



# Mechanical Noise Emission Proposed Garage Development 69 Bassett St, Mona Vale, NSW



Client:  
Chrome Temple Garage  
C/o- MHDP Architects

4 April 2023


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Document	Rev	Date	Prepared	Reviewed	Authorised	Approved
5908R001.DK.230227	0	4 April 2023	DK	RH	RH	

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## GLOSSARY

### NOISE

Noise is produced through rapid variations in air pressure at audible frequencies (20 Hz – 20 kHz). Most noise sources vary with time. The measurement of a variable noise source requires the ability to describe the sound over a particular duration of time. A series of industry standard statistical descriptors have been developed to describe variable noise, as outlined below.

### NOISE DESCRIPTORS

**L<sub>eq</sub>** – The sound pressure level averaged over the measurement period. It can be considered as the equivalent continuous steady-state sound pressure level, which would have the same total acoustic energy as the real fluctuating noise over the same time period.

**L<sub>Aeq(15min)</sub>** – The A-weighted average equivalent sound level over a 15-minute period.

**L<sub>A90</sub>** – The A-weighted noise level that has been exceeded for 90% of the measurement duration. This descriptor is used to describe the background noise level.

**L<sub>A1</sub>** – The A-weighted noise level exceeded for 1% of the sample time.

**RBL** – Rating Background Level. The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24hr period used for assessment background level) This is the level used for assessment purposes.

**dB** – Decibels. The fundamental unit of sound, a Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. Probably the most common usage of the Decibel in reference to sound loudness is dB sound pressure level (SPL), referenced to the nominal threshold of human hearing. For sound in air and other gases, dB(SPL) is relative to 20 micropascals ( $\mu\text{Pa}$ ) =  $2 \times 10^{-5}$  Pa, the quietest sound a human can hear.

### A-WEIGHTING

"A-weighting" refers to a prescribed amplitude versus frequency curve used to "weight" noise measurements in order to represent the frequency response of the human ear. Simply, the human ear is less sensitive to noise at some frequencies and more sensitive to noise at other frequencies. The A-weighting is a method to present a measurement or calculation result with a number representing how humans subjectively hear different frequencies at different levels.

### NOISE CHARACTER, NOISE LEVEL AND ANNOYANCE

The perception of a given sound to be deemed annoying or acceptable is greatly influenced by the character of the sound and how it contrasts with the character of the background noise. A noise source may be measured to have only a marginal difference to the background noise level, but may be perceived as annoying due to the character of the noise.

Acoustic Dynamics' analysis of noise considers both the noise level and sound character in the assessment of annoyance and impact on amenity.

## 1 INTRODUCTION

### 1.1 EXECUTIVE SUMMARY

Acoustic Dynamics is engaged by **MHDP Architects** on behalf of **Chrome Temple Garage** to conduct an assessment of noise emission resulting from the operation of mechanical plant and equipment used to service the proposed garage at 69 Bassett St, Mona Vale, NSW.

This document provides a technical assessment of noise emission resulting from various mechanical noise sources proposed to service the development at the potentially most-affected sensitive receiver locations, to achieve compliance with the relevant noise criteria and objectives.

This mechanical noise emission assessment is prepared in accordance with the various acoustic requirements of:

- (a) Northern Beaches Council;
- (b) The NSW Environment Protection Authority (EPA); and
- (c) Australian Standards.

### 1.2 DESCRIPTION OF PROPOSAL

The development site is located at 69 Bassett St, Mona Vale, situated within a light industrial (IN2) land zone, on the border of a low density residential (R2) land zone within the Northern Beaches Council area of NSW. The subject development has road frontage direct to Bassett St and Tengah Cr and shares a boundary with commercial/industrial sites.

Receivers potentially impacted by noise emission resulting from the proposed equipment are predicted to include:

- Residential receivers located at 1 Paul Close (**north**);
- Industrial receivers at 71 Bassett Street (**east**);
- Industrial receivers located at 67 Bassett Street (**west**).

The subject site, adjacent receivers and surrounding area is shown in the Location Map, Aerial Image and Architectural Plans presented within **Appendix A**.

### 1.3 SCOPE

Acoustic Dynamics has been engaged to provide an acoustic assessment suitable for submission to the relevant authorities.

The scope of the assessment is to include the following:

- Review of local council planning and development control instruments, state guidelines, federal legislation and international standards relevant to noise emission at the subject site;
- Conduct long-term noise monitoring and short-term measurements at the subject site to determine the existing noise environment and establish relevant noise emission criteria;
- Perform relevant calculations and noise modelling associated with the proposed mechanical equipment to determine noise emission at nearby receiver locations; and
- Provide recommendations for design measures (where necessary) to be incorporated to achieve compliance with the relevant criteria and reduce potential noise impacts at nearby receiver locations.

## 2 ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to mechanical noise emission assessment from the subject site. The relevant sections of the legislation are presented below. The most stringent criteria which have been used in this assessment of the subject development are summarised below.

