

**BEFORE THE HEARINGS PANEL
WAIMAKARIRI DISTRICT COUNCIL**

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Waimakariri Proposed District Plan: Hearing Stream
Five (General District Wide Matters - NOISE)

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

SUBMITTER 166

7 Aug 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 seven 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 Proposed Waimakariri District Plan (**Proposed Plan**) with respect to TMTA.
- 7 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 to Hearing Stream 5, which relates to the noise chapter (**NOISE**) of the Proposed Plan.
 - (c) Discuss the evidence of Waimakariri District Council's (**Council**) noise expert, Stuart Camp.
 - (d) Address Jessica Manhire's Section 42A Report – Noise Chapter as it relates to NZDF's submission.
- 8 In preparing this evidence, I confirm that I am familiar with the nature and effects of TMTA.
- 9 I also confirm that I have read the following documents:
- (a) NZDF's submission and further submission relevant to Hearing Stream 5.
 - (b) The section 42A report prepared by Ms Manhire.
 - (c) The statement of evidence of Mr Camp.
- 10 Where appropriate, my statement of evidence, references the statement of evidence provided by Rebecca Davies of NZDF.

SUMMARY OF EVIDENCE

- 11 Temporary Military Training Activities may generate noise within the 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.

- 12 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.
- 13 NZDF has developed bespoke noise standards that are routinely used in district plans to manage the noise effects of TMTA. These standards were included in NZDF’s submission. Council’s noise expert, Mr Camp, disagrees with NZDF’s requirement to have TMTA specific noise standards and this is supported in the s42A report.
- 14 Mr Camp disagrees with NZDF’s two-tier approach, to managing the effects of weapon firing, i.e. where the minimum separation distances specified cannot be met, the activity must comply with the peak sound pressure levels. Mr Camp’s opinion is that NZDF’s daytime separation distance of 500 m would result in significant adverse effects¹ but does not elaborate on why this is and what he considers these effects to be.
- 15 I have fundamental concerns with NOISE-R2 as notified. The separation distances of 1,500 m during the day and 4,500 m at night for weapon firing and use of explosive are unreasonable and there is no evidential basis for their inclusion. The use of maximum noise limits contradicts guidance contained in two New Zealand Standards and the National Planning Standards for impulsive noise events. Regardless, the maximum levels of 65 dB during the day and 50 dB at night significantly penalise TMTA when compared to maximum noise limits across all development zones. Finally, the recommendation that TMTA should comply with the limits of NOISE-R19 fails to recognise the temporary nature and character of TMTA, especially for vehicles.²

¹ Mr Camp’s evidence paragraph 21

² e.g. personnel carriers, light and heavy trucks and construction plant.

- 16 NOISE-R4 provides for an unlimited number of helicopter movements if take-off and landings take place more than 450 m from residential properties, plus movement number restrictions within 450 m. I agree that the notified rule is appropriate for TMTA helicopter operations, subject to the inclusion of a cross-reference to NZS 6807:1994 for the management of helicopter noise (noise abatement procedures).

TEMPORARY MILITARY TRAINING ACTIVITIES

- 17 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.
- 18 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.
- 19 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.
- 20 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.

- 21 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

- 22 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.

- 23 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.

- 24 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.

- 25 The following sections consider the four noise categories and the relief sought by NZDF in the Proposed Plan.

Weapons firing and/or the use of explosives

- 26 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 such as West Melton Rifle Range; 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).
- 27 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.³
- 28 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.
- 29 TMTA may involve a variety of different weapon types ranging from hand held rifles to 40 mm grenades and 81 mm mortars.⁴ 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).

³ Average level being measured and assessed by the LEQ / LAeq noise metric. Maximum by the LMax / LMax noise metric.

⁴ <https://www.nzdf.mil.nz/nzdf/our-equipment/firepower/>

New Zealand Standards

- 30 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.
- 31 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 Standards⁵, it is not designed to assess impulse type sounds such as gunfire and explosions.

Proposed NZDF noise limits

- 32 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 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 activity⁶.

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

⁵ National Planning Standards. 15 Noise and Vibration Metrics Standard

⁶ Mr Camp's evidence paragraph 20 states 5 working days is likely to be challenging for Council to effectively respond and/or control with such a small timeframe.

