

BEFORE THE HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change G: Aokautere Urban
Growth to the Palmerston North City Council
District Plan

**SECTION 42A TECHNICAL REPORT OF NIGEL LLOYD
ON BEHALF OF PALMERSTON NORTH CITY COUNCIL**

TECHNICAL – ACOUSTICS

Dated 15 September 2023

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A. EXECUTIVE SUMMARY

1. The key conclusions of my s 42A technical report are:
 - (a) The Aokautere Urban Growth area is unlikely to be impacted by noise from Turitea Wind Farm.
 - (b) In considering reverse sensitivity issues for the Rifle Rod & Gun Club (**RRGC**) and the protection of the community from RRGC noise, the noise has been measured and assessed and I have recommended changes to the Structure Plan for rural-residential development. These changes anticipate noise mitigation measures that the RRGC will adopt (given there are already dwellings situated closer to the RRGC than the proposed rural-residential development). Other noise mitigation measures include aligning living spaces of dwellings away from the RRGC (which will give them a northerly aspect) and considering placing a notice on relevant LIM reports (which may be outside the plan change process).
 - (c) I do not consider it appropriate for Ngawai Farms to be zoned rural-residential given the RRGC is immediately south of this land and noise levels will exceed 60 dB L_{Amax} . Deferring assessment of the noise to the subdivision stage (as sought by the submitter) would create a false sense of expectation of the development of this land.

B. INTRODUCTION

2. My name is Nigel Robert Lloyd. I have been an acoustic consultant with Acousafe Consulting & Engineering Ltd since 1985. I hold a degree in Mechanical Engineering from the University of Wales, University College Cardiff received in 1976.
3. My previous work experience includes five years as the noise control engineer with the New Zealand Department of Labour and three years with the Industrial Acoustics Company in the United Kingdom. Including my time spent with Acousafe as an acoustical consultant this is a total of over forty-five years direct involvement with noise control and acoustical related work.

4. I have advised Palmerston North City Council (**Council**) on a range of noise matters since the mid-1990s and I gave advice at that time on noise issues for the District Plan and advised on the latest round of Sectional District Plan noise reviews.
5. I am engaged by Council in relation to proposed Plan Change G: Aokautere Urban Growth (**PCG**) which seeks to rezone a new greenfield growth area in Aokautere for residential development and inserts an accompanying structure plan and provisions (objectives, policies, and rules) into the District Plan.
6. I have been involved with PCG since October 2019. My role has involved considering reverse sensitivity matters arising from PCG, including the RRGC.
7. As part of my role, I authored the following draft report: Rifle Rod and Gun Club - Reverse Sensitivity Noise Assessment, 17 January 2020 (**the Acousafe Report**). This report considered the potential reverse sensitivity impacts from the RRGC and was included as part of the s 32 report prepared for PCG.¹

C. CODE OF CONDUCT

8. I confirm that I have read and am familiar with the Code of Conduct for expert witnesses in the Environment Court Practice Note 2023. I agree to comply with this Code. The evidence I give is within my area of expertise and I am not aware of any material facts that would alter or detract from my opinions.

D. SCOPE OF EVIDENCE

9. My s 42A report addresses the following three substantive submissions on noise which have been received:
 - (a) SO 35 Wind Farm Noise;
 - (b) SO 76 Rifle Rod & Gun Club Manawatu; and
 - (c) SO 61 Ngawai Farms.

¹ PNCC Proposed Plan Change G: Aokautere Structure Plan – Section 32 Report (2022), Appendix 8.

10. In responding to these submissions, I have referred to the Acousafe Report, referred to at paragraph [7] above.
11. In addition to my own observations, I rely on the technical evidence of:
 - (a) Mr Andrew Burns – Urban Design;
 - (b) Ms Anita Copplestone – Planning.

SO 35 Wind Farm Noise

12. Submission SO35 expresses concern about wind turbine noise and the potential negative health effects to those close to the turbines, particularly on sleep disturbance at night-time with low speed wind flows.
13. Council's GIS department has provided me with the following plan (Figure 1) which shows the nearest consented wind turbine at Turitea Wind Farm is 2,875m from the proposed rural-residential zoned land and that all of plan change area for PCG is greater than 1.5 km from the nearest turbine. The 1.5km distance is the blue area on the map.
14. The distance of 1.5km is relevant because Rule R9.8.7 in the Rural Zone makes dwellings discretionary activities if they are to be located closer than 1.5 km to a consented wind turbine. This is to protect new dwellings against wind farm noise and wind farms against encroachment of residential development. The separation distance to the PCG area ensures that wind farm noise is unlikely to be an issue.

