

MEMO

Project:	Omaha South Pickleball Courts	Document No.:	Da 003		
To:	Omaha Beach Residents Society	Date:	17 August 2025		
Attention:	Tony Coupe (Chair)	Cross Reference:			
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From:	Christopher Day	No. Pages:	14	Attachments:	No
Subject:	Pickleball Noise Assessment				

Marshall Day Acoustics (MDA) have been engaged by the Omaha Beach Residents Society (OBRS) to assess the potential noise effects from pickleball if it were to be established at Omaha. The brief was to investigate the noise effects with two dedicated pickleball courts on a single tennis court at two locations – the Mangatawhiri Road courts and the Taumata Road courts. Our investigation has involved the measurement of noise from pickleball and tennis and then to use computer modelling to calculate noise levels at the proposed locations at Omaha. Our assessment has involved comparison with the Auckland Unitary Plan (AUP), a comparison of the noise from pickleball with tennis and a subjective listening test.

There is a reasonable amount of negative discussion on the internet regarding the noise from pickleball. It was thus very sensible that the OBRS Committee decided to engage Marshall Day to investigate what the noise would be like in the specific locations at Omaha. The noise level experienced varies in every location due to various factors including distance and screening effects.

Unfortunately, most of the noise data we found on the internet was very vague and non-technical – for example, quoting a noise level of 70dB (on its own) is meaningless unless the measurement parameter (L_{Aeq} vs L_{Amax} etc) and the distance and screening effects are carefully described. For this reason, Marshall Day decided to carry out scientific measurements of pickleball (and tennis) to accurately predict what the noise levels would be at Omaha. Subsequently five papers from a reputable conference (Noise-Con 23) have been obtained and these are discussed later in this report.

MDA Pickleball Noise Measurements and Recording

Marshall Day Acoustics measured noise levels of a game of pickleball at the Henderson Squash Club. The club has 6 pickleball courts laid out on two tennis courts adjacent to a residential area (see photo Figure 1 below).



Figure 1 – Henderson Squash Club Pickleball Courts

Noise measurements and audio recordings were made while four experienced male players played on one court (Figure 2).





Figure 2 – Pickleball noise measurements

The noise measurements made at 15m from court centre were used to calculate the sound power level of pickleball (89dB L_{WA}) which can then be used in 3D sound propagation software (SoundPlan) to calculate noise contours at other locations. The four experienced players were capable of volleying the ball at pace and it is considered the noise levels are a reasonable ‘worst-case’ scenario for the bat/ball impact. There was also a moderate amount of verbal communication between the players which is included in the noise measurements and audio recordings.

Tennis Noise Measurements and Recording

Tennis noise measurements and audio recordings were made at one of the Omaha courts (Mangatawhiri Road) with two experienced senior male players.

The noise measurements made at 23m from court centre were used to calculate the sound power level of tennis (80dB L_{WA}) which was used in the noise modelling reported below. There was a moderate amount of verbal communication by the players. This location experiences moderate amounts of traffic noise from Mangatawhiri Road. Interference from road traffic noise was removed during post analysis from the data and the audio recordings. The calculated sound power level is in line with levels measured for previous tennis noise studies by MDA.

Auckland Unitary Plan Noise Limits

The OBRS Planner has confirmed that the tennis courts at Omaha are zoned ‘Informal Recreation Zone’ and thus the noise limits in Table E25.6.18.1 (copied below) apply within the boundary of any residential site.

In summary, the ‘noise rating level’ (discussed later) must not exceed 50 dB L_{Aeq} within the boundary of a residential site.

E25.6.18. Open Space – Conservation Zone, Open Space – Informal Recreation Zone, Open Space – Civic Spaces Zone or Open Space – Community Zone interface

- (1) The noise (rating) level and maximum noise level from any activity in the Open Space – Conservation Zone, Open Space – Informal Recreation Zone, Open Space – Civic Spaces Zone or Open Space – Community Zone when measured within the boundary of a site in a residential zone or notional boundary of a site in a rural zone must not exceed the levels in Table E25.6.18.1 Noise levels at the Open Space – Conservation Zone, Open Space – Informal Recreation Zone, Open Space – Civic Spaces Zone or Open Space – Community Zone interface below:

Table E25.6.18.1 Noise limits at the Open Space – Conservation Zone, Open Space – Informal Recreation Zone, Open Space – Civic Spaces Zone or Open Space – Community Zone interface

Time	Noise level
Monday to Saturday 7am-10pm	50dB L_{Aeq}
Sunday 9am-6pm	
All other times	40dB L_{Aeq} 75dB L_{AFmax}

Noise Modelling Results

The digital terrain map for Omaha was obtained and noise contours calculated for both the Mangatawhiri Road courts and the Taumata Road courts using the SoundPlan software.

The computer modelling shows that with a standard tennis court fence (mesh) the pickleball noise levels (without rating adjustments discussed below) at the closest residential properties exceed the 50 dB noise limit by approximately 5dB at Mangatawhiri Road and 5 to 10dB for one house at 70 Taumata Road. If pickleball were implemented without noise barriers and other mitigation we would expect significant negative response from the closest residents. We understand the OBRs Committee are open to the concept of noise mitigation being implemented. The pickleball contours with the existing mesh fence (no mitigation) are shown for interest in Appendix A Figures 3 and 4.

To reduce the pickleball noise, noise barriers have been introduced to the modelling. The noise levels with a noise barrier attached to (or beside) the court fence have been modelled with two pickleball courts operating along with one tennis court. The predicted noise contours (without rating adjustments or equipment mitigation) shown in figures 5 and 6 show that the AUP limit (50dB L_{Aeq}) can be achieved. The 'noise rating level' following equipment mitigation and the application of adjustments according to NZS 6802:2008 "Acoustics - Environmental noise" are discussed in the Assessment of Effects section to follow.

