

# ANCCG Meeting

Monitoring Period  
February 2023 – April 2023

Meeting: 12 June 2023

MARSHALL DAY   
Acoustics

NB: Glossary of terminology given in Appendix A



# Aircraft Operations

Figure 1: Number of Aircraft Operations per Month

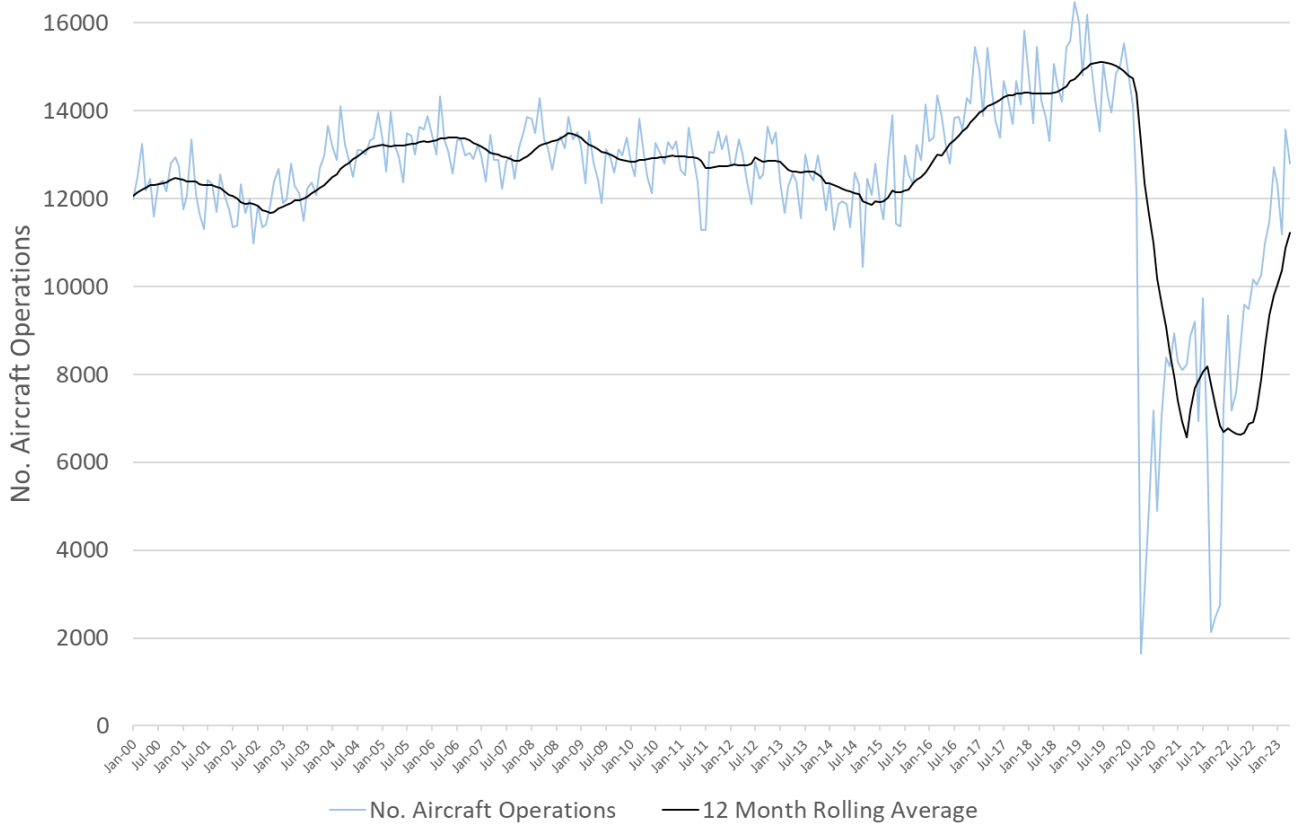


Figure 1 shows the number of aircraft operations per month since the year 2000 (blue line) and the 12-month rolling average (black line).

Aircraft operations have fluctuated over the years with dips in 2002, 2014 and more recently in 2020-2022 due to the COVID-19 pandemic.

Between 2015 and 2020 aircraft operations increased steadily. However, the effect of the COVID-19 pandemic has greatly impacted the aircraft operations in the last two years.

The number of aircraft operations in the three-month period February 2023 to April 2023 has increased by 60% when compared to the same period last year, as the number of flight operations continue to return to pre-pandemic levels. Aircraft operations for this period in 2023 are down 19% from operations in the same period in 2019 (pre-pandemic). Daytime operations have decreased by 19% and night-time operations have decreased by 11% when compared to the same period in 2019.

And when compared to the same (pandemic affected) period last year, daytime operations have increased by 55% and night-time operations have increased by 113%.

Table 1: Summary of Aircraft Operations

Operation	Total	Day	Night
Arrivals	18,776	15,872	2,904
Departures	18,776	17,200	1,576
Circuit	19	18	1
<b>Total</b>	<b>37,571</b>	<b>33,090</b>	<b>4,481</b>

Table 2: Average Daily Aircraft Operations

Total	Day	Night
421	371	50

Table 1 shows a breakdown of aircraft operations in the three-month period February 2023 to April 2023.

Table 2 shows that there were on average 421 aircraft operations that occurred per day (24-hour period), 50 of these were at night-time.

The average daily aircraft operations generally ranged between 450 – 550 movements per day prior to the COVID-19 pandemic, with around 50 – 60 of those at night-time.

Figure 2: Aircraft Operations by Time

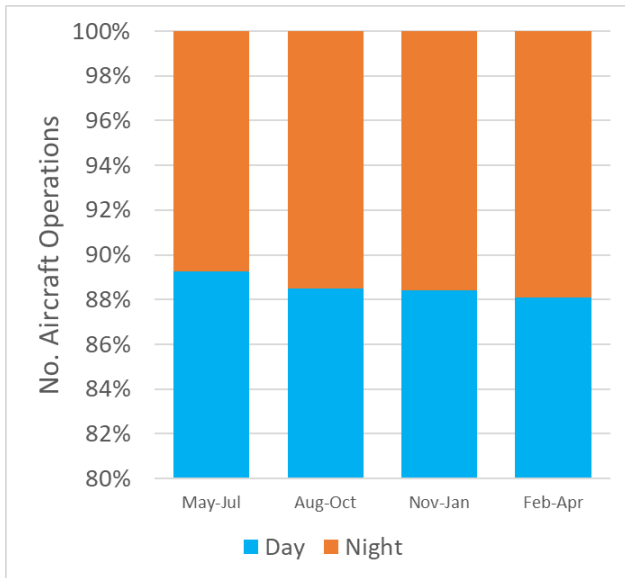


Figure 3: Aircraft Operations by Aircraft Type

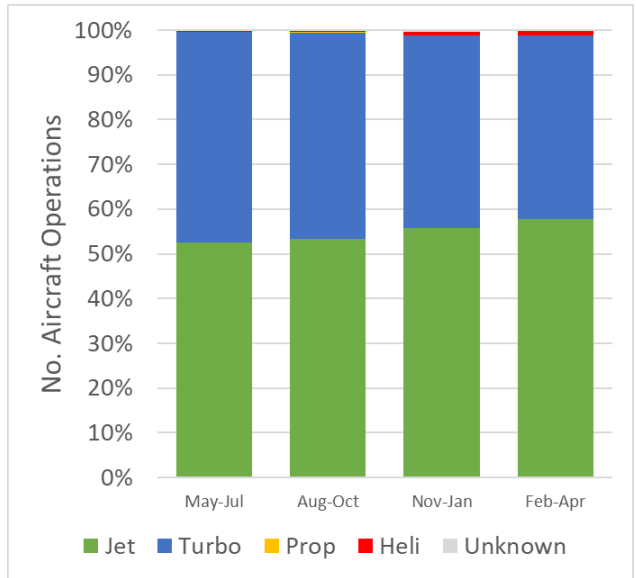


Figure 2 shows the breakdown of aircraft operations by time of day for this three-month period February 2023 to April 2023 and the three quarters preceding.

For this period 88% of aircraft operations occurred in the daytime between 7am and 10pm and 12% occurred at night-time.

This was similar to previous quarters.

Figure 3 shows the breakdown of aircraft operations by aircraft type in this three-month period and the three quarters preceding.

For this period 58% of aircraft operations were jets with 41% being turboprops.

Propeller and helicopter aircraft together made up less than 1% of the total aircraft operations during this period.

Figure 4: Aircraft Operations by Runway

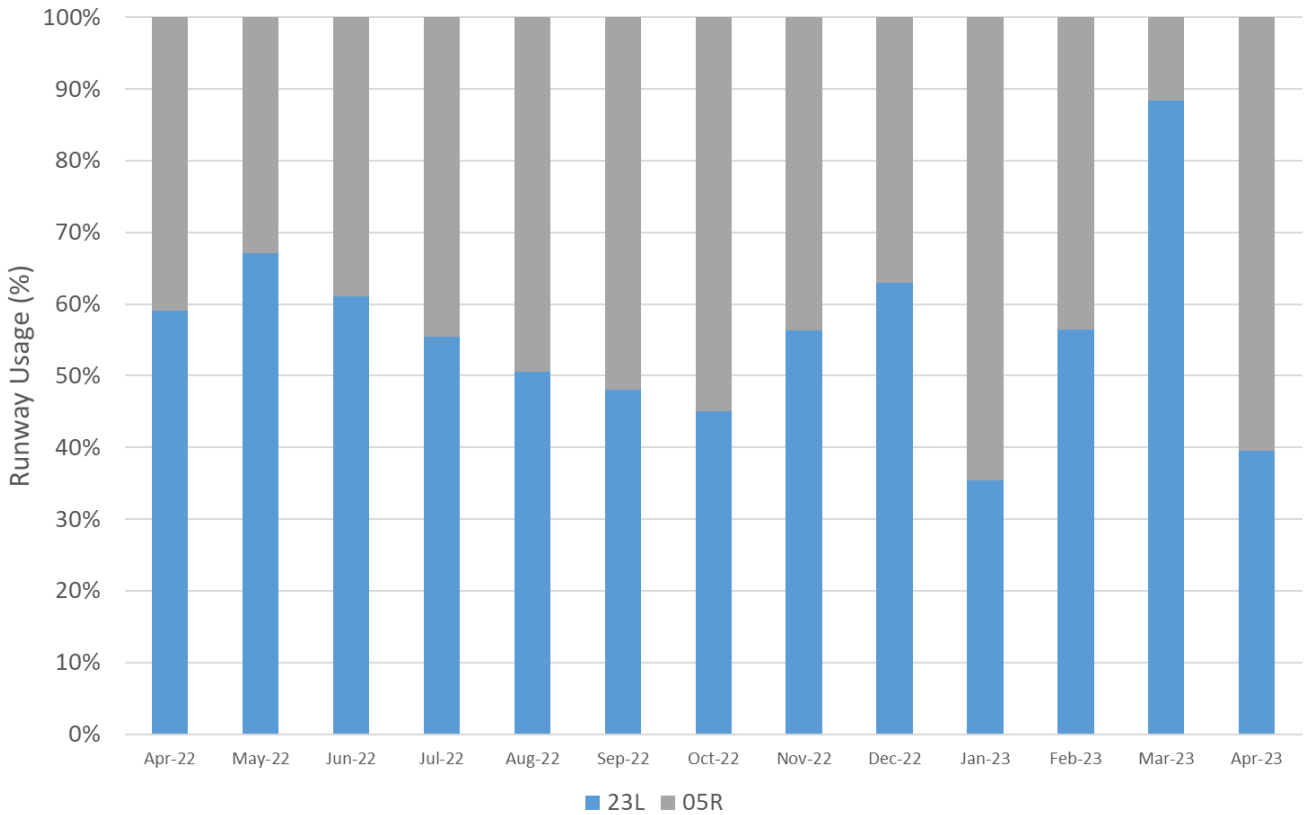


Figure 4 shows the percentage of aircraft operations that used each runway (23L and 05R) over the past 13 months.

Runway 23L is used when westerly winds prevail and Runway 05R is used when easterly winds prevail (refer glossary for explanation)

The historical average runway usage is approximately RW23L 70%/RW05R 30%

The runway usage in the three-month period February 2023 to April 2023 was RW23L 62%/RW05R 38%. In the last twelve months the average runway usage was RW23L 56%/RW05R 44%

The runway use in the same quarter last year was RW23L 44%/RW05R 56%

Figure 5: Number of SMART Approaches per week

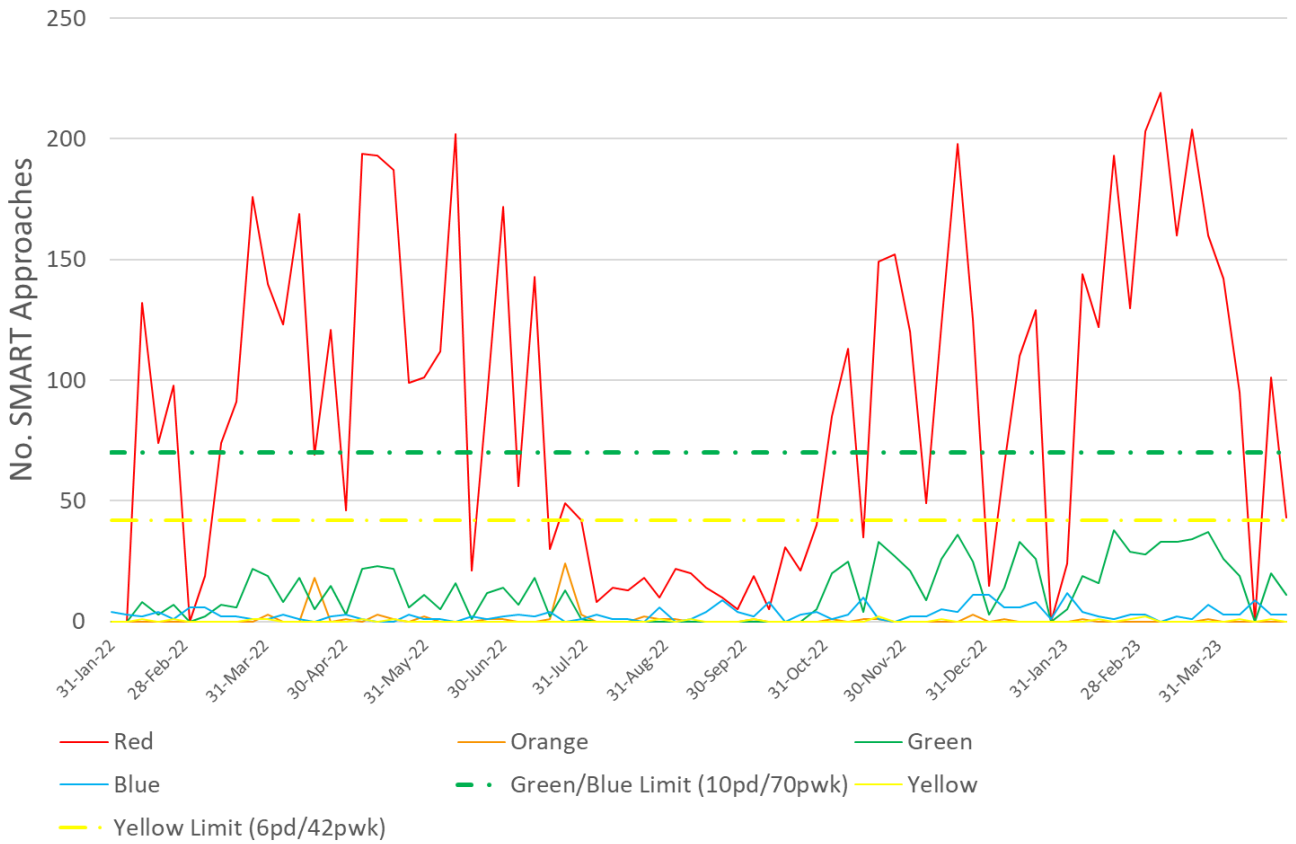


Figure 5 shows the number of SMART flights flown per week in the past 12 months. The SMART Approaches are named as follows:

- Blue X05A – International arrivals from the north on Runway 05R overflying Lynfield
- Green X23A - International arrivals from the north on Runway 23L overflying Highbrook
- Yellow U23 - International arrivals from the north on Runway 23L overflying Whitford
- Red – Domestic arrivals from the south on Runway 23L overflying Wattle Downs
- Orange S23 – Domestic arrivals from the south on Runway 23L overflying Clevedon

There is a limit of:

- 10 SMART approaches per day on the Green and Blue SMART approaches
- 6 per day on the Yellow SMART approach

These limits have been complied with over the past 12 months.



