ANCCG Meeting

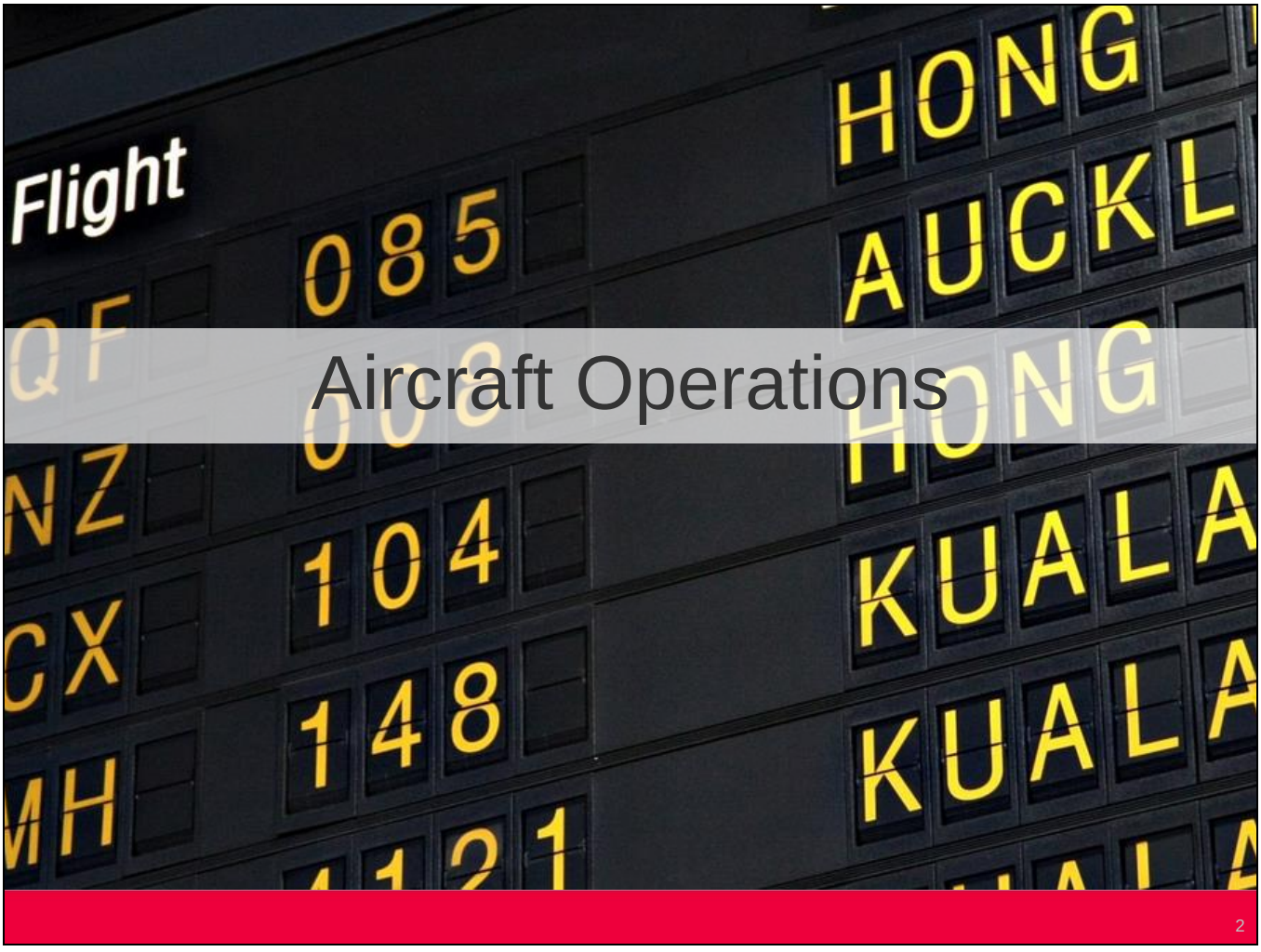
Monitoring Period

May 2022 – July 2022

Meeting: 12 September 2022

MARSHALL DAY Acoustics

NB: Glossary of terminology given in Appendix A



Aircraft Operations

Figure 1: Number of Aircraft Operations per Month

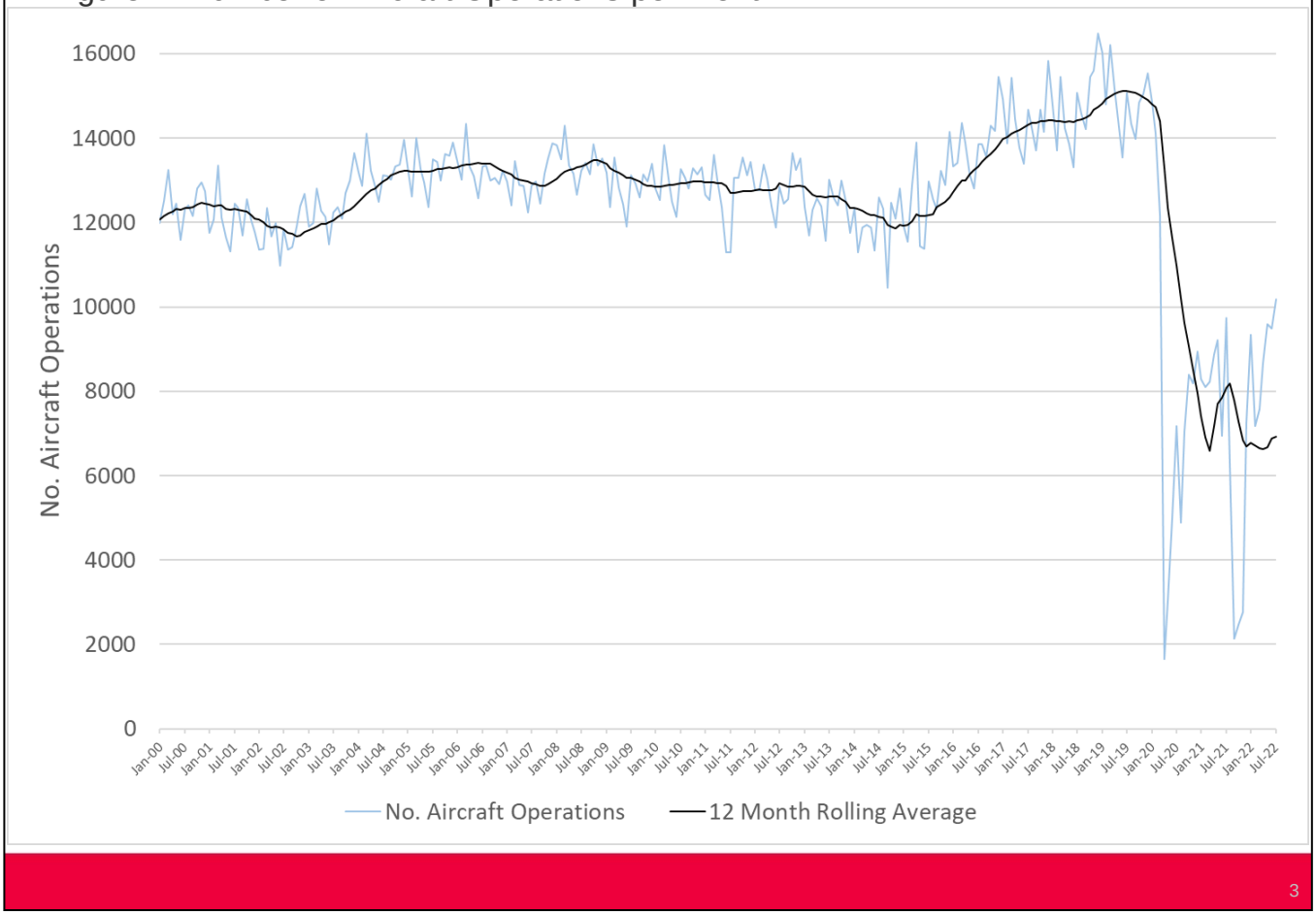


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Figure 1 shows the number of aircraft operations per month since the year 2000 (blue line) and the 12-month rolling average (black line).

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 May 2022 to July 2022 has increased by 13% when compared to the same period last year, due to the continued relaxation of pandemic restrictions. Aircraft operations for this period in 2022 are down 32% from operations in the same period in 2019 (pre-pandemic).

Daytime operations have increased by 10% and night-time operations have increased by 41% when compared to the same (pandemic affected) period last year.

Table 1: Summary of Aircraft Operations

Operation	Total	Day	Night
Arrivals	15,372	13,320	2,052
Departures	13,864	12,782	1,082
Circuit	19	14	5
Total	**29,255**	**26,116**	**3,139**

Table 2: Average Daily Aircraft Operations

Total	Day	Night
318	284	34

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Table 1 shows a breakdown of aircraft operations in the three-month period May 2022 to July 2022.