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

- 33 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 dB⁷ is typically used in district plans to protect people sleeping indoors from individual events. This external level is consistent with rural zones of the notified version of the Proposed Plan (Table Noise-2).⁸ I will provide further details when I address the evidence of Mr Camp.
- 34 NZS 6803:1999 'Acoustics – Construction Noise' provides guidance on noise limits for impulsive noise and blasting activities. An absolute peak sound pressure level limit of 120 dBC is recommended in NZS 6803:1999.⁹ This standard is applied as a permitted activity standard in the Proposed Plan (NOISE-R3).¹⁰
- 35 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 Lpeak manages the effects of night time noise and potential effects on sleep quality and the 95 dBC Lpeak manages the amenity effects of impulsive noise during the day.

⁷ As measured external to a building.

⁸ Table Noise-2 Noise Limits.

⁹ 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."

¹⁰ The Proposed Plan does not have any noise standards for blasting (quarrying activities). Fulton Hogan did seek relief for quarrying blasting but Council rejected their submission in section 3.3 of the s42A report on noise.

Setback distances

- 36 NZDF proposes the use of setback distances of 500 m (7:00 am to 7:00pm) 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.
- 37 **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.
- 38 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.

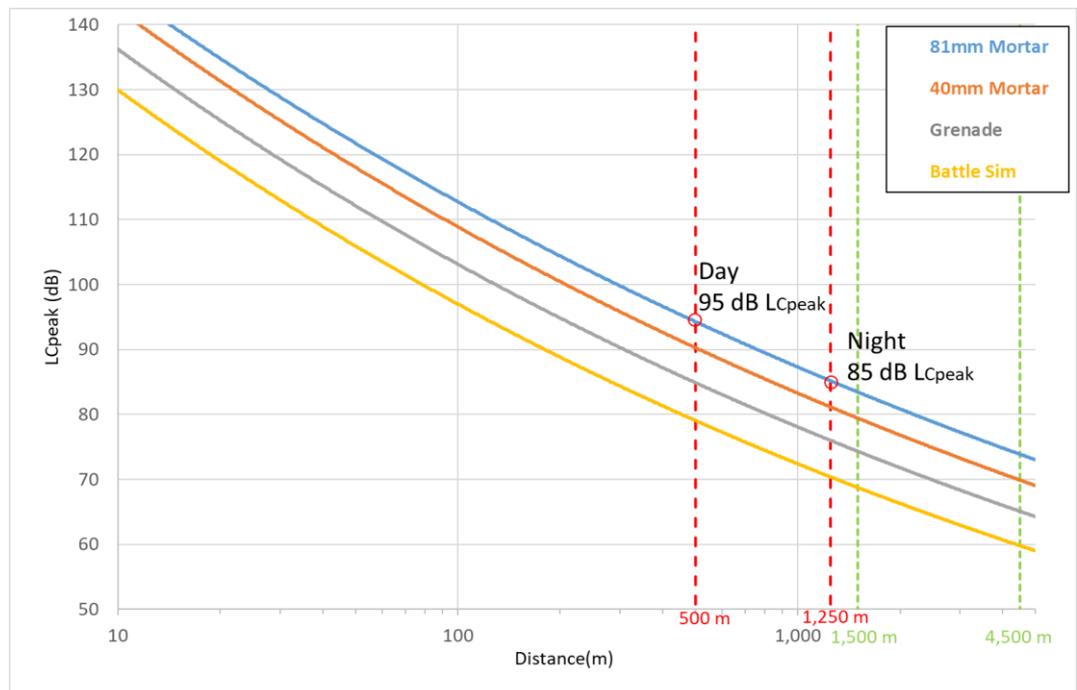


Figure 1 TMTA weapon noise against distance from activity

- 39 The setback distances that were included in NOISE-R2 were 1,500 m (7:00 am-7:00 pm) and 4,500 m (7:00 pm-7:00 am). Historically a setback of 4,500 m was used to manage the noise effects of the L119 Light Gun (105 mm M1 Howitzer). However as I explained, this weapon platform is not used for TMTA. I have annotated these distances in Figure 1 (green lines) and they approximate to 60-65 dB LAmax in the day (~85 dBC Lpeak) and 50-55 dB LAmax at night (~75 dBC Lpeak). I consider the corresponding noise levels to be unnecessarily restrictive as I will demonstrate when I address Mr Camp's evidence.
- 40 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

- 41 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). I would also consider the character of TMTA vehicle noise to be similar to farming vehicles (tractors, harvesters, balers, etc).
- 42 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 Standards¹¹ state that rules in a plan

¹¹ National Planning Standards 2019 clause 15.

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 incorporated within NOISE-R2 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 2 (Table 1).

Fixed noise sources

- 43 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.
- 44 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

TMTA helicopters

- 45 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.

