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Acoustic Report

- Environmental Noise Assessment-

For proposed development at

No. 58-60 Berwick Street, Guildford

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1.0 SCOPE OF WORK

The aim of this report is to determine the building materials to be used and the construction methods to be adopted such that the proposed development at No. 58-60 Berwick Street, Guildford is built to achieve acceptable internal noise and vibration levels as per Cumberland Council requirements.

The site is located on the corner of Berwick Street and Beaufort St, in the suburb of Guildford (Figure 1 – Site Location). The surrounding environment is mainly residential with a small mix of commercial/retail premises (Figure 2 – Surrounding Environment). The architectural plans Dvyne Design dated the 7th June, 2018 are for the proposed construction of a four (4) storey mixed used development, including two (2) levels of basement parking (Figure 3 – Proposed Site Plan).

As per the letter dated the 10th August, 2017 by Cumberland Council, the following report will consider *"noise emissions from the proposed development including but not limited to noise from any air conditioning installed, ventilation from the underground carpark, noise from roller doors and also construction noise. The report should be prepared in accordance with the NSW Environment Protection Authority Industrial Noise Policy".*

A separate report addressing the impact of noise and vibration during construction of the development (including demolition & excavation) has also been prepared (please refer to our report dated the 20th December, 2018).

2.0 NOISE SURVEY & INSTRUMENTATION

On the 30th August, 2017, an engineer from this office visited the proposed site to carry out background noise measurements at the boundary of the nearest residential receivers, No. 63A, 63 & 65 Bangor St at the rear of the site (Figure 4 – Noise Reading Location). The unattended environment noise monitoring was conducted for seven (7) days between Wednesday the 30th August and Wednesday 6th September, 2017.

All measurements were taken in accordance with the Australian Standards AS 1055 "*Acoustics- Description and Measurements of Environmental Noise*".

The noise survey was conducted to determine a conservative reading of the existing day noise levels [15hrs- 7:00 -16:00] $L_{(A90,\ 15\ minutes\ [1hr])}$ and $L_{(Aeq,\ 15\ minutes\ [1\ hr])}$, evening noise levels [15hrs- 18:00 -22:00] $L_{(A90,\ 15\ minutes\ [1hr])}$ and $L_{(Aeq,\ 15\ minutes\ [1\ hr])}$ and to determine a conservative reading of existing night and early morning noise levels [9hrs-22:00-7:00] $L_{(A90,\ 15\ minutes\ [1hr])}$ and $L_{(Aeq,\ 15\ minutes\ [1\ hr])}$.

The measurement procedure and the equipment used for the noise survey are described below. All sound pressure levels are rounded to the nearest whole decibel. All sound level measurements and analysis carried throughout this report are carried with Svantek 957 Noise and vibration level meter which has the following features:

- Type 1 sound level measurements meeting IEC 61672:2002
- General vibration measurements (acceleration, velocity and displacement) and HVM meeting ISO 8041:2005 standard
- Three parallel independent profiles
- 1/1 and 1/3 octave real time analysis
- Acoustic dose meter function
- FFT real time analysis (1920 lines in up to 22.4 kHz band)
- Reverberation Time measurements (RT 60)
- Advanced Data Logger including spectra logging
- USB Memory Stick providing almost unlimited logging capacity
- Time domain signal recording
- Advanced trigger and alarm functions
- USB 1.1 Host & Client interfaces (real time PC "front end" application supported)
- RS 232 and IrDA interfaces
- Modbus protocol

Machine was calibrated prior to reading. Any results affected by strong wind or rain have been disregarded. The Full Average Statistical Noise Parameters including **$L_{(Aeq, 15\ minutes)}$** & **$L_{(A90, 15\ minutes)}$** are presented in Figure 5 – Noise Survey. A Summary of those readings is presented in the table below:

