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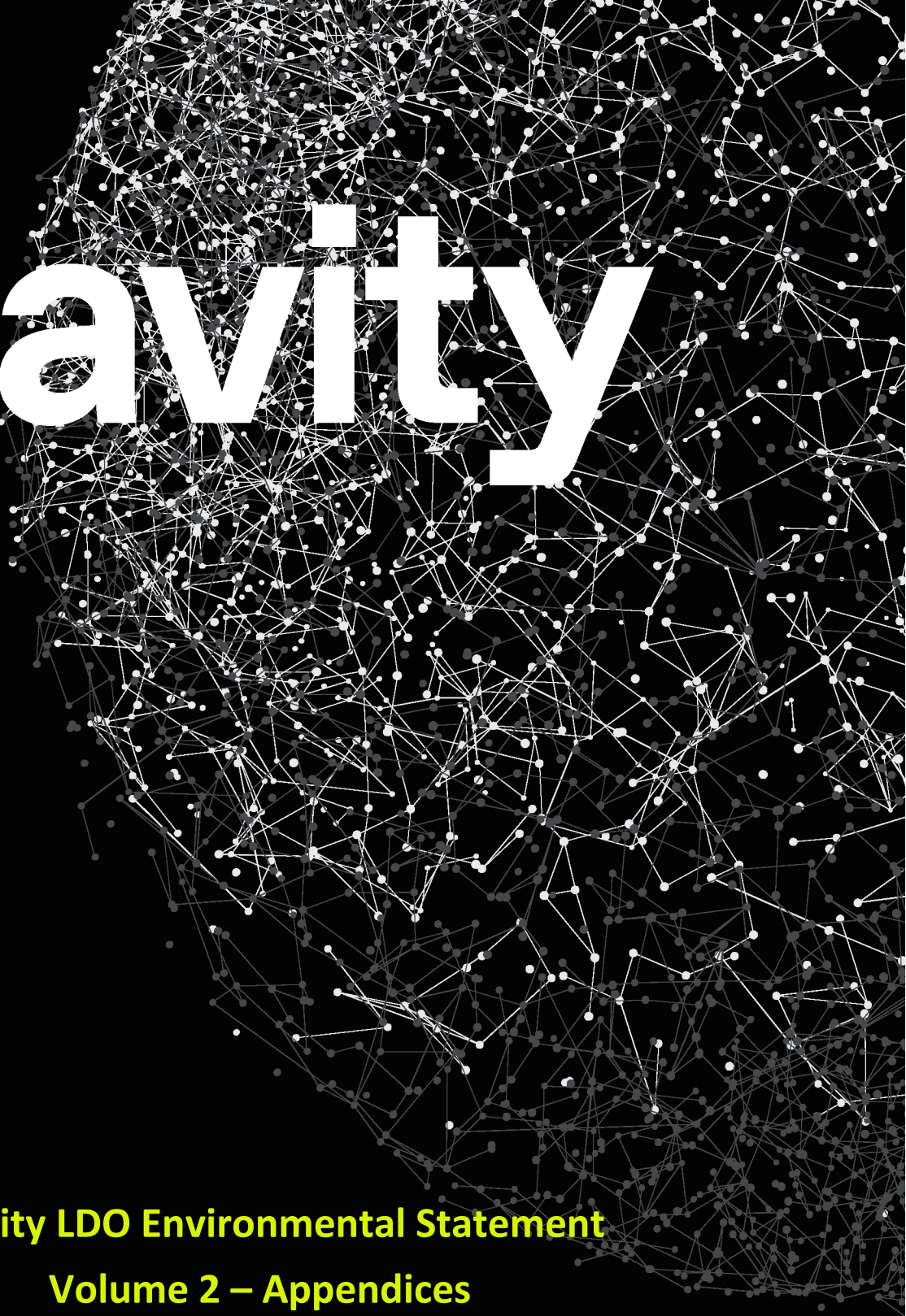

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Appendix 10.1 Glossary of Acoustic Terminology

Appendix 10.1: Glossary of Acoustic Terminology

Term	Definition
Acoustic Environment	Sound at the receiver from all sound sources as modified by the environment.
Ambient Sound Level ($L_A = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
A-Weighted Decibel (dBA)	A decibel level that has been corrected for the A-Weighting curve.
A-Weighting	Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.
Background Sound	The level of sound measured in the absence of extraneous noise sources.
Background Sound Level ($L_{A90,T}$)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.
Baseline Year	The opening year of the road project.
Decibel (dB)	A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power. The reference value for sound pressure is 20 µPa and for sound power is 1 ρW.
Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$)	Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.
Façade Level	The sound pressure level at a distance of 1 metre from the façade
Fast Time Weighted	The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fats time-weighted instrument is 0.125 seconds.
Free-Field Level	The sound pressure level measured away from any reflective surfaces.
Frequency (f)	The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.
Future Assessment Year	The year between baseline and the 15th year where the maximum impact from the road project would occur.
Hertz (Hz)	The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.
Impact Sound Pressure Level (L_i)	Average sound pressure level within a room below a floor that is excited by a tapping machine.

$L_{10,T}$	The noise level exceeded for 10 % for a given time interval, T. Generally used to describe traffic noise.
L_{Amax}	The maximum A-weighted level measured during a given time period.
Normalised Impact Sound Pressure Level (L_n)	Impact sound pressure level normalized for a standard absorption area in the receiving room.
Octave Band	Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.
Rating Level ($L_{Ar,Tr}$)	Specific sound level plus any adjustment for the characteristic features of the sound.
Reference Time Interval (T)	Specified interval over which the specific sound level is determined.
Residual Sound Level ($L_r = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Sound Power (L_W)	The total sound energy radiated by a source, in all directions. Measured in watts (W).
Sound Power Level (L_W)	The logarithm of the ratio of the sound power (W) to the reference sound power level (W_0). The reference value for sound power is 1 ρW. Defined as: $L_W = 10log\left(\frac{W}{W_0}\right)$
Sound Pressure	The difference between the pressure caused by a sound wave and the ambient pressure of the medium the sound wave is passing through. Measured in Pascals.
Sound Pressure Level (L_p)	The logarithm of the ratio of a given sound pressure (p) to the reference sound pressure (p_0). The reference value for sound pressure is 20 μPa. Defined as: $L_p = 20log\left(\frac{p}{p_0}\right)$
Sound Reduction Index (R)	Laboratory measure of the sound insulation properties of a material or building element in a stated frequency band. Defined as: $R = L_1 - L_2 + 10log_{10}\left(\frac{S}{A}\right)$
Sound Sources	Sounds generated by nature or human activity.
Specific Sound Level ($L_s = L_{Aeq,Tr}$)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific Sound Source	Sound source under assessment.
Third Octave Band	Octave bands sub divided into three frequency bands, equal to 23 % of the centre frequency.
Weighted Sound Reduction Index (R_W)	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.

