
Noise and Vibration Impact Assessment Proposed Residential Development 25-27 Boyd Street, Tweed Heads NSW

Prepared for:
Homes NSW
c/- CKDS Architecture

Document No: 242409-10593-R1

November 2024

Project name: Residential Development, 25-27 Boyd Street, Tweed Heads

Prepared for: Homes NSW c/- CKDS Architecture

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Document control number: 242409-10593

Approved for release by: N. Pennington

DOCUMENT CONTROL

Doc. No. / Version	Date Issued	Prepared by	Reviewed by	Issued to
242409-10593-R0	18/11/2024	NP	BR	BR
242409-10593-R0	11/11/2024	NP	NP	BR

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EXECUTIVE SUMMARY

A Noise and Vibration Impact Assessment (NVIA) for the proposed Multi-unit residential development at 25-27 Boyd Street, NSW, has been conducted. The main findings from the assessment are summarised below:

- No adverse noise impacts from external mechanical plant are expected.
- Final mechanical plant selection requires review by an acoustical consultant at the Construction Certification stage.
- Construction noise level may be excessive at some receivers at some times.
- Neighbouring residents should be well informed of proposed activities and times.
- A site contact for community feedback should be visible advertised.
- Pile-driving and rock-breaking should be avoided to minimise offsite vibration impacts.

1.0 INTRODUCTION

1.1 The Proposal

CKDS Architecture has commissioned Spectrum Acoustics on behalf of Homes NSW (the proponent) to prepare a Noise and Vibration Impact Assessment (NVIA) for the proposed multi-unit residential development at 25-27 Boyd Street, Tweed Heads, NSW.

1.2 Project Description

Under the proposal there would be 80 residential units constructed over 13 levels with basement carparking. The site is in a suburban area removed from major roads and industry. The Planning Secretary's Environmental Assessment Requirements (SEARs) Item 12 requires the following:

12. Noise and Vibration

- Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.

This document has been prepared in accordance with the *NSW Noise Policy for Industry (NPfI, 2017)*, the *NSW Interim Construction Noise Guideline* (ICNG, EPA 2009) with some guidance from the *Construction Noise and Vibration Guideline (Public transport infrastructure)* (CNVG, TfNSW 2023). The ICNG is a non-mandatory guideline but is usually referred to by local councils and the NSW Department of Planning when construction/demolition works require development approval.

1.3 Description of Terms

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

Table 1: Definition of acoustical terms

Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.

L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.
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2.0 OPERATIONAL NOISE ASSESSMENT

2.1 Ambient Noise Levels

The subject site is in a suburban area well removed from industry, major roads and the surf. Our experience is that background noise levels in such environments are in the order of 30 – 40 dB(A),L90 during the day and 30 dB(A),L90 or less during the night. For conservatism, this assessment adopts the EPA default minimum background noise levels of 35 dB(A) (day) and 30 dB(A) (evening and night) as defined in the NSW Noise Policy for Industry (NPfI).

Figure 1 shows the project site and surrounding land uses.



Figure 1: Site location and surrounding land uses.

2.2 Noise Criteria

In relation to determining noise goals for the operation of mechanical plant at the site the NPfI sets out two separate sets of criteria designed to ensure developments meet environmental noise objectives. The first criteria account for intrusive noise and the others apply to the protection of amenity of particular land uses. A new development is assessed by applying both criteria to the situation and adopting the more stringent of the two.

Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. The most potentially affected receiver areas near the site would be considered “suburban” as per the definitions in the NPfI.

The project amenity noise trigger level for an industrial development is equal to the recommended amenity noise level (from Table 2.2 in the NPI) minus 2 dB(A) (derived as detailed in the notes to **Table 2**). The intrusiveness criteria are based on the Rating Background Level (RBL) for the time period, plus 5 dB(A).

Table 2: Noise trigger level			
Criterion	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
Intrusiveness dB(A), Leq(15-min.) ¹	40	35	35
Amenity dB(A), Leq(period) ²	53	43	38

1. Rating Background Level (RBL) + 5dB. EPA default minimum RBL's adopted.

2. Project amenity noise level (ANL) is Suburban ANL (NPfI Table 2.2) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level.

