

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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This City residential development, Ancoats, Manchester

Land to the west of Rodney Street

Acoustic planning report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Version	Date	Comments	Author	Reviewer
A	18 May 22		Jose M. Gonzalez	James Atha
B	9 Jun 22	Updates following comments from Avison Young	Jose M. Gonzalez	James Atha
C	9 Jun 22	Updated assessment for Block A ground floor apartments	Jose M. Gonzalez	James Atha

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Summary

Sandy Brown has been commissioned by Wates Construction Ltd to provide acoustic advice in relation to the proposed This City residential development at land to the west of Rodney Street, Manchester, M4 6JJ.

An environmental noise survey has been carried out to determine the existing sound levels in the area, and to set appropriate plant noise limits in line with the requirements of Manchester City Council. The noise survey was carried out between 14:05 on 28 June 2021 and 02:33 on 29 June 2021. The lowest background sound levels measured during the survey were L_{A90} 38 dB during the daytime and L_{A90} 30 dB at night. Based on the requirements of Manchester City Council, all plant must be designed such that the cumulative noise level at 1 m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the typical background noise levels measured.

The plant noise limits are cumulative and apply with all plant operation under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

An additional noise survey was carried out on 7 September 2021 to verify the noise levels to the north-west of the site and close to the A62.

An assessment has been carried out to determine required sound insulation performances for the facades to the residential dwellings and provide guidance on the ventilation strategy. Minimum overall facade sound insulation requirements under the background ventilation condition have been provided. The facade performance requirements are driven by the daytime ambient noise levels for living rooms, and night-time ambient noise levels for bedrooms. The glazing area is equal to or less than 50% of the facade to living rooms and bedrooms, and the proposed external wall build-up is expected to provide a sound insulation of at least 10 dB higher than overall sound insulation performance requirements. On this basis, the highest glazing maximum sound insulation performance will be no higher than $R'_w + C_{tr}$ 27 dB throughout the apartments. This is achievable with standard thermal double glazing (e.g. 6/16/6).

An AVO assessment has been carried out, and the results indicate that there are bedrooms and living rooms in Block A where the SOAEL thresholds of AVO may be exceeded during the daytime depending on the duration that windows need to be opened to control overheating. A mechanical ventilation strategy has been developed by Method to avoid use of opening windows to control overheating during the daytime for these apartments.

Manchester City Council require the night-time limits of Approved Document O to be adhered to as a minimum despite Approved Document O not being strictly applicable for the scheme. The Approved Document O noise criteria are predicted to be met when windows are open to control overheating.

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1 Introduction

Sandy Brown has been commissioned by Wates Construction Ltd to provide acoustic advice in relation to the proposed This City residential development at land to the west of Rodney Street, Manchester, M4 6JJ.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emissions from proposed building services plant. These limits are set in accordance with the requirements of Manchester City Council.

Ambient and maximum noise levels from the noise survey are used to assess building envelope sound insulation requirements to achieve appropriate internal noise levels for residences. These follow standards set in accordance with Manchester City Council requirements.

This report provides details of the noise survey, including measurement results, and provides recommendations.

2 Site description

2.1 The site and its surroundings

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

The proposed development includes the erection of two residential apartment buildings (Use Class C3), one of 8 storeys (68 apartments) and one of 5 storeys (50 apartments), to form a total of 118 residential apartments; and the erection of 10, 3 storey townhouses (Use Class C3); together with car and cycle parking provision, hard and soft landscaping including public realm, access, substation and other associated works

The site is bounded by Rodney Street to the east, Jersey Street to the south, Wadeford close to the west and a footpath to the north.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is located within a mixed residential, commercial and industrial area. A summary of the nearby premises is set out below with reference to Figure 1.

- Residential premises along Rodney Street (highlighted in royal blue)
- Residential premises on Jersey Street and Mozart Close (highlighted in orange)
- Residential tower building on Butler Street (highlighted in red)
- Proposed residential development on Butler Street, planning application reference 129187/FO/2021 (highlighted in purple)
- Commercial premises on Oldham Road (highlighted in green)
- Crown Industrial Estate on Poland Street (highlighted in light blue)
- Poland Street Industrial Estate (highlighted in pink).

There are other planned developments in the area on Jersey Street including Eliza Yard (planning application reference 130354/FO/2021) and Jersey Wharf which are located to the southwest of the site on Jersey Street. The Crown Industrial Estate on Poland Street is also due to be partly redeveloped for a Mobility Hub (planning application reference 130627/FO/2021).

3 Assessment criteria

3.1 NPPF and NPSE

The National Planning Policy Framework, July 2021 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

and

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

The NPSE states that its aims are as follows:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life*
- *Mitigate and minimise adverse impacts on health and quality of life and*
- *Where possible, contribute to the improvement of health and quality of life.'*

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

3.2 ProPG

ProPG *Planning & Noise (Professional Practice Guidance on Planning & Noise), New Residential Development, 2017* provides guidance on the management of noise within the planning system in England. It is restricted to consideration of new residential developments that will be exposed predominantly to airborne noise from transport sources.

The two stages of the approach are given below

- Stage 1 – Initial noise risk assessment of the proposed development site
- Stage 2 – Systematic consideration of four key elements
 - Element 1 – Demonstrating a “Good Acoustic Design Process”
 - Element 2 – Observing internal “Noise Level Guidelines”
 - Element 3 – Undertaking an “External Amenity Area Noise Assessment”
 - Element 4 – Consideration of “Other Relevant Issues”.

Following this approach, there are four possible recommendations, the choice of recommendation is as follows:

- Grant without conditions
- Grant with conditions
- Avoid
- Prevent.

Guidance provided in ProPG has been used to assess the proposed development site and recommend mitigation measures to reduce noise levels.

3.3 Noise egress

3.3.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains ‘attention catching features’ such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

3.3.2 Local Authority criteria

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in *Planning & Noise Technical Guidance* document dated May 2022 states the following in relation to plant noise egress:

‘The development should be designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.’

Corrections for tonal or attention catching characteristics would need to be applied to the rating level in accordance with BS4142: 2014

3.4 Noise ingress

3.4.1 Local Authority requirements

Manchester City Council (MCC) stipulates the criteria provided in Table 1 with regards to internal noise in residential developments due to background ventilation.

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	35
Bedrooms	35	30

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

3.4.2 British Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS 8233:2014 *Sound insulation and noise reduction for buildings*. The guidance limits are shown in Table 2.

These internal levels are based on annual average data and do not have to be achieved in all circumstances. It is normal to exclude occasional events, such as fireworks night or New Year’s Eve.

Table 2 Internal noise criteria for sleeping/resting

Internal space		Indoor ambient noise level, L_{Aeq} (dB)	
		Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
Living rooms	35		-
Dining room	40		-
Bedrooms	35		30 ^[1]

[1] BS 8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. For regular events, such as scheduled aircraft or passing trains, a guideline value may be set in terms of SEL or $L_{Amax,F}$. Sporadic noise events could require separate values.

The standard states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas, such as gardens and patios, the standard states:

‘it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.’

3.4.3 ProPG

Internal noise ingress criteria in ProPG are the same as in BS 8233:2014 but additional guidance is provided. In relation to regular individual noise events the following additional guidance is provided:

‘In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.’

3.4.4 Approved Document O – Overheating

Approved Document O 2021 Edition (to the Building Regulations 2010) (ADO2021) states the following in relation to noise ingress during overheating periods:

‘In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (23:00-07:00 hours).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. $L_{Aeq,T}$ 40 dB average over 8 hours (between 23:00-07:00)
- b. L_{AFmax} 55 dB more than 10 times a night (between 23:00-07:00).’

The above applies to residential dwellings, institutional residential accommodation, and other types of residential accommodation, such as student accommodation.

ADO2021 takes effect on 15 June 2022 for use in England. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15 June 2023.

As such, it is not anticipated that this will be applicable for the scheme. However, Manchester City Council have requested that the noise criteria set out in Approved Document O be achieved within bedrooms.

3.4.5 Acoustics, ventilation and overheating

Guidance on external noise levels from transport noise sources and the assessment of risk in an overheating condition is given in the Association of Noise Consultants *Acoustics Ventilation and Overheating, Residential Design Guide* (AVOG).

A Level 1 assessment comprises assessing the external free-field noise levels to guideline thresholds. External noise levels and the associated risk categories for a Level 1 assessment are adapted and summarised in Table 3, though consideration also has to be given the duration and frequency of any overheating periods.

Table 3 Guidance for Level 1 assessment of noise from transport sources relating to overheating condition

Risk category for Level 1 assessment	External free-field noise level	
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
Negligible	$L_{Aeq} \leq 52$ dB	$L_{Aeq} \leq 47$ dB
Low	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 57$ dB	$L_{Aeq} > 47$ dB and $L_{Aeq} \leq 52$ dB
Medium	$L_{Aeq} > 57$ dB and $L_{Aeq} \leq 62$ dB	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 55$ dB
High	$L_{Aeq} > 62$ dB	$L_{Aeq} > 55$ dB

If a Level 1 assessment finds that the development falls into a ‘Medium’ or ‘High’ risk category a Level 2 assessment should be carried out, assessing the expected internal noise levels for an overheating condition and the associated risk of adverse effect. The Level 2 assessment would consider the following:

- Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a CIBSE TM59 assessment)
- How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a CIBSE TM59 assessment).

The guidance for suitable internal noise levels in order that noise ingress can be suitably controlled for an overheating condition is provided in AVOG. This is adapted and summarised in Table 4, though the figures are not supposed to be taken as limits, rather guidelines to be assessed while also considering the adverse effect of any overheating (duration and severity).

The lowest observed affect level (LOAEL) and the significant observed affect level (SOAEL) for increased noise levels associated with controlling overheating are specific to each project as these depend on the magnitude of the increased internal noise levels and the duration for which they occur.

Table 4 Guidance for Level 2 assessment of noise from transport sources relating to overheating condition

Effect level	Internal noise level from transport sources		
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)	
LOAEL (noise can be heard, but does not cause any change in behaviour)	$L_{Aeq} \leq 35$ dB	$L_{Aeq} \leq 30$ dB	L_{AFmax} 45 dB not normally exceeded
SOAEL upper limit for longer overheating durations	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 40$ dB	$L_{Aeq} > 30$ dB and $L_{Aeq} \leq 35$ dB	-
SOAEL upper limit for shorter overheating durations	$L_{Aeq} > 40$ dB and $L_{Aeq} \leq 50$ dB	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 42$ dB	-
Exceeds SOAEL (noise causes a material change in behaviour)	$L_{Aeq} > 50$ dB	$L_{Aeq} > 42$ dB	L_{AFmax} 65 dB normally exceeded

The AVOG illustrates that there is a link between adverse effects, increasing internal ambient noise levels and the duration of exposure to noise for an overheating condition. These links are indicated in Figure 2.

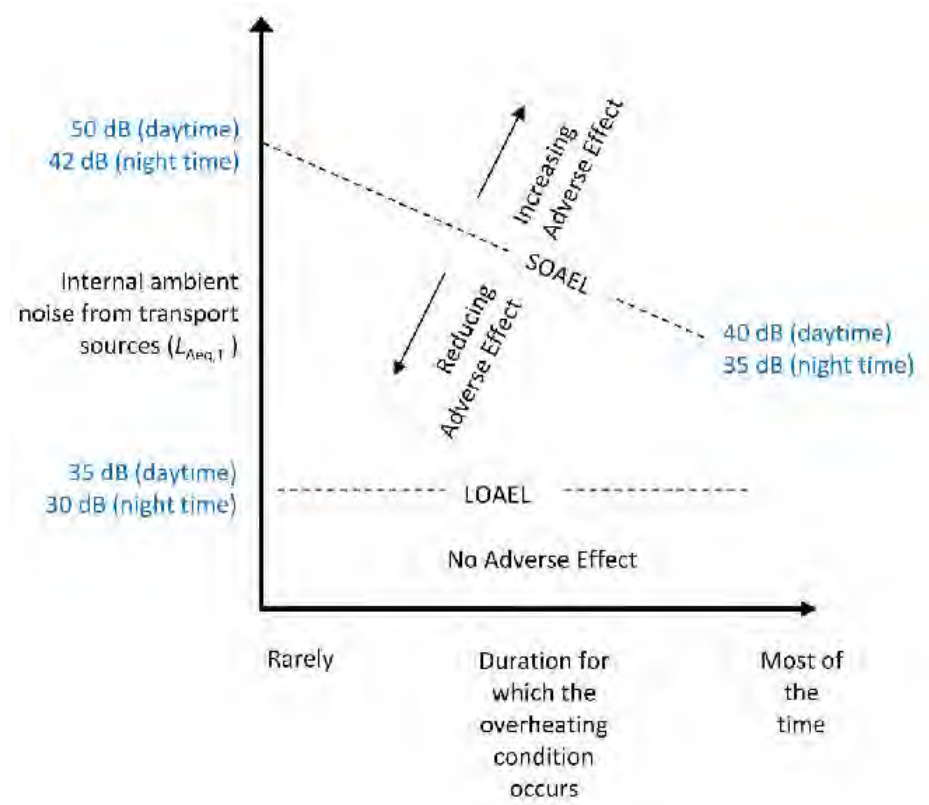


Figure 2 Internal ambient noise levels and increasing adverse effects for an overheating condition

When internal noise levels are above Significant Observed Adverse Effect Level (SOAEL), it is likely that there will be a high potential for an adverse outcome. Adverse outcomes will include:

- Material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion
- Where there is no alternative ventilation, having to keep windows closed most of the time because of the noise
- Potential for sleep disturbance and difficulty in getting back to sleep
- Quality of life diminished.

As illustrated, the potential for adverse outcomes increases with the duration of exposure to noise, ie, a shorter exposure will result in a lower risk of adverse outcomes.

4 Survey method

4.1 Noise survey method

There was not a suitable and safe location on site to install unattended monitoring equipment, therefore the survey included attended noise measurements.

4.1.1 *Attended measurements*

Attended day, evening and night-time sample measurements were performed by José M. González at 4 locations around the site. These are indicated in Figure 1 as positions 1 to 4. The measurements were carried out on 28 and 29 June 2021, over 5 minute periods.

At each position the microphone was mounted on a tripod approximately 1.2 m above the ground level. For all positions, the microphone was located at least 4 m from a reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

An additional noise survey was carried out on 7 September 2021 and performed by Thomas Dent to verify the noise levels to the north-west of the site and close to the A62.

4.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

5 Measurement results

5.1 Observations

5.1.1 *Noise*

The dominant noise sources observed at the site during the survey consisted of road traffic on Butler Street and Rodney Street

Less significant noise sources included constant distant road traffic on Oldham Road, a distant excavator on a construction site, aircraft overhead and pedestrians passing by talking.

