Styles Group
Acoustics & Vibration Consultants

ASSESSMENT OF NOISE EFFECTS

SUNFIELD MASTERPLANNED COMMUNITY
TAKANINI

PREPARED FOR

Winton Land Limited

DATE

8 February 2025

Acoustic advice prepared by Styles Group for Winton Land Limited.

REVISION HISTORY

Rev:	Date:	Comment:	Version:	Prepared by:	Reviewed by:
1	15/12/23	Draft for feedback	Final Draft	Jon Styles, MASNZ Title Styles Group	Gemma Sands Consultant Styles Group
2	08/04/24	Draft for feedback	Draft		
3	01/05/24	Draft for feedback	Draft		
4	20/12/24	Updates for fast-track application	Final		
5	08/02/25	Updates for lodgement	Final		

Table of contents

1.0 Introduction

Winton Land Limited has engaged Styles Group to assess the aircraft noise effects from Ardmore Airport (the **Airport**) across the land subject to the Sunfield fast-track approval application in Takanini (the **Site**).

Parts of the Site are within the Airport's aircraft noise boundaries. Chapter D24 of the Auckland Unitary Plan - Operative in Part (**AUP**) includes land use controls to manage the subdivision and development of land and establishment of Activities Sensitive to Aircraft Noise inside the Outer Control Boundary[1].

The land use controls in Chapter D24 are generally consistent with the recommended land use planning measures in New Zealand Acoustical Standard 6805:1992 *Airport Noise Management and Land Use Planning* (**NZS6805**).

Activities Sensitive to Aircraft Noise (**ASAN**) are defined in Chapter J1 of the AUP as:

> **ASAN** means: Any dwellings, boarding houses, marae, papakāinga, integrated residential development, retirement villages, supported residential care, care centres, education facilities, tertiary education facilities, hospitals, and healthcare facilities with an overnight stay facility.

This advice identifies the aircraft noise levels across the Site and provides high-level recommendations to ensure the proposed resource consent conditions will deliver the level of acoustic amenity prescribed by Chapter D24 of the AUP for the development of land exposed to aircraft noise from the Airport.

2.0 The proposal

Winton Land Limited propose to develop 244 hectares of land in Takanini. The Site is currently zoned Mixed Rural Zone and Future Urban Zone according to the AUP. The proposal is to develop the Site to facilitate a comprehensive master-planned community.

Figure 1 displays the aircraft noise boundaries across the proposed development area. Figure 1 identifies:

i. The small area of land inside the Air Noise Boundary at the 65 dB L_{dn} noise contour (the **ANB**) is proposed to be developed for Employment activities.

ii. The land between the ANB and the 60 dB L_{dn} noise contour is proposed to be developed for Employment, Town Centre, Health Care and Local Hub activities.

[1] Land exposed to aircraft noise levels greater than 55 dB L_{dn}

iii. The land between the 60 dB L_{dn} noise contour and Outer Noise Boundary at the 55 dB L_{dn} noise contour (the **ONB**) is proposed to be developed for Employment, Town Centre, Residential and Aged Care activities.

iv. The land outside the ONB is proposed to be developed for Residential, Aged Care and Employment activities. The AUP does not impose any land use controls in relation to aircraft noise outside the ONB.

The Sunfield masterplan has been designed to align with the existing operative airport noise boundaries.

