SANDY BROWN

Consultants in Acoustics, Noise & Vibration

13247-R04-B

26 July 2017

One Spinningfields, Manchester

Plant noise egress assessment

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Version	Date	Comments	Author	Reviewer
A	9 Feb 17		Chris Perry	Helen Sheldon
B	26 Jul 17		Matthew Robinson	Helen Sheldon

Summary

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development One Spinningfields, Manchester.

A plant noise egress assessment has been carried out to determine whether the proposed plant items associated with the One Spinningfields development meet the relevant criteria at the nearest noise sensitive premises.

The results of the assessment indicate that the proposed plant items meet the plant noise egress criteria is met at each of the nearest noise sensitive premises.

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1 Introduction

Sandy Brown has been commissioned by Hardman Square Investments Limited to undertake an environmental noise survey at One Spinningfields (Quay House), Spinningfields, Manchester.

It is proposed to demolish the existing building on the site (Quay House) and construct a new 20 storey building housing offices and retail units.

This report details an assessment of the noise egress from the proposed normally operating plant items for the development.

2 Plant noise egress limits

An environmental noise survey (*13247-R01-C* given in Appendix B) was carried out between 18 July 2013 and 17 July 2013. Following the results of this survey and in-line with the requirements of Manchester City Council (MCC), plant noise egress limits were set at 1 metre from the nearest noise sensitive premises in each octave band. These limits were included in the EIA chapter (*13247-R03-A*) and are given in Table 1 for ease of reference.

Table 1 Plant noise limits at 1 m from the nearest noise sensitive premises

Time period	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2K	4k
Daytime (07:00-23:00)	49	50	44	39	38	34	27
Night time (23:00-07:00)	48	48	41	36	35	31	23

3 Basis of assessment

The following documents have been used to form the basis of this assessment:

- 6582.011 ONE SPINNING FIELDS BASEMENT SUPPLY & STAIR 04 EXTRACT received 16 March 2017
- CARPARK SUPPLY AIR FANS received 16 March 2017
- Q5203 - Calculation 02 - Rev A received 16 March 2017
- 25675-C57-0001-For Construction-B received 23 January 2017
- 25675-C57-0801-For Construction-B received 23 January 2017
- 25675-C57-B102-For Construction-C received 23 January 2017
- 25675-C57-B103-For Construction-C received 23 January 2017
- 25675-C50-2001-For Construction-D received 16 January 2017
- 25675-C57-1801-For Construction-C received 16 January 2017
- ESL report- 24-11-2106 rev2, Air Cooled Chillers FAT received 7 December 2016
- 113444-SIL-02-Silencer_Schedule-Contract received15 July 2016

- FAN-18-02 Female WC extract received 15 July 2016
- FAN-B-06 CHP extract received 15 July 2016
- Mechanical Equipment Acoustic Data received 20 January 2016
- 9069-20-251 - Section BB received 14 July 2015

Table 2 details the noise levels received for the items of plant that have an external connection. The location of the external connections for each plant item is also highlighted in the figures given in Appendix A.

Table 2 Received plant noise data

Unit	Location of external connection	Sound power level, L_w (dB), Octave-band centre frequency (Hz)						
		63	125	250	500	1000	2000	4000
FAN/B/04	Ground floor above loading bay							
Inlet		86	92	91	93	90	87	81
Outlet		88	94	92	93	91	89	83
FAN/B/05	Ground floor above loading bay							
Inlet		70	77	79	84	89	88	77
Outlet		73	79	80	84	90	89	79
FAN/B/06	Ground floor above loading bay							
Inlet		73	80	82	85	89	86	77
Outlet		76	82	82	86	90	87	78
AHU B/06	Ground floor above loading bay	83	79	87	85	84	79	74
FAN/B/02	Ground floor above loading bay							
Inlet		84	87	91	88	90	87	82
Outlet		85	87	91	89	90	87	83

Unit	Location of external connection	Sound power level, L_w (dB), Octave-band centre frequency (Hz)						
		63	125	250	500	1000	2000	4000
Car park supply fan	North Core							
Supply		84	88	88	90	86	87	83
Extract		85	88	89	90	87	87	84
Breakout		75	67	63	65	62	59	64
AHU 8	Level 8 roof							
Inlet		97	96	95	94	88	85	84
Outlet		94	93	92	91	85	82	81
AHU 18/01	Level 20 fan room							
Inlet		88	83	91	89	85	81	81
Outlet		84	87	84	84	80	78	80
AHU 18/02	Level 18 roof							
Inlet		88	83	91	89	85	81	81
Outlet		81	84	81	81	77	75	77
AHU 18/03	Level 18 roof							
Inlet		88	83	91	89	85	81	81
Outlet		84	87	84	84	80	78	80
FAN 18/02	Level 18 roof							
Inlet		87	84	89	94	94	88	82
Outlet		88	86	90	94	94	88	83
Fan/18/01	Level 20 roof							
Inlet		80	82	84	86	82	78	73
Outlet		81	83	85	86	82	79	74
Chillers WCA/20/01, 02, 03 [1]	Level 20 roof	78	71	70	70	64	58	50

[1] Chiller – Sound pressure measured at 1 m, based on the measured data at full load

4 Assessment

An assessment of the plant noise egress from the proposed plant items and associated attenuation measures has been made using the environmental noise modelling software CadnaA by Datakustic.

The software carries out calculations using a ray tracing technique. This takes account of the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*. An image of the computer model is provided in Figure 1.