Table 2.1- Summary of Noise Readings between 30th Aug & 6th Sept, 2017

At Point A	**$L_{(Aeq, 15\ minutes)}$**	**$L_{(A90, 15\ minutes)}$**
Day Time – 7:00am-6:00pm	55 dB(A)	48 dB(A)
Evening Time – 6:00pm-10:00pm	54 dB(A)	47 dB(A)
Night & Early Morning Time – 10:00pm-7:00am	49 dB(A)	43 dB(A)

3.0 PROPOSED MECHANICAL PLANT & CAR PARK MECHANICAL VENTILATION

A range of mechanical plant, equipment and ventilation will be included in the proposed development at No. 58-60 Berwick St, Guildford. Noise emitted by the use of the proposed mechanical plant is assessed by the NSW Industrial Noise Policy.

The proposed two (2) levels of basement parking are located below ground level and that makes providing natural ventilation not possible and a mechanical extract system should be used. The mechanical ventilation system needs to achieve six air changes per hour for exhaust fume extract and ten air changes per hour for smoke clearance.

A garage roller door may also be located at the entry of the Car Park. Predicted noise levels from the operation of garage roller doors have been estimated according to typical rollers doors installed at other developments. The average time duration for a garage roller door to fully open or close is approximately 30 seconds.

3.1 NSW INDUSTRIAL NOISE POLICY (2000)

The NSW Industrial Noise Policy that came into force in January 2000 replaced chapters 19, 20, 21 & 82 of the ENCM (Environmental Noise Control Manual). The new policy seeks to promote environmental well-being through preventing and minimizing noise by providing a frame work and process for deriving noise limits conditions for consent and licenses.

The Industrial Noise Policy recommends two separate noise criteria's to be considered for the assessment of the proposed development, the Intrusive Noise Criteria and the Amenity Noise Criteria, which are further explained below.

The assessment criteria listed in this report will be the lowest of the intrusive or amenity criteria for each time period in order to protect residential receivers from intrusive noise and a loss of acoustic amenity.

3.1.1 INTRUSIVE NOISE CRITERIA

Section 2.2.1 of the Noise Guide for Local Government states that a noise source is generally considered to be intrusive if the noise from the source when measured over a 15 minute period exceeds the background noise by more than 5 dB(A).

Similarly, The Industrial Noise Policy in section 2.1 summarizes the intrusive criteria as below:

$L_{Aeq,\ 15\ minute} \leq$ rating background level plus 5

According to Section 2.1 of the NSW Industrial Noise Policy (2000) states that 'the intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) measured over a 15 minute period, does not exceed the Rating Background Level (RBL) measured in the absence of the source by more than 5 dB.'

Section 3.1 of the above policy defines the background level as $L_{A90,15\ minutes}$ which is the Noise exceeded 90% percent of a time period over which annoyance reactions may occur (taken to be 15 minutes). The RBL is defined as the overall single-figure $L_{A90,15\ minutes}$ background level representing each assessment period (day/evening/night) over the whole monitoring period.

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Background noise levels were carried out on the eastern boundary of the site (Point A) in order to determine background noise levels. Results were as follows with the allowable intrusive noise emission criterion shown:

Table 3.1.1 – Intrusive Noise Criteria

Time of Day	$L_{(A90,\ 15\ minutes)}$	$L_{(A90,\ 15\ minutes)} + 5$
Day (7am-6pm)	48	**53**
Evening (6pm-10pm)	47	**52**
Night (10pm-7am)	43	**48**

3.1.2 AMENITY NOISE CRITERIA

In the Industrial Noise Policy it is stated that "To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed acceptable noise levels for the area".

Relevant parts of the recommended noise levels from industrial noise sources shown in Table 2.1 of the "NSW Industrial Noise Policy", are shown below:

Table 3.1.2 - Recommended Noise Levels from Industrial Noise Sources

Type of Receiver	Indicate Noise Amenity Area	Time of the Day	Recommended L_{Aeq} Noise Level, dB(A)	
			Acceptable	Recommended Maximum
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45

3.1.3 PROJECT SPECIFIC NOISE CRITERIA

After determining the amenity noise and intrusive noise criteria as listed above, the project specific noise criteria for all noise associated with the proposed development t No. 58-60 Berwick St, Guildford will be as listed in Table 3.1.3 below.

