Noise Impact Assessment

Premier Inn Manchester City Centre (Portland Street)

Whitbread

06/06/2025

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1 Introduction

1.1 Proposals are in place to install new building services plant on the rooftop for the existing Premier Inn Manchester City Centre (Portland Street) hotel. This report presents a noise impact assessment from the proposed new building services plant on nearby noise-sensitive properties.

1.2 An external noise survey has been conducted at site, and the measurement data have been used to establish the prevailing ambient and background sound levels affecting the site and neighbouring noise-sensitive properties. This data has then been used to assess the noise impact in accordance with Manchester City Council's anticipated requirements.

1.3 Section 2 of this report presents the acoustic requirements, Section 3 describes the external noise survey, and the assessment of plant noise emission to neighbouring properties is presented in Section 4. Conclusions have been provided in Section 5.

1.4 The full measurement data are available on request. Definitions of some of the terminology used throughout the report have been included in Appendix A.

2 Criteria

2.1 Local authority

2.1.1 Manchester City Council's *Planning and Noise Technical Guidance (October 2022)* document provides the following criteria regarding plant noise:

> *"The noise assessment should be based on BS 4142, and any application for fixed plant, equipment or machinery must demonstrate that:*
>
> ***'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.***
>
> *...*
> *Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install ventilation equipment on the roof of a residential apartment block or it could be an air source heat pump attached to the side of a building."*

2.2 Landlord requirements

2.2.1 Premier Inn has its own brand standards for the development of its hotels: *Premier Inn Generic Specification for a Turnkey Development (January 2024 - Edition Rev N)*

2.2.2 The brand standards requires that noise emission from all plant associated with the hotel be designed to be at least 5 dB below the lowest measured background sound level at night with all plant operating simultaneously, when assessed at the boundary (assumed to be any normally occupied position) of the nearest noise sensitive property.

2.2.3 Meeting Manchester City Council's requirements will therefore also satisfy the brand standards as the Council's requirements are more onerous.

2.3 British Standard 4142:2014 +A1:2019

2.3.1 BS 4142:2014+A1 2019 *Methods for rating and assessing industrial and commercial sound* presents a method for predicting noise impact on noise-sensitive neighbours. This is done by comparing the noise level of a source (the *specific* sound level) with the existing background noise level in the area, in the absence of the source (the *background* sound level).

2.3.2 The methodology requires consideration be given to all aspects of the assessment process and it must also account for any unusual acoustic features, such as tonal, impulsive, and intermittency characteristics. These are accounted for by the addition of various decibel corrections to the specific sound level. This corrected level is the *rating* level.

2.3.3 The greater the positive difference between the rating level and the background level, the greater the magnitude of the impact. BS 4142:2014 gives the following descriptions with regards to the potential impact:

- A difference of around +10dB or more is likely to be an indication of a *significant adverse impact*, depending upon the context.
- A difference of around +5dB or more is likely to be an indication of an *adverse impact*, depending upon the context.
- Where the rating level does not exceed the background sound level, this is an indication of a *low impact*, depending upon the context.

3 External noise survey

3.1 Site description

3.1.1 The site is located at The Circus, 112-114 Portland Street, Manchester M1 4WB. Immediate surrounding roads also include Oxford Street, Dickinson Street and St James Street. The site is situated in a busy area of Manchester City Centre, just south of St Peter's Square. South of the hotel is Manchester Oxford Road railway station and further east of the hotel is Manchester Picadilly railway station. The hotel is situated in a multi-use building with retail properties on the ground floor. The surrounding area consists primarily of retail and commercial properties.

3.1.2 The main sources of noise affecting the site and neighbouring properties was observed to be road traffic noise from all surrounding roads as well as noise from building services plant (both existing rooftop plant belonging to Premier Inn and plant belonging to other neighbouring properties). Road traffic was observed to consist mainly of light vehicles and buses.

3.1.3 The nearest noise-sensitive receivers (NNSRs) are considered to be the offices on 127 Portland Street, offices on 1 Oxford Street, and the residential building Tuscany House on Dickinson Street.

3.2 Measurement methodology

3.2.1 Continuous, unattended noise level measurements were conducted at a single position on the rooftop of the site.

3.2.2 Statistical and spectral octave-band data were recorded in 15-minute samples between 15:00 on Thursday 15th May and 14:00 on Friday 16th May 2025. The "fast" (125ms) time constant was used.