The noise levels shown in all the noise contours have been calculated at 1.5m above ground level. This is standard practice and represents the normal listening level and the windows for a single-story dwelling. The closest residence to the Taumata Road courts (70 Taumata Road) consists of two buildings – the closest to the courts is one story and the one further back is two storied. Marshall Day have calculated the noise level from pickleball and tennis at this upper façade (5m above ground) as 45 dB L_{Aeq} .

To assist with interpretation of the noise contours, the legend on each plan shows compliance with the critical 50 dB daytime noise limit is represented by the green shading (<50 dB) and non-compliant (>50 dB) represented by yellow/orange. The approximate location of the courts is shown as purple and blue rectangles. The barrier location is shown by the darker blue lines.

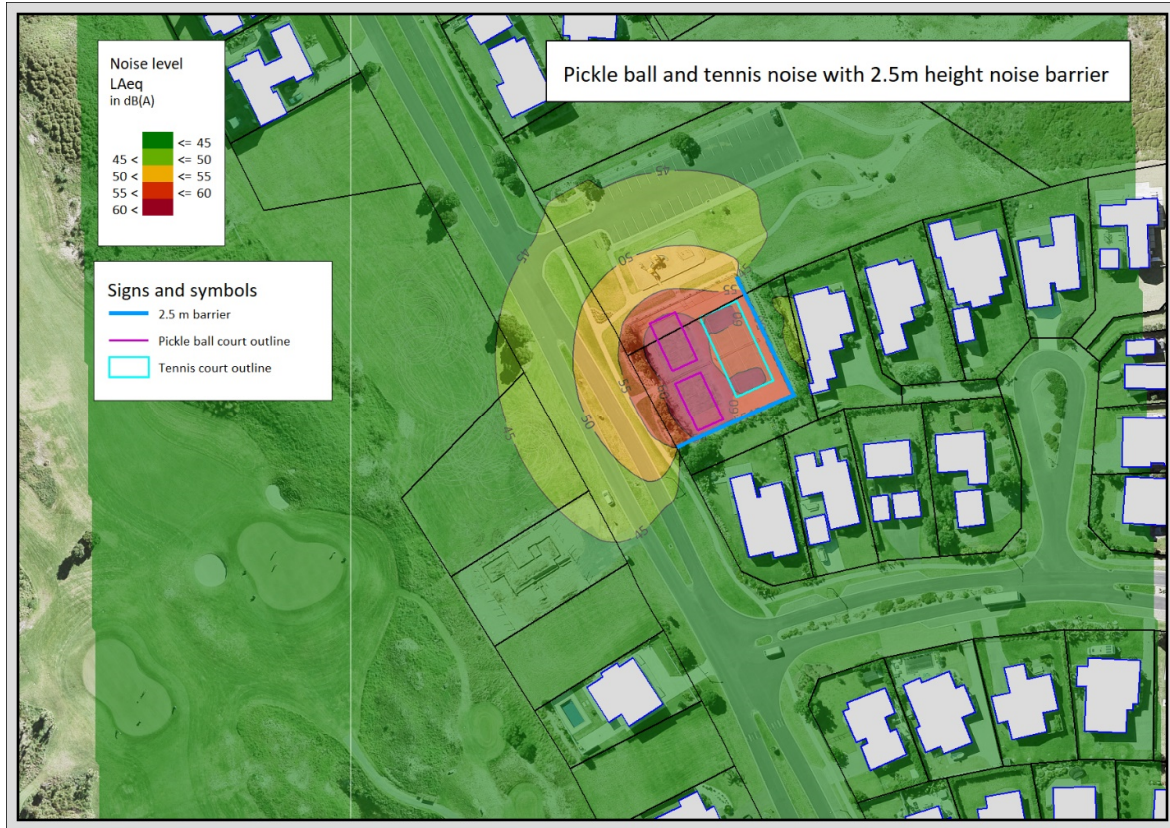


Figure 5 – Mangatawhiri Road Pickleball + Tennis with 2.5m noise barrier

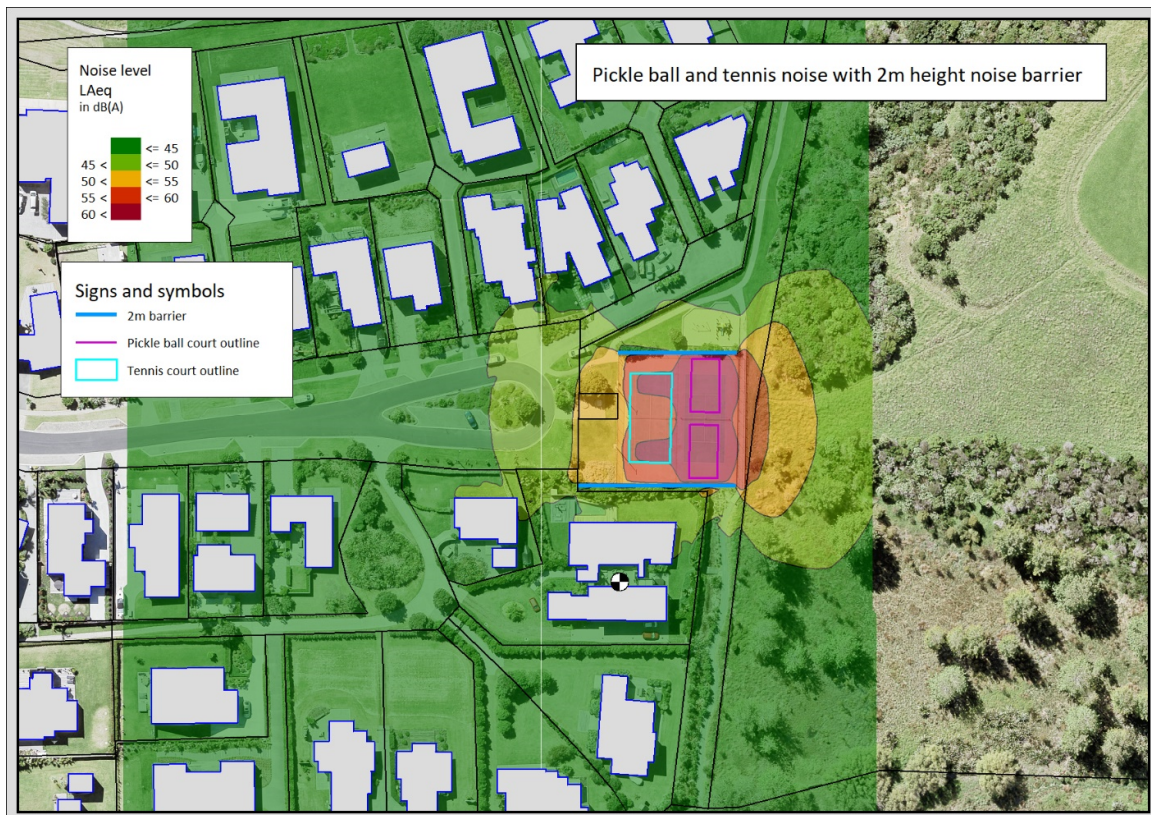


Figure 6 – Taumata Road Pickleball + Tennis with 2.0m noise barrier

By way of comparison, we have modelled the noise from tennis being played on two courts with no noise barriers i.e. the current situation – see Figures 7 and 8 below.

