number	Calibration	
			Date	Certificate no
Svantek 958 – MP2				
Svantek Class 1 Sound and Vibration Analyser	958A	59190	15/05/2026	1517471-2
Microphone	MK 255	12731	15/05/2026	1517471-2
Preamplifier	SV 12L	58585	15/05/2026	1517471-2
Svantek 958 – MP1				
Svantek Class 1 Sound and Vibration Analyser	958A	59140	17/10/2024	1510147-1S
Microphone	MK 255	12582	17/10/2024	1510147-1S
Preamplifier	SV 12L	57964	17/10/2024	1510147-1S
Svantek 958 – MP0				
Svantek Class 1 Sound and Vibration Analyser	958A	59101	16/12/2024	1510811-1S
Microphone	MK 255	26225	16/12/2024	1510811-1S
Preamplifier	SV 12L	164841	16/12/2024	1510811-1S
Svantek 977 – Attended measurements				
Svantek Class 1 Sound Analyser	977	99705	06/12/2024	Factory Cal
Microphone	MK255	24172	06/12/2024	Factory Cal
Preamplifier	SV 12L	164834	06/12/2024	Factory Cal
Svantek Calibrator	SV33	155582	23/01/2026	1516307-1

Appendix 2 Measurements

Time	LAFmax	LAFmin	LAeq	LA1	LA10	LA50	LA90
21:30	76.5	41.0	47.0	49.9	46.9	44.3	42.4
21:45	51.5	41.4	44.7	49.6	46.8	43.9	42.3
22:00	51.9	40.6	44.7	50.6	47.3	43.5	42.0
22:15	52.7	39.1	42.6	48.2	44.7	41.8	40.2
22:30	49.8	39.2	41.5	43.9	42.8	41.4	40.2
22:45	48.7	39.3	41.6	44.6	42.7	41.4	40.3
23:00	78.5	39.2	43.9	45.6	42.8	41.4	40.2
23:15	47.0	39.9	41.8	44.0	42.9	41.7	40.6
23:30	52.9	39.3	41.6	47.2	42.1	41.2	40.2
23:45	48.7	38.4	40.8	45.5	41.8	40.5	39.4
00:00	47.5	38.1	40.7	44.9	41.9	40.3	39.2
00:15	55.2	37.4	40.6	48.1	40.9	39.6	38.6
00:30	56.5	37.3	42.5	49.4	45.6	39.9	38.4
00:45	45.4	37.6	39.5	42.6	40.4	39.4	38.3
01:00	43.6	37.4	39.4	41.8	40.3	39.3	38.2
01:15	49.2	37.6	39.4	41.7	40.2	39.4	38.4
01:30	49.9	37.4	39.4	41.6	40.4	39.4	38.3
01:45	48.3	37.8	40.9	44.9	43.3	39.9	39.0
02:00	60.4	38.8	41.8	44.3	42.3	41.0	40.1
02:15	46.7	39.4	41.2	43.9	42.0	41.1	40.2
02:30	49.6	38.4	42.0	45.8	43.5	41.9	39.6
02:45	43.3	38.0	39.6	41.9	40.5	39.5	38.6
03:00	45.3	38.1	39.9	42.6	40.9	39.7	39.0
03:15	43.0	38.1	39.9	41.9	40.8	39.8	39.0
03:30	55.1	37.8	40.0	42.5	40.8	39.7	39.0
03:45	61.8	38.1	45.2	57.2	45.3	40.5	39.3
04:00	63.7	38.9	47.3	59.8	46.2	42.1	40.2
04:15	88.3	39.3	59.5	70.2	50.6	43.7	41.1
04:30	67.0	39.9	52.0	64.2	55.1	44.8	41.8
04:45	61.1	39.9	45.1	52.1	47.5	43.2	41.2
05:00	55.9	40.0	43.7	50.6	46.0	42.4	41.0
05:15	58.9	39.9	44.4	52.2	46.1	43.1	41.4

Table A 1: Measured sound levels at MP1 (15 minute periods)

