EVIDENCE FOR PC 14 HEARING

BROOKE MCKENZIE.

I strongly believe that the determination of the airport noise contours should be removed from PC14 for the following reasons and ask that common-sense prevail.

1. The new Government has a policy to instruct councils to determine 30 years of developable land and will, if not followed, determine for them. I have been given an email confirming that this policy stands. Their intent is greenfield development and not intensification.
2. ECAN is the sole decision maker when it comes to the db level of the new contours which will be determined in their RPS late 2024.
3. The new contour at 50dbn is, by being included in PC14, will go into the district plans of Selwyn , waimak and ccc. This is not only irresponsible but nonsensical when ECAN is in the process of new contour determination with contours likely to come into line with NZ6805. This is premature as ECAN has not determined the new contour which may well be 55-57dbn.
4. CIAL are pushing for this hearing to reconfirm the 50dbn contour on the revised 2023 contour and increase their level of control over landowners by adoption of the OUTER ENVELOPE CONTOUR and not the AANC preference of the review panel. This expert review is OWNED BY ECAN and is in their domain to make determination for their RPS, not this PC14 hearing. In my opinion CIAL should not be pushing this line as in effect ECAN have ownership of the review for their determination of contours for the RPS in 2024.
5. CCC, SELWYN,WAIMAK AND ECAN should be sitting down together and working contours for the RPS and remove totally fromPC14 scope. This is just simple commonsense.

Brooke McKenzie: #183

Attachments provided:

1	Commonsense
2	PC 14 Submission
3	Emails re PC 14
4	Contour
5	Sleight of hand
6	Extracted pages from Memo to Hearings Panel on Hearing Structure and Issues raised by Momentum
7	Ecan Christchurch Airport Noise Contour Review AADvs Outer
8	Miles Premises Ltd. #883 #2100 and Equus Trust #2102 – Evidence – John Paul Clarke – Airport Noise
9	Briefing Document
10	Email
11	Image

(1)

To:

Mayor of Christchurch.
Christchurch City Councillors
Mayor of Selwyn
Selwyn Councillors.
Mayor of Waimakariri
Waimakariri Councillors

Chair of Environment Canterbury
Environment Canterbury Councillors

Chief Executives. Christchurch City Council, Environment Canterbury, Selwyn Council, Waimakariri Council.

Senior Planning executives: Christchurch City Council, Environment Canterbury, Selwyn
Planning engineers
Planning lawyers

PLAN CHANGE 14 CCC, ENVIRONMENT CANTERBURY RPS, INTERNATIONAL EXPERT PANEL REPORT RE CONTOURS AT CHRISTCHURCH AIRPORT

I am representing myself and a large landowner group affected by contours.
We are deeply concerned to see the lack of professionalism, and lack of co-ordination in relation to the above. The different entities are boxing on with their plan changes in relation to the airport contours in the various district plans through PC14, yet the deciding body being **Environment Canterbury**, who will determine the contour for future development, do not undertake their reassessment until late 2024. It is their decision as to whether new contours within which developments can take will be the current Outer Control Boundary (OCB) 0f 50 dbn or new contour of 55dbn as per new Zealand standard 6805:1992 and in line with every other New Zealand airport or even 57dbn with a larger section Rural residential of 1 acre to create a soft fringe to the city. This wouldl in future protect the airport from long term encroachment but be more than reasonable by world standards.
This lack of co-ordination simply means that as PC14 progresses and as per Environment Canterbury's own acknowledgement the existing 50dbn contour will remain in effect until their revision later in 2024 which may well change the contours to 55 or 57 OCB. In fact the contour OCB to 55/57 is well supported within CCC (staff and majority councillors), ECAN (staff and majority councillors) plus central government ministers of both political persuasions. However Sarah –Jane Oliver of the CCC in her opinion on Plan change 14 seems to opinion a trade-off by retaining 50dbn in district plan. ECAN personal have informed me that ECAN hold a contrary view.

This to me, as a ratepayer, points to either one upmanship between the CCC and ECAN , NOT to see the huge additional expense by not co-ordinating (all parties)at the sensible early stage by fast tracking or by public plan change to work within the time frame of PC14.

The International expert panel spent over one year to come up with their final report which is now online. ECan_CIAL_FinalRemodelledNoiseContour_IEP_Review_Report_Final_28Jun2023%20(1).PDF This review has cost ECAN over $500,000 and from the CIAL input I would assess their cost for the report would be in excess of $1,500,000 (estimated as they would not give me the information under the Official Information Act, Whereas ECAN did).
The report must be complimented in that it is comprehensive but more importantly written in easily understood format for the average reader. However what around $2 million of ratepayer and CIAL shareholder money has achieved is to show the determination of 50, 55 and 65 dbn contours as agreed by the ECAN expert panel and CIAL expert panel. It is simply an agreement of lines determining the position of those contour lines which at the end of the day are not much different from the 2008 contours. What was further determined that the ultimate capacity of the airport, **with improvements and runway extensions completed** will be 201,000 movements per year. I believe that the ultimate capacity of the airport should have been done on the current configuration. Be that as it may it should be noted that this ultimate capacity **will not be reached before 2084.** That is 61 years away.

Two scenarios have been introduced in the report . The current OEC (Outer envelope) and AANC (annual average noise contour). There are differences with the International Expert panel advising ECAN by memo that AANC was advised yet in the report they say both are recognised internationally. ECAN have a further unpublished document comparing OCB of comparable airports to CIAL around the world. All have much more lenient contours than chch.

With such large expenditure one would expect the shareholders of the airport (CCC 75%), CCC councillors and involved staff, ECAN councillors and involved staff , greater Christchurch partnership and involved staff **form a group of involved entities to come to some determination** of where the changes to the contours will be made. **Done immediately to notch into PC14 or PC14 delayed until a OCB determined**
There are only 3 options.

1. OCB remains at 50dbn which stops any development to the west as the status quo.
2. OCB goes to 55dbn as per NZ6805 and every other airport in New Zealand. Some in fact allow development into 55-60 dbn for certain types of development.
3. OCB goes to 57dbn which is still restrictive by world standards creating a rural residential soft fringe acting as a buffer between intensive development and the airport.

Already ECAN staff know exactly where their decision will fall. They have had a long time talking with experts, determining productive land, determining where the so called "reverse sensitivity" issues lie, the safe hard development land and the interests of the city for long term development. CCC have done the same as both councils have screeds of information going back 30 years. Yet why don't they have the sense to all sit down and co-ordinate a time line and **REMOVE ALL UNCERTAINTY**.

What Im saying in this open letter is not promotion of my personal opinions but pointing out a blatant dysfunction between the executive of ECAN and CCC and our elected councillors on both these elected entities who control the direction of our city and the unwarranted cost put on ratepayers by failing to see common sense to co-ordinate on parallel decision making. This includes Selwyn and Waimakariri.

It matters not what ECANS decision is. If they decide the OCB will remain at 50dbn then that is the decision. It will lock up developable land for at least until the next airport review in 10 years. That will achieve exactly what CIAL are arguing in PC14 and they quite frankly are playing the same successful game they have played for the past 35 years.

CCC have made it clear the city needs land and toward the airport is the only option. However there is a clique of employees in both CCC and ECAN who see major intensification within the city being the answer. This is to a degree a nonsense but another days argument.

The new government has confirmed they intend councils to determine a 30 year land supply around cities. They are advocates of greenfield identification and do not lean toward very high intensification within cities.

Finally CCC is the major shareholder of CIAL. Christchurch needs long term developable land. They must ask themselves does CIAL top the city's interest? If it's the city who has a better argument and a 55 or 57 dbn determined. CIAL will fight for as long as they can keeping the consultant lawyer gravy train going. As the major shareholder through a shareholder meeting CCC can determine by shareholder instruction to the board of CIAL to accept the determination of the new OCB whatever it may be, and not contest it. If they refuse replace the board.

This document I believe has a broader public interest than just the parties circulated.

Brooke McKenzie
Affected Landowners group

Submitted Date: Attachments: No

Age: 65 - 79 years

Gender: Male

NZ European

If yes, are you directly affected by an effect of the proposed plan change/part that adversely affects the environment, and does not relate to the trade competition or the effects of trade competition?: Not applicable

The specific provisions of the plan change that my submission relates to are:: Subdivision, Development and Specific Purposes Zone, Chapter 14 - Residential, Open Space, All, Other

My submission is that:

Christchurch desperately needs a large increase in ratepayer numbers to support the infrastructure and enhancement developments (i.e. Stadium) to spread the rate burden over a wider ratepayer catchment so to hold annual rate increases to an acceptable level. Unless this increased catchment is realised rate increases will reach a point of unaffordability for current (plus %over time) ratepayers. The 38% projected rate increase over the next 5 years is unacceptable. If the ratepayer base is not increased then projected council development will have to be curtailed, time line extended or covered by borrowing which the 17% current debt servicing will blow out and eventually have the same end result of containment in future budgets.

50000 houses will have to be built within Christchurch city boundaries within the next 30 years. Since the earthquakes we have lost an incredible number of ratepayers to Selwyn and Waimak because of very unwise decisions by council and the minister using the LURP act to rezone land in the Halswell area which apart from being very expensive TC2 and 3 to develop, was totally unsuitable and has led to storm water problems semi rectified by swales and other flood diversion actions. The expensive development costs of subsequent sections and builds led many homeowners to venture outside Christchurch to buy equivalent or better for substantially less $, with change.. These unwise decisions

made to protect airport contours have cost this city dearly. The Halswell land continues to be developed on a flood plateau that is the catchment tributary for the Heathcote and Avon rivers. With climate change and the insanity of the council and minister's decision will be rewarded with continuous flooding. Still subdivisions get approved into these totally unsuitable areas because there are currently few alternatives.