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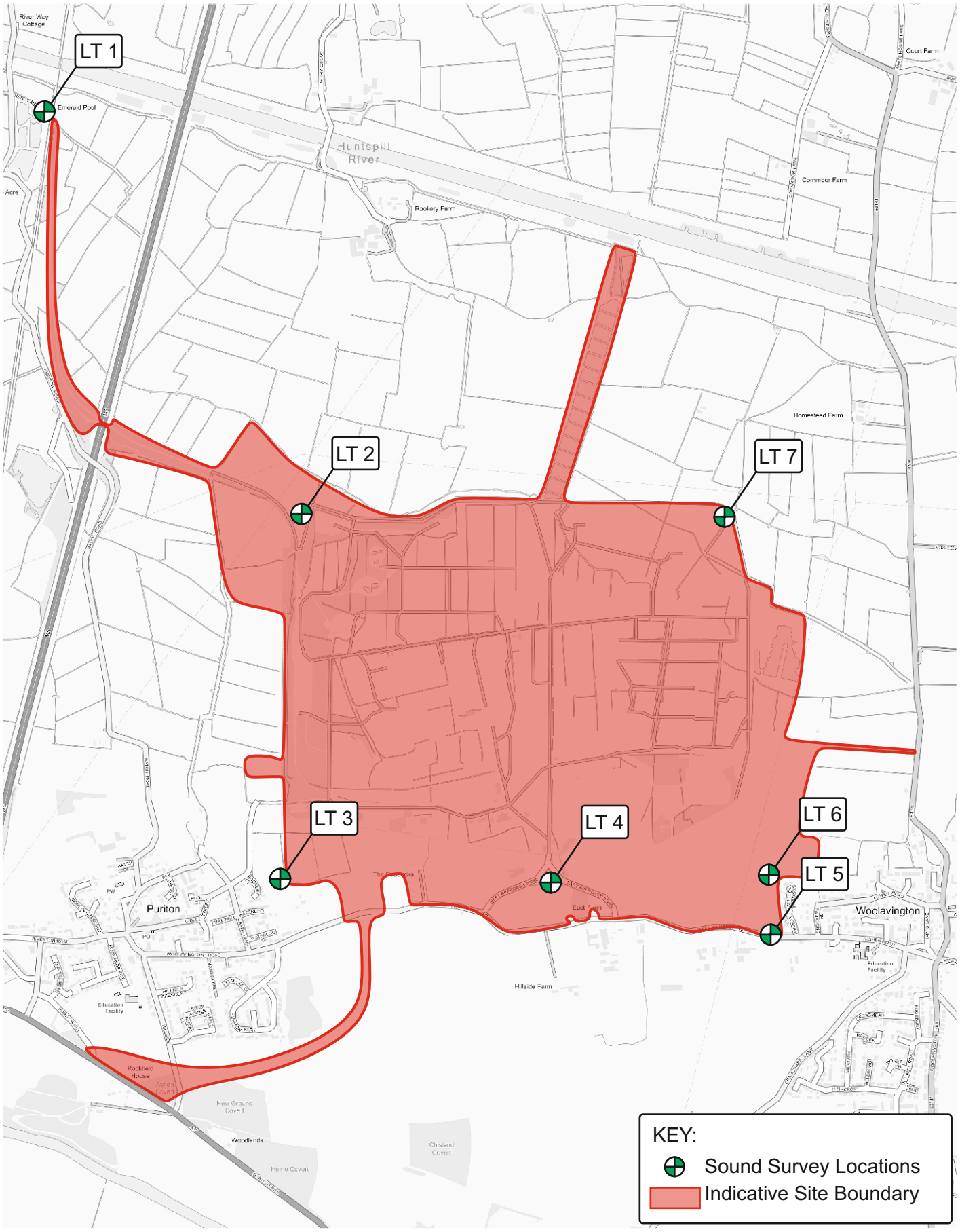
Appendix 10.2 Figures

Appendix 10.2: Figures



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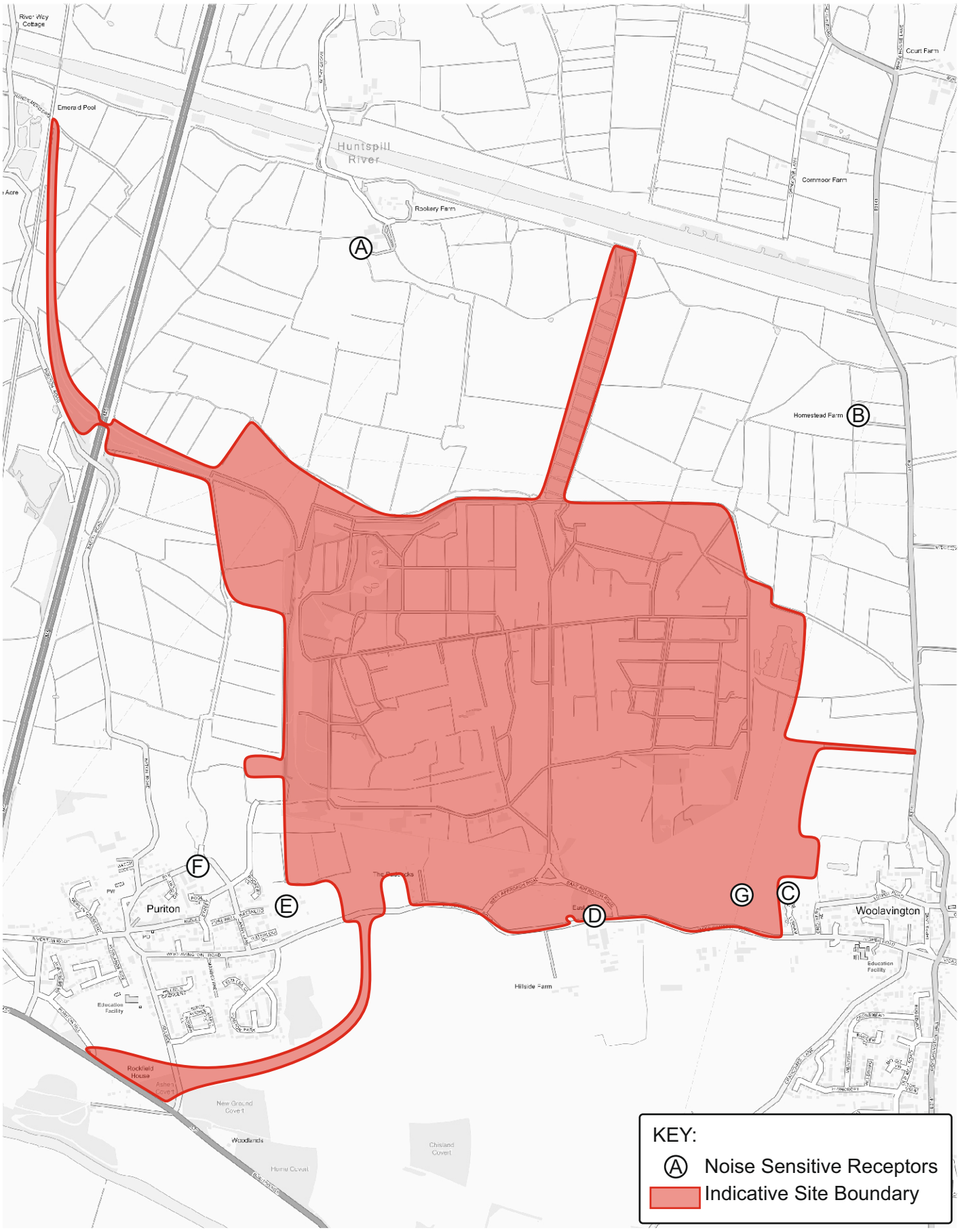
Environmental Sound Survey Locations

Mark	Revision	Drawn	Date	Chkd

Date	24/09/2021
Scale	A4 - N.T.S
Drawn by	ZR
Checked by	MB

FIGURE 10.1



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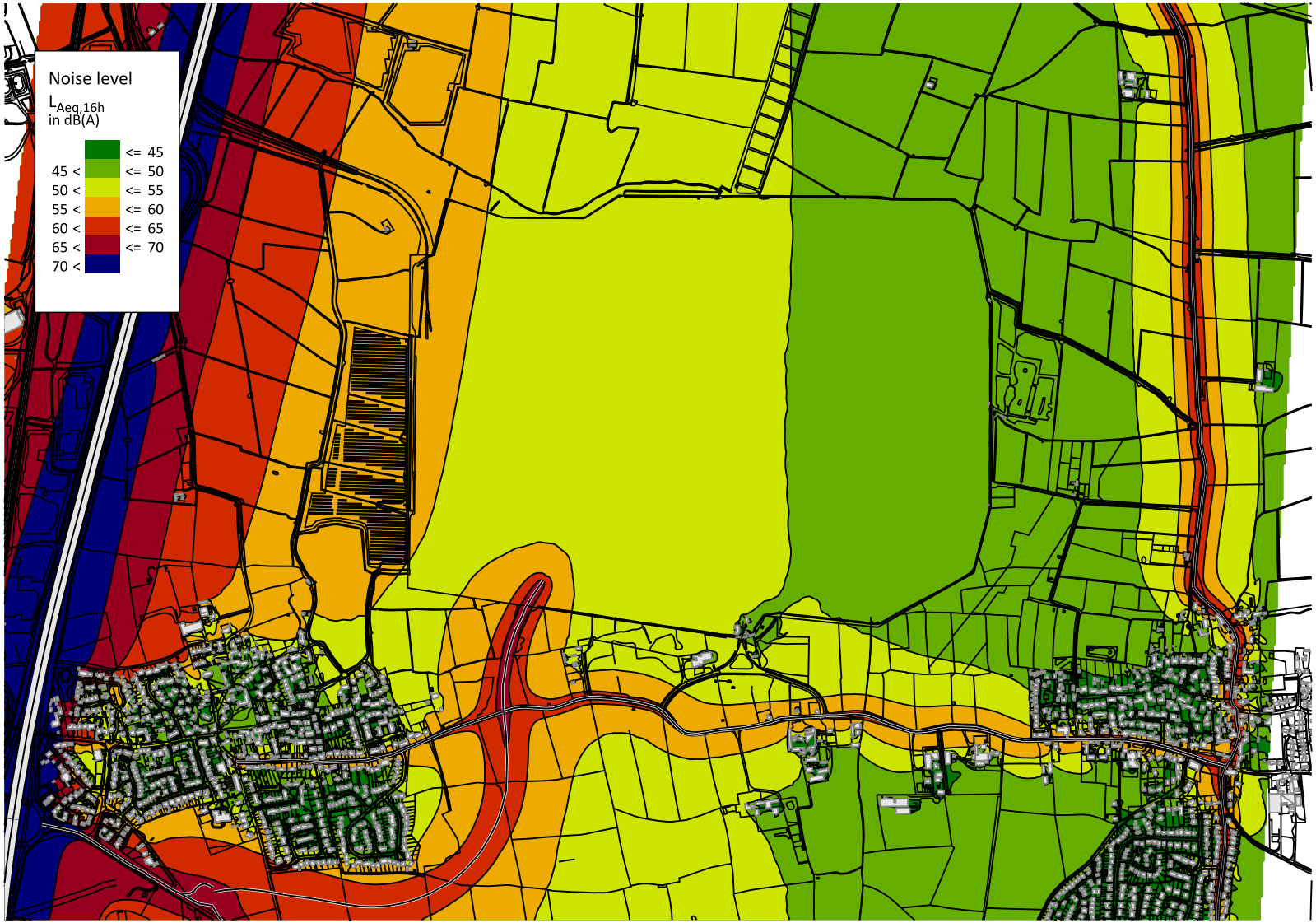
Noise Sensitive Receptor Locations

