Q2 Report Summary

For May 2023 to July 2023:

- Noise limits were complied with for all permanent and temporary monitors, and engine testing noise (slides 30, 35-37, 43)
- Flight operations increased 29% when compared to May-Jul 2022 (slide 4)
  Flight operations are down 12% compared to May-Jul 2019 (slide 4)
- Complaints total 212, increasing from 22 in May-Jul 2022 (slide 17)
- There are two main complainants in Q2:
  one in East Tāmaki Heights that made 17% (35), and
  one in Titirangi that made 66% (139) of total complaints (slide 18)
- At the permanent monitors there has been an increase in Q2 of 3.2 to 4.0 decibels from FY22 to FY23 (slide 31)

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ANCCG Meeting

Monitoring Period

May 2023 – July 2023

Meeting: 11 September 2023

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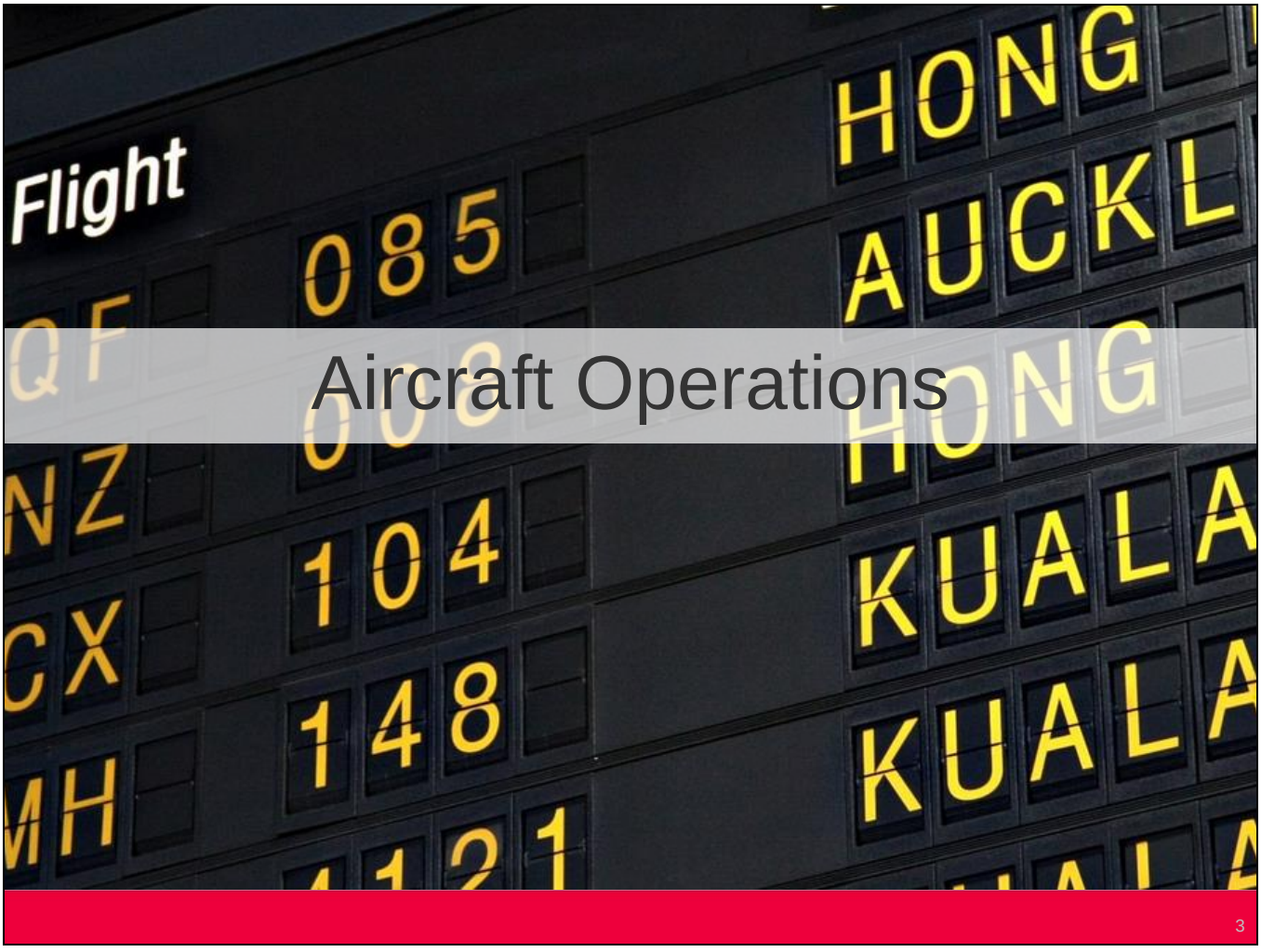
NB: Glossary of terminology given in Appendix A



Aircraft Operations

Figure 1: Number of Aircraft Operations per Month

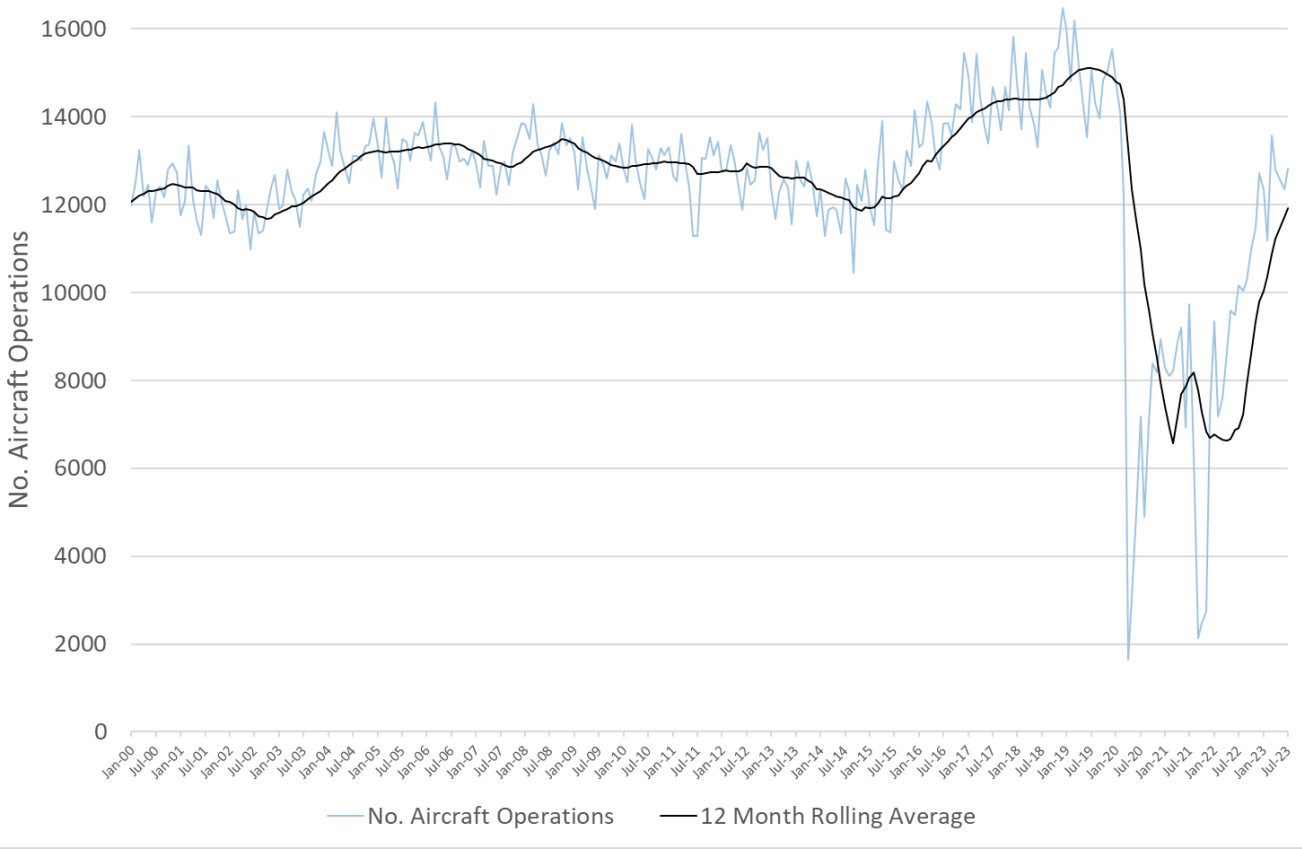


Figure 1 shows the number of aircraft operations per month since the year 2000 (blue line) and the 12-month rolling average (black line).

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 three years.

The number of aircraft operations in the three-month period May 2023 to July 2023 has increased by 29% 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 25% and night-time operations have increased by 61%.

When compared to the same period in 2019 (pre-pandemic), aircraft operations are down 12% from operations in 2019. Daytime operations have decreased by 14% and night-time operations have increased by 2% when compared to the same period in 2019.

Table 1: Summary of Aircraft Operations

Operation	Total	Day	Night
Arrivals	18,862	15,524	3,338
Departures	18,858	17,150	1,708
Circuit	18	17	1
Total	**37,738**	**32,691**	**5,047**

Table 2: Average Daily Aircraft Operations

Total	Day	Night
410	355	55

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

Table 2 shows that there were on average 410 aircraft operations that occurred per day (24-hour period), 55 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

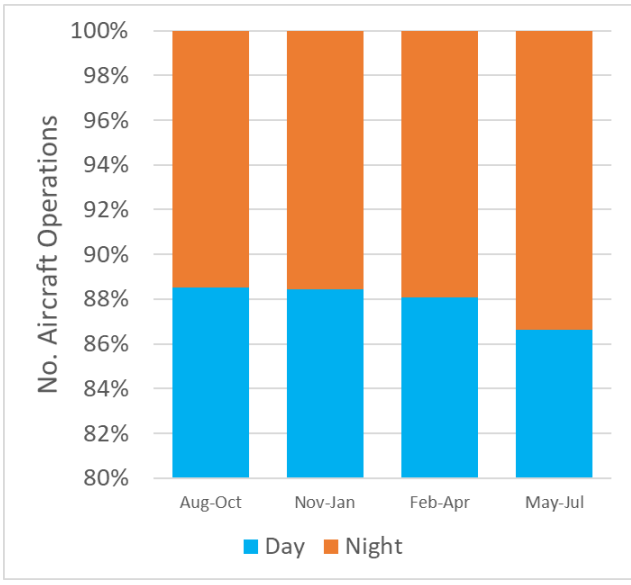

Figure 3: Aircraft Operations by Aircraft Type

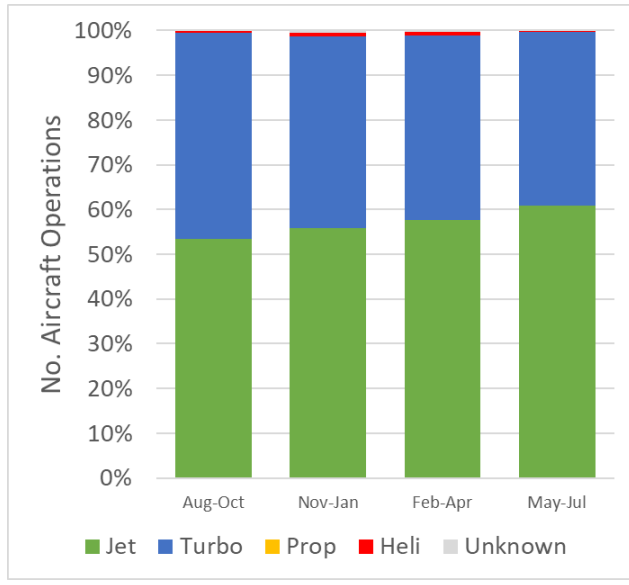

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Figure 2 shows the breakdown of aircraft operations by time of day for this three-month period May 2023 to July 2023 and the three quarters preceding.

For this period 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 61% 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

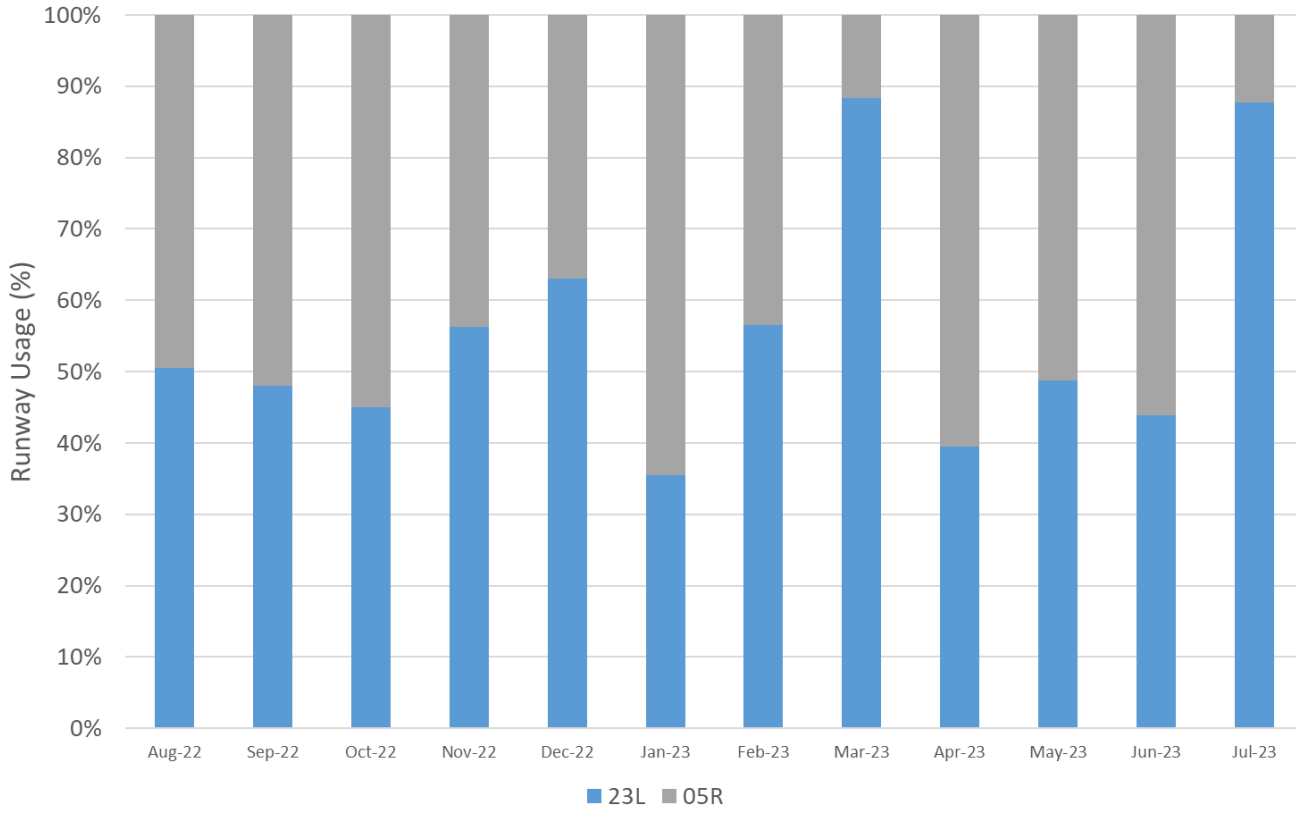

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Figure 4 shows the percentage of aircraft operations that used each runway (23L and 05R) over the past 13 months.