This city needs land for subdivision and it has been widely agreed for 30 plus years that the most suitable TC1 land has been the western fringe out to the airport. There has never been any argument about this fact. The impediment has been protection of the airport and the powers that be persuaded that an outer control boundary (OCB) of 50dbn was the limit for residential and other development. This was determined by a very persuasive airport company and their consultants that development within this band was detrimental to health and may lead to the airport being curfewed. No one wants the airport to be curfewed and the remedy proposed will ensure their protection. However every other airport in New Zealand including Auckland (UNCURFEWED) has accepted the 1992 standard NZ6805 with an OCB of 55dbn.

The Government has recently instructed new rules for intensification of housing. This in effect is offering one type of development in apartment type buildings. The way Christchurch has fought back and determined such development to certain areas is in my opinion the correct one. However on saying that the determination to force people into such accommodation is wrong. This after all is the Garden City. We require, and will continue to require, a diverse range of housing types. Small to larger apartments will suit a sector of the homeowner but others with families will continue to want the "quarter acres section" whilst the small holdings of 1-10 acres will always be in demand. That is what diversity means and people must always have a choice to suit their circumstances and desires. Forcing people into one type of accommodation may well back fire.

There is currently a review underway by an international expert panel to determine the Air Noise Contours that have protected the airport from encroaching development for many years at 50dbn OCB which is the

lowest in the world. ECAN will have most probably received the final REPORT by the time PC14 is heard by Council. This report will only confirm the position of the new contours. However where they fall is not the point. The contours will simply show lines on a map and are only relevant to a decision that ECAN alone will make regarding the OCB Christchurch city will be subject to in the future. Everyone is on the same page when it comes to the fact that the OCB of 50dbn was never reasonable and that to supply the cities future requirements NZ6805 at 55 OCB will be the minimum and sensibly 57dbn inclusive.

At the same time we have a fine international airport now under management who appear to be more receptive to change and prepared to adapt. At the same time protection of such an asset is, in my opinion, desirable. In 30 years having a solid wall of houses out to the 55dbn inclusive OCB will then put pressure on to go to 60dbn OCB which even these days is very common around similar airports. The solution is in fact very simple and can be implemented under PC14 and protect both the airport and the city once the development reaches the OCB. The airport needs a buffer zone between higher density housing by creating a SOFT FRINGE of lower density housing made up of 1 acre lots creating a protective band around the airport which will stop long term future conflict. For example a 10 acre block split into 8 sections would have a single water supply and sewage disposal placed strategically to eventually link into the city system when such infrastructure reaches such developments. The fact is that such large land parcels will attract substantial homes and be extremely well treed and landscaped well before more intensive development reaches the boundary. This soft fringe buffer zone should commence at 54 and cease at 57 inclusive. Many landowners on current 10 acre blocks in this SOFT FRINGE will have no intentions of splitting their land thus maintaining desirability of close in lifestyle blocks. There's one point that's relevant. We live in a world of noise. Inner city, main city roads, motorways, in our cars and in our houses at much higher NOISE levels than close proximity to our airport. With diversity of development people have a choice and know the advantages and disadvantages pertaining to their decision. That choice is lost if councils elect to restrict variation.

I seek the following decision from the Council: The safe TC1 land commencing at 54 dbn and ceasing at 57dbn inclusive be determined as a low density SOFT FRINGE BUFFER ZONE to future protect the city from intensification infringement and airport from further OCB extension. This SOFT FRINGE to include all suitable land within the Christchurch City boundaries with approval for subdivision into a minimum of 1 acre plots.

I further seek a decision from the council that it be recognised that there are many and varied operations that by merit should determine they are suitable within contours inside and outside what is decided the OCB for SOFT FRINGE.

I am seeking that Council make changes to a specific site or sites : Approving 1 acre lots 54 to 57dbn to be established on all suitable land within the Christchurch Boundaries.

Please provide the address or area:

Do you wish to speak at the hearing in support of your submission?: I wish to speak to support my submission.

If others make a similar submission, would you consider presenting a joint case at the hearing?: No

First name: Brooke

Last name: McKenzie

Email: b.mckenzie@xtra.co.nz

Phone: 0212 307090

Address: 602 Yaldhurst Road

Suburb: Yaldhurst

CityTown: Christchurch

Postcode: 7676

Hi Brooke

Apologies for sending through more info, but this Marshall Day extract from CIAL's own November 2021 Noise Modelling Report contains a useful discussion on the AANC v OEC – note the following:

The Outer Envelope has the largest footprint and thus protects the greatest number of people from adverse noise effects by restricting development inside the noise contours. However, most of the research surrounding noise annoyance including community annoyance surveys is based on residents' perception of noise over a 12-month period which suggests that the Annual Average approach would be the best fit for representing these noise levels

This is directly consistent with what the Peer Review Panel has recommended, so begs the question as to why CIAL simply cannot accept the recommendation and move on.

Regards

Maybe they are listening

Cheers

Brooke

Sent from my iPhone

Begin forwarded message:

From: "Stevenson, Mark" <Mark.Stevenson@ccc.govt.nz>

Date: 11 July 2023 at 8:52:08 PM NZST

To: Brooke Mckenzie <b.mckenzie@xtra.co.nz>

Subject: RE: PC14 and ECAN RPS

Thanks for sharing the following. We will consider this on Monday and alternatives to it.

From: Brooke Mckenzie <b.mckenzie@xtra.co.nz>

Sent: Tuesday, July 11, 2023 3:43 PM

To: Stevenson, Mark <Mark.Stevenson@ccc.govt.nz>

Subject: PC14 and ECAN RPS

Hello mark,

Thank you for your email. I'm advised it might not be possible to combine the above. The process could be as below but with ECAN in the very near future determine their intention regarding the OCB to clear up uncertainty.

i) Ecan prepares a discreet change to the RPS which includes the new contours (50 or 55). This can be at Ecan's own initiative or at the request of either the Selwyn, Waimakariri or CCC;

(ii) The change is notified ASAP and goes through the submission and hearing process. It needs to be a fair process one that allows full rights of participation.

(iii) A hearing on those parts of PC14/ Variation 1 to Waimakariri District Plan that are affected by one or more versions of the noise contour (50 or 55) are deferred until the fast track RPS plan change is complete.

Im sure you can work out how to fast track this so all party's know where the OCB will be. It is immaterial whether the 50 is to remain or 55/57 will replace it. I would suggest it would take a working party no more than 2 weeks to come to a decision (as all information is known)which would then clarify the position held by ECAN, CCC, Waimak and selwyn for the future.

This in my opinion is just plain commonsense to have everyone on the same page and save a lot of expense down the line.

If 55 or 57 is determined the the shareholder's of CIAL can issue a shareholders directive to CIAL board to not contest new contour determination which again will save a huge amount of money.

This is in the interests of all councils as what is currently happening is is disjointed and unprofessional.

I am positive your working party will agree with my sense approach to this issue and the need to put the contour issue to bed in a quick timeframe, once and for all.

Kindest regards

Brooke

Sent from my iPhone

(4)

From: "Stevenson, Mark" <Mark.Stevenson@ccc.govt.nz>
Date: 11 July 2023 at 2:33:26 PM NZST
To: Brooke Mckenzie <b.mckenzie@xtra.co.nz>
Cc: Andrew Parrish <Andrew.Parrish@ecan.govt.nz>
Subject: RE: Contours and PC14

Hi Brooke

I have liaised with my colleague Jeff Smith at Environment Canterbury and will be discussing this further on Monday as part of a Planning Managers Group.
The proposition I understand you are seeking is a hearing as part of the RPS review that has parallel plan changes to the District Plans in respect of the Airport Noise Contours.

Thanks
Kind Regards

Mark Stevenson

-----Original Message-----
From: Brooke Mckenzie <b.mckenzie@xtra.co.nz>
Sent: Tuesday, July 11, 2023 12:12 PM
To: Stevenson, Mark <Mark.Stevenson@ccc.govt.nz>
Cc: Andrew Parrish <andrew.parrish@ecan.govt.nz>
Subject: Contours and PC14

Morning mark,
I have had notice of pre hearing meeting for PC14 on August 1.
Have you talked to your greater christchurch partnership associates and Andrew Parrish at ECAN to combine the contour issue into one basket?
I don't care how it's done as long as it is.
ECAN by now, after receiving the international expert panels $500k report know where the OEC and AANC contours fall. They know full well that reverse sensitivity out to 60db bid is a gradient not considered detrimental to that point. They know that a minimum nz6805 55db will be set. They know that cia is controlling a ridiculously low 50dbn OEC as they have an airport comparison report .
Their RPS program for end 2024 is ridiculous in light that they have ALL INFORMATION to determine a new OCB. They know (and stated -Jeff smith email) that current OCB will be retained in selwyn and waimak district plans being finalised on information that will change.
I'm hoping you are getting (as stated) the broad GCP working group together to expedite this issue into PC14 or status quo withdrawn from new district plans And replaced with status pending and/or evidence referring to contours (CIAL) and others deferred.
I would make myself available to assist in any way to bring financial savings to many entities and see commonsense promoted by CCC and ECAN on this issue.
Cheers
Brooke

Sent from my iPhone

[Christchurch City Council logo]<https://ccc.govt.nz>

(5)

Hi Andrew,

In the below evidence cial say the outer envelope contour is supported by both their experts AND ECANS EXPERTS.

ECANS expert panel recommend that AANC be used and this is supported by TT memo to ECAN.

Simple question. Are CIAL puting false info in evidence or has ECAN rolled over.?

