

Waikato District Council
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Attention: Emma Ensor

Dear Emma

Noise submissions for Te Kowhai Airpark

Tonkin & Taylor Ltd (T+T) has been requested to provide acoustic advice to Waikato District Council (WDC) regarding the Proposed Waikato District Plan (PWDP), specifically around the treatment of noise from Te Kowhai Airpark. The work has been done in accordance with our engagement dated 17 January 2020.

NZTE Operations Ltd (NZTE) owns and operates Te Kowhai Airpark and the surrounding land. NZTE proposes to upgrade the Te Kowhai Airfield from visual flight rules (VFR) to instrument flight rules (IFR) with an associated increase in the number of aircraft movements. NZTE wishes to ensure that noise rules in the PWDP do not unduly restrict the future operations of Te Kowhai Airpark, with a particular focus on reverse sensitivity.

The reports / submissions that we have reviewed are:

- Hegley Acoustic Consultants report *Proposed Te Kowhai Airpark. Limmer Road, Te Kowhai. Acoustic Design Report*. Report no 17167.1 dated April 2018, prepared for NZTE (the Hegley report);
- Marshall Day Acoustics consultant advice *Proposed Airport Control Noise Boundaries* Document number Ca 002 r01 dated 8 October 2018, prepared for NZTE (the MDA report); and
- NZTE *Submission on Proposed Waikato District Plan* received by WRC 9 October 2018.

We have provided comment on the relevance of *NZS 6805:1992 - Airport noise management and land use planning* for the current and future use of the Te Kowhai Airfield and the Te Kowhai Airpark, as well as the relevance of including taxiing noise within the noise contour assessment. We discuss how WDC might best to address noise from general aviation and the changes proposed by NZTE.

1 Background

The Te Kowhai Airfield is located approximately 10 km to the northwest of Hamilton. It is a grass strip airfield running on a bearing of approximately 50 / 230 degrees, with associated hangars and buildings. The Te Kowhai Airfield currently operates VFR but NZTE is proposing to upgrade the airfield to IFR. This would allow air movements to take place in less favourable weather conditions and during darkness for those aircraft (and pilots) capable of flying IFR. In connection with this

upgrade, numbers of aircraft movements are proposed to increase, from 6,323 aircraft movements in 2017 to approximately 21,000¹ per annum by 2040.

NZTE is also proposing to develop part of its site as an airpark, with residential lots developed on the land which is owned by NZTE to the south of the runway. Many of the residential lots would have private hangars with direct access to a taxiway and the runway beyond. These hangars would be in addition to the existing hangars at Te Kowhai Airfield. A commercial precinct is also proposed to cater for the maintenance of aircraft, light manufacture and administration.

The precincts are shown in Figure 1.1 and are categorised as:

- Precinct A: runway and operations precinct;
- Precinct B: commercial precinct;
- Precinct C: medium density residential precinct; and
- Precinct D: residential precinct.

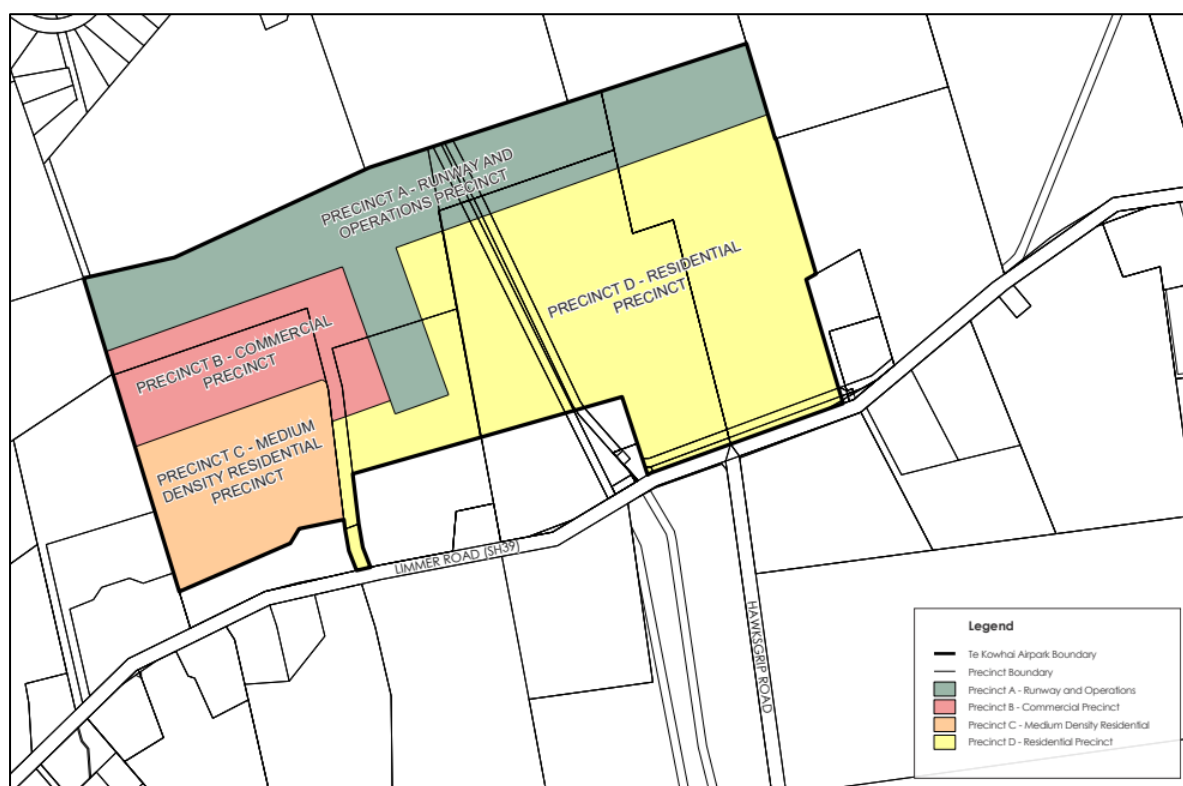


Figure 1.1: Te Kowhai Airpark precinct plan, taken from Appendix 9 of the PWDP.

