

BEFORE THE HEARINGS PANEL

TAUPŌ DISTRICT COUNCIL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Taupō Proposed District Plan Changes 38-43

**STATEMENT OF EVIDENCE OF DARRAN HUMPHESON ON BEHALF OF THE
NEW ZEALAND DEFENCE FORCE**

SUBMITTER OS9

9 August 2023

INTRODUCTION

- 1 My full name is Darran Humpheson. I am a Technical Director of Acoustics at Tonkin & Taylor Limited (**T+T**).
- 2 I hold a Bachelor of Science degree with Honours in Applied Physics and a Master of Science degree in Environmental Acoustics. I am a Member of the Acoustical Society of New Zealand and a Member of the United Kingdom's Institute of Acoustics. I am a New Zealand representative of the International Organisation for Standardisation (**ISO**) technical committee ISO/TC 43 SC1 "Noise".
- 3 I have been employed in acoustics since 1991 and have previously held positions as a consultant for international firms AECOM (Technical Director 2013-2019), Bureau Veritas (Technical Director 2012-2013), RPS Group plc (Technical Director 2002-2012) and as a UK Ministry of Defence scientist (Head of the Royal Air Force's Noise and Vibration Division 1991-2002).
- 4 Of relevance to this hearing, I have extensive experience providing acoustics services for military activities; specialising in aviation and weapon noise. I have previously provided expert opinion on behalf of NZDF regarding noise associated with Temporary Military Training Activities (**TMTA**) at eight district plan hearings.

CODE OF CONDUCT

- 5 I confirm that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 6 I have been engaged by NZDF to provide expert noise advice in relation to the Taupō District Council's (**Council**) proposed Plan Changes 38, 40, 42 and 43 being Strategic Directions, Taupō Town Centre, General Rural and Rural Lifestyle Environments and Taupō Industrial Environments of the District Plan with respect to TMTA.
- 7 NZDF has submitted on the proposed plan changes and relief is being sought to include TMTA noise provisions across each plan change and at a district wide level. This consistent approach is necessary as TMTA may be conducted across the entire Taupō District.
- 8 In this brief of evidence, I will:
 - (a) Provide an overview of TMTA and sources of TMTA noise.
 - (b) Discuss the relief sought by NZDF's submission relevant at a district wide level rather than within specific zones.
 - (c) Consider the evidence of Council's noise experts, Damien Ellerton and Jon Styles (respectively PC40 - Taupō Town Centre and PC42 - General Rural and Rural Lifestyle Environments).
 - (d) Include consideration of the Section 42A reports as they relate to NZDF's submission.
- 9 In preparing this evidence, I confirm that I am familiar with the nature and effects of TMTA.
- 10 I also confirm that I have read the following documents:
 - (a) NZDF's submissions and further submissions.
 - (b) The section 42A reports, principally for PC40 and PC42.
 - (c) The statements of evidence of Mr Ellerton and Mr Styles.

- 11 Where appropriate, my statement of evidence, references the corporate statement of evidence provided by Rebecca Davies of NZDF.

SUMMARY OF EVIDENCE

- 12 Temporary Military Training Activities may generate noise within the Taupō District. The type of noise will vary depending upon the training activities taking place. Typical noise sources include weapon firing, use of vehicles, fixed (stationary) plant such as generators and helicopter operations.
- 13 Not all TMTA include impulsive noise associated with weapon firing, grenades and “battle simulation” pyrotechnics. For much of the time, the noise associated with TMTA will be low level with occasional periods of higher levels of noise.
- 14 NZDF has developed bespoke noise standards that are routinely used in district plans to manage the noise effects of TMTA. While these standards were included in NZDF’s submissions for PC40 and PC42 (respectively Taupō Town Centre, and General Rural and Rural Lifestyle Environments), they apply district wide.
- 15 The respective s42A reports have rejected NZDF’s request to include TMTA noise standards within the plan changes. For the reasons I explain in my evidence, NZDF’s standard noise provisions are appropriate at a district wide level and apply across all areas, including the town centre and rural areas.

