

REF: L1424.2 V3

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16th June 2023

**RE: BOORLEY GREEN GATEWAY, BOTLEY
ZONED FENESTRATION ASSESSMENT – PLANNING CONDITION No 13**

Dear Mrs Frank,

I am writing following your request to undertake a review of the acoustic design for the above project.

We understand that the development includes the construction of mixed-use retail and residential units, and that planning has been granted subject to several conditions.

We are writing this letter with reference to Planning Condition No 13, described in the below sections.

The specifications described should be regarded as detailing the minimum construction to achieve suitable acoustic performance. Where products are named, it should be noted that equivalent alternative products may be selected and used.

1.0 DESIGN OBJECTIVES...

1.1 Planning Condition No. 13

Eastleigh Borough Council have provided conditional acceptance to the planning application. Of relevance to this assessment is Planning Condition No. 13, which states the following.

Excepting Blocks B, D and E, prior to the development above slab level of buildings containing residential units marked as Zone A and Zone B in Figure 4 of the 24Acoustics report: R7472-1 Rev 2 Date: 12 June 2020, details of measures to sound insulate and ventilate habitable rooms with fenestration located in the zoned areas, shall be submitted to and approved in writing by the Local Planning Authority. The approved measures shall be implemented prior to the first occupation of each residential unit and thereafter retained and maintained.

Reason: In the interests of residential amenity.

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The planning condition is understood to correspond to the fenestration zones described in Table 9 of the 24 Acoustics report, and summarised in Table 1.

Zone	Primary Noise Sources	Room	Glazing Type	Ventilation Type
A	Hotel events, existing building services and deliveries	Bedroom	High performance double glazing	Mechanical, eg, MVHR (no trickle vents)
		Living Room		
B	Delivery access and road traffic	Bedroom	Acoustically rated double glazing	Acoustic trickle vents
		Living Room		
All Other Areas	Local road traffic	Bedroom	Standard thermal double glazing	Standard Trickle vents
		Living Room		

TABLE 1: OUTLINE GLAZING AND VENTILATION STRATEGY (24 ACOUSTICS – TABLE 9)

The report makes reference to the British Standard BS8233 and the Professional Practice Guidance on Planning & Noise (ProPG).

BS8233 and ProPG provide recommended criteria for internal ambient noise levels when rooms are unoccupied and dependent on their intended use. Table 2 presents the desirable internal noise levels to be achieved in new developments.

Activity	Location	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Resting	Living room	35 dB $L_{Aeq,16hr}$	--
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8h}$ 45 dB $L_{Amax,F}$

TABLE 2: TARGET INDOOR AMBIENT NOISE LEVELS FROM BS8233:2014 AND PROPG

The night-time maximum noise levels are defined in the ProPG guidance document and recommends that good acoustic design be used so that individual noise events do not exceed 45 dB $L_{Amax,F}$ more than 10 times in a single night.

This assessment has been based on the performance recommendations described in Table 2.

2.0 DESIGN ASSESSMENT...

2.1 External Noise Intrusion

2.1.1 Assessment Method

In predicting the level of noise internally to compare with the criteria we have followed the methodology set out in BS EN 12354-3:2000 *Building Acoustics – Estimation of Acoustic Performance of Buildings from the Performance of Elements Part 3: Airborne Sound Insulation Against Outdoor Sound*. The accuracy of the adopted method for estimation of level difference is stated within the standard to be “on average correct”, with the single number ratings displaying a standard deviation of about 1.5 dB while for individual octave band the deviation will be larger up to 3 dB.

Within the method, it is also possible to include an allowance for flanking and on-site degrade of performance; however, it is rare to have data which is reliable for doing so. It is common practice therefore to include a 3 dB degrade for façade elements to perform differently to their predicted or

laboratory measured performance. We have based our assessment on this principle due to the use of single-figure weighted values.

2.1.2 Site Noise Exposure

The assessment has been based on noise information provided to us. The data has been taken from the 24Acoustics report: R7472-1 Rev 2 Date: 12 June 2020.

The report includes A-weighted sound pressure levels at various receptor locations from various sound sources throughout the development site.

It should be highlighted that the 24Acoustics report does not specify external noise levels on which the specification of the fenestration zones should be based. We have therefore based the specification on a set of derivations and assumptions.

