Bruntwood
Portland Tower
Plant Noise Assessment

AAc/113300-45/R01

Issue 3 | 9 November 2012

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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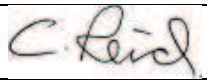
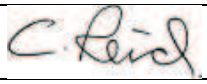
		Signature			
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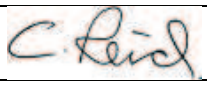
		Signature			
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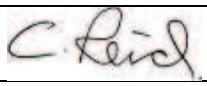
		Signature			
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1 Introduction

Arup has been commissioned by Bruntwood to undertake an assessment of breakout noise from new plant items to be installed to the rear of Portland Tower, Manchester. This assessment is in support of a new planning application which aims to replace the prior planning approval, reference 092194/F0/2010/C2.

Previously Arup completed an assessment of the plant in a proposed enclosure above the existing bin store to the rear of Portland Tower. This new assessment is for the relocation of this plant area to a new proposed enclosure which forms part of the bike storage, staff facilities and minor plant area refurbishment of the triangular infill located beneath the ramp to Chorlton Street NCP car park.

2 Site location and noise climate

The proposed location of the new condenser enclosure is shown in Figure 1. The nearest noise sensitive receivers are:

- Existing offices to the rear of Portland Tower
- Office accommodation in Arthur House on Chorlton Street
- Britannia Hotel on Chorlton Street

The noise climate in the region potentially affected is dominated by road traffic from Portland Street and Chorlton Street; coach and bus manoeuvres in Chorlton Street Coach Station; and plant noise associated with existing buildings.

3 Planning condition

For the previous assessment Manchester Environmental Health Department had advised that, in order to meet the requirements of the planning condition, noise from the proposed plant deck should be such that the rating level of the plant, as defined by BS4142:1997 Acoustics - Method for rating industrial noise affecting mixed residential and industrial areas, shall be at least 5dB below existing background noise levels when calculated at the nearest noise sensitive receivers.

Manchester City Council's Environmental Health Department has confirmed that the council's current guidance on the control of plant noise is that:

Externally mounted ancillary plant, equipment and servicing should be acoustically treated in accordance with a scheme designed so as to achieve a noise level of 5dB below the existing background (L_{A90}) in each octave band at the nearest noise sensitive location.

The current requirement for control of plant noise is more stringent than that of the previous assessment.

4 Baseline noise survey

A baseline noise survey was undertaken for the previous assessment in January 2008 and data obtained during this survey is considered to be representative of the current noise climate as agreed with Manchester City Council. Full details of this survey can be found in Appendix B.

Spot measurements were taken at the nearby noise sensitive receivers in order to obtain the lowest background noise levels during the planned times of operation of the plant. Measurement locations are shown in Figure 1.

Location 1 to the rear of Yates's public house was chosen to reflect the noise climate for offices within Portland Tower. Location 2 was chosen to represent the existing noise climate for facades of Arthur House and Britannia Hotel. Measurements directly outside Britannia Hotel were not possible due to noise emissions from existing low level louvres serving the Hotel. However location 2 is representative of the existing background noise level at the Hotel façade.

Table 1 gives a summary of the lowest octave band noise levels measured at each of the measurement locations and Table 2 shows the Manchester City Council noise limits at each of the nearest noise sensitive receivers.

Measurement location	Octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
1	65	60	58	56	55	50	43	34
2	68	63	61	59	58	54	47	39

Table 1: Lowest measured background level $dBL_{A90,\ 5min}$ at nearest noise sensitive receivers

Assessment location	Octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Portland Tower	60	55	53	51	50	45	38	29
Arthur House and Britannia Hotel	63	58	56	54	53	49	42	34

Table 2: Manchester City Council plant noise limits, dBL_{Aeq}

5 Plant noise assessment

Figure 2 shows the configuration of plant in the proposed new condenser enclosure.

Our assessment of plant noise is based on the following information provided by Bruntwood Ltd:

Documents

Details and drawings shown in the Portland Tower Plant Enclosure Design and Access Statement (Sept 2012) by Bridge Architects.

Equipment

One Mitsubishi PURY-EP200YJM-A external condenser unit.

Assessment of noise from the unit has been undertaken and predicted noise levels attributable to the proposed enclosure at the nearest noise sensitive receivers are given in Table 3.

