

Q1 Report Summary

For February to April 2024:

- Noise limits were complied with for all permanent and temporary monitors, and engine testing noise (slides 30, 35-37, 43)
- Flight operations increased 8% when compared to Feb-Apr 2023 (slide 4)
Flight operations are down 12% compared to Feb-Apr 2019 (slide 4)
- Complaints total 81, decreasing from 188 in Feb-Apr 2023 (slide 17)
 - There is one main complainant in Q4:
a resident in Remuera that made 58% (47) of this quarter's complaints
- Monitors:
 - The Temporary Prices Road monitor was installed last quarter in January
 - The Beachlands monitor was removed at the end of April, and the East Tamaki monitor was removed in May (slide 28)
 - Memos summarising the Beachlands and East Tamaki temporary monitors are included in the Airport's annual monitor review report

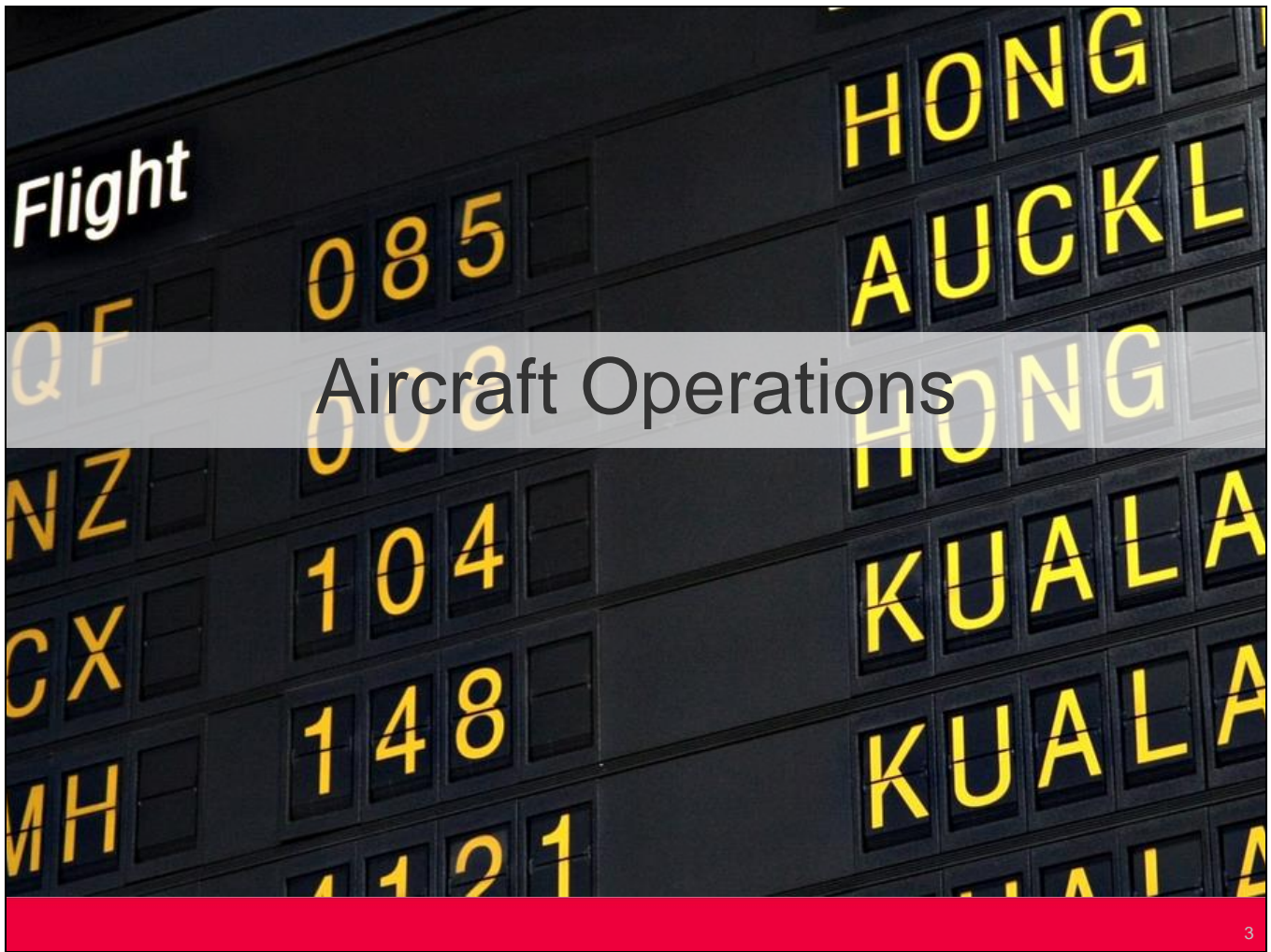
ANCCG Meeting

Monitoring Period
February 2024 – April 2024

Meeting: 10 June 2024

MARSHALL DAY
Acoustics 

NB: Glossary of terminology given in Appendix A



Aircraft Operations

Figure 1: Number of Aircraft Operations per Month

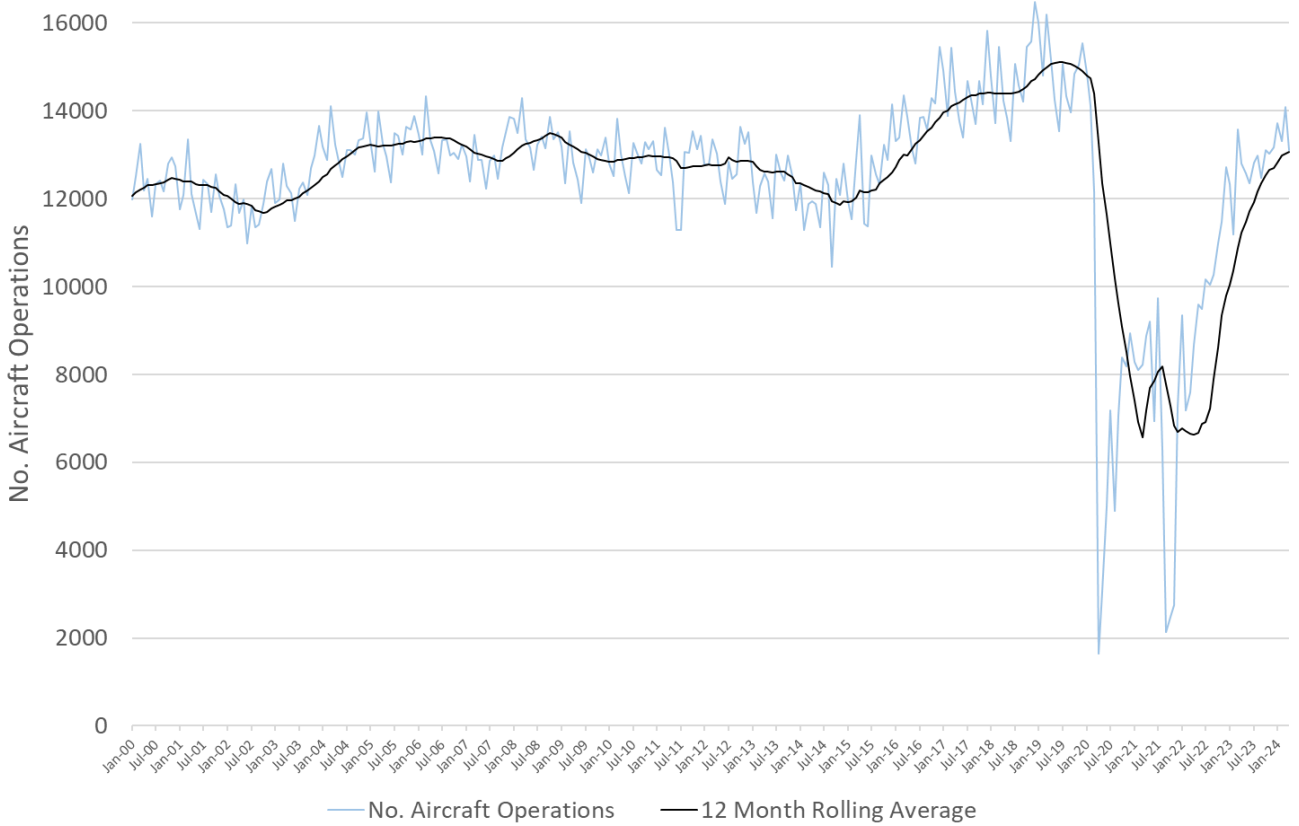


Figure 1 shows the number of aircraft operations per month since the year 2000 (blue line) and the 12-month rolling average (black line).

Aircraft operations have fluctuated over the years with dips in 2002, 2014 and more significantly 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 three years but now there is a consistent upward trend over the last few years.

The number of aircraft operations in the three-month period February 2024 to April 2024 has increased by 8% when compared to the same period last year, as the number of flight operations continue to return to pre-pandemic levels. Looking at this in further detail – daytime operations have increased by 6% and night-time operations have increased by 8%.

When compared to the same period in 2019 (pre-pandemic), aircraft operations are down by 12% from operations in 2019. Daytime operations have decreased by 14% and night-time operations have increased by 5% when compared to the same period in 2019.

Table 1: Summary of Aircraft Operations

| Operation | Total | Day | Night |
|------------|--------|--------|-------|
| Arrivals | 20,245 | 16,888 | 3,357 |
| Departures | 20,214 | 18,253 | 1,961 |
| Circuit | 36 | 36 | 0 |
| Total | 40,495 | 35,177 | 5,318 |

Table 2: Average Daily Aircraft Operations

| Total | Day | Night |
|-------|-----|-------|
| 450 | 391 | 59 |

Table 1 shows a breakdown of aircraft operations in the three-month period February 2024 to April 2024.

Table 2 shows that there were on average 450 aircraft operations that occurred per day (24-hour period), 59 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.

This means operations have returned to the low end of pre COVID-19 aircraft movements.

Figure 2: Aircraft Operations by Time

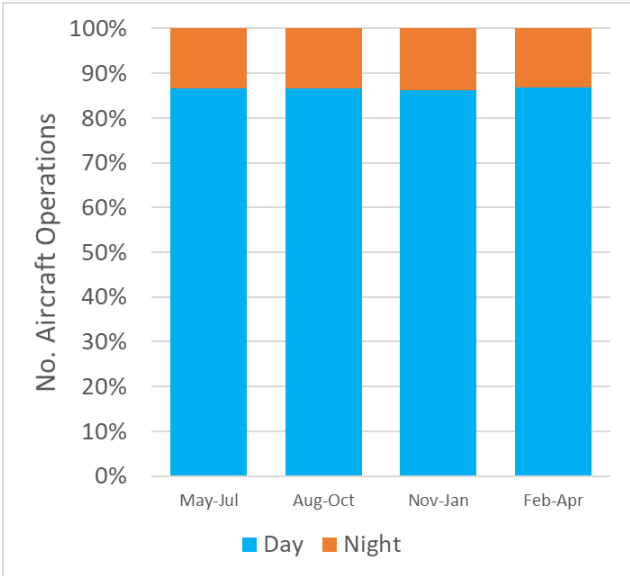


Figure 3: Aircraft Operations by Aircraft Type

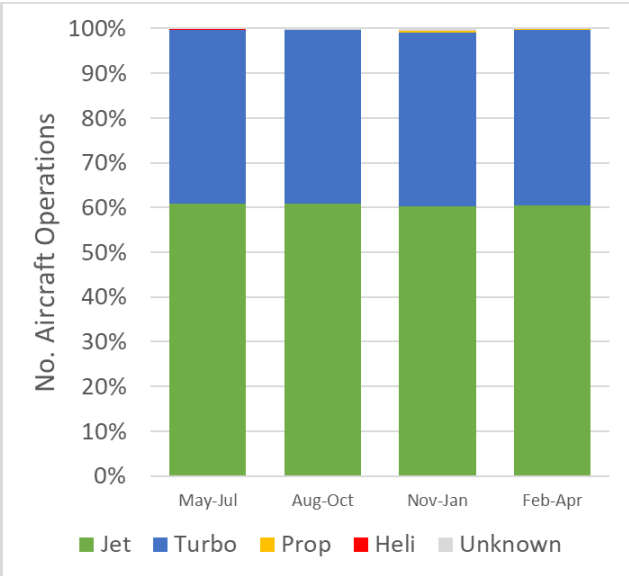


Figure 2 shows the breakdown of aircraft operations by time of day for this three-month period February 2024 to April 2024 and the three quarters preceding.

For this quarter 87% of aircraft operations occurred in the daytime between 7am and 10pm and 13% 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 60% of aircraft operations were jets with 39% 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

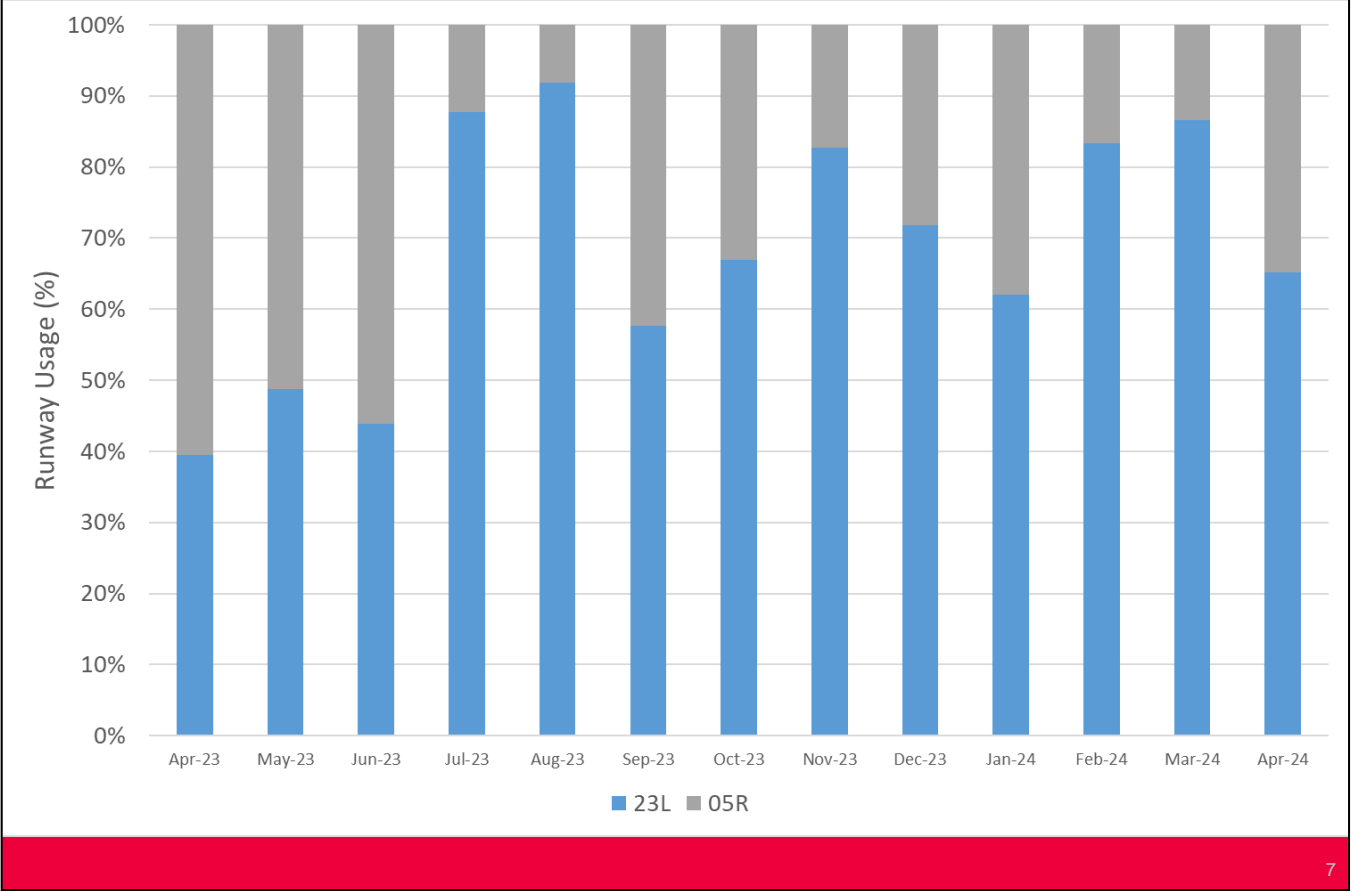


Figure 4 shows the percentage of aircraft operations that used each runway (23L and 05R) over the past 13 months.