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 May 2023 to July 2023 was RW23L 60%/RW05R 40%. In the last twelve months the average runway usage was RW23L 55%/RW05R 45%

The runway use in the same quarter last year was RW23L 61%/RW05R 39%

Figure 5: Number of SMART Approaches per week

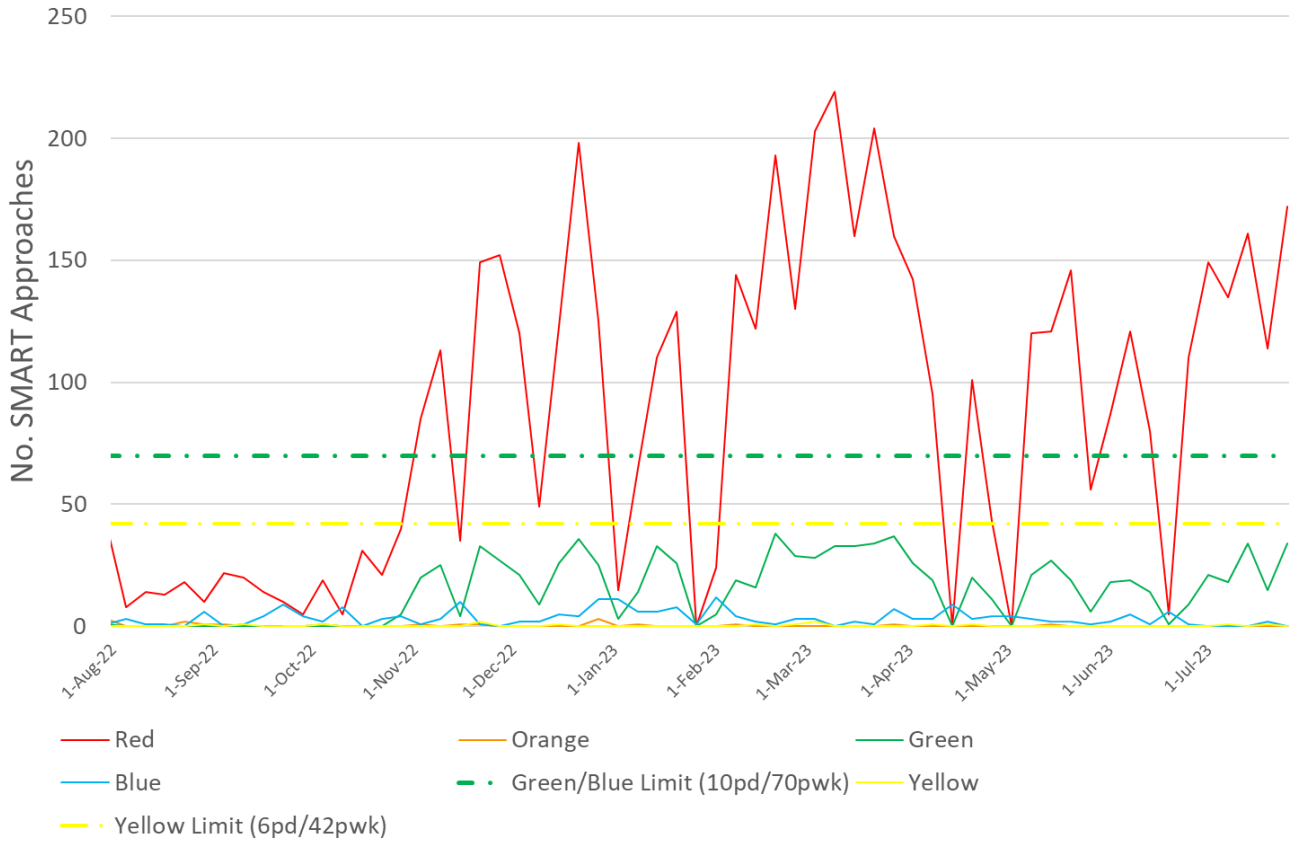

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Figure 5 shows the number of SMART flights flown per week in the past 12 months.
On the next slide, Figure 6 shows a map of the SMART flight paths.

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.

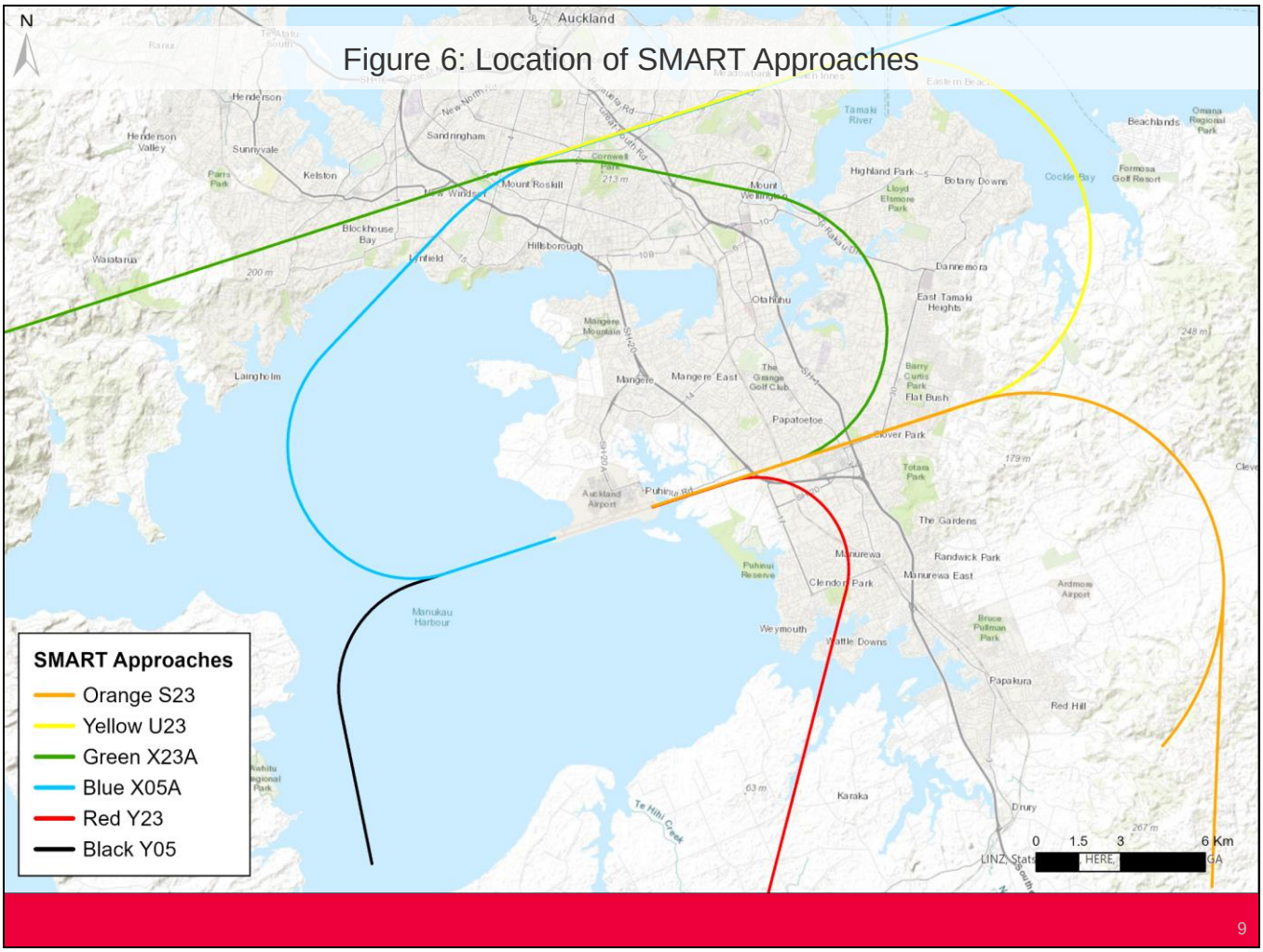

Figure 6 shows the location of the SMART approach flight paths.

Flight Path Diagrams

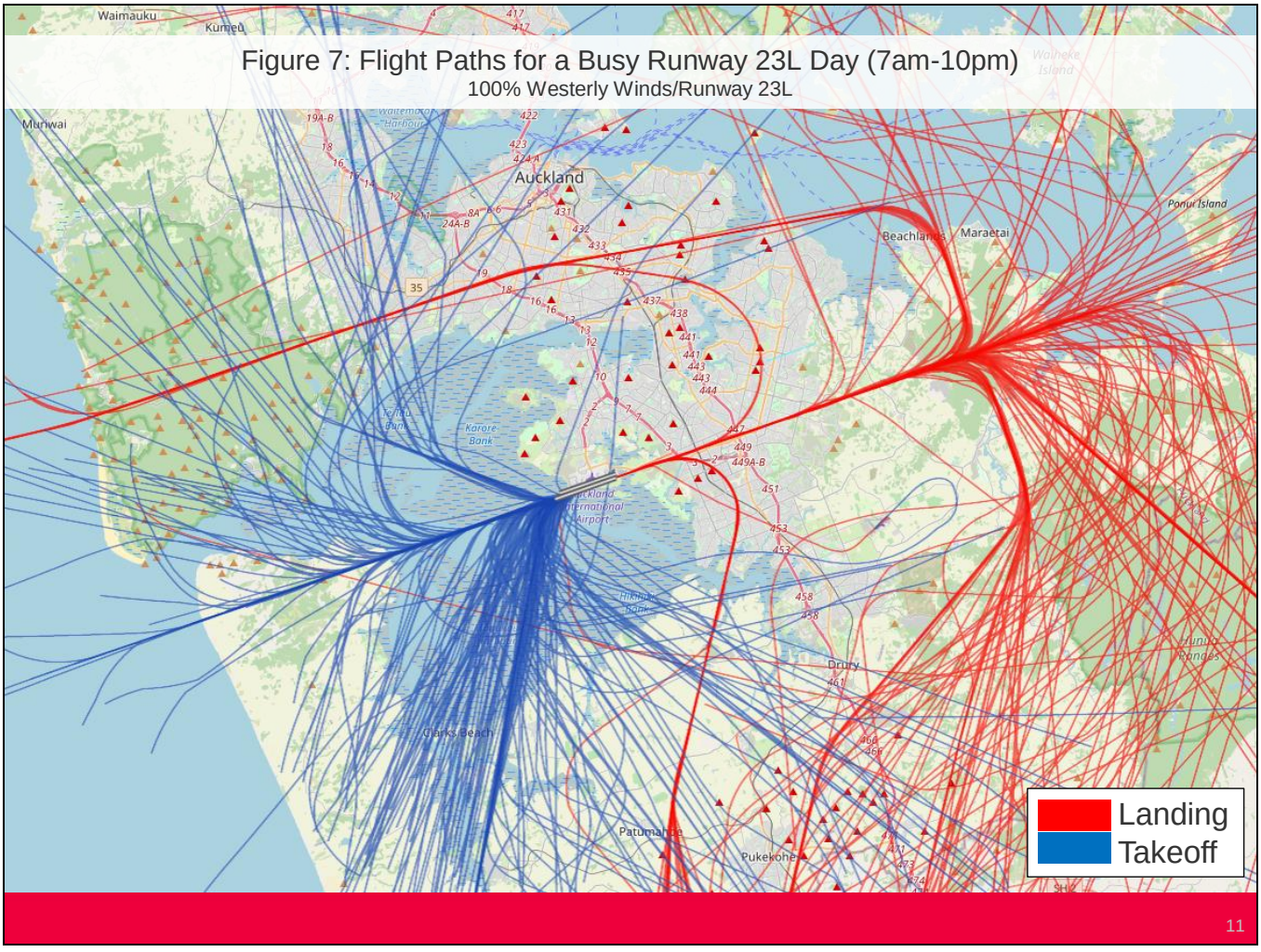

Figure 7 shows the daytime (7am-10pm) flight paths for Thursday 27 July 2023, the busiest day in the three-month period May 2023 to July 2023 when Runway 23L was primarily in use.

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 413 daytime Runway 23L flights on this day.

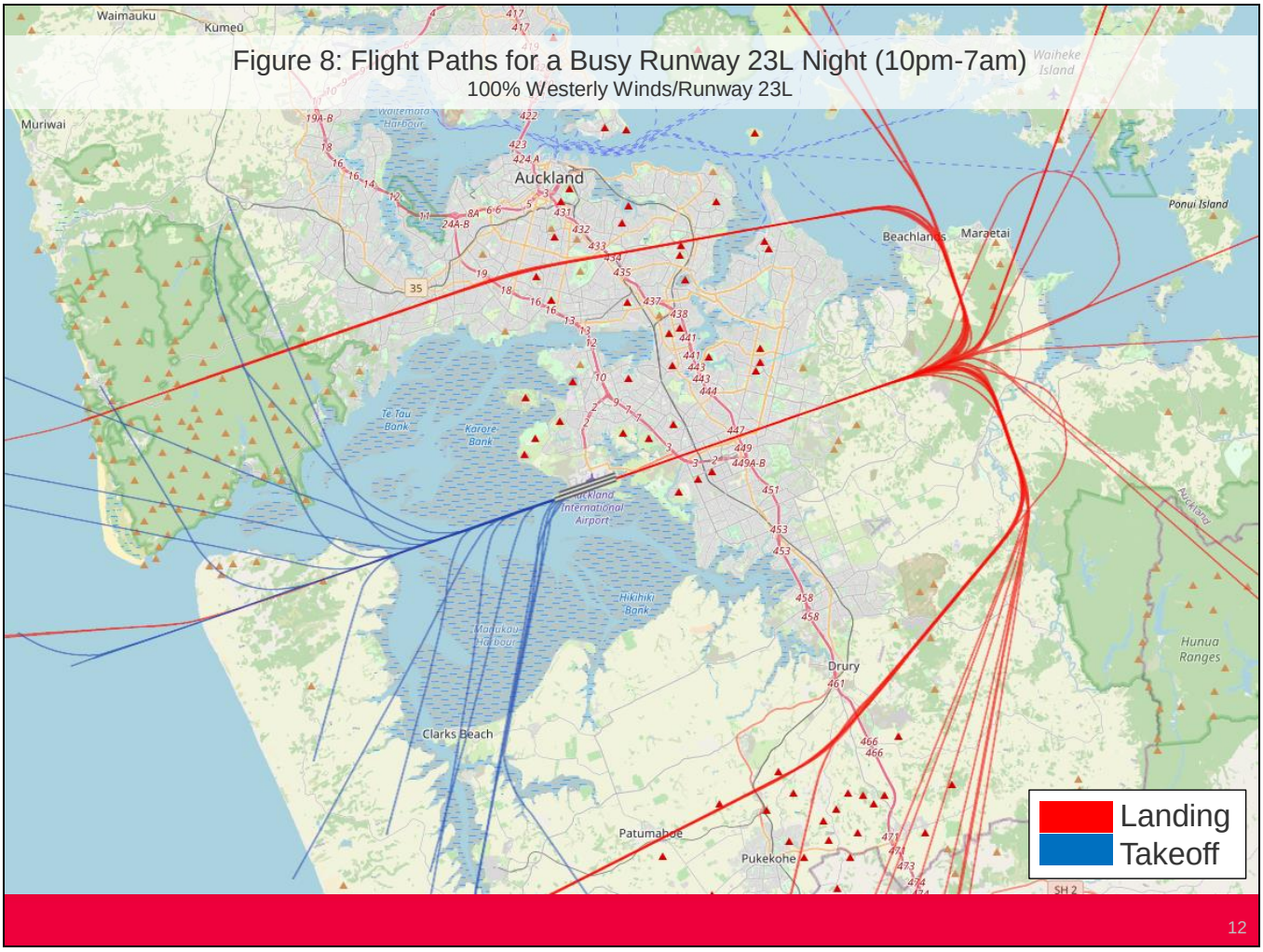

Figure 8 shows the night-time (10pm-7am) flight paths for for Thursday 27 July 2023, the busiest day in the three-month period May 2023 to July 2023 when Runway 23L was primarily in use.