### 2.1 COUNCIL CRITERIA

#### 2.1.1 COUNCIL CONDITIONS

Acoustic Dynamics advises that we have reviewed Council's conditions and the following conditions relevant to this assessment are included below:

##### **"Noise**

*From the PLM meeting, Environmental Health understands the following:*

- *The Building is likely to be naturally ventilated with some individual AC units.*

*As there are residential receivers across the road, Environmental Health recommends an acoustic assessment be undertaken by a suitably qualified and experienced acoustic consultant. This will allow some flexibility if increased ventilation is required during the detailed design phase of the building as the acoustic assessment will have already been completed. From the PLM meeting and a review of the plans, there is an upstairs members lounge and balcony for use by the owners of the storage units. There are concerns that the inappropriate use of this area could cause amenity concerns on residential receivers across the road. As such, Environmental Health recommends that the intentions/use of this area are made clear in the submitted Statement of Environmental Effect and that a Plan of Management is submitted with the application on how this area will be used and how any impacts on residential receivers across the road will be mitigated."*

## 2.1.2 COUNCIL PLANNING & DEVELOPMENT CONTROL INSTRUMENTS

Acoustic Dynamics has conducted a review of the relevant Northern Beaches Council's planning and development control instruments including the following documents:

- *Northern Beaches Council (Pittwater) Local Environmental Plan (LEP) 2014*; and
- *Northern Beaches Council (Pittwater) Development Control Plan (DCP) 2014*.

Acoustic Dynamics' review of the *Northern Beaches Council (Pittwater) LEP 2014* did not yield specific acoustic criteria or information relevant to this assessment.

Acoustic Dynamics' review of the *Northern Beaches Council (Pittwater) DCP 2014* indicated the following information relevant to this assessment:

### ***"C3.20 Plant, Equipment Boxes and Lift Over-Run***

#### ***Land to which this control applies***

*Land zoned IN2 Light Industrial, IN4 Working Waterfront, B6 Enterprise Corridor or B7 Business Park not including the Warriewood Valley locality*

#### ***Uses to which this control applies***

*Industrial Development*

*Occupation/change of use of an existing premises*

#### ***Outcomes***

*To achieve the desired future character of the Locality.*

*The bulk and scale of the built form is minimised. (En, S)*

*Equitable preservation of views and vistas to and/or from public/private places. (S)*

*To achieve reduction in visual clutter. (En, S)*

*The appropriate location and design of noise generating equipment.*

#### ***Controls***

*Where provided, plant and equipment boxes and lift overruns are to be integrated internally into the design fabric of the built form of the building.*

*Locate and design all noise generating equipment such as mechanical plant rooms, mechanical equipment, air conditioning units, mechanical ventilation from car parks, driveway entry shutters, garbage collection areas or similar to protect the acoustic privacy of workers, residents and neighbours.*

#### ***Variations***

*Subject to achievement of the outcomes of this control, consideration may be given to the location of plant, equipment boxes and lift overruns on the roof a building where it can be shown that there will not be a noncompliance with Council's built form controls including building height and building envelope.*

*Where located on the roof any plant, equipment boxes and lift overruns are to be adequately screened from view from adjoining properties and the public domain."*

## 2.2 NSW ENVIRONMENT PROTECTION AUTHORITY

### 2.2.1 NSW EPA'S NOISE POLICY FOR INDUSTRY (NPFI) 2017

The NSW EPA, in its *Noise Policy for Industry (NPfI) 2017* document, outlines and establishes noise criteria for industrial or other noise sources in various zoning areas.

Acoustic Dynamics advise that the following criteria have been applied for the assessment of mechanical noise emission associated with the development.

#### Project Intrusiveness Noise Level

The intrusiveness noise level is determined as follows:

<b><math>L_{Aeq, 15min}</math> = rating background noise level + 5 dB</b>	
where:	
<b><math>L_{Aeq, 15min}</math></b>	represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes.
and	
<b>Rating background noise level</b>	represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B.

#### Project Amenity Noise Level

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for a noise from a **single** industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows:

<p><b>Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)</b></p>
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In accordance with the residential receiver categories of the NPfI, Acoustic Dynamics advises that the project amenity noise level is based on the “*Industrial Interface*” receiver type. The acoustical environment of this area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies.



To establish the acoustic environment at the subject site in accordance with the guidelines of the NSW EPA's NPfI, unattended noise monitoring was conducted between 15 February 2023 and 22 February 2023. The noise logger was shielded from direct noise associated with vehicular traffic or mechanical plant associated with the development.

Acoustic Dynamics advises the measurement location is representative of the existing noise environment of the nearest sensitive receivers. The measurement location is shown within **Appendix A**. Results from the long-term noise monitoring are presented in **Appendix B**.

Following the general procedures outlined in the EPA's NPfI, a summary of the established noise environment is presented in **Table 2.1**.

**Table 2.1 Measured External Noise Levels and Project Noise Objectives – Residential Receivers**

Location	Assessment Period	L <sub>A90</sub> Rating Background Noise Level (RBL) [dB]	Measured L <sub>Aeq</sub> Noise Level [dB]	Project Intrusiveness Noise Level L <sub>Aeq,15min</sub> [dB]	Project Amenity Noise Level L <sub>Aeq,15min</sub> [dB] <sup>2</sup>	Project Noise Trigger Level L <sub>Aeq,15min</sub> [dB]
Nearest Residential Receivers	Day (7am <sup>1</sup> to 6pm)	50	63	55	63	55
	Evening (6pm to 10pm)	39	64	44	63	44
	Night (10pm to 7am <sup>1</sup> )	32	56	37	63	37

Note: 1) 8:00am on Sundays and public holidays.  
 2) Amenity adjustment based on "industrial interface" receiver type (NPfI Table 2.2). The noise emission objective has been modified in accordance with the recommendations detailed within the NPfI Section 2.2, for time standardisation of the intrusiveness and amenity noise levels (L<sub>Aeq,15min</sub> will be taken to be equal to the L<sub>Aeq, period</sub> + 3 dB).