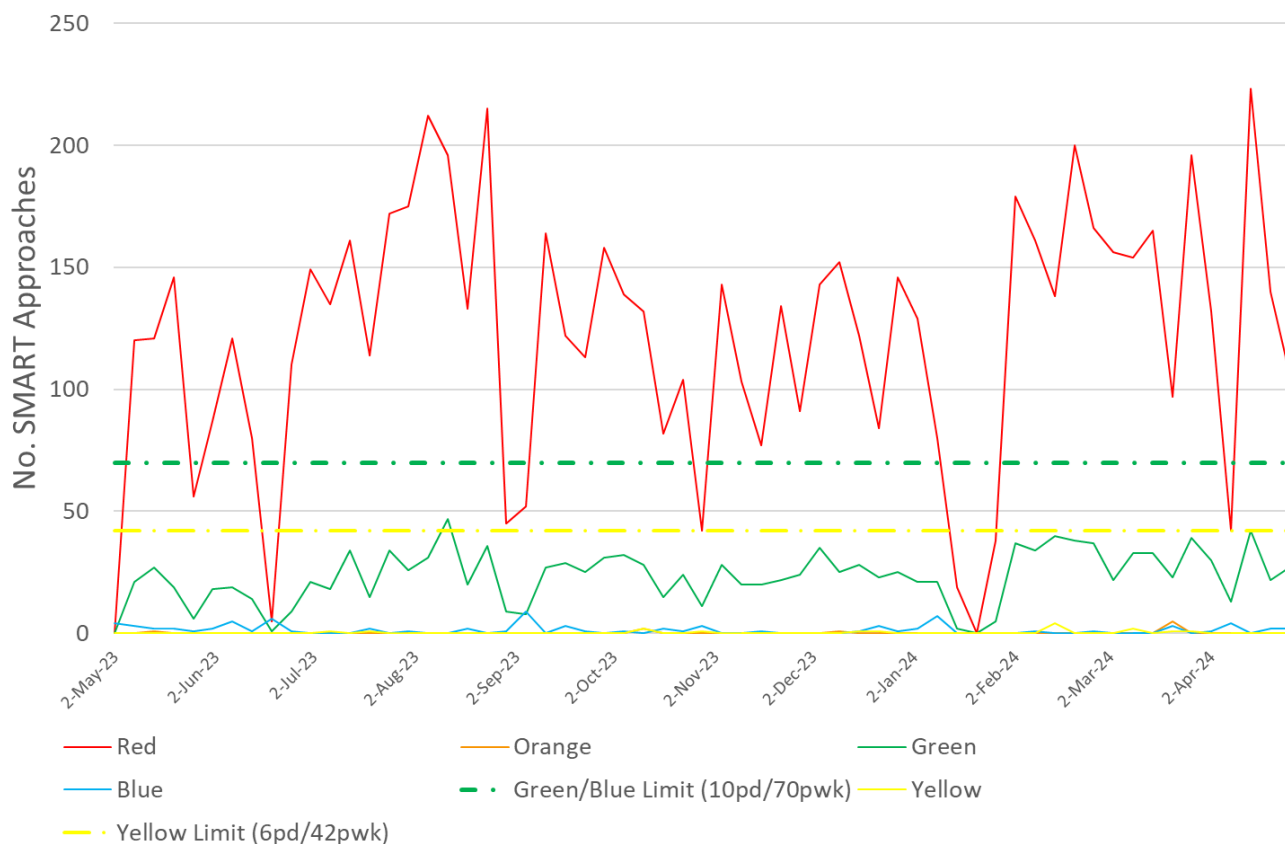
Runway 23L is used when westerly winds prevail and Runway 05R is used when easterly winds prevail (refer glossary for explanation)

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

The runway usage in the three-month period February 2024 to April 2024 was RW23L 79%/RW05R 29%. In the last twelve months the average runway usage was RW23L 69%/RW05R 31%.

The runway use in the same quarter last year was RW23L 62%/RW05R 38%.

Figure 5: Number of SMART Approaches per week



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Figure 5 shows the number of SMART flights flown per week in the past 12 months. On the next slide, Figure 6 shows a map of the SMART flight paths.

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.

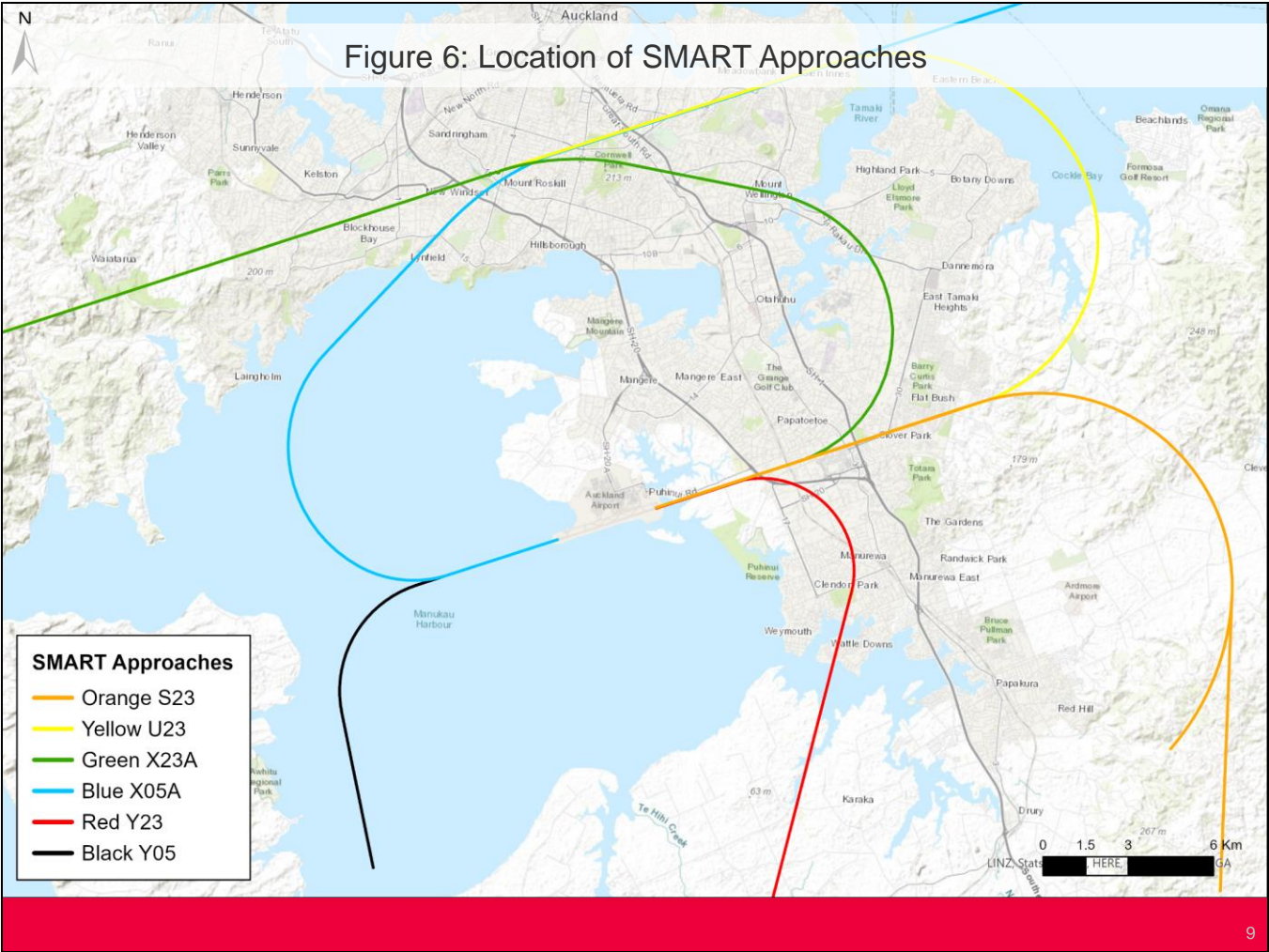


Figure 6 shows the location of the SMART approach flight paths.



Flight Path Diagrams

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

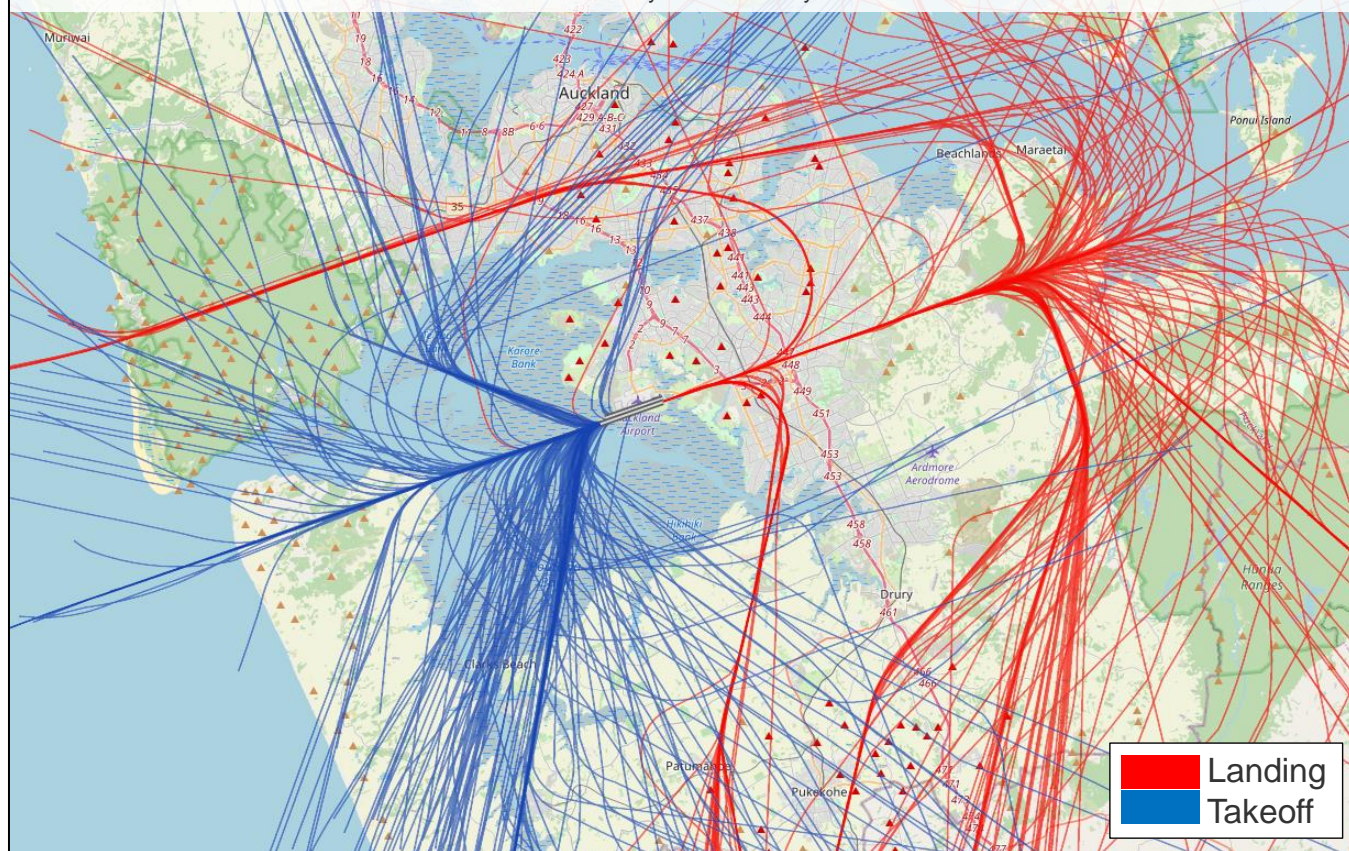


Figure 7 shows the daytime (7am-10pm) flight paths for Thursday 28 March 2024, the busiest day in the three-month period February 2024 to April 2024 when Runway 23L was primarily in use.

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 437 daytime Runway 23L flights on this day.

