



## Introduction

1. My full name is Lindsay John HANNAH. I am an acoustic engineer at Wellington City Council, Specialist Advice and Compliance Team.

## Qualifications

2. My qualifications include a Master's Degree specialising in Acoustics and Environmental Health from Massey University (with distinction), a Post Graduate Diploma in Science (with distinction) specialising in Acoustics from Massey University; and a Bachelor of Building Science Degree (BBSc) from Victoria University School of Architecture.
3. I also hold other qualifications in acoustics including the '*Technical University of Denmark Specialist Sound Insulation Course*' and specialist full year acoustics course taught at Massey University '*Bio-physical effects of noise, vibration and electrometric radiation*'.
4. I have been involved with the prediction, measurement and assessment of environmental noise from a range of developments in both the New Zealand and overseas on a continuous basis over the last 20 plus years. My expertise is based around environmental and building acoustics.
5. I have been responsible for acoustics assessments and design for numerous different activity and project types nationwide and overseas including infrastructure, industrial, commercial, recreational and residential developments. I also have experience in noise control engineering and design works. I have worked on a number of health care and wellbeing projects such as existing and proposed medical centres, hospitals as well as rest homes facilities for example Harbour View Rest Home, Wellington; Met Life Coastal Villas, Paraparaumu and Summer Set Villas, Paremata, and Summer Set Villas, Boulcott, Hutt City
6. I have been employed as a specialist in environmental acoustics since 1999. I was the Lead of Acoustics Engineering at Cardno (now Stantec) a global infrastructure, environmental and social development company operating in over 100 countries. I have also worked for specialist acoustic firms such as Malcolm Hunt Associates which only specialised in acoustics and noise.
7. I am a full member of the New Zealand Acoustics Society<sup>1</sup>, with a requirement of Full Membership being that I satisfy the Society's 2 yearly requirements in regard to continuing professional development (CPD) for both on-going education and development in the field of acoustics. I am an associate member of the New Zealand Planning Institute.
8. I am a current elected board member of the New Zealand Acoustical Society an elected position I have held several times over my career. I am the Editor in Chief of New Zealand Acoustics Journal, a position I have held for several years.

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<sup>1</sup> NZAS Membership Number M1202HL

## Experience

9. I have been involved with the prediction, measurement, assessment and reporting of environmental noise from a range of developments on a continuous basis over the past 20 years. I also have experience in noise control engineering and acoustic design works. I have worked on projects both in New Zealand and overseas.

## Code of Conduct

10. The evidence I give is within my area of expertise. I am not an expert in vibration. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

## Scope of Evidence

11. My evidence will deal with:
- Background and role;
  - Summary of site and activity;
  - Summary of assessment of environmental noise and vibration issues;
  - Response to the Applicants expert noise and vibration reviews;
  - Response to submissions received regarding noise and vibration;
  - Summary of proposed noise management methods; and
  - Recommended noise and vibration conditions.

## Background SR462500

12. My involvement in this Application initially involved preparing a technical review report for Council, as Councils Acoustic Engineer, under the original Application reference **SR471670**. A new Application was then submitted under the WCC reference **SR462500**. I was not asked to prepare an updated noise assessment thus include my updated assessment below for **SR462500** (current application and consent).
13. I understand the change to the application (from **SR471670** to **SR462500**) is negligible with respect to noise and vibration matters. My evidence is based around the Application and information provided by the Applicants noise and vibration experts, Marshall Day Acoustics (MDA). I can confirm I have visited the subject site and reviewed the surrounding area.

## Development Site and Proposed Activity

14. The site, surrounding environs and proposed activity is well described in detail within the Application, and I provide the following summary.
15. Ryman Healthcare Limited (The Applicant) have applied to Wellington City Council (The Council) to construct and operate a new retirement village to be located at Donald Street, Karori, Wellington.
16. The development is surrounded by a host of residential properties and non-residential activities.