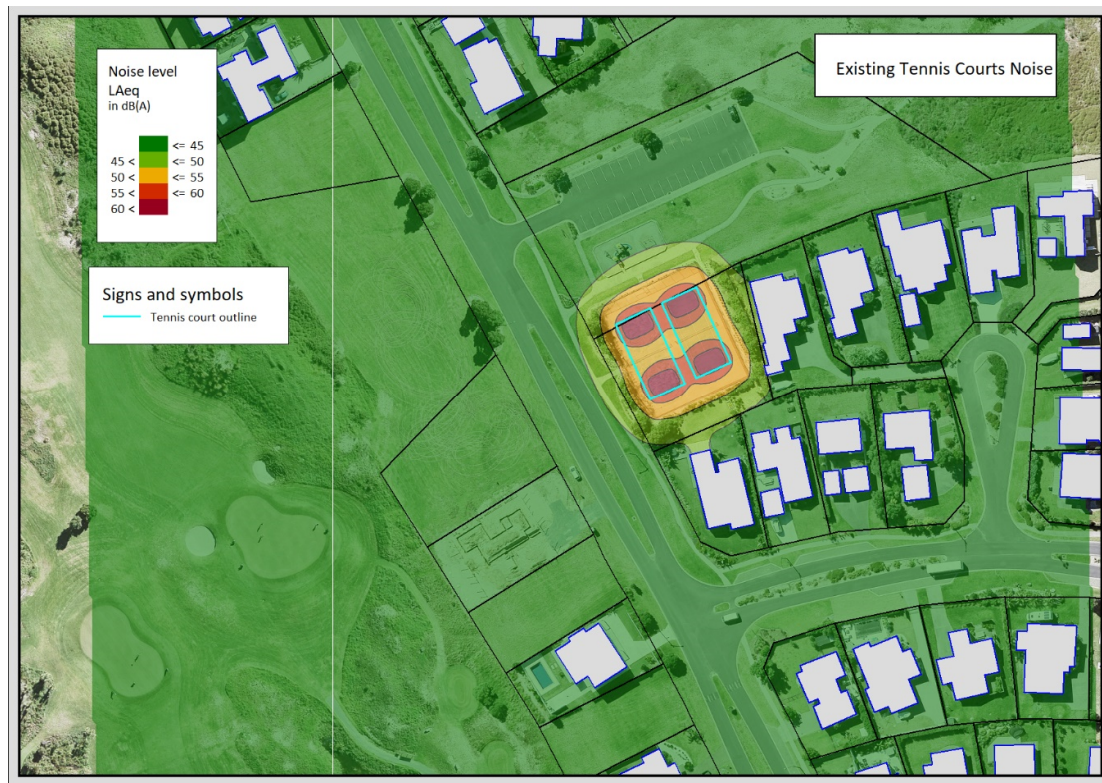


Figure 7 – Mangatawhiri Road Tennis only

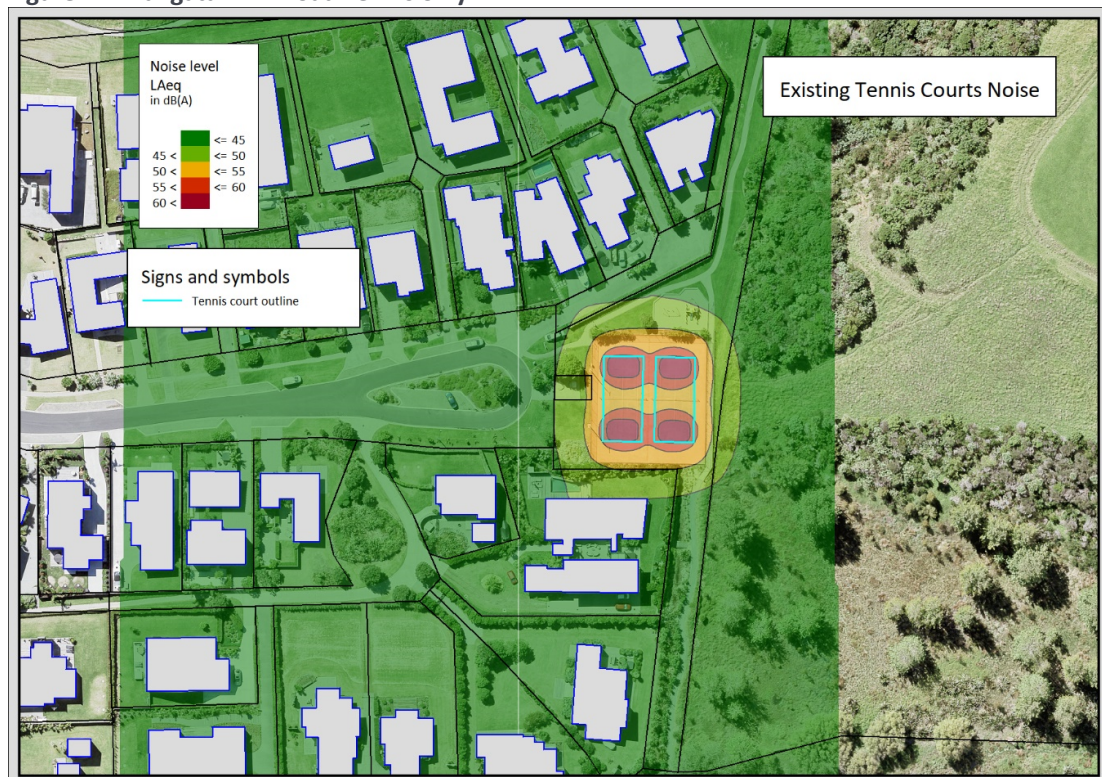


Figure 8 – Taumata Road Tennis only

Assessment of Noise Effects

Comparison with tennis

The Marshall Day measurements and modelling show that pickleball unattenuated is approximately 9dB noisier than tennis. This is a significant difference and would sound approximately twice as loud subjectively. This difference could explain some of the adverse response that has arisen in the USA, along with the high frequency character of the sound. The OBRS have agreed that if pickleball were to be implemented it would need to be mitigated with noise barriers and other measures discussed below. With noise barriers in place, the pickleball predicted noise levels are similar to the noise levels from tennis without barriers – approximately 45 to 50 dB L_{Aeq} at the closest houses.

Internet Information

MDA has reviewed a number of sites that discuss the adverse community response to pickleball. It should be remembered that the internet can be used to ‘drum up’ discontent from an activity that otherwise may have remained relatively inoffensive. Windfarms are a prime example of where social media has created negative community response to effects that are not real. The internet can be used to promote misinformation or technical inaccuracies such as “noise levels up to 70 dB”. Quoting 70 dB is meaningless without a known distance and the measurement parameters. We have not given a lot of weight to such non-technical reporting. On the other hand, the extent of discontent from pickleball noise should also be used as a warning that the effects need to be examined carefully and scientifically.

While some of the articles we reviewed involved tennis courts adapted to pickleball (by marking the courts for pickleball and providing pickleball nets), a number of other articles involved pickleball courts that had been introduced as a completely new activity. The expectation of residents who have ‘bought in’ adjacent to tennis courts with the typical noise effects from the playing of tennis, should differ to those who have had pickleball introduced as a completely new and different activity.

Noise-Con 23 Technical Papers

