

23 November 2021

Auckland International Airport Ltd  
PO Box 73020  
Auckland Airport  
Auckland 2150

**Attention: Kristina Cooper**

Dear Kristina

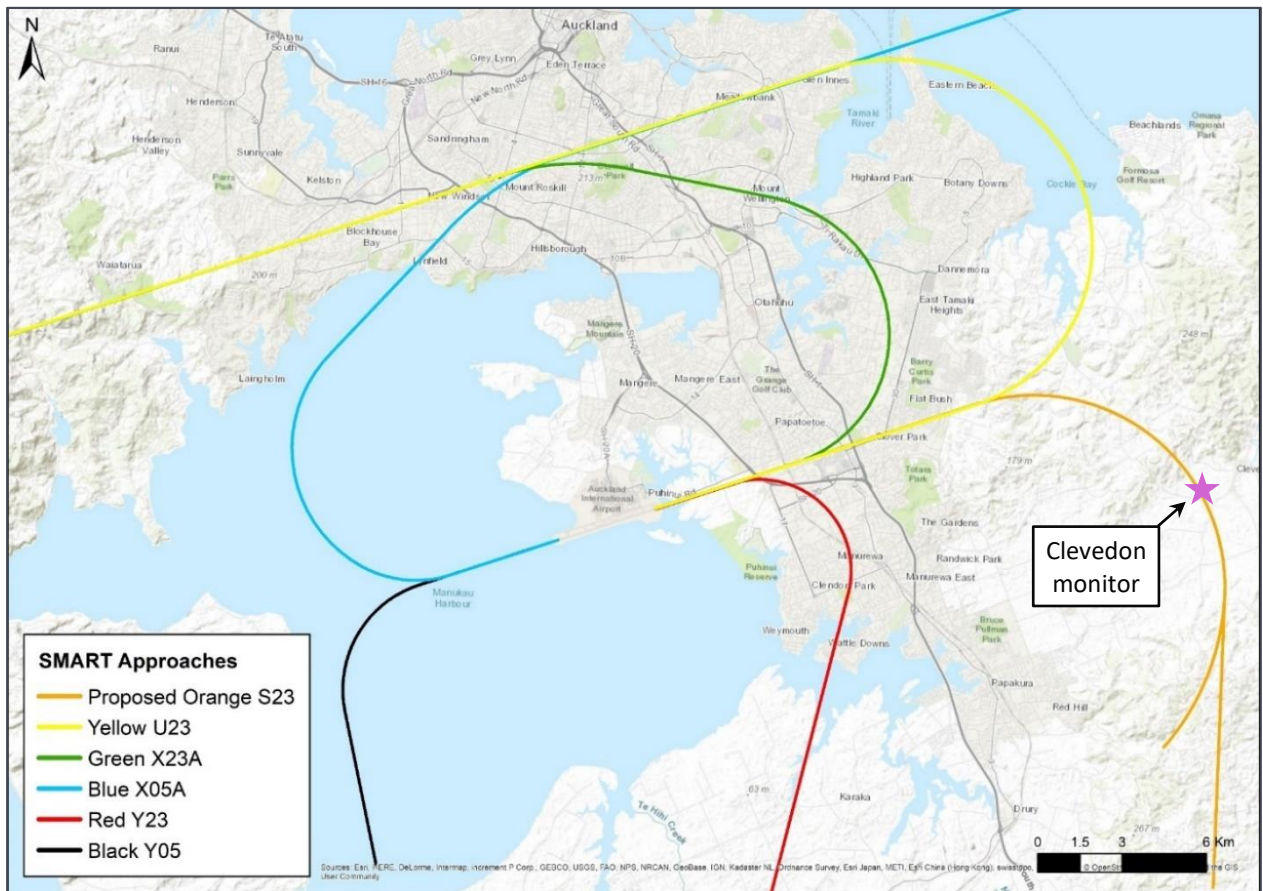
**ORANGE S23 SMART TRIAL RESULTS**

**Introduction**

Auckland International Airport (AIA) engaged Marshall Day Acoustics to analyse the noise levels measured and noise complaints received during the Orange S23 SMART approach trial, which ran for the 12-month period October 2020 to September 2021<sup>1</sup>.

Figure 1 shows the profile of the Orange track (along with the other SMART tracks currently in use), and the position of the noise monitor installed in Clevedon to measure noise in the area from AIA aircraft.

