



Battery Noise Assessment

Battery Box Ltd.

Prepared by:

SLR Consulting Limited

15 Middle Pavement, Nottingham, NG1 7DX

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Basis of Report

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1.0 Introduction

This Report tests noise mitigation for a 'Battery Box' with the Original Equipment Manufacturer (OEM) being Huawei.

The Report is structured as follows:

- A description of the Battery Box Noise Sources.
- Noise Model Predictions.

The information provided in this Report may be used to indicate the specific noise level that may be expected at the nearest Noise Sensitive Receptors to the Site.

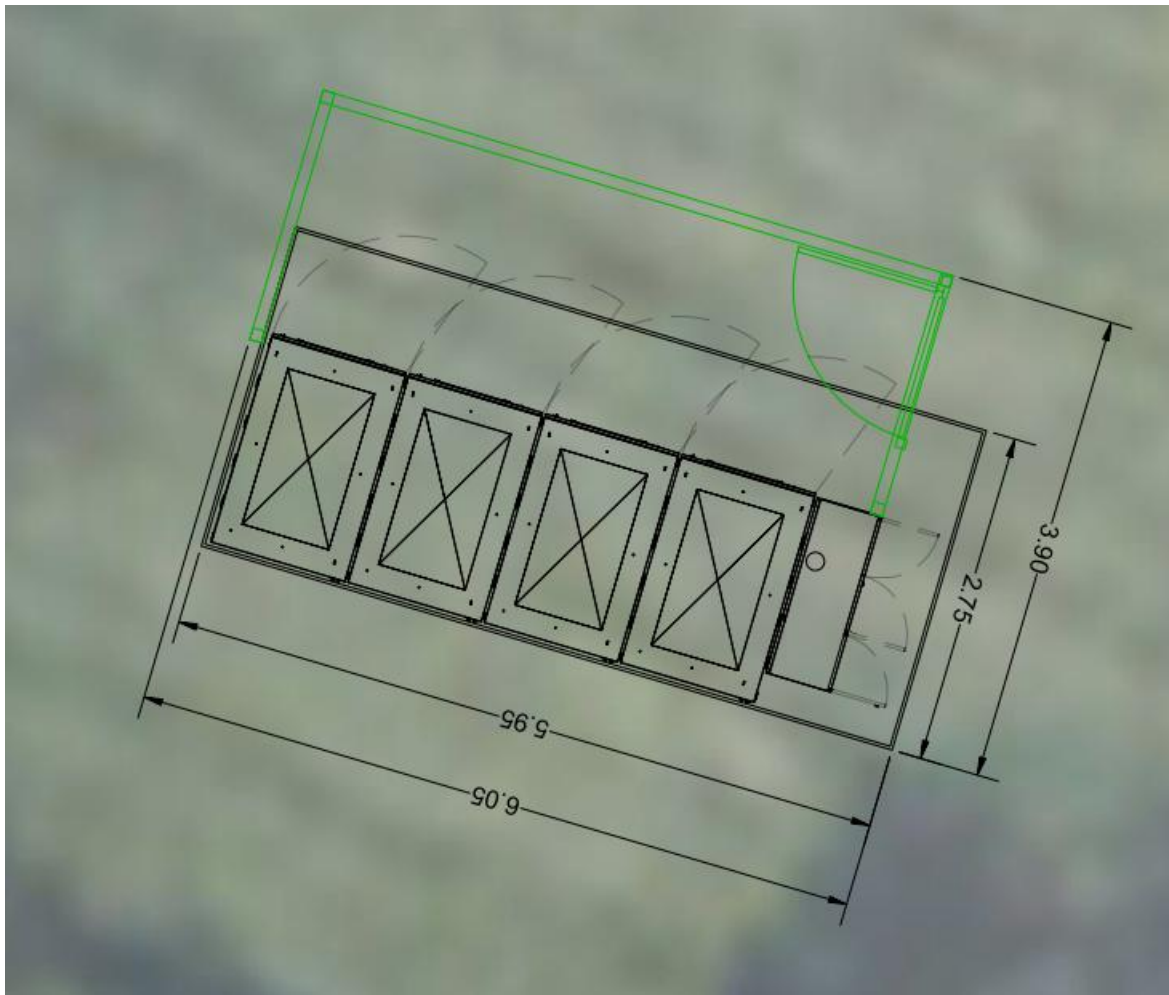


2.0 Noise Sources

2.1 Unit Battery Configuration

Sound levels of four batteries manufactured by Huawei were measured by SLR, with testing conducted at a height of 1.5 meters above the ground, at approximately 1 meter from the source. The layout in plan view of the four batteries can be seen in Figure 2.1.