Table 2 shows that there were on average 318 aircraft operations that occurred per day (24-hour period), 34 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

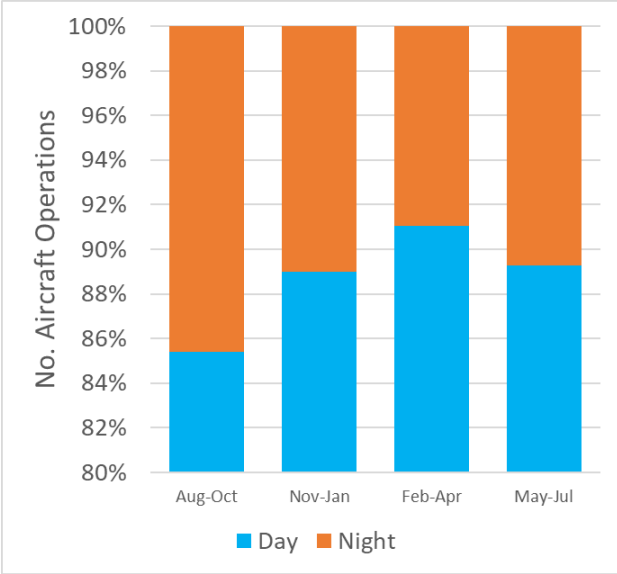

Figure 3: Aircraft Operations by Aircraft Type

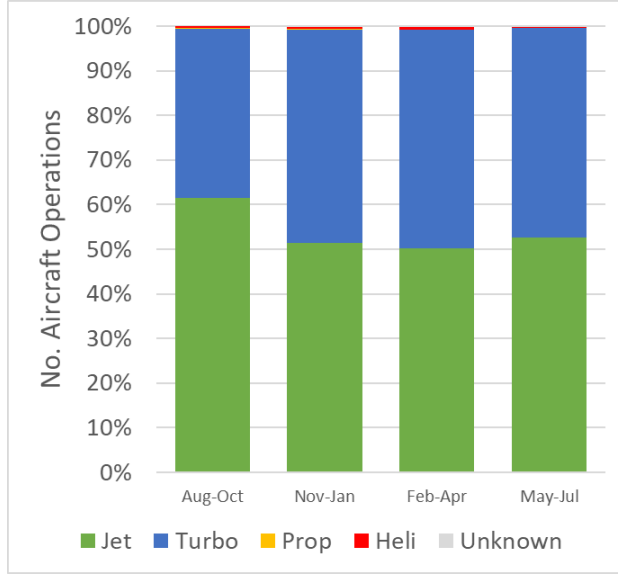

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Figure 2 shows the breakdown of aircraft operations by time of day for this three-month period May 2022 to July 2022 and the three quarters preceding.

For this period 89% of aircraft operations occurred in the daytime between 7am and 10pm and 11% 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 53% of aircraft operations were jets with 47% 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

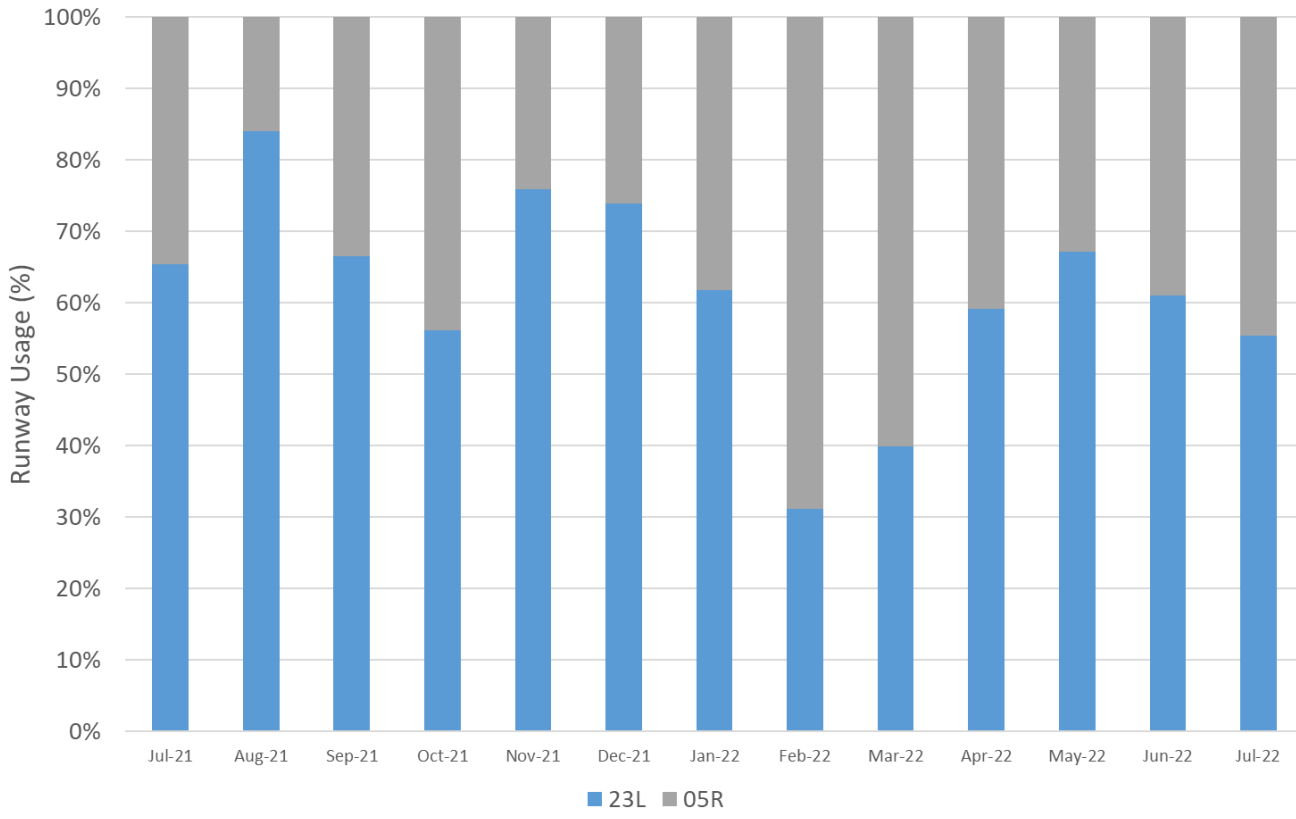

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Figure 4 shows the percentage of aircraft operations that used each runway (23L and 05R) over the past 13 months.

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 2022 to July 2022 was RW23L 61%/RW05R 39%.

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

Figure 5: Number of SMART Approaches per week

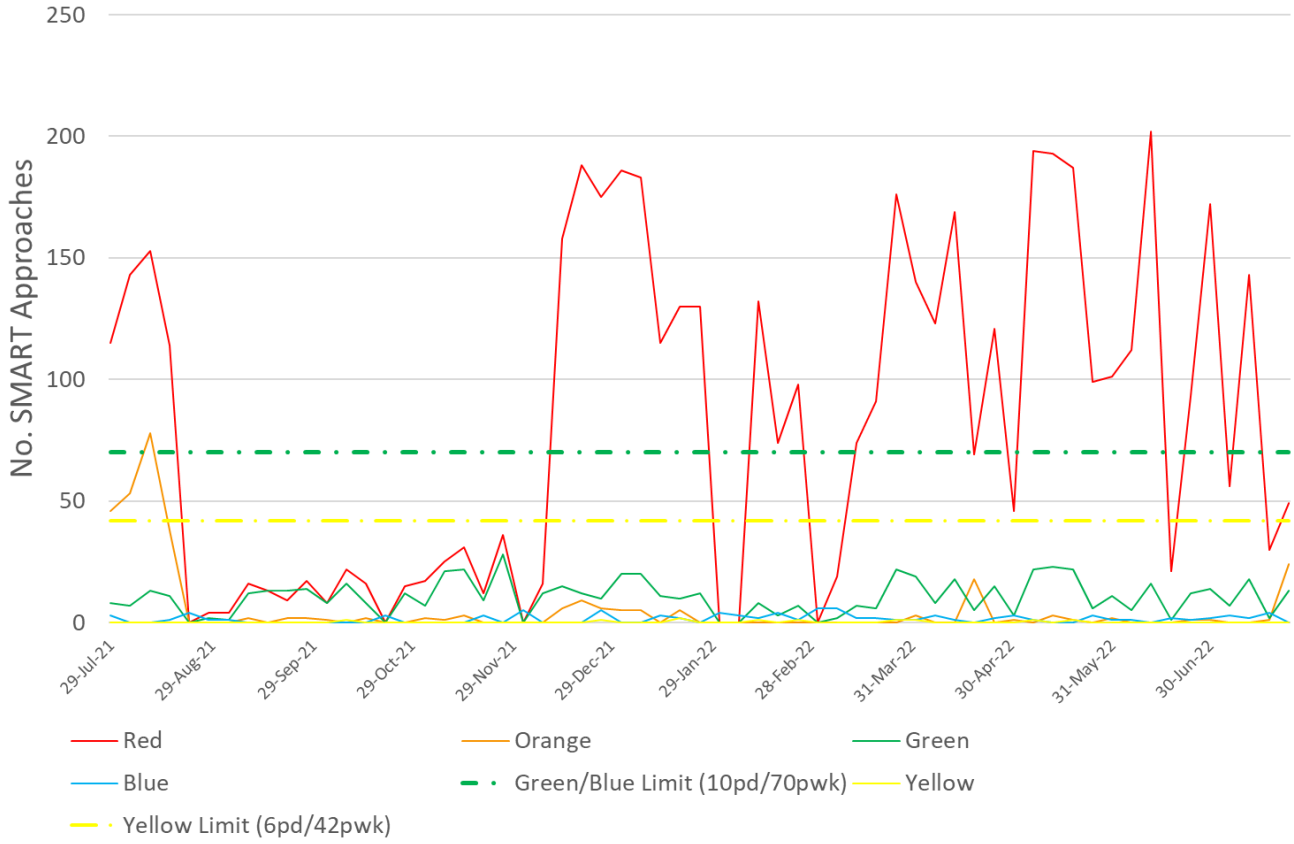

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Figure 5 shows the number of SMART flights flown per week in the past 12 months.

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.