3.2.3 Existing building services plant that are in operation were found on the roof, including air source heat pumps, extract flues and a plant enclosure. The air source heat pumps were observed to be barely audible at a close distance; however, the extract flues were a significant source of noise. The measurement location was therefore selected such that the distance to the extract flues were similar to the distance between each neighbour (except Tuscany House) and the extract flues. Meaning, the noise measured at the selected location is considered to be representative of the building services noise (owing to the extract flues) experienced at both office receivers. Whilst the distance from the flues to Tuscany House was greater, there is an existing plant enclosure closer to Tuscany House, and hence the noise measured at the selected location is also considered representative of the overall building services noise considered to be affecting Tuscany House.

3.2.4 The microphone was placed near the edge of the roof for exposure to the road traffic noise propagating from Oxford Street, Portland Street, St James Street and other surrounding roads. The measurement location is therefore considered to be representative of the road traffic noise experienced by all three NNSRs.

3.2.5 The noise levels measured at the measurement location (see figure below) is therefore considered to be representative of the overall noise levels experienced at each NNSR.

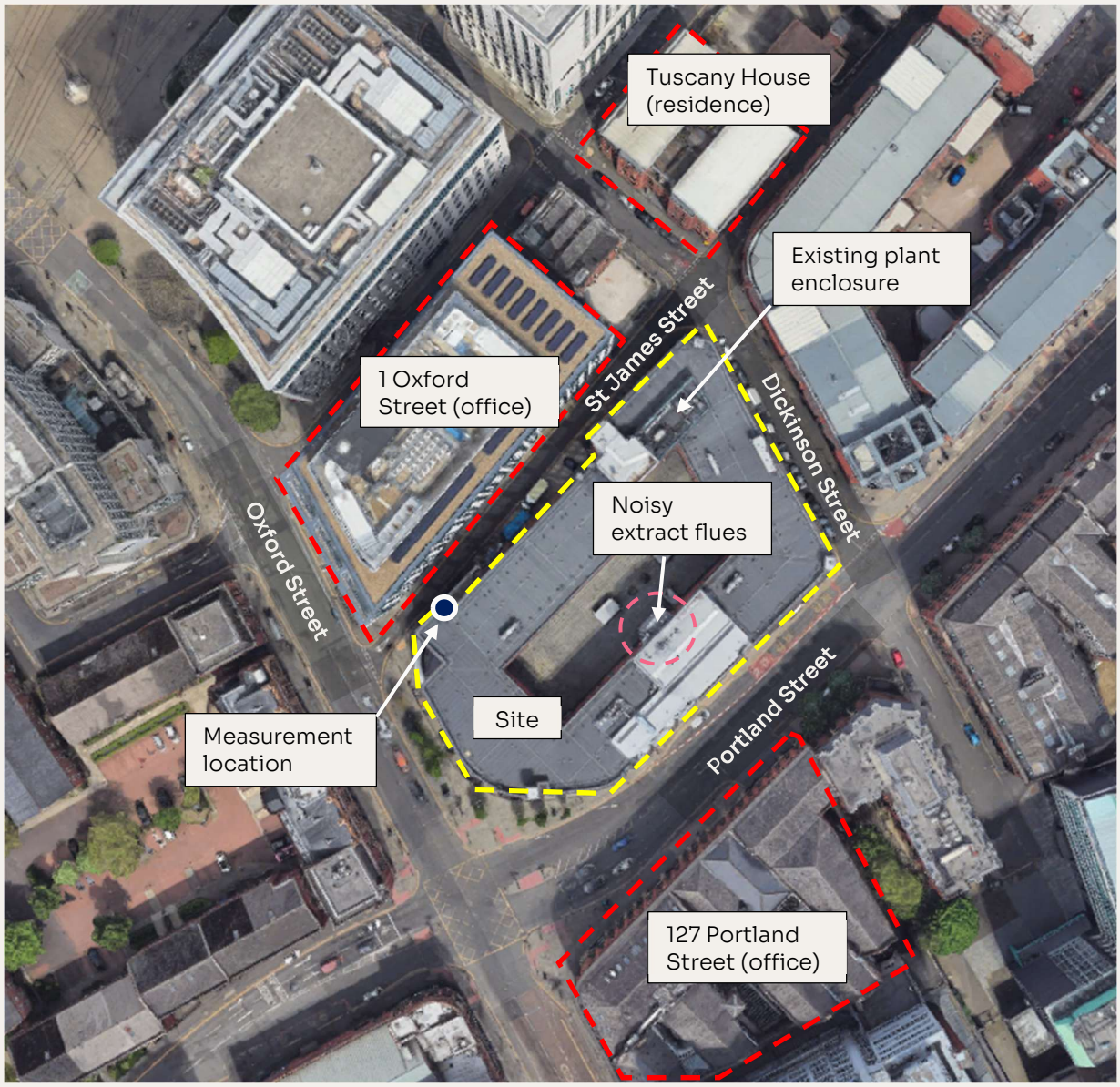


Figure 3-1 Satellite image of site, showing measurement location and nearby properties

3.2.1 The microphone is considered to have been placed in an approximation of free-field conditions; at around 1.5m above roof level.

