BEFORE INDEPENDENT HEARING COMMISSIONERS APPOINTED BY THE WAIMAKARIRI DISTRICT COUNCIL

IN THE MATTER OF	The Resource Management Act 1991 (**RMA** or **the Act**)
AND	
IN THE MATTER OF	Hearing of Submissions and Further Submissions on the Proposed Waimakariri District Plan (**PWDP** or **the Proposed Plan**)
AND	
IN THE MATTER OF	Hearing of Submissions and Further Submissions on Variations 1 and 2 to the Proposed Waimakariri District Plan
AND	
IN THE MATTER OF	Submissions and Further Submissions on the Proposed Waimakariri District Plan by **Momentum Land Limited** and **Mike Greer Homes NZ Limited**

EVIDENCE OF WILLIAM PETER REEVE ON BEHALF OF MOMENTUM LAND LIMITED AND MIKE GREER HOMES NZ LIMITED STREAM 10A – AIRPORT NOISE ISSUES

DATED 2 FEBRUARY 2024

Presented for filing by:
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INTRODUCTION

1 My name is William Peter Reeve. I am employed as a Senior Associate with Acoustic Engineering Services.

2 I hold a Bachelor of Engineering with Honours from the University of Auckland. I am a member of the Acoustical Society of New Zealand.

3 I have over 12 years' experience in the field of acoustic engineering consultancy and have been involved with many environmental noise assessments on behalf of applicants, submitters and as a peer reviewer for Councils. My experience includes aircraft noise modelling, assessing noise effects and undertaking feasibility studies for aircraft landing sites and changes in airport operations. I have also provided advice to commercial aviation groups on appropriate noise controls, and residents and developments exposed to aircraft noise.

4 I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. The matters addressed in my evidence are within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

SCOPE OF EVIDENCE

5 In my evidence I provide commentary on the location of the remodelled aircraft noise contours in the vicinity of my client's sites at Kaiapoi, and potential land use planning implications for these sites.

6 I discuss at a high level the noise control framework outlined in NZS 6805:1992 *Airport Noise Management and Land Use Planning* and how this relates to the controls proposed in this case.

7 I also discuss the relationship between aircraft noise levels and complaints and what this demonstrates about the likelihood of a reverse sensitivity complaints burden on Christchurch Airport arising from the proposed development of the subject sites.

8 My evidence is limited to the above aspects as it is complementary to the wider brief of evidence produced by Dr John-Paul Clarke. Dr Clarke includes commentary on the assumptions inherent in these contours, and how the local controls compare to wider international research and practices.

IMPLICATIONS OF PROPOSED AIRCRAFT NOISE CONTOURS AT KAIAPOI

9 Momentum Land Limited (MLL) wish to develop land in Kaiapoi for residential use, as an extension of the existing Beachgrove residential development (North Block) and as a retirement home (South Block).

10 Mike Greer Homes Limited also wish to develop land in Kaiapoi for residential use. This land is in South Kaiapoi adjoining the southern extent of the current Kaiapoi urban area.

11 These areas are located just inside or straddle the edge of the operative 50 dB L_{dn} noise contour for Christchurch International Airport. This contour has historically been set to provide a higher level of protection than the "outer control boundary" of 55 dB L_{dn} described in the relevant NZ guidance NZS 6805:1992 *Airport Noise Management and Land Use Planning*, and typically used in other airport regulatory controls as described in the evidence of Dr Clarke.

12 The Christchurch International Airport noise contours have been recently remodelled and the modelling process and outputs peer reviewed by technical experts. As discussed below, contours representing two possible control options have been produced for discussion. Embodied in both contour options are modelling inputs based on current aircraft procedures, and projections of future growth and fleet mix. As with the operative noise contour, both remodelled contours reflect the airport operating at calculated ultimate runway capacity and represent a higher level of aircraft operation than currently occurs.

13 The location of the subject sites, relative to the various 50 dB L_{dn} aircraft noise contours is shown in Figure 1 below. The blue contour is the operative control, and the red and yellow contours are the two options arising from the technical remodelling exercise. I discuss the differences in the extent of the yellow and red remodelled contours below.

14 The largest of the remodelled 55 dB L_{dn} contours extends as far north-east as State Highway 1, but not into existing residentially zoned areas of south Kaiapoi. For context I have also shown this contour on Figure 1. The full extent of the operative and remodelled 50 and 55 dB L_{dn} contours are appended to my evidence.

