RBA ACOUSTICS

175 WEST END LANE, HAMPSTEAD

Plant Noise Assessment

REPORT 8336/PNA
Prepared: 23 January 2018
Revision Number: 1

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Revision	Comment	Date	Prepared By	Approved By
1	First issue of report	23 January 2018	Tom Davies-Smith	Gareth Davies

Terms of contract:

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed in to full working drawings by the lead designer to incorporate all other design disciplines.

In line with our Environmental Policy, up to two hard copies of the report will be provided upon request. Additional copies of the report, or further hard copies of revised reports, would be subject to an administrative cost of £20.00 (+VAT) per copy.

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1.0 INTRODUCTION

It is proposed to locate new items of plant at the rear of 175 West End Lane, Hampstead. As part of the planning application, Camden Council requires consideration be given to atmospheric noise emissions from the proposed equipment at the nearest noise-sensitive property.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emissions in accordance with Camden Council's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 General

In accordance with the requirements of the Local Authority, monitoring of the prevailing background noise was undertaken over the following periods:

Monday 13 to Wednesday 15 November 2017

During the survey periods the weather conditions were generally appropriate for the noise measurement exercise, it being dry with light winds. Rain showers were noted to have occurred on occasions during the measurement period.

Measurements were made of the L_{A90}, L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes duration.

2.2 Measurement Locations

Measurements were undertaken with the microphone positioned in the garden to the rear of 175 West End Lane. This measurement position was considered as being representative of the noise climate as experienced at the closest residential receptors to the proposed plant to the rear of the property. The prevailing noise climate was dominated by a kitchen extract from the neighbouring takeaway as well as passing trains from the Jubilee Underground Line to the north of the property.

The measurement position is also illustrated on the attached Site Plan 8336/SP1.

2.3 Instrumentation

The following equipment was used for the measurements.

Table 8336/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406407	U26539	6 September 2019
Norsonic Pre Amplifier	1209	20688		
Norsonic ½" Microphone	1225	226839	26538	6 September 2019
Norsonic Sound Calibrator	1251	34482	U26537	6 September 2019

The sound level meter was calibrated both prior to and on completion of the survey with no calibration drift observed.

3.0 RESULTS

The noise levels at the measurement positions are shown as time-histories on the attached charts 8336/G1-G2

In order to ensure a worst case assessment the lowest background L_{A90} noise levels measured have been used in our analyses. The lowest L_{A90} and the period averaged L_{Aeq} dB noise levels measured are summarised below.

Table 8336/T2 – Measured Levels

Measurement Period	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 23:00)	40	63
Night-time (23:00 – 07:00)	35	60

4.0 CRITERIA

The requirements of Camden Council's Environmental Health Department regarding new building services plant found in the Camden Local Plan (June 2017) with regard to industrial and commercial noise are as follows:

> *"Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion."*

In line with the above requirements we would propose items of mechanical services be designed so that noise emissions from the plant do not exceed the following levels when assessed at the nearest noise sensitive location:

- Daytime (07:00 - 23:00) 30 dBA
- Night-time (23.00 - 07.00) 25 dBA

Should the proposed plant be identified as having intermittent or tonal characteristics, a further correction should be subtracted from any of the above proposed noise emission limits.

It should be noted that the above requirements are applied at the nearest residential adjacencies and alternative criteria should be incorporated if there are also commercial properties affected by the proposed plant installations.

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Proposed Air Conditioning Unit

2No. Samsung AC052FBRDEH/EU

5.2 Position of Units

It is understood that both condenser units are to be located at the rear of the property above the rear windows of the ground floor extension. The equipment positions are indicated on the attached Site Plan 8336/SP2.

5.3 Operating Hours

Exact operating hours of the plant are unknown, however as the proposed units are to service a bar it has been assumed that they will operate between 17:00-2:00 on Mondays to Thursdays and 17:00-3:00 on Fridays to Sundays.

5.4 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The octave band sound pressure levels of the unit (at 1m) are detailed as follows:

Table 8336/T3 – Manufacturer's Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Samsung AC052FBRDEH/EU	Lp at 1m	35	38	39	37	35	31	27	17	40

Review of the octave band data concludes that there are no tonal characteristics associated with the proposed plant.

5.5 Location of Nearest Residential Windows

The closest residential windows to the plant were advised as being the first and second floor windows of the same building, approximately 10m from the proposed plant location.

5.6 Mitigation

During night-time hours, the noise levels are predicted to be above Camden Council's requirements. To allow the condenser units to run at full power throughout the night, the plant should be enclosed with acoustics louvres. The louvres should be capable of achieving the minimum performance levels detailed in Table 8336/T4 below. An example of an acoustic louvre capable of achieving this performance level would be Slimshield SL-100, detailed below.