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 65 night-time Runway 23L flights on this night.

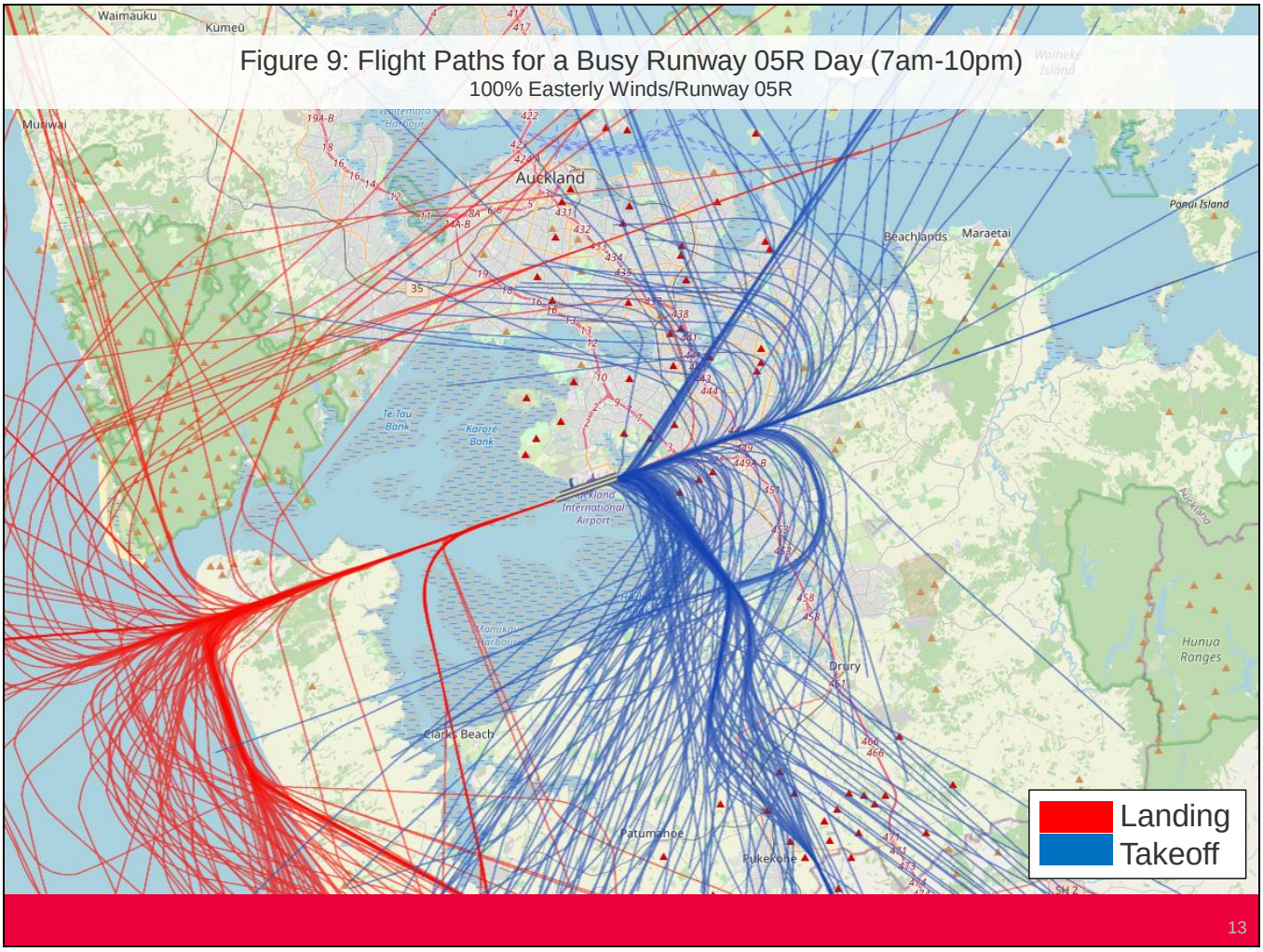

Figure 9 shows the daytime (7am-10pm) flight paths for Friday 5 May 2023, the busiest day in the three-month period May 2023 to July 2023 when Runway 05R was primarily in use.

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

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

There were 395 daytime Runway 05R flights on this day.

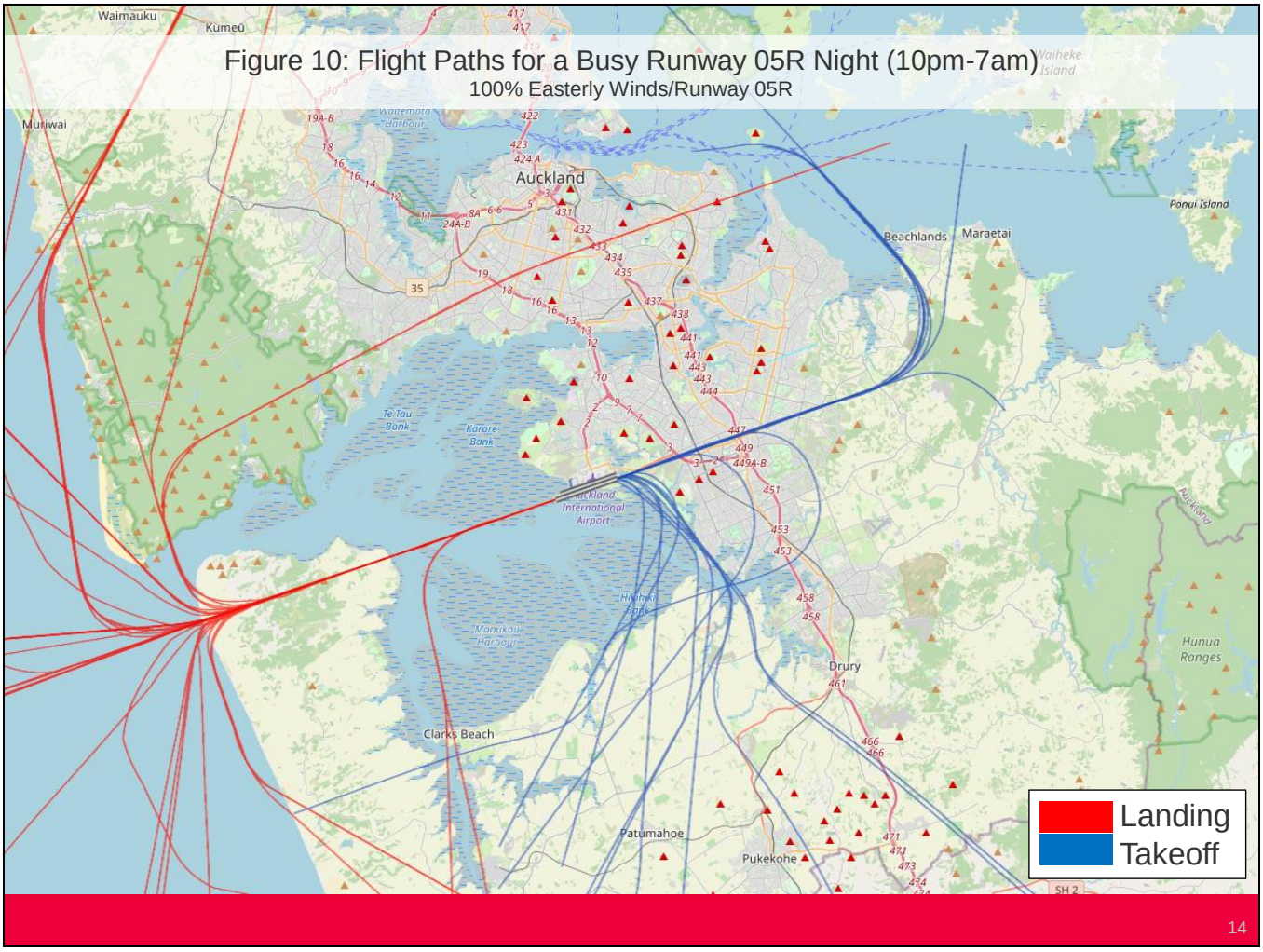

Figure 10 shows the night-time (10pm-7am) flight paths for Friday 5 May 2023, the busiest day in the three-month period May 2023 to July 2023 when Runway 05R was primarily in use.

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

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

There were 62 night-time Runway 05R flights on this night.

Noise Complaints

Figure 11: Number of Aircraft Noise Complaints per Month

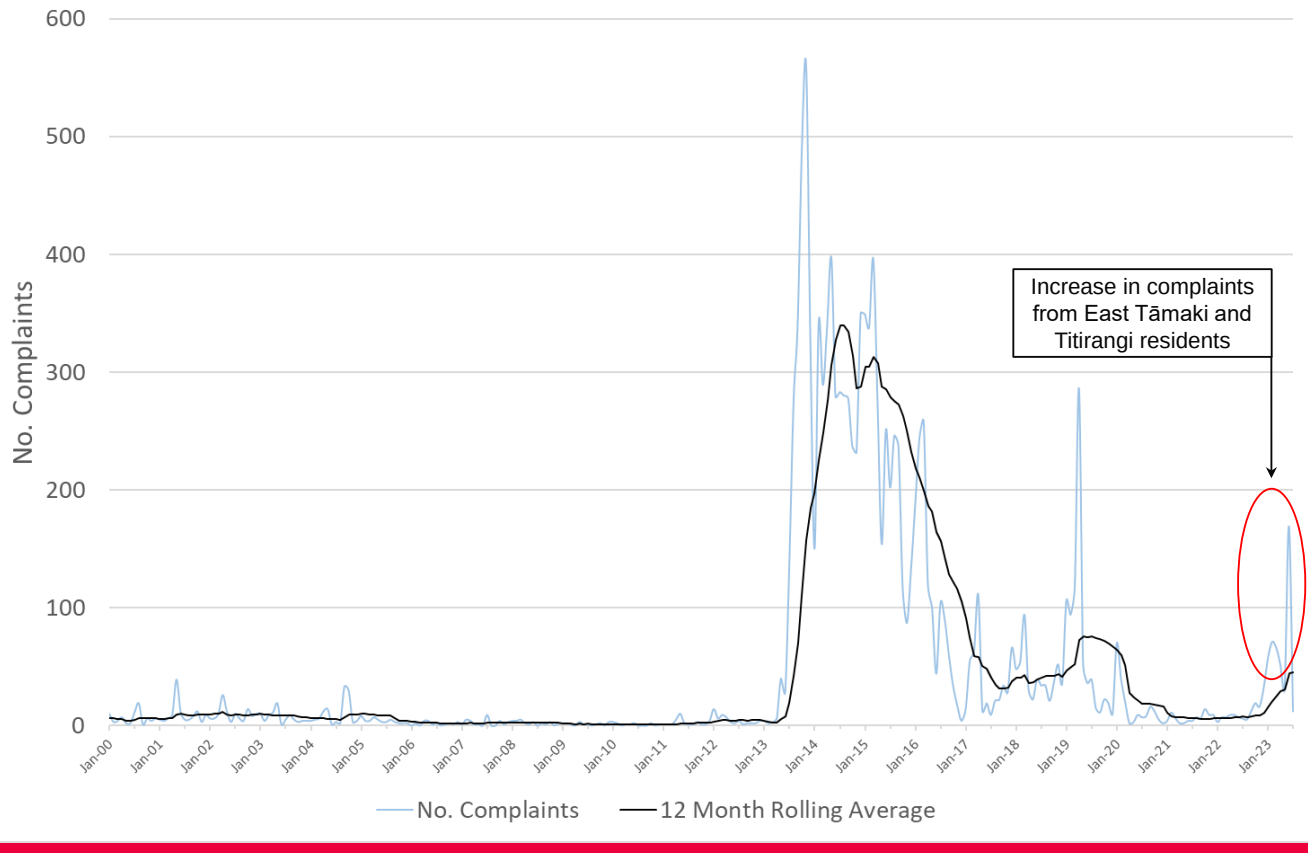

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Figure 11 shows the total number of aircraft noise complaints made per month since the year 2000 (blue line) and the 12-month rolling average (black line).

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 May 2023 to July 2023 has increased from 22 to 212 when compared to the same period last year.

This quarter there were two main complainants who made a shared total of 174 complaints, greatly increasing the total number. One of these is the East Tāmaki Heights complainant from the previous quarters and a new main complainant from Titirangi.

Table 3: Summary of Noise Complaints

	May	Jun	Jul	May-Jul	Feb-Apr	Nov-Jan	Aug-Oct
Number of Complaints	31	169	12	212	188	105	36
Specific	*24*	*160*	*12*	*196*	*184*	*91*	*23*
Generic	*6*	*8*	*0*	*14*	*4*	*11*	*10*
Question	*1*	*1*	*0*	*2*	*0*	*3*	*3*
Number of People Complaining	10	12	5	19	12	17	15

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Table 3 shows a breakdown of the noise complaints in the three-month period May 2023 to July 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 212 complaints in this three-month period, 92% related to specific aircraft events, 7% were generic complaints and 1% were question enquiries.

The two main complainants this quarter are in East Tāmaki Heights and Titirangi. The person in East Tāmaki Heights made 17% (35) and the person in Titirangi made 66% (139) of this quarter's total complaints.

A noise monitor in the East Tāmaki area has been installed on 3 August 2023 to measure the Green SMART track once again. This noise monitor is the redeployment of the Mt Wellington noise monitor. Noise monitoring in this location will also help assess noise levels in the area and understand the noise environment as there has been a recent increase in complaints around East Tāmaki.

The airport has contacted the complainant in Titirangi but has not yet heard back.