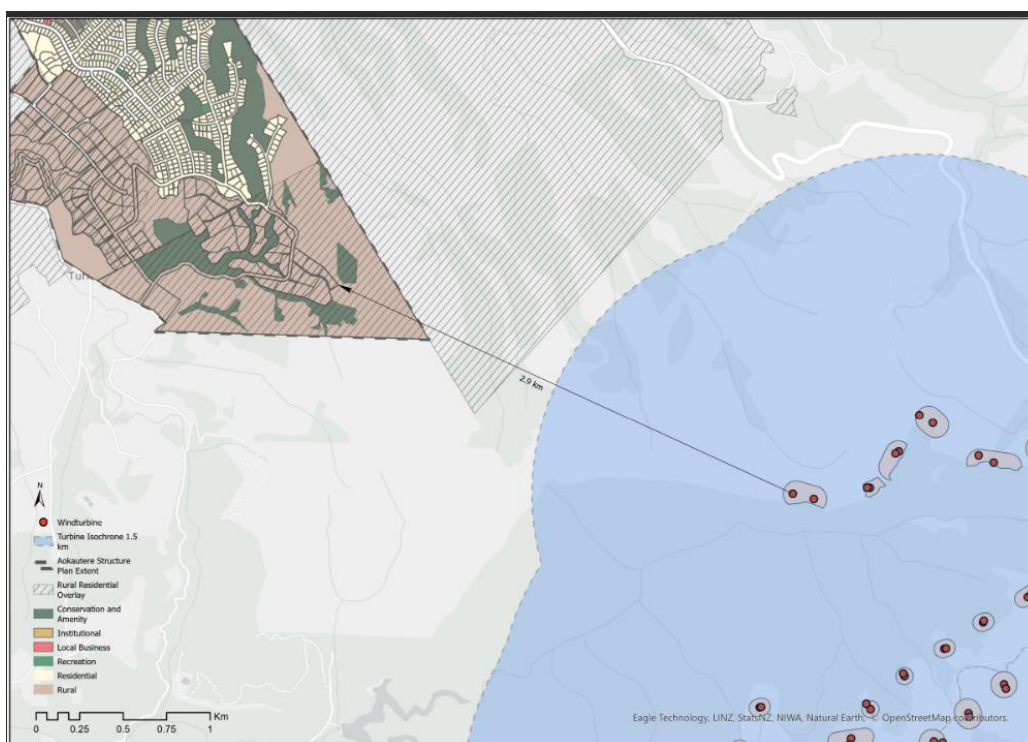


Figure 1. Turitea Wind Farm Separation Distance.

SO 76 Rifle Rod & Gun Club Manawatu

15. The RRG is situated at 333 Turitea Road, generally as shown by the star in the following segment (Figure 2) taken from the Master Plan.