Five papers presented during a ‘Pickleball Noise Session’ at the conference Noise-Con 23 have been reviewed and are referenced in Appendix B. Noise-Con is the annual conference of the Institute of Noise Control Engineering USA. The five papers are of a high technical standard and provide significant insight into the community response and the technical noise levels of pickleball. Three of the five papers are by the same two authors who work for the organisation, Pickleball Noise Mitigation LLC (PNM), the fourth by Weiss & Komrower is a case study of five school courts being built adjacent to a residential area of Cape Cod and the fifth is by Greene, Burke and Leech who all work for an acoustic consulting company called Dudek. All the papers discuss the considerable adverse community response that has occurred in the USA due to pickleball noise.

The paper by Dudek is a case study of a tennis club next to a residential area who converted some courts to pickleball. The study measures and compares the noise from tennis and pickleball and examines the effect of a 3.5m high barrier. The measured noise levels for both activities are very similar to the levels measured by MDA and show pickleball is 8 dB noisier than tennis (MDA 9dB). The paper shows that the noise from tennis without mitigation (53dB) is noisier than from pickleball with the noise barrier (43 dB) in the immediately adjacent residential property. The 3.5m barrier is providing greater attenuation than the 2m to 2.5m barriers in the MDA Omaha study.

The paper by Weiss & Komrower describes the considerable angst caused by the new pickleball courts at the school and the ongoing litigation. It provides a highly complicated technical analysis of short duration noise levels trying to understand the reasons for the adverse response.

The three PNM papers also talk about pickleball noise being the cause of complaints from nearby residents. The authors are of the opinion that this adverse response is because the L_{Amax} (the maximum instantaneous level) is higher than the L_{Aeq} level and ‘stands out’ or is more noticeable because of this. The authors propose a criterion of 50 dB L_{Amax} (average of 4 minutes of sampling). This is a significantly more stringent criterion

than the AUP L_{Aeq} noise limit by approximately 15 dB. I am not aware of this proposed standard being adopted.

The PNM papers also provide results of measurements of the mitigation provided by quiet paddles (bats) and balls. The authors show a reduction of up to 10 dB can be achieved by the selection of quiet equipment. The practicalities of this are discussed later in this report.