Figure 6: Location of SMART Approaches

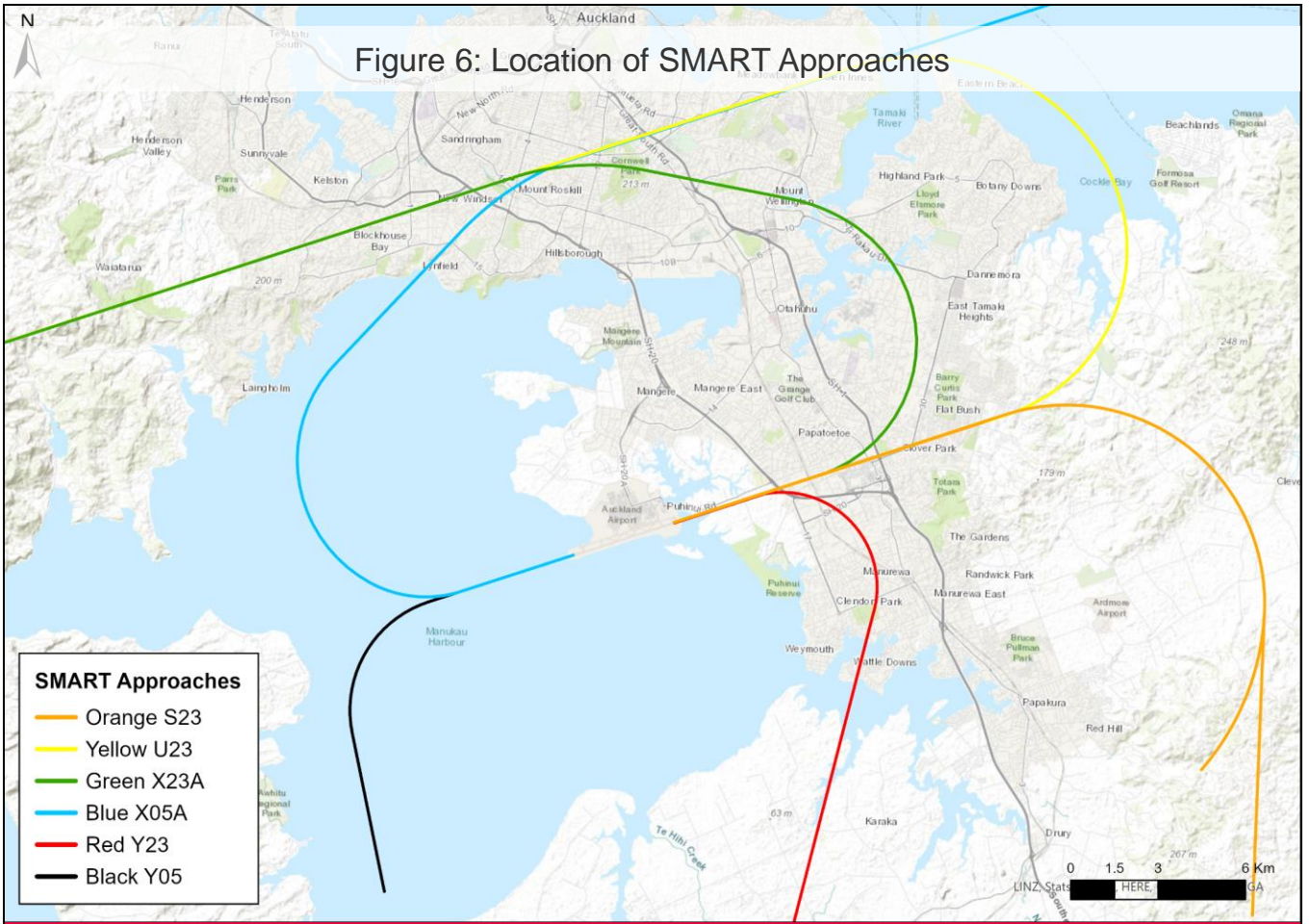


Figure 6 shows the location of the SMART approach flight paths.





# Flight Path Diagrams

Figure 7: Flight Paths for a Busy Runway 23L Day (7am-10pm)  
100% Westerly Winds/Runway 23L

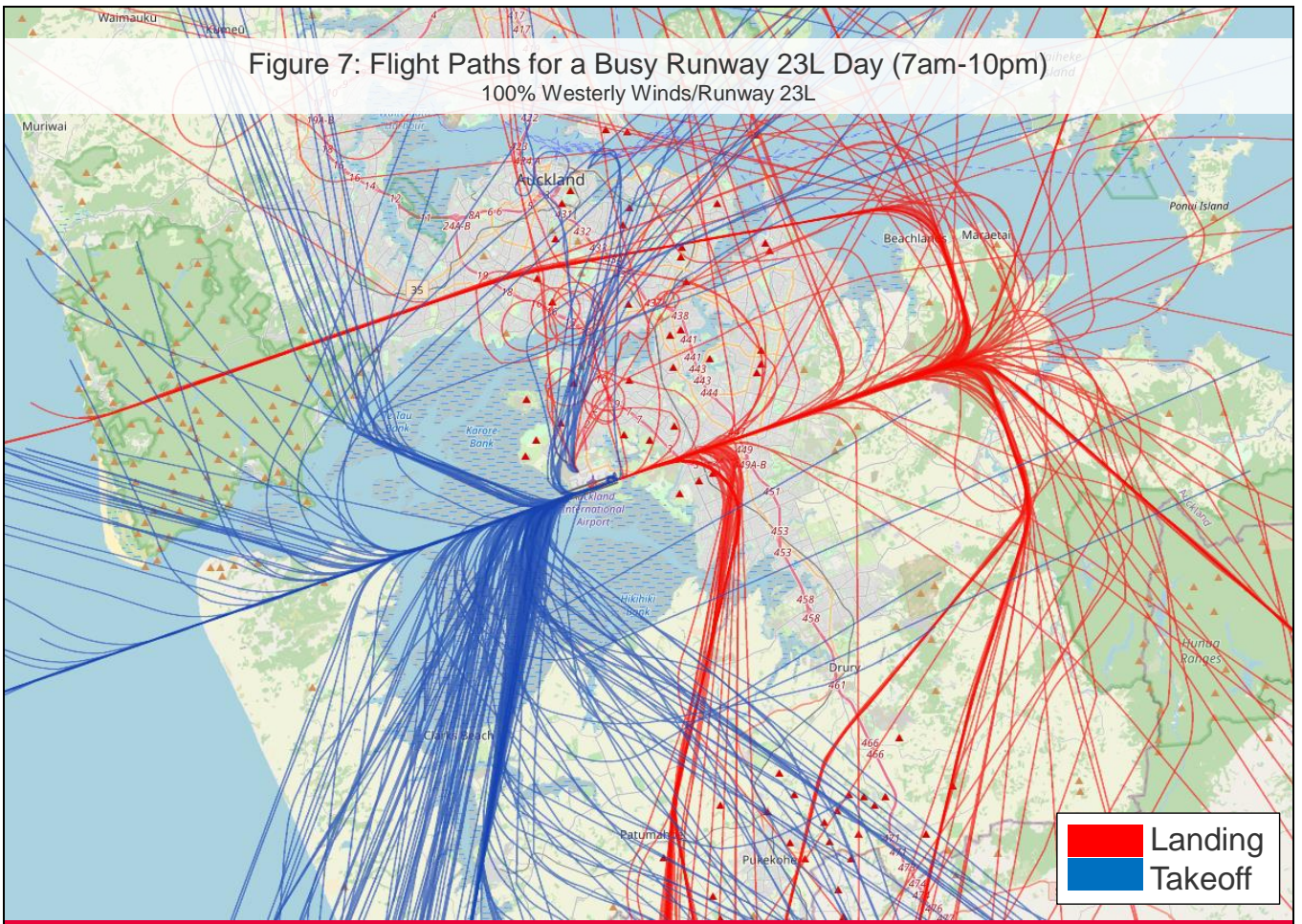


Figure 7 shows the daytime (7am-10pm) flight paths for Friday 3 March 2023, the busiest day in the three-month period February 2023 to April 2023 when Runway 23L was primarily in use.

The red lines indicate arrivals and the blue lines indicate departures.

The runway usage in this 24-hour period was Runway 23L (westerly) 100%.

There were 460 daytime Runway 23L flights on this day.



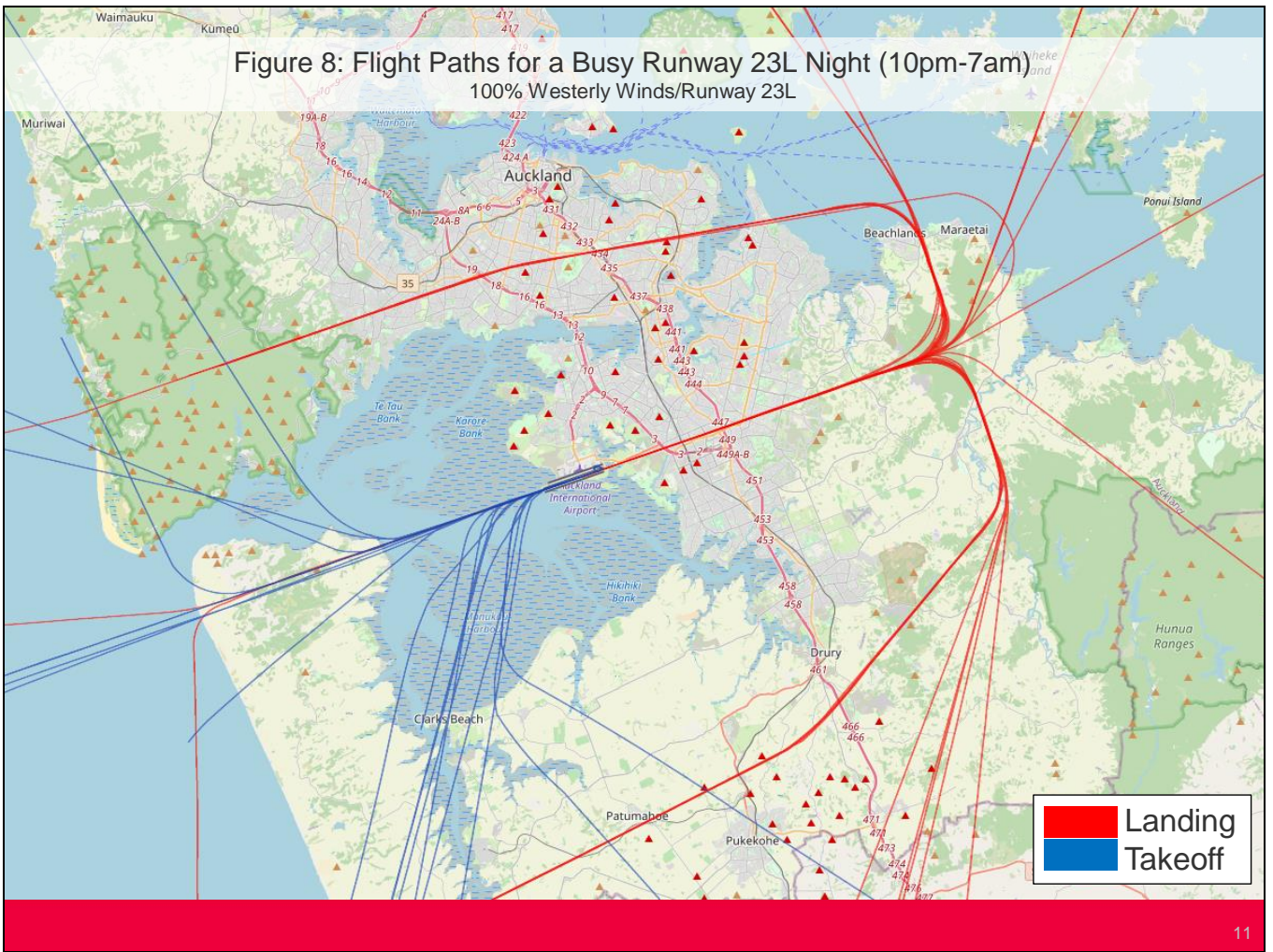


Figure 8 shows the night-time (10pm-7am) flight paths for Friday 3 March 2023, the busiest day in the three-month period February 2023 to April 2023 when Runway 23L was primarily in use.

The red lines indicate arrivals and the blue lines indicate departures.

The runway usage in this 24-hour period was Runway 23L (westerly) 100%.

There were 53 night-time Runway 23L flights on this night.



Figure 9: Flight Paths for a Busy Runway 05R Day (7am-10pm)  
100% Easterly Winds/Runway 05R



Figure 9 shows the daytime (7am-10pm) flight paths for Thursday 6 April 2023, the busiest day in the three-month period February 2023 to April 2023 when Runway 05R was primarily in use.

The red lines indicate arrivals and the blue lines indicate departures.

The runway usage in this 24 hour period was Runway 05R (easterly) 99%.

There were 428 daytime Runway 05R flights on this day.



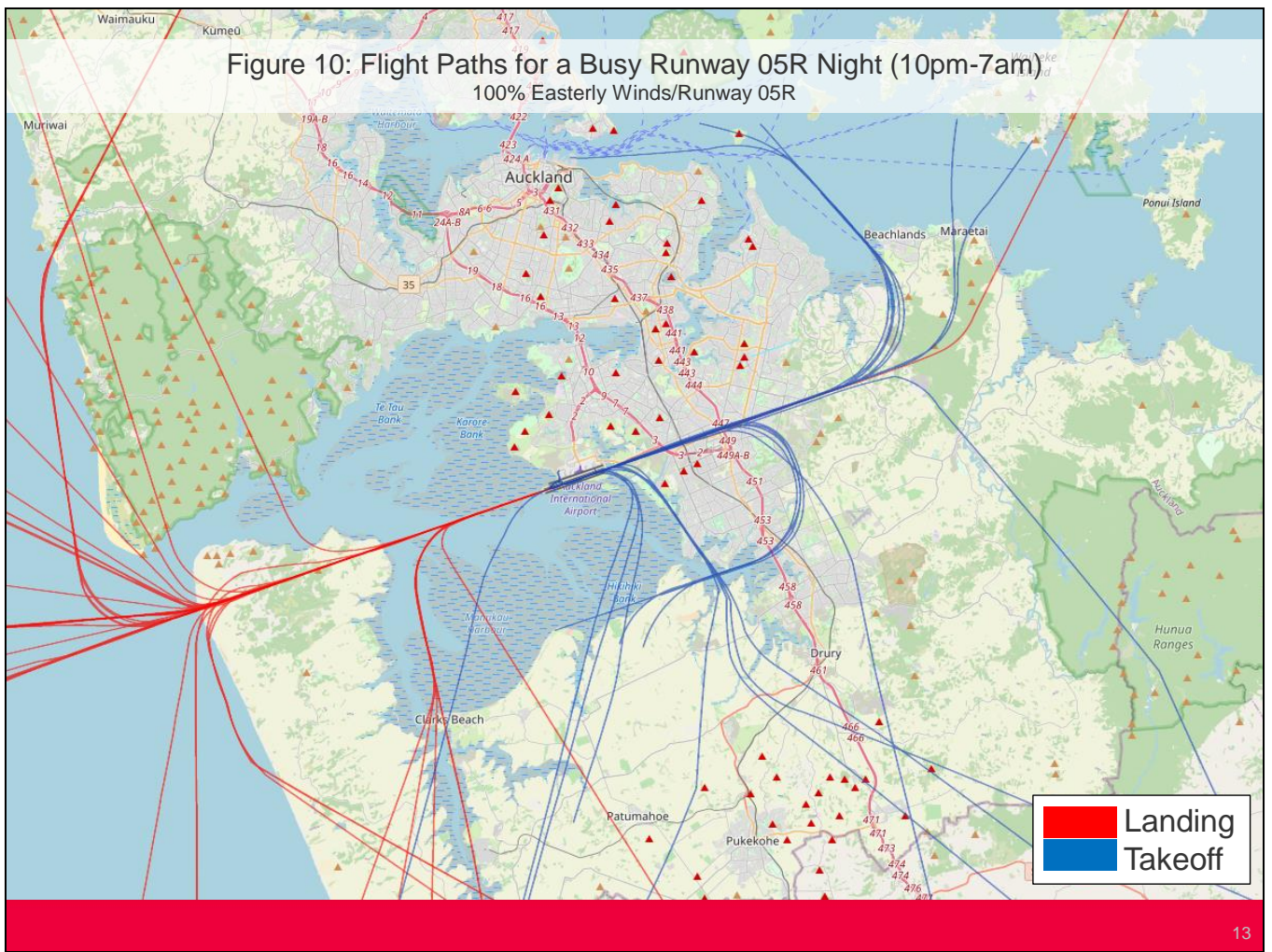


Figure 10 shows the night-time (10pm-7am) flight paths for Thursday 6 April 2023, the busiest day in the three-month period February 2023 to April 2023 when Runway 05R was primarily in use.