The surrounding area is predominantly rural, with sparse dwellings along Limmer Road to the south and Te Kowhai Road to the north and east. The settlement of Te Kowhai lies to the north of the Te Kowhai Airfield. Aircraft are not permitted to fly over a retirement village in Te Kowhai approximately 600 m north of the runway.

2 Assessment criteria

2.1 Sources of noise and guidance documents

There are various types of noise sources from a typical airport or airfield.

¹ Taken from Appendix 13 Summary Assessment of Environmental Effects appended to the S32 report for Te Kowhai Airpark.

Air noise from aircraft movements will normally affect the largest surrounding area. Guidance for dealing with aircraft noise is contained in NZS6805 (refer Section 2.2). The standard contains control measures for two levels of noise exposure via the definition of an outer control boundary (OCB) and an air noise boundary (ANB), collectively called air noise control boundaries (ANCBs). Control measures are limited to restricting or prohibiting noise sensitive uses of spaces, and recommended levels of noise insulation for affected dwellings. There is generally no effective mitigation for outdoor amenity spaces from aircraft noise.

Other sources of noise will include aircraft taxiing and industrial type noise from any ancillary warehouses or equipment. Testing of aircraft engines for repair or maintenance reasons (ground engine testing) can be a significant source of noise. These ground-based noise sources are typically dealt with via noise rules in the district plan (refer Section 2.4). We do not consider it appropriate to assess noise from ground engine testing within the ANCBs.

The World Health Organisation (WHO) provides recommended limits for internal noise sensitive spaces for living and resting areas (refer Section 2.3).

2.2 NZS6805

New Zealand Standard NZS 6805:1992 'Airport Noise Management and Land Use Planning' is used to assess and rate aircraft noise in the vicinity of airports (including aerodromes and airfields). NZS6805 provides guidance on the use of the day / night sound level (Ldn). The Ldn parameter is the day / night average energy level which has a 10 dB weighting for any aircraft noise events which occur during the period between 10 pm and 7 am. Ldn is widely used to assess environmental noise and has been used to establish reasonable noise thresholds for determining community response to noise from aircraft operations (take-off and landing movements) and other sources of environmental noise. The Ldn's 10 dB weighting recognises that night-time noise can be more disturbing than noise that occurs during the day, and that noise at night can result in adverse health effects due to loss of sleep.

To account for the variation in activity that may occur at an airport, aerodrome, or airfield, NZS6805 recommends that a busy three month (90 day) period is used to determine the typical level of aircraft movements that may occur over a 24-hour day.

NZS6805 defines the ANB as:

'An area around an airport within which the current or future daily amount of aircraft noise exposure will be sufficiently high to require appropriate land use controls or other measures to avoid, remedy or mitigate any adverse effects on the environment, including effects on community health and amenity values whilst recognizing the need to operate an airport efficiently.'

The average night-weighted sound levels at the ANB should not exceed 65 dB Ldn, or 55 dB Ldn at the OCB.

The foreword to NZS6805 states (in relation to aircraft noise monitoring stations at the ANB) that 'the control is based on the noise actually received – not what is predicted'.

NZS6805 recommended control measures within the OCB but outside the ANB are to **prohibit** new residential, schools, hospitals or other noise sensitive uses "unless a district plan permits such uses, subject to a requirement to incorporate appropriate acoustic insulation to ensure a satisfactory internal noise environment." Within the ANB, NZS6805 recommends that new residential, schools, hospitals and other noise sensitive uses are prohibited.

NZS6805 does not specifically exclude taxiing noise from the assessment of aircraft noise, but states in section 1.4.3.4: "Only noise resulting from aircraft operations shall be considered when determining sound exposure contours and the air noise boundary."

2.3 WHO recommended internal noise levels

The WHO Guidelines for Community Noise recommend an internal noise level of 30 dB LAeq (8 hour) for continuous noise to avoid any measurable effects on sleep disturbance. For intermittent noise, a maximum sound level of 45 dB L_{Amax} is the recommended limit to avoid noise-induced awakenings.

To avoid interference with speech communication, a level of 35 dB LAeq is recommended within noise sensitive buildings (dwellings).

2.4 Proposed Waikato District Plan rule

Appendix 1 of the PWDP shows the OCB for Te Kowhai Airfield and contains information on the noise buffer surrounding Te Kowhai Airpark.

The Te Kowhai Airpark noise buffer is an area extending 55 m from the boundary of Te Kowhai Airpark (excluding the runway). It does not extend across Limmer Road. Within this buffer area dwellings are required to be acoustically insulated to achieve an internal noise level for habitable spaces of 40 dB L_{dn}. A mechanical ventilation system is required if windows need to be closed to meet this level and noise levels for any installed system are also specified which are consistent with the WHO recommended internal noise levels (5 dB higher than the WHO levels are allowed for ventilation on high setting).