- 39 In my view adopting BPO measures through the adoption of a detailed CNVMP is a **critical** requirement to ensure construction noise is reasonable at all times. The MDA review provides in my opinion a host of reasonable recommendations with respect to noise management. However, as noted in the MDA review additional noise management and mitigation measures will need to be finalised and given further consideration as part of the final mitigation measures once final methods are known. I support this method, as a reasonable approach, and note such measures can be worked through during the draft construction noise and vibration management plan preparation.
- 40 With respect to construction and vibration a host of measures are recommended under **Section 5.0** of the MDA construction noise assessment. There are a host of noise management methods (including but not limited to) the erection of a temporary noise barrier (minimum height 2.4 metres) to be installed to extend around the site perimeter as well as the preparation of a CNVMP is included as a condition of consent on the project. Importantly the MDA review also recommends that ***“where high noise equipment is used close to a sensitive boundary or where receivers are not easily shielded, localised barriers should be used where they would be effective and practicable.”*** I agree.
- 41 With respect to operational noise the MDA review concludes ***“that with the use of conventional noise control treatments (if required), the operation of the Proposed Village would comply with the relevant Permitted Activity noise criteria at all assessment locations, with the exception of the occasional brief exceedance at 29 Campbell Street. The MDA review also concludes compliance of fixed plant is dependent on the review of fixed mechanical plant items, and any required noise mitigation, following completion of design”***.
- 42 Overall, I am in support of the recommended methods proposed by the Applicant, and I agree that these methods are inline with the s.16 duties under the Resource Management Act. I stress the certification of a detailed CNVMP, 2.4m high perimeter barrier and localized mitigation (among other noise mitigation measures) are essential to ensure noise can be managed.

## **Submissions (Noise and Vibration)**

- 43 I have read the submissions where noise and vibration are highlighted as a concern by the community. I have given consideration to noise matters raised in those submissions.
- 44 I am of the view that the submissions raise valid concerns including potential noise matters.
- 45 These issues raised can in my view be addressed through the final design, specifications and operation for operational noise and the CNVMP for construction and vibration measures.
- 46 The following is a subject site map and adjacent sites (from the MDA assessment for construction noise *Appendix A*).



8. **Submission 70 – Mark Moore (17 Paddington Grove):** Car movement noise from tyre squeal from undercroft car parking.

9. **Submission 72 – Bernadette and Tristram Ingham (22 Scapa Terrace):** Car movement noise from tyre squeal from undercroft car parking.

47 In summary the following subject matters are raised in the submissions pertaining to operational ('day to day') noise:

- General concerns with respect to day to day noise emissions including service and plant noise;
- Noise from tyre squealing from the undercroft carparking;
- Car movement noise; and
- Noise from audible warning devices associated with the car parking garage door.

48 I address each of the specific matters separately as follows:

49 **General concerns with respect to noise emissions including plant and service noise.** The Applicant has provided a detailed assessment of operation noise effects. I have discussed such in my evidence above.

50 **Noise from tyre squealing from the undercroft carparking.** Noise from tyre squealing could be a potential noise source that is detectable off site. This issue appears in a host of submissions. The Applicant has not addressed this matter and may wish to consider providing further review. I note that with suitable design and specification, such as the selection of car parking floor surface (for example a rough as opposed to smooth surface (where required)), I see no practical reason why this noise source cannot be suitable mitigated to comply with the operative noise limits.

51 **Car movement noise.** Car movement noise relates to engine sounds, door opening and closing and the movement of the vehicles themselves. The MDA review did not specifically address vehicle noise and referred in their s.92 response (Appendix C) referred the matter back to the Applicants Planner. The Applicant wish to comment further however, in my experience when vehicles are driven sensibly (as would be fair to expect when in the precinct for an aged care facility for our elderly citizens) vehicle noise would be expected to be similar in nature and scale to noise from adjacent residential sites. There are measures that can be adopted such as speed humps and/or signs that will ensure vehicles move at safe and slow speeds on site. I note that heavy vehicle noise will also be present such as collection of waste.