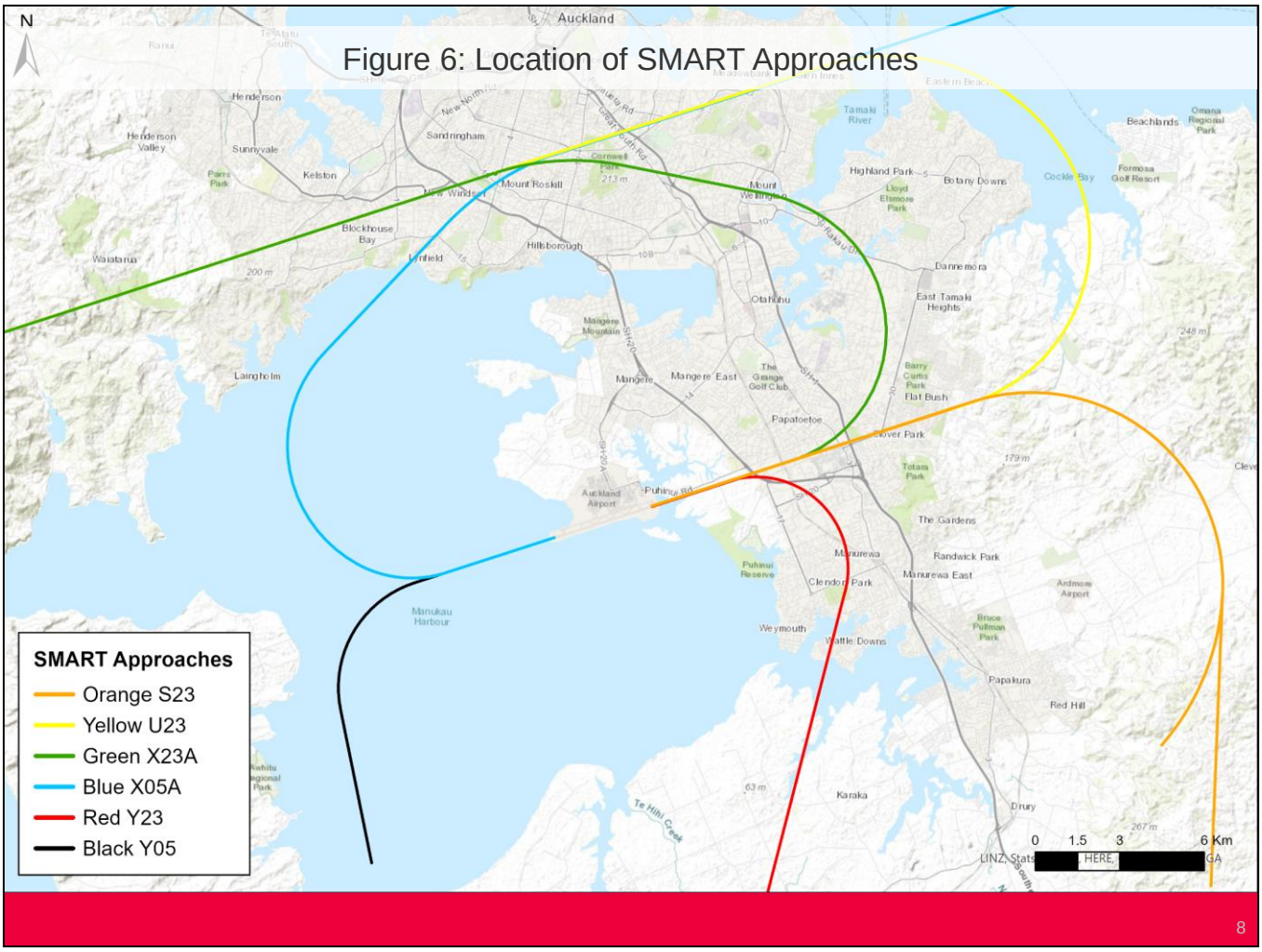

Figure 6 shows the location of the SMART approach flight paths.

Flight Path Diagrams

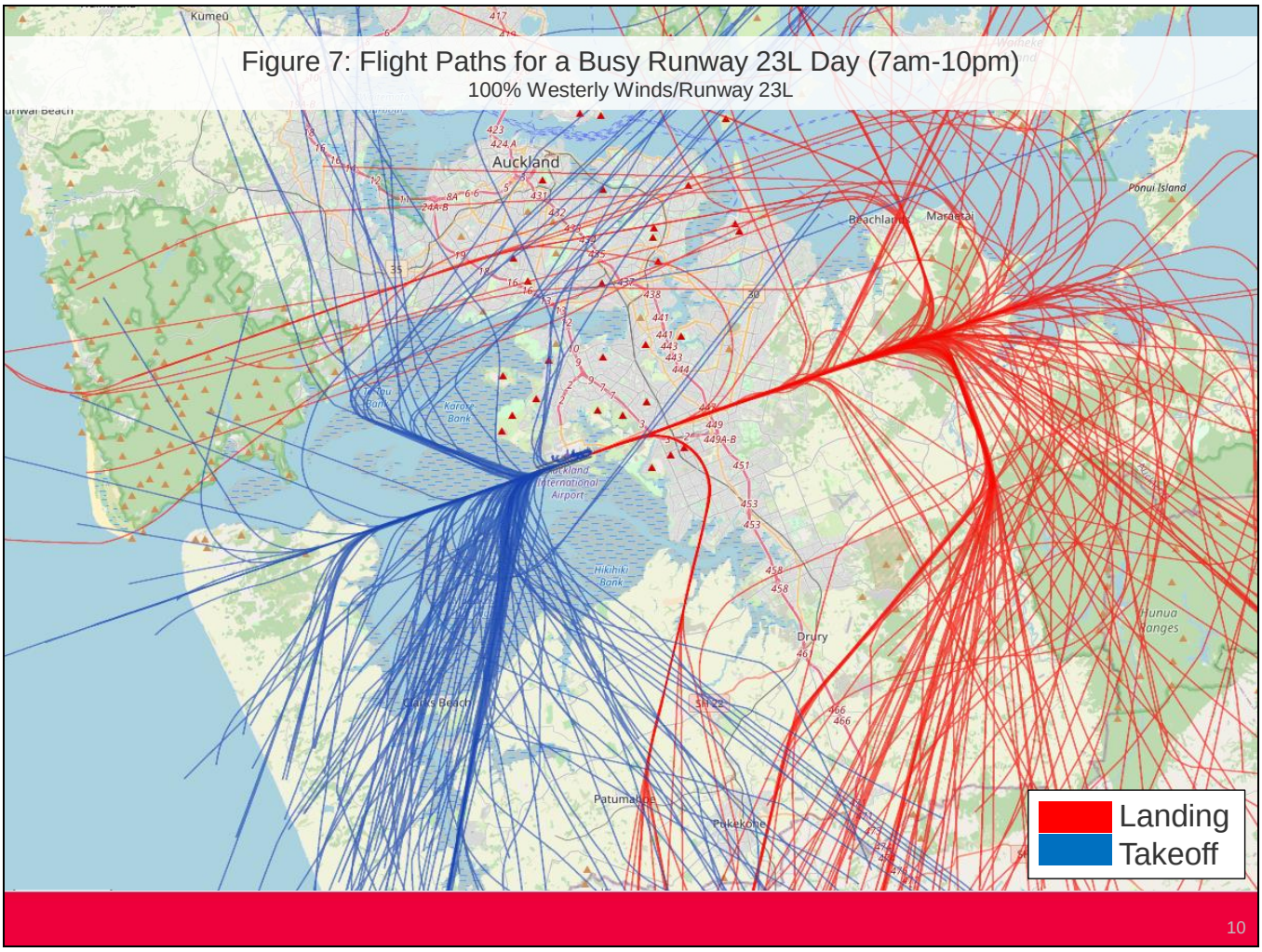

Figure 7 shows the daytime (7am-10pm) flight paths for Friday 3 June 2022, the busiest day in the three-month period May 2022 to July 2022 when Runway 23L was primarily in use.

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 333 daytime Runway 23L flights on this day.

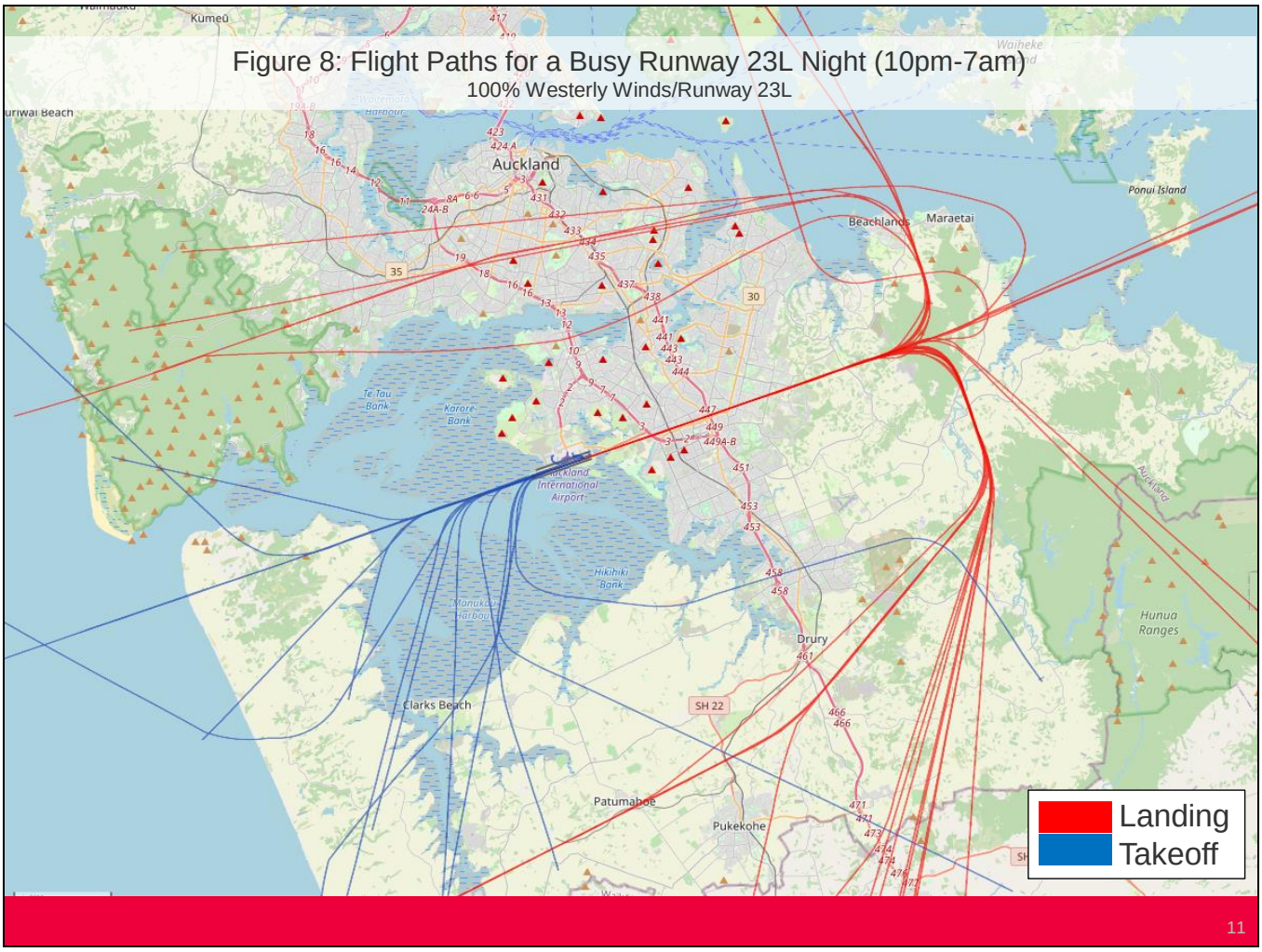

Figure 8 shows the night-time (10pm-7am) flight paths for Friday 3 June 2022, the busiest day in the three-month period May 2022 to July 2022 when Runway 23L was primarily in use.