**Figure 1: SMART approach profiles and Clevedon monitor**



<sup>1</sup> A 12-month trial was initially implemented in September 2019, but ceased in early 2020 to recalibrate the track profile

## Orange Track Usage

During the trial the Orange track was only used by jet aircraft (e.g. A320, A321neo) for daytime<sup>2</sup> arrivals from the south on Runway 23L. For these operations, it provided an alternative to the Red Y23 SMART track (shown in Figure 1), and the traditional ‘long-centrelines’ track that runs east of Clevedon (not shown in Figure 1).

Appendix A shows the daily use of the Orange track during the trial period, and the below summarises the track usage.

- Total Orange usage during trial: **2,556 approaches**
- Orange trial duration: **335 days**
  - Average Orange usage over whole trial: **8 approaches per day**
- Days during trial that Orange approach was used: **234 days**
  - Average Orange usage for ‘Orange days’: **11 approaches per day**

As detailed in the following section, Auckland was under Level 4 lockdown throughout September 2021. Therefore the analysis in Appendix A and above excludes September 2021.

## COVID-19 Restrictions

Table 1 details the periods during the Orange trial that Auckland was in some form of lockdown (i.e. at COVID-19 Alert Level 3 or 4). It shows that there were two short lockdowns early in 2021, and then a longer lockdown which began on 17 August 2021 and was in place for the remainder of the Orange trial.

**Table 1: COVID-19 lockdowns during Orange trial**

Lockdown period during Orange trial	Days at	
	Alert Level 4	Alert Level 3
14 February 2021 – 17 February 2021	-	4
28 February 2021 – 7 March 2021	-	8
17 August 2021 – 30 September 2021	36	9

As the longer and more stringent Level 4 lockdown was in place for all of September 2021, there were significantly reduced flight volumes – and Orange SMART approaches – during this month. This effectively shortened the Orange trial period short by one month. As such, the Orange trial period analysed in this letter is October 2020 through to August 2021, to avoid skewing the results by including a large period of low airport activity.

While the longer Level 4 lockdown began in August 2021, the majority of the month didn’t have any COVID-19 restrictions so is included in the analysis.

## Complaints Analysis

Figure 2 shows the monthly AIA noise complaints for the past 10 years, as well as the dates that the other SMART approaches were trialled and then became operative. It shows that noise complaints were low until 2013, when complaints increased 7 months after the 2012/2013 Green and Blue SMART trials commenced. Complaints have since steadily decreased and are now generally well below 50 per month, with no notable increase during the Orange trial. We note that the large spike in complaints in April 2019 was due to one complainant, whose issue was unrelated to the SMART approaches.

<sup>2</sup> Daytime is defined as 7am to 10pm. Night-time is defined as all other times