Figure 2-1: Battery (Four Units)



The sound pressure level at 1m on each side of the battery (four units) is presented in Table 2.1 below.

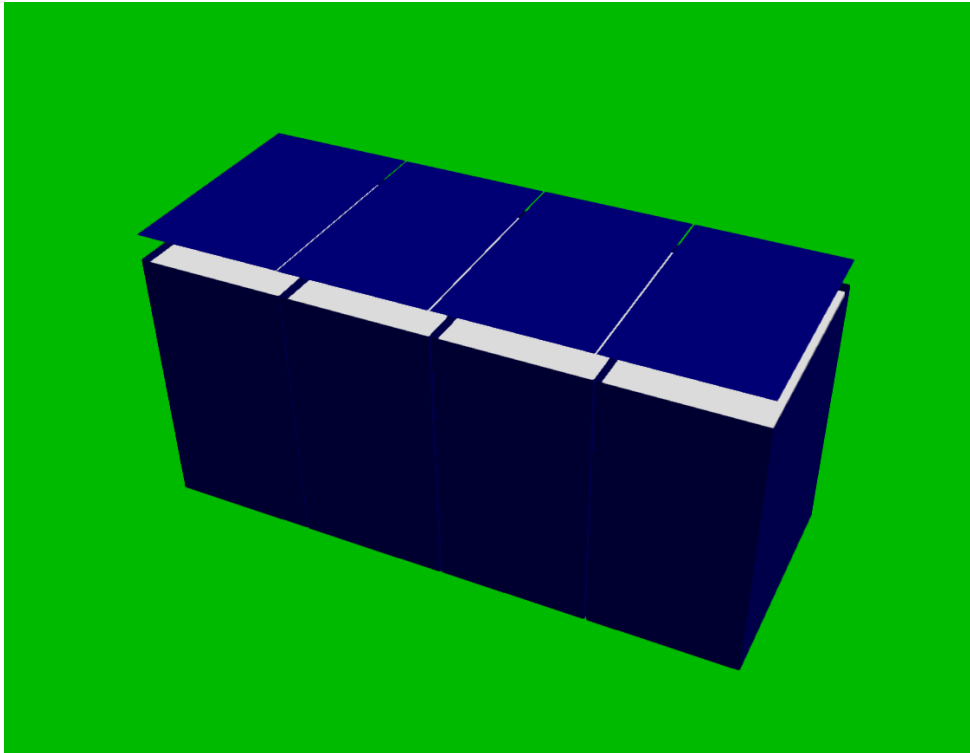
Table 2-1: Sound Data (dB(A))

Front (1m)	Rear (1m)	Left (1m)	Right (1m)	Top (1m)
47.8	38.5	37.7	37.5	40.2

The sound data in Table 2-1 has been used developed a noise model of the battery, using CadnaA software. The CADNA view of the four-battery unit is shown in Figure 2-2.



Figure 2-2: Battery View in CADNA



3.0 Noise Model Predictions for Four Units

With four batteries in situ, the calculated sound level up to 25m away can be seen in Figure 3.1 and up to 100m away can be seen in Figure 3-2. In this section, all receivers have been set at a height of 4m to represent a first-floor window.

Within each noise model the following has been selected:

- The receiver height has been set to 4m (first floor window level).
- Hard ground (worst case).
- Assumes zero background noise.
- Receiver is outside, no adjustment made for levels inside (which would be lower).
- Assumes no mitigation from other local structures, vegetation etc.

Figure 3-1: CadnaA Output $L_{Aeq,T}$ dB (5 - 25m from Source)