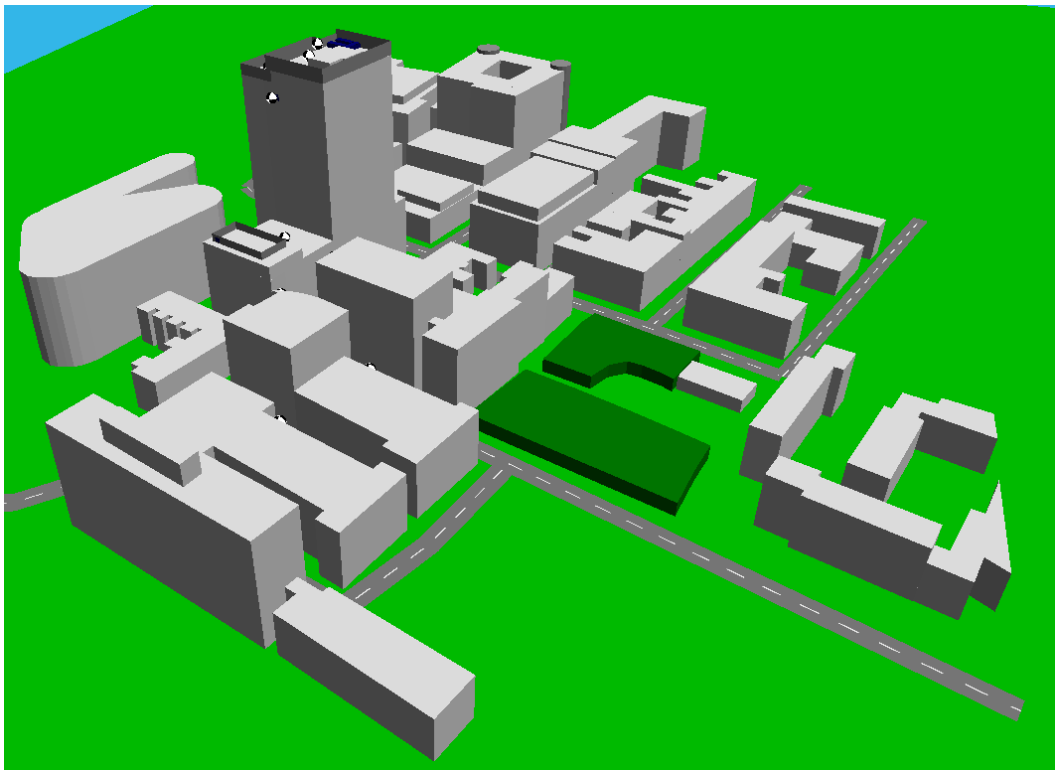


Figure 1 Image of the computer model

4.1 Assessment results

The nearest noise sensitive premises to the site have been set out in EIA report *13247-R03-A ES Chapter - Noise and vibration*. The nearest residential premise has been identifies as Rosetti Place and the nearest commercial premises have been identifies at the Manchester Opera House and the Judge & Partners solicitors and Gartside Street.

The predicted noise level at 1 m from each of the nearest noise sensitive premises due the proposed plant items from the One Spinningfields development are provided in Table 3.

Table 3 Sound pressure level at the nearest noise sensitive premises

Location	Octave-band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
Rosetti Place[1]	43	38	30	22	18	20	16
Manchester Opera House	45	39	39	33	25	24	27
Gartside Street	49	46	36	36	33	31	26

[1] Rosetti Place is residential therefore it is to be assessed against the night time limits

5 Conclusion

An assessment of the plant noise egress from the proposed plant items associated with the One Spinningfields development has been carried out.

The results of the assessment indicate that the proposed plant items meet the plant noise egress criteria is met at each of the nearest noise sensitive premises.