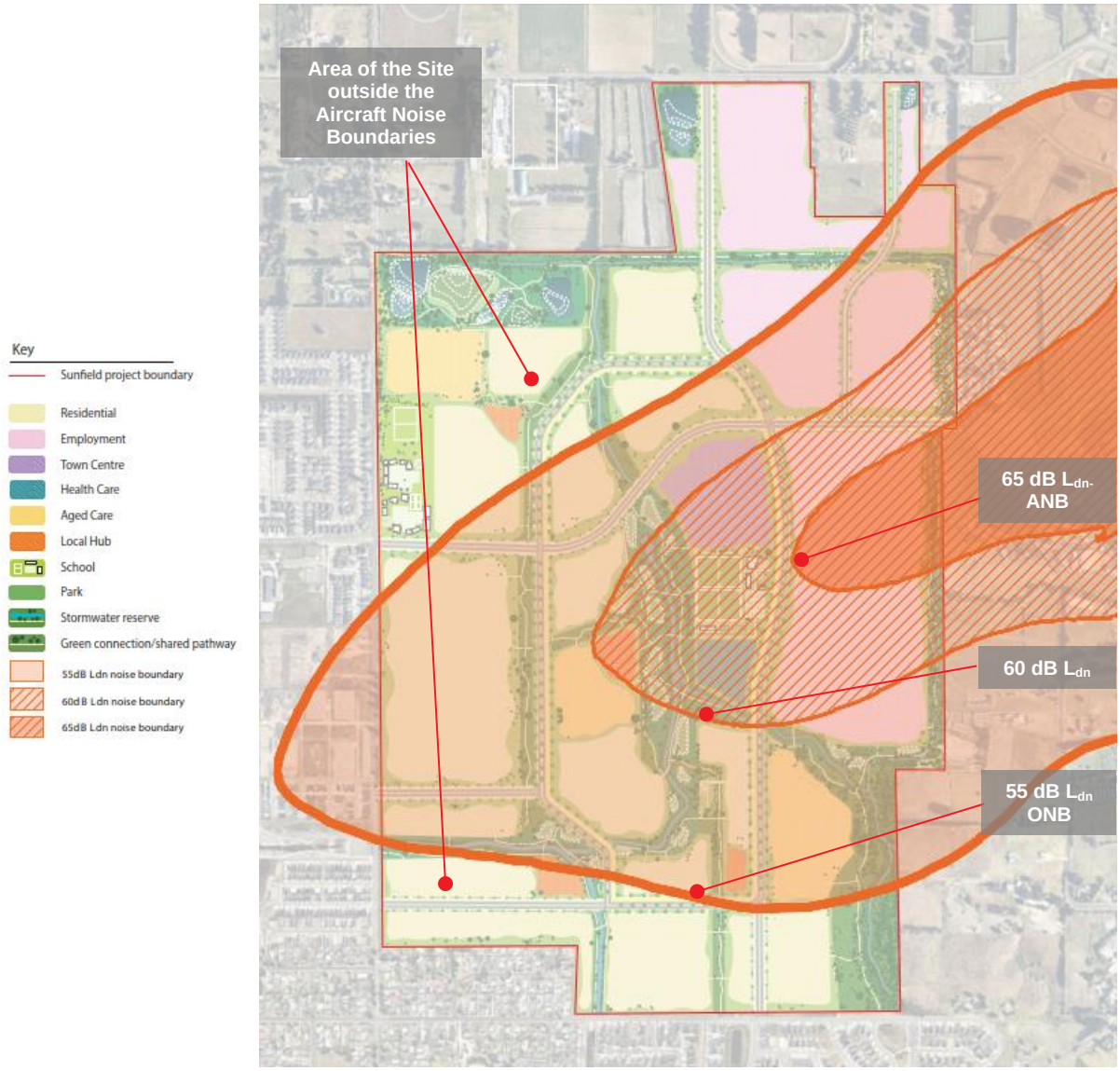

Figure 1 Proposed development layout and Ardmore's aircraft noise boundaries (from the AUP)

3.0 Proposed development inside the ANB

Figure 2 shows the proposed Employment area across a relatively small area of land inside the ANB.

Policy D24.3(1) of the AUP seeks to "*avoid the establishment of new activities sensitive to aircraft noise (except tertiary education facilities) within the 65 dB L_{dn} noise contour in the Aircraft Noise Overlay"*. The activity table in Chapter D24 applies a prohibited activity status to new ASAN inside the ANB. A26 and A27 also require legal mechanisms to be included in subdivision applications to preclude the establishment of future ASAN inside the ANB.