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

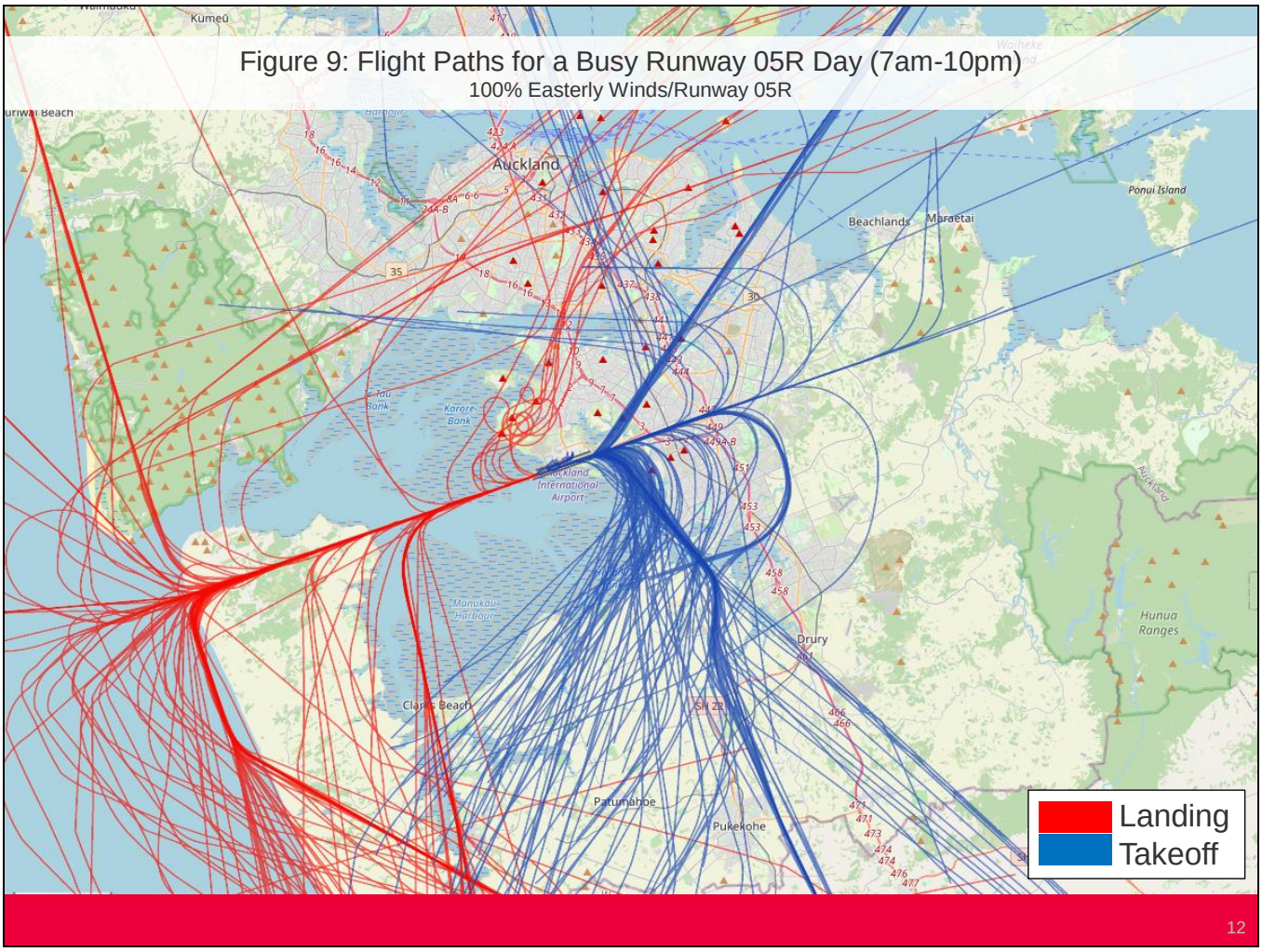

Figure 9 shows the daytime (7am-10pm) flight paths for Friday 24 June 2022, the busiest day in the three-month period May 2022 to July 2022 when Runway 05R was primarily in use.

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 320 daytime Runway 05R flights on this day.

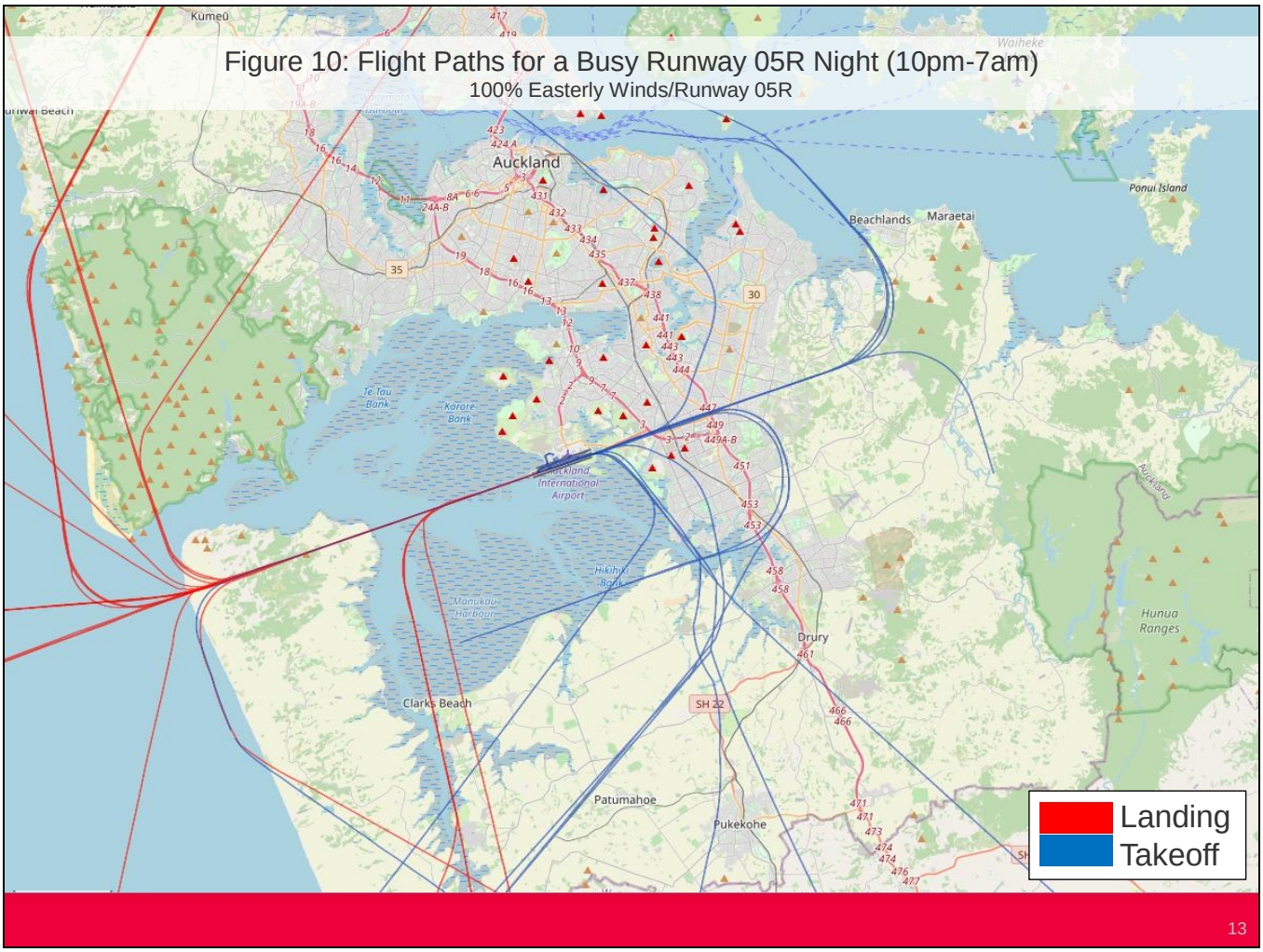

Figure 10 shows the night-time (10pm-7am) flight paths for Friday 24 June 2022, the busiest day in the three-month period May 2022 to July 2022 when Runway 05R was primarily in use.

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 39 night-time Runway 05R flights on this night.

This figure also shows arrivals on RW05R and in one instance a departure on RW23L (i.e. both overflying the Manukau Harbour) being prioritized at night to reduce noise emissions over urban Auckland, as per the Noise Abatement Procedures for the airport.