5.2 Noise measurement results

5.2.1 *Attended measurement results- daytime (28-29 June 2021)*

Noise levels and key sources recorded during the attended measurements are summarised in Table 5.

Table 5 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	14:05	49	67	43	Distant road traffic, pedestrians passing by
	14:10	45	61	43	talking, reverse beeping, distant excavator
	14:15	47	62	44	
	15:25	47	62	44	Distant road traffic, pedestrians passing by
	15:30	50	64	45	talking, distant excavator
	15:35	48	61	45	
	19:25	46	62	41	Car passing by, distant road traffic, bird song
	19:30	45	51	43	
	19:35	48	70	43	Distant road traffic, aircraft overhead, car passing by
	20:35	48	68	40	Distant road traffic. Maximum level dominated by distant siren
2	20:40	44	54	43	Distant road traffic
	20:45	46	56	43	Distant road traffic, aircraft overhead, distant alarm
	14:25	50	66	44	Cars passing by Jersey Street, distant excavator and reverse beeping, distant road traffic
	14:30	50	66	45	
	14:35	47	63	44	
	15:45	49	64	43	Cars passing by Jersey Street, distant road traffic, pedestrians passing by, distant excavator
	15:50	53	70	45	As above, Maximum levels caused by distant siren

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
3	15:57	51	63	44	Cars passing by, distant road traffic and excavator, distant drill
	19:41	48	63	42	Cars passing by on Jersey Street, distant road traffic
	19:46	47	68	40	As above + pedestrians talking
	19:52	47	62	43	
	20:50	50	66	42	Cars passing by, distant road traffic, distant siren and alarm
	20:56	44	56	40	Car passing by, distant road traffic
	21:01	47	64	38	
	14:40	57	73	50	Road traffic on Butler Street, excavator, car slamming door, aircraft overhead
	14:50	54	70	48	
	14:55	54	76	49	Road traffic on Butler Street and aircraft overhead
	16:05	52	65	46	Road traffic on Butler Street, cars passing by on Rodney Street, car slamming door
	16:10	54	69	48	Road traffic on Butler Street and Rodney Street distant reverse beeping, car slamming door
3	16:15	52	61	47	Road traffic on Butler Street
	20:00	51	67	43	Road traffic
	20:05	51	62	45	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
4	20:10	53	68	46	Road traffic, pedestrians passing by talking
	21:07	50	61	43	Road traffic on Butler Street and Rodney Street
	21:12	53	70	47	
	21:18	53	65	46	As above + pedestrians passing by talking
	15:05	59	68	50	Road traffic on Butler Street, distant reverse beeping, distant road traffic from Oldham Road
	15:10	60	70	52	As above + distant excavators activities including impulsive metal clashes
	15:15	62	80	52	
	16:22	64	81	52	Road traffic on Butler Street, distant reverse beeping, distant road traffic from Oldham Road car slamming door. Maximum levels dominated by road traffic
	16:27	61	76	51	Road traffic on Butler Street, distant road traffic from Oldham Road
	16:32	60	69	49	
4	20:16	56	68	45	Road traffic on Butler Street and Rodney Street, distant road traffic from Oldham Road
	20:21	56	69	43	
	20:26	57	69	44	
	21:23	56	68	44	Road traffic on Butler Street, distant road

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
	21:30	56	67	44	traffic from Oldham Road, aircraft overhead Road traffic on Butler Street, distant road traffic from Oldham Road

5.2.2 Attended measurements results- daytime (additional noise survey 7 September 2021)

Please refer to section 6 for further information in relation to the additional noise survey.

Table 6 Noise levels and key noise sources from attended measurements (daytime)

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
5	13:41	53	78	44	Distant road traffic and construction activities, vehicle passing by. Maximum level from construction activities
6	14:00	67	92	56	Road works (tarmac), pedestrians passing by talking, construction activities. Maximum level from motorbike passing by.

5.2.3 Attended measurement results – night-time (28-29 June 2021)

Noise levels and key sources recorded during the attended night-time measurements are summarised in Table 7.

Table 7 Noise levels and key noise sources from attended measurements (night-time)

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	00:22	41	51	36	Distant plant, distant road traffic from Butler
	00:27	39	45	35	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
2	00:32	41	48	36	Street and Oldham Road
	01:27	38	54	33	Distant road traffic from Butler Street and Oldham Road, distant pedestrians talking
	01:32	36	54	30	Distant road traffic from Butler Street and Oldham Road
	01:37	36	51		
	00:38	40	56	36	Distant road traffic from Butler Street and Oldham Road
	00:43	38	48	33	
	00:48	38	49	33	
	01:43	38	57	33	
	01:49	37	44	32	
	01:54	35	45	31	
3	00:54	42	57	33	Road traffic on Butler Street, distant road traffic from Oldham Road. Maximum levels dominated by road traffic
	00:59	51	64	37	
	01:05	48	65	35	
	02:00	41	60	32	Road traffic on Butler Street, distant road traffic from Oldham Road.
4	02:05	43	59	33	
	02:11	46	60	34	
	01:10	44	62	32	Road traffic on Butler Street, distant road traffic from Oldham Road. Maximum levels caused by HGV (Royal Mail)
	01:15	54	71	33	
	01:21	54	70	35	
	02:17	51	67	33	Road traffic on Butler Street, distant road traffic from Oldham Road, pedestrian passing
	02:23	47	67	33	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
	02:28	54	72	34	by talking Road traffic on Butler Street, distant road traffic from Oldham Road. Maximum levels caused by HGV (Royal Mail)

6 Impact of Covid-19

The survey measurements in June 2021 were carried out during a period of restricted movement due to the Covid-19 pandemic and consequently background noise levels may have been affected compared to the usual conditions.

A robust estimate of the environmental noise climate has been carried out in line with the *“Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments”* produced by the Association of Noise Consultants and the Institute of Acoustics.

Traffic flow data from the Department of Food and Rural Affairs (Defra) shows that during the attended measurements the national traffic rate was 80% of what would normally be expected. As such, a 1 dB correction is to be applied to the average noise levels to account for this.

Additional noise survey measurements were also carried out on 7 September 2021 to verify the noise levels to the north-west of the site and close to the A62 for the modelling purposes. The results are summarised in Section 5.2.2.

7 Plant noise limits – noise egress

7.1 Basic limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 8.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels (a 3 dB facade correction has been applied to the free-field measurement results).

These limits have been based on the lowest background noise levels measured during the survey which was during a period of partially restricted movement due to Covid-19 pandemic.

Table 8 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, L_{Aeq} (dB)
Daytime (07:00-23:00)	36
Night-time (23:00-07:00)	28

^[1] The limits set out in Table 8 do not include any attention catching features. The penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

7.2 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. This will be assessed as the design progresses.

8 Facade sound insulation – noise ingress

This section describes an assessment of facade sound insulation to control noise ingress. The required facade specification largely depends on the external noise levels and the internal noise criteria.

The following assessment is based on achieving the internal noise levels set out in Section 3.3.

8.1 External noise levels

8.1.1 Environmental noise modelling

A computer model of the site and its surrounding has been built using CadnaA software by Datakustik, with the purpose of calculating the external noise levels at the different facades of the proposed development based on the results of the environmental noise surveys.

The 3D acoustic model has been built using the layouts included in the proposed plans.

The software carries out calculations using a ray tracing technique. This takes into account the effects to 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*.

Images of the computer model are provided in Figure 3 and Figure 4.

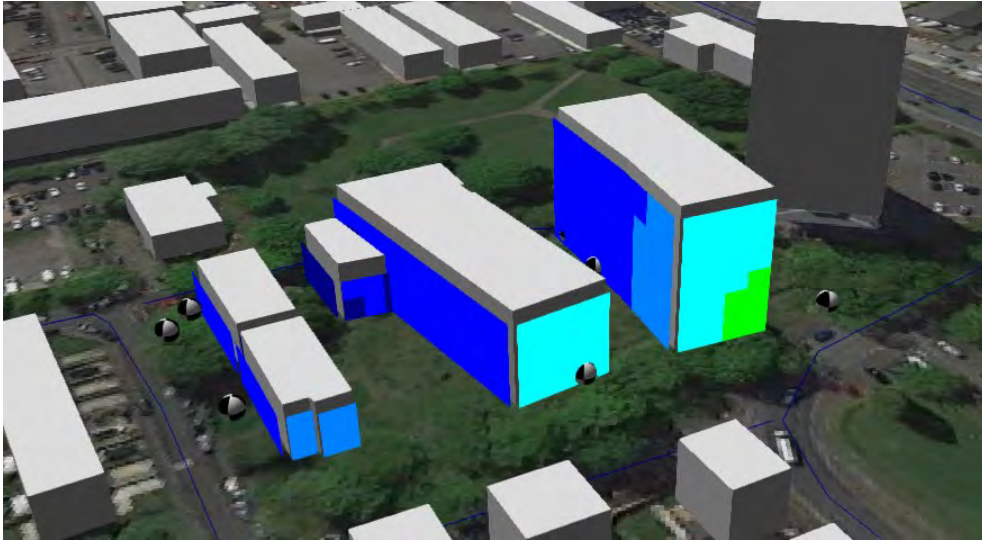


Figure 3 Screenshot of 3D environmental noise model – Predicted facade noise levels, daytime, L_{Aeq} (dB)

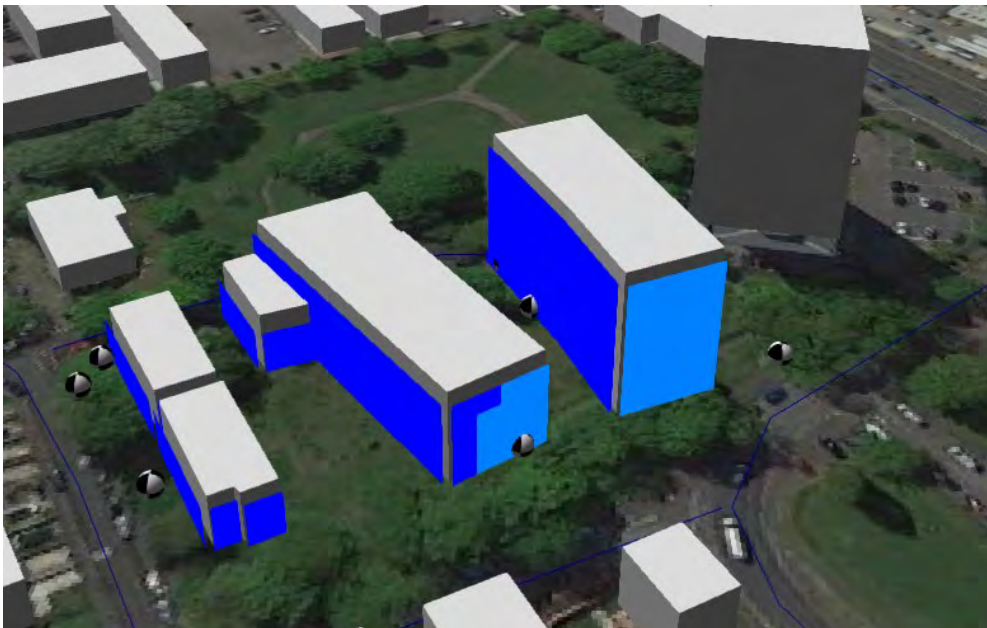


Figure 4 Screenshot of 3D environmental noise model – Predicted facade noise levels, night-time, L_{Aeq} (dB)

The predicted facade noise levels have been grouped into zones. The predicted noise levels at the facades of the proposed development are marked-up in Appendix C for day and night-time, and have been used to set out the overall minimum facade sound insulation requirements.

8.2 Facade sound insulation

Minimum sound insulation requirements for the facades, under the background ventilation condition are given in Table 9. These have been determined to achieve the internal noise criteria for bedrooms and living areas using the predicted external noise levels at the facades.

The facade specification has been determined to ensure that L_{AFmax} criterion is exceeded on no more than 15 occasions based on the worst affected night during the survey.

The facade performance requirements are driven by the daytime ambient noise levels for living rooms, and night-time ambient noise levels for bedrooms.

The predicted daytime and night-time facade noise levels for the proposed development are marked-up in Appendix C (based on draft copies of elevation plans – please refer to planning application submission drawings for final versions).

Table 9 Facade sound insulation performance requirements

Facade zone	Predicted facade noise level L_{Aeq} (dB)	Overall minimum sound insulation performance $R'_w + C_{tr}$ (dB)		
		Living rooms	Bedrooms	
		Daytime	Daytime	Night-time
A 	60-62	30	30	-
B 	57-59	27	27	
C 	54-56	24	24	29
D 	51-53	21	21	26
E 	≤48-50	18	18	23

The minimum requirements set out above include an uplift of 3 dB to allow for equal contributions from internal building services noise (eg, noise from MVHR units). There should be no reliance upon openings/vents in the facade to provide background ventilation conditions.

8.3 Guidance on facade construction, glazing, and ventilation strategy

Table 10 sets out some examples of glazing configurations and ventilation strategies that could achieve the required sound insulation performance.

Table 10 Example glazing configurations and ventilation strategies for overall facade sound insulation

Overall facade sound insulation, R'_w+C_{tr} (dB)	Example glazing configuration	Ventilation strategy
18-27	6 mm glass/16 mm cavity/6 mm glass	Acoustically attenuated passive ventilation (eg, trickle vents)
29	6.8 mm acoustic laminate/16 mm cavity /6 mm glass	Acoustically attenuated passive ventilation (eg, trickle vents)
30	8.8 mm acoustic laminate /16 mm cavity/6 mm glass	Acoustically attenuated passive ventilation (eg, trickle vents)

The attenuation of sound provided by an open window is typically in the region of 10 to 15 dB, depending on the open area. As such, where the required facade sound insulation performance is less than R'_w+C_{tr} 10 dB, it is likely that opening windows can be used for ventilation while achieving the necessary internal noise levels.

In areas where the required facade sound insulation is between R'_w+C_{tr} 10 and 15 dB, partially open windows may be used for ventilation purposes.

The performance required by each element will depend on the relative areas of glazed and non-glazed elements, and the ventilation strategy. If applicable, this includes the acoustic performance of trickle ventilators and the number of ventilators per room. As a guide, for a mechanically ventilated room with a 50% glazed facade, the glazing sound insulation requirement would typically be 3 dB lower than the overall facade sound insulation requirement. This is provided the non-glazed external wall elements provide at least 10 dB more sound insulation than the glazed elements.

The glazing area for the apartment building blocks is equal to or less than 50% of the facade to the living rooms and bedrooms, and the proposed external wall build-up is expected to provide a sound insulation of at least 10 dB higher than overall sound insulation performance requirements.