The rules in Appendix 1 of the PWDP are separated for dwellings within the Te Kowhai Airfield OCB and those within the Te Kowhai Airpark noise buffer. However, the PWDP conditions around acoustic insulation and mechanical ventilation requirements are the same; the only difference is the parameters for specifying internal noise levels. Table 6 of Appendix 1 provides an internal limit of 40 dB L_{dn} within the OCB, consistent with the L_{dn} parameter for predicted airnoise contours. Section 3.2 of Appendix 1 provides an internal noise limit of 35 dB LAeq in all habitable rooms for dwellings within the Te Kowhai Airpark noise buffer, based on noise from Te Kowhai Airpark being equivalent to a level of 50 dB LAeq at 55 m. It is not clear where the location of noise source(s) should be assumed within the noise buffer to implement this rule.

There is some overlap between the existing OCB and the Te Kowhai Airpark noise buffer (see Figure 2 in Appendix 1-3 of the PWDP), however new dwellings are unlikely to be located in this area due to the proximity to the airfield and the existing airfield buildings. The OCB in Appendix 1 of the PWDP will need to be updated due to the higher numbers of aircraft proposed at Te Kowhai Airfield, as discussed in more detail in the T+T memo contained in Appendix 1 of this report. This is likely to result in greater overlap between the two areas which may cause confusion in the application of noise limits.

A simpler approach to specifying noise insulation requirements may be advisable such as combining the contours and providing a single limit and parameter for internal noise levels. Providing more detail around the anticipated noise levels within this combined OCB, for example by providing additional contours in 1 or 2 dB increments, will provide greater clarity for developers reading the PWDP on what level of sound insulation is required in specific areas. The ANB should also be shown.

The rules in the PWDP for Te Kowhai Airpark noise from sources other than aircraft noise (Rule 27.2.6) and noise from aircraft on taxiways (Rule 27.2.7) are shown below:

27.2.6 Noise - Other than Taxiways

P1	(a) Noise from any activity in PRECINCT B must not exceed the following noise limits when measured at the notional boundary of a site within the Rural Zone: (i) 55dB (L_{Aeq}), 7am to 10pm every day; and (ii) 40dB (L_{Aeq}) and 70dB (L_{AFmax}), 10pm to 7am the following day.
P2	(a) Noise from any activity in PRECINCTS C OR D must not exceed the following noise limits when measured at the notional boundary of any site in the Rural zone outside of the Te Kowhai Airpark Zone: (i) 50dB (L_{Aeq}), 7am to 7pm every day; and (ii) 45dB (L_{Aeq}), 7pm to 10pm every day; and (iii) 40dB (L_{Aeq}), and 65dB (L_{AFmax}) all other times.
P3	(a) In ALL PRECINCTS, Rules P1 and P2 do not apply to: (i) Noise from aircraft movement on the taxiways; or (ii) Construction noise, or (iii) Noise from emergency sirens.
DI	Any activity that does not comply with Rule 27.2.6 P1, P2 or P3

27.2.7 Noise – Taxiways

P1	(a) In ALL PRECINCTS, noise from aircraft movements on the taxiways must not exceed the following noise limits: (i) When measured at the notional boundary of 202, 212 and 214 Limmer Road: A. 50dB (L_{Aeq}), 7am to 10pm every day; and B. 40dB (L_{Aeq}), and 65dB (L_{AFmax}) at all other times; or (ii) When measured at the notional boundary of any other site in the Rural Zone: A. 50dB (L_{Aeq}), 7am to 7pm every day; and B. 45dB (L_{Aeq}), 7pm to 10pm every day; and C. 40dB (L_{Aeq}), and 65dB (L_{AFmax}) at all other times (b) Rule 27.2 (P1)(a)(ii) does not apply to 98A and 98B Limmer Road
DI	Any activity that does not comply with Rule 27.2.7P1 .

Rule 27.2.6 contains different limits for noise from Precinct B (commercial) to that from Precincts C or D (residential). These noise limits are consistent with those for the Commercial and Business zones, however it may be simpler to require noise from any precinct to meet the noise limits for the receiving zone. This is commonly the approach in other district plans.

The noise limits for taxiways are in general accordance with the Rural Zone limits, however there are changes to the evening limits for some properties, and other properties are exempted. This is quite confusing and may prove difficult to monitor compliance.

3 Review of reports / submissions

Two acoustic reports have been prepared which support the development of Te Kowhai Airpark and control measures to manage noise effects by a combination of noise rules and updated ACNBs.

3.1 Hegley report

The purpose of the Hegley report is to inform rules for the PWDP. The Hegley report provides an assessment of noise from taxiing aircraft and proposed commercial activities within Te Kowhai Airpark on sites outside the airpark.

Residential sites are proposed within Te Kowhai Airpark itself, with associated aircraft hangars for personal use. The impact of noise on these sites within Te Kowhai Airpark is not considered. We consider that these properties may be affected by noise. The Hegley report assumes that this will be managed by NZTE and appropriate acoustic insulation will be incorporated to provide protection against aircraft noise when indoors. We expect that the occupiers of these dwellings are likely to be

fully aware of the local aircraft noise environment and are therefore likely to be less sensitive to the noise of aircraft compared to neighbouring off-site residents.

The Hegley report only makes mention of the OCB, the location of which is taken from the Operative District Plan. The Hegley report does not cover the ANB.

Rule 25.17 in the District Plan (DP) is referenced, as well as the rural zone noise rule in the PWDP. The same numerical values are given for limits at different times of day, but the LA10 parameter has been updated to LAeq, in line with general accepted practice. The Hegley report suggests that although there are no limits defined for the Te Kowhai Airpark site (it is 'under discussion'), adopting the Rural limits would be reasonable.