Appendix A

Plant louvre locations

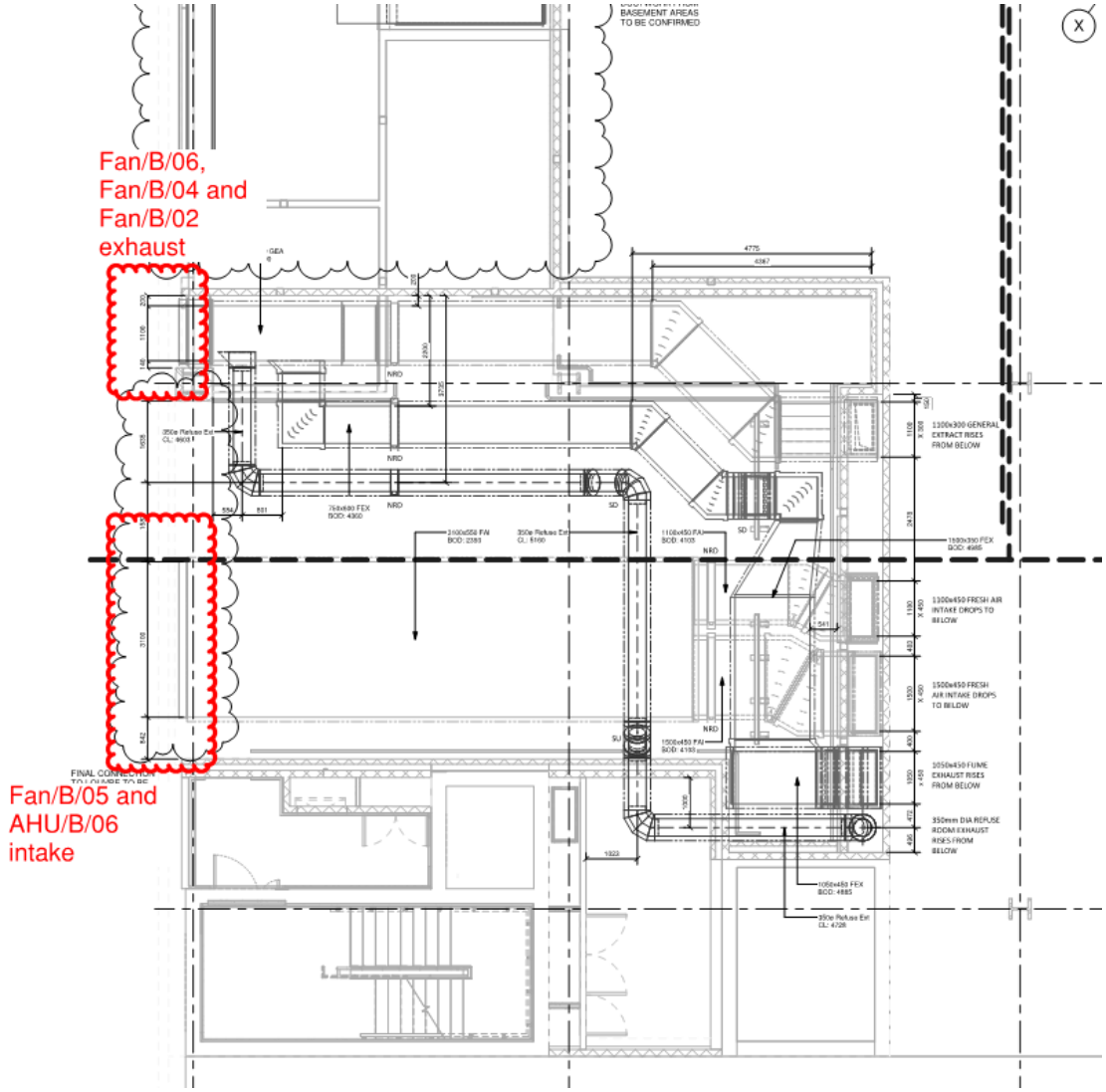


Figure A1 Ground floor external louvres

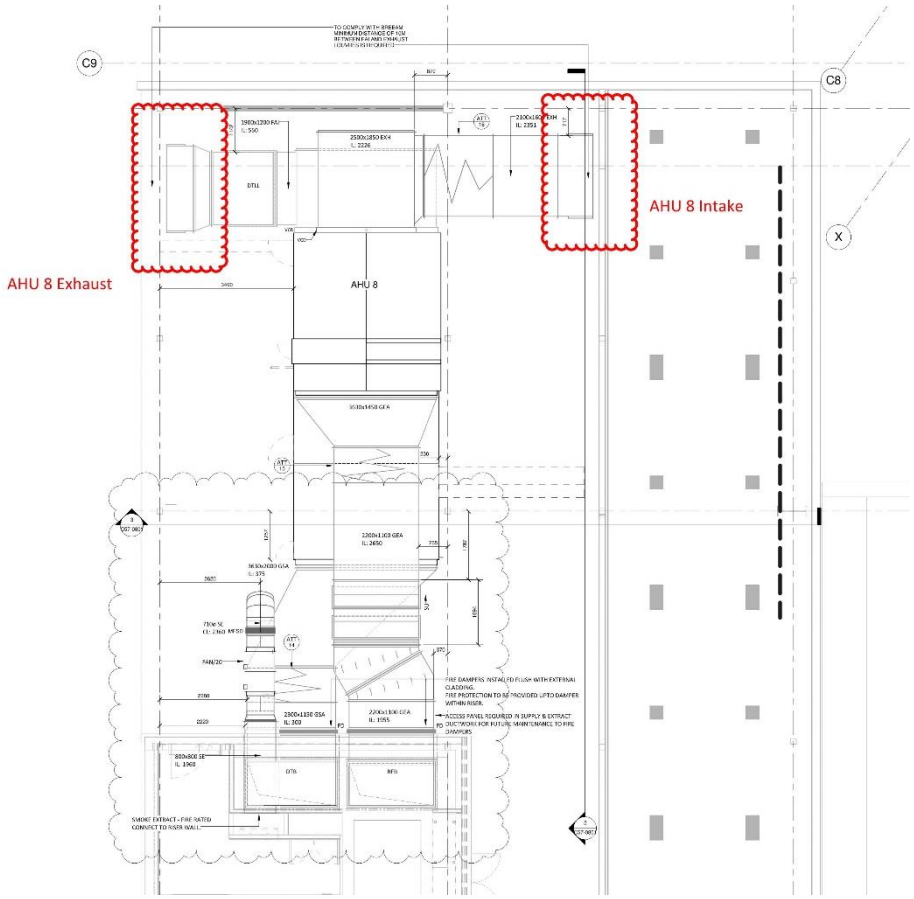


Figure A2 Level 8 roof external louvres

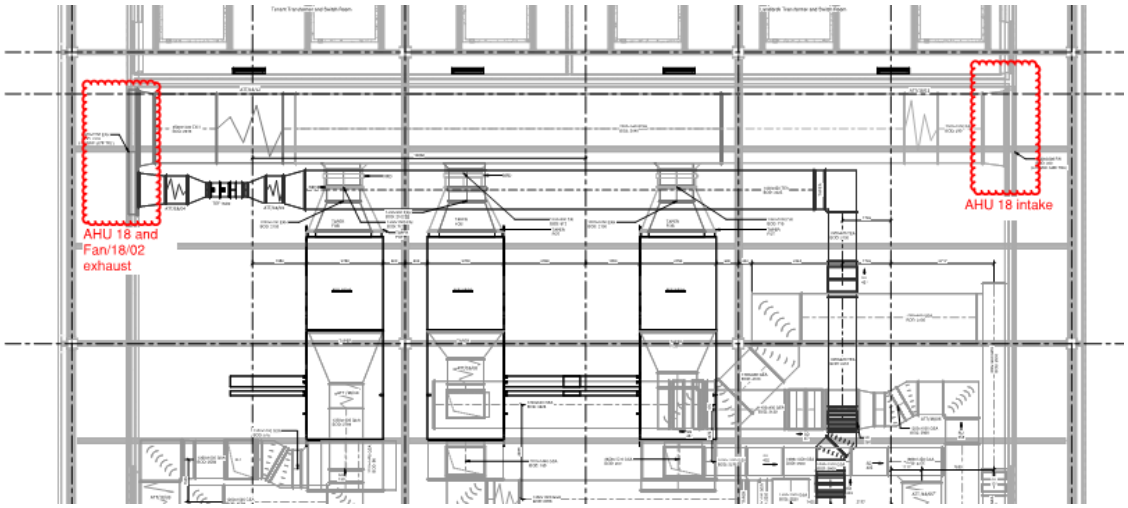


Figure A3 Level 18 external louvres

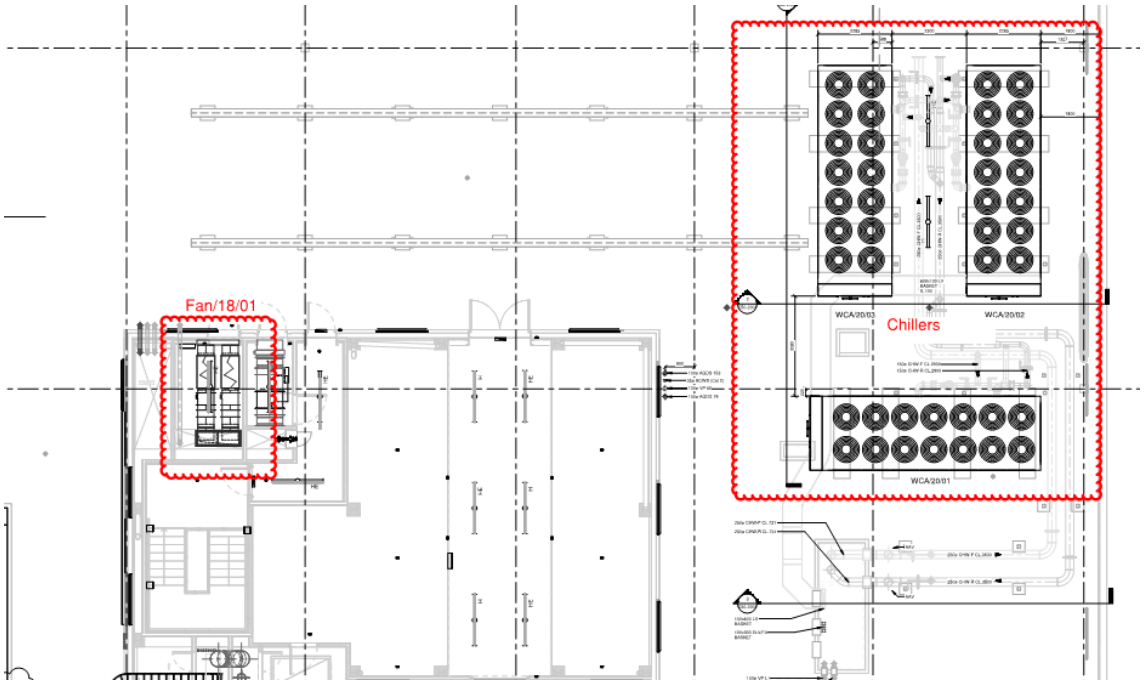


Figure A4 Level 20 roof plant

Appendix B

Environmental noise survey report

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

13247-R01-C

16 December 2013

One Spinningfields, Manchester

Environmental noise survey report

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A	7 Aug 13		James Atha	Una Brown
B	23 Aug 13	Minor amendments	Jake Howarth	Una Brown
C	16 Dec 13	Minor amendments	James Atha	Mark Howarth

Summary

Sandy Brown Associates LLP (SBA) has been appointed to carry out an environmental noise survey at One Spinningfields (Quay House), where it is proposed to demolish the existing Quay House building and construct a new 20 storey building containing offices and retail units and restaurants. The survey has been carried to determine the existing background noise levels in the area. The results have been used to set appropriate plant noise limits and amplified music limits in line with the requirements of Manchester City Council.

The noise survey was performed between 16:30 on 18 July 2013 and 17:00 on 22 July 2013.

The lowest background noise levels measured during the survey were $L_{A90,5min}$ 48 dB during the daytime and $L_{A90,5min}$ 45 dB at night.

Guidance on minimum facade sound insulation performances have been provided for the offices based on achieving internal noise levels in line with BS 8233 and BCO 2011. Outline advice has been provided for glazing build ups and ventilation strategies capable of achieving the required sound insulation.

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1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by Hardman Square Investments Limited to undertake an environmental noise survey at One Spinningfields (Quay House), Spinningfields, Manchester.

It is proposed to demolish the existing building on the site (Quay House) and construct a new 20 storey building housing offices and retail units.

The purpose of the survey was to establish the existing background noise levels in the vicinity of nearby noise sensitive premises. The background noise levels measured enable appropriate limits to be set regarding noise emission from proposed building services plant. These limits are to be set to be 5 dB below the existing background noise measurements in octave bands, in accordance with the requirements of the Manchester City Council.

An initial assessment of facade sound insulation to control noise ingress to the offices is also provided.

This report presents the survey method, results of the environmental noise survey, and a discussion of acceptable limits for noise emission from building services plant.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1.

There is an existing building on the site known as Quay House which is located on Quay street, which is a busy main road.