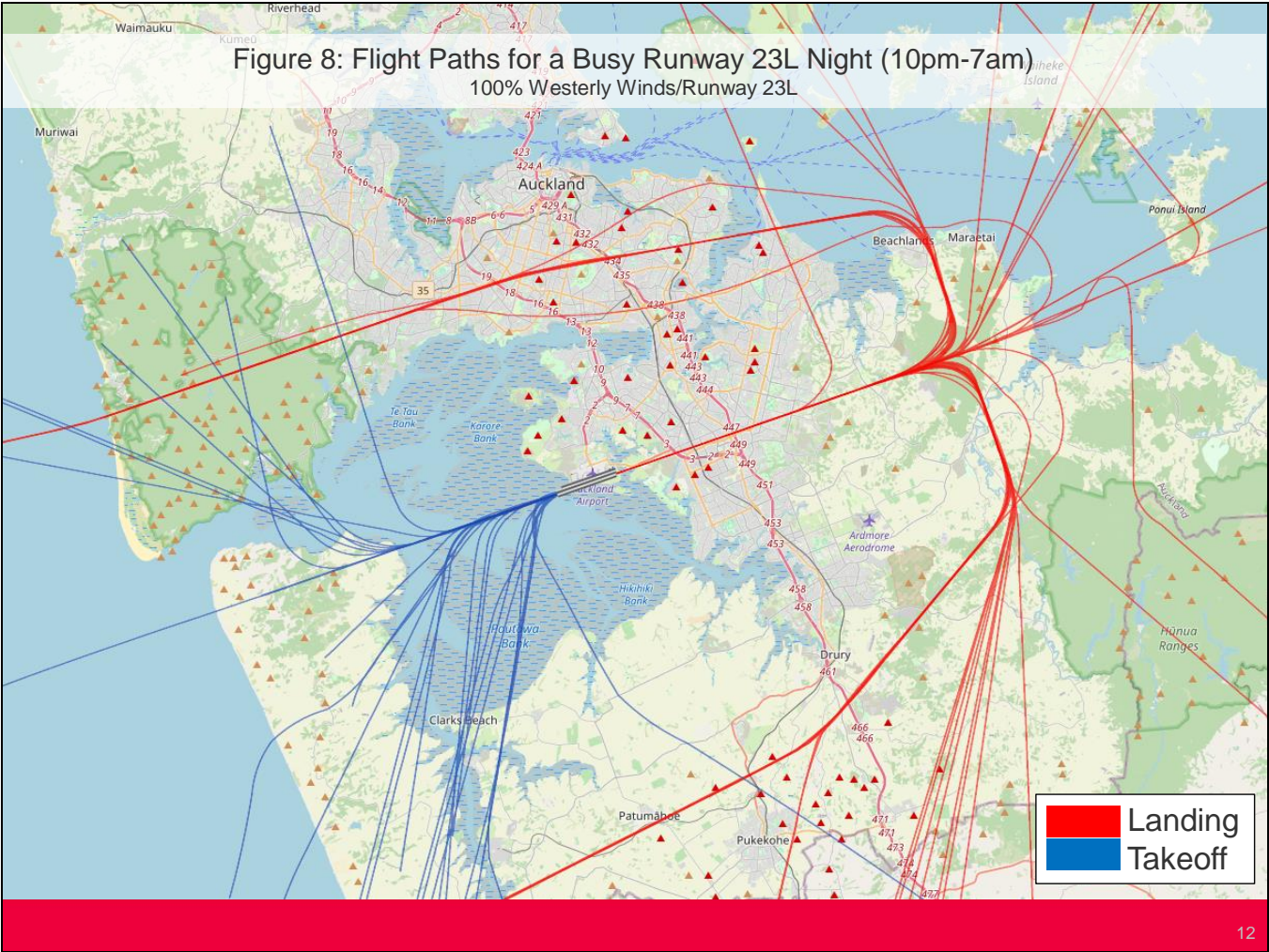


Figure 8 shows the night-time (10pm-7am) flight paths for Thursday 28 March 2024, the busiest day in the three-month period February 2024 to April 2024 when Runway 23L was primarily in use.

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 70 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

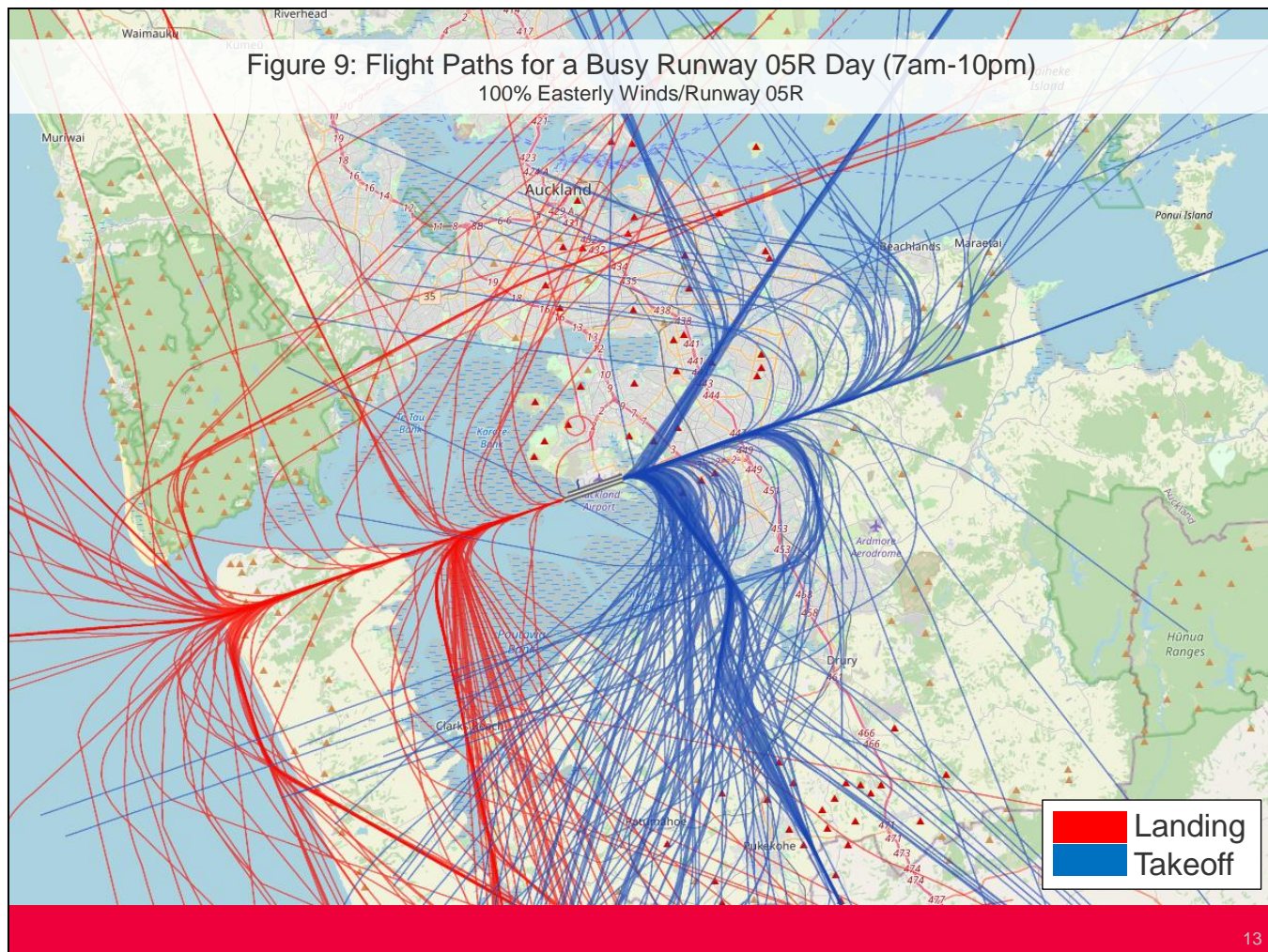


Figure 9 shows the daytime (7am-10pm) flight paths for Friday 22 March 2024, the busiest day in the three-month period February 2024 to April 2024 when Runway 05R was primarily in use.

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

The runway usage in this 24-hour period was Runway 05R (easterly) 100%.

There were 422 daytime Runway 05R flights on this day.

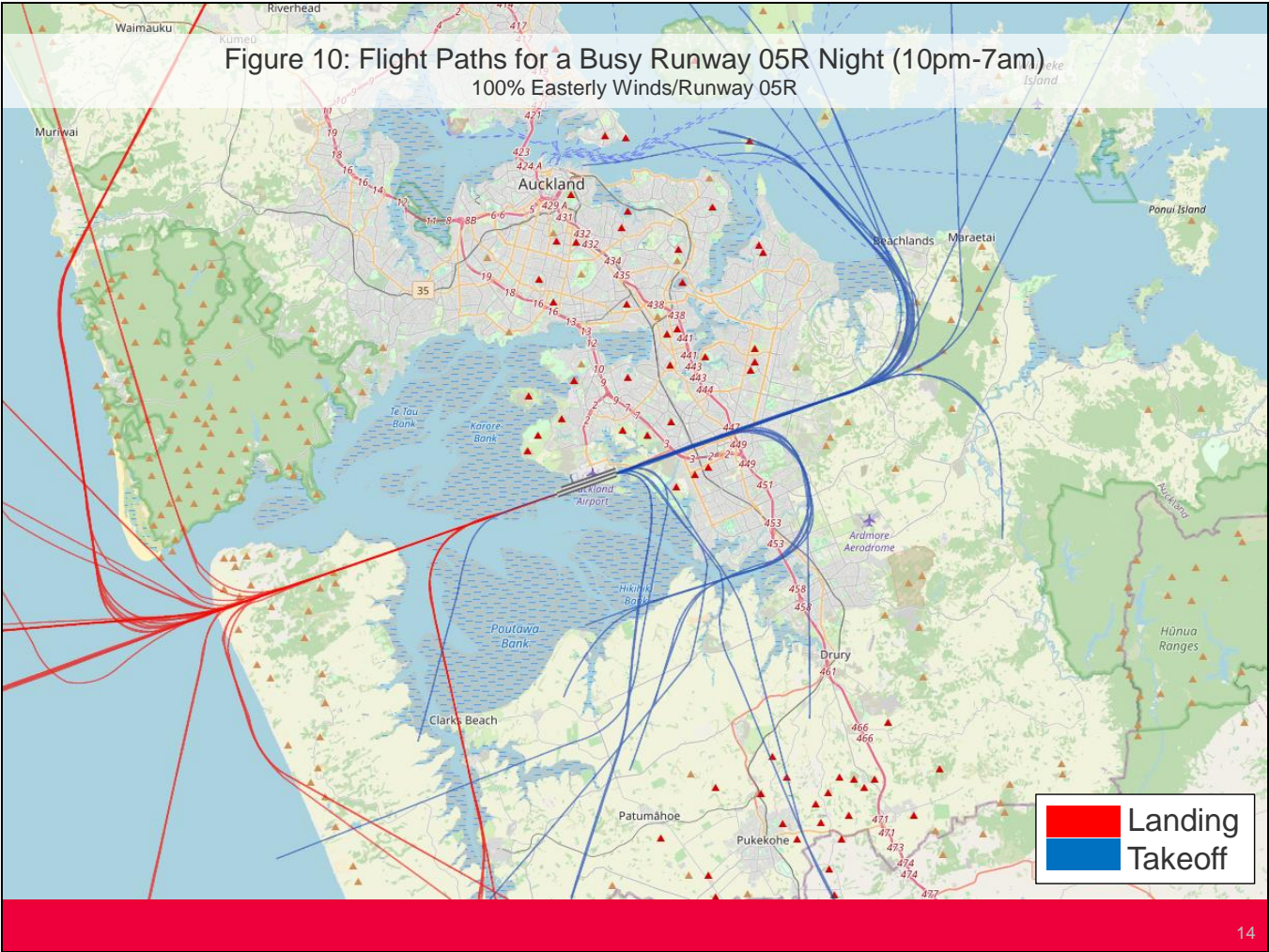


Figure 10 shows the night-time (10pm-7am) flight paths for Friday 22 March 2024, the busiest day in the three-month period February 2024 to April 2024 when Runway 05R was primarily in use.

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

The runway usage in this 24-hour period was Runway 05R (easterly) 100%.

There were 70 night-time Runway 05R flights on this night.

Noise Complaints



Figure 11: Number of Aircraft Noise Complaints per Month

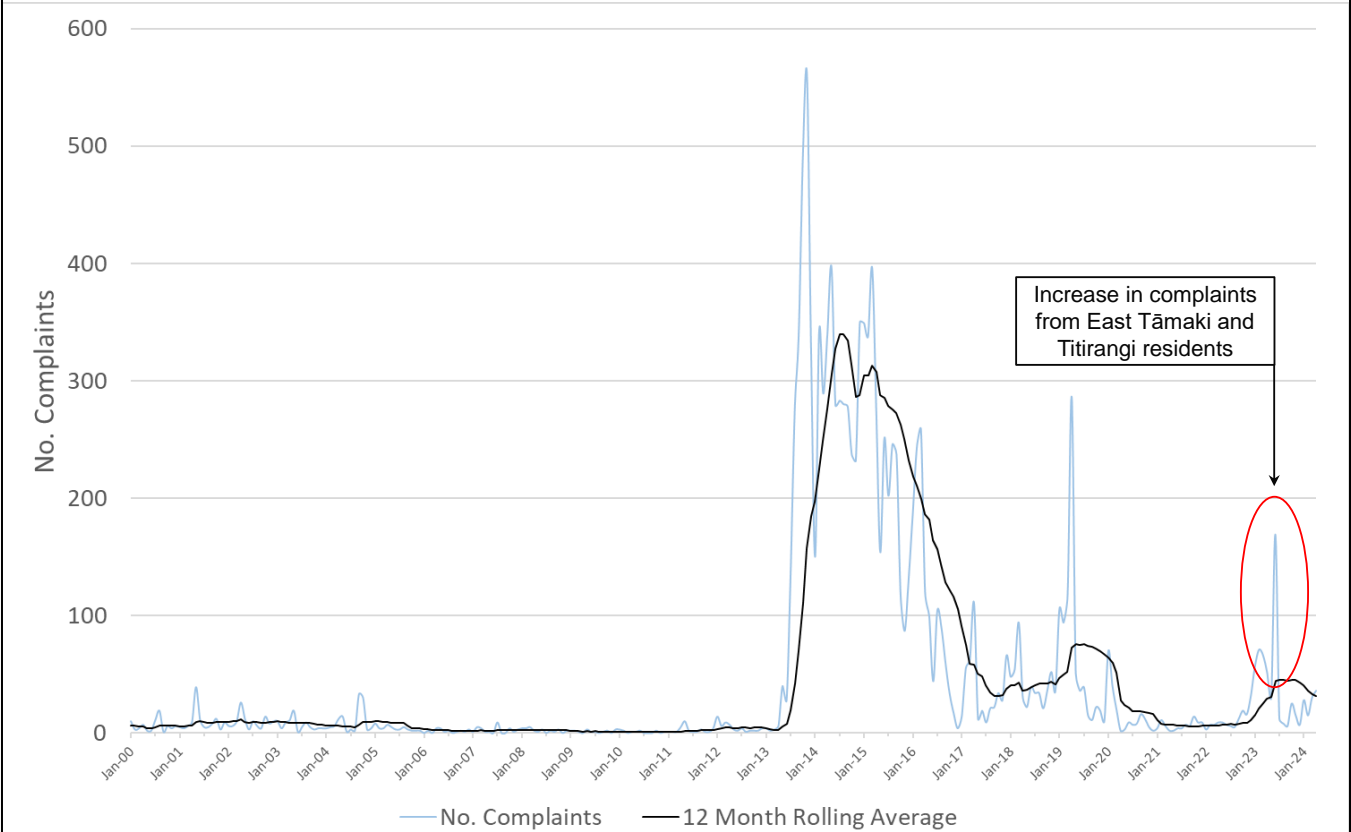


Figure 11 shows the total number of aircraft noise complaints made per month since the year 2000 (blue line) and the 12-month rolling average (black line).

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 2024 to April 2024 has decreased from 188 to 81 when compared to the same period last year.

This quarter there was one main complainant who made a total of 47 complaints. This was the historic complainant from Remuera.

Table 3: Summary of Noise Complaints

| | Feb | Mar | Apr | Feb-Apr | Nov-Jan | Aug-Oct | May-Jul |
|------------------------------|-----|-----|-----|---------|---------|---------|---------|
| Number of Complaints | 15 | 30 | 36 | 81 | 50 | 39 | 212 |
| <i>Specific</i> | 14 | 22 | 32 | 68 | 42 | 35 | 196 |
| <i>Generic</i> | 1 | 6 | 3 | 10 | 5 | 4 | 14 |
| <i>Question</i> | 0 | 2 | 1 | 3 | 3 | 0 | 2 |
| Number of People Complaining | 7 | 10 | 7 | 22 | 15 | 13 | 19 |

Table 3 shows a breakdown of the noise complaints in the three-month period February 2024 to April 2024 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 81 complaints in this three-month period, 84% related to specific aircraft events, 12% were generic complaints and 4% were question enquiries.