The Hegley report notes the differences in noise limits for the site between the DP and the PWDP and proposes to adopt the PWDP limits for the assessment. We agree this is appropriate.

3.1.1 Taxiing aircraft

The Hegley report rightly points out that NZS6805 only covers noise from aircraft arriving at and departing from the airfield, and does not explicitly include taxiing noise. NZS6802 *Acoustics – Environmental Noise* is appropriate for assessing commercial sound from the airfield but specifically “does not apply to the assessment of sound where the source is within the scope of, and subject to, the application of other New Zealand acoustical Standards”. It is therefore not entirely clear as to how taxiing noise should be dealt with.

However, the Hegley report asserts that it is not necessary to combine taxiing noise with the airnoise contours as there will be little or no cumulative effect as the taxiways are mainly outside the OCB. In particular, where the Deferred Village zone to the north is covered by the existing OCB contour, it will not be cumulatively affected by taxiing noise as this occurs south of the runway.

Therefore, the Hegley report considers noise from taxiing aircraft against the noise rules of the PWDP and does not seek to alter the OCB (55 dB Ldn contour).

The Hegley report assesses taxiing noise using measured noise levels from three selected representative aircraft, as well as values from the US Federal Aviation Administration's (FAA) Integrated Noise Model (INM - standard aircraft noise modelling software) for helicopters. We agree this is an appropriate approach.

As noise levels from taxiing were predicted to exceed the PWDP limits, the Hegley report considers mitigation options for the surrounding sites, including internalising taxiways, noise barriers and operational limitations. Neighbours on Limmer Road and Te Kowhai Road were consulted to develop the most appropriate solution. Adjustments to the noise limit were proposed by some residents, and full written consent obtained from others. Consultation showed that noise barriers were least desirable due to shadowing and restricting views, although a barrier may be desirable for Site 4.

The proposed layout now includes the internalised taxiways.

The Hegley report takes a pragmatic approach to managing noise levels, and provides a number of 'permissible aircraft movements' in order for noise limits to be met at each location. We agree this is an appropriate approach and should be relatively straightforward for Te Kowhai Airpark to implement and manage.

For some properties an evening limit of 50 dB LAeq has been agreed between the property owner and NZTE, whilst for others the 45 dB LAeq PWDP limit will be the controlling factor for permissible numbers. During the day, higher numbers of aircraft can be allowed.

The Hegley report notes that as the airfield is not lighted, flights will not take place after dark which can be relatively early in winter. However, this will change once Te Kowhai Airfield is upgraded to IFR, but the runway would still have to be lit to comply with CAA regulations.

The numbers of taxiing movements shown for the 'typical' and 'noisy' aircraft types are sufficiently high that it is not considered to be a limiting factor for aircraft operations. It is not entirely clear whether Table 4 of the Hegley report showing the upper limit of aircraft movements is for Cessnas and YAKs, or for one type or the other.

Site 4 within the residential lots is discussed separately and a noise barrier may be appropriate if written consent is not obtained. However, it is noted that the proposed height of the barrier may require it to be set back from the boundary, which may not be acceptable to the occupants. If a barrier is not acceptable, the Hegley report considers that an alternative solution may be possible, for example restricting the noisiest type of aircraft from the two lots from which aircraft would need to taxi past Site 4.

3.1.2 Noise from commercial precinct

The Hegley report considers that noise from the commercial precinct will readily comply with the PWDP limits, which seems reasonable given the distance to the nearest properties and the screening from buildings.

3.1.3 Future dwellings

In order to mitigate reverse sensitivity from any future dwellings constructed near Te Kowhai Airpark, a buffer zone is proposed of 75 m between any new dwelling and the boundary of Te Kowhai Airpark, or 55 m from the notional boundary to the boundary of Te Kowhai Airpark (Precincts B, C and D). This is based on the distance of the assessed properties. Within this buffer distance, the Hegley report proposes that dwellings are required to meet an internal noise level of 35 dB LAeq which is consistent with the intent of the PWDP limits (i.e. 50 dB LAeq external, with assumed 15 dB attenuation of an open window). We agree this is an appropriate approach.

The Hegley report recommends a rule is proposed to be included in the PWDP requiring a buffer zone around Te Kowhai Airpark, with a requirement within that buffer zone to ensure that internal noise levels do not exceed 35 dB LAeq during the day time period. The proposed rule, as it is presented in the Hegley report, does not define that the buffer distance is measured to the notional boundary. If this buffer distance were to be implemented, we consider that a buffer zone of 75 m for dwellings, rather than 55 m for the notional boundary of dwellings, would be less confusing and would achieve the same result.

This approach does not take into consideration reverse sensitivity from aircraft noise; this is discussed in Section 3.3.

3.1.4 Proposed conditions

Conditions are proposed for NZTE's development of the Te Kowhai Airpark consistent with the assessment undertaken.

The conditions control how the noise limits will be met, rather than controlling the permissible numbers of aircraft. Therefore, the responsibility of complying with the permissible number of aircraft lies with NZTE. The Hegley report states that this is not an onerous restriction.

3.2 MDA report

The MDA report details the method and inputs into Te Kowhai Airfield's ANCBs.

The MDA report notes that night-time aircraft movements have a +10 dB weighting, however no night-time flights or taxiing have been included in the modelling. This is likely to be representative of existing operations at Te Kowhai Airfield.

