

# Proposed Horowhenua District Plan

## Temporary Military Training Activities/New Zealand Defence Force (NZDF)

### Officer Right of Reply and Response to Commissioners Questions

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#### Temporary Military Training Activities/New Zealand Defence Force (NZDF)

NZDF submitted on the temporary military training activity rules across all Zones in the Proposed Plan. The submission sought consistent changes to these rules across all Zones (consistent provisions applied across all Zones in the Proposed Plan as notified). As this submission applies to all Zones, it has been evaluated in each Section 42A Report, and heard at each hearing. This right of reply applies to all Zones and considers all of the evidence presented which is briefly summarised below.

NZDF submitted pre-circulated expert planning and acoustic evidence for the Open Space Zone Hearing on the 10<sup>th</sup> April 2013. This pre-circulated evidence was responded to in a Supplementary Section 42A Report which was presented at the Open Space Zone hearing. A second set of planning evidence was presented by the NZDF at the Urban Environment Hearing on 22<sup>nd</sup> April which effectively superseded the planning evidence presented to the Open Space Zone Hearing, but not the acoustic evidence. Council officers/advisors and NZDF's experts generally agree on the provisions for temporary military training activities, apart from those relating to noise. These agreed provisions are summarised below, with reasons for these agreed provisions outlined in the respective Section 42A Reports and planning evidence.

In relation to the area of disagreement on the noise issue, it is noted this only relates to noise from weapons firing and explosives. Council officers/advisors and NZDF's experts agree on the provisions for noise from all other sources (i.e. mobile sources, fixed sources and helicopters) (refer Appendix 1). These agreed noise provisions are summarised below, with reasons for these agreed provisions outlined in the respective Section 42A Reports and planning evidence.

In terms of noise from weapons firing and explosives, the Proposed Plan manages noise from weapons firing and explosives through the application of the construction noise standard and restricting these types of training activities during the night time period of 8.00pm – 7.00am. Any proposal that did not comply with this standard would require resource consent as a Controlled Activity.

In their original submission (see summary table below), NZDF conditionally supported the Proposed Plan noise standards for temporary military training activities (95.25) and also sought (95.35) night time noise be permitted through adding a new standard which stated "impulse noise resulting from the use of explosives and small arms is not to exceed 122 dBC", but noting a technical noise review was still to be completed. Following completion of the technical noise review, NZDF sought alternative provisions (superseded original submission) which were based on separation distances between the temporary military training activity and any dwelling or sensitive activity (residential, education or healthcare activity) for day time and night time. If an activity could not comply with the separation distances, then another set of conditions would apply which set maximum daytime and night-time sound levels (peak sound pressure levels) for the use of explosives and weapons firing, being 120 dBC (daytime) and 90 dBC (night-time). In conjunction with the peak sound

pressure levels, NZDF offered the requirement to prepare a noise management plan as a condition of a permitted activity rule.

Sub No.	Submitter Name	Support/ In-Part/ Oppose	Summary of Submission	Decision Requested	Further Submission
95.25	New Zealand Defence Force (NZDF)	In-Part	Conditionally supports the introduction of these new noise standards, but has commissioned a technical review to investigate the matter in more detail. At the time of this submission this review has not yet been completed; as soon as the results of the review are available, NZDF will come back to the Council to confirm its support (or otherwise) for the change and to discuss any specific recommendations or request that may arise from the review.	Retain Rule 20.6.22 (a) (iv) (v) as notified (conditionally)	
95.35	New Zealand Defence Force (NZDF)	Oppose	<p>The existing requirements for all zones (except Residential 1) is that: "Impulse Noise Resulting from the use of explosives and small arms is not to exceed 122 dBC"</p> <p>The Section 32 reports supporting the Proposed Plan states that "it is considered efficient and effective to provide for permitted noise levels that are in character with the zone" but do not give any specific reasons why the change from the status quo is necessary. NZDF submits that the status quo has been working satisfactorily to date and there appear to be no valid reasons given for introducing a blanket restriction on night-time use of explosives and small arms.</p> <p>For these reasons NZDF opposes this proposed Permitted Activity condition, and request that the current provisions for the District Plan in respect of night-time noise be retained, with the proviso that NZDF would wish to discuss this matter further with Council once a more detailed technical review has been completed.</p>	<p>Retain current provisions in the District Plan in regards to night time noise, which state;</p> <p><u>Impulse Noise Resulting from the use of explosives and small arms is not to exceed 122 dBC.</u></p>	

