

Attachment E

Acoustic Report



DA Acoustic Assessment – The Exchange Hotel, 34-36 Oxford Street, Darlinghurst

Eastern Property Alliance
c/o Sydney Architecture Studio
Level 2, 94 Beattie Street,
Balmain NSW 2041

2020-04-19 Acoustic DA Assessment – The Exchange Hotel, 34-36 Oxford Street, Darlinghurst –
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DA Acoustic Assessment – The Exchange Hotel, 34-36 Oxford Street, Darlinghurst

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1 INTRODUCTION

1.1 Report Objectives

Sydney Architecture Studio (SAS) have been engaged to undertake the design for the adaptive reuse of the Exchange Hotel into short term accommodation. The Exchange Hotel is located at 34-36 Oxford Street, Darlinghurst.

Pulse Acoustic Consultancy Pty Ltd (Pulse Acoustics) has been commissioned to provide the Acoustical Assessment required accompanying the Development Application (DA). The assessment addresses the noise impact of existing road traffic, surrounding mechanical noise from adjacent buildings and operational noise from surrounding external entertainment facilities (namely Oxford Arts Factory OAF, see section 8) on the amenity of internal spaces and sets criteria for noise emission from the development with respect to mechanical plant and activity noise from the proposed communal spaces.

Additionally, approved under application D/2018/1163 are two licensed venues located within the project building. Firstly a live music venue located in the basement with a permissible operation up to 4:00am for a maximum of 250 patrons. Secondly, a bar area located on ground level with identical uses. As approval for these spaces have been previously granted, this report will not assess their impacts to external receivers, which has been undertaken in the *Acoustic Dynamics Report* (ADR) submitted at part of the previous application (reference 4216R002.LB.180830, dated 31st August 2018). Internal transmission is airborne and structure borne noise has been assessed to ensure the future acoustic amenity for future staying guests, see section 9.

The development will be assessed against relevant statutory regulations and guidelines including *Sydney Development Control Plan (DCP) 2012*, Australian / New Zealand Standard AS/NZS 2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors*, the acoustic requirements of the Environment Protection Authority's (EPA) *Noise Policy for Industry (NPI)* and Liquor & Gaming NSW's noise criteria that can be imposed as a Condition on the Hotel's liquor license.

The acoustic criteria required by the Building Code of Australia (BCA) section of the National Construction Code (NCC) for internal construction within the development will also be identified.

1.2 Relevant Guidelines

The guidelines applicable to this assessment include:

- *Sydney Development Control Plan (DCP) 2012 - Part 4 - Section 4.2.3.11 – Acoustic Privacy;*
- *Australian / New Zealand Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors;*
- *NSW Noise Policy for Industry 2017 (NPI);*
- Liquor and Gaming NSW typically imposed noise conditions; and
- Section F5 of the Building Code of Australia (BCA) component of the National Construction Code (NCC) 2019.

1.3 Noise Descriptors and Terminology

Environmental noise constantly varies in level with time. It is therefore necessary to measure environmental noise in terms of quantifiable time periods and statistical descriptors. Typically environmental noise is measured over 15 minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dB(A), the A indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' arithmetic does not apply, e.g. adding two sources of sound of an equal value results in an increase of 3dB (i.e. $60 \text{ dBA} + 60 \text{ dBA} = 63 \text{ dBA}$). A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the L_{Aeq} , $LA1$, $LA10$ and $LA90$ noise levels. The L_{Aeq} noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period and is equivalent to a level that would have been experienced had the fluctuating noise level remained constant during the measured time period.

The $LA1$, $LA10$ and $LA90$ levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels are sometimes thought of as the typical maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included as Appendix A.

2 DESCRIPTION OF EXCHANGE HOTEL REDEVELOPMENT

The hotel is currently closed, however it was previously licensed to serve both food and alcohol.

The primary features of the redevelopment works include:

- Retention and refurbishment of the ground floor into a future licensed bar/café and short term accommodation foyer/reception;
- Conversion of the first and second floor areas to short term accommodation; and
- Construction of the third and fourth floor areas to short term accommodation.

The site is bounded by the following:

- Norman Street along the northern boundary of the site with existing commercial receivers further north located on the opposite side of the street.
- Along the eastern boundary of the site is a three storey mixed use building. The building contains the following uses:
 - Basement Level: A venue with the capacity of 500 persons commonly known as the Oxford Arts Factory (OAF). Currently operating as per D/2006/645/H, dated 25th January 2018.
 - Ground level: a mix of retail and licensed venues (approved).
 - Level 1: 24 hour sex on premise located on level ; and
 - Level 2: Commercial office with a capacity less than 40 works, permitted to be used between 6:00pm and 10:00pm.
- Oxford Street located along the southern boundary of the site with existing commercial and residential receiver further south.
- Existing mixed use building located along the western boundary of the site with ground floor retail and residential located above.

The principal source of external environmental noise impacting on the future development site is vehicle traffic on Oxford Street. Oxford Street carries a high volume of passenger vehicles and public buses, with bus stops located regularly up and down Oxford Street.

In addition to the traffic noise, operational noise impacts from the surrounding licensed venues have the potential to impact on the development, in particular the late night operations of the Oxford Arts Factory.

A site map has been provided below which identifies and surrounding receivers and monitoring locations, see Figure 1. The proposed internal layouts of the building are shown in Figure 2 to Figure 7 below.

Figure 1 Site Location



Legend

- Project Site (*The Exchange Hotel*)
- Residential Receiver
- Commercial Receiver
- Unattended Noise Monitor Location (NML "x")

Figure 2 Plan – Basement

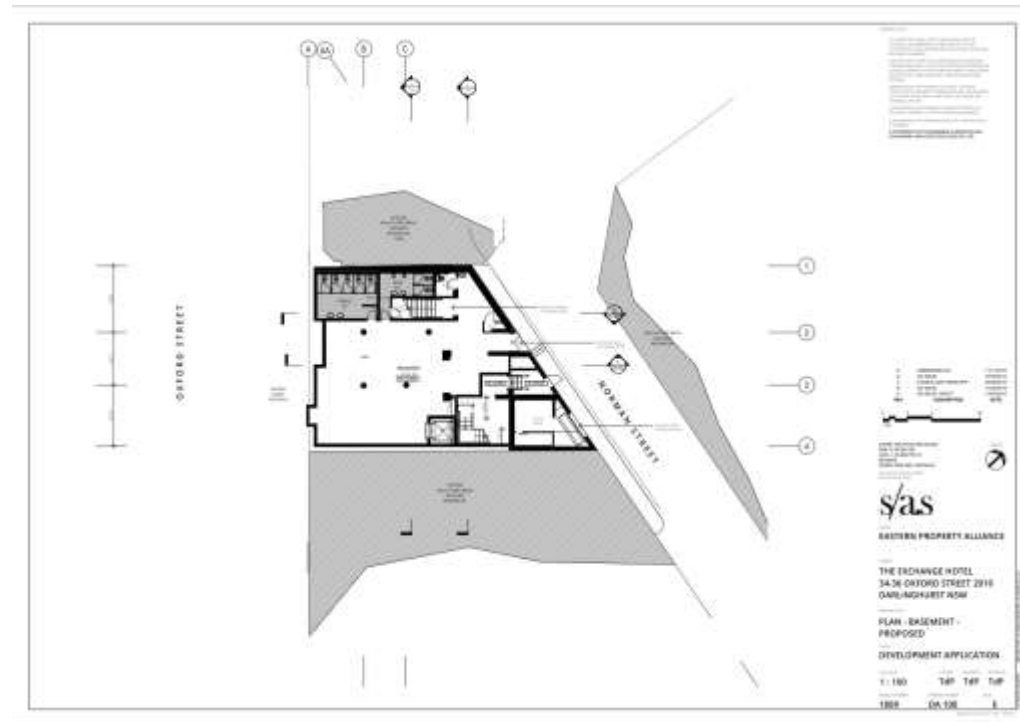


Figure 3 Plan – Ground Level

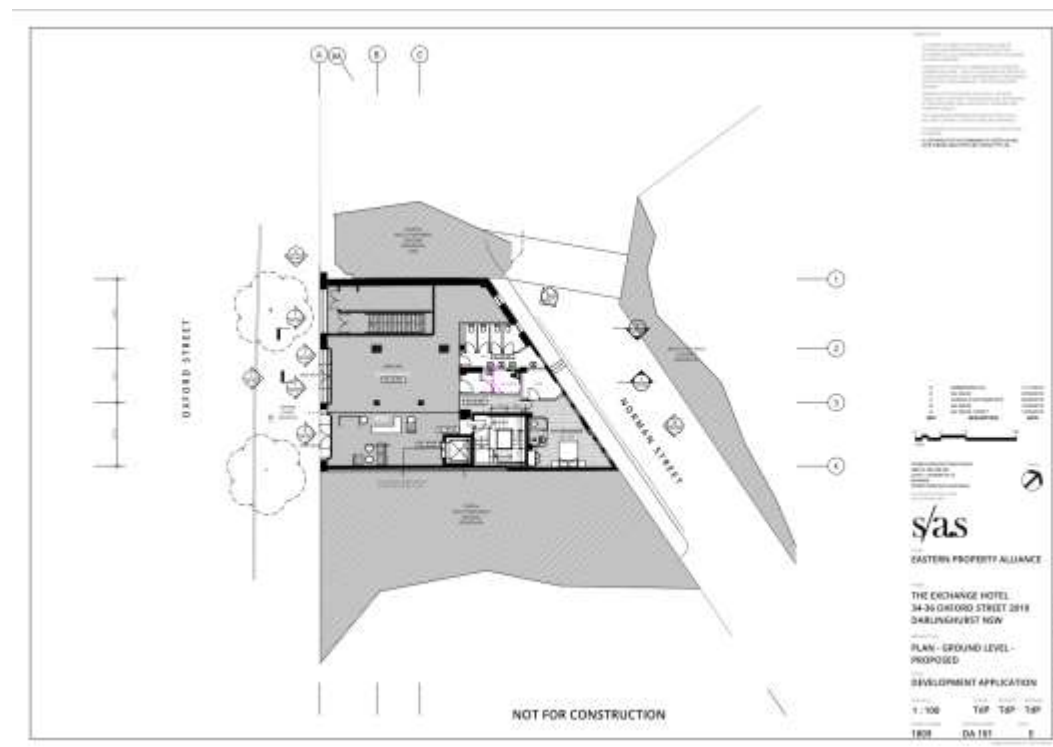


Figure 4 Plan – Level 1

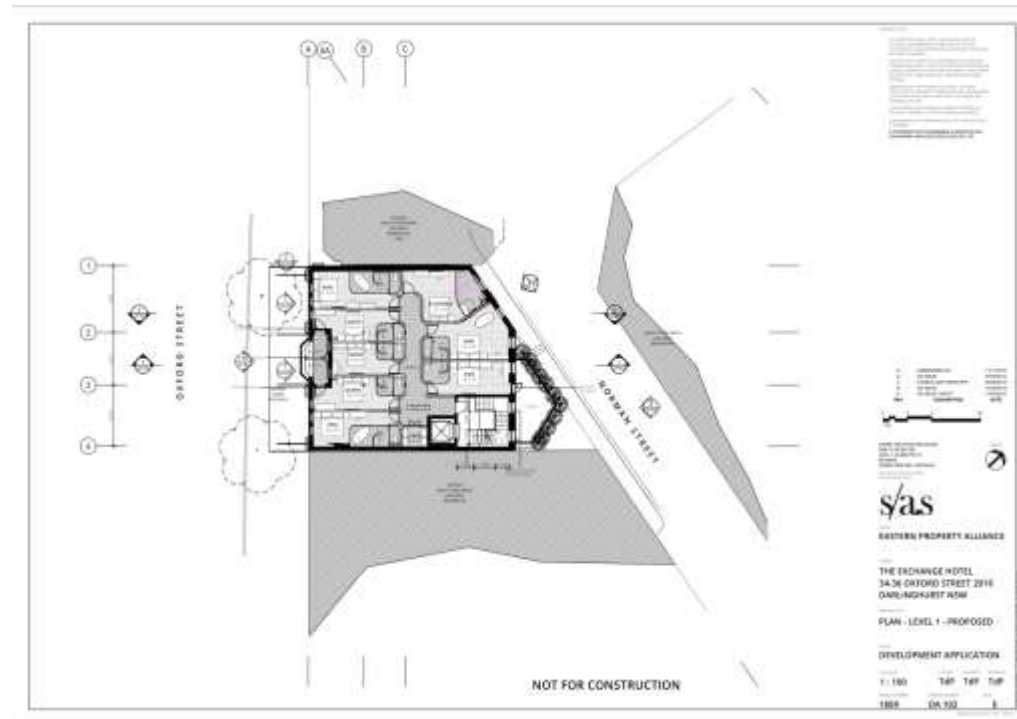


Figure 5 Plan – Level 2

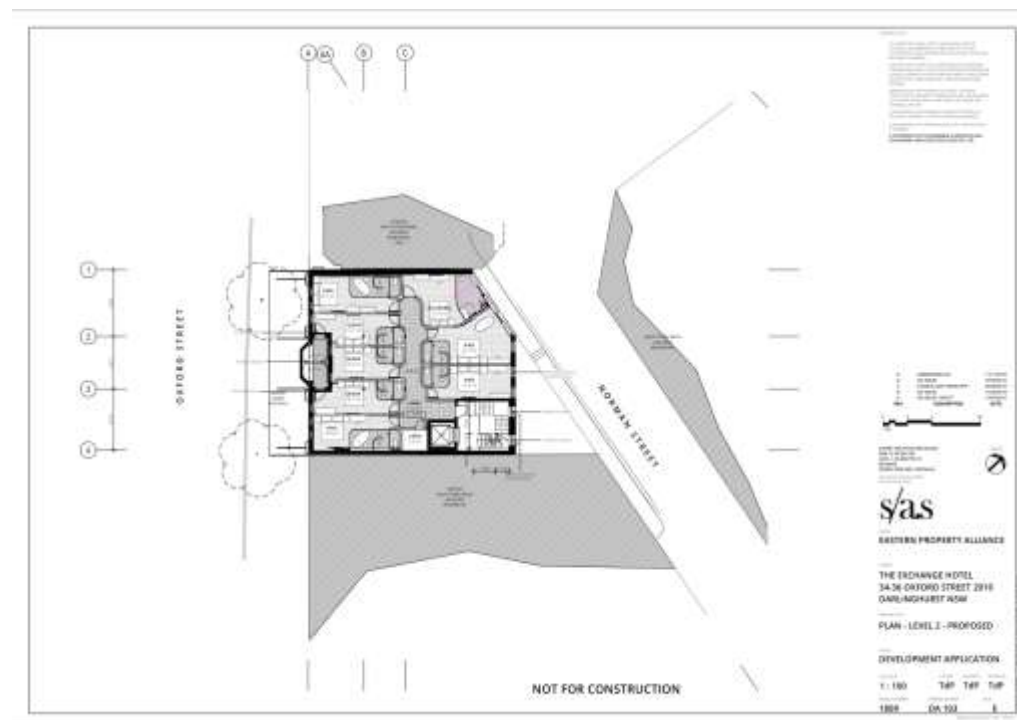


Figure 6 Plan – Level 3

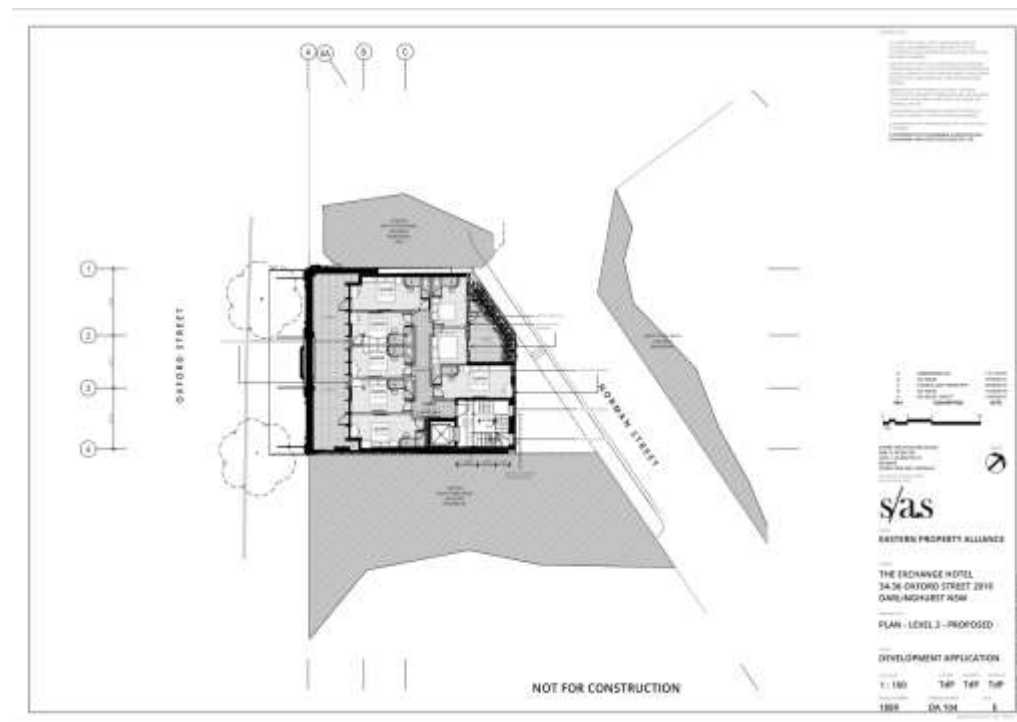
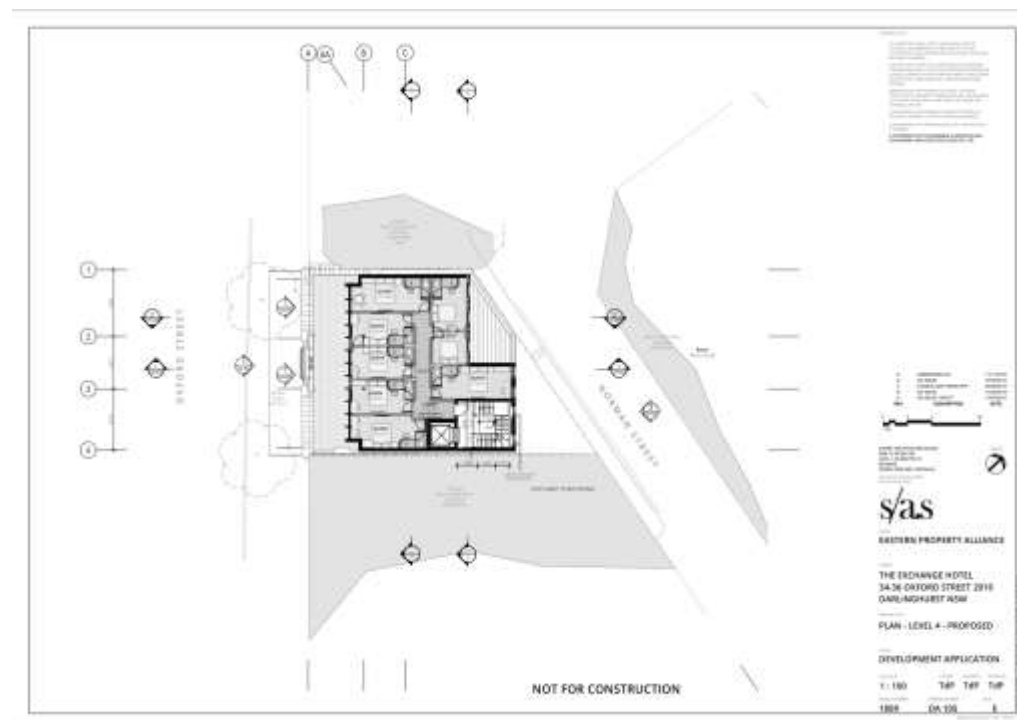


Figure 7 Plan – Level 4



Key aspects of the project include:

- Controlling noise intrusion from road traffic to the short term accommodation;
- Controlling noise emission from the mechanical services associated with the development to satisfy the requirements of the Environment Protection Authority (EPA) and Council;
- Establishing noise criteria for patron or music levels associated with an existing/future licensed venue.

The accommodation to be provided includes:

- Site manager accommodation on the ground floor;
- Eight (8) rooms on Level 1 and 2; and
- Seven (7) rooms on Level 3 and four.

3 EXISTING NOISE ENVIRONMENT

3.1 Unattended Noise Monitoring

Unattended noise monitoring was recently carried out at two locations on the development site, each discussed below.

Onsite noise monitoring was undertaken to quantify the existing noise levels which impact on the development from traffic noise, mechanical plant from surrounding buildings and any operational noise from licensed venues. Additionally, unattended noise monitoring was conducted to establish rating background noise levels in order to nominate permissible acoustic criteria for noise being emitted by the development.

One logger was positioned along the Oxford Street frontage (NML-1) on an existing balcony with full view to Oxford Street. The balcony is located on level one and representative of the first level of hotel accommodation. This location (NML-1) has a façade reflection equal to approximately 2-3 dBA.

The second noise logger was positioned in the rear of the property along Norman Street on level two (NML-2).

The unattended noise monitoring was carried out over a number of days during a one week period from Friday 10th January 2020 to Monday 20th January 2020. The locations of the unattended noise logging surveys are shown in Figure 1 above. During the ambient monitoring, some data was affected by rain periods. These affected time periods have been excluded from the calculated overall statistical noise level results.

Instrumentation used for the noise survey comprised two Svantek 971 sound level meter / analysers (serial numbers 39165 and 39005) fitted with microphone windshields. Calibration of the loggers was checked prior to and following the measurements. Drift in calibration did not exceed ± 0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B and Appendix C. These charts, representing each 24 hour period, show the L_{A1} , L_{A10} , L_{Aeq} and L_{A90} noise levels measured over 15 minute time periods.

The measurement results have been filtered to remove data affected by adverse weather conditions, such as excessively windy or rainy time periods, as recorded by the Bureau of Meteorology weather station at Observatory Hill (ID:066062). Noise measurement data during the time periods when the background noise levels were significantly affected by mechanical services equipment, were also removed from the calculated overall statistical levels.

The noise monitoring locations are also shown in the images contained in Figure 8 and Figure 9 below.

Figure 8 Oxford Street Noise Monitor (NML-1) – Southern Boundary

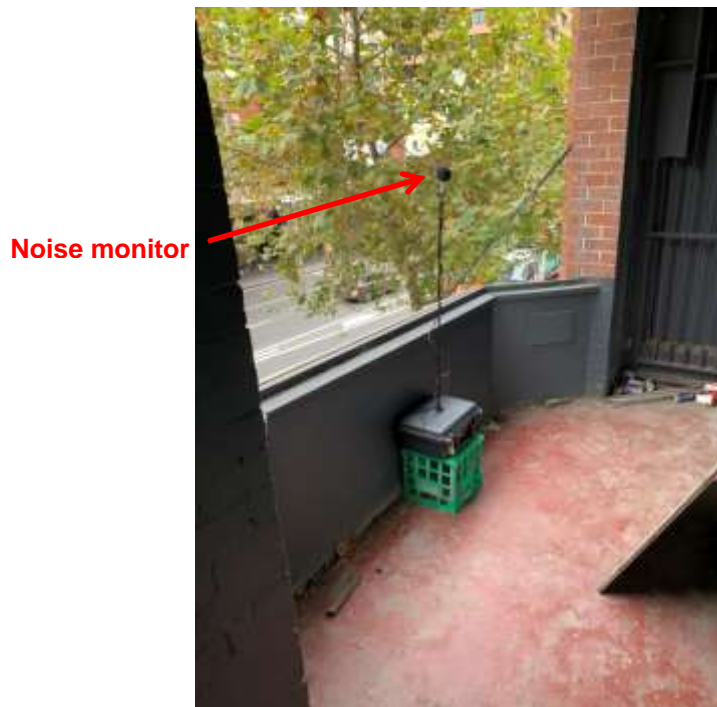


Figure 9 Norman Street Noise Monitor (NML-2) – Northern Boundary



3.1.1 L_{Aeq} Noise Monitoring Results

In order to assess road noise levels incident on the proposed development facade, the data obtained from the two noise loggers has been processed to establish representative ambient noise levels during the defined standard time periods.

These time periods are defined in the NSW Environment Protection Authority's (EPA) Road Noise Policy (RNP) and City of Sydney Council DCP.

Table 1 Measured L_{Aeq} Noise Descriptors (dBA)

Monitor Number	Measurement Location	NSW RNP Periods		City of Sydney DCP Periods	
		Day Period L_{Aeq} (15hour) ¹	Night Period L_{Aeq} (9hour) ¹	Whole Period L_{Aeq} (1hour) (24hour) ¹	Night Period L_{Aeq} (1hour) (9hour) ¹
NML-1	Oxford Street – Southern Boundary	71 dBA	68 dBA	72 dBA	71 dBA
NML-2	Norman Street – Northern Boundary	56 dBA	55 dBA	63 dBA	60 dBA

Note 1: Day period is defined as 7:00am to 10:00pm and Night period is defined as 10:00pm to 7:00am.

3.1.2 Environmental Noise Monitoring Results

In order to assess the acoustical impacts of the development at nearby noise sensitive receivers, the measured background noise data of both monitors was processed in accordance with the recommendations contained in the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (NPI).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and night. The RBL $L_{A90(15minute)}$ and L_{Aeq} noise levels are presented in Table 2 below.

Data affected by adverse meteorological conditions and by operational mechanical services, have been excluded from the results.

A summary of the monitored data representative of the noise levels at the nearest sensitive receivers to the proposed development can be seen below, with the detailed noise logging results contained in Appendix B and C.

Table 2 Measured Ambient Noise Levels corresponding to the NPI's Assessment Time Periods

Monitor Number	Measurement Location	Daytime ¹ 7:00 am to 6:00 pm		Evening ¹ 6:00 pm to 10:00 pm		Night-time ¹ 10:00 pm to 7:00 am	
		RBL ²	LAeq ³	RBL ²	LAeq ³	RBL ²	LAeq ³
NML-1	Oxford Street – Southern Boundary	60 dBA	71 dBA	59 dBA	71 dBA	51 dBA	68 dBA
NML-2	Norman Street – Northern Boundary	51 dBA	57 dBA	52 dBA	57 dBA	50 dBA	56 dBA

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The RBL noise level is representative of the “average minimum background sound level” (in the absence of the source under consideration), or simply the background level.

Note 3: The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

In addition to the overall broadband noise levels (i.e. single number ambient noise level measurement results) provided above, the accompanying single (1/1) octave band spectrum noise levels for each 15-minute period throughout the identified monitoring periods were also recorded. Octave band noise level criteria are sometimes imposed by Liquor and Gaming NSW as a condition on the hotel's Liquor License. The background L_{A90} noise levels in octave obtained during the monitoring periods are shown below.

Table 3 1/1 Spectra – Monitoring Location 1 – Northern Boundary – NML-2 – Norman Street

Time Period	Parameter ¹	Octave Band Centre Frequency, Hz										Overall dBA
		31.5	63	125	250	500	1k	2k	4k	8k		
7:00am – 12:00am (day, evening and early night period) ²	Day Period											
	Measured L _{A90}	52	53	54	52	49	45	40	34	25	51	
	Evening Period											
	Measured L _{A90}	51	54	57	56	52	48	42	36	27	52	
	Early Night Period											
	Measured L _{A90}	48	51	53	50	48	44	39	34	26	50	
Note 1:	Measured L _{A90} spectrum has been collected by the unattended noise monitor, not through attended measurements.											
Note 2:	For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 12:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 12:00 am.											

4 NOISE INTRUSION ASSESSMENT CRITERIA

Internal spaces within the proposed development shall comply with the requirements listed below.

4.1 Sydney Development Control Plan (DCP) 2012 - Part 4 - Section 4.2.3.11 – Acoustic Privacy

Section 4.2.3.11 of the City of Sydney DCP provides the following internal design objectives for residential buildings and serviced apartments:

- 7) *The repeatable maximum $L_{Aeq}(1 \text{ hour})$ for residential buildings and serviced apartments must not exceed the following levels:*
 - a. *for closed windows and doors:*
 - i. 35dB for bedrooms (10pm-7am); and
 - ii. 45dB for main living areas (24 hours).
 - b. *for open windows and doors:*
 - i. 45dB for bedrooms (10pm-7am); and
 - ii. 55dB for main living areas (24 hours).
- 8) *Where natural ventilation of a room cannot be achieved, the repeatable maximum $L_{Aeq}(1 \text{ hour})$ level in a dwelling when doors and windows are shut and air conditioning is operating must not exceed:*
 - a. 38dB for bedrooms (10pm-7am); and
 - b. 48dB for main living areas (24 hours).
- 9) *These levels are to include the combined measured level of noise from both external sources and the ventilation system operating normally.*

Note: The requirements listed above are not strictly applicable to this project as the development is not classified as a *residential building* or *serviced apartments* as defined by the Sydney City LEP, rather *tourism and visitor accommodation* or *short term accommodation*. However, to ensure the future internal acoustic amenity of the occupants, the requirement from item 8a will be adopted. The development also proposes to provide air conditioning to all short term accommodation areas.

4.2 Australian / New Zealand Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors - (AS/NZS 2107:2016)

Recommended ambient noise levels and reverberation times for internal spaces are given in a number of publications including Table 1 of Australian / New Zealand Standard 2107:2016 “*Acoustics - Recommended design sound levels and reverberation times for building interiors*”. Unlike the previous version of this Standard, this latest edition recommends a range with lower and upper levels (rather than “satisfactory” and “maximum” internal noise levels) for building interiors based on room designation and location of the development relative to external noise sources. This change has occurred due to the fact that sound levels below ‘satisfactory’ could be interpreted as desirable, but the opposite may in fact be the case. Levels below those which were listed as ‘satisfactory’ can lead to inadequate acoustic masking resulting in loss of acoustic isolation and speech privacy.

Internal noise levels due to the combined contributions of external noise intrusion and mechanical ventilation plant should not exceed the maximum levels recommended in this Standard. The levels for areas relevant to this development are given in Table 4 below. The mid to maximum points of the internal noise level ranges are generally adopted as the internal design noise criteria for the combined effect of mechanical services and external noise intrusion. In this report we will confine our recommendations to dBA levels, however, where the background noise appears to be unbalanced, AS/NZS 2107:2016 provides direction in terms of suitable diagnostic tools that can be used to assess the spectrum distribution of the background noise.

Table 4 Recommended Design Sound Levels and Reverberation Times

Type of Occupancy/Activity	Design sound level range dBA (LAeq,t)	Project Design Noise Level ¹ dBA (LAeq,t)
Hotel and motels—		
Hotels and motels in inner city areas or entertainment districts or near major roads—		
Sleeping areas (night time)	35 to 40	40
Washrooms and toilets	45 to 55	50
Foyers and recreation areas	45 to 50	50
Bars and lounges	<50	<50
<i>Note 1: Overall recommended level for mechanical services noise and intrusive noise, combined.</i>		

Section 6.18 of AS/NZ 2107:2016 notes that the presence of discrete frequencies or narrow band signals may cause the sound level to vary spatially within a particular area and be a source of distraction for occupants. Where this occurs, the sound level shall be determined as the highest level measured in the occupied location(s).

If tonal components are significant characteristics of the sound within a measurement time interval, an adjustment shall be applied for that time interval to the measured A-weighted sound pressure level to allow for the additional annoyance. If the background sounds include spectral imbalance, then the RC (Mark II) levels indicated in the Standard should be referenced (see also Appendix D of AS/NZ 2107:2016 for additional guidance).

Generally, where the final noise levels are within +/- 2 dB of the specified level given above, the design criteria will be considered met. Both the upper and lower limits will need to be satisfied especially where privacy is important or where noise intrusion to be avoided.

5 OPERATIONAL NOISE EMISSION CRITERIA

5.1 External Noise Criteria

External noise criteria for operational noise are set by NSW EPA's Noise Policy for Industry (NPI).

5.1.1 NSW EPA Noise Policy for Industry (NPI) 2017

In NSW, the control of noise emissions is the responsibility of Local Government (Council) and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled *Noise Policy for Industry* (NSW NPI 2017) which provides a framework and process for determining external noise criteria for the assessment of noise emission from industrial developments. The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

5.1.1.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (LA_{eq}), measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

5.1.1.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient LA_{eq} noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

5.1.1.2.1 Area Classification

The NSW NPI characterises the “Urban” noise environment as an area with an acoustical environment which shows the following:

- It is dominated by ‘urban hum’ or industrial source noise, where urban hum means the aggregate sound of many unidentifiable sources, consisting mostly of traffic and/or industrial related sounds
- Has through traffic with characteristically heavy and continuous traffic flows during peak periods
- It is near commercial or industrial districts
- It has a combination of any of the above

The residential area surrounding the proposed development falls under the “Urban” area classification (residential areas are located within R1 zones which are classified as “urban” in Table 2.3 of the NSW NPI). For residential and non-residential receivers in an urban area, the recommended amenity criteria are shown in Table 5 below.