The main complainant this quarter is in Remuera. The person in made 58% (47) of this quarter’s total complaints.

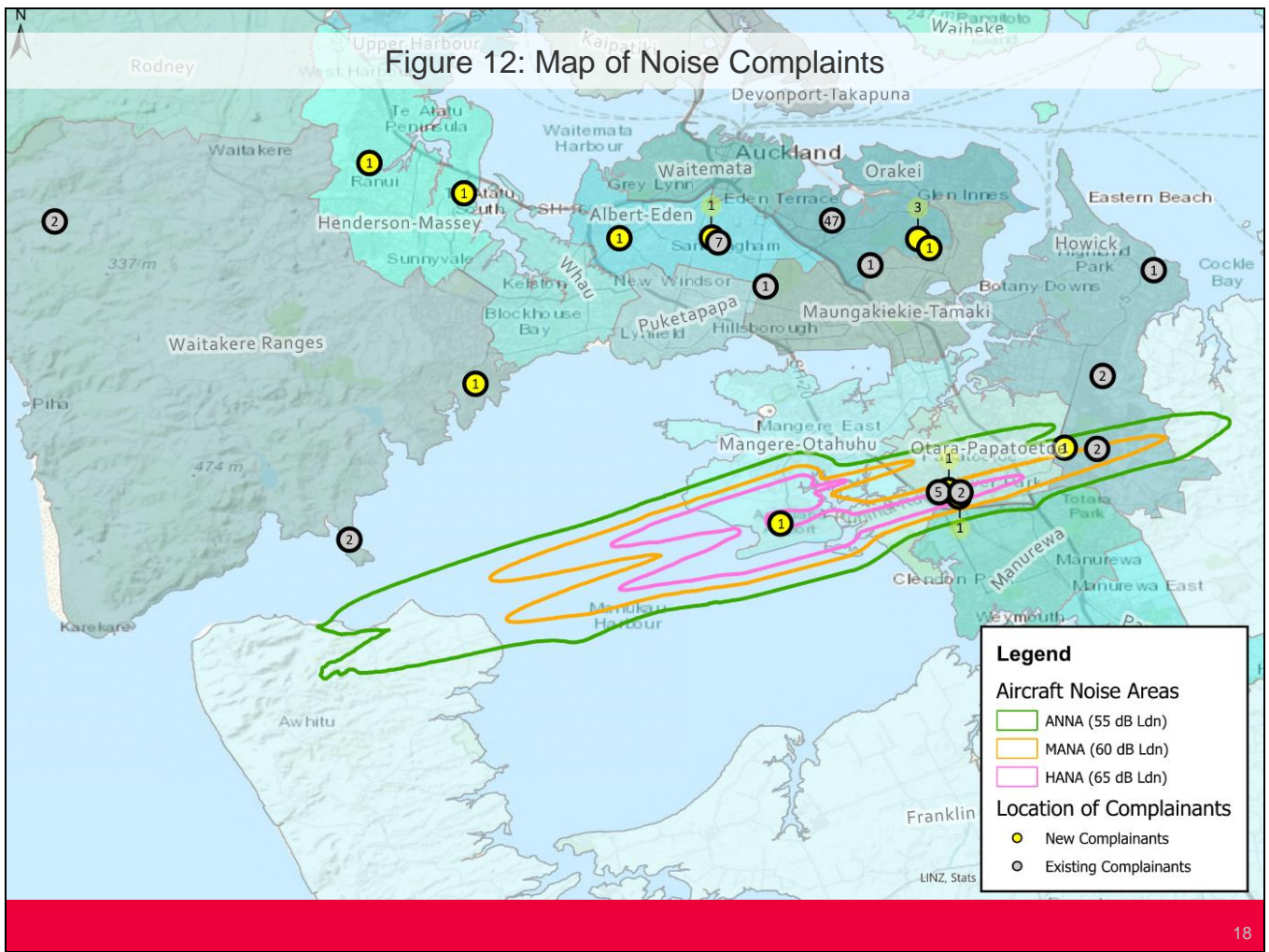


Figure 12 shows a map with the location of each complainant and the Auckland Council Local Boards are labelled and shown in shades of blue. (Note, the Waiheke Local Board includes Waiheke Island, Rangitoto Island and Motutapu Island).

Each point represents the location of a person who complained in the three-month period February 2024 to April 2024.

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

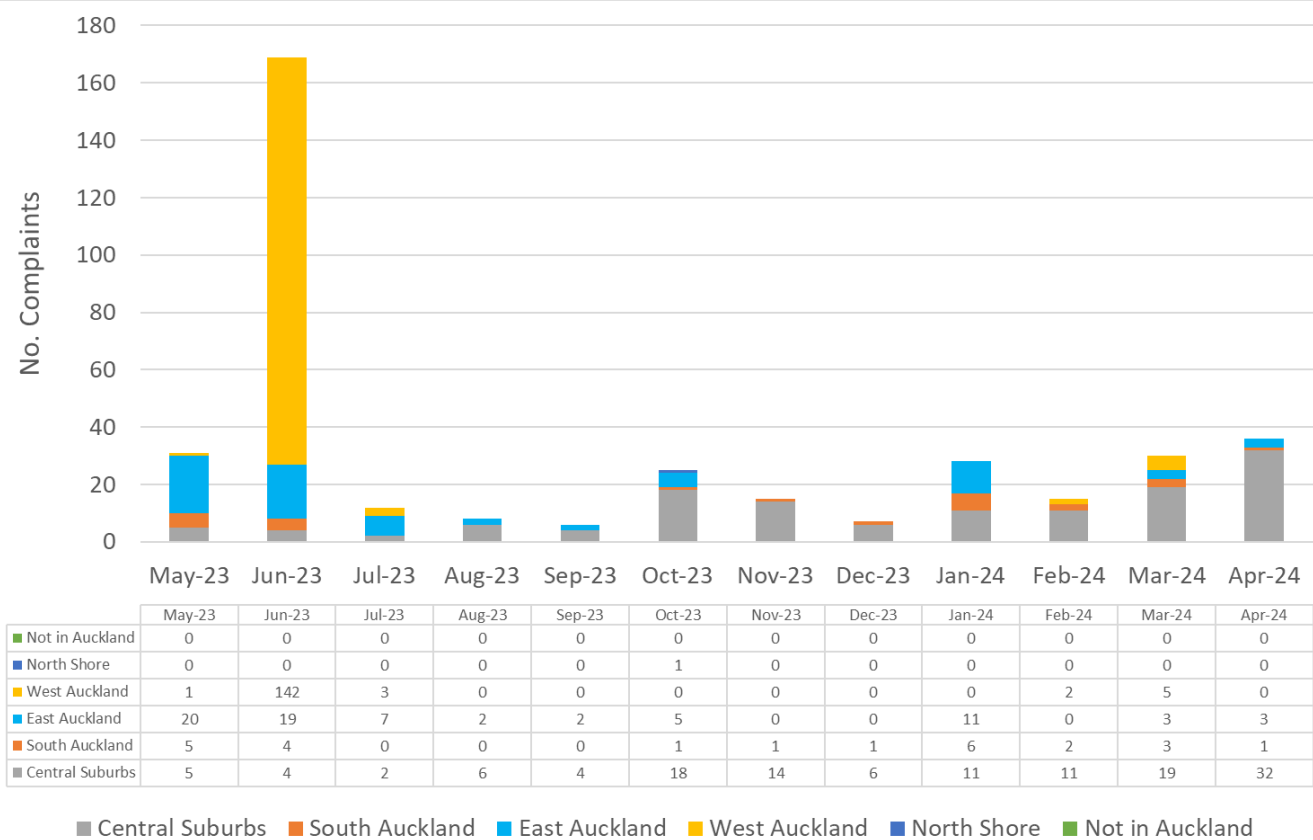


Figure 13 shows the number of complaints made by people residing in different areas of Auckland over the past 12 months.

Central Auckland had the most complaints at 62 in the three-month period of February 2024 to April 2024.

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

Figure 14: Noise Complaints by Time

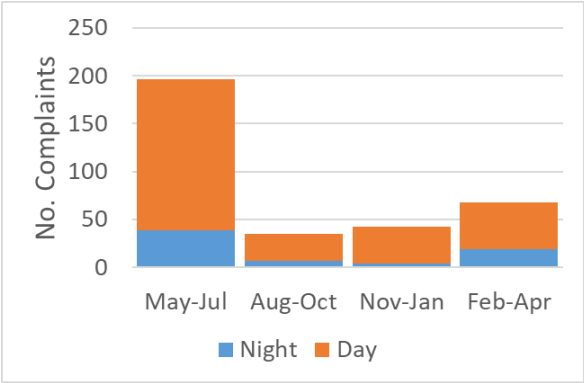


Figure 15: Noise Complaints by Runway

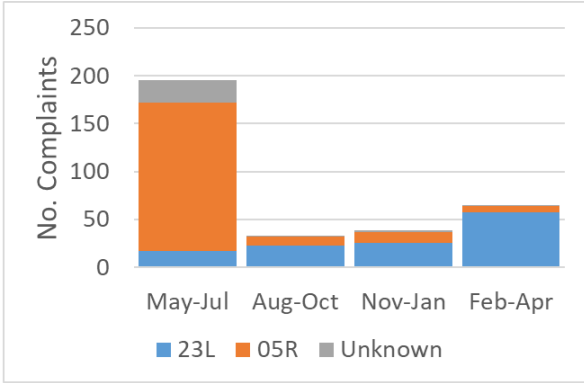


Figure 16: Noise Complaints by Aircraft

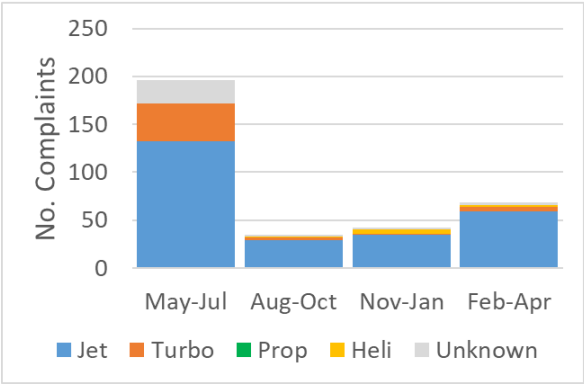
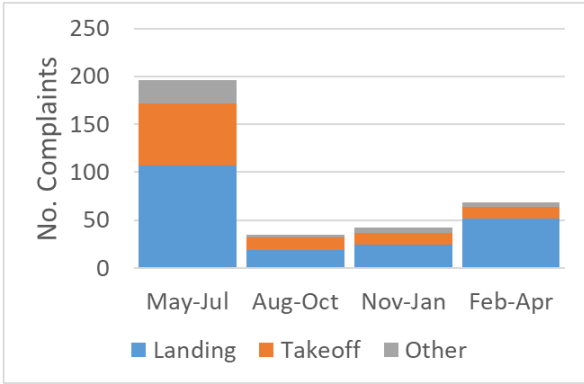


Figure 17: Noise Complaints by Operation



Figures 14-17 show a breakdown of the ‘specific’ aircraft noise complaints made in the three-month period February 2024 to April 2024 and the three quarters preceding.

Figure 18: Specific Noise Complaints by Destination

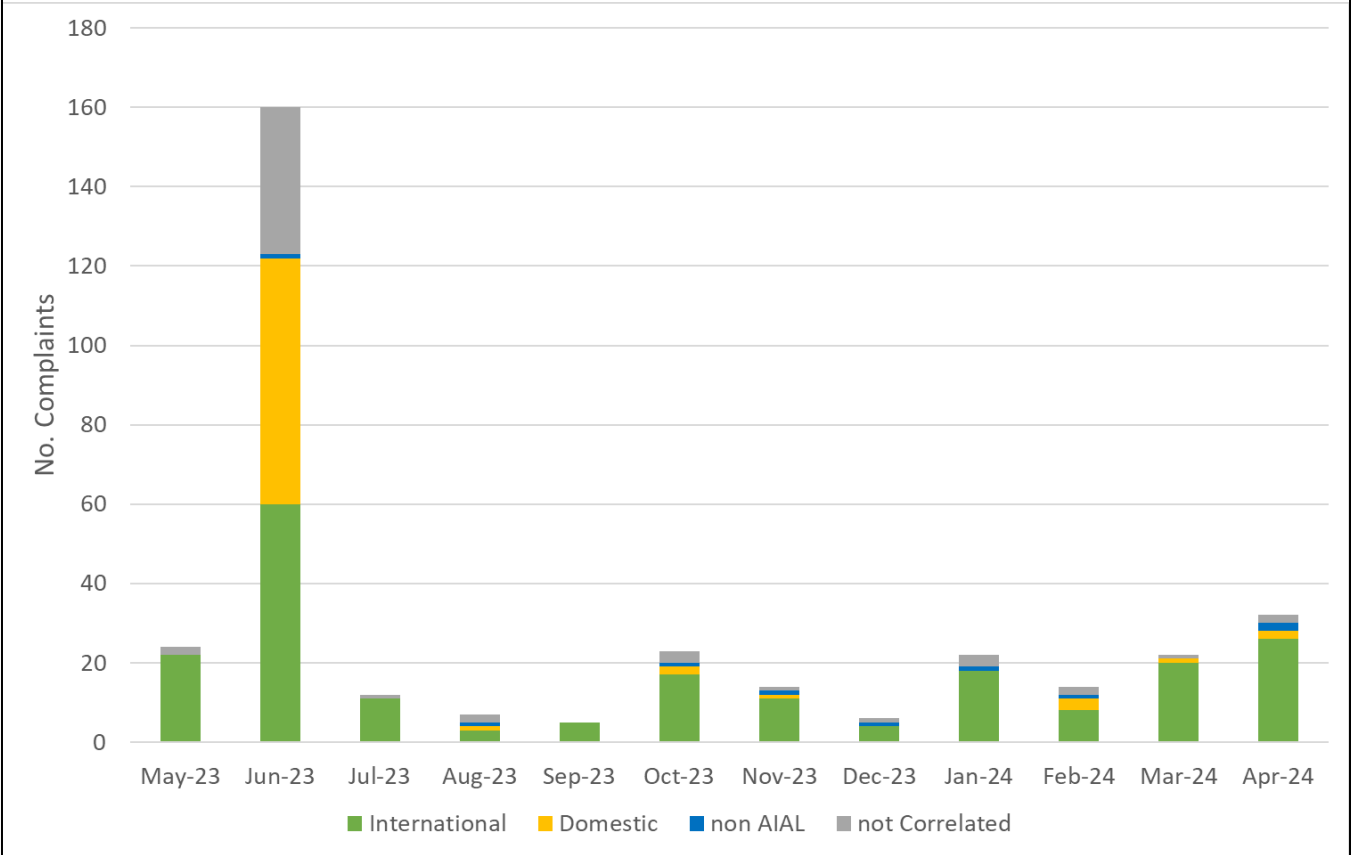


Figure 18 shows the number of specific aircraft complaints made about international and domestic flights over the past 12 months.

