Proposed Car Wash, The Lighthouse
Mechanical Noise Emission Assessment for DA
888 Pittwater Road, Dee Why, NSW

Client:
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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 in Section 2 below.

NOISE DESCRIPTORS

L_{eq} – 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.

$L_{Aeq(15min)}$ - The A-weighted average equivalent sound level over a 15 minute period.

L_{A90} - 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.

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 (μPa) = 2×10^{-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 SUMMARY

Acoustic Dynamics is engaged by **Collard Maxwell Architects** to prepare an acoustic assessment of operational noise emission associated with the proposed car wash development located within Level P2 of the basement car park at the Lighthouse, at 888 Pittwater Road, Dee Why, NSW.

This document provides an assessment of operational noise emission associated with the proposed car wash, and is prepared in accordance with the various acoustic assessment requirements of Northern Beaches Council, the NSW EPA and relevant Australian Standards.

1.2 DESCRIPTION OF PROPOSAL AND LOCATION

The subject development application is for a proposed car wash located at 888 Pittwater Road, Dee Why. The subject car wash is located within the Lighthouse mixed-use urban development site, in the basement car park level P2. The nearest access driveway into the underground parking complex is via Howard Avenue. The proposal consists of the following:

- Two car drop-off areas;
- Two fully self-contained wash bays;
- Two vacuum and detailing areas;
- One plant room; and
- One office.

The trading hours for the proposed car wash facility are as follows:

- Monday to Friday – 7:00am to 6:00pm; and
- Saturday & Sunday – 8:00am to 5:00pm.

The basement car park has access via the northern boundary direct to Howard Avenue, and exit via the southern boundary direct to Oaks Avenue. The nearest residential receivers are located adjacent to the Lighthouse complex at 28 Oaks Avenue (residential apartments). The nearest commercial receivers are located at ground level, along Oaks Avenue and throughout the Meriton Retail Precinct. The residential receivers located at 28 Oaks Avenue are considered the most affected receivers and compliance with these receivers will ensure compliance with all other surrounding receivers.

The subject site is located in a mixed-use urban environment with an acoustical environment that is dominated by industrial and commercial source noise, with an aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources. The subject site also has through-traffic with characteristically heavy and continuous traffic flows during peak periods. Existing noise sources that residents of the area are exposed to specifically include:

- Woolworths heavy truck loading;

- Entrance from Howard Avenue and exit to Oaks Avenue;
- Vehicular traffic on Pittwater Road;
- Traffic of buses, cars and motorbikes on Howard Avenue and Oaks Avenue;
- Garbage bin trucks;
- Police Station located across Pittwater Road; and
- High pedestrian activity within the Meriton Retail Precinct, Woolworths Supermarket, restaurants and the Dee Why main bus stop located in front of the Lighthouse complex.

Acoustic Dynamics understands that several items of noise-generating plant and equipment will be required to service the proposed car wash. These items will include:

- 1 x Silenced 3 HP Air Compressor Model EC 2.5;
- 2 x 415 v Pressure Washer Model E100; and
- 2 x 240 Vacuum Model ESSA 2 Motor.

The subject site, and adjacent receivers are shown in the Location Map, Aerial Photograph, Drawings and Photos presented within **Appendix A**.

2 ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to 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 NORTHERN BEACHES COUNCIL CRITERIA

Acoustic Dynamics has been provided a letter from the Northern Beaches Council for a request for additional information as part of the development application DA 2020/1235, dated 10 February 2021. Council have requested that the following information be provided:

> *"While the proposed operation is located away from any immediate receptors there are potential noise/vibration concerns due to the proposed car wash being located within an enclosed space with hard reflective surfaces. Furthermore, car washes can provide multiple noise sources with pressure hoses, vacuums and pumps. Noise and vibrations from the car wash could potentially be amplified if not effectively treated/managed.*
>
> *There are however, potential concerns with vibrations and noise traveling through the adjacent lift shaft and fire stairs/ The applicant has provided little information on plant and sound power contribution levels of individual equipment.*
>
> *An acoustic assessment from a suitably qualified professional such as an acoustic engineer is to be undertaken to determine acoustic treatments to control noise emissions from all mechanical plant noise."*

2.1.1 LOCAL ENVIRONMENT PLAN

A review of the Northern Beaches Council's Warringah Local Environment Plan (LEP) 2011 did not yield specific acoustic criteria relating to acoustics.