Table 5 NSW NPI – Recommended LAeq Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day ¹	Recommended Amenity Noise Level (LAeq, period) ²
Residence	Urban	Day	60
		Evening	50
		Night	45
Commercial	All	When in use	65
<p><i>Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am</i></p> <p><i>Note 2: The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.</i></p>			

When the existing noise level from industrial noise sources is close to the recommended “Amenity Noise Level” (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

Where existing road traffic noise is high enough to render stationary industrial noise sources effectively inaudible, the ANL can be modified so that the amenity criteria is not unduly stringent in an environment where road traffic noise is the dominant source of environmental noise. If all the conditions below are satisfied, the ANL becomes LAeq,traffic minus 15 dBA. The conditions are:

- The road traffic noise is the dominant noise source
- The existing noise is 10dB(A) or more above the acceptable ANL for the area
- It is highly unlikely the road traffic noise levels would reduce in the near future

5.1.1.3 Project Specific External Noise Emission Criteria

The intrusive and amenity criteria for industrial noise emissions, derived from the measured data, are presented in Table 6. These criteria are nominated for the purpose of determining the operational noise limits for mechanical plant associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 6.

Table 6 External noise level criteria in accordance with the NSW NPI

Location	Monitor Number	Time of Day ¹	Project Amenity Noise Level, $L_{Aeq, period}$ ² (dBA)	Measured $LA_{90, 15 min}$ (RBL) ³ (dBA)	Measured $L_{Aeq, period}$ Noise Level (dBA)	Intrusive $L_{Aeq, 15 min}$ Criterion for New Sources (dBA)	Amenity $L_{Aeq, 15 min}$ Criterion for New Sources (dBA) ⁵
Oxford Street – Southern Boundary (Residences)	NML-1	Day	55	60	71	65	59
		Evening	45	59	71	64	59
		Night	40	51	68	56	59
Norman Street – Northern Boundary (Residences)	NML-2	Day	55	51	57	56	58
		Evening	45	52	57	57	48
		Night	40	50	56	55	43
Commercial	N/A	When in use	60	N/A	N/A	N/A	63
<p><i>Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am</i></p> <p><i>Note 2: Project Amenity Noise Levels corresponding to “Urban” areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA</i></p> <p><i>Note 3: LA_{90} Background Noise or Rating Background Level</i></p> <p><i>Note 4: Project Noise Trigger Levels are shown in bold</i></p> <p><i>Note 5: Where the resultant project amenity noise level is 10 dB or more lower than the existing traffic noise level or traffic levels are the dominant source, the project amenity noise levels can be set at 15 dB below existing industrial noise levels.</i></p> <p><i>Note 6: According to Section 2.2 of the NSW NPI, the $L_{Aeq, 15 minutes}$ is equal to the $L_{Aeq, period} + 3 dB$</i></p>							

5.1.2 Liquor & Gaming NSW

Section 79 of the Liquor Act 2007 provides mechanisms for complaints to be made when the amenity of local areas is disturbed by the use of licensed premises and registered clubs (including disturbances caused by patrons). These complaints are addressed by the Director of Liquor and Gaming, and in this process they may impose temporary or permanent noise conditions on the licensed venue. Typical noise conditions that are imposed upon licensed premises are as follows:

The LA_{10}^ noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) by more than 5 dB between 07:00 am and 12:00 midnight at the boundary of any affected residence.*

The LA_{10}^ noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) between 12:00 midnight and 07:00 am at the boundary of any affected residence.*

Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07:00 am.

** For the purposes of this condition, the LA_{10} can be taken as the average maximum deflection of the noise emission from the licensed premises.*

This is a minimum standard. In some instances the Director may specify a time earlier than midnight in respect of the above condition.

Interior noise levels which still exceed safe hearing levels are in no way supported or condoned by the Director.

These criteria are applicable to noise emissions from the licensed venue component of the development, excluding noise from mechanical services. For external noise emissions, octave band spectral criteria for each assessment period has been summarised in Table 7 below.

These are based on the measured noise spectra shown in Table 3 and have been adjusted to match the overall RBLs listed in Table 2.

Table 7 Liquor & Gaming NSW – L₁₀ Criteria (external)

Time Period	Parameter ¹	Octave Band Centre Frequency, Hz									Overall dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
7:00am – 12:00am (day, evening and early night period) ²	Day Period										
	Measured L _{A90}	52	53	54	52	49	45	40	34	25	51
	Criteria L _{A10}	57	58	59	57	54	50	45	39	30	56
	Evening Period										
	Measured L _{A90}	51	54	57	56	52	48	42	36	27	52
	Criteria L _{A10}	56	59	62	61	57	53	47	41	32	57
	Early Night Period										
	Measured L _{A90}	48	51	53	50	48	44	39	34	26	50
	Criteria L _{A10}	53	56	58	55	53	49	44	39	31	55
	Note 1: Measured L _{A90} spectrum has been adjusted to match overall RBL for corresponding periods.										
Note 2: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am											

5.1.3 City of Sydney Council – Typically imposed conditions

Conditions of consent typically imposed by the City of Sydney Council in relation to acoustics are outlined below:

NOISE - ENTERTAINMENT

- The L_{A10, 15 minute} noise level emitted from the use must not exceed the background noise level (L_{A90, 15minute}) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 5dB between the hours of 7.00am and 12.00 midnight when assessed at the boundary of any affected residence.
- The L_{A10, 15 minute} noise level emitted from the use must not exceed the background noise level (L_{A90, 15 minute}) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hours of 12.00 midnight and 7.00am when assessed at the boundary of any affected residence.

- (c) *Notwithstanding compliance with (a) and (b) above, noise from the use when assessed as an $L_{A10, 15 \text{ minute}}$ enters any residential use through an internal to internal transmission path is not to exceed the existing internal $L_{A90, 15 \text{ minute}}$ (from external sources excluding the use) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) when assessed within a habitable room at any affected residential use between the hours of 7am and 12midnight. Where the $L_{A10, 15 \text{ minute}}$ noise level is below the threshold of hearing, T_f at any Octave Band Centre Frequency as defined in Table 1 of International Standard ISO 226 : 2003- Normal Equal-Loudness-Level Contours then the value of T_f corresponding to that Octave Band Centre Frequency shall be used instead.*
- (d) *Notwithstanding compliance with (a), (b) and (c) above, the noise from the use must not be audible within any habitable room in any residential use between the hours of 12.00 midnight and 7.00am.*
- (e) *The $L_{A10, 15 \text{ minute}}$ noise level emitted from the use must not exceed the background noise level ($L_{A90, 15 \text{ minute}}$) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.*

Note: The $L_{A10, 15 \text{ minute}}$ noise level emitted from the use is as per the definition in the Australian Standard AS1055-1997 Acoustics – Description and measurement of environmental noise. The background noise level $L_{A90, 15 \text{ minute}}$ is to be determined in the absence of noise emitted by the use and be representative of the noise sensitive receiver. Background noise monitoring must be carried out in accordance with the long-term methodology in Fact Sheet B of the NPfI unless otherwise agreed by the City's Area Planning Manager.

NOISE – COMMERCIAL PLANT / INDUSTRIAL DEVELOPMENT

- (a) *Noise from commercial plant and industrial development must not exceed a project amenity/intrusiveness noise level or maximum noise level in accordance with relevant requirements of the NSW EPA Noise Policy for Industry 2017 (NPfI) unless agreed to by the City's Area Planning Manager. Further:*
 - (i) *Background noise monitoring must be carried out in accordance with the long-term methodology in Fact Sheet B of the NPfI unless otherwise agreed by the City's Area Planning Manager.*
 - (ii) *Commercial plant is limited to heating, ventilation, air conditioning, refrigeration and energy generation equipment.*
- (b) *An $L_{Aeq, 15 \text{ minute}}$ (noise level) emitted from the development must not exceed the $L_{A90, 15 \text{ minute}}$ (background noise level) by more than 3dB when assessed inside any habitable room of any affected residence or noise sensitive commercial premises at any time. Further:*
 - (i) *The noise level and the background noise level shall both be measured with all external doors and windows of the affected residence closed.*
 - (ii) *Background noise measurements must not include noise from the development but may include noise from necessary ventilation at the affected premise.*

- (c) *Corrections in Fact Sheet C of the NPfI are applicable to relevant noise from the development measured in accordance with this condition, however duration corrections are excluded from commercial noise.*

Note: Requirements shown in the *Noise – Entertainment* condition outlined above are identical to those outlined in the Liquor & Gaming NSW requirements shown above (section 5.1.2). Requirements shown in the *Noise – Commercial Plant / Industrial Development* condition are identical to those outlined in NSW EPA Noise Policy for Industry (NPI) (section 5.1.1).

6 INTERNAL SOUND INSULATION CRITERIA

6.1 National Construction Code (NCC) & Building Code of Australia (BCA)

The National Construction Code (NCC) & Building Code of Australia (BCA) provided internal sound isolation requirements for Class 2 or 3 building in Part F5.

A Class 3 building is a residential building, other than a Class 1 or 2 building, which is a common place of long term or transient living for a number of unrelated persons. Example: boarding-house, hostel, backpackers accommodation or residential part of a hotel, motel, school or detention centre.

The short term accommodation located above ground fall under a Class 3 category.

6.1.1 Common Floors

Section FP5.1 of the BCA states that for Class 2 or 3 buildings:

Floors separating -

- a) *sole-occupancy units; or*
- b) *sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or a part of a different classification,*

must provide insulation against the transmission of airborne and impact generated sound sufficient to prevent illness or loss of amenity to the occupants.

F5.4 provides the sound insulation performance rating of floors as follows:

- a) *A floor in a Class 2 or 3 building must have an R_w+C_{tr} (airborne) not less than 50 and an $L_{n,w}$ (impact) not more than 62 if it separates—*
 - (i) *sole-occupancy units; or*
 - (ii) *a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.*
- b) *A floor in a Class 9c building separating sole-occupancy units must have an R_w not less than 45.*

FV5.1 states that compliance with FP5.1 is verified when it is measured in-situ that the separating floor has -

- a) *airborne: a weighted standardised level difference with spectrum adaptation term ($D_{nT,w} + C_{tr}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1; and*
- b) *impact: a weighted standardised impact sound pressure level with ($L_{nT,w}$) not more than 62 when determined under AS ISO 717.2.*

6.1.2 Common Walls

Section FP5.2 of the BCA requires:

Walls separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, must provide insulation against the transmission of -

- a) *airborne sound; and*
- b) *impact generated sound, if the wall is separating a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit,*

sufficient to prevent illness or loss of amenity to the occupants.

F5.5 of the BCA provides the sound insulation performance rating of walls as follows:

- a) *A wall in a Class 2 or 3 building must -*
 - (i) *have an $R_w + C_{tr}$ (airborne) not less than 50, if it separates sole-occupancy units; and*
 - (ii) *have an R_w (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and*
 - (iii) *comply with F5.3(b) if it separates—*
 - (A) *a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or*
 - (B) *a sole-occupancy unit from a plant room or lift shaft.*
- b) *A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an R_w not less than 30.*
- c) *A wall in a Class 9c building must have an R_w not less than 45 if it separates—*
 - (i) *sole-occupancy units; or*
 - (ii) *a sole-occupancy unit from a kitchen, bathroom, sanitary compartment (not being an associated ensuite), laundry, plant room or utilities room.*
- d) *In addition to (c), a wall separating a sole-occupancy unit in a Class 9c building from a kitchen or laundry must comply with F5.3 (b).*
- e) *Where a wall required to have sound insulation has a floor above, the wall must continue to -*
 - (i) *the underside of the floor above; or*

- (ii) *a ceiling that provides the sound insulation required for the wall.*
- f) *Where a wall required to have sound insulation has a roof above, the wall must continue to -*
 - (i) *the underside of the roof above; or*
 - (ii) *a ceiling that provides the sound insulation required for the wall.*

FV5.2 states that compliance with FP5.2(a) to avoid the transmission of airborne sound through walls is verified when it is measured in-situ that –

- a) *a wall separating sole-occupancy units has a weighted standardised level difference with spectrum adaptation term ($D_{nT,w} + C_{tr}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1; or*
- b) *a wall separating a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, has a weighted standardised level difference ($D_{nT,w}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1; or*
- c) *any door assembly located in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby, or the like, has a weighted standardised level difference ($D_{nT,w}$) not less than 25 when determined under AS/NZS 1276.1 or ISO 717.1.*

6.1.3 Summary of BCA Acoustic Requirements

A summary of the acoustic requirements of the BCA 2019 for Class 2 or 3 buildings is given in Table 8 below.

Table 8 BCA 2019 Sound Insulation Requirements

Construction	2019 BCA	
	Laboratory performance requirements	Verification method
Walls between sole occupancy units	$R_w + C_{tr}$ not < 50	$D_{nT,w} + C_{tr}$ not < 45
Walls between a bathroom, sanitary compartment, laundry or kitchen in one sole occupancy unit and a habitable room (other than a kitchen) in an adjoining unit	$R_w + C_{tr}$ not < 50 and Must have a minimum 20 mm cavity between two separate leaves	$D_{nT,w} + C_{tr}$ not < 45 “Expert Judgment” Comparison to the “Deemed to satisfy” Provisions
Walls between sole occupancy units and a plant room or lift shaft	R_w not < 50 and Must have a minimum 20 mm cavity between two separate leaves ¹	$D_{nT,w}$ not < 45
Walls between sole occupancy units and a stairway, public corridor, public lobby or the like, or parts of a different classification	R_w not < 50	$D_{nT,w}$ not < 45
Door assemblies located in a wall between a sole-occupancy unit and a stairway, public corridor, public lobby or the like	R_w not < 30 ²	$D_{nT,w}$ not < 25
Floors between sole-occupancy units or between a sole-occupancy unit and a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification	$R_w + C_{tr}$ not < 50 $L_{n,w}$ not > 62	$D_{nT,w} + C_{tr}$ not < 45 $L'_{nT,w}$ not > 62
Soil, waste, water supply and stormwater pipes and ductwork to habitable rooms	$R_w + C_{tr}$ not < 40	n/a
Soil, waste, water supply and stormwater pipes and ductwork to kitchens and other rooms	$R_w + C_{tr}$ not < 25	n/a
Intra-tenancy Walls	There is no statutory requirement for airborne isolation via intra-tenancy walls.	
<i>Note 1: A wall must be of “discontinuous construction” if it separates a sole occupancy unit from a plant room or lift shaft. Clause F5.3(c) defines “discontinuous construction” as a wall having a minimum 20 mm cavity between two separate leaves with no mechanical linkage except at the periphery.</i>		
<i>Note 2: Clause FP5.3(b) in the 2016 BCA states that the required insulation of a floor or wall must not be compromised by a door assembly.</i>		
<i>Note 3: Masonry walls must be laid with all joints filled solid, including those between the masonry and any adjoining construction</i>		

7 NOISE INTRUSION ASSESSMENT

Utilising the measured noise levels presented in Section 3 and the internal noise objectives outlined in Section 4 the following building envelope constructions are recommended.

7.1 Glazing Recommendations

Recommendations of in-principle sound transmission loss requirements and indicative glazing systems are based on a typical reverberation time of 0.6 seconds in the identified rooms.

The recommended sound transmission loss requirement required to satisfy the specified internal noise level criteria, together with typical glazing constructions, are summarised in Table 9 below.

Table 9 In-principle Glazing Recommendations

Level	Occupancy Area	Minimum Glazing System Rating Requirements	Indicative glazing selection
Ground Level	Northern Façade (Norman Street)	Bar & Café (Including Basement Doors): Rw (C;Ctr): 35 (-1;-3)	12.38mm Laminate
		Site Manager: Rw (C;Ctr): 33 (-1;-3)	10mm Float
	Southern Façade (Oxford Street)	Bar & Café: Rw (C;Ctr): 35 (-1;-3)	12.38mm Laminate
		Hotel Foyer: Rw (C;Ctr): 33 (-1;-3)	10mm Float
Level 1, 2, 3 and 4	Northern Façade (Norman Street)	Rw (C;Ctr): 33 (-1;-3)	10mm Float
	Southern Façade (Oxford Street)	Rw (C;Ctr): 48 (-1;-3)	10.38mm Laminate + 100mm Airgap + 6mm Float
Note 1: These are preliminary selections will be confirmed in the detailed design stage.			

Please note for windows, this performance is not only subject to the glazing selection but also to the construction of the window frame and the frame seal selection. Therefore, it is recommended that the window manufacturer should confirm that the required sound insulation can be achieved. It is anticipated that the window system should comprise Q-Lon (or equivalent) or fin seals with deep C channels as part of the window track (**i.e. Performance levels outlined above need to be achieved with glazed panels + frame + seals**).

7.2 External Wall Construction

External wall constructions will be constructed either from the existing masonry or light weight cladding systems. In the event the external wall is constructed from a masonry construction, no further acoustic upgrading is required.

For walls constructed from a light weight construction, the following construction is recommended.

Table 10 Recommended Light Weight External Wall Construction

Façade	Space	External Lining	Stud System	Internal Lining
Northern Façade (Norman Street)	Short term accommodation (hotel rooms)	Zinc Panelling (assumed 0.6mm)	Steel Stud + 110mm thick 11kg/m ³ glasswool insulation	2 x 13mm Standard Plasterboard
	Wet Areas (i.e. Bathrooms, ensuites etc.)			1 x 9mm Fibre Cement Sheeting
Northern Façade (Norman Street)	Short term accommodation (hotel rooms)			2 x 13mm Standard Plasterboard
	Wet Areas (i.e. Bathrooms, ensuites etc.)			1 x 9mm Fibre Cement Sheeting

If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

7.3 External Roof Construction

The external roof will be constructed from a sheet metal construction, as such the following constructions are recommended.

Table 11 Recommended Light Weight External Roof Construction

Space	External Lining	Truss System	Internal Lining
Sleeping areas and common areas	0.48mm sheet metal (assumed Colorbond™ or similar)	Steel or Timber Truss with a minimum airgap of 250mm + 75mm thick 11kg/m ³ glasswool insulation	1 x 13mm Standard Plasterboard
Wet Areas (i.e. Bathrooms, ensuites etc.)			1 x 13mm Standard Plasterboard OR 1 x 6mm Fibre Cement Sheeting

If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

8 OPERATIONAL NOISE IMPACTS – OXFORD ARTS FACTORY

As detailed in Section 2 of this report, the Oxford Arts Factory (OAF) is located in the basement of the building along the eastern boundary of the site. To ensure that the future occupants are not unduly affected by noise from the operation of this existing venue, a detailed assessment has been conducted below.

8.1 Operating Parameters

Currently, the venue operates in a wide range of ways, as shown in the most recent Section 4.55 for the venue (D/2006/645/H, dated 14th March 2018). See Condition 1 and 4 below.

Figure 10 Condition 1 *Approved Development* – Oxford Arts Factory – D/2006/645/h

(1) APPROVED DEVELOPMENT

- (a) Development must be in accordance with Development Application No. D/2006/645 dated 28 April 2006 and Statement of Environmental Effects prepared by Design Collaborative dated April 2006, and supplementary amending Statement of Environmental Effects prepared by Design Collaborative dated September 2006, and the following drawings:

Drawing Number	Architect	Date
S96/F	Michiel Gerber	September 2006

and as amended by the conditions of this consent:

- (b) In the event of any inconsistency between the approved plans and supplementary documentation, the plans will prevail.
- (c) Between the hours of 11.00am to 6.00pm the premises shall be used as an art gallery and art house cinema only, which may or may not permit minors to be in attendance, ~~(with the exception of major special events including the Festival of Sydney, the Sydney Biennale, the Gay & Lesbian Mardi Gras, Mercedes Australian Fashion Week and any other major events and functions from time to time, with such other events and functions,~~ which may or may not permit minors to be in attendance.

~~,not occurring on more than 3 days in any one week being approved in writing by the Council. For the purpose of clarity, if single or multiple events and/or functions are proposed, the combined number of days shall be no more than 3 days in any one week. If written notification is given to Council at least twenty-eight (28) days beforehand, such events or functions may occur on more than 3 days in any one week, unless Council advises otherwise within seven (7) days of that notification.)~~

After 9.00pm until close at least 2 different forms of entertainment (excluding stationary art exhibitions) shall take place such as live music, theatre, cabaret, burlesque, vaudeville, dance, comedy, spoken word, poetry recitals, art house cinema, art exhibitions, fashions shows, special events, functions and DJs. For the purpose of clarity, this condition does not require the provision of 2 continuous and simultaneous forms of entertainment between 9.00pm and closing. The premises must not

operate solely as a nightclub and shall be a venue which has a market orientation towards art, live performances, and supporting cultural events and endeavours.

(Section 96 modification D/2006/645/F, 10 February 2012)

(As amended D/2006/645/H – 14 March 2018)

- (d) Patron queues shall be required to be formed with a cordon placed on the footpath to ensure at least 4 metres of clearance for the public to pass. The queue shall be limited to 10 people except at opening times, shall form against the building edge, and shall not obstruct any emergency exits or the entry point to any open premises.

(Section 96 modification D/2006/645/F, 10 February 2012)

- (e) Entry to the premises shall be restricted between the hours of 8pm and 6am the following day to persons 18 years of age and over.
 - (i) Notwithstanding (e) above, entry may be permitted to minors who are part of an entertainment set. Their movement shall be restricted to either the stage or green room. Minors who are permitted entry for the purpose of entertainment are not permitted in any other part of the premises between the hours of 8pm and 6am the following day when not in the company of a staff member or guardian. Once the minor has finished their set they must leave the premises within thirty (30) minutes.
 - (ii) All ages are permitted in the premises between the hours of 11am and 8pm.
- (f) Notwithstanding (e) above, entry to minors may be permitted between the hours of 8pm and 12 midnight for the purposes of an open age function, of which, the following must be satisfied for such a function to be permissible:
 - (i) Written notification must be given to the NSW Police Service not less than two (2) weeks prior to the commencement of the function.
 - (ii) All minors must leave the premises with fifteen (15) minutes of the cessation of the function, of which, will be no later than 12 midnight of the same day the function began.
 - (iii) All patrons aged eighteen (18) or over who wish to purchase alcohol must obtain an identification band. The band must only be obtained after showing photo identification. The identification bands must not be easily removable and will be constructed in such a way as to only be removed through cutting or tearing of the band.
 - (iv) Two separate bar areas must be in operation during an open age function, of which, one must serve no alcohol and no alcohol is to be visible.
 - (v) Drinks are not permitted to be taken from one bar area to the other during a function.

- (g) The Oxford Art Factory will not be held responsible for minors who purposefully and intentionally mislead staff by providing falsified identification documents, unless due care has not been taken to verify the authenticity of such documents, including:
 - (i) Checking the identification for evidence of tampering. Including scratches to modify the date of birth or attempts to peel the identification apart;
 - (ii) Checking for a clear laminate cover to modify the date of birth;
 - (iii) Using an ultra-violet light to check for hidden insignia; and
 - (iv) Checking that the person providing the identification is the person to which the identification belongs to. Where a reasonable search, such as the above, would not reveal a falsified identification document then the Oxford Art Factory will not be held responsible. If a minor is found to be on premises and a reasonable search would reveal falsified documents then the Oxford Art Factory is responsible for that minor being permitted entry.
- (h) If a minor is found attempting to intentionally mislead staff via falsified documents in order to gain entry to the premises, the identification is to be confiscated and the minor is to be held and handed over to the NSW Police Service.

Amended 20 January 2009

Figure 11 Condition 4 *Hours of Operation – Sensitive Uses* – Oxford Arts Factory – D/2006/645/h

(4) HOURS OF OPERATION – SENSITIVE USES

The hours of operation are regulated as follows:

- (a) The hours of operation must be restricted to between 11:00am and 12:00 midnight, seven (7) days per week.
- (b) Notwithstanding (a) above, the premises may operate between 12.00 midnight and 6.00am the following day, seven days a week for a trial period of ~~12 months from the date of this Section 96 consent (20 January 2009) of issue of an Occupation Certificate for the premises two five~~ years from the date of the Notice of Determination for Section ~~96-4.55~~ modification D/2006/645/DGH, **which is 21 December 2012 14 March 2018**. However, there shall be no entry of new patrons after 3.00am on any day above.

(Section 96 modification D/2006/645/F, 10 February 2012)

(Amended 21 December 2012)

(As amended D/2006/645/H – 14 March 2018)

- (c) A further application may be lodged to continue the trading hours outlined in (b) above before the end of the trial period. Council's consideration of a proposed continuation and/or extension of the hours permitted by the trial will be based on, among other things, the performance of the operator in relation to the compliance with development consent conditions, any substantiated complaints received and any views expressed by the Police.

Amended 20 January 2009

8.2 Assessment of Noise Impacts

To ensure the acoustic amenity of the future occupants, an assessment of the existing operational noise impacts from the Oxford Arts Factory has been addressed below. In assessing the potential noise impacts, two forms of noise transmission have been identified; airborne transmission (i.e. noise breaking through the common wall construction and then subsequently being transmitted between internal spaces as well as breaking out of the structure and then breaking back in through the proposed development's facade) and structure borne transmission (vibration transmission through the common or connected building structures). Each is discussed in detail below.

Note: In addressing the transmission paths below, some assumptions have been made. These assumptions are all outlined in detail and justification for each assumption has been provided. These assumptions, in particular the operations of the OAF, have been based on the publically available information contained in the City of Sydney's Development Application website. We have tried to confirm the validity of these assumption however we cannot take any responsibility for the accuracy of this publically listed information.

8.2.1 Airborne Transmission (i.e. Façade Breakouts)

As the OAF is located in the basement of the 38-46 Oxford Street building, there is a limited area for airborne noise to breakout into the surrounding atmosphere. However, each area is assessed below.

8.2.1.1 Noise in Rear Lane (Norman Lane)

- Located along the northern boundary of the site (Norman Lane) are a collection of emergency entry/exit points as well as non-operable windows. During the original application for the OAF (D/2006/645) Wilkinson Murray (WM) conducted an acoustic assessment and nominated the following acoustic treatments to be installed along the northern façade of the venue:
 - (Page 9 of WM Report): *"..... potential to receive noise emission from the proposed new venue transmitted via the fire escape doors and roller doors in the rear façade of the building. The building openings will need to be acoustically treated using sound locks."*
 - (Page 9 of WM Report): *".....It will be necessary to seal up unnecessary openings with heavy masonry"*
- As per condition 19a of application D/2006/645 these recommendations were required to be installed. As the OAF is now operating, Pulse Acoustics has assumed these have been installed as required by the approval.
- An acoustic model of noise breakout via the identified openings above was conducted by Pulse Acoustics and compliance with the internal noise criteria outlined in Section 4 of this report was determined to have been satisfied.
 - It is noted that the modelling was based on the maximum number of patrons permitted as well as the maximum noise level permitted in the venue, all of which is outlined in the WM report. These are 500 patrons and 107dBA L_{A10} .
 - Additionally, as identified in section 2 of this report an unattended noise monitor was installed in the rear of the project property (along Norman Lane) for a period of eleven (11) days. Any typical airborne noise breakout from the OAF would have been recorded by the monitoring device and considered in the acoustic assessment of noise intrusion through the building envelope.

- It is noted that information available online suggests that several music events were held at the OAF during the period of monitoring.

8.2.1.2 Noise along Oxford Street

- Similar to the explanation above, noise breakout from the facade of the main entry/exit lobby of the OAF located along Oxford Street frontage is a possibility.
- Oxford Street, which fronts the southern building façade of the project site, is a very busy road and carries a range of passenger and commercial vehicles, including public transit buses. The average night time noise levels along the future hotel room façade measured noise levels of 68dBA $L_{Aeq}(1\text{hour})$.
- To ensure that the internal noise level for the future hotel rooms achieves the objectives given in Section 4; Pulse Acoustics recommends the building envelope be acoustically upgraded as outlined in Section 7 of this report.
- Therefore, any level of noise breakout from the operation of the OAF (assuming environmentally compliant operations of the venue) impacting on the future hotel room façade will be significantly less than the levels of transportation noise and therefore internal noise levels will still be achieved.
 - Also an unattended noise monitor (similar to Norman Street) was installed along the Oxford Street façade to capture all environmental noise (both transportation and entertainment events) and so has already been allowed for in our façade acoustic treatment.

8.2.1.3 Noise Breakout above Ground Level

In our review of the WM report, it was noted that noise impacts to other commercial receivers within the same building as the OAF was assessed. In the report, WM state that a 200mm concrete slab would be sufficient to control noise escaping to levels above ground level. They also note that the existing slab is thinner than this and therefore an alternate acoustic ceiling is recommended inside the OAF tenancy.

Pulse Acoustics believes any potential noise breakout above ground level are not considered to be an issue as the recommendations for the acoustic ceiling would have been installed as they were part of Condition 19a of the project approval.

8.2.1.4 Summary of Airborne Noise Impacts

In summary, an assessment of the airborne breakout noise impacts has been provided for the northern and southern façades, as well as above the ground level of the Oxford Arts Factory building, and will result in compliance with the criteria outlined in Section 4.

8.2.2 Structure borne Noise Impacts

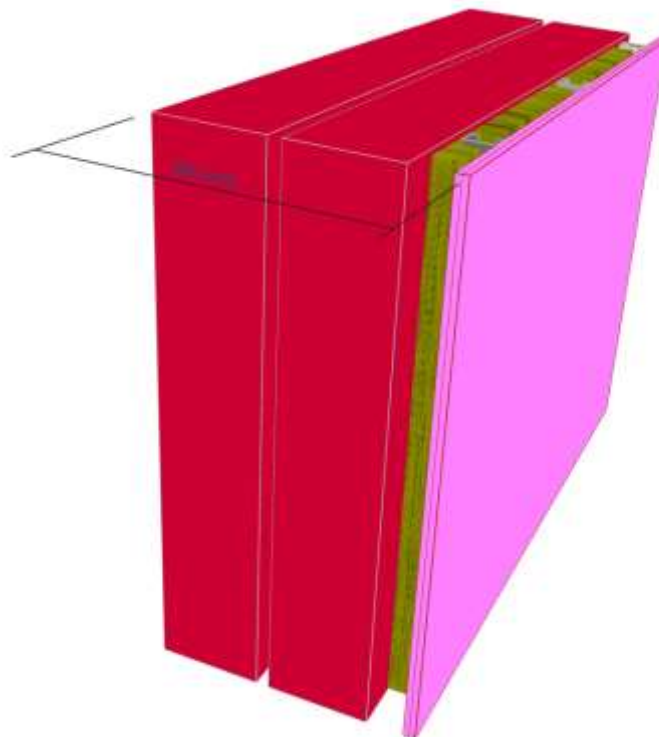
An assessment of the structure borne noise impacts from the OAF to the proposed development has been assessed using a desktop study methodology as well as recommendations for further onsite works in the event of approval. Each are discussed below.

8.2.2.1 Recommendations Prior to Onsite Investigations

A common wall construction is located along the eastern boundary of the project site and the western boundary of the OAF building. The exact build-up of this wall is not known for either side due to the age of the buildings and their date of construction. However, from onsite observations and previous experience, we have assumed the following **worst case construction** of the walls.

- Wall of the 34-36 Oxford Street Building (Project Site): 230mm double brick wall – no current internal lining.
- Wall of the 38-46 Oxford Street Building (OAF Building): 230mm double brick wall – unknown internal lining, therefore assuming unlined.
- Cavity present between the two buildings, assumed to be 30mm. Brick ties have been assumed on a 1200mm x 1200mm basis. Although the presence of these ties are unlikely, bridging between the walls by masonry

Figure 12 3D Acoustic Modelled Wall System (Modelled with Insul)



To undertake a model of the structural noise transfer between two spaces on an adjacent horizontal plane is common (i.e. the same level).

However, in this particular case, the source venue (i.e. OAF) is located two floors below the receiving space which is located on level 1. Predicting the value of transmission loss through the structure is a difficult and potentially inaccurate process due the unknown relationships between the wall structures. Also it is noted, to undertake this type of analysis advanced modelling software similar to those used in Finite Element Analysis (FEA) would need to be used. Therefore an alternate method has been considered.

A two stage assessment has been conducted. As both buildings contain a basement level (one being the OAF venue) the first step is to predict the noise level from the OAF into the basement of the project building (i.e. both on the same horizontal plane). Using the maximum noise level of 107dBA L_{A10} , assumed wall construction as outlined above as well as the dimensions available on the architectural drawings contained in both D/2006/645 and with this DA.