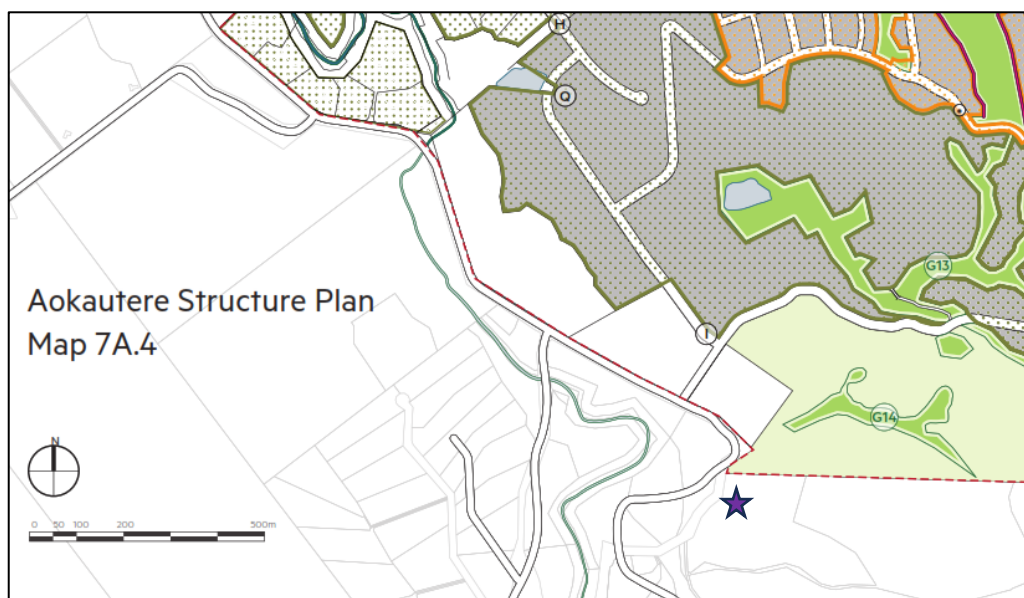


Figure 2. Location of RRG

16. As noted earlier, the Acousafe Report regarded the potential reverse sensitivity impacts from the RRG.
17. In making this assessment I undertook informal noise monitoring of shooting taking place during my visit to the range.² In making my assessment I have considered the principles set out in the decision of the Environment Court in the Cable Bay Rifle Range case (**the Cable Bay case**).³ A contextual feature of that case was that over time a proliferation of rural-residential development near to the Cable Bay Rifle Range ultimately led to the Rifle Range needing to curtail its operations as the Court determined that the noise from the rifle range exceeded a reasonable level (and was offensive and objectionable) to such an extent that it had an adverse effect on the

² By informal monitoring I mean that I did not prearrange to measure a variety of firearms but took the opportunity to request to measure rifles that were in use at the time of my visit. The club welcomed me to undertake the monitoring and the club members were obliging in firing their rifles and allowing monitoring of the .308 rifle with and without the suppressor. Monitoring was undertaken at the central firing location and on the adjacent property.

³ *Nelson City Council v Harvey* [2011] NZEnvC 48.

environment. This was the case even though the noise generation pre-existed many of the affected properties.

18. There is assessment in the case about the application of FIDOL factors (Frequency, Intensity, Duration, Offensiveness/character and Location) in determining whether noise exceeded reasonable levels or is offensive or objectionable. I consider that an assessment of FIDOL factors for the RRGc would give a similar outcome here.
19. In the Environment Court's view, a sound level of 50 dB L_{AFmax} was a reasonable level at the notional boundary (measured within 20 metres) of the position of any dwelling or approved dwelling site, on any property other than the site.
20. L_{AFmax} (often referred to as L_{max} or L_{Amax}) is the maximum A-weighted sound pressure level measured on the F-time weighting (fast) response of the sound level meter. In this instance, it is the actual maximum sound level of any gunshot without any time averaging. The A-weighting is a standardised electrical frequency weighting that allows the measured level to be more representative of human hearing.
21. I concluded in the Acousafe Report that a reasonable set back from the firing ranges would be approximately 400 metres unless the ridgeline intercedes. I had undertaken informal monitoring⁴ at the club on 30 October 2019 of two rifles including a .308 rifle firing both with a suppressor and without. It is expected that firearms used at the club would mostly be quieter than the unmoderated .308 rifle, although I am aware that black powder shooting also takes place at this club, which is also noisy. I have not monitored black powder shooting.
22. The modelling of noise on land to the immediate north of the RRGc indicated that no residential dwelling sites should be located south of the ridgeline on the Waters Block. This is because any future dwellings would be subject to a noise level greater than 50 dB L_{AFmax} , which represents an unreasonable noise level, in reliance on the Environment Court's decision in the Cable Bay case.

⁴ See footnote 2.