Time	LAFmax	LAFmin	LAeq	LA1	LA10	LA50	LA90
21:30	54.2	38.3	41.6	47.1	42.9	41.0	39.6
21:45	52.7	38.4	41.2	43.8	42.5	41.1	40.0
22:00	48.9	38.3	41.0	45.0	42.4	40.6	39.4
22:15	53.6	36.9	40.6	46.3	42.6	39.7	38.2
22:30	61.2	36.6	39.6	44.9	40.6	38.9	37.8
22:45	45.4	36.3	39.2	43.1	40.5	38.9	37.6
23:00	45.0	36.0	38.6	41.9	39.8	38.4	37.2
23:15	44.2	36.7	38.8	41.8	39.9	38.6	37.5
23:30	47.0	36.1	38.8	43.0	39.8	38.5	37.3
23:45	51.3	35.0	38.4	44.7	39.8	37.6	36.3
00:00	46.1	34.5	38.0	43.4	39.7	37.4	36.0
00:15	47.6	34.5	38.1	44.8	39.4	37.5	36.2
00:30	47.5	34.0	38.3	44.6	40.1	37.4	36.0
00:45	44.9	34.2	37.2	40.9	38.6	36.9	35.5
01:00	71.6	34.7	40.7	47.4	39.9	37.6	36.1
01:15	66.8	35.0	39.0	41.8	38.3	37.0	36.0
01:30	45.1	33.9	36.2	39.3	37.6	36.0	35.0
01:45	40.6	34.3	36.8	39.3	38.0	36.6	35.3
02:00	50.6	35.2	37.3	40.1	38.5	37.1	36.1
02:15	65.8	35.2	39.1	43.9	39.9	37.9	36.6
02:30	50.5	35.3	38.7	44.7	39.9	38.1	36.7
02:45	43.9	34.7	37.1	39.9	38.3	36.9	35.8
03:00	43.6	34.8	38.0	41.6	39.5	37.6	36.2
03:15	44.9	35.2	38.8	43.0	40.5	38.4	36.6
03:30	53.1	35.2	39.4	43.8	40.9	38.7	36.8
03:45	57.3	36.3	40.5	48.5	41.4	39.4	38.0
04:00	58.9	35.8	47.6	56.6	52.5	42.1	38.8
04:15	59.8	37.3	47.4	56.8	51.9	42.4	39.7
04:30	75.0	37.2	59.8	72.2	62.9	43.3	40.1
04:45	73.9	38.9	59.8	71.7	63.8	42.6	40.2
05:00	76.3	37.9	56.3	68.7	59.6	42.5	40.3
05:15	67.5	39.9	47.4	60.2	46.9	43.8	42.1

Table A 2: Measured sound levels at MP2 (15 minute periods)