Figure 2: Historical complaints trends and key SMART approach dates

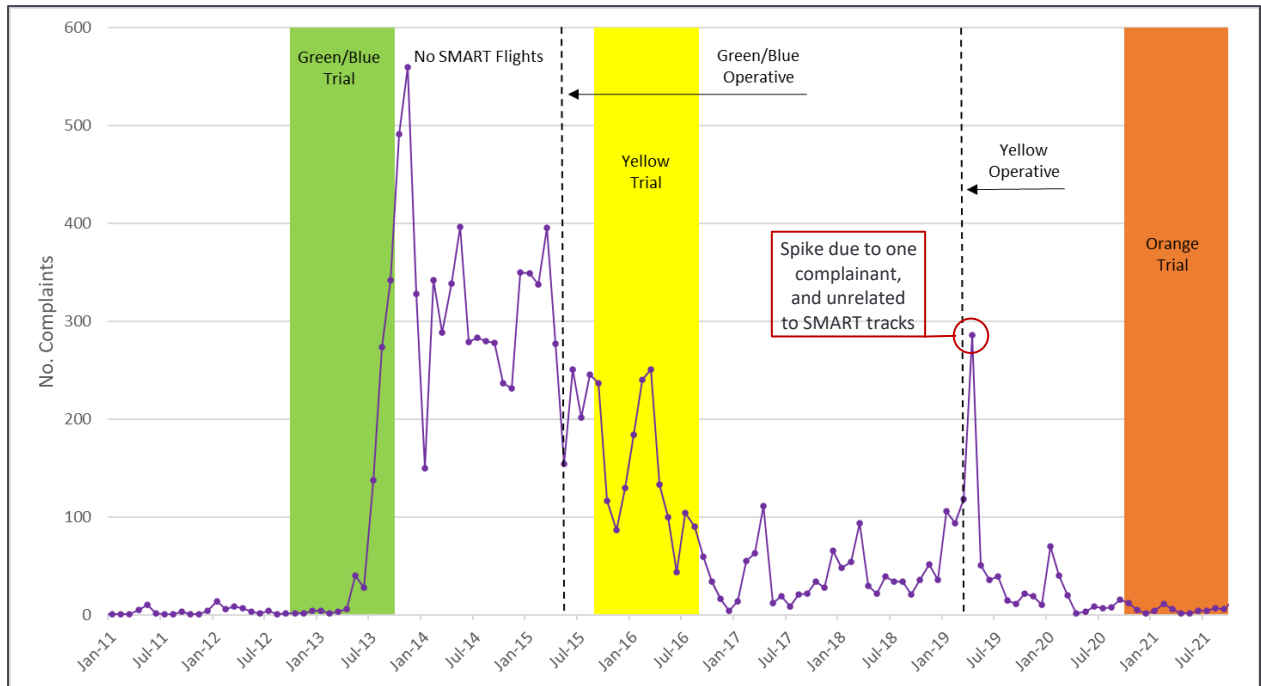


Table 2, Table 3, and Table 4 summarise the noise complaints made during the trial period. If a complaint was made about a specific aircraft event, it's categorised as a 'Specific' complaint. The other categories are 'Generic' for general complaints about aircraft noise, and 'Questions' for enquiries about aircraft noise and how it's managed.

Table 2: Summary of overall complaints during trial period

Total Complaints	Specific Complaints	Generic Complaints	Questions	Complainants
59	35	14	10	27

Table 3: Summary of all specific complaints during trial period

23L / 05R / Other	Landing / Take-off / Other	Jet / Other
37% / 34% / 29%	54% / 17% / 29%	69% / 31%

Table 4: Summary of specific complaints related to Orange track

Overall Number of Specific Complaints	35
Number of Orange Complaints	0
Number of Orange Approaches	2,556
Number of Orange Complainants	0

Table 4 shows there were no specific complaints made for aircraft flying the Orange track during the trial.

We note that during the trial there were several question enquiries made about the Orange track by a complainant who had recently moved to Flat Bush. They wanted information regarding the balance between Red and Orange SMART approach usage, the usage of other SMART approaches, and runway usage in different wind conditions.

## Noise Measurement Results

A noise monitor was installed in Clevedon prior to the Orange trial to capture the ‘baseline’ noise environment in the area without Orange flights. The three-month baseline period used for the noise measurement analysis in this letter is May 2019 through to July 2019.

The noise measurement analysis for the Orange trial period is for October 2020 to August 2021. As noted, the analysis excludes September 2021 as Auckland was in lockdown for the whole month, which would skew the results if included.

### *Baseline and Orange trial comparison*

The trial period of October 2020 to August 2021 included 15 days in Alert Level 4, and 12 days in Alert Level 3. This likely impacted the flights volumes at the airport. Further, the trial was carried out in a ‘post-COVID world’, where flights were reduced from pre-pandemic volumes. So, it’s necessary to factor this in when comparing the baseline measurements – which were pre-pandemic – to the trial period, in order to make a fair comparison that adjusts for the lower airport noise (due to lower flight volumes).

Another factor is the proportion that Runway 23L was used during both periods, which could be different due to differences in the prevailing wind directions, and also needs adjustment to accurately compare the two periods.

In summary, during the trial the relevant<sup>3</sup> flight volumes on Runway 23L were 31% lower (due to COVID) and Runway 23L was used less (due to wind direction averages) than during the baseline period. The combined effect of these two means a **+2.1 decibel penalty** needs to be applied for aircraft noise measured during the trial to adjust for these factors, as shown in Table 5.

**Table 5: Required noise level correction for Orange trial**

	Baseline Period	Orange Trial	Noise Level Adjustment
Daily average arrivals on Runway 23L*	43.7 per day	30 per day	+1.6 decibels
Runway 23L use	71%	64%	+0.5 decibels

\* For daytime domestic jet arrivals

### *Measured Noise Levels*

The Clevedon noise monitor is able to measure the aircraft noise events separately from the ambient noise by using aircraft recognition software. Table 6 details the average daily noise level measured by the monitor for both the AIA aircraft noise (including aircraft not using the Orange track) and the ambient<sup>4</sup> noise, during the baseline and Orange trial periods.