Mark	Revision	Drawn	Date	Chkd

Date	24/09/2021
Scale	A4 - N.T.S
Drawn by	ZR
Checked by	MB

FIGURE 10.2



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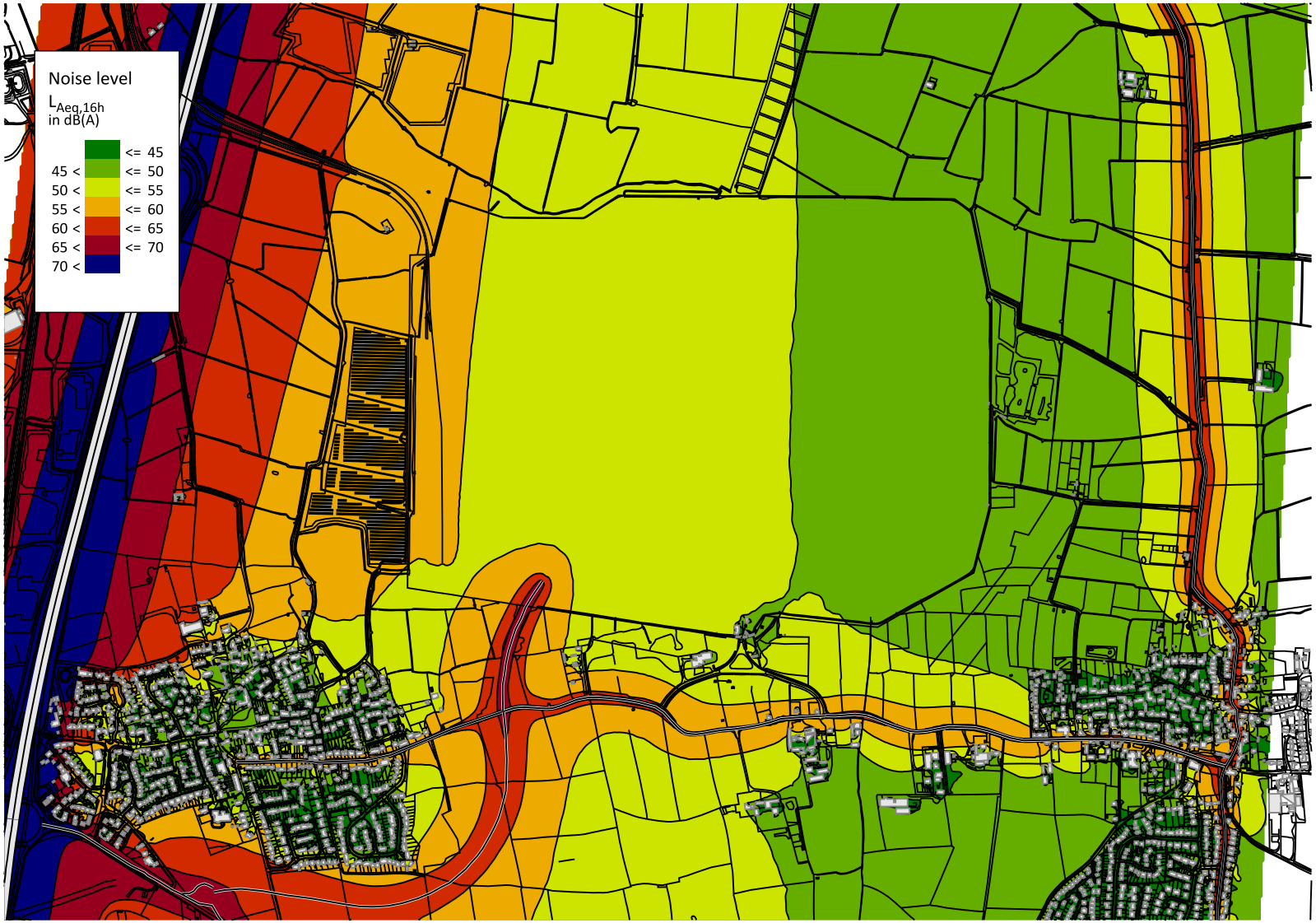
Future Baseline
Noise Contours

Mark	Revision	Drawn	Date	Chkd

Date	24/09/2021
Scale	A4 - N.T.S
Drawn by	GT
Checked by	MM

FIGURE 10.3



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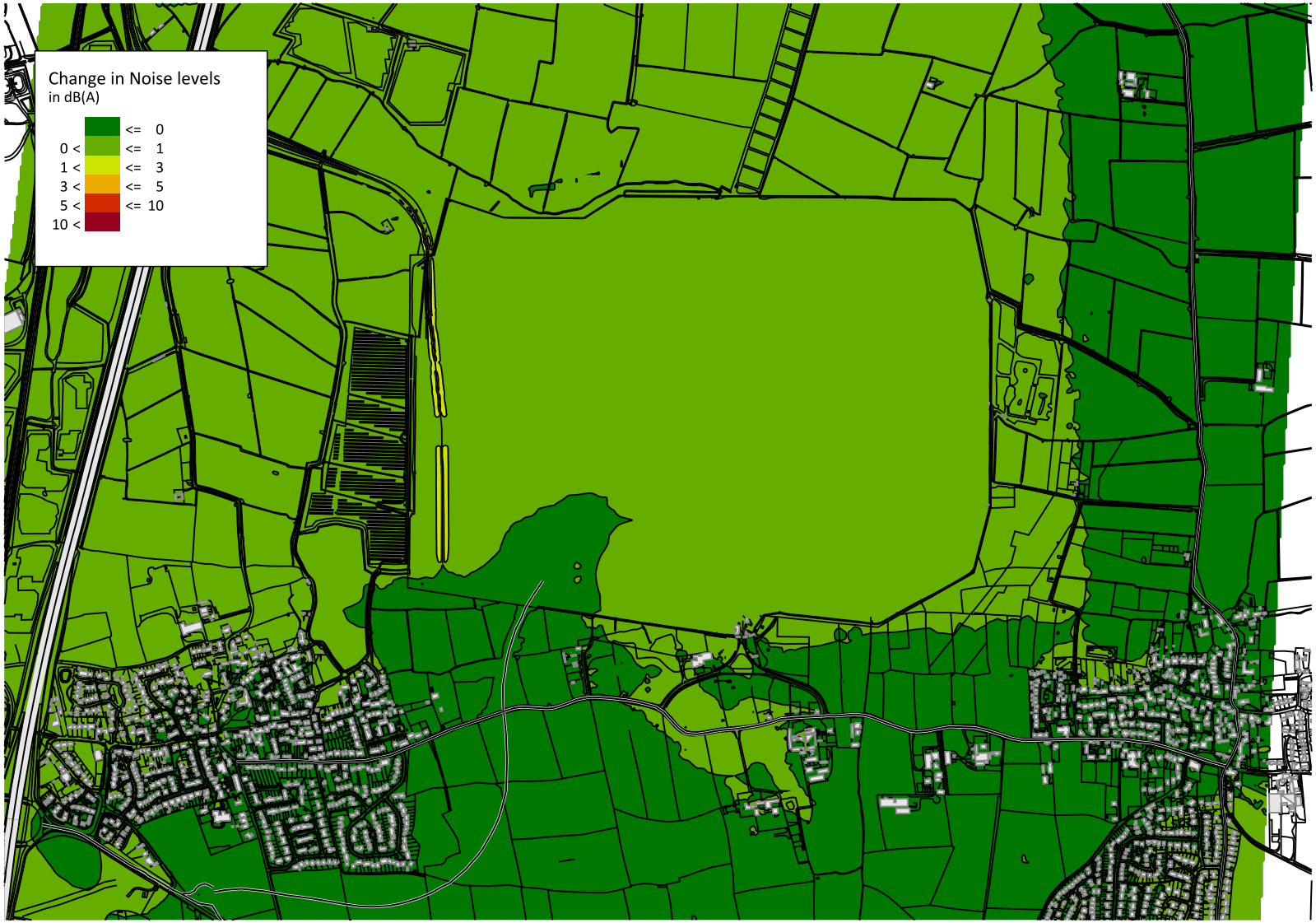
Future With Development
Noise Contours