3.2.2 The following equipment was used to carry out the measurements:

Equipment	Manufacturer/model	Serial no.
Class 1 sound level meter	Norsonic 139	1392774
Environmental microphone	Norsonic 1218	12182559
Portable calibrator	Norsonic 1251	34926

Table 3-1 Equipment used for noise survey

3.2.3 The calibration of the sound level meter and associated microphone were checked prior to and on completion of the survey in accordance with recommended practice. No significant drift in calibration occurred during the survey. The accuracy of the calibrator can be traced to National Physical Laboratory Standards.

3.3 Weather

3.3.1 Weather conditions throughout the survey[1] are believed to have been dry with little wind (according to data sourced from local weather station in Manchester Airport). Average windspeeds were not recorded to have exceeded 5 m/s, and so are expected to have had minimal impact on the measurements.

3.4 Results & commentary

3.4.1 A graph showing the noise level history, as measured during the survey, is presented on the following page.

3.4.2 Noise levels appear to be generally flat during the day, as commonly seen at sites exposed to constant building services noise. Noise levels drop off overnight – presumably as nearby plant are operating at a lower demand and/or duty and road traffic reduces (although, the roads surrounding the site were observed to still be relatively busy at night) – and begin to rise again early morning.

3.4.3 The lowest background sound levels measured are as follows:

Time	Level
Daytime (07:00-23:00)	53 dB $L_{AF90,15mins}$
Night-time (23:00-07:00)	51 dB $L_{AF90,15mins}$