- 46 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.
- 47 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.
- 48 In the notified version of the Proposed Plan, NOISE-R4 provides set back distances/time of day restrictions to manage helicopter noise. There are no noise limits. If movements occur between 8:00 am and 6:00 pm and further than 450 m from a residential building then there are no limits on the number of helicopter movements.¹² Within 25 m of a residential building the helicopter movements must be on the same site as the building. Between 25 m and 450 m there are movement limits:
- (a) Maximum of 24 in a 12 month period
 - (b) Maximum of 10 in any month; and
 - (c) Maximum of 6 in any week.

¹² A movement is either a take-off or landing.

- 49 It is not clear whether NOISE-R4 limits all helicopter operations to 8:00 am to 6:00 pm regardless of sub-clauses 2 and 3 of this rule.
- 50 NOISE-R4 does not reference NZS 6807:1994, which I consider to be an omission as the Standard does include guidance on the management of helicopter noise, in particular the adoption of Appendix A which introduces management considerations.¹³ I consider the reasonableness of NOISE-R4 when I discuss Mr Camp's evidence.

COUNCIL'S RECOMMENDATION

- 51 Mr Camp does not support NZDF's submission points for bespoke noise standard and does not consider that NZDF's requested relief would achieve a better outcome than the notified rule.¹⁴ He considers them to be overly complex.
- 52 The approach being adopted by Mr Camp and Council is very similar to the TMTA noise standards contained within the Christchurch District Plan. For the reasons I explain below, I do not agree with the approach being promoted in the notified version of the Proposed Plan or by Mr Camp in his evidence and Ms Manhire in her s42A report. I do note that in the Operative Plan, TMTA is exempt from the complying with relevant noise rules.¹⁵

Prior notice to Council

- 53 Mr Camp states the request for 5 days notification is insufficient for Council to respond and/or have effective control. A 10 day notification requirement is preferred. As Ms Davies' notes, there is no particular expectation that Council needs to respond to the notice or control a TMTA, rather controls are inherent in NZDF's proposed approach. I understand that 10 days is acceptable to NZDF for TMTA involving the use of weapons or explosives.

Weapon firing and use of explosives

¹³ In particular reference to the Fly Neighbourly guide for noise abatement procedures.

¹⁴ Mr Camp's evidence Paragraph 19

¹⁵ Operative Plan – Rule 31.12.2.2 exemptions

- 54 Mr Camp's evidence¹⁶ states a daytime separation of 500 m would result in significant adverse effects but does not explain what type of effects he is referring to. Adverse effects relating to health/wellbeing and community annoyance are measured and assessed differently.¹⁷
- 55 He considers that 1,500 m (7:00 am - 7:00 pm) and 4,500 m (7:00 pm – 7:00 am) setback distance proposed for NOISE-R2 are appropriate. I have already explained the historical basis of the 1,500 m and 4,500 m setbacks, which are no longer relevant for TMTA. I have already provided justification as to why NZDF's 500 m and 1,250 m setbacks are necessary and appropriately protect amenity values.
- 56 To demonstrate the restrictive nature of the setbacks favoured by Mr Camp, I have undertaken a spatial analysis using readily available data from LINZ for the whole of the Waimakariri District. I have created buffers around buildings greater than 100 square metres (to remove small outbuildings and garages) and plotted these in Attachment 1 to my evidence. I should emphasise that this spatial analysis is purely illustrational and some of the buildings identified may not be residential. However it illustrates an issue by adopting setbacks without an evidential basis. It is very obvious from the analysis that there are few areas left in the district which can accommodate TMTA involving weapon firing and use of explosives if these setback distances are implemented; thus nullifying this type of training.
- 57 Mr Camp sees no benefit to include noise limits as part of the permitted activity rule¹⁸, however NOISE-R2, as notified, includes noise limits of 65 dB LAF(max) during the day and 50 dB LAF(max) at night for firing of weapons and explosive events. I do not see any justification to adopt these limits, as I consider them to be unnecessarily restrictive and they are at odds with other permitted activity standards for general noise in the district. For

¹⁶ Mr Camp's evidence Paragraph 21

¹⁷ World Health Organisation, Environmental noise guidelines for the European region, 2018.

¹⁸ Mr Camp's evidence Paragraph 22

example in the rural zone, the night time limit is 65 dB LAF(max). TMTA is effectively being penalised by 15 dB without any evidential basis.