2.1.2 DEVELOPMENT CONTROL PLAN

A review of the Northern Beaches Council's Warringah Development Control Plan (DCP) 2011 did not yield specific acoustic criteria relating to acoustics.

2.2 NSW EPA'S ENVIRONMENTAL NOISE CRITERIA

2.2.1 NOISE POLICY FOR INDUSTRY (NPFI)

Acoustic Dynamics advises that noise emission assessment at nearby and adjacent noise sensitive receivers has been conducted with reference to relevant acoustic criteria and standards and has yielded the following information.

The newly implemented NSW Noise Policy for Industry (NPfI, 2017) has replaced the NSW Industrial Noise Policy (INP, 2000), with certain specific exceptions. Acoustic Dynamics advises that the following criteria have been applied:

> ***"Project Intrusiveness Noise Level***
>
> *The intrusiveness noise level is determined as follows:*
>
> | | |
> |---|---|
> | $L_{Aeq,\ 15min}$ **= rating background noise level + 5 dB** | |
> | ***where:*** | |
> | $L_{Aeq,\ 15min}$ | ***represents the equivalent continuous (energy average) A- weighted sound pressure level of the source over 15 minutes.*** |
> | ***and*** | |
> | ***Rating background noise level*** | ***represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B."*** |

And

> ***"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 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:*

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)"

2.3 DETERMINATION OF APPLICABLE ASSESSMENT CRITERIA

To establish the acoustic environment at the subject site in accordance with the guidelines of the NSW EPA's NPfI, short-term operator-attended noise logging was conducted at the subject development site between 3:45pm and 4:30pm on Wednesday 17 February 2021. Acoustic Dynamics advises the measurement locations are representative of the existing noise environment of the nearest sensitive receivers.

The prevailing weather conditions during the short-term operator attended noise monitoring were generally calm and did not influence the noise measurements taken.

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

Table 2.1 Measured Noise Levels and Continuous Noise Criteria

Location	Time of Day	L_{A90} Rating Background Noise Level (RBL) [dB]	Measured L_{Aeq} [dB]	Project Intrusive Noise Level L_{Aeq} [dB]	Project Amenity Noise Level L_{Aeq} [dB]	Project Noise Trigger Level L_{Aeq} [dB]
Nearest residential receivers (external)	Daytime (7am to 6pm)[1]	55	60	60	60	**60**
Nearest residential receivers (internal)[2]		45	61	50	60	**50**
Nearest commercial receivers		55	60	60	65	**60**

Note: 1) 8am to 6pm on Sundays and public holidays

2) Based on measurements conducted within the carpark.

Of the project intrusive noise level and the project amenity noise level, the project noise trigger level for continuous or semi-continuous noise sources at a residential receiver, during any period, is that which is most stringent.

The EPA's NPfI 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, impulsive, or intermittent noise.

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 survey instrumentation used during the survey is set out in **Table 3.1**.

Table 3.1 Noise Survey Instrumentation

Type	Serial Number	Instrument Description
2270	2664115	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2385698	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4230	623588	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 ACOUSTIC MEASUREMENT RESULTS

Acoustic Dynamics advises that the $L_{Aeq\ (15min)}$ noise emission levels from the operation of various mechanical noise source items at the subject development site has been determined based on the results of short-term operated-attended measurements conducted at the subject site on 17 February 2021.

The following section provides an assessment of the acoustic impact of maximum operational noise emission associated with the use and operation of the car wash at nearby residential receivers, against the various noise criteria and objectives outlined in **Section 2** above.

Based on the drawings and information provided by the proponent, Acoustic Dynamics has undertaken calculations and modelling to determine the maximum predicted contributed noise emission levels at the nearest receiver locations resulting from the operation of the proposed car wash. The specified sound power levels of the proposed noise-generating plant and equipment are as follows:

- 1 x Silenced 3 HP Air Compressor Model EC 2.5 – SWL 76 dB(A);
- 2 x 415 v Pressure Washer Model E100 – SWL 76 dB(A); and
- 2 x 240 Vacuum Model ESSA 2 Motor – SWL 73 dB(A).

Acoustic Dynamics has undertaken noise modelling and calculations based on the following, conservatively high, assumptions for the likely maximum operations of the proposed car wash, during daytime operational hours.