Based on a compensated sound insulation calculation for the above, the glazing performance can be reduced by 3 dB compared to the overall minimum sound insulation performance set out in Table 9. Therefore, the highest glazing maximum sound insulation performance will be no higher than R'_w+C_{tr} 27 dB. This is achievable with standard thermal double glazing (e.g. 6/16/6).

The external wall build-ups to the townhouses will need to be reviewed when they become available.

9 Acoustics, ventilation, and overheating assessment

9.1 Level 1 assessment

A Level 1 assessment of noise ingress during an overheating condition has been carried out in line with the Association of Noise Consultants *Acoustics Ventilation and Overheating, residential Design Guide*.

The risk categories associated with the level 1 AVO assessment have been marked-up in Figure 5.



Figure 5 Level 1 AVO assessment – mark-up of risk categories

The measured noise levels to the north of the site to Block A result in a 'Medium' category, and a Level 2 AVO assessment has therefore been carried out to consider the following:

- Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a CIBSE TM59 assessment)
- How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a CIBSE TM59 assessment)
- Design, extent and construction of attenuated passive ventilation.

The measured levels to other areas of the site fall into the 'Low' and 'Negligible' categories, so a Level 2 AVO assessment is not required for these areas. Partially opening windows are expected to be suitable for controlling overheating in these areas.

9.2 Level 2 AVO assessment

The apartments in Block A that have been selected for the overheating assessment by Method are shown in Figure 6.

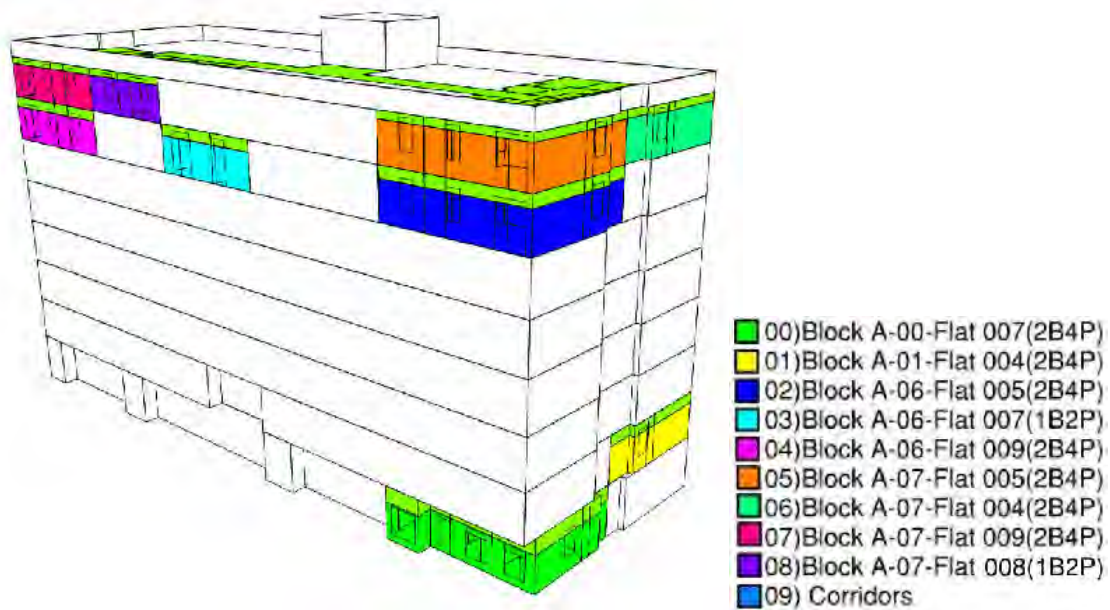


Figure 6 Block A apartments selected for overheating assessment

9.3 Predicted external noise levels

The predicted worst-case external free-field noise levels at the selected apartments in Block A are detailed in Table 11.

Table 11 Predicted external free-field levels from 3D model

Location	$L_{Aeq,16hrs}$ (dB) day (0700-2300)	$L_{Aeq,8hrs}$ (dB) night- time (2300-0700)	Not normally exceeded L_{AFmax} (dB)
Block A-00- Flat 007(2B4P)	58	51	65
Block A -01- Flat 004(2B4P)	58	50	71
Block A -06- Flat 005 (2B4P)	51	50	63

Location	$L_{Aeq,16hrs}$ (dB) day (0700-2300)	$L_{Aeq,8hrs}$ (dB) night- time (2300-0700)	Not normally exceeded L_{AFmax} (dB)
Block A -06- Flat 007 (1B2P)	46	44	55
Block A -06- Flat 009 (2B4P)	45	44	63
Block A -07- Flat 005 (2B4P)	50	49	63
Block A -07- Flat 004 (2B4P)	56	50	70
Block A -07- Flat 009 (2B4P)	46	44	63
Block A -07- Flat 008 (1B2P)	46	44	55

9.4 Noise ingress via partially open windows during overheating

The current design includes partially opening windows to control overheating in the apartments. The noise attenuation provided by a partially open window depends on the degree of opening.

Appendix C of the AVO guide provides the following information based on a field study in Switzerland:

They measured (free-field) outside-to-inside level differences of $10.0 \pm 2.9\text{dB}$ for open windows and $15.8 \text{ Open} \pm 2.7\text{dB}$ for tilted windows. A value of 13dB is consistent with a situation between 'open' and 'tilted'.

The calculated internal noise levels set out below are based on the following which are understood to be in line with the current design:

- Ground floor: Side hung windows to bedrooms and living rooms to the north and south elevations achieving an outside to inside level difference of 13 dB.
- A bottom hung tilted partially open inwards window to all bedrooms achieving an outside to inside level difference of 16 dB
- A bottom hung tilted partially open inwards window to living rooms on the east and west facades achieving an outside to inside level difference of 16 dB
- A Juliette style partially open window to living rooms on north and south facades achieving an outside to inside level difference of 13 dB
- For living rooms with more than one window, Method Consulting confirmed that only the Juliette style window is proposed to be open for overheating control.

A potential variation of ± 3 dB should be considered to allow for adjustment of window openings.

Table 12 Predicted internal levels based on partially open window

Location	$L_{Aeq,16hrs}$ (dB) day (0700-2300)	$L_{Aeq,8hrs}$ (dB) night-time (2300-0700)	Not normally exceeded L_{AFmax} (dB)
<i>Block A-00-Flat 007(2B4P)</i>			
Bedroom	43	37	52
Living room	38	33	
<i>Block A-01-Flat 004(2B4P)</i>			
Bedroom	42	34	55
Living room	47	39	
<i>Block A-06-Flat 005 (2B4P)</i>			
Bedroom	35	34	47
Living room	39	36	
<i>Block A-06-Flat 007 (1B2P)</i>			
Bedroom	30	28	39
Living room	33	31	
<i>Block A-06-Flat 009 (2B4P)</i>			
Bedroom	29	28	47
Living room	39	36	
<i>Block A-07-Flat 005 (2B4P)</i>			
Bedroom	34	33	47
Living room	39	35	
<i>Block A-07-Flat 004 (2B4P)</i>			
Bedroom	40	34	54
Living room	45	38	
<i>Block A-07-Flat 009 (2B4P)</i>			
Bedroom	30	28	47
Living room	39	36	

Location	$L_{Aeq,16hrs}$ (dB) day (0700-2300)	$L_{Aeq,8hrs}$ (dB) night-time (2300-0700)	Not normally exceeded L_{AFmax} (dB)
<i>Block A-07-Flat 008 (1B2P)</i>			
Bedroom	30	28	39
Living room	33	31	

The chart formats below are from the AVO guide. Whether the Significant Observed Adverse Effect Level (SOAEL) threshold is exceeded depends on the duration that partially open windows are needed to control overheating.

For each assessment, the position of the dot along the X-axis would be hours where windows would need to be opened to control overheating which will be determined as part of the overheating assessment provided by Method. The position of the dot on the Y-axis would be the predicted noise ingress levels presented in Table 12.

The assessment is to be considered from the beginning of May to the end of September, which is 153 days.

- The daytime X-axis would then extend to a maximum of $153 \times 16hrs = 2448$ hrs
- The night-time X-axis would extend to a maximum of 153×8 hrs = 1224 hrs.

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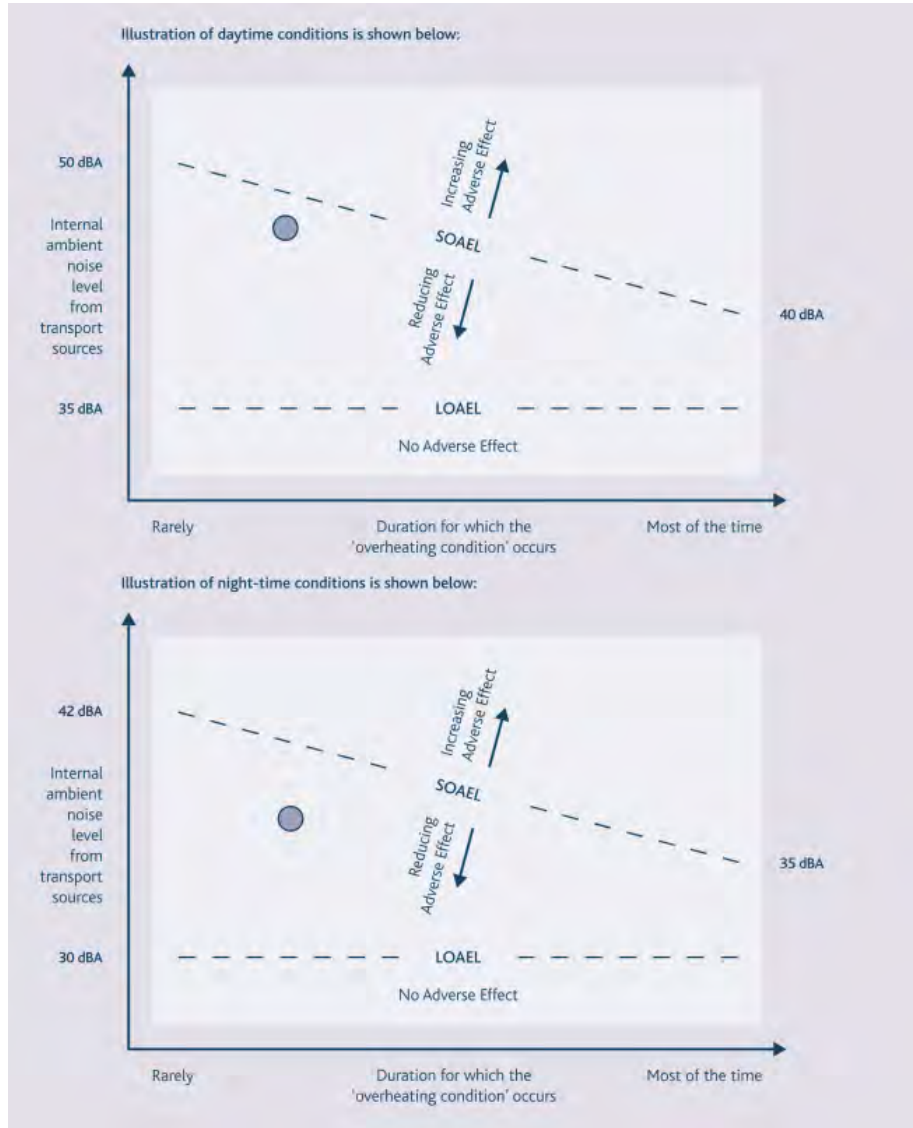


Figure 7 Example AVO assessment charts

Table 3-3 of the AVO guide provides examples of outcomes for internal ambient noise levels. This is shown below.

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Table 3-3 Guidance for Level 2 assessment of noise from transport noise sources^(Note 1) relating to overheating condition

Internal ambient noise level ^(Note 2)			Examples of Outcomes ^(Note 5)	
$L_{Aeq,T}$ ^(Note 3) during 07:00 – 23:00 ^(Note 4)	$L_{Aeq,6h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^(Note 4)		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A90,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
 Increasing noise level			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^(Note 5)
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A90,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^(Note 5) . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figure 8 Excerpt of Table 3-3 of AVO guide

9.5 Acoustic AVO assessment

The assessment indicates that there is a potential risk of the SOAEL threshold being exceeded during the daytime for the following apartments selected by Method for the overheating assessment:

- Block A-07-Flat 004 (2B4P): Living room
- Block A-01-Flat 004 (2B4P): Living room and Bedroom
- Block A-00-Flat 007 (2B4P): Bedroom.

There are other apartments which are predicted to be exposed to similar external noise levels which could lead to the SOAEL threshold being exceeded during the daytime with windows open these are summarised below:

- Block A-01-Flat 005(2B4P): Bedroom
- Block A-02-Flat 005(2B4P): Bedroom
- Block A-03-Flat 005(2B4P): Bedroom
- Block A -02-Flat 004(2B4P): Living room and Bedroom
- Block A -03-Flat 004(2B4P): Living room and Bedroom
- Block A -04-Flat 004(2B4P): Living room and Bedroom
- Block A -05-Flat 004(2B4P): Living room and Bedroom
- Block A-07-Flat 003(2B4P): Living room
- Block A-07-Flat 002(2B4P): Living room
- Block A-06-Flat 004(2B4P): Living room
- Block A-06-Flat 003(2B4P): Living room
- Block A-06-Flat 002(2B4P): Living room
- Block A-05-Flat 003(2B4P): Living room
- Block A-05-Flat 002(2B4P): Living room
- Block A-04-Flat 003(2B4P): Living room
- Block A-04-Flat 002(2B4P): Living room
- Block A-03-Flat 003(2B4P): Living room
- Block A-03-Flat 002(2B4P): Living room
- Block A-02-Flat 003(2B4P): Living room
- Block A-02-Flat 002(2B4P): Living room
- Block A-01-Flat 003(2B4P): Living room
- Block A-01-Flat 002(2B4P): Living room
- Block A-00-Flat 003(2B4P): Living room and Bedroom.

A mechanical ventilation has been developed by Method for the apartments listed above to allow windows to remain closed during the daytime, hence mitigating the potential AVO noise issue.

In all of the other the instances assessed, the predicted levels are below the AVO SOAEL thresholds even if windows are open '*most of the time*' to control overheating. All of the night-time noise ingress levels predicted are within the AVO SOAEL thresholds.

10 Approved Document O

Approved Document O is not expected to be applicable for the development due to the proposed date when the site is to be registered with Building Control and the date that site works are proposed to commence. However, Manchester City Council have requested that the night-time criteria for bedrooms is achieved.