52 The MDA review notes that when assessed in accordance with NZS 6802:2008, the noise from rubbish trucks is predicted to comply with the 50 dB  $L_{Aeq\ 15\ minutes}$  District Plan daytime limit for non-residential activities at all assessment locations, with the exception of the 29 Campbell Street (Early Childhood Education (ECE) facility) where the MDA assessment concludes at this location, a 3 dB exceedance has been predicted twice a week. I have discussed this issue above in my evidence.

- 53 Council's Trade Waste bylaw (***Controls for the Solid Waste Management and Minimisation Bylaw 2020***) permits collection of waste in residential areas **only** between 7.00am to 9.00pm Monday to Saturday thus the collection of waste by heavy vehicles could only be during daytime hours.
- 54 **Noise from audible warning devices such as associated with the car parking garage door.** I see no practical reason why noise from the garage door and related warning devices cannot in my experience be suitably designed, specified and operated so that these noise source can comply with the operative noise limits. Such measures could include the audible component of noise is only present during day and at night the flashing light operates but not the warning beeper noise. Other options may include adopting broad band noise emitters as opposed to beepers. The Applicant may wish to provide further comment.
- 55 **Noise from outdoor areas such as the pocket park (picnic area).** Noise from persons outside would be expected to be normal vocal effort meaning persons talking and normal levels and would be expected to be similar in nature and scale to surrounding residential activity. With respect to the pocket park (picnic area) the boundary fence between the site and neighbour will have a fence shown as "Type C" which is a timber board fence.
- 56 The "Type C" fence is shown as running along the entire common boundary of Donald Street. The site also has a host of other outdoors areas, for example the bowling green. This area is set back from the common site boundary, regardless as noted above I see no reason why when suitable managed the outdoor areas would not produce reasonable levels of noise that comply with the permitted district plan noise limits.

(b) **Construction Noise Submissions**

10. **Submission 1 – Heng Hu (26 Donald Street):** General noise impacts during construction.
11. **Submission 38 – Barbara Carruthers (14 Scapa Terrace):** Construction noise impacts (during construction).
12. **Submission 41 – Nikki Fraser (19<sup>A</sup> Campbell Street):** Construction noise impacts, during demolition as well as use of radios and builders talking during construction, builders working outside permitted hours. WCC 'promptly attend to issues' for residents including noise'.
13. **Submission 43 – Jude Wallace (13 Scapa Terrace):** Level of construction noise and how this will continue for 'years of construction activity'. Concern of construction noise from persons working from home; confine excessively noise activity to certain period of the day and none at the weekend. Construction vibration. Ryman prepare a construction check (survey) prior to any construction work.
14. **Submission 49 – Bonita Gestro (6 Scapa Terrace):** Noise impacts from construction and excavation and piling.





65 The New Zealand Acoustic Standard **NZS6803:1999 Acoustics Construction Noise** set limits in Table 2 and Table 3 of that standard. The limits are summarised below:

**Table 2 – Recommended upper limits for construction noise received in residential zones and dwellings in rural areas**

Time of week	Time period	Duration of work					
		Typical duration (dBA)		Short-term duration (dBA)		Long-term duration (dBA)	
		$L_{eq}$	$L_{max}$	$L_{eq}$	$L_{max}$	$L_{eq}$	$L_{max}$
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and public holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

- (a) "Short-term" means construction work at any one location for up to 14 calendar days;
- (b) "Typical duration" means construction work at any one location for more than 14 calendar days but less than 20 weeks; and
- (c) "Long-term" means construction work at any one location with a duration exceeding 20 weeks.

66 As indicated in **Table 2** above (from NZS6803) the standard sets varying limits based on a number of factors including the length of the project, time of week and time of day. As the project is long duration the limits at adjacent sites are 5 dB more stringent for typical duration projects and 10 dB more restrictive for short term projects. Limits are also more restrictive during evening and night time periods, Sundays and Public Holidays.