Receiver	Octave band centre frequency, Hz dBL_{Aeq}							
	63	125	250	500	1k	2k	4k	8k
Portland Tower	64	63	63	58	56	53	49	45
Arthur House	42	38	25	20	18	15	11	7
Britannia Hotel	40	37	28	23	21	18	14	10

Table 3: Predicted noise level at nearby receivers

Table 4 shows the extent to which the criteria specified by the local authority are exceeded at each of the nearby noise sensitive receivers.

Receiver	Octave band centre frequency, Hz dBL_{Aeq}							
	63	125	250	500	1k	2k	4k	8k
Portland Tower	4	8	10	7	6	8	11	16
Arthur House	No excess							
Britannia Hotel	No excess							

Table 4: Excess in noise above the MCC requirement, dB

6 Mitigation

In order to mitigate the noise from the condenser enclosure to a level that satisfies the environmental breakout criteria it is proposed that acoustic louvres be installed either in place of the weather louvre or to the rear of each weather louvre on all three sides of the enclosure. The transmission loss values required for the acoustic louvre are shown in Table 5. The transmission loss shown is based on an IAC Slimshield SL600.

	Octave band centre frequency							
	63	125	250	500	1k	2k	4k	8k
Acoustic louvre transmission loss	7	9	12	24	31	33	29	30

Table 5: Acoustic louvre transmission loss performance, dB

Noise levels at each of the receivers after the implementation of mitigation measures are shown in Table 6. Predicted noise levels at both Arthur House and Britannia Hotel are significantly lower than the MCC limiting criteria. Predicted noise levels at Portland Tower meet the MCC criteria.

Receiver	Octave band centre frequency, Hz dBL$_{Aeq}$							
	63	125	250	500	1k	2k	4k	8k
Portland Tower	57	54	51	34	25	20	20	15
Arthur House	35	29	13	0	0	0	0	0
Britannia Hotel	33	28	16	0	0	0	0	0

Table 6: Predicted noise levels at nearby receivers after mitigation, dB

7 Conclusions

The inclusion of a condenser enclosure within the proposed bike storage, staff facilities and minor plant area to the rear of Portland Tower, without mitigation, would result in the Local Authority noise criteria being exceeded for offices within Portland Tower directly opposite the condenser enclosure.

Mitigation in the form of acoustic louvres will enable the limiting criteria specified by the Local Authority to be met.