Approved Document O states the following in relation to noise ingress via opening windows:

'In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (23:00-07:00 hours).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. $L_{Aeq,T}$ 40 dB average over 8 hours (between 23:00-07:00)
- b. L_{AFmax} 55 dB more than 10 times a night (between 23:00-07:00).'

These values are predicted to be complied with based on the Acoustics, Ventilation and Overheating assessment presented in Section 9.

11 Conclusion

An environmental noise survey was carried out on 28 and 29 June 2021, this included attended day, evening and night-time sample measurements. These measurements may have been affected by the Covid-19 pandemic traffic restrictions, therefore an additional noise survey was carried out on 7 September 2021 to verify the noise levels to the north-west of the site and close to the A62.

The lowest background sound levels measured during the survey were L_{A90} 38 dB during the daytime and L_{A90} 30 dB at night. Based on the requirements of Manchester City Council, all plant must be designed such that the cumulative noise level at 1 m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the typical background noise levels measured. All building services plant will be designed to achieve the noise limits set out in line with Manchester City Council requirements, including any corrections for attention catching features.

An assessment has been carried out to determine required acoustic performances for the facades and provide guidance on the ventilation strategy. The glazing area for the apartment building blocks is equal to or less than 50% of the facade to the living rooms and bedrooms, and the proposed external wall build-up is expected to provide a sound insulation of at least 10 dB higher than overall sound insulation performance requirements. Based on a compensated sound insulation calculation for the above, the glazing performance can be reduced by 3 dB compared to the overall minimum sound insulation performance set out in Table 9. Therefore, the highest glazing maximum sound insulation performance will be no higher than $R'_w + C_{tr}$ 27 dB. This is achievable with standard thermal double glazing (e.g. 6/16/6).

An AVO assessment has been carried out, and the results indicate that there are apartments in Block A where the SOAEL thresholds of AVO may be exceeded during the daytime depending on the duration that windows need to be opened to control overheating. A mechanical ventilation has been developed by Method for these apartments to allow windows to remain closed during the daytime, hence mitigating the potential AVO noise issue.

Manchester City Council require the night-time limits of Approved Document O to be adhered to as a minimum. The Approved Document O limits are predicted to be met.

Appendix A

Survey details

Equipment

The attended noise measurements were taken using a RION NL-52 sound level meters

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
Survey carried out on 28 and 29 June 2021				
Sound level meter	2250/3011964	Brüel & Kjær	4 Sep 21	UCRT19/1970, UTRC19/1976
Microphone	4189/3100176	Brüel & Kjær	4 Sep 21	UCRT19/1970, UTRC19/1976
Pre-amp	ZC0032/26376	Brüel & Kjær	4 Sep 21	UCRT19/1970, UTRC19/1976
Calibrator	4231/3019123	Brüel & Kjær	3 Sep 21	UCRT19/1969
Survey carried out on 7 September 2021				
Sound level meter	NL-52/01143564	Rion	15 Dec 22	TCRT20/1738
Microphone	UC-59/10153	Rion	15 Dec 22	TCRT20/1738
Pre-amp	NH-25/43581	Rion	15 Dec 22	TCRT20/1738
Calibrator	NC-74/34257023	Rion	14 Dec 22	TCRT20/1736

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 in June 2021, the weather was cloudy and generally dry, occasional light rain showers occurred between 21:00 and 21:35 on 28 June 2021 and between 00:22 and 00:32 on 29 June 2021. Wind speeds varied between 0 m/s and 3 m/s.

During the attended noise measurements in September 2021, the weather was clear and dry and no rain occurred. Wind speeds at each position and varied between 0 m/s and 3 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

Appendix C

Predicted facade sound levels

Title

Predicted external facade noise level mark-ups (Daytime)

Project

This City residential development, Ancoats, Manchester

Project no.

22013

Version

B

Marked-up by

Jose M. Gonzalez

Reviewed by

James Atha

Date

18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

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Window Types - Basement (Upper Floor)

CW01

Curtain Walling Type 1

External Door Type 1 - Single Leaf / VP

EXD01

External Door Type 2 - Single Leaf

EXD02

External Door Type 3 - Double Leaf

EXD03

Brick Type 01 - TBC

BT01

Brick Type 02 - TBC

BT02



P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Minor changes to window sizes and positions at ground floor to suit daylighting results
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

Rev Date Ints Details

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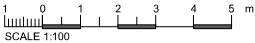
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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester
Drawing ref	Residential Block A - North Elevation_General Arrangement

Date	04/05/2022 15:06:13	Scale	As indicated
Checker	--	Orig Paper Size	A1
Job No:	9139	Status	S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-A-XX-DE-A- 02320- P03



Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

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Window	Window Types - bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified WT3A in key
P02	29.04.22	SD	Minor amendments to window positions
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

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Project Title Rodney Street, Ancoats

Client Wates Construction Ltd

Location Manchester

Drawing ref Residential Block A - East & West Elevations_General Arrangement

Date 04/05/2022 15:08:51

Checker --

Job No: 9139

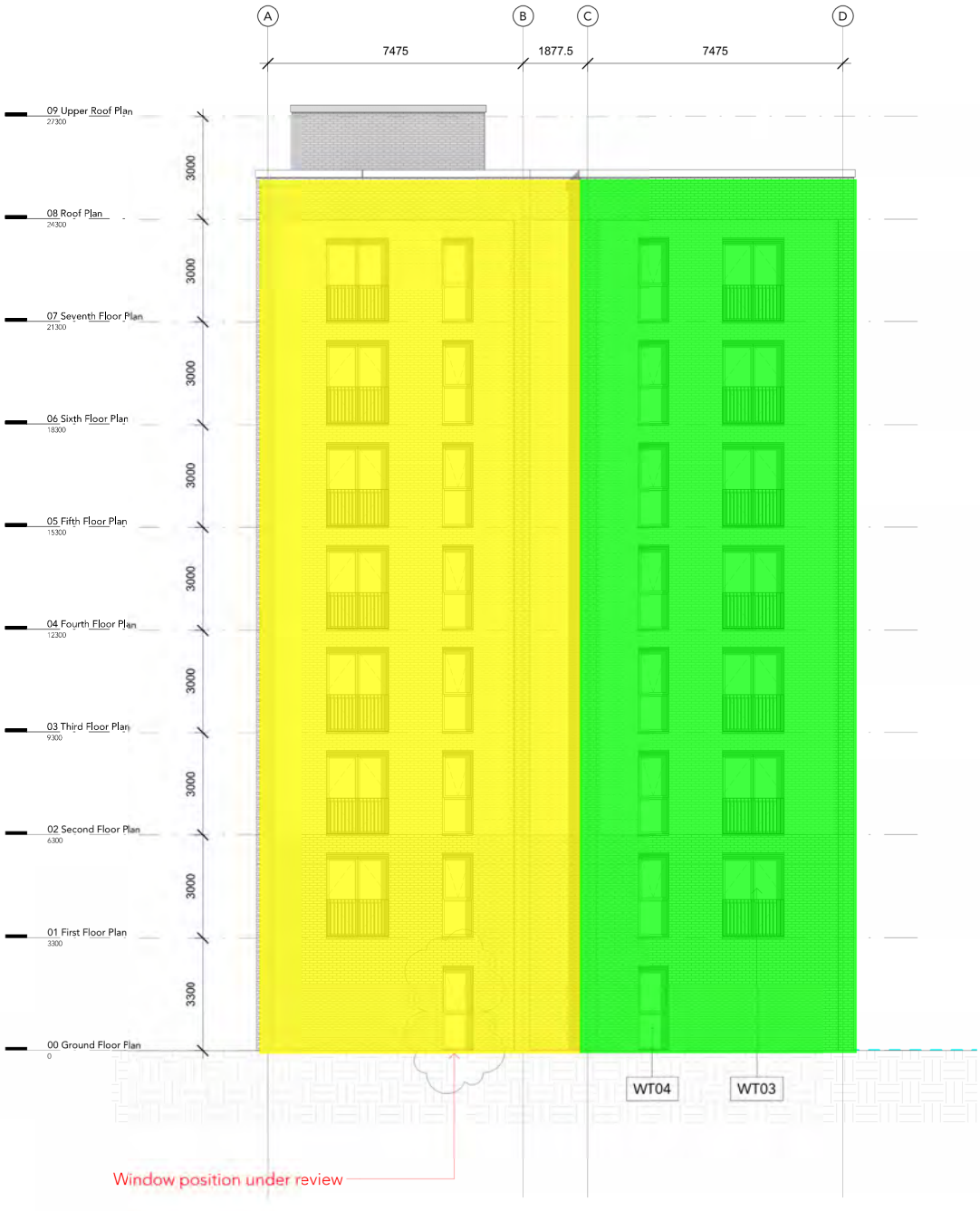
Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

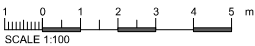
RODSTA-BUT-A-XX-DE-A- 02321- P03



East Elevation_General Arrangement



West Elevation_General Arrangement



Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

SANDY BROWN
Consultants in Acoustics, Noise & Vibration

Window	Window Types - bedroom (upper floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Amendments to window sizing at ground and first to suit daylight reqmnts.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

Rev Date Ints Details

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Project Title Rodney Street, Ancoats
Client Wates Construction Ltd
Location Manchester

Drawing ref Residential Block A - South Elevation_General Arrangement

Date 04/05/2022 15:11:58 Scale As indicated
Checker -- Orig Paper Size A1

Job No: 9139 Status S2

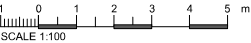
Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-A-XX-DE-A- 02322- P03



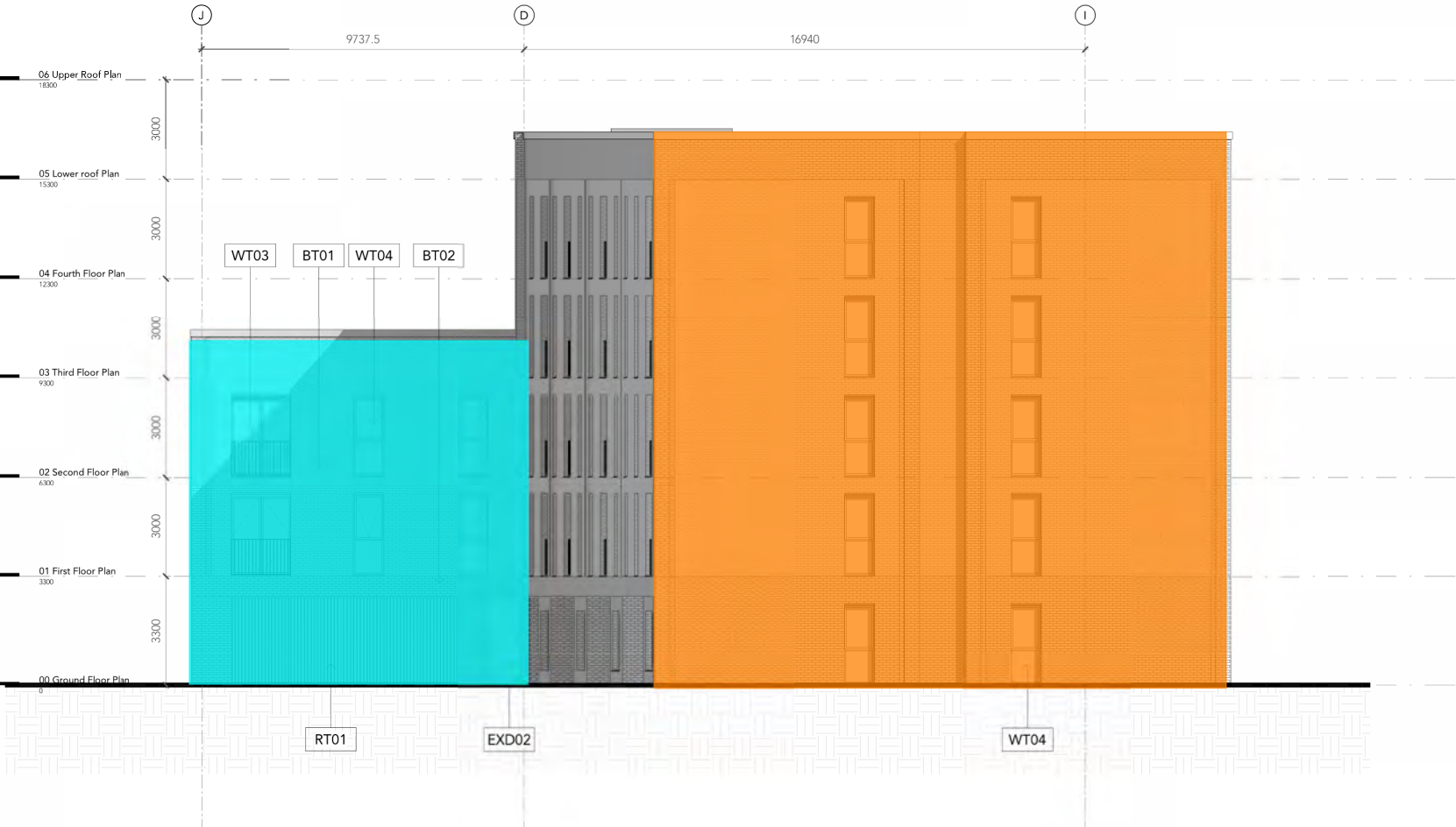
South Elevation_General Arrangement

1 : 100

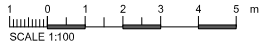




North Elevation_General Arrangement
1 : 100



East Elevation_General Arrangement
1 : 100



Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key	
	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB
SANDY BROWN Consultants in Acoustics, Noise & Vibration	

WT03A	Window Type 3A - Living Room (Upper Floor)
WT04	Window Type 4 - Bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC
RT01	Railing 01 - TBC

P04	10.05.22	SD	Updated window configuration to suit daylighting and overheating requirements
P03	04.05.22	SD	Updated drawing number to suit TIDP Identified WT3A in key
P02	29.04.22	SD	Updated amended kitchen and living room windows to suit daylighting requirements.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

Rev Date Ints Details

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Residential Block B - North & East Elevations_General Arrangement

Date	10/05/2022 15:10:08	Scale	As indicated
Checker	LB	Orig Paper Size	A1

Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-B-XX-DE-A- 02420- P04



South Elevation_General Arrangement

1 : 100



West Elevation_General Arrangement

1 : 100

Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022
Mark-up key L_{Aeq} 60- 62 dB L_{Aeq} 57-59 dB L_{Aeq} 54-56 dB L_{Aeq} 51-53 dB L_{Aeq} ≤48-50 dB	
SANDY BROWN Consultants in Acoustics, Noise & Vibration	

WT03A	Window Type 3A - Living Room (Upper Floor)
WT04	Window Type 4 - Bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC
RT01	Railing 01 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Updated amended kitchen and living room windows to suit daylighting requirements.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