The project noise trigger levels (PNTL) are therefore,

Day	40 dB(A) Leq (15 min)
Evening	35 dB(A) Leq (15 min)
Night	35 dB(A) Leq (15 min)

In relation to sleep disturbance, Section 2.5 of the NPfI states that where the subject development/premises night-time noise levels at a residential location exceed:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

The adopted minimum background noise level of 30 dB(A) for the night period implies a sleep disturbance trigger level of **52 dB(A), Lmax**.

2.3 Operational Noise Impacts

2.3.1 Driveway Roller Doors

Figure 2 shows the location of the proposed entry driveway off Brett Street. There are existing residences along the southern side of the road at a distance of approximately 30m from the location of the automatic roller door and an approved 7-storey residential flat building (RFB) to the west of the site. The locations of proposed electrical boxes are also indicated.

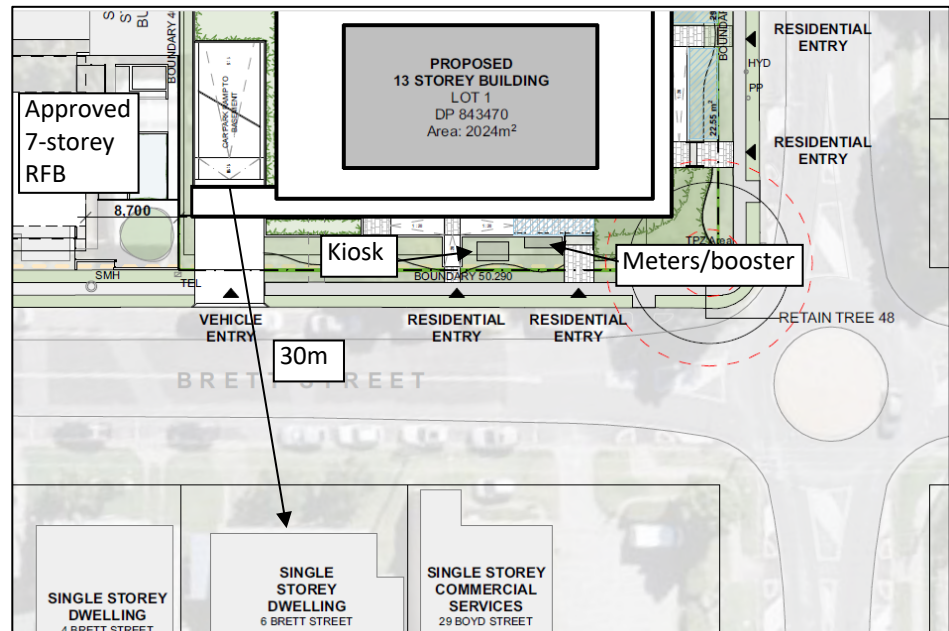


Figure 2: Location of roller door and residential receivers.

Maximum noise impacts from an automatic roller door are typically assessed as up to 75 dB(A),L_{max} for a door in good condition. These impacts have the potential disturb sleep at night, and the EPA prefers these impacts to be assessed against a “sleep disturbance” trigger level (SDTL), which has been established as 52 dB(A),L_{max} in this report. Accounting for distance loss over 30m, the level of the roller door would be 37 dB(A),L_{max}. This is well below the SDTL and no further assessment is required.

The nearest façade of the adjoining approved RFB is approximately 10m from the roller door. The roller door would be set back from the building façade with a masonry “blade” wall at the left side and a concrete over hang above. This will provide minimum 10 dB barrier loss with respect to the neighbouring RFB. Adding this to the 10m distance loss, the predicted level of 37 dB(A) will also be well below the SDTL.

Spectrum acoustics has previously been provided with noise data for an electrical kiosk indication a sound power level of 65 dB(A). At a distance of 30m this reduced to 27 dB(A) which is 8 dB below the night time noise trigger level of 35 dB(A) and there is minimal chance of adverse noise impacts.

2.3.2 Mechanical Plant

Air conditioning will typically be provided by split system units. Condenser units would be located on the balcony of each residential Unit. Condenser units for similar applications, typically, have sound power levels in the range 60 to 65 dB(A) when they are operating at full capacity.

Allowing for nominally five AC condensers to be exposed to any residential receiver surrounding the site, 10m distance and the barrier effect of solid balcony balustrades, the predicted level of 28 dB(A) is below the night time PNTL of 35 dB(A). Prior to the issue of a Construction Certificate, air conditioner selection and location should be

reviewed by the acoustical consultant to ensure compliance with the criteria established in this report.