- 58 More importantly, use of LAmax to measure and limit impulsive noise is inappropriate and contrary to the guidance of both NZS 6801:2008 and NZS 6802:2008, and not in line with the mandatory directions of the National Planning Standards – Part 15, Clause 2, which I reproduce below:

‘2. Any plan rule to manage noise emissions must be consistent with the mandatory assessment methods in section 6 Rating Level and section 7 LMAX of New Zealand Standard 6802:2008 Acoustics – Environmental Noise (incorporated by reference into the planning standards), provided the type of noise emitted is within the scope of New Zealand Standard 6802:2008.’

- 59 I therefore do not agree with Mr Camp and the findings of the s42A report.
- 60 NZDF’s peak noise limits are much lower than guidance for comparable noise events such as quarry blasting and blasting associated with construction activities (120 dBC Lpeak. Therefore NZDFs noise standards ensure an appropriate level of noise at residential dwellings and other buildings used for noise sensitive activities.
- 61 For the reason Ms Davies and I have stated, there is a technical basis for the adoption of the NZDF’s two tier approach; setback distances in the first instance and then noise limits if the minimum setbacks cannot be achieved.

Mobile and stationary sources

- 62 With respect to other source of TMTA noise, Mr Camp states that there is no need to provide exemptions from general noise rules (Table NOISE-2) for mobile and stationary noise sources.¹⁹

¹⁹ Mr Camp’s evidence Paragraph 23

- 63 He considers that the setback distances to accommodate shooting will generally be more than adequate to ensure that mobile and stationary noise sources will comply with the general noise rules. I am unsure why Mr Camp makes this statement as these sources should not be 'bundled' with the setback approach used for weapon firing and use of explosives. The characteristics of each noise source differs as does their frequency of occurrence. As I have stated weapon firing and use of explosives is an infrequent activity compared to general TMTA that involves mobile and stationary noise sources. Ms Davies has provided examples of TMTA which do not involve weapon firing and I therefore do not agree with Mr Camp's statement in his paragraph 23. There should be TMTA specific noise provisions to address these sources of noise to reflect the temporary nature of the activities and not the use of setbacks as implied by Mr Camp.
- 64 I have explained why limits based on NZS 6803:1999 should be applied to mobile sources. Applying the noise limits of Table NOISE-2 in my view is overly restrictive. Mobile sources can include personnel carriers, light and heavy vehicles, self-propelled equipment and construction plant. The noise from these sources will be intermittent and will come and go as the vehicle moves. The limits of NZS 6803:1999 recognise these characteristics and the temporary nature of the activity and I consider the limits I have proposed at Attachment 2 are more relevant and appropriate
- 65 Table NOISE-2 specifies the LAeq over a daytime period of 15 hours and a night time period of 9 hours. NZDF's proposed limits specify the LAeq over a 15 minute period. NZS 6802:2008 allows noise to be averaged during the day if it does not occur for the whole of the prescribed time frame. A maximum adjustment of 5 dB is allowed if the noise source only operates for less than 30% of the time. No adjustment is allowed for noise at night. So for example, 55 dB LAeq over 15min period during the day is equivalent to 50 dB LAeq(15h) if the noise is only present for less than for 30% of the time.
- 66 I consider that NZDF's approach of using a 15 minute assessment period is more appropriate than determining noise over longer periods for the purposes of demonstrating compliance. A 15 minute measurement is

simpler than having to determine how long the noise source operates for or having to measure noise over the entire daytime period. From my experience, it is typical for there to be a 5 dB difference between noise limits which use 15 minutes compared to limits average over the entire period. I therefore recommend that NZDF's limits as attached to my evidence are used rather than the limits of Table NOISE-2.

Helicopters

- 67 NZDF seeks to apply NZS 6807:1994 for the management and control of helicopter noise. NOISE-R4 provides an alternative approach by adopting setback and movement limits. I consider that this approach is reasonable but may not account for the full range of helicopter noise that could occur in the district. For example, a single engine R22 compared to NZDF's twin-engine NH-90.
- 68 However, I agree with Mr Camp that NOISE-R4 provides a mechanism for checking compliance in a similar manner to the weapon firing setbacks, rather than having to rely on noise measurements or calculations. Given the small number of helicopter movements that may be generated by TMTA, I support NOISE-R4. However, NOISE-R4 should include reference to NZS 6807:1994 for the management of helicopter noise and clarification sought whether clauses 2 and 3 are time of day constrained (8:00 am to 6:00 pm).