The number of movements representative of an average day from the busiest three months of the year have been modelled. This is consistent with NZS6805.

Assumptions around the runway are provided in the MDA report. We have not independently verified these assumptions. We recommend that WDC should clarify with NZTE how many night flights are anticipated or have been recorded, noting that 'night-time' hours (10 pm to 7 am) may fall within daylight hours during the summer.

There is no discussion in the MDA report of the increase in numbers expected as a result of changing from VFR to IFR, neither overall flight numbers nor night-time flights.

Numbers of aircraft are given for busy average day. The source of these numbers is not given. Annualised total numbers add to 25,538², whereas the proposed annual number of aircraft is 21,000³. The seasonal variation in numbers is not given; it is probable that aircraft numbers during the busiest three months are significantly higher than at other times of the year.

Aircraft taxiing has been included in the contours. This is not required by NZS6805. A factor of 1.5 has been allowed for uncertainties around taxiing to private residences.

The MDA report states that '*the Outer Control Boundary has been extended out to the Airpark Zone boundary to the south to provide for taxiing within the zone and to limit the noise at the zone boundary rather than within the Airpark.*' As noise within the Te Kowhai Airpark site will be controlled by NZTE this seems a reasonable approach.

The MDA report recommends land use controls are in line with NZS6805. We agree this is appropriate.

The MDA report proposes a replacement for Rule 27.2.7 in the PWDP as follows:

27.2.7 Noise –Aircraft Operations

Noise from aircraft operations in ALL PRECINCTS, including aircraft movements on taxiways, shall not exceed 55 dB Ldn outside the Outer Control Boundary and 65 dB Ldn outside the Air Noise Boundary as shown in the Planning Maps. These limits do not apply inside the Te Kowhai Airpark Zone. For the purpose of this control aircraft noise shall be assessed in accordance with NZS 6805:1992 "Airport Noise Management and Land Use Planning" and logarithmically averaged over a three month period. For the purposes of this rule aircraft operations shall include aircraft taking-off, landing, taxiing and flying on circuit flight paths. The following operations are excluded from the calculation of noise for compliance with the noise limits:

- *Aircraft engine testing and maintenance*
- *Aircraft landing or taking off in an emergency*
- *Emergency flights required to rescue persons from life threatening situations or to transport patients, human vital organs or medical personnel in a medical emergency*
- *Flights required to meet the needs of a national or civil defence emergency declared under the Civil Defence Emergency Management Act 2002*
- *Aircraft using the airfield due to unforeseen circumstances as an essential alternative to landing at a scheduled airport elsewhere*
- *Aircraft undertaking firefighting duties*

² Annualised movements derived from three months of air movement data being extended to the full 12 month period.

³ Appendix 13 Summary of Assessment of Effects appended to the S32 report for Te Kowhai Airpark.

- *Air Shows (for one air show per year)*

Aircraft movements shall be recorded monthly and once the total movements in the busiest three month period reaches 4,500, noise contours for the purpose of assessing compliance with Rule 27.2.7 shall be calculated once every three years. When the calculated noise levels are within one decibel of the limit, noise contours for the purpose of assessing compliance with Rule 27.2.7 shall be calculated annually and verified with infield monitoring once every three years.

In general we agree that this rule is in line with NZS6805 and appropriate to replace Rule 27.2.7. The exceptions listed are reasonable.

Airshow noise is typically controlled by limiting the frequency and duration of this type of event rather than including it in the assessment period for the airfield. It is not practical to specify noise limits for airshows due to the variety of activities that take place.

The proposed threshold of 4,500 movements that triggers contour calculation is not explained in the MDA report. We consider it is likely to be related to the modelling results and a percentage of the total annualised number of movements, e.g. within 85% of the number of movements in three months that derived the ANB, which would be reasonable. The frequency and type of verification (modelling every three years then monitoring once levels are within 1 dB) are reasonable as levels are unlikely to change rapidly. WDC could consider increasing the frequency of verification monitoring to every two years to be conservative and demonstrate ongoing compliance.

The MDA report recommends a contour plot showing Ldn contours in 2 dB increments is included in the PWDP Appendix 1 to assist with the assessment. We agree with this recommendation but it may be useful to include increments in 1 dB steps to provide greater certainty on aircraft noise exposure if designing acoustic treatment of buildings.

3.3 NZTE submission

The submission on the PWDP from NZTE seeks an increase to the OCB and a new ANB as per the MDA report in order to future-proof airfield and Te Kowhai Airpark activities and prevent reverse sensitivity. It states the existing OCB is not sufficient for operational needs of the Airfield and Te Kowhai Airpark.

NZTE's submission notes that the OCB from the Operative District Plan has been included in the PWDP, and claims that the only purpose of that OCB is to impose acoustic insulation standards on new noise sensitive development, without restrictions on aircraft noise, or protection of Te Kowhai Airfield from reverse sensitivity effects. The OCB also does not include taxiway noise; this is managed by the proposed Airpark Noise Buffer in the Rural Chapter.

The ANCBs in the MDA report include taxiway noise, so the notified provisions relating to the 'Te Kowhai Airpark Buffer Zone' are no longer necessary if the ANCBs from the MDA report are incorporated into the PWDP.

The NZTE submission seeks:

- Non-complying status within the 65 dB Ldn ANB;
- Within OCB - only permit new noise sensitive activities / alterations to existing noise sensitive activities with sound insulation and ventilation installed as per Chapter 29 Appendix 1;
- An update to the ANCBs as per the MDA report, which include taxiway noise; and
- The planning maps to be updated.