We have identified within the 24 Acoustics assessment noise levels considered relevant. By compiling and summing the noise levels into the separate fenestration zones, we have concluded a set of design values in which the performance of each zone is to be based on.

We have separated Zone A into North and South zones fenestration due to the differing noise sources. The worst case is expected to be applied to both.

Fenestration Zone	Noise Source	24 Acoustics Report Reference	Daytime (07:00 to 23:00 hours)	Night Time (23:00 to 07:00 hours)
Zone A (North)	Store deliveries	Table 10	68 dB $L_{Aeq,1hr}$	73 dB $L_{Aeq,15min}$
	Store plant	Table 13	37 dB $L_{Aeq,1hr}$	32 dB $L_{Aeq,1hr}$
	Road traffic	Paragraph 6.22	56 dB $L_{Aeq,16hr}$	48 dB $L_{Aeq,8hr}$ 64 dB $L_{Amax,fast}$
Total¹			68 dB $L_{Aeq,16hr}$	73 dB $L_{Aeq,8hr}$ 78 dB $L_{Amax,fast}$²

TABLE 3: ZONE A (NORTH) DERIVED EXTERNAL NOISE LEVELS (FREE-FIELD)

¹ We have assumed all noise levels to represent the full 16 hour/8 hour day/night time periods. This is considered to represent a worst case.

² It is not possible for the $L_{Amax,fast}$ parameter to exceed that of the $L_{Aeq,8hr}$ parameter. This is an anomaly of the 24 Acoustics assessment and the overall $L_{Amax,fast}$ value is not clear. We have therefore assumed the maximum noise level to be 5 dB higher than the night time store delivery level of 73 dB $L_{Aeq,15min}$. It should be highlighted that this is an estimation.

Fenestration Zone	Noise Source	24 Acoustics Report Reference	Daytime (07:00 to 23:00 hours)	Night Time (23:00 to 07:00 hours)
Zone A (South)	Hotel entertainment	Table 7	42 dB $L_{Aeq,5min}$	42 dB $L_{Aeq,5min}$
	Hotel plant	Paragraph 6.16	42 dB $L_{Aeq,15min}$	42 dB $L_{Aeq,15min}$
	Hotel deliveries	Table 12	57 dB $L_{Aeq,1hr}$	62 dB $L_{Aeq,15min}$
	Road traffic	Paragraph 6.22	56 dB $L_{Aeq,16hr}$	48 dB $L_{Aeq,8hr}$ 64 dB $L_{Amax,fast}$
Total¹			57 dB $L_{Aeq,16hr}$	62 dB $L_{Aeq,8hr}$ 64 dB $L_{Amax,fast}$

TABLE 4: ZONE A (SOUTH) DERIVED EXTERNAL NOISE LEVELS (FREE-FIELD)

¹ We have assumed all noise levels to represent the full 16-hour/8-hour day/night time periods. This is considered to represent a worst case.

Fenestration Zone	Noise Source	24 Acoustics Report Reference	Daytime (07:00 to 23:00 hours)	Night Time (23:00 to 07:00 hours)
Zone B	Store deliveries	Table 10	53 dB $L_{Aeq,1hr}$	59 dB $L_{Aeq,15min}$ ¹
	Store plant	Table 13	37 dB $L_{Aeq,1hr}$	32 dB $L_{Aeq,1hr}$
	Road traffic	Paragraph 6.22	56 dB $L_{Aeq,16hr}$	48 dB $L_{Aeq,8hr}$ 64 dB $L_{Amax,fast}$
Total¹			58 dB $L_{Aeq,16hr}$	59 dB $L_{Aeq,8hr}$ 64 dB $L_{Amax,fast}$

TABLE 5: ZONE B DERIVED EXTERNAL NOISE LEVELS (FREE-FIELD)

¹ We have assumed all noise levels to represent the full 16-hour/8-hour day/night time periods. This is considered to represent a worst case.

² Not specifically referred to in the 24 Acoustics BS4142 assessment of the night time store deliveries, however, the +3 dB character correction has been applied to the value described Table 8 of the 24 Acoustics assessment.