A predicted noise level with the basement level of the 34-36 Oxford Street building is 44dBA L_{A10} .

As mentioned the first level of hotel rooms is located two floors above on level 1. Therefore, the second stage of the calculation is to predict the additional noise reduction gained by moving up the building.

Propagation of vibration within buildings (which is what we are considering) is a widely studied topic and has been extensively researched by Nelson (1987), his findings are shown below.

Table 12 Floor-to-Floor Loss Values

Floor Level above Ground	Floor-to-Floor Loss (dB)																		
	5 Hz	6.3 Hz	8 Hz	10 Hz	12 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz
1	1	1	1	1	1.5	1.5	1.5	2	2	2	3	3	3	2	2	2	3	3	3
2	1	1	1	1	1.5	1.5	1.5	2	2	2	2	2	2	3	3	3	3	3	3
Note 1:	The floor losses outlined above are additive. This means if you were assessing the second level above ground the lost at 63 hertz would be 5dB.																		

Applying the Floor-to-Floor loses in the table above and the predicted noise level above, the resultant level in the level one hotel room is 38dBA (Room 1.01). This is a 3dBA exceedance over the level outlined in section 4. For the room located in the identical spot, however on the level above (level 2) compliance has been predicted.

Note:

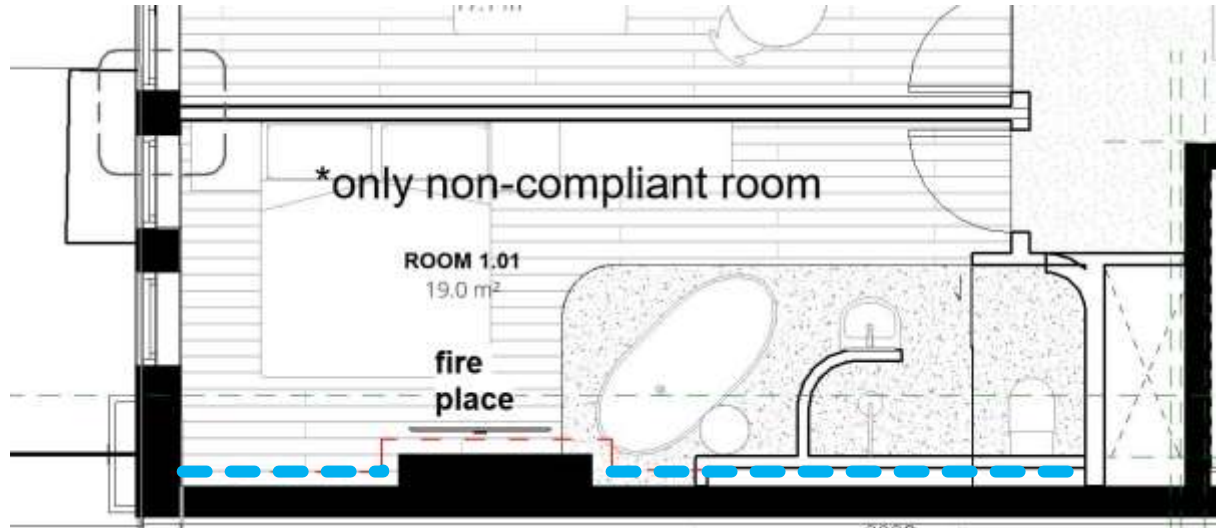
- It is noted at this point that the prediction outlined above is an indicative prediction and onsite testing is required to verify the exact level of transmission loss being achieved.
- In our experience, we believe the onsite testing will result in a higher level of transmission loss being achieved and will result in a lower level of impact.

In the event, the onsite testing was conducted and the results showed the level of transmission between the two spaces was equal or even worse (resulting in a higher exceedance) the resultant acoustic treatment would be as follows:

- A dummy studwork wall is to be constructed from slab to soffit level which is separated from the existing brickwork by 20mm. The studwork is to be a minimum of 64mm steel studs with 75mm thick 11kg/m³ glasswool insulation in the cavity and 2x13mm Fyrchek as per the below.

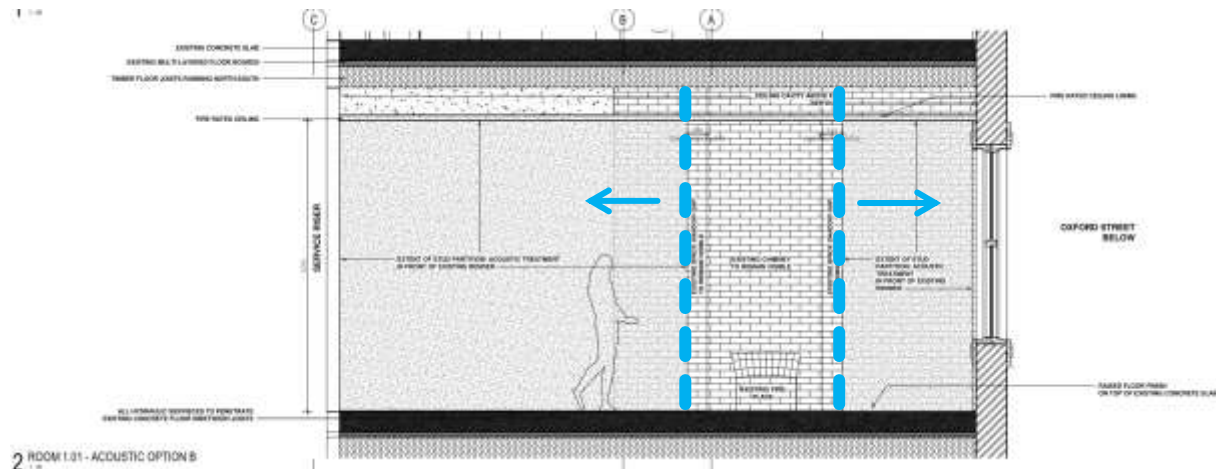
Note: Pulse Acoustics considers this recommendation to be the worst-case scenario.

Figure 13 Possible Location of Acoustic Wall Option B – Room 1.01 - Plan



Blue line above indicates line of additional stud wall. Wall is to be stopped short of the fire place as per the architectural drawing DA 402 (Option B).

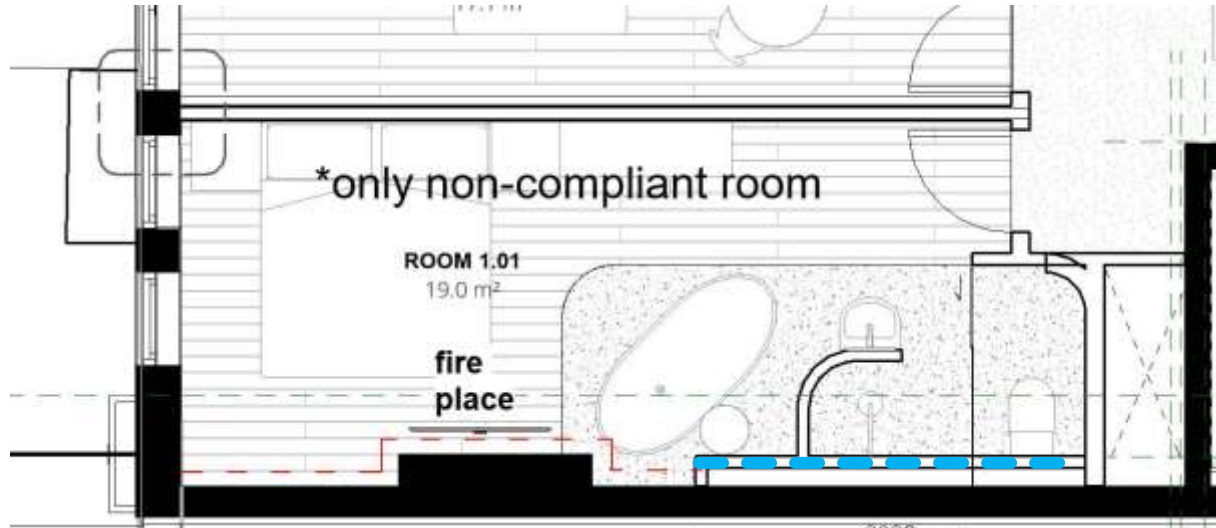
Figure 14 Possible Location of Acoustic Wall Option B – Room 1.01 - Elevation



Blue line above indicates line of additional stud wall. Wall is to be stopped short of the fire place as per the architectural drawing DA 402 (Option B).

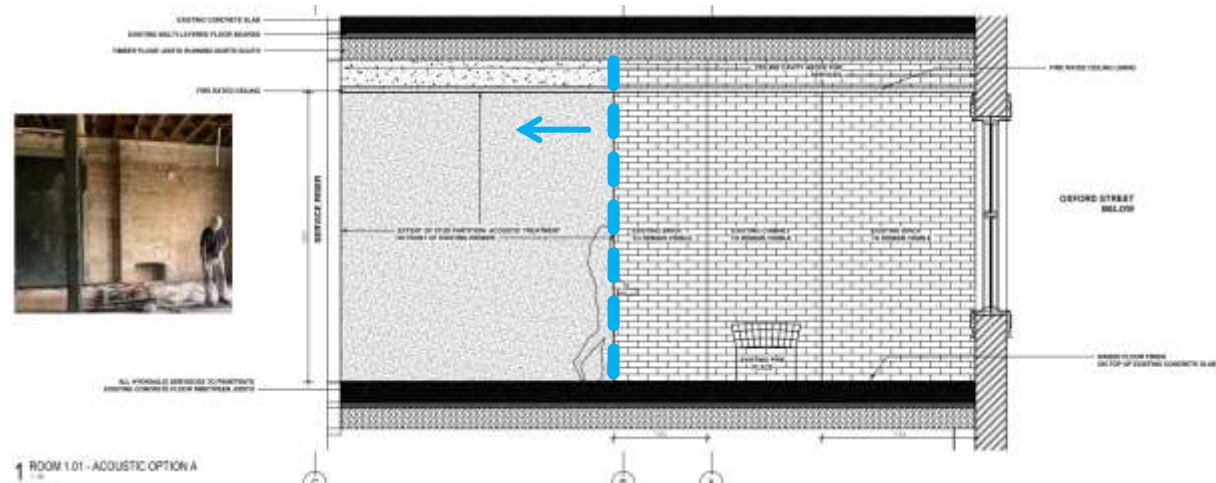
Additionally, in the event onsite investigations provide a higher level of transmission loss to which has been adopted for this assessment, the installation of the dummy stud wall can be reduced. If this occurs the dummy wall will only be required as per the mark up below.

Figure 15 Possible Location of Acoustic Wall Option A– Room 1.01 - Plan



Blue line above indicates line of additional stud wall. Wall constructed as per the architectural drawing DA 402 (Option A).

Figure 16 Possible Location of Acoustic Wall Option A – Room 1.01 - Elevation



Blue line above indicates line of additional stud wall. Wall constructed as per the architectural drawing DA 402 (Option A).

8.2.2.2 Recommendations for Onsite Investigations

As discussed in sections above, modelling can result in inaccuracies due to unknown relationships between the two wall structures. Therefore prior to the issue of any Construction Certificate (CC), further onsite acoustic transmission loss testing should be undertaken to verify the analysis above and confirm which of options is required.

8.3 Summary of Oxford Art Factory Analysis

From the analysis which has been provided below, a detailed review of the two possible transmission paths for noise to enter the future hotel rooms has been undertaken. Results of this assessment are:

- From this analysis airborne noise impacts will not result in any additional acoustic treatments to the building envelope to which already have been identified in section 7 of this report.
- Indicative modelling of the potential structure borne noise impacts has been undertaken. From our modelling we concluded the following:
 - Noise impacts for the hotel rooms located on level 2 will be compliant with no additional acoustic treatments required.
 - Further onsite investigations are required to determine which level of treatment is required. In any case either part or most of the wall for hotel room 1.01 may need to be installed. Onsite transmission loss testing between the OAF and room 1.01 will confirm these.
- The further onsite investigation works are recommended to occur as part of the submission for the Construction Certificate (CC).

9 OPERATIONAL NOISE IMPACTS – FUTURE BASEMENT / GROUND LEVEL LICENSED VENUES

As outlined in section 1.1 of this report, the two licensed venues have been previously approved for the basement and ground level of the project building. To ensure that the future occupants are not unduly affected by future noise levels from the operation of the venues below a detailed assessment has been conducted below.

9.1 Conditions of Project Approval

Acoustic related conditions from the previous project approval (D/2018/1163) are outlined below.

Figure 17 Condition 5 *Acoustic Report* – 34-36 Oxford Street Licensed Venues

(5) COMPLIANCE WITH THE ACOUSTIC REPORT PRIOR TO CONSTRUCTION AND OR OCCUPATION CERTIFICATES

- (a) All performance parameters, requirements, engineering assumptions and recommendations contained in the acoustic report prepared by Acoustic Logic, dated 31 August 2018, titled Noise Emission Assessment – 34-36 Oxford Street, Darlinghurst, ref 4216R002.LB.180830, must be implemented as part of the detailed design assessment and implemented into the design drawings prior to the commencement of the use of the premises in accordance with the requirements of (b) and (c) below and to the satisfaction of the Principal Certifier.
- (b) Prior to the issue of a Construction Certificate, the construction drawings and construction methodology must be assessed and certified by a suitably qualified acoustic consultant* (see definition below) to be in accordance with the requirements of the DA acoustic report.
- (c) Prior to the issue of an Occupation Certificate, a suitable qualified acoustic consultant is to provide a written Acoustic Verification Report to the satisfaction of the Principal Certifier that the development complies with the requirements set out in the Report and in (a) and (b) above.

Note: Suitably qualified Acoustic Consultant means a consultant who possesses the qualifications to render them eligible for membership of the Australian Acoustics Society, Institution of Engineers Australia or the Association of Australian Acoustic Consultants at the grade of member.

Note: Item 5(a) above refers to an acoustic report prepared by *Acoustic Logic*, it has been assumed that an error in the writing of the condition has occurred. As the submitted and correctly identified “document reference” listed in the condition relates to an *Acoustic Dynamics* Report (ADR).

Figure 18 Condition 6 *Acoustic Design* – 34-36 Oxford Street Licensed Venues

(6) ACOUSTIC DESIGN

- (a) The proposed alterations must not affect the existing acoustic integrity of the building in relation to the control of noise emissions from the premises.
- (b) No additional equipment may be installed or changes made to the acoustic design unless certified by a suitably qualified acoustic consultant* that the equipment will not increase noise emissions from building.

Note: Suitably qualified Acoustic Consultant means a consultant who possesses the qualifications to render them eligible for membership of the Australian Acoustics Society, Institution of Engineers Australia or the Association of Australian Acoustic Consultants at the grade of member.

Figure 19 Acoustic Dynamics Report (ADR) Management Recommendations – 34-36 Oxford Street Licensed Venues

1. The DJ and amplified sound within the venue should be restricted to a maximum internal reverberant level of 98 dB(A) with a graphic equalizer employed to reduce low frequencies being emitted from the sound-system. Acoustic Dynamics advises an appropriately qualified professional sound engineer is to be engaged by the proponent to provide accurate sound-system programming to ensure appropriate playback levels;
2. Speakers should be isolated from the building structure or services through the use of rubber mounts to reduce the regenerated noise throughout the building;
3. Speakers should not be installed outside, within areas of ingress/egress or music played in any outdoor areas;
4. Internal speakers should be located to increase the distance to the nearest sensitive receiver and so the direction of music being played is not orientated toward outdoor areas;
5. Glass bottle and rubbish disposal should be conducted between the hours of 7am and 6pm only (8am to 6pm on Sundays);
6. Doors are to be kept closed at all times inclusive of entrance doors and doors on to Norman St. Acoustic Dynamics notes that there is a roller door on Norman St which can be used for the acceptance of deliveries and removal of rubbish between the hours of 7am to 6pm (8am to 6pm on Sundays);
7. Ensuring patrons leave the premises in a quiet and sensible manner to minimise any potential impacts on the surrounding amenity, including signage reminding patrons to be aware of their neighbours and to leave in a quiet manner; and
8. Staff should actively discourage loitering near the venue to minimise any potential impacts on the surrounding amenity.

Note: In the first bullet point above, Acoustic Dynamic Report (ADR) states a reverberant sound level of 98dBA is permissible in the licensed venue areas. It is noted that a noise level of 98dBA inside a space is representative of a noise level inside a nightclub/dance floor area. The proposed café/bar area to be located on the ground level will not be amplifying music at this level. Rather, just the use of background music similar to a high end hotel lobby similar to Fullerton Hotel (rebranded Westin Hotel) in Martin Place. Therefore a maximum noise level for amplified music inside the ground floor bar will be 80dBA has been adopted, which is still high for this type of space.

9.2 Assessment of Noise Impacts

To ensure the acoustic amenity of the future occupants, an assessment of the future operational noise impacts from the internal venues has been addressed below. In assessing the potential noise impacts, two forms of noise transmission have been identified; airborne transmission (i.e. noise breaking out and re-entering the building façades) and structure borne transmission (vibration transmission through the mutual structures). Each is discussed in detail below.

Note: In addressing the transmission paths below, some assumptions have been made. These assumptions are all outlined in detail and justification for each assumption has been provided. In formulating any of the assumptions, in particular the operations of the OAF, these have been based on the publically available information contained on the City of Sydney's Development Application website. If information portrayed in the public information is incorrect, Pulse Acoustics takes no responsibility. However, all assumptions have been analysed for their validity.

9.2.1 Airborne Transmission (i.e. through the façade and common floor structure)

Similar to the explanation provided in the OAF section above, in the event any noise breakout from the licensed venue façades occurred, attenuation by the documented façade constructions for the level one hotel rooms outlined in section 7 would achieve compliance with the internal noise criteria as outlined section 4 will be achieved.

However, there is a potential for airborne noise transfer via the common floor structure which separates the ground floor area and the level one hotel rooms could occur. As outlined in section 5.4 of the ADR the concrete slab which separates these spaces has a thickness of approximately 250mm. From modelling compliance with the internal noise criteria as outlined section 4 will be achieved.

9.2.2 Structure borne Noise Impacts

Structure borne noise impacts are only expected to occur from the amplification of music within the venues. As outlined above, the ground floor area will only be amplifying music to a background level. With the correct isolation of any speakers installed. Structure borne noise at the level proposed above for this area (i.e. 80dBA) will not result in any structure borne noise impacts.

For the basement venue, a reverberant noise level of 98dBA may result in the transmission of structure borne noise. However we note the following:

- Bullet point two (2) of the ADR management controls (see Figure 19 above) all speakers must be installed on isolated mounts. On the assumption these systems are correctly specified and installed, structure borne noise direct from the speaker system will be attenuated.
- However, with a reverberant noise level of 98dBA within the space (i.e. airborne noise), this has the potential to transfer into the structure and travel up the building. Therefore the following is recommended:

- An isolated suspended ceiling consisting a plasterboard lining, insulation in the cavity and an isolated mounting system.
- All columns, lift core or structural elements have a false studwork wall constructed in front to prevent airborne noise reaching the structural element.

Note: The basement area has been operating as a live music venue under a previous application and Pulse Acoustics has been advised acoustic treatments identified above have already being installed and during construction will ensure made good.

Adopting the a similar methodology for calculating the potential structure borne noise impacts as above, a resultant level through the common floor slab (assuming flanking paths treated) to above is predicted below.

A predicted noise level with the ground level area of the 34-36 Oxford Street building is 34dBA L_{A10} .

As the first level of hotel rooms is located two floors above on level 1. Therefore, the second stage of the calculation is to predict the additional noise reduction gained by moving up the building.

Propagation of vibration within buildings (which is what we are considering) is a widely studied topic and has been extensively researched by Nelson (1987), his findings are shown below.

Table 13 Floor-to-Floor Loss Values

Floor Level above Ground	Floor-to-Floor Loss (dB)																		
	5 Hz	6.3 Hz	8 Hz	10 Hz	12 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz
1	1	1	1	1	1.5	1.5	1.5	2	2	2	3	3	3	2	2	2	3	3	3

Applying the Floor-to-Floor loses in the table above and the predicted noise level above, the resultant level in the level one hotel room is 31dBA (level one rooms). This is compliant with the levels outlined in section 4, with a higher level of compliance predicted on level two.

As discussed in sections above, modelling can result in inaccuracies due to unknown relationships between the two wall structures. Therefore prior to the issue of any Construction Certificate (CC), further onsite acoustic transmission loss testing should be undertaken to verify the analysis above and confirm which of options is required.

10 EXTERNAL NOISE EMISSION ASSESSMENT

10.1 Mechanical Plant Noise

Precise selection of the mechanical plant has not been made and will take place during the detailed design phase of the project.

It is likely that the criteria set out in Table 6 will be met through the use of conventional noise control methods (e.g. selection of equipment on the basis of quiet operation and, where necessary, providing enclosures, localised barriers, silencers and lined ductwork).

All mechanical plant and equipment with the potential to operate during the night-time periods (i.e. after 10.00 pm) would need to be selected, positioned, and, if necessary, treated, to ensure compliance with the limiting noise criteria at the surrounding residential receivers.

10.2 Previous DAs

Outlined in section 1.1, this report has not conducted an assessment of the approved venues to any external receivers. However, as the ground floor has been amended as part of this DA we provide the following commentary regarding the external impacts of the ground floor:

- Floor size of the updated ground floor and the previous ground floor has reduced therefore reducing the number of people permissible in the area in accordance with the BCA. As such noise impacts from patrons will decrease.
- Identified above the assessed noise level of 98dBA for the ground floor area is significantly higher than its intended use and a maximum anticipated noise level within the space will not exceed 80dBA. This is 18dBA quieter than the previous assessment and therefore is further compliant.

It therefore is determined that the changes associated with the minor layout changes of the ground floor will result in a higher level of compliance to which was been achieved in the ADR.

11 CONCLUSION

As part of the Development Application, Pulse Acoustics has prepared an acoustical assessment of the proposed redevelopment of the Exchange Hotel located at 34-36 Oxford Street, Darlinghurst.

The following discusses the outcomes of this assessment.

11.1 Noise Intrusion

Based upon the findings of this assessment, the development as proposed is suitable on the basis of acoustics. Acceptable internal noise levels can be achieved with appropriate facade constructions, indicative selections are provided in section 7.

The glazing specification must be reviewed at the detailed design stage to optimise glass selection and will be based on the combined requirements of acoustics, thermal and structural considerations.

11.2 Mechanical Noise Sources

Mechanical services design information is unavailable at this stage of the development, as plant selection and design, where required, will take place during the detailed design phase of the project.

It is likely that the noise emission criteria set out in Section 5 will be met through the use of conventional noise control methods and the selection of equipment on the basis of quiet operation.

Any mechanical plant associated with the development should be reviewed for acoustical compliance at the detailed design stage when the mechanical services design is finalised and plant selection has been made.

11.3 Future Noise Survey

From the analysis which has been provided below a detailed review of the two possible transmission paths for noise to enter the future hotel rooms has been undertaken. Results of this assessment are:

- From this analysis airborne noise impacts will not result in any additional acoustic treatments to the building envelope to which already have been identified in section 7 of this report.
- Indicative modelling of the potential structure borne noise impacts has been undertaken. From our modelling we concluded the following:
 - Noise impacts for the hotel rooms located on level 2 will be compliant with no additional acoustic treatments required.
 - Further onsite investigations are required to determine which level of treatment is required. In any case either part or most of the wall for hotel room 1.01 may need to be installed. Onsite transmission loss testing between the OAF and room 1.01 will confirm these.
- The further onsite investigation works are recommended to occur as part of the submission for the Construction Certificate (CC).

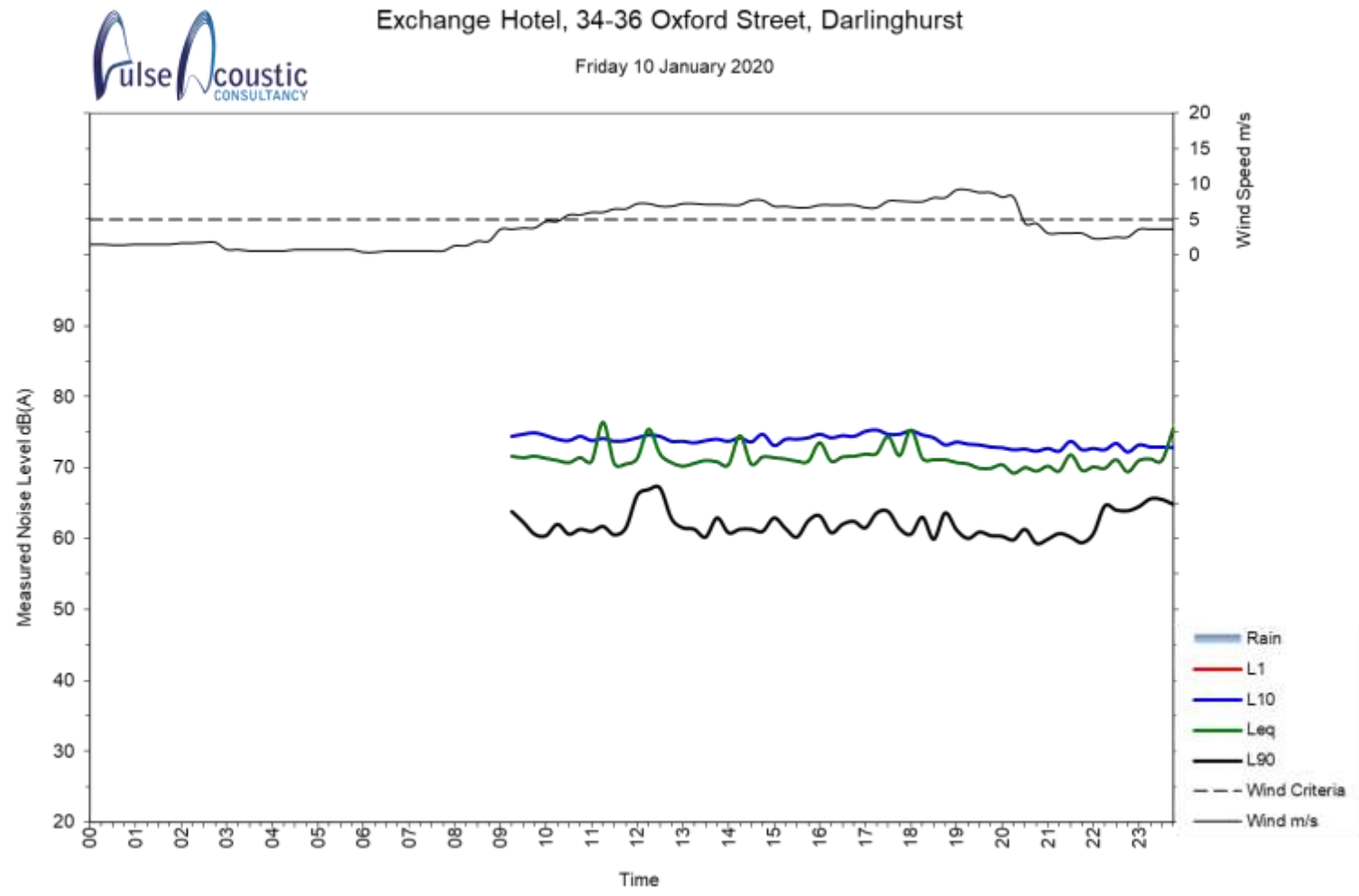
APPENDIX A – ACOUSTIC GLOSSARY

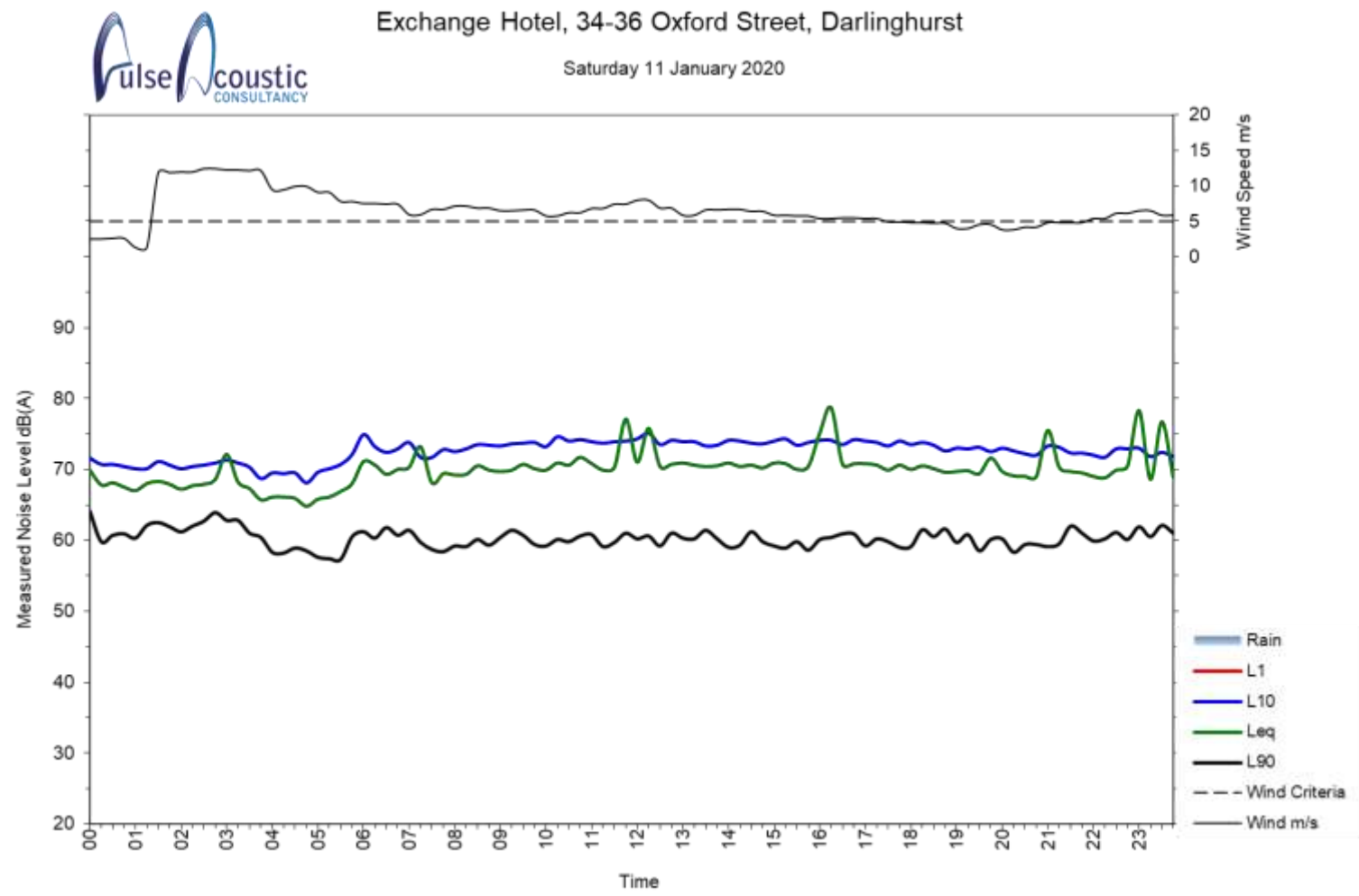
The following is a brief description of the acoustic terminology used in this report.