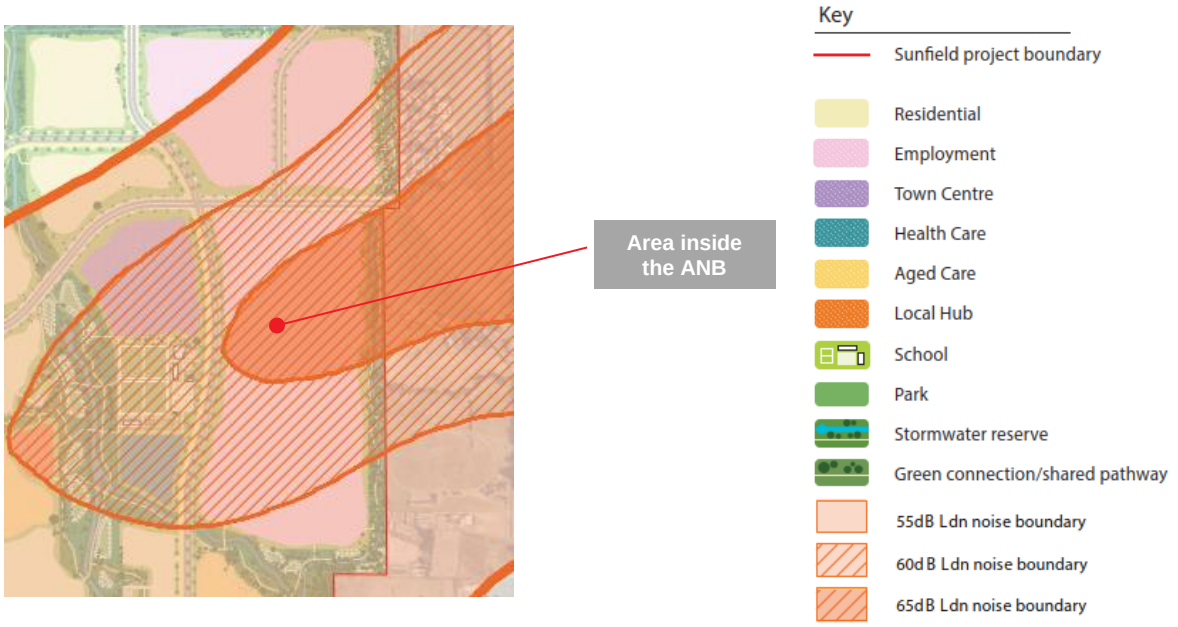

Figure 2 Proposed development inside the ANB

3.1 Recommendations

ASAN inside the ANB are a prohibited activity and are therefore precluded by Chapter D24.

We understand that the Employment area will be designed to provide for industrial type activities such as warehousing. We recommend that the proposal aligns with Chapter D24 by enabling land use activities that are not sensitive to aircraft and that can be noise inherently noisy themselves.

4.0 Proposed development between the 65 dB L_{dn} and 60 dB L_{dn} noise contour

Figure 3 displays the proposed development arrangements between the ANB and the 60 dB L_{dn} noise contour.

We understand that the proposal is to limit the potential for new ASAN between the ONB and 60 dB L_{dn} noise contours. The proposed development arrangements between the ONB and

60 dB L_{dn} noise contours will provide for retail and service activities in the Town Centre, healthcare activities inside the Health Care area and retail and service activities inside the Local Hub. The areas of Open Space are intended to provide for active / organised recreation.