**NB:** Project noise trigger level is the lowest value of project intrusiveness or project amenity noise level after conversion to the L<sub>Aeq</sub> equivalent value.

For premises to which it applies, the NPfI noise criteria for the assessment of noise emission from industrial noise sources at the boundaries of other zoned areas are presented as **Table 2.2**.

**Table 2.2 Project External Noise Level Objectives – Other Receivers**

Type of Receiver	Noise Amenity Area	Assessment Period	Project Noise Trigger Level $L_{Aeq,15min}$ [dB] <sup>1</sup>
Commercial premises	All	When in use	68
Industrial premises	All	When in use	73

Note: 1) Amenity adjustments based on “Industrial Interface” receiver type (NPfI Table 2.2). The noise emission objective has been modified in accordance with the recommendations detailed within the NPfI Section 2.2, for time standardisation of the intrusiveness and amenity noise levels ( $L_{Aeq,15min}$  will be taken to be equal to the  $L_{Aeq, period} + 3$  dB).

The EPA’s NPfI Table C1 specifies additional noise emission level corrections that should be applied when a noise source is determined to include “*modifying factors*” that can vary the perceived intrusiveness of a noise source. Such modifying factors include tonal, low frequency, or intermittent noise.

The modifying factor adjustments are summarised in **Table 2.3**.

**Table 2.3 NPfI Modifying Factor Adjustments**

Factor	Assessment/ Measurement	When To Apply	Correction <sup>1,2</sup>
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO 1996.2-2007 – Annex D).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: <ul style="list-style-type: none"> <li>• 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz</li> <li>• 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz</li> <li>• 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.</li> </ul>	5 dBA <sup>2,3</sup>
Low Frequency Noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted $L_{eq,T}$ levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: <ul style="list-style-type: none"> <li>• where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period</li> <li>• where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2 dB(A) positive adjustment applies for the daytime period.</li> </ul>	2 or 5 dBA <sup>2</sup>

<b>Factor</b>	<b>Assessment/ Measurement</b>	<b>When To Apply</b>	<b>Correction<sup>1,2</sup></b>
<i>Intermittent Noise</i>	<i>Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.</i>	<i>The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.</i>	5 dBA
<i>Duration</i>	<i>Single-event noise duration may range from 1.5 min to 2.5 h.</i>	<i>One event in any assessment period.</i>	0 to 20 dB(A)
<i>Maximum adjustment</i>	<i>Refer to individual modifying factors.</i>	<i>Where two or more modifying factors are indicated.</i>	Maximum correction of 10 dB(A) <sup>2</sup> (excluding duration correction).

Note: 1) Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.

2) Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

Acoustic Dynamics advises that achieving compliance with the NPfI's noise emission objectives applicable at the boundaries of the nearest sensitive receivers will adequately protect the acoustic amenity of all nearby receivers.

## 2.3 NSW PROTECTION OF THE ENVIRONMENT OPERATIONS LEGISLATION

### 2.3.1 PROTECTION OF THE ENVIRONMENT OPERATIONS (POEO) ACT 1997

Noise emission from any items of mechanical plant must comply with the requirements of the *Protection of the Environment Operations (POEO) Act 1997*. The POEO Act 1997 requires that the subject mechanical equipment must not generate "offensive noise".

"Offensive noise" is defined as follows:

**"offensive noise"** means noise:

- (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:
  - (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
  - (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or
- (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations."

## 2.4 DETERMINATION OF APPLICABLE ASSESSMENT CRITERIA

Acoustic Dynamics advises that assessment of noise emission associated with the operation of the proposed mechanical equipment must comply with the various relevant noise criteria detailed above. Assessment of noise emission from the mechanical sources against the most stringent applicable criteria will ensure compliance with the various other relevant criteria.

Accordingly, we provide the following summary tables outlining the most stringent **external** and **internal** noise emission criteria applicable to the use of the proposed mechanical equipment. The noise emission criteria detailed below have been established based on the background noise levels measured at a location representative of the nearest residential receivers, as detailed above.

**Table 2.3 Summary of Measured Noise Levels and Applicable External Noise Criteria (NPfI)**

Location	Period	L <sub>A90(15min)</sub> Background Noise Level [dB]	Criteria (Calculation)	L <sub>Aeq(15min)</sub> Noise Criterion [dB]
Nearest Residential Receiver(s)	Day (7am <sup>1</sup> to 6pm)	50	NPfI (RBL + 5 dB) <sup>3</sup>	55
	Evening (6pm to 10pm)	39		44
	Night (10pm to 7am <sup>1</sup> ) <sup>2</sup>	32		37

Note: 1) 8:00am on Saturdays, Sundays and public holidays.  
 2) Acoustic Dynamics advises that achieving compliance with the most stringent night period will also demonstrate compliance with the day and evening periods, when background noise levels are much higher.  
 3) External Noise Level, at nearest residential boundary. External background noise level plus 5 dB.