Figure 12: Map of Noise Complaints

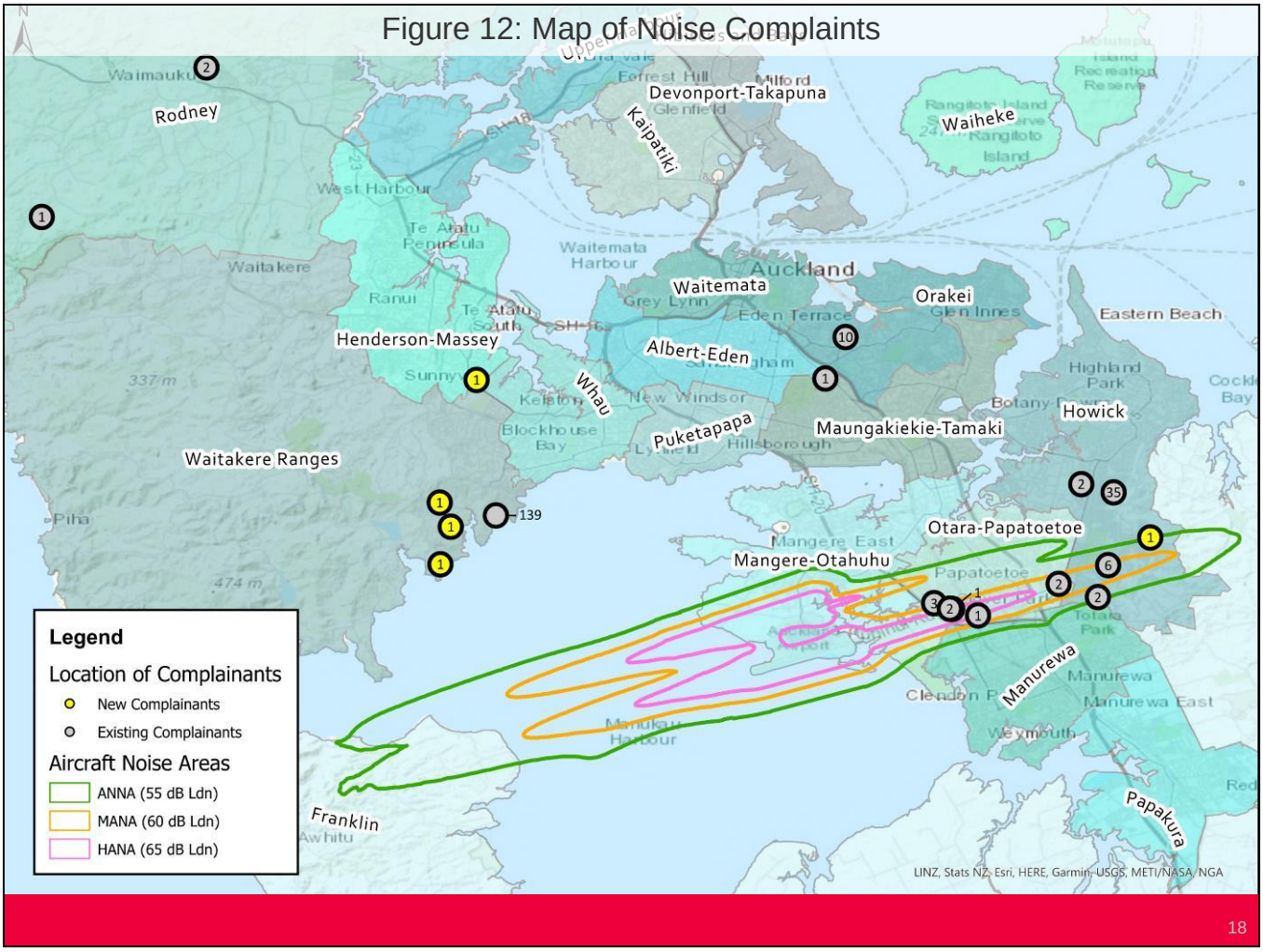


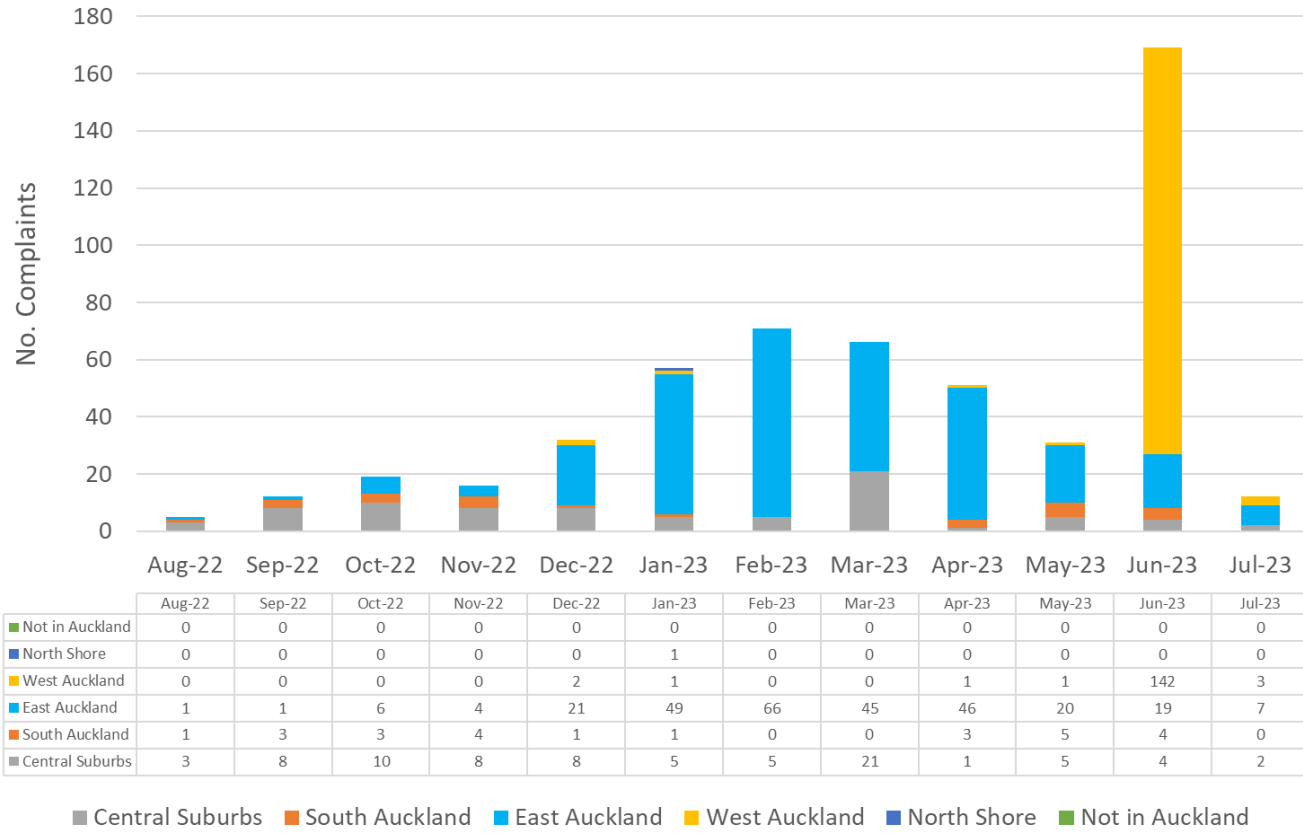
Figure 12 shows a map with the location of each complainant.

Each point represents the location of a person who complained in the three-month period May 2023 to July 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



	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23
Not in Auckland	0	0	0	0	0	0	0	0	0	0	0	0
North Shore	0	0	0	0	0	1	0	0	0	0	0	0
West Auckland	0	0	0	0	2	1	0	0	1	1	142	3
East Auckland	1	1	6	4	21	49	66	45	46	20	19	7
South Auckland	1	3	3	4	1	1	0	0	3	5	4	0
Central Suburbs	3	8	10	8	8	5	5	21	1	5	4	2

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

West Auckland had the most complaints at 146 in the three-month period of May 2023 to July 2023.

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

Figure 14: Noise Complaints by Time

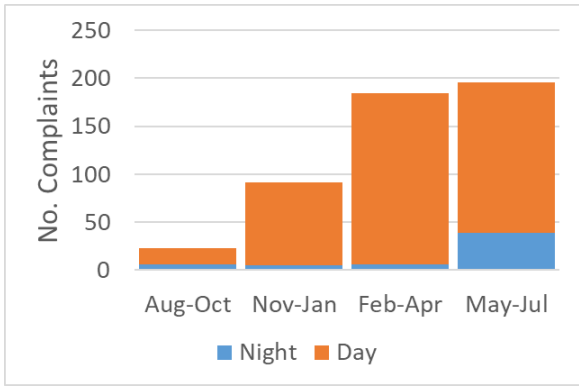


Figure 15: Noise Complaints by Runway

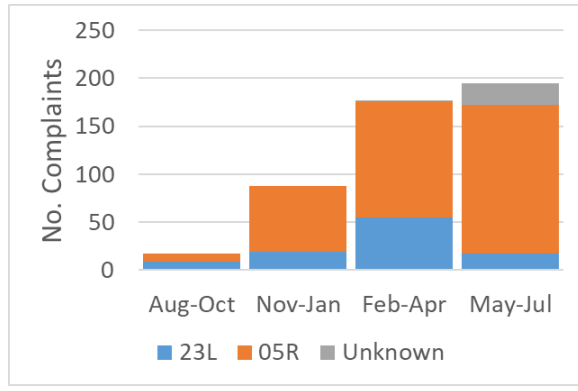


Figure 16: Noise Complaints by Aircraft

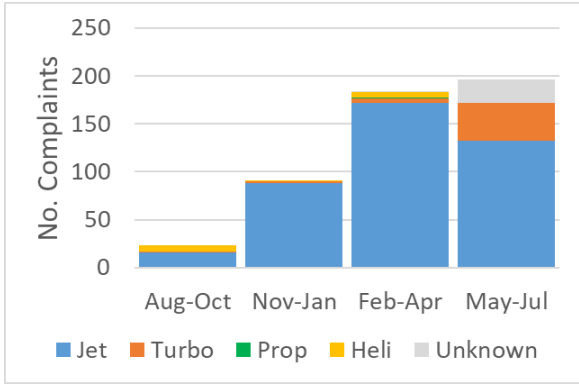
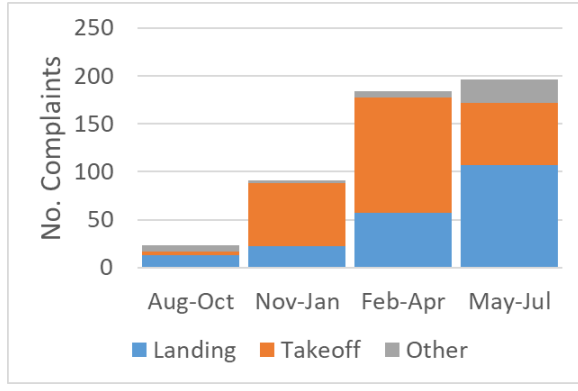


Figure 17: Noise Complaints by Operation

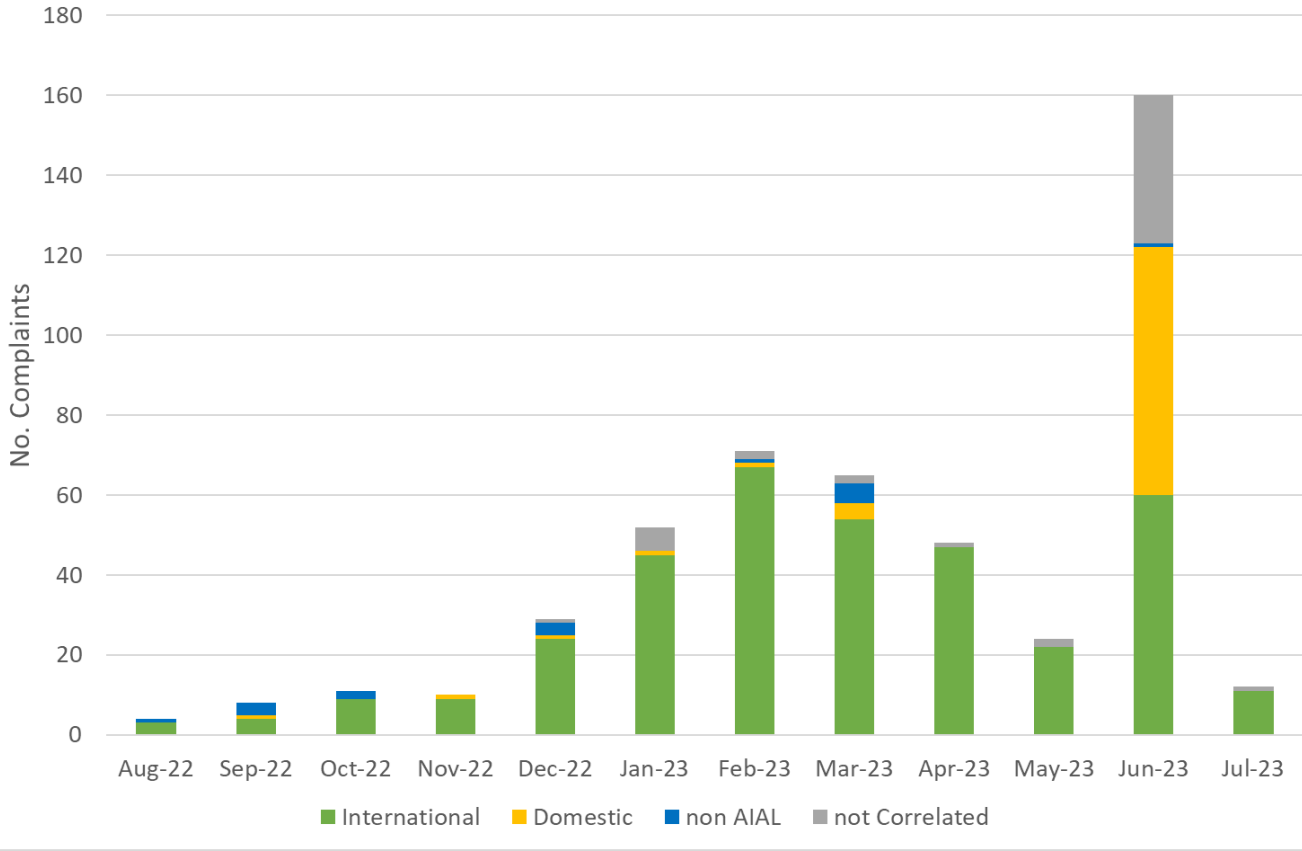


Figures 14-17 show a breakdown of the ‘specific’ aircraft noise complaints made in the three-month period May 2023 to July 2023 and the three quarters preceding.

In the last three quarters there has been a large jump in complaints. This is largely due to the two complainants in East Auckland and the new main complainant in Titirangi. Combined they have made a total of 397 complaints in the last three quarters (174 this 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



21

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

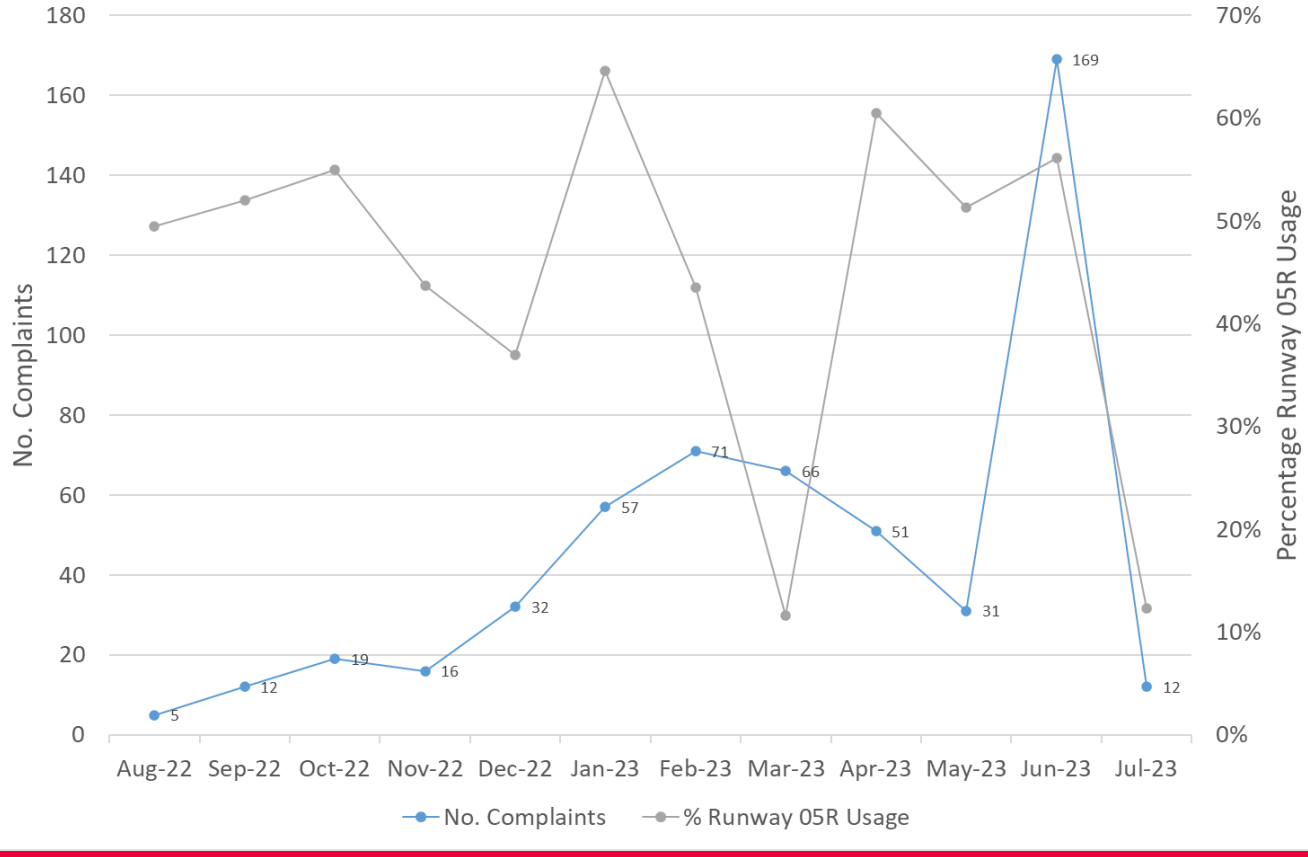


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Figure 19 shows the number of specific noise complaints per month received in the past 12 months compared to the usage of Runway 05R.