Table 3-2 Lowest background sound levels measured during the survey

[1] https://www.timeanddate.com/weather/uk/manchester/historic?month=5&year=2025

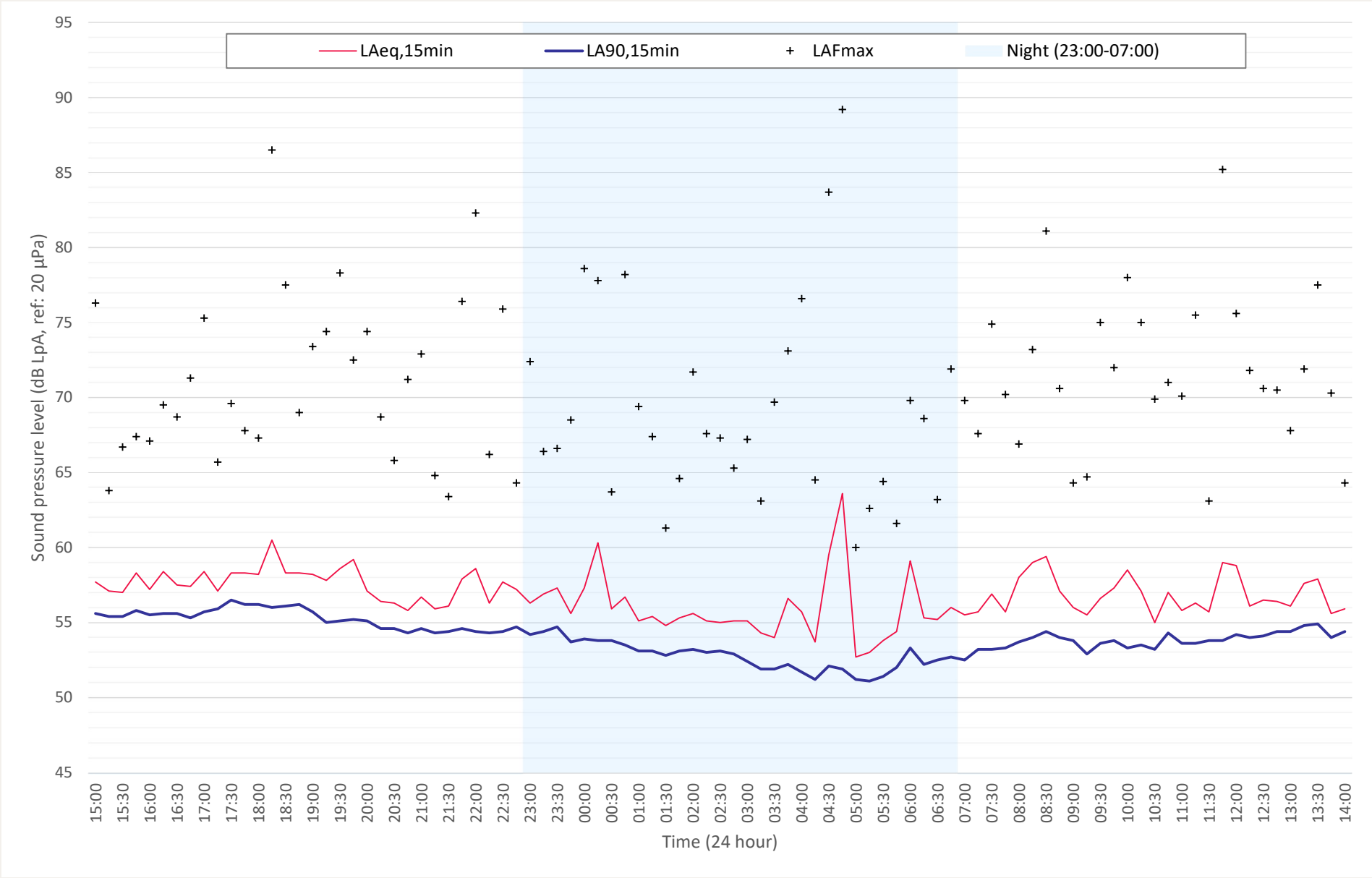


Figure 3-2 Graph showing sound levels for noise survey period

4 Noise emission assessment

4.1 Plant noise emission limits

4.1.1 Manchester City Council's (MCC) *Planning and Noise Technical Guidance* bases its plant noise criteria by comparing the BS 4142 rating level to the *typical* background sound level. The lowest background sound levels presented in Table 3-2 are considered to be suitable values for the typical background sound levels. This is supported by the example method, presented in Appendix A of the Planning and Noise Technical Guidance, of establishing a typical background sound level, where the typical background sound level is taken to be the minimum value of the arithmetically averaged sound levels for each 15-minute period.

4.1.2 Based on the criteria in MCC's Planning and Noise Technical Guidance, plant noise emission limits as BS 4142 rating levels have been established below for daytime (07:00 – 23:00), night-time (23:00 – 07:00) as well as office hours (08:00 – 18:00). Office hour limits have been provided for receivers that are offices since it is only expected that the offices would be noise-sensitive in typical office hours, and night-time limits in the period of 23:00 – 07:00 are not considered to be applicable.

Receiver	Time	Plant noise emission limit
Tuscany House	Daytime (07:00-23:00)	48 dB $L_{Ar,Tr}$
	Night-time (23:00-07:00)	46 dB $L_{Ar,Tr}$
127 Portland Street 1 Oxford Street	Office hours (08:00 – 18:00)	48 dB $L_{Ar,Tr}$

Table 4-1 Plant noise emission limits for each noise-sensitive receiver

4.2 Plant proposals

4.2.1 To serve fan coil units in hotel guestrooms, two new chiller units are proposed to be installed externally at roof level, as shown on the roof plan below:

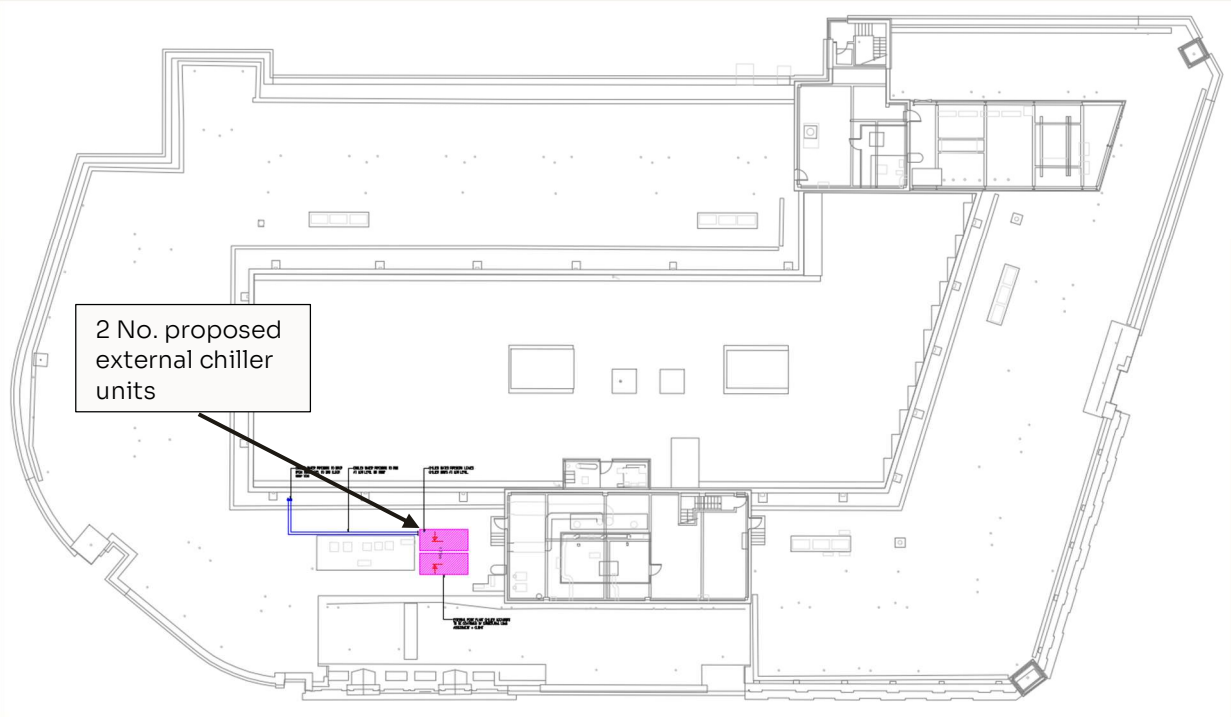


Figure 4-1 Roof plan showing location of proposed external plant

4.2.2 The new fan coil units in the guestrooms have not been included in the noise emission assessment as they are located internally.

4.2.3 The sound power levels for the chiller units, as quoted by the manufacturer, are provided below:

Model		Octave band centre frequency (Hz)								Type
	Qty.	125	250	500	1k	2k	4k	8k	dBA	
Trane CXAX 46 SE LN	2	86	83	82	84	81	70	60	87	$L_{W\ per\ unit}$

Table 4-2 Manufacturer provided linear sound power levels (dB ref: 10^{-12} W)

The operational duty of the proposed plant has not been specified at this stage. The assessment is therefore based on a worst-case scenario with the plant operating 24 hours a day and 7 days a week.

4.3 Assessment locations

4.3.1 The nearest noise sensitive receivers (NNSRs) have been established to be the offices on 127 Portland Street, offices on 1 Oxford Street, and the residential building Tuscany House on Dickinson Street.