TEMPORARY MILITARY TRAINING ACTIVITIES

- 16 As covered in Ms Davies’ statement, section 5 of the Defence Act 1990 provides for the raising and maintenance of armed forces for various purposes, including for the defence of New Zealand, to protect the interests of New Zealand, to assist the civil power in times of emergency, and in the provision of any public service.
- 17 As Ms Davies explains, training is essential for the “maintenance” of armed forces and NZDF needs to undertake TMTA across the country in a wide variety of locations ranging from built-up urban areas to remote rural sites.

While weapons and use of explosives will more often be undertaken in rural zones with landowner permission, these activities may also be carried out in built-urban areas which may be zoned residential. The ability to undertake TMTA across all zones is important and Ms Davies in her Statement of Evidence provides further explanation as to why this is important.

- 18 TMTA by definition are temporary in nature and can vary in duration from a couple of hours or days to a few weeks depending upon the type and scale of the activity. NZDF's submission seeks to include specific noise control permitted activity standards for TMTA relating to weapons firing and/or the use of explosives; mobile noise sources; fixed (stationary) noise sources; and helicopter landing areas.
- 19 These training activities are essential in maintaining the capability of the armed forces so that NZDF is ready to respond to a wide range of national and international situations in diverse environments, including providing aid and assistance following emergencies such as earthquakes and major storm events. As Ms Davies explains, off-base TMTA are essential so that personnel are able to operate (including using equipment) in a variety of unfamiliar surroundings and to provide 'realism' to skills learnt on-base.
- 20 Ms Davies' evidence also provides detail on noise management to avoid unnecessary effects on nearby residences with advanced notice as part of the management process.

TMTA NOISE SOURCES

- 21 Not all TMTA include impulsive noise associated with weapon firing, grenades and "battle simulation" pyrotechnics. For much of the time, the noise associated with TMTA may be low level with occasional periods of higher levels of noise. Ms Davies provides examples of TMTA and many of these activities are also conducted by other service of civilian organisations such as the Police Force, Fire and Emergency NZ and search and rescue organisations.

- 22 The noise generated by TMTA may be categorised by the following:
- (a) Impulsive noise - live and blank firing and explosions;
 - (b) Mobile sources, such as vehicles and earth moving equipment;
 - (c) Fixed sources, such as power generators and water pumps; and
 - (d) Helicopter landings.
- 23 These four categories of noise may occur in isolation or in combination and each category of noise has its own characteristics in terms of noise level (magnitude), duration (transient or continuous) and frequency (low or high frequency/pitch). The character of each noise source means that different noise assessment methods are relevant when controlling and assessing noise effects.
- 24 The following sections consider the four noise categories and the relief sought by NZDF at a district wide level.

Weapons firing and/or the use of explosives

- 25 Live and blank firing activities as part of off-base TMTA are relatively infrequent and are recognised as being a unique source of noise, specific to certain forms of TMTA. Weapon firing and the detonation of explosives are typically performed within designated training areas; however, firing of blank ammunition on land controlled by a private or public owner does occur and will more commonly be from small arms (rifles).
- 26 Unlike other sources of impulsive noise which commonly occur in the district (bird scarers, alarms etc), the impulsive characteristics of weapon firing and/or use of explosives by NZDF warrants a different assessment approach compared to the average or maximum noise level assessment approach routinely applied in district plans.¹

¹ Average level being measured and assessed by the LEQ / LAeq noise metric. Maximum by the LMax / LAmx noise metric.