The red lines indicate arrivals and the blue lines indicate departures.

The runway usage in this 24-hour period was Runway 05R (easterly) 99%.

There were 67 night-time Runway 05R flights on this night.

# Noise Complaints



Figure 11: Number of Aircraft Noise Complaints per Month

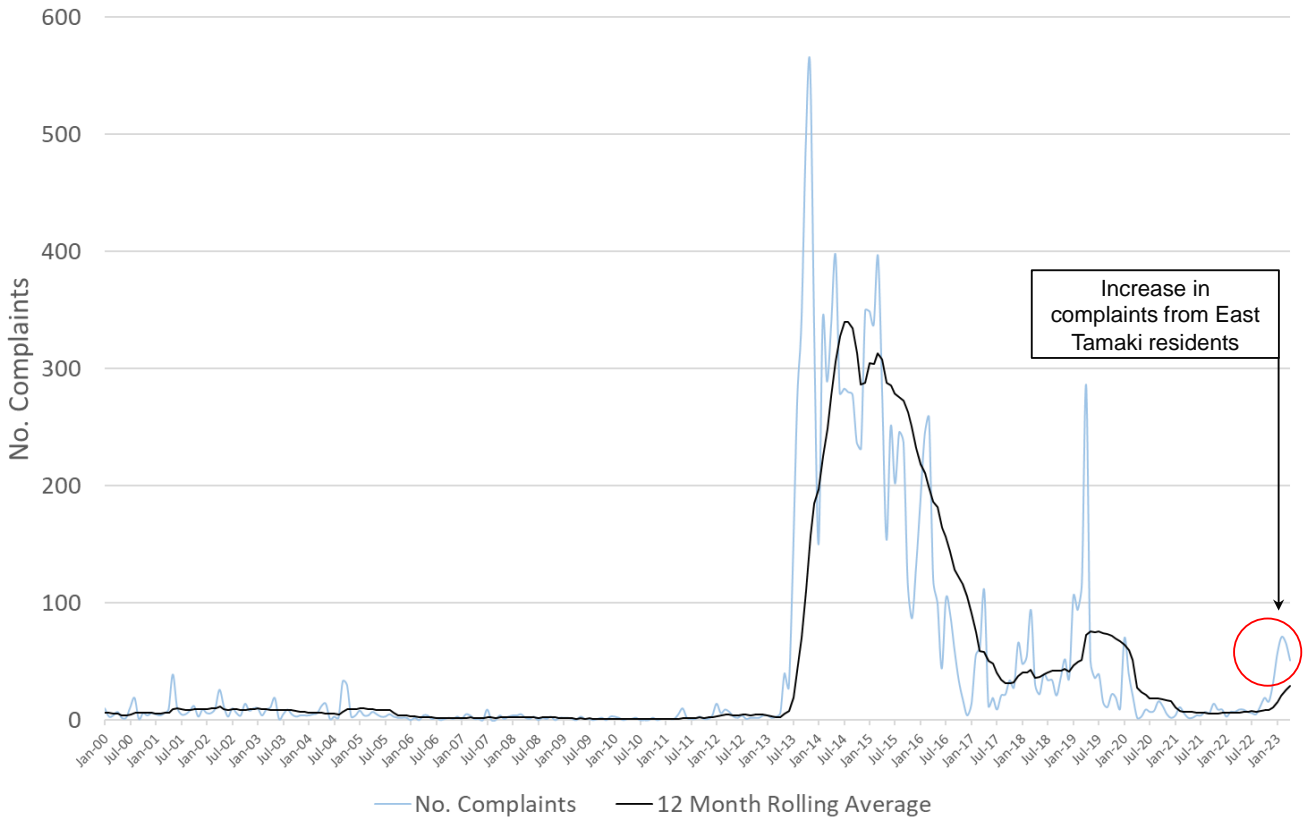


Figure 11 shows the total number of aircraft noise complaints made per month since the year 2000 (blue line) and the 12-month rolling average (black line).

Aircraft noise complaints were low up until 2013 when the number of complaints increased from about 2 per month to a peak of 560 in Aug 2013 and have decreased steadily since then.

This increase in complaints coincided with the 2012/13 SMART trials where community awareness to noise was heightened.

The number of noise complaints in the three-month period February 2023 to April 2023 has increased from 23 to 188 when compared to the same period last year.

Again this quarter there were two main complainants who made a shared total of 149 complaints, greatly increasing the total number. These complainants live in the suburbs East Tamaki and East Tamaki Heights and are primarily affected by flights departing on Runway 05R in easterly conditions. A portion of these departing flights turn North or West and pass above the complainants' residences at around 5000-6000 feet.



Table 3: Summary of Noise Complaints

	Feb	Mar	Apr	Feb-Apr	Nov-Jan	Aug-Oct	May-Jul
Number of Complaints	71	66	51	188	105	36	22
<i>Specific</i>	71	65	48	184	91	23	18
<i>Generic</i>	0	1	3	4	11	10	2
<i>Question</i>	0	0	0	0	3	3	2
Number of People Complaining	4	6	7	12	17	15	5

Table 3 shows a breakdown of the noise complaints in the three-month period February 2023 to April 2023 with the previous three quarters shown for reference.

A particular person may have made several complaints over time. These individual complaints could have been regarding one specific aircraft operation or a more general complaint which does not reference a specific aircraft operation.

There are two types of general complaints: ‘generic’ and ‘question’. The first relates to people lodging a general complaint about aircraft noise rather than a specific event, the second relates to people enquiring to ask for information about aircraft noise or management of noise. We therefore refer to:

- The number of ‘complainants’ (no. of people who complain),
- The number of ‘generic’ noise complaints (e.g. “there was more aircraft noise last night”)
- The number of ‘question’ noise enquiries (e.g. “can you tell me more about how noise is managed at the airport”)
- The number of ‘specific’ event complaints (e.g. “the 6:25pm flight was noisy”)

There were a total of 188 complaints in this three-month period, 98% related to specific aircraft events, 2% were generic complaints and 0% were question enquiries.

The two main complainants this quarter are in East Tāmaki and East Tāmaki Heights. The person in East Tāmaki made 22% (41) and the person in East Tāmaki Heights made 57% (108) of this quarter’s total complaints.

The complainants didn’t show at the last virtual meeting, so AIAL organised an in-person meeting on 18/05/2023. A translator was also in attendance to help further understand their complaints.

Noise monitoring in the East Tamaki area was already being considered as part of the routine noise monitoring programme. The airport had planned to redeploy the Mt Wellington noise monitor in East Tāmaki to measure the Green SMART track once again. Noise monitoring in this location will now also help assess noise levels in the area and understand the noise environment around the complainants.

Figure 12: Map of Noise Complaints

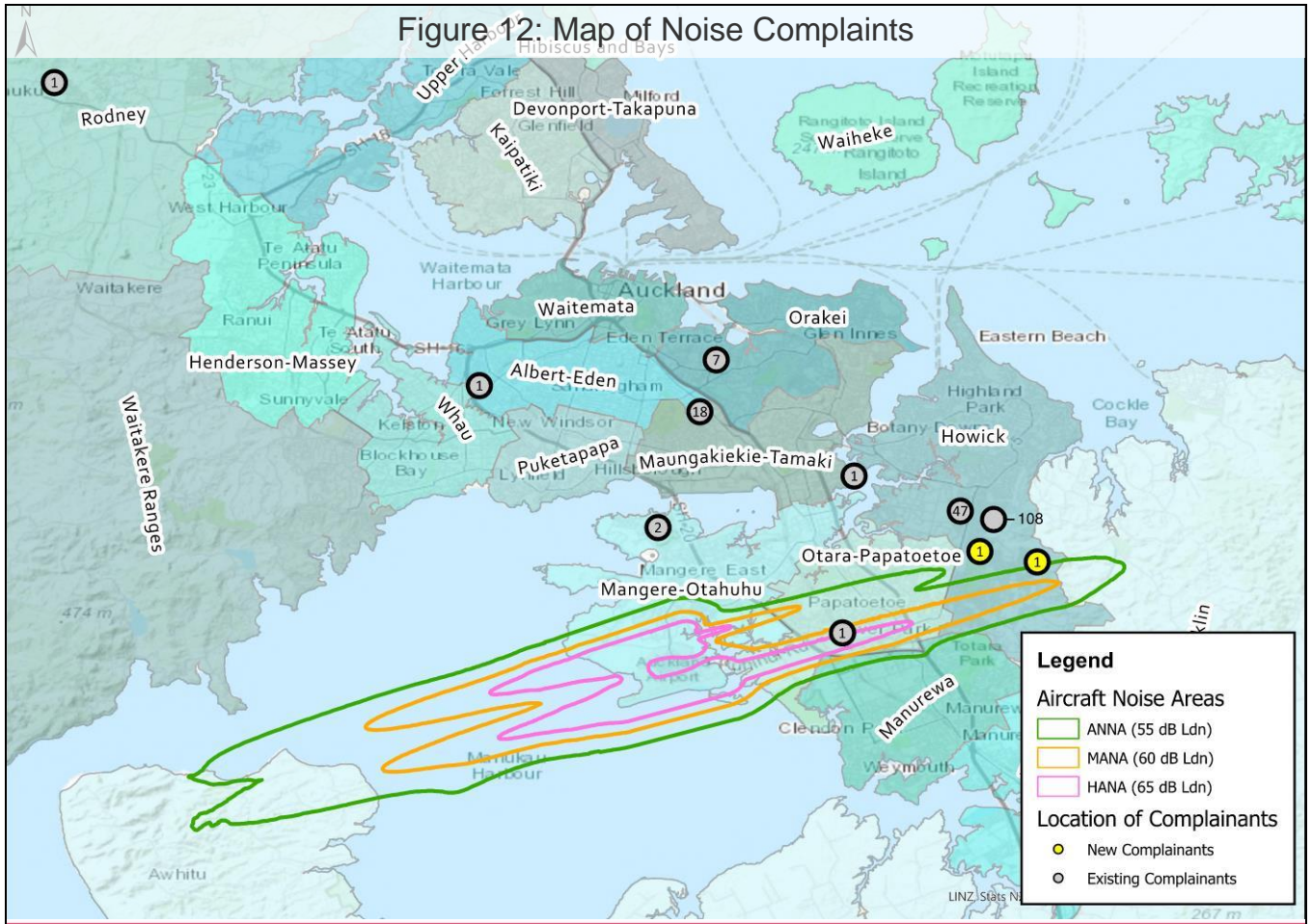


Figure 12 shows a map with the location of each complainant.

Each point represents the location of a person who complained in the three-month period February 2023 to April 2023.

The colour of the point represents whether it was an existing complainant (grey - someone who has complained before) or a new complainant (yellow - someone who hasn't complained before).

The numbers on top of each point give the number of complaints made by each person in the three-month period.

Figure 13: Number of Noise Complaints by Area

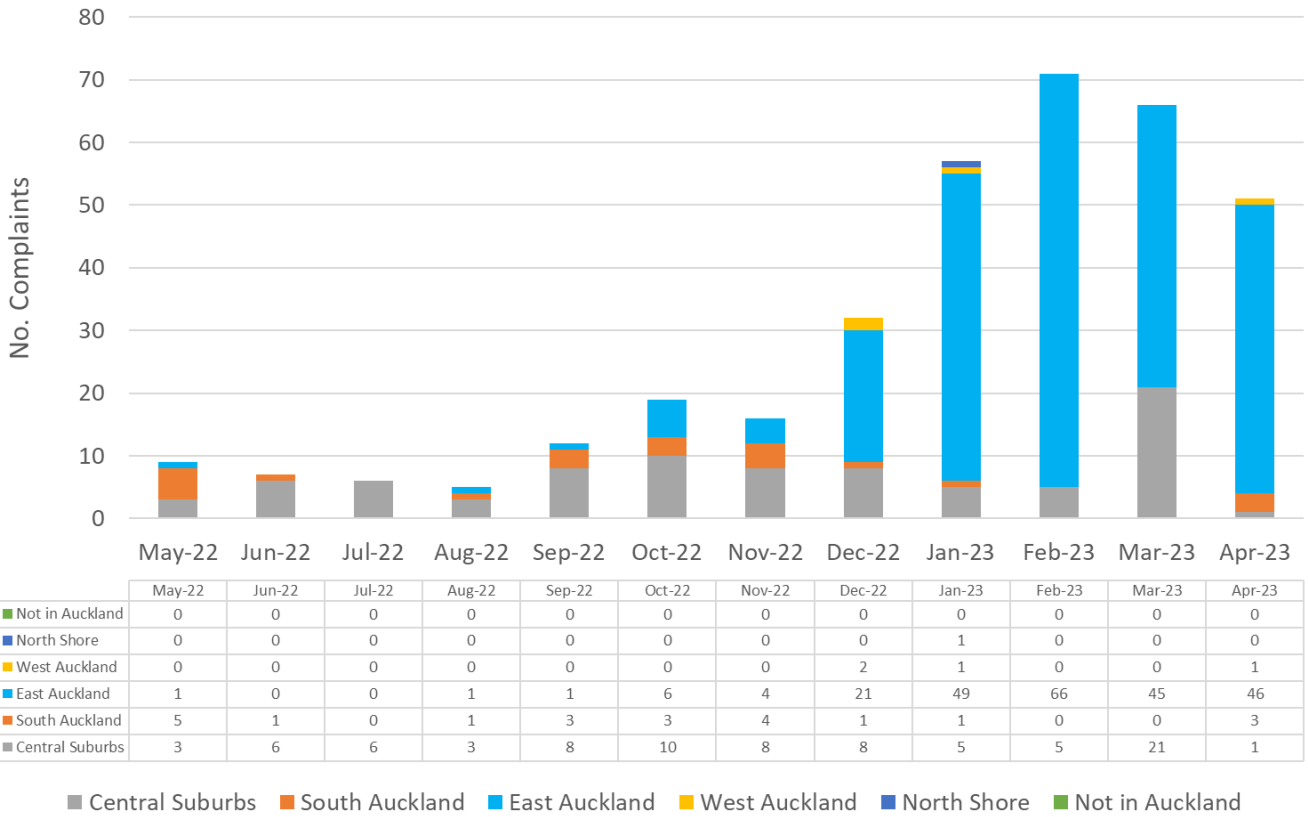


Figure 13 shows the number of complaints made by people residing in different areas of Auckland over the past 12 months.

East Auckland had the most complaints at 157 in the three-month period February 2023 to April 2023. This is linked to the increased Runway 05R usage this period, with departing flights that turn North or West passing over East Auckland.

A list of which suburbs fall into each area is provided in Appendix C.

