

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

17287-R04-C

13 July 2023

Ancoats Gardens, Manchester

Planning condition 15 discharge report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Version	Date	Comments	Author	Reviewer
A	16 Jun 22	Initial issue for comment	Daniel Shaw	Matthew Robinson
B	27 Apr 23	Updated with internal noise measurements	Tom Stephenson	Matthew Robinson
C	13 Jul 23	Updated with additional internal noise measurements	Skylar Clark	Matthew Robinson

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Summary

Sandy Brown have been appointed by Beech Design and Build Ltd to provide acoustic consultancy services in relation to Ancoats Gardens, Manchester.

This report sets out relevant information to discharge parts (a) and (b) of planning condition 15 (of MCC decision notice 123371/JO/2019). This includes the construction proposals for:

- External walls
- Roof
- External glazing
- Ventilation.

Internal noise measurements have been carried out over a representative sample of spaces on 18 April 2023 and 12 July 2023:

- 12 out of 16 bedrooms met the night-time internal noise limit (L_{Aeq} 30 dB)
- 16 out of 16 living rooms met the daytime internal noise limit (L_{Aeq} 35 dB).

Three bedrooms were unable to be re-tested following remedial works due to access restrictions, however based on attended measurement results from other spaces are expected to achieve the internal noise criteria.

The bedroom in apartment 305 failed to meet the night-time internal noise limit (L_{Aeq} 30 dB). It was noted that the measurements (during the day) were dominated by environmental noise ingress from traffic on Rochdale Road. Based on the results of the unattended noise measurements (day and night), it is expected that the level will reduce to approximately L_{Aeq} 31 dB, which is considered within measurement tolerance of the internal noise criteria. Environmental noise ingress was noticeably louder in this room in comparison to other spaces overlooking Rochdale Road. It should be ensured that windows are correctly sealed and the building envelope does not have any gaps.

At all other locations, observations from attended measurements and results from the unattended noise measurements demonstrate that the facade suitably controls environmental noise ingress.

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1 Introduction

Sandy Brown have been appointed by Beech Design and Build Ltd to provide acoustic consultancy services in relation to Ancoats Gardens, Manchester.

This report sets out relevant information to discharge parts (a) and (b) of planning condition 15 for the development (of MCC decision notice 123371/JO/2019).

Internal noise measurements have been carried out over a representative sample of spaces on 18 April 2023. 2 out of 16 bedrooms met the night-time internal noise limit (L_{Aeq} 30 dB) and 14 out of 16 living rooms met the daytime internal noise limit (L_{Aeq} 35 dB).

Details of the internal noise survey are set out in Appendix A.

Mark-ups of the internal noise survey locations are presented in Appendix B.

2 Planning condition 15

Planning condition 15 (of MCC decision notice 123371/JO/2019) states the following:

'15) Notwithstanding the noise assessment stamped as received by the City Council, as Local Planning Authority, on the 7 November 2017 and update stamped as received by the City Council, as Local Planning Authority, on the 5 January 2018,

- (a) Prior to the first occupation of the residential accommodation hereby approved, the accommodation shall be insulated in accordance with a scheme submitted for approval in writing by the City Council, as Local Planning Authority.*
- (b) The approved scheme shall then be implemented, and a post completion survey submitted for approval in writing by the City Council, as Local Planning Authority, prior to the first occupation of the residential accommodation. The measures implemented shall be retained and maintained for as long as the development remains in use.*

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbances pursuant to policies SP1, H1 and DM1 of the Core Strategy (2007) and saved policy DC26 of the Unitary Development Plan for the City of Manchester (1995).

3 Basis of review

The review has been based on the following documents:

- Sandy Brown planning report 17287-R01-C
- Sandy Brown Acoustic design report 17287-R03-A
- Sandy Brown memo 17287-M007-A Comments on further external wall constructions.

4 Acoustic design requirements – Part (a)

Planning condition 15 part (a) is in relation to the residential section of the scheme. The acoustic design requirements of this element are defined by Manchester City Council (MCC) internal noise criteria set out in the Planning and Noise Technical Guidance document (2015) and the external noise level predicted at each facade.

4.1 External noise

The external noise levels predicted at the facades of the development are set out in Sandy Brown planning report 17287-R01-C. The external noise levels were predicted from a 3D environmental noise model based on measured noise survey data. From this the facade sound insulation requirements were assessed to meet the MCC internal noise criteria.

Design development subsequent to the planning report is set out in Sandy Brown Acoustic design report 17287-R03-A.

4.2 Internal noise criteria

The internal noise criteria for the development have been set in line with MCC guidance for internal noise and entertainment noise set out in the Planning and Noise Technical Guidance document (2015). This is presented in Sandy Brown Acoustic design report 17287-R03-A and is reproduced below.

4.2.1 Residential (background ventilation)

Manchester City Council (MCC) stipulates the criteria provided in Table 1 in the Planning and Noise Technical Guidance document (2015) with regards to internal noise in residential developments.

Table 1 Manchester City Council internal noise criteria for residential developments

Internal space	Internal noise limit, L_{Aeq} (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Living rooms	35	-
Bedrooms	-	30

It is also stipulated that individual noise events in bedrooms should not normally exceed L_{Amax} 45 dB by more than 15 times.

In addition, where entertainment noise is a factor in the noise climate, MCC states the following:

‘Music noise levels in the 63Hz and 125Hz octave centre frequency bands should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively.’

These criteria apply to both music noise from existing premises in the surrounding area and from any non-residential units proposed as part of the development.

From discussions with MCC it is understood that the low frequency noise criteria only applies to bedrooms at night-time (23:00-07:00) for external noise ingress.

4.2.2 Residential (purge ventilation)

It is understood from discussion with MCC that the noise criteria in Section 4.2.1 do not apply during purge ventilation (ie, when windows are open to get rid of cooking /paint smells, etc).

4.2.3 Residential (summertime cooling)

During rapid ventilation for summertime cooling, at the time the conditions were issued it was understood that MCC permit a 5 dB relaxation on the criteria given in Section 4.2.1.

4.2.4 Building services noise limits

The maximum internal noise levels due to building services are set out in Table 2.