- 27 In comparison to general environmental noise sources, TMTA impulsive noise associated with the use of weapons and explosives has a much greater magnitude and strong low frequency component. It also has a very fast rise time and very short decay (very short duration), typically lasting less than 100 milliseconds.
- 28 TMTA may involve a variety of different weapon types ranging from hand held rifles to 40 mm grenades and 81 mm mortars.² The largest weapon type - L119 Light Gun (105 mm M1 Howitzer) – is not used for TMTA. The L119 Light Gun is only used on dedicated ranges. Therefore the 81 mm mortar will typically result in the highest sound level and to ensure a conservative approach this forms the basis for the NZDF's TMTA noise standards (noting that this weapon type is not commonly used for TMTA).

New Zealand Standards

- 29 New Zealand Standard NZS 6801:2008 'Acoustics – Measurement of environmental sound' is a mandatory noise standard of the National Planning Standards. NZS 6801:2008 requires that an impulse noise source (such as weapon firing and use of explosives) is measured using the peak level and either the C-weighting or the Z-weighting (L_{peak} / L_{pk}) is applied. C-weighting is more commonly used as it more accurately mimics the frequency response of the human ear to low frequency impulsive noise.
- 30 New Zealand Standard NZS 6802:2008 Acoustics – Environmental Noise is used as the starting platform for setting district plan environmental noise limits within New Zealand. However as set out in Clause 1.2 of that Standard and the National Planning Standards³, it is not designed to assess impulse type sounds such as gunfire and explosions.

Proposed NZDF noise limits

- 31 As I have explained above, it is not appropriate to measure and assess the noise generated by TMTA weapons firing and use of explosives using NZS

² <https://www.nzdf.mil.nz/nzdf/our-equipment/firepower/>

³ National Planning Standards. 15 Noise and Vibration Metrics Standard

6801:2008 and NZS 6802:2008. This is why NZDF has developed a standard approach to assessing and managing this type of noise and a standard set of noise rules which are commonly applied across the country as set out and explained below.

Notice is provided to the Council at least 5 working days prior to the commencement of the activity.

The activity complies with the following minimum separation distances to the notional boundary of any building housing a noise sensitive activity:

7:00am to 7:00pm : 500m

7:00pm to 7:00am : 1,250m

Where the minimum separation distances specified above are not met, then the activity shall comply with the following peak sound pressure level when measured at the notional boundary of any building housing a noise sensitive activity:

7:00am to 7:00pm : 95 dBC

7:00am to 7:00pm : 85 dBC

- 32 These peak sound levels approximate to 70-75 dB LAmax during the day time and 60-65 dB LAmax at night. At night an LAmax of around 65 dB⁴ is typically used in district plans to protect people sleeping indoors from individual events. This external level is 10 dB below the maximum noise level limit of PC42⁵ and 20 dB below the temporary activities limit within PC40⁶.
- 33 NZS 6803:1999 'Acoustics – Construction Noise' provides guidance on noise limits for impulsive noise and blasting activities. An absolute peak

⁴ As measured external to a building.

⁵ Table 4b.4.13 maximum noise limits.

⁶ Table 4g.2.2 maximum noise limits.

sound pressure level limit of 120 dBC is recommended in NZS 6803:1999.⁷ This standard is applied as a permitted activity standard in PC42.⁸

- 34 For the reasons I have explained, NZDF applies more rigorous levels of 95 and 85 dBC (compared to the permitted activity threshold of 120 dBC set out in NZS 6803:1999). Therefore NZDF's proposed night time noise standard of 85 dBC L_{peak} manages the effects of night time noise and potential effects on sleep quality and the 95 dBC L_{peak} manages the amenity effects of impulsive noise during the day.