Proposed rooftop plant including fans for carpark exhaust and stairwell pressurisation would be elevated by several storeys relative to existing and potential future residential building, mitigating the potential for significant offsite noise impacts. Prior to the issue of a Construction Certificate, rooftop plant selection should be reviewed by the acoustical consultant to ensure compliance with the criteria established in this report.

3.0 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

Section 1.5 of the EPA Interim Construction Noise Guideline (ICNG, 2009) outlines the steps for management of construction noise impacts as follows:

1. **identify sensitive land uses** that may be affected.
2. **identify hours** for the proposed construction works.
3. **identify impacts** at sensitive land uses.
4. **select and apply the best work practices** to minimise noise impacts.

Each of the above four points is assessed in detail in the following sections.

3.1 Sensitive land uses

The subject site adjoins existing residential receivers to the north and west, to the east across Boyd Street and to the south across Brett Street. Potential construction noise impacts at these existing residences will require assessment.

3.2 Construction hours

Standard daytime construction hours are given in the ICNG as follows:

- Monday to Friday 7am to 6pm;
- Saturday 8am to 1pm; and
- No work on Sundays or Public Holidays.

The Construction Noise and Vibration Guideline (Roads) (CNVGR, TfNSW, 2023) acknowledges there may be need to conduct works at night to minimise disruption to daytime traffic on busy roads. Management measures for night time works are discussed in Section 4 for completeness, although the Applicant has advised that there is no proposal to conduct works at night.

3.3 Impacts at sensitive land uses

The ICNG provides two assessment methodologies for construction noise impacts: a 'qualitative' assessment where works occur for less than three weeks and a 'quantitative' assessment for works of longer duration. As construction works on the site will take longer than three weeks, the quantitative methodology is applicable.

3.4 Construction noise management levels

Table 2 is an extract from the ICNG setting out noise management levels for construction works as reproduced below.

Table 2: Noise at residences using quantitative assessment

Time of day	Management level $L_{Aeq}(15\text{ min})^*$	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. - Where the predicted or measured $L_{Aeq}(15\text{ min})$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: - times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) - if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Based on the EPA default minimum daytime background noise levels given in Section 3 the construction noise management level (NML) is **45 dB(A), Leq(15min)** during standard daytime hours.

3.5 Work practices and noise sources

Existing structures on site would be demolished before excavating the basement level and constructing the building. Given the close proximity to neighbouring dwellings, there is a likelihood of the “highly noise affected” level of 75 dB(A) to be exceeded at various stages of the works. In particular, demolition of the existing buildings may be excessive during the knock-down activities but not during the rubbish removal. Earthworks such as basement excavation may also be excessive at times. Exact excavation methods are unknown at this stage (would there be a need for rock-breaking or can the material be removed by excavator? Would there be boring or pile driving for

foundation construction?) A comprehensive Construction Noise and Management Plan would be required prior to commencement of works. General construction noise management practices are presented below, sourced from the ICNG.

3.6 Noise control

The best ways to minimise construction noise impacts are to employ quiet work practices and use the quietest available construction equipment. There are four main methods of controlling noise. These are;

1. Controlling noise at the source. Examples are; sound proof covers, sound reducing mufflers on plant etc. Also included here is the substitution of processes or equipment with less noisy items,
2. Controlling the transmission of noise in its path. Examples are noise barriers (such as appropriate fencing) or portable barriers which may be used around static equipment like generators,
3. Controlling noise at the receiver. Examples are insulation on buildings and thicker glazing, and
4. In addition to the above noise mitigation can involve scheduling of the more noisy activities to less sensitive periods of the day or times of the year.

For the current construction works there is little scope for the feasible and reasonable application of methods in items 3. Item 2 would be partially achieved for residences to the west by sheds along their rear property boundaries.

With regard to item 1 several recommendations are made in **Section 3.8** of this report. In addition to this, **Section 3.7** details noise management procedures to enable identification of particularly noise sensitive times.

3.7 Noise planning

The proponent should undertake noise control planning as part of project pre-planning. This will identify potential noise problems and eliminate them in the planning phase prior to site works commencing.

Residents in streets adjacent to the construction site should be notified of the project timing. This would, typically, be done by a letterbox drop. Included in the notification should be a description of proposed works and an outline of the proposed time frame for the various stages of the works.