The noise limits in residential apartments assume equal noise contributions from external noise ingress and building services noise. Therefore, the building services noise shall be 3 dB below the internal noise criteria when providing background ventilation (ie, L_{Aeq} 27 dB in bedrooms and L_{Aeq} 32 dB in living rooms).

Table 2 Maximum internal noise levels due to building services in residential apartments

Space	Maximum internal noise levels due to building services	
	Background ventilation	Summertime cooling
Bedroom	L_{Aeq} 27 dB	L_{Aeq} 34 dB
Living room	L_{Aeq} 32 dB	L_{Aeq} 39 dB
Bathroom/en-suite	L_{Aeq} 40 dB	

4.3 Assessment

4.3.1 Facade sound insulation performance

The overall facade sound insulation performance requirements are set out in Sandy Brown Stage 4 report 17287-R03-A.

The most onerous overall facade sound insulation performance requirement is R_w+C_{tr} 45 dB.

Based on the external wall information, glazing information and ventilation strategy as set out in the following Sections, the most onerous facade sound insulation performance requirements can be achieved.

4.3.2 External wall constructions

The proposed external wall constructions are provided in Table 3.

Table 3 Comments on proposed external wall constructions

Ref	Proposed construction	Comments
103_SK_125 (Wall type 01A)	102.5 mm brick (assumed $\geq 1600 \text{ kg/m}^3$), 130 mm cavity containing 80 mm Rockwool DuoSlab insulation (assumed $\geq 80 \text{ kg/m}^3$), 12.5 mm cement board (assumed $\geq 1150 \text{ kg/m}^3$), 150 mm SFS studs containing 150 mm mineral wool insulation (assumed $\geq 30 \text{ kg/m}^3$), 2 x 12.5 mm standard plasterboard	Provided the outer cavity is sealed this external wall construction is capable of achieving $R'_w + C_{tr}$ 52 dB and would be suitable for all facade zones.
103_SK_151 Typical wall detail	102.5 mm brick (assumed $\geq 1600 \text{ kg/m}^3$), 123 mm cavity containing 60 mm Rockwool DuoSlab insulation (assumed $\geq 80 \text{ kg/m}^3$), 10 mm cement board (assumed $\geq 1150 \text{ kg/m}^3$), 200 mm SFS studs containing 200 mm RWA45 insulation ($\geq 30 \text{ kg/m}^3$), 2 x 12.5 mm standard plasterboard	Provided the outer cavity is sealed this external wall construction is capable of achieving $R'_w + C_{tr}$ 52 dB and would be suitable for all facade zones.
103_SK_152 Recessed brick detail	102.5 mm brick (assumed $\geq 1600 \text{ kg/m}^3$), 60 mm cavity, 10 mm cement board (assumed $\geq 1150 \text{ kg/m}^3$), 200 mm SFS studs containing 200 mm mineral wool insulation (assumed $\geq 30 \text{ kg/m}^3$), 2 x 12.5 mm standard plasterboard	Provided the outer cavity is sealed this external wall construction is capable of achieving $R'_w + C_{tr}$ 52 dB and would be suitable for all facade zones.
103_SK_153 Typical wall detail	8-12 mm fibre cement cladding (assumed $\geq 1500 \text{ kg/m}^3$), 123 mm cavity containing 60 mm Rockwool DuoSlab insulation (assumed $\geq 80 \text{ kg/m}^3$), 10 mm cement board (assumed $\geq 1150 \text{ kg/m}^3$), 200 mm SFS studs containing 200 mm mineral wool insulation (assumed $\geq 30 \text{ kg/m}^3$), 2 x 12.5 mm standard plasterboard	Provided the outer cavity is sealed this external wall construction is capable of achieving $R'_w + C_{tr}$ 42 dB and would be suitable for all but the four most onerous bedroom facade zones and the most onerous living room facade zone.
103_SK_154 Recessed brick detail	As 103_SK_152	As 103_SK_152

Ref	Proposed construction	Comments
103_SK_155 Typical wall detail	As 103_SK_153	As 103_SK_153
103_SK_156 Typical wall detail	As 103_SK_151 (typical brick detail), 103_SK_152 (recessed brick detail) and 103_SK_153 (typical wall detail)	As 103_SK_151 (typical brick detail), 103_SK_152 (recessed brick detail) and 103_SK_153 (typical wall detail)

4.3.3 External glazing configurations

Glazing configurations which are capable of achieving the above sound insulation performances are presented in Table 4.

The specific glazing configurations installed to the apartments will need to be confirmed.

Table 4 Example glazing configurations

Minimum glazing sound insulation performance, R_w+C_{tr} (dB)	Example glazing configuration
≤ 28	6 mm glazing/12 mm air-space/6 mm glazing
29-32	6.4 mm acoustic laminate glazing/12 mm air-space/6 mm glazing
33-35	6.4 mm acoustic laminate glazing/12 mm air-space/10 mm glazing
36-38	12.8 mm acoustic laminate glazing/12 mm air-space/10 mm glazing
39-41	12.8 mm acoustic laminate glazing/20 mm airgap/10 mm glazing
42	16.8 mm acoustic laminate glazing/20 mm airgap/16.8 mm acoustic laminate glazing

4.3.4 Roof

The roof sound insulation performance is R_w+C_{tr} 50 dB. This is primarily to be achieved with a 200 mm concrete slab. No lightweight roofs are proposed.

4.3.5 Ventilation strategy

Natural ventilation is not relied upon to provide background ventilation. The minimum overall sound insulation requirements should be able to be achieved with the windows closed.

4.3.6 Building services noise levels

The maximum internal noise levels in residential spaces due to building services are set out in Sandy Brown Stage 4 report 17287-R03-A.

The noise limits in residential apartments assume equal noise contributions from external noise ingress and building services noise. Therefore, the building services noise shall be 3 dB below the internal noise criteria when providing background ventilation (ie, L_{Aeq} 27 dB in bedrooms and L_{Aeq} 32 dB in living rooms).

The MEP contractor is to provide calculations for the MVHR noise levels, and this will need to be reviewed.

5 Internal noise measurements – Part (B)

Internal noise measurements have been carried out across the development. These were carried out during the day and night of 18 April 2023. Mark-ups of the testing locations are set out in Appendix B. The building services were understood to be in operation, commissioned and operating at typical duty.