23. The proposed zoning in PCG as notified shows the Rural-Residential Overlay removed from that area, which has the effect that no sites would be able to be developed for rural-residential living on sites most impacted by the gun club noise.
24. The submission from the RRGc opposes the rezoning of nearby land to residential because the higher density of neighbours will increase the probability of noise complaints and the club is concerned about reverse sensitivity issues.
25. The submission explains the club has been in existence since 1946 and has operated at its current address since the early 1960s. There are dwellings constructed near to the club and the submission describes the current noise management measures that have been adopted *“in order to maintain a good relationship with neighbours”*.
26. The measures include restriction to daytime hours of operation and no shooting on Christmas Day and on the morning of ANZAC day. Shooting can also be suspended when requested by neighbours for special occasions. Otherwise, the club can be operational 363½ days per year.
27. Along with its members, the club is used by New Zealand Police for firearms training including handguns and rifles.
28. The submission opposes rezoning of neighbouring land, but if land is to be rezoned then it requests any homes and businesses within one kilometre of the club to be built with professionally designed and approved insulation, in conjunction with *“no complaints consent notices on properties”*. Further, then the submission also seeks that any resource consent should include a stipulation that the owners are aware that the RRGc is nearby.
29. In the Acousafe Report I identified that land immediately to the north of the RRGc was inappropriate for residential zoning because of gun club noise and that this would extend up to the ridgeline. The ridgeline provides good protection from noise to residential development further away and forms a natural boundary location. This recommendation was incorporated into the Structure Plan.

30. Another recommendation in the Acousafe Report was that sites to the immediate west of the internal access road were also inappropriate for development because they were also adversely exposed to RRGc noise.⁵ This was not picked up in the Structure Plan.
31. I revisited the RRGc on Sunday 30th July 2023 with the intention of undertaking formal measurements of RRGc noise in the vicinity of the club. This was with the assistance of the club and its members.
32. Noise measurements were made of a .308 rifle firing both with and without a suppressor fitted. The measurements were made at the location shown in Figure 3 which is approximately 650 metres from the firing station for the .308 rifle.



Figure 3. Location of Formal Noise Monitoring

⁵ Acousafe Report, Figure 1 - Sites 34, 36, 37 and 38.

33. The weather was cool and calm with the paddocks saturated with heavy rain from the week before with some areas of pooling.
34. The measured sound level of the .308 rifle is shown in Figure 4 with five unsuppressed rounds fired in quick succession after 9:22:07am, then five suppressed rounds fired after 9:26:53am and a further five suppressed rounds after 9:53:00am. The unsuppressed rounds were between 56-58 dB L_{Amax} and the suppressed rounds between 55-58 dB L_{Amax} with one round reaching 60 dB L_{Amax} . Note the timeframe of the chart is not consecutive.
35. At the measurement location there was not a significant difference between the noise of a rifle with and without a suppressor fitted (although there was reported to be a much greater perceived difference close to the firing station and that is also my experience).