To the west of the site is Gartside Street which is used primarily for access to car parking facilities at Spinningfields. There are also a number of low-rise commercial properties located on Gartside Street.

To the east of the site is Byrom Street, which is a relatively quiet road used for access to the Spinningfield area.

To the north of the site is Hardman square, which is a busy pedestrian area.

The unattended measurement location is donated by ‘L’, and the attended measurements are denoted by numbers 1 to 3.

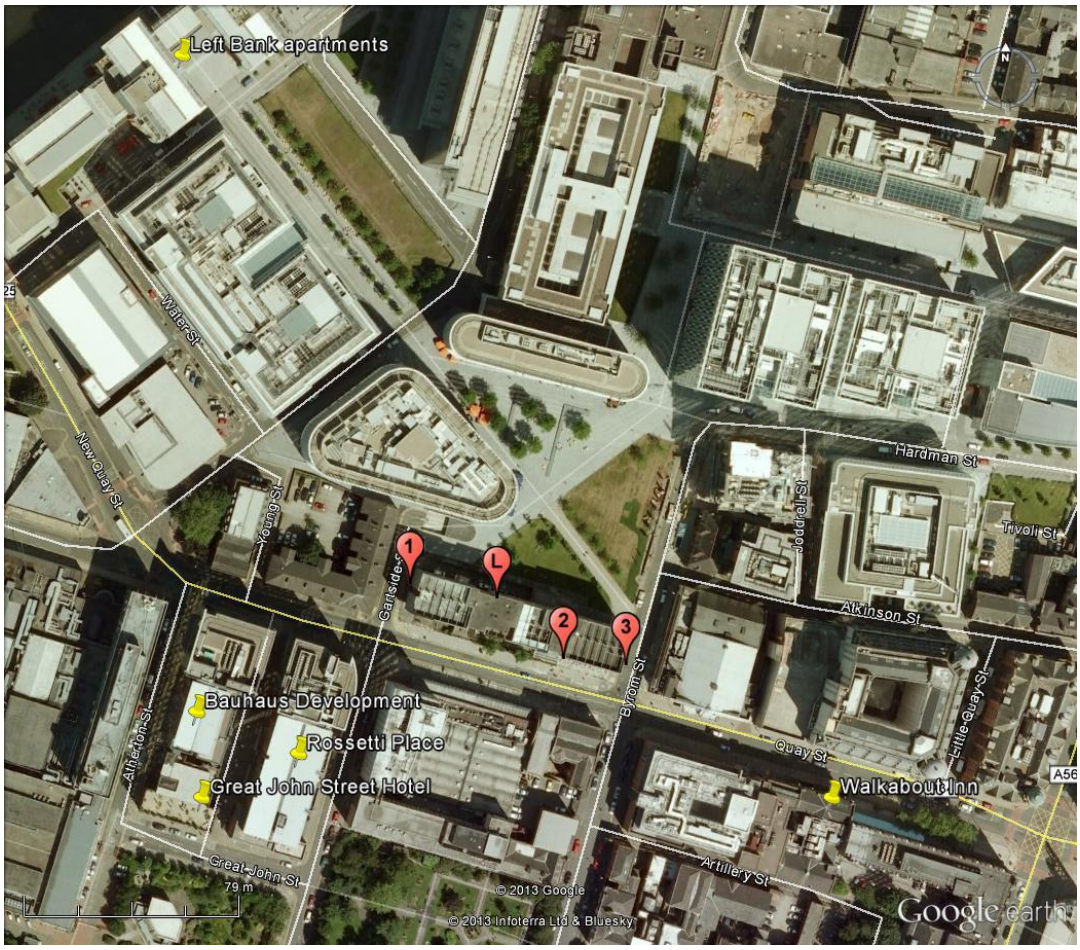


Figure 1 1 Hardman Square site plan (Google Earth)

2.2 Adjacent premises

The surrounding area is mostly retail and office premises.

The nearest noise sensitive premises are Manchester Opera House, located to east of the site, and Judge & Partners solicitors, located to the west of the site on Gartside Street, both at a distance of approximately 11 metres.

There are residential premises at Rossetti Place, located approximately 60 metres from the proposed development and partially screened; the Bauhaus Development, located approximately 100 metres from the site; the townhouses at St. John's Gardens approximately 130 metres from the site; and Left Bank apartments, located approximately 180 metres from the site. The Bauhaus Development, the townhouses at St. John's Gardens and the Left Bank Apartments are all fully screened from the proposed site.

The Great John Street Hotel is approximately 100 metres from the site and fully screened from it, and the Walkabout Inn is approximately 80 metres from the site.

3 Method

3.1 Unattended measurements

A 4 day unattended continuous noise logging survey was undertaken at the site to determine the existing background noise levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 5 minute periods between 16:30 on 18 July 2013 and 17:00 on 22 July 2013.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. The Microphone was positioned out of a 6th floor window of Quay house, at least 0.5m away from the external wall and approximately 25m above the ground. A photograph showing the view from the measurement location is provided in Figure 2. This location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises.

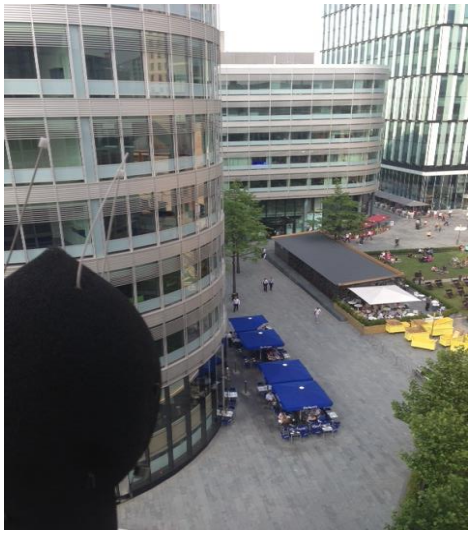


Figure 2 View from position 'L'

3.2 Attended measurements

Attended sample measurements were performed at a number of different locations around Quay House. These are indicated in Figure 1 as positions 1 to 3.