Table 8336/T4 – Acoustic Louvres

Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
5	4	5	6	9	13	14	13

5.7 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed air conditioning units at the nearest residential window, based on the information stated above, is summarised below.

- Source Term SPL / SWL
- Additional Unit Contribution
- Mitigation
- Screening
- 20LogR Distance Attenuation

The results of the calculations indicate the following noise levels at the nearest affected residential windows:

Table 8336/T5 – Predicted Noise Levels

Operating Period	Prediction (dBA)	Criterion (dBA)
Daytime (07:00 – 23:00)	15	30
Night-time (23:00 – 07:00)	15	25

6.0 VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that condensing units be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

It is important the isolation is not "short-circuited" by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7.0 CONCLUSION

Measurements of the existing background noise levels at 175 West End Lane, Hampstead have been undertaken. The results of the measurements have been used in order to determine the required criteria for atmospheric noise emissions from the future plant installations.

The results of the assessment indicate atmospheric noise emissions from the plant are within the criteria required by Camden Council providing suitable mitigation measures are employed. As such, the proposed plant installations should be considered acceptable.

Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10}, L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B – Plant calculations

Received Noise Levels Summary

Table 8336/T6 – Predicted Noise Levels Calculation

Unit	Lp @ 1m (dBA)	Reflections (dB)	Distance Loss (dB)	Received Level (dBA)
Samsung AC052FBRDEH/EU (Lower Ground)	40	+6	-19 (9m)	27
Samsung AC052FBRDEH/EU (Ground)	40	0	-20 (10m)	20
Total at Receiver				**28**
Samsung AC052FBRDEH/EU Low Mode (Lower Ground)	30	+6	-19 (9m)	17
Samsung AC052FBRDEH/EU Low Mode (Ground)	30	0	-20 (10m)	10
Total at Receiver				**18**

Appendix C – CDM Considerations

The following hazards pertinent to our design input have been identified and control measures suggested:

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Plant room noise levels may be above lower exposure action level	Hearing damage.	Contractors/ Operators	3	4	12	Alternative plant investigated but not considered viable. Employer should undertake noise at work assessment.	1	4	4
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3
Inertia bases	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3

L: Likelihood
S: Severity
R: Rating

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L_{Aeq} Time History

Measurement Position 1, Monday 13 to Wednesday 15 November 2017

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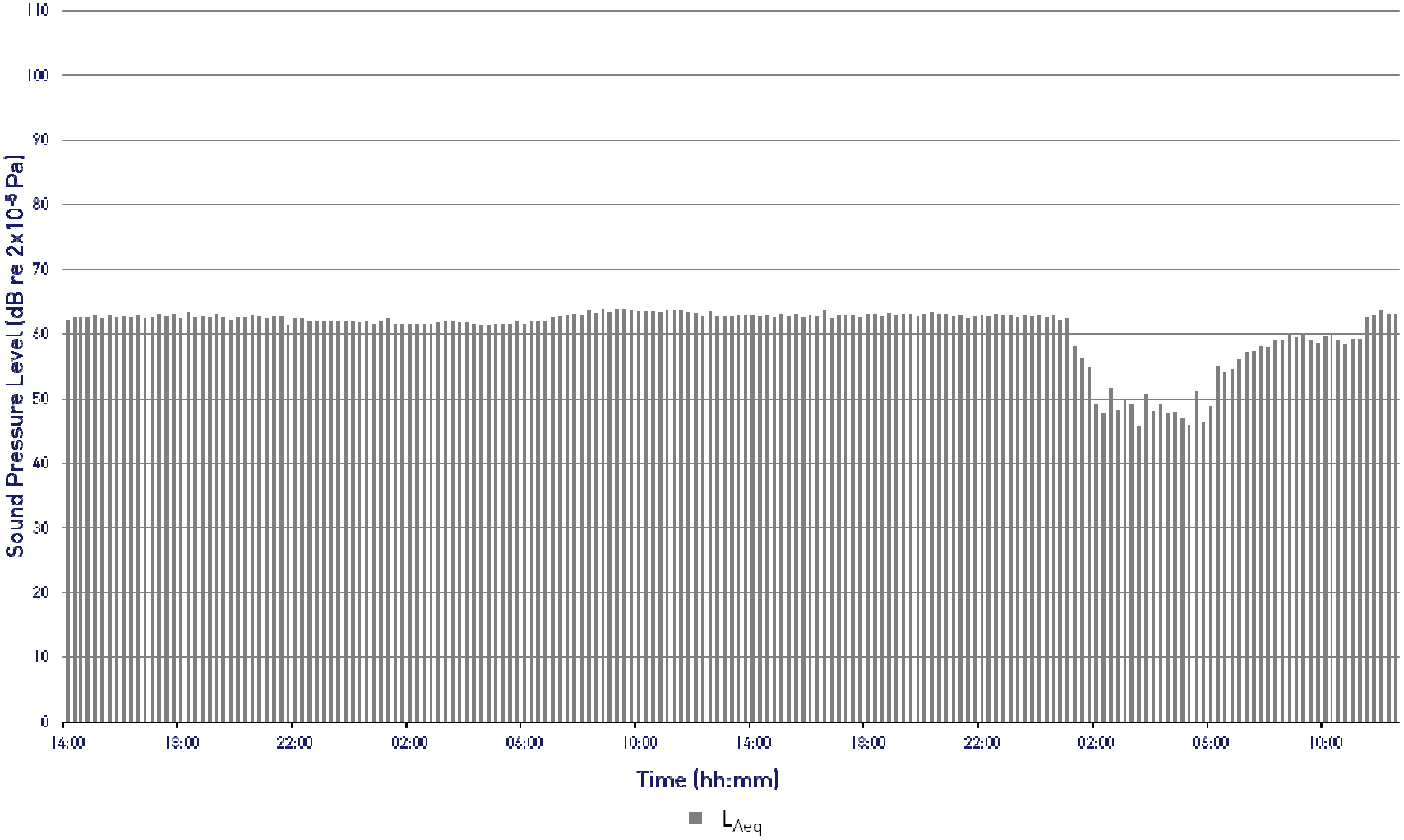
Graph 8336/G1