67 NZS6803:1999 sets very restrictive limits for Sundays and Public Holidays permitting levels up to 55 dB  $L_{Aeq}$  and 85 dB  $L_{AFmax}$  between 7.30am to 6.00pm. The Applicant may wish to comment further with respect to any planned works on Public Holidays occurring.

68 I am of the view that in accordance with s.16 duties to manage noise, any high noise impact activity that cannot comply with the permitted limits set out in NZS6803, such activities could for example be limited, for example between 9.00am and 4.00pm Monday to Friday only.

69 It is understandable that there is concern around the community **working from home** and the noise effects. As above I support the use of a CNVMP to ensure noise is suitable managed inline with BPO s.16 so as to ensure noise remains reasonable at all times.









**(....) Construction Vibration and Management**

The Consent Holder must ensure that construction activities, except were identified in the construction noise and vibration management plan (CNVMP) as predicted to exceed the levels in 'DIN 4150-3:1999 "Structural Vibration – Part 3: Effects of vibration on structures' shall be managed and controlled so that the vibration levels received at any site does not exceed the limits in 'DIN 4150-3:1999 "Structural Vibration – Part 3: Effects of vibration on structures'.

Where a specific construction activity cannot comply with the vibration limits set out in 'DIN 4150-3:1999 "Structural Vibration – Part 3: Effects of vibration on structures' the Consent Holder must provide Wellington City Councils Compliance Monitoring Officer (CMO) an assessment of vibration control methods that must be adopted. The assessment shall be in line with s.16 Best Practical Option (BPO) and included in the draft Construction Noise and Vibration Management Plan submitted to Council for approval.

**(....) Construction Noise and Vibration Management Plan (CNVMP)**

The Consent Holder must submit to Wellington City Councils Compliance Monitoring Officer (CMO) a Construction Noise and Vibration Management Plan (CNVMP) for review and approval. The Construction Noise and Vibration Management Plan must be prepared by a suitably qualified and experienced acoustic expert acceptable to Council. The Construction Noise and Vibration Management Plan shall be drafted in accordance with Appendix E2 of NZS6803:1999 Acoustics – Construction'. The Plan must also:

- Identify and describe all specific activities that cannot comply with the upper recommended noise levels set in Table 2 of 6803:1999;
- Identify and describe all specific activities that cannot comply with vibration limits in 'DIN 4150-3:1999 'Structural Vibration – Part 3: Effects of vibration on structures';
- Specify the predicted noise and vibration limits, and identify each separate affected properties, for each activity (Stage) that exceeds the recommended levels;
- Specify the duration of the works exceeding the recommended noise and vibration levels;
- Specify the physical and managerial noise mitigation methods that must be adopted to reduce noise to a reasonable level of noise and vibration in accordance with Section 16 Best Practical Option (BPO) of the Resource Management Act 1991;

The CNVMP must be amended, where directed by the CMO to address proven deficiencies in its operation.