The derived noise levels used for fenestration design are summarised in Table 6. 24 Acoustics have confirmed to us that all noise levels specified in their assessment are free-field levels. We have therefore applied a +3 dB correction to account for façade level conditions.

Please note, the night time store delivery has been excluded due to what is considered an overly onerous performance requirement. We strongly recommend that all deliveries occur between the hours of 07:00 and 23:00 only.

Fenestration Zone	Daytime (07:00 to 23:00 hours)	Night Time (23:00 to 07:00 hours)
Zone A	71 dB $L_{Aeq,16hr}$	62 dB $L_{Aeq,8hr}$ 81 dB $L_{Amax,fast}$
Zone B	61 dB $L_{Aeq,16hr}$	62 dB $L_{Aeq,8hr}$ 67 dB $L_{Amax,fast}$

TABLE 6: DERIVED FENESTRATION DESIGN NOISE LEVELS (FAÇADE LEVEL)

It should be noted that the noise levels have been based on information provided to us by others. We therefore accept no liability for the accuracy of this information or omissions and cannot guarantee the predictions that have been derived from it.

2.1.3 Façade Specification

We have based the assessment on a small bedroom and a living room with an approximate volume of 29 m³ and 65 m³ respectively. These are considered to be the worst-case dimensions throughout the three blocks.

We have selected a bedroom with the larger c 1.9 m² window. The Juliet balcony doors serving the living rooms have been approximately measured at 3 m².

We have been advised that both Zones A and B are to be ventilated via trickle ventilators in the window, with a minimum requirement of 2500 mm² EA.

The sound insulation offered by the building envelope is dictated by numerous elements, such as the sound reduction performance of the wall, window and trickle vent, and each has a different relative area.

To convert the Sound Level Difference into a Sound Reduction Index requires details of the façade and the relative areas of each element (e.g. window, wall etc) together with the room dimensions and finishes. The internal room parameters used in our assessment are summarised in Table 7.

Room Type	Approximate Element Areas (m ²)				Approx. Room Volume (m ³)	Average Reverberation Time 63-8k Hz (s)
	Wall	Window	Juliet Balcony Door	Vent Opening		
Bedroom	5	1.9	--	0.005	29	0.5
Living Room	21	1.9	3	0.005	65	0.5

TABLE 7: ROOM GEOMETRY USED IN ASSESSMENT

The proposed façade constructions for each fenestration zone are described in Table 8.

Location	Performance Rating	Proposed Construction Description
Zone A		
Walls	56 dB $R_w + C_{tr}$	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB $R_w + C_{tr}$	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration. Data provided by Guardian Glass.
Juliet Balcony Door	33 dB $R_w + C_{tr}$	Acoustically rated Juliet balcony door system to achieve 33 dB $R_w + C_{tr}$.
Ventilation	37 dB $D_{new} + C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Greenwoods 5000EA trickle vent per room.
Zone B		
Walls	56 dB $R_w + C_{tr}$	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB $R_w + C_{tr}$	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration ¹ . Data provided by Guardian Glass.
Juliet Balcony Door	21 dB $R_w + C_{tr}$	Acoustically rated Juliet balcony door system to achieve 21 dB $R_w + C_{tr}$.
Ventilation Openings	35 dB $D_{new} + C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Munster M335 AV17 trickle vent per room.

TABLE 8: PROPOSED CONSTRUCTION DESCRIPTIONS

Within our calculations we have included a correction to the sound insulation performance of the façade elements to account for site installation and construction tolerance of -3 dB. The specifications are therefore considered to be laboratory measured performances.

The laboratory-based specification of building elements should be ascertained by testing and have been undertaken in a laboratory accredited to undertake sound insulation testing to BS EN ISO 10140-5 (e.g. UKAS or equivalent). All testing should have been undertaken in accordance with BS EN ISO 10140 Part 1 and Part 2 or equivalent. For the avoidance of doubt the laboratory measured performance of windows and Juliet doors shall include the effects of the framing as well as the glass. We recommend this be confirmed by the chosen manufacturer prior to installation.

2.1.4 Building Envelope Performance

The noise data contained within the 24 Acoustics report is primarily provided as single figure A-weighted values. We are therefore unable to assess the noise levels in 1/1 octave bands. The below results summarise the calculation results using single-figure values only.