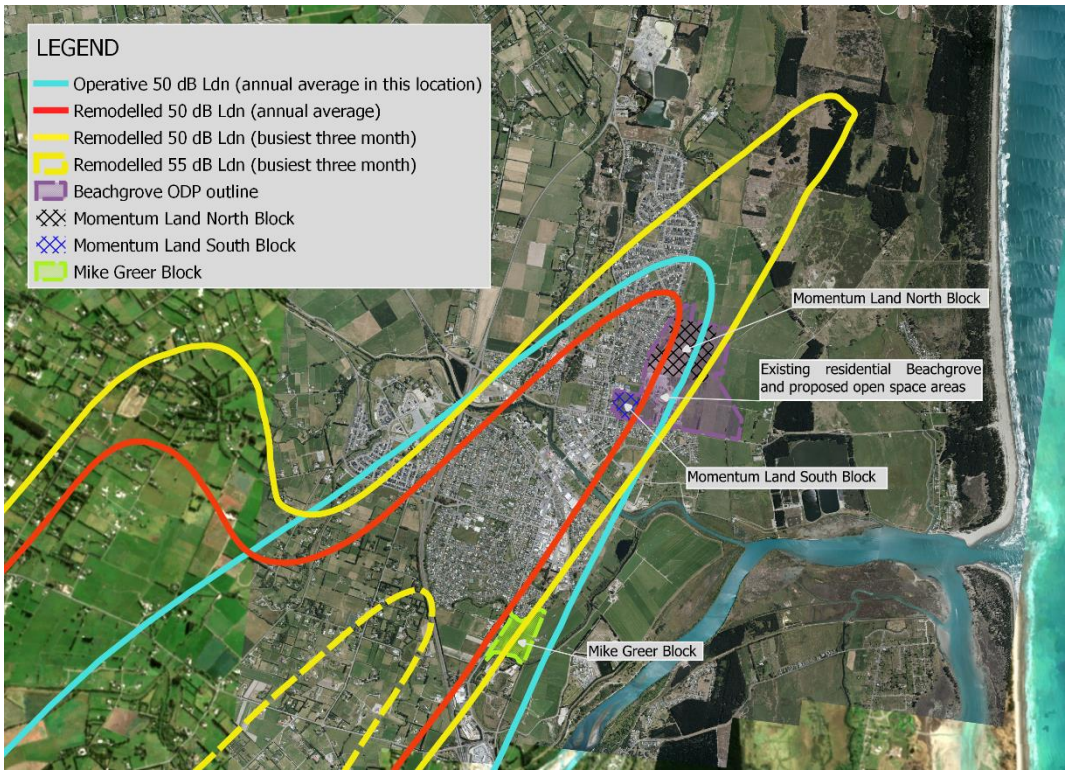


Figure 1

15 The contours are based on an L_{dn} parameter, which represents the 24-hour daily sound exposure. A 10 dB penalty is applied to noise generated at night (after 10:00 pm and prior to 7:00 am) to account for the increased noise sensitivity during this time. L_{dn} values can be used to describe long term aircraft noise exposure by using annual aircraft movement numbers, or a shorter period such as the busiest three months of the year.

16 The smaller red remodelled contour represents an annual average of 50 dB L_{dn}. Using an annual average is consistent with the approach used previously for the operative contour in the vicinity of Kaiapoi.

17 The larger solid yellow contour is the remodelled 50 dB L_{dn} contour, based on the movements over the busiest 3-months of the year on each runway end, and the broken yellow contour is the remodelled 55 dB L_{dn} contour, based on the movements over the busiest 3-months. This is a more conservative approach than has previously been applied in the vicinity of Kaiapoi in that it suggests that no relief is provided for receivers by the fact that for 9 months of the year, noise levels will be lower. The operative 50 dB L_{dn} contour is based on the annual average, not the busiest 3 months.

18 The complete operative contour which traverses the Waimakariri, Christchurch City and Selwyn Districts is effectively a hybrid: it uses the annual average on

the main runway (which affects Kaiapoi), and a "scaled up" average on the secondary cross wind runway (which affects Christchurch City) to account for increased seasonal usage when north-westerly winds dominate.

19 CIAL have submitted that the "busiest 3 month" contour should be incorporated into the Proposed Waimakariri District Plan. As noted above, this would be a different approach to the current operative contour which is an annual average in the directions which affect Kaiapoi. As I have explained above, in the technical remodelling exercise, two contour options have been presented for discussion. However, the documents produced describing the technical remodelling exercise note that the current scope did not include providing an assessment of effects, or recommendations on which approach is appropriate to adopt. These are matters which are to be determined through the review of the contours in the Regional Policy Statement.

20 The scope is outlined in section 3 of the Marshall Day Acoustics report *Christchurch Recontouring Volume 5: Noise Modelling Report* where it is stated *"We do not provide an assessment or recommendation on which of the options should be adopted. We consider both options are valid approaches with respect to aircraft noise modelling and NZS 6805:1992. The decision regarding which option to implement will likely involve other town planning considerations beyond our expertise."*

21 By confirming that both options are valid, and a decision on this matter should involve other planning considerations beyond the expertise of a noise expert, Marshall Day imply that the noise effects associated with either outcome should not be the main determining factor, and any additional land use controls triggered by sites covered by the "busiest 3 month" contour are not necessary from a noise effects point of view.

22 In fact, I note that the remodelled contour sizes do not represent any difference in noise exposure for specific sites or people within their extent - the busiest 3-month contour is simply a more conservative way of representing seasonal variation in flight volumes. However, as the contours trigger various land use controls and have different spatial extents in relation to Kaiapoi, they do have a significant impact on how land can be utilised.