4.3.2 For each NNSR, an assessment location of 1m in front of the window nearest to the proposed plant has been selected. The assessment locations in relation to the proposed plant location, including the distances between, are presented below:

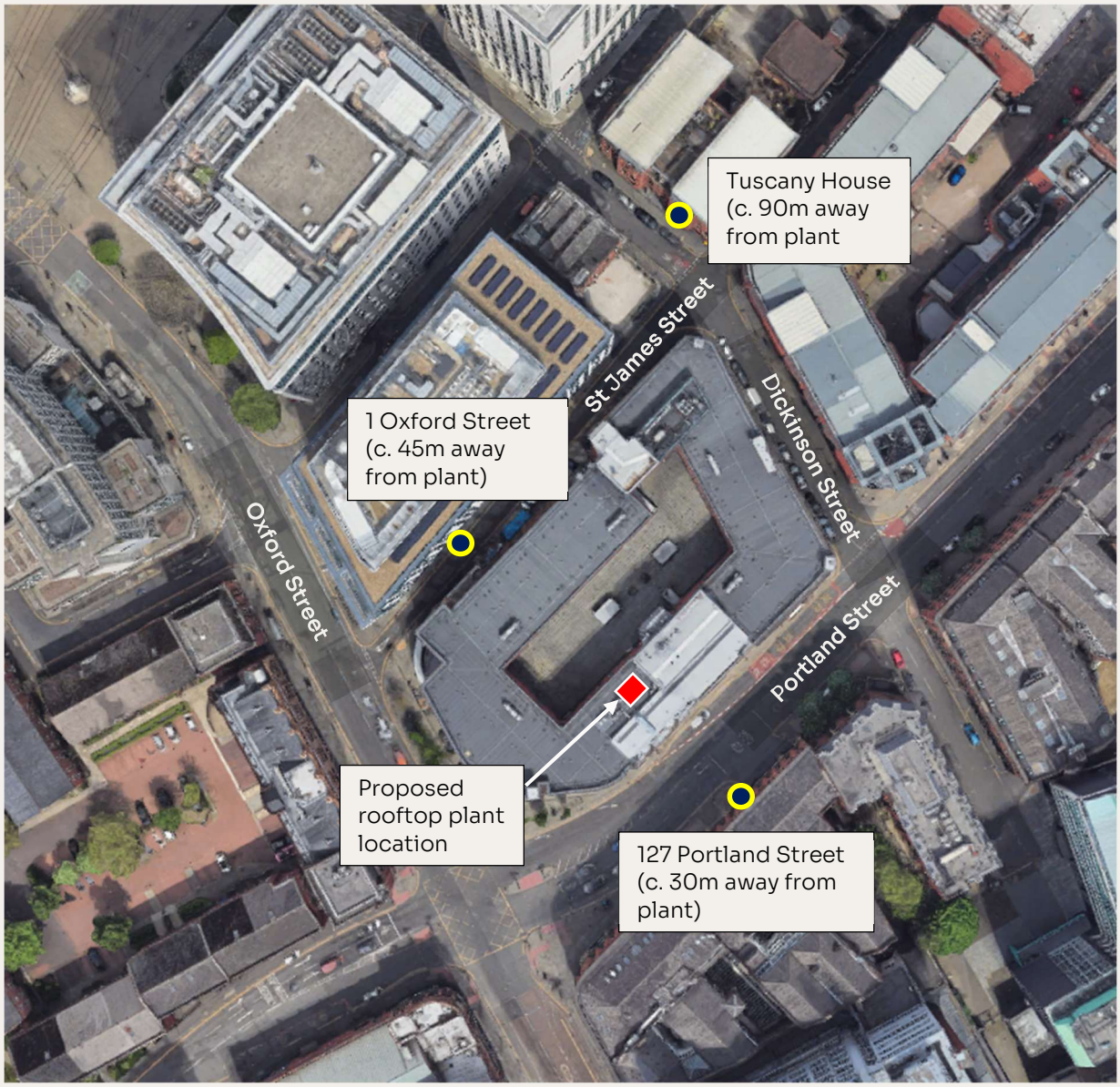


Figure 4-2 Assessment locations in relation to proposed plant location

4.3.3 The noise impact to other neighbouring properties not identified in this report is expected to be less than that presented, due to the increased propagation distances and screening due to buildings. The assessment is therefore considered to be representative of a reasonable worst-case scenario.

4.4 Calculation methodology

4.4.1 The calculation of the specific sound level for each noise-sensitive receiver has been carried out in accordance with the general calculation methodology outlined in ISO 9613-2:2024, as per typical industry practice. Calculations have been made for each of the following means of attenuation, where considered to be relevant:

- Geometric divergence – which describes the reduction in sound pressure level as the distance from the source increases.
- Screening – which describes the attenuation provided when the line-of-sight between source and receiver is obscured by an imperforate object with a surface mass of at least 10 kg/m^2.