5.1 Methodology

5.1.1 Sample noise measurements

Sample noise measurements were carried out in a sample of 32 spaces (16 living rooms and 16 bedrooms).

In each location, 1 x 5 minute sample measurement was carried out. Measurements were obtained at least 1.5 m from the ground and at least 1 m from the nearest wall.

Building services were understood to be operating at design duty during the measurements.

5.1.2 Unattended noise monitoring

Unattended noise monitoring was carried out in one apartment over a period of at least 24 hours.

Measurements were obtained at least 1.5 m from the ground and at least 1 m from the nearest wall.

Building services were understood to be operating at design duty during the measurements.

5.1.3 *Equipment*

Rion NL-52 sound level meters were used to carry out the sample and unattended noise level measurements. Details of these are given in Appendix B.

5.1.4 *Locations*

Testing locations have been chosen to be representative of the variety of locations within the development. The apartment numbers are given below. For each apartment, measurements are carried out in both living rooms and bedrooms. Mark-ups of the testing locations are presented in Appendix C.

Sample noise measurement locations are listed below:

- Apartment 207
- Apartment 211
- Apartment 216
- Apartment 303
- Apartment 305
- Apartment 309
- Apartment 506
- Apartment 515
- Apartment 704
- Apartment 712
- Apartment 901
- Apartment 906
- Apartment 1102
- Apartment 1104
- Apartment 1303
- Apartment 1304.

Unattended noise monitoring measurements were carried out in the bedroom of apartment 205, which overlooks Rochdale Road to the west.

During the re-test visit on 12 July 2023, Access to the following rooms was unable to be accommodated and could therefore not be re-tested:

- Apartment 712 Bedroom
- Apartment 1303 Bedroom
- Apartment 1304 Bedroom.

It was noted that adjustments to MVHR levels were made across the entire building. It is therefore expected that building services noise levels in these rooms will be in a similar range to the remainder of the re-tested spaces, and therefore will likely meet the internal noise criteria.

5.1.5 Reverberation time correction

All measurements have been corrected for the measured reverberation time to 0.5 s to account for furnishings as will be in practice.

5.2 Unattended noise monitoring – Apartment 205

The results of the unattended noise monitoring measurements are summarised in Table 5. Measurements were carried out in one of the bedrooms of apartment 205. The location was chosen as a worst-case facade as this apartment over looks Rochdale Road.

Night-time noise levels are not considered to be significantly affected by on-site activities.

Measurements were carried out from 16:10 on 18 April 2023 to 08:50 on 20 April 2023. The measurements have been corrected for the measured reverberation time.

The dominant noise source noted when the measurements were carried out were building services noise. Less dominant sources included road noise traffic and a pedestrian crossing.

Table 5 Unattended noise monitoring results

Date	Measured internal noise level, L_{Aeq} (dB)		Number of night L_{Amax} events over 45 dB
	Day (07:00-23:00)	Night (23:00-07:00)	
18 Apr 23	-	29	8
19 Apr 23	33	29	9
20 Apr 23	-	-	-

All of the day and night noise levels meet the overall criteria with the number of L_{Amax} events being less than 15 times over each night-time period.

5.3 Sample noise measurements

5.3.1 18 April 2023

The results of the sample noise measurements are summarised in Table 6 and Table 7.

All sample noise measurements were carried out on 18 April 2023. Daytime measurements were carried out between 16:00 and 20:30. Night-time measurements were carried out between 23:00 and 02:30.

The measurements have been corrected for the measured reverberation time.

Table 6 Sample noise measurement results – Day

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments on noise sources
18 April 23	207	Bedroom	35	Building services noise dominated.
18 April 23	207	Living room	30	Building services noise dominated.
18 April 23	211	Bedroom	31	Building services noise dominated.
18 April 23	211	Living room	32	Building services noise dominated.
18 April 23	216	Bedroom	36	Building services noise dominated.
18 April 23	216	Living room	34	Building services noise dominated.
18 April 23	303	Bedroom	34	Building services noise dominated.
18 April 23	303	Living room	33	Building services noise and environmental noise ingress via the balcony door.
18 April 23	305	Bedroom	38	Building services noise dominated.
18 April 23	305	Living room	32	Building services noise dominated.

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments on noise sources
18 April 23	309	Bedroom	34	Building services noise dominated.
18 April 23	309	Living room	33	Building services noise dominated.
18 April 23	506	Bedroom	30	Building services noise dominated.
18 April 23	506	Living room	29	Building services noise dominated.
18 April 23	515	Bedroom	29	Building services noise dominated.
18 April 23	515	Living room	33	Building services noise dominated.
18 April 23	704	Bedroom	34	Building services noise dominated.
18 April 23	704	Living room	37	Building services noise dominated.
18 April 23	712	Bedroom	37	Building services noise dominated.
18 April 23	712	Living room	34	Building services noise dominated.
18 April 23	901	Bedroom	35	Building services noise dominated.
18 April 23	901	Living room	38	Building services noise dominated.
18 April 23	906	Bedroom	31	Building services noise dominated.
18 April 23	906	Living room	34	Building services noise dominated.
18 April 23	1102	Bedroom	32	Building services noise dominated.
18 April 23	1102	Living room	32	Building services noise dominated.

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments on noise sources
18 April 23	1104	Bedroom	44	Building services noise dominated.
18 April 23	1104	Living room	30	Building services noise dominated.
18 April 23	1303	Bedroom	35	Building services noise dominated.
18 April 23	1303	Living room	32	Building services noise and environmental noise ingress via the balcony door.
18 April 23	1304	Bedroom	31	Building services noise dominated.
18 April 23	1304	Living room	25	Building services noise dominated.

Table 7 Sample noise measurement results – Night

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments
18 April 23	207	Bedroom	34	Building services noise dominated.
18 April 23	207	Living room	29	Building services noise dominated.
18 April 23	211	Bedroom	35	Building services noise dominated.
18 April 23	211	Living room	31	Building services noise dominated.
18 April 23	216	Bedroom	35	Building services noise dominated.
18 April 23	216	Living room	33	Building services noise dominated.
18 April 23	303	Bedroom	39	Building services noise dominated.