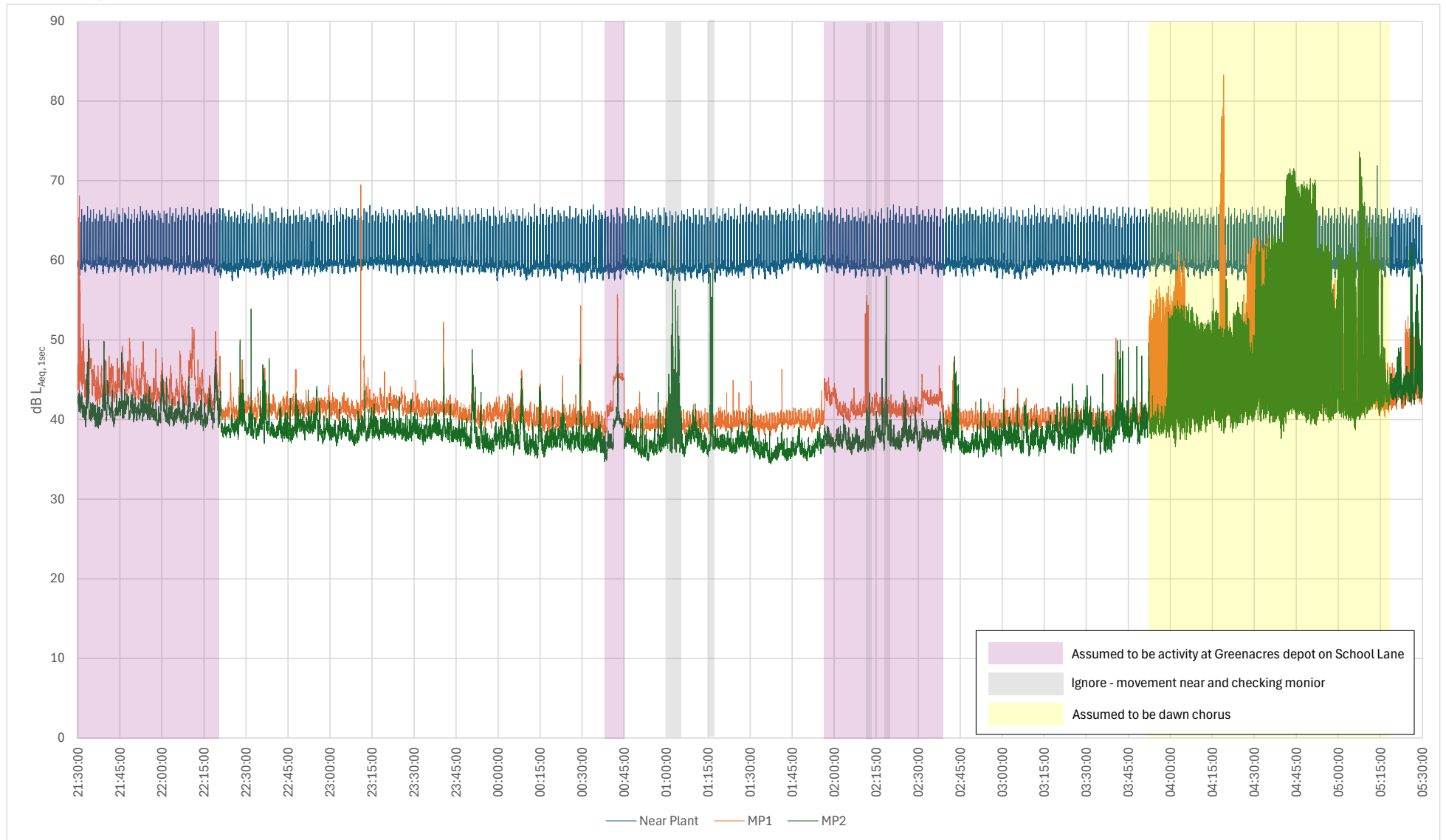


Figure A 1: Time history of measured levels at MPO (Near plant), MP1 and MP2