Rev Date Ints Details

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Residential Block B - South & West Elevations_General Arrangement

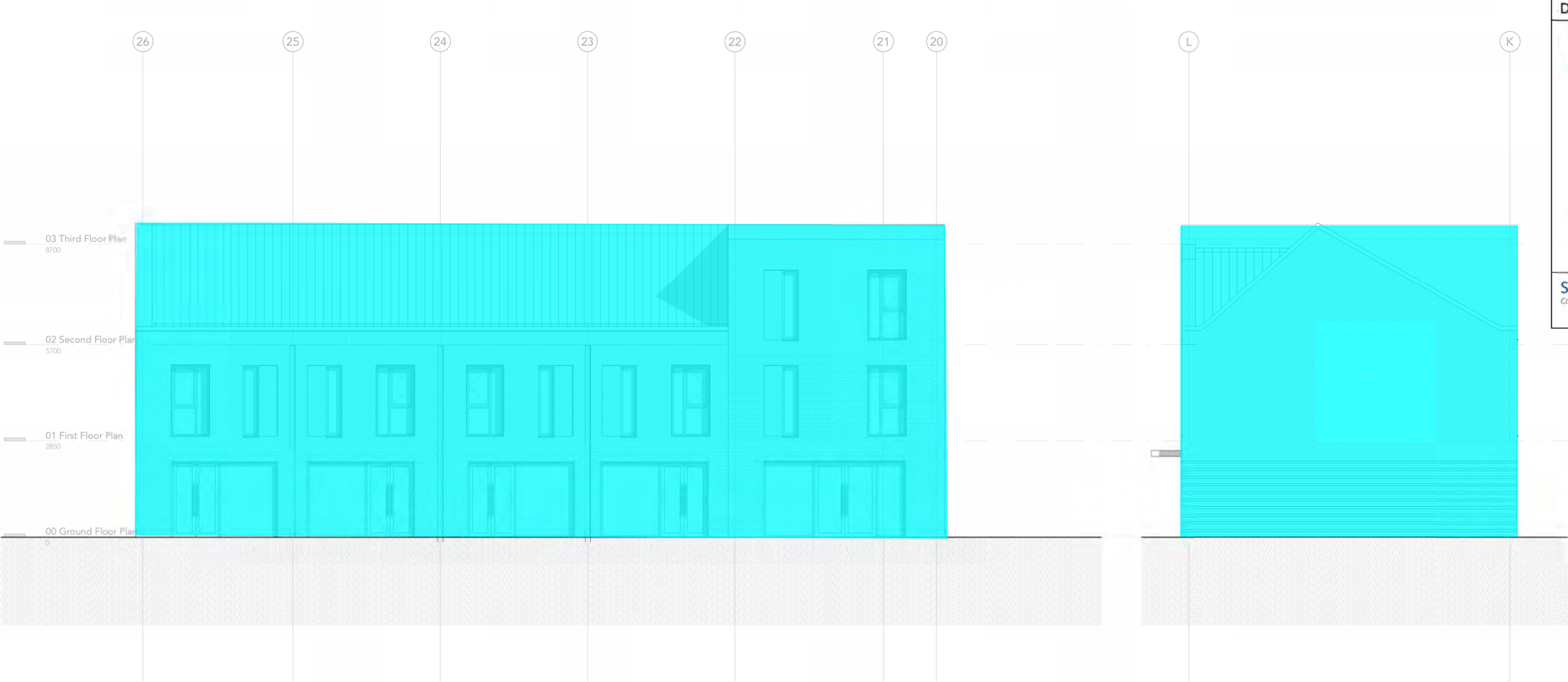
Date	04/05/2022 15:04:31	Scale	As indicated
Checker	LB	Orig Paper Size	A1

Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-B-XX-DE-A- 02421- P03

Town Houses 1



A - Proposed North Elevation

1 : 100

B - Proposed East Elevation

1 : 100

DRAFT
FOR COMMENT



Note:
Do Not Scale from this drawing.
Dimensions are to be checked on site.

Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022
Mark-up key L_{Aeq} 60- 62 dB L_{Aeq} 57-59 dB L_{Aeq} 54-56 dB L_{Aeq} 51-53 dB L_{Aeq} ≤48-50 dB	
SANDY BROWN Consultants in Acoustics, Noise & Vibration	

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Rev	Date	Intls	Details
	27.04.22		DRAFT ISSUE

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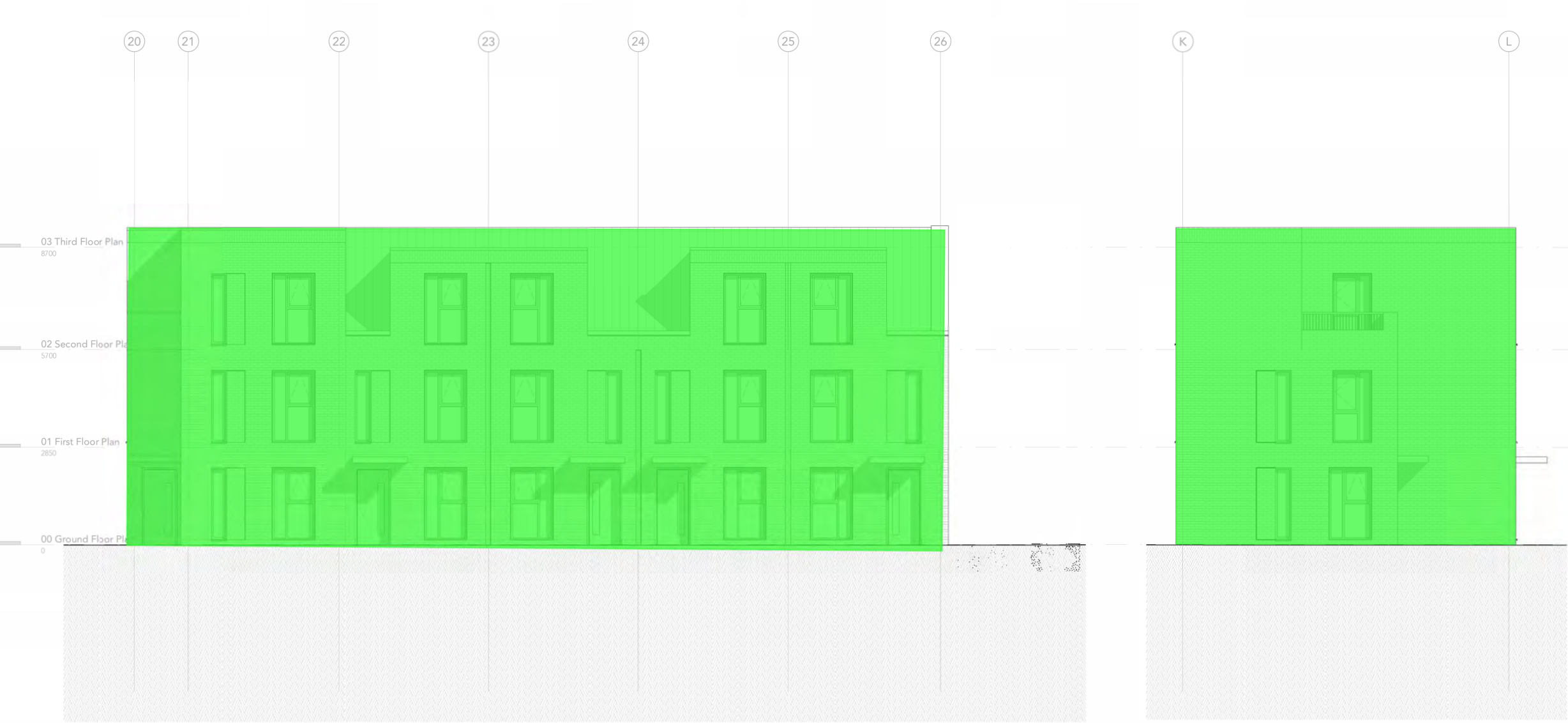
Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Townhouses - North and East Elevation

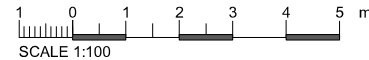
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Checker	BT	Orig Paper Size	A2				
Job No:	9139	Status	DRAFT - FOR COMMENT				
Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:

RODSTA-BUT-TA-XX-DE-A- 02510- -

Town Houses 1



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FOR COMMENT



D

Note:
Do Not Scale from this drawing.
Dimensions are to be checked on site.

Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

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Drawing ref

Townhouses - South and West Elevation

Job No:

9139

Status

DRAFT - FOR COMMENT

RODSTA-BUT-TA-XX-DE-A- 02511- -

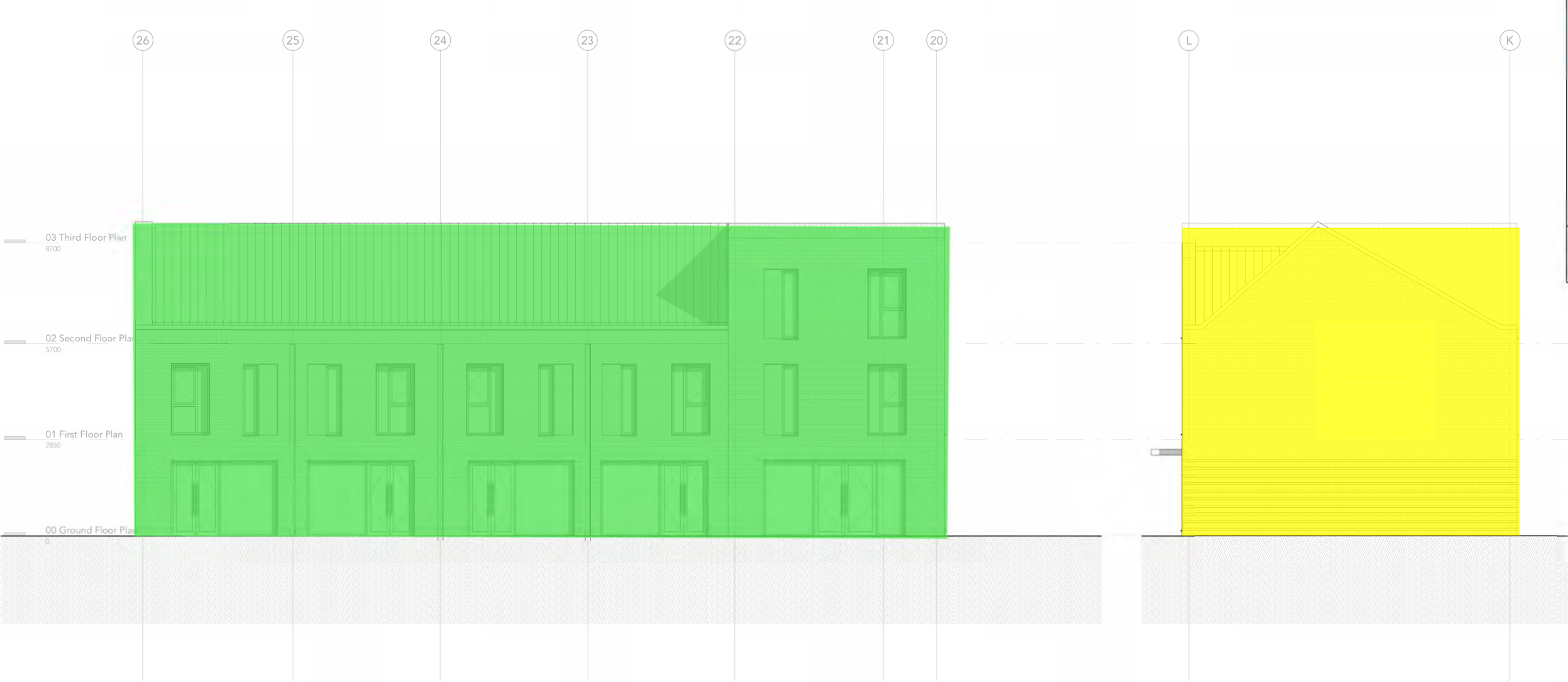
Town Houses 2

Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

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A - Proposed North Elevation
1 : 100

B - Proposed East Elevation
1 : 100

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27.04.22	DRAFT ISSUE		
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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Townhouses - North and East Elevation

Date	29/04/2022 17:09:31	Scale	1 : 100
Checker	BT	Orig Paper Size	A2

Job No:	9139	Status	DRAFT - FOR COMMENT
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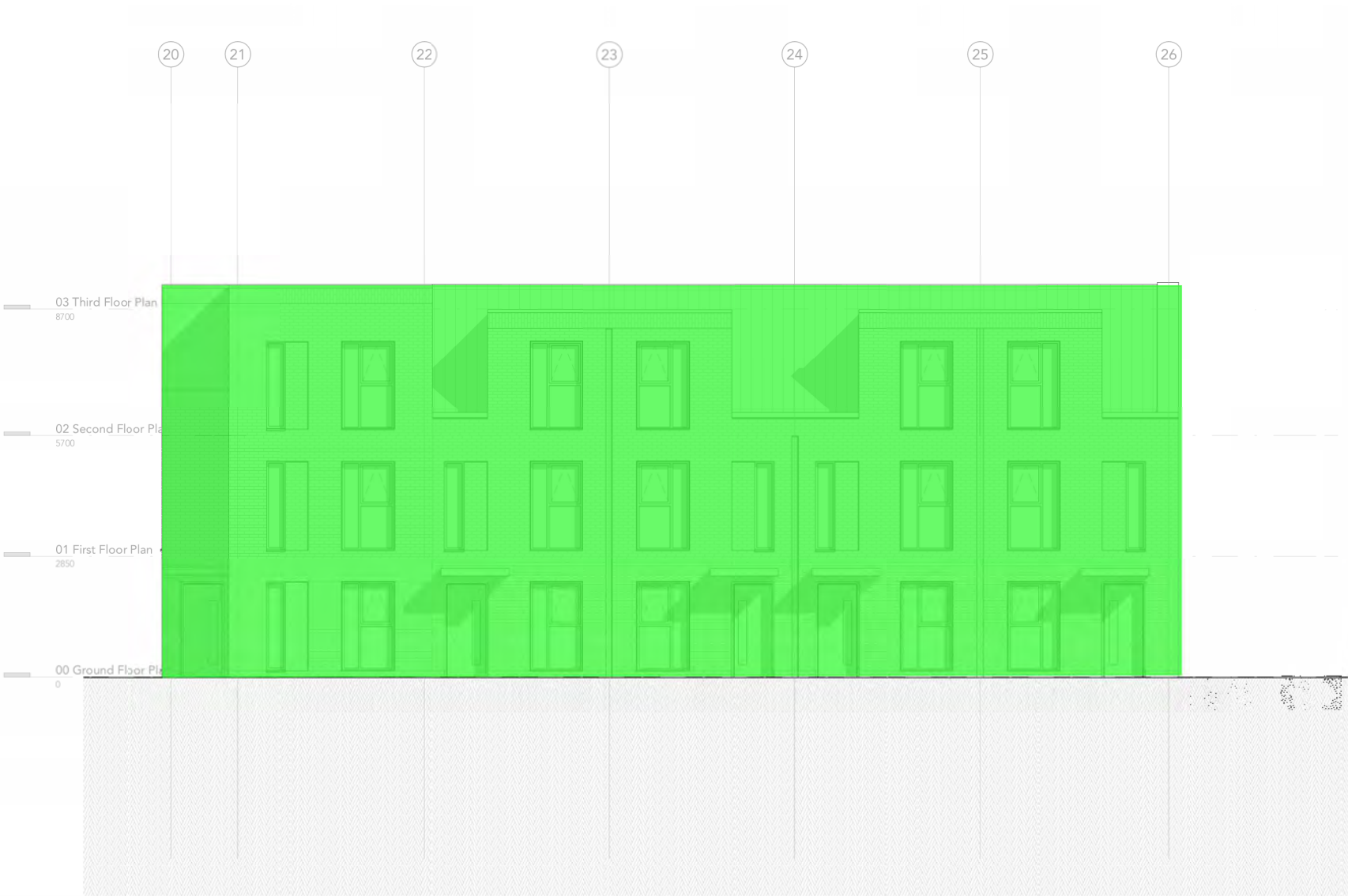
Project: Origin: Zone: Level: Type: Disc: Number: Rev:

DRAFT
FOR COMMENT

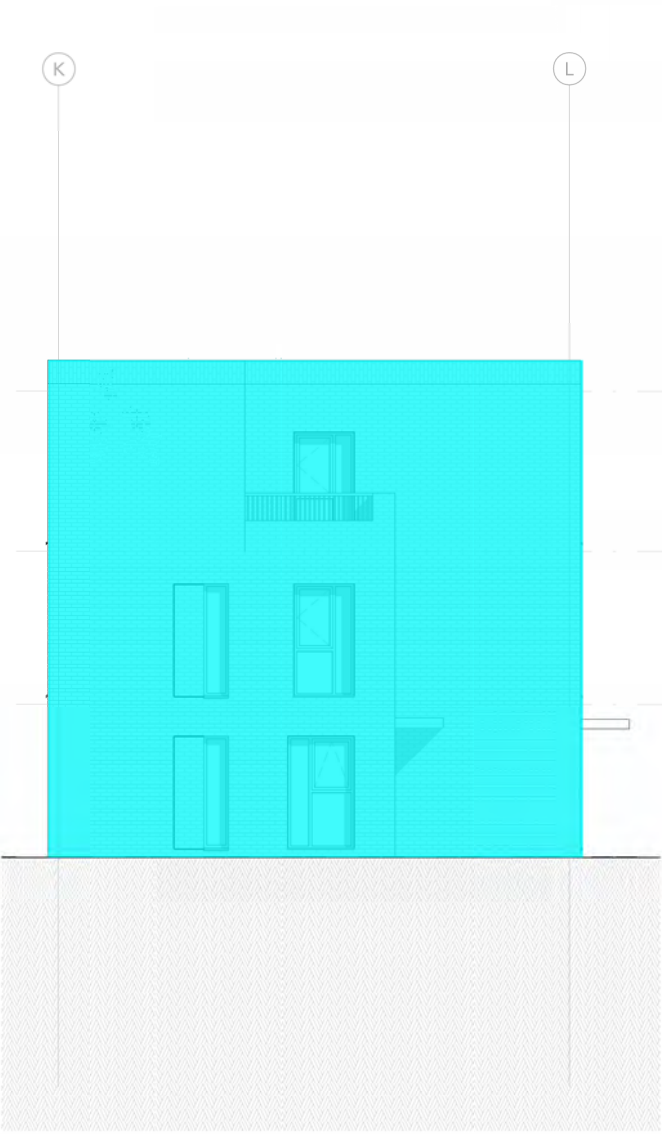


RODSTA-BUT-TA-XX-DE-A- 02510-

Town Houses 2

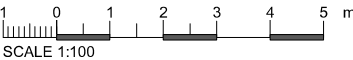


C - Proposed South Elevation
1 : 100



D - Proposed West Elevation
1 : 100

DRAFT
FOR COMMENT



Title	Predicted external facade noise level mark-ups (Daytime)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

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Rev	Date	Intls	Details
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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref

Townhouses - South and West Elevation

Date	29/04/2022 17:09:39	Scale	1 : 100
Checker	BT	Orig Paper Size	A2

Job No: 9139

Status DRAFT - FOR COMMENT

Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:
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RODSTA-BUT-TA-XX-DE-A-02511-

Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

SANDY BROWN
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Window Type	Window Type - Bedroom (Upper floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Minor changes to window sizes and positions at ground floor to suit daylighting results
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

Rev Date Ints Details

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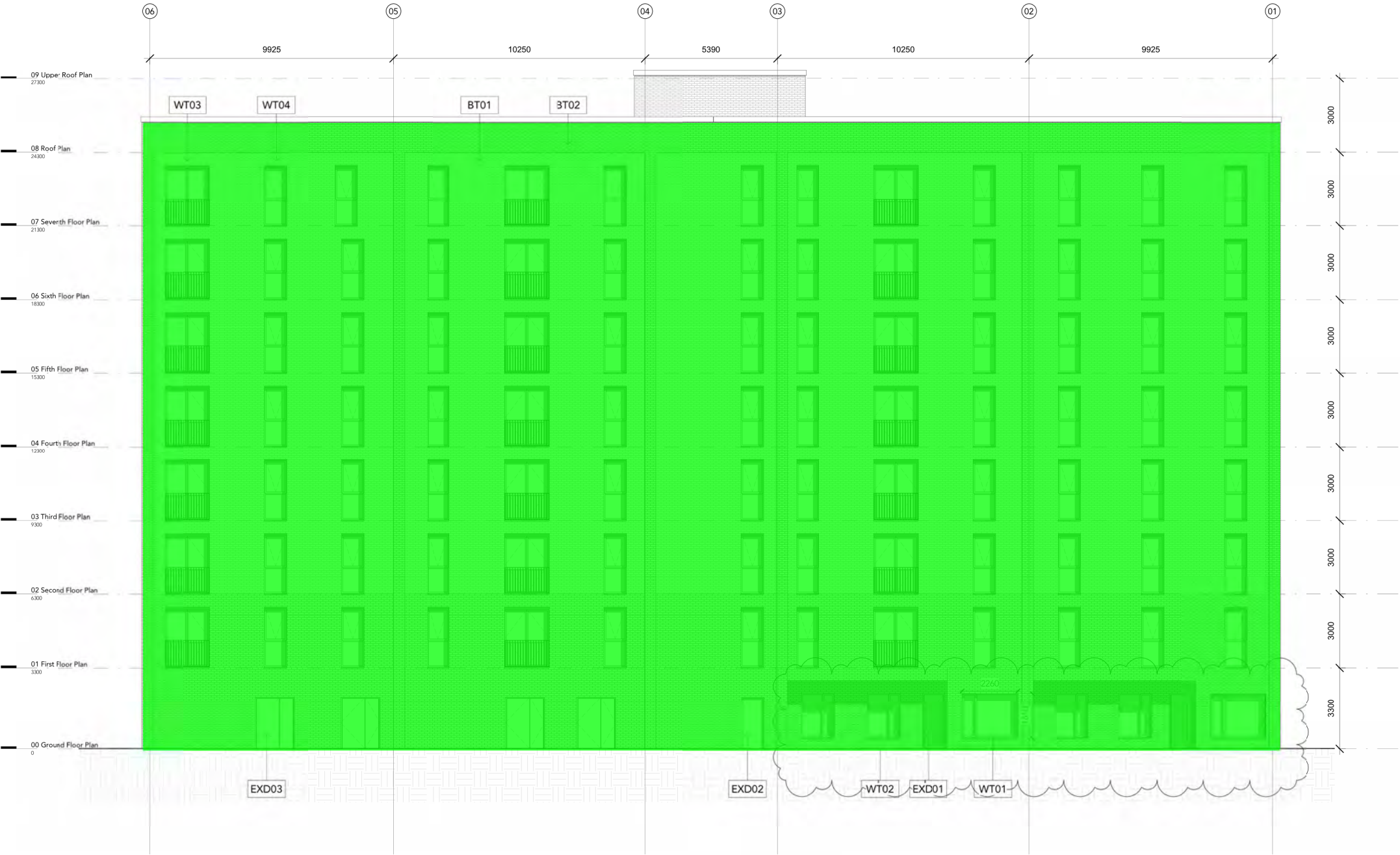
Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester
Drawing ref	Residential Block A - North Elevation_General Arrangement

Date	04/05/2022 15:06:13	Scale	As indicated
Checker	--	Orig Paper Size	A1

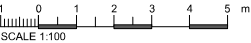
Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-A-XX-DE-A- 02320- P03



North Elevation_General Arrangement
1 : 100



Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

SANDY BROWN
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Window	Window Types - bedroom (upper floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified WT3A in key
P02	29.04.22	SD	Minor amendments to window positions
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

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Project Title Rodney Street, Ancoats
Client Wates Construction Ltd
Location Manchester

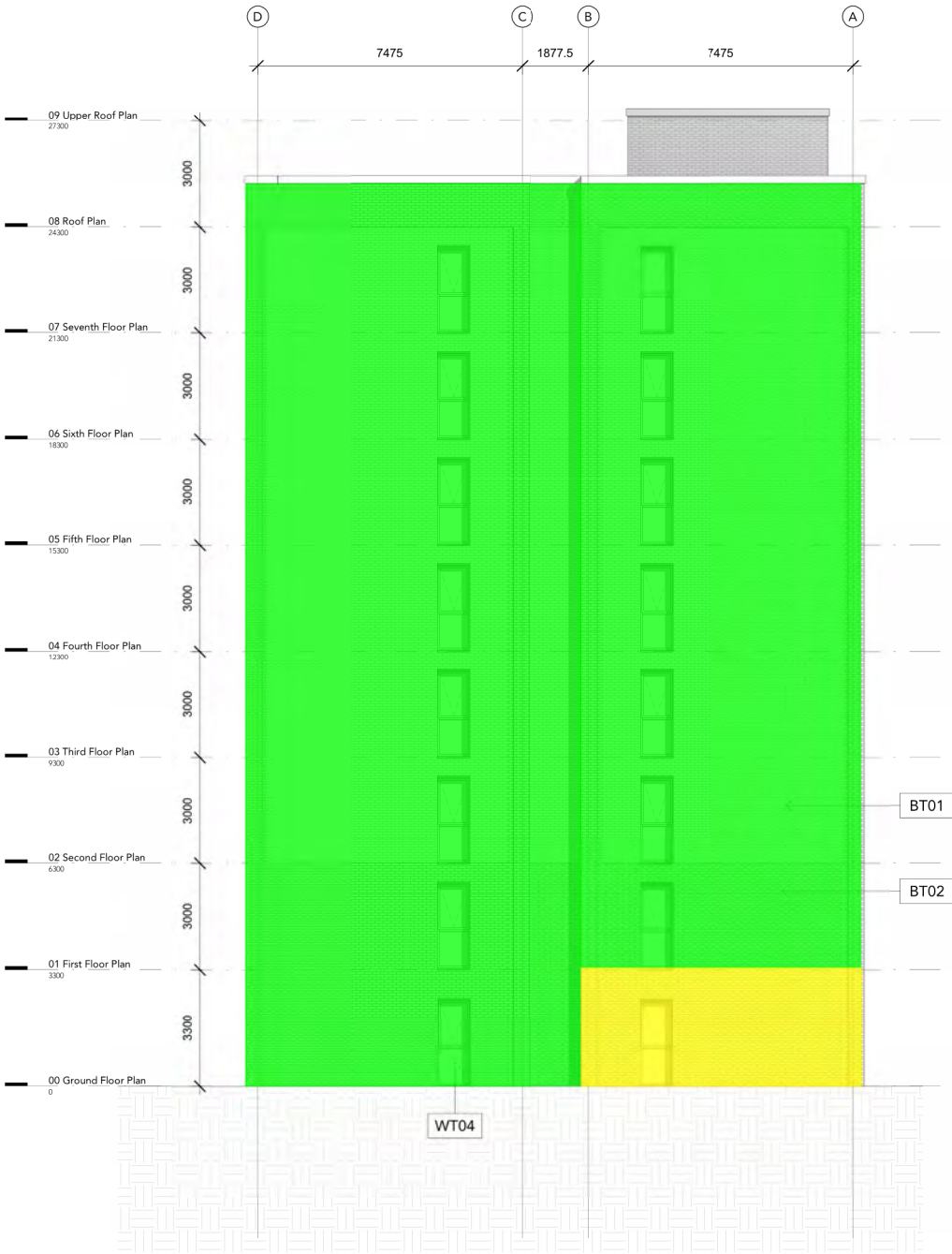
Drawing ref Residential Block A - East & West Elevations_General Arrangement