As reported in the Urban and Rural Environment Section 42A Reports, the separation distance proposed by NZDF are considered largely ineffective and inefficient in the Horowhenua context. This evaluation is based on the scale of the separation distances (e.g. 750m up to 4.5km) are such that there are few areas in the district where compliance could be achieved. This point is acknowledged by the NZDF<sup>1</sup>. However, NZDF still seeks the use of separation distances in the Proposed Plan as it provides efficiencies for them in planning training exercises and suitable/unsuitable locations if firing of weapons or explosives are to be used. These efficiencies would particularly be gained if these standards applied across District Plans nationally, and it is understood the Proposed Horowhenua District Plan is the first District Plan the NZDF is seeking this consistent approach for. Given this, while these separation distances are considered largely ineffective and inefficient in the Horowhenua context, from a national consistency perspective, they are supported.

If the separation distances cannot be complied with, the NZDF proposes maximum daytime and night-time sound levels. In relation to the daytime noise limit of 120 dBC, as noted in the Section 42A Reports, this noise limit is the same limit that applies in the NZ Construction Noise Standard adopted in the Proposed Plan as notified. Therefore, this limit is considered appropriate.

In relation to the night-time maximum noise limit of 90 dBC, NZDF contends that this noise limit is less than the level considered appropriate for fixed and mobile sources at night-time. Additional comment was sought from Council's acoustic advisor, who noted a discrepancy between information contained in Mr Hunt's evidence and report. Mr Hunt has clarified and corrected this discrepancy through an amended Table 1 to his report (refer correspondence in Appendix 2). Based on further advice from Council's acoustic advisor, this comparison is not considered appropriate or relevant as it is comparing two different types of noises with different characteristics. Noise from fixed and mobile sources is likely to be relatively constant or slightly variable noise at a moderate level, while weapons firing and use of explosives is sudden and impulsive noise at a very high level. Given these different characteristics, this comparison in justifying the 90 dBC peak sound level is not considered appropriate.

Notwithstanding this, we have considered whether the 90 dBC is an appropriate noise limit. In our view, the 90 dBC noise limit is not appropriate at night as noise levels during the night are generally low in all zones in the district (urban, open space and rural areas). Sudden noise from weapons firing or use of explosives during night is not considered to maintain or enhance the character and amenity values of these different environments, including protecting residential amenity such as sleep. It is noted loud noises are not permitted at night for all activities in all zones. For example, the Construction Noise Standard restricts loud noises during night time (i.e. no night-time peak sound limit) and hours of operation are restricted for noisier activities (e.g. bird-scaring devices in the Rural Zone and temporary events in all zones). Therefore, it is not considered appropriate to add a permitted activity standard for night-time use of explosives and weapons firing.

Therefore, it is recommended various submission points made by NZDF are accepted (in full), accepted in part or rejected as detailed in the Section 42A Reports, except as amended below. Furthermore, the rules and conditions for temporary military training activities in all Zones be amended as detailed below.

It is noted the NZDF does not support this recommendation and conclusion. The response received the NZDF on the 'draft' right of reply is attached in Appendix 1.

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<sup>1</sup> Paragraph 2.6 of Statement of Evidence, Mr Rob Owen dated 22 April 2013 to Urban Environment Hearing

## Reporting Officer's Recommendation

### Open Space Zone Section 42A Report– Section 4.9 Permitted Activity Conditions

Sub. No	Further Sub. No.	Submitter Name	Further Submitter Position	Officer's Recommendation
95.35		New Zealand Defence Force (NZDF)		Reject

### Urban Environment Section 42A Report Zone – Section 4.18 Permitted Activity Condition (15.6.31) - Temporary Military Training Activities (Residential Zone)

Sub. No	Further Sub. No.	Submitter Name	Further Submitter Position	Officer's Recommendation
95.31		New Zealand Defence Force (NZDF)		Reject

### Urban Environment Section 42A Report Zone – Section 4.38 Permitted Activity Condition (16.6.23) - Temporary Military Training Activities (Industrial Zone)

Sub. No	Further Sub. No.	Submitter Name	Further Submitter Position	Officer's Recommendation
95.32		New Zealand Defence Force (NZDF)		Reject

### Urban Environment Section 42A Report Zone – Section 4.61 Permitted Activity Condition (17.6.25) - Temporary Military Training Activities (Commercial Zone)