Non-complying status within the 65 dB Ldn ANB is not consistent with NZS6805 which recommends that new noise sensitive development should be prohibited. Between the OCB and the ANB,

NZS6805 recommends noise sensitive developments are prohibited unless the district plan permits them subject to sound insulation requirements. If the PWDP rules are to be consistent with NZS6805, then noise sensitive developments between the OCB and the ANB should be prohibited, although this will require an exception to be made for Te Kowhai Airpark. Alternatively, new developments could be non-complying which would be more consistent with allowing the Te Kowhai Airpark development within the OCB. We consider it may be appropriate to provide an exception for Te Kowhai Airpark as the future residents will have an interest in aircraft, and will presumably be aware of the associated noise.

4 Ldn contours

T+T has produced airnoise contours using the assumptions detailed in the MDA report using the FAA's AEDT software⁴. A comparison between the two sets of contours is contained in the T+T memo dated 30 October 2020. Additional contours are provided in the T+T memo dated 3 December 2020 based on a different set of operating assumptions, as requested by WDC (15,000 movements per year). These memos are both included in Appendix A of this report.

5 Additional controls

The noise disturbance experienced by light aircraft (general aviation) is not just related to the level of noise. The number of aircraft movements has been shown to be a controlling factor as light aircraft will generally undertake significantly more movements compared to commercial aircraft, especially if flight training is taking place. Controls based on ANCBs and aircraft movement caps are often used for small aerodromes / airfields to minimise the potential for noise disturbance. This may be particularly relevant for any future flight training where aircraft fly circuits around the airfield.

The change to IFR may mean that aircraft movements at Te Kowhai Airfield could occur in the night-time period of 10 pm to 7 am. We understand that the contours in the MDA report do not include night-time activity and that any air movements that occur in the dark do so before 10 pm (and after 7am). The method of calculation of the contours includes a 10 dB weighting for any night-time flights. Night-time operations would require airfield lighting to be compliant with CAA regulations.

6 Suggested approach to addressing noise from general aviation and proposed changes

6.1 Discussion

The revised Rule 27.2.7 proposed in the MDA report offers an appropriate means of managing aircraft noise (including taxiing noise) within the contours that have been predicted, noting that there are some minor differences between the predictions by MDA and T+T (the T+T predictions did not include taxiing noise). The OCB contour for 15,000 movements describes a notably smaller area than the MDA contour.

The number of movements that are allowed by WDC at Te Kowhai Airfield has yet to be finalised in the PWDP. The number of annual movements should be partly based on the use of the airfield by different aviation sectors and also the actual year on which the forecasts are based. It should be noted that the life of a district plan is 10 years and the NZTE forecasts are for the next 20+ years.

Appendix 1 of the PWDP provides noise limits for internal spaces within the OCB and the Te Kowhai Airpark noise buffer zone. If the Te Kowhai Airpark noise buffer zone is replaced by the OCB as is

⁴ The US Federal Aviation Administration's (FAA) Aviation Environment Design Tool (AEDT) has replaced the FAA's INM software and is the preferred means of generating aircraft noise contours. While there are slight differences in the software, the aircraft noise and performance databases are identical in both software programs.

recommended in the MDA report and by us, then section 3.2 of the PWDP will become redundant and should be deleted.

It is considered that the internal noise limit of 40 dB Ldn is more appropriate to use than an internal noise limit of 35 dB LAeq, as the use of the Ldn parameter in the limit will take account of any night-time flights and is consistent with the noise metric used to define the OCB and ANB.

In line with the recommendations of NZS6805, we consider that noise sensitive development within the OCB should be prohibited (rather than non-complying as suggested by NZTE) unless there is good reason for the district plan to allow otherwise. This will require an exception for development within Te Kowhai Airpark. It may be desirable to have a greater level of consistency for development within the OCB and Te Kowhai Airpark, which could be achieved by having noise sensitive development within the OCB as non-complying, with a requirement for sound insulation.

Rules for noise received in a residential zone should be clearly defined and compliance monitoring should be straightforward. With the proposed zoning within Te Kowhai Airpark there is the possibility of two different noise limits being applied to the residential zone, for noise received from the commercial and residential zones within Te Kowhai Airpark. This would not benefit the residents and it would be difficult to monitor compliance. It is recommended that a single set of noise limits are applicable at the residential zone, i.e. if a commercial or business zone is adjacent to a residential zone, it is obliged to meet residential noise limits at the residential zone boundary. This is commonly the approach in other district plans.

6.2 Recommendations

We make the following recommendations regarding noise rules for Te Kowhai Airpark in the PWDP:

Table 6.1: Recommended actions for Te Kowhai Airpark PWDP rules

PWDP rule	Comment	Recommendation
27.2.6 Noise – Other than taxiways	All precincts should have to meet Rural zone limits	Rename as “Noise – other than Aircraft Operations ⁵ ” Replace rules P1 and P2 with the following: “Noise from activities other than aircraft operations in all precincts (A, B, C and D) must not exceed the following noise limits when measured at the notional boundary of a site within the Rural Zone and Village Zone: (i) 50 dB LAeq 7 am to 7 pm every day; and (ii) 45 dB LAeq 7 pm to 10 pm every day; and (iii) 40 dB LAeq and 65 dB LAFmax all other times.”
27.2.7 Noise – Taxiways	Existing PWDP rule is complicated and difficult to enforce	Replace rule 27.2.7 with MDA’s proposed rule - noting that the 4,500 movements prior to preparing contours requires confirmation. Also consider changing frequency of compliance monitoring to 2-yearly.
27.2.8 Construction Noise	No comments	Keep rule
Appendix 1 – 3 Te Kowhai Airpark	OCB needs to be updated.	Update Figure 2 to include OCB (with taxiing noise), ANB and contours in 2 dB increments. Remove reference to noise buffer.