Figure 14: Noise Complaints by Time

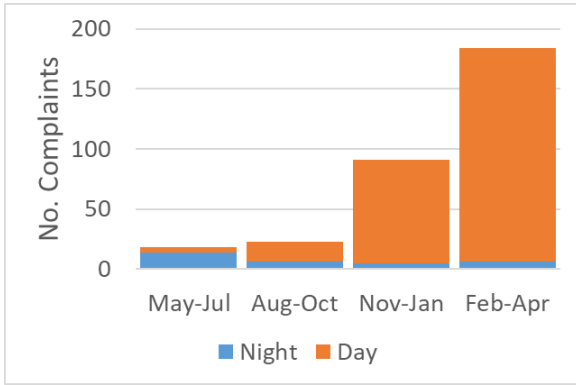


Figure 15: Noise Complaints by Runway

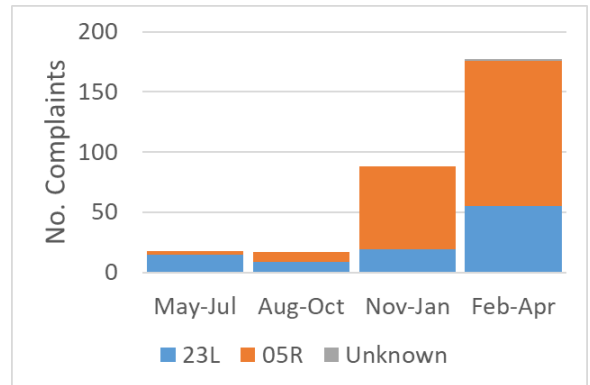


Figure 16: Noise Complaints by Aircraft

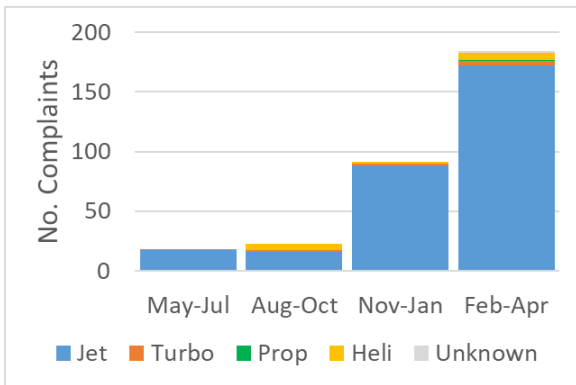
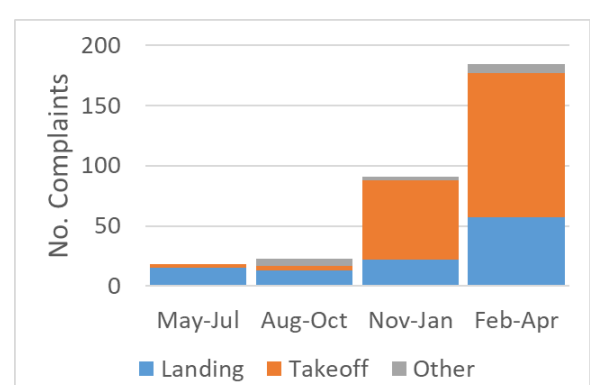


Figure 17: Noise Complaints by Operation



Figures 14-17 show a breakdown of the ‘specific’ aircraft noise complaints made in the three-month period February 2023 to April 2023 and the three quarters preceding.

The two main complainants in East Auckland have made a shared total of 223 complaints in the last two quarters (155 this quarter), thus the large jump in complaints for this and the previous quarter.

The increase in complaints during this quarter compared to the previous quarters may be due to the change in flight volume. Residents may have become accustomed to the lower number of flights during the COVID-19 travel restrictions, so are more sensitive to the increased flight volume as the number of flights continue to return to pre-pandemic levels. Another reason may be the increased use of Runway 05R compared to Runway 23L as seen in Figure 4 or later in Figure 19.

Figure 18: Specific Noise Complaints by Destination

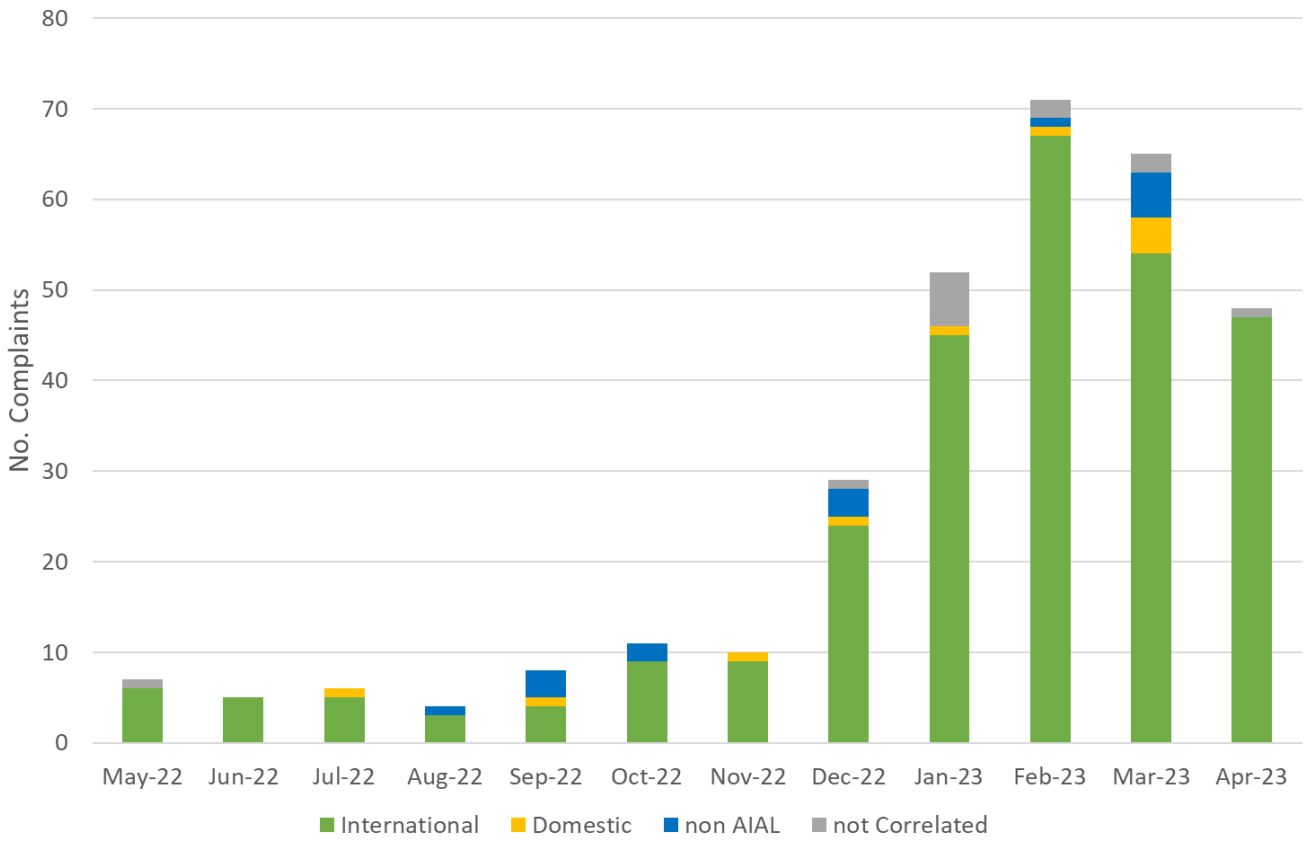


Figure 18 shows the number of specific aircraft complaints made about international and domestic flights over the past 12 months.

Figure 19: Specific Noise Complaints vs Usage of Runway 05R

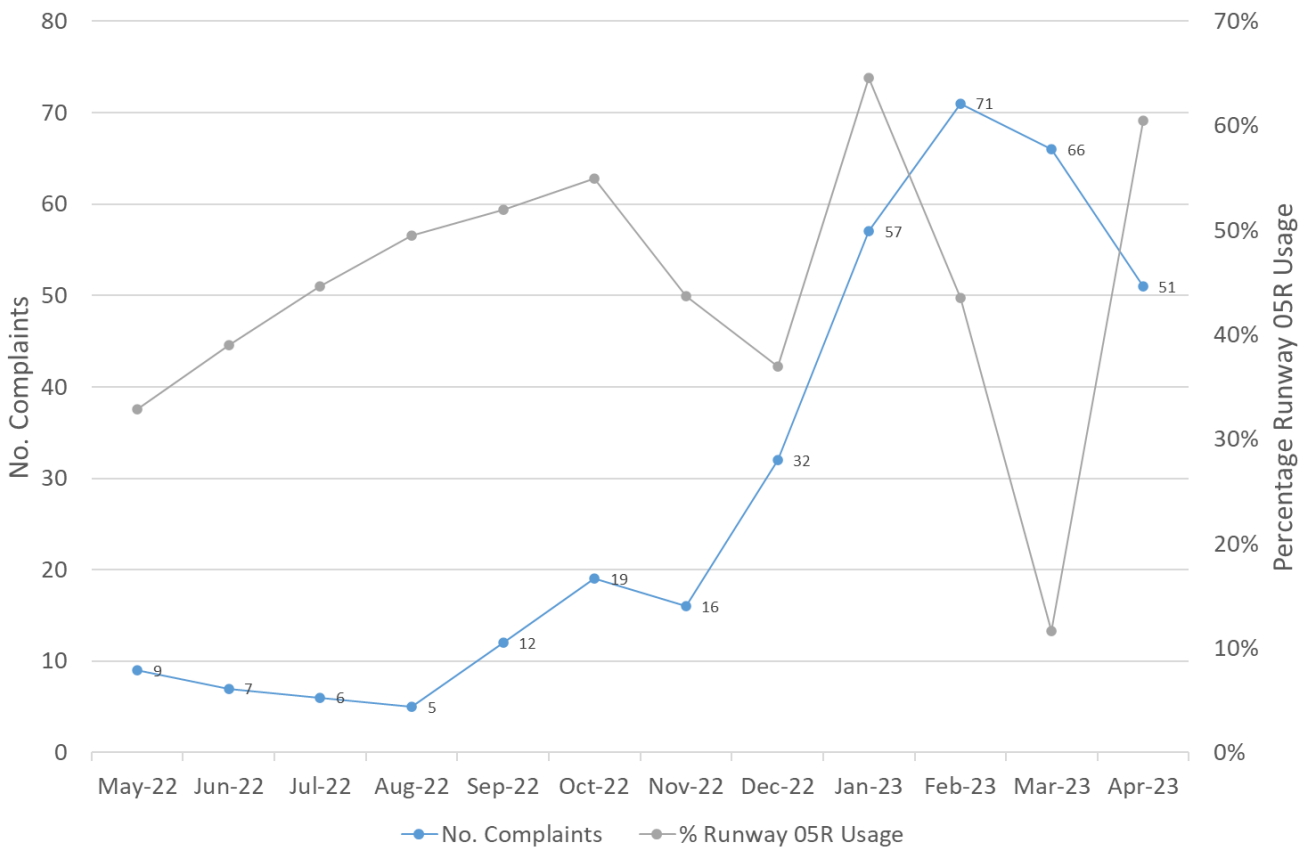


Figure 19 shows the number of specific noise complaints per month received in the past 12 months compared to the usage of Runway 05R.

Usage of Runway 05R is associated with easterly winds which cause departing aircraft to depart to the east over populated areas instead of over the Manukau Harbour (as occurs in the predominant westerly winds).

Departing aircraft are generally louder than arriving aircraft.

There is normally a low correlation between runway usage and the number of complaints. For the East Tamaki complainants, there is a higher degree of runway usage correlation.



Figure 20: Specific Complaints by Hour vs Aircraft Operations by Hour

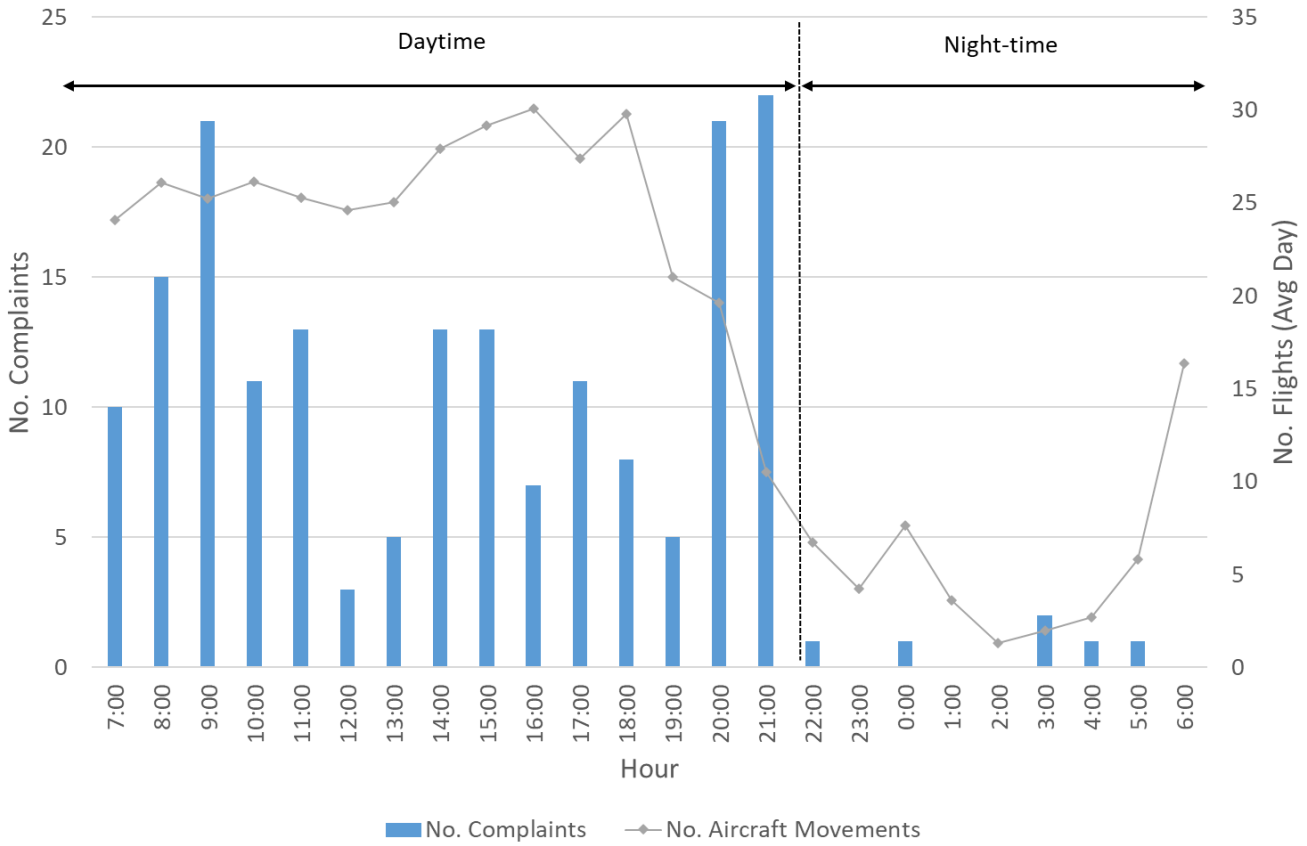


Figure 20 shows the number of specific aircraft noise complaints and the number of aircraft operations per hour.

The blue bars show the number of complaints that related to an aircraft operation in each hour of the day in the three-month period February 2023 to April 2023.

The gray line shows the average daily aircraft operations that occurred in each hour of the day during this period.