Noise Rating Level and the AUP

The predicted noise levels discussed in our modelling (and shown in the contours) are the 'measured' noise levels during a game of pickleball or tennis. The noise rule in the AUP (copied above) specifies the "noise rating level" must comply with the 50 dB noise limit in Table E25.6.18.1. The noise rating level is defined in NZS 6802:2008 "Acoustics - Environmental noise" as the measured noise level with two adjustments applied where applicable.

The first adjustment allows for the duration of the noise activity. If the noise operates for only 5 hours (or less) during the 15 hour 'daytime' period, an adjustment of -5dB is applied to the measured noise level. If the noise operates for only 8 hours during the 15 hour 'daytime' period, an adjustment of -3dB is applied to the measured noise level. This concept reflects the relief experienced by residents during the other 10 hours (or 7 hours) of no activity - there are less overall adverse effects.

The second adjustment is applied if the noise contains 'special audible characteristic' (SAC) such as tonality or impulsiveness. A previous decision from the Auckland City Council for tennis courts at Diocesan School for Girls (LUC NO.: R/LUC/2008/1522) ruled that this adjustment should not be applied for tennis. We have listened to the sound from pickleball and tennis at similar noise levels and are of the opinion that the subjective quality of the noise from pickleball is not significantly different to tennis and thus the SAC adjustment may not necessarily be applicable in our opinion. However, the sound does have a high frequency impulsive characteristic that is more distinctive than tennis and considering the significant adverse response reported in the USA, we are of the opinion that +5dB SAC penalty should be applied to pickleball noise.

Noise Mitigation

Controlling the duration of play can mitigate the noise effects. We understand anecdotally that tennis is only played intermittently at the moment (rather than continuously from 9am to 10pm when the courts are stated to be available for use) and possibly 5 hours actual play per day would be a reasonable estimate of court usage. On this basis, the 'noise rating level' for tennis would be 5dB less than the predicted levels shown in the noise contours shown earlier in this report. If actual tennis usage were up to 8 hours across the 9am to 10pm day, the outcome would be 3dB less than the predicted levels.

If the duration of play of pickleball was controlled by the OBRS or by the OBRS's court manager (Insite Security), so that pickleball could occur only from 9am to 5pm, then the noise from pickleball could also be mitigated by 3 dB. If, as with tennis, pickleball in practice was played for no more than a total of 5 hours across the day, 5 dB of mitigation would apply.

The selection of quiet equipment (bats and balls) can provide a separate noise reduction of up to 10 dB. This equipment could be purchased by the OBRS and stored inside the security fence in a locker for the players use. Rules could perhaps be implemented to avoid use of private (noisier) equipment. Or if that is not practical, strong encouragement could be given to using the OBRS equipment.

Audio Demonstration

A subjective demonstration of the sound from pickleball and tennis was played to some members of the OBRS committee in January 2025. The noise was experienced on an outdoor deck overlooking a recreation reserve by playing recordings through a high quality loudspeaker at distance. The recordings of both pickleball and tennis were calibrated to provide noise levels of 47-48dB L_{Aeq} on the deck – the level predicted at the closest houses (tennis without noise barriers, pickleball with barriers).

It was generally agreed that the noise of tennis (unmitigated) and pickleball (mitigated) were similar. Some members of the committee regarded the noise from both as reasonable, but some others found the noise from pickleball potentially annoying.

Conclusions

MDA recommend the following conservative approach is applied if it were decided to install two dedicated pickleball courts at the Mangatawhiri Road courts. The result of this approach will be that the noise rating level (including SAC penalty) in the adjacent properties will be approximately 10dB below the 50 dB noise limit in the AUP and the likelihood of disturbance to residents should be minimised. This worst-case noise rating level is based upon the predicted noise level at the façade (45 dB) plus 5dB penalty for SAC, less 3 dB for duration correction (8hours play) and less 5 to 9 dB for equipment mitigation.

The noise rating level on Sunday will be 2 dB higher than other days due to the AUP rule which specifies 'daytime' on Sundays as 9am to 6pm. This will still be below the AUP noise limit and further mitigation (duration and quiet equipment) could be implemented if necessary.

This conservative approach of approximately 10 dB less than the AUP limit is recommended following the adverse response experienced in the USA and some negative feedback from Omaha residents already. Houses further away than the nearest house used in this analysis will receive lower noise levels again.

The pickleball courts should be installed on the western court at Mangatawhiri Road and we recommend the following mitigation be implemented;

- A 2.5m barrier fence should be installed on the eastern and southern boundaries of the courts (construction options are provided in Appendix C)
- The playing of pickleball should be restricted to 9am to 5pm by the OBRS. (As the court surface is to be marked out for both tennis and pickleball, tennis could be played on the same court for the normal hours including after 5pm).
- Quiet paddle bats and balls should be provided to the players and become the mandatory equipment in use if that is practical, or strongly encouraged otherwise.

It is our opinion, from the simulated listening tests and the mitigated noise levels detailed above, that the noise from pickleball would be reasonable given the normal expectations of living adjacent to a pair of tennis courts. This expectation is similar to the expectations for houses located adjacent to a golf tee (where high frequency impulsive noise is experienced) and waterfront properties on the estuary experiencing jetboat and ski boat noise.

Some residents who have built up a preconceived negative opinion of pickleball from reading on the internet, may in practice find the noise annoying despite it complying with the AUP noise limits by a significant margin. This does not necessarily mean the noise is unreasonable.

The installation of noise barriers would also reduce the noise from tennis to the benefit of residents.