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. In the last quarter there is a general runway usage correlation, especially in June and July.

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

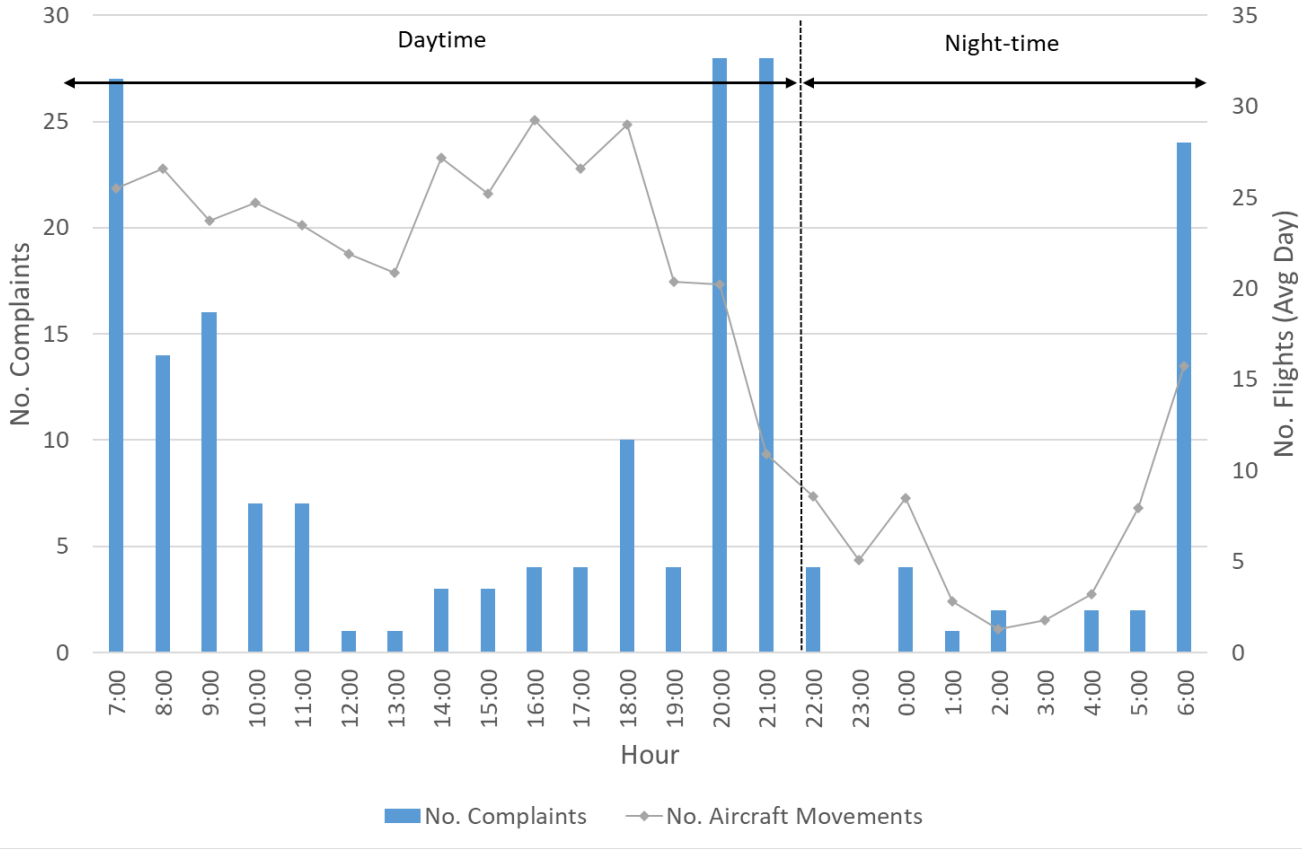

Figure 20 shows the number of specific aircraft noise complaints and the number of aircraft operations per hour.

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 May 2023 to July 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

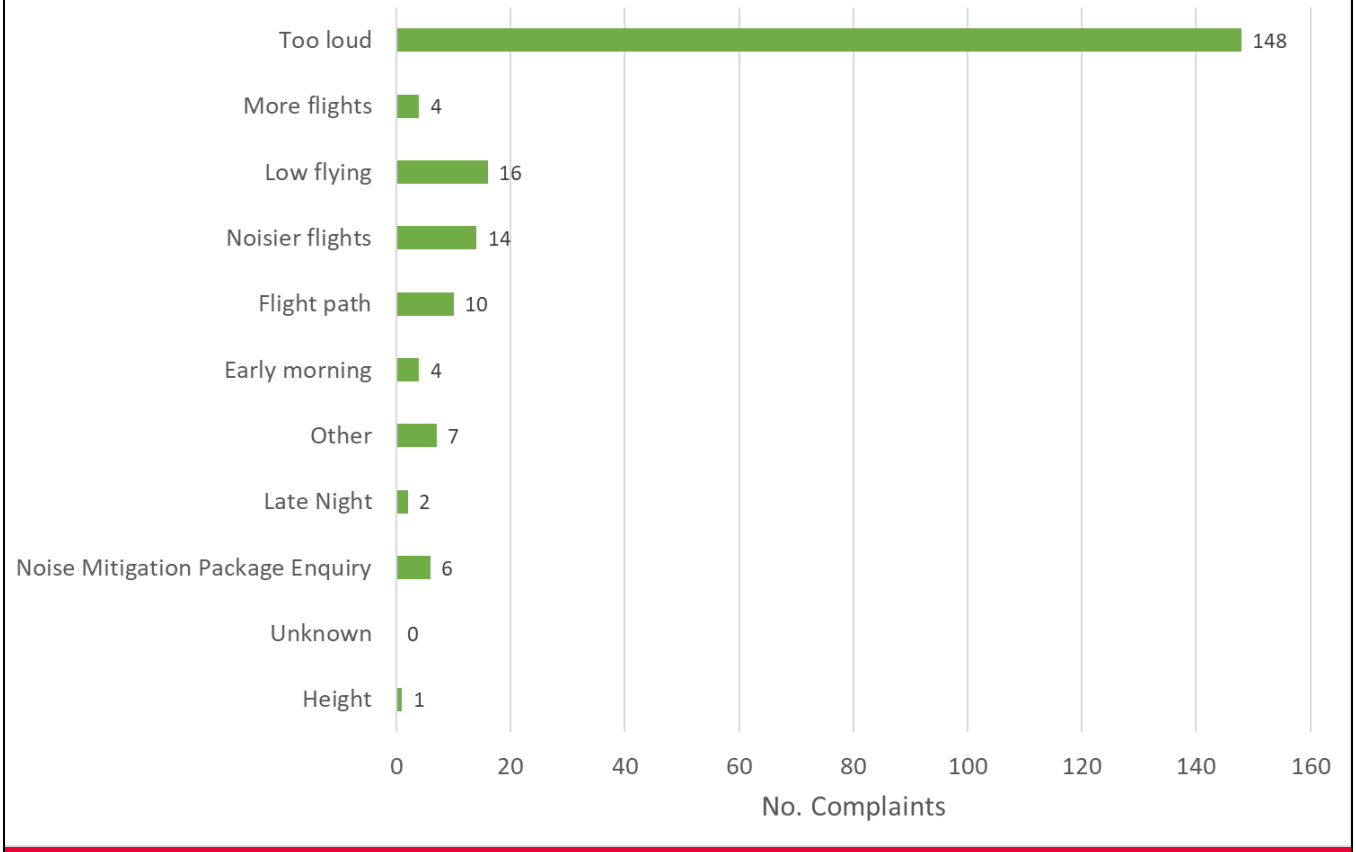

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Figure 21 shows the reason for each noise complaint in the three-month period May 2023 to July 2023. This includes all complaints (generic, question and specific).

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

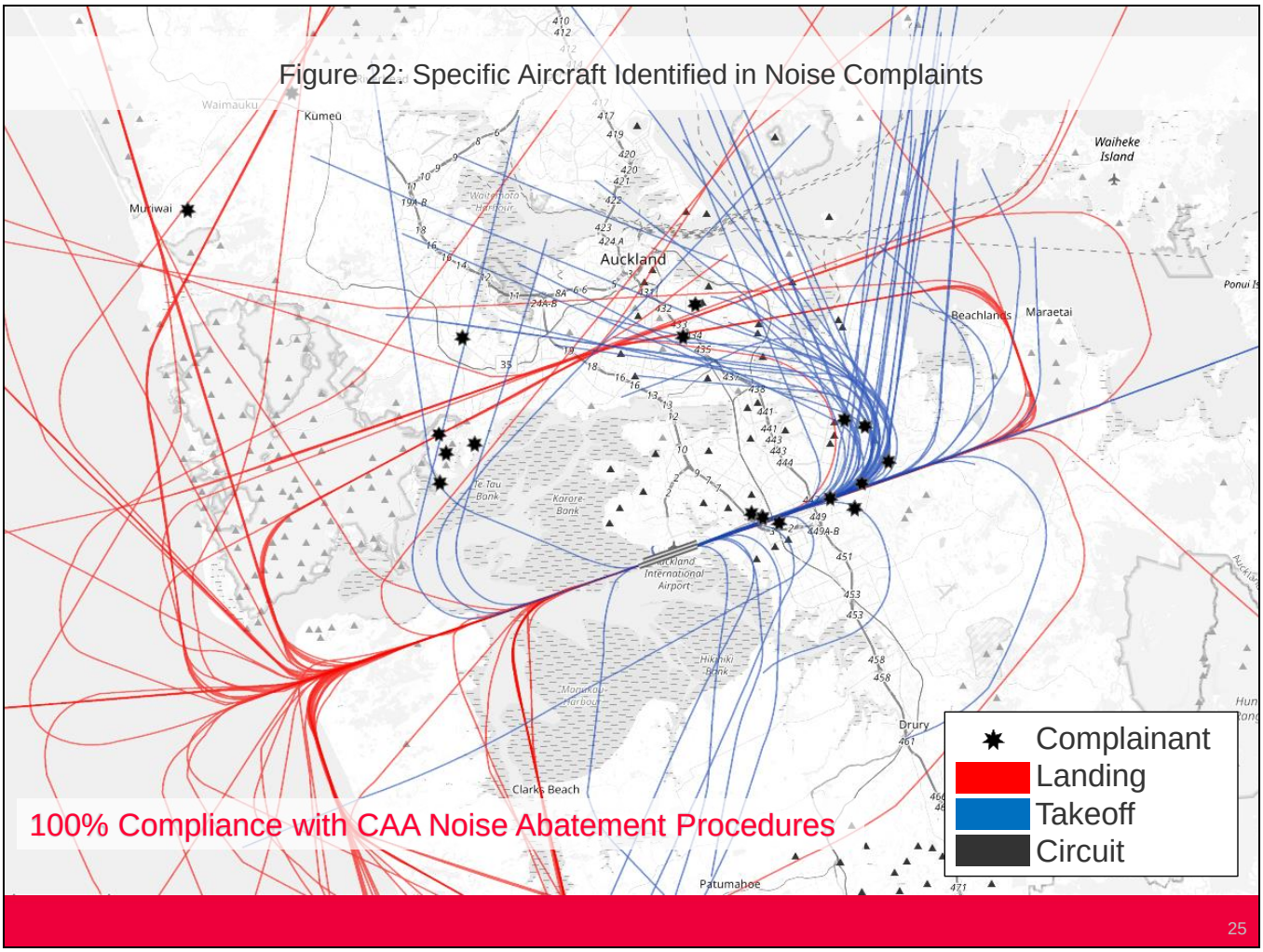


Figure 22 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period May 2023 to July 2023.

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.