**Table 2.4 Summary of Measured Noise Levels and Applicable Internal Noise Criteria (POEO)**

Location	Period	L <sub>A90(15min)</sub> Background Noise Level [dB]	Criteria (Calculation)	L <sub>Aeq(15min)</sub> Noise Criterion [dB]
Nearest Residential Receiver(s)	Night (10pm to 7am <sup>1</sup> )	32	POEO (RBL – 20 dB) <sup>2</sup>	<b>12</b>

Note: 1) 8:00am on Saturdays, Sundays and public holidays.  
 2) Internal Noise Level, at nearest habitable room of residential receiver. External background noise level minus 10 dB for inaudibility and minus 10 dB for outdoor to indoor.

## 3 NOISE MEASUREMENT EQUIPMENT & STANDARDS

All measurements were conducted in general accordance with Australian Standard 1055.1-1997, "Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures". Acoustic Dynamics' sound measurements were carried out using precision sound level meters conforming to the requirements of IEC 61672-2002 "Electroacoustics: Sound Level Meters – Part 1: Specifications". The instrumentation used during the survey is set out in **Table 3.1**.

**Table 3.1 Noise Survey Instrumentation**

Type	Serial Number	Instrument Description
2250	2679541	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2670479	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4230	1234136	Brüel & Kjaer Acoustic Calibrator
NGARA	878069	ARL Real Time Sound Acquisition System
4230	1234148	Brüel & Kjaer Acoustic Calibrator

The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

## 4 ASSESSMENT METHODOLOGY

Acoustic modelling was undertaken using noise modelling software (*CadnaA Version 2020*) to predict operational noise levels generated by the development. CadnaA calculates environmental noise propagation according to the applicable international and ISO standards, including the ISO 9613 algorithm.

Within our calculations and acoustic modelling, noise emission contributions from the development have been considered taking the following factors into account:

- Airborne noise losses due to distance and ground topography;
- Losses due to direction and diffraction;
- Increases due to reflections; and
- Acoustic shielding.

### 4.1 MODELLING ASSUMPTIONS

The following assumptions were made regarding the noise model configuration:

1. All building facade constructions are assumed to be of masonry construction and reflective;
2. Air conditioning units will be located externally on the south-west corner of the development;
3. Lift mechanical plant servicing both Levante Park Total Move© and Lift Shop E Series© will be located internally, at the base of the shaft; and
4. Acoustic Dynamics has conservatively assumed all units will operate at maximum operational capacity during the daytime and evening periods, and at reduced capacity during the night-time period, unless stated otherwise. Acoustic Dynamics advises that although the maximum operational capacity scenario is unlikely to occur for the majority of the time, the assessment is conducted conservatively in this way to demonstrate compliance.

## 4.2 NOISE SOURCES

Acoustic Dynamics has established and assessed the following items of mechanical equipment proposed to service the development.

The noise data presented in **Table 4.1** has been established based on information provided by the proponent, short-term measurements and inspections conducted on-site, or referenced from our database of nearfield measurements at similar developments.

**Table 4.1 Noise Sources**

Quantity	Description	Sound Power Level [dBA]
<b>Ground Level</b>		
1	Levanta Park Total Move Car Lift	75 <sup>1</sup>
1	Lift Shop E Series – Custom Luxury Elevator	62 <sup>1,2</sup>
2	Air Condenser Unit	65
1	Garbage Exhaust Fan	61
1	Kitchen Exhaust Fan	61
2	Toilet Exhaust Fans	61
<b>First Level</b>		
2	Toilet Exhaust Fan	61
<b>Second Level</b>		
2	Toilet Exhaust Fan	61

Note: 1) Includes a 5 dB modifying factor correction for noise character, in accordance with the requirements of the NPfI's Table C1 (refer to **Section 2.2**).  
 2) Sound Power Level is based on manufacturer provided Sound Pressure Level of 42dB(A) at 1.5m.

## 4.3 RECEIVERS

The cumulative noise impact has been assessed to the potentially most affected point at the adjacent sensitive receiver properties and presented in **Table 4.2** below.

**Table 4.2 Nearest Sensitive Receiver Locations**

Source	Location	Direction
<b>Residential Receivers</b>		
R <sub>1</sub>	1 Paul Cl, Mona Vale	North
<b>Industrial Receivers</b>		
I <sub>1</sub>	67 Bassett St, Mona Vale	East
I <sub>2</sub>	71 Bassett St, Mona Vale	West

Acoustic Dynamics advises that by achieving compliance with the nearest sensitive receiver locations, compliance will also be achieved at all other sensitive receiver locations further away.

## 5 MECHANICAL NOISE EMISSION ASSESSMENT

The calculated maximum noise emission levels at the nearest receiver locations against the relevant criteria are presented below. It is advised that by achieving compliance with the nearest sensitive receiver locations, compliance will also be achieved at all other receiver locations.

The assessment location for **external noise emission** is defined as the most affected point on or within any sensitive receiver property boundary. Examples of this location may be:

- 1.5m above ground level;
- On a balcony at 1.5m above floor level; and
- Outside a window on the ground or higher floors, at a height of 300mm below the head of the window.

The assessment location for **internal noise emission** is defined as the most affected point within the nearest habitable room of any residential receiver, assuming windows are open.

### 5.1 EXTERNAL NOISE EMISSION LEVELS

The calculated maximum **external** noise emission levels at the nearest receiver locations are presented against the relevant noise emission criteria below.