Cheers

Brooke

Sent from my iPhone

From: b.mckenzie@xtra.co.nz

Date: 2 November 2023 at 1:19:17 PM NZDT

To: Andrew parish jeff smith

CIAL therefore supports the inclusion of the 50dB Ldn Air Noise Contour as a constraint in the draft Spatial Plan. However, the Air Noise Contour has recently been remodelled and the draft Spatial Plan mapping requires amendment to reflect the 2023 50dB Ldn Outer Envelope Air Noise Contour (as shown in Appendix B). 65 The two -year remodelling process was rigorous and robust and the final 2023 50dB Ldn Outer Envelope Air Noise Contour has been agreed by independent experts engaged by both CIAL and Environment Canterbury. CIAL's experts produced the report 2023 Updated Christchurch International Airport Noise Contours and this is available on CIAL's website.4 The report contains key information that explains the effects of aircraft noise on communities and the importance of land use planning tools to address those effects. 5 It also outlines the technical remodelling and review processes in greater detail. 6 66 The 2023 50dB Ldn Outer Envelope Air Noise Contour represents the most up to date technical information of the geographical extent of projected aircraft noise exposure within Greater Christchurch , with Christchurch Airport operating at its ultimate runway capacity. This is the correct information for inclusion in a long -term strategic planning document. B

Andrew Parish to Jeff Smith Ecan

Can you have a bit of a look into the below? I am pretty sure this is another example of us needing to be very clear as to what the evidence of the Panel actually is.

Let me know

Cheers

A

Hi Brooke

I thought it appropriate for me to respond to your question on this part of CIAL's evidence:

"... the final 2023 50dB Ldn Outer Envelope Air Noise Contour has been agreed by independent

There is a level of ambiguity in this sentence that is open to interpretation. I'm confident that the point being made here is that the CIAL modellers and Environment Canterbury's independent experts have agreed on the assumptions and inputs that were used in the modelling. There is therefore agreement that modelling of the 50dBA Ldn Outer Envelope Air Noise Contour is robust.

However, there is also agreement that modelling of the following contours is robust:

55dBA Ldn Outer Envelope

65dBA Ldn Outer Envelope

50dBA Ldn Annual Average

55dBA Ldn Annual Average

65dBA Ldn Annual Average

What has not been agreed by the experts is which of these contours is appropriate for land use planning. It is not appropriate for the modelling experts to have a position on this and the Marshall Day Acoustics report (available here - pg 29) is very clear on the scope of their work:

"This report does not consider the land use planning or compliance monitoring rules associated with the contours and is not an assessment of noise effects. Nor does this report include an assessment or recommendation on which of the two options should be adopted."

Therefore I don't think CIAL's evidence is prejudicial, although perhaps it might prompt questions of clarification from a decision making panel. Environment Canterbury has certainly not "rolled over" or adopted any position on which of these contours might be appropriate for managing activities that may be affected by airport noise.

Please give me a call if you have any further questions (027 231 5344)

Regards,

Jeff

From: Brooke Mckenzie <b.mckenzie@xtra.co.nz>

Sent: Friday, November 3, 2023 12:54 PM

To: Andrew Parrish <Andrew.Parrish@ecan.govt.nz>

Cc: Jeff Smith <Jeff.Smith@ecan.govt.nz>; Katherine Trought <Katherine.Trought@ecan.govt.nz>; Governance <Governance@ecan.govt.nz>

Subject: Re: cial evidence

Yes this is why the contours should be removed from PC14 and all parties sit down and decide where the OCB will be immediately so everyone is on same page.

Cial are irresponsible and trying to get their ideas into the DP's before ECAN has determined the contours for the RPS. Everything is back to front and the councils should be informed CIALS statement is false

Cheers

B

Appendix A – Environment Canterbury memo on Airport Noise Contours

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Memo

Date	Friday 9 June 2023
To	Senior Managers Group (SMG) and Chief Executives Advisory Group (CEAG)
CC	
From	Andrew Parrish – Planning Manager

Remodelling of Christchurch International Airport Noise Contours

The Canterbury Regional Policy Statement (CRPS) includes policies to avoid noise sensitive activities within the airport noise contour. This is to avoid compromising the operation of Christchurch International Airport as well as the health, well-being and amenity of surrounding communities. The CRPS is currently being reviewed (due for notification in late 2024) and Christchurch International Airport Limited (CIAL) was requested to undertake remodelling of the noise contours to inform the review of the CRPS.

The timing of release for the remodelled noise contours has raised a challenge in relation to concurrent district council planning processes across the Greater Christchurch Councils. These processes include the Selwyn and Waimakariri District Plan Reviews, intertwined with the implementation of the Medium Density Residential Standards as plan changes or variations across the three Councils.

This challenge was heightened when CIAL tabled a remodelled noise contour over parts of Rolleston in evidence for the hearing on Variation 1 (District Wide, Area Specific & Qualifying Matters) to the proposed Selwyn District Plan on May 10th. The "updated contours" are based on remodelling undertaken by the CIAL modellers however they were tabled ahead of completion of the technical peer review process by the Independent Expert Peer Review Panel appointed by Environment Canterbury. The technical report to accompany the updated contours has been published by CIAL today, Friday 9 June 2023, while the report from the expert review panel is still being developed.

The timing of these different processes presents a risk that different processes could be informed by different noise contours. This could lead to inconsistent outcomes across the three District Councils.

Next Steps

The report from CIAL detailing the update to the airport noise contours was released today, Friday 9 June 2023. This is slightly earlier than Environment Canterbury was expecting but it does provide the public with updated information on noise more quickly. The report by the Independent Expert Peer

Review Panel is anticipated 22 June 2023. This timing is dependent on the level of alignment between the CIAL's report and the work of the Independent Expert Peer Review Panel.

Environment Canterbury has been seeking to co-ordinate communications about the release with CIAL.

Following the release of the technical peer review report, Environment Canterbury will:

- Assess whether the remodelled contours filed in hearing evidence differ from the those published by CIAL and reviewed by the Expert Panel.
- Consider the Independent Hearing Panel's decision on Variation 1 to the proposed Selwyn District Plan, especially their judgement on whether there is a pathway to base their planning decisions on the remodelled (but not confirmed) contours. □ Seek alignment of an appropriate way forward with the Greater Christchurch Councils to ensure District Plans utilise the same information base as they review their District Plans or develop plan changes to align with the Medium Density Residential Standards.

Attachments:

File reference: (SharePoint or TRIM)

Tonkin+Taylor

MEMORANDUM

Date: July 14, 2022

To: Tammy Phillips
Ecan

From: Darran Humpheson

Subject: ANNUAL AVERAGE CONTOUR VERSUS OUTER ENVELOPE CONTOUR

The Christchurch International Airport Limited (CIAL) provided two sets of noise contours: an Annual Average Contour based on the average runway splits derived from a 10 year period and an Outer Envelope Contour which comprises the busiest usage recorded on each runway from the same 10 year period. The Outer Envelope Contour is a composite of the four max use contours (Runways 02, 11, 20 and 29).

The Annual Average Contour is based on the annual average movement numbers and does not reflect the normal busy 3 month period (no peaking factor applied). Whereas the Outer Envelope Contour is based on the worst case 3 month period. It uses appropriate peaking factors to increase the annual movement numbers to the busy 3 month period at Christchurch International Airport. The Outer Envelope Contour not only uses the highest 3 month usage for each runway, but it also applies the peak factor to establish a 'worst case' 3 month contour. The Outer Envelope Contour also includes a 10% addition to account for potential climate change effect on Runway 11/29 due to increased prevalence of nor-west wind conditions. The Outer Envelope Contour is a theoretical contour that would never be achieved.

The New Zealand Standard for airport noise management and land use planning (NZS 6805:1992) recommends that the average sound exposure is established over a period of 3 months or such other period as agreed between the operator and the local authority. In New Zealand and Australia, average contours are the norm, with or without a peaking factor applied to represent a busy period. For some airports which have reasonably consistent movements regardless of the time of the year, there is minimal differences between a busy 3 month contour and that derived from an annual average.

According to the International Organization for Standardization's ISO 15666-2021, *Acoustics — Assessment of noise annoyance by means of social and socio-acoustic surveys*, community noise exposure studies will determine community response to noise by establishing their annoyance response over the past 12 months. It is unusual for a social study to enquire about a respondents worst experience. As land based control contours use community response (noise annoyance) thresholds, the contours themselves should also be derived from situations that would normally be experienced by a community and not a hypothetical situation.

For consistency with NZS 6805 and standard practice, annual average contours with or without a peaking factor applied to represent a busy three months are appropriate.

cc: Stephen Smith, Ricondo & Associates, Inc.; Joseph Huy, Ricondo & Associates, Inc.; Erik Wilkins, Ricondo & Associates Inc.; Ian Kincaid, InterVISTAS; Ben Hargreaves, REHBEIN Airport Consulting

p:_projects\ecan\22061272_nzch peer review_operative noise contours\07_aadvsouter recommendation memo\ecan_christchurchairport_noisecontourreview_aadvsouter_07142022.docx

Before Independent Hearing
Commissioners at Christchurch

I MUA NGĀ KAIKŌMIHANA
WHAKAWĀ MOTUHAKE
KI ŌTAUTAHI

Under	the Resource Management Act 1991
In the matter of	The hearing of submissions and further submissions on Plan Change 14 to the Operative Christchurch District Plan

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Evidence of John-Paul Barrington Clarke

On behalf of submitters: Miles Premises Limited (883) and Equus Trust (2102)

20 September 2023

Applicant's solicitors:
Sarah Eveleigh | Sarah Eveleigh
Anderson Lloyd
Level 3, 70 Gloucester Street, Christchurch 8013
PO Box 13831, Armagh, Christchurch 8141
DX Box WX10009
p + 64 3 379 0037
sarah.eveleigh@al.nz | sarah.eveleigh@al.nz

anderson lloyd.