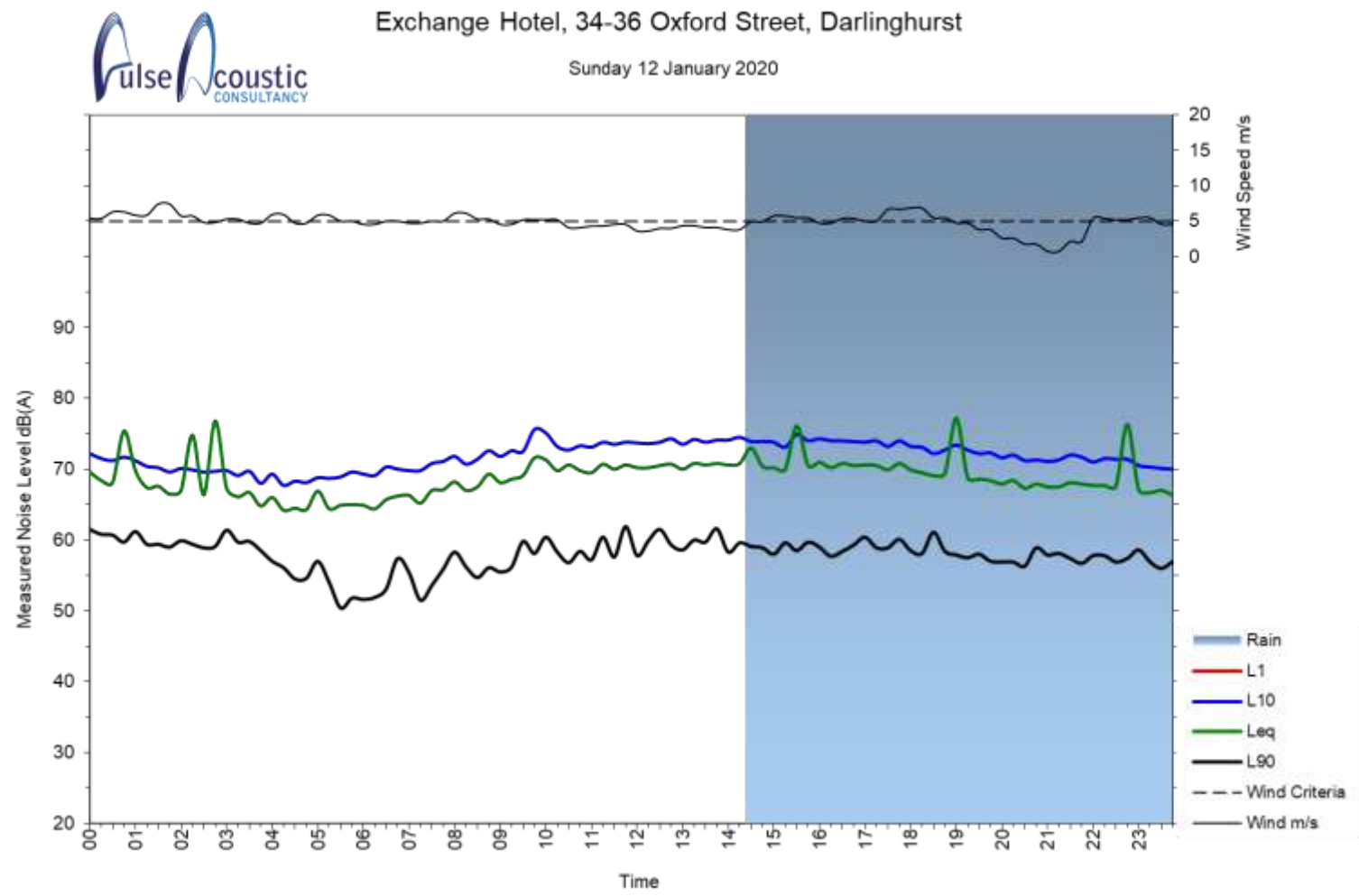
<i>Ambient Sound</i>	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
<i>Audible Range</i>	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
<i>Character, acoustic</i>	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
<i>Decibel [dB]</i>	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; <ul style="list-style-type: none"> 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
<i>dB(A)</i>	<i>A-weighted decibels</i> The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
<i>Frequency</i>	Frequency is synonymous to <i>pitch</i> . Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
<i>Loudness</i>	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
<i>L_{Max}</i>	The maximum sound pressure level measured over a given period.
<i>L_{Min}</i>	The minimum sound pressure level measured over a given period.
<i>L₁</i>	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
<i>L₁₀</i>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
<i>L₉₀</i>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L ₉₀ noise level expressed in units of dB(A).
<i>L_{eq}</i>	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
<i>Background Sound Low</i>	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources.

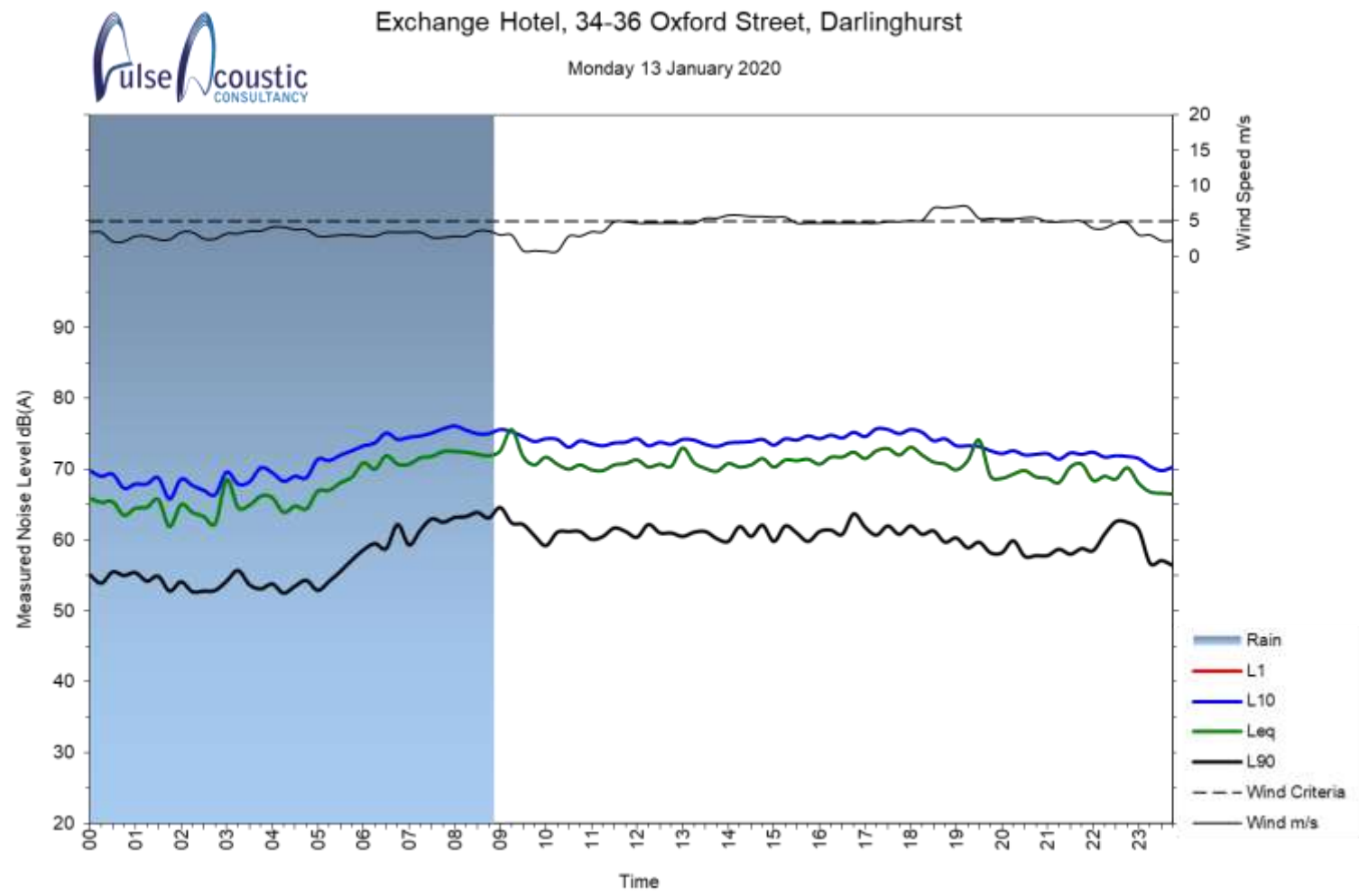
	Usually taken to mean the LA90 value
<i>Ctr</i>	A frequency adaptation term applied in accordance with the procedures described in ISO 717.
<i>dB (A)</i>	'A' Weighted overall sound pressure level
<i>Noise Reduction</i>	The difference in sound pressure level between any two areas. The term "noise reduction" does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
<i>NR Noise Rating</i>	Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the "A" weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration.
<i>R_w</i>	Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for <i>R_w</i> are defined in ISO 140-2:1991 "Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data".
<i>R'_w</i>	Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction.
<i>Sound Isolation</i>	A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term "sound isolation" does not specify any grade or performance quality and requires the units to be specified for any contractual condition
<i>Sound Pressure Level, L_p dB</i>	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
<i>Sound Power Level, L_w dB</i>	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
<i>Speech Privacy</i>	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
<i>Transmission Loss</i>	Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations.

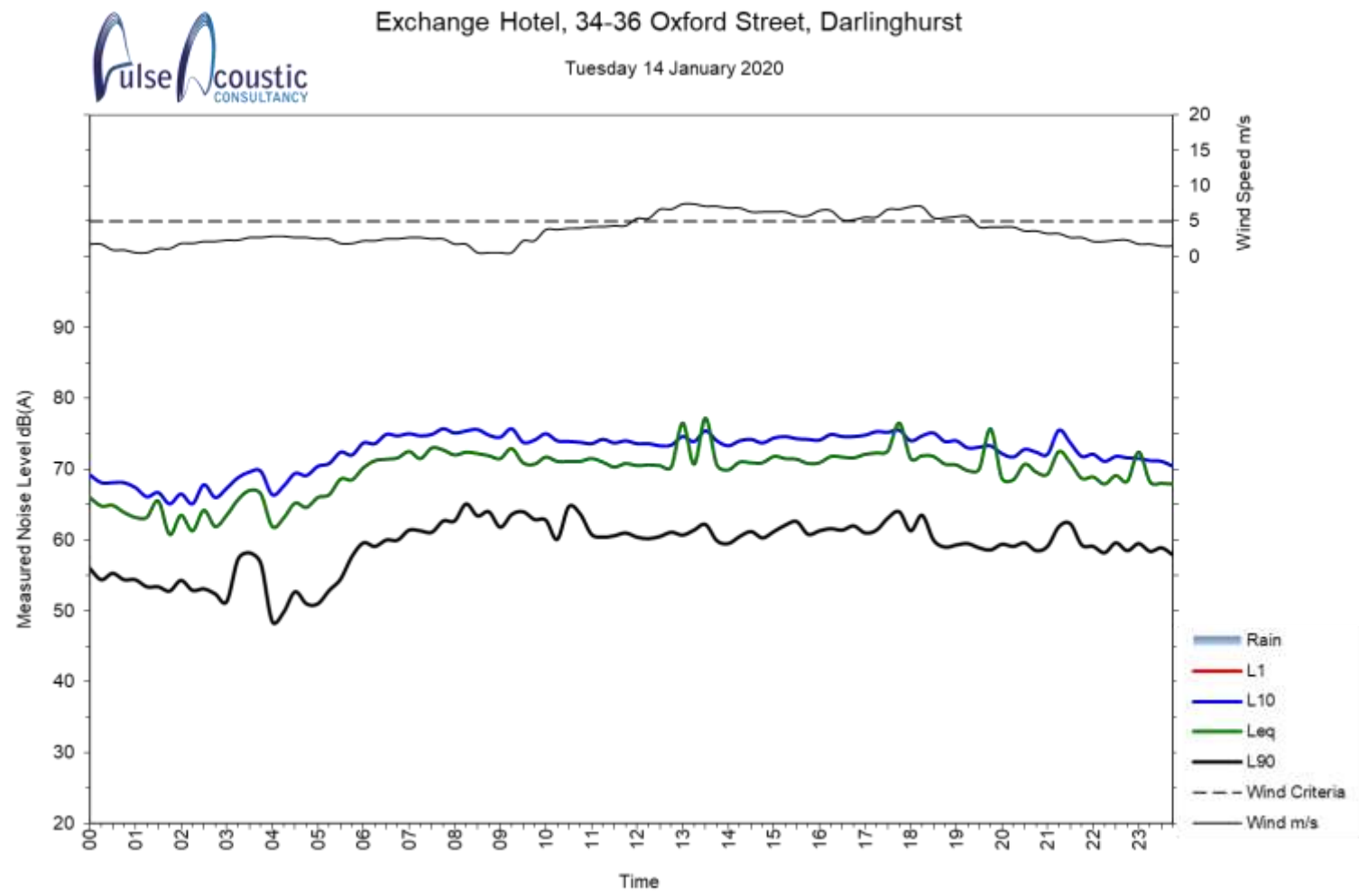
APPENDIX B – UNATTENDED NOISE MONITORING RESULTS – SOUTHERN BOUNDARY – OXFORD STREET – NML-1