Figure 21: Noise Complaints by Type

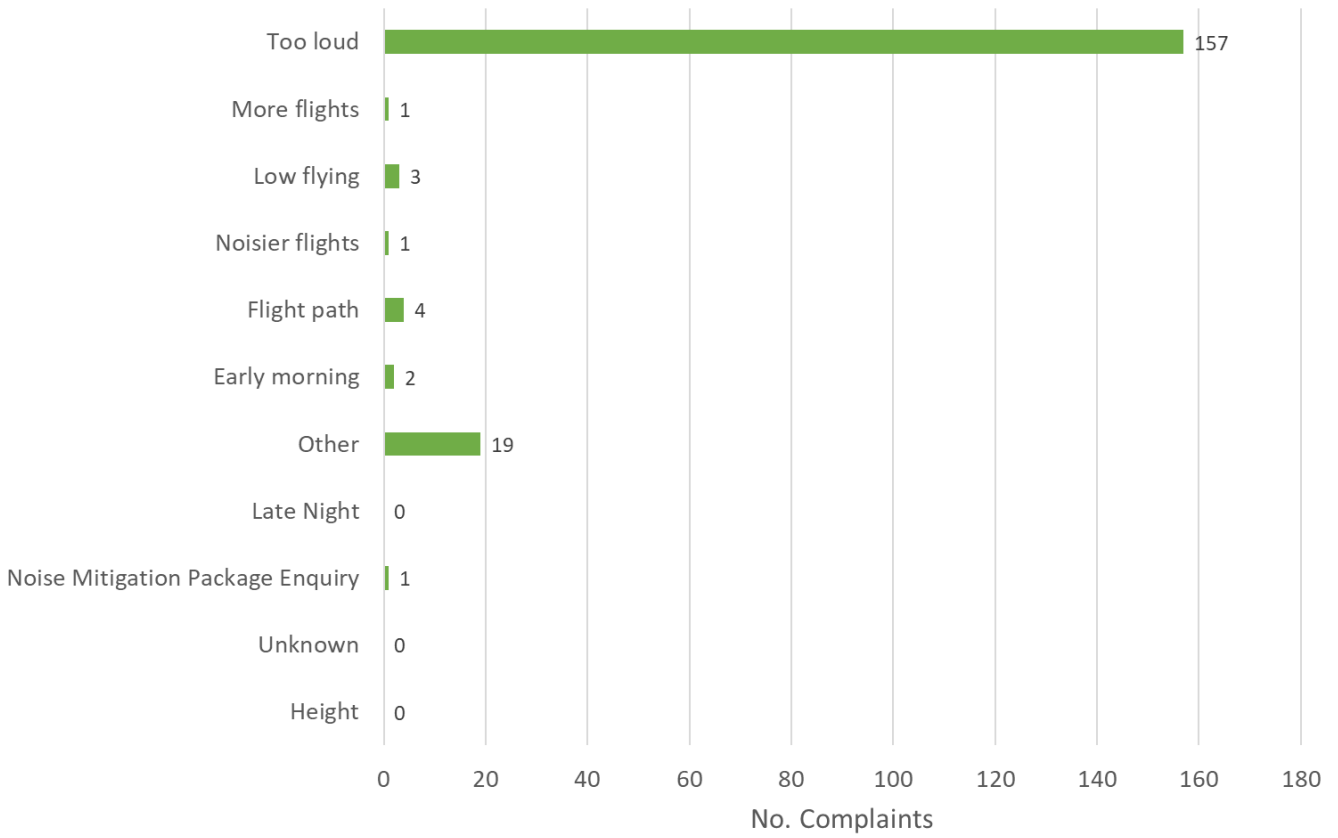


Figure 21 shows the reason for each noise complaint in the three-month period February 2023 to April 2023. This includes all complaints (generic, question and specific).

A full description of each cause is given in Appendix B.

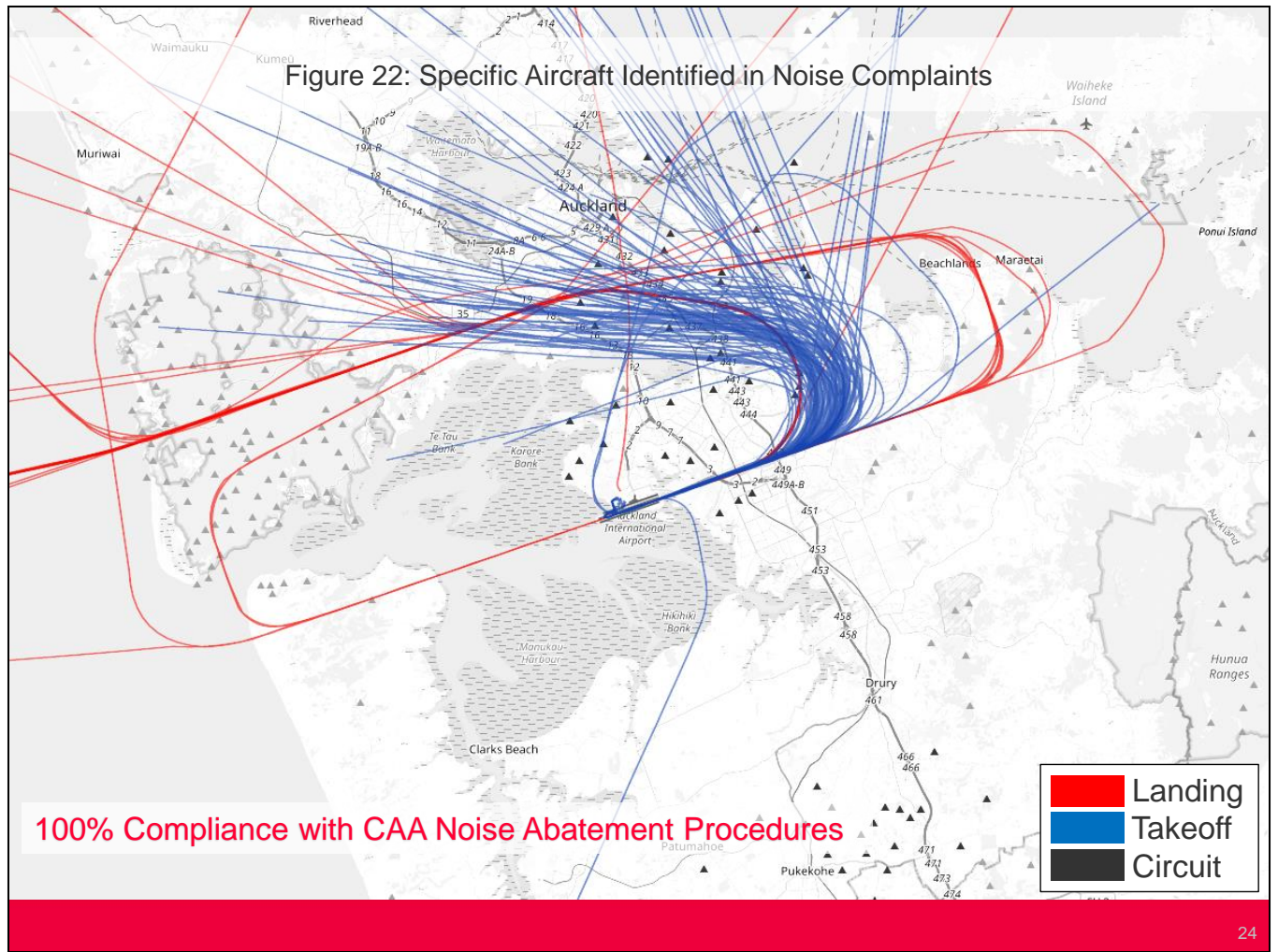


Figure 22 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period February 2023 to April 2023.

The red lines indicate arrivals, the blue lines indicate departures.

These Auckland Airport aircraft events have been reviewed by the Airport and all of them complied with the Civil Aviation Authority Noise Abatement Procedures.

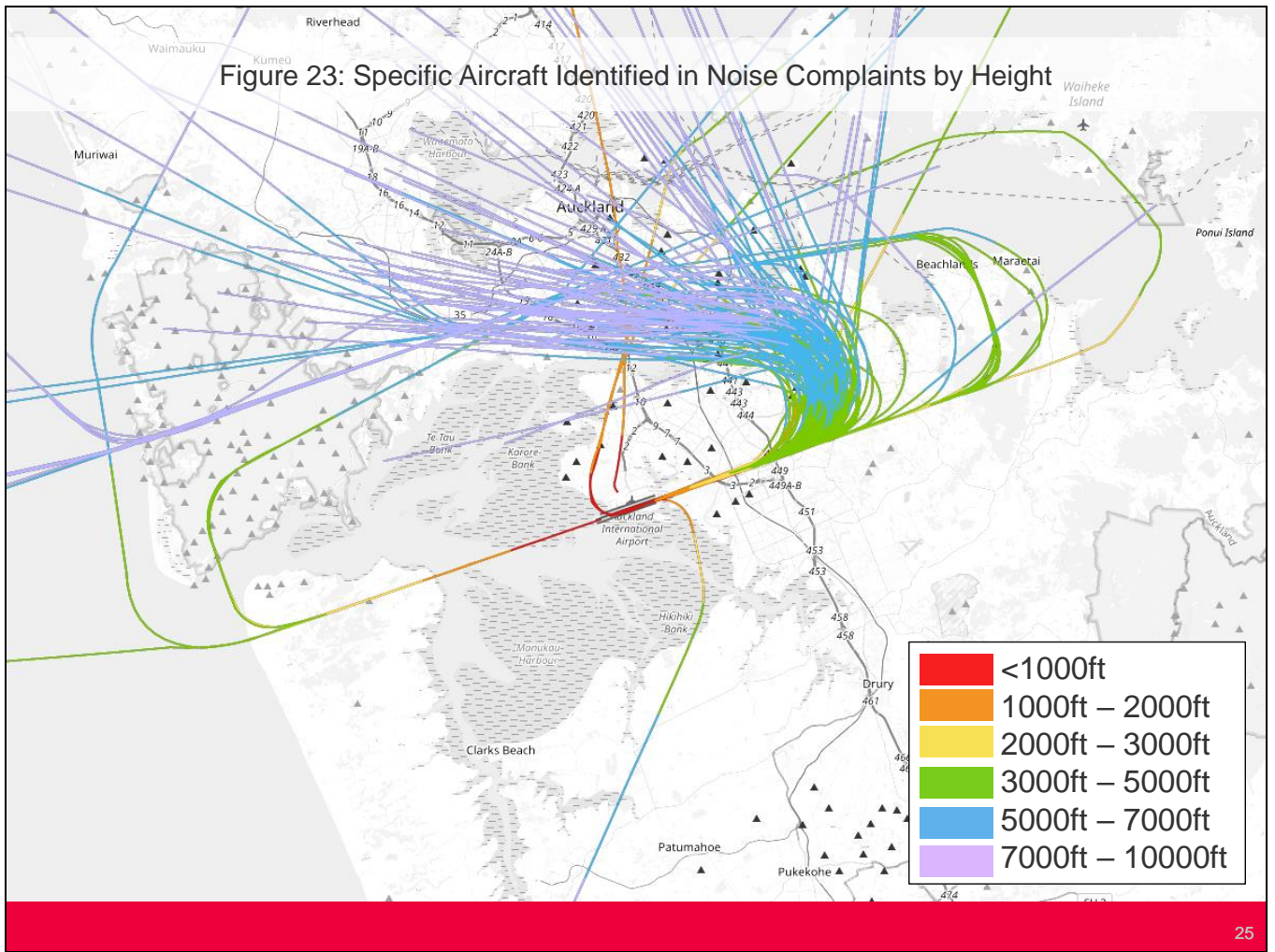


Figure 23 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period February 2023 to April 2023.

The flight paths are shown in terms of altitude.

A photograph of a noise monitoring station. A tall, white, cylindrical pole stands in the center. At the top of the pole is a small, dark, cylindrical sensor. A thin, white cable runs vertically down the side of the pole. Below the main pole, there is a horizontal arm with several smaller sensors and a rectangular panel. The background is a cloudy sky. In the upper left quadrant, a white commercial airplane is flying towards the right. The overall scene is outdoors, with some greenery visible at the bottom edge.

# Noise Monitoring



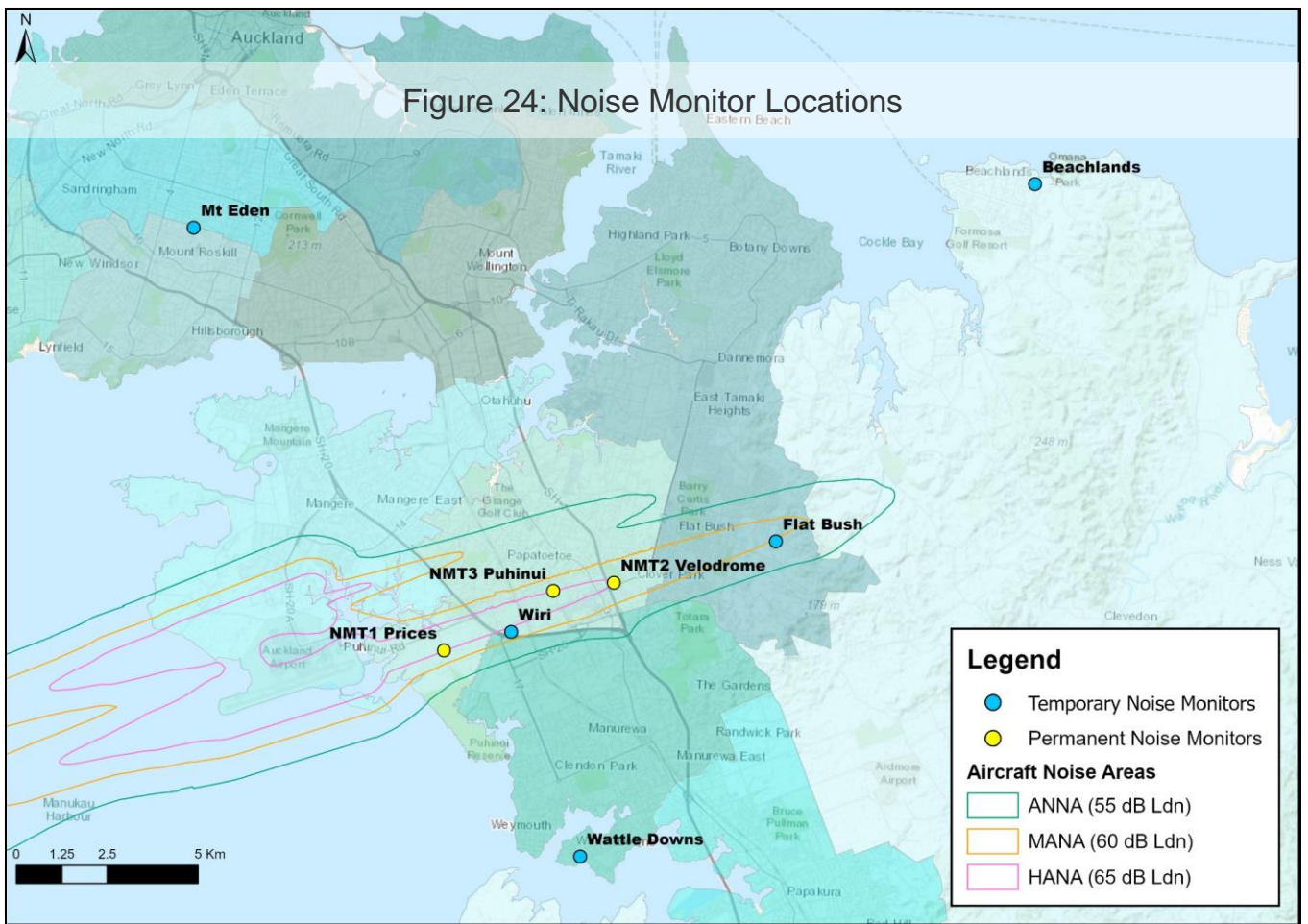


Figure 24 shows the location of Auckland Airport’s three permanent and five temporary noise monitors.

The airport is planning to redeploy the Mt Wellington noise monitor in East Tāmaki to measure once again movements on the Green SMART approach. These measurements will also be useful as there have been many complaints in the area.

All of the permanent noise monitors are located on the outer boundary of the HANA which is set at 65 dB  $L_{dn}$  for future aircraft operations.