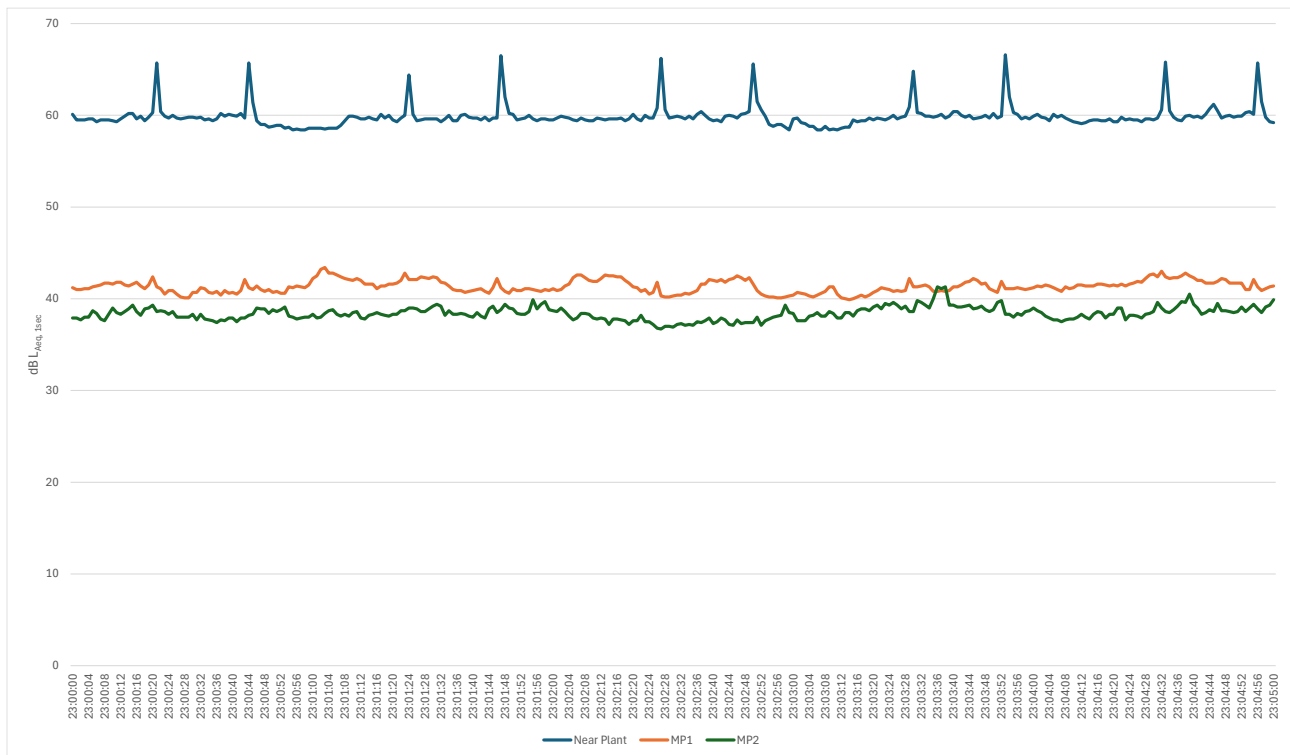


Figure A 2: Correlated 1 second time-history of measured sound levels at MP0, MP1 and MP2 - 23:00