⁵ We understand you propose to define ‘aircraft operations’ elsewhere in the PWDP.

In addition, we recommend that noise sensitive development between the OCB and the ANB should be prohibited, in line with NZS6805, with an exception made for development within Te Kowhai Airpark which would be subject to sound insulation requirements.

7 Applicability

This report has been prepared for the exclusive use of our client Waikato District Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

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Appendix A: Memos

- T+T contours
- MDA contours

Memo

To:	Emma Ensor	Job No:	1013185
From:	Darran Humpheson	Date:	30 October 2020
Subject:	Te Kowhai Airfield airnoise contours		

Tonkin & Taylor Ltd (T+T) has undertaken an assessment of aircraft noise on behalf of Waikato District Council as part of their district plan review. T+T has modelled aircraft noise contours of the Te Kowhai Airfield as part of the review process and compared these contours against those provided by Marshall Day Acoustics (MDA) in their consultant advice note (CAN) dated 8 October 2018.

MDA provided their noise model's input in a spreadsheet on 23 October 2020. T+T received this information from WDC on 27 October 2020 and have used this information to generate new contours using AEDT 3c aircraft noise modelling software.

We can confirm that on the basis of the MDA input data near identical contours have been produced to those in the MDA CAN using standard flight profiles. The additional noise contribution from taxiing aircraft has a minimal effect on the size and shape of the contours.

The differences relate to the choice of aircraft in T+T's original noise model and those provided by MDA:

Item	MDA model	T+T model	Use	% of daily movements
1	General Aviation Fixed Pitch Prop – Generic aircraft type (GASEPF)	Cessna 140	Hobby flight training	~5%
2	General Aviation Variable Pitch Prop – Generic aircraft type (GASEVF)	Cessna 441 – twin prop	Moderate use commercial / flight school / private residents	~65%
3	Cessna 206	Cessna 206	High Use Commercial	~30%

The choice of variable pitch propellor aircraft (Item 2) is the reason why the T+T contours are smaller than those in the MDA CAN (in addition to accounting for about ~65% of daily movements).

The T+T choice of aircraft is recognised to be quieter than a generic piston engine aircraft (GASEVF) and is representative of more modern aircraft which generate less noise when taking off and landing. As the Te Kowhai Airfield air noise boundary (ANB) needs to represent a likely future noise situation it is reasonable to assume that aircraft will be updated in the future and it is likely that quieter aircraft will replace older and hence noisier aircraft. However if this is not the case then the ANB should be based on the aircraft assumptions provided by MDA.

From T+T's experience of general aviation operations, non-commercial use aircraft are not generally replaced as frequently as aircraft used for commercial purposes. As residential use of aircraft accounts for approximately 42% of the variable pitch type of aircraft, they will still influence the

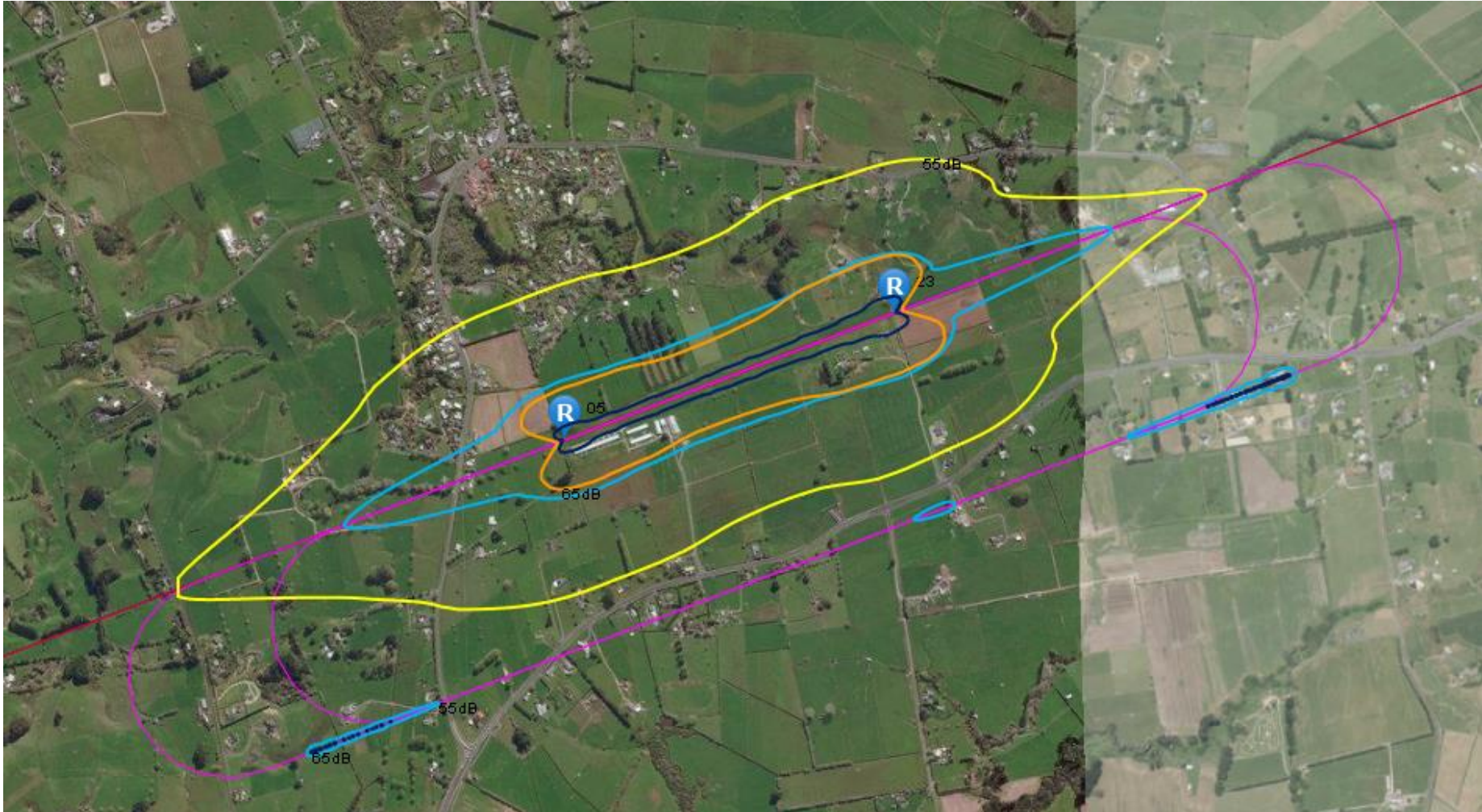
overall noise level and replacing the commercial use element with a quieter variable pitch aircraft will not result in a significant reduction in the size and shape of the ANB.