23 In the context of the subject land – the option selected (3-month or annual average) could determine whether these sites are broadly "in" or "out" of areas

subject to aircraft noise controls that would restrict new residential development – meaning that under one scenario the planning controls would appear to render the sites unfit for residential development, and which under the other the sites would be developed and dwellings would not require specific acoustic design or upgrades – all while the actual noise experienced on the sites is the same in either case.

24 I agree with the Marshall Day observations that airport noise and the resulting potential adverse effects is only one of the factors which determine whether a site is appropriate for residential development. This is reflected in clause 1.4.3.7 of NZS 6805:1992 which provides a set of considerations for local authorities when determining whether a set of contours and associated land use controls would be a *"reasonable basis for future land use planning*" which are as follows:

(a) The time frame of the projection

(b) The extent of non-compliance of existing land uses with table 1 (which starts at 65 dB L_{dn})

(c) The impacts, including economic, social, health and safety of airport development on surrounding land use;

(d) National, regional and local development, and national and international transportation requirements;

(e) The effects of aircraft noise on the welfare, amenity values and health of any affected community;

(f) The effects of the contours on existing aircraft operators' flexibility to meet the community's demand for services in a commercially and economically viable way;

(g) New Zealand's obligations to international standards relating to aircraft noise emission, and programmes to phase out noisier aircraft types;

(h) The costs and benefits of land use controls, based on the airnoise boundary, compared to other options which would achieve the same objective of managing the adverse effects of airport noise.

25 In this context, I understand the wider land use planning implications include the need to provide sufficient land for housing to meet demand in Kaiapoi and the desirability of enabling a well-functioning urban environment (including creating a compact urban form).

26 A 50 dB L_{dn} outer control boundary is already a conservative control, and these sites are either outside, or at the outer extent of the remodelled "annual average" contour. In my opinion, adopting the more conservative aircraft noise contour or restricting development of these sites purely because of noise effects would not reflect the balanced approach to land use planning anticipated by NZS 6805:1992. This view appears to align with the observations made by Marshall Day in their Noise Modelling Report.

FURTHER COMMENTARY ON NZS 6805:1992

27 NZS 6805:1992 provides guidance relating to the appropriate land use planning controls to protect community health and amenity values without unduly restricting the operation of airports.

28 The Standard requires the modelling of future projected aircraft noise to establish an Airnoise Boundary (ANB) and Outer Control Boundary (OCB), defined by 65 dBA L_{dn} and 55 dBA L_{dn} noise contours respectively.

29 Within the ANB (65 dBA L_{dn}) the Standard recommends that new residential or other noise sensitive uses are prohibited. Steps shall be taken to provide existing residential properties with appropriate acoustic insulation to ensure a satisfactory internal noise environment. Alterations or additions to existing residences or other noise sensitive uses shall be permitted only if fitted with appropriate acoustic insulation.

30 Within the OCB (55 dBA L_{dn}) the Standard recommends that new residential or other noise sensitive uses are prohibited unless the District Plan permits such uses subject to a requirement to incorporate appropriate acoustic insulation to ensure a satisfactory internal noise environment. Alterations or additions to existing residences or other noise sensitive uses should be fitted with appropriate acoustic insulation and encouragement should be given to ensure a satisfactory internal environment throughout the rest of the building.

31 The Standard does not propose any controls at noise levels below 55 dB L_{dn} – and with this noise exposure a typical dwelling construction would provide the sound insulation required to achieve satisfactory internal levels.

32 While this is the case, NZS 6805 does provide decision makers with discretion about where to locate the projected sound exposure contours – noting in clause 1.4.3.8: *"After considering the matters specified in 1.4.3.6 above, the local*

authority should incorporate into its district plan a map showing the projected sound exposure contours, or showing the contours in a position further from, or closer to the airport, if it considers it more reasonable to do so in the special circumstances of the case". The effects of aircraft noise on the affected community is only one of the eight matters to consider when determining this (reproduced in paragraph 24).

33 A choice about the appropriate sound exposure averaging period is also required, with clause 1.4.1.2 noting that this should be *"over a three-month period or such other period as agreed between the operator and the local authority".* While this does seem to give preference to the 3-month period as a baseline, it is in the context of a less conservative outer control boundary set at 55 dB L_{dn}.

34 Another key decision required when implementing NZS 6805 is the length of the projection period for future aircraft operations – with a minimum of 10 years recommended (clause 1.4.3.1). In this case the contours are based on projected ultimate runway capacity at Christchurch Airport.

35 While NZ 6805 allows scope for decisions which influence the size of the aircraft noise contours, an outer control that is based on a lower 50 dB L_{dn} threshold as well as a "busiest 3-month" contour, at ultimate runway capacity represents stacked conservatisms. This means that the remodelled contours that primarily impact the subject sites go further than the baseline values set in NZS 6805 to protect community health and amenity values.