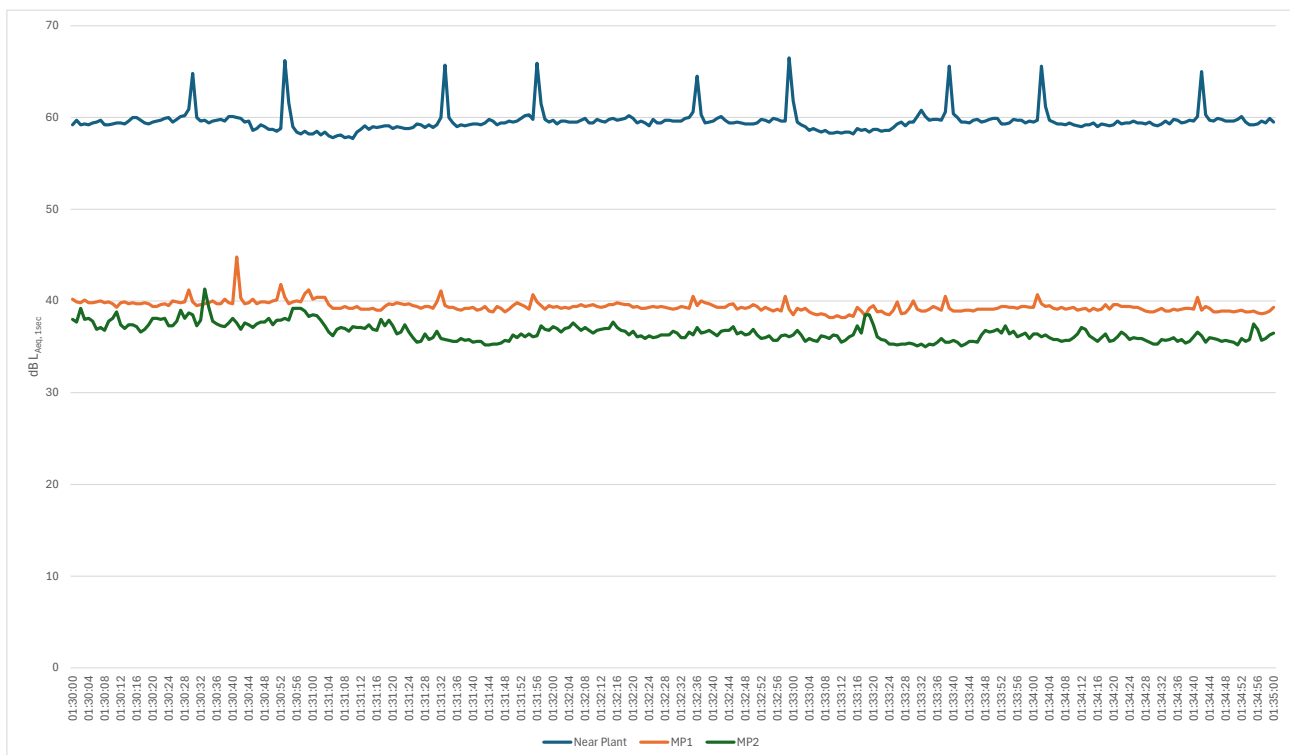


Figure A 3: Correlated 1 second time-history of measured sound levels at MP0, MP1 and MP2 – 01:30

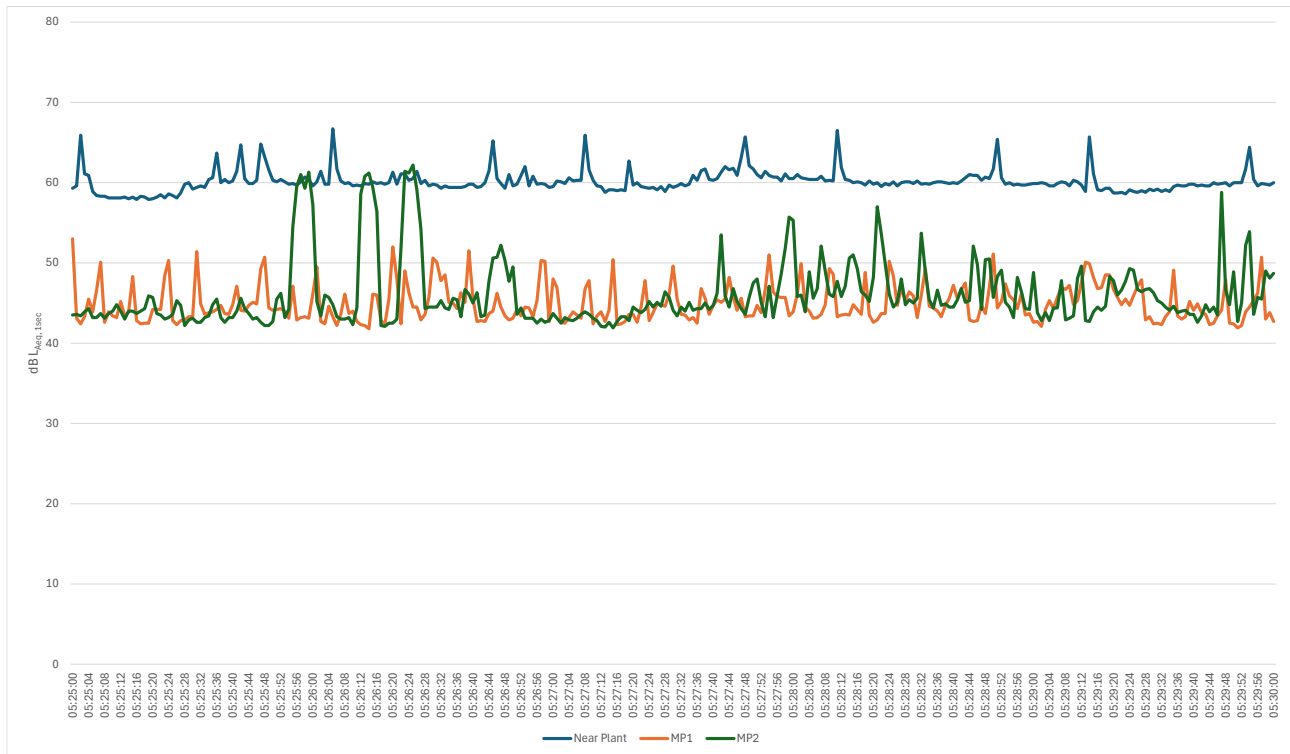


Figure A 4: Correlated 1 second time-history of measured sound levels at MP0, MP1 and MP2 – 05:25

