

Appendix 1: AES Memorandum

Memorandum

To: Vicki Barker, Selwyn District Council

CC:

From: Jeremy Trevathan, AES

File Reference: AC16218 – DW404 – 04 – R3

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Project: Proposed Selwyn District Plan – Right of reply comments: Noise

Pages: 7

Meeting

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Telephone

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Memorandum

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Dear Vicki,

Please find my comments below on the various issues you have highlighted.

NOISE-R1: Whether noise emitted by the Lake Coleridge Hydro-Electric Power Scheme should be expressly permitted whereby noise limits would not apply?

Based on historic noise monitoring, the Lake Coleridge Hydro-Electric Power Scheme may comply with a 40 dB L_{Aeq} limit at dwellings on Riverview Tce and Harper Place. Levels would however likely exceed 40 dB L_{Aeq} at the 114 Hummocks Road Lodge, which is closer. Noise levels are lower when the power station is not at full generation, or all doors are closed.

The SETZ zone travels closer to the power station than those existing dwellings, and it may not be practical to comply with a 40 dB L_{Aeq} limit at the closest points of the SETZ zone, where levels of 55 to 60 dB L_{Aeq} are currently experienced.

If an overlay was to be considered, the accompanying Rules should not just require sound insulation, but also permit the power station to exceed the general noise limits, provided it complied with a specified noise level at the edge of the overlay. It would be appropriate for the overlay to be based on a modelled 45 dB $L_{Aeq(15min)}$ contour for the power station, and for new dwellings in the overlay area to be designed to achieve 30 dB $L_{Aeq(15min)}$ in bedrooms (an internal design target of 45 dB L_{Aeq} is not appropriate). Given daytime power station noise levels are likely to only just exceed 'normal' residential levels very close to the power station, it would be onerous to require other habitable spaces (e.g. living, kitchen areas) to also be reviewed and upgraded.

If the overlay enabled noise levels exceeding the District Plan limits at existing noise sensitive locations, a process where these effects were quantified and examined would be appropriate, before a final decision was made.

NOISE-R3: Whether the 100 m State Highway noise overlay should be amended to an appropriate distance based on noise contours measured after the best practicable option has been adopted and appropriate noise modelling carried out?

A blanket overlay based on 100 metres is simple. But the parallel rules also proposed reduce the overlay to 50 metres if a road noise barrier is provided, and remove it completely if the actual noise level is low (less than 57 dB L_{Aeq}). So, the Rule does have some nuance.

Conceptually, there is no issue with refining the overlay to try to better follow a 57 dB L_{Aeq} contour each side of State Highway. However, in reality that is a major exercise, will immediately begin to be out of date, and will involve detailed modelling of hundreds of kilometres of road which dwellings will not ever be built in the vicinity of (just to capture the few instances where they will). In his paragraph 11.1 Mr Styles suggests that “significant parts” of the State Highway network in Selwyn have already been modelled. The Christchurch Southern Motorway Stage 2 (CSM2) is a small part (8 km) of hundreds of kilometres of State Highway in the District. The National Road Noise Mapping project discussed by Mr Styles and Dr Chiles and conducted by my colleague James Boland was a high level ‘meta data’ exercise that is already out of date, and was not intended to be the basis of this type of overlay.

An intermediate option would be a two-tiered system, with an overlay based on nominally 100 m where the speed limit is 70 to 100 km/hr and reduced distance at 60 km/hr or lower. However, that would make the rule more complex, and so needs to be balanced against how often this change would save a developer money - given the current 57 dB L_{Aeq} ‘exemption’ already provides a simple route forward where traffic noise levels are genuinely low (likely at a modest cost to a developer, as Mr Styles evidence confirms, and is discussed further below). I consider that the CSM2 figure which Mr Styles included on page 27 of his evidence is actually a demonstration of how a 100 metre overlay, 50 metre / noise barrier modification and 57 dB L_{Aeq} in combination will provide a reasonable outcome on average - considering those parts of the highway are new and have mitigation i.e. low noise surface, bund / barrier.