Table 4: Noise Monitor Maintenance Work

Wiri	23/02/2023 – 01/03/2023	– Loss of mains power due to water in the power lead connection – fixed 01/03/2023 – Missing noise data during this period
Wiri	21/04/2023 – 02/05/2023	– NMT powered down due to tripped breaker – fixed 02/05/2023 – Missing noise data during this period
Mt Eden	21/04/2023 – 05/05/2023	– NMT removed temporarily for calibration – reinstalled 05/05/2023

Table 4 summarises any replacement, repair, or maintenance work undertaken on the noise monitors for the three-month period February 2023 to April 2023. The three permanent noise monitors and the two temporary monitors at Wiri and Flat Bush (previously Clevedon) are owned by Casper, who administer any works on these monitors as required. Marshall Day Acoustics carries out work on three temporary monitors at Mt Eden, Beachlands (previously Whitford), and Wattle Downs.

The permanent Casper monitors at Prices Rd, Velodrome and Puhinui school and the temporary Casper monitor at Flat Bush required no maintenance work this quarter. The temporary Casper monitor at Wiri had power issues that caused it to be offline for two periods in February and April – a total of 14 days.

The MDA Mt Eden monitor was dismantled and sent for calibration 21 April and reinstalled 05 May.

During this three-month period there was no active maintenance work required for the remaining MDA monitors in Beachlands and Wattle Downs.



Figure 25: Measured 365 Day Rolling Noise Exposure ( $L_{dn}$ ) – Permanent Monitors

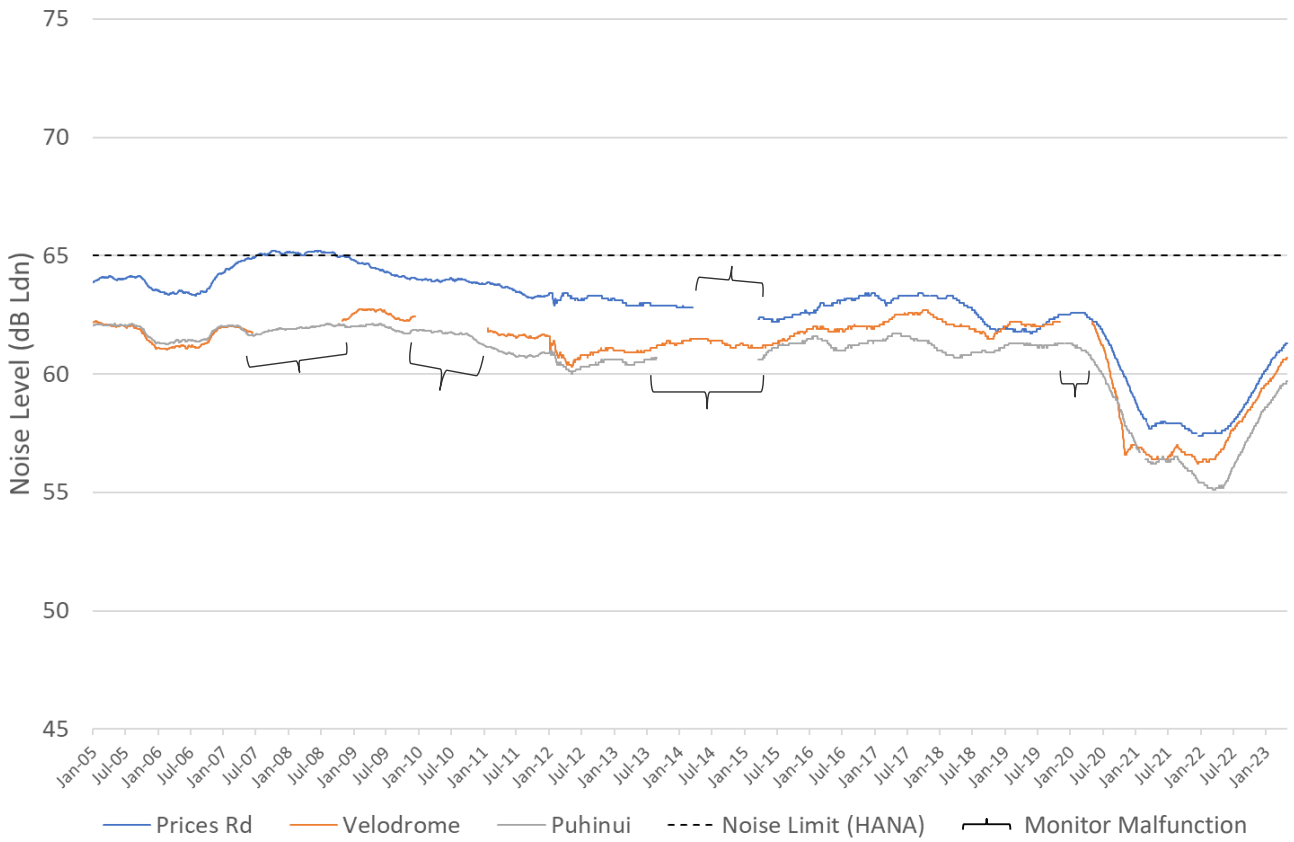


Figure 25 shows the rolling 365-day Noise Exposure ( $L_{dn}$ ) at the permanent noise monitors since January 2005.

The noise limit in the District Plan is 65 dB  $L_{dn}$  (rolling 365 day) at the boundary of the HANA.

The rolling 365-day  $L_{dn}$  is the average  $L_{dn}$  noise level over 365 days calculated each day, and is the overall average  $L_{dn}$  for the 365 days preceding and including the day of the calculation.

For example the point for 31 December 2020 represents the average  $L_{dn}$  noise level from 1 January 2020 to 31 December 2020.

The rolling 365-day  $L_{dn}$  was below the 65 dB  $L_{dn}$  noise limit in the three-month period February 2023 to April 2023.

The noise levels in the three-month period have increased by 3.7 dB at Prices Rd, 3.9 dB at Velodrome and 4.4 dB at Puhinui when compared to the same quarter last year.

A change in noise level of 1 to 2 dB is generally imperceptible to the human ear, while a change of 3 to 4 dB is just perceptible to discernible, and a change of 5 to 8 dB is noticeable to appreciable.

Table 5: Measured Noise Exposure ( $L_{dn}$ ) for each Financial Year – Permanent Monitors

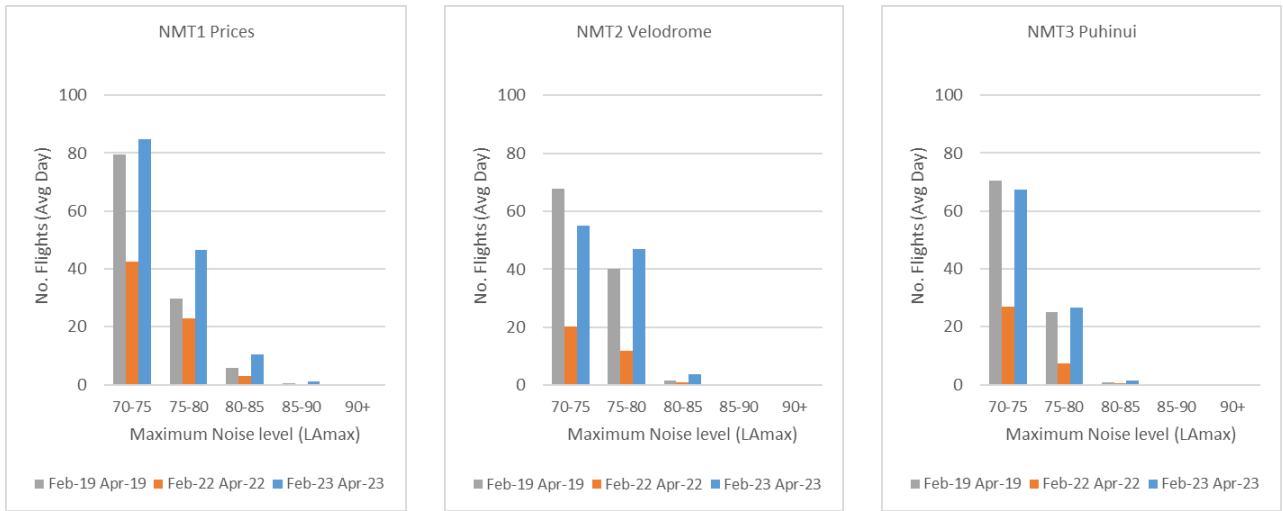
Financial Year	Prices Rd	Velodrome	Puhinui
FY09 (Jul-08 to Jun-09)	64.3	62.6	62.0
FY10 (Jul-09 to Jun-10)	64.0	62.4	61.8
FY11 (Jul-10 to Jun-11)	63.5	61.6	60.7
FY12 (Jul-11 to Jun-12)	63.1	60.8	60.3
FY13 (Jul-12 to Jun-13)	63.0	61.0	60.6
FY14 (Jul-13 to Jun-14)	63.6	61.4	60.3
FY15 (Jul-14 to Jun-15)	62.2	61.3	61.1
FY16 (Jul-15 to Jun-16)	63.1	61.9	61.0
FY17 (Jul-16 to Jun-17)	63.3	62.5	61.6
FY18 (Jul-17 to Jun-18)	62.8	61.9	60.9
FY19 (Jul-18 to Jun-19)	61.9	62.0	61.2
FY20 (Jul-19 to Jun-20)	61.8	61.2	60.0
FY21 (Jul-20 to Jun-21)	57.9	56.5	56.4
FY22 (Jul-21 to Jun-22)	58.0	57.7	56.0

Table 5 shows the Noise Exposure ( $L_{dn}$ ) at the permanent noise monitors for each financial year (1 Jul – 30 June) since 2008

The noise limit in the District Plan is 65 dB  $L_{dn}$  (rolling 365 day) at the boundary of the HANA.

There was a decrease of 0.4 decibels at Puhinui and an increase of 0.1 and 1.2 decibels at Prices Rd and Velodrome respectively from FY21 to FY22.

Figure 26: Number of Aircraft Noise Events in Each Noise Band  
Permanent Monitors ( $L_{Amax}$  – Maximum Noise Level)



NB: Aircraft noise events over 70-75  $L_{Amax}$  start to become disturbing inside houses with windows open as they have the potential to interfere with watching tv, talking etc.



Figure 26 shows the average daily number of aircraft that overflowed each permanent noise monitor in each noise band in the three-month period February 2023 to April 2023 (blue bars), the same quarter last year (orange bars), and the same quarter from 2019 pre-pandemic (grey bars).

$L_{Amax}$  is the maximum noise level experienced as an aircraft overflies a monitor.

The permanent noise monitors received 96-143 events above 70  $L_{Amax}$  during this three-month period. The same quarter last year saw 33-69 events, and the same quarter in 2019 (pre-COVID) saw 89-135 events.

Table 6: Correlation of Aircraft Operations with Captured Noise Events  
Permanent Monitors

	NMT1 Prices	NMT2 Velodrome	NMT3 Puhinui
Total Aircraft Operations	16,805	11,001	11,985
No. Aircraft Operations Captured by Monitors	14,329	10,086	11,438
Correlation	85%	92%	95%

NB: Generally a correlation of >80% is considered reasonable. The aircraft that are missed are generally lower noise level events and will not have any effect on the overall noise level.

All monitors show a correlation above 80% this quarter.

Table 6 shows the number of aircraft that flew in the vicinity of each permanent noise monitor and the number of aircraft noise events that were correlated with an aircraft flyover in the three-month period February 2023 to April 2023.

Generally a noise monitor is unable to pick up every noise event due to ambient noise, inclement weather or other factors.

This table shows how well each noise monitor is performing in correlating aircraft noise events.

Table 7: Temporary Noise Monitor Summary of Measured Aircraft Events Since Deployment

	Date Deployed	Days Deployed	Measured $L_{dn}$	Average $L_{Amax}$
Mt Eden	1-Apr-15	2943	38	62
Wiri	4-Aug-17	2183	58	75
Wattle Downs	23-Dec-17	1955	47	67
Beachlands	4-Nov-22	178	43	64
Flat Bush	20-Dec-22	132	58	70

Table 7 gives a summary of the measured noise levels at each temporary noise monitor since deployment (up until 30 April 2023).

The measured  $L_{dn}$  for aircraft noise ranges from 38-47 dB  $L_{dn}$  across all the temporary monitor locations, except for the noise monitors in Wiri and Flat Bush (both 58 dB  $L_{dn}$ ).

New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB  $L_{dn}$  are suitable for residential development. The noise levels measured at the temporary noise monitors are 8-17 dB below the 55 dB  $L_{dn}$  New Zealand Standard, except for the noise monitors in Wiri and Flat Bush.

The noise levels measured at the Flat Bush and Wiri noise monitors are both 3 dB above the NZS 6805 guideline which is why they are located on and within the Moderate Aircraft Noise Area. The future aircraft noise level allowed for at these sites is 60 and 62-63 dB  $L_{dn}$  respectively. Both monitors are currently comfortably below these future noise levels.

The average  $L_{Amax}$  ranges from 62-70 dB  $L_{Amax}$  across the various monitors except for the noise monitor in Wiri where the average is 75 dB  $L_{Amax}$ .

The average  $L_{Amax}$  is calculated by averaging the maximum noise level from all of the individual aircraft noise events during the full monitoring period (i.e. since the monitor has been deployed).

The  $L_{Amax}$  differs for each aircraft operation depending on the aircraft type, type of operation etc.

Aircraft noise events over 70-75  $L_{Amax}$  start to become disturbing inside houses with windows open as they have the potential to interfere with watching tv, talking etc.

Mt Eden and Beachlands recorded less than one flyover above 70 dB  $L_{Amax}$  per day, and Wiri, Wattle Downs and Flat Bush which recorded 48, 16 and 49 respectively.

Figure 27: Measured Monthly Noise Exposure ( $L_{dn}$ ) – Central Suburbs Temporary Monitors

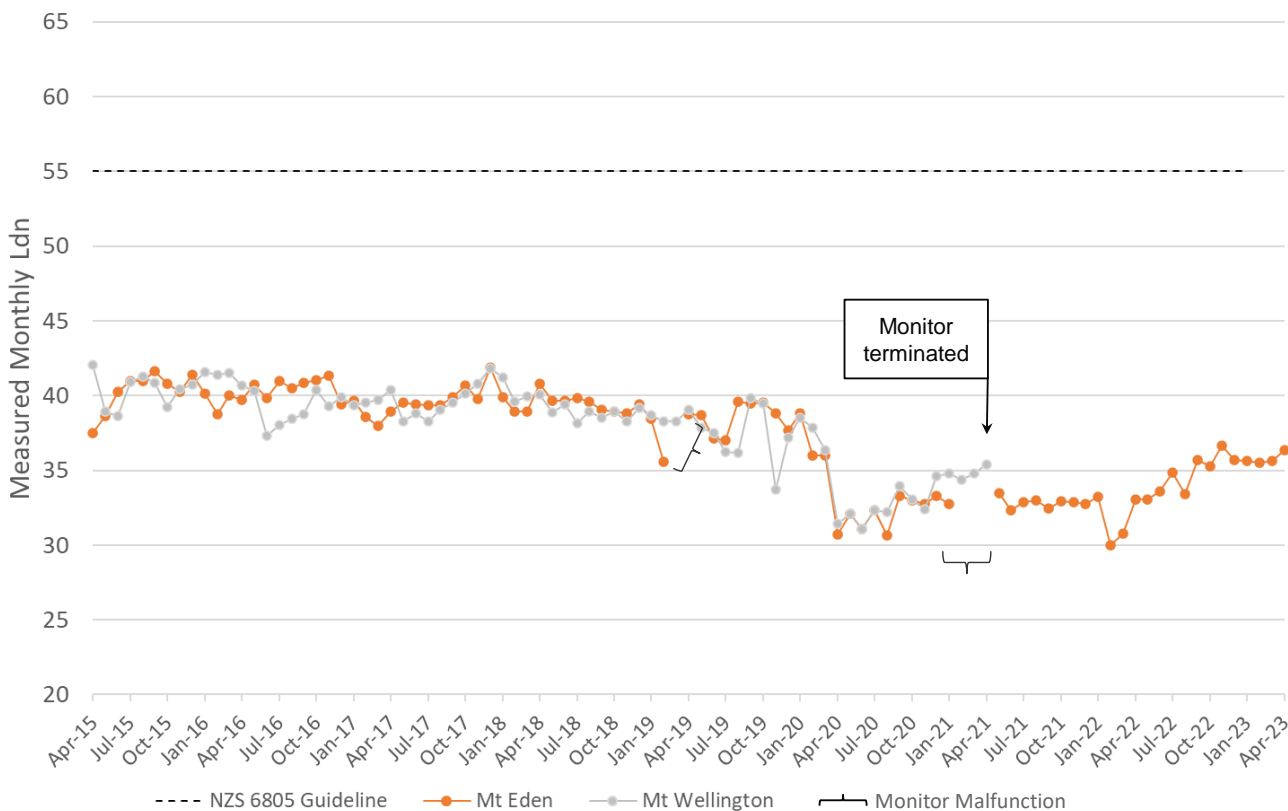


Figure 27 shows the monthly Noise Exposure ( $L_{dn}$ ) trends for aircraft noise at the temporary noise monitor in the Central Suburbs since its deployment.