Introduction

1 My full name is John-Paul Barrington Clarke.

2 I am a Professor at The University of Texas in Austin, Texas, USA; where I have an appointment in the Department of Aerospace Engineering and Engineering Mechanics, and hold the Ernest Cockrell Jr. Memorial Chair in Engineering.

3 I have three degrees from the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, USA. I received the Bachelor of Science (S.B.) in Aeronautics and Astronautics in June 1991; the Master of Science (S.M.) in Aeronautics and Astronautics in September 1992; and the Doctor of Science Degree (Sc.D.) in Aeronautics and Astronautics in February 1997.

4 I am a globally recognized expert in aircraft trajectory prediction and optimization, especially as it pertains to the development of flight procedures that reduce the environmental impact of aviation. My research has been instrumental in changing both the theory and the practice of flight procedure design, and has spurred the global effort to reduce the environmental impact of aviation via changes in operational procedures.

5 I am also recognized globally for my work in noise propagation modelling. I was an integral member of the team that was the first to quantify how the noise directivity patterns of aircraft with wing-mounted engines differ from the noise directivity patterns of aircraft with fuselage-mounted engines, and then subsequently developed the state-of-the-art model that is used in the Integrated Noise Model (INM) to predict the "excess ground attenuation" that is observed for aircraft that are close to the ground, as they are near airports (Fleming et al., 2002). I have also developed multiple models for predicting the propagation of noise in non-standard atmospheric conditions. One such model is particularly useful for predicting noise propagation at night, when temperature inversions increase the distance over noise propagates (Clarke et al., 2004).

6 Further, I am an expert in the development and use of stochastic models and optimization algorithms to improve the efficiency and robustness of airline, airport, and air traffic operations. My research has changed long-

established views regarding the need for and the best way to achieve robust schedules, particularly in the airline industry.

7 I have received several awards for my work. Those most relevant to the matters being addressed are the 1999 AIAA/AAAE/ACC Jay Hollingsworth Speas Airport Award, the 2003 FAA Excellence in Aviation Award, the 2006 National Academy of Engineering Gilbreth Lectureship, the 2012 AIAA/SAE William Littlewood Lectureship, and the 2015 SAE Environmental Excellence in Transportation (E2T) Award.

8 In addition to my work in academia, I have served as a consultant for airports and community groups around the world on matters of noise prediction and regulations for over 20 years. Further, I have consulted for several airlines around the world on matters pertaining to their operations, including the schedule of flights and maintenance events.

9 In 2007, I was engaged by the Selwyn District Council to serve as their expert in the deliberations surrounding the appropriate extent of the noise contours around Christchurch International Airport. I ultimately ended up chairing the group, often referred to as the 'Panel of Experts,' that estimated the future operations at Christchurch International Airport and subsequently developed noise contours.

10 In 2016, I was engaged in the matter of the Resource Management Act 1991 and the Canterbury Earthquake (Christchurch Replacement District Plan) Order 2014 and in the matter of the General Rules and Procedures Proposal (Stage 3) as an expert by the following submitters (with associated submitted number): Bruce Campbell (2489); David Lawry (2514); Mike Marra (2054); Vanessa Payne (2191); John Sugrue (2567); Gerrit Venema (2091).

11 This statement of evidence has been developed in collaboration with Truls Gjestland.

12 Mr. Gjestland graduated as a civil engineer (eguivalent to M.Sc.) from the Norwegian Technical University (NTH) in 1967. Since then, he has been employed at the research institute SINTEF, interrupted only by a year as a visiting researcher at the American high-tech company Bolt, Beranek & Newman. At SINTEF, he has held positions as researcher and research

director, and continues (since his retirement) as a part-time, senior researcher. In the period 1981–1983, he was a member of SINTEF's board.

13 He developed the noise management plan for the Emirate of Abu Dhabi and has for periods acted as an adviser to the World Health Organization (WHO), the International Civil Aviation Organization (ICAO), the European Aviation Safety Agency (EASA) and the Federal Aviation Administration (FAA).

14 He is also a member of the EU's Noise Expert Group and has been a member of the "International Commission on Biological Effects of Noise" for more than 40 years.

15 His many honors include being named an Honorary member of the East-European Acoustical Association (2002), an Honorary member of the Norwegian Acoustic Society (2005), Silencer of the Year by the Norwegian Noise Association (2010), a Fellow of the Acoustical Society of America 2016, and a Distinguished International Member of the Institute for Noise Control Engineering (2023). He has also been awarded The King's Medal of Merit among other things for his achievements in acoustics (2023).

16 I confirm that the issues addressed in this statement of evidence are within my area of expertise and that of my colleague Truls Gjestland. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

17 I reviewed the following documents in the preparation of this evidence:

(a) New Zealand Standard for Airport Noise Management and Land Use Planning, NZS6805-1992, Standards Association of New Zealand, 1992.

(b) 2023 Updated Christchurch International Airport Noise Contours

(c) Christchurch Airport Remodelled Contour - Independent Expert Panel Report, Ricondo, June 2023

(d) The PC14 Section 32 report – s77K Airport Related Qualifying Matters in the Christchurch District Plan, RMG, 11 July 2022

(e) Airbiz Report – Airport Operations and Safeguarding, 14 June 2022

(f) Review of international and domestic freight trends through Christchurch International Airport – Richard Paling Consulting, June 2022

(g) Christchurch Airport Recontouring Assessment of Noise Effects – Annual Average Updated Contours – Marshall Day Acoustics – 21 July 2022

(h) Christchurch International Airport Land Use Planning, Marshall Day Acoustics, 23 May 2022

Scope of Evidence

18 The evidence is based on the combined expertise of myself and Mr. Gjestland, and will be focused on the following topics:

(a) Whether the noise modeling assumptions were appropriate;

(b) Whether 50 DNL is the appropriate noise control boundary.

Executive Summary

19 By making worst-case assumptions with respect to aircraft noise characteristics and air traffic management procedures, i.e., by assuming that aircraft source noise characteristics as well as the air traffic management procedures and thus the resulting flight tracks will not change over the next 60 years, the modelers have ensured that the contours will be significantly larger than reality. It does not make sense to assume that aircraft noise will not decline over the next 60 years.

20 In 60 years, when the demand in forecast by CIAL to be near the practical capacity, single-aisle aircraft will likely be at least 5dB quieter than the current generation of single-aisle aircraft, and the variability in flight tracks will be much lower.

21 Further, the use of an "outer envelope" contour introduces an absolute worst-case scenario for which there is no known relationship with annoyance. The dose-response curves that have been developed

internationally are based on "a yearly average exposure" and they should not be applied to an outer envelope.

22 No data has been presented that should warrant a change in today's policies regarding acceptable exposure limits for aircraft noise. Most countries that have noise regulations for land use planning have limits corresponding to about Ldn 55 dB or higher for aircraft noise.

23 Reports on an alleged increase in aircraft noise annoyance is most likely caused by non-acoustic factors such as the selection of study areas, survey procedures, and response scales.

24 There are no indications that the noise sensitivity among residents of New Zealand is higher than in similar populations.

25 The new WHO Environmental noise guidelines recommending a limit of Lden 45 dB for aircraft noise to avoid adverse health effects, is a European document not adopted by the other WHO regional offices. Aside from the European Commission, no other regulatory authority has endorsed this limit.

26 After the publication of the WHO Environmental noise guidelines for the European Region, two European countries, Switzerland, and UK, have presented new evidence that an exposure limit for aircraft noise around Ldn 55 dB is a reasonable and correct choice.

Were the noise modeling assumptions appropriate?

27 When determining whether noise modeling assumptions are appropriate, it is necessary to consider the individual and collective reasonableness of the assumptions over the entire period being modeled.

28 The CIAL Expert Team chose to use the term "ultimate capacity", defining it as the point where demand approaches the practical capacity rather than the theoretical maximum daily capacity.

29 We agree with the use of a "practical capacity" versus the theoretical maximum capacity.

30 This approach recognizes the fact that no airport, even if it is open for operation for the entire day, will have its runways fully utilized during the

entire day. This is particularly relevant for an airport such as CHC where there is a limit to the times of the day when passengers and cargo would seek to fly to and from CHC because of its location relative to global population centroids.

31 This approach is also consistent with the fundamental principles of queuing theory, where demand below the maximum theoretical capacity produces elevated but still acceptable levels of delay, rather than the "unrecoverable" delays that occur when the demand is closer or equal to the maximum theoretical capacity.

32 A practical capacity of 200,000 is in the realm of possibility given the current state of the art in air traffic management at airports in the United States that operate primarily in visual meteorological conditions and where modest delays are deemed acceptable (Gentry, Duffy, & Swedish, 2014; de Neufville, Odoni, Belobaba, & Reynolds, 2013), the proposed improvements in air traffic management that are currently under development and are likely to positively impact on the efficiency of terminal area and runway operations.

33 However, I do not believe that this practical capacity will be utilized based on the historical trends in traffic growth at CHC and other airports at extreme geographical locations relative to population centroids, and the fact that air traffic control efficiency in the US is typically greater than in other countries.

34 That said, the CIAL Expert Team now projects that aircraft movements will not exceed 200,000 movements until FY2084, rather than FY2063 as previously projected due to the COVID-19 pandemic and to lower growth rate in both passengers and aircraft movements. Of further concern is the lack of any consideration of increasing aircraft seating capacity. A 10% or more increase in seat capacity in the average aircraft will increase passenger count by that amount without increasing operations. This is the airlines primary response to aircraft operational constraints whether by regulation or airport capacity

35 This increase in the time horizon over which the noise impact is modeled means that the assumptions regarding fleet composition, aircraft source noise characteristics, as well air traffic management procedures and the

resulting flight tracks must be collectively valid throughout the entire period ending in FY2084.