In his evidence (e.g. paragraph 1.6) Mr Styles refers to land in the 100 m overlay as “affected” – when there may well be very little or nothing required from a developer (if there is a traffic noise barrier in place and the site is between 50 and 100 metres from the road, or external noise levels are actually low). I disagree with Mr Styles implication that if a site falls within the 100 m overlay, even the process of engaging an engineer to determine whether the 57 dB L_{Aeq} exemption applies would likely involve significant delay and cost. As he records in his para in 8.3(a) the cost could be as little as \$750 (in my experience \$1000 + GST may be typical and there is considerable competition for this type of work with regard to both cost and timeliness).

If there is more than a nominal “effect” (e.g. dwelling upgrades are shown to be required) it is because the development would have otherwise created an unhealthy living environment. In his paragraph 8.3.b Mr Styles refers to a developer having to engage in this process as a burden – however if the analysis shows upgrades are required, it means the project involves building something new in an existing loud area – so it is difficult to see why some cost is not reasonable. I note the large costs Mr Styles refers to in his paragraph 8.3.c are for “dwellings very close to major roads...” and so are not typical.

Are there ‘existing issues’?

I was unclear if the overall Kainga Ora position is that “there is an obligation to prove a threshold of amenity impact had been reached and there was no evidence that we have reached that point”, or the position advanced by Mr Styles which was that “there are significant effects arising now”. I note the lack of submissions on this issue, and the current Rules in the Plan which have helped proactively manage the situation.

In his paragraph 4.15g Mr Styles could be understood as suggesting that because there is potentially a very complex and difficult problem with existing noise sources and dwellings, no effort should be made to protect the occupants of new buildings (via a well-tested and practicable method). My understanding of the Auckland Unitary Plan process was that these same sorts of rules were proposed, but they were rejected by the Panel because cost concerns were raised late in the process, and there was no evidence on that either way. That

means that in Auckland dwellings continue to be built in unhealthy environments. That is not an outcome to aspire to in my view.

Are there practicable ways to eliminate 'existing issues', thereby also removing the need for new in-fill housing to be reviewed?

In his paragraph 7.17 Mr Styles states that existing traffic noise “could be reduced significantly in many cases” (emphasis added). I consider that to overstate the reality of the situation. Methods for reducing noise from existing roads are finite:

- Apply a low noise surface. This typically involves a high initial cost, and low / moderate noise reduction (4 – 6 dB). There is also a high ongoing maintenance cost. There will still be dwellings exposed to greater than 57 dB L_{Aeq} so a sound insulation Rule would still be needed.
- Redirect traffic / heavy vehicles. If the number of vehicles could be halved, there would be a 3 dB reduction. This will have an effect on the efficiency and function of the road network. Traffic engineering advice would be required as to the significance of that effect. There will still be dwellings exposed to greater than 57 dB L_{Aeq} so a sound insulation Rule would still be needed.
- Construct barriers. Without a complete network redesign (as happens with large motorway alteration projects) this will block / remove peoples driveway access from the road. The reduction may be 0 to 10 dB, depending on what openings were required for access. There will still be dwellings exposed to greater than 57 dB L_{Aeq} so a sound insulation Rule would still be needed.

In his paragraph 7.3 Mr Styles states that “the most effective way” to address the issue is to reduce noise at source. As demonstrated by the bullet points above, the reality is that while reducing noise at source may be ‘effective conceptually’, there are significant challenges in reality.

With reference to Mr Styles paragraph 7.11 – I agree the proposed Rule (sound insulation of dwellings) would be the “least preferred option for reducing noise effects” if the context was the construction of a new road close to existing dwellings. But that is not the context in which the Rule will be applied. The most practicable option when considering *new houses* looking to locate next to an *existing road* is much more likely to be the sound insulation of those dwellings.

Rail noise

New construction next to railways in Selwyn is rare in my experience, and it does not seem to be a reasonable balance to conduct significant noise measurement and modelling work for the entire network ‘up front’, to save a modest cost for the handful of projects which the Rule may be relevant to over the next 10 years.