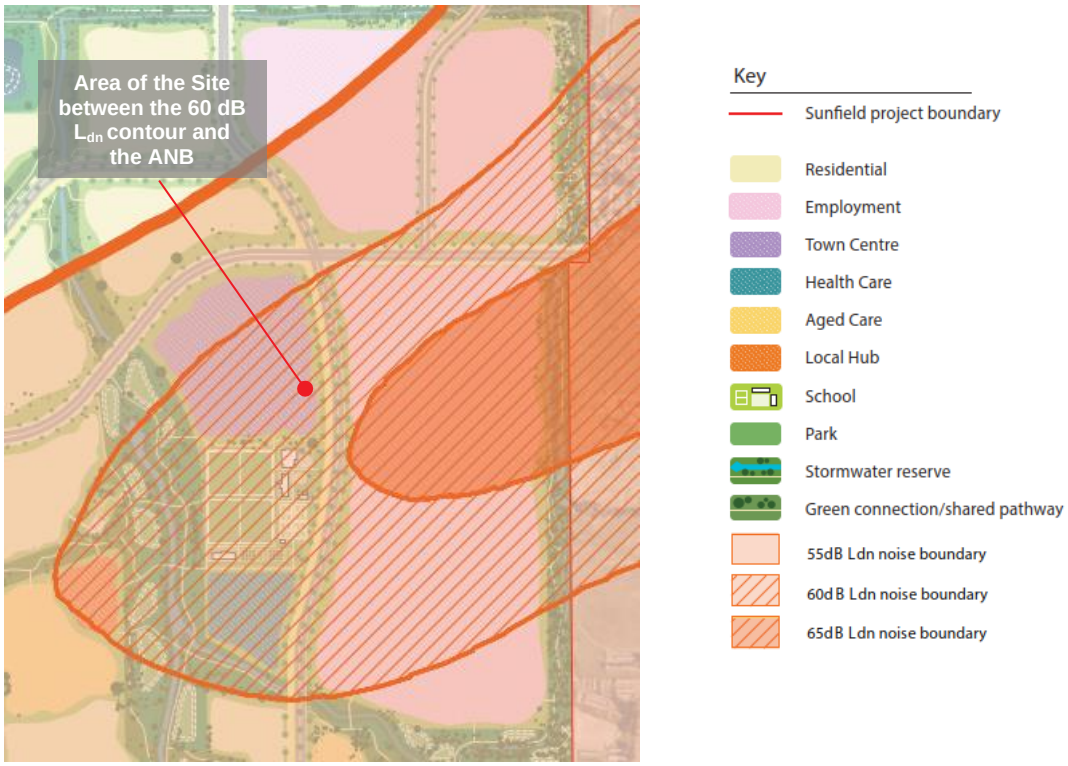

Figure 3 Proposed development between the ANB and 60 dB L_{dn} contour

Table D24.4.2 (A14 and A15) of Chapter D24 applies a discretionary activity status to new ASAN, where they are designed and constructed in accordance with the relevant acoustic treatment standards in D24.6.2(1) and D24.6.2(5). ASAN are a non-complying activity where they do not comply with the specified acoustic treatment requirements.

4.1 Recommendations

We understand that the proposed development arrangements will generally preclude ASAN between the 65 dB L_{dn} and 60 dB L_{dn} noise contours.

We note that the proposed Health Care area may introduce the potential for ASAN if hospitals or healthcare facilities include an overnight stay facility. It is our experience that specialised facilities such as hospitals and healthcare facilities with overnight stay facilities that have no or very limited outdoor areas can be easily designed and constructed to be compatible with high noise environments through use of appropriate acoustic treatment.

We recommend that any overnight stay facility within a Health Care facility be designed and constructed in accordance with the relevant acoustic treatment requirements in D24.6.2.(1) and D24.6.2(5). We have worked with the Project Team to develop conditions of consent that

will deliver a superior level of acoustic amenity through adoption of the mechanical ventilating and cooling system provisions in E25.6.10(3)(b) to (f). The reasons for adopting the mechanical ventilation controls in E25.6.10(3)(b) to (f) rather than those prescribed by D24.6.2 are set out in Section 7.0.

We understand that the proposed areas of Open Space between the 65 dB L_{dn} and 60 dB L_{dn} noise contours are intended to provide for active forms of recreation that are generally not noise sensitive. We consider that this arrangement is acceptable as the proposal sets aside Open Space areas designed for passive recreational use outside the ONB. Sunfield residents will therefore have access to a variety of passive and active open space areas, including areas that provide a higher level of aural amenity outside the ONB.

We generally consider that the proposed development arrangements between the 65 dB L_{dn} and 60 dB L_{dn} noise contours can align with the anticipated outcomes of Chapter D24 provided that the development conditions limit the potential for ASAN.

5.0 Proposed development arrangements between the 60dB L_{dn} noise contour and the ONB

Figure 4 displays the proposed development arrangements between the 60 dB L_{dn} noise contour and the ONB. This area is proposed for Employment, Town Centre, Aged Care and Residential development.

We understand that the proposal is to provide for acoustically treated residential development between the 60 dB L_{dn} noise contour and the ONB.

A20 and A21 of Table D24.4.2 specifies a restricted discretionary activity status for ASAN between the 60 dB L_{dn} noise contour and the ONB where buildings containing ASAN are designed and constructed in compliance with standards D24.6.2(1), D24.6.2(4) and D24.6.2(5).