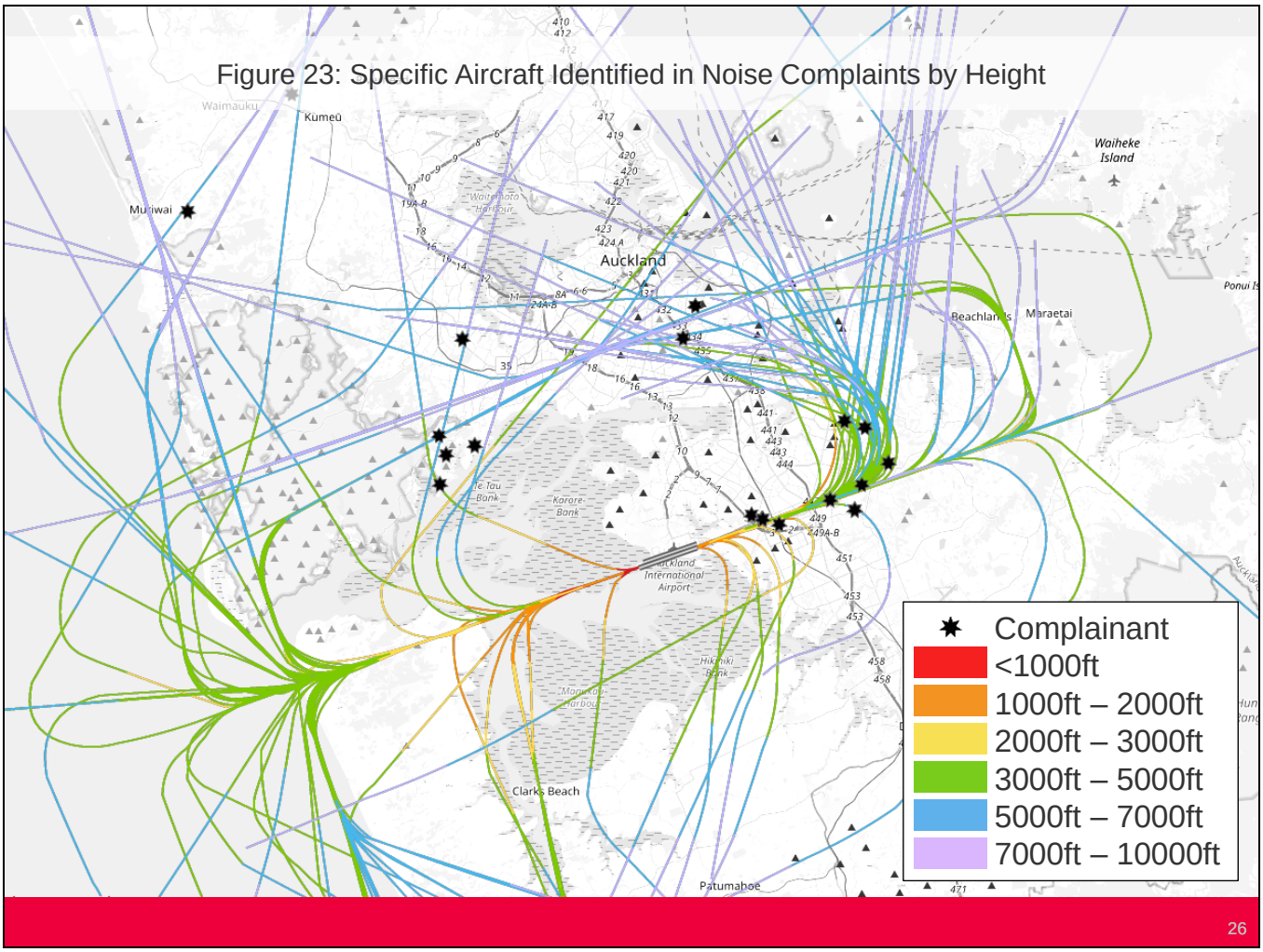
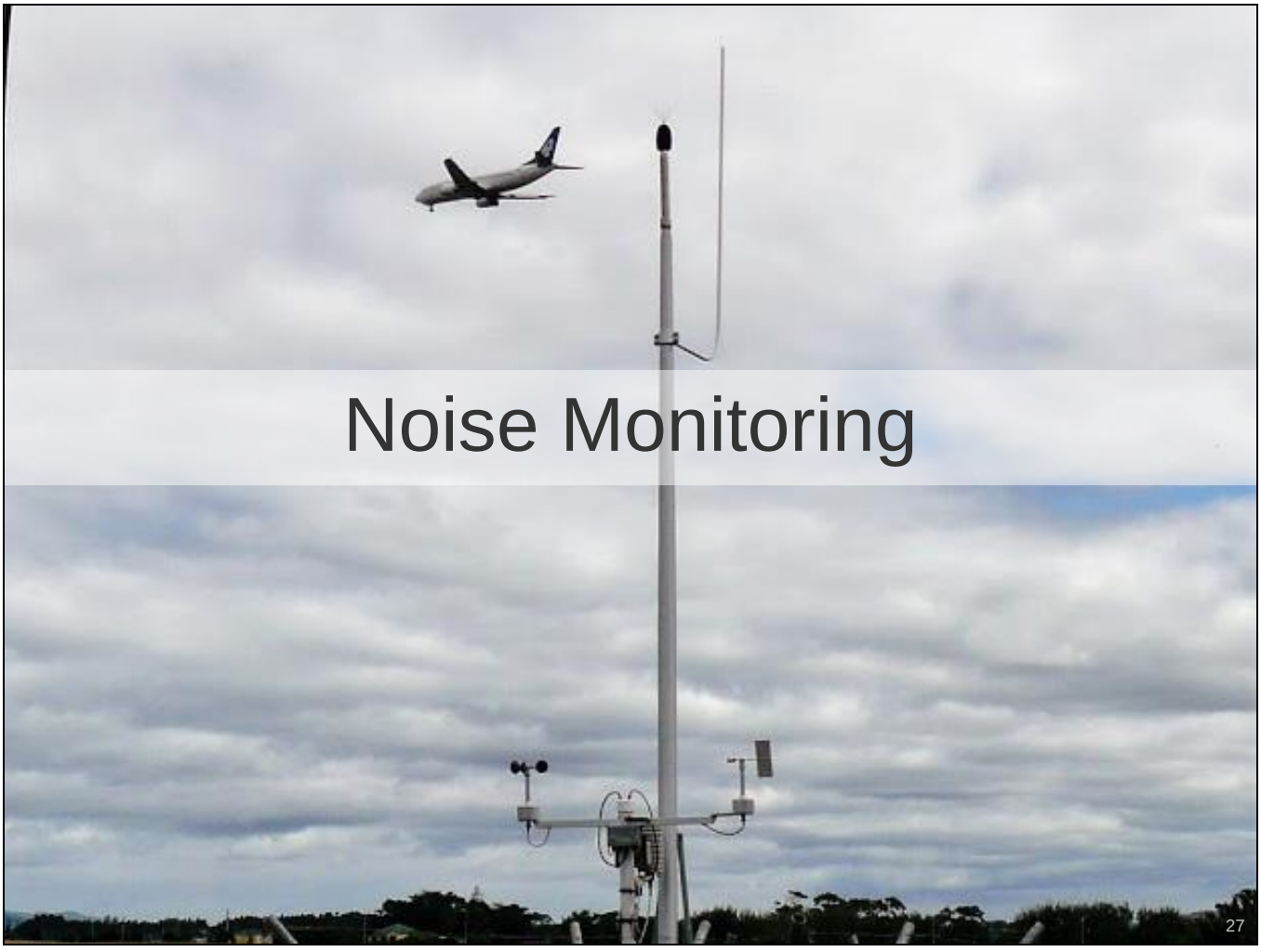


Figure 23 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period May 2023 to July 2023.

The flight paths are shown in terms of altitude.


Noise Monitoring
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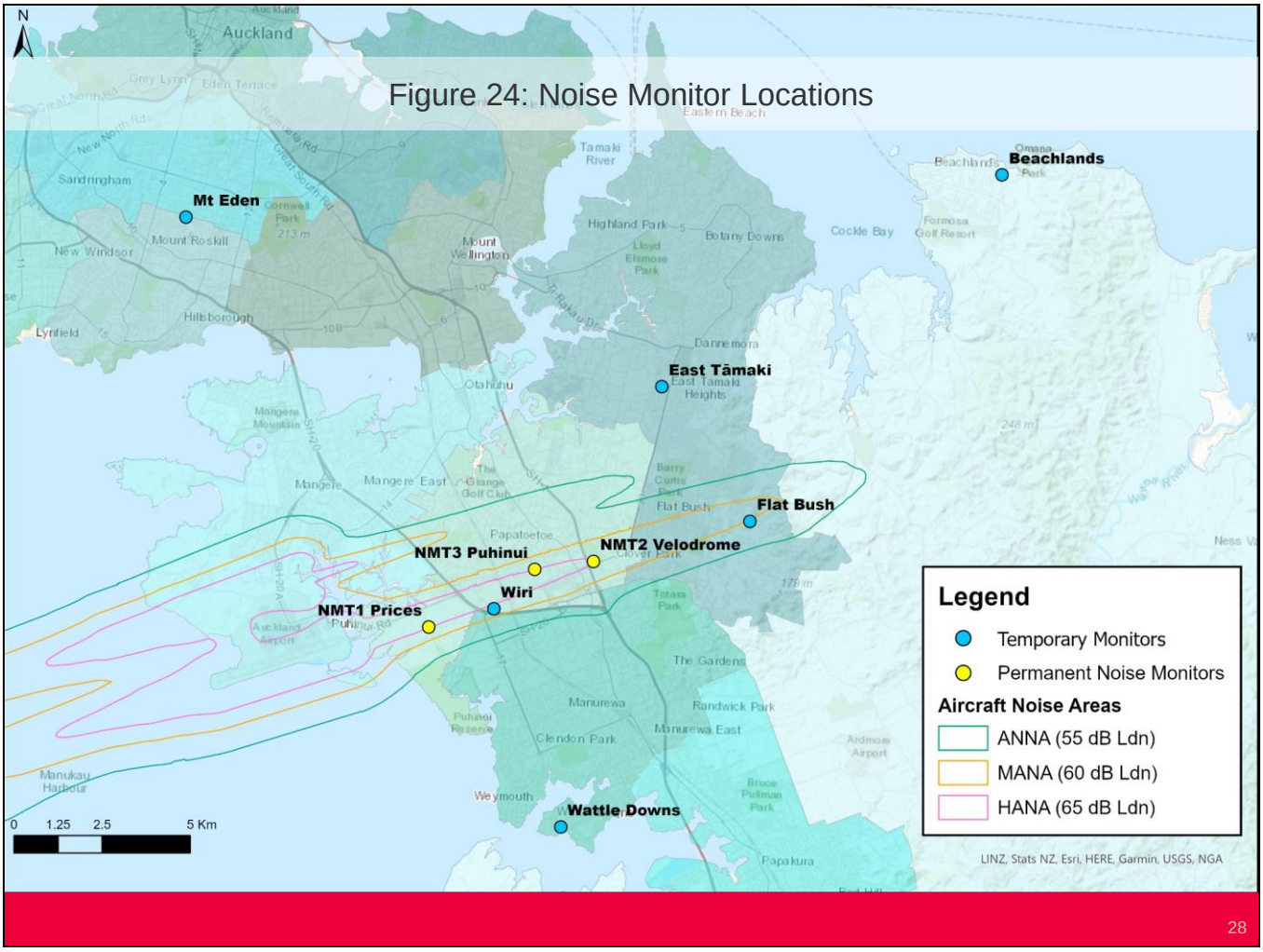

Figure 24 shows the location of Auckland Airport's three permanent and six temporary noise monitors.

The Mt Wellington noise monitor was redeployed in East Tāmaki on 3 August 2023. This is to measure movements on the Green SMART approach again and the measurements will also be useful to investigate the 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	21/04/2023 to 02/05/2023	–	Electrical issues caused missing noise data (fixed 02/05/2023)
Mt Eden	21/04/2023 to 05/05/2023	–	NMT removed temporarily for calibration (reinstalled 05/05/2023)
Velodrome	30/06/2023 to 01/07/2023	–	NMT upgrade, missing data during this period
Prices Rd	05/07/2023 to 06/07/2023	–	NMT upgrade, missing data during this period
Velodrome	05/07/2023 to 17/07/2023	–	Power interruption on site, offline for 12 days (fixed 17/07/2023)
Puhinui	06/07/2023	–	NMT upgraded, missing data on this day
Wiri	10/07/2023	–	NMT upgraded, missing data on this day
Flat Bush	10/07/2023	–	NMT upgraded, missing data on this day

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Table 4 summarises any replacement, repair, or maintenance work undertaken on the noise monitors for the three-month period May 2023 to July 2023. 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).

All permanent and temporary Casper monitors had equipment upgrades this quarter. The Casper monitors in Wiri and Velodrome had electrical issues that caused them to be offline for 2 and 12 days respectively.

The MDA Mt Eden monitor was dismantled and sent for calibration in April and reinstalled 5 May.

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

The East Tāmaki monitor was installed on 4 August but this was not in this quarter so has not been included in the table.

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

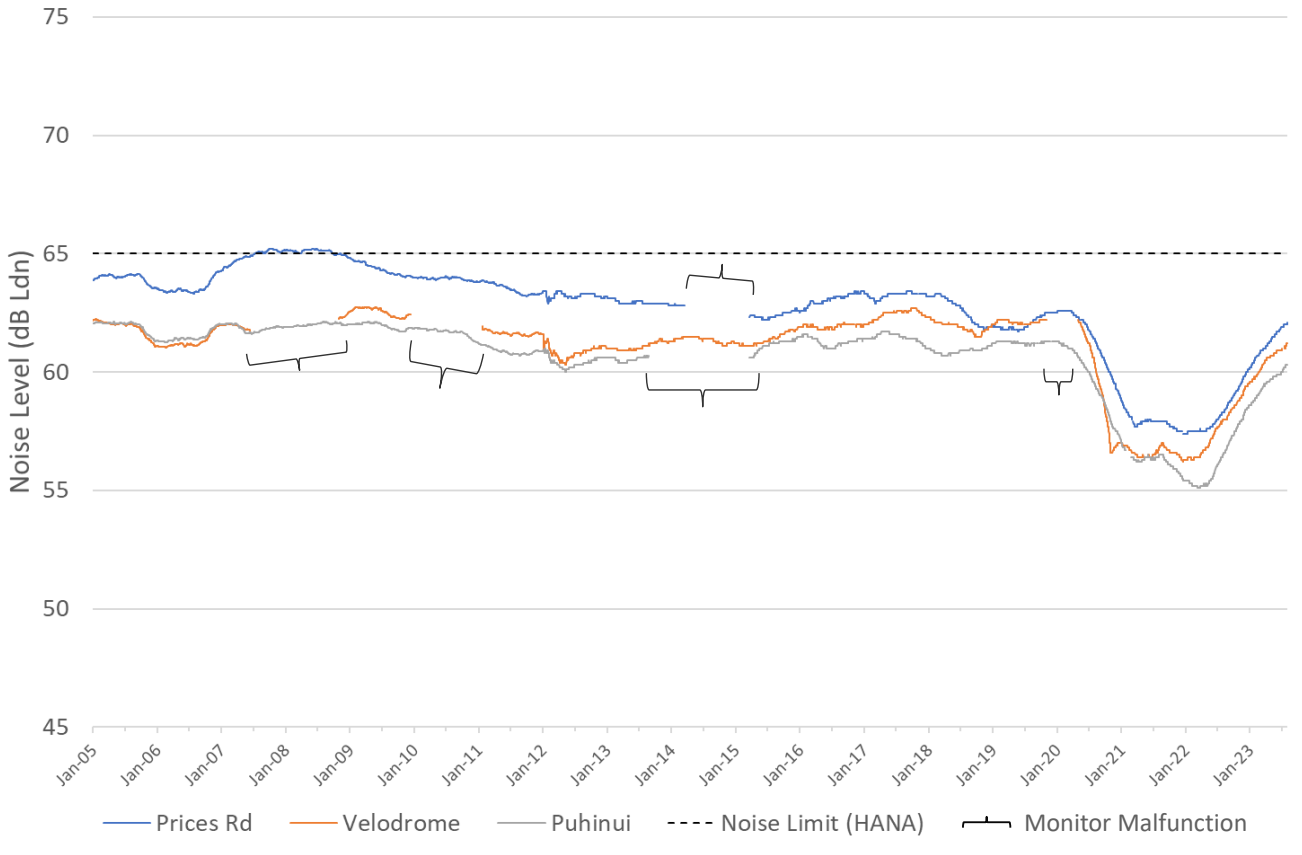

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Figure 25 shows the rolling 365-day Noise Exposure (L_{dn}) at the permanent noise monitors since January 2005.

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 May 2023 to July 2023.