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments
18 April 23	303	Living room	30	Building services noise and environmental noise ingress via the balcony door.
18 April 23	305	Bedroom	33	Building services noise dominated.
18 April 23	305	Living room	31	Building services noise dominated.
18 April 23	309	Bedroom	35	Building services noise dominated.
18 April 23	309	Living room	31	Building services noise dominated.
18 April 23	506	Bedroom	31	Building services noise dominated.
18 April 23	506	Living room	32	Building services noise dominated.
18 April 23	515	Bedroom	29	Building services noise dominated.
18 April 23	515	Living room	33	Building services noise dominated.
18 April 23	704	Bedroom	28	Building services noise dominated.
18 April 23	704	Living room	29	Building services noise dominated.
18 April 23	712	Bedroom	36	Building services noise dominated.
18 April 23	712	Living room	33	Building services noise dominated.
18 April 23	901	Bedroom	33	Building services noise dominated.
18 April 23	901	Living room	31	Building services noise dominated.

Date	Apt	Room	Average internal noise level, L_{Aeq} (dB)	Comments
18 April 23	906	Bedroom	42	Building services noise dominated.
18 April 23	906	Living room	33	Building services noise dominated.
18 April 23	1102	Bedroom	29	Building services noise dominated.
18 April 23	1102	Living room	29	Building services noise dominated.
18 April 23	1104	Bedroom	32	Building services noise dominated.
18 April 23	1104	Living room	27	Building services noise dominated.
18 April 23	1303	Bedroom	44	Building services noise dominated.
18 April 23	1303	Living room	29	Building services noise and environmental noise ingress via the balcony door.
18 April 23	1304	Bedroom	34	Building services noise dominated.
18 April 23	1304	Living room	25	Building services noise dominated.

Based on the results of the unattended noise logging, the sample noise measurements have been corrected to daytime and night-time periods. The results of this are set out in Table 8.

Table 8 Corrected sample noise measurement results

Apt	Room	Daytime, $L_{Aeq, 16hr}$ (dB) (07:00-23:00)		Night time, $L_{Aeq, 8hr}$ (dB) (23:00-07:00)		Pass/fail
		Calculated, corrected noise level	Criterion	Calculated, corrected noise level	Criterion	
207	Bedroom	-	-	33	30	Fail
207	Living room	31	35	-	-	Pass
211	Bedroom	-	-	33	30	Fail ^[1]
211	Living room	32	35	-	-	Pass
216	Bedroom	-	-	32	30	Fail ^[1]
216	Living room	34	35	-	-	Pass
303	Bedroom	-	-	33	30	Fail ^[1]
303	Living room	32	35	-	-	Pass
305	Bedroom	-	-	33	30	Fail ^[1]
305	Living room	31	35	-	-	Pass
309	Bedroom	-	-	34	30	Fail
309	Living room	32	35	-	-	Pass
506	Bedroom	-	-	32	30	Fail ^[1]
506	Living room	29	35	-	-	Pass
515	Bedroom	-	-	31	30	Fail ^[1]
515	Living room	33	35	-	-	Pass
704	Bedroom	-	-	30	30	Pass
704	Living room	37	35	-	-	Fail ^[1]

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Apt	Room	Daytime, $L_{Aeq, 16hr}$ (dB) (07:00-23:00)		Night time, $L_{Aeq, 8hr}$ (dB) (23:00-07:00)		Pass/fail
		Calculated, corrected noise level	Criterion	Calculated, corrected noise level	Criterion	
712	Bedroom	-	-	37	30	Fail ^[1]
712	Living room	34	35	-	-	Pass
901	Bedroom	-	-	35	30	Fail
901	Living room	38	35	-	-	Fail
906	Bedroom	-	-	43	30	Fail ^[1]
906	Living room	35	35	-	-	Pass
1102	Bedroom	-	-	30	30	Pass
1102	Living room	31	35	-	-	Pass
1104	Bedroom	-	-	34	30	Fail ^[1]
1104	Living room	29	35	-	-	Pass
1303	Bedroom	-	-	45	30	Fail ^[1]
1303	Living room	33	35	-	-	Pass
1304	Bedroom	-	-	36	30	Fail ^[1]
1304	Living room	26	35	-	-	Pass

^[1] The presented failure is consistent with the predicted exceedances of the internal noise level limits presented in Sandy Brown memo 17287-M019-A *MVHR unit internal noise assessment*. This is discussed further in Section [1], below.

5.3.2 12 July 2023

The results of the noise measurements undertaken on 12 July are summarised in Table 9. These measurements were undertaken during the daytime, between 11:00 and 13:00.

Where contributions from facade ingress are not dominating, measured internal noise levels are expected to be representative of both daytime and night-time levels.

The measurements have been corrected for the measured reverberation time.

Table 9 Sample noise measurement results – 12 July 2023

Apt	Room	Daytime, $L_{Aeq, 16hr}$ (dB) (07:00-23:00)		Night time, $L_{Aeq, 8hr}$ (dB) (23:00-07:00)		Pass/fail
		Calculated noise level	Criterion	Calculated noise level	Criterion	
1104	Bedroom	-	-	29	30	Pass
906	Bedroom	-	-	26	30	Pass
901	Bedroom	-	-	29	30	Pass
901	Living room	29	35	-	-	Pass
704	Living room	28	35	-	-	Pass
506	Bedroom	-	-	25	30	Pass
515	Bedroom	-	-	27	30	Pass
303	Bedroom	-	-	25	30	Pass
305	Bedroom	-	-	35	30	Fail ^[1]
207	Bedroom	-	-	28	30	Pass
216	Bedroom	-	-	28	30	Pass
211	Bedroom	-	-	26	30	Pass
309	Bedroom	-	-	24	30	Pass

^[1] See discussion of failed test in Section 5.4.

5.4 Discussion of results

During the initial measurements, 2 out of 16 bedrooms met the night-time internal noise limit (L_{Aeq} 30 dB) and 14 out of 16 living rooms met the daytime internal noise limit (L_{Aeq} 35 dB).

Following the re-test visit on 12 July 2023, 12 out of 16 bedrooms met the night-time internal noise limit (L_{Aeq} 30 dB), and 16 out of 16 living rooms met the daytime internal noise limit (L_{Aeq} 35 dB).