AIRCRAFT NOISE COMPLAINTS

36 Marshall Day have previously stated that noise complaints may lead to restrictions in airport activity, and implied that people exposed to noise levels between 50 and 55 dB L_{dn} continue to pose a meaningful risk to CIAL in this regard. I have therefore been asked to provide comment on the location and frequency of airport noise complaints relating to Christchurch International Airport, and what this demonstrates about the likely complaints burden arising from development of the subject sites.

37 Regarding what level and frequency of aircraft noise may lead to complaints - the majority of aircraft noise research is focussed on a dose response curve giving the percentage of people who will be annoyed or highly annoyed when

living in an environment exposed to aircraft noise at a given average level. There is no methodology for determining how many of this subset would then go on to make a complaint. This is because the relationship between annoyance and complaints is complex and relies on many factors, including attitudes towards the airport, whether it is perceived that the complaint is likely to make a difference, people's socio-economic situation, and changes in airport operation.

38 Some information can be drawn from the *Report on the Survey of Christchurch Residents Experience of Environmental Noise*, prepared by Taylor Baines in 2002. This study provided some local context on the prevalence of aircraft noise complaints at various noise levels. Survey participants were asked whether they had ever made a complaint and the nature of the complaint.

39 Three categories were given, informal 'complaining' (to other members of the household, friends or family), direct complaint (to CIAL) and formal complaint (to CCC by phone or letter). These responses were evaluated in a "core area" where measured aircraft noise levels ranged between 50 dBA L_{dn} and 65 dBA L_{dn} and an "extended area" where measured aircraft noise levels ranged between 45 dBA L_{dn} to 50 dBA L_{dn}.

40 This study confirmed that the combined percentage of direct and formal complaint was low (3.8% in the core area and 3.0% in the extended area). The prevalence of informal complaining was much higher, but also relatively similar between the core and extended areas (44.3% in the core area and 39.1% in the extended area). This confirms that the number of formal complaints is low even where people are annoyed enough to complain to family and friends.

41 There are other international studies which show general agreement with the relationship between L_{dn} levels and likelihood of formal complaints, for example the paper *Self-Reported Aircraft Noise Complaints and Socioeconomic Demographics in the Greater Philadelphia Region: A Survey of Complaint Data from 1997 to 2009* by Collette. For that airport, the mean number of complainant households per 10,000 people was also confirmed to be low (10.13 at 45 – 50 dBA L_{dn}, 9.36 at 50 – 55 dBA L_{dn} and 25.62 at 55 – 60 dBA L_{dn}). This study also showed no distinct difference in the number of complainant households between 45 – 50 dB L_{dn} and 50 – 55 dB L_{dn}.

42 This breakdown is not available in the Taylor Baines report given the "core area" spans 50 – 65 dB L_{dn} which spans a wide range of potential noise effects.

43 Both these studies indicate that the incidence of complaints is relatively low, and similar both above and below 50 dB L_{dn}. It follows that a discrete area of residential development close to the 50 dB L_{dn} contour would not result in a meaningful change to the current or future complaints burden for CIAL.

44 While complaints only represent a small subset of those exposed to aircraft noise, they can still provide insight about the location and nature of the source of complaint for people who experience aircraft noise and are motivated to complain.

45 CIAL are required in their Noise Monitoring Reports to provide a summary of complaints and have an online system for people to use. The summary in the 2022 Noise Monitoring Report, records 31 complaints from 13 individuals (between 1 January and 31 December 2022). A range of different reasons for complaints are noted, including night flights, low flying aircraft, unusual aircraft movements and general observations about changes in aircraft operations / traffic. I have also reviewed the pre-Covid Noise Monitoring Reports from 2019 (57 complaints from 31 individuals), 2018 (38 complaints from 20 individuals) and 2017 (47 complaints from 19 individuals). The reasons given for complaints varied in these three years and included concerns about low flying aircraft, night flights and increased traffic. CIAL have observed that some complaints were because of the Performance Based Navigation Trials being undertaken.

46 The monitoring reports show that the number of complaints CIAL currently receives is relatively modest. However, since the aircraft noise controls represent a future situation with a higher level of aircraft traffic, and therefore noise, the prevalence of complaints could increase as aircraft operations (and the City population) increase.

47 The Noise Monitoring Reports also provide some insight into how complaints are handled by CIAL. Typically this appears to involve investigation of the reason for the complaint (i.e. 'was there anything unusual happening?'), further communication with the complainant (sometimes explaining the reason for what they observed, other times confirming that what was observed was in accordance with what is permitted, and explaining the regulations/rules). In some cases the Report notes that the complainant indicated that they were

satisfied by the response, in other cases there is ongoing correspondence, or meetings, further information provided on the website or the like. Overall, the current 'complaints burden' on CIAL appears to be low, and there is no evidence of any situations which appear poised to escalate to a point where they would result in a direct 'reverse sensitivity effect' (for example, additional operational controls imposed on CIAL).

48 I have shown the locations of CIAL logged complainants between February 2017 and September 2023 in Figure 2 below. Complaints relating to engine testing have not been included. I note that the locations are approximate – as the exact street address has not been provided by CIAL to maintain anonymity. In most cases a road name and suburb were provided, or in some cases only a suburb. Locations where multiple complaints have been recorded in a year has not been shown, as this cannot be determined with confidence without an exact street address.