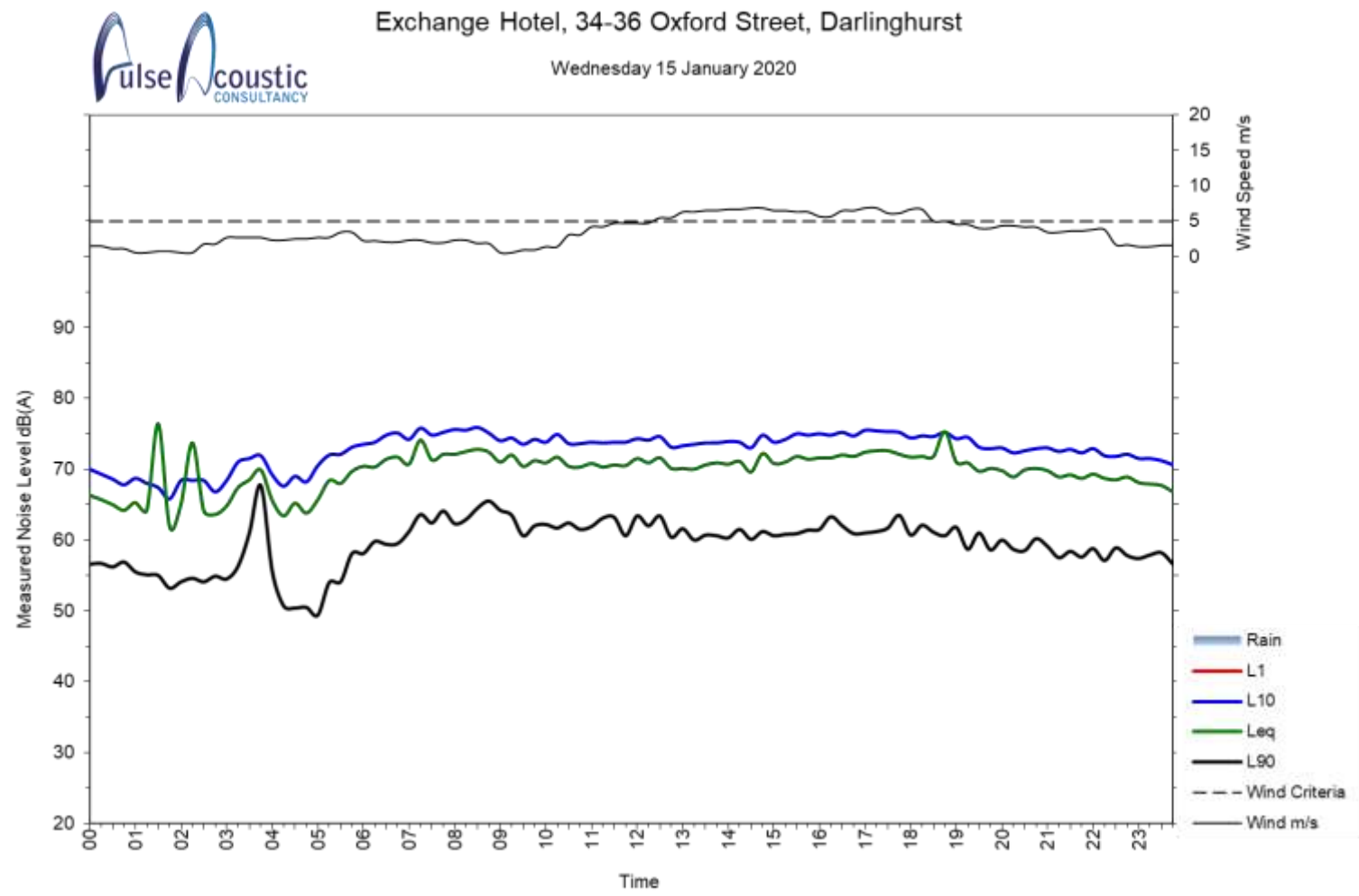


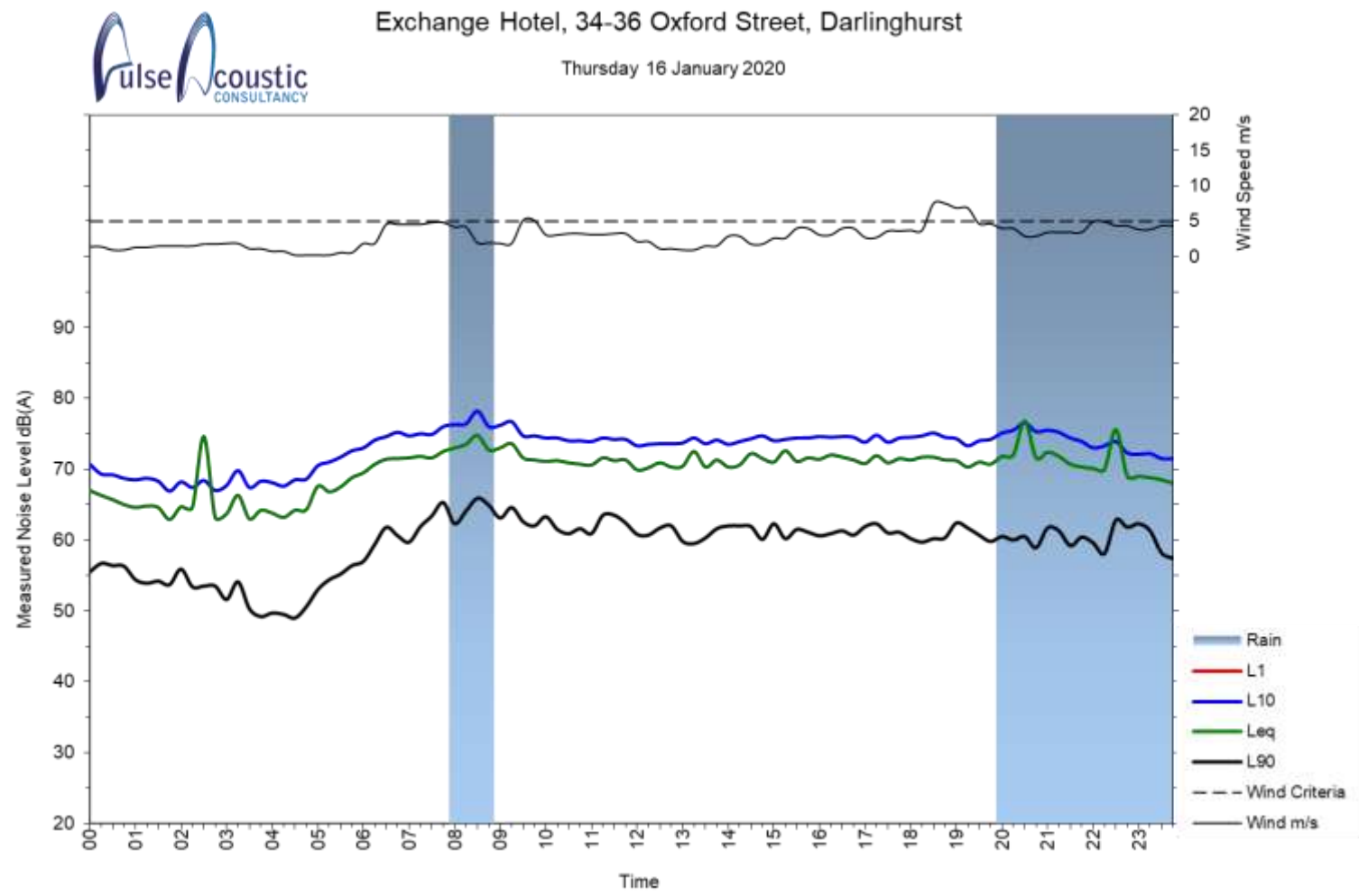


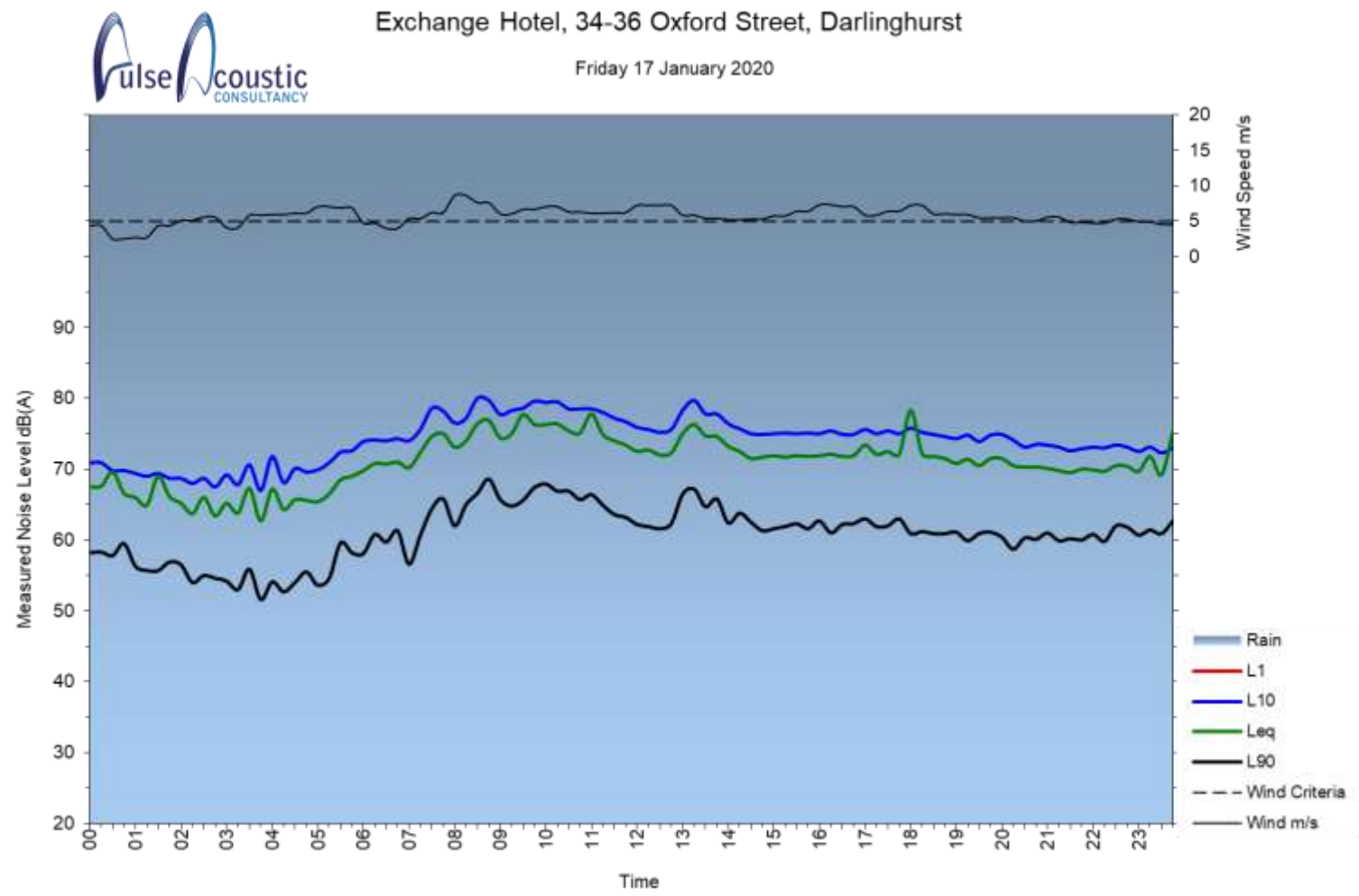






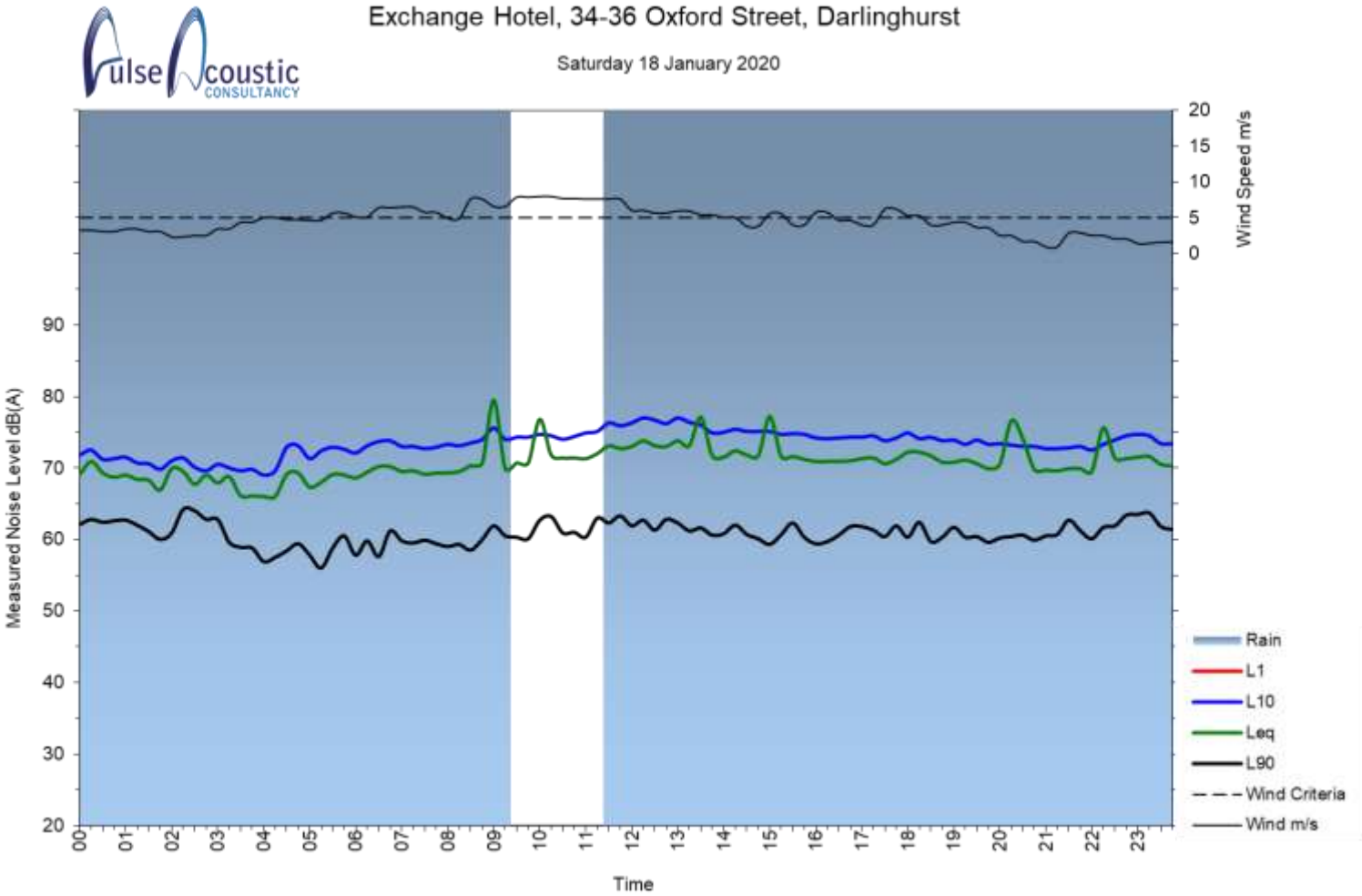


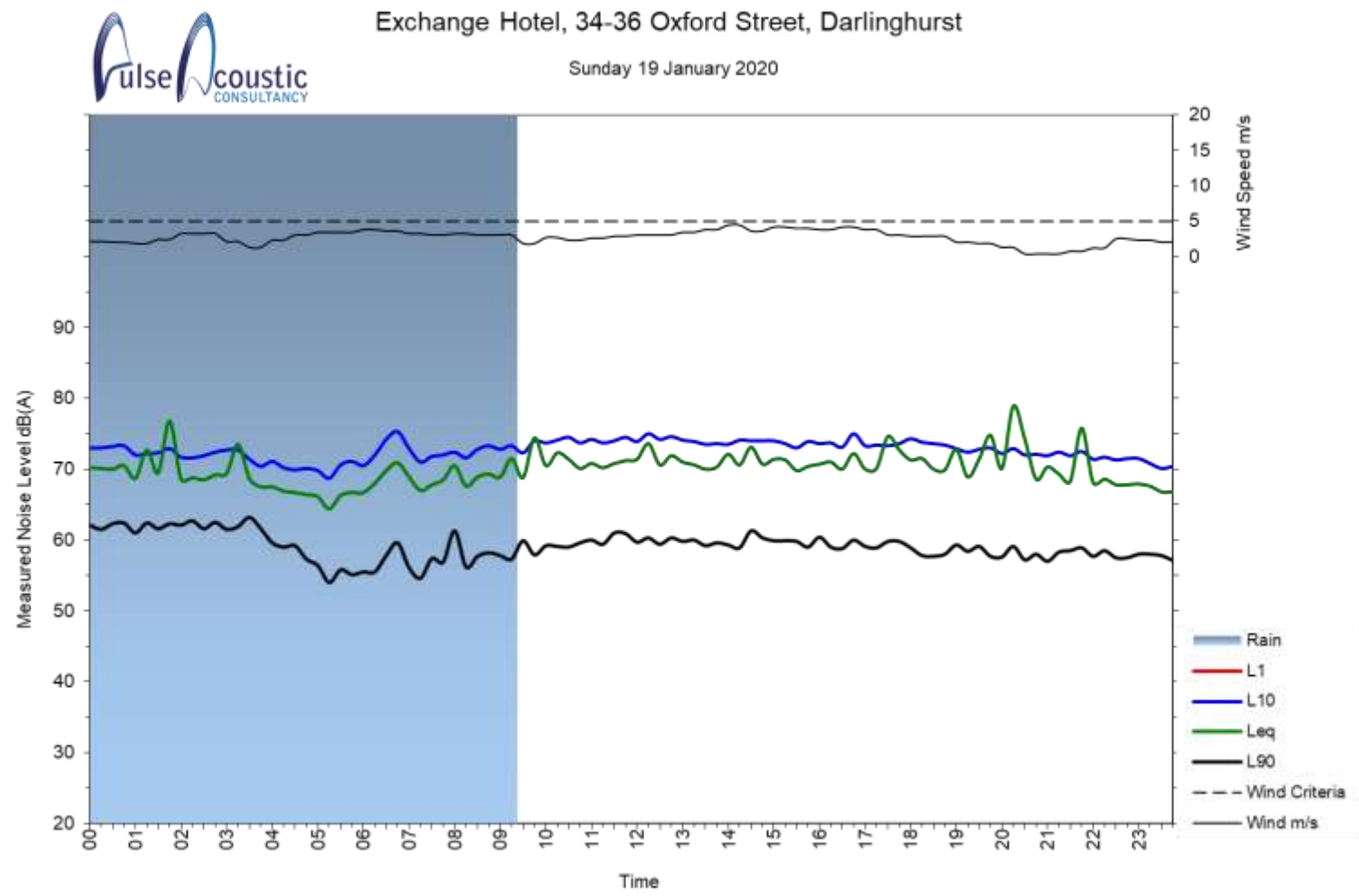


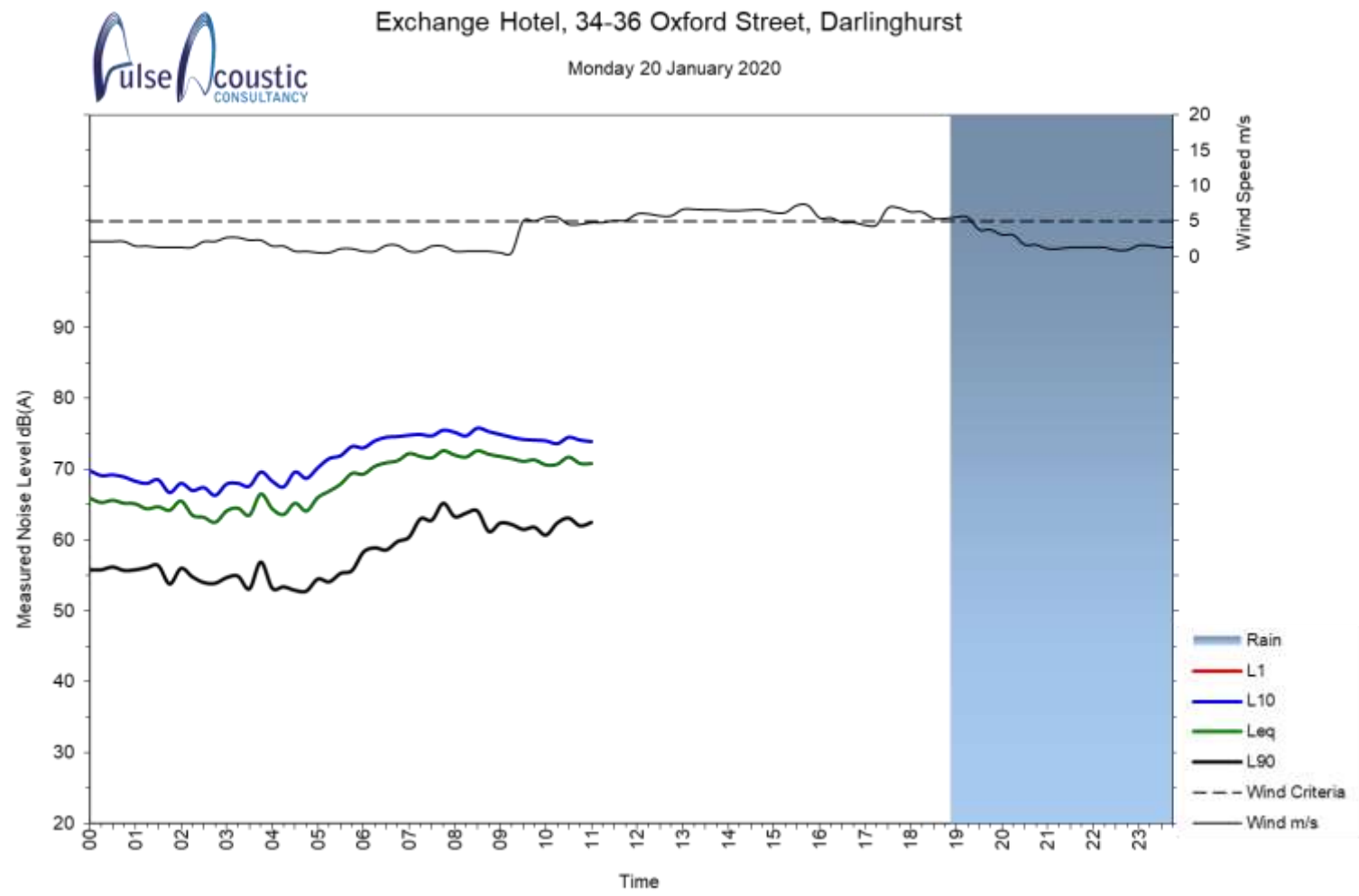


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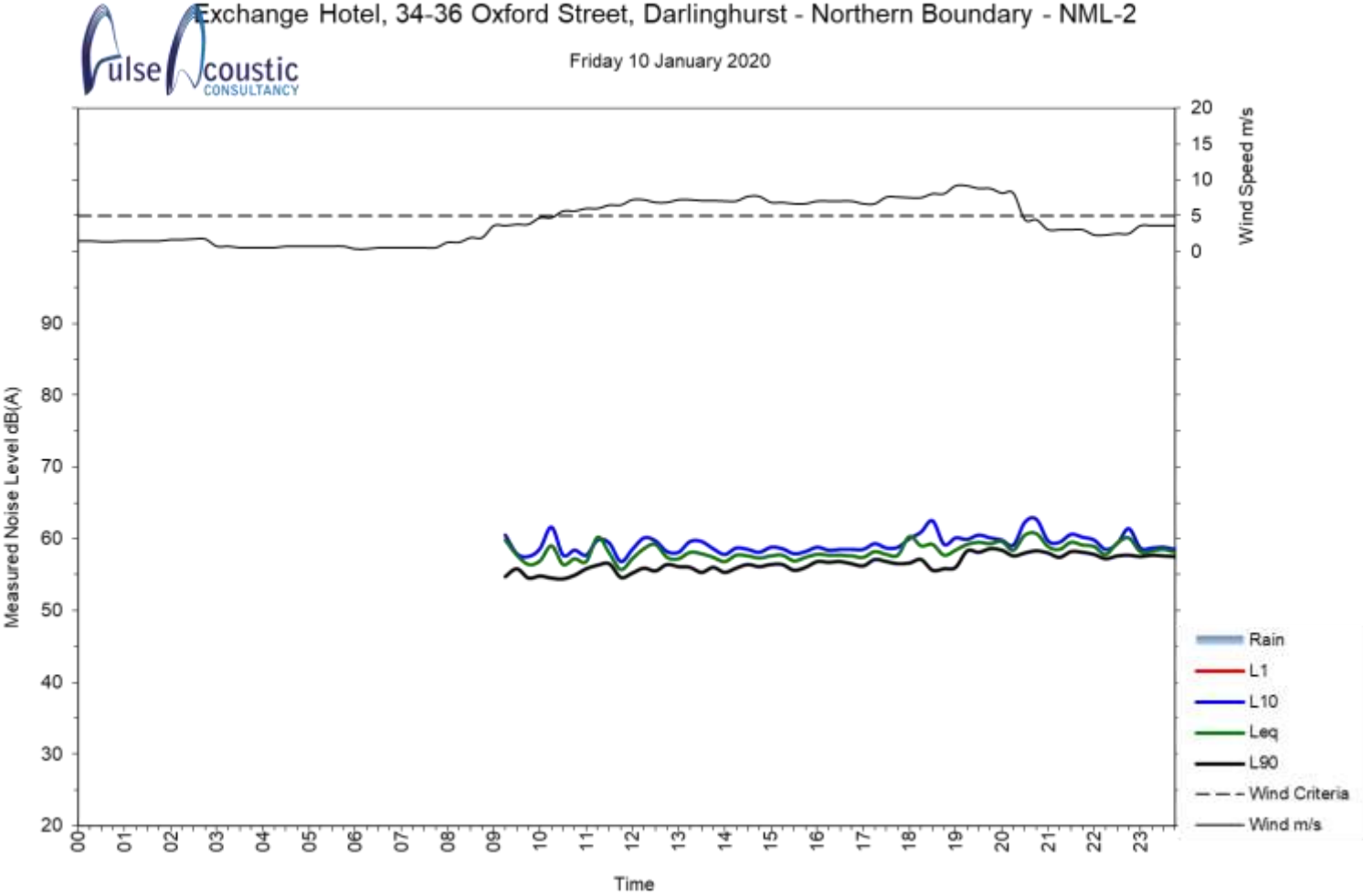
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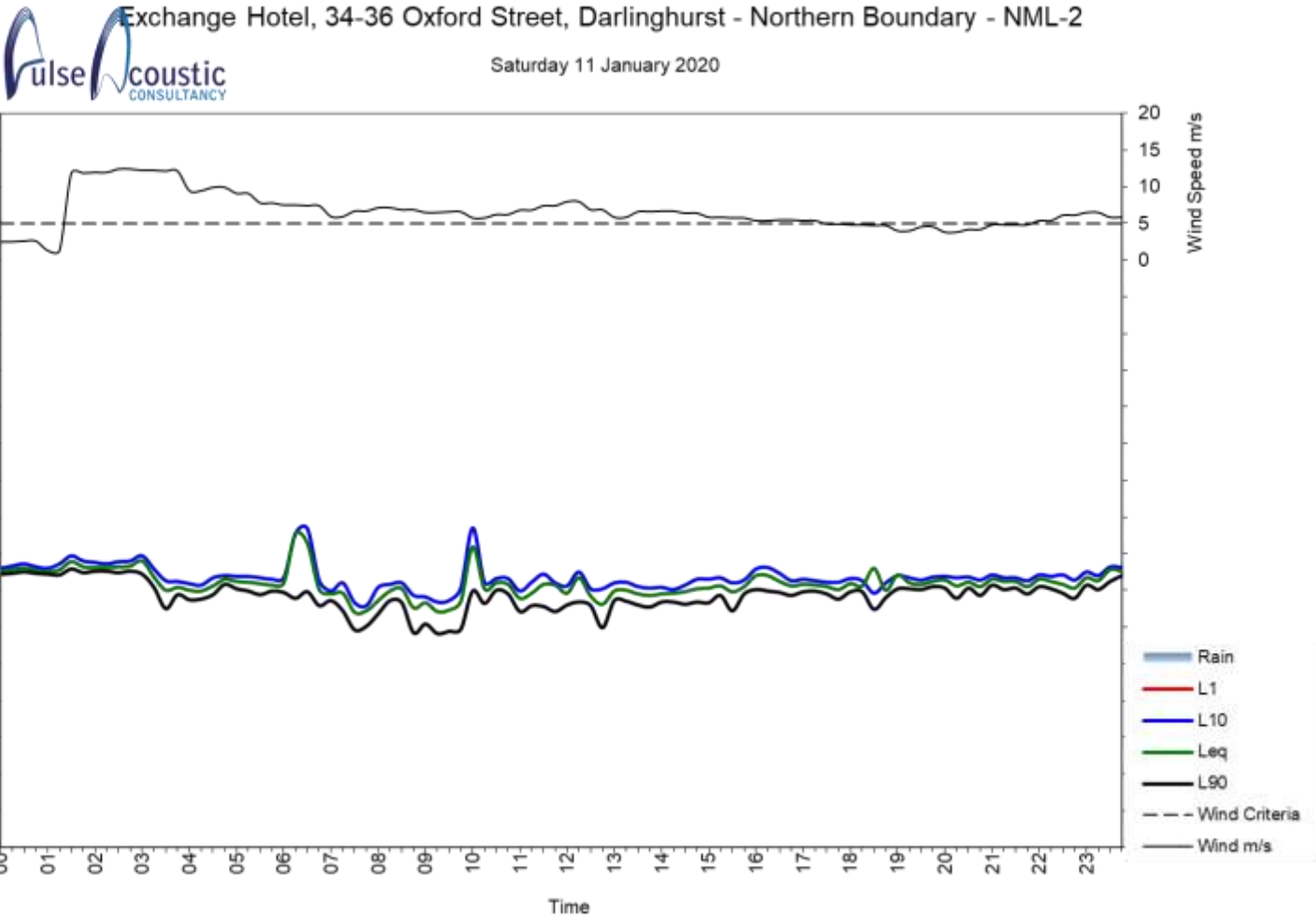


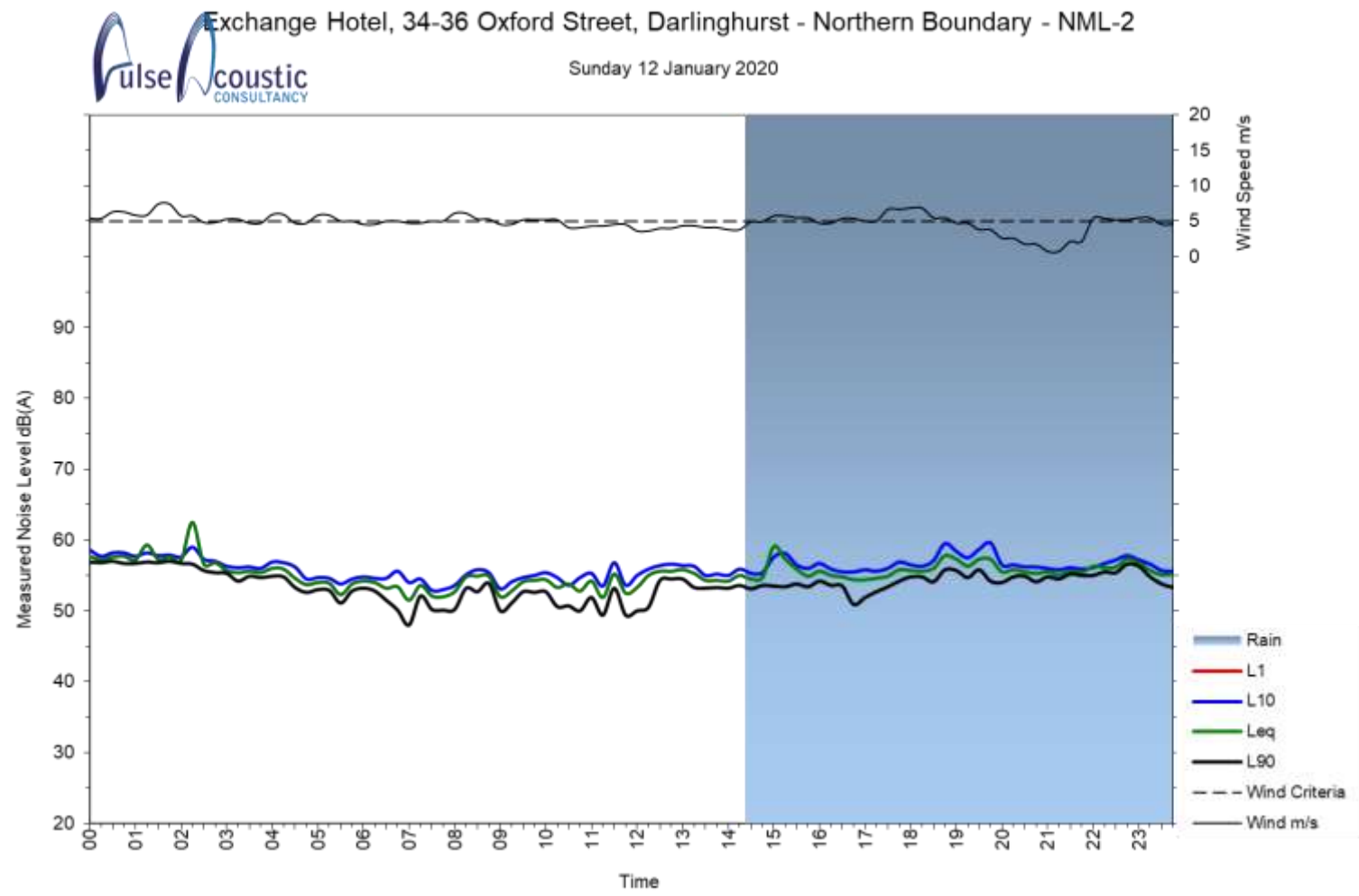


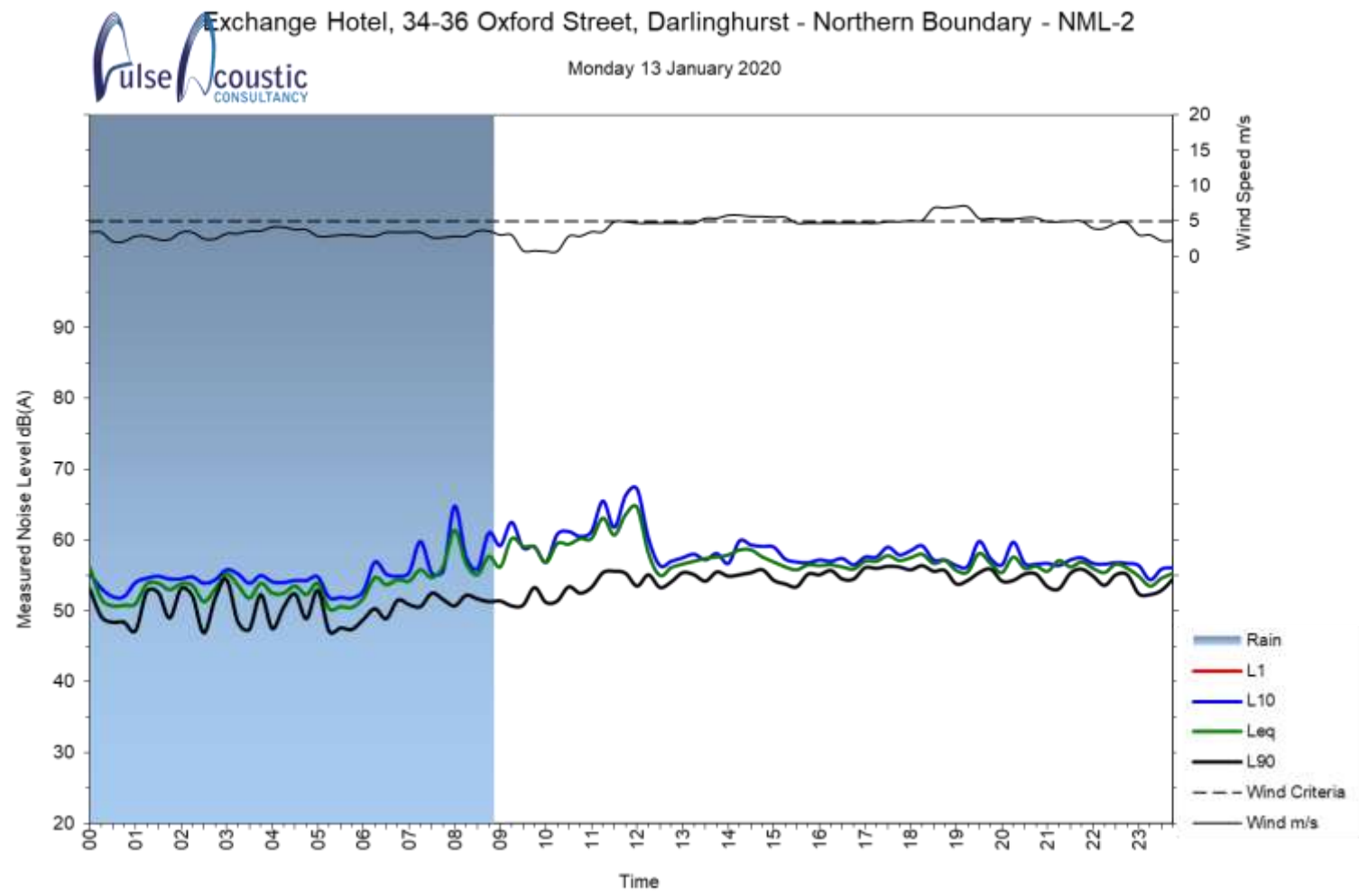


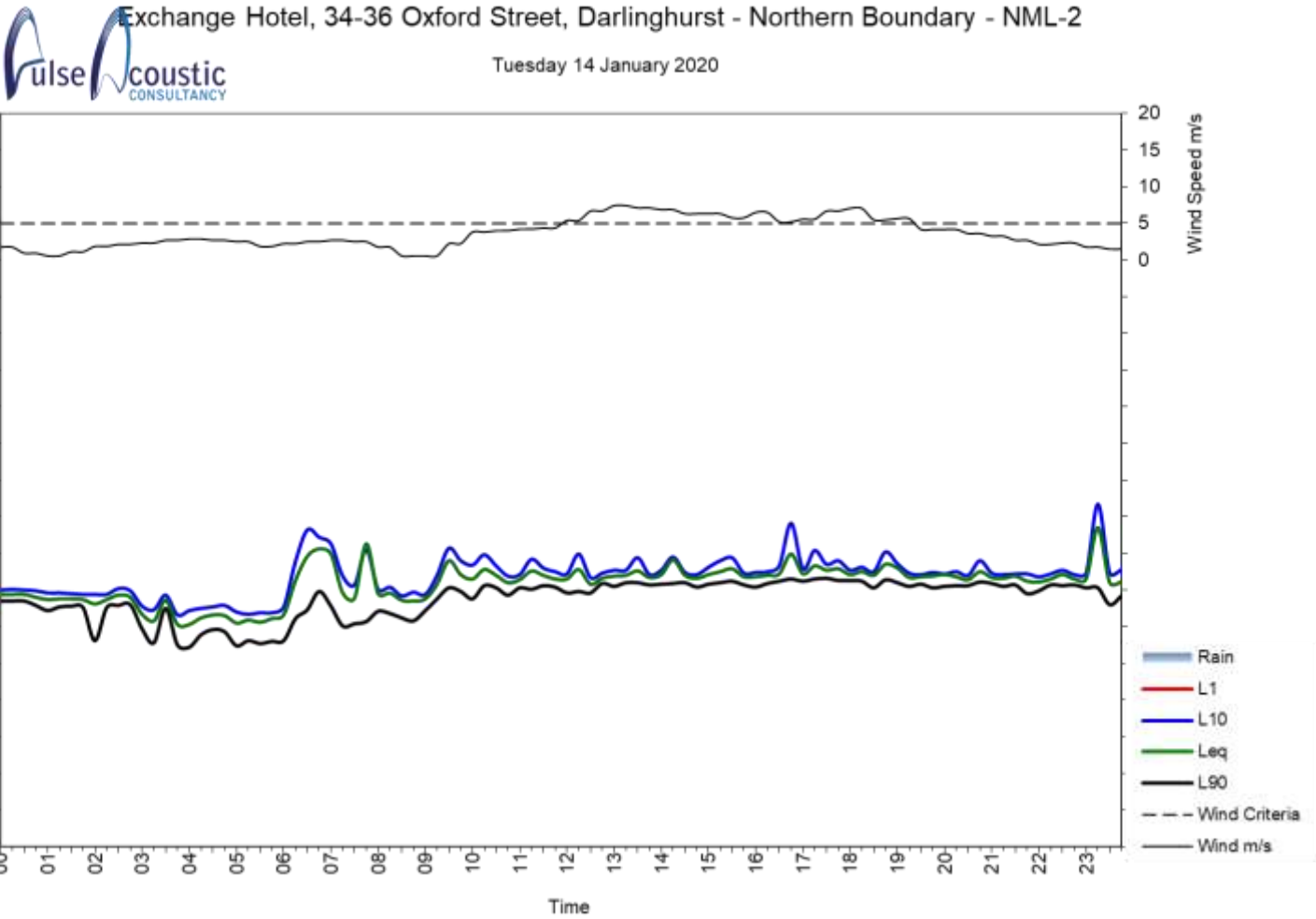
APPENDIX C – UNATTENDED NOISE MONITORING RESULTS – NORTHERN BOUNDARY – NORMAN STREET – NML-2