APPENDIX A – PICKLEBALL NOISE CONTOURS WITHOUT MITIGATION

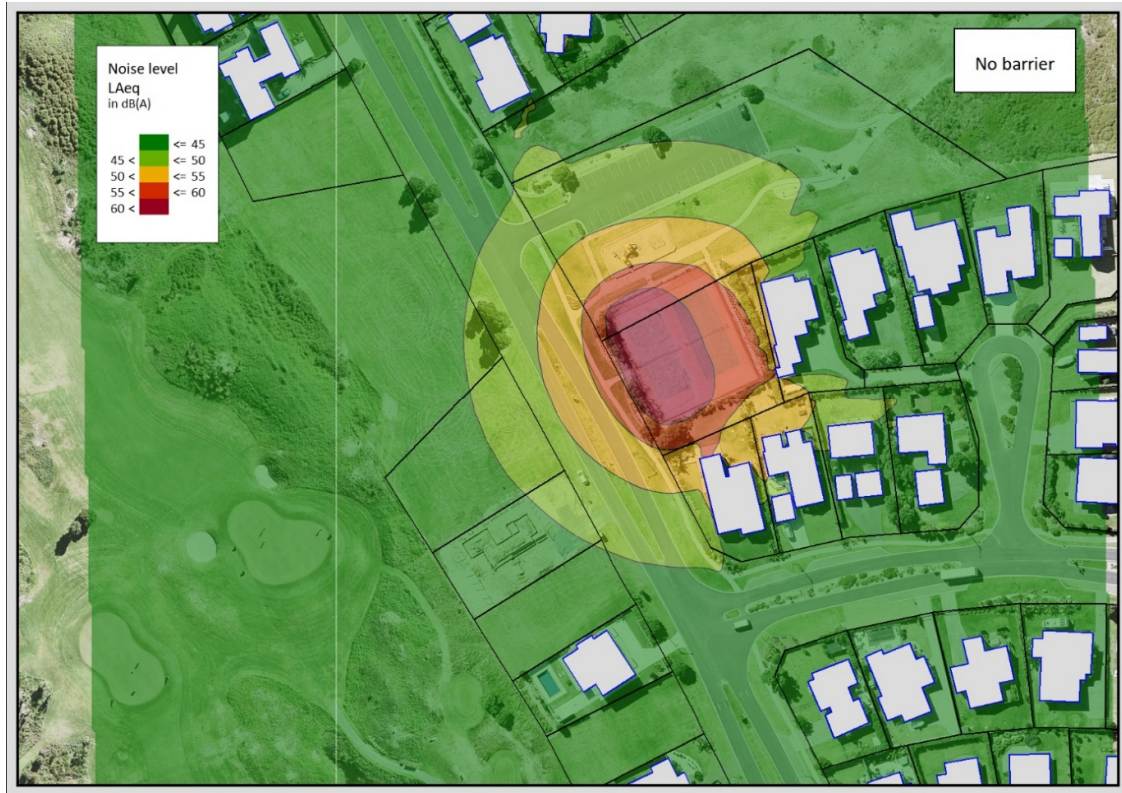


Figure 3 - Mangatawhiri Road courts

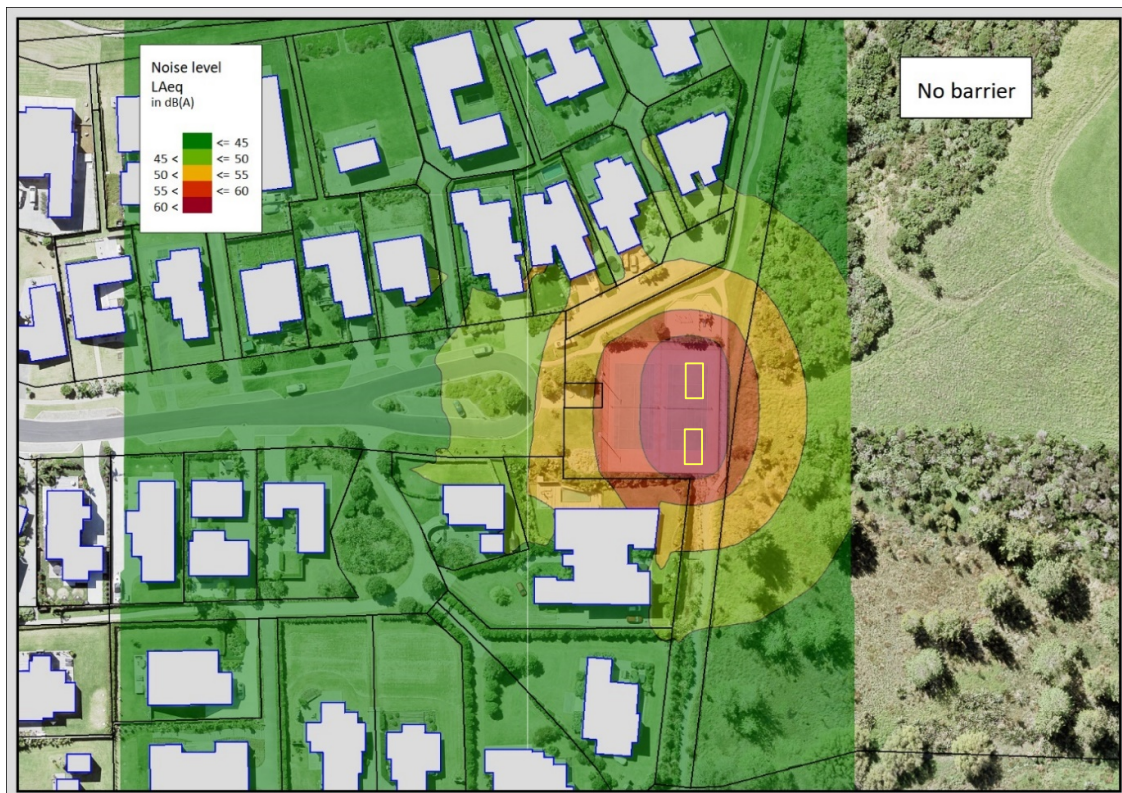


Figure 4 - Taumata Road courts

APPENDIX B – REFERENCES NOISE-CON 23

3:40 PM	Pickleball Sound 101 - The Statistics of Pickleball Sound and a Recommended Noise Standard for Pickleball Play
4:00 PM	Barry Wyerman ¹ , Robert Unetich ² ¹ Pickleball Sound Mitigation LLC, HURON, OH, ² Pickleball Sound Mitigation LLC 🔊 Recreation facility noise challenges (e.g., pickleball, dog parks, playgrounds, breweries; and usage during nighttime hours)
4:00 PM	Pickleball Sound 102 - Time History and Spectral Analysis of Pickleball Sound
4:20 PM	Barry Wyerman ¹ , Robert Unetich ² ¹ Pickleball Sound Mitigation LLC, HURON, OH, ² Pickleball Sound Mitigation LLC 🔊 Recreation facility noise challenges (e.g., pickleball, dog parks, playgrounds, breweries; and usage during nighttime hours)
4:20 PM	Pickleball Sound 103 - Mitigating Pickleball Sound - Is Pickleball Compatible with Residential Environments?
4:40 PM	Barry Wyerman ¹ , Robert Unetich ² ¹ Pickleball Sound Mitigation LLC, HURON, OH, ² Pickleball Sound Mitigation LLC 🔊 Recreation facility noise challenges (e.g., pickleball, dog parks, playgrounds, breweries; and usage during nighttime hours)