With regard to the suggestion that the current level of railway line use should be the basis for analysis - if new houses are built close to a railway line on the basis that the current level of use is low, this risks either restricting future railway use to that level, or exposing people in the future to inappropriate levels of noise.

NOISE-R3: Whether rules which require vibration limits to be achieved should be removed?

State Highway vibration

I agree with Mr Styles that at 40 metres from a State Highway it is unlikely the vibration levels will exceed 0.3 mm/s unless there is some significant defect or feature in the road surface. Based on data we have on file 30 metres would be adequate, and even at 20 metres you would only be likely to ‘miss’ a small percentage of situations. There may be other constraints on how close a new dwelling could be built to a State Highway which mean that 20 metres or less is very unlikely – for example I understand Rule 3.13 of the ODP states that buildings are permitted when more than 20 metres from an “Arterial or Strategic Rd” (which would seem the only justification for removing the rule completely).

Rail vibration

In paragraph 1.13 I understand Mr Styles to accept that controls on rail vibration may be appropriate, but he in essence questions the size of the overlay, and if anything can be done to reduce vibration at source. From the Dr Chiles evidence (paragraph 5.1) it is not obvious what further is practicable and should be done to reduce rail vibration. Mr Styles only suggestion is to reduce the speed of trains, however there is no evidence as to what extent that is practicable, and how much it would reduce the overlay extent.

Vibration is situation specific as it depends on the ground conditions, but from a review of distance / level predictions and measurements, 0.3 mm/s at 60 metres from rail is not an unreasonable threshold for higher speed lines unless track design mitigation was significant (e.g. ballasted track with ballast mat, or floating slab track). For lower speed portions of track, a 30 metre overlay could be considered. However, again only a few instances are likely to be observed in the District of new dwellings being constructed at either of these distances, unless in the context of a major new residential subdivision (which is likely to go through its own consenting process).

NOISE-R7: Whether the activity status of NOISE-R7.3 (development within the 65 dB Noise Control Overlay) should be changed to restricted discretionary rather than non-complying?

The West Melton Rifle Range (WMRR) contours are based on a busy future scenario where the average daily use is:

- Wooster Ranges - 4,800 shots per day with each shot typically generating approximately 65 L_{AFmax} at the inner control boundary.
- Grenades - 80 per day each generating approximately 95 L_{AFmax} at the inner control boundary and mortars (5 per day) and detonations (one per week) which are even louder.

The relevant noise issues with regard to whether new residential should be non-complying within the inner control boundary (which is based on the 65 dB L_{dn} contour) are as follows:

High L_{AFmax} levels

A body of guidance is available with regard to reasonable L_{AFmax} noise emissions associated with impulsive firearms noise. A review of international shooting noise regulations¹ outlines that typical noise limits at residential receivers generally fall between 50 to 60 dB L_{AFmax} , with some exceptions (both higher and lower limits). Other guidance² indicates that the threshold for annoyance is in the order of 60 – 65 dB L_{AFmax} . We have undertaken work relating to noise emissions from several existing gun clubs in NZ and have typically recommended noise limits of between 50 – 55 dB L_{AFmax} at residential receivers. The Court discusses that, and the impact of levels over 65 dB L_{AFmax} in Harvey vs NCC³.

Other guidance from the UK Chartered Institute of Environmental Health regarding Clay Target Shooting⁴, uses a Shooting Noise Level (SNL) to quantify noise effects, which is the average L_{AFmax} of the 25 loudest shots. This guidance states that annoyance is less likely to occur at a mean SNL of below 55 dB L_{AFmax} and highly likely to occur at a mean SNL above 65 dB L_{AFmax} . This guidance also states:

¹ V. Desarnaulds *et al.* *Shooting noise regulation review of various national practices*. Proceedings of Internoise 98, Christchurch.

² Sorensen, S. and Magnurror, J. *Annoyance caused by noise from shooting ranges*. Journal of Sound and Vibration, 62(3), pp 437 – 442, 1979.