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

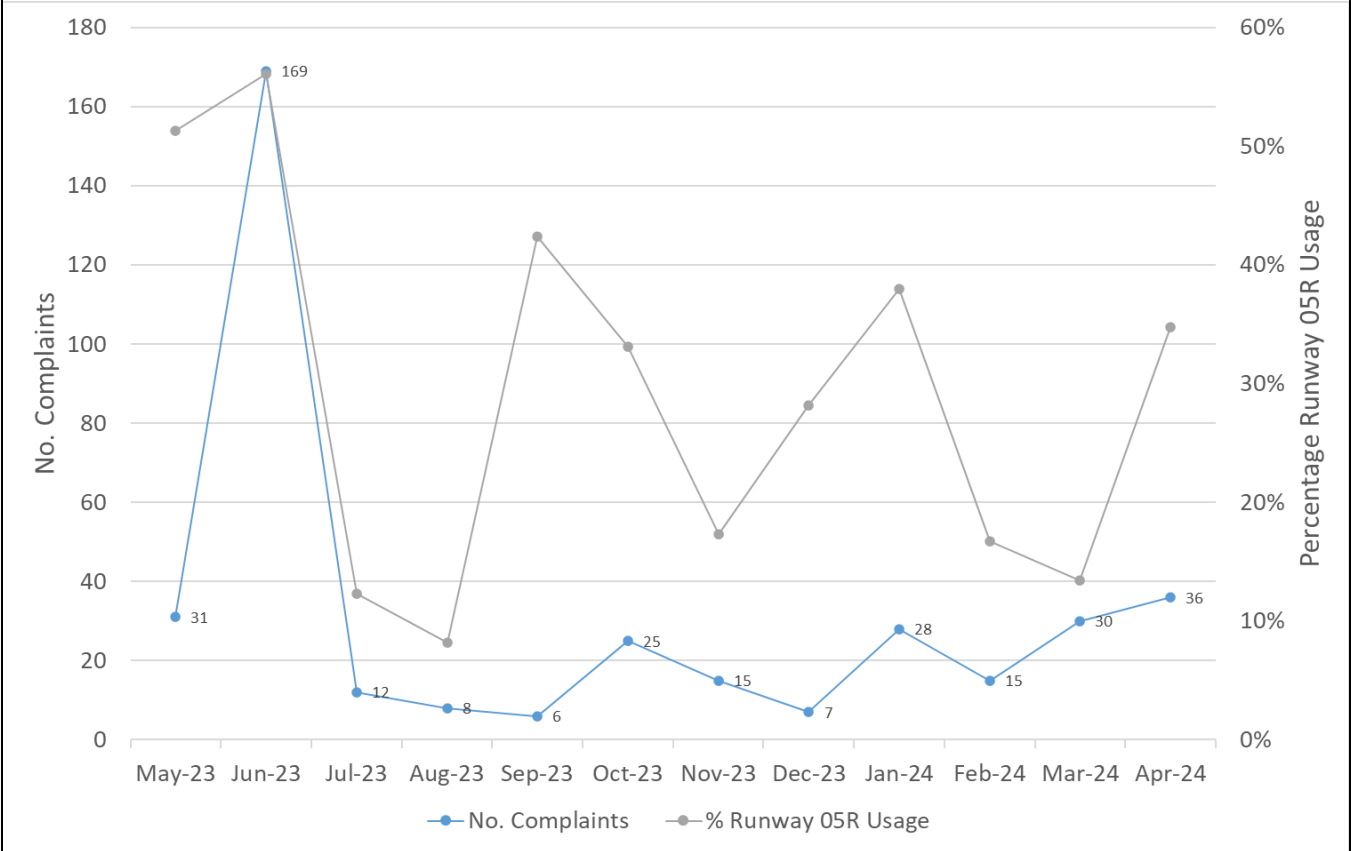


Figure 19 shows the number of specific noise complaints per month received in the past 12 months compared to the usage of Runway 05R.

Usage of Runway 05R is associated with easterly winds which cause departing aircraft to depart to the east above 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 but we see a definite increase in June 2023 where the runway usage favored Runway 05R and the complaints greatly increased.

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

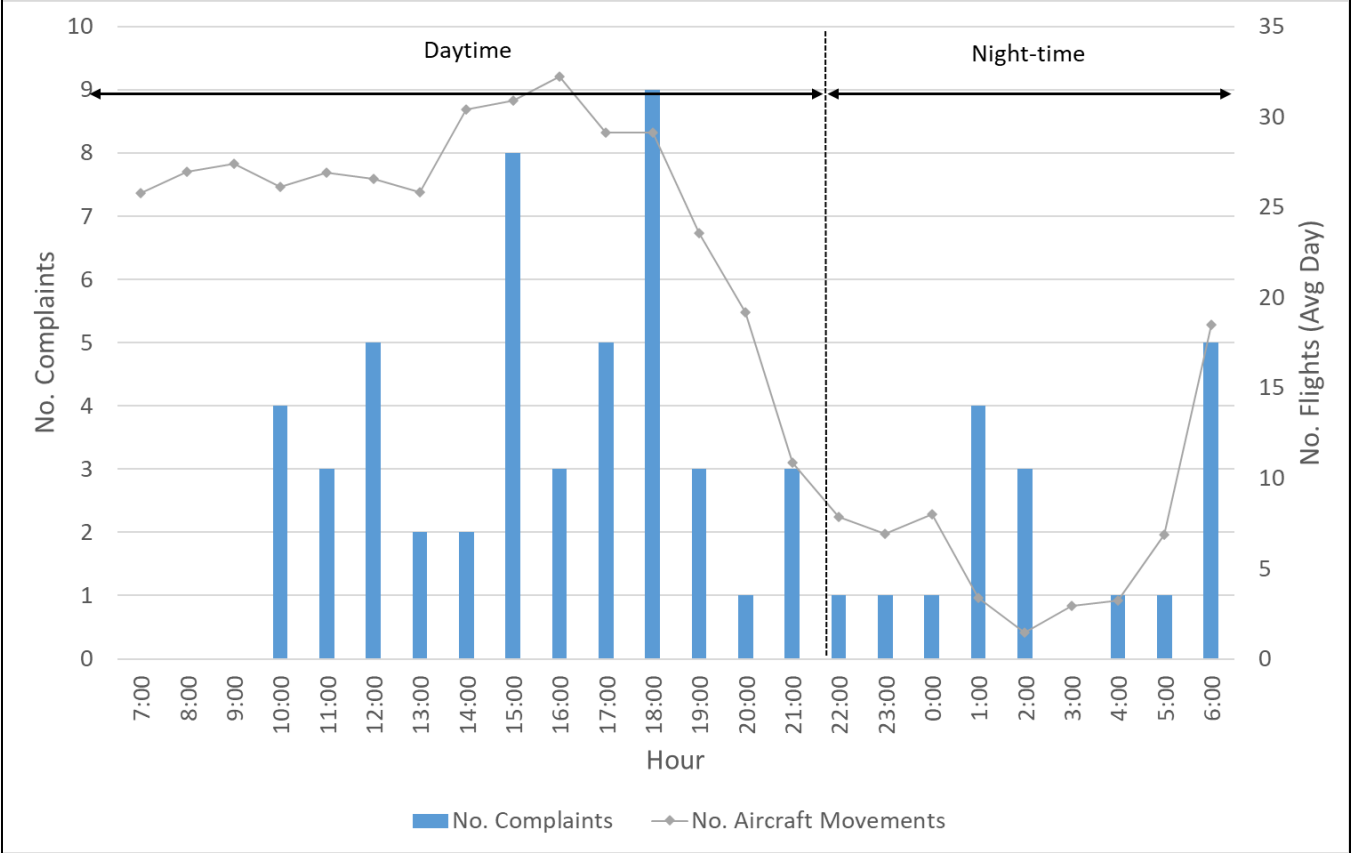


Figure 20 shows the number of specific aircraft noise complaints and the number of aircraft operations per hour.

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 2024 to April 2024.

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

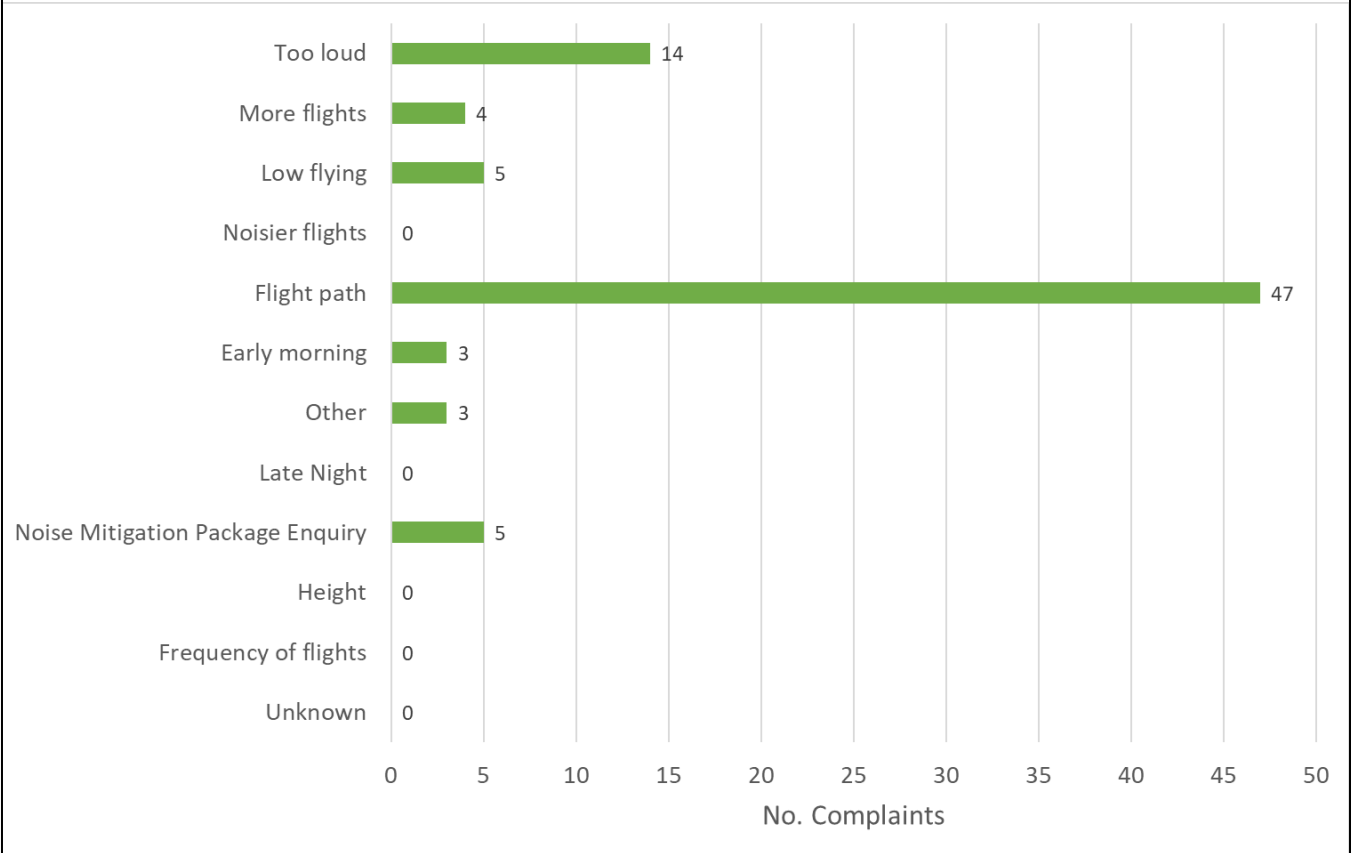


Figure 21 shows the reason for each noise complaint in the three-month period February 2024 to April 2024. This includes all complaints (generic, question and specific). A full description of each cause is given in Appendix B.

Figure 22: Specific Aircraft Identified in Noise Complaints

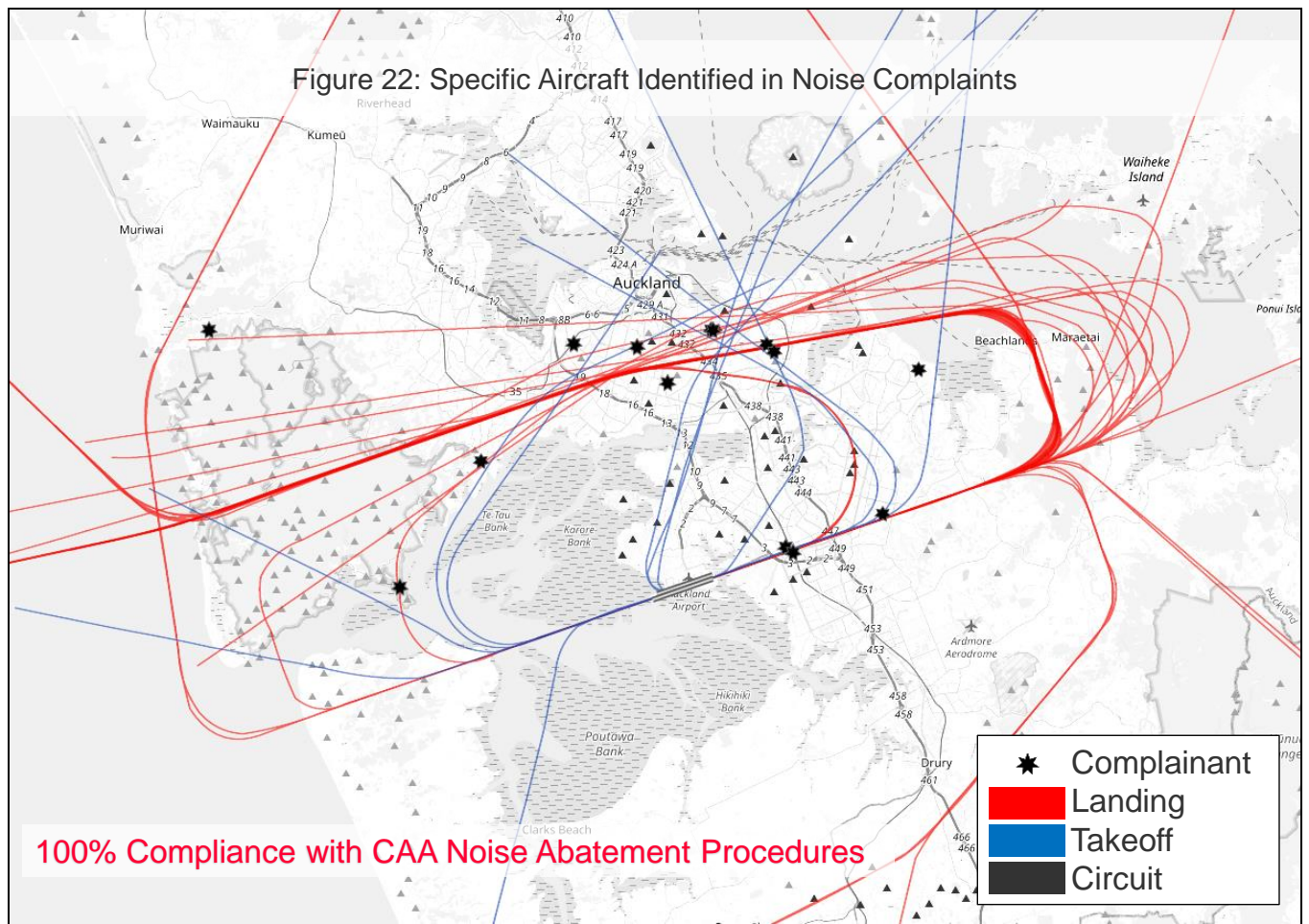


Figure 22 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period February 2024 to April 2024.