4.4.2 The amount of distance attenuation expected to occur between each item of plant and each assessment location has been calculated based on point-source propagation. This is considered an appropriate assumption over the propagation distances.

4.4.3 There is clear line-of-sight between the plant and the assessment location of 1 Oxford Street. Hence no corrections owing to screening have been applied.

4.4.4 Line-of-sight between the plant and the assessment location of Tuscany House is obscured by a structure on the roof, hence screening has been accounted for.

4.4.5 Line-of-sight between the plant and the assessment location of 127 Portland Street is partially obscured by a structure on the roof. Hence screening has been accounted for.

4.4.6 The guidance in BS 4142 requires that appropriate corrections be added to the *specific sound level* to account for certain acoustic characteristics that may indicate that the plant noise is more discernible. The corrected sound level is defined as the *rating level*. The following characteristics have been considered:

- Tonality – Noise from the proposed units will typically be airflow noise at maximum duty, which is broadband in character, and therefore not expected to contain tonal qualities. Therefore, no correction has been applied.
- Impulsivity – When properly maintained, noise from the proposed units is not expected to exhibit impulsive characteristics, therefore this correction has not been applied.
- Intermittency – The duty of each individual unit will adjust depending on the cooling/heating duty requested by the occupants. The equipment is, however, expected to operate with gradual stop/starts, so it is not expected that an

intermittent characteristic would be experienced at the neighbouring properties.
- **Other** – The units are not expected to emit any other characteristics that would be readily distinctive against the existing acoustic environment, therefore no correction has been applied.

4.5 Predicted sound levels at neighbouring properties

4.5.1 The predicted sound levels, as BS 4142 rating levels, at each receiver are presented below in comparison to the plant noise emission limits established in Table 4-1.

Receiver	Time	Noise emission limit	Rating level
Tuscany House	Daytime (07:00-23:00)	48 dB $L_{Ar,Tr}$	38 dB $L_{Ar,Tr}$
	Night-time (23:00-07:00)	46 dB $L_{Ar,Tr}$	38 dB $L_{Ar,Tr}$
127 Portland Street	Office hours (08:00 – 18:00)	48 dB $L_{Ar,Tr}$	46 dB $L_{Ar,Tr}$
1 Oxford Street	Office hours (08:00 – 18:00)	48 dB $L_{Ar,Tr}$	46 dB $L_{Ar,Tr}$

Table 4-3 Summary of specific sound levels

4.5.2 The calculated BS 4142 rating levels at all NNSRs meet the noise emission limits established in Table 4-1, i.e., the rating level is predicted to be at least 5dB below the typical background sound level at the nearest noise-sensitive receivers. Noise emission from the proposed plant is therefore expected to comply with Manchester City Council's requirements.

4.6 Structure-borne noise

4.6.1 Manchester City Council's *Planning and Noise Technical Guidance* requires the consideration of structure-borne noise for when fixed plant is attached to a noise-sensitive building. As the site is a hotel, it is considered a noise-sensitive property.

4.6.2 Whitbread details standards, in *Premier Inn Generic Specification for a Turnkey Development (January 2024 - Edition Rev N)*, for installing plant such that acoustic requirements are met. The proposed rooftop plant will be placed atop anti-vibration spring mounts which will be selected to isolate the plant from the surrounding roof structure.

4.6.3 By following the guidance in the Premier Inn standards, structure-borne noise into hotel guestrooms below is expected to be readily controlled.

5 Conclusion

5.1 An external noise survey has been conducted at the site, and the measurement data have been used in conjunction with planning guidance from Manchester City Council to establish noise emission limits at nearby neighbouring properties.

5.2 A noise emission assessment has been undertaken of proposed new building services plant associated with the proposed extension, based on the manufacturer's noise emission data and the findings of the noise survey.

5.3 Noise levels, as BS 4142 rating levels, are expected to be at least 5dB below typical background sound levels at the nearest noise-sensitive receivers. Hence noise emission from the proposed plant is expected to meet Manchester City Council's anticipated requirements.

5.4 Structure-borne noise into the Premier Inn guestrooms will be controlled by installing the proposed equipment on anti-vibration mounts.