Noise Complaints

Figure 11: Number of Aircraft Noise Complaints per Month

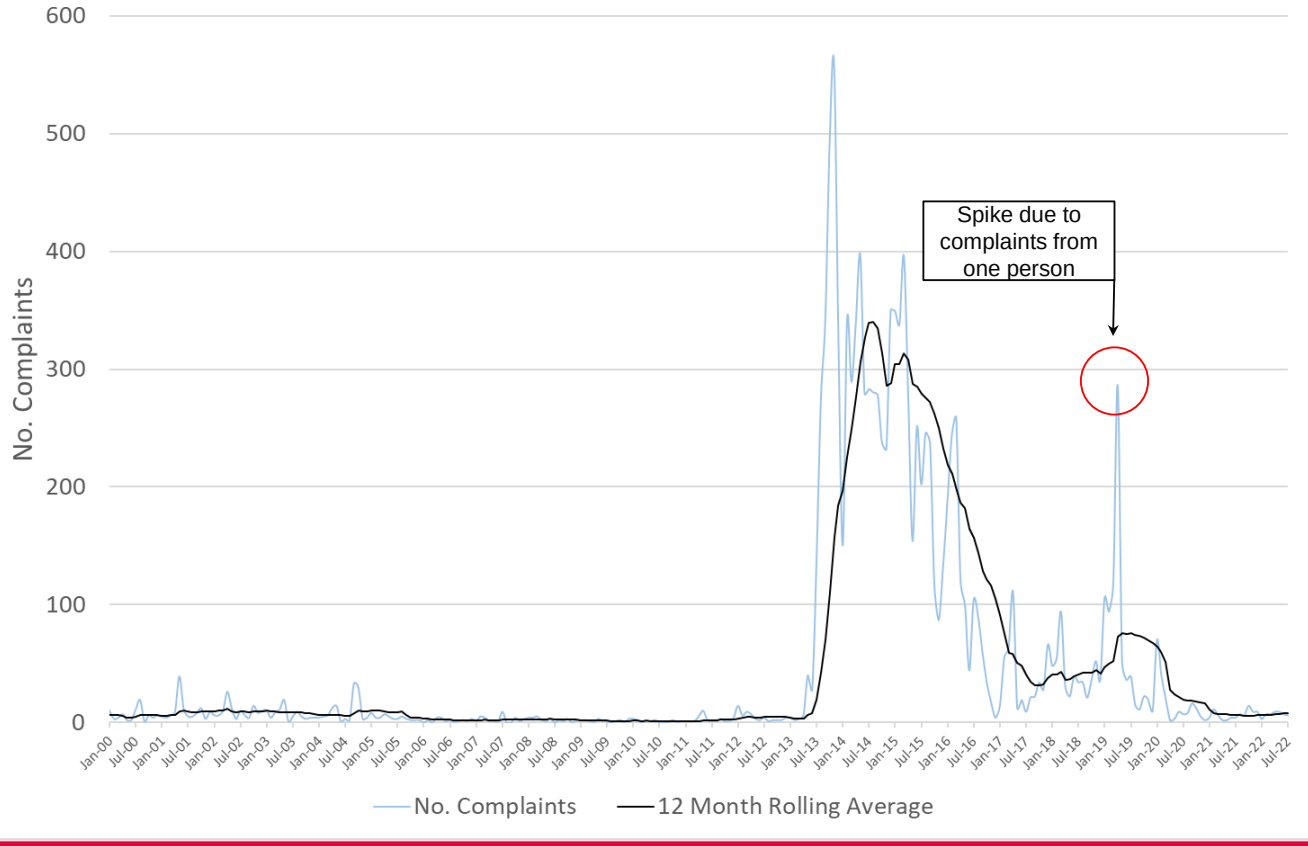

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Figure 11 shows the total number of aircraft noise complaints made per month since the year 2000 (blue line) and the 12-month rolling average (black line).

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 2022 to July 2022 has decreased from 23 to 22 when compared to the same period last year.

Table 3: Summary of Noise Complaints

	May	Jun	Jul	May-Jul	Feb-Apr	Nov-Jan	Aug-Oct
Number of Complaints	9	7	6	22	23	21	27
Specific	*7*	*5*	*6*	*18*	*14*	*17*	*20*
Generic	*1*	*1*	*0*	*2*	*5*	*3*	*7*
Question	*1*	*1*	*0*	*2*	*4*	*1*	*0*
Number of People Complaining	4	2	1	5	8	8	9

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Table 3 shows a breakdown of the noise complaints in the three-month period May 2022 to July 2022 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 22 complaints in this three-month period, 82% related to specific aircraft events, 9% were generic complaints and 9% were question enquiries.

One person from Remuera made 68% (15) of the complaints for the three-month period.

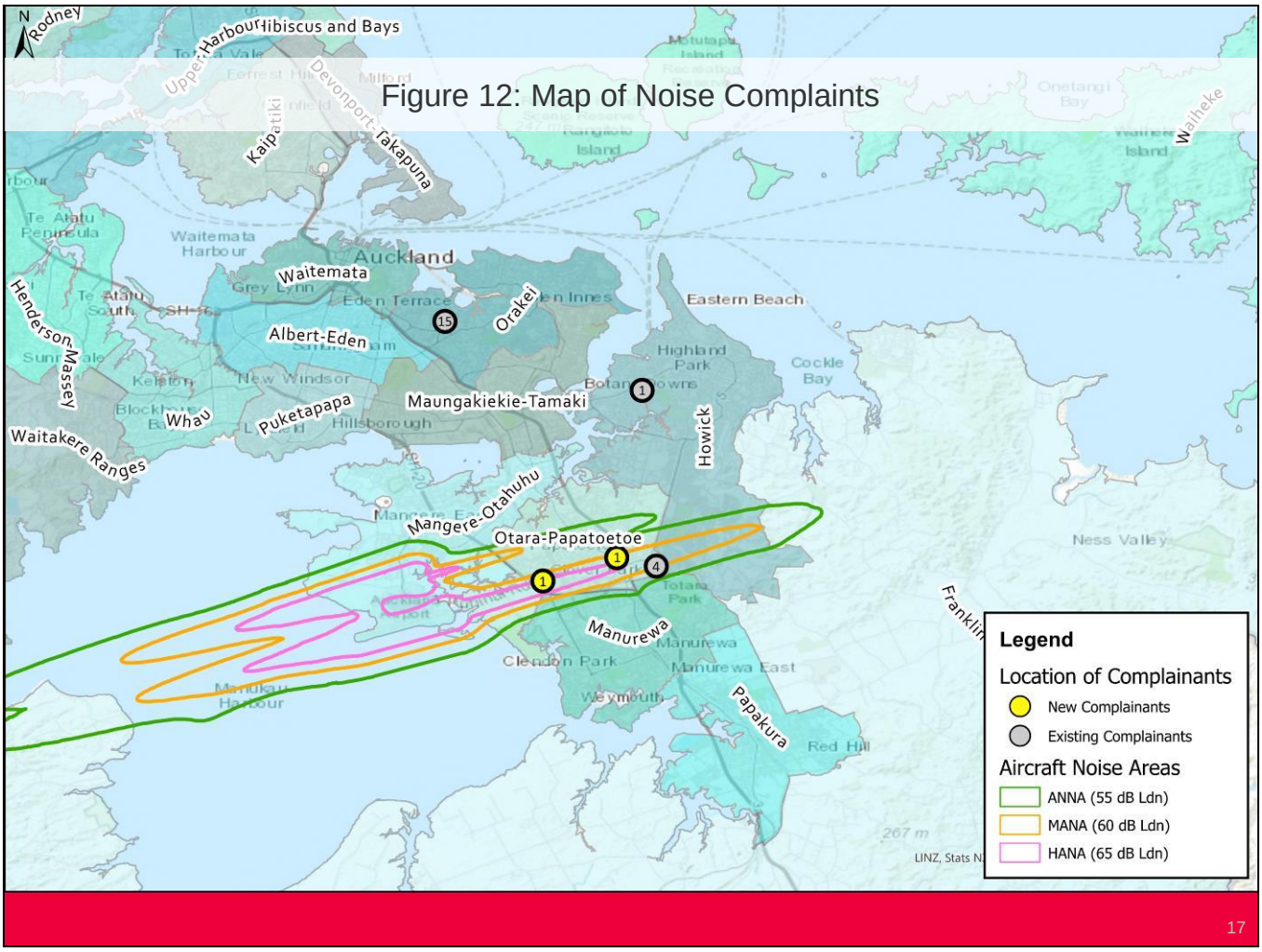

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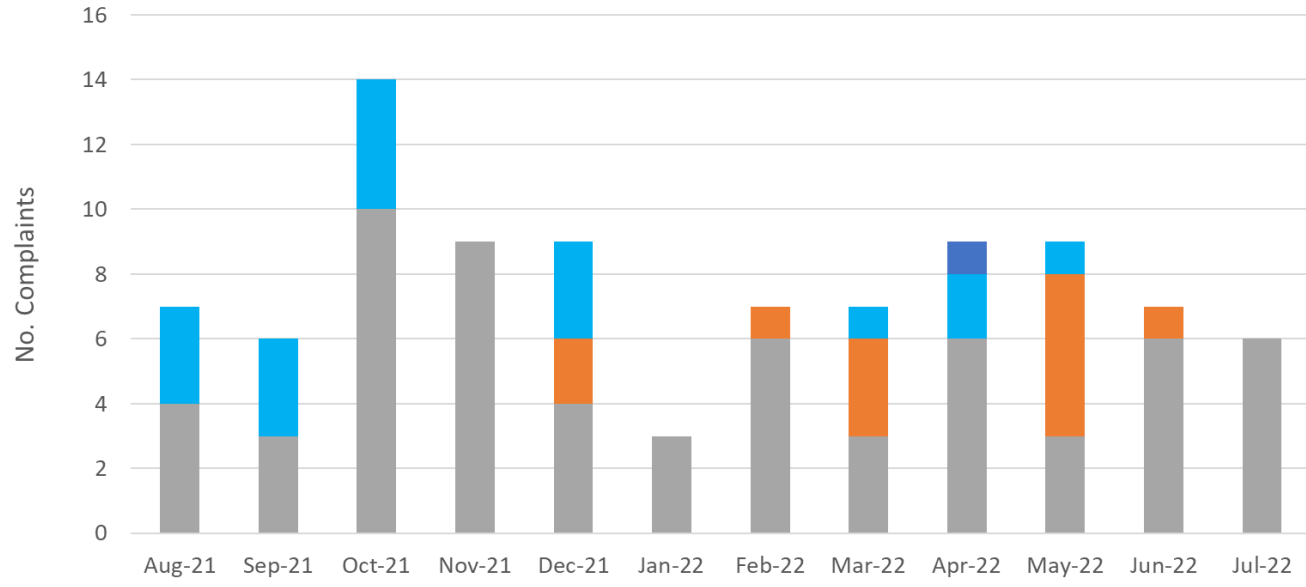
Figure 12 shows a map with the location of each complainant.

Each point represents the location of a person who complained in the three-month period May 2022 to July 2022.