**Table 5.1 Calculated Maximum External Noise Emission & Objectives**

Receiver Location	Relevant Assessment Period	L <sub>Aeq</sub> Noise Emission Objective [dB]	Calculated Maximum External L <sub>Aeq</sub> Noise Level [dB] <sup>1</sup>	Complies?
R <sub>1</sub>	Day (7am <sup>2</sup> to 6pm)	55	14	Yes
	Evening (6pm to 10pm)	44		Yes
	Night (10pm to 7am <sup>2</sup> )	37		Yes
I <sub>1</sub>	Day (7am <sup>2</sup> to 6pm)	55	23	Yes
	Evening (6pm to 10pm)	44		Yes
	Night (10pm to 7am <sup>2</sup> )	37	N/A	N/A

Receiver Location	Relevant Assessment Period	L <sub>Aeq</sub> Noise Emission Objective [dB]	Calculated Maximum External L <sub>Aeq</sub> Noise Level [dB] <sup>1</sup>	Complies?
I <sub>2</sub>	Day (7am <sup>2</sup> to 6pm)	55	39	Yes
	Evening (6pm to 10pm)	44		Yes
	Night (10pm to 7am <sup>2</sup> )	37	N/A	N/A

Note 1) Includes the benefits of recommendations outlined in **Section 7** of this report.  
 2) 8:00am on Saturdays, Sundays and public holidays.

Acoustic Dynamics advises the calculated **external** noise emission levels are conservatively based on **maximum capacity** operations at the development. Acoustic Dynamics advises that such a scenario is unlikely to occur and noise levels are likely to be below those calculated for the majority of the time.

## 5.2 INTERNAL NOISE EMISSION LEVELS

The calculated maximum **internal** noise emission levels at the nearest receiver locations are presented against the relevant noise emission criteria below.

**Table 5.2 Calculated Maximum Internal Noise Emission & Objectives (POEO)**

Receiver Location	Relevant Assessment Period	L <sub>Aeq</sub> Noise Emission Objective [dB]	Calculated Maximum Internal L <sub>Aeq</sub> Noise Level [dB] <sup>1</sup>	Complies?
R <sub>1</sub>	Night (10pm to 7am <sup>2</sup> )	12	4	Yes

Note 1) Includes the benefits of recommendations outlined in **Section 7** of this report.  
 2) 8:00am on Saturdays, Sundays and public holidays.

Acoustic Dynamics advises the calculated **internal** noise emission levels are conservatively based on **maximum capacity** operations at the development. Acoustic Dynamics advises that such a scenario is unlikely to occur and noise levels are likely to be below those calculated for the majority of the time.



## 6 DISCUSSION

The calculated noise emission levels associated with the use and operation of mechanical equipment proposed to service the development indicate the following:

1. Noise emission resulting from the use and operations of all proposed mechanical equipment is **predicted to comply** with the relevant **external** noise emission criteria of Northern Beaches Council, the NSW EPA and federal legislation during the proposed hours of operation when assessed at the nearest sensitive receivers;
2. Noise emission resulting from the use and operations of all proposed mechanical equipment is **predicted to comply** with the relevant **internal** noise emission criteria of Northern Beaches Council, the NSW EPA and federal legislation during the proposed hours of operation when assessed at the nearest sensitive receivers;
3. There is **low risk** of acoustic disturbance to the nearest sensitive receivers during the proposed hours of operation;
4. To ensure the assessment is conducted in a conservative manner, noise emission has been assessed as a **worst-case** scenario (i.e. all mechanical units operating simultaneously and at maximum capacity during the daytime, evening and night-time period. Generally, mechanical noise emission is **predicted to be lower** than the calculations presented; and
5. The noise calculations and operational assumptions should not be considered prescriptive. They are modelling assumptions that have been used to demonstrate the proposed items of mechanical plant and equipment **can be designed to achieve compliance** with the relevant criteria.

## 7 RECOMMENDATIONS

The following recommendations are provided (as a minimum) to ensure adequate control of noise and vibration associated with the use of the lifts:

1. The lift shaft, lift frame and rails/guides must be acoustically isolated from the adjacent building structure. Acoustic Dynamics advises installation of resilient ties between the lift shaft and the adjacent building structure to prevent the transmission of structure-borne noise and vibration. Suitable resilient ties would be the Matrix SB06 resilient wall tie (or equivalent);
2. The rails/guides for the subject lift are required to be isolated from the structure of the building via commercially available vibration isolation mounts;
3. All perimeter joints of the lift shaft must be sealed airtight using a suitable flexible sealant. Sealants must be flexible, durable and have capacity to retain acoustic properties for the life of the design. Appropriate sealants are polyurethane or silicone based;

4. Any access panels or hatches must be installed with a compressible rubber perimeter seal or gasket to ensure an airtight seal when closed;
5. Acoustic Dynamics recommends the lift motor and associated equipment should be located on an isolated platform. The platform should be isolated from the building structure through the use of suitable vibration mounts. Alternatively, a resilient layer (such as Embelton Supershearflex) can be installed between the motor and the basement garage structural slab or mounting bracket;
6. Passive ventilation to the motor enclosure can be supplied via an acoustic vent installed through the wall of the enclosure. An appropriate acoustic vent is the Silenceair 64mm Passive Acoustic Wall Ventilator (or equivalent); and
7. Reduce mechanical plant vibration through regular inspection and where necessary maintenance and repair of the motor and hydraulic systems. Inspection and maintenance should include the motor, lift shaft, bearings, belts, pulleys and tightening of any loose parts or connections.