Sub. No	Further Sub. No.	Submitter Name	Further Submitter Position	Officer's Recommendation
95.33		New Zealand Defence Force (NZDF)		Reject

### Rural Environment Section 42A Report Zone – Section 4.65 Permitted Activity Condition (19.6.30) - Temporary Military Training Activities (Rural Zone)

Sub. No	Further Sub. No.	Submitter Name	Further Submitter Position	Officer's Recommendation
95.34		New Zealand Defence Force (NZDF)		Reject

## Recommended Amendments to the Plan Provisions

Amend the temporary military training activity permitted activity conditions for the Open Space, Rural, Industrial and Commercial Zones (i.e. Rules 20.6.22, 15.6.31, 16.6.23, 17.6.25 and 19.6.30), with respect to the noise provisions as follows:

### 20.6.22 Temporary Military Training Activities

(a) All temporary military training activities shall, in addition to the other conditions, also comply with the following conditions:

- (i) No permanent structures shall be constructed;
- (ii) The activity shall not require excavation (permanent or mechanical), unless provided for in this District Plan;
- (iii) The duration of any temporary military training activity shall not exceed 31 consecutive days;
- (iv) Noise generated from mobile sources (other than weapons firing and use of explosives) shall be assessed in accordance with and not exceed the limits as set out in, NZS 6803:1999 Acoustics - Construction Noise.

Noise levels shall be measured and assessed in accordance with that Standard as if it were construction noise; ~~and~~

- (vi) Noise generated from any fixed source (other than weapons firing and use of explosives) shall not exceed the following limits when measured at the notional boundary of any noise sensitive activity, or any Residential Zone or Greenbelt Residential Zone site boundary:

- On any day -

- 7.00am – 7.00pm: 55 dB  $L_{Aeq(15min)}$
- 7.00pm – 10.00pm: 50 dB  $L_{Aeq(15min)}$
- 10.00pm – 7.00am: 45 dB  $L_{Aeq(15min)}$
- 10.00am – 7.00am: 75  $L_{AFmax}$

Noise levels shall be measured and assessed in accordance with the provisions of NZS 6801:2008 Acoustics - Measurement of environmental sound and assessed in accordance with the provisions of NZS 6802:2008 Acoustics - Environmental noise.

- ~~(vi) Noise resulting from the use of explosives and small arms weapons shall not occur between 8.00pm and 7.00am the following day and shall otherwise comply with Section 8.1.4 of NZS 6803:1999.~~

- (viii) Noise generated from the use of helicopters shall be assessed in accordance with NZS6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas and comply with the limits set out therein.

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

- (ix) Any training activities involving the use of explosives and/or firing of weapons shall comply with either:

- (a) The separation distances identified in Table 20.3; or

Table 20.3: Separation Distances for Temporary Military Training Activities involving explosives and weapons.

<u>Type of military noise source</u>	<u>Standards</u>	
	<u>Time (Monday to Sunday)</u>	<u>Separation distance required from any residential dwelling unit or building used for noise sensitivity activities in any Zone, and any site within the Residential Zone or Greenbelt Residential Zone</u>
1. <u>Live firing of weapons and single or multiple explosive events</u>	7.00am to 7.00pm	At least 1500m
2. <u>Firing of blank ammunition</u>	7.00am to 7.00pm	At least 750m

(b) A peak sound pressure level of 120 dBC when measured at the notional boundary of any noise sensitive activity, or any Residential Zone or Greenbelt Residential Zone site boundary, provided the New Zealand Defence Force produces and undertakes the activity in accordance with a Noise Management Plan submitted to the Council at least 15 working days prior to the activity being undertaken (refer 28.2.X for information requirements for Noise Management Plan).

(x) No training activities involving the use of explosives and/or firing of weapons shall occur between 7.00pm and 7.00am.

AND

Amend the temporary military training activity permitted activity conditions for the Residential Zone (i.e. Rule 15.6.31), with respect to the noise provisions as follows:

**15.6.31 Temporary Military Training Activities**

(a) *All temporary military activities shall, in addition to the other conditions, also comply with the following conditions:*

- (i) *No permanent structures shall be constructed;*
- (ii) *The activity shall not require excavation (permanent or mechanical), unless provided for in this District Plan;*
- (iii) *The duration of any temporary military training activity shall not exceed 31 consecutive days;*
- (iv) *Noise generated from mobile sources (other than weapons firing and use of explosives) shall be assessed in accordance with and not exceed the limits as set out in NZS 6803:1999 Acoustics - Construction Noise.*