The attended measurements were carried out on 18 July 2013, over 5 minute periods, with the purpose of determining the existing noise levels from road traffic, pedestrians and other significant noise sources in the area.

The locations of the measurements are indicated in Figure 1. In each case the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 1 m from any other reflective surface.

3.3 Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The attended measurements were carried out using a Norsonic 118 sound level meter.

The calibration data for the equipment used during the survey is provided in Appendix A to this report.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

3.4 Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast time weighting in accordance with the requirements of BS 8233 : 1999.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

The L_{A90} is considered most representative of the background noise level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

3.5 Weather Conditions

During the attended measurements carried out on 18 July 2013, the weather was clear and dry and no rain occurred. Wind speeds were low and did not affect measurements.

During the unattended noise measurements between 18 July 2013 and 22 July 2013, weather reports for the area indicated that temperatures varied between 17°C at night and 28°C during the day, and the wind speed was less than 2 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

4 Measurement results

4.1 Observations

The noise sources observed at the site during the survey consisted of the following:

- Traffic noise from Quay Street and Byrom Street
- Heavy pedestrian activity
- Taxis idling on Byrom street
- Occasional car park activity on Gartside street
- Infrequent use of a pedestrian crossing on Quay street

4.2 Unattended measurement results

The results of the unattended noise measurements performed at the site are summarised in the following tables. A graph showing the results of the unattended measurements is provided in Appendix B of this report.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
18 July 2013	67*	58
19 July 2013	65	63
20 July 2013	66	66
21 July 2013	62	53
22 July 2013	61*	-

* Measurement not made over full period due to monitoring start and end time; not included in the average

The minimum background noise levels measured during the unattended survey are given in Table 2.

Table 2 Minimum background noise levels (L_{A90} dB) measured during the survey

Date	Daytime (07:00 – 23:00) $L_{A90,5min}$ (dB)	Night (23:00 – 07:00) $L_{A90,5min}$ (dB)
18 July 2013	62 *	46
19 July 2013	54	47
20 July 2013	51	46
21 July 2013	48	45
22 July 2013	54 *	-

* Measurement not made over full period due to monitoring start and end time

The lowest background noise levels measured during the survey were $L_{A90,5min}$ 48 dB during the daytime and $L_{A90,5min}$ 45 dB at night.

The octave band sound pressure levels corresponding to the minimum background L_{A90} (dB) levels measured are provided in Table 3.

Table 3 Minimum octave band background noise levels (L_{90} dB)

Time period	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2K	4k
Daytime (07:00-23:00)	54	55	49	44	43	39	32
Night time (23:00-07:00)	53	53	46	41	40	36	28

4.3 Attended measurement results

Attended measurements were performed at a number of different locations around the site on 18 July 2013. The sound pressure levels recorded during these measurements are summarised in Table 4 in terms of the most notable parameters. The dominant noise sources noted during the measurements are also described in the following table. All the attended measurements were performed over 5 minute periods.

Table 4 Sound pressure levels from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{Amax,5min}$	$L_{A90,5min}$	
1	16:45	64	74	60	Traffic noise from Quay Street, Car park activity, pedestrians
	16:50	64	78	59	
	16:55	65	83	60	
2	17:05	74	96*	64	Traffic noise from Quay street, Busses, pedestrians, pedestrian crossing
	17:10	69	87	63	
	17:15	69	80	61	
3	17:20	66	77	61	Traffic noise from Quay Street and Byrom Street, Use of access door on Byrom Street
	17:25	67	86	61	
	17:30	68	95**	63	

* Passing motorbike, ** Slamming of access door on Byrom street

5 Noise egress assessment

5.1 Plant noise egress

5.1.1 Standard guidance

Standard guidance for noise emission from proposed new items of building services plant is given in BS4142: 1997 '*Method for rating industrial noise affecting mixed residential and industrial areas*'.

BS4142 provides a method for assessing noise from items such as building services plant against the existing background noise levels at the nearest noise sensitive receptors to assess the risk of complaints occurring.

BS4142 suggests that if the rating noise level is 10 dB or more higher than the existing background noise level, complaints are likely. If the rating level is 5 dB above the existing background noise level, it is considered of marginal significance. If the rating level is 10 dB or more below the existing background noise level, this is considered a positive indication that complaints are unlikely.

If the noise contains 'attention catching features' such as tones, bangs etc, these limits should be reduced by a further 5 dB.

5.1.2 Manchester City Council

Manchester City Council (MCC) typically stipulates the following criteria in regards to plant noise emissions:

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

5.1.3 Plant noise limits

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed 5 dB below the minimum external noise level in octave bands. These limits are set out in Table 5.

Table 5 Plant noise limits at 1 m from the nearest noise sensitive premises

Time period	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2K	4k
Daytime (07:00-23:00)	49	50	44	39	38	34	27
Night time (23:00-07:00)	48	48	41	36	35	31	23

The limits in Table 5 are the cumulative levels from all plant items and limits will need to be set for individual tenants.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), the plant should be designed to achieve a limit 5 dB below those set out in Table 5.

5.1.4 Assessment

At this stage, no information is available in relation to the proposed installation of building services plant, and this will need to be assessed in detail as the design progresses. However, all plant items will be designed to achieve the plant noise limits set out in Table 5.