Mark	Revision	Drawn	Date	Chkd

Date	24/09/2021
Scale	A4 - N.T.S
Drawn by	GT
Checked by	MM

FIGURE 10.4



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Change in Noise Levels

Mark	Revision	Drawn	Date	Chkd

Date	24/09/2021
Scale	A4 - N.T.S
Drawn by	GT
Checked by	MM

FIGURE 10.5

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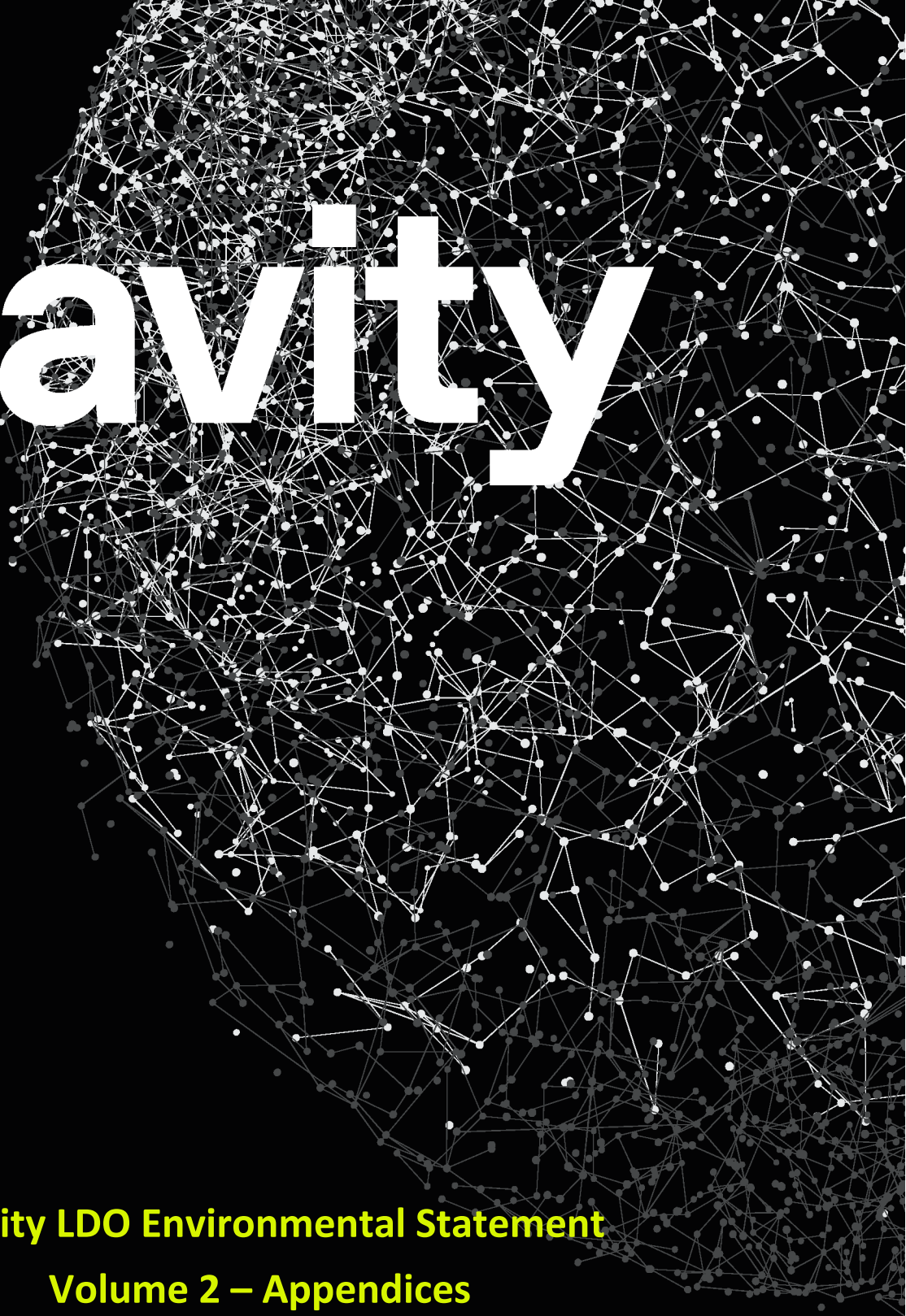

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Appendix 10.3 Instrumentation

Appendix 10.3: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	RION	NL-52	1043458	13/09/2019
½" Pre-polarised microphone		UC-59	07233	13/09/2019
Pre-amplifier		NH-25	43487	13/09/2019
Sound Level Meter	RION	NL-52	542903	06/02/2021
½" Pre-polarised microphone		UC-59	06480	06/02/2021
Pre-amplifier		NH-25	42931	06/02/2021
Sound Level Meter	RION	NL-52	1043457	07/02/2021
½" Pre-polarised microphone		UC-59	07232	07/02/2021
Pre-amplifier		NH-25	43486	07/02/2021
Sound Level Meter	RION	NL-52	542901	09/01/2020
½" Pre-polarised microphone		UC-59	06478	09/01/2020
Pre-amplifier		NH-25	42929	09/01/2020
Sound Level Meter	RION	NL-62	930517	08/01/2020
½" Pre-polarised microphone		UC-59	00598	08/01/2020
Pre-amplifier		NH-26	00559	08/01/2020
Sound Level Meter	RION	NL-52	654033	31/10/2019
½" Pre-polarised microphone		UC-59	08287	31/10/2019
Pre-amplifier		NH-25	54078	31/10/2019
Sound Level Meter	RION	NL-52	1043456	13/02/2021
½" Pre-polarised microphone		UC-59	7231	13/02/2021
Pre-amplifier		NH-25	43485	13/02/2021
Sound Calibrator	RION	NC-74	34746693	21/09/2020

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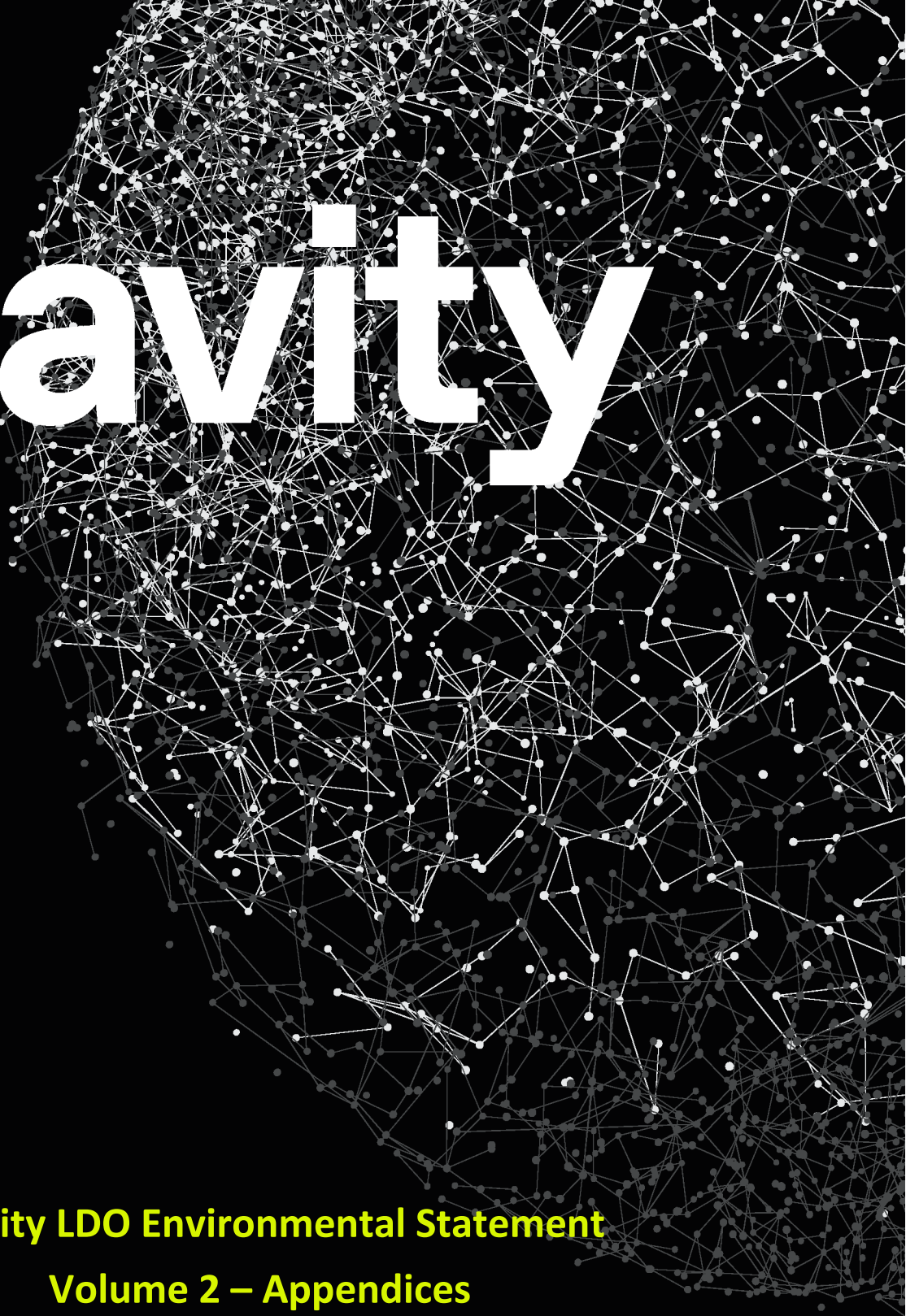