## 8 CONCLUSION

Acoustic Dynamics has conducted an assessment of noise emission from the proposed mechanical plant and equipment to be installed to service the development at 69 Bassett St, Mona Vale. A review of applicable noise standards and local authority noise criteria was conducted.

Noise levels were assessed in accordance with the requirements of:

- (a) Northern Beaches Council;
- (b) The NSW Environment Protection Authority (EPA); and
- (c) Australian Standards.

### **Acoustic Opinion**

**Further to our site survey, noise monitoring and measurements, our review of the relevant acoustic criteria and requirements, and our calculations, Acoustic Dynamics advises that the proposed mechanical plant can be designed to comply with the relevant acoustic criteria of Northern Beaches Council, the NSW EPA, and applicable legislation with the incorporation of our recommendations detailed within Section 7 above.**

**It is our opinion that the acoustic risks associated with the proposed mechanical equipment can be adequately controlled and the amenity of neighbouring properties and residents can be satisfactorily protected.**

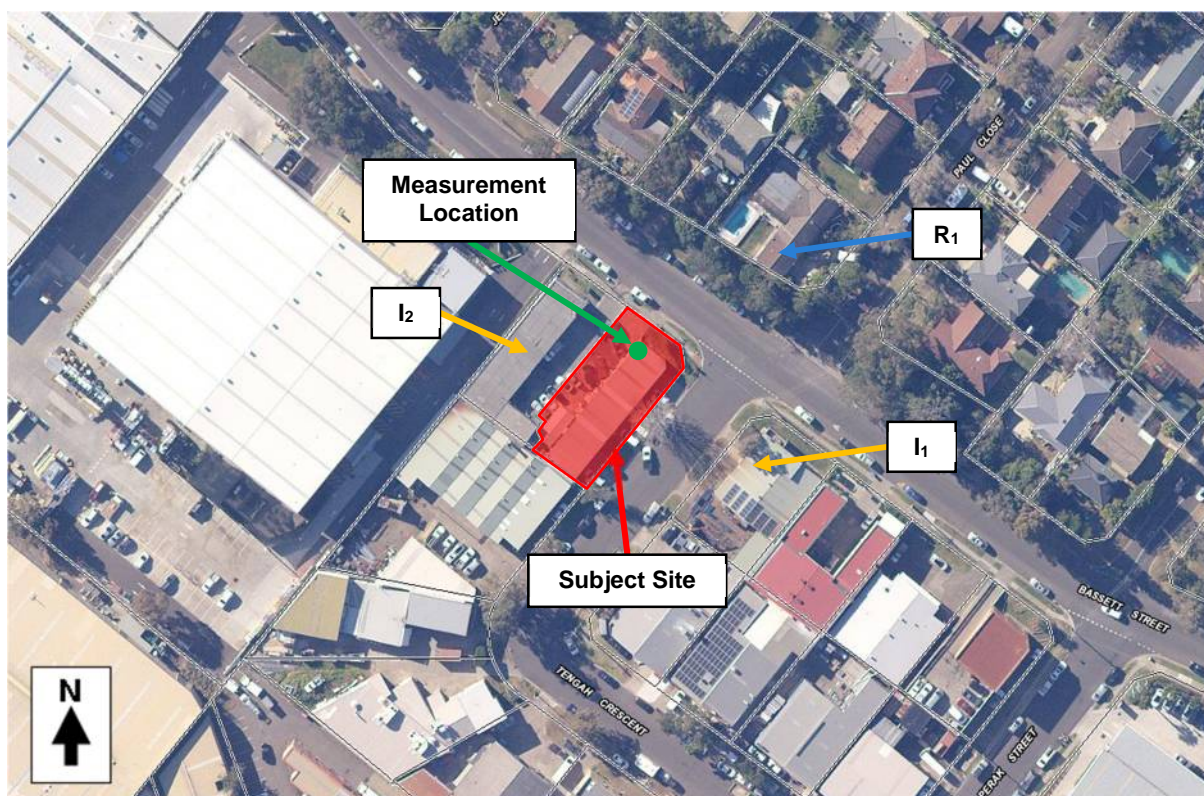
We trust that the above information meets with your present requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information.