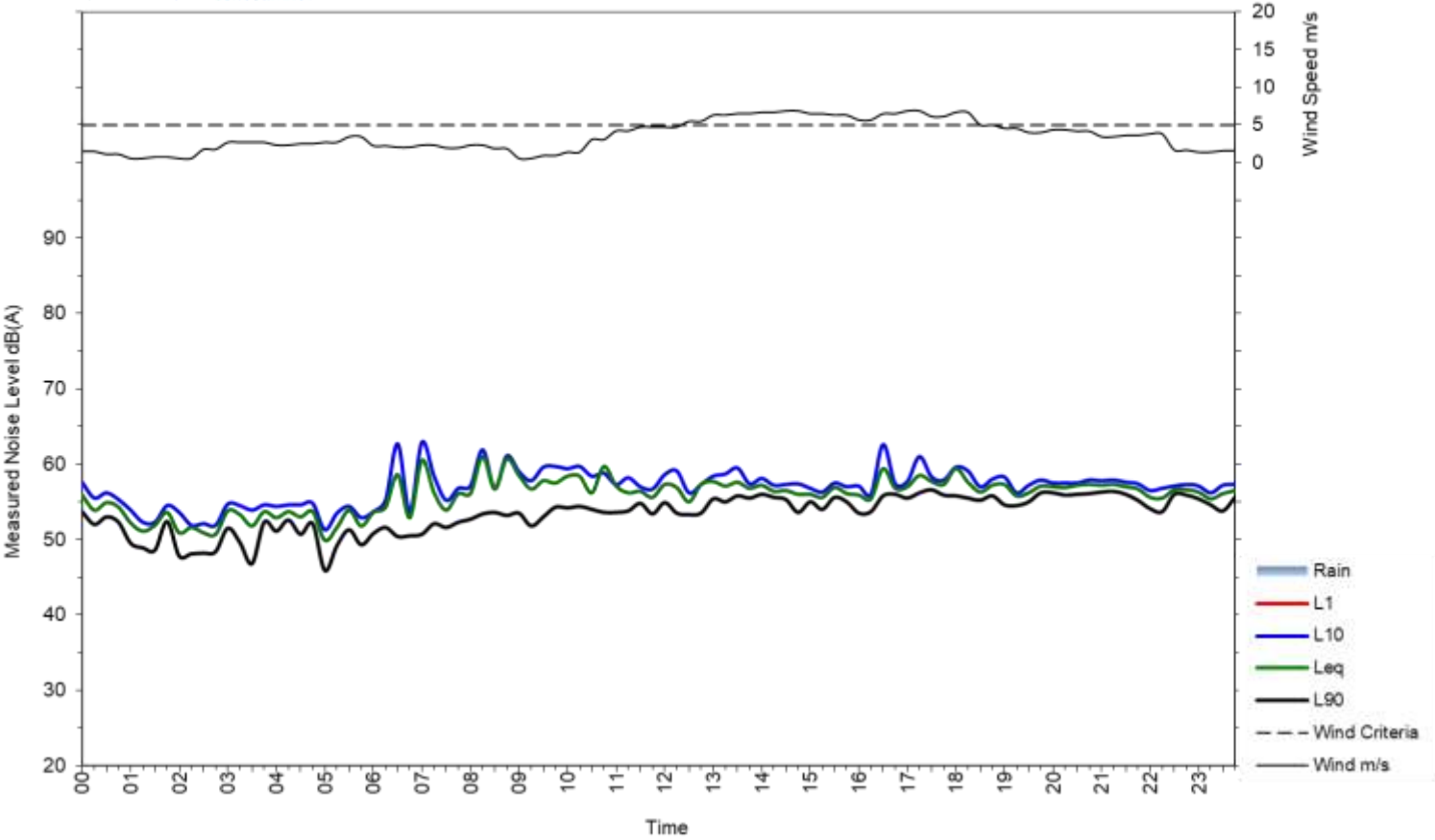


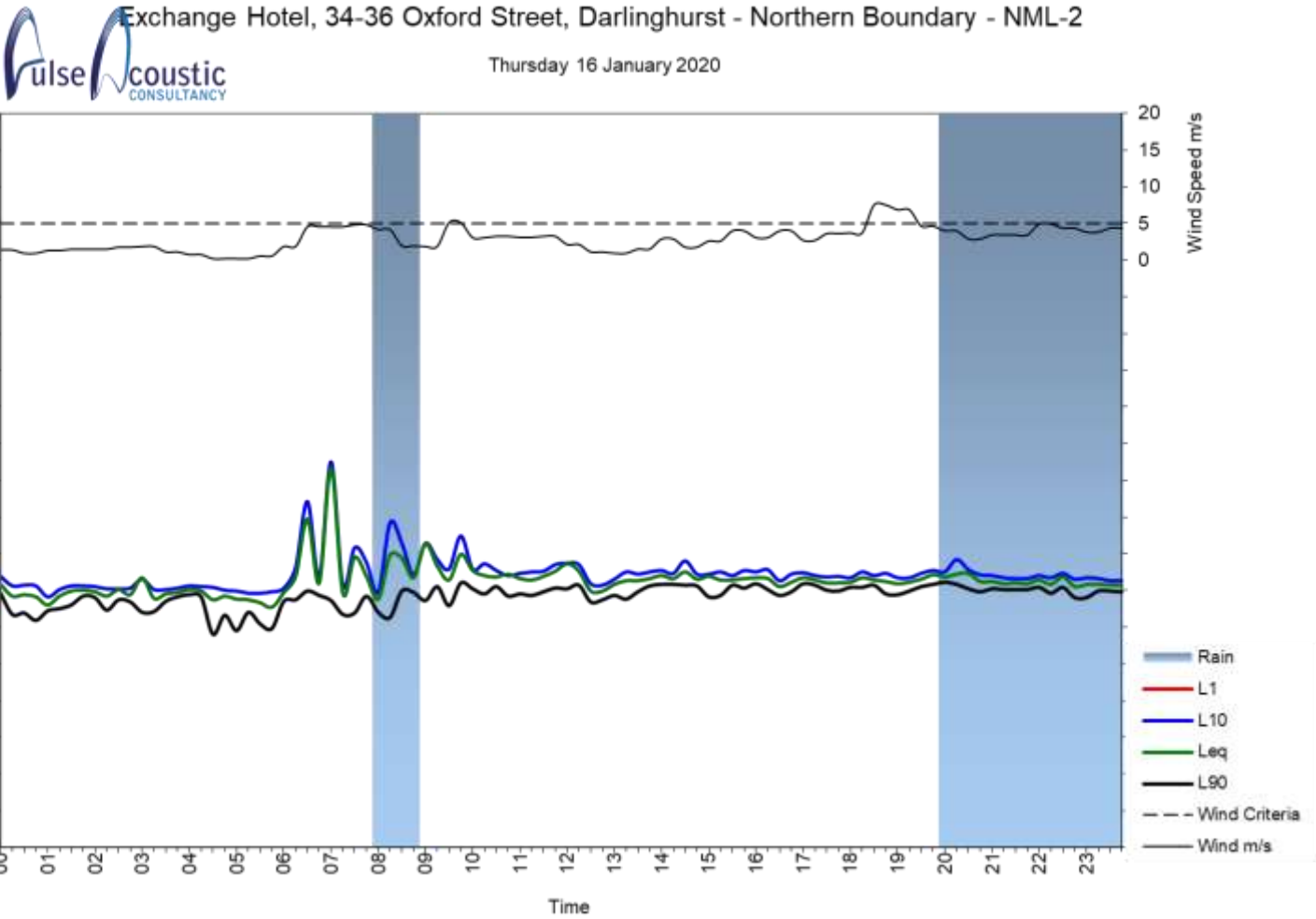


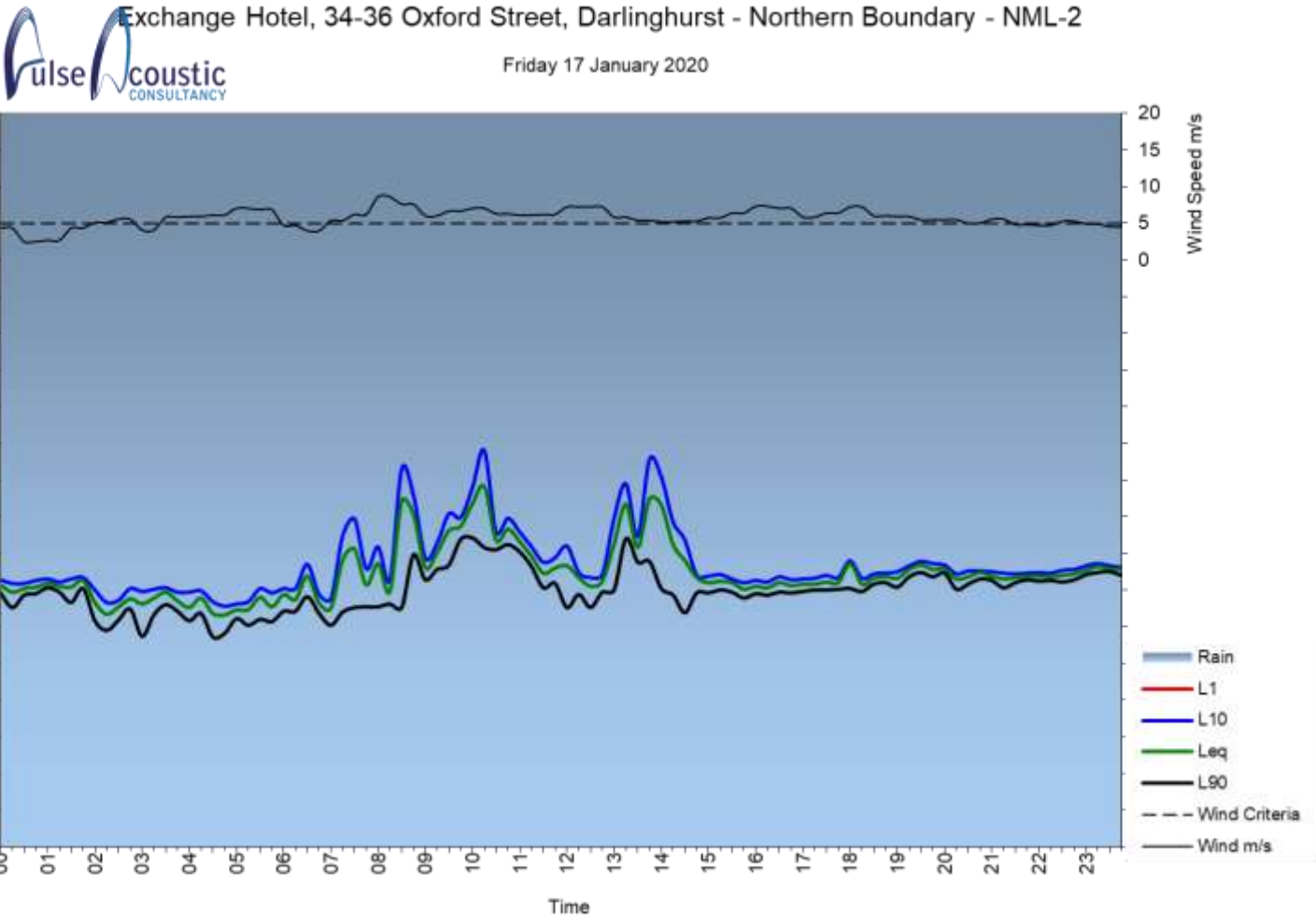


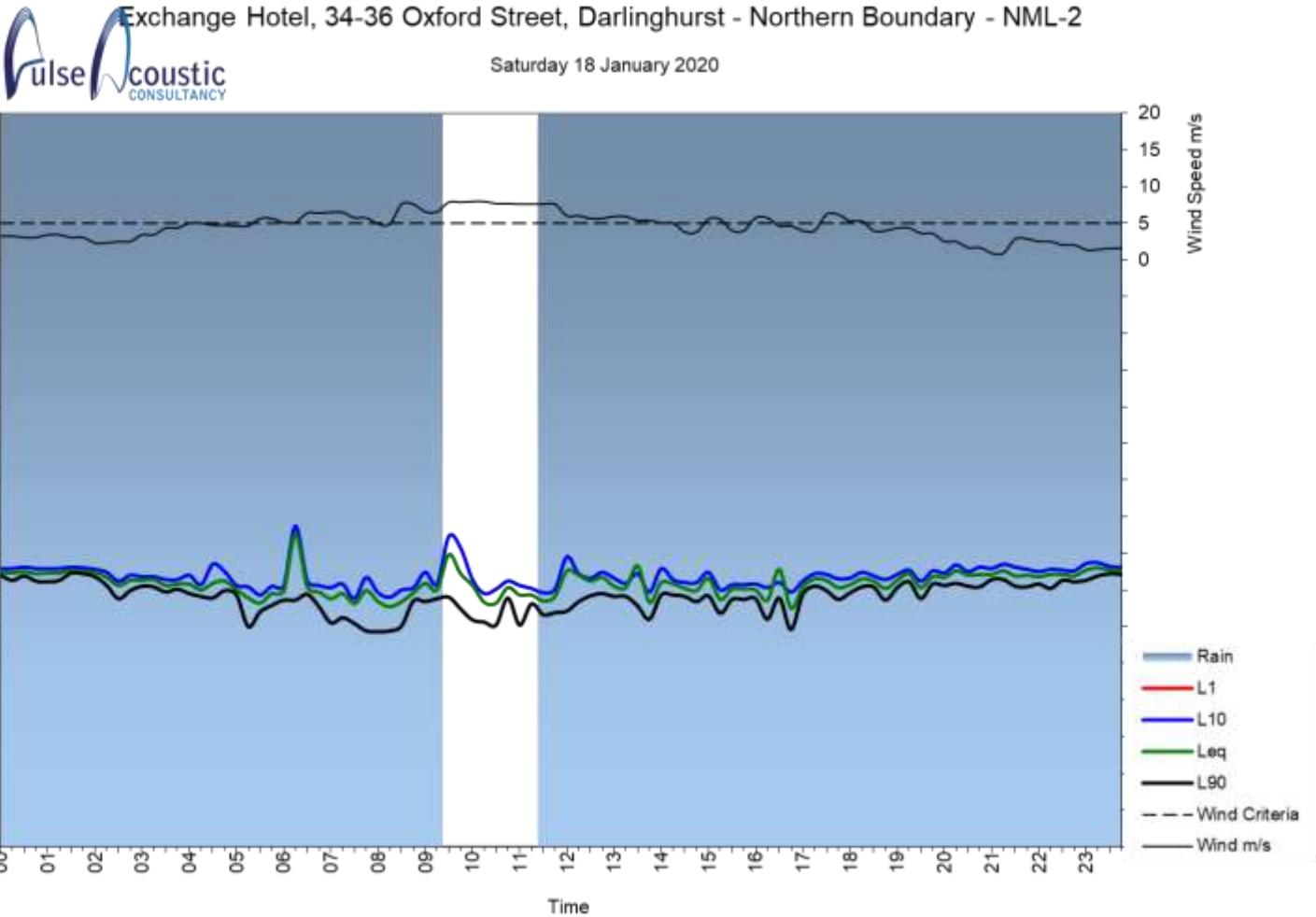
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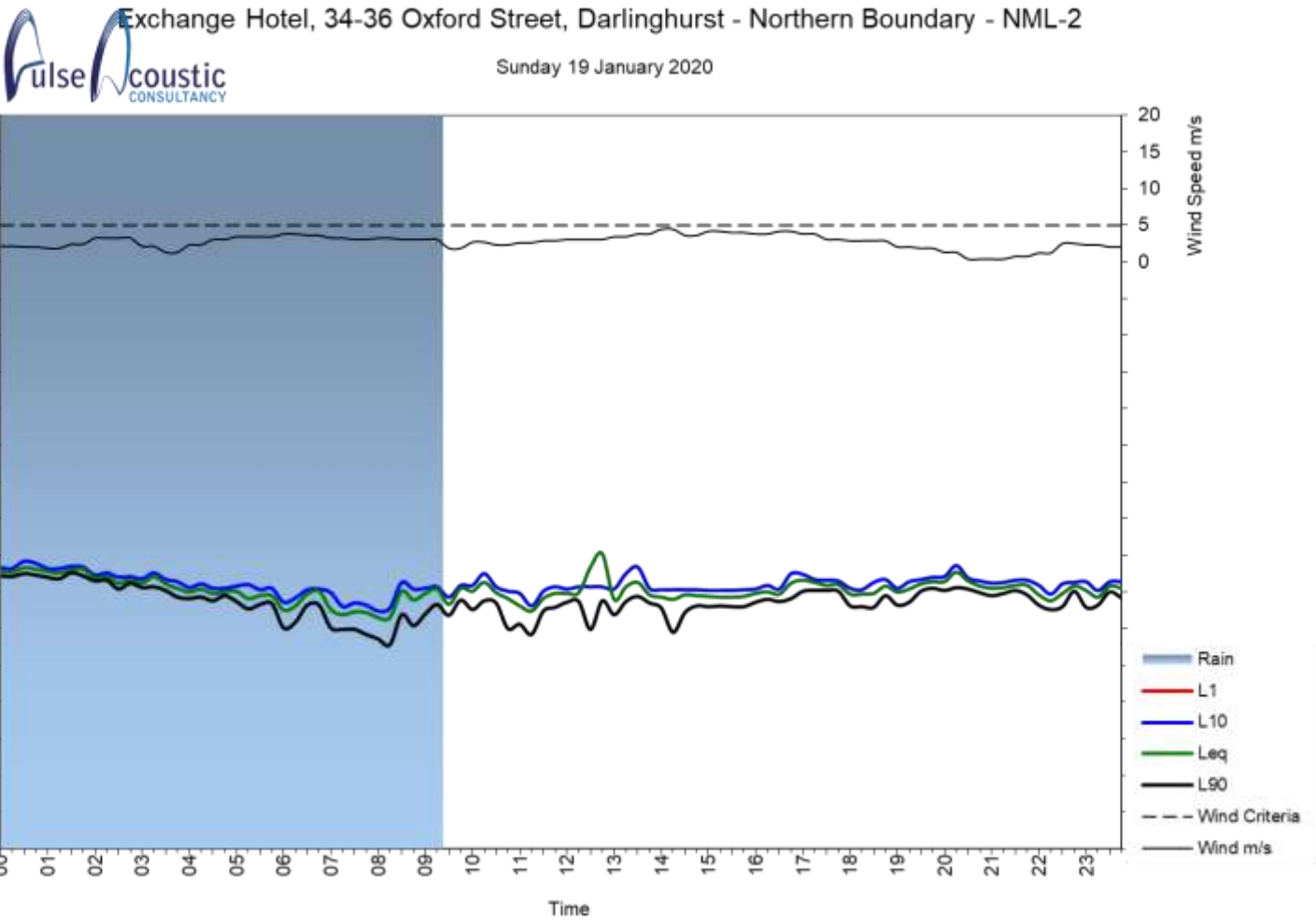
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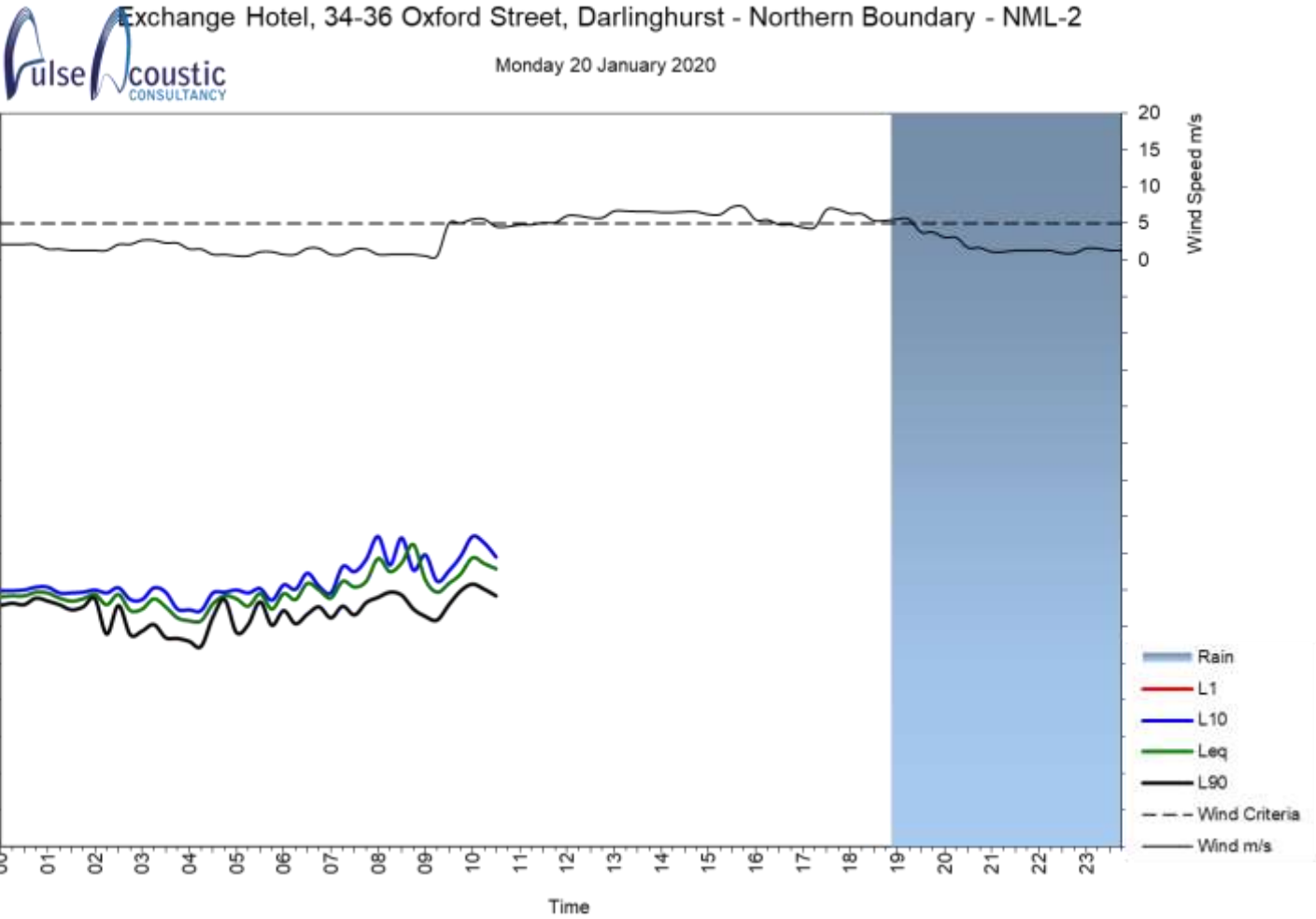




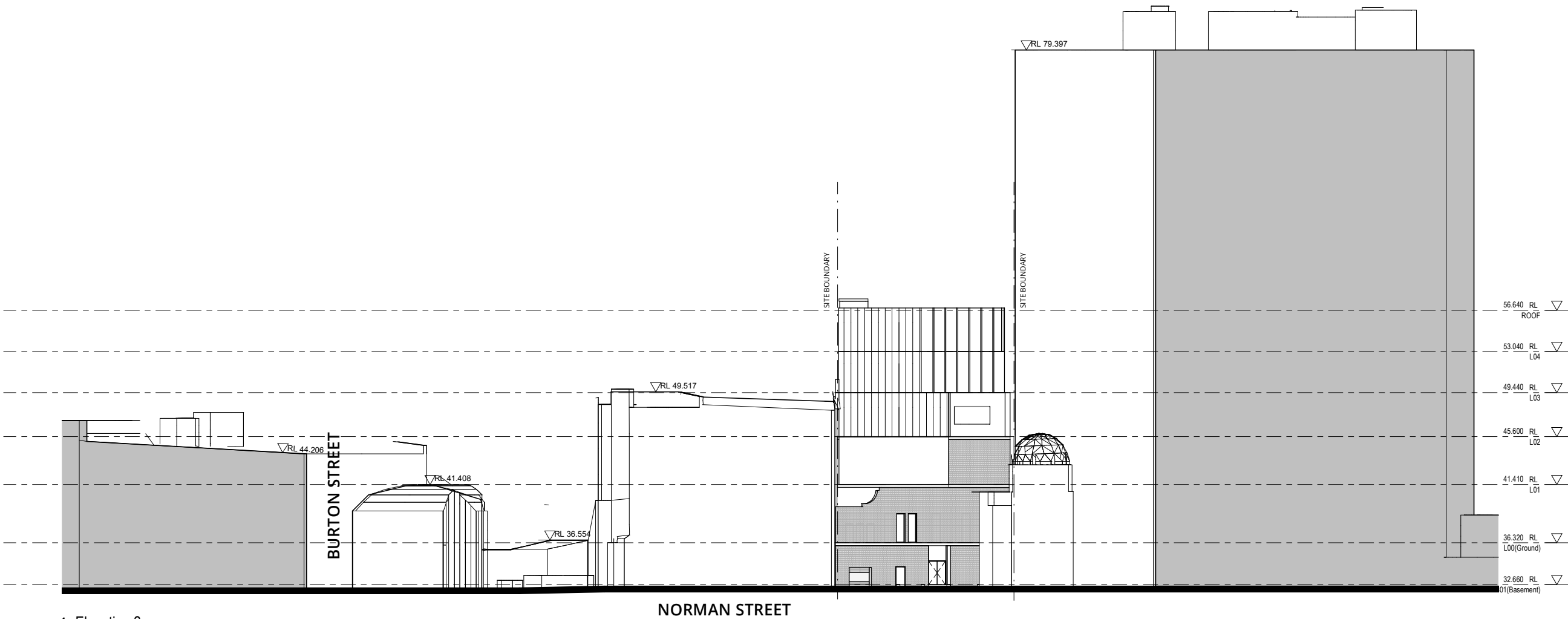








APPENDIX D – ARCHITECTURAL DRAWINGS



1 Elevation 2 - a
1:200



4 ELEVATION 4 - STREET FRONTAGE
1:200

GENERAL NOTES

ALL WORKS TO COMPLY WITH THE BUILDING CODE OF AUSTRALIA, REQUIREMENTS OF RELEVANT STATUTORY AUTHORITIES/ LOCAL GOVERNMENT & RELEVANT AUSTRALIAN BUILDING STANDARDS.

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REV	DESCRIPTION	DATE



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Nominated Architect NSW:
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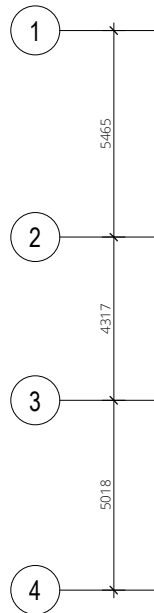
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EASTERN PROPERTY ALLIANCE

PROJECT
THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE
ELEVATIONS - SITE CONTEXT -
EXISTING

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1:200	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 005	E	



OXFORD STREET

OXFORD STREET FOOTPATH



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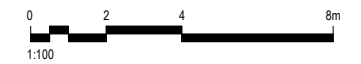
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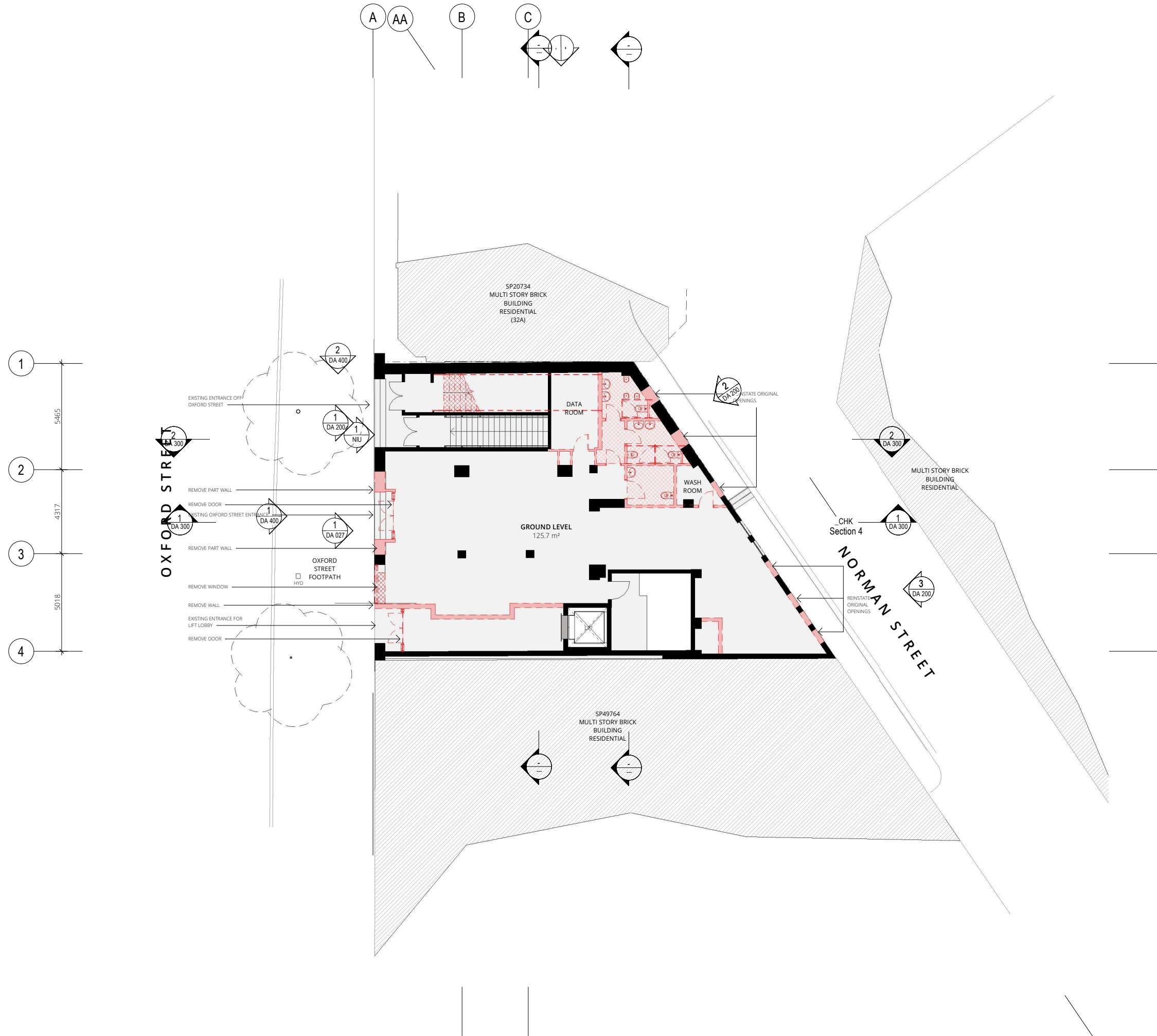
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - BASEMENT - EXISITNG
& DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 020	E	



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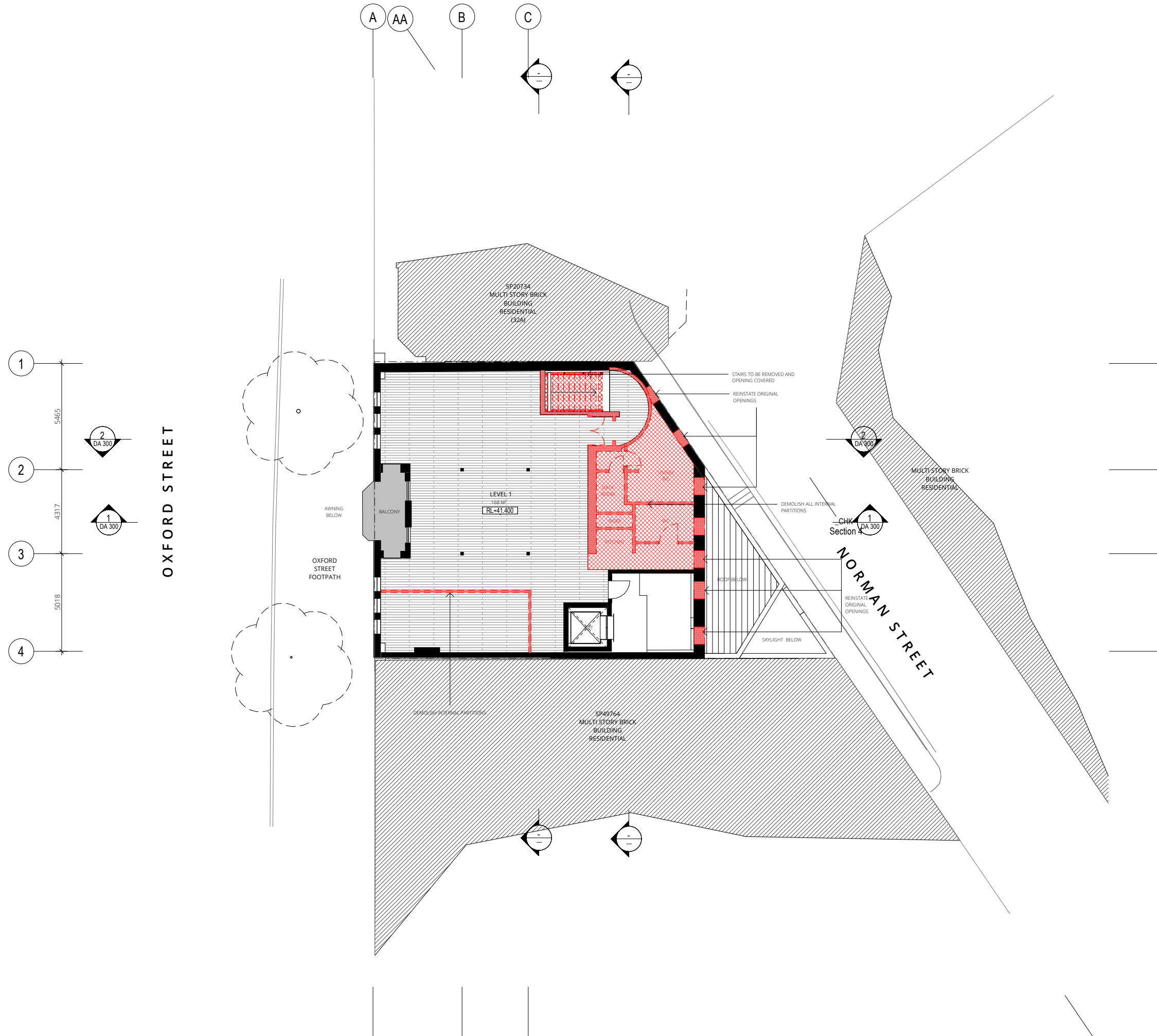
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - GROUND LEVEL -
EXISTING & DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 021	E	



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PROJECT

THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE

PLAN - LEVEL 1 - EXISTING &
DEMOLITION

STATUS

DEVELOPMENT APPLICATION

SCALE @ A1

1 : 100

AUTHOR

TdP

REVIEWED

TdP

APPROVED

TdP

PROJECT NUMBER

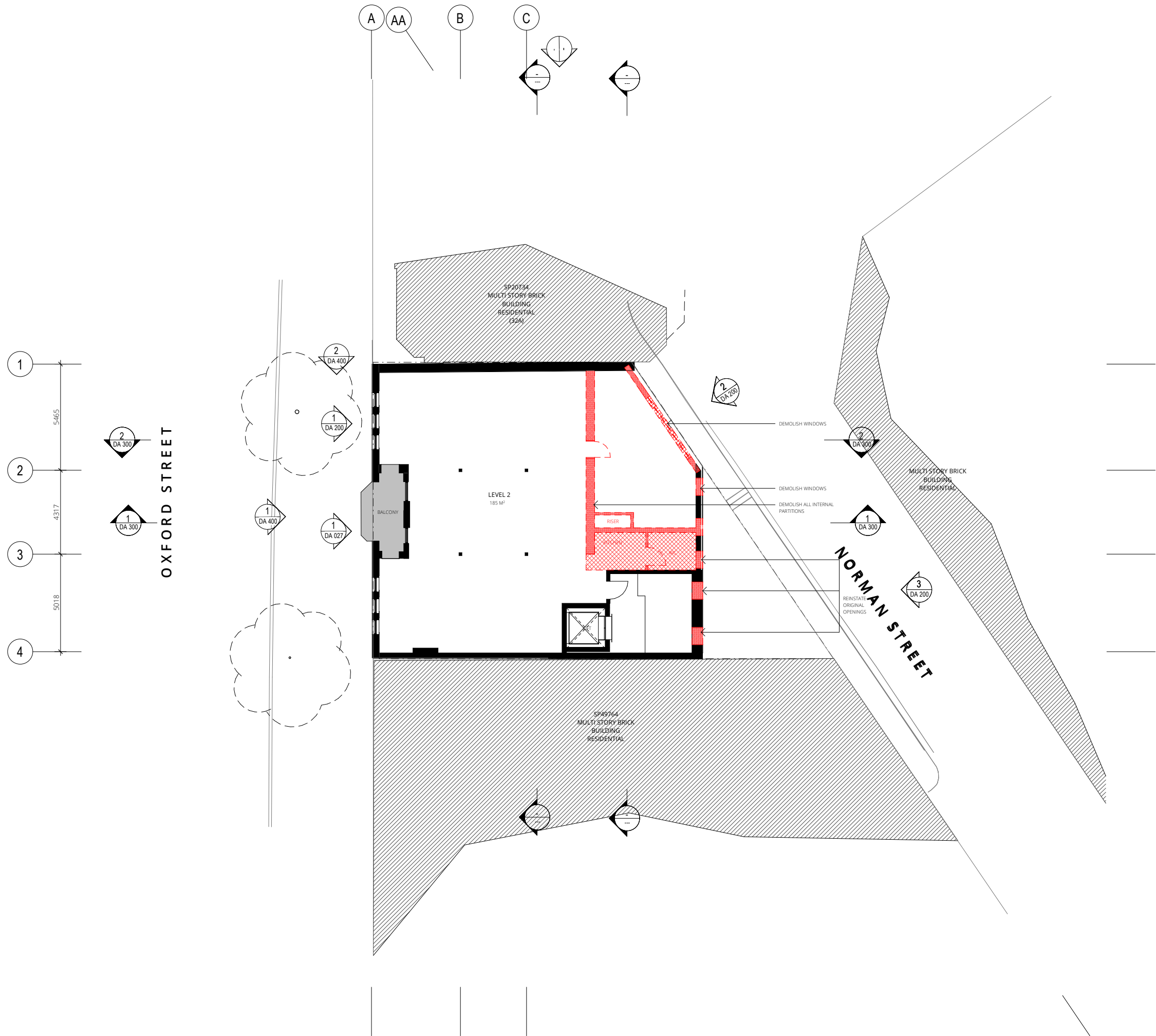
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DRAWING NUMBER

DA 022

ISSUE

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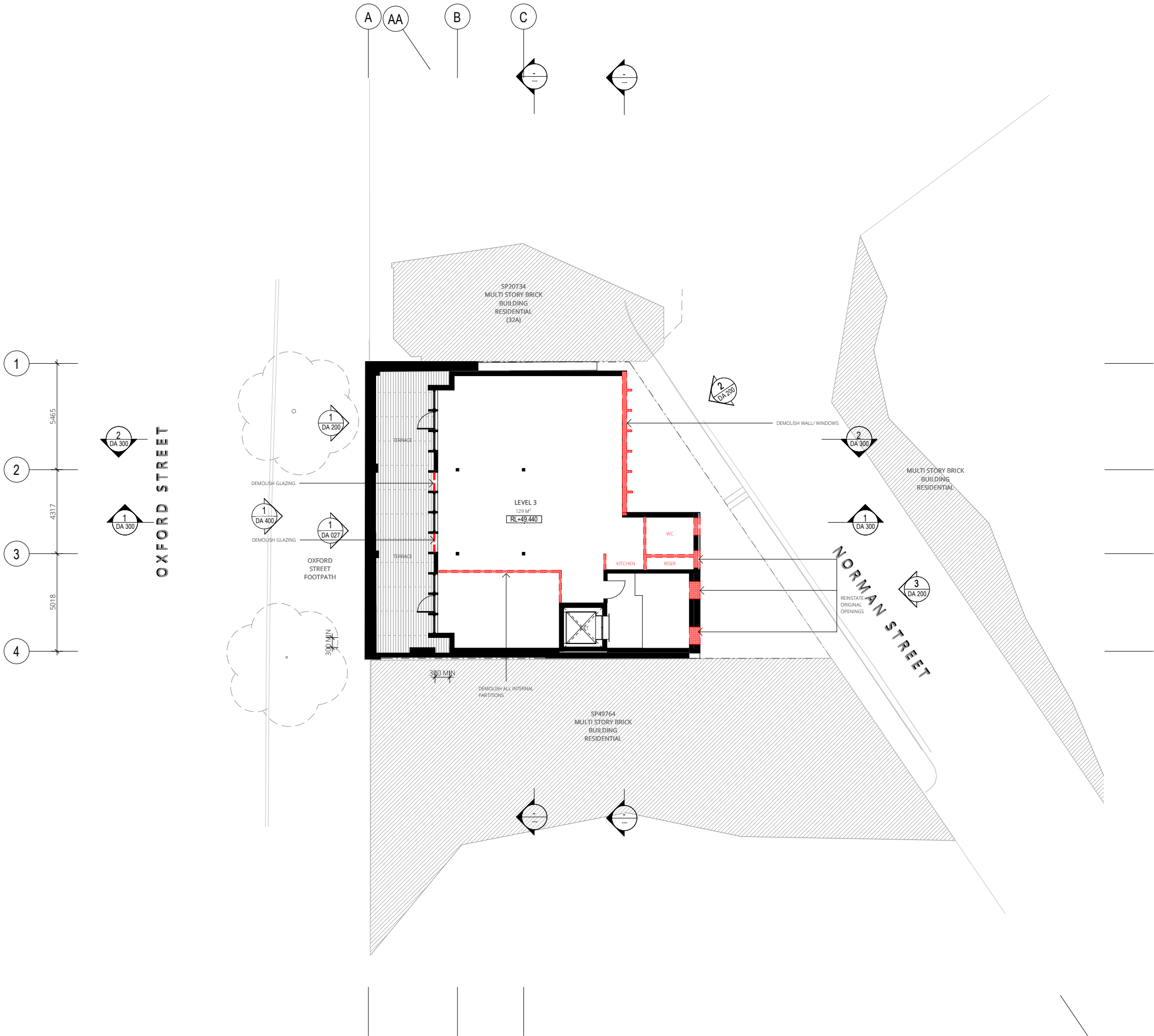
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - LEVEL 2 - EXISTING &
DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 023	E	