Setback distances

- 35 NZDF proposes the use of setback distances of 500 m (7:00 am to 7:00 pm) and 1,250 m (7:00 pm to 7:00 am) to assist both in the planning of TMTA and for use within district plans. These setback distances were developed based on realistic TMTA noise levels.
- 36 **Figure 1** shows how TMTA noise levels reduce with distance. For typical TMTA weapon firing, the peak levels I have outlined above correspond to setback distances of 500 m and 1,250 m respectively for 81 mm mortars. This weapon type is the loudest piece of equipment and is rarely used for TMTA but has been included to represent a worst case.
- 37 The setback distances are based on conservative assumptions; positive downwind sound propagation conditions. In practice, the resulting sound levels will be lower than these due to more favourable propagation conditions and the effects of shielding from terrain and buildings. The setback distances therefore ensure the NZDF's peak noise limits will be met with a factor of safety built into them.

⁷ NZS 6803:1999 states at clause 8.1.4: "Noise from use of explosives is also a special case. The adoption of good blasting practices will reduce the inherent and associated impulsive noise and vibration. Practices should conform with the provisions of documents such as AS 2187:Part 2 [Explosives—Storage and use Part 2: Use of explosives 2006], provided that the airblast noise limit shall be a peak sound level of 120 dBC measured at a suitable location as specified in 6.1."