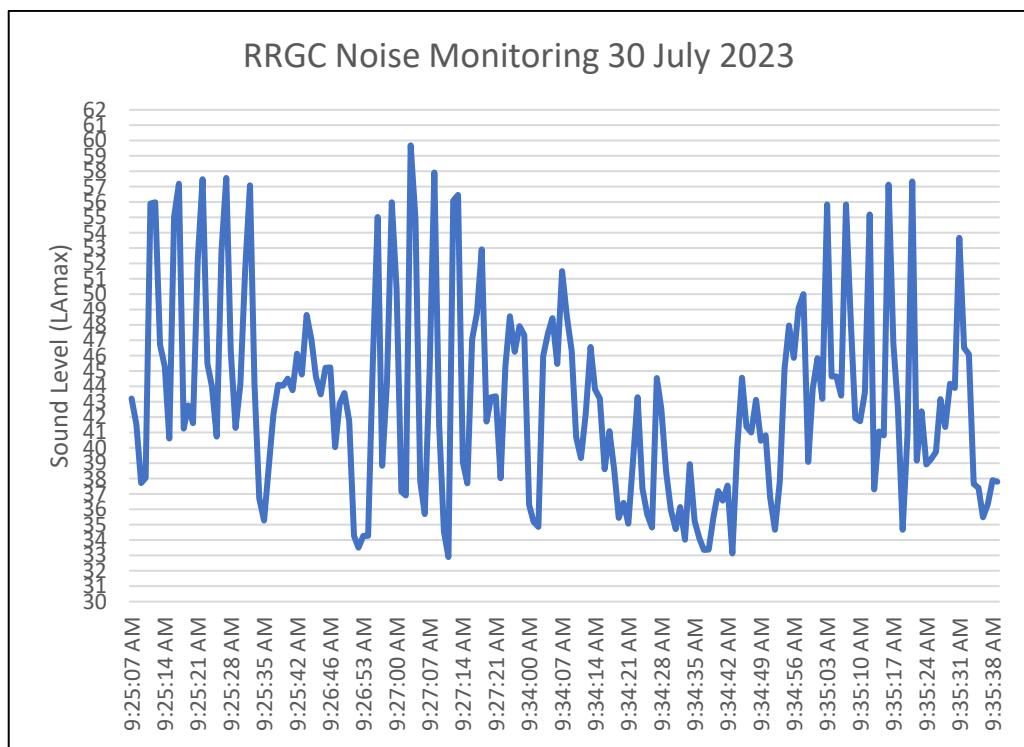


Figure 4. Chart of .308 Rifle Firing

36. Pistol shooting (0.22) was taking place in addition to the .308 rifle firing, with volleys of fire also able to be measured. The pistol volleys were generally around 50 dB L_{Amax} .

37. I have undertaken further acoustic modelling over the southern extent of the Structure Plan using this new information to calibrate the prediction methodology and this is shown in Appendix A.⁶ In undertaking my modelling, I first calibrated the rifle noise to generate 57 dB L_{Amax} at the receiving position using saturated ground absorption coefficient of 0.2 then modelled the dry ground absorption coefficient of 1.0. This resulted in a reduction of noise of 2-3 dB. The modelling shown in Appendix A is with dry ground absorption coefficient of 1.0.
38. The wet ground does not absorb the sound as it passes over the surface like dry ground does. The analogy is sound travelling long distances over water.
39. Appendix A shows where the 50 dB L_{AFmax} sound level extends into the Plan Change G area in the .308 suppressed scenario and identifies land that is shown on the Structure Plan and proposed zoning map as within the Rural-Residential Overlay, i.e. enabled for rural-residential development. This land will be adversely impacted by RRG noise.
40. The area of land that is exposed to greater than 50 dB L_{AFmax} is calculated to be up to 1.3 km from the RRG where topography provides a clear line of sight. This extends to existing dwellings on Cyprus Place on the edge of the escarpment looking south.
41. The RRG submission seeks a number of provisions or requests to address its concerns with regard to this land if it was to be rezoned, including:
- (a) Noise sensitive activities shall be noise insulated;
 - (b) No complaints covenants;
 - (c) Notification of the presence of the RRG noise.
42. RRG informed me during my visit that they intend to take measures to reduce the noise from their regular activities. This includes plans to acoustically house the .308 firing station. While this will reduce the muzzle blast noise of the rifles, it will not reduce the sound of the supersonic bullet or the impact of the bullet on the target.

⁶ Acoustic modelling was undertaken using CadnaA computer aided noise abatement software in accordance with ISO 9613.

43. While it is possible for dwellings to be insulated against noise, I consider this would be of limited effectiveness as a mitigation measure for dwellings in this area, where outdoor amenity will be important. The RRGC only operates during the day and night-time noise is not an issue. Noise insulation would also need to be provided along with mechanical ventilation, to allow windows to be kept closed, which seems to defeat the object of living in a rural-residential environment.
44. One advantage to this location is that the RRGC is south of the area under consideration. Dwellings would normally be constructed with indoor and outdoor living areas taking advantage of the northerly aspect. This allows outdoor living areas close to dwellings a degree of protection from RRGC noise by the screening of the building itself and for ventilating windows to be located on the side of the dwelling away from the RRGC. It would not protect the amenity in the wider sections though.
45. I do not consider “*no complaints covenants*” should be encouraged, and they should not form the first line of defence against a noise nuisance. They do nothing to control a noise nuisance and, in my opinion, and based on my experience, preventing people from complaining about a nuisance only exacerbates the situation. People who want to complain about an issue will find ways to circumvent such measures in any case.
46. The other option of placing a notice on a LIM report (for example) would warn a prospective buyer of the presence of the gun club, however in my experience, people find it difficult to anticipate their reaction to noise until they actually experience it. Accordingly, while I consider it may be useful to place notices on the relevant LIM reports and the Council may consider this approach outside of the plan change process, this is not a measure that can control the noise nuisance and cannot adequately address noise issues alone.
47. I note that there are already more than twelve dwellings constructed within 500 metres of the ranges at the RRGC, and to that extent I acknowledge that rural residential development has already moved near to the club. The submission explains the measures RRGC are carrying out to maintain good relationships with its existing neighbours.
48. The closeness of existing dwellings already requires RRGC to adopt the RMA Section 16 duty to adopt the best practicable option to avoid unreasonable noise. While I am not