36 The assumption regarding fleet composition is reasonable given the statements by both Airbus and Boeing that the next generation of single-aisle (narrow-body) aircraft will likely be certified between 2035 and 2040 and will thus only become a substantial part of the fleet in the 2050 timeframe when the aircraft that are currently being sold are retired.

37 Single-aisle aircraft make up the majority of the fleet at most airports and thus dominate the noise impact.

38 The assumptions regarding aircraft source noise characteristics, as well as air traffic management procedures and the resulting flight tracks are not reasonable within the context of an evaluation period ending in FY2084.

39 The modelers have collectively assumed that:

(a) The next generation of single-aisle aircraft will have the same source noise characteristics as the current generation of single-aisle aircraft; and

(b) The air traffic management procedures that are currently in use will still be in use in FY2084, thus the spread in the flight tracks will be the same.

Aircraft Source Noise Characteristics

40 It is not reasonable to assume that next generation of single-aisle aircraft will have the same source noise characteristics as the current generation of single-aisle aircraft.

41 Over a 60-years period commencing with the certification of the B707-200 in 1957, there has been a significant (approximately 30dB) reduction in the lateral noise level (in EPNdB) of aircraft (see Figure 1).

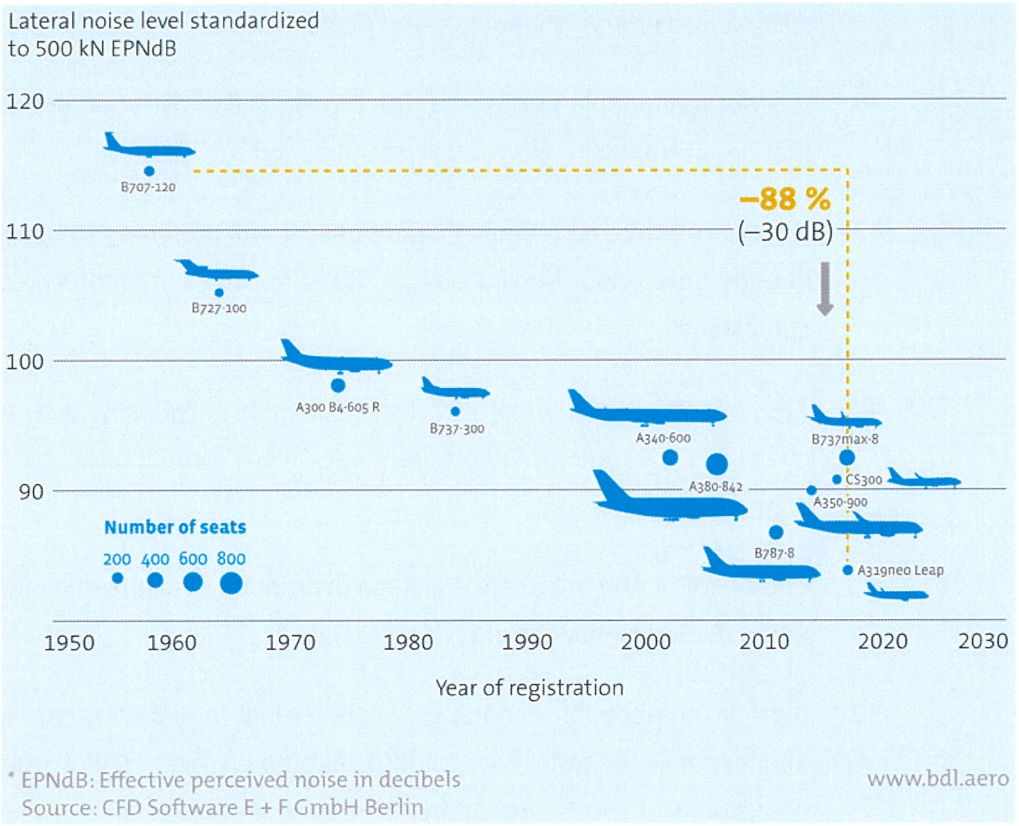

Figure 1: Lateral noise levels of commercial jet aircraft.

42 This 30dB reduction is significant because the lateral noise level has been shown to be the best predictor of the noise impact around airports.

43 While is true that there are diminishing returns overall with respect to the reduction in lateral noise of aircraft, i.e., an exponential curve with a negative exponent has a higher r2 (a measure of the goodness of fit) than a linear curve with a negative slope, the next generation of single-aisle aircraft will likely be at least 5dB quieter than the current generation of single-aisle aircraft.

44 This assertion is supported by a simple comparison of the 727-100, 737-300, and the A319-neo Leap.

45 These three aircraft have similar seating capacities, and the best fit curve though those three points for these aircraft in Figure 1 would be a straight line, indicating that there are likely to be substantive improvements in the next generation of single-aisle aircraft.

Air Traffic Management Procedures and Flight Tracks

46 It is not reasonable to assume that the air traffic management procedures that are currently in use will still be in use in FY2084.

47 Several improvements in flight control systems are being developed or are already being deployed to ensure that aircraft will fly more precisely and consistently.

48 The observed dispersion in flight tracks are typically due to manual overriding of automated/programmed flight procedures by air traffic controllers.

49 The need for and prevalence of such overrides will dimmish over time given the expected flight control improvements.

50 Further, no account is made for improvement in aircraft controller training and capabilities (with and without automated aids) that would improve precision with which aircraft are flown and delivered.

Average versus Outer Envelope Contours

51 Separately, it is not reasonable to use the highest 3-month usage for each runway THEN also apply the peak factor to establish a 'worst case' 3-month contour AND add 10% to account for potential climate change effect on Runway 11/ 29.

52 This introduces an absolute worst-case scenario for which there is no known relationship with annoyance. The dose-response curves that have been developed internationally are generally based on “a yearly average exposure” and they cannot be applied to an outer envelope.

Conclusions

53 By making worst-case assumptions with respect to aircraft noise characteristics and air traffic management procedures, i.e., by assuming that aircraft source noise characteristics as well as the air traffic management procedures and thus the resulting flight tracks will not change over the next 60 years, the modelers have ensured that the contours will be significantly larger than they should be.

54 In 60 years, when the demand in forecast by CIAL to be near the practical capacity, single-aisle aircraft will likely be at least 5dB quieter than the current generation of single-aisle aircraft, and the variability in flight tracks will be much lower.

55 Further, the use of an "outer envelope" contour introduces an absolute worst-case scenario for which there is no known relationship with annoyance. The dose-response curves that have been developed internationally are based on "a yearly average exposure" and they cannot be applied to an outer envelope.

Is Ldn 50 dB the appropriate noise control boundary?

56 The report from Marshall Day entitled "Christchurch airport – Community response to aircraft noise," Rp 001 20201126, May 2022, authored by Laura McNeill, is a literature review of recent articles on aircraft noise annoyance. A total of 45 aircraft noise studies have been reviewed and the 14 most prominent ones have been summarized. Comparisons have been made between the reported results and the standard reference curve published by Miedema and Vos (1998) and later refined by Miedema and Oudshoorn (2001).

57 Many of the comparisons and comments that are being made in the Marshall Day report comprise survey results that have been derived using different methodologies, and they cannot therefore be readily compared.

58 The main conclusions in the Marshall Day report are that annoyance from aircraft noise has increased markedly and that international bodies around the world are considering adopting the new WHO guidelines for environmental noise. The Marshall Day report provides no documentation to back this statement.

59 In contrast to these conclusions, the prevalence of high annoyance with aircraft noise has been stable over a long period of time, and there are no indications that people today are more annoyed by aircraft noise than they were, say, 25 or 50 years ago. Likewise, the noise sensitivity in populations similar to that of New Zealand has not changed.

The difference between regulatory limits and WHO guideline values

60 It is important to recognize the difference in approach for the two quantities. When the World Health Organization issues guidelines to avoid health issues due to noise annoyance, the perspective is that no resident should be annoyed by noise, whereas a regulatory authority usually will accept a certain risk for health impairment.

61 In 2000 WHO issued its first guidelines for community noise (Berglund, Lindvall, Schwela, & Goh, 2000). The document defined guideline values for various noise situations. The limits were stated in 16-hour equivalent levels, and they were non-source-specific. However, by applying the transformation tables provided by Brink et al. (2017) the recommended values can be transformed into quantities that can readily be compared with today's guidelines and regulatory limits.

62 The 2000 WHO-recommended guidelines to avoid serious annoyance or moderate annoyance from aircraft noise were Lden 57 dB and Lden 52 dB respectively[1]. The rationale for choosing these values was simply: during the daytime few people are annoyed by activities with these levels.

63 The WHO rationale became more evident in the next guideline publication (World Health Organization, 2018). In this document the guideline value for annoyance is defined as the level corresponding to 10 % highly annoyed. This equals roughly the percentage of a normal population that consider themselves very noise sensitive. This is confirmed by Heinonen-Guzejev, Vuorinen, Mussalo-Rauhamaa, & Kaprio (2004) presenting data for Europe and Finland in particular, and Shepherd, et al. (2000) presenting data for New Zealand. In other words, WHO assumes that their recommendation for environmental noise limits will protect the majority of a normal population from experiencing any noise annoyance at all, and only those that are very noise sensitive will be affected.

64 A regulatory authority, on the other hand, must take other aspects than merely the presence or absence of a negative health effect into account. In

[1] In this report the two quantities Lden and Ldn is used interchangeably. The difference between them is usually less than 0.5 dB for aircraft noise.

most cases negative effects cannot be completely avoided. Therefore, these effects must be assessed together with other aspects such as prevalence risk, disability weight, etc. The WHO publication "Burden of disease from environmental noise" (WHO, 2011) describes procedures that are relevant for such calculations. The "cost" of annoyance must be compared to other societal costs and benefits such as for instance easy access to transportation. Necessary trade-offs between costs and benefits must be done in a systematic way.