³ Decision No [2010] NZEnvC98 ENV-2009-WLG-000221, ENV-2010-WLG-000048 Interim Decision – In the matter of applications under section 316 of the Resource Management Act 1991 between Nelson City Council, Delaware Bay Residents (Applicants) and Sharon Harvey and Bruce Harvey (Respondents)

⁴ Chartered Institute of Environmental Health (2003) *Clay Target Shooting. Guidance on the Control of Noise* [online]

“At shooting noise levels below the mid 50's dB(A) there is little evidence of significant levels of annoyance at any site, whereas for levels in the mid to high 60's, significant annoyance is engendered in a majority of sites. For levels in between however, the extent of the annoyance varies considerably from site to site”

The studies reviewed also indicate that the range in acceptable noise levels from activities involving firearms noise is dependent on local conditions, including community attitude to the noise generator, cumulative shooting time, number of shooting days, time at which shooting occurs, predominant meteorological conditions and how the site is managed.

Based on the above, having an 'inner control boundary' for the WMRR within which new residential is discouraged appears appropriate where the noise from the most frequently audible aspect of the activity (Wooster Ranges) is typically 65 dB L_{AFmax} . Coincidentally, this is also where the overall Tonkin and Taylor (T&T) average 65 dB L_{dn} contour falls for the activity. The fact that at this location there are also less frequent, but regular, impulsive events with a much higher level (grenades, mortars and detonations) only further supports this position as the minimum appropriate protection.

Other precedent for a 65 L_{dn} inner control boundary

As discussed our peer review, the use of the L_{dn} parameter (which takes into account both the number of noise events and level of noise events, with penalty for night time noise) is common in New Zealand for port and aircraft noise. The dose / response relationship between L_{dn} level and annoyance is similar between sources, and there is no reason to conclude that the 65 dB L_{dn} calculated by T&T for the WMRR means something different in terms of average exposure and likely effects, than what an exposure of 65 dB L_{dn} means in those other New Zealand Standards. In fact, to the contrary, the T&T approach uses a longer averaging period than those Standards, and impulsive noise from firearms and explosions is disproportionately annoying compared to aircraft or port noise - so the T&T WMRR 65 dB L_{dn} may potentially even underestimate possible annoyance. However, that is balanced in this case by the 'busy period 10 years in the future' scenario the T&T contours are based on (which it seems may be conservative compared to what is actually currently experienced), and the assumption that favourable propagation conditions always exist when noise is emitted (I understand that the opposite is in fact true – such conditions are actively avoided).

Those other Standards describe the 65 dB L_{dn} as:

- NZS6805:1992 Table 1: *New residential, schools, hospitals or other noise sensitive uses are prohibited. Steps shall be taken to provide existing residential properties with appropriate acoustic insulation.*
- NZS6807:1994 6.3.1 with regard to 65 dB L_{dn} “...where the current or predicted future port noise is above a desirable limit for residential uses, hospitals, and schools”. Table 1 “New noise-sensitive activities should be prohibited activities”.

The one reference T&T have provided which is specific to firearms noise and uses a metric similar to L_{dn} is complicated by the fact that the recommendations are limited to 'large calibre weapons' and it uses a slightly different metric to the L_{dn} – however the level where “noise-sensitive land uses are not recommended” is 70 CDNL – which is relatively similar to 65 dB L_{dn} .

Again, overall conclusion from that is that on balance the T&T 65 dB L_{dn} WMRR contour is likely to be a reasonable threshold for the onset of significant new land use restrictions.

Robustness of the noise reports and peer review

In line with the above, I note the peer review did not read as a complete unconditional endorsement – but rather our view was that while there may be different ways of approaching the analysis, on balance the contours and associated controls seem to be reasonable. The questions at the Hearing about the Malcom Hunt

Associates (MHA) earlier contours being smaller were answered in the T&T report, which stated in section 4.4:

“The WMRR SoundPLAN noise contour is comparable in size and shape to the MHA report. However source data for the new weapon types has resulted in a lengthening of the outer noise control boundary contour to the south of the range in the vicinity of Halkett Road / Weedons Ross Road”

My understand is that in summary, the MHA contours were for the rifle ranges only. When explosive weapon types were added in, the contours became larger.