3 bedrooms were unable to be re-tested, but are expected to meet the night-time limits based on re-tested measurements in other spaces.

The bedroom in apartment 305 failed to meet the night-time internal noise limit (L_{Aeq} 30 dB). It was noted that the measurements (during the day) were dominated by environmental noise ingress from traffic on Rochdale Road. Based on the results of the unattended noise measurements (day and night), it is expected that the level will reduce to approximately L_{Aeq} 31 dB, which is considered within measurement tolerance of the internal noise criteria. Environmental noise ingress was noticeably louder in this room in comparison to other spaces overlooking Rochdale Road. It should be ensured that windows are correctly sealed and the building envelope does not have any gaps.

At all other locations, observations from attended measurements and results from the unattended noise measurements demonstrate that the facade suitably controls environmental noise ingress.

Appendix A

Survey and equipment details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter and a Rion NL-52 sound level meter, respectively.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	21 Mar 25	TCRT23/1250
Microphone	UC-59/05549	Rion	21 Mar 25	TCRT23/1250
Pre-amp	NH-25/32354	Rion	21 Mar 25	TCRT23/1250
Calibrator	NC-74/34125432	Rion	21 Mar 25	TCRT23/1248
Sound level meter	NL-52/01143564	Rion	15 Dec 24	TCRT22/1766
Microphone	UC-59/10153	Rion	15 Dec 24	TCRT22/1766
Pre-amp	NH-25/43581	Rion	15 Dec 24	TCRT22/1766
Calibrator	NC-74/34257023	Rion	15 Dec 24	TCRT22/1765
Sound level meter	2250/3011964	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Microphone	4189/3100176	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Pre-amp	ZC0032/26376	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Calibrator	4231/3019123	Brüel & Kjær	8 Sep 23	UCRT21/2086

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

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

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*.

Weather conditions

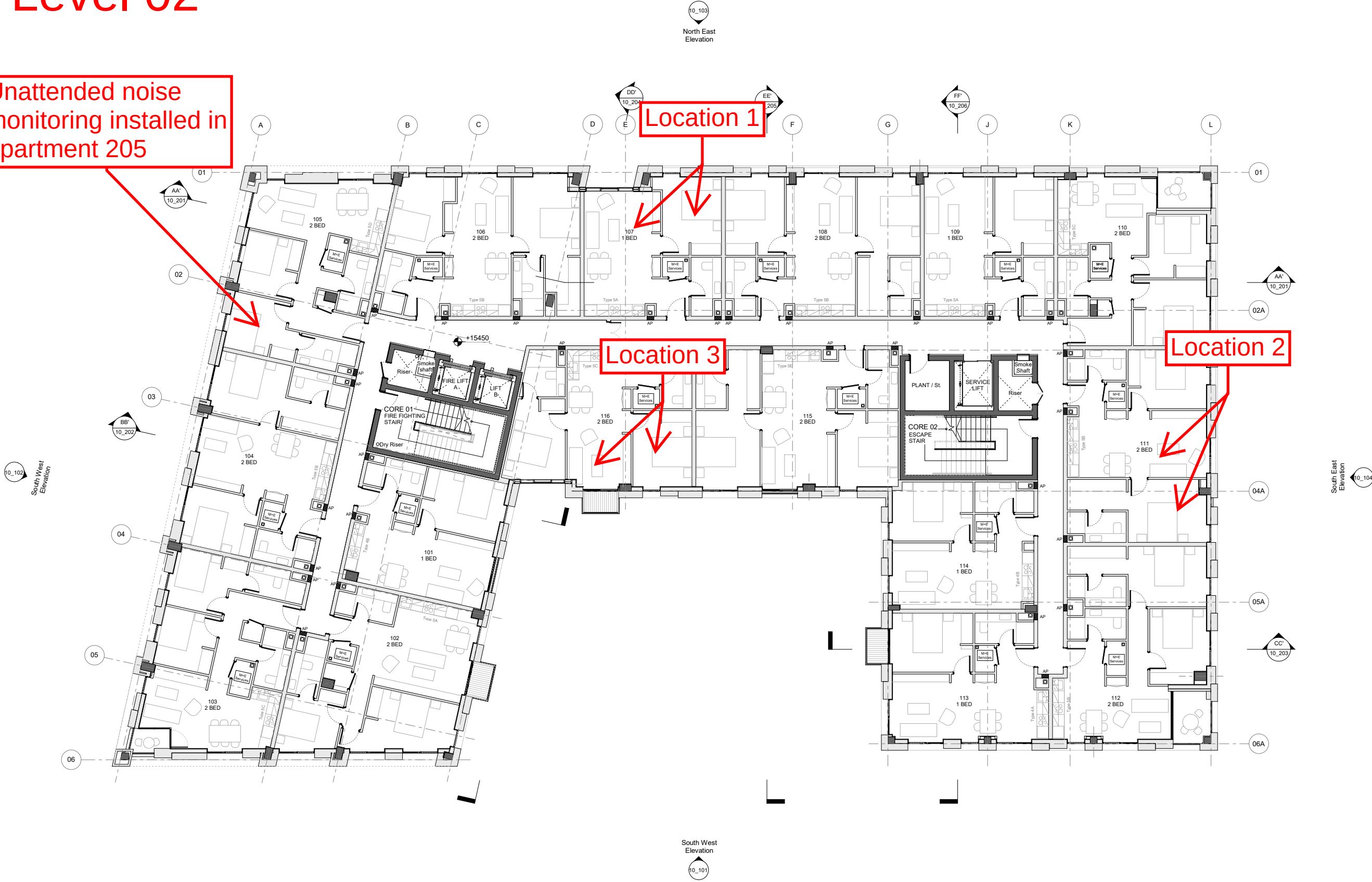
During the attended noise measurements, the weather was generally clear and dry and no rain occurred. These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Measurement locations