an expert on firearms, I consider that with or without PCG, it is important for RRGc to be vigilant about managing its own noise, for example by ensuring that all members firing higher calibre (noisy) rifles should be required to fit suppressors to them, where this is practical, along with any other reasonably practicable measures. As noted above, I understand that the club is already pursuing measures to reduce noise, such as to acoustically house the rifle firing station.

49. Further, while I accept that it may not be practical to mitigate noise from certain types of firearms, the closeness of the existing residential development that has already occurred may mean that it is not appropriate for such firearms to be used if they are noisy and cannot be controlled. While I cannot be specific about Best Practicable Option (**BPO**) matters here as this is not within the scope of this report, I make the observation to simply illustrate further that there are existing obligations on the RRGc such that it will have to be increasingly vigilant about controlling its own noise.
50. My concern is that applying the 50 dB L_{Amax} criterion used by the Environment Court in the Cable Bay case to prevent any new dwellings within that noise contour would have a 'sterilising' effect on a wide area of land which has otherwise been identified as appropriate for rural-residential living by other planning disciplines. As there are already a significant number of dwellings constructed closer to the RRGc, then I consider a reasonably balanced option is provide for rural-residential subdivision up to a location generally representative of the predicted 55 dB L_{Amax} contour.
51. This measure anticipates the need for further reduction of noise from RRGc (in accordance with measures it is currently planning, and any other BPO measure), and would need to be accompanied by a plan provision that would require some form of 'notice' to future residents in the proximity of RRGc to be imposed through any consent process and a provision encouraging or requiring that dwellings located closer than 50 dB L_{Amax} to the RRGc should be designed with living areas and ventilating windows facing towards the north (I acknowledge that this is likely to happen anyway as most new development will wish to be north-facing). Further, the RRGc only operates during the day, so bedrooms (and sleep disturbance) are not an issue.
52. I therefore recommend that the RRGc submission be accepted in part and that an intensification of noise sensitive activities be avoided within the 55 dB L_{AFmax} contour

shown in Appendix A. The contour in Appendix A is representative of firearm noise with suppressors fitted, which I consider is a measure that should be adopted by the club members in any case. The 55 dB L_{AFmax} contour shown in Appendix A will be exceeded by some firearms currently used at the club.

53. The 50 dB L_{Amax} contour could also be included in the District Plan to identify land that may be exposed to RRG noise.
54. The contours in Appendix A are formed by the topography of the area (and the RRG) and I have collaborated with Andrew Burns at McIndoe Urban to advise on how these contours can be translated pragmatically along cadastral boundaries that can then inform the location of the Rural-Residential boundary. This collaboration has resulted in Appendix B which shows the sites that can be appropriately located on land on or outside of the 55 dB L_{Amax} contour. I am satisfied that Appendix A and Appendix B spatially represent my opinions in this evidence.
55. I would recommend that the RRG satisfy themselves that the assumptions I have made with regard to gun usage are correct and to present evidence at the hearing to clarify any concerns they may have.

SO 61 Ngawai Farms

56. Mr Waters of Ngawai Farms objects to my original recommendation that no new residential lots should be located on his land to the immediate north of RRG and south of the ridgeline. He seeks for any noise impacts to be assessed at the time of a subdivision application. This would maintain the rural-residential zoning on his land.
57. Appendix A shows noise levels exceeding 60 dB L_{AFmax} on land immediately to the north of RRG and both my original and more recent measurements confirm that RRG noise is unreasonably high on this land.
58. Given these existing noise levels, I do not consider that it would be appropriate to zone this land rural-residential and that it would be wrong to defer a noise impact assessment to the subdivision stage. Deferring assessment to a resource consent stage would have reverse sensitivity implications for RRG and would create a false expectation of the development potential of this land.