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Appendix 10.4 Traffic Data

Appendix 10.4: Traffic Data

Link Description	2032 Future Baseline		2032 Future Baseline with Gravity	
	Total Vehicles	% HGVs	Total Vehicles	% HGVs
Woolavington Road East between Entrance Rbt and Proposed Resi Access	4937	2.6%	4786	3%
Woolavington Road East between Proposed Resi Access and B3141 Crossroads	5290	2.2%	5139	2%
B3139 Causeway	5147	2.3%	4767	3%
B3141 Woolavington Hill	9887	2.2%	10117	2%
Woolavington Road West , west of Entrance Rbt	3432	4.0%	3164	4%
A39 East of Puriton Hill Link Road Rbt	17504	4.8%	17485	5%
A39 between Puriton Hill Link Road Rbt and M5 Jct 23	26489	8.4%	27572	7%
M5 Motorway mainline north of Jct 23	110589	11.2%	111360	11%
M5 Motorway mainline south of Jct 23	95164	10.5%	95313	10%
A38 between Jct 23 and Dunball Rbt	28622	8.6%	28785	9%
A38 North of Dunball Rbt	11640	5.8%	11666	6%
A38 South of Dunball Rbt	32218	8.7%	32355	9%

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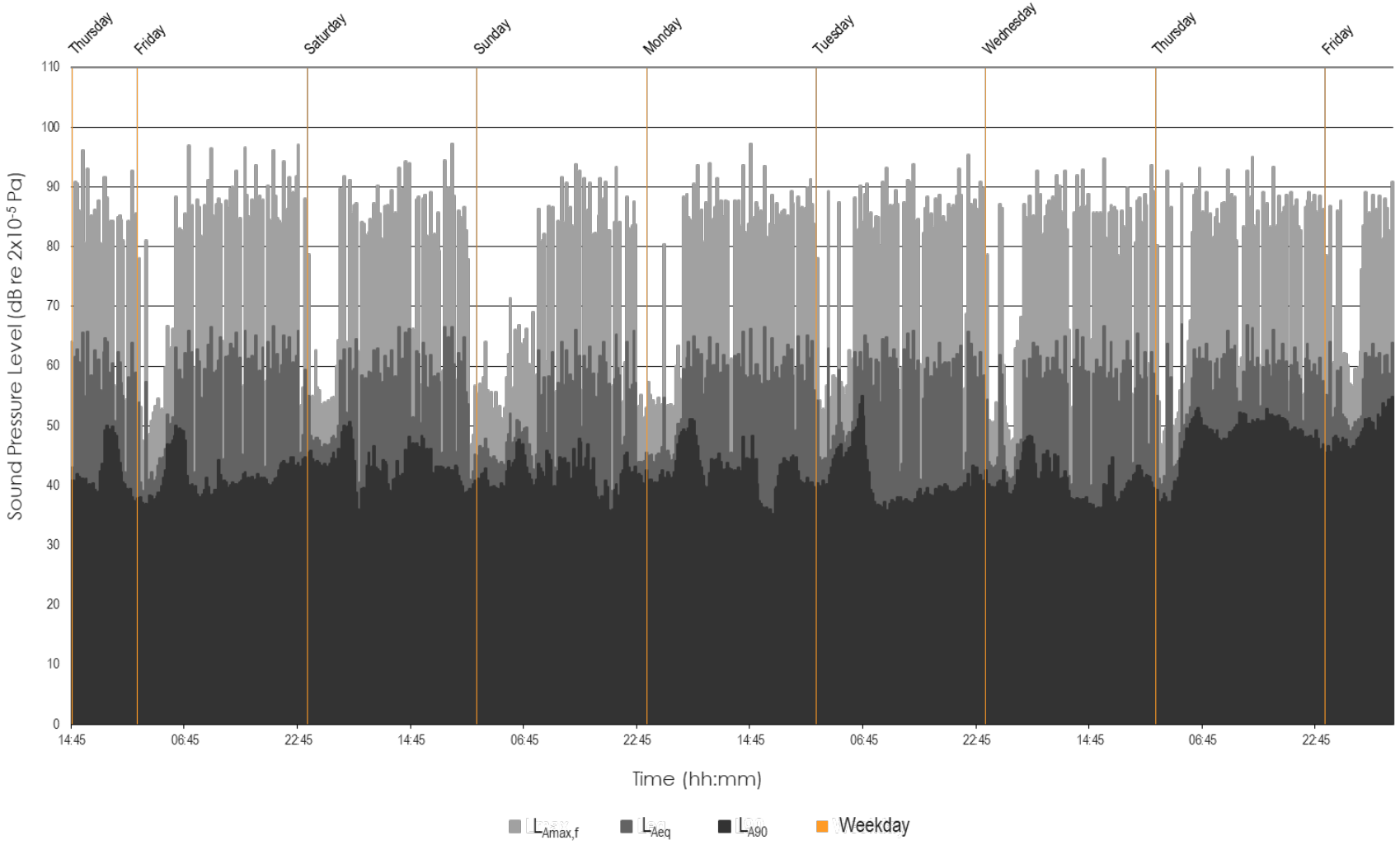
Appendix 10.5 Time History Graphs

Appendix 10.5: Time History Graphs

Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

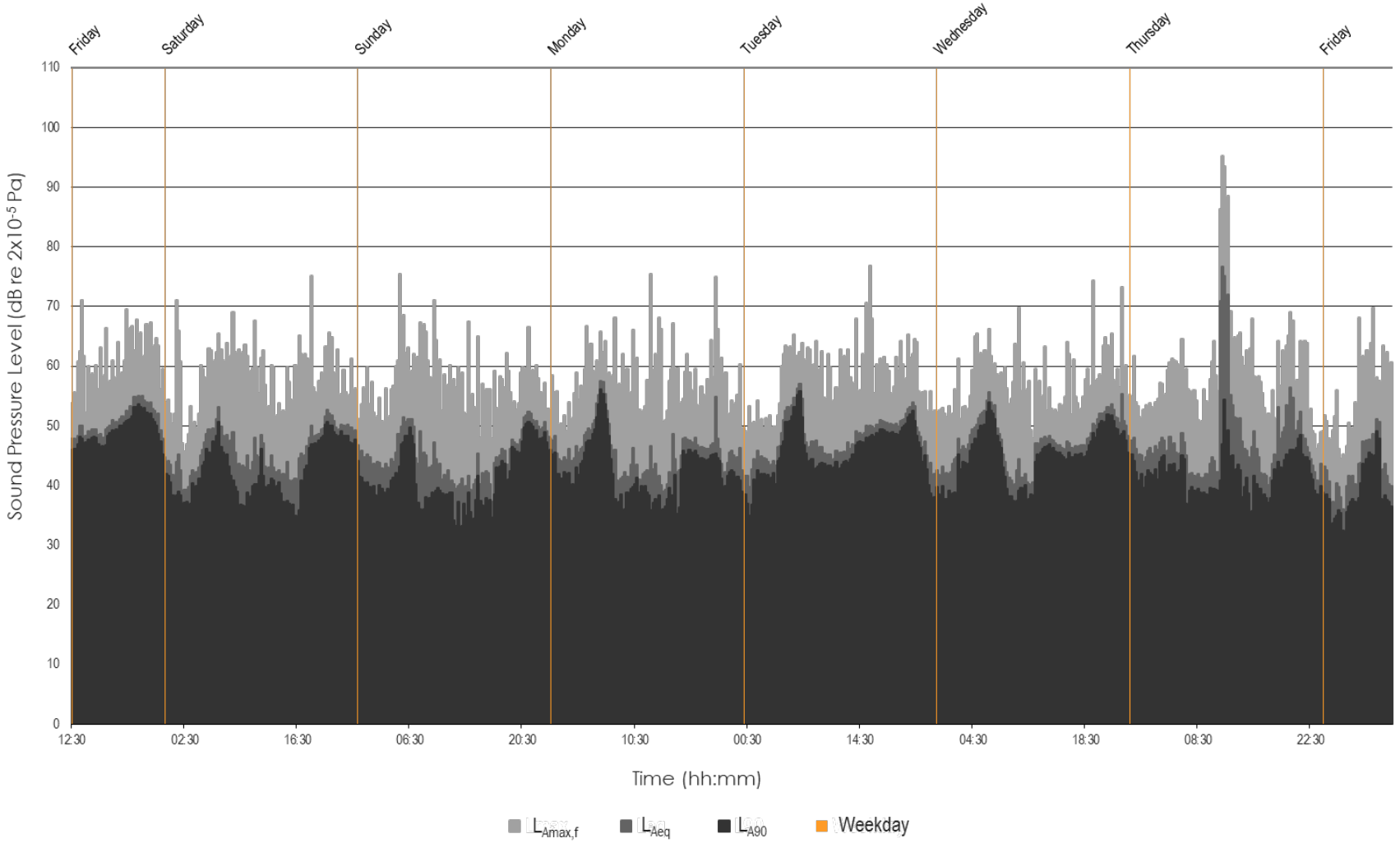
LT 1 - Thursday 15 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