The required attenuation measures will depend on the type and location of the plant items, but typical measures include in-duct attenuation, acoustic screens and louvres.

5.2 Amplified music egress

5.2.1 Criteria

It is possible that the tenants of the retail units and restaurants may wish to have amplified music. It is therefore recommended that the cumulative noise egress from amplified music be limited to be 10 dB below the existing background (L_{90}) in each octave band at the nearest noise sensitive premises. This is the cumulative level and therefore limits will need to be set for individual tenants to achieve this.

5.2.2 Noise egress limits for amplified music

Based on the noise survey results, it is advised that the cumulative noise level as a result of noise egress due to amplified music does not exceed the limits in Table 6.

Table 6 Maximum cumulative sound pressure levels for amplified music at the nearest noise sensitive premises

	Octave band centre frequency (Hz), L_{eq} dB						
Time of day	63	125	250	500	1k	2k	4k
Daytime (07:00-23:00)	44	45	34	34	33	29	22
Night (23:00-07:00)	43	43	36	31	30	26	18

5.2.3 Assessment

Maximum internal noise levels from amplified music will be set for individual retail and restaurant tenants in order to meet the external noise criteria described above. Where required, electronic noise limiters will be utilised in order to prevent music noise levels from exceeding the maximum levels.

6 Facade sound insulation – noise ingress

This section discusses internal noise level criteria and assesses the required facade sound insulation performance.

In principle, the required facade specification depends on two factors – the external noise levels at the site, and the internal noise criteria.

6.1 Internal noise criteria

6.1.1 BS 8233

BS8233 recommends the ambient noise levels provided in Table 7 for offices.

Table 7 BS8233 ambient noise level criteria for offices

Criterion	Typical situation	Design range $L_{Aeq,T}$ dB	
Reasonable conditions for study & work requiring concentration	meeting room, executive office	35 (good)	40 (reasonable)
Reasonable conditions for study & work requiring concentration	cellular office	40 (good)	50 (reasonable)
Reasonable acoustic privacy in shared spaces	open plan office	45-50	
Reasonable speech or telephone communications	Retail	50 (good)	55 (reasonable)

6.1.2 BCO 2011

BCO Guide to Fit Out 2011 recommends that the combined level from building services and noise intrusion should not exceed the noise levels provided in Table 8.

Table 8 BCO 2011 criteria

Space	Noise level
Open plan office	NR 38
Cellular office	NR 35
Audio/Visual suites	NR 35
Conference room (small)	NR 35
Conference room (large)	NR 30

6.1.3 Recommended target

Taking into account the BCO 2011 and BS8233 criteria, an internal noise target of L_{Aeq} 40 dB is recommended for environmental noise ingress to the open plan office spaces, retail units and restaurants.

6.2 External noise levels

In order to allow an assessment of the worst case scenario, the averages of the attended sample measurements provided from Table 4, and the average daytime sound pressure levels from the unattended measurements have been used to assess noise ingress.

On this basis, the predicted external noise levels at the various facades of the proposed development are shown in Figure 3.

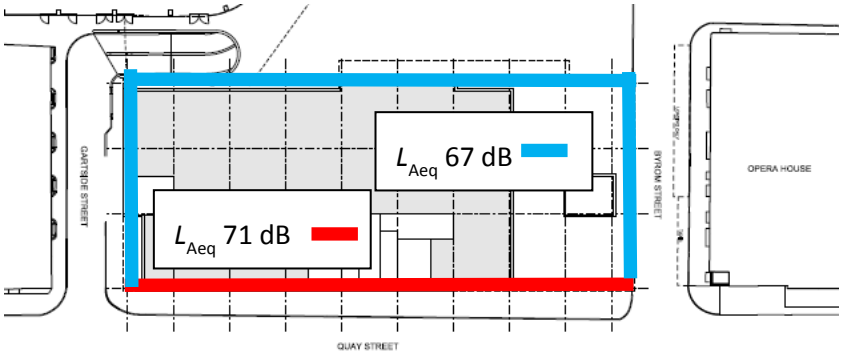


Figure 3 Facade zone mark-up

6.3 Facade sound insulation

To achieve the L_{Aeq} 40 dB internal noise criteria given in section 6.1, minimum facade sound insulation requirements have been determined, based on the external noise levels at each facade.

The minimum sound insulation performances for the different building facades are given in Table 9.

Table 9 Facade sound insulation performance requirements

Facade	Overall sound insulation performance R'_w+C_{tr} (dB)
A	31
B	27

If meeting rooms, conference rooms or audio visual suites are proposed to be located on the facade, a higher facade sound insulation performance may be required to control noise ingress.

6.4 Guidance on facade construction, glazing, and ventilation strategy

Table 10 sets out some examples of glazing build ups and ventilation strategies that could be employed to achieve the required sound insulation performance for the elevations.

Table 10 Example glazing configurations and ventilation strategies

Sound insulation $R_w + C_{tr}$ (dB)	Example glazing configuration	Ventilation Strategy
27	6 mm/12 mm/6 mm	Attenuated passive ventilation (eg, trickle vents)
31	6.4 mm/12 mm/6 mm	Attenuated passive ventilation

The performance required by each element will depend on the construction of the solid elements, the glazing specification, the relative areas of the solid and glazed elements, and the ventilation strategy (including the acoustic performance of the trickle ventilators and the number of ventilators required to serve individual rooms, if applicable).

As the design progresses, a more detailed facade sound insulation assessment will need to be performed, taking into account the factors listed above, to ensure that the overall performance requirements will be met.

7 Conclusion

A noise survey has been carried out to determine the existing background noise levels in the vicinity of the site and surrounding noise sensitive premises.