4:40 PM	Pickleball Noise & Political Ploys: A Cape Cod Case Study
5:00 PM	Zachary Weiss ¹ , Jeffrey Komrower ² ¹ Noise Control Engineering, LLC, Billerica, MA, ² Noise Control Engineering, LLC 🔊 Recreation facility noise challenges (e.g., pickleball, dog parks, playgrounds, breweries; and usage during nighttime hours)
5:00 PM	Case study: measurements and modeling of noise from pickleball versus tennis play, and estimation of proposed noise reduction measures
5:20 PM	Mike Greene ¹ , Jonathan Leech ² , Connor Burke ³

Appendix C – Noise Barriers

A pickleball noise barrier could be made of any solid material with a minimum surface density of 3 kg/m^2 . It is important that there are no significant gaps in the barrier and that the structure and materials are long lasting. Acceptable materials include (but not limited to), mass loaded vinyl, timber, plywood, and fibre-cement. Drawings of three timber options are attached below which could be used for pricing purposes.

Mass loaded vinyl is used commonly in the construction industry to reduce noise. This is typically a temporary installation as shown in the photograph below. A local supplier Hushtec also has a customised pickleball barrier available known as ClearPlay 360 TM. If mass loaded vinyl is to be attached to the existing tennis court fences, wind loading would need to be investigated.