4.1 MECHANICAL PLANT NOISE EMISSION ASSESSMENT

Acoustic Dynamics understands that the five items of mechanical equipment will be installed within a well-sealed plant room for further noise reduction. It is understood the sealed room will be constructed of 50mm thick fire rated EPS core panelling (eg. Versiclad or Bondor).

Acoustic Dynamics advises that this room must be well-sealed (air-tight) to provide an effective acoustic enclosure around the equipment, including the construction of the access door to the plant room.

Aside from other carpark users, it is understood the nearest sensitive receivers are commercial receivers located within the subject building two levels above the proposed car wash and residential occupants located within the subject building, located on higher levels above the proposed car wash (second level and above, being at least 4 levels above the car wash).

Council has expressed concern that airborne and structure-borne noise and vibration emission may be radiated to these sensitive receivers via the adjacent fire stairs and lift shaft.

The calculated maximum noise emission levels at the nearest commercial and residential receiver locations, resulting from the operation of the subject car wash, are presented against the relevant noise emission criteria in **Table 4.1**.

Table 4.1 Calculated Maximum L_{Aeq} Noise Emission Levels & Relevant Criteria (With Mitigation)

Receiver Location	Noise Sources	Assessment Period	Calculated Maximum $L_{Aeq(15min)}$ Noise Emission Level [dB][1]	Noise Emission $L_{Aeq(15min)}$ Criterion [dB]	Complies
Commercial Receivers on Ground Floor (2 levels above car wash)	Patron cars arriving to car wash, car wash activities and cars leaving car wash	Daytime (7am to 6pm)	<30	60	**Yes**
Residential Receivers (Second level & above, 4 levels above car wash)			<20	50	**Yes**

Note: 1) L_{Aeq} noise emission includes patron car engines, car doors, boots, start-ups and drive offs, compressor, pressure washer, vacuum cleaner motor, hoses and a radio.

Acoustic Dynamics advises that the above calculated noise emission levels are conservatively based on the maximum source noise levels and maximum capacity operations (i.e. a worst-case scenario) at the proposed development.

The predicted airborne noise emission levels presented above include allowances for relevant distance, direction and shielding losses. The calculated noise emission levels also account for the acoustic benefit provided by the recommendations detailed within **Section 5** below.

Further to the calculated maximum $L_{Aeq(15min)}$ noise emission levels presented within **Table 4.1** above, Acoustic Dynamics advises that the use and operation of the proposed car wash after following the incorporation of the recommendations contained within **Section 5** of this report, will easily **achieve compliance** with the relevant noise emission criteria, and is unlikely to cause adverse impact to the acoustic amenity of nearby residential or commercial receivers.

5 RECOMMENDATIONS

Further to the noise prediction calculation results presented within **Table 4.1** above, Acoustic Dynamics advised that noise mitigation and management measures are required to be incorporated into the proposed development to ensure noise emission compliance is achieved.

Accordingly, the following noise mitigation measures are required to be incorporated:

1. Construction of Sealed Plant Room

Acoustic Dynamics understands that the five items of noise-generating mechanical equipment will be installed within a well-sealed plant room for further noise reduction, as shown on the plans within **Appendix A**. Acoustic Dynamics understands that the client intends the room to be constructed of 50mm thick fire rated EPS core panelling (eg. Versiclad or Bondor).

This construction **must** have minimum surface density of **15 kg/m²**, and contain **no gaps** along the surface of the enclosure. All gaps are to be adequately sealed using a flexible mastic sealant.

All building materials specified must be tested and certified by a locally recognised and accepted testing agency in respect of their intended use. Where appropriate, materials and noise mitigation measures specified by Acoustic Dynamics must be certified by a locally recognised (qualified) and accepted professional for suitability (structural, wind loading, or other) for the intended use.

2. Isolation of Mechanical Plant & Equipment

The proposed mechanical plant and equipment **must** be isolated from the building structure by incorporating vibration isolation mounts where feasible (spring mounts or rubber mounts). Suppliers of appropriate vibration isolation mounts and vibration isolation hangers are:

- G P Embleton and Co Pty Ltd (Embleton) – Ph: 1800 339 638. (For more information see www.vibrationisolation.com.au); and
- Mason Mercer – Ph: 03 9462 2357 (For more information see www.masonmercer.com.au).

6 CONCLUSION

Acoustic Dynamics has conducted an acoustic assessment of operational noise emission associated with the proposed car wash development located within Level P2 of the basement car park at the Lighthouse, at 888 Pittwater Road, Dee Why, NSW.