The  $L_{dn}$  fluctuates month on month by 5 dB at the Mt Eden noise monitor depending on aircraft operations, wind direction and other factors. This 5dB variation is consistent prior and during the COVID-19 pandemic.

There are no notable trends in the data, besides a recent increase in  $L_{dn}$  after the COVID-19 restrictions were relaxed.

The measured  $L_{dn}$  for aircraft noise ranges from 30-42 dB  $L_{dn}$  per month at the Mt Eden monitor.

New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB  $L_{dn}$  are suitable for residential development.

The noise levels measured at this monitor in the Central Suburbs is 13-25 dB below this level.

The quarterly  $L_{dn}$  at this logger has increased by 5 dB when compared to the same quarter last year.

We note that the Mt Wellington monitor is no longer deployed, but the data captured is included for reference.



Figure 28: Measured Monthly Noise Exposure ( $L_{dn}$ ) – Eastern Suburbs Temporary Monitors

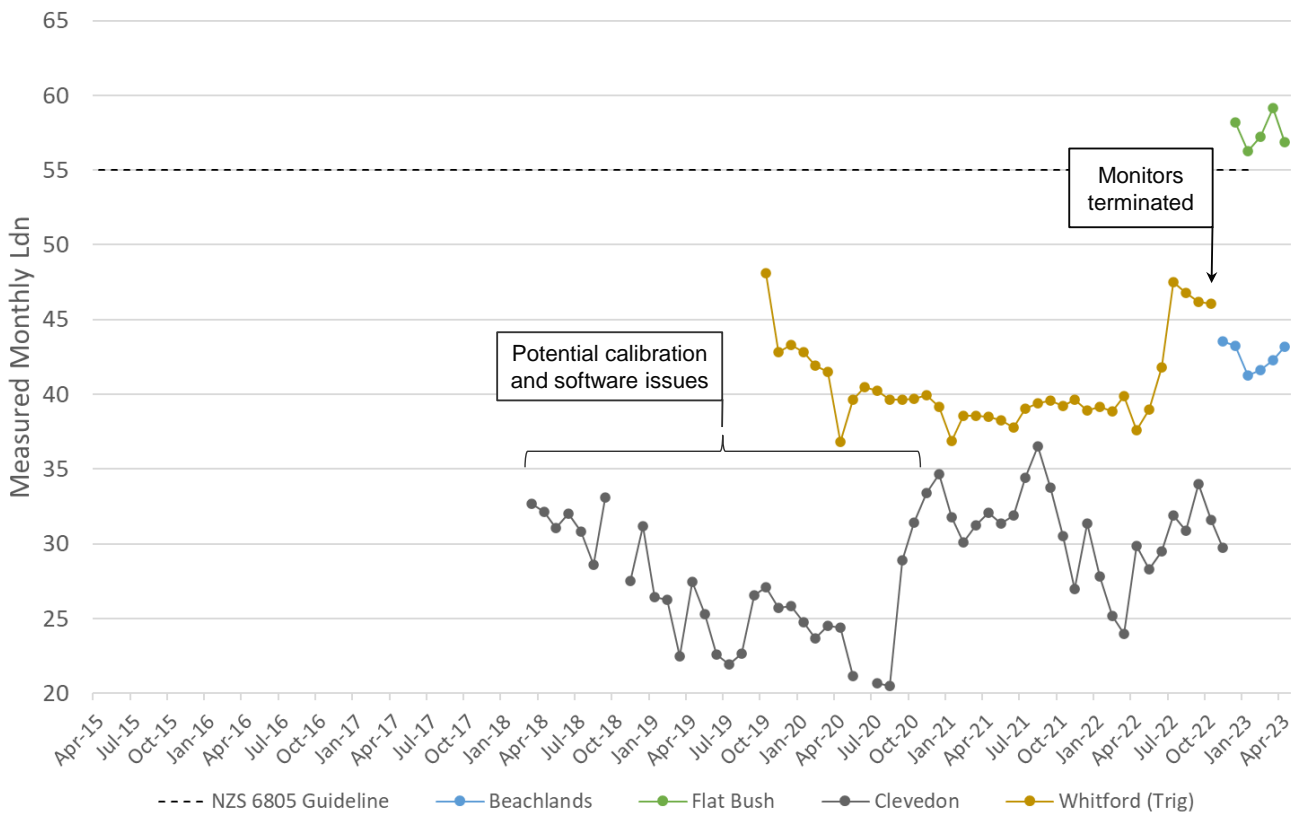


Figure 28 shows the monthly Noise Exposure ( $L_{dn}$ ) trends for aircraft noise at the temporary noise monitors in East Auckland since their deployment.

The  $L_{dn}$  fluctuates month on month by 5-10 dB at each noise monitor depending on aircraft operations, wind direction and other factors.

There are no significant trends in the data.

The measured  $L_{dn}$  for aircraft noise ranges from 41-59 dB  $L_{dn}$  per month across the current Eastern Suburb monitor locations.

New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB  $L_{dn}$  are suitable for residential development.

The noise level measured at the Beachlands noise monitor is 12 dB below this level. **The noise level at the Flat Bush monitor is 3 dB above that level and is located on the Moderate Aircraft Noise Area contour that provides for noise levels between  $L_{dn}$  60 dB and 65 dB.**

Both the Beachlands and Flat Bush monitors were newly installed late last year so cannot be compared to previous years.

The Whitford monitor and Clevedon monitors were terminated last quarter, but the data captured is included for reference.

Figure 29: Measured Monthly Noise Exposure ( $L_{dn}$ ) – Southern Suburbs Temporary Monitors

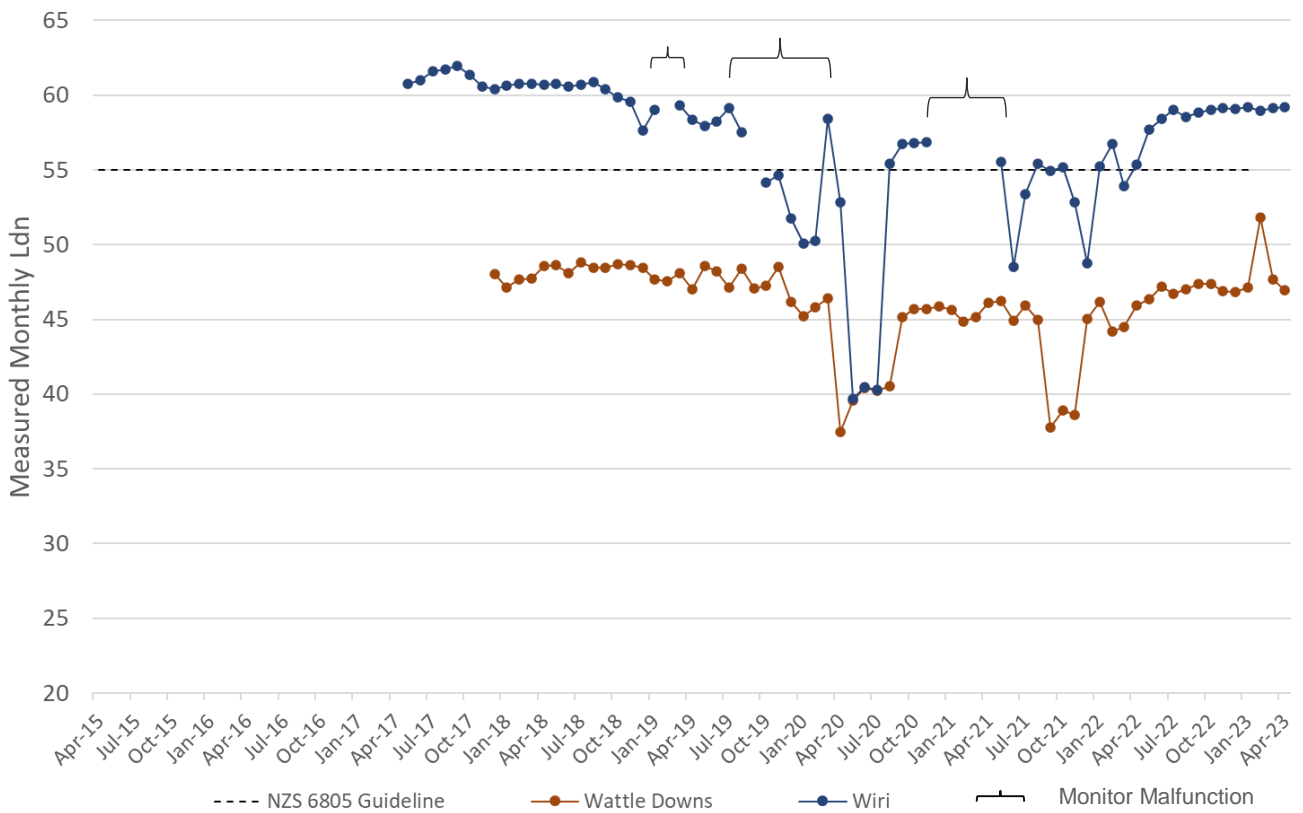


Figure 29 shows the monthly Noise Exposure ( $L_{dn}$ ) trends for aircraft noise at the temporary noise monitors in South Auckland since their deployment.

The  $L_{dn}$  fluctuates month on month by around 5-10 dB at each noise monitor depending on aircraft operations, wind direction and other factors.

There are no significant trends in the data, besides the recent reduction in  $L_{dn}$  due to the COVID-19 pandemic.

There were likely hardware and software issues with the Wiri monitor from July 2019 to March 2020, as such this data may not be reliably used.

The measured  $L_{dn}$  for aircraft noise ranges from 37-62 dB  $L_{dn}$  per month across the Southern Suburb monitor locations.

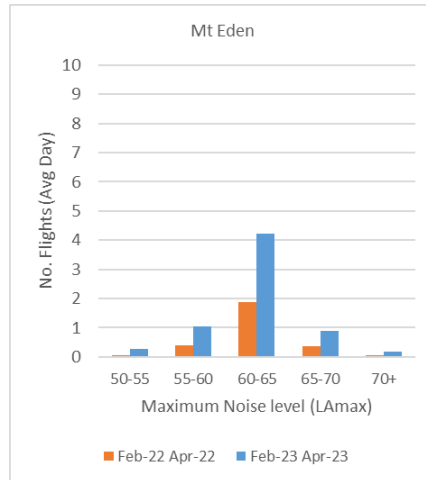
New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB  $L_{dn}$  are suitable for residential development.

The noise level measured at the Wattle Downs noise monitor is 8 dB below this level.

This noise level measured at the Wiri noise monitor is typically above this level, which is why this location is within the Moderate Aircraft Noise Area.

The quarterly  $L_{dn}$  has increased by 2 dB at Wattle Downs and increased by 1 dB at Wiri when compared to the same quarter last year.

Figure 30: Number of Aircraft Noise Events in Each Noise Band  
Central Suburbs Monitors ( $L_{Amax}$  – Maximum Noise Level)



NB: Aircraft noise events over 70-75  $L_{Amax}$  start to become disturbing inside houses with windows open as they have the potential to interfere with watching tv, talking etc.

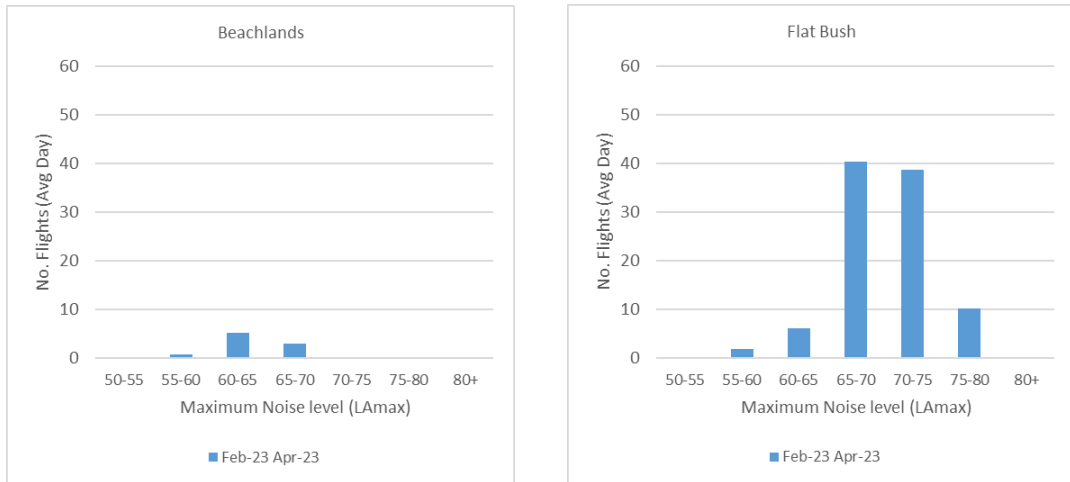
Figure 30 shows the average daily number of aircraft that overflowed the Mt Eden noise monitor in each noise band in the three-month period February 2023 to April 2023 (blue bars) and the same quarter last year (orange bars). The quarter from 2019 is not included as the monitor was not operational during part of this period.

We note that the Mt Wellington monitor is no longer deployed, so Mt Eden is the only active monitor in the Central Suburbs.

$L_{Amax}$  is the maximum noise level experienced as an aircraft overflies a monitor.

This noise monitor received less than one event above 70  $L_{Amax}$  per day.

Figure 31: Number of Aircraft Noise Events in Each Noise Band  
Eastern Suburbs Monitors ( $L_{Amax}$  – Maximum Noise Level)



NB: Aircraft noise events over 70-75  $L_{Amax}$  start to become disturbing inside houses with windows open as they have the potential to interfere with watching tv, talking etc.

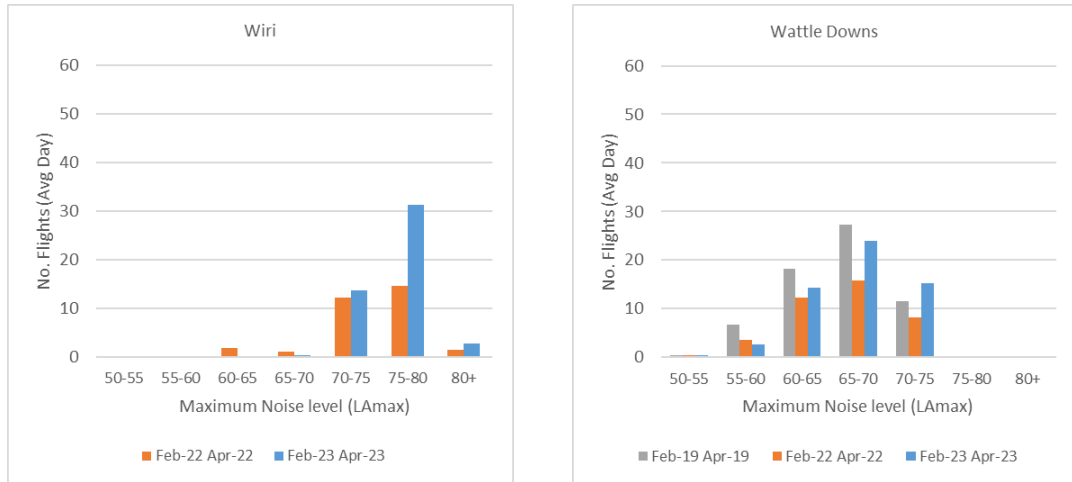
Figure 31 shows the average daily number of aircraft that overflowed each of the Eastern Suburbs temporary noise monitors in each noise band in the three-month period February 2023 to April 2023. These monitors are both newly installed late last year so have no data from previous years for comparison.