65 A new Swiss report gives a detailed description of the considerations that form the basis for new limit values for environmental noise in Switzerland (FNAC, 2021). The Swiss Commission considers 25 % highly annoyed corresponding to Lden 55 dB for aircraft noise according to Swiss-based exposure-response curves[2] as a suitable limit for acceptable noise exposure.

66 In short: a WHO guideline limit considers only the health aspects of the exposure to a certain agent, whereas a limit defined by a regulatory authority has a more holistic approach and considers the specific exposure in connection with other relevant factors.

Comparison of survey results

67 Surveys to assess the annoyance from environmental noise have been conducted since the 1960's, but only recently have such surveys been standardized. The International Commission on Biological Effects of Noise, ICBEN, published two papers in 1997 and 2001 attempting to facilitate cross-survey comparisons (Fields, et al., 1997) (Fields, et al., 2001). Subsequently these recommendations were adopted as an ISO Technical Specification, ISO/TS 15666, which was revised in 2021 (ISO, 2021). However, even if the survey is conducted according to this Technical Specification, there are several details that will affect the results (Gjestland, Issues affecting the results of noise surveys around airports, 2022a).

68 The Technical Specification recommends two different response scales for assessing the annoyance from various environmental noise sources, a

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[2] Switzerland favors surveys with mailout questionnaire

verbal 5-point scale and an 11-point numerical scale. The prevalence of high annoyance is defined differently for the two scales. When assessing the results from a survey it is therefore necessary to know which scale is being used. People responding to a 5-point verbal scale seem to be more annoyed than people responding to a numerical scale. Gjestland and Morinaga (2022) have analyzed 43 recent surveys where both response scales were being used. The average difference between the two results was equivalent to a 6 dB shift in the noise exposure. People responding to a numerical scale seem to tolerate 6 dB higher noise levels to express the same degree of annoyance.

69 Also, the way the survey questions are presented is important. A survey involving an interview with a live agent either face-to-face or via telephone, seems to produce lower annoyance than a postal survey with a written questionnaire. This issue was recently studied in the US 20 airport survey (Miller, et al., 2021). This large survey, comprising about 10,000 respondents, was conducted as a mail survey. However, in order to check the influence of the mode of presentation, an additional 2,000 interviews were conducted via telephone. Miller et al. found that the average difference between the two modes was equivalent to a 5dB shift in the noise exposure. So, on average people being interviewed via telephone seemed to tolerate 5 dB higher noise levels than people responding to a written questionnaire in order to express the same degree of annoyance. Fidell et al. have compared the results from 45 different surveys conducted either as face-to-face or telephone interviews or via mail (Fidell, Mestre, Gjestland, & Tabachnick, 2022). They found no difference between face-to-face or telephone interviews, but an average difference between these two and postal mode equivalent to a 10dB shift.

Selection of representative airports – High/low-rate change

70 A "general purpose" dose-response curve can be constructed on the basis of survey results from a selection of representative airports. The first general-purpose curve of this type was presented by Schultz (1978). His curve was updated in 1991 on the basis of more recent surveys (Fidell, Barber, & Schultz, 1991), and later on Miedema and Vos presented source-specific dose-response curves for annoyance due to transportation noise (Miedema & Vos, 1998). These were later refined by Miedema and

Oudshoorn (2001). These curves, commonly referred to as "the Miedema curves", have become a de facto standard reference. The curve for aircraft noise is based on 20 surveys conducted over a period of about 30 years comprising more than 50 different communities in Europe, North America and Australia which Miedema and Vos considered "representative airport communities".

71 Janssen and Guski conducted a meta-analysis of a large number of recent surveys and observed that the airports being studied could be divided into two different categories. Most airports experience a gradual increase in traffic whereas others may experience abrupt changes in traffic volume or operations such as the opening of a new runway or if a carrier moves its operation from another airport.

72 Janssen and Guski defined two categories of airports. The default situation is a low-rate change, LRC airport where changes are slow and gradual. If abrupt changes occur within a specified period, the airport is categorized as a high-rate change, HRC airport. Even an announcement of planned but not yet implemented changes may yield an HRC categorization. Likewise, bad public relations and unfavorable press qualify for an HRC category (Janssen & Guski, 2017).

73 Janssen and Guski applied their change rate categorization to a set of recent surveys and found that the average difference between the two types was equivalent to a 6 dB shift in annoyance. Residents in an HRC community tolerate on average 6 dB less noise than residents in an LRC community in order to express the same degree of annoyance.

74 Gelderblom et al. (2017) did a similar analysis of 62 surveys conducted between 1961 and 2017 and found an average difference equivalent to a 9 dB shift in the exposure.

75 When selecting surveys for a meta-analysis it is important to have a typical distribution of HRC and LRC airports in order to get at representative result.

Has annoyance due to aircraft noise increased?

76 Some authors claim that annoyance with aircraft noise has increased over the years. Others say the annoyance has decreased and still others have

observed no change. The Marshall Day report (McNeill, 2022) repeats the claim of the first group: Recent literature on annoyance shows that annoyance levels have increased markedly compared to the 2001 Miedema study (p.39).

77 The Marshall Day report reviews in detail 14 studies conducted since 2001 (p.12). Five of these studies report an increase, two studies report a decrease, four studies say no change, and three studies do not comment on a possible change. These studies therefore hardly justify the conclusion that annoyance levels have increased markedly.

78 In the summary (p.11) Marshall Day erroneously report six cases of increase (WHO must be identical to Guski 2017) and only one decrease (one study from Vietnam missing).

79 Various factors have been listed to explain the alleged increase in people's annoyance due to aircraft noise. More knowledge of health risks, increased noise sensitivity, increased environmental awareness, etc. However, it is difficult to explain why only annoyance with aircraft noise has increased. The same trend has not been observed regarding other environmental noise sources such as road traffic or rail traffic.

80 We find it plausible that the alleged increase can be explained inter alia by differences in survey protocols and in the selection of airports that have been studied.

81 The Miedema and Oudshoorn dose-response curves (Miedema & Oudshoorn, 2001) are based on surveys using face-to-face or telephone interviews, and the definition and scoring of high annoyance closely resembles counting people that respond to the upper three categories of an 11-point numerical scale as highly annoyed.

82 When making comparisons, results from surveys that are not conducted according to the same protocol, must be properly adjusted.

83 The Taylor Baines study from 2002 concludes that the annoyance has increased compared with the Miedema and Oudshoorn curve (see figure 3, p.10 in the MD report). The exposure levels corresponding to 10 percent highly annoyed are Ldn 50 dB and Ldn 54 dB respectively. However, the

Taylor Baines study used mail outs as opposed to telephone interviews. According to Miller et al. (2021) and Fidell et al. (2022) this difference in survey mode is equivalent to 5 to 10 dB shift in the exposure level. So, if the Taylor Baines curve is shifted 5 to 10 dB to the right in the figure, the two curves can be regarded similar or perhaps the Taylor Baines curve shows a slightly lower annoyance. In other words, there has been no real change in the annoyance response.

84 The FAA 2021 study was conducted as a mail out study and high annoyance was defined as the two upper response categories of a verbal 5-point scale. For comparison with the Miedema and Oudshoorn curve the FAA curve must be adjusted 5 dB for mail vs. telephone mode (documented in the study itself), and 6 dB for verbal vs. numerical scale. The adjustments would be more evident if the analysis had been done according to the CTL method, but the 19% HA point at Ldn 50 dB would be shifted to about Ldn 61 dB which is very close to the Miedema and Oudshoorn curve. In other words, no meaningful change in the annoyance response, especially not for low exposure levels which are of primary interest for regulatory purposes.

85 The three Guski reports have been critically questioned by Gjestland (2018) in peer-reviewed journals. Guski et al. (2019) wrote a rebutal to Gjestland's critical remarks, but they failed to have a plausible answer to the most prominent comments. Half of the airports included in the Guski et al. (2017) analysis for WHO came from the HYENA (Hypertension and Exposure to Noise Near Airports) study[3]. Due to other considerations the age range for respondents in this study was restricted to 45 to 70 years only. Despite evidence that the annoyance response is age dependent and the annoyance peaks around 45 years of age, in their rebuttal Guski et al. assumed that the age effect could be neglected. Likewise, the HYENA study did not use standardized annoyance questions. Instead of asking for overall annoyance in general, the respondents were asked to assess the annoyance during the day and during the night separately. Guski et al. cited the authors of the HYENA report: They assumed that the overall annoyance

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[3] Wolgang Babisch et al: "Annoyance due to aircraft noise has increased over the years - Results of the HYENA study," Environment International, vol. 35, pp. 1169 - 1176, 2009.

(day + night) is mostly determined by the annoyance during the daytime. In other words, half of the survey results in the Guski et al. report to WHO are based on assumptions that have not been properly verified.

86 Gelderblom et al. (2017) have analyzed the results from 62 different studies on aircraft noise annoyance conducted between 1961 and 2015. The complete dataset comprises about 650 paired observations of aircraft noise exposure and prevalence of high annoyance extracted from more than 100,000 responses. The raw data indicate that there has been a gradual increase in annoyance, and that people today tolerate about 8 dB less noise than they did in the 1960's in order to express a certain degree of annoyance. However, if the survey results are divided in high-rate change (HRC) and low-rate change (LRC) airports as proposed by Janssen and Guski, no temporal change in the annoyance response could be observed.

87 Social surveys are time-consuming and expensive to conduct. New surveys are therefore more often than not carried out at airports "where noise has become an issue", in other words a typical HRC airport. An increasing number of HRC airports will cause an apparent increase in the annoyance, unless the two types of airports are handled separately.