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.

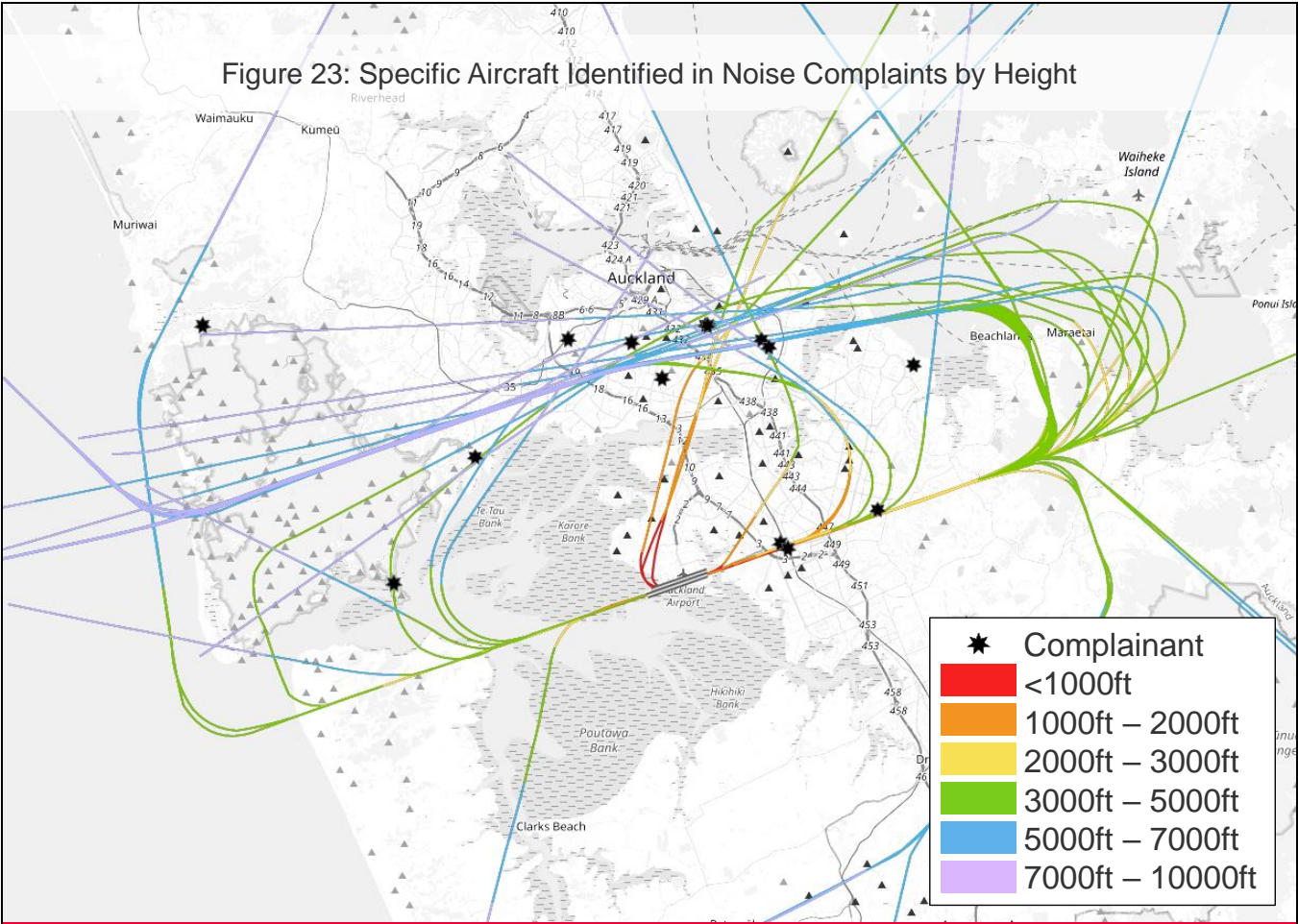


Figure 23 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period February 2024 to April 2024.

The flight paths are shown in terms of altitude.

A photograph of a noise monitoring station. A tall, white, vertical pole stands in the center. At the top of the pole is a small, black, cylindrical sensor. A thin, white, curved cable hangs from the pole. Below the main pole, there are several smaller sensors and equipment mounted on a horizontal arm. The background shows a cloudy sky and a line of trees at the bottom. An airplane is visible in the upper left portion of the sky.

Noise Monitoring

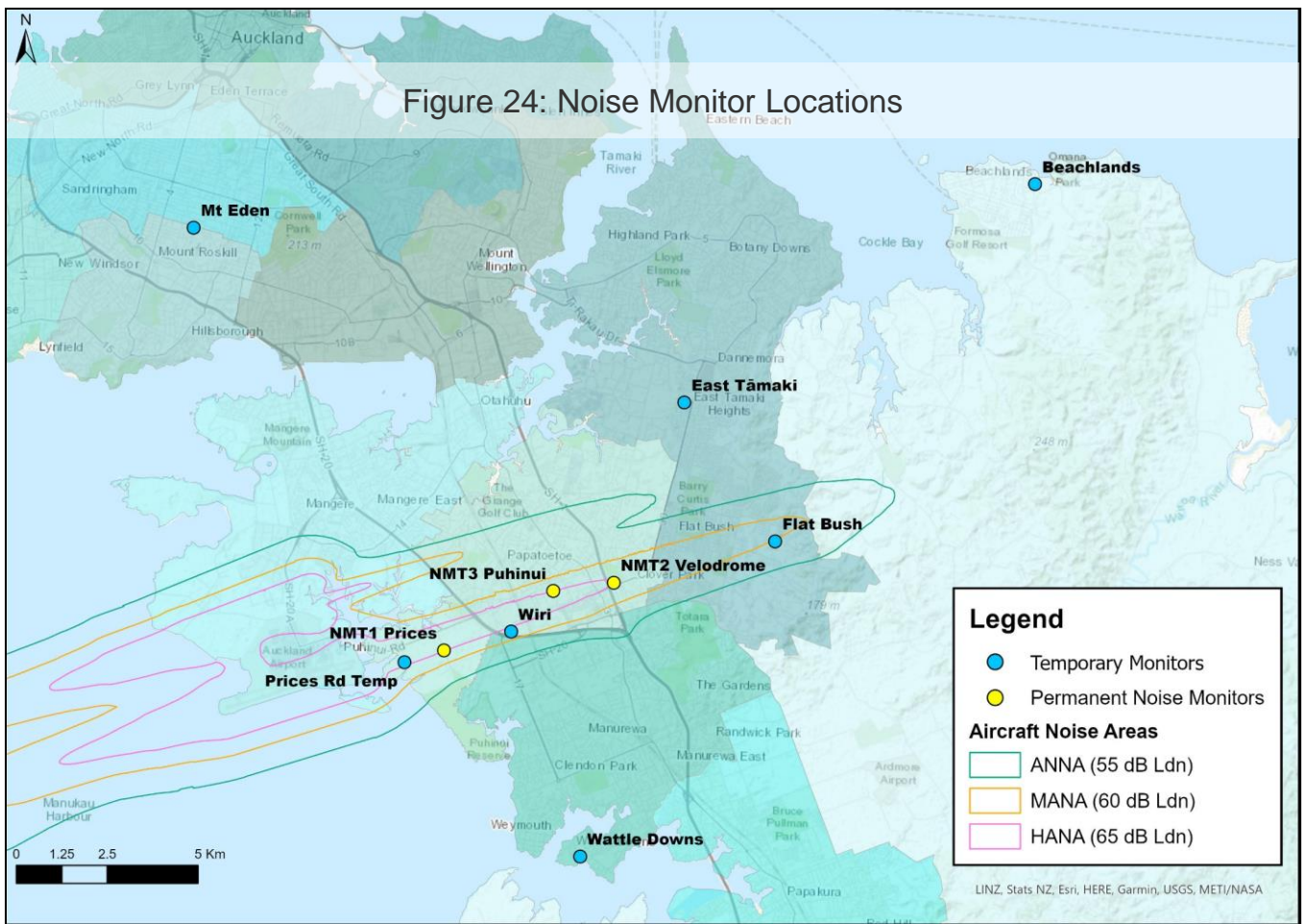


Figure 24 shows the location of Auckland Airport’s three permanent and six temporary noise monitors.

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.

The Wiri monitor sits between the HANA (65 dB Ldn) and MANA (60 dB Ldn) contours, and the Flat Bush monitor sits on the MANA contour.

The Temporary Prices Road monitor was installed last quarter on 10/01/2024.

The MDA Beachlands monitor was uninstalled on 29 April 2024. Prior to its removal, a review of the monitor was completed. The purpose of this monitor was to study aircraft arrivals (including the Sydney Night STARS). The review showed the noise levels and number of loud flights were low, so there was no further technical reason to continue monitoring at Beachlands.

Similarly, a review was undertaken for the MDA East Tāmaki monitor and it was removed 27 May 2024. The monitor was installed to study Runway 05 departures and the Green SMART Track arrivals. The review found the noise levels and number of loud flights were low, so we recommended the monitor’s removal as there was no technical reason to continue monitoring at East Tāmaki.

Table 4: Noise Monitor Maintenance Work

| | | |
|-------------|--------------------------|--|
| East Tāmaki | 13/03/2024 to 20/03/2024 | <ul style="list-style-type: none">– SD Card failure from 13/03/2024, replaced 20/03/2024– Missing noise data during this period |
| Beachlands | 29/04/2024 | <ul style="list-style-type: none">– Monitor was uninstalled |
| Wiri | 03/04/2024 to 04/04/2024 | <ul style="list-style-type: none">– SIM Card error, replaced 04/04/2024– One day of missing noise data |

Table 4 summarises any replacement, repair, or maintenance work undertaken on the noise monitors for the three-month period February 2024 to April 2024.

The three permanent noise monitors and the two temporary monitors at Wiri and Flat Bush are owned by Casper, who administer any works on these monitors as required. Marshall Day Acoustics carries out work on four temporary monitors at Mt Eden, Beachlands, Wattle Downs, and East Tāmaki (previously Mt Wellington).

During this three-month period, the three permanent Casper monitors (at Prices Road, Velodrome and Puhinui School) required no maintenance work.

The MDA East Tāmaki monitor had a problem that required the SD Card to be replaced. This gave 7 days of lost data for monitor.

As stated on the previous slide, the Beachlands monitor was removed on 29/04/2024 and the East Tāmaki monitor was removed 27/05/2024 (but is not included in the table above as this is outside this reported quarter).

The Casper Wiri monitor had issues with its SIM card that required a SIM card replacement – this resulted in one day of missing data.

This quarter there was no active maintenance work required for the temporary Casper Flat Bush monitor, or the remaining MDA monitors (Mt Eden and Wattle Downs).

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

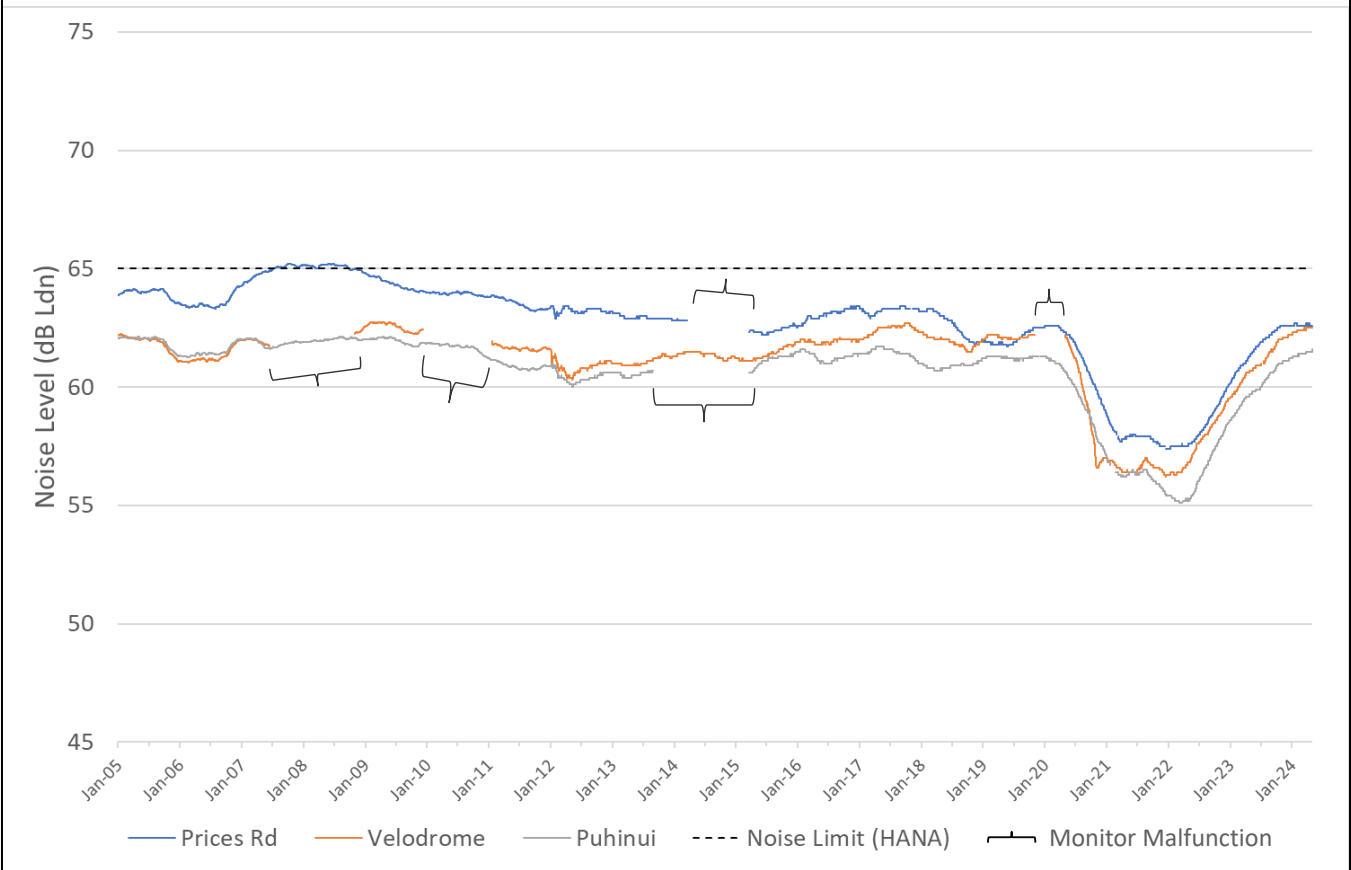


Figure 25 shows the rolling 365-day Noise Exposure (L_{dn}) at the permanent noise monitors since January 2005.

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 2024 to April 2024.

The noise levels in the three-month period have increased by 1.4 dB at Prices Rd, 1.8 dB at Velodrome, and 1.9 dB at Puhinui when compared to the same quarter last year for all permanent noise monitors.