Level 02

Unattended noise monitoring installed in apartment 205



- GENERAL NOTES
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 2. ALL LEVELS ARE IN METRES UNLESS OTHERWISE STATED
 3. DIMENSIONS ARE NOT TO BE SCALED FROM THE DRAWING
 4. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS 1981 (INCLUDING AMENDMENTS) AND ALL RELEVANT BRITISH STANDARDS/CODES OF PRACTICE
 5. CONTRACTOR IS RESPONSIBLE FOR THE CORRECT SETTING OUT OF THE WORKS ON SITE. ALL DIMENSIONS TO BE CHECKED PRIOR TO FABRICATION OF MATERIALS
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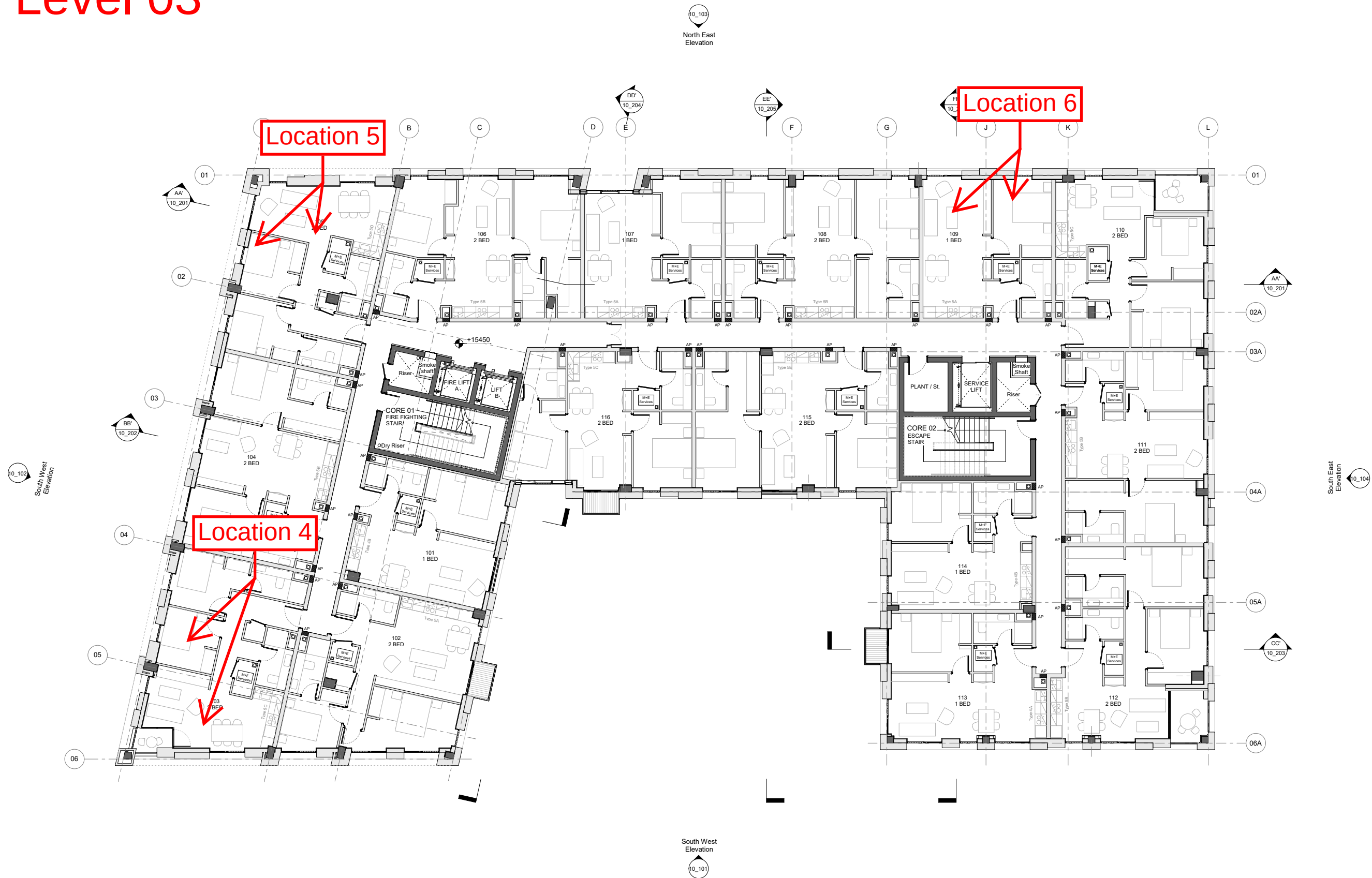


- LEGEND
- M+E Services as per M+E Consultants' design:
 - Washing Machine
 - Under Floor Heating Manifold (UFH)
 - Heat Interface Unit
 - VENT Axia Sentinel Kinetic Advance Unit
 - SVP as per M+E Consultants' design
 - Fire Rated and acoustic Access Panel for Maintenance access. Size 300x300mm Levels 1, 3, 5, 7, 9, 11, 13 & 14.

P1 Issued for Information		MC	2018.05.15
Rev	Description	By	Date
CLIENT:			
PROJECT: 103 Ancoats Gardens			
Proposed GA Plan			
Level 01			
DRAWING TITLE:			
Information			
DRAWN:	M CADAVALL	CHECKED:	S LOWE
APPROVED:	I GRIFFITHS	DATE:	May 2018
1 : 100	103 10_003	P1	
SCALE	DRAWING NUMBER	REV	(A1)

Level 03

- GENERAL NOTES
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PROJECT: 103 Ancoats Gardens
Proposed GA Plan
Level 01

DRAWING TITLE:

Information

DRAWING STATUS: I CHECKED: S LOWE

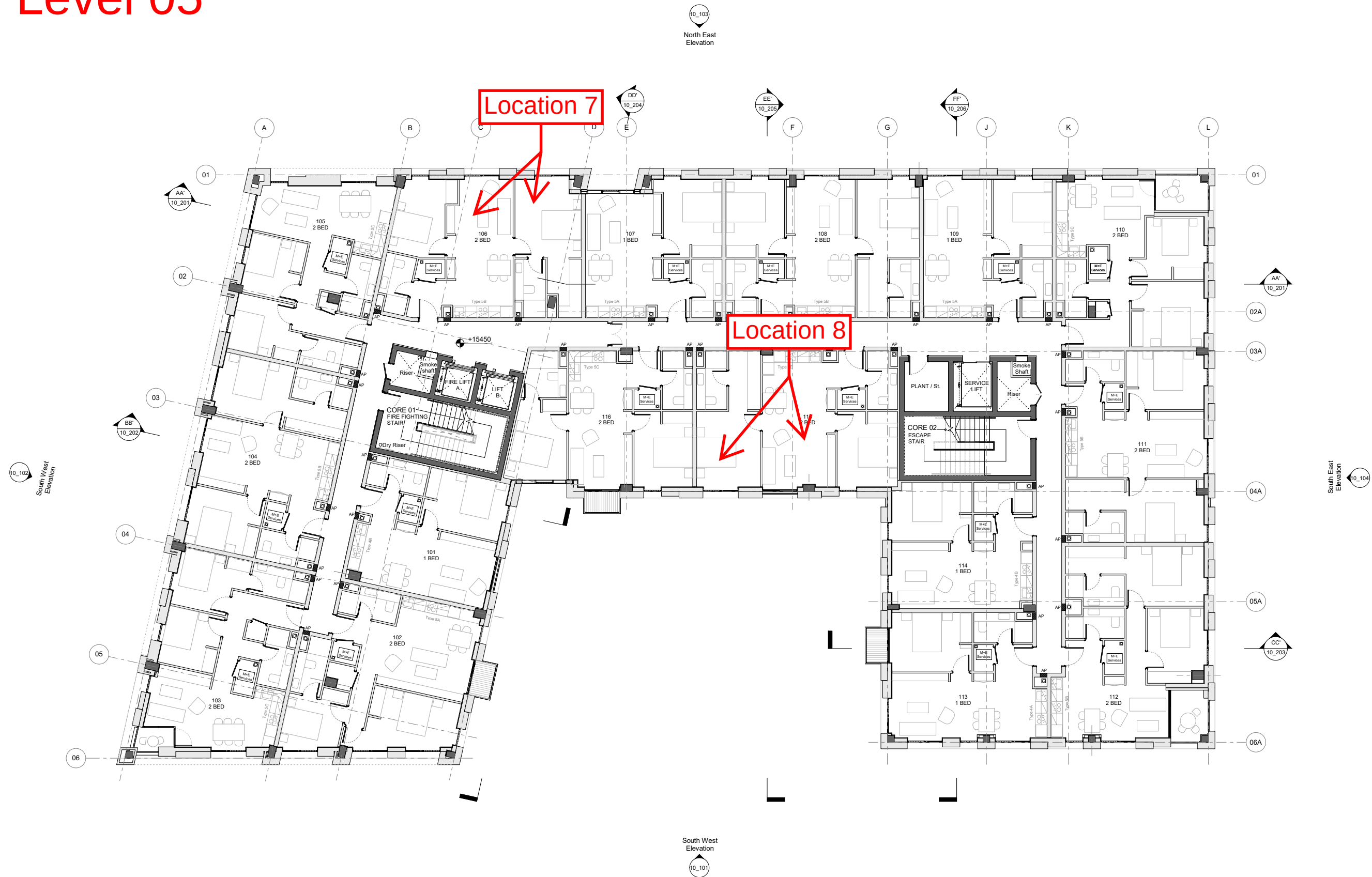
APPROVED: I GRIFFITHS DATE: May 2018

1 : 100 103 10_003 P1

SCALE: DRAWING NUMBER: REV: (A1)

Level 05

- GENERAL NOTES
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P1 Issued for Information MC 2018.05.15

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PROJECT: 103 Ancoats Gardens