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) NSW Environment Protection Authority (EPA); and
(c) Australian Standards.

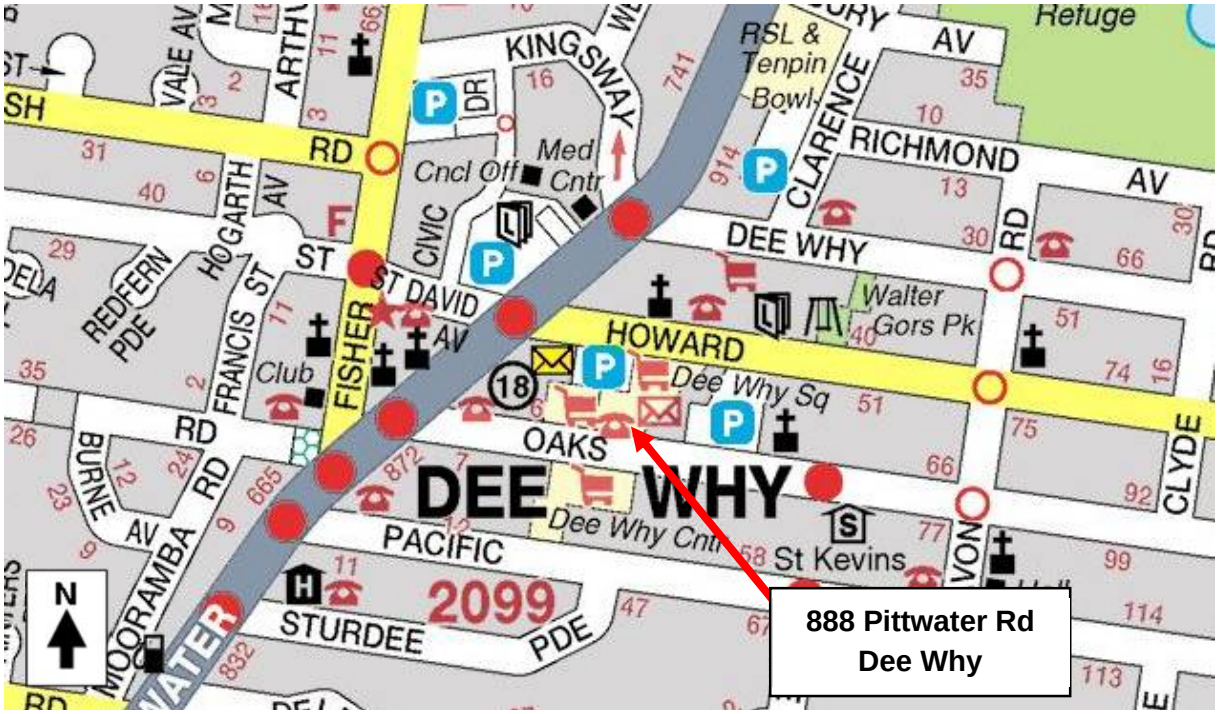
Acoustic Assessment

Further to our assessment, following the incorporation of the recommendation within Section 5, Acoustic Dynamics advises that the that the use and operation of the proposed car wash will comply with the relevant noise emission criteria.