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

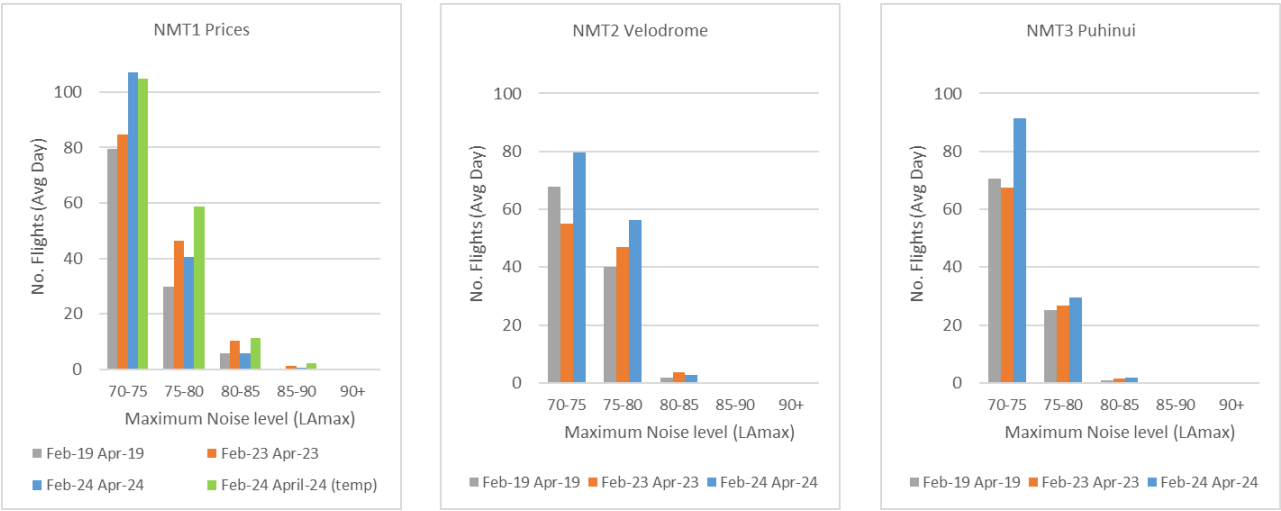
| Financial Year | Prices Rd | Velodrome | Puhinui |
|-------------------------|-----------|-----------|---------|
| FY10 (Jul-09 to Jun-10) | 64.0 | 62.4 | 61.8 |
| FY11 (Jul-10 to Jun-11) | 63.5 | 61.6 | 60.7 |
| FY12 (Jul-11 to Jun-12) | 63.1 | 60.8 | 60.3 |
| FY13 (Jul-12 to Jun-13) | 63.0 | 61.0 | 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 |
| FY23 (Jul-22 to Jun-23) | 61.9 | 60.9 | 60.0 |

Table 5 shows the Noise Exposure (L_{dn}) at the permanent noise monitors for each financial year (1 July – 30 June) since 2009.

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

There was an increase of 3.9, 3.2 and 4.0 decibels at Prices Rd, Velodrome and Puhinui respectively from FY22 to FY23.

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 2024 to April 2024 (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 123-154 events above 70 L_{Amax} during this three-month period. The same quarter last year saw 96-146 events, and the same quarter in 2019 (pre-COVID) saw 97-115 events.

The temporary Prices Road monitor is on the NMT1 Prices graph for comparison. The NMT1 Prices Road received 154 events above 70 L_{Amax} and the temporary monitor experienced 177 events.

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

| | NMT1 Prices | Prices (Temp) | NMT2 Velodrome | NMT3 Puhinui |
|---|----------------|------------------|-------------------|-----------------|
| Total Aircraft Operations | 20,341 | 20,773 | 15,257 | 17,994 |
| No. Aircraft Operations Captured by Monitors | 15,357 | 17,162 | 13,289 | 14,712 |
| Correlation | 75% | 83% | 87% | 82% |

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, except the NMT1 Prices Road.

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 2024 to April 2024.

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 | 3317 | 38 | 62 |
| Wiri | 4-Aug-17 | 2555 | 59 | 75 |
| Wattle Downs | 23-Dec-17 | 2320 | 47 | 67 |
| Beachlands | 4-Nov-22 | 541 | 45 | 64 |
| Flat Bush | 20-Dec-22 | 497 | 59 | 70 |
| East Tāmaki | 4-Aug-23 | 271 | 38 | 66 |

Table 7 gives a summary of the measured noise levels at each temporary noise monitor since deployment (up until 30 April 2024).

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 59 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 4 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 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.

Since deployment, the Mt Eden, Beachlands, and East Tāmaki recorded less than one flyover above 70 dB L_{Amax} per day, and Wiri, Wattle Downs, Flat Bush and which recorded 41, 13 and 60 respectively.

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

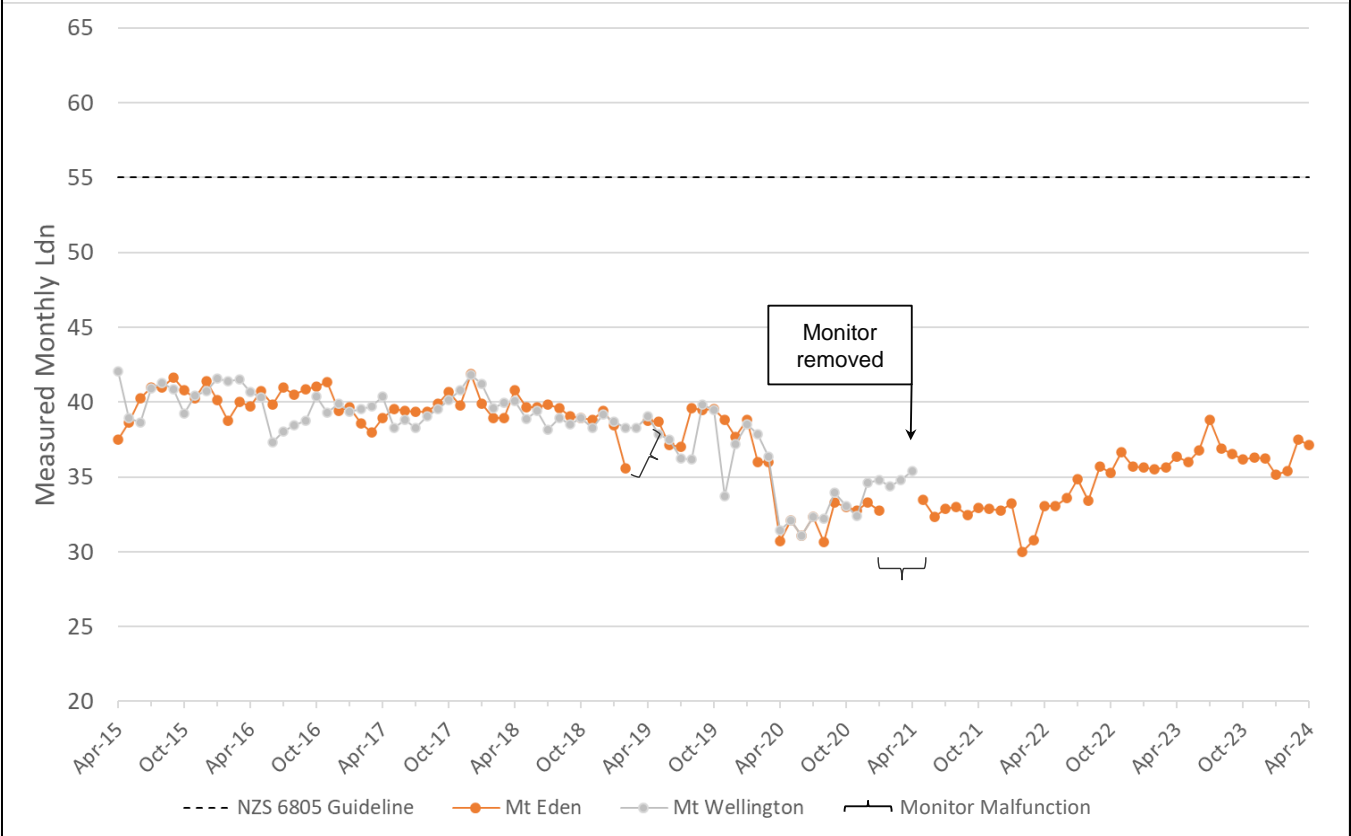


Figure 27 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitor in the Central Suburbs since its deployment.

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 0 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

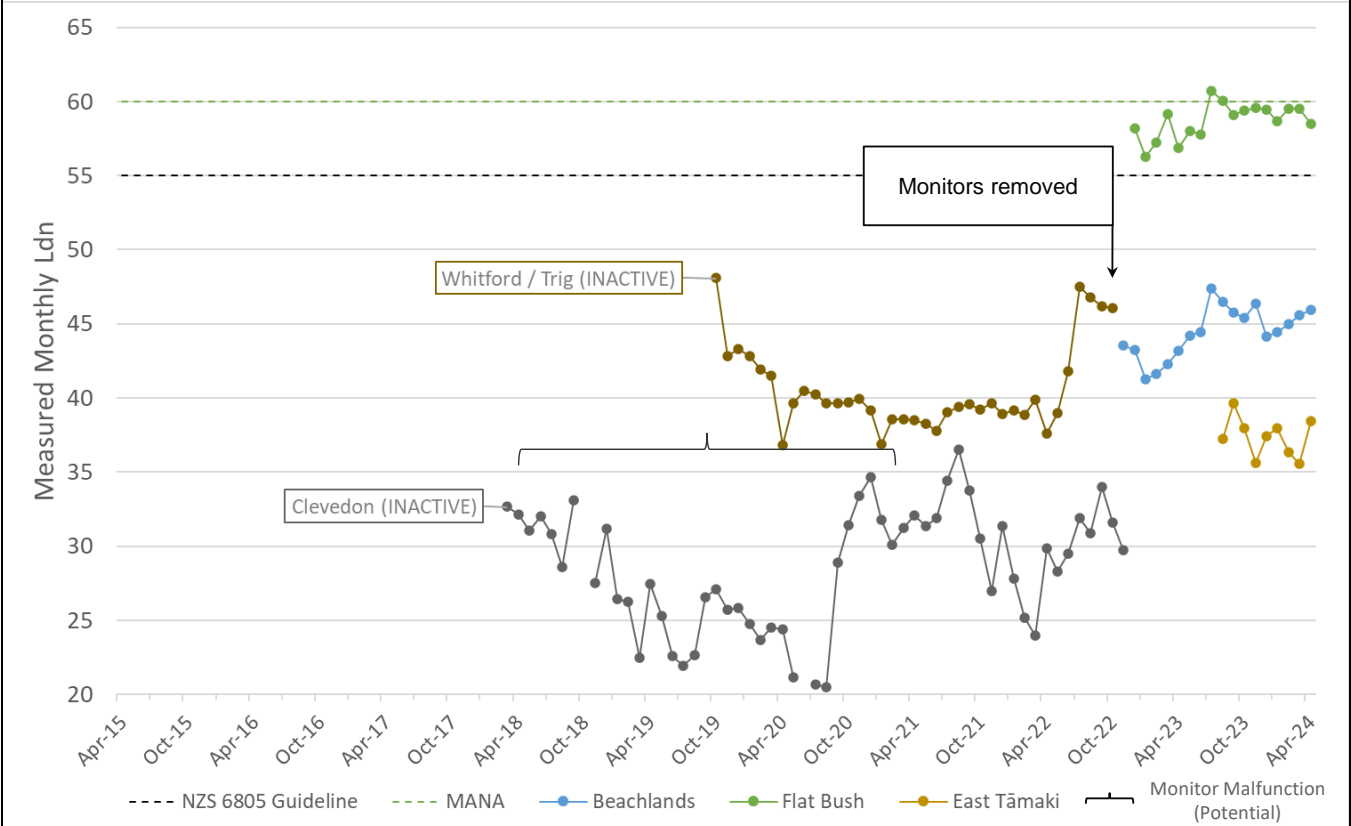


Figure 28 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitors in East Auckland since their deployment.

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 36-61 dB L_{dn} per month across the current Eastern Suburb monitor locations.

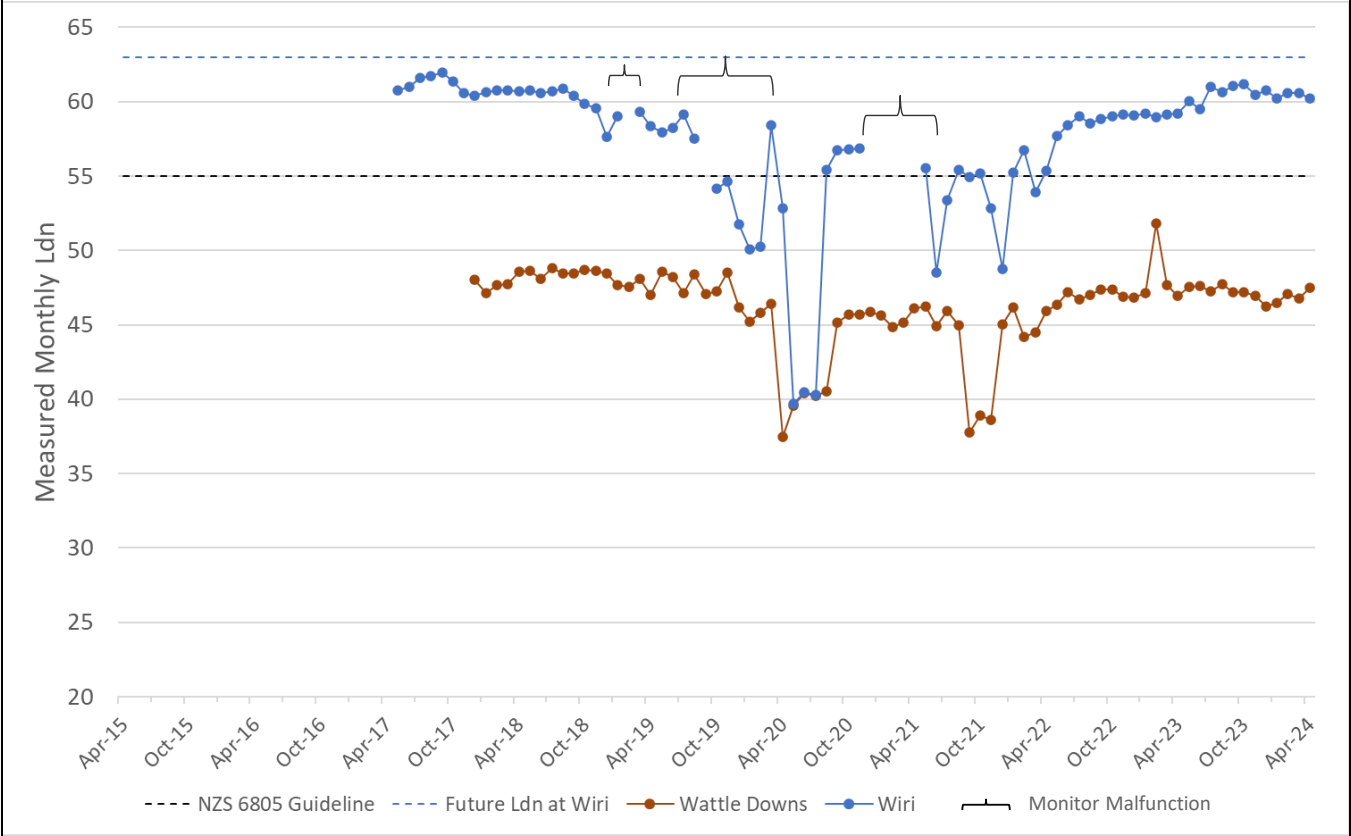
New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB L_{dn} are suitable for residential development.