$L_{Amax}$  is the maximum noise level experienced as an aircraft overflies a monitor.

The Flat Bush monitor recorded approximately 49 events above 70  $L_{Amax}$  per day and the Beachlands monitor received less than one event.



Figure 32: Number of Aircraft Noise Events in Each Noise Band  
Southern Suburbs Monitors ( $L_{Amax}$  – Maximum Noise Level)



NB: Aircraft noise events over 70-75  $L_{Amax}$  start to become disturbing inside houses with windows open as they have the potential to interfere with watching tv, talking etc.

Figure 32 shows the average daily number of aircraft that overflowed the Southern Suburbs temporary noise monitors in each noise band in the three-month period February 2023 to April 2023 (blue bars), the same quarter last year (orange bars), and for Wattle Downs the same quarter from 2019 pre-pandemic (grey bars). Wiri data from the same quarter in 2019 pre-pandemic was compromised due to hardware and software issues so has been excluded.

$L_{Amax}$  is the maximum noise level experienced as an aircraft overflies a monitor.

The Wiri and Wattle Downs monitors recorded approximately 48 and 16 flyovers per day above 70 dB  $L_{Amax}$  respectively.



# Engine Testing

Figure 33: Engine Testing Compliance Locations

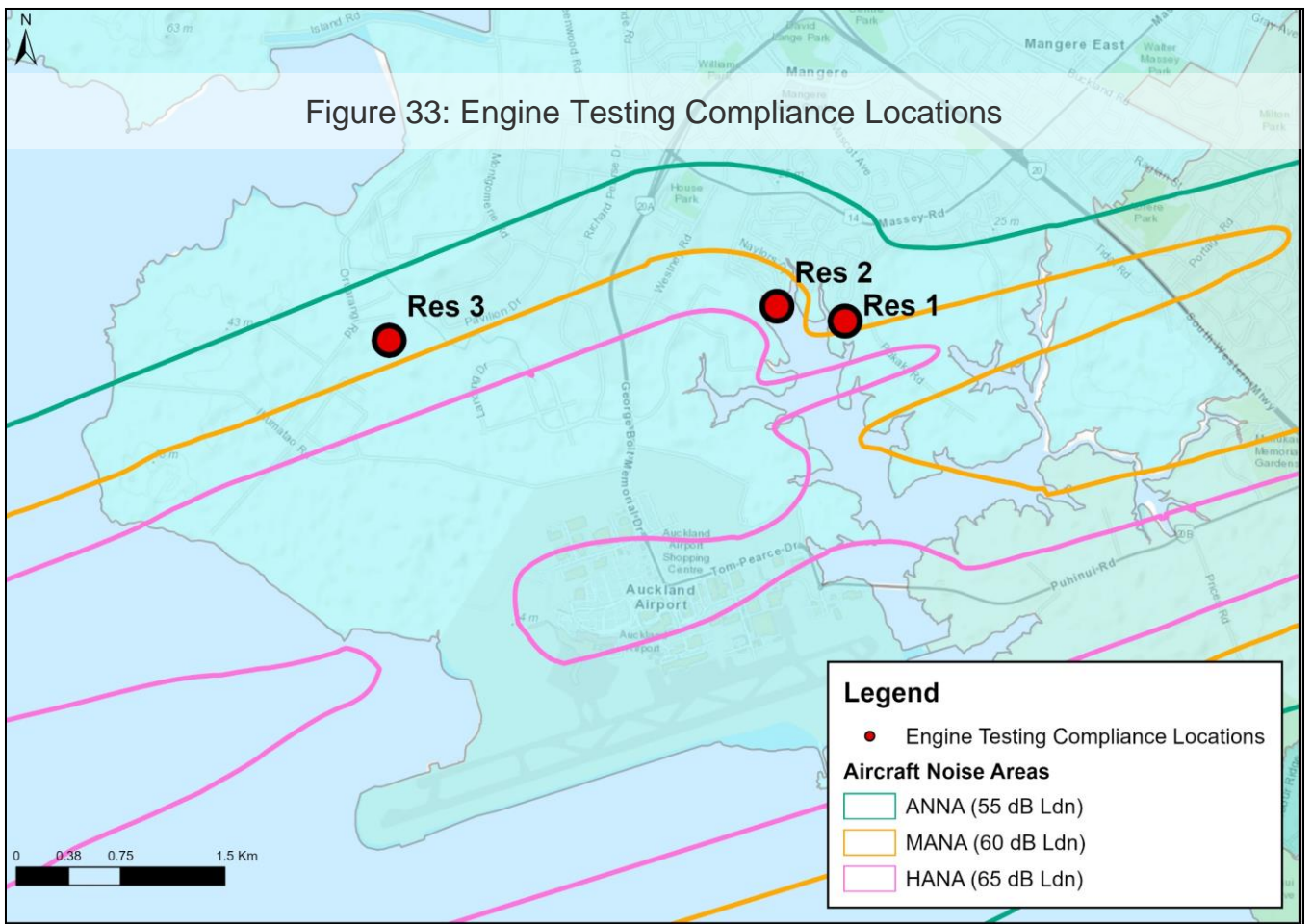


Figure 33 shows the three locations where compliance with the engine testing noise rule is calculated.

Figure 34: Engine Testing Summary

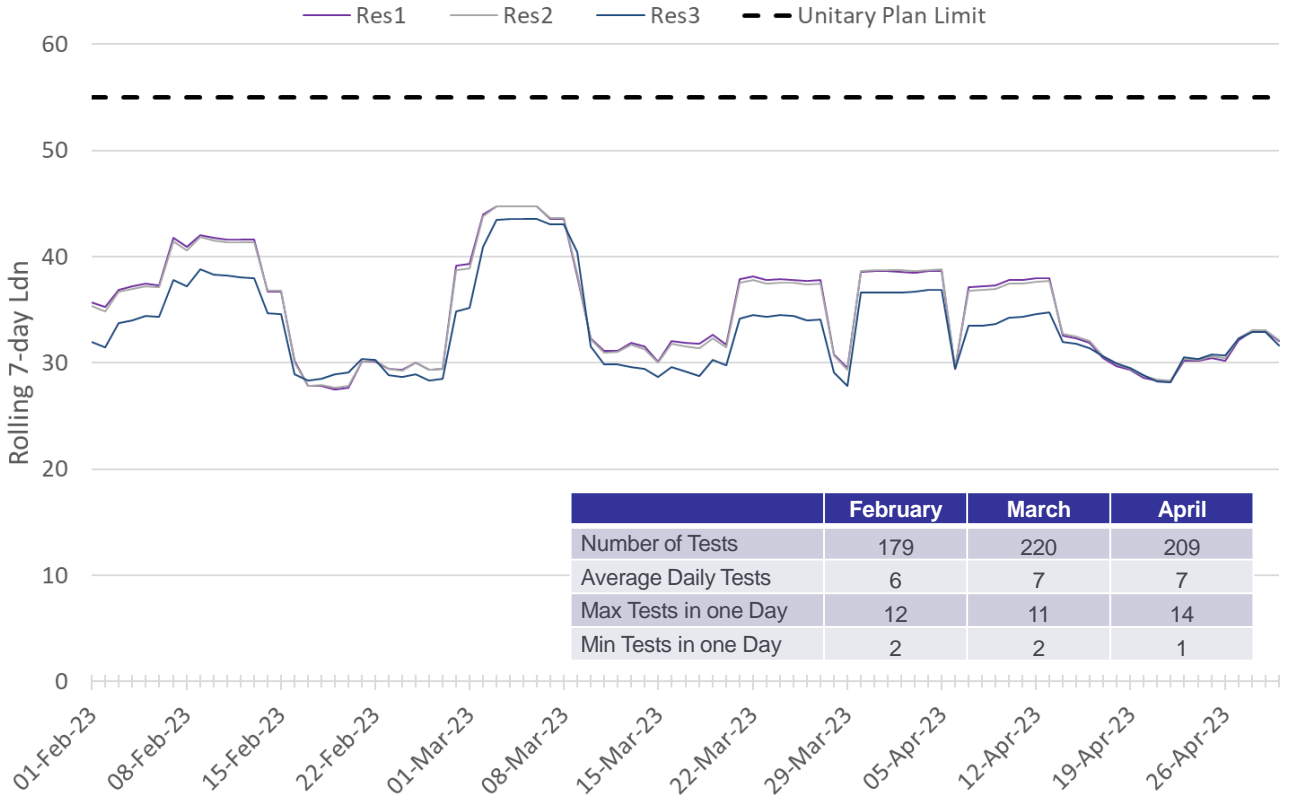


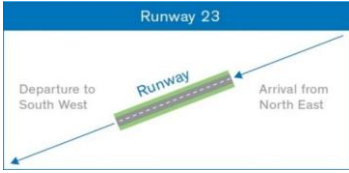
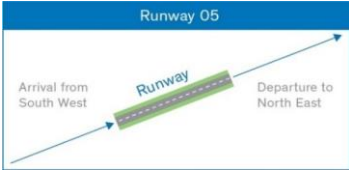
Figure 34 shows the rolling 7-day average noise level for engine testing activity at the airport in the three-month period February 2023 to April 2023.

The District Plan noise limit for engine testing activity is 55 dB L<sub>dn</sub> (7 day rolling).

The engine testing noise levels were compliant with this noise limit.

The Table insert shows the average, maximum, and minimum (above zero) number of engine tests performed on an average day in each month along with the total number of tests completed in each month.

# Appendix A: Glossary of Terminology

Term	Definition
Daytime	The period from 7:00am to 10:00pm
Night-time	The Period from 10:00pm to 7:00am
Runway 23L/Runway 05R	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Occurs in Westerly Wind Conditions</p>  </div> <div style="text-align: center;"> <p>Occurs in Easterly Wind Conditions</p>  </div> </div>
<b>Complaint Type</b>	
“Specific” complaint	Complaints relating to a specific aircraft operation.
“Generic” complaint	Complaints that don’t relate to a specific aircraft operation but relate to noise in general.
“Question” enquiry	An enquiry to find out more information about noise related topics.
“Aircraft” Noise	Noise that is from aircraft operations only.
“Ambient” Noise	The total noise that is from general ambient noise sources (cars, wind etc.). Includes noise from aircraft operations.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
L <sub>dn</sub> – Noise Exposure	The average A-weighted noise level over a day/month/year with a 10 dB penalty applied to the night-time (10pm – 7am).
L <sub>Amax</sub> – Maximum Noise Level	The highest A-weighted noise level which occurs during an aircraft operation.
ANNA	Aircraft Noise Notification Area – Set at 55-60 dB L <sub>dn</sub>
MANA	Moderate Aircraft Noise Area – Set at 60-65 dB L <sub>dn</sub>
HANA	High Aircraft Noise Area – Set at 65+ dB L <sub>dn</sub>

## Appendix B: Noise Complaint Type

Cause	Description
<b>Low flying</b>	Aircraft flying at a low altitude
<b>Too loud</b>	Aircraft making too much noise
<b>Early morning</b>	Aircraft flying in the early morning
<b>Late night</b>	Aircraft flying late at night or overnight
<b>Height</b>	Aircraft flying higher or lower than usual
<b>More flights</b>	More aircraft operations than usual
<b>Noisier flights</b>	Aircraft are noisier than usual
<b>Flight path</b>	Aircraft flying on a different flight path than usual
<b>Other</b>	The disturbance is different from those listed
<b>Unknown</b>	Cause not stated
<b>Noise Mitigation Package Enquiry</b>	Enquiry relating to the Noise Mitigation Packages



## Appendix C: Suburbs by Area

Suburb	Area	Suburb	Area	Suburb	Area	Suburb	Area
Alfriston	South Auckland	Grafton	Central Suburbs	Mount Eden	Central Suburbs	Rothesay Bay	North Shore
Anawhata	West Auckland	Greenhithe	North Shore	Mount Roskill	Central Suburbs	Royal Oak	Central Suburbs
Arkles Bay	North Shore	Greenlane	Central Suburbs	Mount Wellington	Central Suburbs	Saint Andrews	Central Suburbs
Auckland	Central Suburbs	Grey Lynn	Central Suburbs	Muriwai	West Auckland	Saint Heliers	Central Suburbs
Auckland Central	Central Suburbs	Gulf Harbour	North Shore	Newmarket	Central Suburbs	Saint Johns	Central Suburbs
Avondale	West Auckland	Half Moon Bay	East Auckland	Northcote Point	North Shore	Saint Marys Bay	Central Suburbs
Beachlands	East Auckland	Hauraki	North Shore	Northcross	North Shore	Sandringham	Central Suburbs
Birkdale	North Shore	Henderson	West Auckland	Northpark	South Auckland	Shamrock Park	East Auckland
Birkenhead	North Shore	Henderson Valley	West Auckland	One Tree Hill	Central Suburbs	Shelly Park	South Auckland
Blockhouse Bay	West Auckland	Herne Bay	Central Suburbs	Onehunga	Central Suburbs	Silverdale	North Shore
Botany Downs	East Auckland	Howick	East Auckland	Oneroa	Central Suburbs	Snells Beach	North Shore
Bucklands Beach	East Auckland	Huntly	Not in Auckland	Onewhero	Not in Auckland	Somerville	South Auckland
Chatswood	North Shore	Hunua	South Auckland	Orakei	Central Suburbs	Stanley Point	North Shore
Clendon Park	South Auckland	Karaka	South Auckland	Oratia	West Auckland	Sunnyhills	East Auckland
Clevedon	South Auckland	Kohimarama	Central Suburbs	Otahuhu	South Auckland	Takanini	South Auckland
Clover Park	South Auckland	Laingholm	West Auckland	Otara	South Auckland	Te Atatu South	West Auckland
Coatesville	North Shore	Long Bay	North Shore	Pakuranga	East Auckland	Titirangi	West Auckland
Cockle Bay	East Auckland	Lynfield	Central Suburbs	Pakuranga Heights	East Auckland	Totara Heights	South Auckland
Cornwallis	West Auckland	Mangere	South Auckland	Panmure	Central Suburbs	Totara Vale	South Auckland
Drury	South Auckland	Mangere Bridge	South Auckland	Papakura	South Auckland	Waiheke Island	Central Suburbs
East Tāmaki	East Auckland	Mangere East	South Auckland	Papatoetoe	South Auckland	Waitakere	West Auckland
East Tamaki Heights	East Auckland	Manukau	South Auckland	Parnell	Central Suburbs	Waiuku	South Auckland
Ellerslie	Central Suburbs	Manukau Heads	South Auckland	Patumahoe	South Auckland	Wattle Downs	South Auckland
Epsom	Central Suburbs	Manurewa	South Auckland	Point Chevalier	Central Suburbs	Westmere	Central Suburbs
Farm Cove	East Auckland	Massey	West Auckland	Point England	Central Suburbs	Weymouth	South Auckland
Flat Bush	East Auckland	Meadowbank	Central Suburbs	Pollok	South Auckland	Whanganui	Not in Auckland
Forrest Hill	North Shore	Mellons Bay	East Auckland	Ponsonby	Central Suburbs	Whangaparaoa	North Shore
Glendowie	Central Suburbs	Milford	North Shore	Randwick Park	South Auckland	Whangaripo	North Shore
Glenfield	North Shore	Mission Bay	Central Suburbs	Ranui	West Auckland	Whitford	East Auckland
Goodwood Heights	South Auckland	Mount Albert	Central Suburbs	Remuera	Central Suburbs	Wiri	South Auckland