Proposed GA Plan Level 01

DRAWING TITLE: Information

DRAWING STATUS: I CHECKED: S LOWE

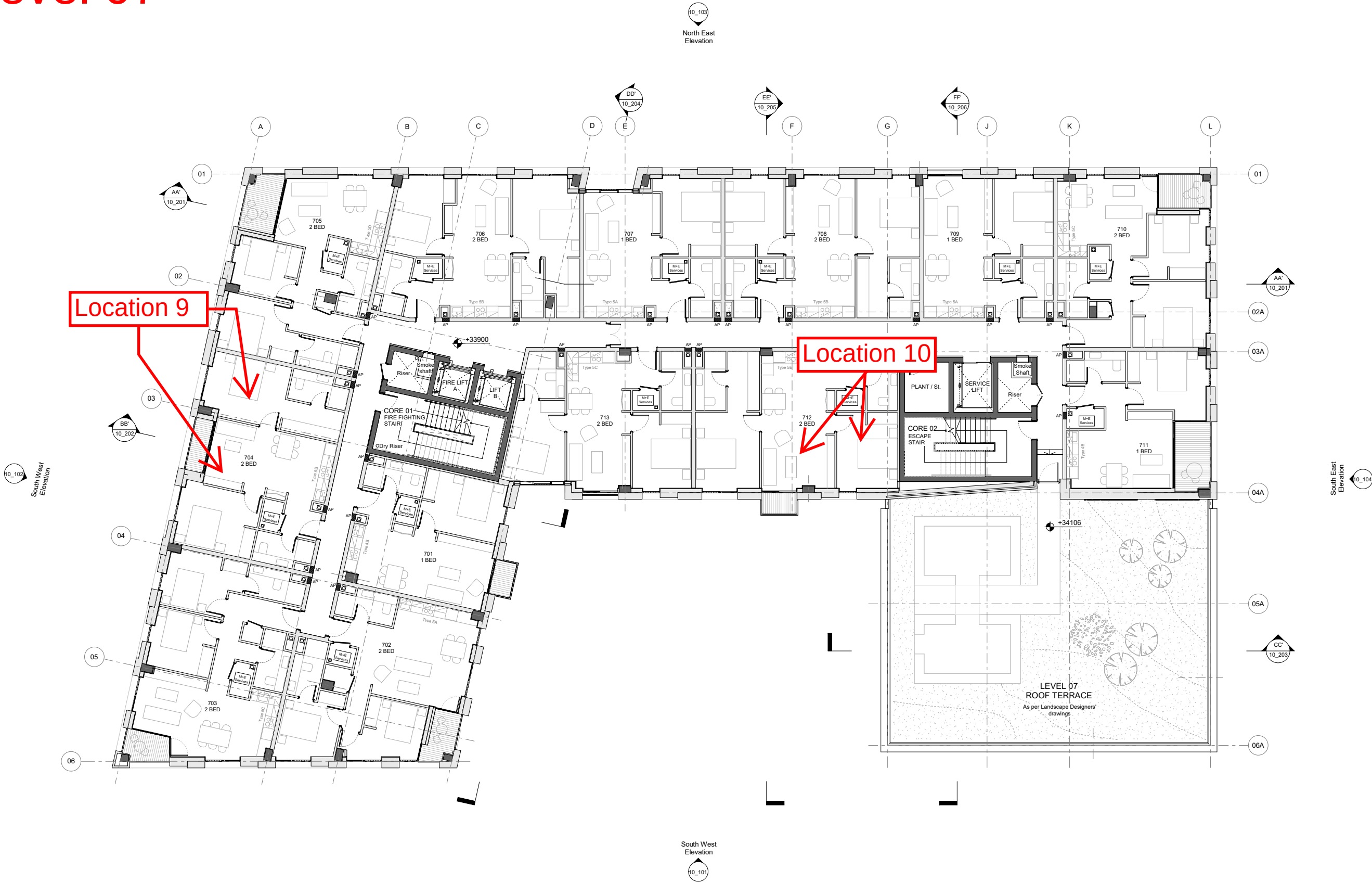
APPROVED: I GRIFFITHS DATE: May 2018

1:100 103 10_003 P1

SCALE: DRAWING NUMBER: REV: (A1)

Level 07

- GENERAL NOTES
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P1 Issued for Information MC 2018.05.15

Rev Description By Date

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PROJECT: 103 Ancoats Gardens

Proposed GA Plan
Level 07

DRAWING TITLE: Information

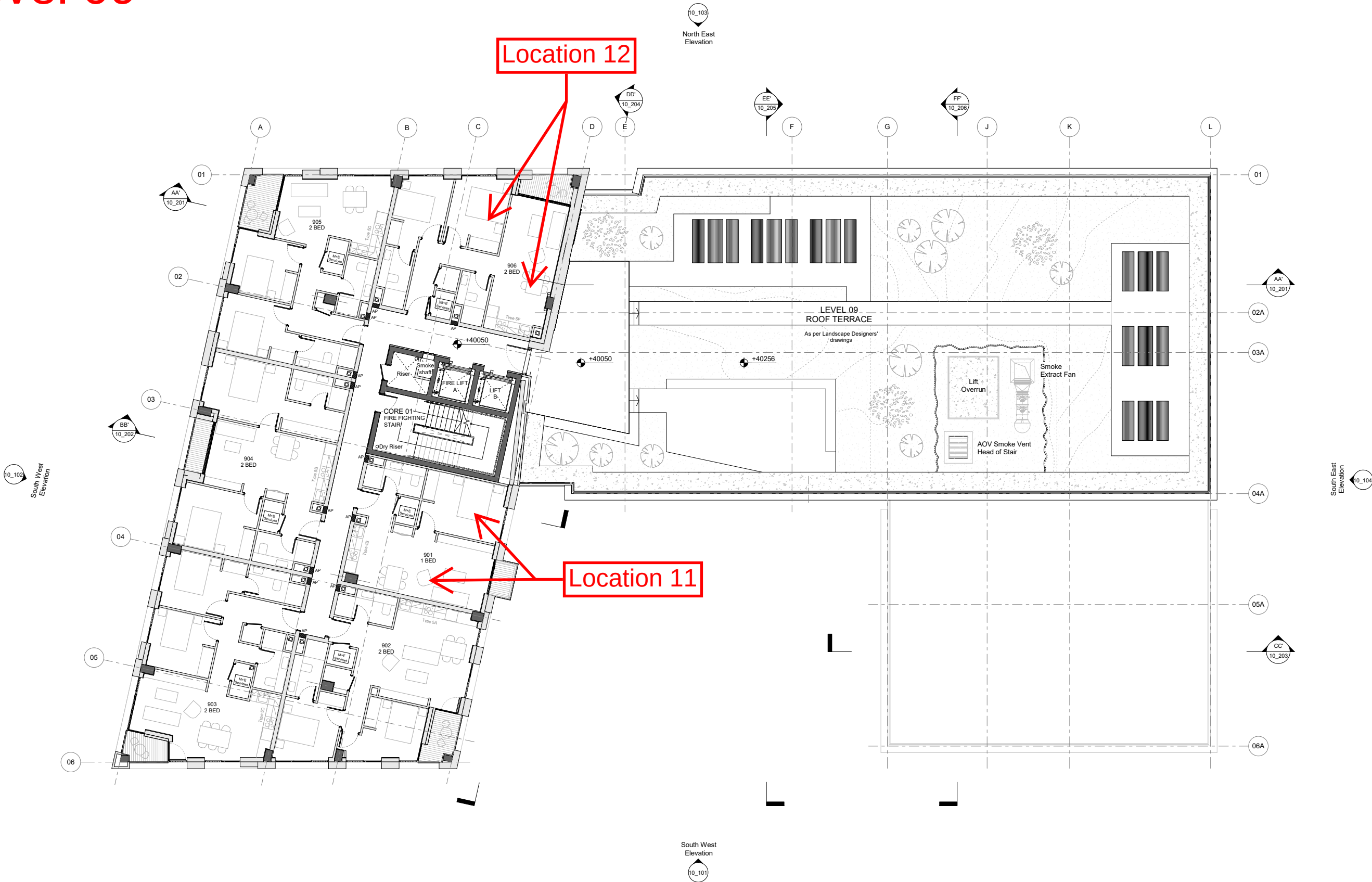
DRAWING STATUS: I CHECKED: S LOWE

APPROVED: I GRIFFITHS DATE: May 2018

1 : 100 103 10_009 P1
SCALE DRAWING NUMBER REV (A1)

Level 09

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Level 11

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Location 13

Location 12

Level 13

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P1 Issued for Information MC 2018.05.15

Rev Description By Date



CLIENT:

PROJECT: 103 Ancoats Gardens

Proposed GA Plan Level 13

DRAWING TITLE:

DRAWING STATUS: Information

DRAWN: M CADAVALL CHECKED: S LOWE

APPROVED: I GRIFFITHS DATE: May 2018

1:100 103 10_015 P1

SCALE: DRAWING NUMBER: REV: (A1)