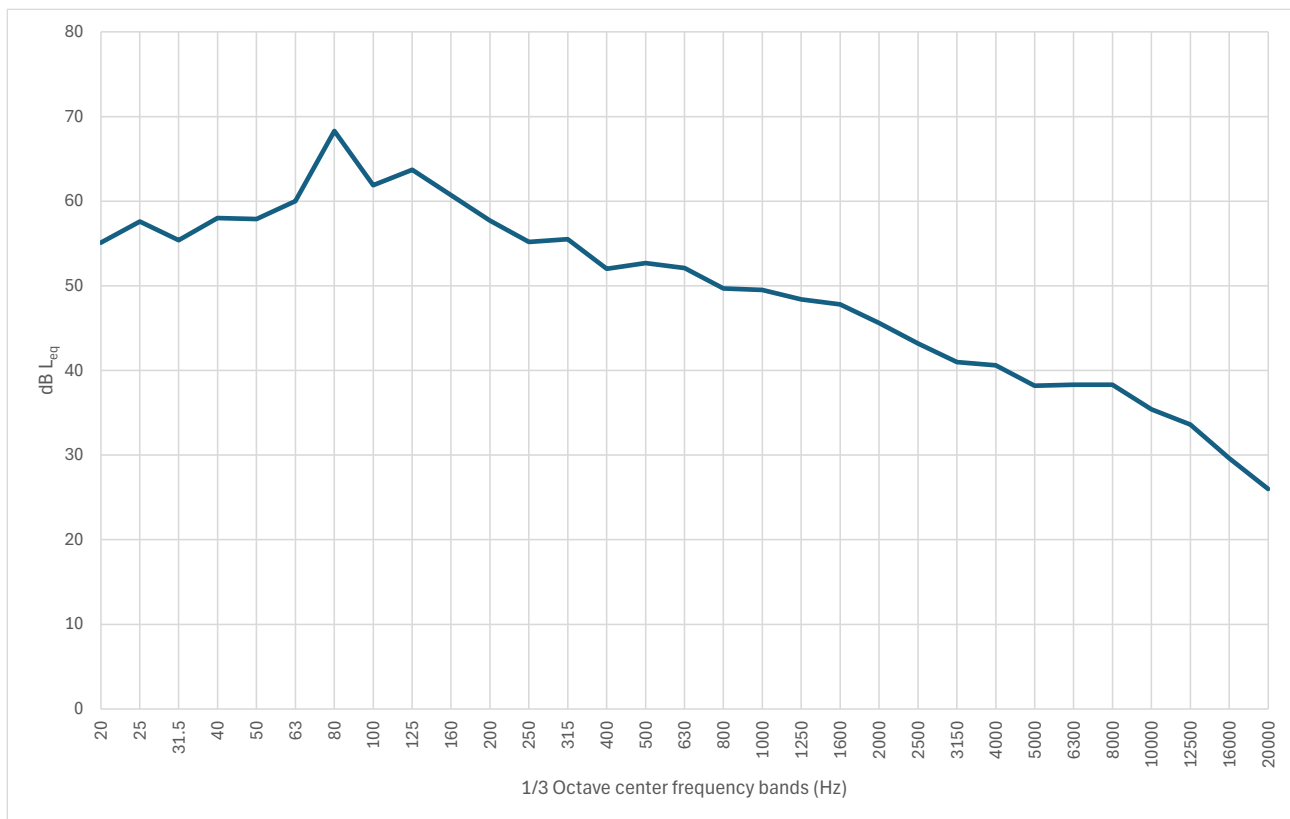


Figure A 5: 1/3 octave frequency spectrum near to plant at MP0

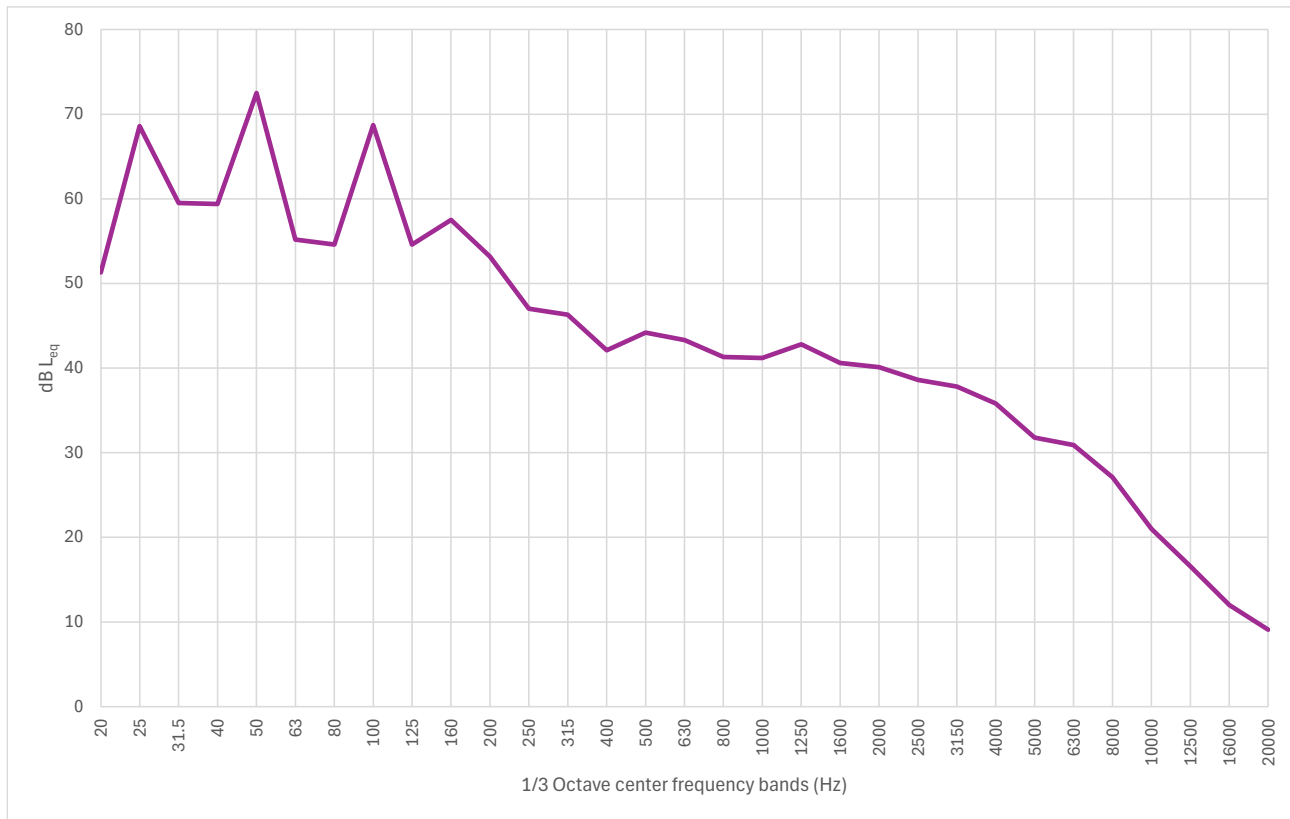


Figure A 6: 1/3 octave frequency spectrum near to Greencore depot on School Lane (position E) at 02:00