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$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1, Monday 13 to Wednesday 15 November 2017

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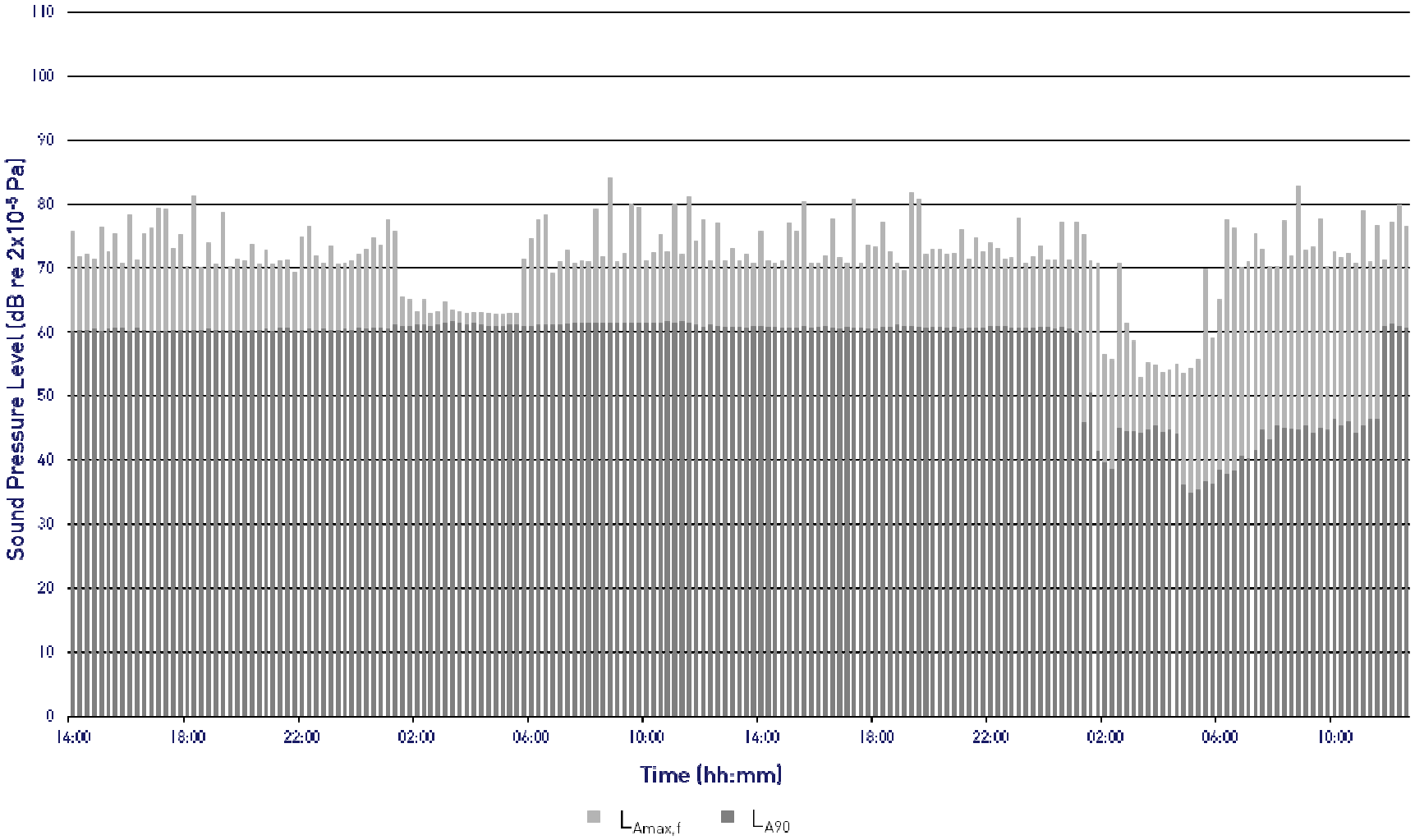
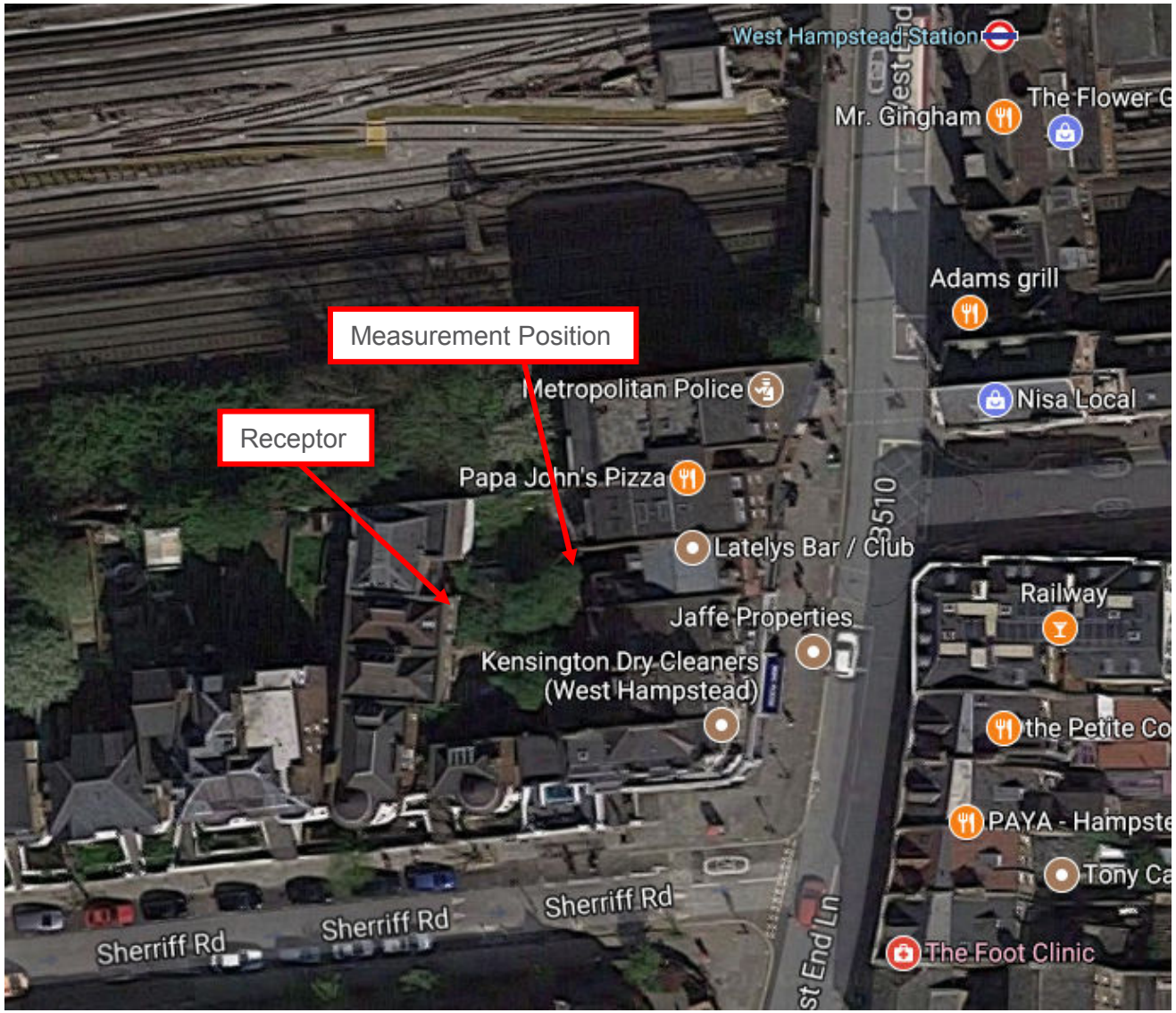
Graph 8336/G2