The project specific noise criteria for the project is the most stringent noise level derived from both the intrusive and amenity criteria, as per the requirements of the NSW Industrial Noise Policy.

Table 3.1.3 – Summary of Project Specific Noise Criteria

Time of Day	Intrusive Criteria = L_{90} + 5	Amenity Criteria	Final *Project Specific Noise Criteria* to be used
Day (7am-6pm)	53	55	**53**
Evening (6pm-7pm)	52	45	**45**
Night (6am-7am)	48	40	**40**

3.2 RECOMMENDATIONS

We have assumed that mechanical services plant including the carpark ventilation and security roller door may operate as required up to 24 hours each day. Noise criteria of the exhaust fan, medium condensing unit, and car park security roller door sound power levels are presented in the table below:

Table 3.2.1 – Typical Mechanical Plant Leq Sound Power Levels

FREQUENCY [Hz]	63	125	250	500	1000	2000	4000	8000	dBA
Typical Car park Exhaust fan	80	82	84	87	86	83	78	71	90
Typical Condensing Unit	71	69	67	61	58	54	47	44	64
Leq, 15 mins Car-Park security roller door.	62	57	60	60	68	63	62	57	77

In order for the operation of the car park & building mechanical plant and equipment to meet the noise criteria listed in Section 3.1 of this report, we recommend the following:

Table 3.2.2 - Mechanical Plant Recommendations

MECHANICAL PLANT	RECOMMENDATIONS
Car Park Supply air	• Install a silencer Min 2D (E29/90)[1] or Equivalent.
Car Park Exhaust Fan	• Provide silencer before and after Fan. • Silencer Min 2D (E29/90)[1] or Equivalent. • Lagged duct with min 38mm 32 kg/m^3 acoustic insulation a minimum 10 metres into the car park

Note: All silencers should be placed 1 to 2 duct diameter distance away from the fans. Specifications of silencers/acoustic louvers are provided in Table below

Table 3.2.2 - Silencer specifications

Insertion Loss of Recommended Silencers [dB]								
FREQUENCY [Hz]	63	125	250	500	1000	2000	4000	8000
Attenuator/Silencer	6	11	18	31	36	27	24	17

Alternative attenuator/silencer or acoustic louvers can be considered provided that the insertion loss values are equal or greater than the values specified in the Table above.

Air conditioning units may also be proposed for use in the residential units in the development. In general, noise emission from air-conditioning units can be controlled by implementing the following:
− Procurement of quiet plant (when required) and the maintenance of existing plant;
− Strategic positioning of plant away from potential sensitive receivers;
− Acoustic screens and barriers between units and sensitive neighbouring premises; and/or
− Partially-enclosed or fully enclosed acoustic enclosures around plant.

The proposed air conditioning unit/s to be used will not affect the noise level at the boundary of the nearest potential receiver provided the following is adhered to:

1) The air conditioning unit is to be provided at least 3 metres from the boundary
2) The outdoor Sound Power Level of the air conditioning unit is not to exceed 60dB(A).

We recommend that further acoustic assessment is carried out when the development has been approved and Mechanical Plans have been prepared and become available for our review.

4.0 DISCUSSION & CONCLUSION

The construction of the proposed development at No. 58-60 Berwick Street, Guildford, if carried out as recommended in the plans and specifications and including the acoustic recommendations in this report, will meet the required noise reduction levels as required in AS 2107 'Acoustics – Recommended Design Sound Levels and Reverberation Times and Cumberland Council Conditions/Requirements.

All proposed mechanical plant & equipment will comply with the NSW Industrial Noise Policy provided recommendations are adhered to.

Should you require further explanations, please do not hesitate to contact us.