CONCLUSION

- 69 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. These controls are proposed for the Proposed Waimakariri District Plan.
- 70 I do not agree with the proposed controls for weapon firing and use of explosives, mobile sources and stationary sources. I do however agree with

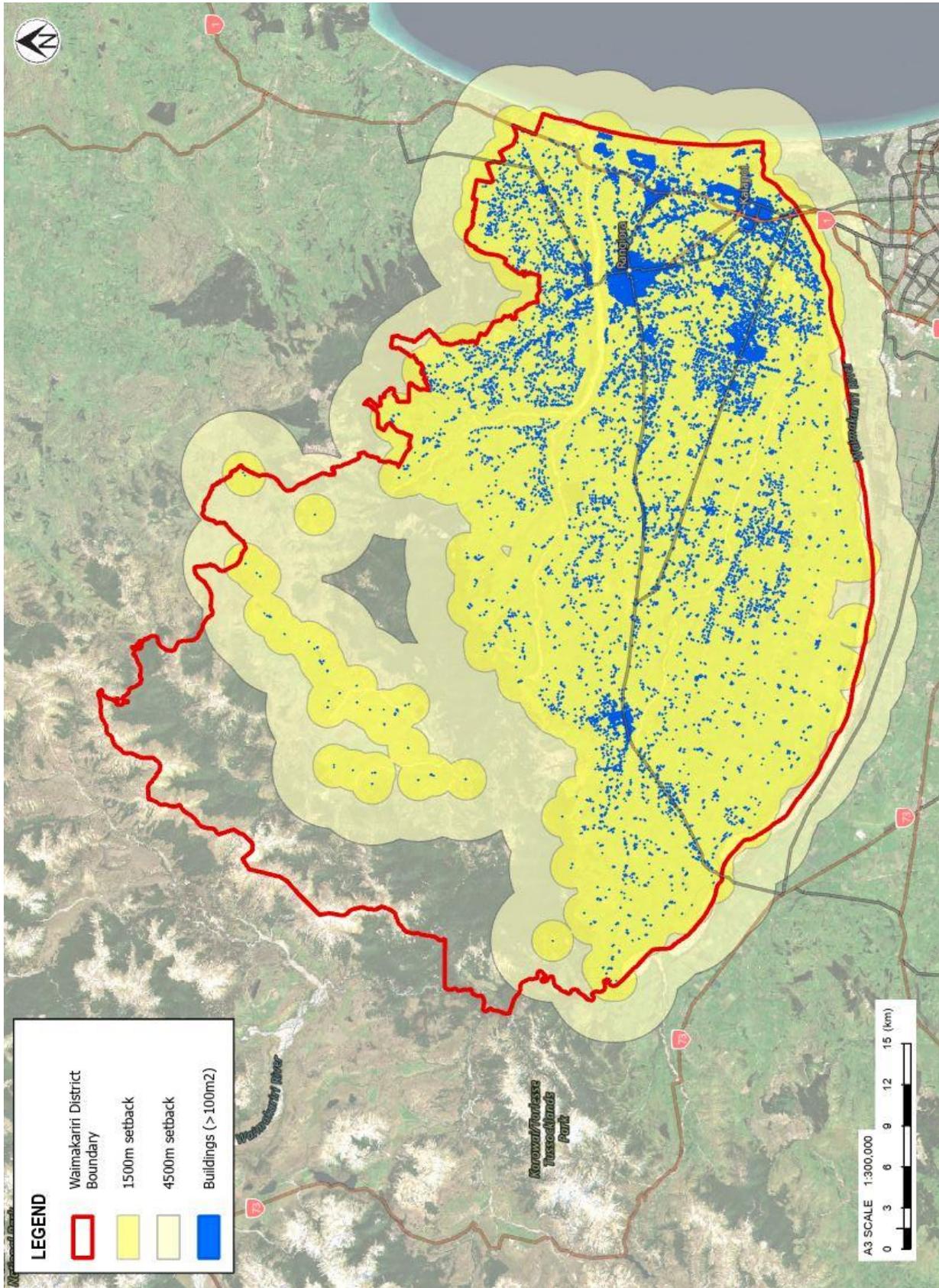
the helicopter noise rule with one minor amendment and one clarification needed.

- 71 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.

Dated: 7 Aug 2023

Darran Humpheson

ATTACHEMENT 1 – NOTIFIED PLAN BUFFER DISTANCES



ATTACHEMENT 2-

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 10 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

As NOISE-R4 with the inclusion of:

‘Helicopter noise will be managed in accordance with Appendix A of NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas. ‘

* Noise levels shall be measured in accordance with NZS6801:2008 Acoustics – Measurement of Sound.