*Noise levels shall be measured and assessed in accordance with that Standard as if it were construction noise; and*

- (vi) Noise generated from any fixed source (other than weapons firing and use of explosives) shall not exceed the following limits when measured at the site boundary of any noise sensitive activity:

- On any day -
  - 7.00am – 7.00pm: 55 dB  $L_{Aeq(15min)}$
  - 7.00pm – 10.00pm: 50 dB  $L_{Aeq(15min)}$
  - 10.00pm – 7.00am: 45 dB  $L_{Aeq(15min)}$
  - 10.00am – 7.00am: 75  $L_{AFmax}$

Noise levels shall be measured and assessed in accordance with the provisions of NZS 6801:2008 Acoustics - Measurement of environmental sound and assessed in accordance with the provisions of NZS 6802:2008 Acoustics - Environmental noise.

~~(vi) Noise resulting from the use of explosives and small arms weapons shall not occur between 8.00pm and 7.00am the following day and shall otherwise comply with Section 8.1.4 of NZS 6803:1999.~~

(viii) Noise generated from the use of helicopters shall be assessed in accordance with NZS6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas and comply with the limits set out therein.

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

(ix) Any training activities involving the use of explosives and/or firing of weapons shall comply with either:

(a) The separation distances identified in Table 15.3; or

Table 15.3: Separation Distances for Temporary Military Training Activities involving explosives and weapons.

<u>Type of military noise source</u>	<u>Standards</u>	
	<u>Time (Monday to Sunday)</u>	<u>Separation distance required from any residential dwelling unit or building used for noise sensitivity activities</u>
<u>1. Live firing of weapons and single or multiple explosive events</u>	<u>7.00am to 7.00pm</u>	<u>At least 1500m</u>
<u>2. Firing of blank ammunition</u>	<u>7.00am to 7.00pm</u>	<u>At least 750m</u>

(b) A peak sound pressure level of 120 dBC when measured at the notional boundary of any noise sensitive activity, or any Residential Zone or Greenbelt Residential Zone site boundary, provided the New Zealand Defence Force produces and undertakes the activity in accordance with a Noise Management Plan submitted to the Council at least 15 working days prior to the activity being undertaken (refer 28.2.X for information requirements for Noise Management Plan).

(x) No training activities involving the use of explosives and/or firing of weapons shall occur between 7.00pm and 7.00am.

AND

Amend the temporary military training activities 'Matters of Control' (i.e. Rules 15.7.4, 16.7.6, 17.7.6, 19.7.10 and 20.7.6) as follows:

#### **15.7.4 Temporary Military Training Activities**

- (a) Matters of Control
- ~~(i) The avoidance, remedying or mitigating of any adverse effects on the environment.~~
  - (i) The size and positioning of buildings and structures;
  - (ii) The measures used to avoid, remedy or mitigate adverse effects from excavation.
  - (iii) Methods to manage effects on the amenity and character of the area as a result of non-compliance with the noise and duration permitted activity conditions;
  - (iv) The actual and potential adverse effects on the safety and efficiency of the road network, as a result of additional traffic generation for a prolonged period of time; and
  - (v) The provision of safe and efficient vehicular access and on-site car parking to avoid, remedy or mitigate potential traffic effects.

Add a new section to Chapter 28 for information requirements for a Noise Management Plan for temporary military training activities as follows:

#### **28.2.X Information Requirements: Noise Management Plan for Temporary Military Training Activities**

The Noise Management Plan required under Rules 15.6.31, 16.6.23, 17.6.25, 19.6.30 and 20.6.22 shall contain the following:

- (i) State the objectives of the Management Plan (i.e. comply with a peak sound pressure level of 120 dBC when measured at the notional boundary of any residential dwelling unit or noise sensitive activity, or any site boundary in the Residential Zone or Greenbelt Residential Zone).
- (ii) A description of the site including but not limited to any characteristics which may mitigate noise and a map showing potentially affected noise sensitive activities.
- (iii) A description of the activity, including times, dates, nature and location of the activity and noise sources and a map showing the predicted peak sound pressure levels (noise contour map).
- (iii) Methods to ensure the emission of noise does not exceed the noise level specified in Rules 15.6.31, 16.6.23, 17.6.25, 19.6.30 and 20.6.22, including but not limited to, location and orientation of dwellings, location of activities and hours of operation.
- (iv) Detail on the programme for notification and communication with the occupiers of affected noise sensitive activities prior to the activities commencing, including updates during the event.
- (v) Detail procedures for receiving and deciding on complaints.
- (vi) Detail procedures for noise monitoring and reporting.