⁸ Rule 4b.2.10 and 4b.4.14

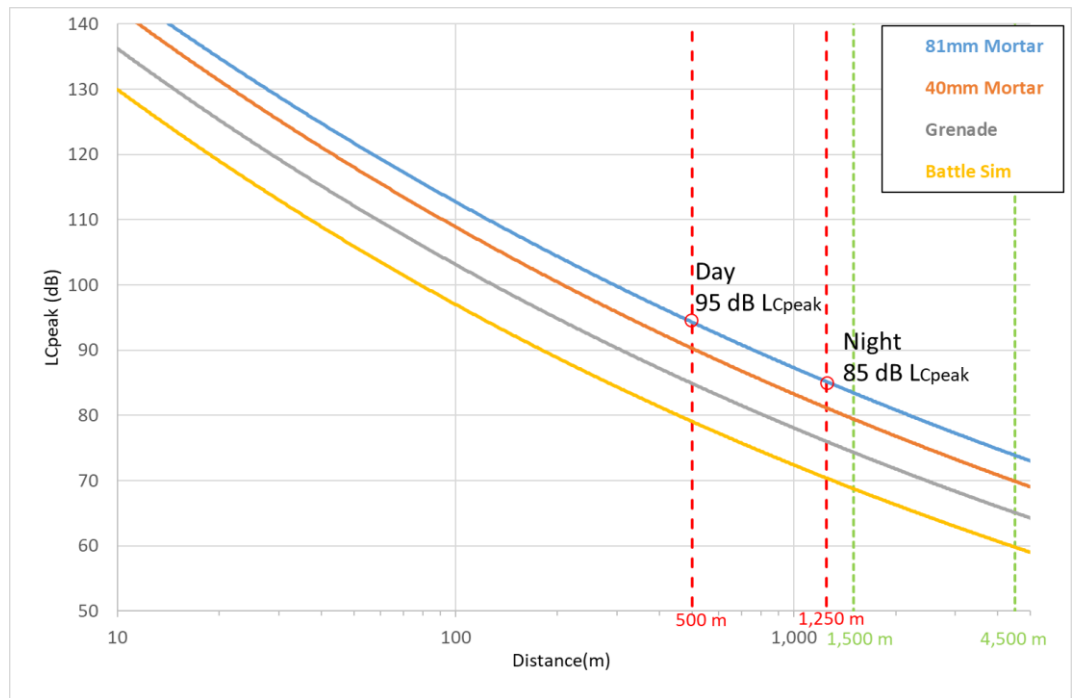


Figure 1 TMTA weapon noise against distance from activity

- 38 Historically a setback of 4,500 m was used to manage the noise effects of the L119 Light Gun (105 mm M1 Howitzer) and this distance was referenced in the PC42 s42A report of Mr Bonis, when he compared the setbacks sought by NZDF against those of the Christchurch District Plan. As I explained, this weapon platform is not used for TMTA, and therefore a setback of 4,500 m is not appropriate. I have annotated these distances in Figure 1 (green lines) for comparative purposes only.
- 39 NZDF's submission included peak sound levels and setback distances to manage the effects of weapon noise. This two tier approach is appropriate, especially as the setback distance has merit because it allows NZDF personnel with no acoustics knowledge to plan where firing may occur without adversely affecting residential amenity. It also provides certainty to councils as the distance at which an activity occurs can be measured without the need to undertake compliance noise monitoring. A further advantage to the setbacks is that weather conditions do not need to meet the prescribed standards for undertaking noise measurements. Ms Davies provides more details on the advantages of this approach in her Statement of Evidence.

Mobile noise sources

- 40 TMTA mobile sources can include moving vehicles, earthmoving equipment and personnel which are typically intermittent and infrequent. They will typically be present during daytime hours only and have similar noise and operating characteristics to vehicles and plant (earthmoving equipment) used on construction sites (as assessed using NZS 6803:1999).
- 41 NZDF's submission was to adopt the noise limits of the construction noise standard to reflect the temporary nature of the activity and their noise characteristics. The National Planning Standards⁹ state that rules in a plan must be made in accordance with the relevant New Zealand Standards. As TMTA mobile sources are not construction, they fall outside the scope of NZS 6803:1999. Therefore a table of noise limits to reflect mobile noise sources is being sought by NZDF, to reflect the duration of TMTA, i.e. up to 31 days duration. I have included this table at Attachment 1 (Table 1).

Fixed noise sources

- 42 A fixed source could be a generator or water pump which has a fixed (stationary) location. These types of sources, which may run continuously during the TMTA, are more easily controlled through careful selection and siting of the equipment on site, and through noise control methods such as screening. The noise limits proposed by NZDF using NZS 6802:2008 for fixed sources relies on well-established standards that are appropriate for these types of sources. NZDF's submission included the following table of noise limits.

Table 1 : TMTA fixed noise sources

Time period (Monday to Sunday)	L_{Aeq} (15 min)	L_{AFmax}
7 am to 7 pm	55 dB	n.a.
7 pm to 10 pm	50 dB	
10 pm to 7 am the next day	45 dB	75 dB

Note: Measured at the notional boundary of any building housing a noise sensitive activity

⁹ National Planning Standards 2019 clause 15.

TMTA helicopters

- 43 Within New Zealand, helicopter noise is assessed using NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas. The foreword of the Standard notes that NZS 6807:1994 includes methods for measurement and assessment of noise from proposed and existing helicopter landing areas as well as recommendations for appropriate land use planning measures. The scope of the Standard is intended to apply to helicopter landing areas used for ten or more flights in any month or where flight movements are likely to result in a maximum sound level (L_{max}) exceeding 70 dBA at night or 90 dBA during day-time in any residential zone or within the notional boundary of any rural dwelling.
- 44 From discussions with NZDF, I understand that TMTA only very occasionally involve the use of helicopters and temporary landing areas may be required on private and public land (with land owner permissions). Whilst these areas are not permanent sites, the number of flights that may be generated can be very low, e.g. a single landing and take-off. In other situations, such as Exercise Southern Katipo, there can be multiple movements during the day and at night.
- 45 District plans do not control noise from overflying aircraft when aircraft are not in the vicinity of a landing area. In these situations, Section 56 of the Civil Aviation Act 2023 can be used by the Civil Aviation Authority (CAA) to control noise from overflying aircraft. Councils do however have the power as consent authorities to control the movement of aircraft by managing the effects of aircraft noise in the vicinity of landing areas. For temporary landing areas (fewer than ten flights in any month) specific controls are not required as the effects are considered acceptable.

COUNCIL'S RECOMMENDATION

- 46 Mr Bonis in his PC40 s42A report considers the relief sought by NZDF. Mr Bonis recognises from discussions with NZDF that a nationally consistent suite of noise provisions is sought. He, however, considers that the full nature of the relief requested is inappropriate for the Taupō Town Centre,

as more benign TMTA within the town centre would already be enabled by the Plan.