**Table 6: Measured noise level summary**

Source	Daily Average Noise Level (dB L <sub>dn</sub> <sup>5</sup> )	
	Baseline Period	Orange Trial
AIA aircraft	23	36*
Ambient (excl. AIA aircraft)	47	55

\* Includes +2.1 decibel adjustment as summarised in Table 5

<sup>3</sup> Relevant arrivals are daytime (as the Orange track was only used in the daytime during the trial), domestic (as arrivals from the south are primarily domestic), and jet (as only jets used the Orange track during the trial)

<sup>4</sup> Noise that excludes AIA aircraft, but includes all other noise sources in the area such as road traffic, domestic activities, and aircraft from other airfields

<sup>5</sup> L<sub>dn</sub> is the cumulative noise exposure over a 24-hour period, with a 10 decibel penalty applied during the night-time

Table 6 shows that the aircraft noise level during the trial (36 dB  $L_{dn}$ ), while higher than baseline (23 dB  $L_{dn}$ ), is a low level of aircraft noise and was significantly lower than the ambient noise in the area (55 dB  $L_{dn}$ ). At almost 20 decibels lower than ambient, the total noise from AIA is an insignificant contribution to the overall noise level in the area. We note this doesn't mean residents in the area wouldn't notice any aircraft events – they may notice discreet events as they occur – but the overall noise level in the area wouldn't increase by adding a significant number of flights on the Orange track.

In addition to the low level of cumulative aircraft noise exposure (due to the low aircraft  $L_{dn}$ ), the maximum noise level measured from individual aircraft on the Orange track was 61 dB  $L_{Amax}$  on average. This also confirms the low level of aircraft noise in the area.

As noted, on the days the Orange track was used, it was used for an average of 11 approaches per day. It would take over 65 approaches per day for the noise from Orange approaches to contribute to the overall noise level in the area (i.e. to get within 10 decibels of the ambient noise level). Appendix A shows that Orange approaches were limited to 25 per day until July, when the ANCCG agreed to remove the limit. It also shows that the most Orange approaches in a single day was 24 while the limit was in place, and 18 in the two months without a limit.

Table 6 also shows that the ambient noise in the area increased by 8 decibels between the baseline and trial periods. We are unsure why this is, but it could have been due to increased development and population in the area, or a change in traffic patterns/lifestyle due to Covid. We note that even when compared to the lower baseline ambient noise level, the aircraft noise level during the trial is still more than 10 decibels lower and so would still be considered insignificant.

We note that New Zealand Standard NZS 6805: 1992 *Airport Noise Management and Land Use Planning* states that areas exposed to aircraft noise levels **below 55 dB  $L_{dn}$**  are suitable for residential use. During the trial, the noise level from AIA aircraft was 36 dB  $L_{dn}$ , which is 19 decibels below the NZS 6805 criterion<sup>6</sup>.

As such, the noise from AIA operations – and specifically the use of the Orange track – during the trial readily met the criteria in NZS 6805, and was significantly lower than the ambient noise level in the area. Therefore, we consider the noise impact in Clevedon from the use of the Orange track during the trial to be minimal.

## Conclusion

The Orange S23 SMART approach trial ran from October 2020 to September 2021 and provided an alternative approach on Runway 23L for daytime jet arrivals from the south.

On days when the Orange track was used, it was used for an average of 11 approaches per day. During the trial, there were no specific noise complaints made about the Orange track, nor was there any notable increase in overall noise complaints.

After adjusting for reduced airport activity between the baseline and trial periods, the measured noise level from AIA aircraft in the area during the trial was 36 dB  $L_{dn}$ . This level was higher than the baseline aircraft noise but was well below the ambient noise level in the area of 47 - 55 dB  $L_{dn}$ , and well below the 'residential' criterion in NZS 6805 of 55 dB  $L_{dn}$ .

As such, we consider the noise impacts from the use of the Orange track during the trial to be minimal.

We trust that this information is satisfactory. Please don't hesitate to contact us for any further information.

Yours faithfully

**MARSHALL DAY ACOUSTICS LTD**

**Pranaya Thaker**  
**Acoustician**

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<sup>6</sup> This study is for AIA aircraft. However, if all other aircraft (e.g. from Ardmore Airport) are included, the overall aircraft noise level would be 41 dB  $L_{dn}$ . This is still a low level of aircraft noise and still significantly below the NZS 6805 criterion

APPENDIX A NUMBER OF ORANGE S23 SMART APPROACHES PER DAY DURING TRIAL