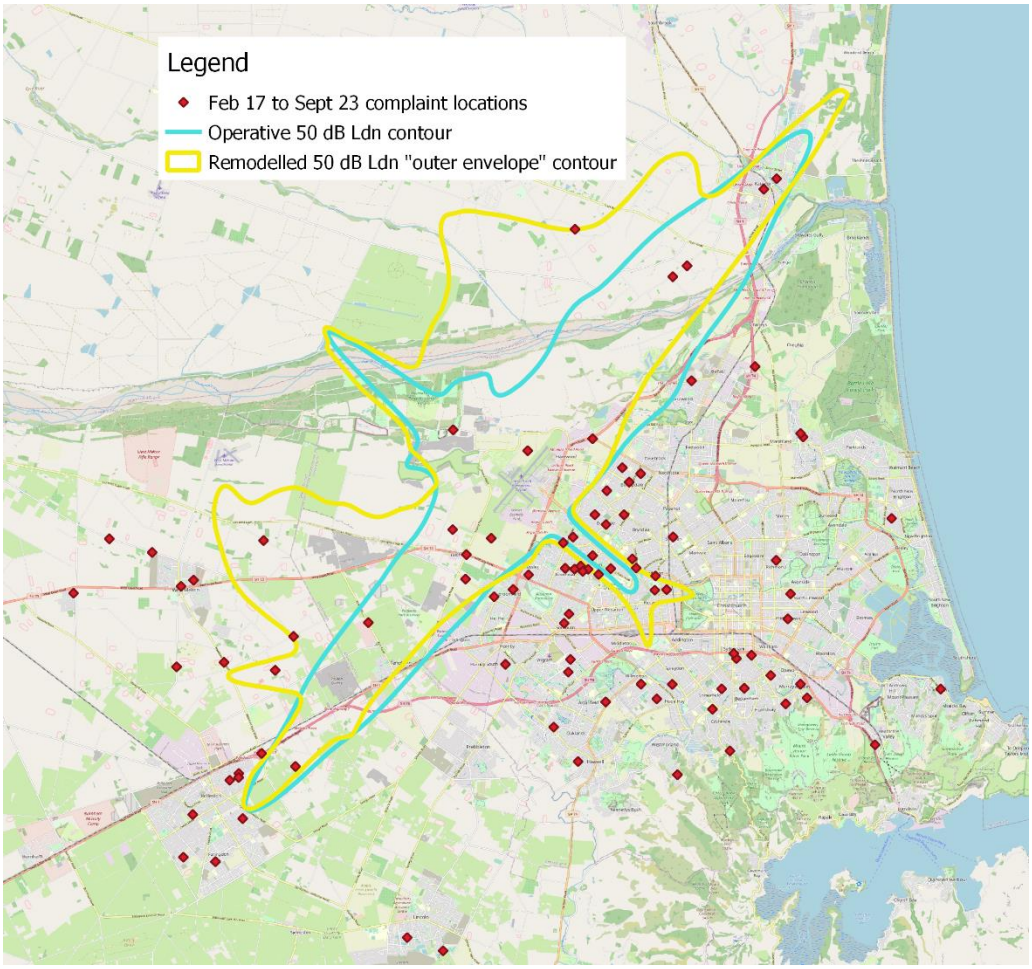


Figure 2

49 This analysis shows that the location of complainants is distributed across populated areas of the city, and many come from areas that are exposed to levels of aircraft noise below 50 dB L_{dn} (current or future). It does not appear to support a conclusion that if there were more dwellings between the 50 and 55 contours, there would be complaints at a greater concentration than that observed generally over the City.

50 This accords with a summary provided in the Marshall Day report titled *Christchurch Airport Recontouring, Assessment of Noise Effects – Outer Envelope Updated Contours* which was attached to the evidence of Laurel Smith for Plan Change 14 in Christchurch. In this report it is noted that complaints coming from outside the airport contours is not unusual, and the report notes that: *"Similar trends are seen for complaints from CIA, with most complaints coming from people located outside the noise contours. Analysis of complaints data from 2017 to March 2022 shows that 75% of complainants were located outside the noise contours."* (emphasis added).

51 The complaints data from Auckland Airport as shown in the *2023 Financial Year Auckland Annual Noise Management Report* also demonstrates this trend. While there is a concentration of complaints from Papatoetoe and similar areas where current / future noise levels are above 55 dB L_{dn}, there are also many complaints from locations further from the airport – including several locations from which many complaints were made in a year. To illustrate this, I have reproduced figure 15 from this report, which shows the 2023 financial year

complaints, and have shown the 55 dB L_{dn} contour as an overlay. This is shown as Figure 3 below.