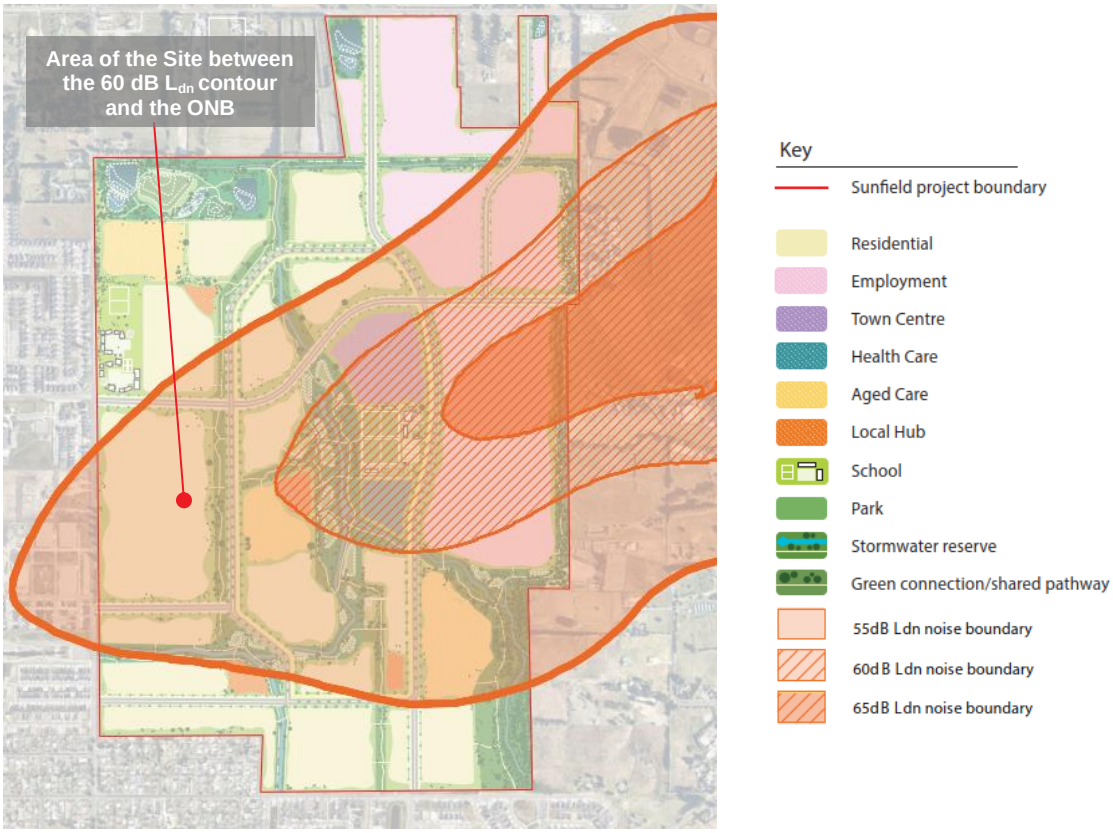

Figure 4 Proposed development between the ONB and 60 dB L_{dn} contour

5.1 Recommendations

We recommend that the proposed development between the ONB and the 60 dB L_{dn} contour achieves the following outcomes:

- All ASAN will need to be acoustically treated in compliance with the acoustic treatment standards set out in D24. We have provided additional comment on the specifications for mechanical ventilation and cooling systems in Section 7.0.
- We understand that a no-complaints covenant is proposed to be registered on the titles. Our experience is that this is likely to function as an “alert” to future residents that aircraft noise should be anticipated. They can help to make an incoming resident aware that the noise environment is, or has the potential to be, noisier than what could be expected in other parts of the city, and that aircraft noise could be a regular feature of the area. It is our experience that such covenants can have the effect of ‘filtering out’ the most noise-sensitive of the potential incoming residents.

6.0 Proposed development arrangements outside the ONB

The area of the site beyond the ONB is proposed to be developed for Employment, Aged Care and Residential activities. The proposal also includes a School, along with areas of Open Space.

The AUP does not include any noise-related land use controls to manage the subdivision and development of land exposed to aircraft noise levels less than 55 dB L_{dn} (i.e. all land beyond the ONB).

We consider that there is no need to manage exposure to aircraft noise in this area.

7.0 Mechanical ventilation and cooling specifications for ASAN inside the ONB

D24.6.2(1) requires that new ASAN are provided with ventilation and/or air-conditioning measures to enable occupants to remain adequately ventilated and thermally comfortable when windows are shut to reduce aircraft noise.

Mechanical ventilation and cooling systems are a fundamental part of the overall acoustic treatment package and ensure that an adequate internal noise environment is achievable, particularly in warm weather.

If such a system is not provided, or is inadequate, occupants may be compelled to open windows and doors for ventilation and to remain cool in hot weather. This results in aircraft noise intrusion and invalidates the effort of applying acoustic treatment to the building envelope.