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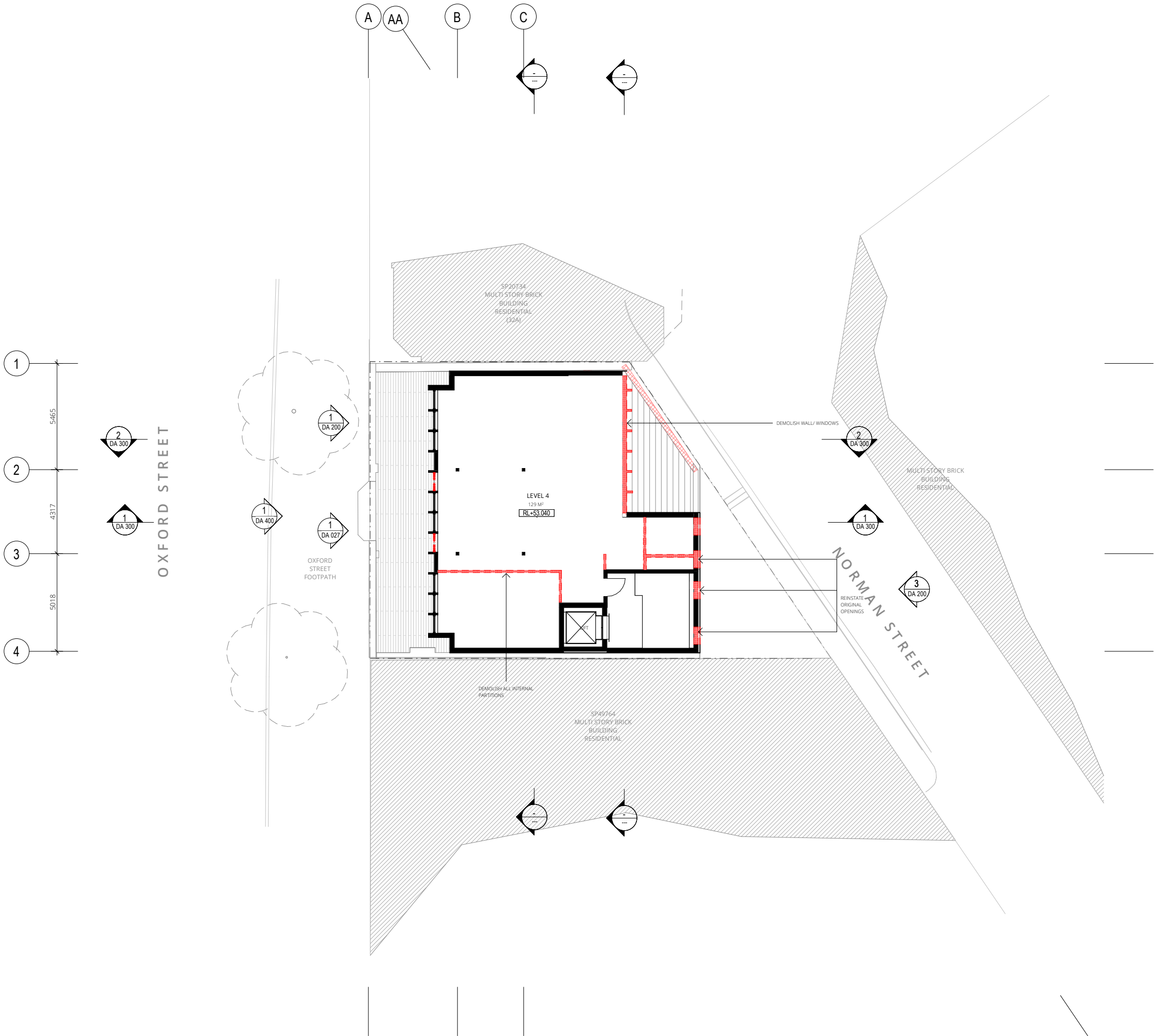
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EASTERN PROPERTY ALLIANCE

PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - LEVEL 3 - EXISTING &
DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 024	E	



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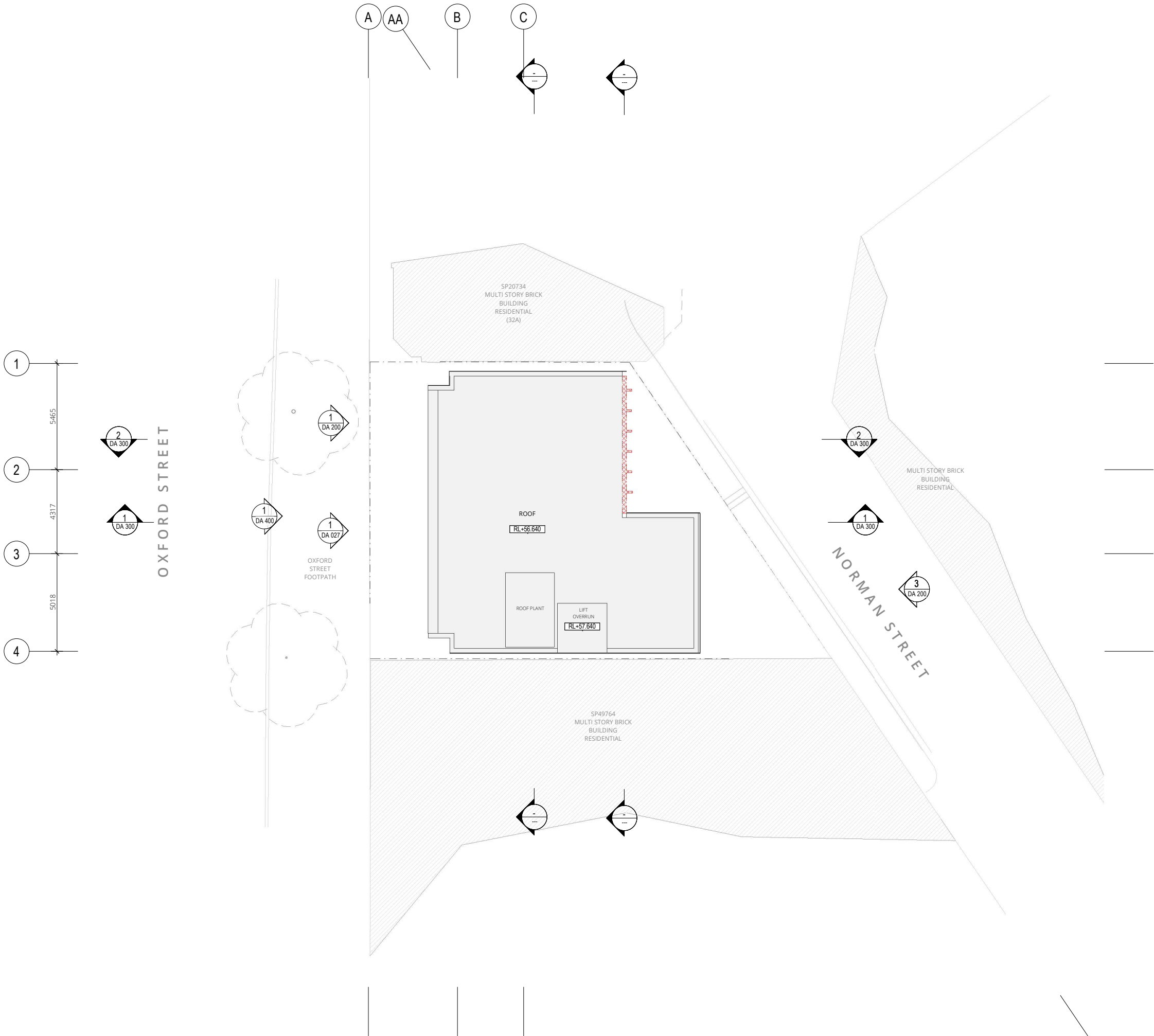
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - LEVEL 4 - EXISTING &
DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 025	E	



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Nominated Architect NSW:
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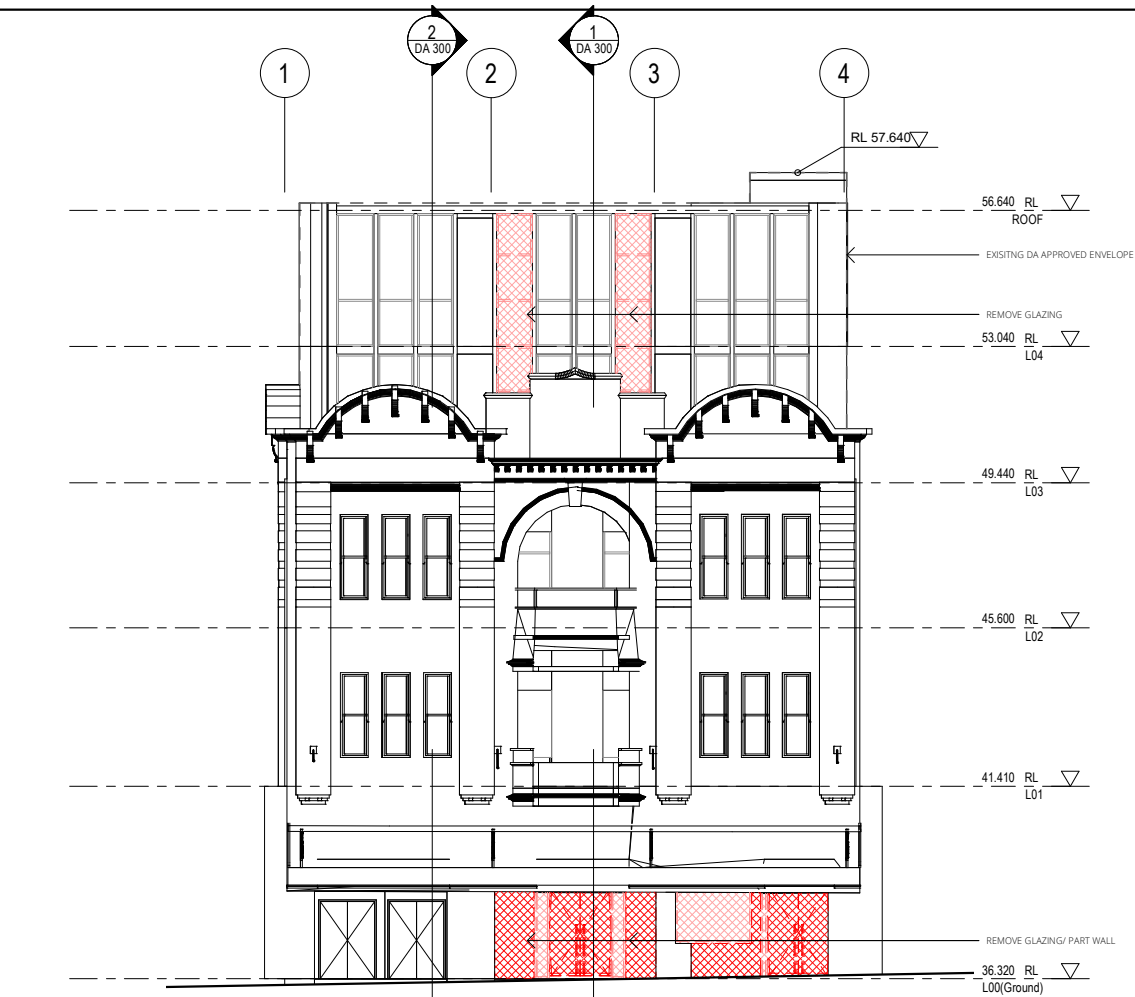
CLIENT
EASTERN PROPERTY ALLIANCE

PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

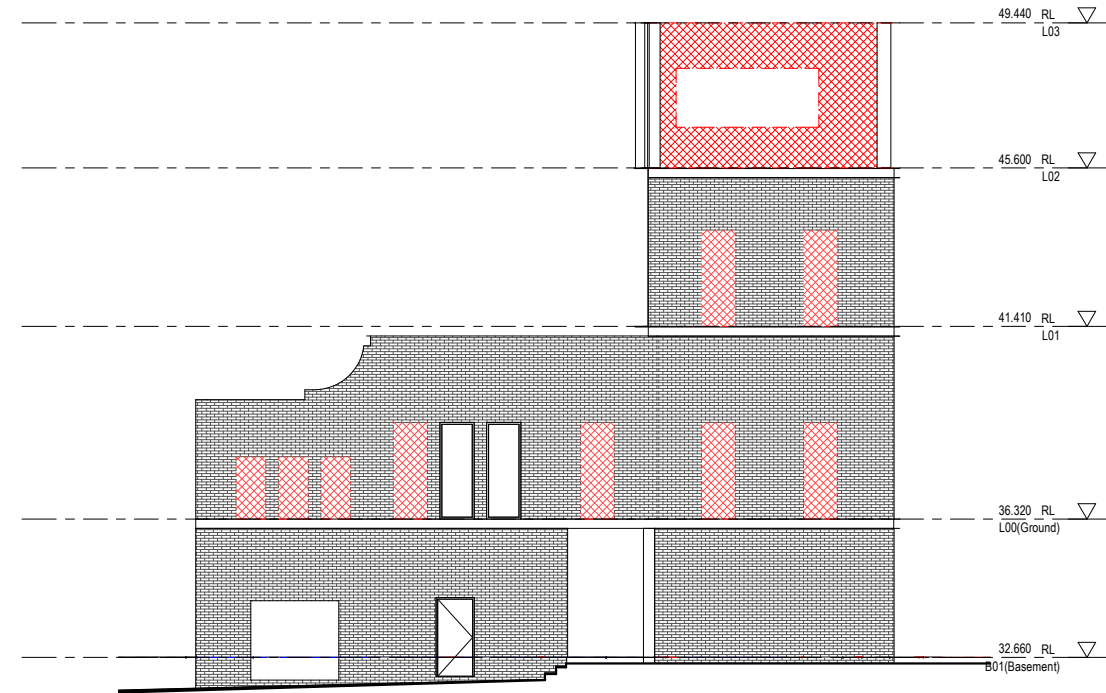
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**PLAN - ROOF - EXISTING &
DEMOLITION**

STATUS
DEVELOPMENT APPLICATION

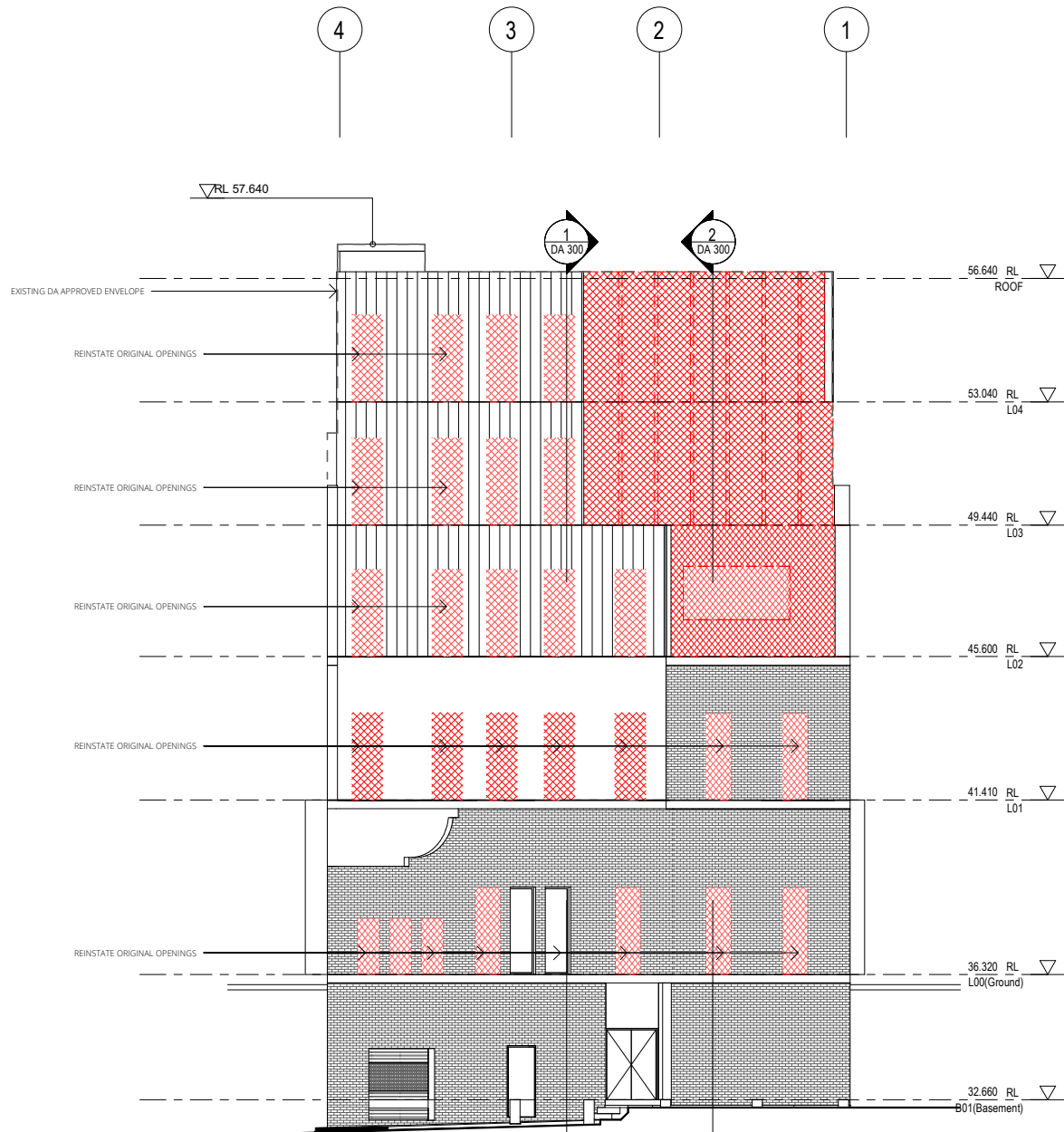
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PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 026	E	



1 OXFORD STREET ELEVATION - EXISITNG & DEMOLITION
1 : 100



2 NORMAN STREET ELEVATION A - EXISTING & DEMOLITION
1 : 100



3 NORMAN STREET ELEVATION B - EXISTING & DEMOLITION
1 : 100

GENERAL NOTES

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REV	DESCRIPTION	DATE



SYDNEY ARCHITECTURE STUDIO
ABN 16 326 548 330
LEVEL 1, 94 BEATTIE ST,
BALMAIN
SYDNEY NSW 2041 AUSTRALIA
Nominated Architect NSW:
Tom de Plater 9807

s/as

CLIENT
EASTERN PROPERTY ALLIANCE

PROJECT
THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE
ELEVATIONS - EXISTING & DEMOLITION

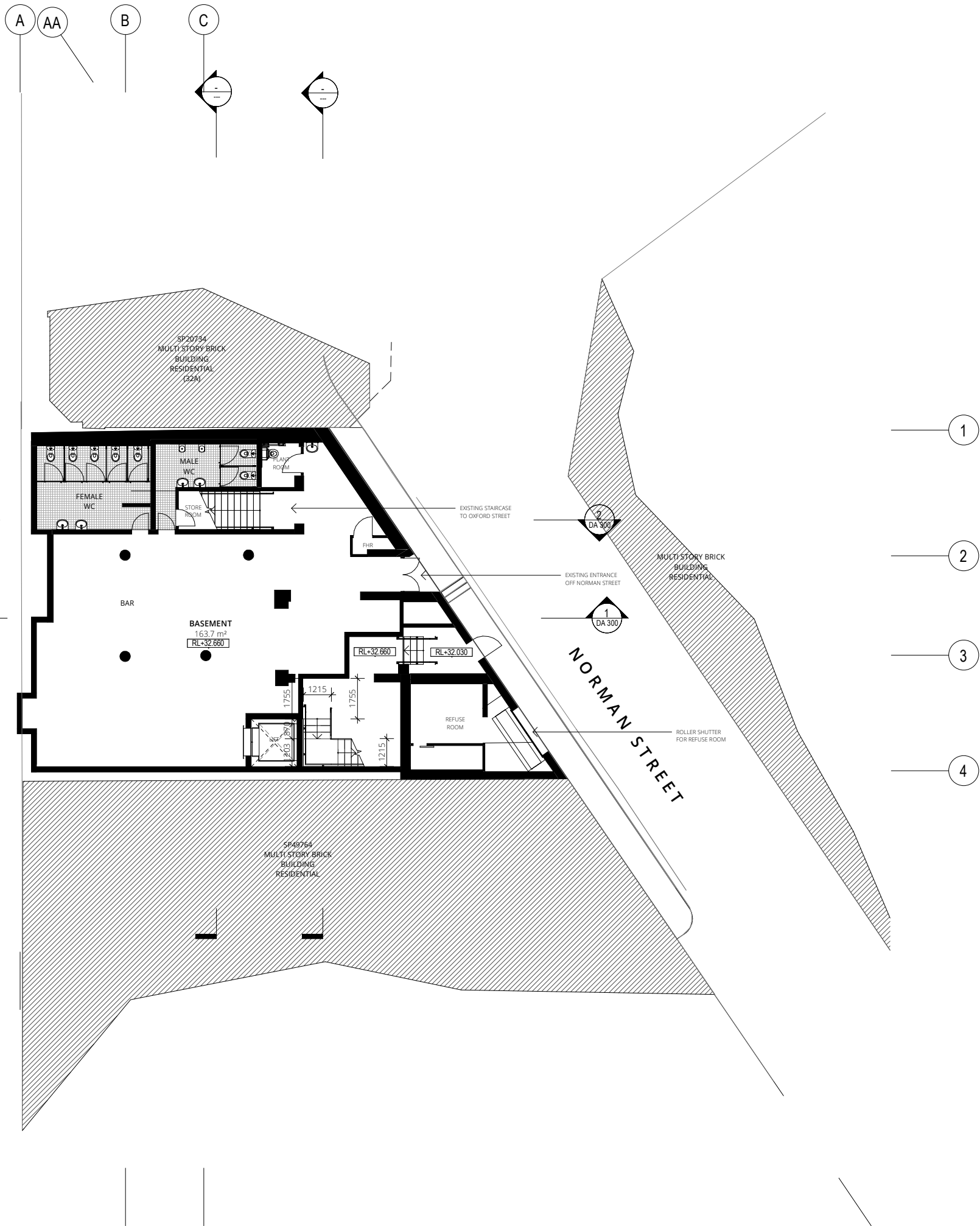
STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 027	E	



OXFORD STREET

OXFORD STREET FOOTPATH



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Nominated Architect NSW:
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NORTH

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CLIENT
EASTERN PROPERTY ALLIANCE

PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

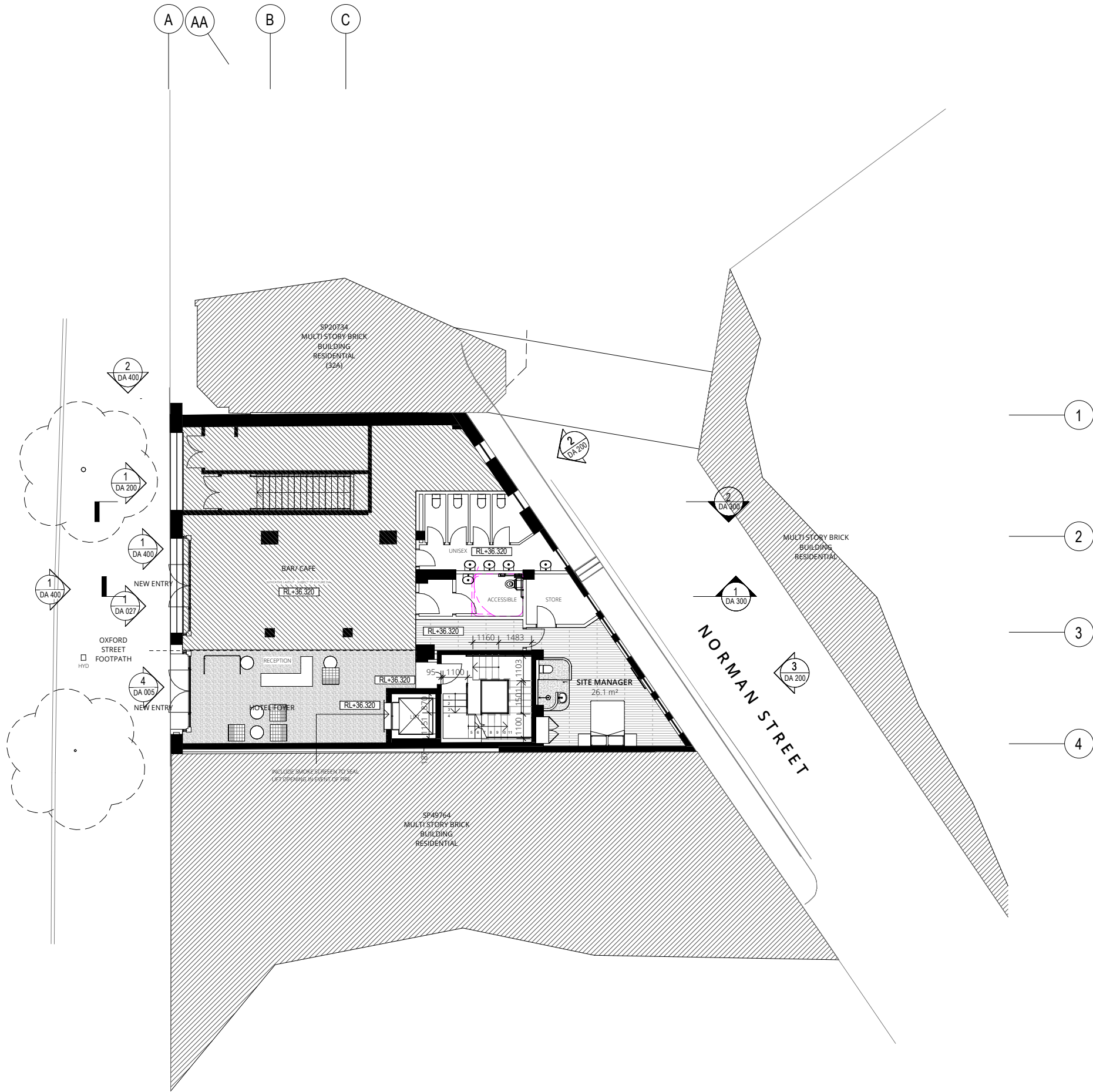
DRAWING TITLE
**PLAN - BASEMENT -
PROPOSED**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
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OXFORD STREET

NORMAN STREET



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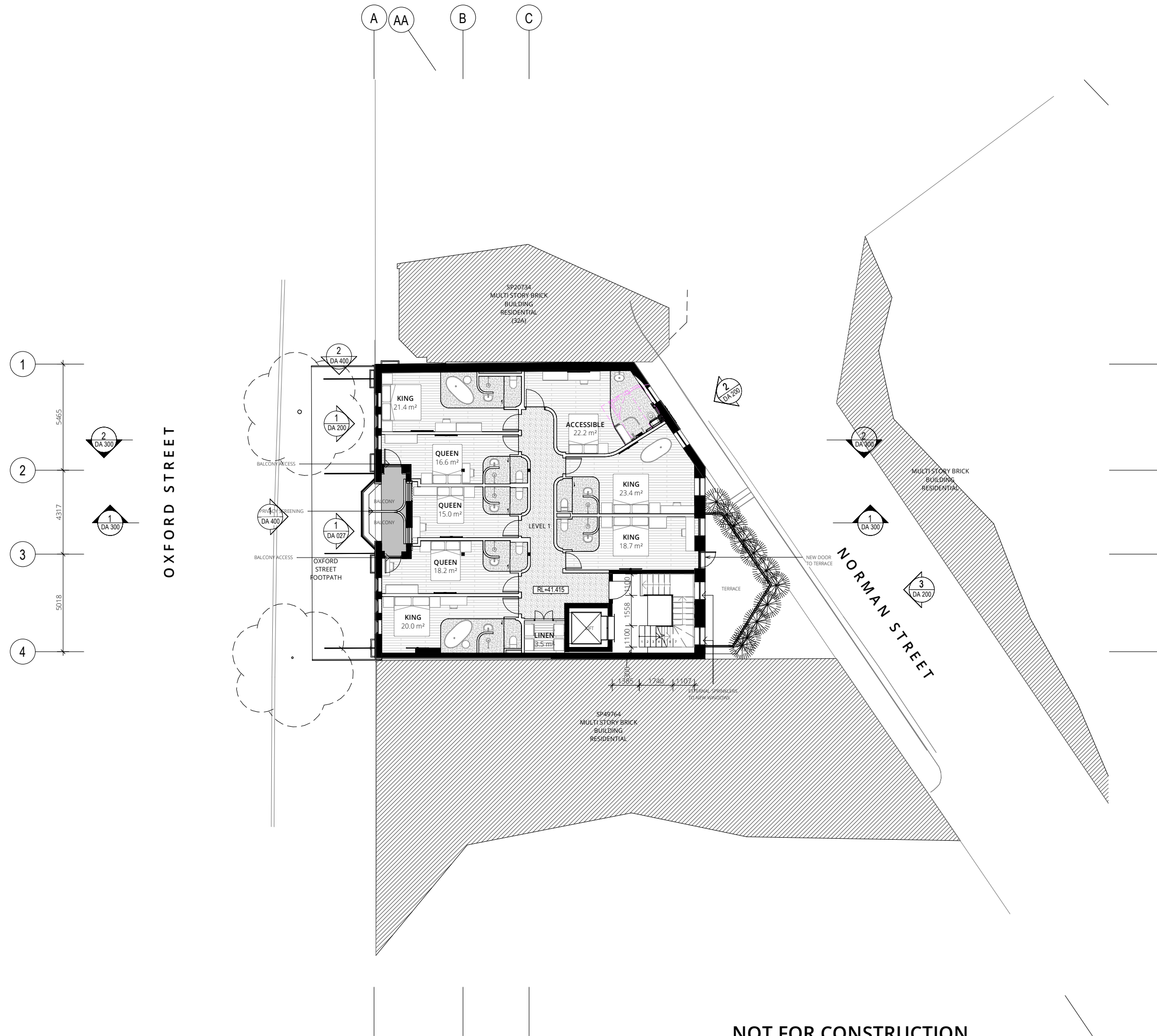
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
**PLAN - GROUND LEVEL -
PROPOSED**

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 101	E	



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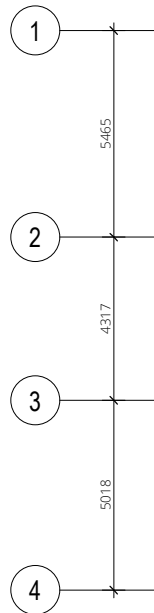
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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

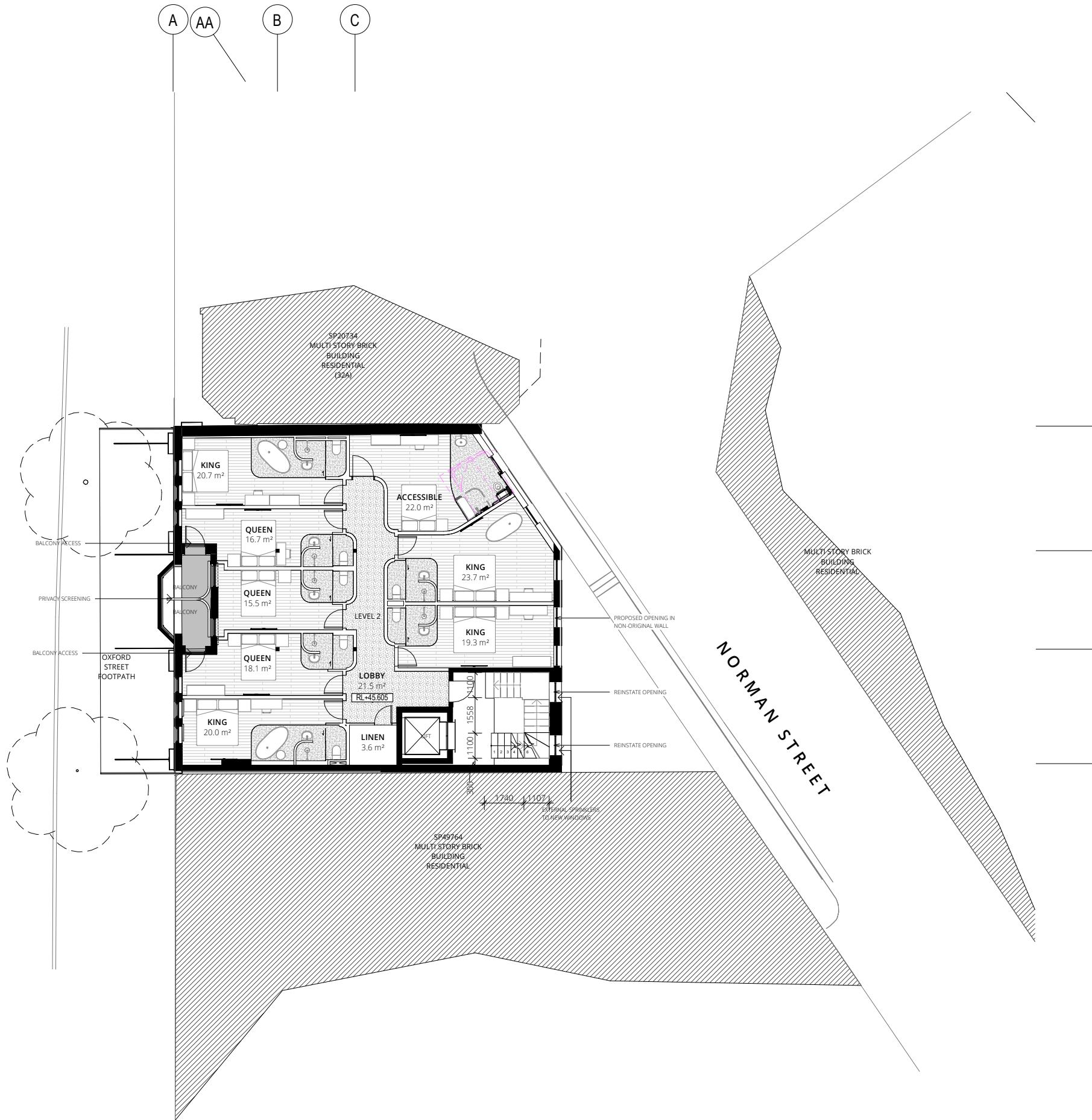
DRAWING TITLE
PLAN - LEVEL 1 - PROPOSED

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 102	E	



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ABN 16 326 548 330
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BALMAIN
SYDNEY NSW 2041 AUSTRALIA