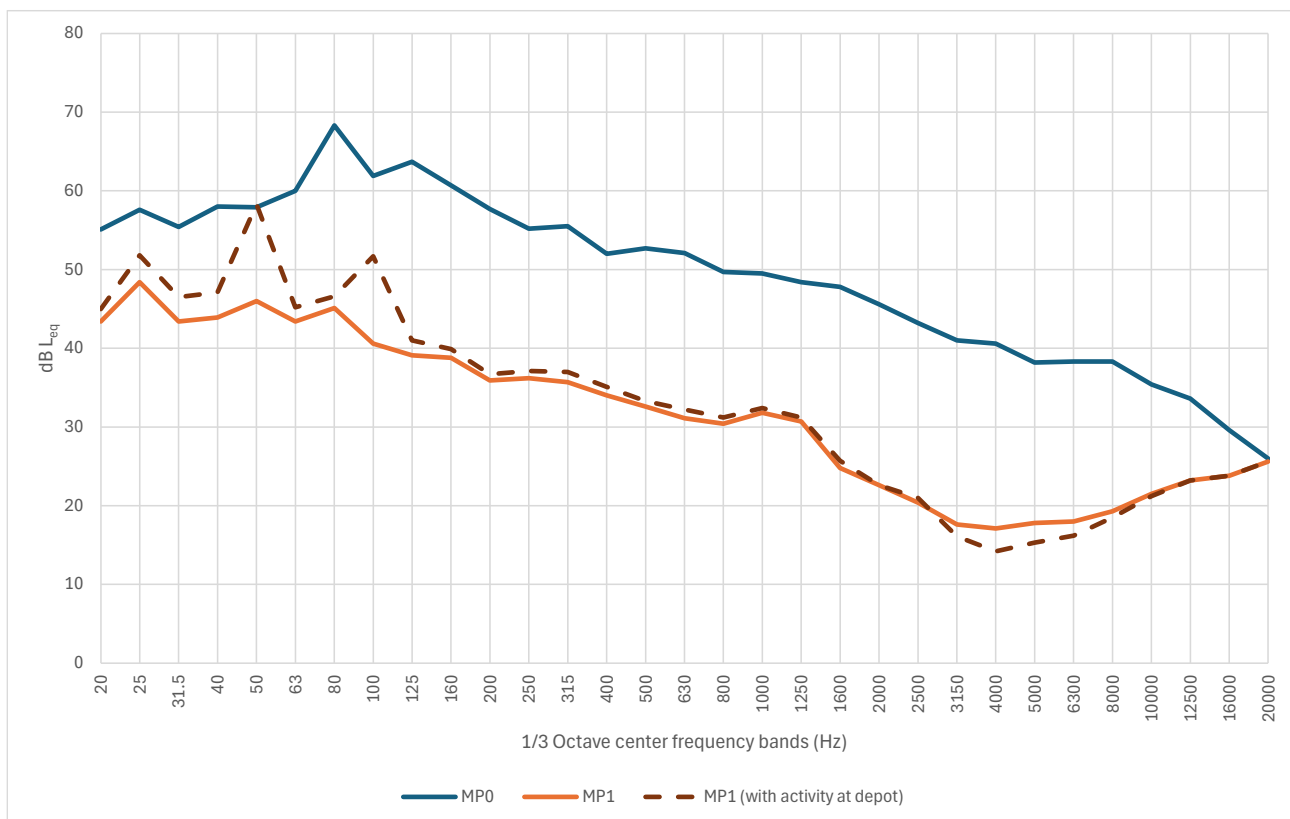


Figure A 7: 1/3 octave frequency spectrum comparison between MP0 and MP1

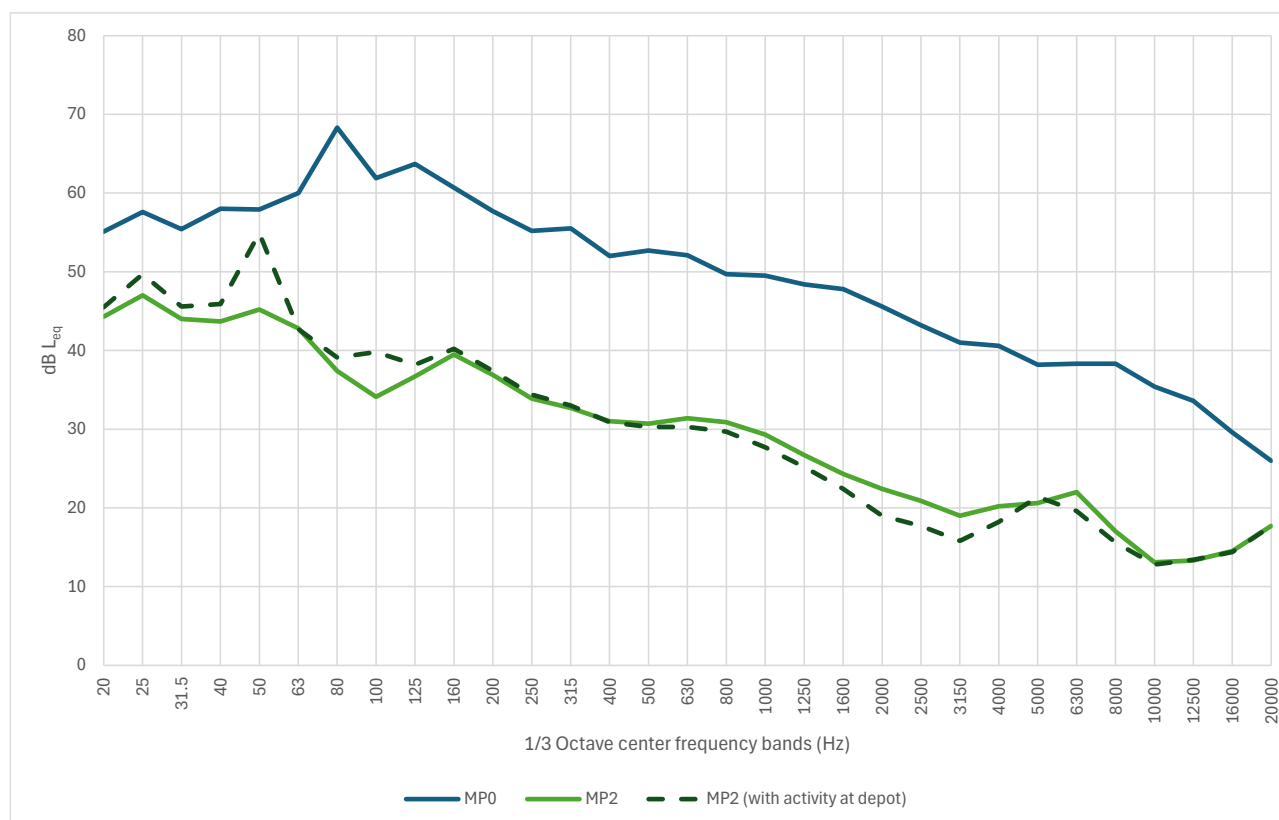


Figure A 8: 1/3 octave frequency spectrum comparison between MP0 and MP2

Position	Start Time	Duration, mm:ss	Measured level, dB					
			L _{Aeq}	L _{Afmax}	L _{Afmin}	L _{A1}	L _{A50}	L _{A90}
A	00:42:40	05:00	48.2	52.4	45.1	50.8	48.1	46.9
A	01:53:25	04:31	48.3	53.5	45.8	51.4	48.2	46.9
B	00:35:40	05:00	50.2	55.3	47.0	53.8	50.1	48.4
B	01:49:13	03:49	50.8	55.6	48.0	54.2	50.7	49.0
C	00:29:40	05:00	52.7	58.5	47.8	57.0	52.5	50.8