## APPENDIX A – LOCATION MAP, AERIAL IMAGE & ARCHITECTURAL PLANS

### A.1 LOCATION MAP



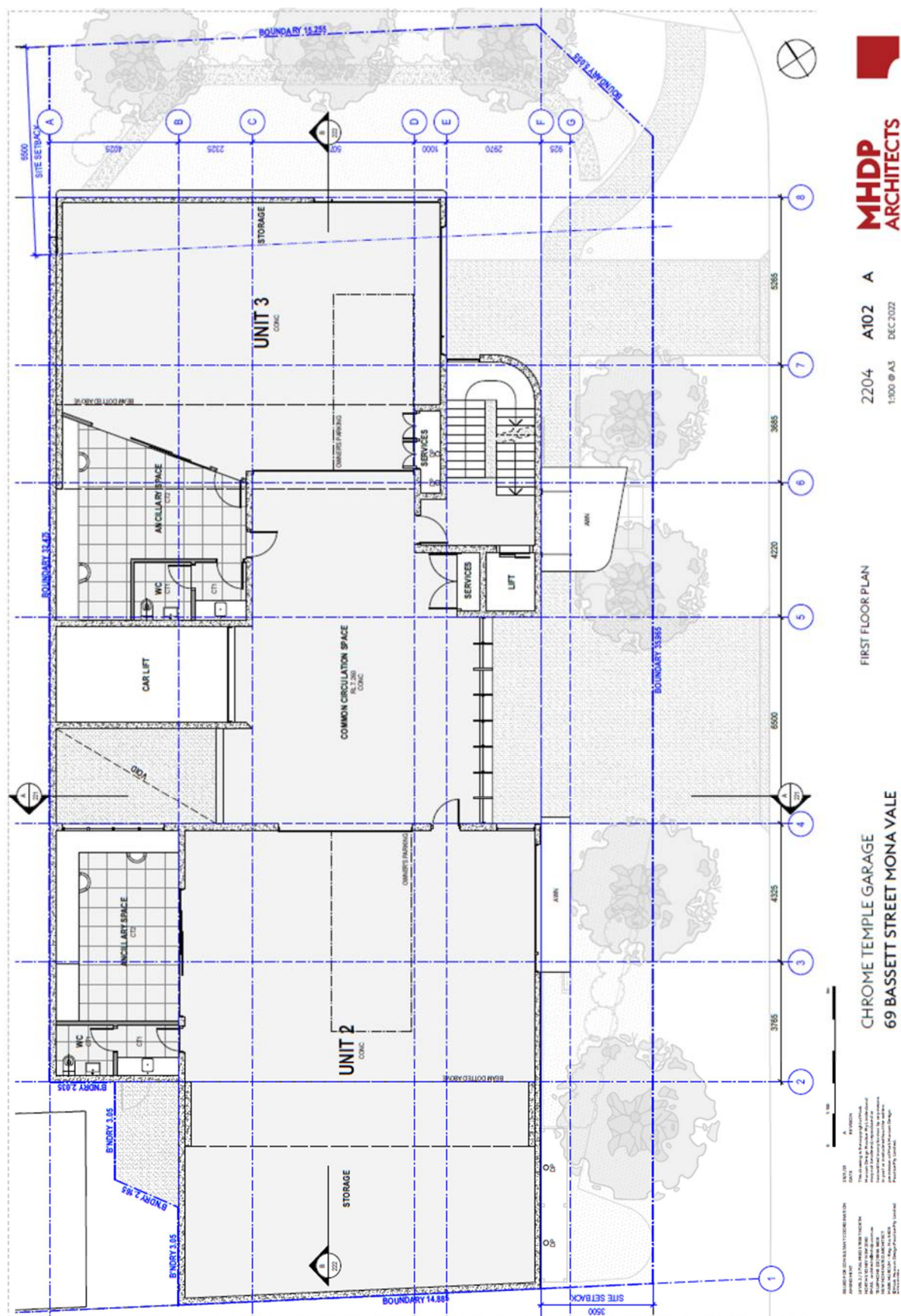
### A.2 AERIAL IMAGE (COURTESY OF SIX MAPS)