We have estimated the acoustic performance of the proposed external facade and compared it against the requirement of each octave band, summarised in Table 9.

Zone A			
External Noise Levels (Façade Level)	71 dB $L_{Aeq,16hr}$	62 dB $L_{Aeq,8hr}$ 81 dB $L_{Amax,fast}$	
Room Details	Lounge	Bedroom	Elemental Performance
Wall	21 m ²	5 m ²	56 dB R_w
Window	0.9 m ²	1.9 m ²	34 dB R_w
Juliet Balcony Door	3 m ²	--	33 dB R_w
Ventilation	0.005 m ²	0.005 m ²	37 dB $D_{ne,w}$
Total Area	26 m ²	7 m ²	
Composite Sound Reduction Index of Envelope	41 dB R_w	39 dB R_w	
Room Volume	65 m ³	29 m ³	
Reverberation Time	0.5 seconds	0.5 seconds	
Tolerance	±3 dB	±3 dB	
On-site Level Difference	37 dB $D_{A,tr}$	38 dB $D_{A,tr}$	
Targets	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,fast}$	
Estimated Internal Noise Level	34 dB $L_{Aeq,16hr}$	24 dB $L_{Aeq,8hr}$ 43 dB $L_{Amax,fast}$	
Acceptable?	Yes	Yes	

TABLE 9: ZONE A PERFORMANCE CALCULATIONS

Zone B			
External Noise Levels (Façade Level)	61 dB $L_{Aeq,16hr}$	62 dB $L_{Aeq,8hr}$ 67 dB $L_{Amax,fast}$	
Room Details	Lounge	Bedroom	Elemental Performance
Wall	21 m ²	5 m ²	56 dB R_w
Window	0.9 m ²	1.9 m ²	34 dB R_w
Juliet Balcony Door	3 m ²	--	21 dB R_w
Ventilation	0.005 m ²	0.005 m ²	35 dB $D_{ne,w}$
Total Area	26 m ²	7 m ²	
Composite Sound Reduction Index of Envelope	30 dB R_w	39 dB R_w	
Room Volume	65 m ³	29 m ³	
Reverberation Time	0.5 seconds	0.5 seconds	
Tolerance	±3 dB	±3 dB	
On-site Level Difference	26 dB $D_{A,tr}$	38 dB $D_{A,tr}$	
Targets	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,fast}$	
Estimated Internal Noise Level	35 dB $L_{Aeq,16hr}$	24 dB $L_{Aeq,8hr}$ 29 dB $L_{Amax,fast}$	
Acceptable?	Yes	Yes	

TABLE 10: ZONE A PERFORMANCE CALCULATIONS

Our assessment has shown the proposed façade to be capable of achieving the requirement for internal ambient noise levels inside the residential dwellings.

3.0 CONCLUSIONS...

We have undertaken a review of the fenestration zones A and B Boorley Green Gateway development with reference to the 24 Acoustics noise report.

We have derived a set of external noise levels from the 24 Acoustics report for use in this assessment.

We have compared the results against a set of target parameters relating to noise provided as part of the conditioned planning consent.

We are of the opinion that subject to the recommendations and derived external noise levels included within this assessment, the target noise levels will be achieved.

I hope this covers all required points at this stage, but please advise if you require anything further.

Yours sincerely,
For Red Twin Limited



Gavyn Bache B.Sc.(Hons) PgD MIOA
Associate

APPENDIX A – PLAN MARK UPS...

Location	Performance Rating	Proposed Construction Description
Zone A		
Walls	56 dB R_w+C_{tr}	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB R_w+C_{tr}	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration. Data provided by Guardian Glass.
Juliet Balcony Door	33 dB R_w+C_{tr}	Acoustically rated Juliet balcony door system to achieve 33 dB R_w+C_{tr} .
Ventilation	37 dB $D_{new}+C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Greenwoods 5000EA trickle vent per room.
Zone B		
Walls	56 dB R_w+C_{tr}	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB R_w+C_{tr}	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration ¹ . Data provided by Guardian Glass.
Juliet Balcony Door	21 dB R_w+C_{tr}	Acoustically rated Juliet balcony door system to achieve 21 dB R_w+C_{tr} .
Ventilation Openings	35 dB $D_{new}+C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Munster M335 AV17 trickle vent per room.