**(....) Construction Noise and Vibration Management Plan**

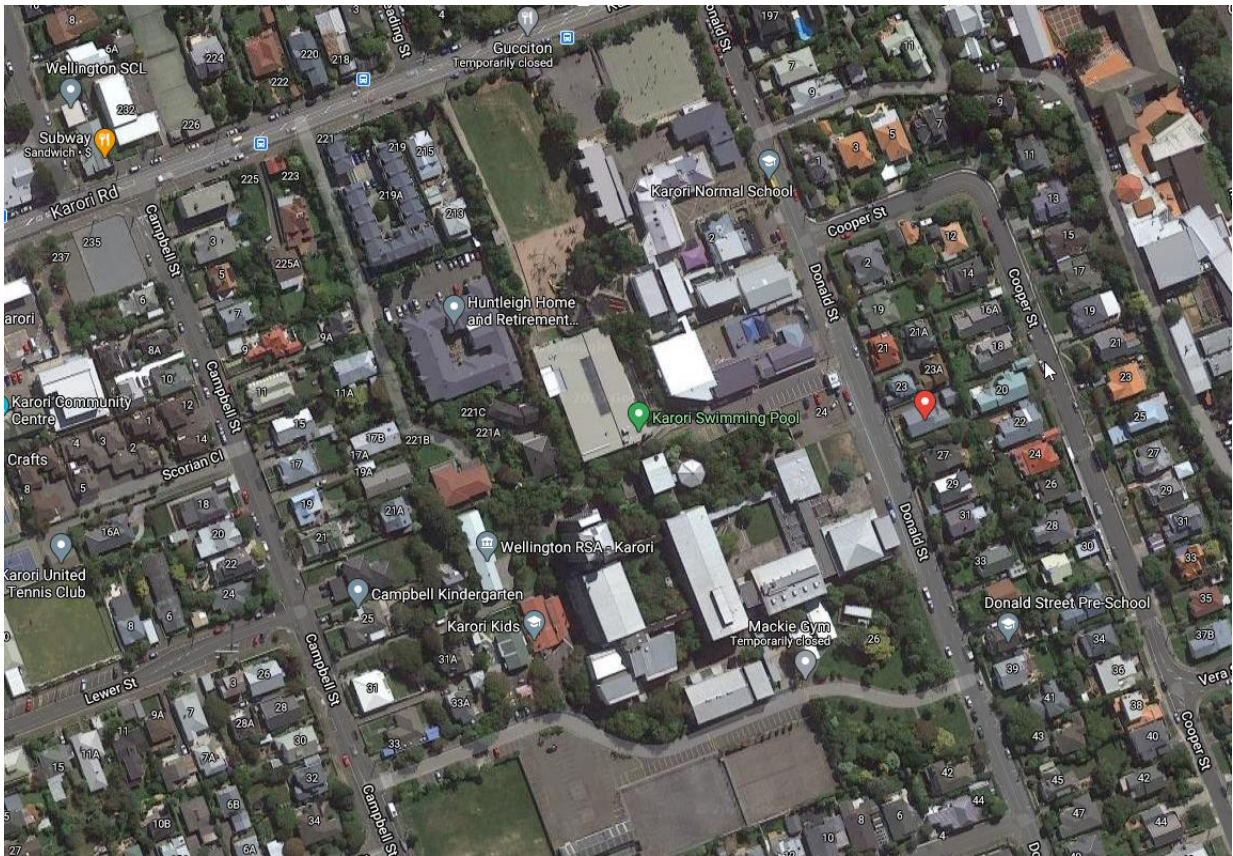
The Consent Holder must not undertake any activities authorised by this consent until the Construction Noise Management Plan (CNVMP) has been signed off by Councils Compliance Monitoring Officer as final and is denoted by Council as being ‘certified approved for use’ as the final Construction Noise and Vibration Management Plan (CNVMP). The mitigation and vibration measures detailed in the certified CNVMP must be adopted at all times by the Consent Holder for the duration of construction works.

**(....) Acoustic Design Certificate District Plan Compliance (Fixed Plant Noise)**

The Consent Holder must ensure that prior to residential occupation authorised by this consent that the Consent Holder submit to Wellington City Councils Compliance Monitoring Officer an Acoustic Design Certificate (ADC) for Fixed Plant. This certificate must certify that suitable acoustic mitigation measures have been incorporated into the final design are sufficient to ensure noise emitted from all Fixed Plant on the site authorised by this consent comply in all respects of the permitted noise standards set out under the Condition (...) above. The Acoustic Design Certificate must be prepared by a suitably qualified and experienced acoustic expert acceptable to Council.

**Advice Note:** The intent of this condition is to ensure final design and specifications of fixed plant is suitable designed, specified, located and operated to ensure noise emissions comply with the fixed plant operational noise limits.

## Supporting Background Information























### Construction Work: Drilling Rig Adjacent Scrap Terrace



### Construction Work: Drilling Rig North and Central (1-off)