We have been involved in several recent plan review processes involving the scrutiny and development of ventilation standards for dwellings in high noise environments. While we are not experts in mechanical ventilation, we understand that the requirements of D24.6.2(b) do not reflect best practice.

D24.6.2(c) simply requires that "*the related ventilation and/or air conditioning system(s) satisfies the requirements of New Zealand Building Code Rule G4 with all external doors of the building and all windows of the habitable rooms closed".* We understand the solutions required by the New Zealand Building Code are not effective for cooling and do not address the potential for overheating where windows and doors are closed to reduce external noise intrusion.

Where external windows and doors of ASAN must be closed to achieve the specified internal noise environments set out in Chapter D24, we recommend conditions that require the adoption of the mechanical ventilation and cooling specifications in AUP standard E25.6.10(3)(b) to (f). We recommend this standard applies instead of the ventilation system that is otherwise required by D24.6.2(c)(i). The system specification in E25.6.10(3)(b) to (f) require temperature control to ensure that the indoor environments remain cool whilst windows and doors are closed to reduce noise intrusion. The requirements of Clause G4 of the Building Code will still apply. Our experience is that the controls we recommend are typically complied

with by the implementation of domestic air conditioning systems and an extraction fan that is capable of ensuring an adequate fresh air supply to reduce the concentration of contaminants.

8.0 Management of aircraft noise under the Chapter D24 of AUP

The noise control boundaries and provisions for managing exposure to aircraft noise associated with Ardmore Airport's designation were reviewed and adopted as part of the AUP plan review process.

The Airport's noise contours define the locations at which the maximum sound exposure, expressed in L_{dn} dBA, must not be exceeded. The Airport must operate in compliance with the noise limits specified at the ANB.

8.1 Chapter D24 Objectives

The controls in Chapter D24 give effect to the objectives in D24.2(1) and (2) of the AUP which require:

(1) Airports and airfields are protected from reverse sensitivity effects.

(2) The adverse effects of aircraft noise on residential and other activities sensitive to aircraft noise are avoided, remedied or mitigated.

8.2 Chapter D24 Policies

The policies in D24 that manage aircraft noise from Ardmore Airport include:

D24.3. Policies

(1) Avoid the establishment of new activities sensitive to aircraft noise (except tertiary education facilities) within the 65dB L_{dn} noise contour in the Aircraft Noise Overlay.

(2) Avoid the establishment of new tertiary education facilities and additions or alterations to existing activities sensitive to aircraft noise (other than existing dwellings) within the 65dB L_{dn} noise contour in the Aircraft Noise Overlay unless all habitable rooms and all learning, amenity and recreation spaces on site are located inside buildings and achieve an internal noise environment of 40dB L_{dn}.

(3) Avoid establishing residential and other activities sensitive to aircraft noise at:

(a) airports/airfields except for Auckland International Airport: within the area between the 55dB L_{dn} and 65dB L_{dn} noise contours, unless the effects can be adequately remedied or mitigated through restrictions on the numbers of people to be accommodated through zoning and density mechanisms and the acoustic treatment (including mechanical ventilation) of buildings containing activities sensitive to aircraft noise excluding land designated for defence purposes;

(5) Manage residential intensification and activities sensitive to aircraft noise within areas identified for accommodating urban growth in a way that avoids

> reverse sensitivity effects as far as practicable, including reverse sensitivity effects between those land uses and such effects on Auckland International Airport, Ardmore Airport, Whenuapai Airbase and North Shore Airport, and that avoids, remedies or mitigates adverse aircraft noise effects on people and communities.

Policy D24.3(1) is given effect to by a prohibited activity status for all new ASAN inside the ANB.

All other policies refer to the need to avoid the establishment of residential and other ASAN within the area between the ONB and ANB, unless the effects can be "adequately remedied or mitigated" through:

- Acoustic treatment (including mechanical ventilation) of all buildings containing ASAN
- Restrictions on the numbers of people to be accommodated through zoning and density mechanisms
- Management of residential intensification (and ASAN) within areas identified for accommodating urban growth in a way that avoids reverse sensitivity effects as far as practicable and avoids, remedies or mitigates adverse aircraft noise effects on people and communities.