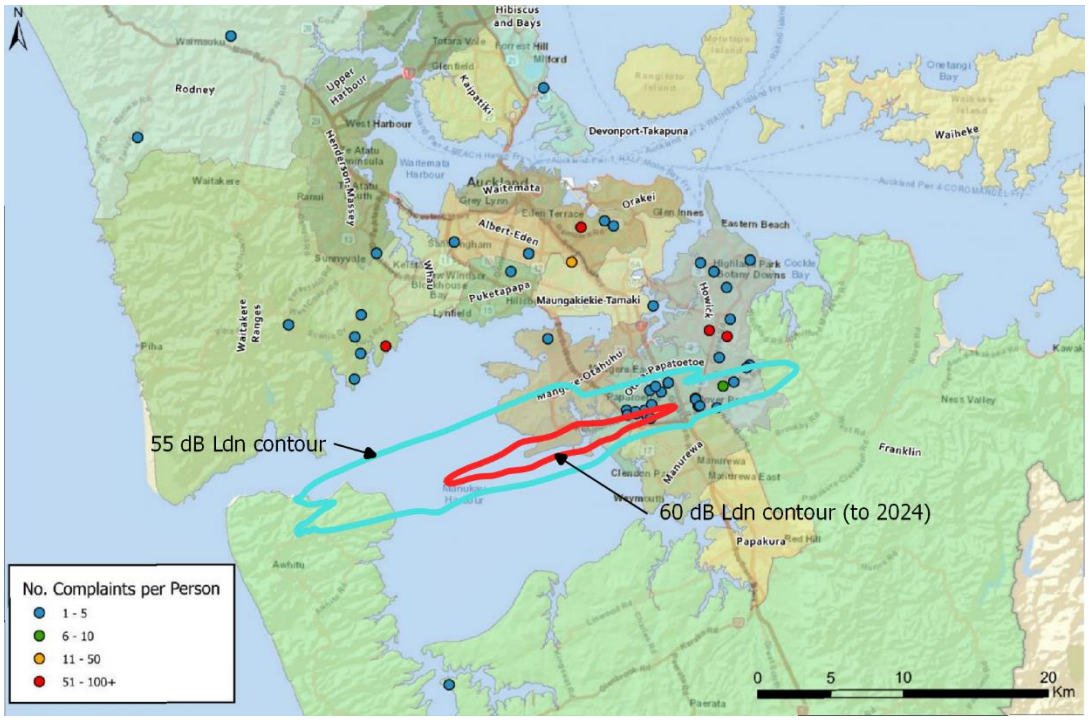


Figure 3

52 This analysis therefore provides no support to the idea that a discrete area of residential development close to the 50 dB L_{dn} contour would result in a meaningful change to the current or future complaints burden for CIAL.

CONCLUSIONS

53 I have summarised my conclusions below.

3-month vs annual average

54 Two remodelled contour options have been generated by CIAL and these lead to significant land use planning implications in the vicinity of my client's sites at Kaiapoi.

55 However, the documents describing the technical remodelling exercise note that a decision on this matter should involve other planning considerations beyond the expertise of a noise expert – and that either is a valid option. I agree that the noise effects associated with either outcome should not be the determining factor. This demonstrates that additional land use controls triggered by sites covered by the "busiest 3 month" contour are not required from a noise effects point of view.

56 CIAL have submitted that the outer envelope, or "busiest 3 month" contour should be incorporated into the proposed Waimakariri District Plan. This would be a different approach to the current operative contour which is an annual average in the directions which affect Kaiapoi.

57 In the context of the subject land – the contour option selected could determine whether these sites are broadly "in" or "out" of areas subject to aircraft noise controls that would restrict new residential development – meaning that under one scenario the planning controls would appear to render the sites unfit for residential development, and which under the other the sites would be developed and dwellings would not require specific acoustic design or upgrades – all while the actual noise experienced on the sites is the same in either case.

58 I agree with the Marshall Day observations that airport noise and the resulting potential adverse effects is only one of the factors which determine whether a site is appropriate for residential development. In this context, I understand the wider land use planning implications include the need to provide sufficient land for housing to meet demand in Kaiapoi and the desirability of enabling a well-functioning urban environment (including creating a compact urban form).

59 A 50 dB L_{dn} outer control boundary is already a conservative control, and these sites are either outside, or at the outer extent of the remodelled "annual average" contour. In my opinion, adopting the more conservative aircraft noise contour or restricting development of these sites purely because of noise effects would not reflect the balanced approach to land use planning anticipated by NZS 6805:1992. This view appears to align with the observations made by Marshall Day in their Noise Modelling Report.

NZS 6805 framework

60 The NZS 6805:1992 framework has noise controls which commence at 55 dB L_{dn} – with new residential or other noise sensitive uses prohibited unless the District Plan permits such uses with appropriate acoustic insulation.

61 NZS 6805:1992 does not propose any controls at noise levels below 55 dB L_{dn} – and with this noise exposure a typical dwelling construction would provide the sound insulation required to achieve satisfactory internal levels.

62 While this is the case, NZS 6805 does provide decision makers with discretion to locate the projected sound exposure contours in a position further from, or

closer to the airport after considering eight planning matters, one of which is noise effects.