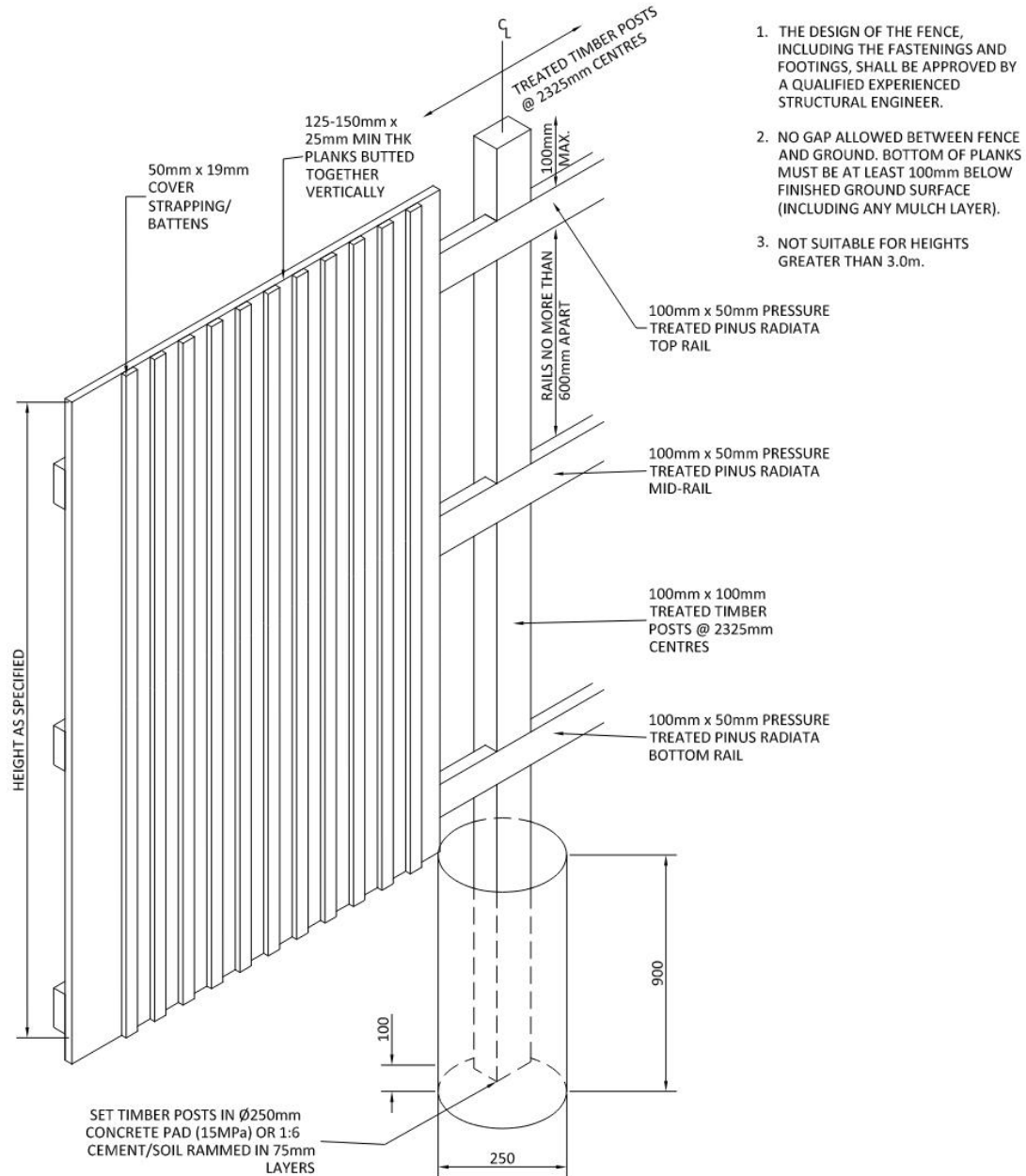


Hushtec Construction Noise Barrier



Hushtec ClearPlay 360TM

Timber Fence Options

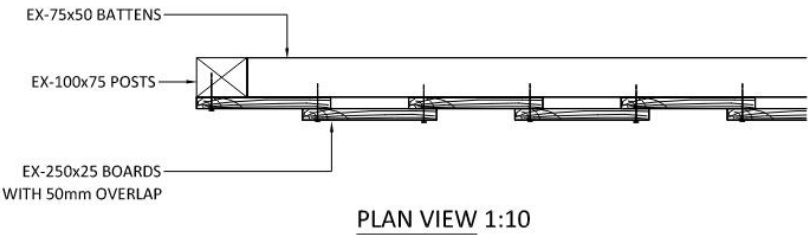
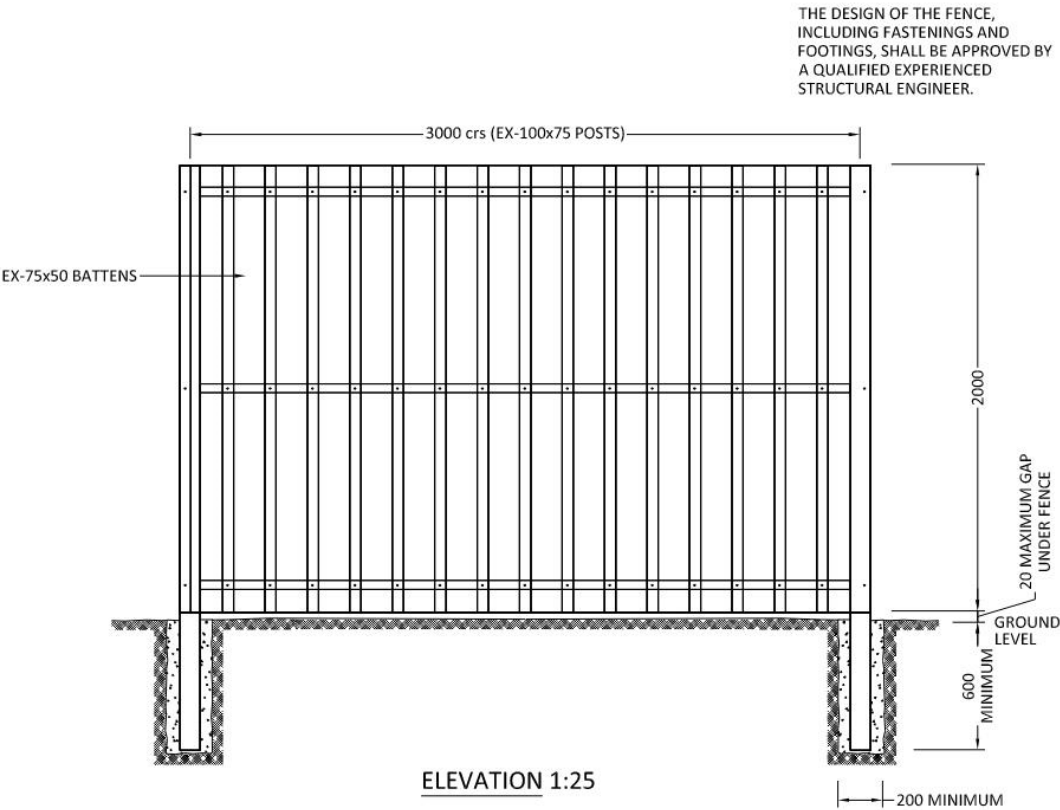


MARSHALL DAY Acoustics 	ACOUSTIC TIMBER FENCE - VERTICAL PLANKS	<small>THIS DESIGN IS THE PROPERTY OF MARSHALL DAY AND MUST NOT BE REPRODUCED WITHOUT THE COMPANY'S PERMISSION</small> MDA-ENV-FEN-001 REVISION: C
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Technical drawing showing the connection of a roof plate to a wall plate. The roof plate is 193mm wide and 35mm thick. The wall plate is 25mm thick. The connection is made using 2 x No. 75mm long galvanized nails in each plank. The roof plate is supported by a batten. Dimensions are given in mm.

BATTEN NAILING
DETAIL 1:5

MDA-ENV-FEW-002
REVISION: B



<div> <div>MARSHALL DAY</div> <div>Acoustics</div>  </div>	<div>CLOSE BOARDED TIMBER FENCE</div>	<div> <div>THIS DESIGN SHOWS FOR THE DESIGNER'S USE ONLY. IT IS THE PROPERTY OF MARSHALL DAY AND MUST NOT BE REPRODUCED WITHOUT THE OWNER'S PERMISSION.</div> <div>MDA-ENV-FEN-003</div> <div>REVISION: B</div> </div>
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