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-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22
Not in Auckland	0	0	0	0	0	0	0	0	0	0	0	0
North Shore	0	0	0	0	0	0	0	0	1	0	0	0
West Auckland	0	0	0	0	0	0	0	0	0	0	0	0
East Auckland	3	3	4	0	3	0	0	1	2	1	0	0
South Auckland	0	0	0	0	2	0	1	3	0	5	1	0
Central Suburbs	4	3	10	9	4	3	6	3	6	3	6	6

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

Central had the most complaints at 15 in the three-month period May 2022 to July 2022.

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

Figure 14: Noise Complaints by Time

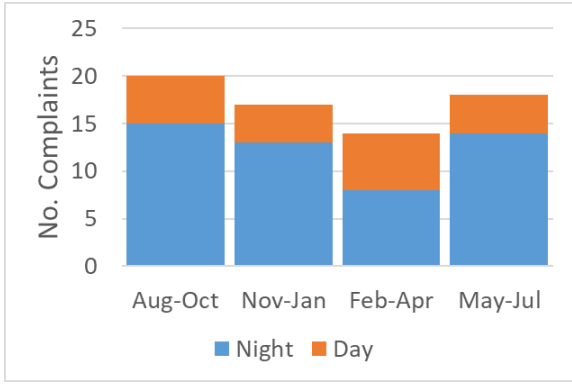


Figure 15: Noise Complaints by Runway

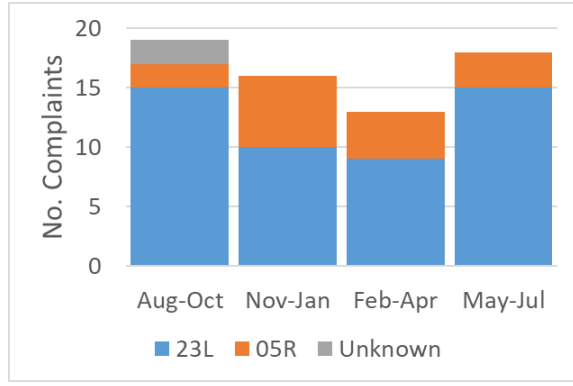


Figure 16: Noise Complaints by Aircraft

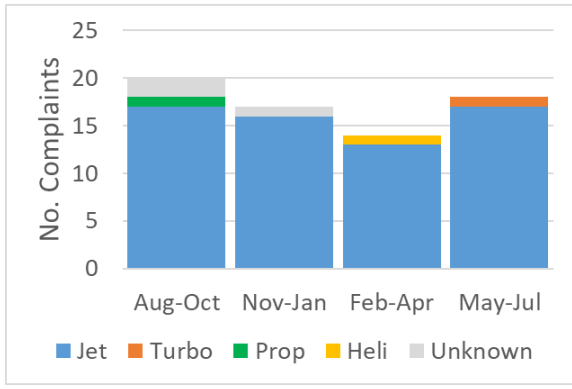
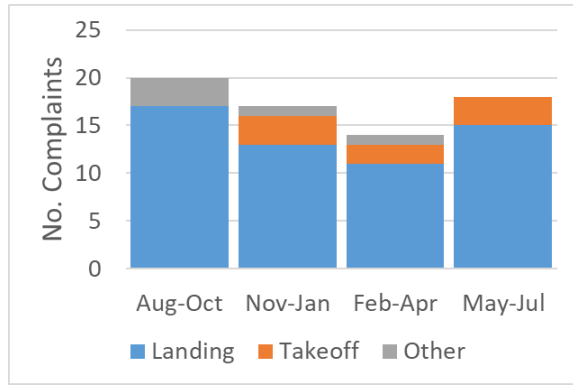


Figure 17: Noise Complaints by Operation



Figures 14-17 show a breakdown of the ‘specific’ aircraft noise complaints made in the three-month period May 2022 to July 2022 and the three quarters preceding.

Figure 18: Specific Noise Complaints by Destination

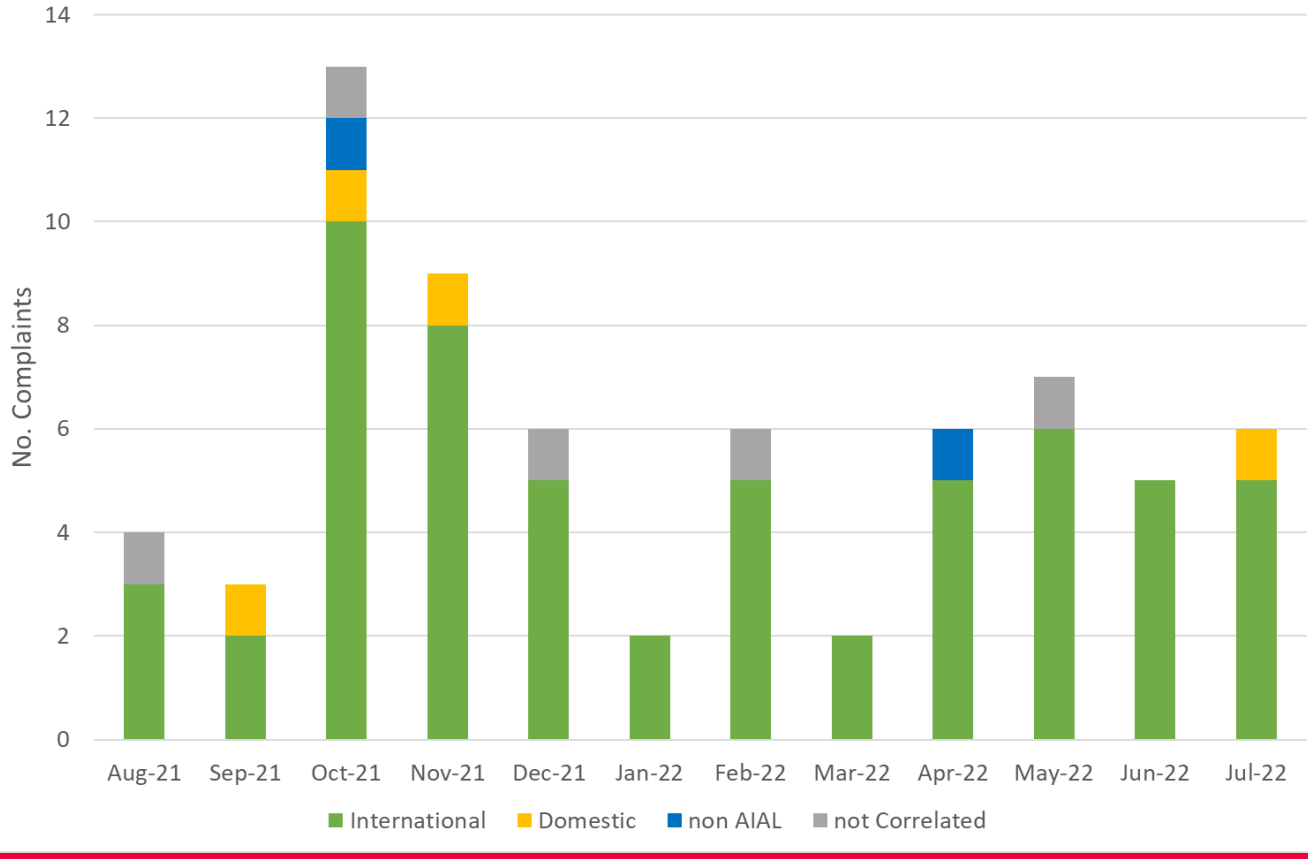


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Figure 18 shows the number of specific aircraft complaints made about international and domestic flights over the past 12 months.