The minimum measured background noise levels were $L_{A90,5min}$ 48 dB during the day, and $L_{A90,5min}$ 45 dB during the night. On the basis of the requirements of the Local Authority, the plant noise limits have been set at the worst affected existing noise sensitive premises to be 5 dB below these levels in each octave band. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be 5 dB more stringent than those set out above.

As the proposals include retail units and restaurants, noise egress limits have also been set for amplified music. These have been set to be 10 dB below the minimum background noise levels in octave bands outside the nearest noise sensitive premises.

Guidance on minimum facade sound insulation performances have been provided for the offices, retail and restaurants based on achieving internal noise levels in line with BS 8233 and BCO 2011. Outline advice has been provided for glazing build ups and ventilation strategies capable of achieving the required sound insulation.

Appendix A

Equipment calibration information

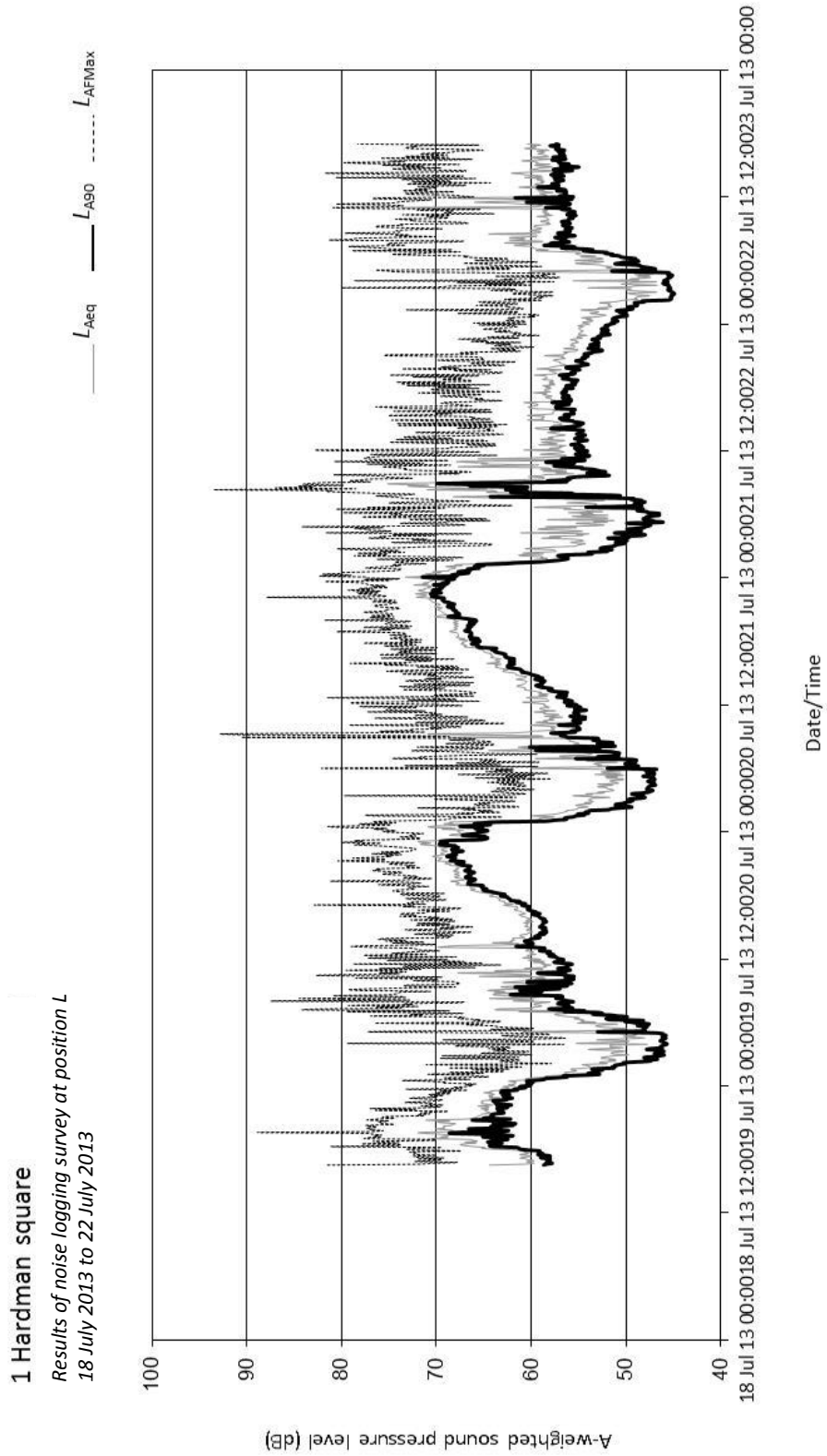
Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	Nor118/31754	Norsonic	3 July 14	1207294
Microphone	40AF/62396	Gras	3 July 14	1207294
Calibrator	1251/31322	Norsonic	3 July 14	1207293
Sound level meter	NL-52/00320635	Rion	12 April 14	1204157
Microphone	UC-59/03384	Rion	12 April 14	1204157
Calibrator	NC-74/34125432	Rion	12 April 14	1204153

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meters used in this survey are available upon request.

Appendix B

Results of unattended measurements at Location 'L'


1 Hardman square
Results of noise logging survey at position L
18 July 2013 to 22 July 2013
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
100
90
80
70
60
50
40
18 Jul 13 00:00
18 Jul 13 12:00
19 Jul 13 00:00
19 Jul 13 12:00
20 Jul 13 00:00
20 Jul 13 12:00
21 Jul 13 00:00
21 Jul 13 12:00
22 Jul 13 00:00
22 Jul 13 12:00
23 Jul 13 00:00
Date/Time