88 In the summer of 2014 UK authorities conducted a survey on aircraft noise annoyance referred to as SoNA – Survey of Noise Attitudes. The objectives were to either confirm the existing or to establish new national dose-response curves for United Kingdom. Face-to-face interviews were conducted at 9 large airports in England, addressing 2000 residents exposed to aircraft noise levels above $L_{Aeq,16h}$ = 51 dB. A dose-response function showing the prevalence of highly annoyed residents as a function of the chosen noise index was derived by conventional regression techniques (UK CAA, 2021). The sixteen-hour day equivalent level can be converted to DENL using the conversion tables proposed by Brink et al. (2017). The SoNA dose-response curve indicates a slightly smaller prevalence of annoyance than the curve derived by Miedema and Oudshoorn as shown in Figure 2. When the confidence intervals are taken into account, the two curves must be considered equal. In other words, for a given noise exposure in 2014 people in the UK seem to be equally annoyed by aircraft noise than what was predicted by the dose-response

curve presented by Miedema and Oudshoorn (2001). This last curve is based on surveys going back to the 1960ies.

89 In other words, the annoyance response seems to have remained stable over a period of 50 years, and no temporal increase can be observed.

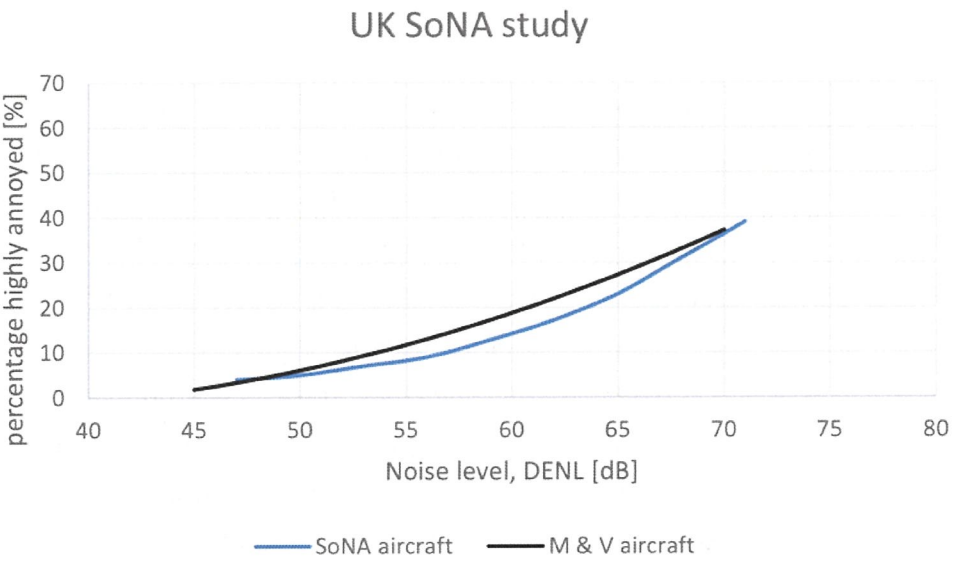

Figure 2. Results from the 2014 SoNA study. The new UK dose-response curve (blue line) compared with the curve derived by Miedema and Oudshoorn 2001 (Miedema and Vos 1998)

90 The 2019 NZTA survey used a mix of telephone interviews and postal questionnaires. The results can therefore not be directly compared with Miedema and Oudshoorn curves. The conclusion that New Zealand population has become more sensitive to noise is therefore not substantiated. This claim is also contradicted by the observations by Shepherd et al. (2000) who states that the noise sensitivity among the New Zealand population is similar to what has been found in comparable countries.

91 The two surveys conducted around Vietnam's main international airport Tan Son Nhat show a much lower prevalence of annoyance than the Miedema curve. The results do not in any way support the statement that annoyance with aircraft noise has increased.

Status of the WHO guidelines

92 The World Health Organization is the United Nations agency that connects nations, partners, and people to promote health. The WHO member states are grouped in 6 regions. In order for a report to be published as a general WHO document, consensus must be reached among all the regional offices.

93 The Marshall Day report states that "international bodies around the world are considering whether to update their policies, and the WHO guidelines could provide the latest scientific knowledge" (p.3). This is hardly correct. The WHO document Guidelines for Community Noise (Berglund, Lindvall, Schwela, & Goh, 2000) had been approved by all the regional offices. This is not the case for the new guidelines. Therefore, the full title of this latter document is Environmental Noise Guidelines for the European Region (World Health Organization, 2018). It has been published by the WHO European Office for Europe only. The reason for this is that no consensus could be reached among the other regions.

94 In the new guidelines for the European region, it is stated explicitly that this document supersedes the previous 2000 Guidelines (Berglund, Lindvall, Schwela, & Goh, 2000) and the 2009 Night noise guidelines for Europe (WHO Europe, 2009). In the remaining 5 WHO regions, the 2000 Community Noise Guidelines document has not been withdrawn. These guidelines specify noise limits for various activities and situations. The guideline limit for what is called critical health effects in general outdoor living areas is LAeq 55 dB for the 16-hour daytime period. This can be translated to Lden 57 dB for aircraft noise.

95 The European Commission has endorsed the new WHO guidelines for the European region, but to this author's knowledge no national or international regulatory body has yet adopted these guidelines. On the contrary, some European regulatory bodies (FNAC, 2021) (UK CAA, 2021) have recently introduced environmental noise limits that deviates substantially from the new WHO guidelines (i.e. less stringent noise limits).

Choice of limit exposure level to avoid adverse effects

96 Most countries that have imposed regulatory limits on aircraft noise exposure, specify a limit around Ldn 55 dB for "onset of adverse effects". The prevalence of highly annoyed residents at that exposure level matches the prevalence of very noise sensitive people in a general population, about 10 %. This implies that at the limit exposure level, only those that are very noise sensitive will experience high annoyance, and the remaining ca 90 % of the population will be less affected. A similar strategy is being used for other environmental noise sources as well (road and rail).

97 The 1999 WHO community noise guidelines recommend a limit for a general outdoor noise situation equivalent to Ldn 57 dB because during the daytime few people are annoyed by activities with these levels. The most recent studies with the objectives to update national noise exposure limits, recommend Ldn 55 dB (Switzerland, 2021) and Ldn 57 dB (UK, 2021). The UK has established a new exposure-response curve, and Ldn 57 dB corresponds to 10 % highly annoyed.

98 The recent 20-airport study (US, 2021) was conducted according to a very different survey protocol than these two, so a direct comparison cannot be made. However, with reasonable adjustments 10 % highly annoyed can be found at approximately Ldn 54 dB.

99 The Miedema curve which is widely used as a reference yields 10 % highly annoyed at Ldn 54 dB. This curve is derived from a representative mix of HRC and LRC airports. The corresponding curve for CHC, being a typical LRC airport, would indicate a higher tolerance for noise yielding 10 % highly annoyed at a higher level, typically 55 dB < Ldn < 60 dB.

100 This lower limit for aircraft noise-induced restrictions does not mean that noise sensitive buildings (residences, day-care facilities, hospitals, etc.) cannot be established inside this contour. Many countries have a limit 10 dB above the "onset contour" inside which development of noise sensitive buildings is discouraged or restricted. The US FAA, for instance, defines Ldn 65 dB as the limit for significant impact.

101 Outside the outer limiting contour (around Ldn 55 dB) very few people will be affected, and only sporadic noise complaints will be registered. The number of complaints will remain relatively stable for exposure levels even below this limit as there will always be a small percentage of complainers that will react negatively no matter how low the limit exposure level is defined.

The use of noise predictions for land use purposes

102 Noise maps are often calculated/predicted for an airport on a decennary (i.e., 10-year) basis. Noise prediction programs used for this purpose are accurate within typically plus/minus 1-2 dB. These noise maps show expected yearly average noise levels on the basis of anticipated traffic growth. Regulatory limits are typically shown as noise contours. The current guideline limit for aircraft noise for critical health effects endorsed by the Western Pacific Regional Office of WHO is equivalent to Ldn 57 dB (Berglund, Lindvall, Schwela, & Goh, 2000).

103 If it should be considered desirable to impose lower limits the general background noise must be taken into account. In most cases there will be infrastructure like major roads and railroads that make large contributions to the background noise level in a particular location. It makes little sense to restrict land use due to aircraft noise above a certain level if the general background noise level is higher.

104 The noise contours reflect the flight paths. They extend in the direction of the trajectories but may cover a more limited area to the sides. An increase in traffic will therefore typically stretch the contour lengthwise in the direction of the flight path with a relative smaller increase to the sides. Locations to the side of the trajectories are therefore less impacted by an unexpected growth in the traffic volume than locations under the flight path.

Conclusions

105 No data has been presented that should warrant a change in today's policies regarding acceptable exposure limits for aircraft noise. Most countries that have noise regulations for land use planning have limits corresponding to about Ldn 55 dB or higher for aircraft noise.

106 Reports on an alleged increase in aircraft noise annoyance is most likely caused by non-acoustic factors such as the selection of study areas, survey procedures, and response scales.

107 There are no indications that the noise sensitivity among residents of New Zealand is higher than in similar populations.

108 The new WHO Environmental noise guidelines recommending a limit of Lden 45 dB for aircraft noise to avoid adverse health effects, is a European document not adopted by the other WHO regional offices. Aside from the European Commission, no other regulatory authority has endorsed this limit.

109 After the publication of the WHO Environmental noise guidelines for the European Region, two European countries, Switzerland, and UK, have presented new evidence that an exposure limit for aircraft noise around Ldn 55 dB is a reasonable and correct choice.

110 Most countries that have regulatory limits for aircraft noise allow development inside the outer noise contour (typically around Ldn 55 dB. This contour is considered the onset of adverse effects and special low-noise features may be recommended. Development of noise sensitive buildings is typically discouraged or restricted at a level 10 dB above the "onset contour".