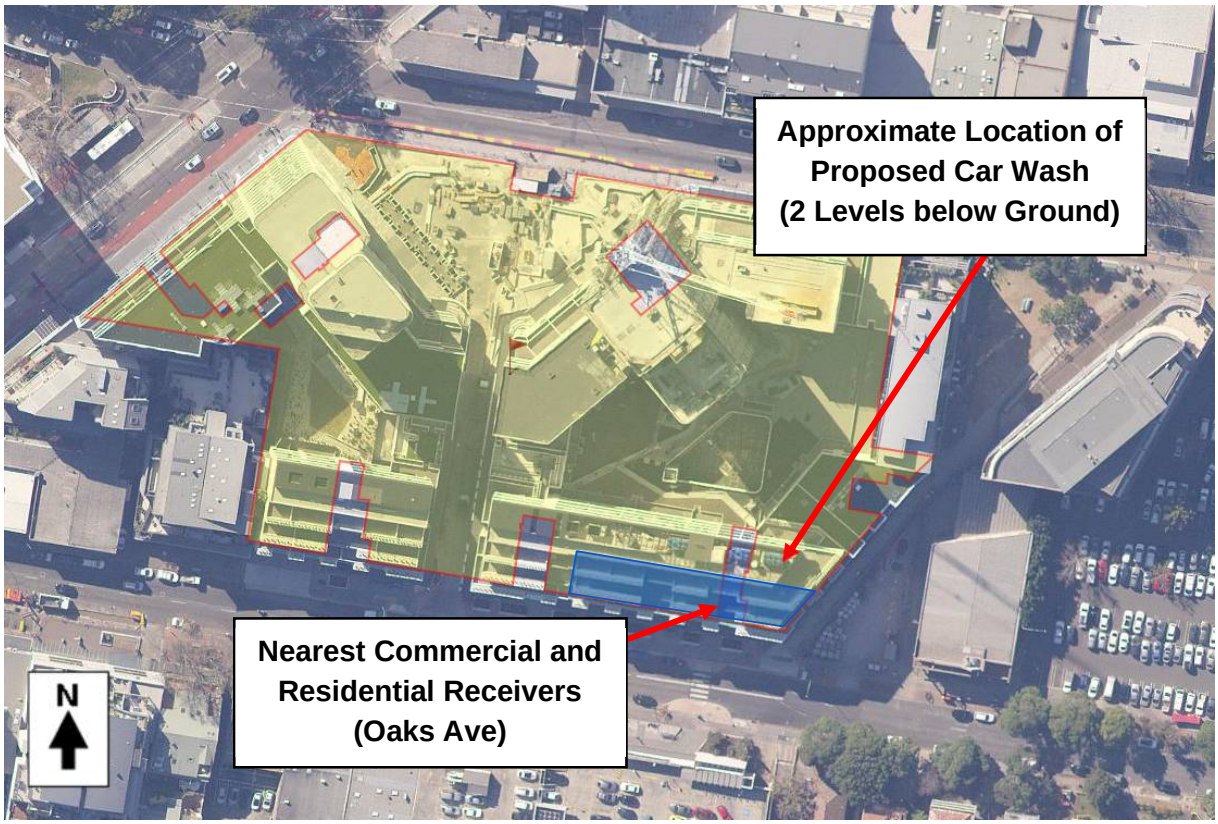
We trust that the above information meets with your present requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information.