C	01:43:33	05:00	53.0	62.8	50.1	56.9	52.9	51.4
D	00:53:50	03:01	44.9	49.2	43.7	46.6	44.8	44.1
Depot	01:59:33	02:36	54.5	60.2	47.2	59.0	53.3	48.8
MP1	01:18:41	05:00	37.1	46.2	35.4	39.2	36.9	36.1
MP1	01:24:25	05:00	37.3	46.8	35.2	39.1	37.2	36.3
MP1	02:04:46	05:00	39.5	52.7	37.5	41.2	39.3	38.4
MP2	01:05:19	05:00	36.4	40.9	33.2	39.6	36.2	34.8
MP2	01:10:27	05:00	35.8	39.0	33.8	38.0	35.6	34.5
MP2	02:12:30	05:00	37.5	46.2	34.4	43.3	36.6	35.4

Table A 3: Measured levels at positions A, B and C

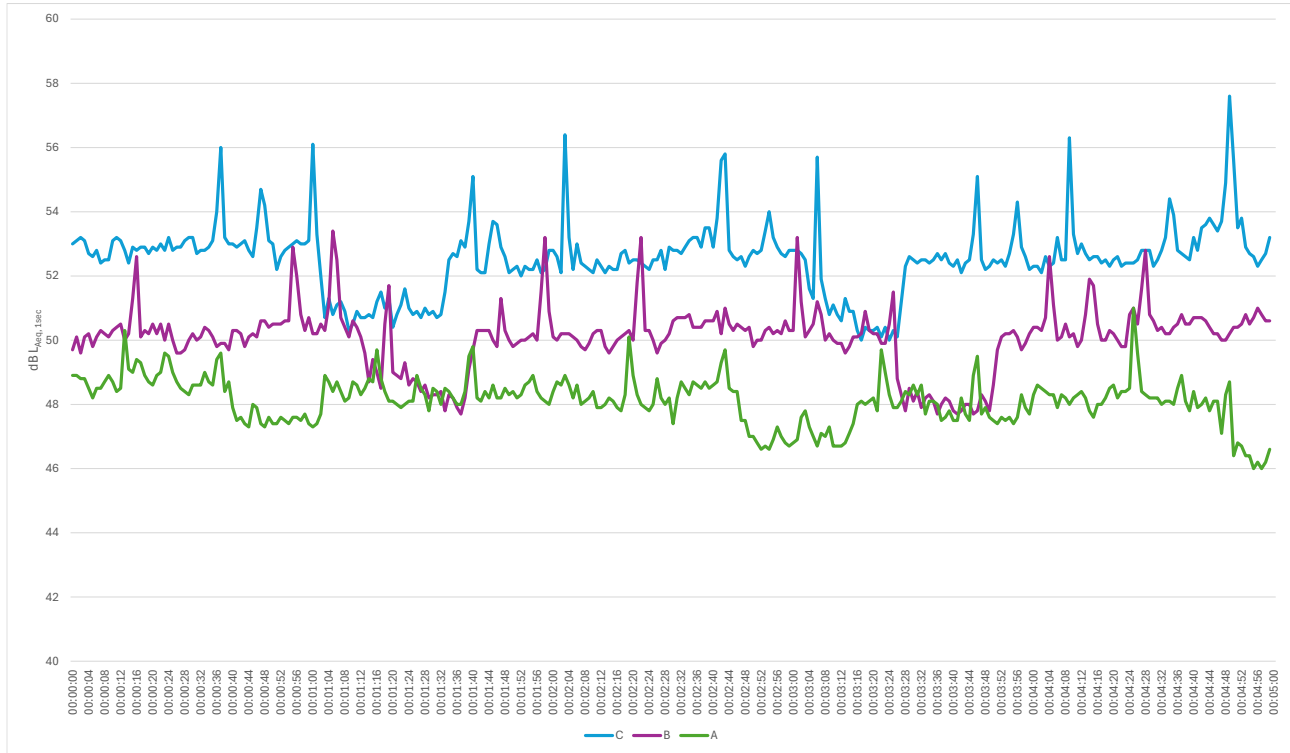


Figure A 9: Example 1 second time histories at position A-C