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

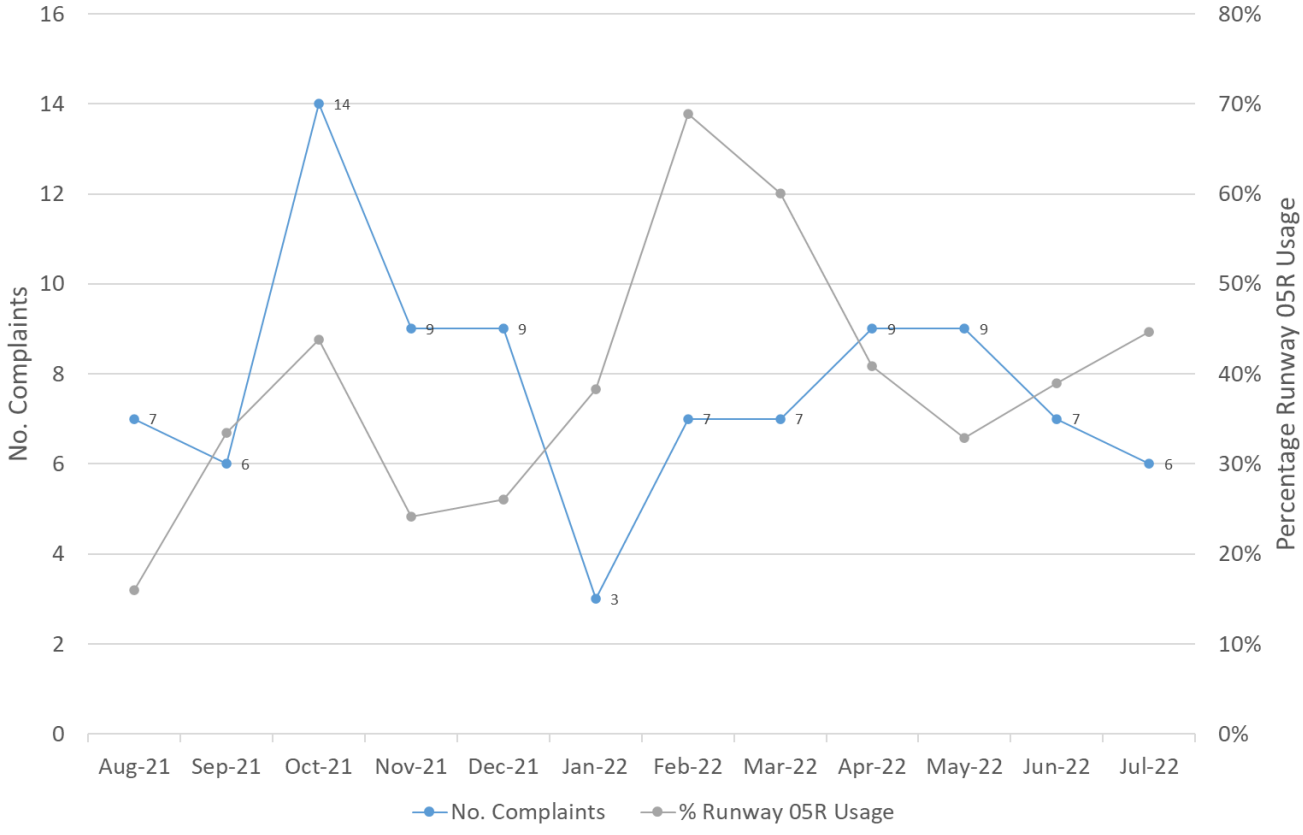

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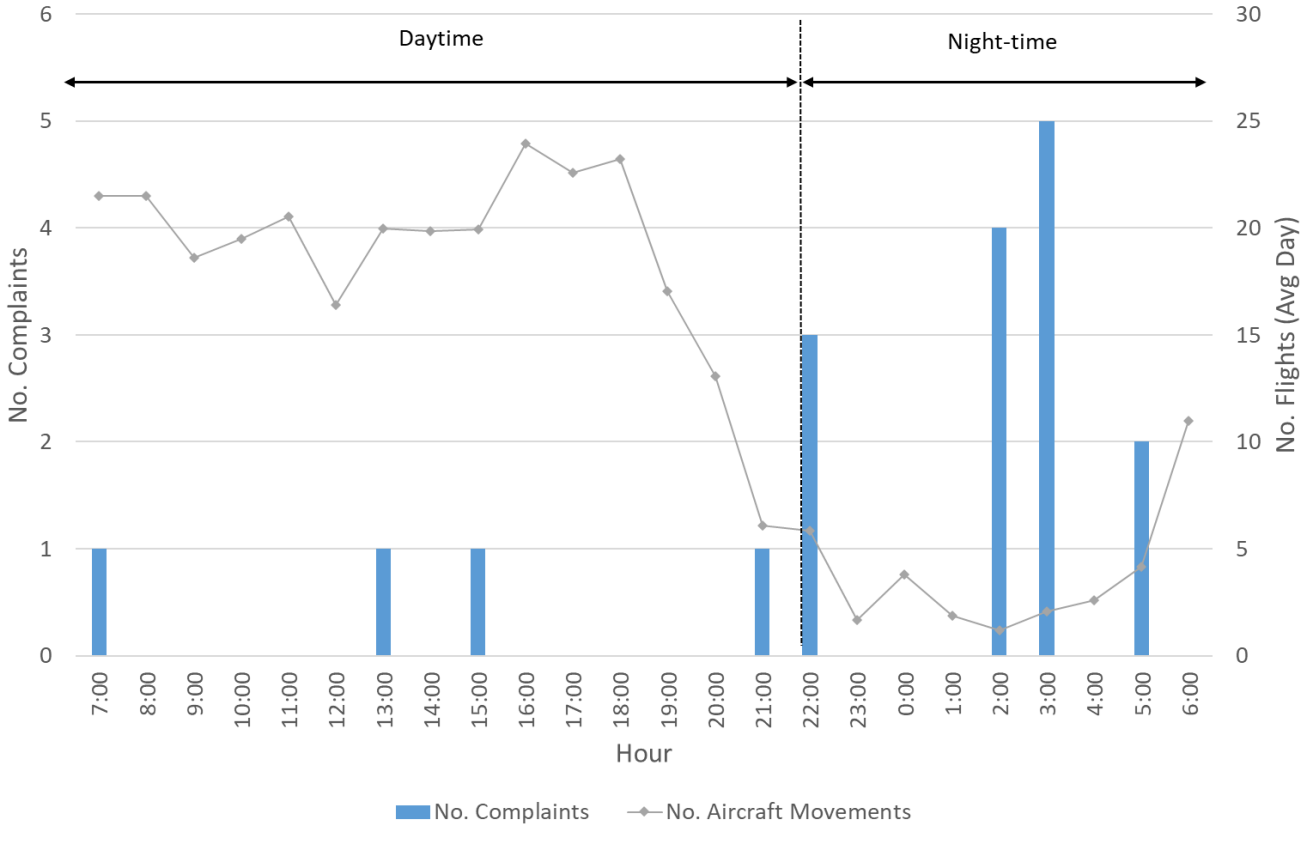
Figure 19 shows the number of specific noise complaints per month received in the past 12 months compared to the usage of Runway 05R.

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 generally a low correlation between runway usage and the number of complaints.

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



22

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 2022 to July 2022.

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

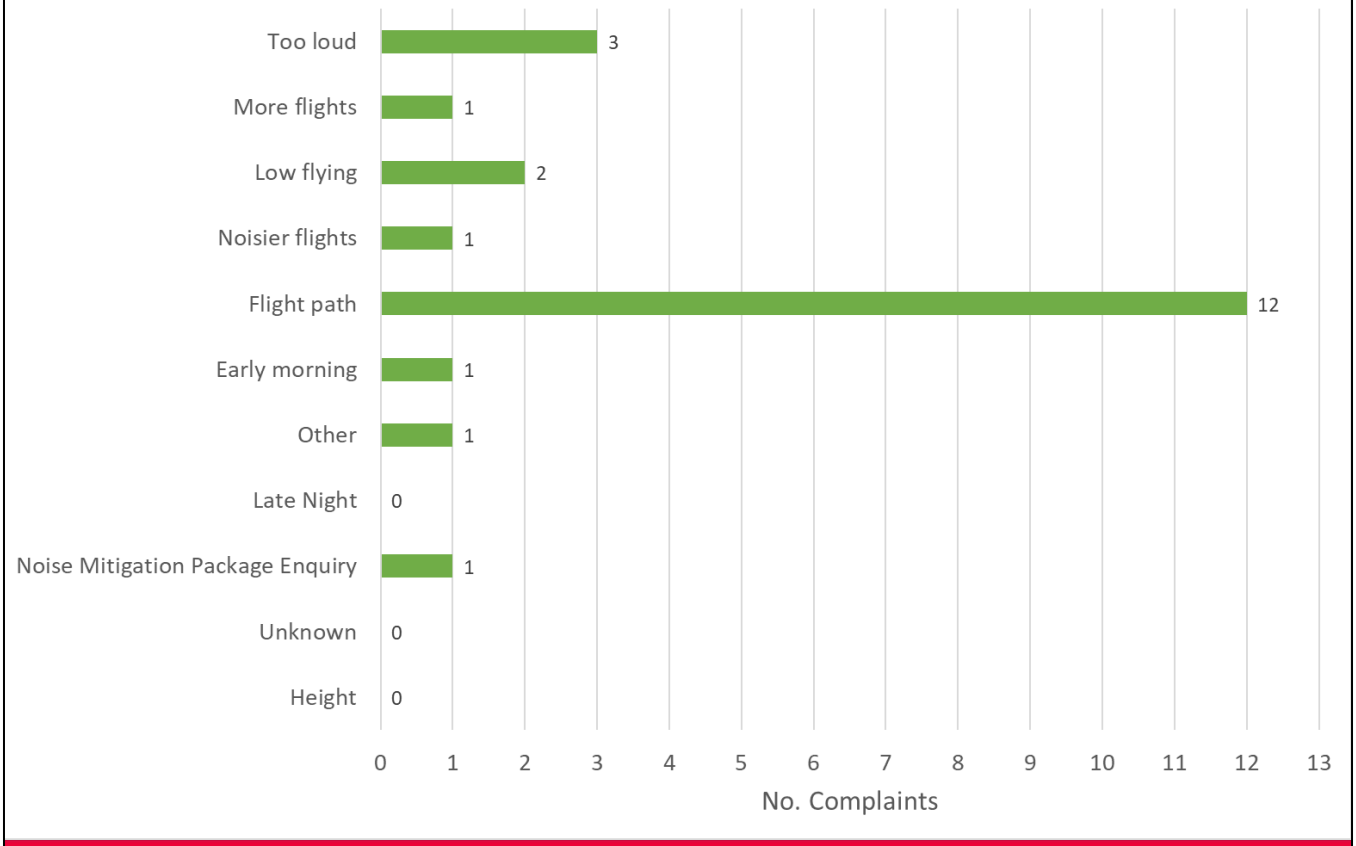


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Figure 21 shows the reason for each noise complaint in the three-month period May 2022 to July 2022. This includes all complaints (generic, question and specific).