175 West End Lane, Hampstead

Site Plan showing measurement position

Figure 8336/SP1

23 January 2018

Not to Scale

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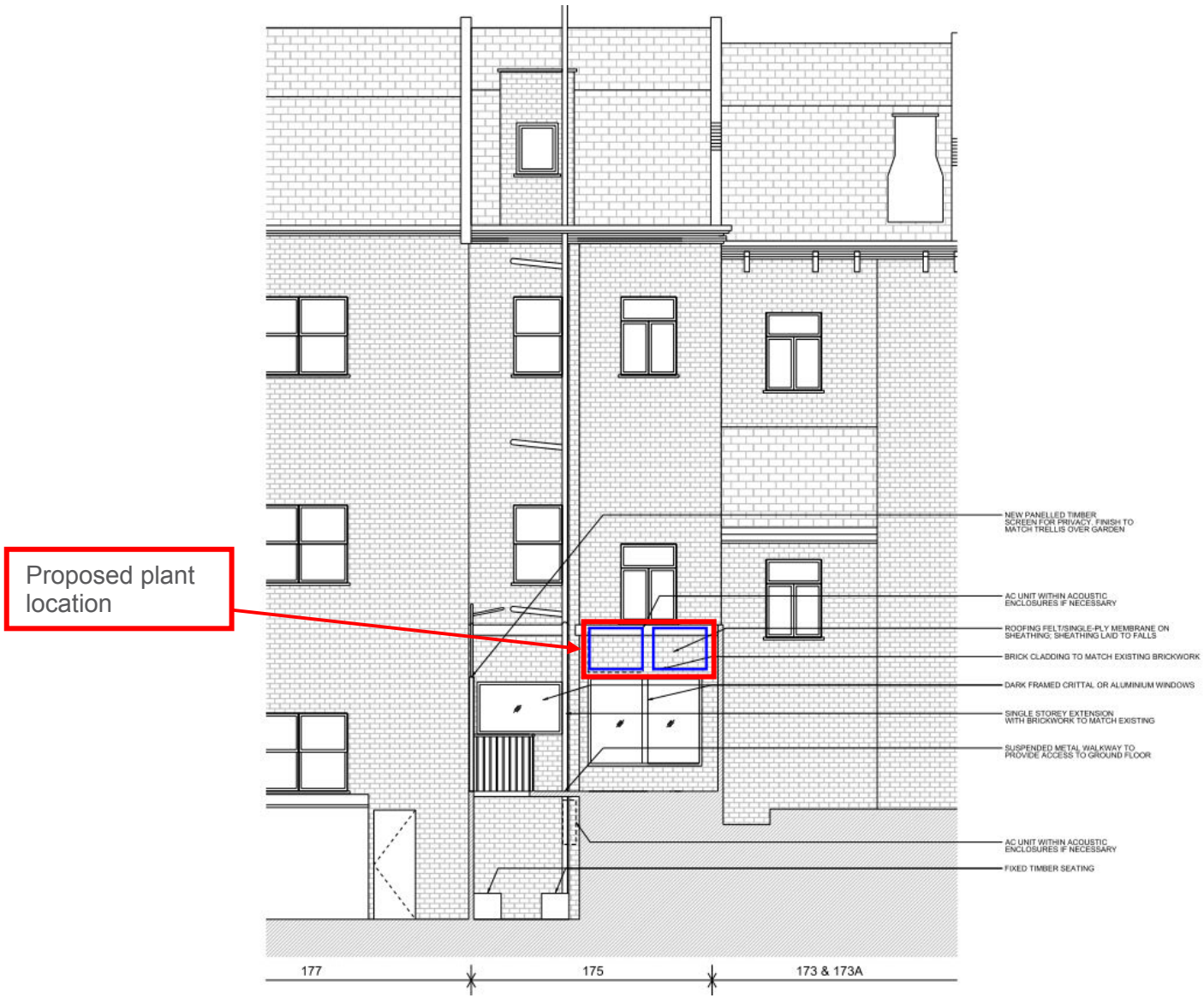

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Site Elevation showing plant locations

Figure 8336/SP2

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Not to Scale

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