Figures

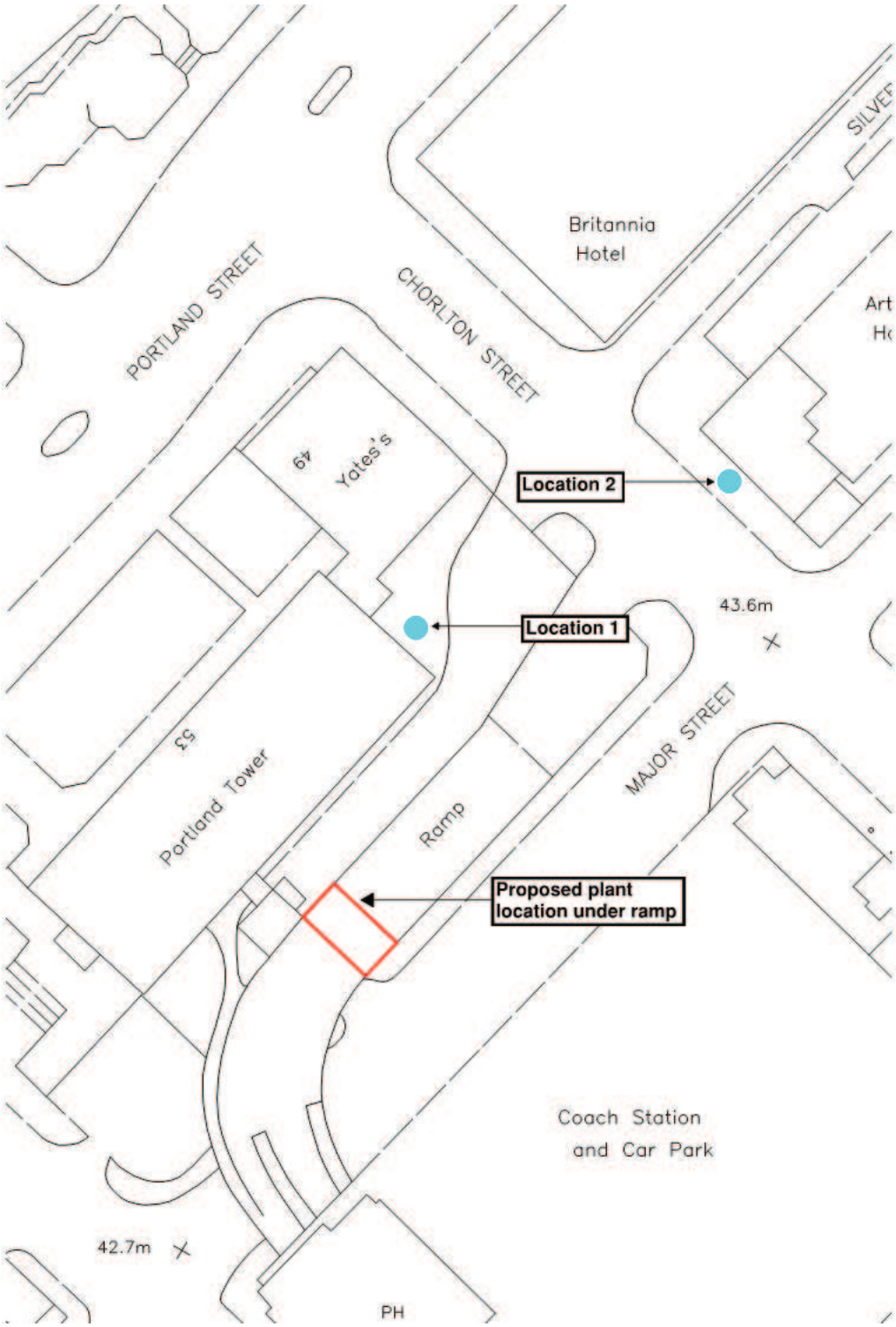

Figure 1 Site plan and measurement locations

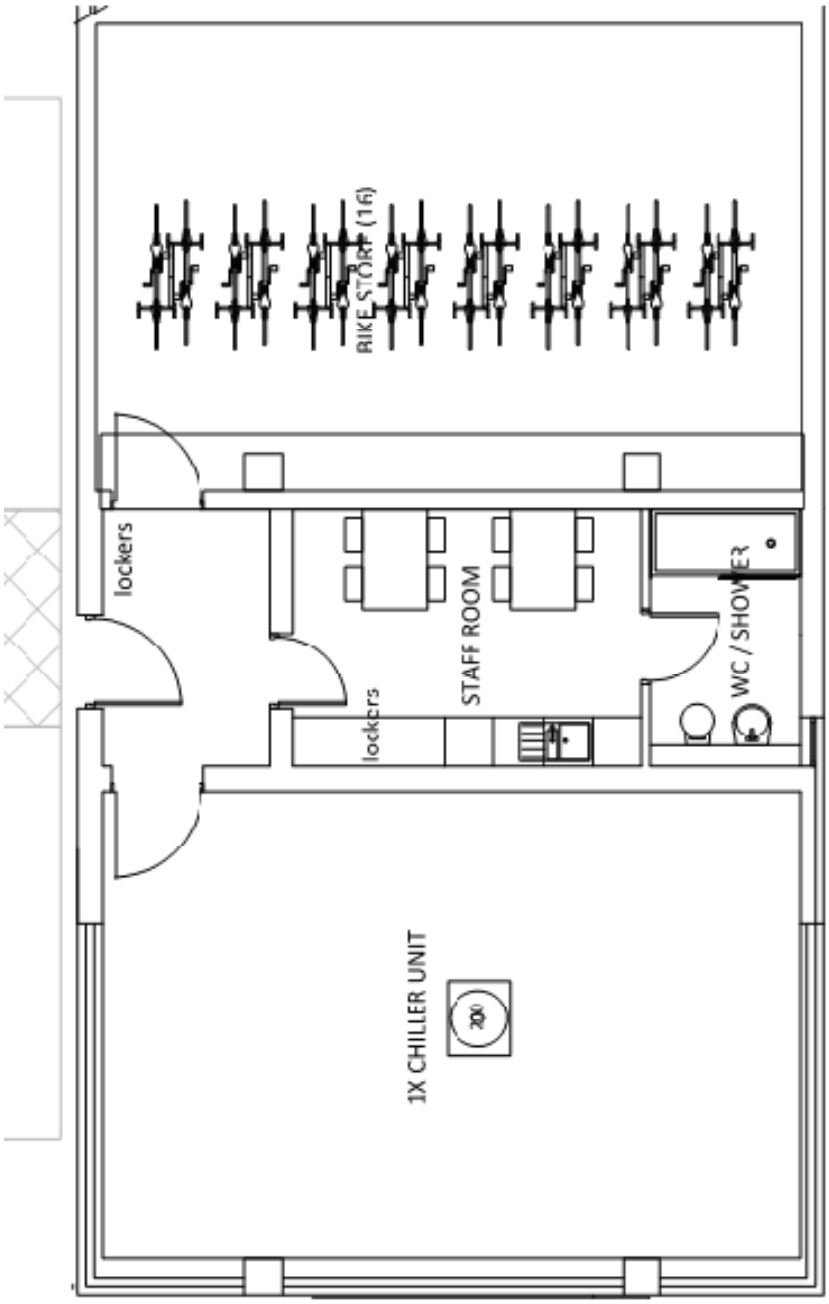

Figure 2: Plant layout within enclosure

Appendix A

Acoustic Terminology

A1 Decibel

The ratio of sound pressures which we can hear is a ratio of 10^6 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

A2 dB(A)

The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). An A-weighting network can be built into a sound level measuring instrument such that sound levels in dB(A) can be read directly from a meter. The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. It is worth noting that an increase or decrease of approximately 10dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3dB is subjectively barely perceptible.

A3 Equivalent Continuous Sound Level

Another index for assessment for overall noise exposure is the equivalent continuous sound level, L_{eq}. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

A4 Statistical Noise Levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{90}, the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level. The L_1, the level exceeded for one per cent of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted L_{A10}, dBL_{A90} etc. The reference time period (T) is normally included, eg $dBL_{A10,\ 5min}$ or $dBL_{A90,\ 8hr}$

Appendix B

Environmental Noise Survey

B1 Survey Details

To establish the quietest time of day during which the plant will be operating (08:00 to 17:00 hours) attended noise measurements were taken at locations 1 and 2 during mid morning and mid afternoon. Measurement times have been established from previous experience and monitoring undertaken by Arup Acoustics in Manchester City Centre and these correlate with quietest daytime periods (based on a working daytime of 08:00 to 17:00 hours)

The measurement locations are shown in Figure 1.

B2 Survey Dates, Times and Personnel

The survey was undertaken between 14:25 to 15:00 hours 15 January 2008 and 10:20 to 10:50 17 January 2008. Measurements were taken by Craig Reid of Arup Acoustics. The meter was setup to record and log noise levels over five minute periods throughout the measurement time.