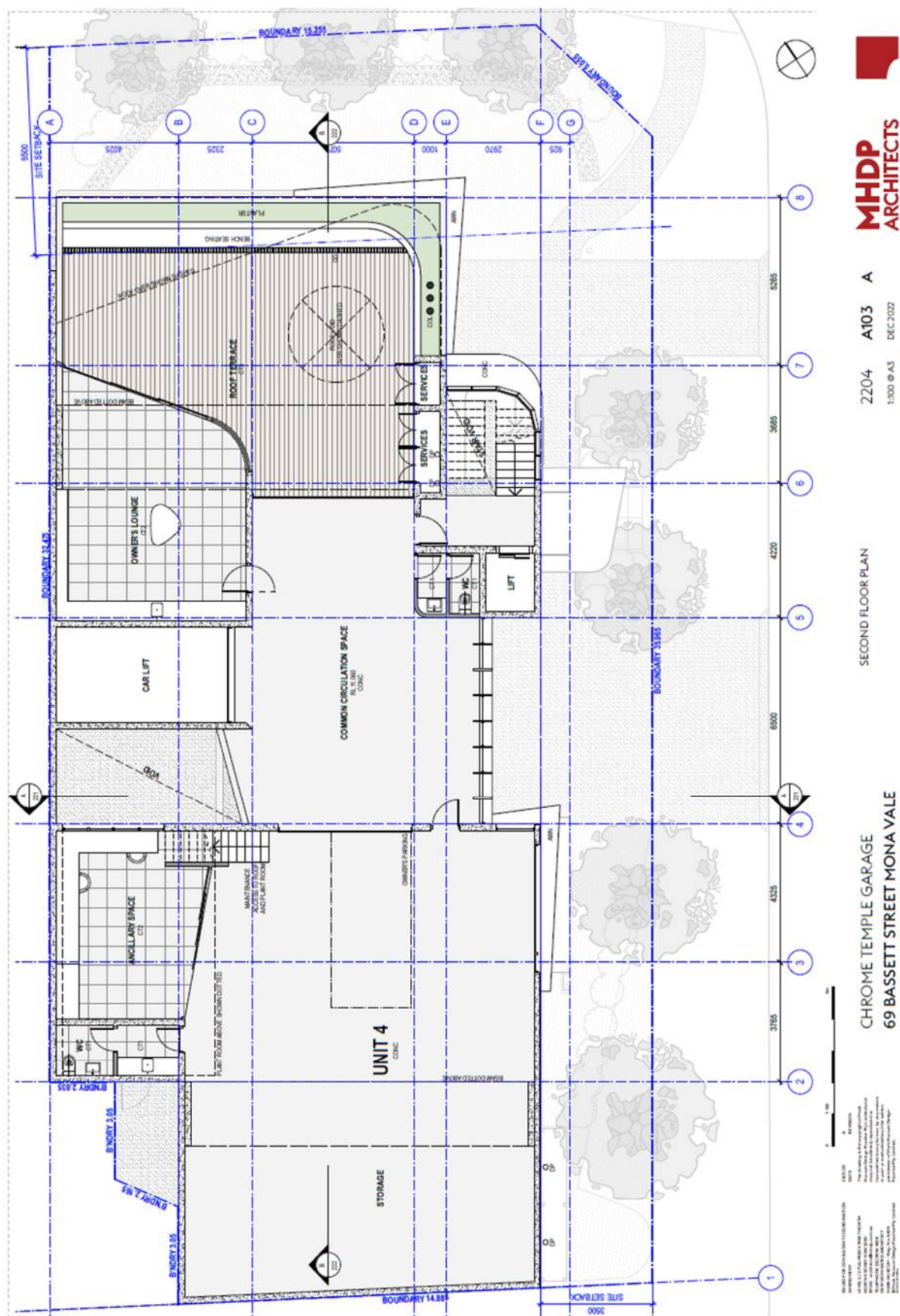


### A.3.2 FIRST FLOOR PLAN

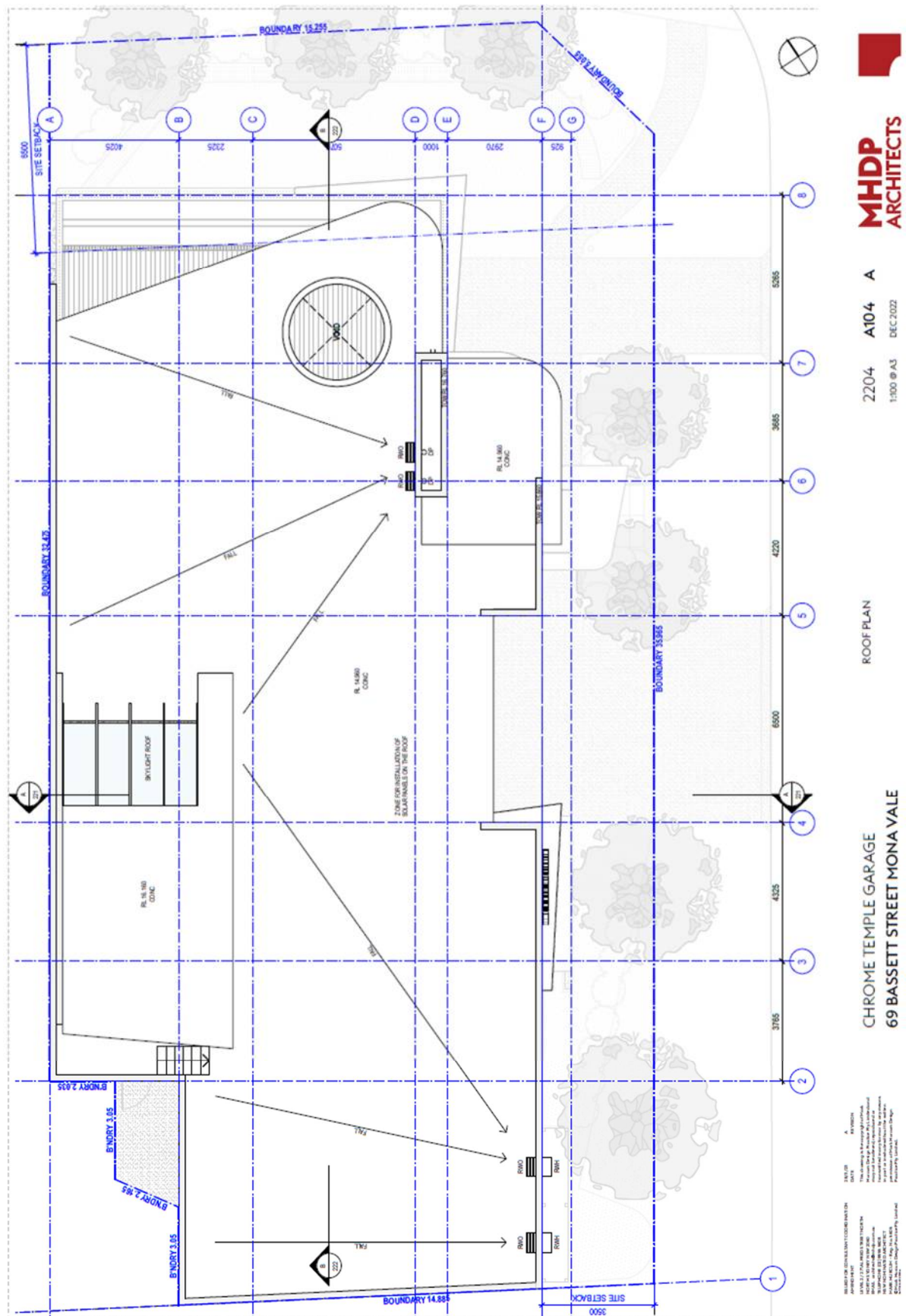




### A.3.3 SECOND FLOOR PLAN



## A.3.4 ROOF PLAN





## APPENDIX B – UNNATTENDED NOISE LOGGING STATISTICAL GRAPHS