- 47 Whilst I agree with Mr Bonis, NZDF's preference is to apply a consistent approach across the entire country, including the whole of the Taupō District (including the town centre). By applying TMTA district wide, the less benign elements of TMTA may not comply with the permitted activity standards. For example, weapon firing and use of explosives would not meet the setback distance requirements within the town centre but could potentially meet the noise limits (for example if activities occur indoors).
- 48 Mr Sharman in Appendix 1 to his PC42 s42A report considers the relief sought by NZDF for TMTA should be addressed at a later date at a district wide manner as part of the transition to the national planning standards. I understand that NZDF supports this approach but in the absence of a confirmed timeframe, wishes to see provision for TMTA in the Taupō Town Centre and General Rural and Rural Lifestyle Environments in the interim.

CONCLUSION

- 49 Temporary military training activities are essential and in many respects are identical to training activities carried out by other emergency services and commercial organisations. NZDF is seeking to apply a standard set of rules to TMTA noise that can be consistently used in district plans throughout the country.
- 50 I have prepared, as an attachment to my evidence, revised noise standards and as I have noted in my evidence, I consider that the relief sought by NZDF will result in acceptable noise effects that appropriately protect amenity values across the whole of the Taupō District.

Dated: 9 Aug 2023

Darran Humpheson

ATTACHEMENT 1

NOISE STANDARDS FOR TEMPORARY MILITARY TRAINING ACTIVITIES

Temporary Military Training Activities are permitted activities provided they comply with the following noise standards:

WEAPONS FIRING AND/OR THE USE OF EXPLOSIVES

- a Notice is provided to the Council at least 5 working days prior to the commencement of the activity.
- b The activity complies with the following minimum separation distances to the notional boundary of any building housing a noise sensitive activity:
7.00 am to 7.00 pm: 500 m

7.00 pm to 7.00 am: 1,250 m
- c Where the minimum separation distances specified above cannot be met, then the activity shall comply with the following peak sound pressure level when measured at the notional boundary of any building that contains a noise sensitive activity:
7.00 am to 7.00 pm: 95 dBC

7.00 pm to 7.00 am: 85 dBC

TEMPORARY MILITARY TRAINING ACTIVITIES INVOLVING MOBILE NOISE SOURCES

The noise generated by mobile TMTA activities must not exceed the levels in Table 1 when measured at 1 m from the façade of any occupied building that contains a noise sensitive activity.

Table 1 Mobile noise limits for activities sensitive to noise

Time of week	Time period	L _{Aeq} (15 min)	L _{Amax}
Weekdays	6:30 am – 7:30 am	55	75
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	65	80
	8:00 pm – 6:30 am	45	75
Saturdays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75
Sundays and public holidays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	55	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75

No adjustments shall be made for duration.

Noise levels shall be measured in accordance with NZS 6801:2008.

This rule applies to use of temporary mobile TMTA activities such as personnel carriers, light and heavy vehicles, self-propelled equipment and construction plant.

FIXED (STATIONARY) NOISE SOURCES

Shall comply with the noise limits set out in the table below when measured at the notional boundary of any building housing a noise sensitive activity*.

Time period (Monday to Sunday)	L_{Aeq(15 min)}	L_{AFmax}
7 am to 7 pm	55 dB	n.a.
7 pm to 10 pm	50 dB	
10 pm to 7 am the next day	45 dB	75 dB

Note: Fixed (stationary) noise sources (other than firing of weapons and explosives) include power generation, heating, ventilation or air conditioning systems, or water or wastewater pumping/treatment systems.

HELICOPTER LANDING AREAS

Shall comply with NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas.

* Noise levels shall be measured in accordance with NZS 6801:2008 Acoustics – Measurement of Sound.