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Response prepared by Claire Price and Hamish Wesney  
Reviewed by David McCorkindale  
Dated 27<sup>th</sup> May 2013



## **Appendix 1 – Comments from NZDF on Draft Officers Right of Reply**

**From:** Emily Grace [mailto:EGrace@tonkin.co.nz]  
**Sent:** Friday, 24 May 2013 4:19 p.m.  
**To:** Hamish Wesney  
**Cc:** OWEN ROB, MR  
**Subject:** NZDF's reply for Horowhenua Hearings Committee  
**Importance:** High

Hi Hamish,

Thanks for the opportunity to review the draft Reply you have prepared for the Hearings Committee. Below are NZDF's final comments on the matter. As you offered, I'd appreciate you passing these on to the Hearings Committee.

Regards  
Emily

**Emily Grace**  
Resource Management Consultant  
Ph 04 806 4987, Cell 021 496 185  
Tonkin & Taylor Ltd, PO Box 2083, Wellington 6140

### **NZDF's final comments on Horowhenua Proposed District Plan, 24 May 2013**

*NZDF has provided expert noise and planning evidence to three of the District Plan hearings, focused on provisions relating to temporary military training activities. Each time, the evidence has responded to different officer recommendations, which have generally progressed closer towards agreement with NZDF's requests. We have had the opportunity to review a draft of the Officer's Reply on NZDF's matters, which we received on 21 May. We find this reply retracts from recommendations included in the Urban and Rural Officer's Reports, in that it recommends rejecting NZDF's request relating to night time firing of weapons and use of explosives, where the previous officers reports had recommended acceptance in part. The recommendation in the reply is that no firing of weapons or use of explosives should be undertaken at night time as a permitted activity.*

*The Reply is correct that agreement has been reached between officers and NZDF on all matters except permitted standards for night time weapons firing and explosives. We have provided some technical corrections to the provisions as written in the draft Reply, and expect that we will be accepting of the final version of these provisions included in the final Reply (except condition (x)).*

*NZDF's arguments relating to permitted activity standards for weapons firing and explosives at night time are contained in NZDF's evidence statements. After reading the draft reply, it appears that there is now a difference in technical acoustic opinion, which has not been made clear by the officers until this draft Reply. NZDF considers that weapons firing and use of explosives can occur at night time without causing sleep disturbance, provided the setbacks specified are met, or the peak noise level does not exceed 90 dBC. The expert evidence of NZDF was that night time single event noise meeting a peak noise level of 90 dBC would in fact provide a level of sleep protection similar to the Lmax 65 dBA limit that applies to permitted activities. In the draft Reply, the officer considers that a peak noise level of 90 dBC is not sufficient to protect against sleep disturbance.*

*In developing its proposed noise standards, NZDF has relied on detailed and extensive acoustic*

*research into the noise levels and noise characteristics of actual military activities. By comparison, the acoustic evidence presented by the Council has been extremely limited, and we are not aware of the Council's acoustic expert actually presenting evidence at the hearings. While the draft Reply suggested that NZDF has used an incorrect justification for using a peak noise level of 90 dBC, the draft Reply ignored other justifications (see specifically paragraph 5.6 B of Mr Hunt's evidence for the Rural Hearing), and was therefore misleading. The officers offer very limited technical rebuttal of NZDF's acoustic evidence.*

*The lack of technical arguments on the part of the officers suggests that there are other reasons they think it is not appropriate for the use of weapons firing and explosives to take place at night. NZDF maintains that the setbacks and peak noise limit proposed will protect residential amenity at night time.*

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## Appendix 2 – Response from NZDF on Revised Table 1 in Malcolm Hunt's Report

**From:** Emily Grace [mailto:EGrace@tonkin.co.nz]  
**Sent:** Friday, 17 May 2013 4:43 p.m.  
**To:** Hamish Wesney  
**Subject:** Noise question, NZDF Horowhenua Proposed Plan

Hi Hamish,

Please see below – black text is my question to Malcolm (hopefully I understood you correctly), and the blue text is Malcolm's response. There is also a table attached from Malcolm. As you suggested, if Nigel still has questions, he can call Malcolm directly.

