



39 Tib Street, Manchester, M4 1LX
126755/FO/2020

Noise Impact Assessment

25th June 2020
First Issue



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Revision History

Version	Comments	Author	Date
First Issue	First issued version of the report	Chris Parker-Jones Director and Acoustic Consultant BSc (Hons) MSc MIOA	25th June 2020

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Executive Summary and Conclusions

This document, a Noise Impact Assessment (NIA), has been written to assess the risk of adverse impact from noise 'pollution' (and vibration) generated by the proposed launderette on the dwellings on the floors above at 39 Tib Street.

In summary, the risk of adverse impact from noise is low, without requiring further mitigation.

The assessment has demonstrated that internal sound transfer in an absolute worst-case scenario (with all washer/dryer machines running on a maximum spin cycle) would be controlled to an acceptable level in the dwelling above (an absolute maximum of 24 dB L_{Aeq} , but generally around 11 – 19 dB L_{Aeq}). This is because the existing floor construction has already been designed with a high level of acoustic performance (60 dB $D_{nT,w}$), on the basis that at the time of the design, the applicant had accounted for potential use as a restaurant/bar.

The risk of adverse impact from vibration will also be low, providing that the applicant follows the recommendations in Section 5. This includes anti-vibration mounts or matting underneath the washer/dryer stacks and using anti-vibration fixings to the wall (or maintaining a gap between the unit and the wall with no connection). These measures are not onerous or unusual for a development of this type.

In conclusion, noise and vibration should not pose a constraint to achieving planning permission for the proposed development, providing the applicant follows the advice herein.

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1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a Noise Impact Assessment in support of a planning application (ref: 126755/FO/2020) for the change of use of an existing basement and partial ground floor space from a commercial unit (Class B) to a launderette (Sui Generis) at 39 Tib Street, Manchester, M4 1LX.

1.1 Scope of Report

This document, a Noise Impact Assessment (NIA), has been written to assess the risk of adverse impact from noise 'pollution' generated by the proposed development on noise-sensitive receptors (NSRs) in the surrounding area, once it is fully operational. The objective is to ensure that the risk of noise (and vibration) impact will be controlled sufficiently.

This is based upon ensuring that noise and vibration generated internally within the launderette (from the use of washer/dryers) does not cause a significant adverse impact on the residential dwelling(s) above.

Note that whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

1.2 Regulations and Guidelines

This report takes into consideration local planning guidance and national planning policies including the National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and the Planning Practice Guidance on Noise (PPG-N) (summarised in **Appendix B**), which outline the purpose and long-term vision of planning policy concerning noise.

The assessment of noise generated internally within the launderette transmitting through the floor/building structure into the dwelling(s) above has been assessed based on the guidance of the Manchester City Council '*Planning & Noise Technical Guidance*' document and BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'.

2.0 Site and Development Description

The existing property is on the basement and ground floors of 39 Tib Street in the Northern Quarter area of Manchester. The 5 storey-building was recently constructed having gained planning permission in 2015 (ref: 107610/FO/2014/C2), with Class C3 use apartments on the upper floor above the Class B1 business use on the lower floors in question.

The proposals involve changing the current use to a launderette (Sui Generis class use). This would include 7 no. washer/dryer stacks and 1 no. rotary ironer on the ground floor, with storage in the basement.

The proposed opening hours will be from 08:30 to 19:00, therefore the business would not operate during the night-time period (23:00 to 07:00).

As referenced above, the nearest 'noise-sensitive receptors' are the apartments on the 1st floor, which share a party floor with the proposed development.

The site location and proposed plans are shown in **Appendix C**.

2.1 Planning History/Previous Noise Assessments

The previous successful planning application for the building included two Noise Impact Assessments by separate companies which included an external baseline noise survey, and recommendations regarding the construction of the floor between ground and first levels, on the basis that a high level of sound insulation was warranted between commercial and residential use – particularly as the type of business (and specific planning class) to occupy the ground floor had not been determined at the time.

Therefore, the floor was designed based upon the possible usage of the ground floor as a busy bar/restaurant which relatively high levels of generated noise. This high-performance design remained despite the fact the planning application was actually for Class B1 use, i.e. offices, and is referenced within planning condition 2 (ref: 107610/FO/2014/C2).

On this basis, the party floor construction is believed to be a continuous monolithic concrete slab ($\approx 150\text{mm}$) with a suspended ceiling using two layers of acoustic plasterboard on isolating acoustic hangers (specifically Oscar Acoustic 'Iso-Mount') which have been designed to achieve a reduction from ground to first floor of $60\text{ dB } D_{nT,w}$.