8.3 Chapter D24 Assessment Criteria

We understand that the Assessment Criteria in D24.8.3.1 are relevant. These state:

> D24.8.3.1. North Shore Airport, Kaipara Flats Airfield and Whenuapai Airbase and Ardmore Airport
>
> (1) The internal noise environment of the proposed and any existing structure should provide satisfactorily levels of health and amenity values to occupants.
>
> (2) The internal air quality of the proposed or any existing structure should provide satisfactory health, and amenity values to occupants.
>
> (3) The proposed measures for attenuation of aircraft noise arising in connection with the airport/airfield/airbase should satisfactorily avoid, remedy or mitigate those effects.
>
> (4) Mechanisms should be put in place to ensure there is an ongoing obligation on owners to ensure that required acoustic treatment measures are not removed without the Council's prior consent.
>
> (5) Having regard to all the circumstances, including location in relation to the airport/airfield/airbase, likely exposure of the site to aircraft noise, noise attenuation and ventilation measures proposed, and the number of people to be accommodated, the nature, size and scale of the proposed activity should not be likely to lead to potential conflict with and adverse effects upon the operation of the airport/airfield/airbase.

Our recommendations to meet the internal design noise levels specified in D24 and to adopt the mechanical cooling and ventilation requirements of E25 (in place of those in D24) meets and exceeds (respectively) Assessment Criteria 1 to 3.

Assessment Criteria 4 will be addressed by the proposed conditions of consent.

A full assessment against Assessment Criteria 5 requires the assessment of planning matters that are outside of our expertise. We understand that the density proposed by the resource consent application generally aligns with the established density of existing residential development on the western side of Cosgrave Road that is also inside the ONB.

8.4 Potential noise effects

People can be exposed to aircraft noise when they are inside their dwellings or other ASAN and when they are outside. Exposure outside is generally only an issue when amenity expectations are high, such as during passive recreation or when socialising in a residential setting. Exposure during outdoor activities such as commuting or at work is generally not an issue.

The proposal is to acoustically treat all ASAN. This will adequately mitigate the majority of the noise effects. The greenfield development means that all ASAN will be acoustically treated. This is quite different to the situation around many airports in New Zealand where acoustic treatment of ASAN inside the ONB is generally incomplete and to variable standards.

Most guidance and standards on effects are based on studies of communities near to international airports with 24hr operations and with a mix of acoustically treated dwellings and untreated dwellings. We are not aware of any published guidelines or findings that refer specifically to known noise effects on communities living entirely within acoustically treated dwellings where the noise effects are restricted to daytime hours only. This makes an assessment of potential effects difficult in this case. We consider that an assessment against the published guidance and standards will show a greater level of effect than will actually be experienced.

Most countries adopt 55 dB L_{dn} as the regulatory threshold for which land use planning controls are required to manage land use compatibility on land exposed to aircraft noise. The percentage of people that will be "highly annoyed" at levels of between 55 dB L_{dn} and 60 dB L_{dn} will vary and be determined by a range of factors including non-acoustical factors (such as expectations and attitude towards the airport generally).

The 2018 World Health Organization Environmental Noise Guidelines for the European Region[2] (**the 2018 Guidelines**) are probably the most commonly adopted reference for determining adverse health and annoyance effects. However, we consider that the 2018 Guidelines are not appropriate for determining the level of potential annoyance effects on

[2] https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf

communities where acoustic treatment has been implemented in all noise sensitive spaces, and where aircraft noise is restricted to daytime hours as it is at Ardmore.

There is a general consensus that the WHO targets are impracticable for towns and cities to achieve when taking into account the practical challenges faced involved in managing urban development in a way that would avoid exposing communities to noise from transport infrastructure, while meeting demand for housing supply and population growth.

It is our experience that the WHO targets are often regarded as optimistically low, or 'ideal'. The WHO limits are strictly health-based targets and do not take into account any other non-acoustical factors that may arise from achieving them, such as the costs and social and environmental benefits and disbenefits of delivering an urban environment where noise effects from major infrastructure is avoided entirely.

We understand that the provisions in the designation conditions and D24 have been based on the principles of New Zealand standard NZS6805 *Airport Noise Management and Land Use Planning* (**NZS6805**) but with a range of specific changes to improve the outcomes. The major improvements include decreasing the indoor design noise level from 45dB L_{dn} (NZS6805) to 40dB L_{dn} (D24) and the Designation Conditions having a night time curfew on flights to avoid night time noise effects.