The noise level measured at the Beachlands noise monitor is 10 dB below and the East Tāmaki monitor measured 17 dB below this level. The noise level at the Flat Bush monitor is 4 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.

The quarterly L_{dn} has increased by 1 dB at Flat Bush and 0 dB at Beachlands when compared to the same quarter last year. The East Tāmaki monitor was newly installed mid-2023, so cannot be compared to previous years.

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

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



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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.

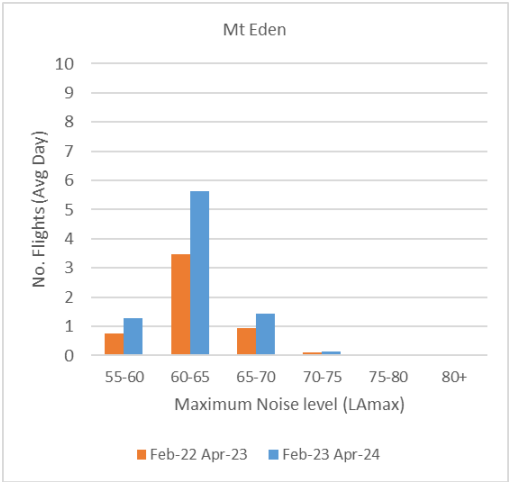
The measured L_{dn} for aircraft noise ranges from 37-62 dB L_{dn} per month across the Southern Suburb monitor locations.

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 decreased 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 2024 to April 2024 (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.

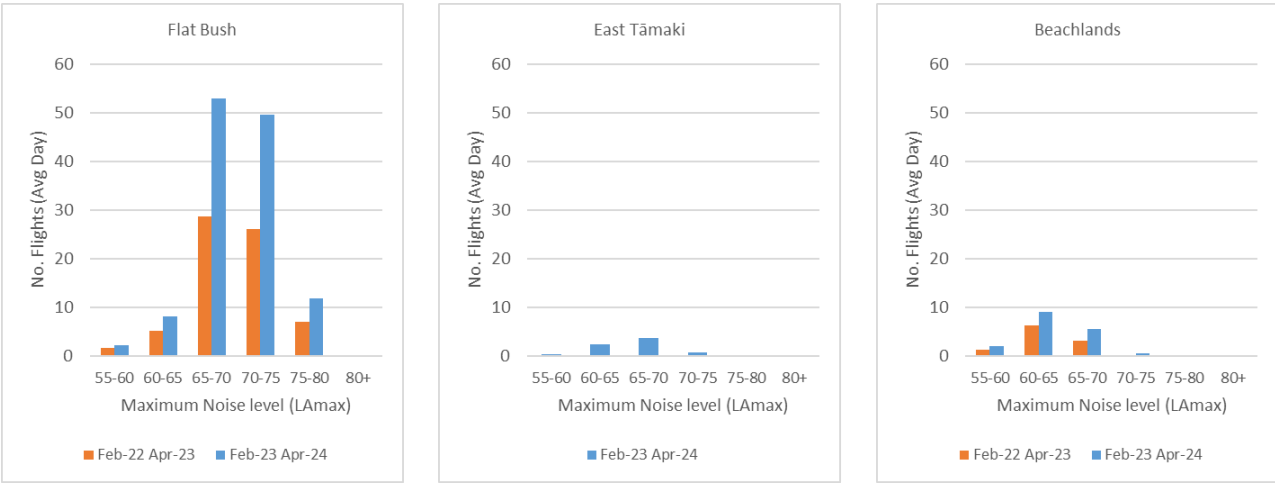
We note that the Mt Wellington monitor is no longer deployed, so Mt Eden is the only active monitor in the Central Suburbs.

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.

(Also of note, the Mt Wellington graph’s vertical axis is smaller than the other temporary monitors graphs)

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 2024 to April 2024.

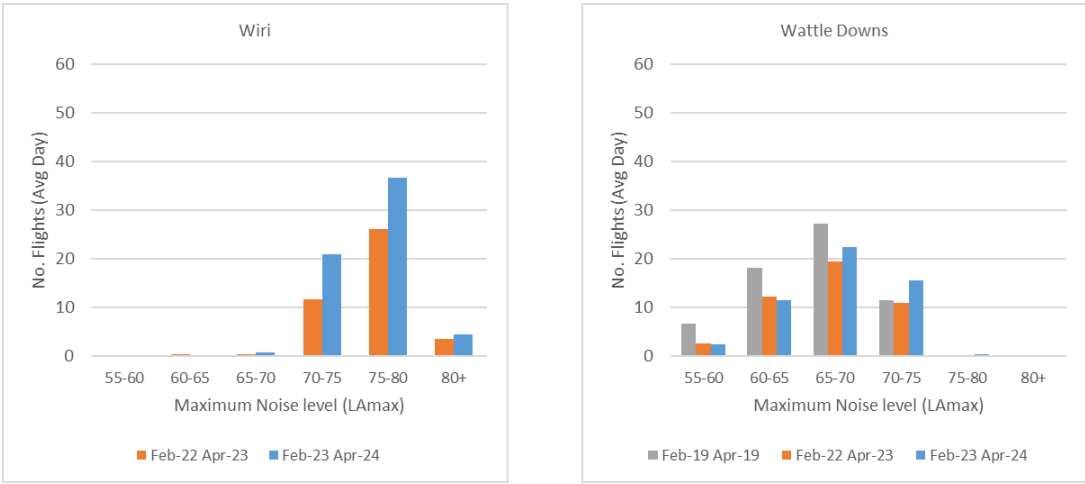
The East Tāmaki monitor was newly installed last year, so does not have data from 2023 for comparison.

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

The Flat Bush monitor recorded approximately 61 events above 70 L_{Amax} per day, and the Beachlands and East Tāmaki monitor received less than one event.

Note, the Flat Bush monitor experiences more noise events as it sits on the Moderate Aircraft Noise Area contour and the other two sit well outside the Aircraft Noise Areas.

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 2024 to April 2024 (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 62 and 16 flyovers per day above 70 dB L_{Amax} respectively.



Engine Testing

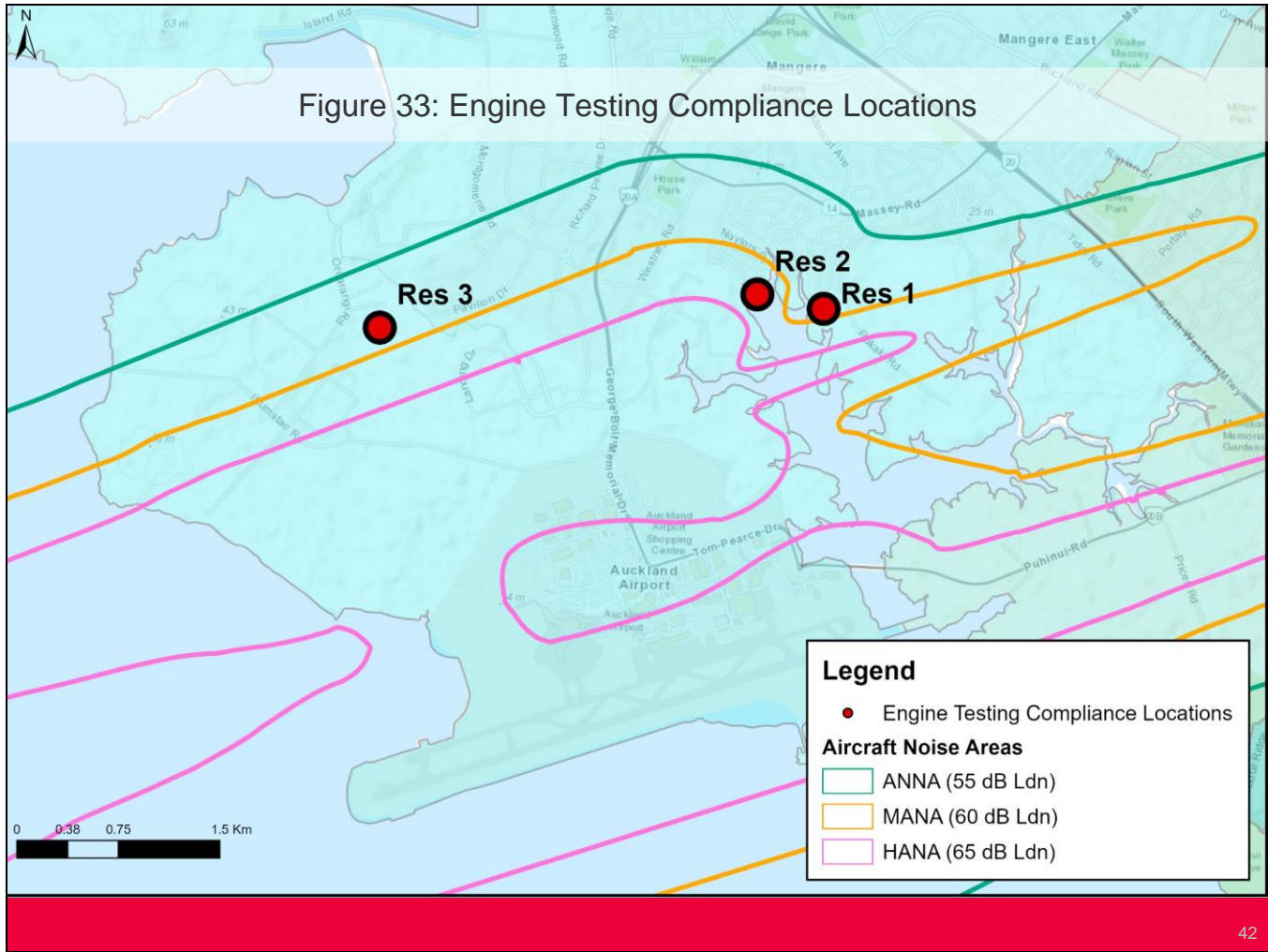


Figure 33 shows the three locations where compliance with the engine testing noise rule is calculated.

Figure 34: Engine Testing Summary

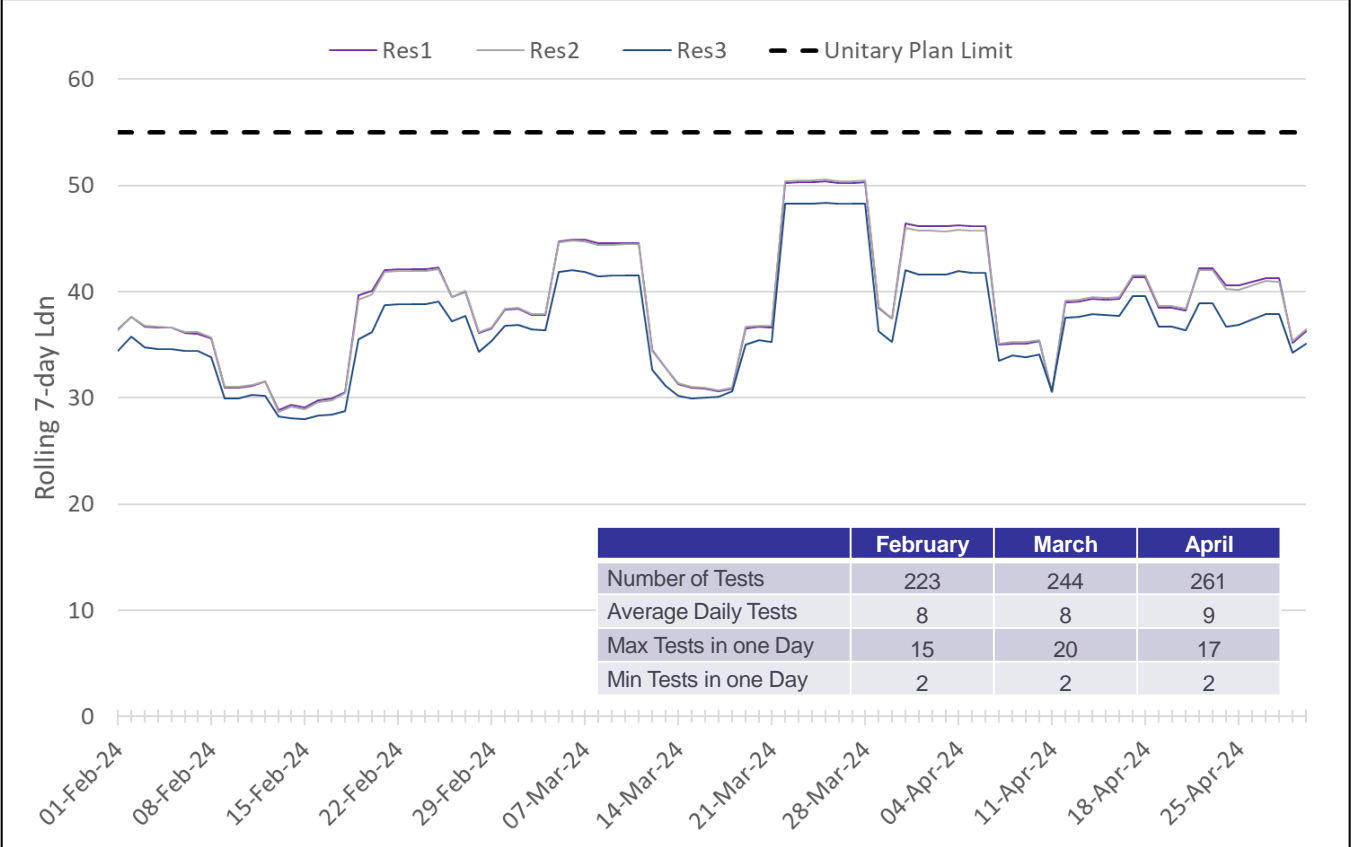


Figure 34 shows the rolling 7-day average noise level for engine testing activity at the airport in the three-month period February 2024 to April 2024.

The District Plan noise limit for engine testing activity is 55 dB L_{dn} (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>Occurs in Westerly Wind Conditions</div> <div>Occurs in Easterly Wind Conditions</div> |
| <div><div>Runway 23</div><div>Departure to South West</div><div>Runway</div><div>Arrival from North East</div></div> <div><div>Runway 05</div><div>Arrival from South West</div><div>Runway</div><div>Departure to North East</div></div> | |
| Complaint Type | |
| “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 | <div>The total noise that is from general ambient noise sources (cars, wind etc.).</div> <div>Includes noise from aircraft operations.</div> |
| A-weighting | The process by which noise levels are corrected to account for the non-linear frequency response of the human ear. |
| L _{dn} – 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 _{Amax} – 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 _{dn} |
| MANA | Moderate Aircraft Noise Area – Set at 60-65 dB L _{dn} |
| HANA | High Aircraft Noise Area – Set at 65+ dB L _{dn} |

Appendix B: Noise Complaint Type

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