B3 Measurement Equipment

Measurements were carried out using the equipment detailed in Table B1. The sound level meters and microphones are Type 1 conforming to BS EN 60804. The calibration of the sound level meters and microphones was checked using the calibrator before and after the survey, to confirm there was no significant drift in meter response at the calibrator frequency and level. This verification indicated there was no more than a 0.1dB variation between checks. The meters are annually calibrated and this calibration is traceable to international standards.

Measurements were made for octave band measurements from 63Hz to 8kHz.

Equipment	Manufacturer	Type
Precision grade sound level meter	Brüel Kjær	2260
Microphone	Brüel Kjær	4188

Table B1: Measurement equipment

B4 Weather

The weather was mainly wet and damp with intermittent light rain throughout the majority of the measurement periods. Measurements were taken in-between light rain periods, but standing water was not evident on the road surfaces and as such rain did not influence the noise level significantly. Measured wind speeds are believed not to have exceeded 5m/s.

B5 Noise Sources

The noise climate was dominated by road traffic, in particular, buses, trams and diesel engine taxis on Portland St and nearby services noise from adjacent buildings.

B6 Results

Table B2 and Table B3 shows measured levels at Location 1 and Location 2.

Date	Time	$L_{Amax,5mins}$	$L_{Aeq,5mins}$	$L_{A90,5mins}$
15 January 2008	14:25	74	64	61
15 January 2008	14:45	77	63	60
15 January 2008	14:53	81	66	60
17 January 2008	10:23	76	64	60
17 January 2008	10:29	86	64	61

Table B2: Measured levels at location 1, dB

Date	Time	$L_{Amax,5mins}$	$L_{Aeq,5mins}$	$L_{A90,5mins}$
15 January 2008	14:32	80	68	63
15 January 2008	14:38	90	69	63
15 January 2008	15:03	82	69	64
17 January 2008	10:36	91	72	65
17 January 2008	10:42	81	68	64

Table B3: Measured levels at location 2, dB

Measurement location	Octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
1	65	60	58	56	55	50	43	34
2	68	63	61	59	58	54	47	39

Table B 4: Lowest octave band data at each location, $dBL_{A90,5min}$