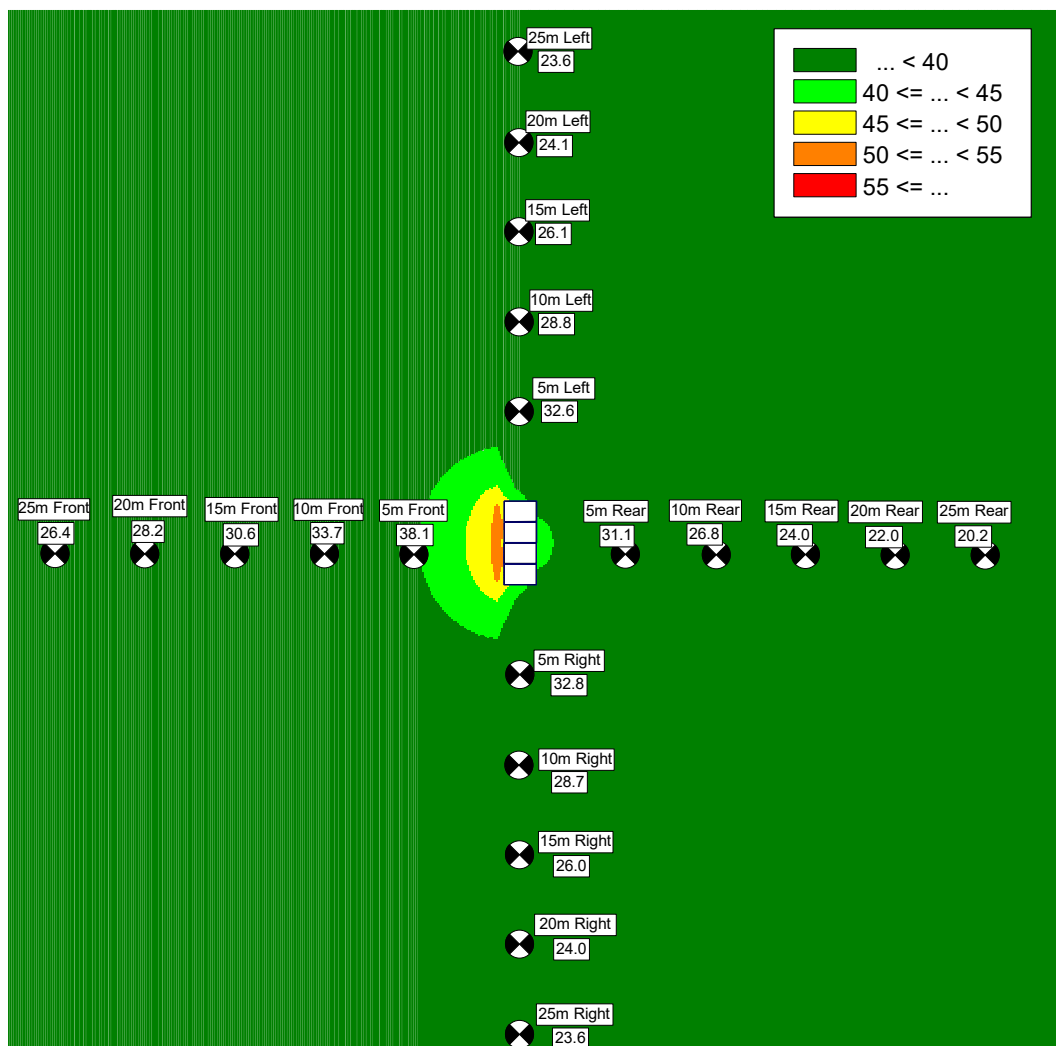


Figure 3-2: CadnaA Output $L_{Aeq,T}$ dB (50 to 100m from Source)



The results are tabulated in Table 3-1.

Table 3-1: CadnaA Output $L_{Aeq,T}$ dB (5 - 100m from Source) Data

Aspect	Distance From Source						
	5M	10M	15M	20M	25M	50M	100M
	L_{Aeq} dBA						
Front	38.1	33.7	30.6	28.2	26.4	20.5	14.4
Right	32.8	28.7	26.0	24.0	23.6	18.1	13.1
Left	32.6	28.8	26.1	24.1	23.6	18.1	13.7
Rear	31.1	26.8	22.0	20.2	24.0	14.8	9.1



4.0 NANR45 Assessment

With regard to assessing the impact of low frequency noise upon a Noise Sensitive Receptor there is a guidance document titled Procedure for the assessment of low frequency noise complaints (Contract no: NANR45) (dated February 2005). This document contains a reference curve detailing the noise level above which a low frequency noise may be classed as a nuisance.

The procedure is intended to assist in the evaluation of existing problems. It is not intended as a means of predicting when disturbance might occur, for example in a planning situation, and would not be reliable to use as such. However as requested SLR has followed the method and compared the modelled data to the reference curve.

The linear sound levels in each octave band at 5m to 100m is shown in Table 4.1. CadnaA will only calculate to 25Hz so 10Hz to 20 Hz is not presented.