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(9)

BRIEFING DOCUMENT: FOR THE ATTENTION OF HIS WORSHIP THE MAYOR OF CHRISTCHURCH CITY.

BACKGROUND: REVIEW OF AIR NOISE CONTOURS

The current air noise contours have applied to the Christchurch, Selwyn, and Waimakariri Districts since 2008. The effect of these contours is essentially to prevent residential development, including the rezoning of land within each District where it falls underneath the 50 dBA Ldn contour. Christchurch Airport is the only airport in either New Zealand or globally that imposes this restriction.

At the time the present contours were developed, there was an agreement amongst the experts involved that a review should take place every 10 years to allow for changes to, amongst others, flight paths, fleet mix and growth projections. A process has been put in place whereby CIAL were required, as a first step, to produce a new set of contours for review by an independent panel of experts appointed by Environment Canterbury (Ecan).

CIAL commenced the process of reviewing the contours in mid- 2018, however did not deliver a new set of contours to Ecan until November 2021.

Two sets of contours were provided to Ecan for the panel of expert's consideration and decision:

Option A: An Outer Envelope Contour (OEC), which is based on the three busiest months of commercial air traffic movements on each of the runways at Christchurch Airport; and

Option B: An Annual Average Noise Contour (AANC), based on the annual average runway usage by commercial air traffic.

In early 2022, Environment Canterbury appointed a panel of experts from the USA, Australia and New Zealand to review the contours. Work on the review commenced in May 2022, with the final report from the Panel expected in early-mid June 2023.

INTENSIFICATION PLANS – IMPLICATIONS OF NOISE CONTOURS

As a consequence of an amendment to the Resource Management Act (RMA) in December 2021, all councils in Greater Christchurch have been required to notify amendments to their proposed and/or operative plans to enable much greater intensification within existing residential zones. In preparing these intensification documents, the councils had to assess whether or not to include either of the Options described above in their plans as a "Qualifying Matter" i.e., a matter which would prevent residential intensification.

In mid-2022, Ecan asked the Expert Panel to provide a recommendation as to which contour should be adopted. The **attached** memorandum of advice (July 2022) and associated correspondence from the Expert Panel recommends that the AANC should be adopted in preference to the OEC, with the OEC being described as follows:

The Outer Envelope Contour is a theoretical contour that would never be achieved.

In terms of land use controls over development within air noise contours, the advice was:

…As land-based control contours use community response (noise annoyance) thresholds, the contours themselves should also be derived from situations that would normally be experienced by a community and not a hypothetical situation.

Further, during 2022, CIAL provided a significant body of information and analysis to both the Christchurch City and Waimakariri District Councils in support of adopting the AANC as the appropriate contour for Qualifying Matter purposes. Both Councils proceeded to notify their respective changes to their plans with the AANC, these being Variation 1 to the Waimakariri Proposed District Plan and Plan Change 14 to the Christchurch District Plan. Both documents also included the existing 2008 as a Qualifying Matter as an interim measure until the AANC was confirmed by Ecan on the basis of the final report, due on 10 June 2023. In respect of Christchurch City, the AANC was preferred over the OEC on the basis that the OEC would prevent intensification with the Riccarton area, intensification that is regarded as pivotal for supporting a future mass transit system in Christchurch.

The **attached** Maps show the relative position of the AANC v OEC in both Variation 1 & Plan Change 14. In Variation 1 to the Waimakariri District Plan the AANC is shown in **RED** and the OEC in YELLOW. In Plan Change 14, the AANC is in GREEN and the OEC in **RED**. As will be evident, the OEC affects a considerably greater area of land than the AANC, affecting the majority of Kaiapoi and extending over Riccarton and onto Hagley Park in Christchurch.

CIAL has lodged submissions on both Variation 1 and Plan Change 14 seeking that the OEC apply.[1] CIAL has publicly justified its position on the basis that, despite the July 2022 advice referred to above, the Expert Panel has **not** made a recommendation as to which of the Options should be considered. CIAL has stated that it is uncertain whether the Expert Panel's Final Report will include a recommendation and that the decision on which Option to apply needs further planning and policy input. CIAL says that this planning and policy input should take place as part of the review of the Canterbury Regional Policy Statement, scheduled to commence in December 2024.

CIAL's position should be seen in light of the extensive planning and policy analysis it prepared in support of the AANC for both Variation 1 and Plan Change 14.

THE POTENTIAL IMPLICATIONS

The position now adopted by CIAL creates a significant level of uncertainty as to what land in Christchurch, Waimakariri and Selwyn will be affected by the new noise contours. If CIAL is able to successfully argue that the OEC applies to all Districts, this will essentially prevent a significant level of residential development that would otherwise be enabled in appropriate locations within each of these Districts.

It is expected that significant costs will be incurred by the community in legal and other expert costs in the inevitable arguments that will arise as to which of the Options should apply. These costs are not limited to the current planning process but will inevitably extend into the review of the Regional Policy Statement.

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[1] An identical submission has also been lodged on Variation 1 to the Selwyn District Plan.

The above likely future costs are in addition to the significant costs already incurred by CIAL, Ecan and the Councils in reviewing the contours and establishing a case in support of the AANC. It is understood, for example, that the cost to date of the Expert Peer Review Panel appointed by Ecan is just under $500,000. The costs incurred by CIAL to date have not been disclosed on the basis of commercial confidentially but are likely to be significant.

A PROPOSED SOLUTION

The following immediate steps are recommended to resolve the uncertainty and avoid future unnecessary costs:

1. Ecan is immediately asked to direct the Expert Peer Review Panel to make an **unqualified** recommendation that the AANC is adopted as the most appropriate contour. It is critical that the recommendation is unqualified, as otherwise this would leave the door open for an argument that further policy and planning analysis is required in order to decide which contour should apply.
2. This unqualified recommendation should be communicated by Ecan to all councils and made public as soon as possible, preferably before the final report is released.
3. On or before release of Panel's unqualified recommendation, CIAL is either requested or directed to withdraw any submissions to the intensification plans outlined above and to publicly confirm that it supports the AANC alone and no longer seeks to have the OEC apply in any of the Selwyn, Christchurch or Waimakariri Districts.

20 May 2023.

10

From: Stephen Smith <ssmith@ricondo.com>
Sent: Thursday, 14 July 2022 3:49 AM
To: Tammy Phillips <Tammy.Phillips@ecan.govt.nz>
Cc: Andrew Parrish <Andrew.Parrish@ecan.govt.nz>; Darran Humpheson <dhumpheson@tonkintaylor.co.nz>; Ben Hargreaves <Ben.H@lar.net.au>; Ian Kincaid <Ian.Kincaid@InterVISTAS.com>; Erik Wilkins <ewilkins@ricondo.com>; Joe Huy <jhuy@ricondo.com>
Subject: Expert Panel Recommendation RE: Annual Average Day versus Outer Envelope Contour Options

Hi Tammy,

Please find a memo drafted by Darran Humpheson that represents the Expert Panel's opinion related to Average Annual Day versus the Outer Envelope contour options. In summary, the Expert Panel concurred that the Annual Average Day is preferred based on existing guidelines and policy. Please let me know if you would like to discuss the conent.

Regards,
Steve

Stephen C. Smith, PMP | Director

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Tonkin+Taylor

MEMORANDUM

Date: July 14, 2022

To: Tammy Phillips
Ecan

From: Darran Humpheson

Subject: ANNUAL AVERAGE CONTOUR VERSUS OUTER ENVELOPE CONTOUR

The Christchurch International Airport Limited (CIAL) provided two sets of noise contours: an Annual Average Contour based on the average runway splits derived from a 10 year period and an Outer Envelope Contour which comprises the busiest usage recorded on each runway from the same 10 year period. The Outer Envelope Contour is a composite of the four max use contours (Runways 02, 11, 20 and 29).

The Annual Average Contour is based on the annual average movement numbers and does not reflect the normal busy 3 month period (no peaking factor applied). Whereas the Outer Envelope Contour is based on the worst case 3 month period. It uses appropriate peaking factors to increase the annual movement numbers to the busy 3 month period at Christchurch International Airport. The Outer Envelope Contour not only uses the highest 3 month usage for each runway, but it also applies the peak factor to establish a 'worst case' 3 month contour. The Outer Envelope Contour also includes a 10% addition to account for potential climate change effect on Runway 11/29 due to increased prevalence of nor-west wind conditions. The Outer Envelope Contour is a theoretical contour that would never be achieved.

The New Zealand Standard for airport noise management and land use planning (NZS 6805:1992) recommends that the average sound exposure is established over a period of 3 months or such other period as agreed between the operator and the local authority. In New Zealand and Australia, average contours are the norm, with or without a peaking factor applied to represent a busy period. For some airports which have reasonably consistent movements regardless of the time of the year, there is minimal differences between a busy 3 month contour and that derived from an annual average.

According to the International Organization for Standardization's ISO 15666-2021, *Acoustics — Assessment of noise annoyance by means of social and socio-acoustic surveys*, community noise exposure studies will determine community response to noise by establishing their annoyance response over the past 12 months. It is unusual for a social study to enquire about a respondents worst experience. As land based control contours use community response (noise annoyance) thresholds, the contours themselves should also be derived from situations that would normally be experienced by a community and not a hypothetical situation.

For consistency with NZS 6805 and standard practice, annual average contours with or without a peaking factor applied to represent a busy three months are appropriate.

cc: Stephen Smith, Ricondo & Associates, Inc.; Joseph Huy, Ricondo & Associates, Inc.; Erik Wilkins, Ricondo & Associates Inc.; Ian Kincaid, InterVISTAS; Ben Hargreaves, REHBEIN Airport Consulting

Christchurch Airport Qualifying Matter – Residential Density Areas A and B