63 In this case, what is proposed is an outer control that is based on a lower 50 dB L_{dn} threshold as well as a "busiest 3-month" contour, with future projections based on ultimate runway capacity. This represents a series of stacked conservatisms and means that the remodelled contours that affect my client's sites go further than the baseline values set in NZS 6805 to protect community health and amenity values.

Complaints data

64 I consider that current complaint data can provide useful insight about trends in location and source of complaints for the subset of the population who experience aircraft noise and are motivated to complain. This can be used to extrapolate the likelihood of a reverse sensitivity complaints burden on Christchurch Airport arising from the proposed development of the subject sites.

65 An analysis of complaints data shows that the location of complainants is distributed across populated areas of Christchurch City and surrounds. Many come from areas that are exposed to levels of aircraft noise below 50 dB L_{dn}.

66 Similarly, for Auckland Airport, while there is a concentration of complaints from Papatoetoe and similar areas where current / future noise levels are above 55 dB L_{dn}, there are also many complaints from locations further from the airport – including several locations from which many complaints were made in a year.

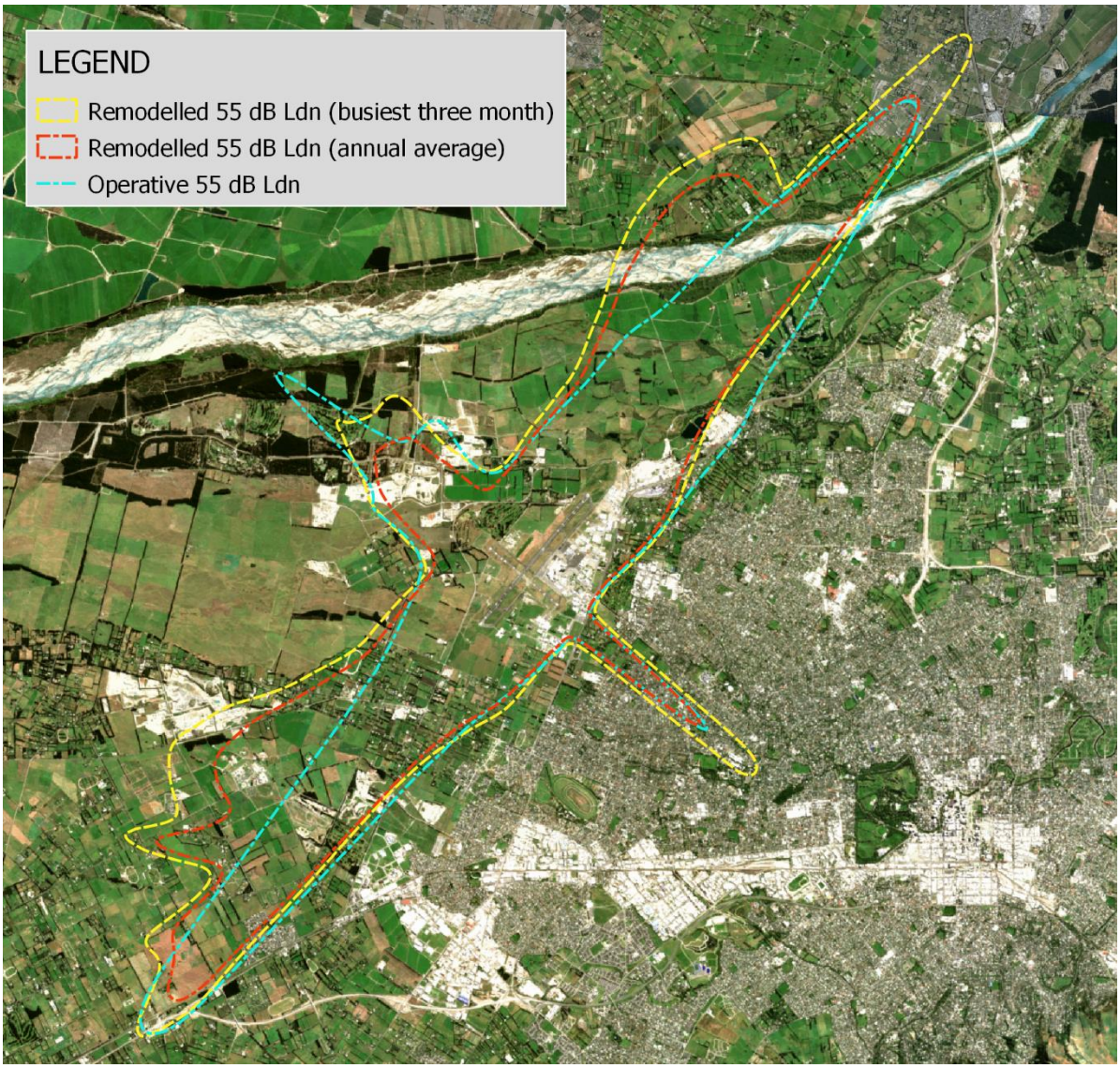
67 The 2002 Taylor Baines Christchurch study also provides some local context on the prevalence of aircraft noise complaints at various noise levels. This study confirmed that the combined percentage of direct and formal complaint to Council or CIAL was low, and relatively similar between a core area exposed to noise levels of 45 – 50 dB L_{dn}, and an extended area exposed to noise levels of 50 – 65 dB L_{dn}.