3.0 Guidelines and Criteria

3.1 Local Planning Policy

The following is taken from the *Planning & Noise – Technical Guidance* document published by Manchester City Council in December 2015.

Manchester City Council has adopted the following internal noise limits for residential properties:

- *Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 15 times).*
- *Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq} .*
- *Gardens and terraces (daytime) 55 dB L_{Aeq} ."*

These criteria tie in with the internal noise level targets given by BS 8233:2014.

3.2 BS 8233:2014

BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' suggests appropriate criteria and limits for different situations. This includes internal noise criteria for residential developments. The limits with BS 8233:2014 are similar to those in the WHO's 'Guidelines for Community Noise and Night Noise Guidelines for Europe' document.

Table 4 of BS 8233:2014 provides internal ambient noise level (IANL) limits for dwellings from "steady external noise sources". These are summarised in Table 3.1 below (only the daytime limits are shown as the operating hours of the development will be daytime only).

Table 3.1 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$

4.0 Sound Transfer Assessment

4.1 Noise Levels inside the Launderette

The proposed equipment inside the launderette will include:

- 7 no. JLA 98 Washer/Dryer Stacks; and;
- 1 no. JLA 1023 Rotary Ironer.

Unfortunately, the manufacturer does not provide noise emission data for these products. Therefore, PJA has drawn data from a research paper¹ investigating noise emissions from washing machines and from manufacturer data for a similar rotary ironer², adding 5 dB to these figures as a safety margin. Therefore, the following sound power levels have been used:

- Washer/Dryer
 - Wash cycle – 64.3 dB L_{WA}
 - Dry cycle – 62.5 dB L_{WA}
 - Spin cycle (1200 RPM – max speed) – 77.3 dB L_{WA}
- Rotary ironer – 58.5 dB L_{WA}

The absolute worst-case scenario would, therefore, occur when all 7 of the washer/dryer machines are simultaneously on a maximum spin cycle, plus the rotary ironer.

Based on this, PJA has calculated a cumulative reverberant sound pressure level inside the ground floor of the launderette of **83 dB(A) for this absolute worst-case scenario**.

In reality, this worst-case scenario will rarely occur if at all, as washing machine cycles are unlikely to start and end at the same time because they're used by different customers. With a handful of machines on a spin cycle, levels would reach around 78 dB(A). With all machines on either washing or drying cycles, noise levels would be around 70 dB(A).

4.2 Sound Insulation across the Separating Floor

As discussed in Section 2.1, the floor/ceiling construction was based upon a noise assessment conducted for the previous planning application, based upon a *typical* noise level of 80 – 85 dB(A) inside a busy bar/restaurant.

The party floor construction is believed to be a continuous monolithic concrete slab (~150mm) with a suspended ceiling using two layers of acoustic plasterboard on isolating acoustic hangers (specifically Oscar Acoustic 'Iso-Mount') which have been designed to achieve a reduction from ground to first floor of 60 dB $D_{nT,w}$.

1 - Solutions-Based Approach for Reducing Noise in Washing Machines. Available from: <http://www.sandv.com/downloads/0911bap.pdf>

2 - Miele rotary ironer GM 16-83. Available from: https://www.miele.co.uk/pmedia/ZGA/TX2070/7660590-000-00_07660590-00.pdf

Using the software package *Insul* (which is specifically for predicting the sound reduction indices of bespoke constructions), PJA estimate that the floor would achieve a laboratory rated sound reduction index of ≈ 67 dB R_w . After accounting for possible flanking sound transmission (though minimal flanking is expected through the monolithic structure), this would tie in with the original design target of 60 dB $D_{nT,w}$ (the normalised level difference when measured on-site).

4.3 Noise Levels inside the 1st Floor Dwelling

Based upon the absolute worst-case internal noise level inside the launderette, and the sound reduction anticipated across the floor, internal noise levels within the bedrooms and living rooms of the residential dwelling(s) upstairs have been predicted using a BS 12354-1 calculation.

In this absolute worst-case scenario, noise levels inside a bedroom/living room may reach a maximum of 24 dB L_{Aeq} . In the majority of scenarios under general use (without all machines simultaneously running on a spin cycle), levels would be around 11 – 19 dB L_{Aeq} . These latter levels would effectively be imperceptible to residents.