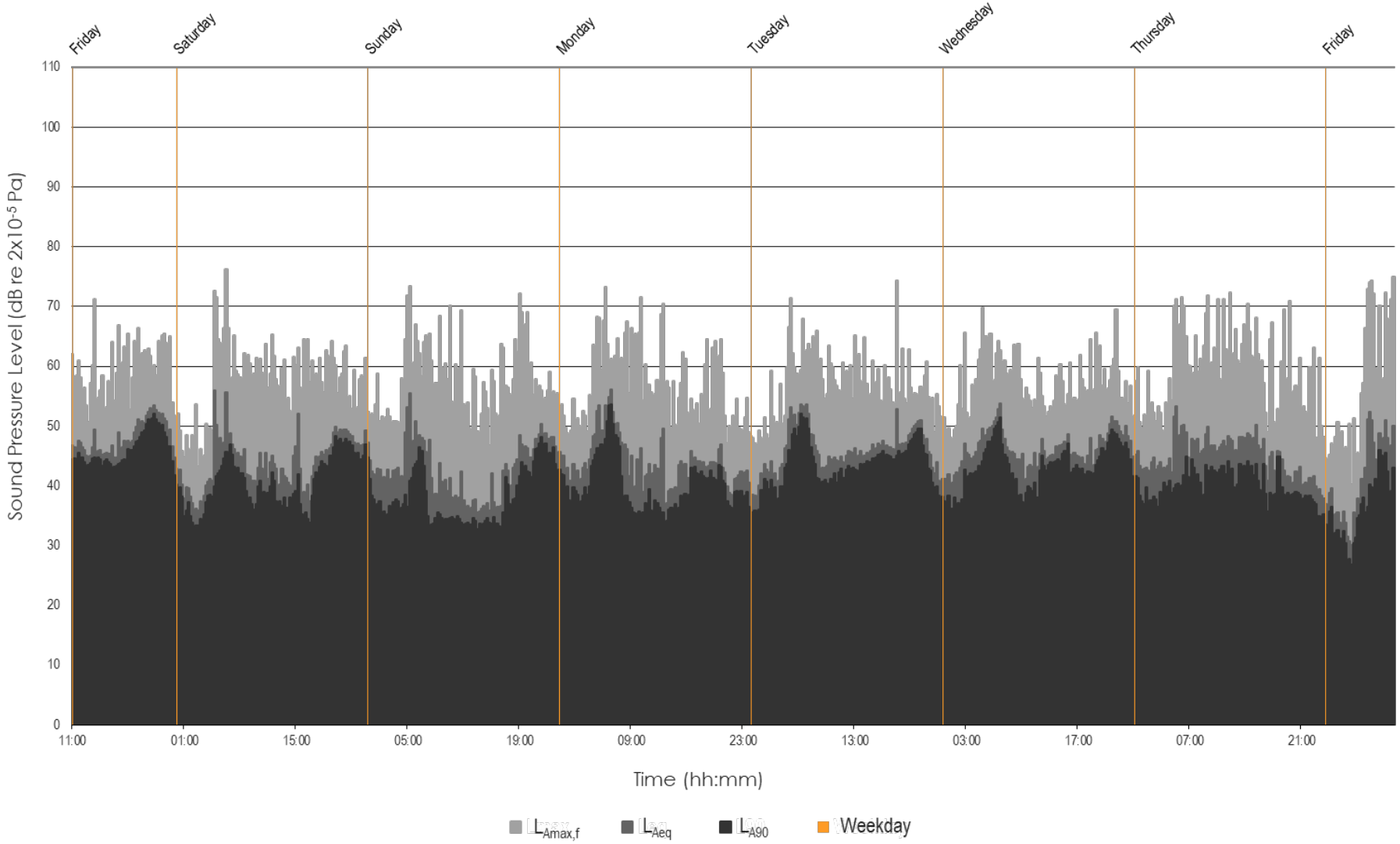
LT 2 - top western part of site - Friday 16 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

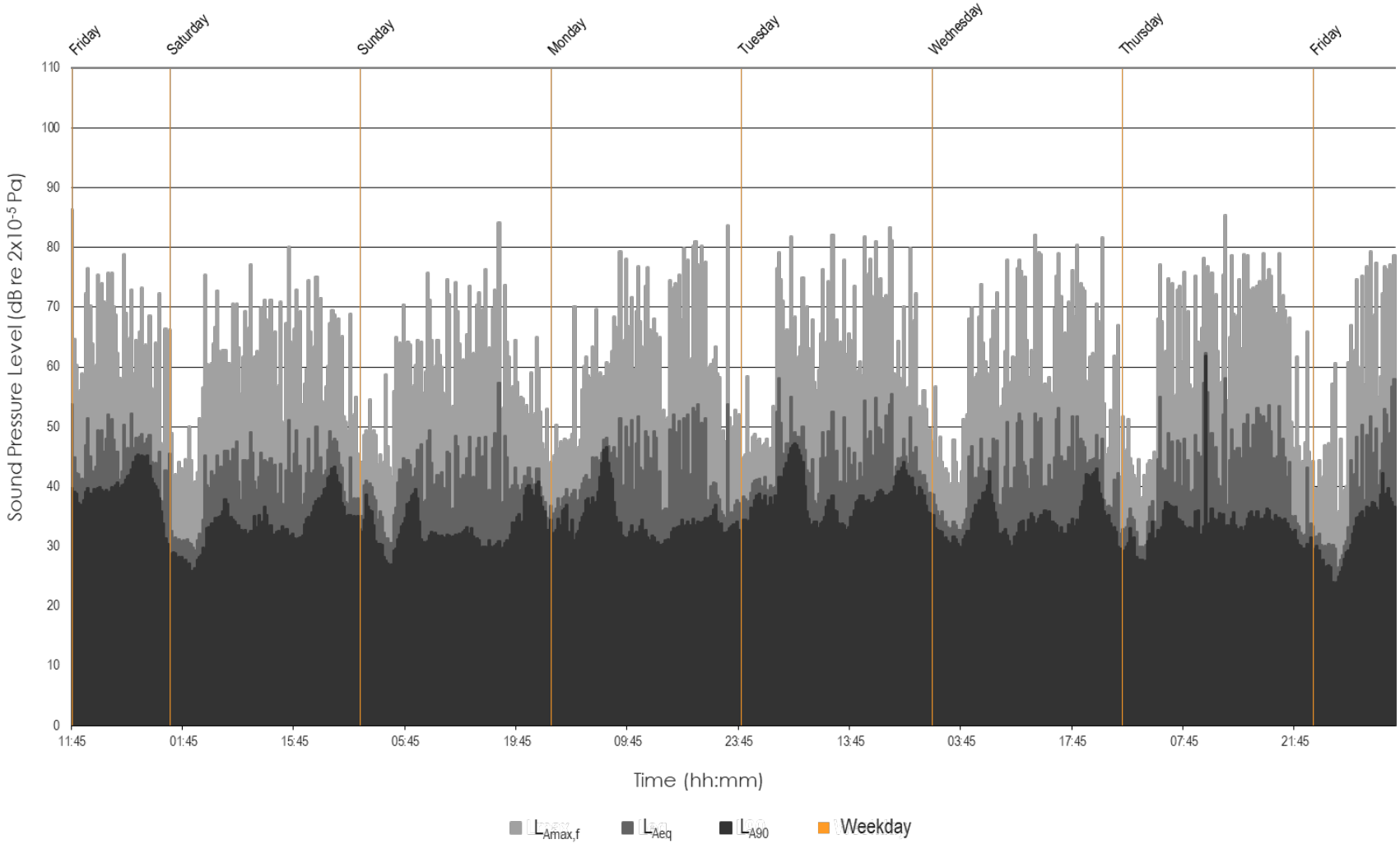
LT 3 - Friday 16 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