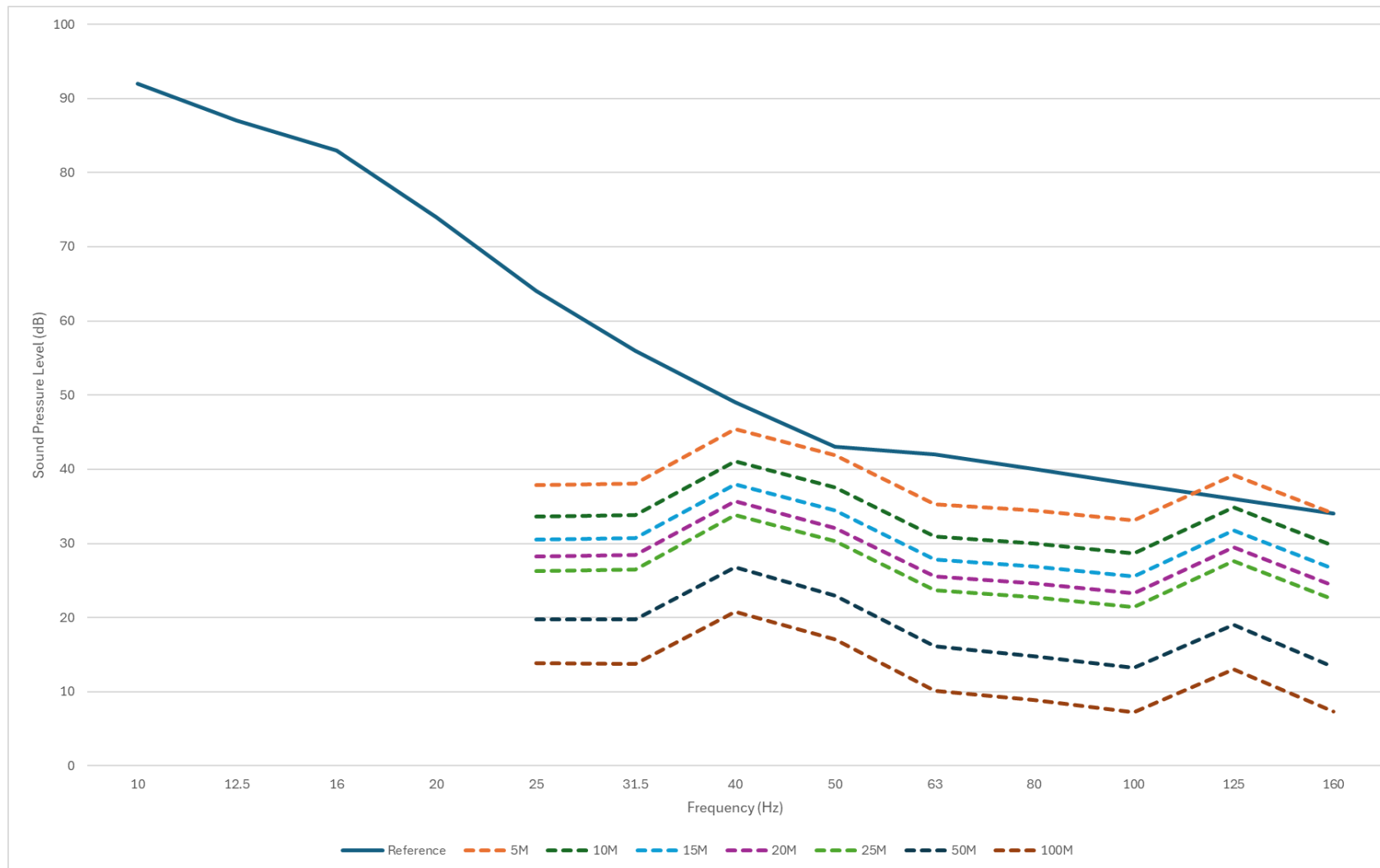
Table 4-1: Proposed Reference Curve & Modelled Data at 5m

Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Ref curve dB, L_{eq}	92	87	83	74	64	56	49	43	42	40	38	36	34
Modelled data dB, L_{eq} 5M	-	-	-	-	38	38	45	42	35	34	33	39	34
Modelled data dB, L_{eq} 10M	-	-	-	-	34	34	41	38	31	30	29	35	30
Modelled data dB, L_{eq} 15M	-	-	-	-	31	31	38	35	28	27	26	32	27
Modelled data dB, L_{eq} 20M	-	-	-	-	28	28	36	32	26	25	23	30	24
Modelled data dB, L_{eq} 25M	-	-	-	-	26	27	34	30	24	23	21	28	22
Modelled data dB, L_{eq} 50M	-	-	-	-	20	20	27	23	16	15	13	19	13
Modelled data dB, L_{eq} 100M	-	-	-	-	14	14	21	17	10	9	7	13	7

Table 4-1 is visualised in Figure 4-1 below.



Figure 4-1: Proposed Reference Curve and Modelled Data



As can be seen from Table 4-1 and Figure 4-1, at 10m the limit is met at each frequency assessed. The comfortable meeting of the limit at 25Hz indicates the limit would be met at 10 to 20 Hz.

It is therefore considered that there would be no low frequency noise impact at the Noise Sensitive Receptors.





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