Yours Sincerely,

M. Zaioor
M.S. Eng'g Sci. (UNSW).
M.I.E.(Aust), CPEng
Australian Acoustical Society (Member)

5.0 APPENDIX

Figure 1 - Site Location

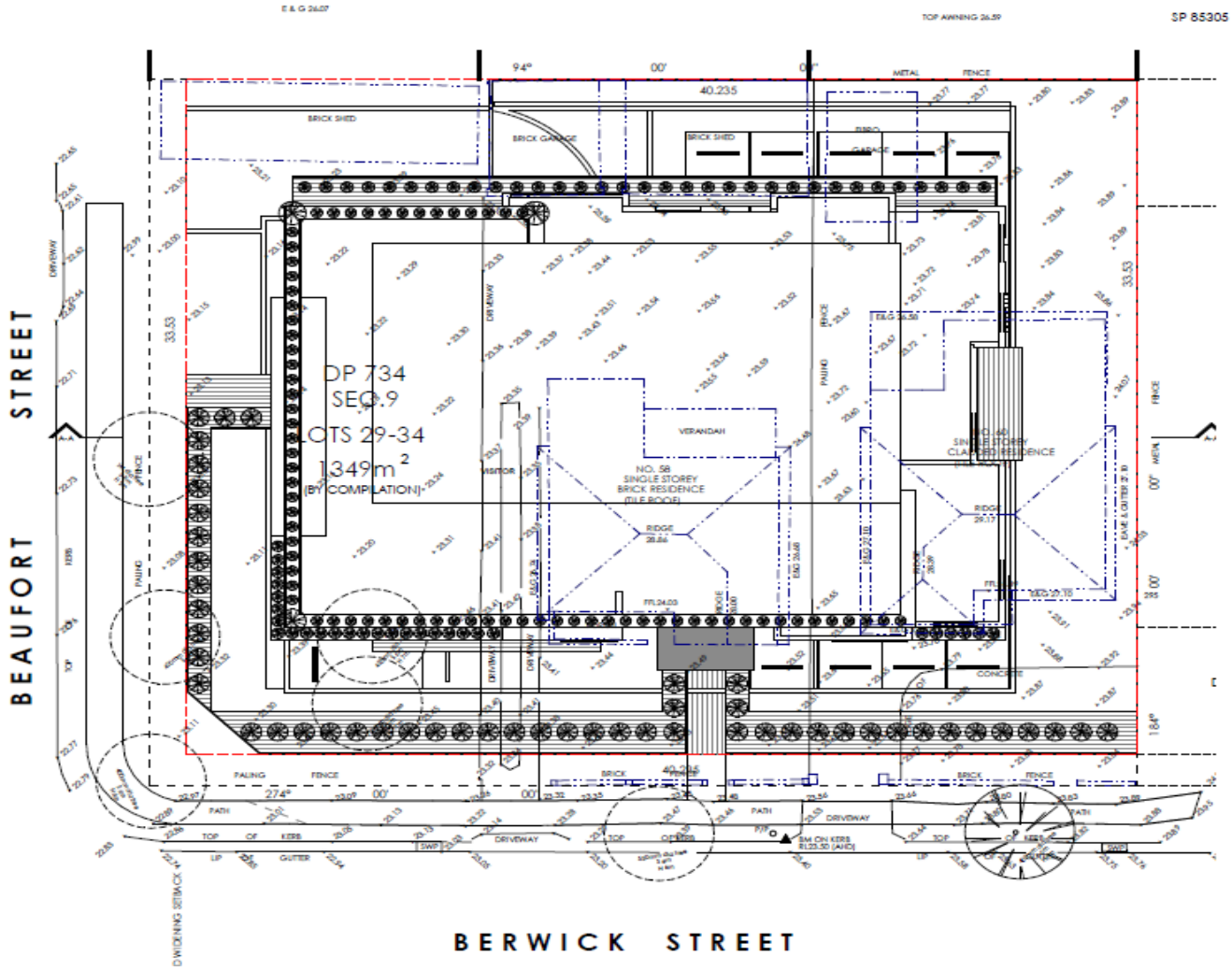

Figure 2 - Proposed Site Plan