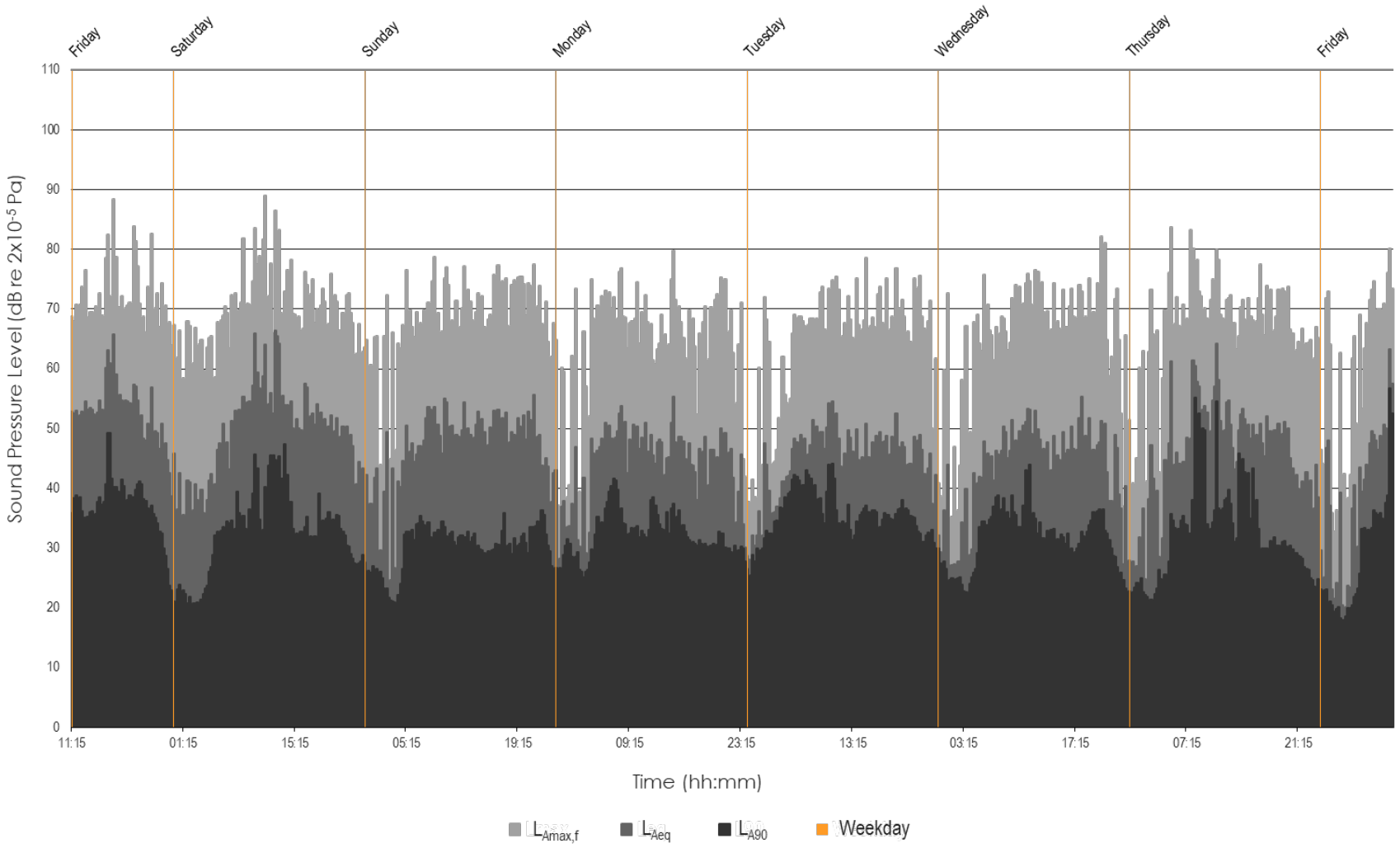
LT 4 - Friday 16 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

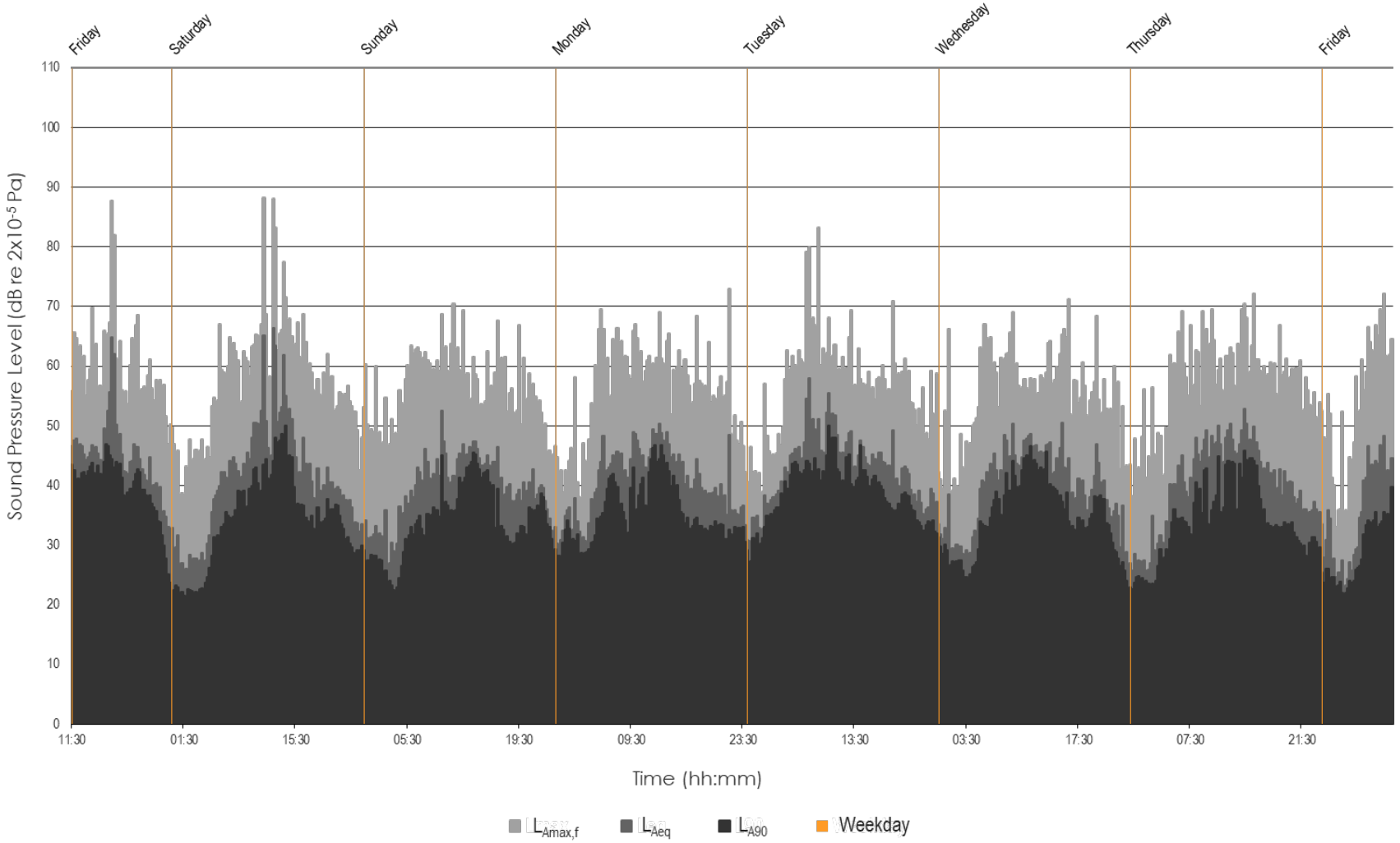
LT 5 - Friday 16 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