TABLE 11: PROPOSED CONSTRUCTION DESCRIPTIONS

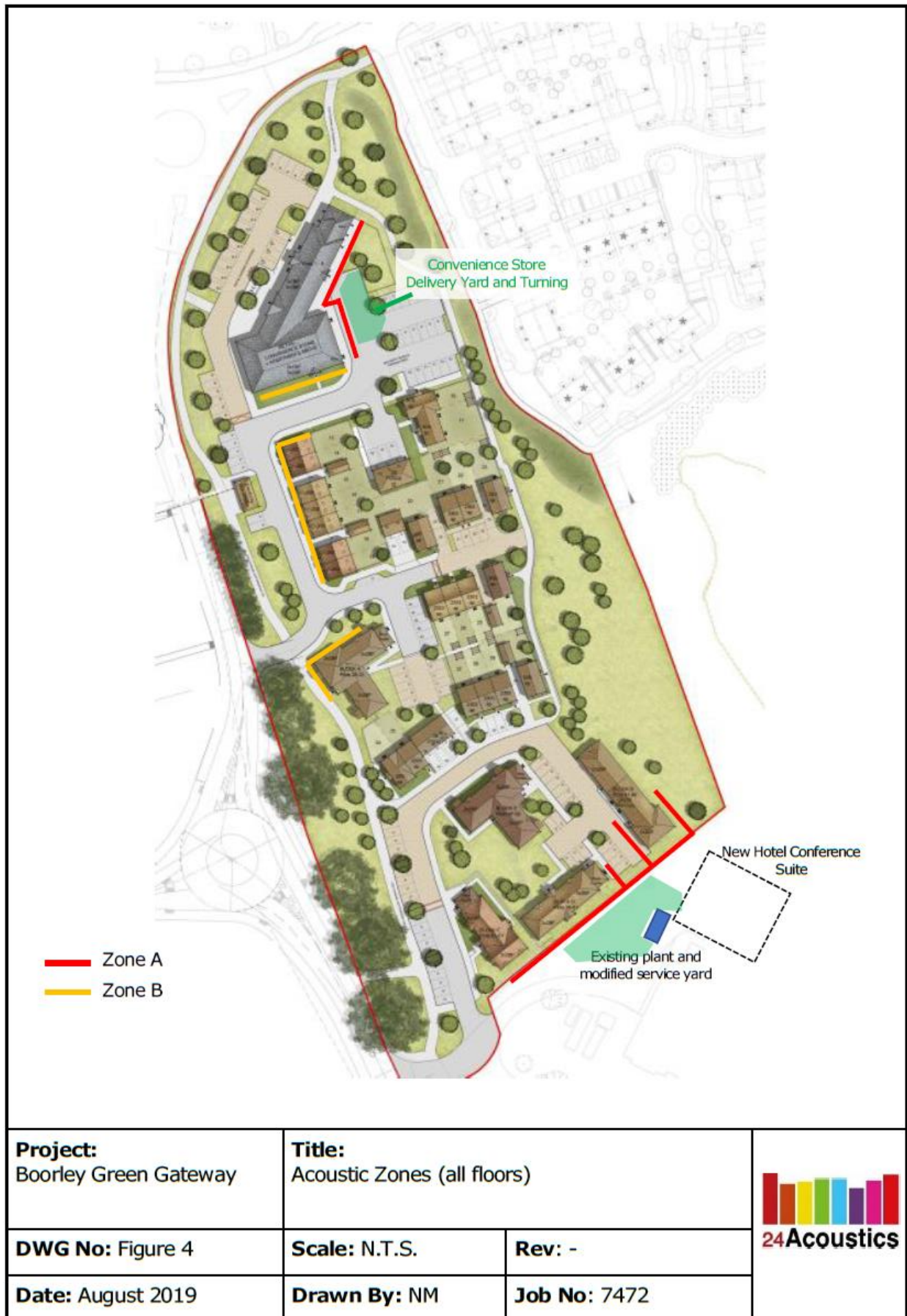


FIGURE 1: FENESTRATION ZONES A & B FAÇADE SPECIFICATION MARK-UP (24 ACOUSTICS)