The noise levels in the three-month period have increased by 3.8 dB at Prices Rd, 3.3 dB at Velodrome and 3.8 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

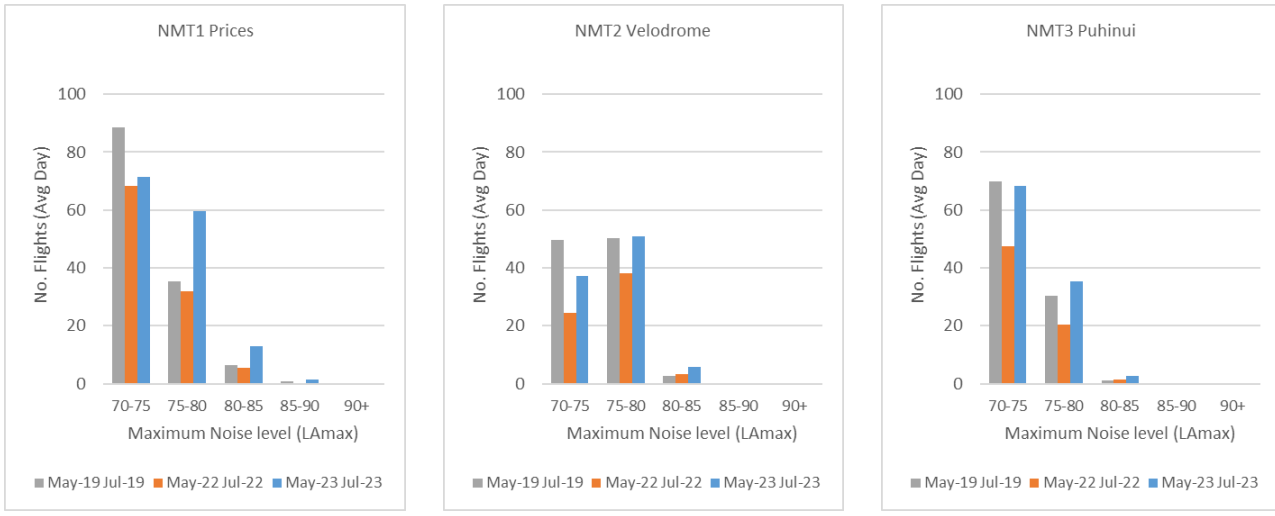
Financial Year	Prices Rd	Velodrome	Puhinui
FY10 (Jul-09 to Jun-10)	64.0	62.4	61.8
FY11 (Jul-10 to Jun-11)	63.5	61.6	60.7
FY12 (Jul-11 to Jun-12)	63.1	60.8	60.3
FY13 (Jul-12 to Jun-13)	63.0	61.0	60.6
FY14 (Jul-13 to Jun-14)	63.6	61.4	60.3
FY15 (Jul-14 to Jun-15)	62.2	61.3	61.1
FY16 (Jul-15 to Jun-16)	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 Jul – 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.

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Figure 26 shows the average daily number of aircraft that overflew each permanent noise monitor in each noise band in the three-month period May 2023 to July 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 94-146 events above 70 L_{Amax} during this three-month period. The same quarter last year saw 69-106 events, and the same quarter in 2019 (pre-COVID) saw 101-131 events.

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

	NMT1 Prices	NMT2 Velodrome	NMT3 Puhinui
Total Aircraft Operations	17,116	11,864	12,475
No. Aircraft Operations Captured by Monitors	14,843	9,081	12,045
Correlation	87%	77%	97%

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 Velodrome monitor. This is due to the Velodrome monitor being offline for 12 days. If only considering the days when the monitor was online, the correlation is 93%.

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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 May 2023 to July 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	3044	38	62
Wiri	4-Aug-17	2282	58	75
Wattle Downs	23-Dec-17	2047	47	67
Beachlands	4-Nov-22	270	44	64
Flat Bush	20-Dec-22	224	58	70

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Table 7 gives a summary of the measured noise levels at each temporary noise monitor since deployment (up until 31 July 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).

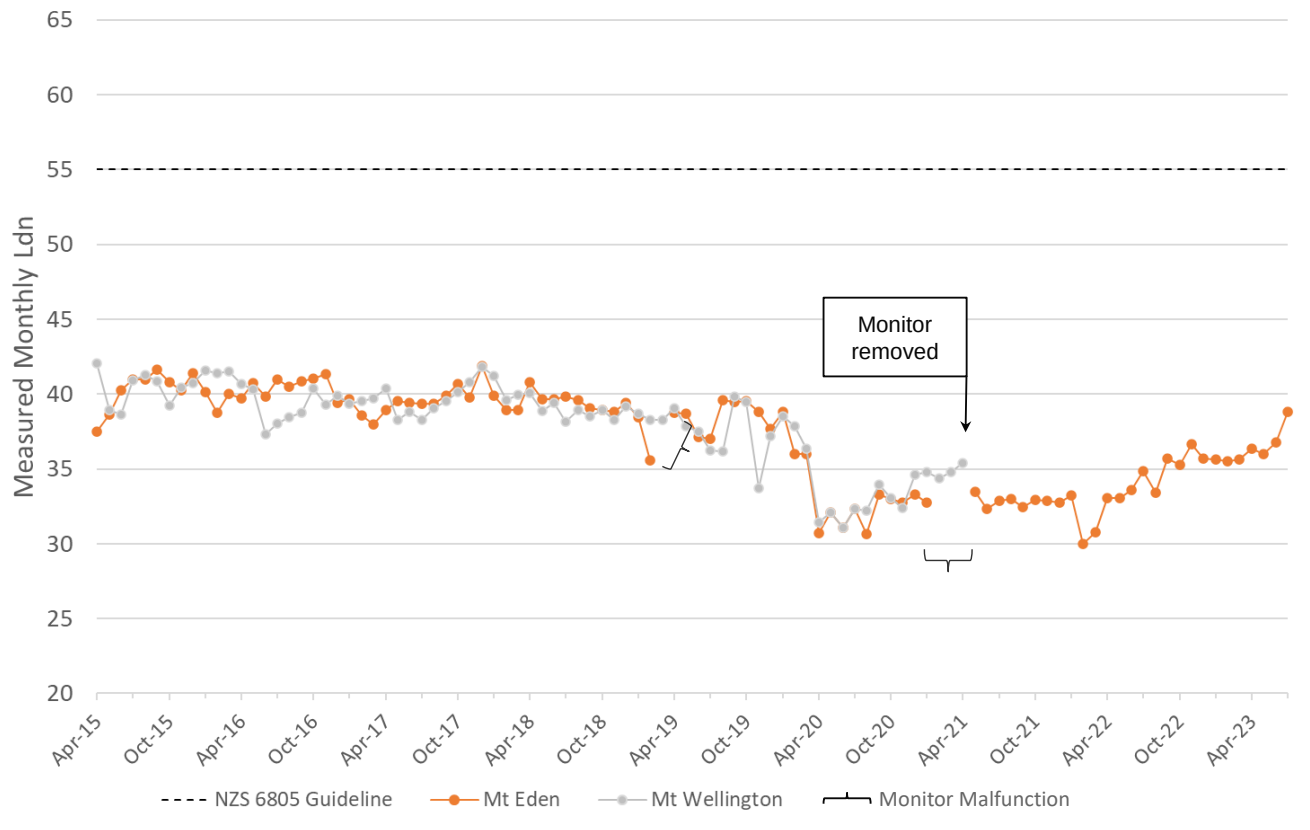
The L_{Amax} differs for each aircraft operation depending on the aircraft type, type of operation etc.

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.

The new East Tāmaki noise monitor is not shown as it was not deployed this quarter.

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



35

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 3 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

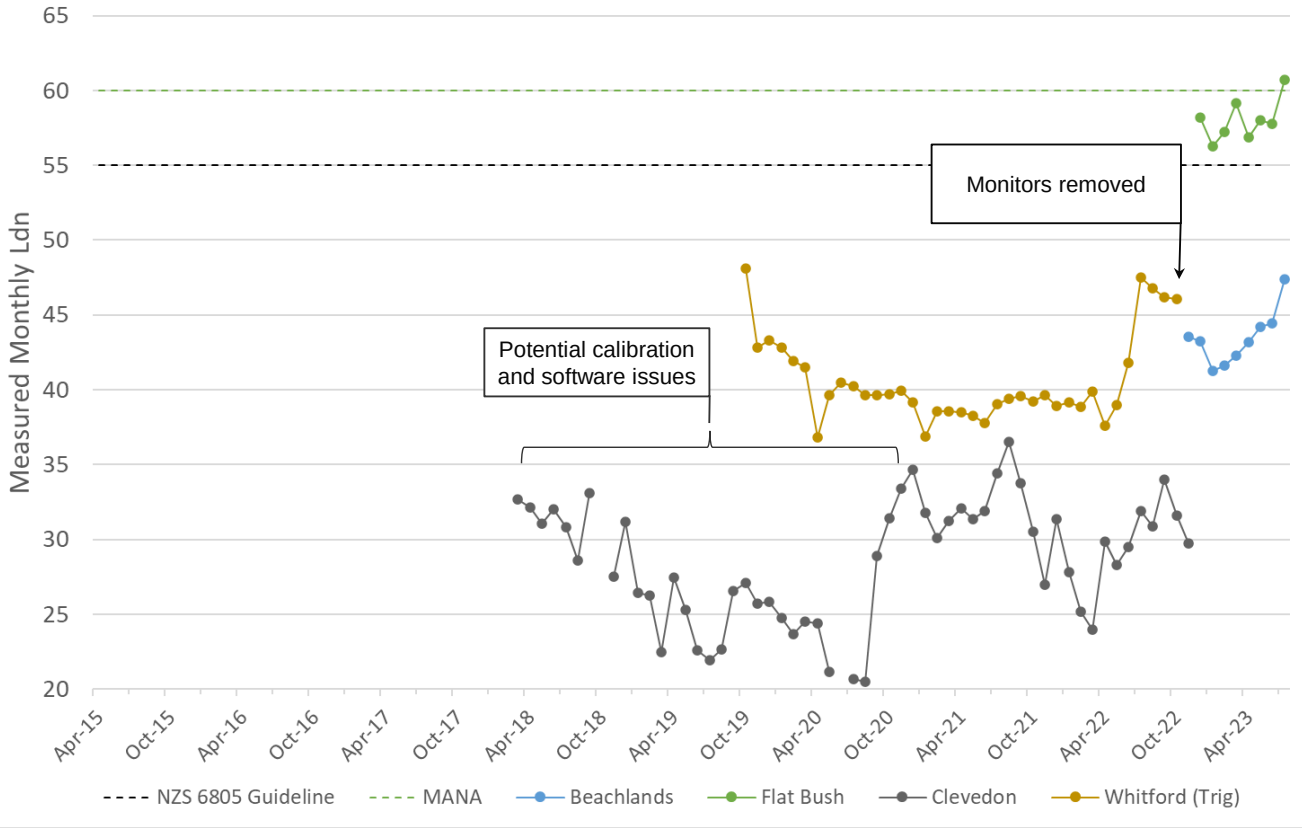


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Figure 28 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitors in East Auckland since their deployment.

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 Ldn for aircraft noise ranges from 41-61 dB L_{dn} per month across the current Eastern Suburb monitor locations.

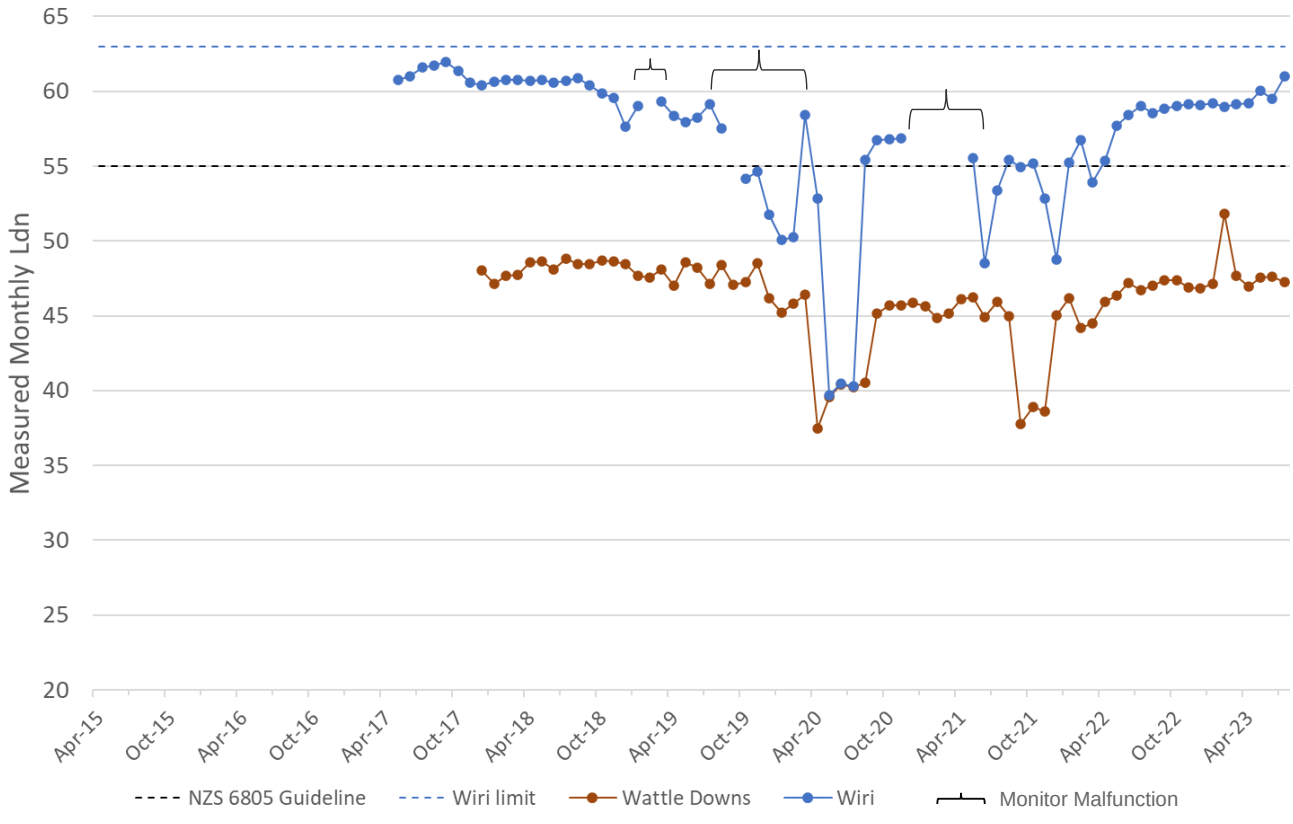
New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB L_{dn} are suitable for residential development.

The noise level measured at the Beachlands noise monitor is 11 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 year, but the data captured is included for reference.

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



37

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.

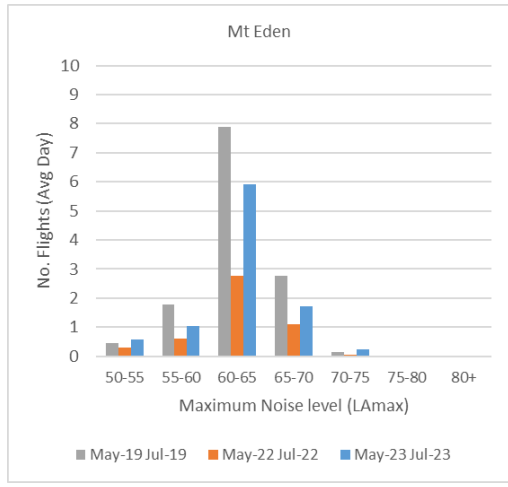
New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB L_{dn} are suitable for residential development.

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 0 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.

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Figure 30 shows the average daily number of aircraft that overflew the Mt Eden noise monitor in each noise band in the three-month period May 2023 to July 2023 (blue bars), the same quarter last year (orange bars), and the same quarter from 2019 (grey bars).