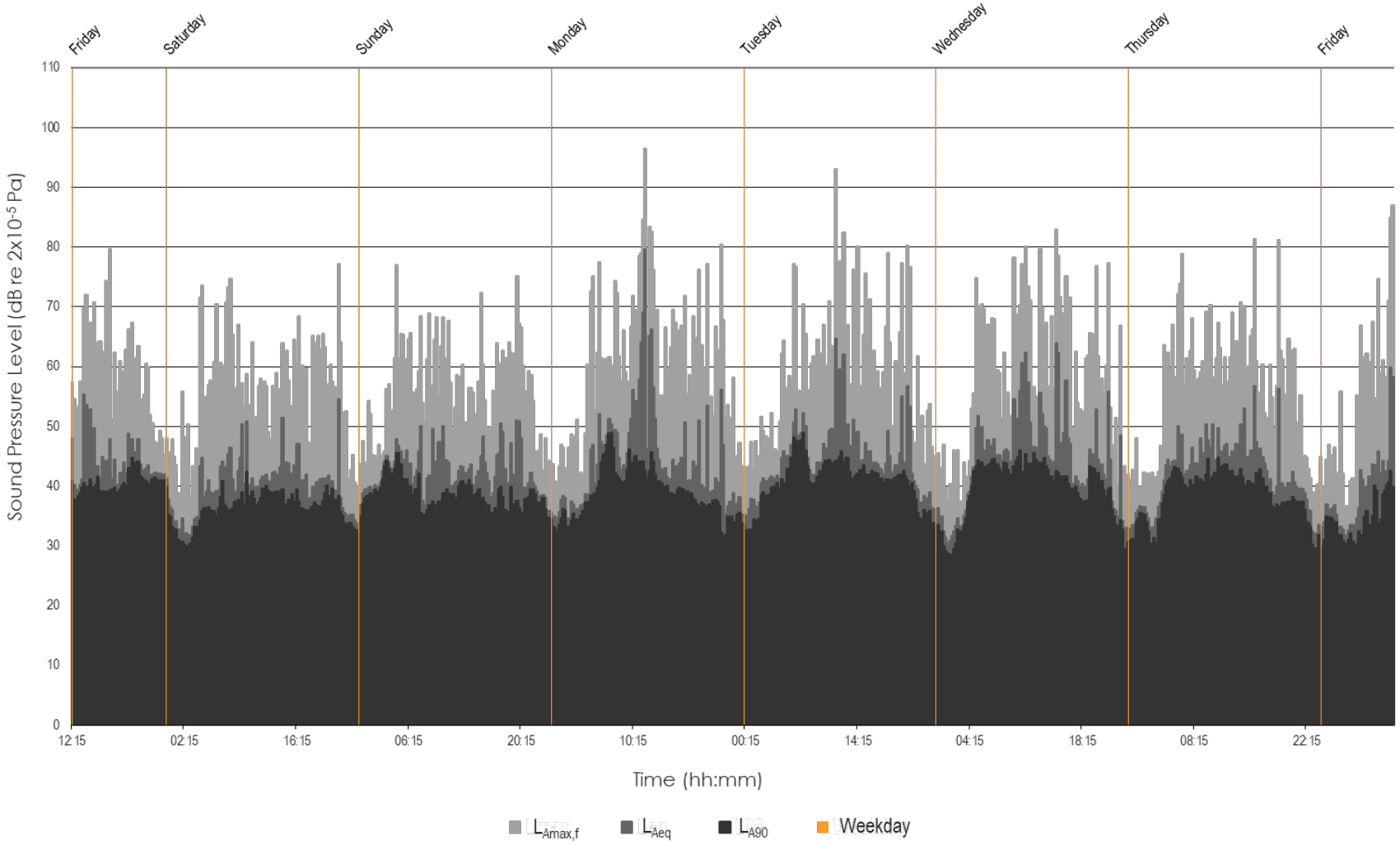
LT 6 - Friday 16 July to Friday 23 July 2021



Gravity

L_{Aeq}, $L_{Amax,f}$ and L_{A90} Time History

LT 7 - top east corner of site - Friday 16 July to Friday 23 July 2021



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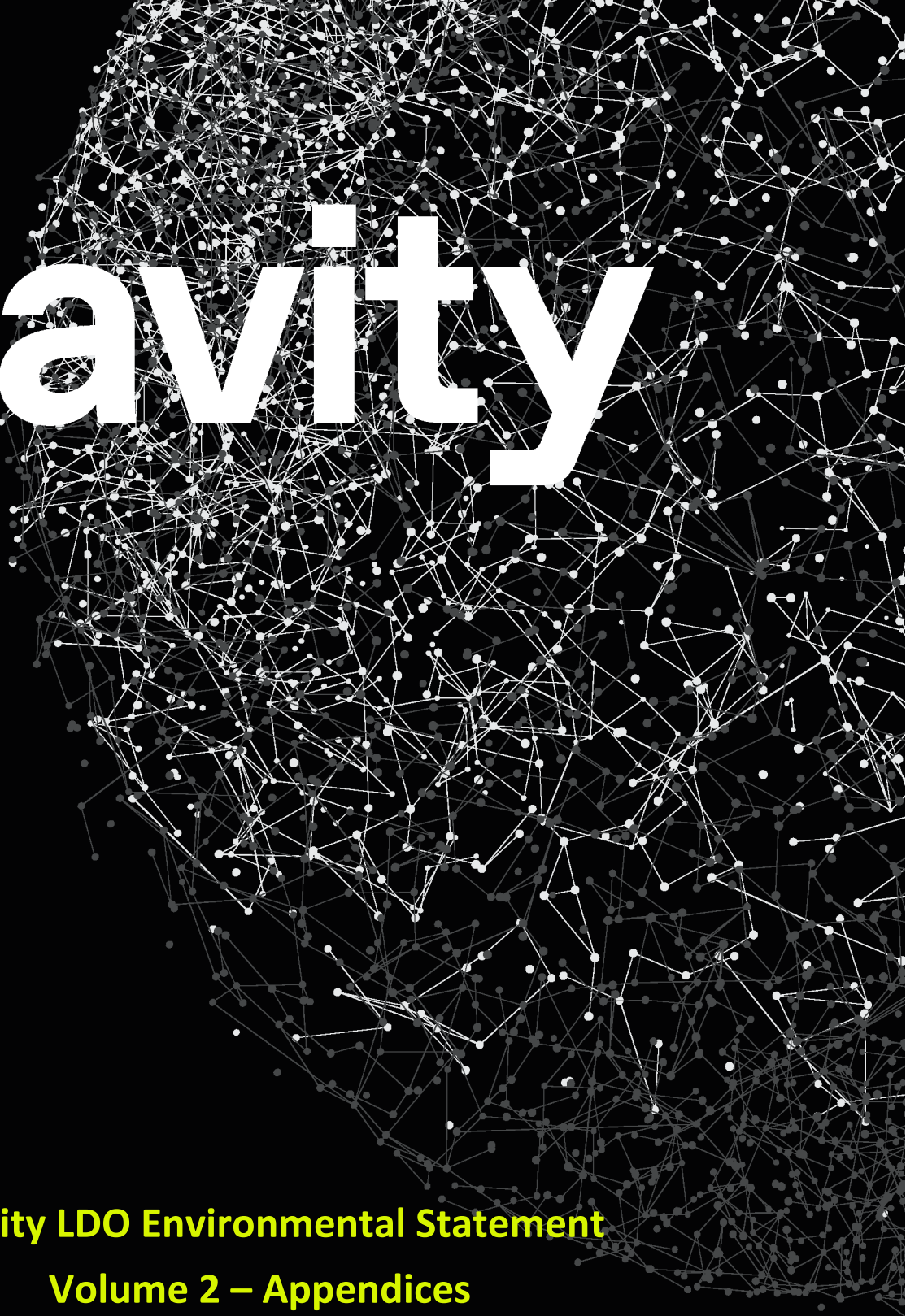

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Appendix 10.6 Operational Sound Levels

Appendix 10.6: Operational Sound Levels

Location	Source	Sound Power Level (dB $L_{Aeq,T}$) at octave frequencies (in Hz)								
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Freight Terminal	Gantry Crane – Movement	103	99	99	95	95	90	83	73	99
	Gantry Crane – Broadband Alarm	89	90	88	86	85	89	84	74	93
	Gantry Crane – Spreader Impact	98	93	92	92	88	83	77	67	93
	Gantry Crane – Container Placement	90	86	85	81	78	76	69	59	84
	Reach Stacker	114	114	113	109	105	108	97	90	113
	Telehandler	122	111	105	103	99	97	93	85	106