Nigel Lloyd

15 September 2023

E. APPENDICES

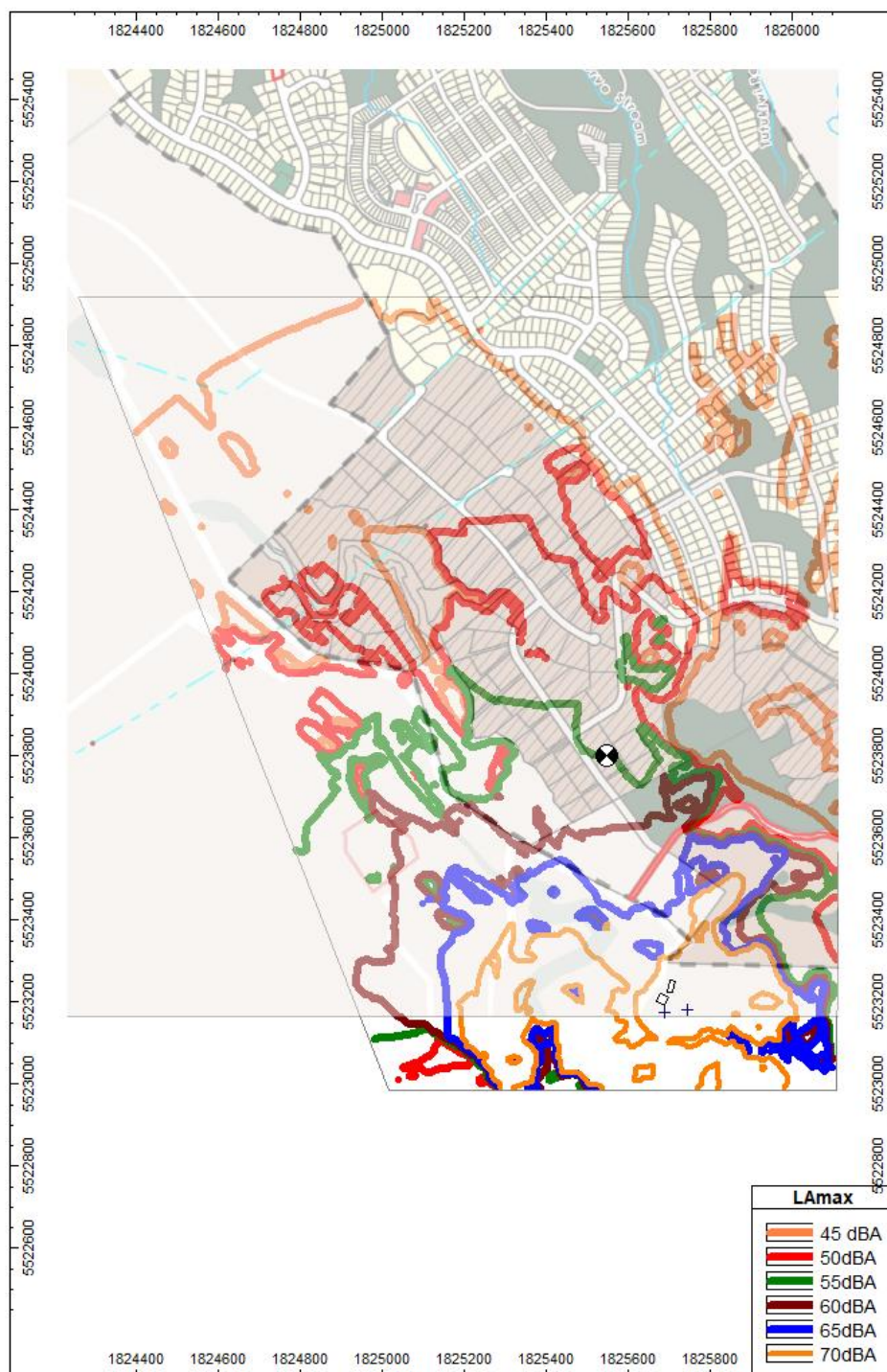
Appendix A: Modelling of Rifle Rod and Gun Club Noise

Appendix B: Noise Contour for Rural-Residential Zoning

APPENDIX A

Modelling Of Rifle Rod & Gun Club Noise

.308 Rifle With Suppressor



APPENDIX B

Land Outside the 55 dB L_{Amax} Noise Contour suitable for Rural-Residential Zoning