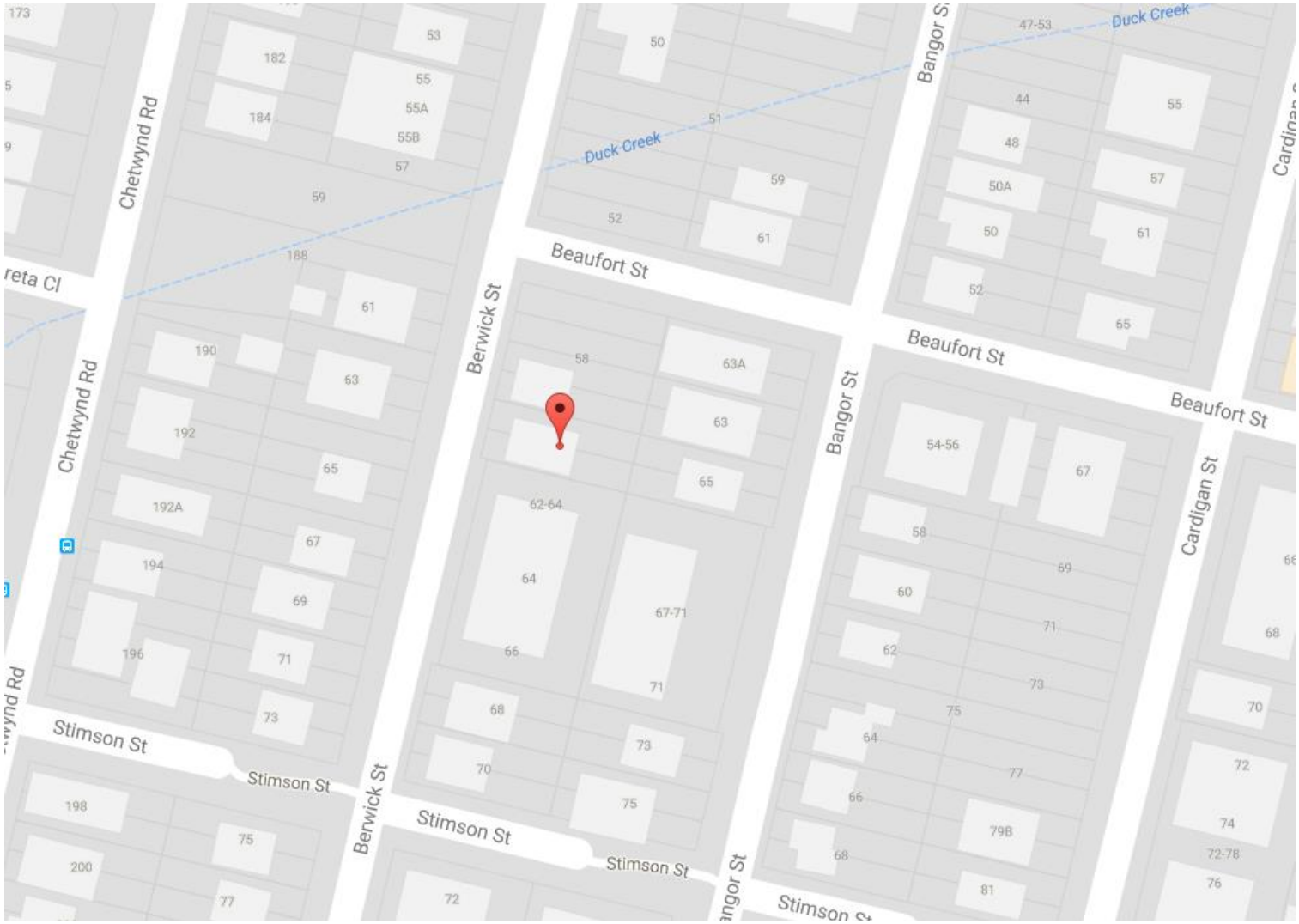

Figure 3 – Surrounding Environment

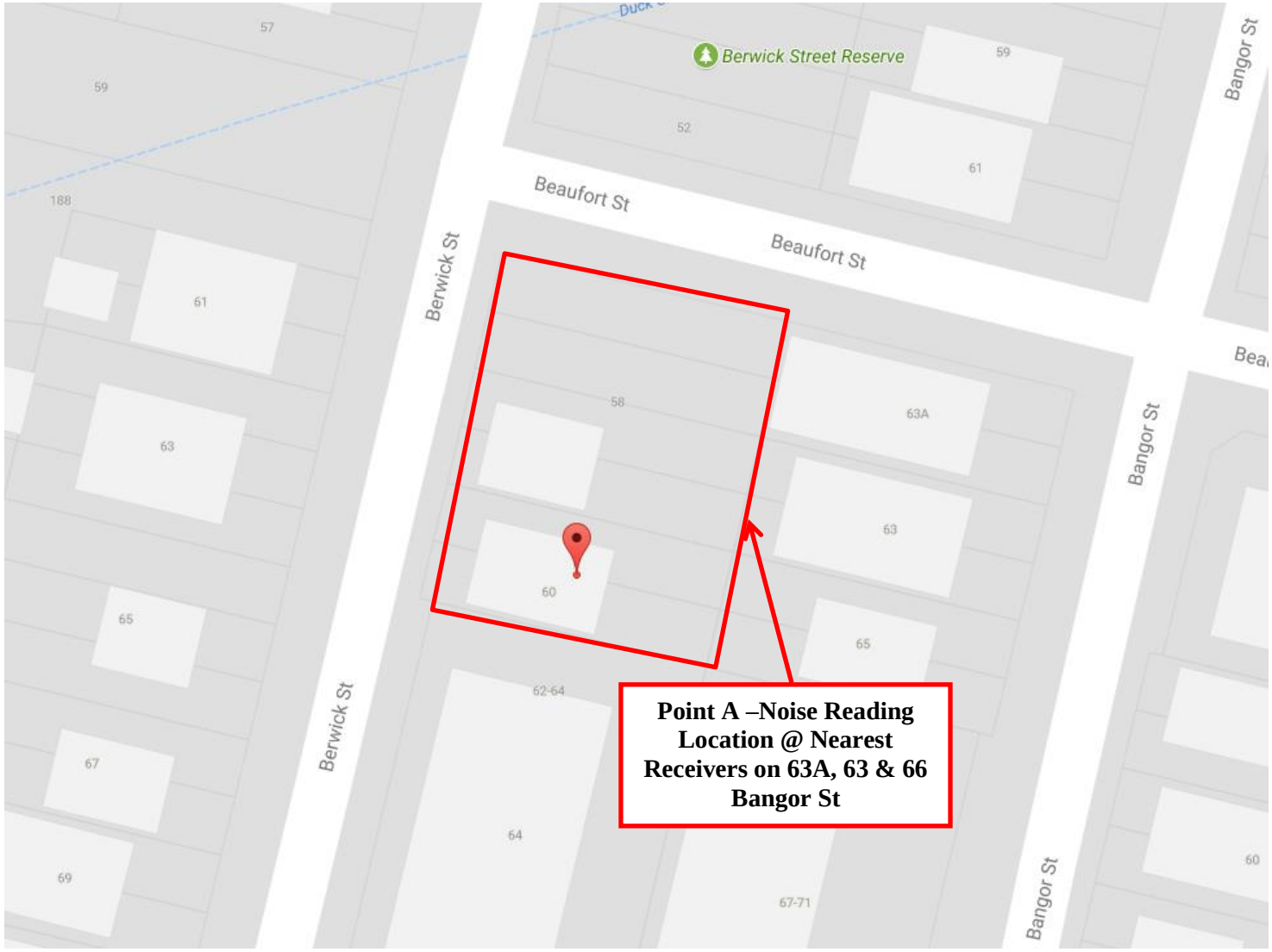