Thanks  
Emily

### **Emily Grace**

Resource Management Consultant  
Ph 04 806 4987, Cell 021 496 185  
Tonkin & Taylor Ltd, PO Box 2083, Wellington 6140

The planning officer has asked a question, which has come from Nigel Lloyd. This is for the Council's final reply to our evidence. The question is about consistency between Table 1 on page 11 of Malcolm's report, and Appendix B to Malcolm's evidence statement. Both tables show noise readings for weapons firing at a distance of 1500m. However, the table in the report shows a difference in Peak and Max measurements of 3 – 6 db, whereas the table in the evidence shows an average difference of 25 db. Could Malcolm please explain this?

Firstly, the two numbers being compared are not equal. Table 1 on page 11 of the MHA report represents output from our prediction model depicting noise level effects over distance. The tabulated data in Appendix B to my evidence was from field measurements. Due to different frequency weightings, peak levels in Table 1 of the report are not directly comparable to the reported measurement data shown in Appendix B of my evidence although a measure of commonality would be expected. I have therefore looked further into this and it does appear that an error has been made in what I have tabulated. Table 1 states the quoted peak sound levels are "Z weighted". The Table 1 output data is actually all A weighted. Thus, peak levels quoted are not Z weighted (as quoted) but A weighted. This error doesn't affect our findings, just the table header is wrong. I attach an amended Table 1 which reports all A, C and Z weighted Peak levels.

To answer the point made by Nigel, yes there is little difference between Lmax and peak levels found in Table 1. This is because the values in the table are all A weighted. A weighted levels are not the same as peak levels measured using C weighting which will always measure much higher than A weighted levels due to taking more account of the low freq content of the sound. C weighting was used in the final analysis due to this fact, and also because peak levels register higher than Lmax for sounds that are truly impulsive. In my evidence to the hearing I was pointing out that at the setback distances proposed, single events will measure less than LCpeak 90 which in turn would not be likely to measure above Lmax of 65 dB (being the night time permitted activity noise standard for single events). This is confirmed for typical NZDF single events in the attached (amended) Table 1.

Category 1 Sources	10 METRES						100 metres						1000 metres						1500 Metres						4500 Metres						
	LAeq	LAmx	LApeak	LCpeak	LZpeak		LAeq	LAmx	LApeak	LCpeak	LZpeak		LAeq	LAmx	LApeak	LCpeak	LZpeak		LAeq	LAmx	LApeak	LCpeak	LZpeak		LAeq	LAmx	LApeak	LCpeak	LZpeak		
MOBILE:																															
Heavy Vehicles	88	92	94	96	97		69	73	75	77	78		51	55	57	59	78		48	52	54	56	57		39	43	45	47	48		
Armed personnel / LAV	89	93	98	100	101		70	74	79	81	85		52	56	61	63	82		49	53	58	60	61		40	44	49	51	52		
Unimog	82	85	89	91	92		63	66	70	72	76		45	48	52	54	73		42	45	49	51	52		33	36	40	42	43		
Excavator	85	94	98	100	101		66	75	79	81	85		48	57	61	63	82		45	54	58	60	61		36	45	49	51	52		
Loader	86	96	103	105	106		67	77	84	86	90		49	59	66	68	87		46	56	63	65	66		37	47	54	56	57		
100 kVA generator	71	73	75	77	78		52	54	56	58	62		34	36	38	40	59		31	33	35	37	38		22	24	26	28	29		
water pumps	62	65	66	68	69		43	46	47	49	53		25	28	29	31	50		22	25	26	28	29		13	16	17	19	20		
Kitchen plant	59	62	63	65	66		40	43	44	46	50		22	25	26	28	47		19	22	23	25	26		10	13	14	16	17		
Category 2 Sources																															
Howitzer	118	131	143	145	145		99	112	124	129	128		81	94	106	113	112		78	91	103	110	109		69	82	94	107	106		
81mm Mortar	81	94	101	119	122		62	75	82	103	106		44	57	64	88	90		41	54	61	85	87		32	45	52	82	84		
40mm Mortar	93	106	110	118	120		74	87	91	102	104		56	69	73	87	88		53	66	70	84	85		44	57	61	81	82		
Grenade	87	99	102	114	117		68	80	83	98	101		50	62	65	83	85		47	59	62	80	82		38	50	53	77	79		
Battle Sim	80	97	102	110	116		61	78	83	94	98		43	60	65	79	70		40	57	62	76	67		31	48	53	73	64		

Revised Table 1 Model outputs of temporary military training noise levels versus distance as LAeq, LAmx, LApeak, LCpeak, and LZpeak