Without further breakdown of actual and future aircraft types at Te Kowhai Airfield we are reliant on the aircraft assumptions provided by MDA but do note that the contours are likely to over-estimate the degree of aircraft noise around the airfield.

30-Oct-20

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Enclosure 1 – Airnoise boundary 65 dB Ldn and outer control boundary 55 dB Ldn (T+T original – blue contours and MDA assumptions yellow/orange)



Memo

To:	Emma Ensor	Job No:	1013185
From:	Darran Humpheson	Date:	03 December 2020
Subject:	Te Kowhai Airfield airnoise contours		

Tonkin & Taylor Ltd (T+T) has undertaken an assessment of aircraft noise on behalf of Waikato District Council (WDC) as part of their district plan review. T+T has modelled aircraft noise contours of the Te Kowhai Airfield as part of the review process and compared these contours against those provided by Marshall Day Acoustics (MDA) in their consultant advice note (CAN) dated 8 October 2018.

MDA subsequently provided their noise model's input in a spreadsheet on 23 October 2020. T+T received this information from WDC on 27 October 2020 and have used this information to generate new contours using the US FAA's AEDT 3c¹ aircraft noise modelling software. These new contours are near identical to those provided in the MDA CAN, which was generated using the FAA's INM² software. The additional noise contribution from taxiing aircraft has a minimal effect on the size and shape of the contours and has been ignored.

WDC requested a further set of noise contours to reflect an operational scenario of 15,000 aircraft movements per year, no flights between 10pm and 7am and no flight training school or circuit training flights. The no flights request between 10pm and 7am was already included within the MDA contours.

New 55 dB Ldn Outer Control Boundary (OCB) and 65 dB Air Noise Boundary (ANB) contours are included at Enclosure 1. The contours include a comparison to the MDA OCB and ANB contours, which were based on 21,000 aircraft flight movements per annum, which is the equivalent of 25,5538 annualised busy day movements. The revised aircraft movement numbers (omitting the training school movements and all touch and go movements) are included at Enclosure 2.

3-Dec-20
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¹ United States Federal Aviation Administration Aviation Environmental Design Tool noise modelling software version 3c

² United States Federal Aviation Administration Aviation Integrated Noise Model noise modelling software

Enclosure 1 – 65 dB Ldn ANB and 55 dB Ldn OCB - new 15,000 contours shown as blue and MDA contours for 21,000 movements shown green



Enclosure 2 - Revised 15,000 annual movements

ACFT_ID	AIRCRAFT MODEL	AEDT AIRFRAME TYPE	OP_TYPE	RWY_ID	OPS_DAY
CPL_PPL	GASEPF	Cessna 150	Arrival	23	1.109099
CPL_PPL	GASEPF	Cessna 150	Arrival	05	0.597207
CPL_PPL	GASEPF	Cessna 150	Departure	23	1.109099
CPL_PPL	GASEPF	Cessna 150	Departure	05	0.597207
HUCOM	CNA206	Cessna 206	Arrival	23	5.941605
HUCOM	CNA206	Cessna 206	Arrival	05	3.199327
HUCOM	CNA206	Cessna 206	Departure	23	5.941605
HUCOM	CNA206	Cessna 206	Departure	05	3.199327
ITINRNT	GASEPV	Cessna 400	Arrival	23	3.696999
ITINRNT	GASEPV	Cessna 400	Arrival	05	1.990691
ITINRNT	GASEPV	Cessna 400	Departure	23	3.696999
ITINRNT	GASEPV	Cessna 400	Departure	05	1.990691
RESIDENT	GASEPV	Cessna 400	Arrival	23	5.494665
RESIDENT	GASEPV	Cessna 400	Arrival	05	2.958666
RESIDENT	GASEPV	Cessna 400	Departure	23	5.494665
RESIDENT	GASEPV	Cessna 400	Departure	05	2.958666
Busy day average					49.98
Annualised day average					41.10
Annualised total (from busy day average)					18,241
Annualised total					15,000
Increase – busy day compared to annualised average day					22%