Date 04/05/2022 15:08:51 Scale As indicated
Checker -- Orig Paper Size A1

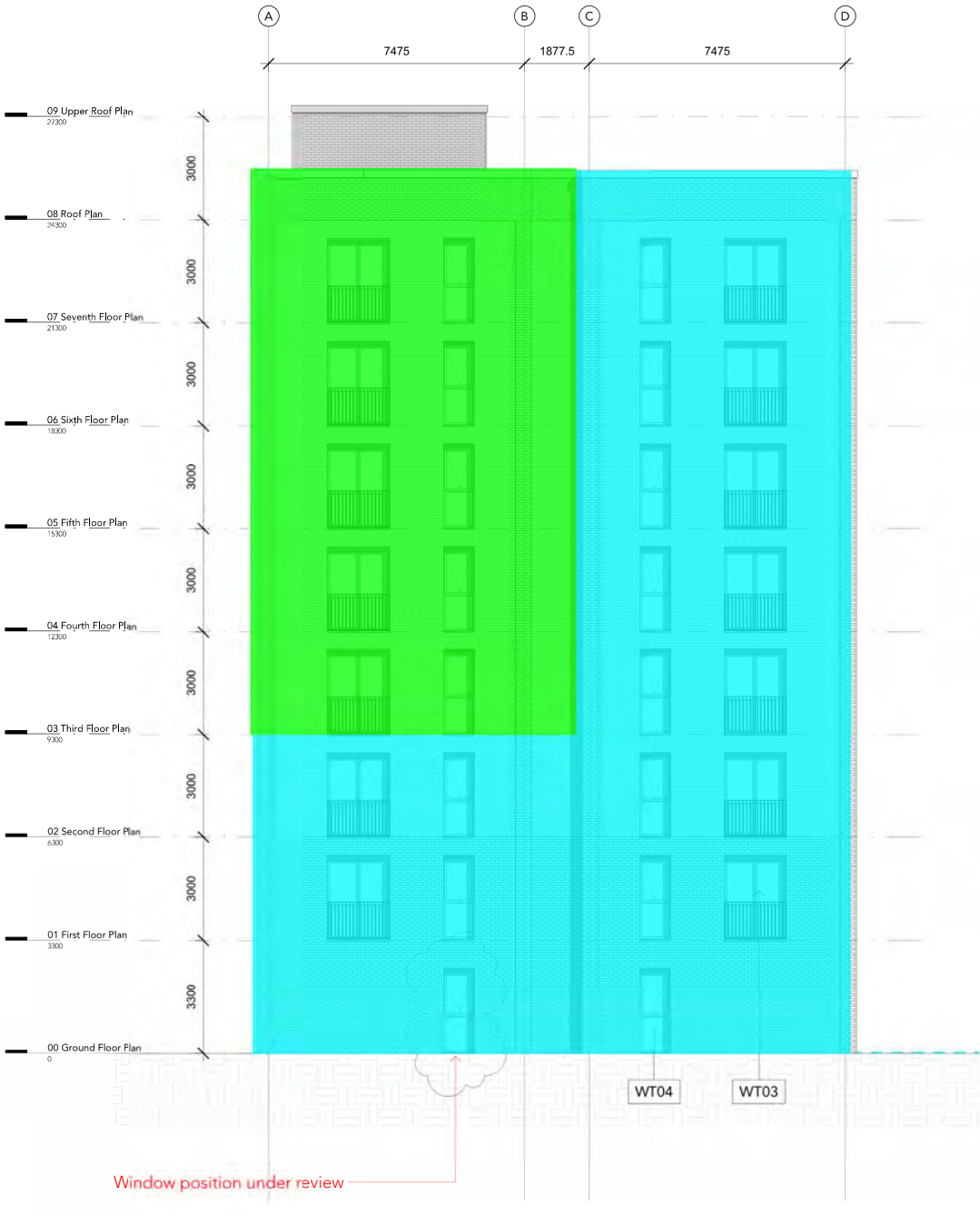
Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-A-XX-DE-A- 02321- P03



East Elevation_General Arrangement



West Elevation_General Arrangement

1 0 1 2 3 4 5 m
SCALE 1:100

Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB

SANDY BROWN
Consultants in Acoustics, Noise & Vibration

Window	Window Types - Bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Amendments to window sizing at ground and first to suit daylight reqmnts.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

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Project Title Rodney Street, Ancoats
Client Wates Construction Ltd
Location Manchester

Drawing ref Residential Block A - South Elevation_General Arrangement

Date 04/05/2022 15:11:58 Scale As indicated
Checker -- Orig Paper Size A1

Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

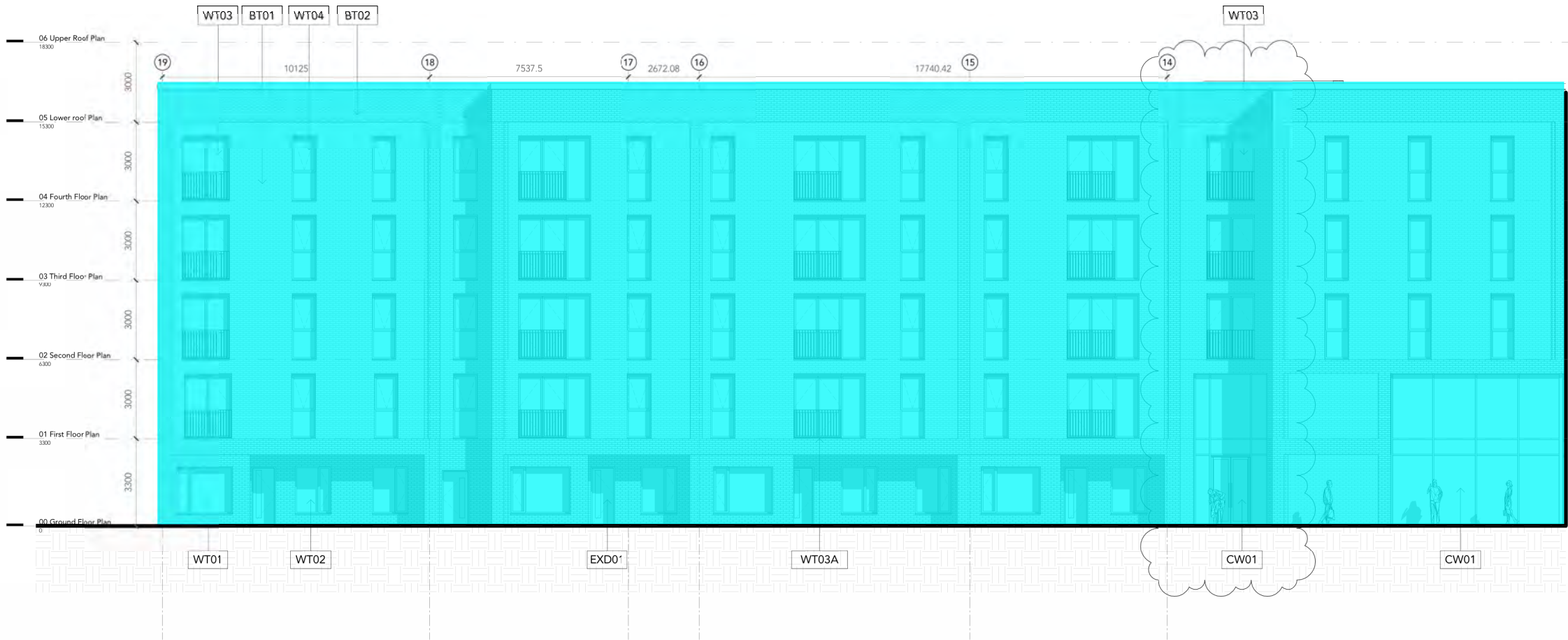
RODSTA-BUT-A-XX-DE-A- 02322- P03



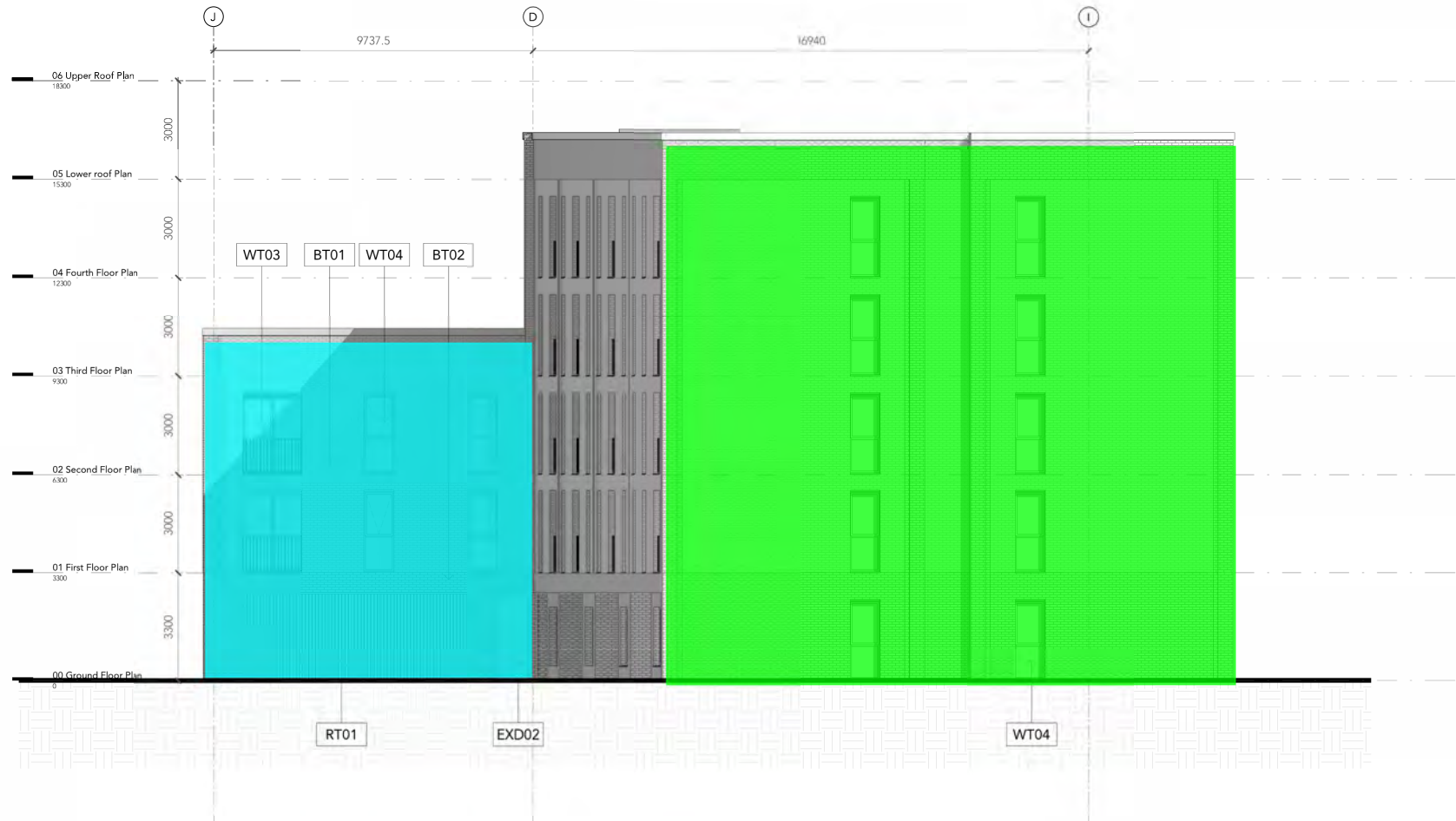
South Elevation_General Arrangement

1 : 100

1 0 1 2 3 4 5 m
SCALE 1:100



North Elevation_General Arrangement
1 : 100



East Elevation_General Arrangement
1 : 100

Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

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Consultants in Acoustics, Noise & Vibration

WT03A	Window Type 3A - Living Room (Upper Floor)
WT04	Window Type 4 - Bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC
RT01	Railing 01 - TBC

P04	10.05.22	SD	Updated window configuration to suit daylighting and overheating requirements
P03	04.05.22	SD	Updated drawing number to suit TIDP Identified WT3A in key
P02	29.04.22	SD	Updated amended kitchen and living room windows to suit daylighting requirements.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

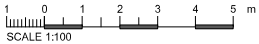
Drawing ref Residential Block B - North & East Elevations_General Arrangement

Date	10/05/2022 15:10:08	Scale	As indicated
Checker	LB	Orig Paper Size	A1

Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-B-XX-DE-A- 02420- P04





South Elevation_General Arrangement

1 : 100



West Elevation_General Arrangement

1 : 100

Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022
Mark-up key	
	L_{Aeq} 60- 62 dB
	L_{Aeq} 57-59 dB
	L_{Aeq} 54-56 dB
	L_{Aeq} 51-53 dB
	L_{Aeq} ≤48-50 dB
SANDY BROWN Consultants in Acoustics, Noise & Vibration	

WT03A	Window Type 3A - Living Room (Upper Floor)
WT04	Window Type 4 - Bedroom (Upper Floor)
CW01	Curtain Walling Type 1
EXD01	External Door Type 1 - Single Leaf / VP
EXD02	External Door Type 2 - Single Leaf
EXD03	External Door Type 3 - Double Leaf
BT01	Brick Type 01 - TBC
BT02	Brick Type 02 - TBC
RT01	Railing 01 - TBC

P03	04.05.22	SD	Updated drawing number to suit TIDP Identified
P02	29.04.22	SD	Updated amended kitchen and living room windows to suit daylighting requirements.
P01	26.04.22	AMP	Preliminary Issue - GA Elevations

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Residential Block B - South & West Elevations_General Arrangement

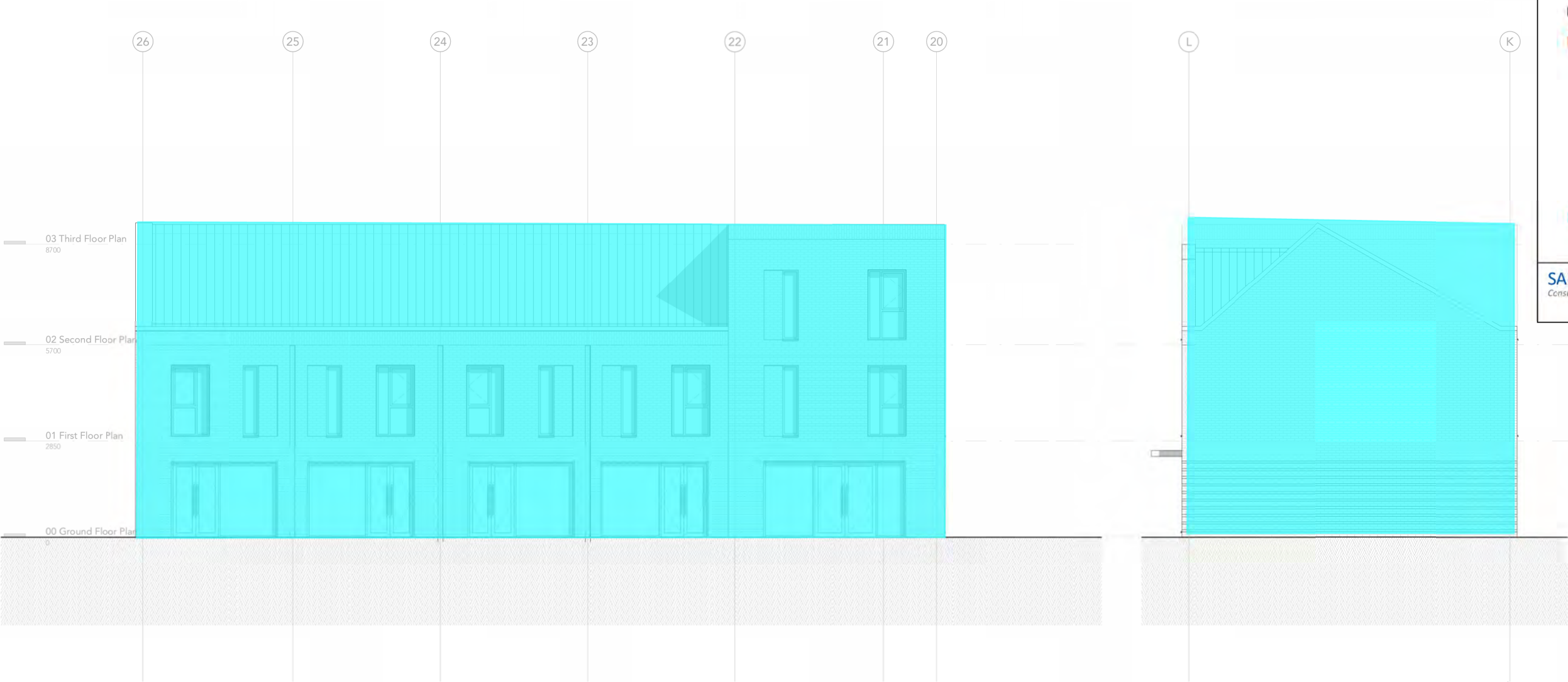
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Checker	LB	Orig Paper Size	A1