The general planning arrangements and noise level thresholds for introducing land use controls (55dB L_{dn} at the ONB) in D24 are consistent with NZS6805. NZS6805 states that new activities sensitive to aircraft noise should be prohibited inside the ONB unless they are acoustically treated, but NZS6805 does not state what the consenting status should be for new activities sensitive to aircraft noise that are acoustically treated. The implication is that they should be Permitted. Our experience is that most District Plans around New Zealand state that new activities sensitive to aircraft noise within the ONB are typically permitted or restricted discretionary provided they are acoustically treated. The potential adverse outdoor noise effects are accepted as being unavoidable in these circumstances.

The effects on people outdoors can be described as the 'residual' effects. The potential residual effects cannot be quantified using any annoyance data or curves that we are aware of. As set above, this is because the annoyance data available is generally based on large studies of people living in environments with a mixture of housing typologies and where only a portion of the population live in acoustically treated dwellings.

The residual effects will generally be experienced as hearing the regular noise of aircraft overhead – and especially during the day. Based on our experience of the area, we expect that the noise level of aircraft overhead will range subjectively from being inaudible at times or distant but noticeable, through to close and loud enough to affect outdoor conversation, especially if the distance between people talking is more than a few metres. This may be similar to living a short distance from a busy road, but less than what would be experienced living next to a busy road.

Overall, we consider that the aircraft noise environment between the ONB and the 60dB L_{dn} contour could be described as moderate. The proposed land use controls are consistent with the guidance in NZS6805 and the outdoor noise effects are anticipated by the same standard.

The development of activities sensitive to noise near to roads, rail and airports is common in New Zealand. The NPS-UD encourages residential intensification around transport nodes that are essentially high noise environments. The NPS-UD does not direct a requirement for acoustic treatment. We understand that there are a number of planning benefits associated with developing land near to transport infrastructure that can be high noise environments. These include reducing distance to employment, reducing road traffic and increasing walking and cycling opportunities. These matters are outside our expertise to evaluate. However, our experience is that the ultimate balancing and weighting of these factors can often mean that it becomes desirable overall to authorise intensification to achieve these outcomes despite the residual noise effect arising in the outdoor areas of residential development.

Activities that are not ASAN can be developed according to the provisions of D24. These are working environments where aircraft noise effects will not have an adverse effect on people.

9.0 Summary

We have reviewed the proposal to determine compatibility with the anticipated noise outcomes in Chapter D24 of the AUP relating to the subdivision and development of ASAN on land adjacent to Ardmore Airport.

Chapter D24 provides a hierarchy of subdivision and land use restrictions based on the level of aircraft noise exposure above 55 dB L_{dn}.

Chapter D24 prohibits the establishment of new ASAN inside the ANB.

The proposal is to enable acoustically treated ASAN between the ANB and the ONB. The Assessment of Effects describes the proposed land use activities and density of development. We have recommended consent conditions that improve the certainty and effectiveness of the provisions in D24 requiring ventilation and / or air conditioning of all ASAN inside the ONB.

The mechanical ventilation and cooling specifications in AUP standard E25.6.10(3)(b) to (f) will deliver a superior level of internal amenity as they are designed to enable occupants of high noise environments to remain thermally comfortable when windows must be closed to reduce external noise. We recommend the specifications in standard E25.6.10(3)(b) to (f) apply to ASAN across the development, rather than the simple ventilation system that would otherwise be required by D24.6.2(c)(i).

We have recommended that the conditions of consent applying to ASAN also include visitor accommodation. Visitor accommodation is defined as an activity sensitive to noise according to Chapter J of the AUP, however is excluded from the definition of ASAN. The conditions of

consent will ensure that any visitor accommodation inside the ONB is subject to the acoustic treatment controls.

The development of activities sensitive to noise near to roads, rail and airports is common in New Zealand. The NPS-UD encourages residential intensification around transport nodes that are essentially high noise environments (and without any requirement for acoustic treatment). We understand that there are a number of planning benefits associated with developing land near to transport infrastructure that can be high noise environments. These include reducing distance to employment, reducing road traffic and increasing walking and cycling opportunities. These matters are outside our expertise to evaluate. However, our experience is that the overall balancing and weighting of these factors can often mean that it becomes desirable overall to authorise intensification to achieve these outcomes despite the residual noise effect arising in the outdoor areas of residential development. The Assessment of Effects addresses the planning considerations related to Assessment Criteria 5 in D24.8.3.1.