Nominated Architect NSW:
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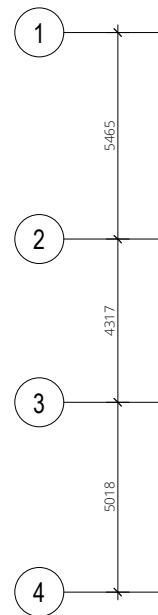
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EASTERN PROPERTY ALLIANCE

PROJECT
THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

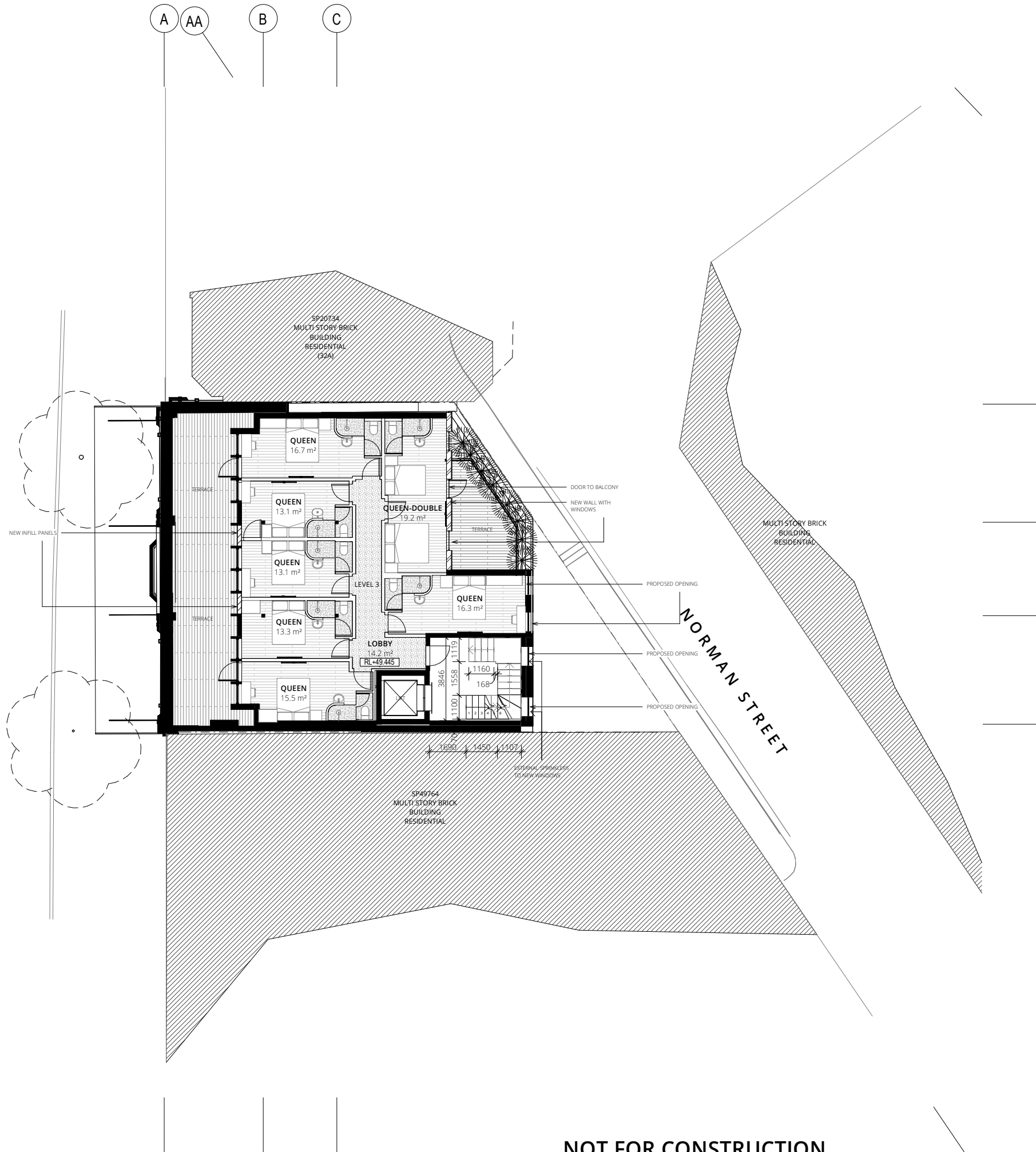
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PLAN - LEVEL 2 - PROPOSED

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
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Nominated Architect NSW:
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NORTH

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PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
PLAN - LEVEL 3 - PROPOSED

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 104	E	



NORTH

A circular compass rose with four main directional arrows. The top arrow is labeled 'NORTH', the bottom 'SOUTH', the left 'WEST', and the right 'EAST'. There are also four smaller arrows between the main ones, labeled 'NORTH-EAST', 'SOUTH-EAST', 'SOUTH-WEST', and 'NORTH-WEST'.

Figure 1. The location of the study area in the north-east of Iran.

the study area. The climate of the study area is semi-arid with an average annual precipitation of 150 mm and an average annual temperature of 18°C.

2.2. Study area

The study area is located in the north-east of Iran, in the city of Urmia, which is one of the largest cities in Iran. The city is situated on the southern shore of Lake Urmia, which is one of the largest saltwater lakes in the world. The city is located at an altitude of 1350 m above sea level.

The study area is divided into two main parts: the urban area and the rural area. The urban area is located in the north-east of the city, and the rural area is located in the south-west of the city.

2.3. Data collection

The data were collected from the urban and rural areas of the study area. The urban area was divided into four districts, and the rural area was divided into four districts. The data were collected from the four districts of the urban area and the four districts of the rural area.

2.4. Data analysis

The data were analyzed using the following methods: descriptive statistics, correlation analysis, and regression analysis.

2.5. Results

The results of the data analysis are presented in the following sections: descriptive statistics, correlation analysis, and regression analysis.

2.6. Discussion

The results of the data analysis are discussed in the following sections: descriptive statistics, correlation analysis, and regression analysis.

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s/a.s

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EASTERN PROPERTY ALLIANCE

PROJECT
THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE

PLAN - LEVEL 4 - PROPOSED

STATUS

DEVELOPMENT APPLICATION

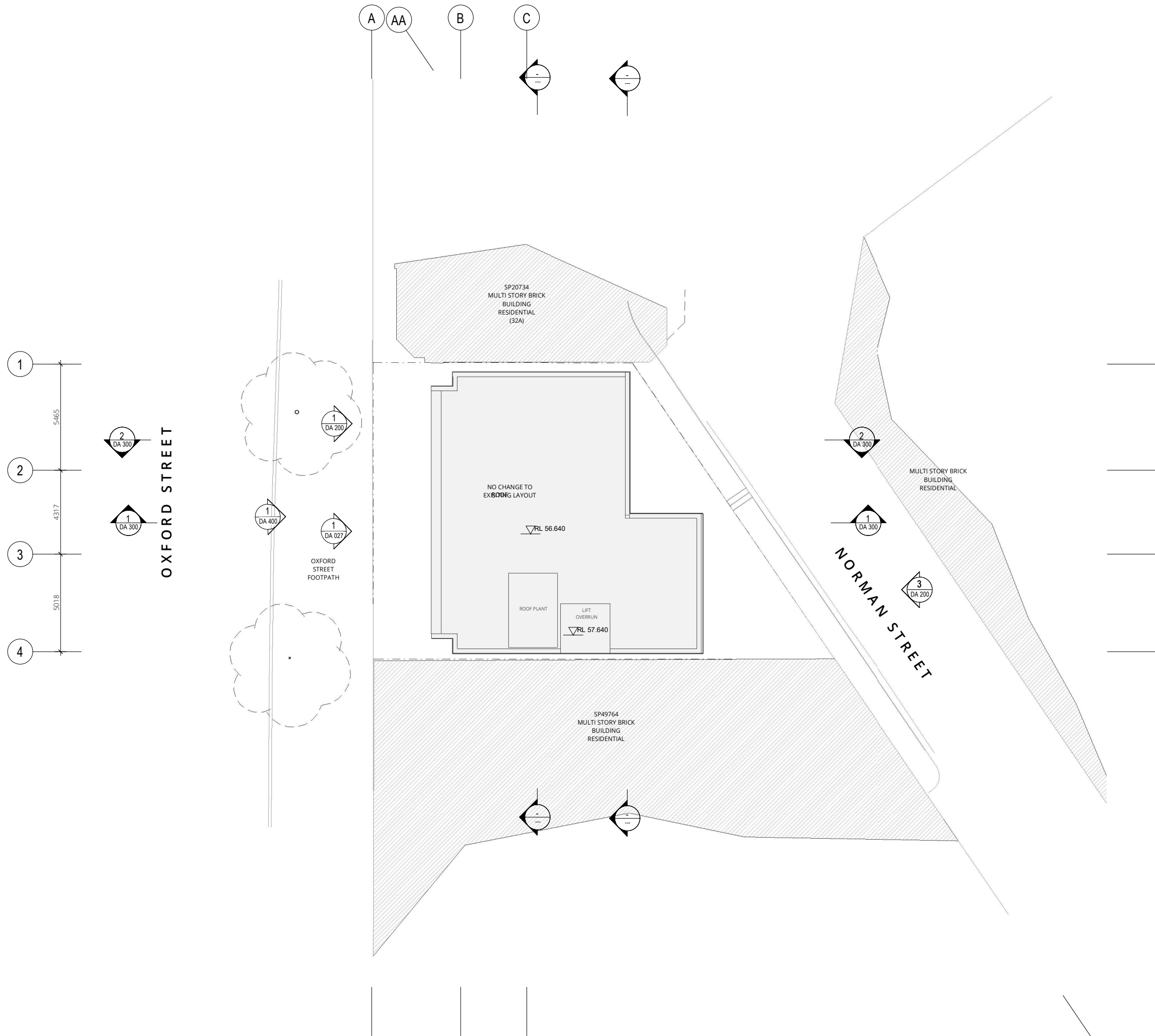
SCALE @ A1	AUTHOR	REVIEWED	APPROVED
1 : 100	TdP	TdP	TdP

PROJECT NUMBER	DRAWING NUMBER	ISSUE
1809	DA 105	E

AIM 360://1901 34 Oxford Street/1901 34 Oxford DA 2 nt

3/11/2019 4:33:33 PM

Original Sheet Size A1 - 841 x 594mm



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SYDNEY ARCHITECTURE STUDIO
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SYDNEY NSW 2041 AUSTRALIA

Nominated Architect NSW:
Tom de Plater 9807

NORTH

s/as

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EASTERN PROPERTY ALLIANCE

PROJECT
**THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW**

DRAWING TITLE
PLAN - ROOF - PROPOSED

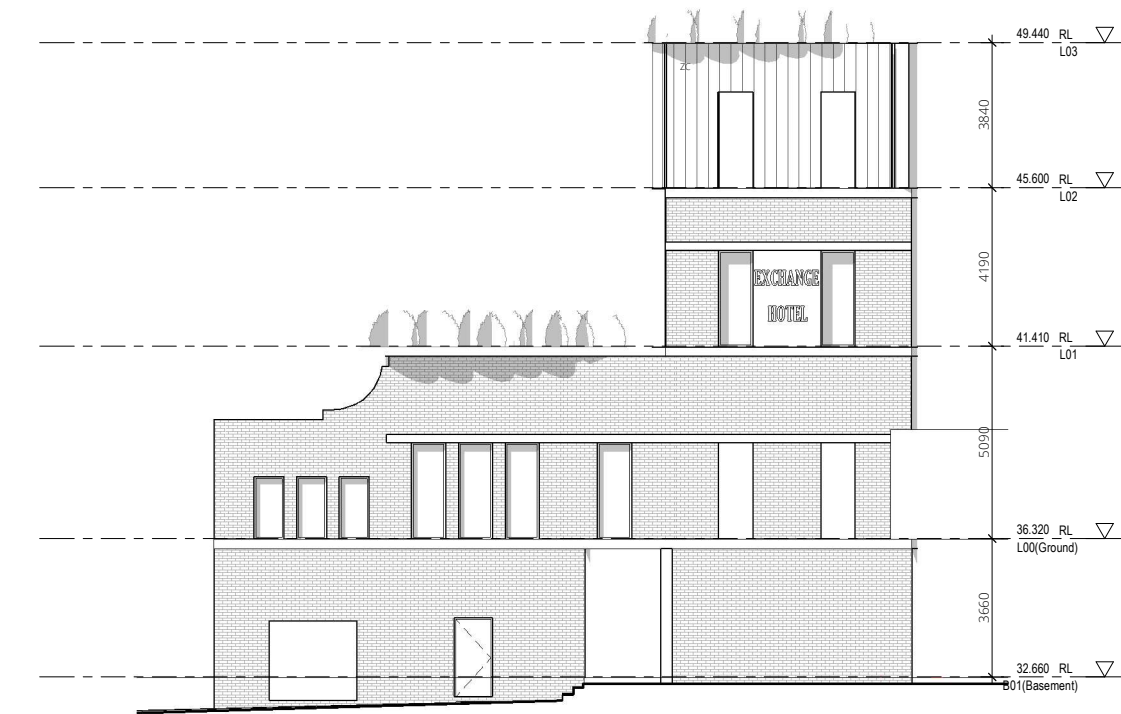
STATUS
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1 : 100	TdP	TdP	TdP
PROJECT NUMBER	DRAWING NUMBER	ISSUE	
1809	DA 106	E	

1 OXFORD STREET ELEVATION - PROPOSED

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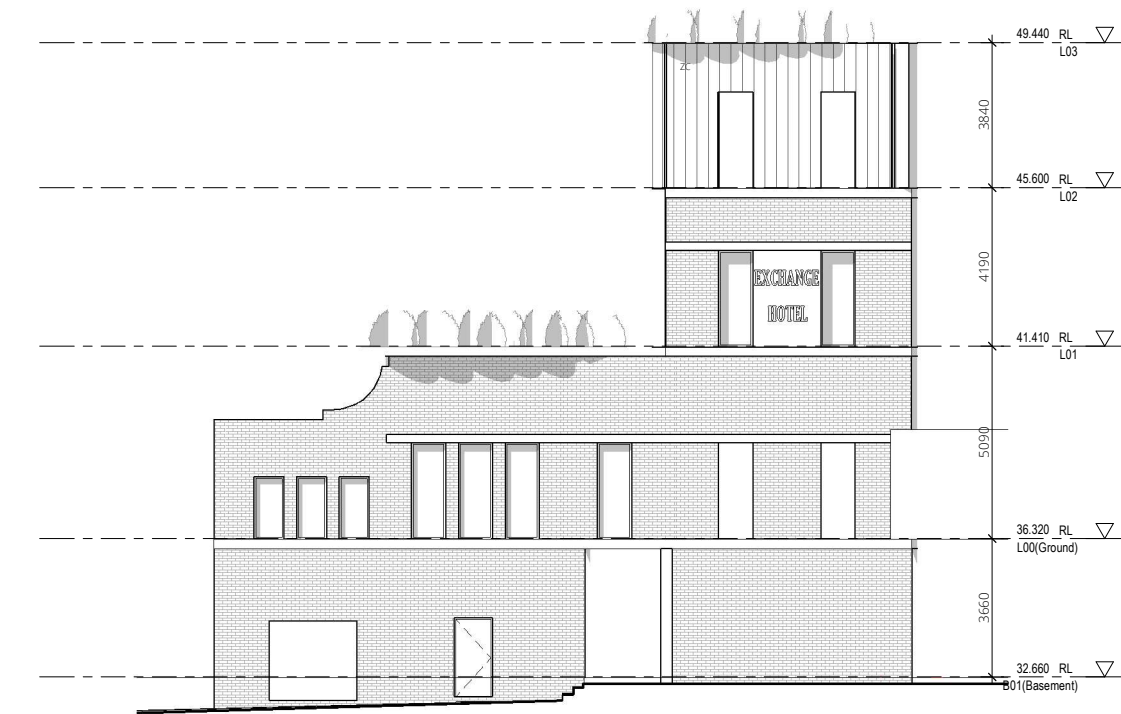
212



2 NORMAN STREET ELEVATION A - PROPOSED

1:100

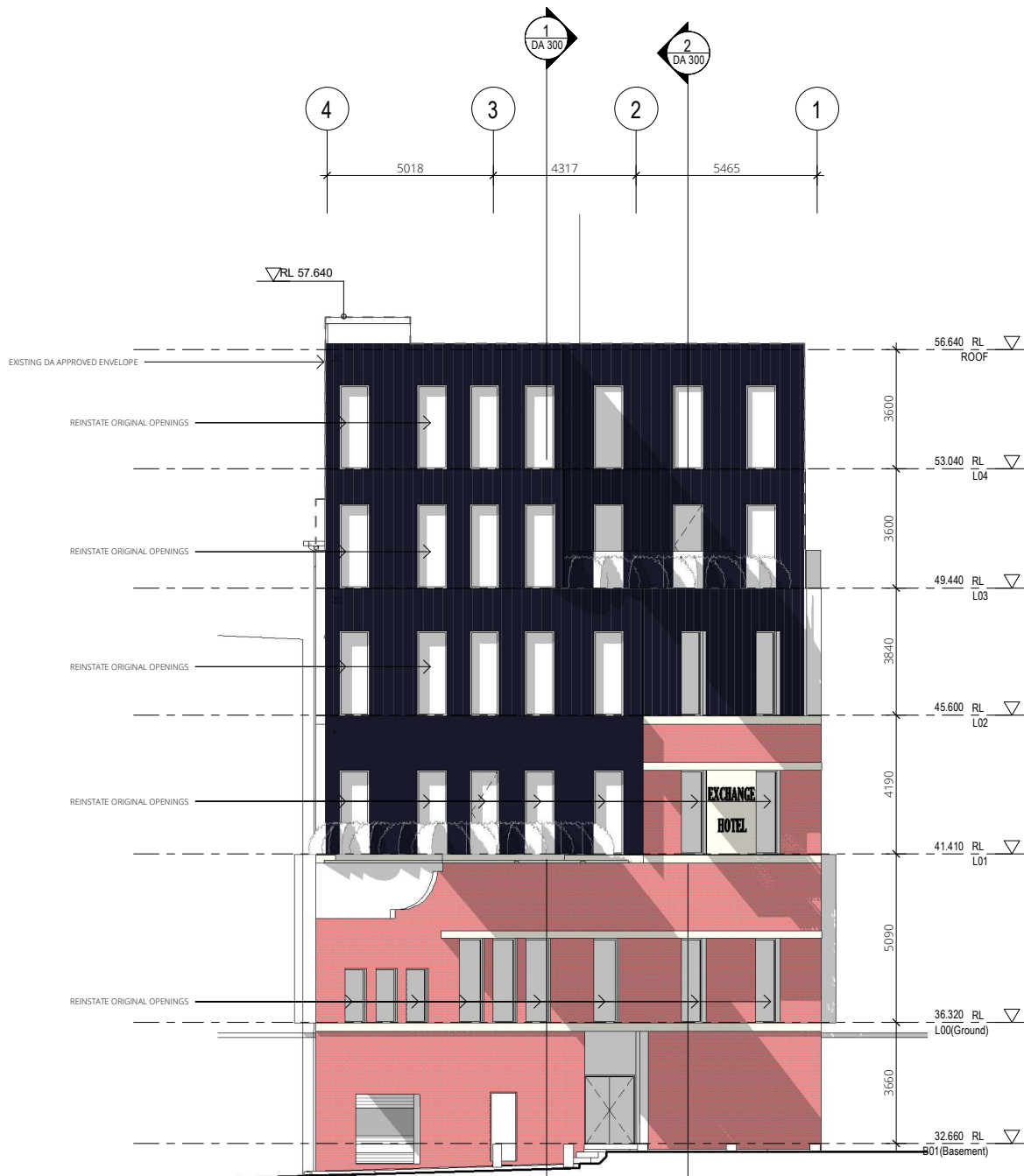
212



3 NORMAN STREET ELEVATION B - PROPOSED

1:100

212



- EXISTING BRICK
- EXISTING WHITE RENDER/PAINT
- PROPOSED ZINC PANELLING
- EXISTING PRESSED METAL

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Nominated Architect NSW:
Tom de Plater 9807

s/as

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EASTERN PROPERTY ALLIANCE

PROJECT
THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE
ELEVATIONS - PROPOSED

STATUS
DEVELOPMENT APPLICATION

SCALE @ A1
1:100

AUTHOR
TdP

REVIEWED
TdP

APPROVED
TdP

PROJECT NUMBER
1809

DRAWING NUMBER
DA 200

ISSUE
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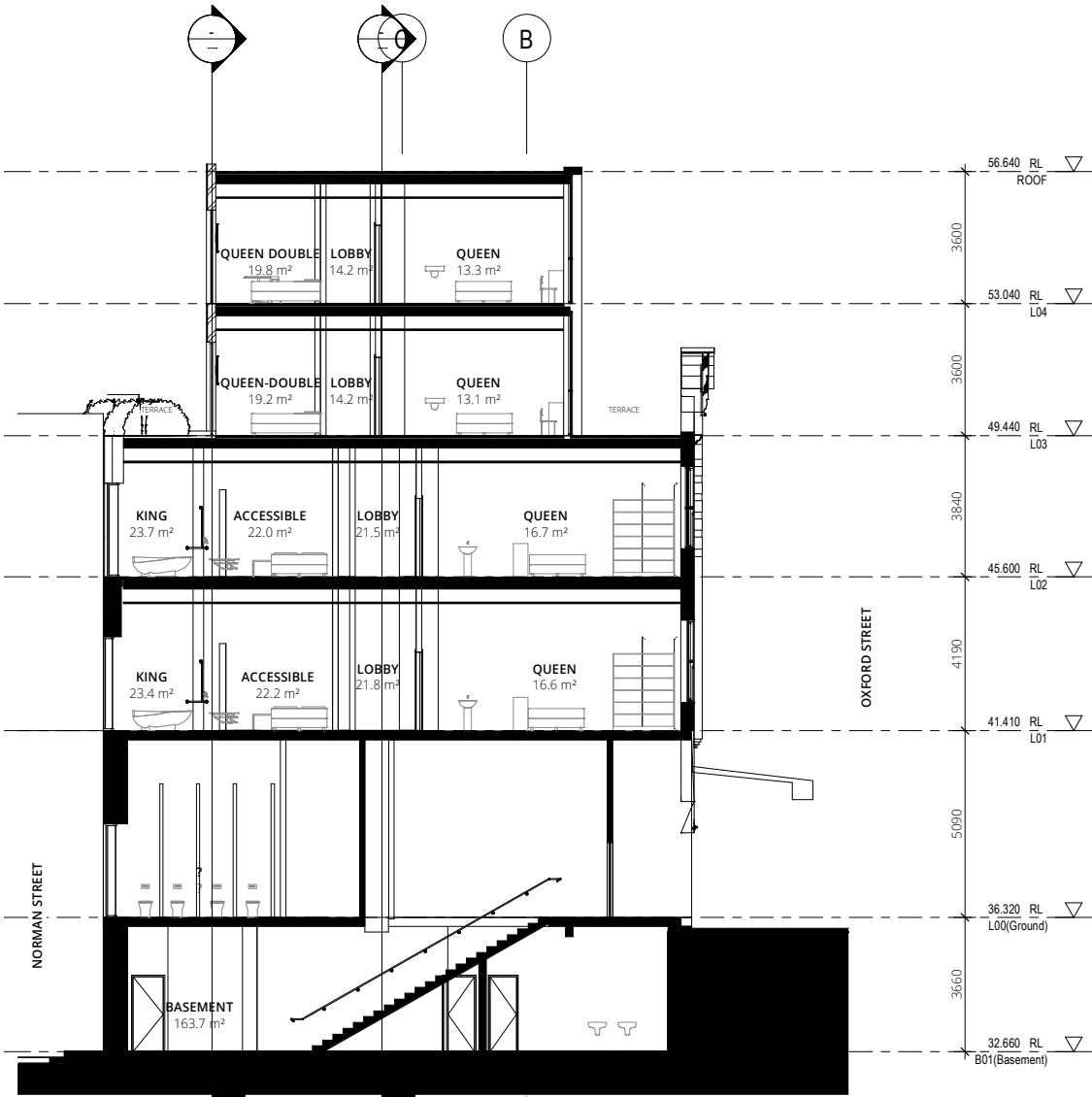
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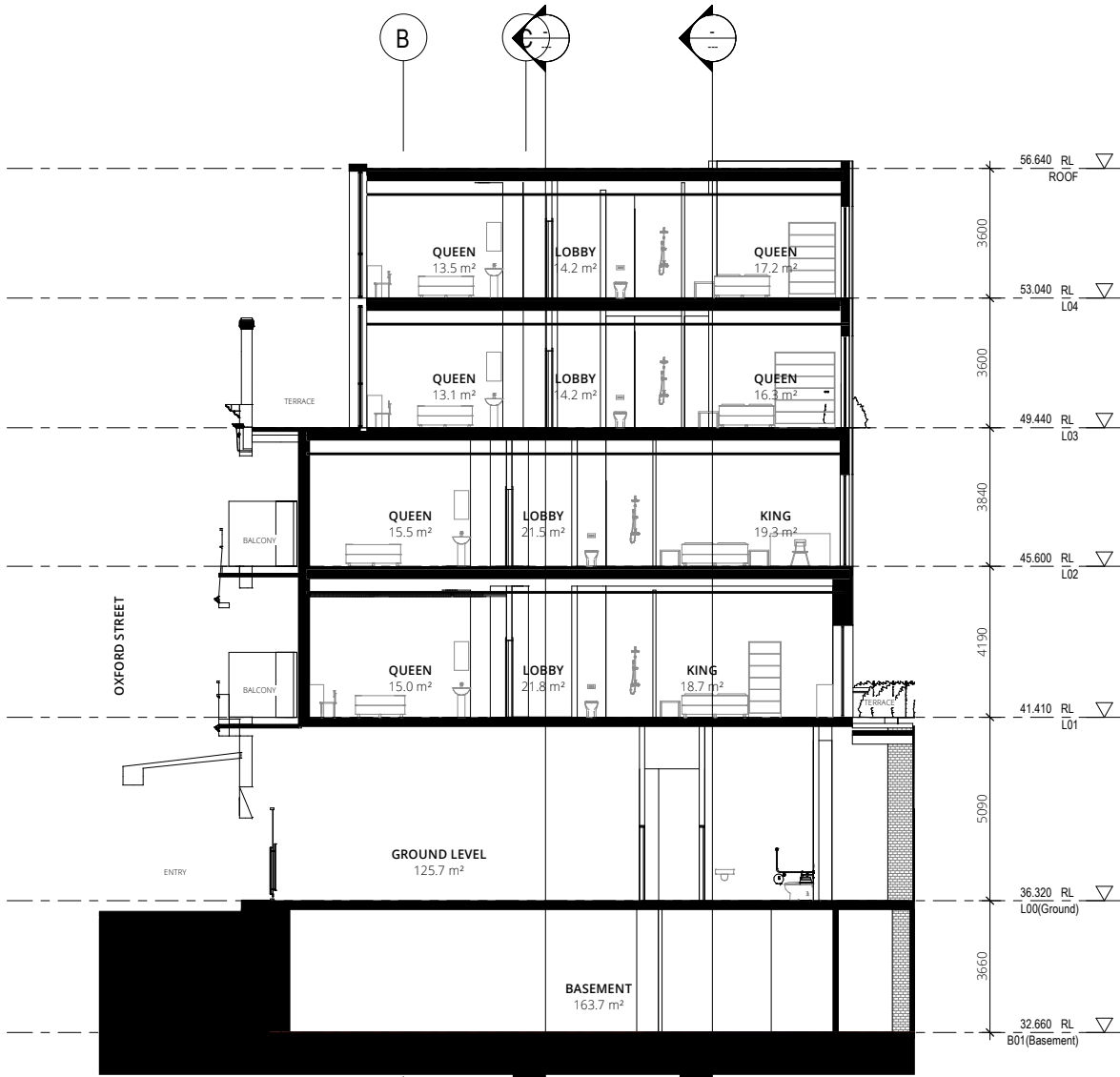
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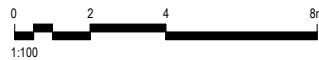


2 LONG SECTION 02
1:100



1 LONG SECTION 1
1:100

REV	DESCRIPTION	DATE
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PROJECT

THE EXCHANGE HOTEL
34-36 OXFORD STREET 2010
DARLINGHURST NSW

DRAWING TITLE

SECTIONS - PROPOSED

STATUS

DEVELOPMENT APPLICATION

SCALE @ A1

1:100

AUTHOR

TdP

REVIEWED

TdP

APPROVED

TdP

PROJECT NUMBER

1809

DRAWING NUMBER

DA 300

ISSUE

E

APPENDIX E – NOISE INTRUSION CALCULATION – LEVEL 1 KING ROOM

Oxford Street - Level 1 - King Room - Glass

Item / Description	Rating/Broadband/Input			Octave Band Centre Frequency, Hz								
	Rating	dB	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
External Noise Level LAeq(1 Hour)- Façade Levels (Night Period)		77.2	66.0 (A)	72.2	73.2	69.2	64.2	61.2	62.2	58.2	51.2	38.2
Reverberation Time - Hotel Room (AS/NZS 2107:2016)	0.60 s			0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.4	0.3
Transmission Loss - 10.38mm Laminate + 100mm Airgap + 6mm Float	Rw (C; Ctr) 50(-1;-3)			-12.0	-15.0	-26.0	-42.0	-54.0	-58.0	-61.0	-58.0	-61.0
Direct Noise Component												
Facade Noise Break-In - Type: Direct - Area of Facade: 3.6m²		1 m	27.6 (A)	54.3	52.3	37.3	16.3	1.3	-1.7	-8.7	-12.7	-28.7
Reverberant Noise Component												
Facade Noise Break-In - Type: Reverberant - Area of Facade: 3.6m²		66 m³	33.7 (A)	61.0	58.4	43.1	21.7	6.3	3.3	-4.2	-9.3	-26.7
Result Combined Internal Noise Level (Glass Only)		63.8	34.6 (A)	61.9	59.3	44.1	22.8	7.5	4.5	-2.9	-7.7	-24.6

Oxford Street - Level 1 - King Room - External Wall

Item / Description	Rating/Broadband/Input			Octave Band Centre Frequency, Hz								
	Rating	dB	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
External Noise Level LAeq(1 Hour)- Façade Levels (Night Period)		77.2	66.0 (A)	72.2	73.2	69.2	64.2	61.2	62.2	58.2	51.2	38.2
Reverberation Time - Hotel Room (AS/NZS 2107:2016)	0.60 s			0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.4	0.3
Transmission Loss - Masonry Brick 2 x 110mm	Rw (C; Ctr) 51 (-1;-3)			-39.0	-42.0	-45.0	-41.0	-46.0	-53.0	-61.0	-66.0	-69.0
Direct Noise Component												
Facade Noise Break-In - Type: Direct - Area of Facade: 7.2m²		1 m	14.3 (A)	29.5	27.5	20.5	19.5	11.5	5.5	-6.5	-18.5	-34.5
Reverberant Noise Component												
Facade Noise Break-In - Type: Reverberant - Area of Facade: 7.2m²		66 m³	20.4 (A)	37.0	34.4	27.1	25.7	17.3	11.3	-1.2	-14.3	-31.7
Result Combined Internal Noise Level (External Wall Only)		40.2	21.4 (A)	37.7	35.2	27.9	26.6	18.3	12.3	-0.1	-12.9	-29.9

Oxford Street - Level 1 - King Room - Combined Noise Level

Item / Description	Rating/Broadband/Input			Octave Band Centre Frequency, Hz								
	Rating	dB	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Combined Internal Noise Level (Glass Only)		63.8	34.6 (A)	61.9	59.3	44.1	22.8	7.5	4.5	-2.9	-7.7	-24.6
Combined Internal Noise Level (External Wall Only)		40.2	21.4 (A)	37.7	35.2	27.9	26.6	18.3	12.3	-0.1	-12.9	-29.9
Result Combined Internal Noise Level		63.9	34.8 (A)	61.9	59.4	44.2	28.1	18.6	12.9	1.8	-6.5	-23.5
AS/NZS 2107:2016 SPL Guidance - Hotels and motels (night time), 35-40 dB(A)			40 (A)	-	-	-	-	-	-	-	-	-
CoS Council DCP 2012 - LAeq(1hour) Sleeping Spaces (Night Time) 35dB(A)			35 (A)									
217 Compliance			Yes	-	-	-	-	-	-	-	-	-