NOISE-REQ1: Provide further clarification around the KNOZ noise limits and whether they are appropriate?

For general noise, 60 dB L_{Aeq} daytime and 45 dB L_{Aeq} night time are reasonable for residential units in a mixed-use environment. The main way the KNOZ limits could be considered ‘incompatible with residential living’ is with regard to the night time construction noise limits. An appropriate solution is to move KNOZ up to row 1 in NOISE-TABLE6.

DPZ-SCHED1: Whether the proposed extension of the Noise Control Overlay (outer and inner) is supported?

The issue of “permitted noise emissions” is still not completely clear to me – Mr Walton’s paragraphs 6.2 and 6.2.3 suggests noise is being included in the “permitted noise emissions” modelling which is different to “initial estimates”. However overall, I agree with the evidence that the proposed new Noise Control Overlay is ‘only a minor change’ from the accumulation of what is already consented or occurring, the State Highway noise already reduces the amenity in the area, and that existing dwellings will not be significantly affected.

I have also reviewed the document *Hearing 26 PJ Hindin DPZ-SCHED1 Submission Point FS016* dated March 2022 as requested. Mr Hindin outlines a number of steps which could be taken to reduce noise from container handling vehicles. I have spoken with Mr Walton who I understood to essentially agree that modifying the equipment would be possible. Mr Walton confirmed he had discussed various options with Synlait in the past. In terms of the most practicable approach, I understand from Mr Walton that Synlait consider that purchasing quieter machinery when older equipment is due for replacement is a reasonably balanced approach, as opposed to attempting to also modifying existing equipment. Given that the noise in the case of the Hindin site is received at a shed and forestry block, with a nearby State Highway and railway line, I consider that the proposed Noise Control Overlay will not enable an unreasonable level of noise. Therefore, implementing progressive mitigation over a longer time period as container handling equipment is replaced is a satisfactory approach.

Additional issue: Whether the existing West Melton Rifle Range designation could be altered to include a Noise Management Plan condition?

Based on the submitter presentations, this appeared to be a reasonable addition to explore. I have subsequently reviewed the NZDF Designations hearing evidence and listened to their responses to questions, and provided input on the NMP condition which is now recommended in the Designations Right of Reply report.

There has also been some discussion about possible ‘noise monitoring’ with respect to compliance with the T&T contours. That would be complex. As discussed above, the T&T contours are based on:

- Wooster Ranges - 4,800 shots per day with each shot typically generating approximately 65 L_{AFmax} at the inner control boundary.
- Grenades - 80 per day each generating approximately 95 L_{AFmax} at the inner control boundary and mortars (5 per day) and detonations (one per week) which are louder.

T&T have measured the noise generated by those sources and to calculate the L_{dn} have then (effectively) multiplied the number of events, by the noise level typically associated with each event. So 'monitoring' could be conducted by either:

1. Requiring the NZDF to report how many of each event type had occurred in the past 3 months (or other time period), which could then be inserted in the L_{dn} calculation (i.e. assuming the noise level from each event is as T&T originally measured). If the daily average number of events for the period was exactly as set out above, the L_{dn} contour would also be exactly the same. If there were less events, it would be smaller.

Or,

2. Also requiring noise level measurements – to in effect check that the 'noise level from each event' data T&T have previously measured and used in the model is correct. This approach is more problematic because the activity is sporadic and would potentially require measurement over a long time period, and then significant post-processing to extract the relevant noise events from the data, and attempt to identify the source and location of each event that had been captured. What was measured would also depend on the metrological conditions on those day(s), and the exact location of the more mobile sources (hand grenades etc). Many assumptions would then be required as all those fragments of data were inserted back into the model. The end result would therefore likely reflect the accumulation of multiple assumptions, than a genuine 'verification' of the contour (which is also a 1 year average). This is different to the original T&T exercise, where the shooting and measurements were 'staged' or at least coordinated with the NZDF, so repeatable 'clean' measurements could be obtained.

Overall, 'noise compliance monitoring' with respect to the contours is therefore challenging, and is unlikely to be practicable.

I trust this is of some assistance.

Kind Regards,



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