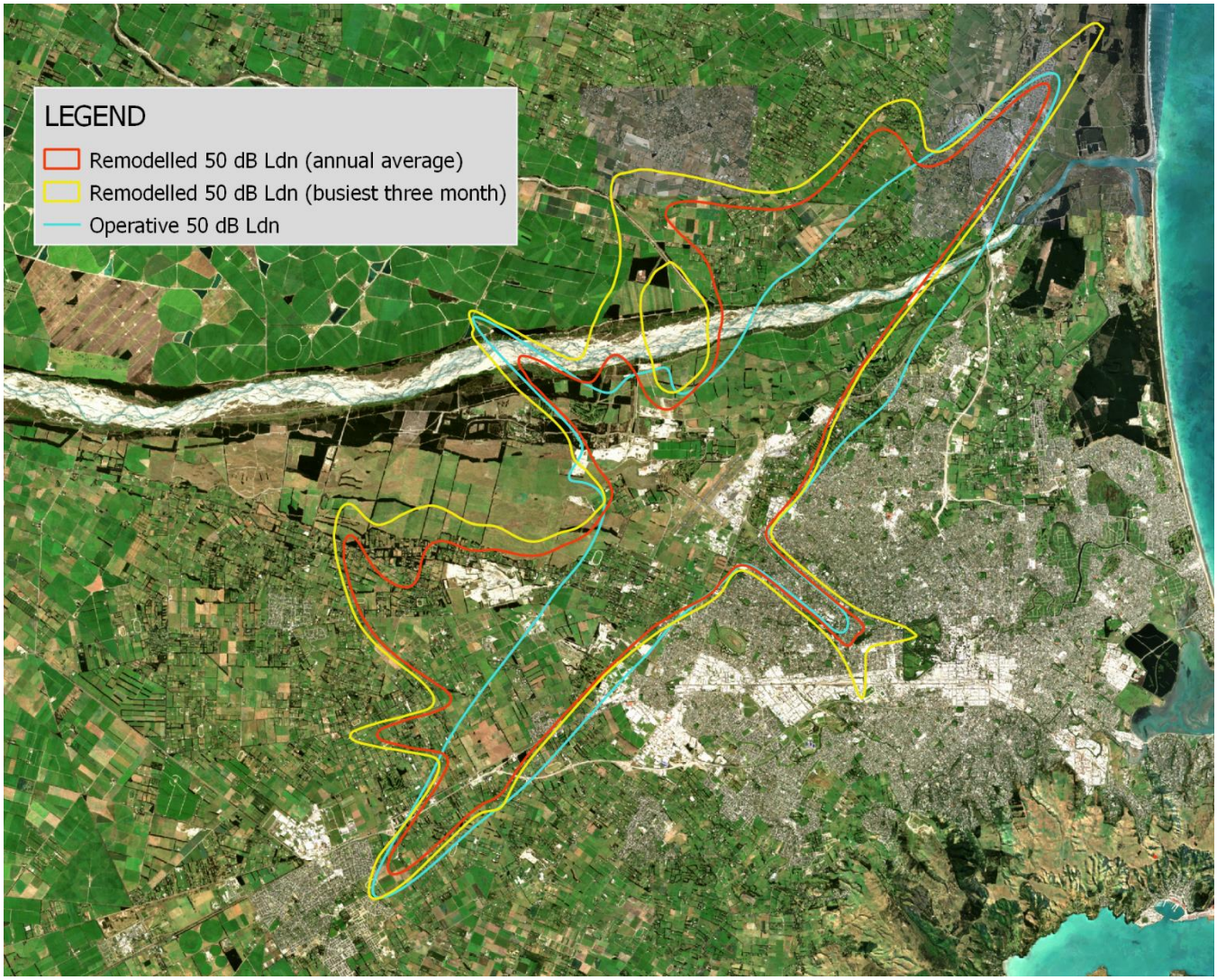
68 The relationship between L_{dn} levels and likelihood of formal complaints is also demonstrated in a Philadelphia study. In that case, the mean number of complainant households was also confirmed to be low at around 10 complaints per 10,000 people, with no distinct difference in the number of complainant households between 45 – 50 dB L_{dn} and 50 – 55 dB L_{dn} (a comparison which is not available from the Taylor Baines report).

69 Both these studies and the review of complaints data indicate that the incidence of complaints is relatively low, and similar both above and below 50 dB L_{dn}. This analysis therefore provides no support to the idea that discrete residential development close to the 50 dB L_{dn} contour would result in a meaningful change to the current or future complaints burden for CIAL.

William Peter Reeve

2 February 2024


LEGEND
Remodelled 55 dB Ldn (busiest three month)
Remodelled 55 dB Ldn (annual average)
Operative 55 dB Ldn


LEGEND
Remodelled 50 dB Ldn (annual average)
Remodelled 50 dB Ldn (busiest three month)
Operative 50 dB Ldn