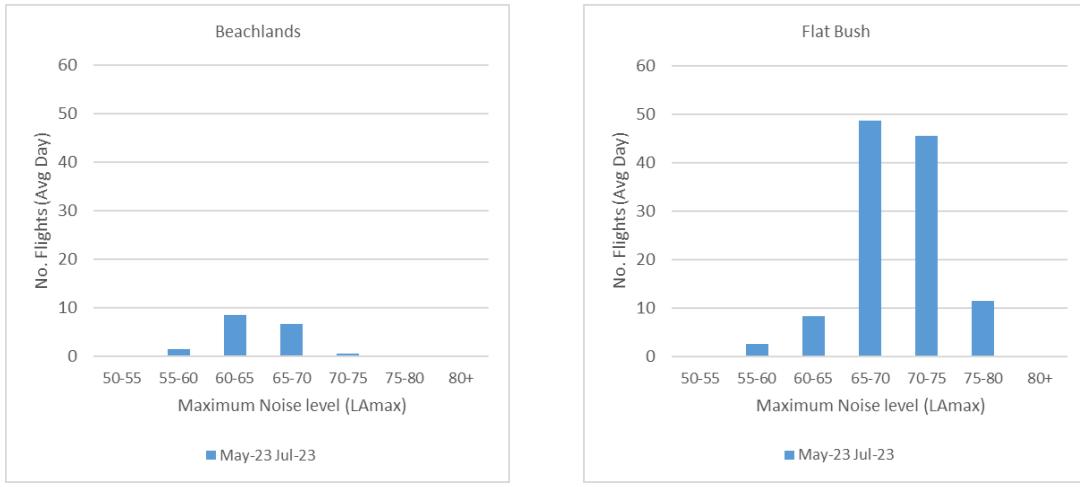
We note that the Mt Wellington monitor is no longer deployed, so Mt Eden is the only active monitor in the Central Suburbs.

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.

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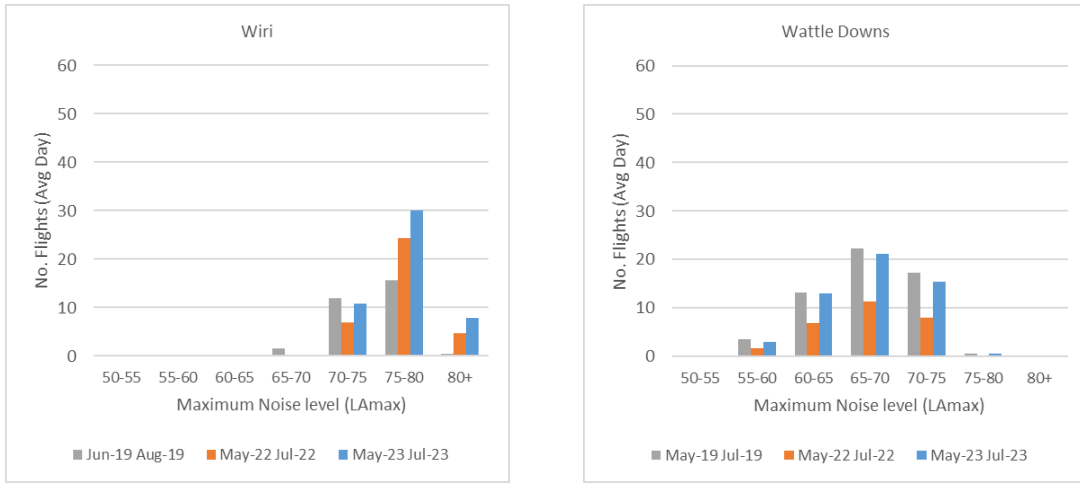
Figure 31 shows the average daily number of aircraft that overflew each of the Eastern Suburbs temporary noise monitors in each noise band in the three-month period May 2023 to July 2023. These monitors are both newly installed late last year so have no data from previous years for comparison.

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

The Flat Bush monitor recorded approximately 57 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.

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Figure 32 shows the average daily number of aircraft that overflew the Southern Suburbs temporary noise monitors in each noise band in the three-month period May 2023 to July 2023 (blue bars), the same quarter last year (orange bars), and the same quarter from 2019 (grey bars).

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

The Wiri and Wattle Downs monitors recorded approximately 49 and 16 flyovers per day above 70 dB L_{amax} respectively.


Engine Testing

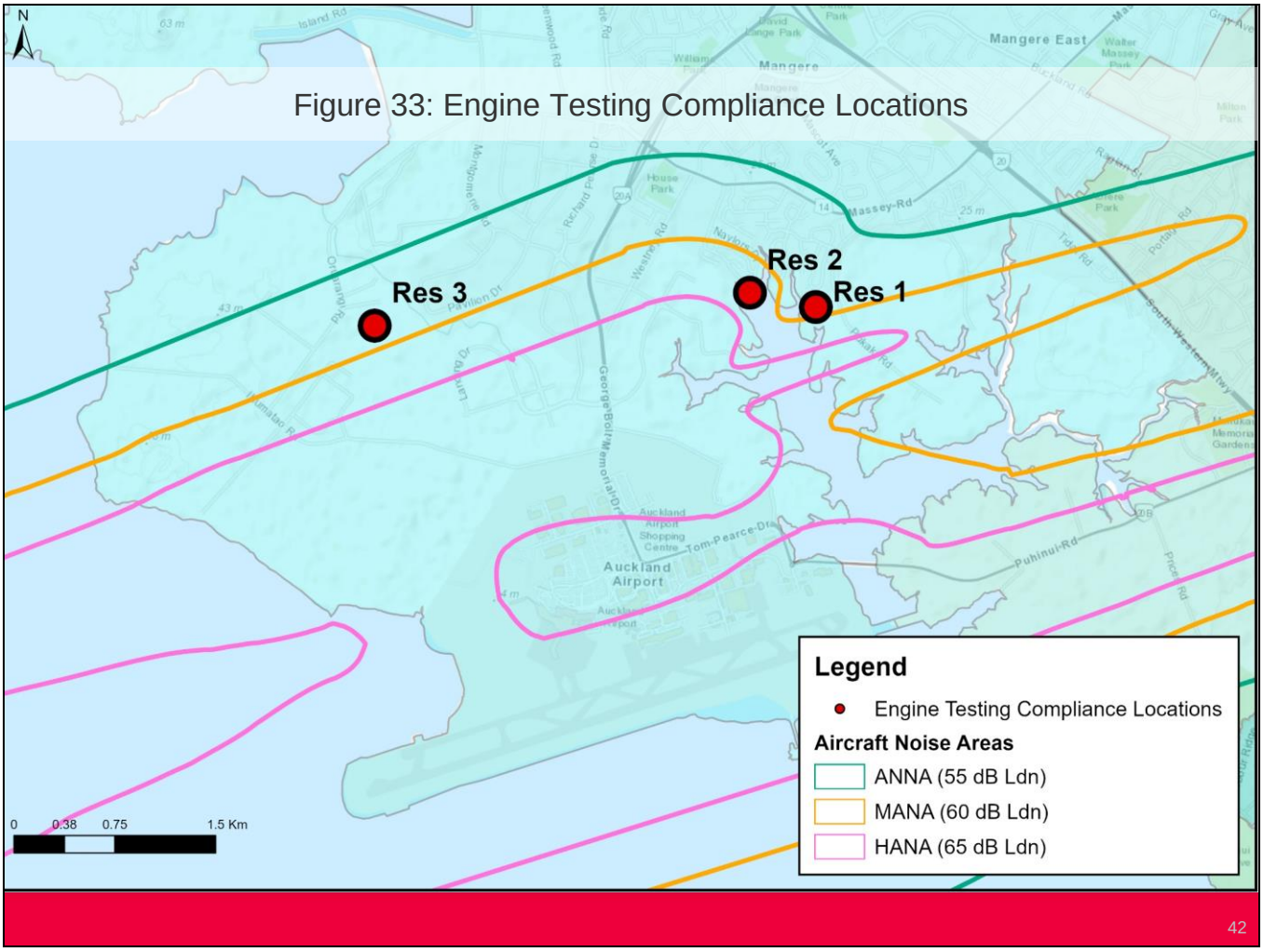
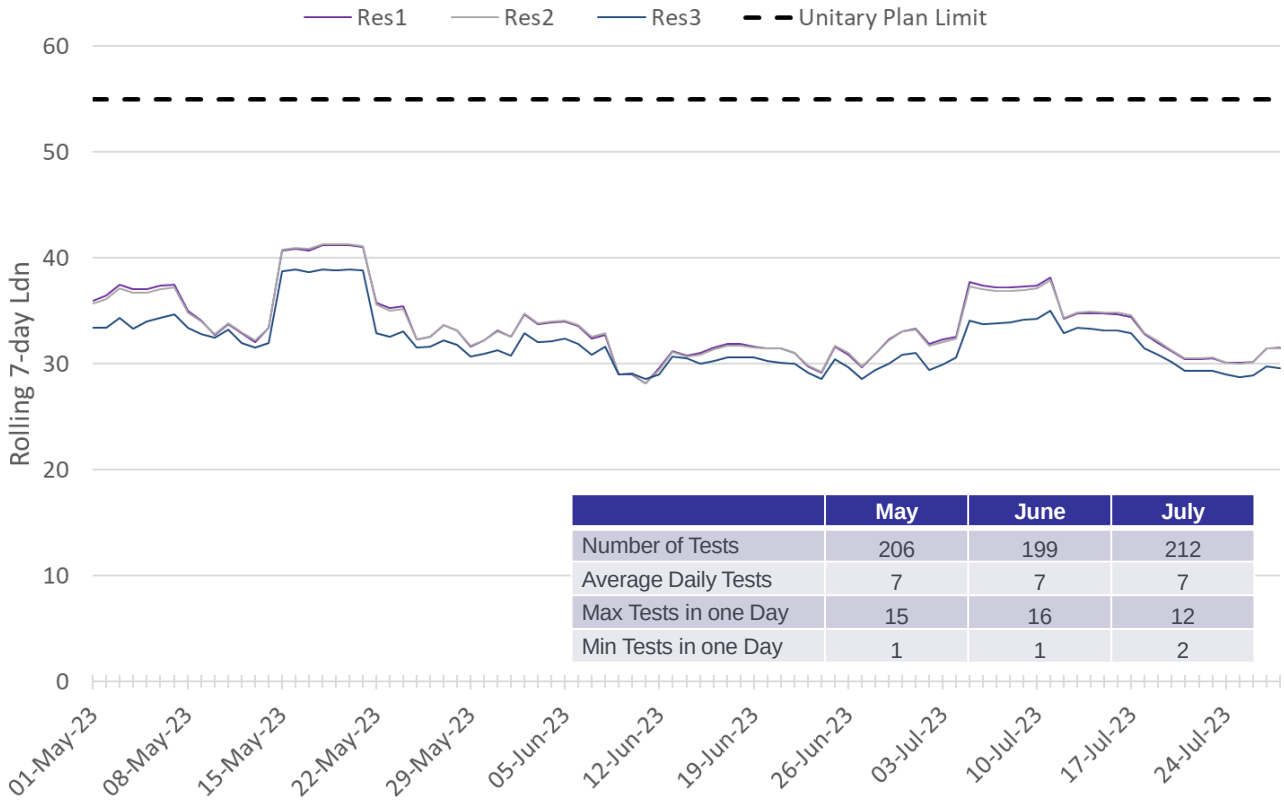


Figure 33 shows the three locations where compliance with the engine testing noise rule is calculated.

Figure 34: Engine Testing Summary



	May	June	July
Number of Tests	206	199	212
Average Daily Tests	7	7	7
Max Tests in one Day	15	16	12
Min Tests in one Day	1	1	2

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

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	Occurs in Westerly Wind Conditions  Occurs in Easterly Wind Conditions 
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	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_{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

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Appendix C: Suburbs by Area

Suburb	Area
Alfriston	South Auckland
Anawhata	West Auckland
Arkles Bay	North Shore
Auckland	Central Suburbs
Auckland Central	Central Suburbs
Avondale	West Auckland
Beachlands	East Auckland
Birkdale	North Shore
Birkenhead	North Shore
Blockhouse Bay	West Auckland
Botany Downs	East Auckland
Bucklands Beach	East Auckland
Chatswood	North Shore
Clendon Park	South Auckland
Clevedon	South Auckland
Clover Park	South Auckland
Coatesville	North Shore
Cockle Bay	East Auckland
Cornwallis	West Auckland
Drury	South Auckland
East Tāmaki	East Auckland
East Tāmaki Heights	East Auckland
Ellerslie	Central Suburbs
Epsom	Central Suburbs
Farm Cove	East Auckland
Flat Bush	East Auckland
Forrest Hill	North Shore
Glendowie	Central Suburbs
Glenfield	North Shore
Goodwood Heights	South Auckland

Suburb	Area
Grafton	Central Suburbs
Greenhithe	North Shore
Greenlane	Central Suburbs
Grey Lynn	Central Suburbs
Gulf Harbour	North Shore
Half Moon Bay	East Auckland
Hauraki	North Shore
Henderson	West Auckland
Henderson Valley	West Auckland
Herne Bay	Central Suburbs
Howick	East Auckland
Huntly	Not in Auckland
Hunua	South Auckland
Karaka	South Auckland
Kohimarama	Central Suburbs
Laingholm	West Auckland
Long Bay	North Shore
Lynfield	Central Suburbs
Mangere	South Auckland
Mangere Bridge	South Auckland
Mangere East	South Auckland
Manukau	South Auckland
Manukau Heads	South Auckland
Manurewa	South Auckland
Massey	West Auckland
Meadowbank	Central Suburbs
Mellons Bay	East Auckland
Milford	North Shore
Mission Bay	Central Suburbs
Mount Albert	Central Suburbs

Suburb	Area
Mount Eden	Central Suburbs
Mount Roskill	Central Suburbs
Mount Wellington	Central Suburbs
Muriwai	West Auckland
Newmarket	Central Suburbs
Northcote Point	North Shore
Northcross	North Shore
Northpark	South Auckland
One Tree Hill	Central Suburbs
Onehunga	Central Suburbs
Oneroa	Central Suburbs
Onewhero	Not in Auckland
Orakei	Central Suburbs
Oratia	West Auckland
Otahuhu	South Auckland
Otara	South Auckland
Pakuranga	East Auckland
Pakuranga Heights	East Auckland
Panmure	Central Suburbs
Papakura	South Auckland
Papatoetoe	South Auckland
Parnell	Central Suburbs
Patumahoe	South Auckland
Point Chevalier	Central Suburbs
Point England	Central Suburbs
Pollok	South Auckland
Ponsonby	Central Suburbs
Randwick Park	South Auckland
Ranui	West Auckland
Remuera	Central Suburbs

Suburb	Area
Rothesay Bay	North Shore
Royal Oak	Central Suburbs
Saint Andrews	Central Suburbs
Saint Heliers	Central Suburbs
Saint Johns	Central Suburbs
Saint Marys Bay	Central Suburbs
Sandringham	Central Suburbs
Shamrock Park	East Auckland
Shelly Park	South Auckland
Silverdale	North Shore
Snells Beach	North Shore
Somerville	South Auckland
Stanley Point	North Shore
Sunnyhills	East Auckland
Takanini	South Auckland
Te Atatu South	West Auckland
Titirangi	West Auckland
Totara Heights	South Auckland
Totara Vale	South Auckland
Waiheke Island	Central Suburbs
Waitakere	West Auckland
Waiuku	South Auckland
Wattle Downs	South Auckland
Westmere	Central Suburbs
Weymouth	South Auckland
Whanganui	Not in Auckland
Whangaparaoa	North Shore
Whangaripo	North Shore
Whitford	East Auckland
Wiri	South Auckland

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