The daytime noise limits used by Manchester City Council and BS 8233:2014 are 35 dB L_{Aeq} . Therefore, the absolute worst-case predicted level is well within this criterion.

4.4 Conclusion

The assessment has demonstrated that internal sound transfer in an absolute worst-case scenario (with all washer/dryer machines running on a maximum spin cycle) would be controlled to an acceptable level in the dwelling above without further mitigation. This is due to the fact that the existing floor construction has already been designed with a high level of acoustic performance, on the basis that at the time of the design, the applicant had accounted for potential use as a restaurant/bar.

Overall, the risk of adverse impact from noise is low, without requiring further mitigation.

5.0 Vibration Assessment

As the proposed development is on the ground floor, beneath a first-floor residential flat, there is the possibility (if not mitigated appropriately) that perceived vibration and structure-borne noise can transmit from the washer/dryers which inherently vibrate significantly when running on a spin cycle

At the base of each washer/dryer stack where it rests upon the floor, they will be installed using either:

- Resilient anti-vibration mountings. Such mounts would usually be made of a resilient material such as rubber and/or incorporate a spring to dampen vibration transmission. The manufacturer will usually provide rubber feet as standard that are appropriate for the size of the machine.
- or
- Local anti-vibration matting³ beneath the whole machine or anti-vibration pads beneath the feet. These mats/pads are typically around 20mm thick and made from compressed rubber crumb.

The stacks will be checked regularly to ensure that they are level with all footings of the appliance firmly grounded, to avoid rocking of the appliance during spin cycles which cause avoidable vibration.

The applicant will also consider adding additional anti-vibration matting in the unlikely event that a formal complaint is received from the property above.

In addition, washer/dryer stacks will either be:

- Placed slightly away from the wall so that there is no connection between the machine and the wall;
- or
- If this cannot be avoided, they will be fixed using anti-vibration fixings/washings on screws, to dampen vibration transmitting through the fixings and radiating up the walls into the flat above.

These are not considered to be unusual or onerous requirements. The mitigation measures above are usually supplied as standard by the appliance manufacturers.

Overall, the risk of adverse impact from vibration will be low providing the advice above is followed.

3 - <https://www.floormats.co.uk/washing-machine-mats>

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
Airborne sound	Airborne sound is sound that is transmitted through the air. Airborne sound can be transmitted through elements, by causing the element to vibrate (imperceptible to the eye), in turn transmitting vibrations into the air on the other side. Most noise in a typical acoustic assessment is 'airborne' sound and is generated by sources such as speech, music and transport.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$D_w / D_{nT,w}$	The D_w weighted level difference used to characterize the sound insulation between rooms in a building as they are. Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. A $D_{nT,w}$ is a D_w which is then 'normalised' to account for the reverberation time of the room (the 'nT'), recognising that the level difference is dependent on how reverberant the receiver room is and that every room will have a slightly different reverberation time, hence the $D_{nT,w}$ is adjusted to reference conditions.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, when considering a separating wall, as well as transmitting directly through the wall, sound can also travel around the wall by the floor, ceiling, corridor wall, and external wall.
Frequency	Sound is generally assessed over the frequency range of 63 Hz to 4000 Hz (4 kHz), although humans can potentially hear between 20 Hz and 20 kHz. Frequency is often divided into ('first') octave bands for analysis, with the range above considered within 7-octave bands with centre frequencies at 63 Hz, 125 Hz, 250 Hz, 1 kHz, 2 kHz and 4 kHz. 'Third' octave bands split this further into smaller frequency bands.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.
Sound insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to stop sound travelling through it.
Structure-borne sound	Transmission of sound energy as vibrations inside the structure of a building. Can be used an alternative term to impact sound, however, structure-borne will usually refer to noise transmitted into a structure from mechanical sources, rather than human sources.

A.2 – Subjective Changes in Sound Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – Relevant Planning Policies and Guidelines

B.1 – National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans. With explicit reference to noise, the NPPF states that *"Planning policies and decisions should contribute to and enhance the natural and local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from ... noise pollution"*.

B.2 – Noise Policy Statement for England (NPSE)

The NPPF refers to the Noise Policy Statement for England (NPSE), which applies to most forms of noise including environmental noise. The NPSE sets out the long-term vision of Government policy which is to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."* It aims that *"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."*

The use of the terms *"significant adverse"* and *"adverse"* are key phrases within the NPSE. The guidance establishes the concept of how the level of adverse effect on health and quality of life can be referenced including:

- **NOEL – No Observed Effect Level** - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level** - This is the level above which *adverse* effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level** - This is the level above which *significant adverse* effects on health and quality of life occur.