APPENDIX A – LOCATION MAP, AERIAL IMAGE & DRAWINGS

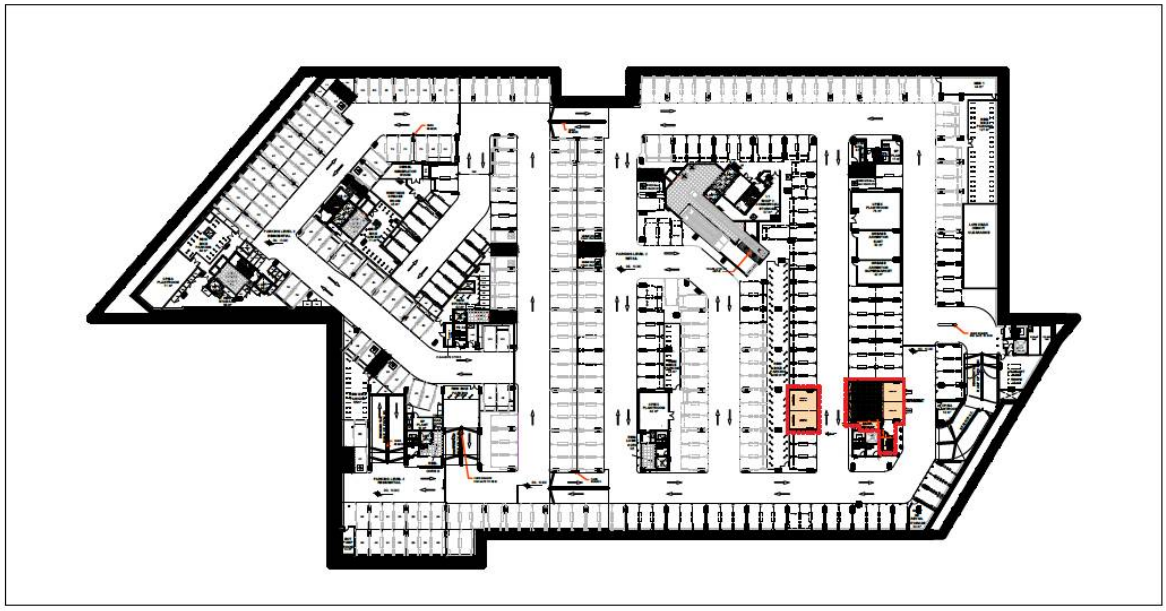
A.1 LOCATION MAP



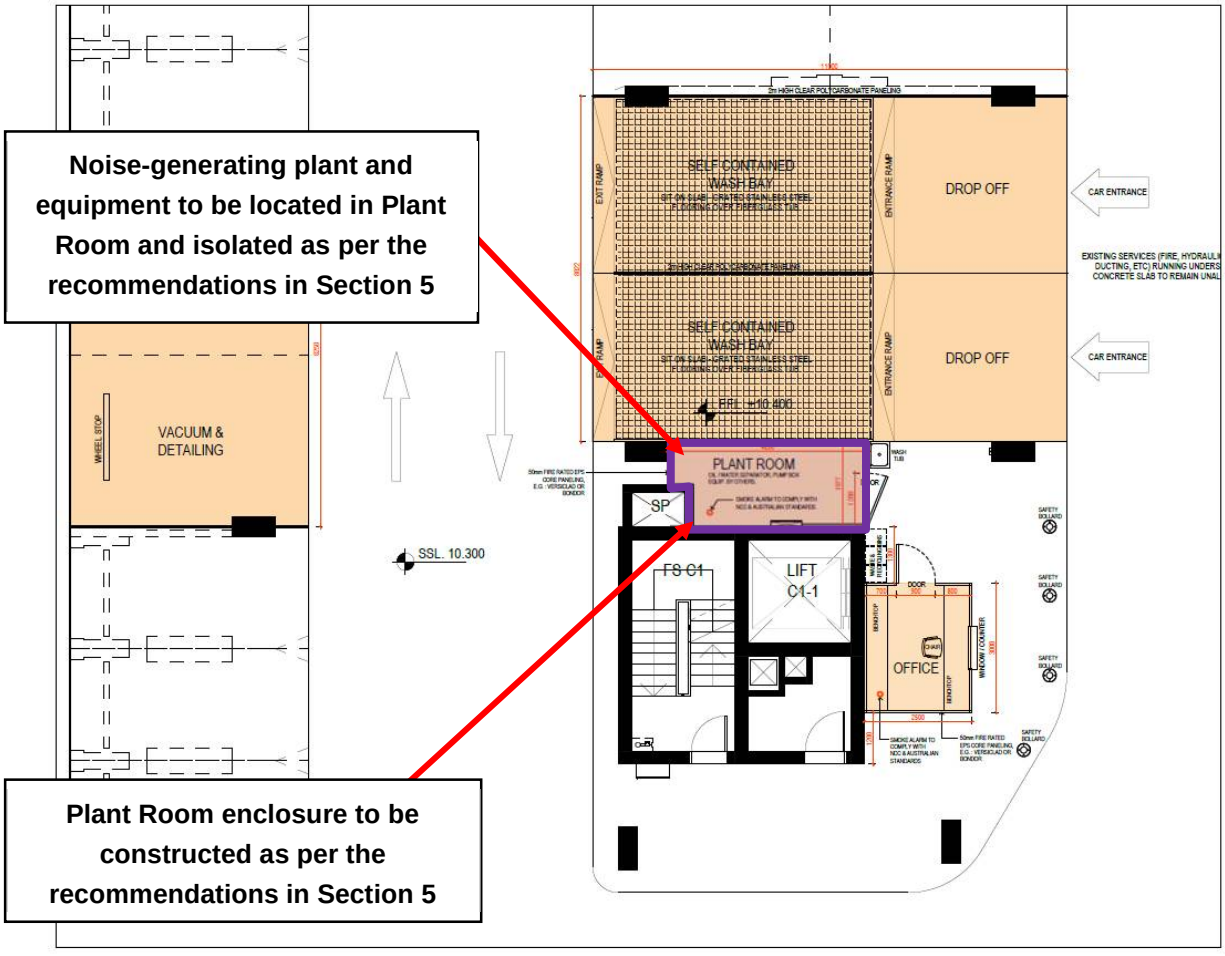
A.2 AERIAL IMAGE (COURTESY OF SIX MAPS)



A.3 DRAWINGS AND MARK-UP



Site Plan (Basement Level P2)



Proposed Car Bay Wash Plan (Level P2)