The letterbox drop should include all residential properties within approximately 100m of the works.

The contact name and phone number of a responsible person should be given out so that residents may comment on the works and indicate any particularly significant noise sensitive times.

The advice should also advise the name and phone number of the person responsible for accepting and dealing with complaints. All complaints or communications should be answered promptly and a record kept of all response and actions.

The main contractor should plan to co-ordinate subcontractors so that there are no unnecessary cumulative impacts arising from the simultaneous activities of more than one subcontractor. That is, planning to avoid, if practical, having more than one noisy activity taking place in close proximity. It is good practice to appoint a single co-ordinator to oversee all significant noise producing activities.

3.8 General noise management

All personnel working on the site must be made aware of the approved construction hours.

All personnel working on the job including subcontractors and their employees must be made aware of their obligations and responsibilities with regard to minimising noise emissions. A sample Noise Emission Risk Assessment is attached to this Plan for reference.

Site inductions and toolbox meetings to all employees and subcontractors must include information about the need to minimise noise impacts to surrounding areas.

Contractors should familiarise themselves with methods of controlling noisy machines and alternative construction procedures. These are explained in AS2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

Any activities that are known or have the potential to create excessive noise should, where possible, be scheduled to occur at times to cause least annoyance to the community. Carrying out such work during early morning, typically prior to 8 am, should be avoided. This includes start up and idling etc. of heavy machinery prior to commencement of work.

Mechanical plant should be silenced using best available control technology. Noise suppression devices should be maintained to manufacturer's specifications.

Any portable equipment with the potential to create high levels of noise e.g. compressors, generators etc. should only be selected for use if it incorporates effective noise control. This equipment should be located where practical to maximise the distance between it and the nearest potentially affected receivers.

Plant known to emit noise strongly in one direction, such as a concrete agitator, should, where possible, be oriented such that the noise is directed away from the closest or the most noise sensitive receivers.

Regular and effective maintenance of all equipment including vehicles moving on and off the site should be conducted. Prompt attention must be given to repair of loose or

rattling parts and broken equipment. All maintenance work should only be carried out by qualified persons.

When selecting contractors and/or equipment for the job, preference must be given to those with capacities best suited to the task at hand. That is the use of larger machines with excess capacity should be avoided unless these can be shown to be quieter than smaller capacity machines.

Site access should be designed such that delivery vehicles, and other heavy vehicles moving through the site can do so with minimum need to reverse.

Where possible loading and unloading of plant and materials should be carried out away from potentially affected receivers. No delivery of plant or materials should be accepted before 7 am Monday to Friday or 8 am on Saturday, where possible. Care should be taken not to drop materials from height either into, or out of trucks or other rigid surfaces.

3.9 Construction vibration

The CNVG recommends minimum setback distances for certain construction machinery to ensure no adverse impacts on structures and residential amenity. Table 2 of the CNVG showing recommended minimum setback distances for various construction equipment is reproduced below.

Table 20: Recommended minimum working distances from vibration intensive plant

Equipment	Approx. Size/ Weight/ Model	Minimum Distance – Cosmetic Damage (BS 7385)	Minimum Distance – Human Response (OE&H Vibration Guideline)
Vibratory roller	1-2 tonne	5 m	15 m to 20 m
	2-4 tonne	6 m	20 m
	4-6 tonne	12 m	40 m
	7-13 tonne	15 m	100 m
	13-18 tonne	20 m	100 m
	> 18 tonne	25 m	100 m
Small hydraulic hammer	300 kg (5 to 12t excavator)	2 m	7 m
Medium hydraulic hammer	900 kg (12 to 18t excavator)	7 m	23 m
Large hydraulic hammer	1600 kg (18 to 34t excavator)	22 m	73 m
Pile driver - vibratory	Sheet piles	2 m to 20 m	20 m
Piling rig - bored	≤ 800 mm	2 m (nominal)	N/A
Piling rig - hammer	12 t down force	15 m	50 m
Jackhammer	Handheld	1 m (nominal)	Avoid contact with structure

Note: More stringent conditions may apply to heritage or other sensitive structures.

Based on the above setback distances for human comfort, vibratory pile driving, medium to large hydraulic hammers and vibratory rollers are unlikely to be suitable for this site.

This report contains no appendices