Under the first aim of the NPSE (*"avoid significant adverse impacts on health and quality of life"*), an impact in line with SOAEL should be avoided. Under the second aim (*"mitigate and minimise adverse impacts on health and quality of life"*), where the impact lies somewhere between LOAEL and SOAEL, requiring that all reasonable steps are taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, but does not mean that such adverse effects cannot occur.

B.3 - Planning Practice Guidance on Noise (PPG-N)

The Planning Practice Guidance on Noise (PPG-N) is part of a suite of web-based guidance which is intended to support the implementation of the policies in the NPPF and the NPSE.

It aids in expanding on the definitions from the NPSE of NOEL, LOAEL and SOAEL, by linking these terms to 'examples of outcomes', i.e. changes in behaviour and/or attitude to noise. The table below summarises the guidance from PPG-N in this regard.

Table B.1 – Noise exposure hierarchy based on the likely average response – adapted from PPG-N

Perception	Examples of outcomes	Increasing effect level	Action
NOEL - No Observed Effect Level ¹			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL - Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up the volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. 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 resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to a change in the acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent
¹ This line is an assumption of the adverse effect level and is not explicitly referenced by PPG-N, though this appears to be a safe assumption.			

Appendix C – Site Location and Development Plans

Figure C.1 – Site location plan

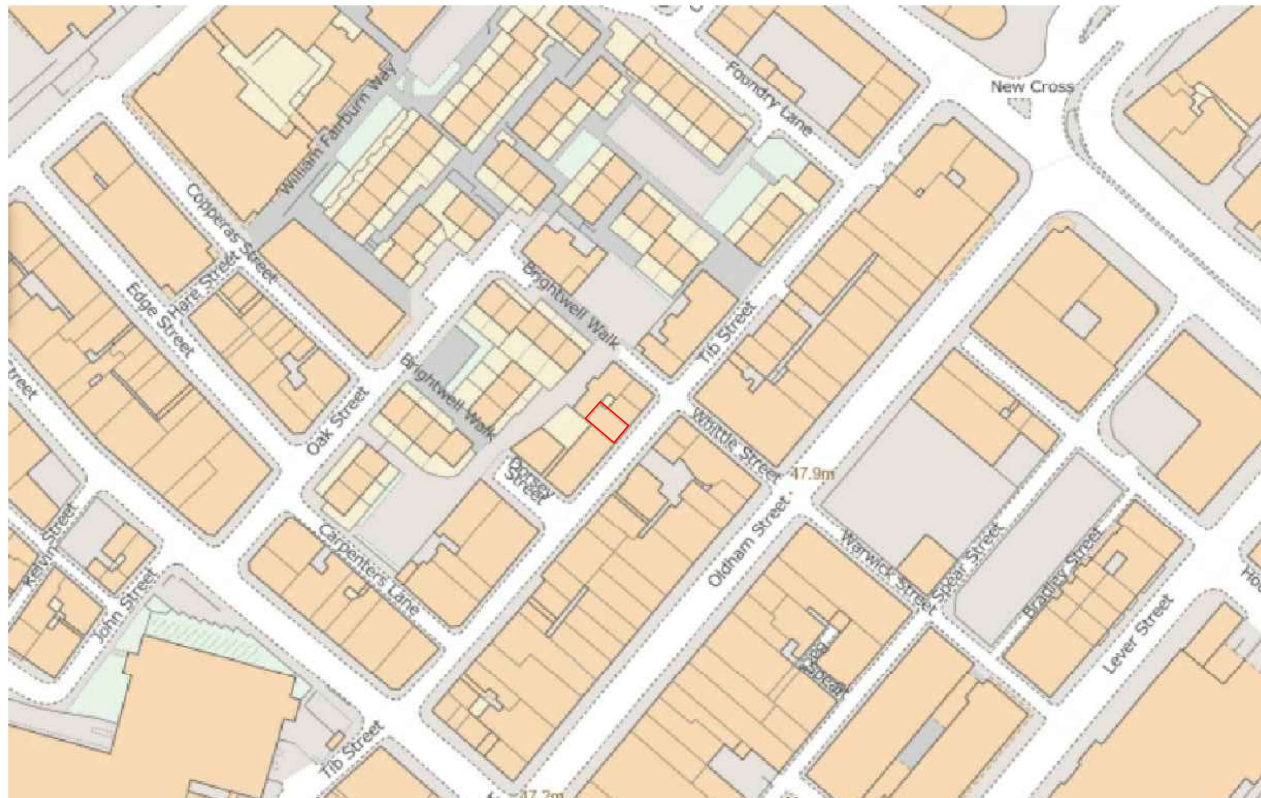
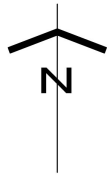


