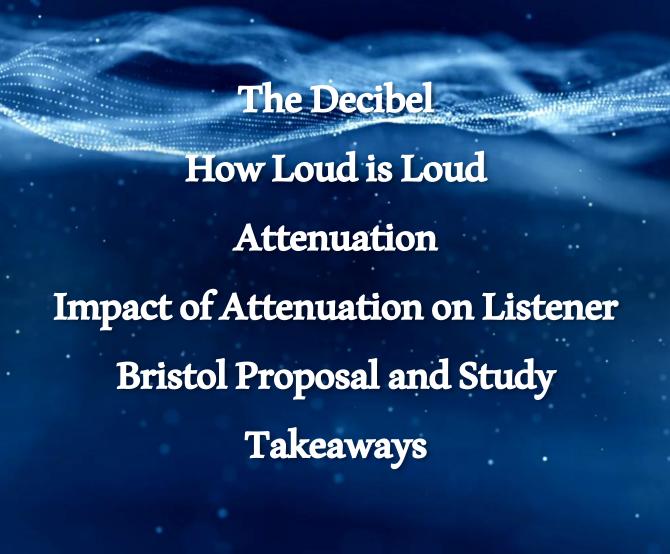


NASHVILLE FAIRGROUNDS SPEEDWAY

NOISE MITIGATION STUDY:

Breaking It Down



WHAT IS THE DECIBEL?

Measurement of the intensity (energy) of sound

Based on *pressure* it takes to move the eardrum

A sound 100 times more powerful than 0 dB is 20 dB.

A sound 1,000 times more powerful o dB is 30 dB.

HOW LOUD IS LOUD?

Intensity	Samples			
180	rocket launch			
165	357 magnum revolver			
150	fighter jet launch			
140	threshold of pain			
135	jet engine (to 140)			
130	large jet airplane take off			
120	lawnmower			
110	full symphony orchestra			
100	helicopter			
95	food processor			
90	bass drum			
80	freight train (100 ft away)			
75	toilet flushing/vacumn cleaner			
70	hairdrye r			
65	busy street			
60	Conversational speech			
45	light rain			
40	quiet living room/office			
30	rustle of leaves			
25	Whisper			
10	breath			

WHAT IS ATTENUATION?

Reduction of sound volume

HOW DO YOU ACHIEVE ATTENUATION?

Double the distance (from the sound source) and the intensity drops by 6dB

Reduce the intensity of the sound at the source

Provide barriers to impede sound propagation & length of exposure

Provide for sound absorptive materials

Bristol's Executive Summary: Proposed Noise Mitigation Measures

BRISTOL'S PROPOSED NOISE MITIGATION

Limit to a total of 10 race weekends per year

Reduction in practice days

Curfews on event start and stop times

Adding engineered sound absorbing wall

New grandstand building, Track buildings

Expo building and MLS Stadium

Mandated muffler use and enforcement for all non-NASCAR racing

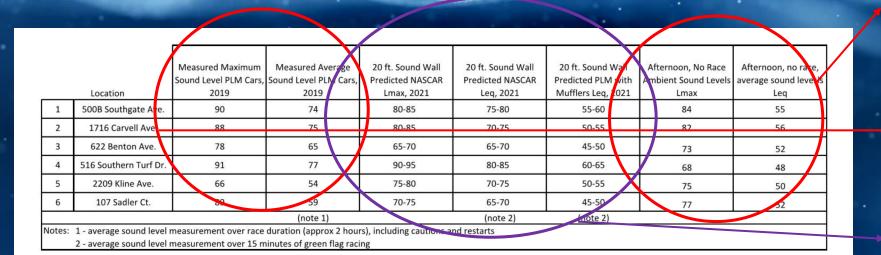
RESULTING IN....

-7 dBA in all areas for local/regional events — nearing a 50% reduction in perceived loudness

No appreciable difference between 2019 All American 400 and predicted NASCAR event.

Predicted non-NASCAR event mitigated sound levels to be consistent with current ambient levels.