Job No: 9139 Status S2

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-B-XX-DE-A- 02421- P03

Town Houses 1



A - Proposed North Elevation
1 : 100

B - Proposed East Elevation
1 : 100

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FOR COMMENT



Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022
Mark-up key L_{Aeq} 60- 62 dB L_{Aeq} 57-59 dB L_{Aeq} 54-56 dB L_{Aeq} 51-53 dB L_{Aeq} ≤48-50 dB SANDY BROWN Consultants in Acoustics, Noise & Vibration	

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FOR COMMENT

27.04.22	DRAFT ISSUE		
Rev	Date	Intls	Details

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Townhouses - North and East Elevation

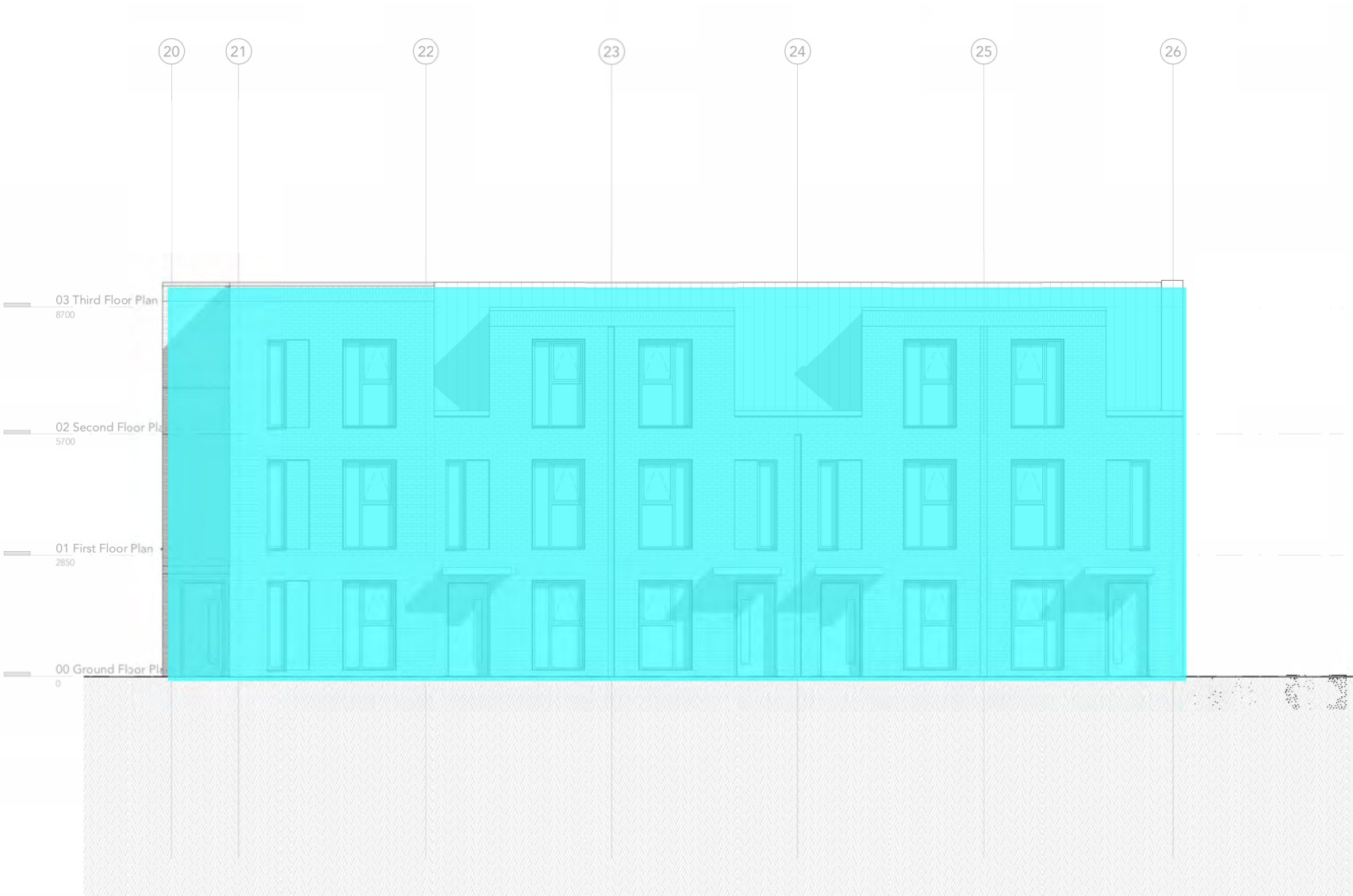
Date	29/04/2022 17:09:31	Scale	1 : 100
Checker	BT	Orig Paper Size	A2

Job No:	9139	Status	DRAFT - FOR COMMENT
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Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-TA-XX-DE-A- 02510- -

Town Houses 1

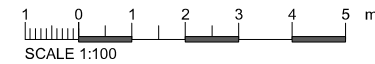


C - Proposed South Elevation
1 : 100



D - Proposed West Elevation
1 : 100

DRAFT
FOR COMMENT



Note:
Do Not Scale from this drawing

Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
Version	B
Marked-up by	Jose M. Gonzalez
Reviewed by	James Atha
Date	18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

SANDY BROWN
Consultants in Acoustics, Noise & Vibration

- 27.04.22 DRAFT ISSUE

Rev	Date	Intls	Details
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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref	Townhouses - South and West Elevation
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Date	29/04/2022 17:09:39	Scale	1 : 100
Checker	BT	Orig Paper Size	A2

Job No:	9139	Status	DRAFT - FOR COMMENT
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Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:
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RODSTA-BUT-TA-XX-DE-A- 02511- -

Town Houses 2

Title

Predicted external facade noise level mark-ups (Night-time)

Project

This City residential development, Ancoats, Manchester

Project no.

22013

Version

B

Marked-up by

Jose M. Gonzalez

Reviewed by

James Atha

Date

18 May 2022

Mark-up key

L_{Aeq} 60- 62 dB

L_{Aeq} 57-59 dB

L_{Aeq} 54-56 dB

L_{Aeq} 51-53 dB

L_{Aeq} ≤48-50 dB

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	27.04.22		DRAFT ISSUE
Rev	Date	Intls	Details

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Project Title	Rodney Street, Ancoats
Client	Wates Construction Ltd
Location	Manchester

Drawing ref Townhouses - North and East Elevation

Date	29/04/2022 17:09:31			Scale	1 : 100		
Checker	BT			Orig Paper Size	A2		
Job No:	9139			Status	DRAFT - FOR COMMENT		
Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:

RODSTA-BUT-TA-XX-DE-A- 02510-

A - Proposed North Elevation

1 : 100

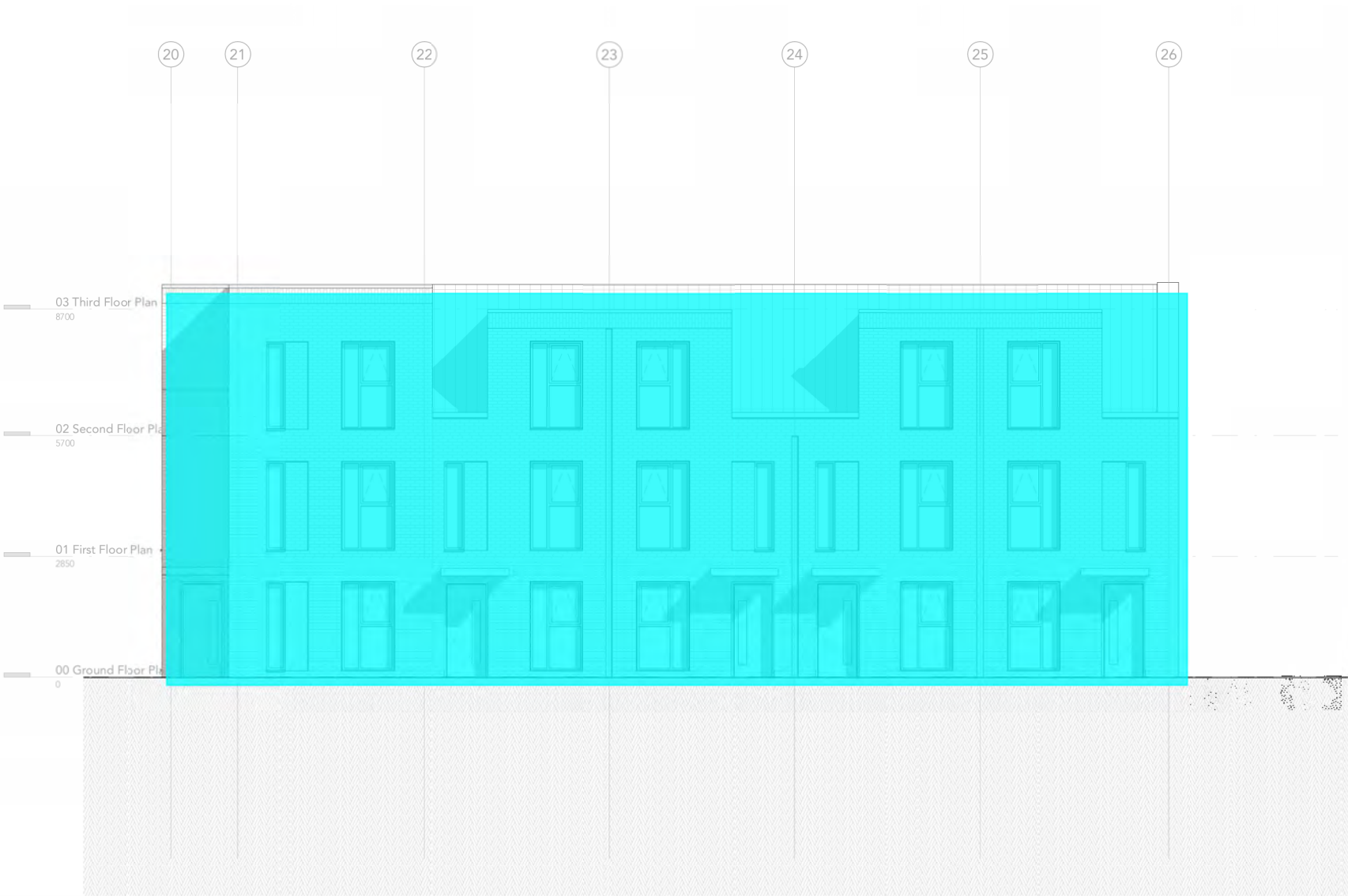
B - Proposed East Elevation

1 : 100

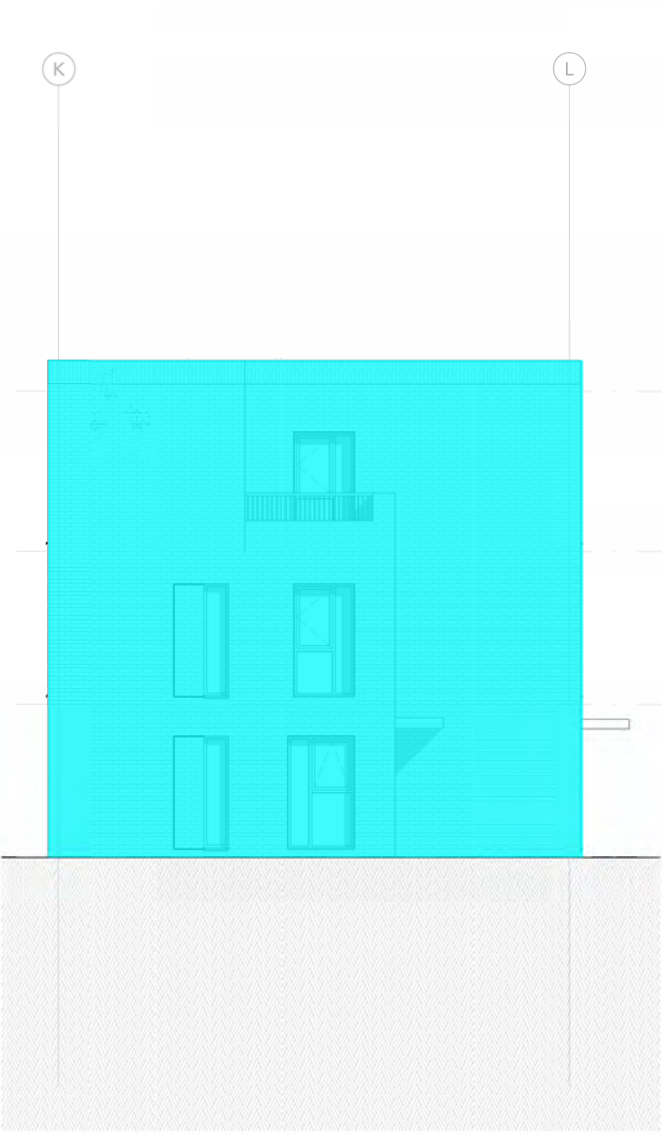
DRAFT
FOR COMMENT



Town Houses 2

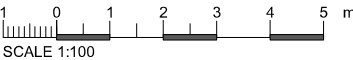


C - Proposed South Elevation
1 : 100



D - Proposed West Elevation
1 : 100

DRAFT
FOR COMMENT



Title	Predicted external facade noise level mark-ups (Night-time)
Project	This City residential development, Ancoats, Manchester
Project no.	22013
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-	27.04.22	DRAFT ISSUE	
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Drawing ref Townhouses - South and West Elevation

Date	29/04/2022 17:09:39	Scale	1 : 100
Checker	BT	Orig Paper Size	A2

Job No:	9139	Status	DRAFT - FOR COMMENT
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Project: Origin: Zone: Level: Type: Disc: Number: Rev:

RODSTA-BUT-TA-XX-DE-A-02511