Figure C.2 – Proposed floor plans

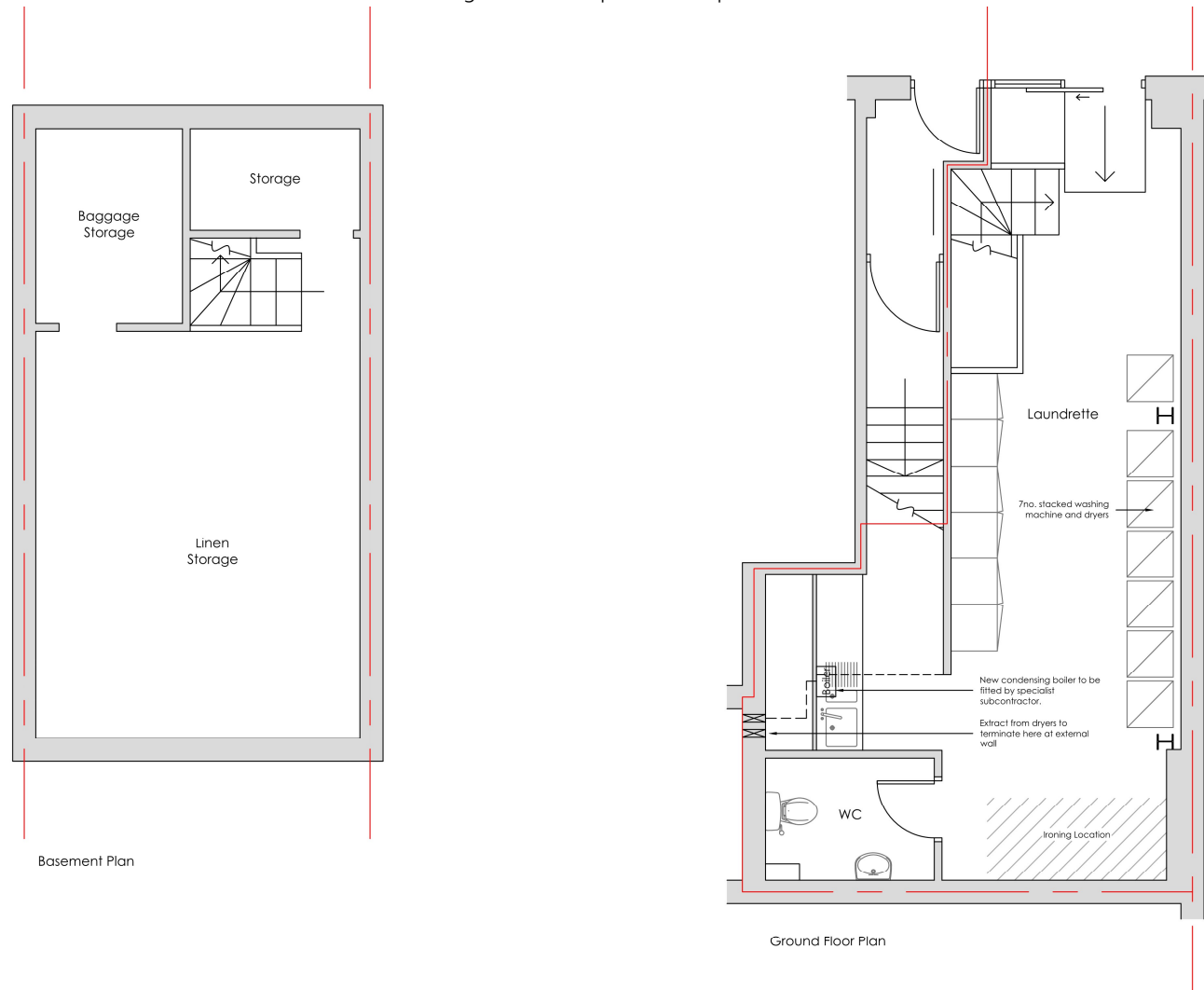


Figure C3 – Proposed elevations



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