MEASURED & PREDICTED SOUND LEVELS – BY THE NUMBERS



1. Intensity levels measured no race

2. Intensity levels measured – maximum and averages for PLM cars 2019

3. Intensity levels measured with 20 ft sound wall with and without mufflers for PLM and Nascar

IMPACT OF ATTENUATION FOR THE LISTENER

5		2040 DVVV D VV V V	2040 PIN	N N 11 1 1 1
Intensity _	Samples	2019 PLM Race Max Levels	2019 PLM	Nascar Predicted Avg
		No Sound Mitigation	with mufflers & sound wall	with sound wall
180	rocket launch		in the state of th	
165	357 magnum revolver			The state of the s
150	fighter jet launch			
140	threshold of pain	Manager of the last of the las		The second second
135	jet engine (to 140)			
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120	lawnmower			
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95	food processor			
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45	light rain			
40	quiet living room/office			
30	rustle of leaves			
25	Whisper			
10	breath			

IMPACT OF ATTENUATION FOR THE LISTENER

PERCEIVED NOISE REDUCTION

I ENGLIVED NOISE REDUCTION				
dB	Actual SPL	Perceived Volume		
uв	Reduction	Reduction		
3 dB	50.00%	18.77%		
6 dB	75.00%	34.02%		
9 dB	87.50%	46.41%		
12 dB	93.75%	56.47%		
15 dB	96.88%	64.64%		
18 dB	98.44%	71.28%		
21 dB	99.22%	76.67%		
24 dB	99.61%	81.05%		
27 dB	99.80%	84.61%		
30 dB	99.90%	87.50%		
33 dB	99.95%	89.85%		
36 dB	99.98%	91.75%		
39 dB	99.99%	93.30%		
42 dB	99.99%	94.56%		
45 dB	100.00%	95.58%		
48 dB	100.00%	96.41%		
51 dB	100.00%	97.08%		
54 dB	100.00%	97.63%		
57 dB	100.00%	98.08%		
60 dB	100.00%	98.44%		
63 dB	100.00%	98.73%		
66 dB	100.00%	98.97%		
69 dB	100.00%	99.16%		
72 dB	100.00%	99.32%		
75 dB	100.00%	99.45%		
78 dB	100.00%	99.55%		
81 dB	100.00%	99.64%		

	A STATE OF THE PARTY OF THE PAR			
2019 PLM Race	2019 with Mufflers	Average PLM	Perceived	
Max levels	and Sound Wall, Avg.	Attenuation	Volume Reduction	
90	55-60	30	88%	
88	50-55	38	92%	
78	45-50	28	85%	
91	60-65	26	83%	
66	50-55	11	53%	
89	45-50	39	93%	
	Max levels 90 88 78 91 66	Max levels and Sound Wall, Avg. 90 55-60 88 50-55 78 45-50 91 60-65 66 50-55	Max levels and Sound Wall, Avg. Attenuation 90 55-60 30 88 50-55 38 78 45-50 28 91 60-65 26 66 50-55 11	

	Predicted Nascar	Average Nascar	Average PLM	Perceived	
	with 20 ft Wall, max	with 20 ft wall, average	Attenuation	Volume Reduction	
5008 Southgate Avenue	80-85	75-80	5	32%	
1716 Carvell Avenue	80-85	70-75	5	32%	
622 Benton Avenue	65-70	65-70	0	no change	
516 Southern Turf Drive	90-95	80-85	10	50%	
2209 Kline Avenue	75-80	70-75	5	32%	
107 Sadler Ct.	70-75	65-70	5	32%	

^{**} Retrieved from https://www.acousticalsurfaces.com/soundproofing

SIMPLE MATH....OR NOT

CAR SOURCE SOUND LEVEL COMPARISONS				
Car Type	Measurement Source	Measurement Type	Measured Levels	Normalized Levels
2019 Pro Late Model, Practice	Measured at Nashville, 2019	Lmax, slow (10 min)	107 dBA at 105'	107 dBA at 100'
Pro Late Model Regulations	From Email with Nashville		97 dBA at 100'	97 dBA at 100'
NASCAR at COTA, Single Car, Straight	Measured at COTA, 2021	Lmax, slow (5 sec)	112 dBA at 95'	112 dBA at 100'
NASCAR at COTA, Single Car, Turn	Measured at COTA, 2021	Lmax, slow (5 sec)	98 dBA at 88'	97 dBA at 100'



97 97 97 97 97

= 97 + 3 + 1+ 1+ 1+ 1

= 104 dB

TAKEAWAYS

PLM see greatest attenuation with combination of mufflers and sound wall, from 11dB to 30dB attenuation

Nascar races see 25 - 50% attenuation with sound wall, no muffler attenuation

53 – 93% perceived quieter for PLM races

32 – 50% perceived quieter for Nascar races

Additional noise mitigation occurs with future construction

Heat maps offer comparisons by neighborhood