Figure 4 - Noise Reading Location

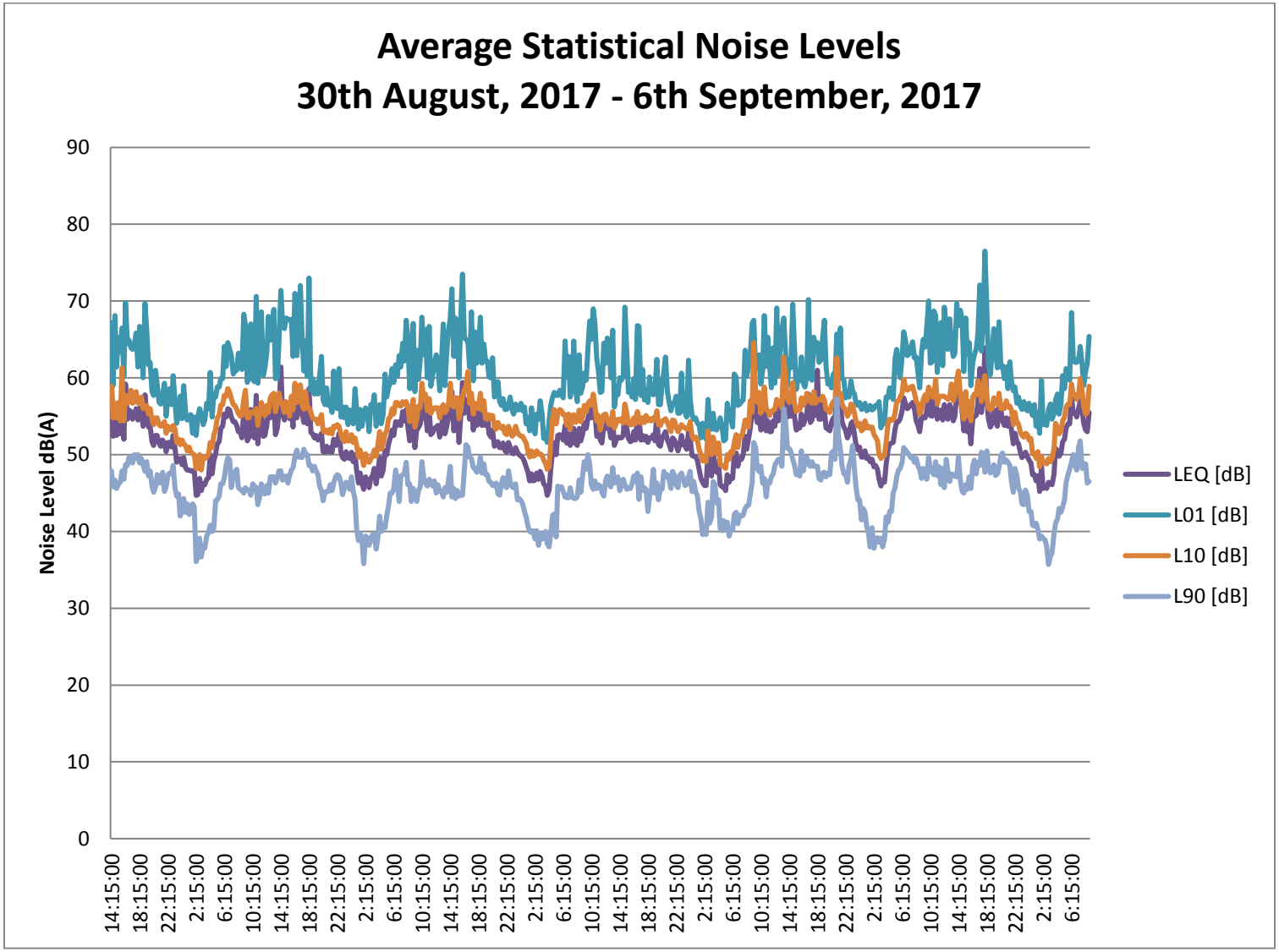

Figure 5 - Noise Survey