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

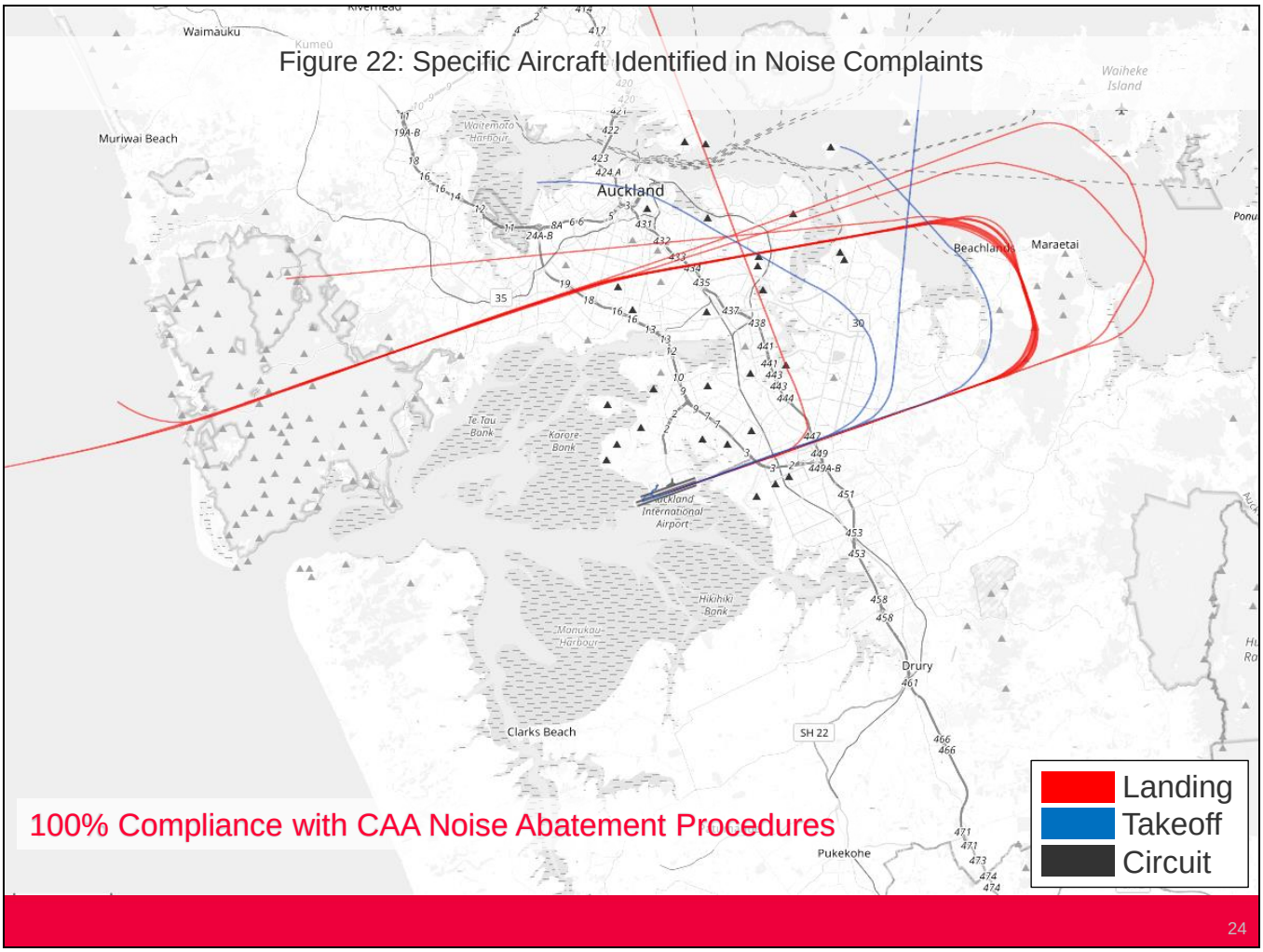


Figure 22 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period May 2022 to July 2022.

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.

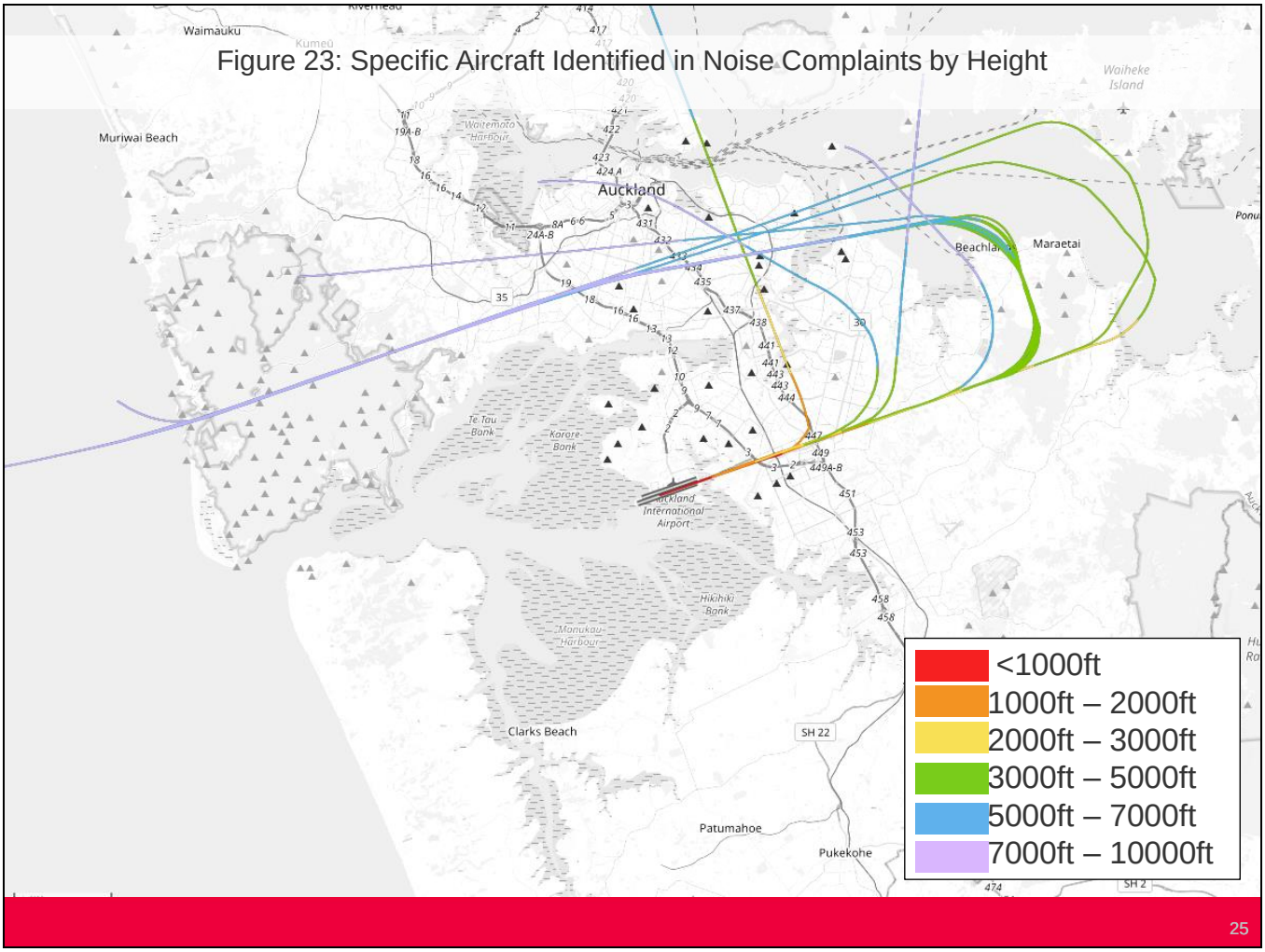
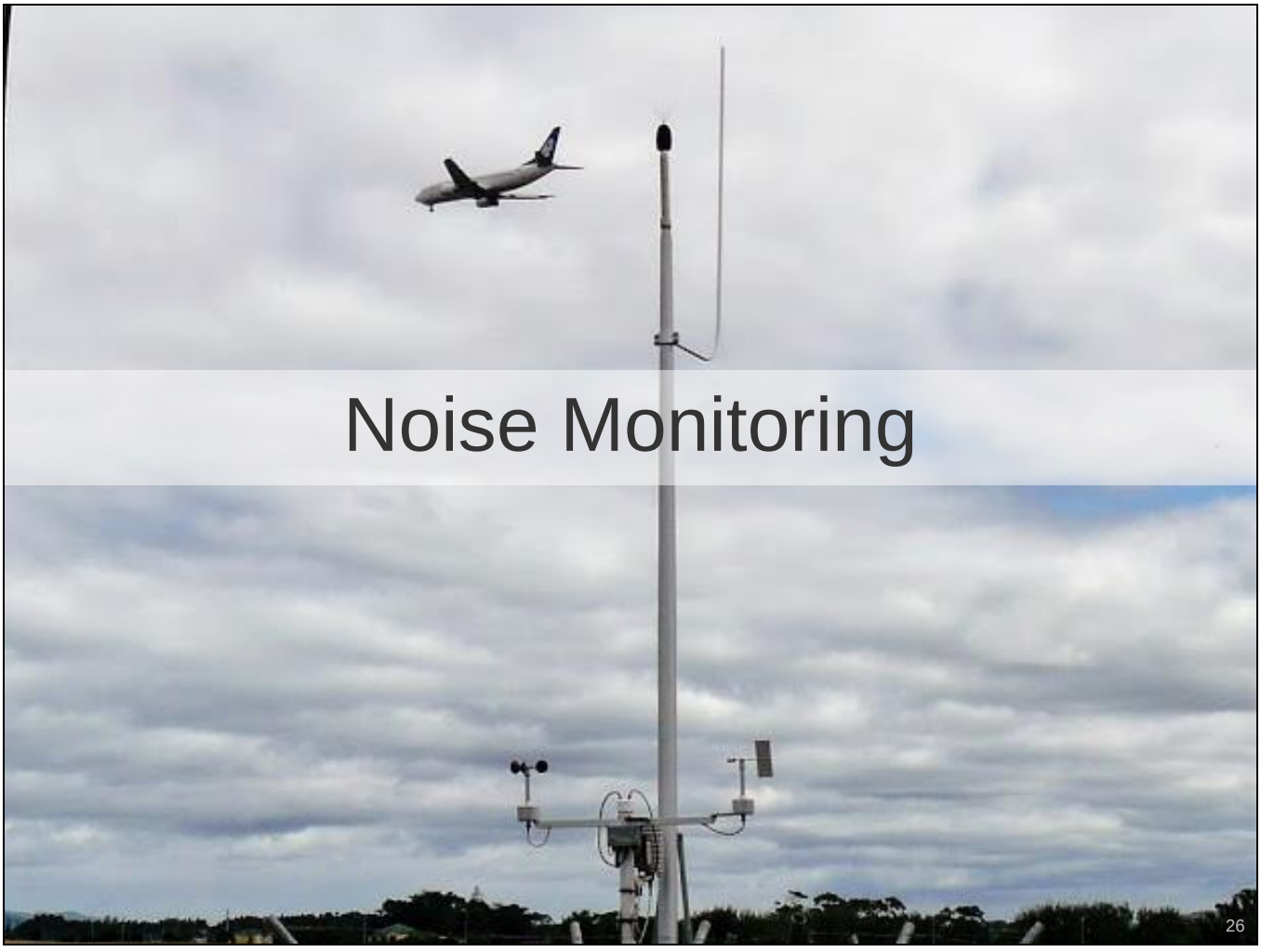


Figure 23 shows the flight paths for specific aircraft from Auckland Airport identified in noise complaints for the three-month period May 2022 to July 2022.

The flight paths are shown in terms of altitude.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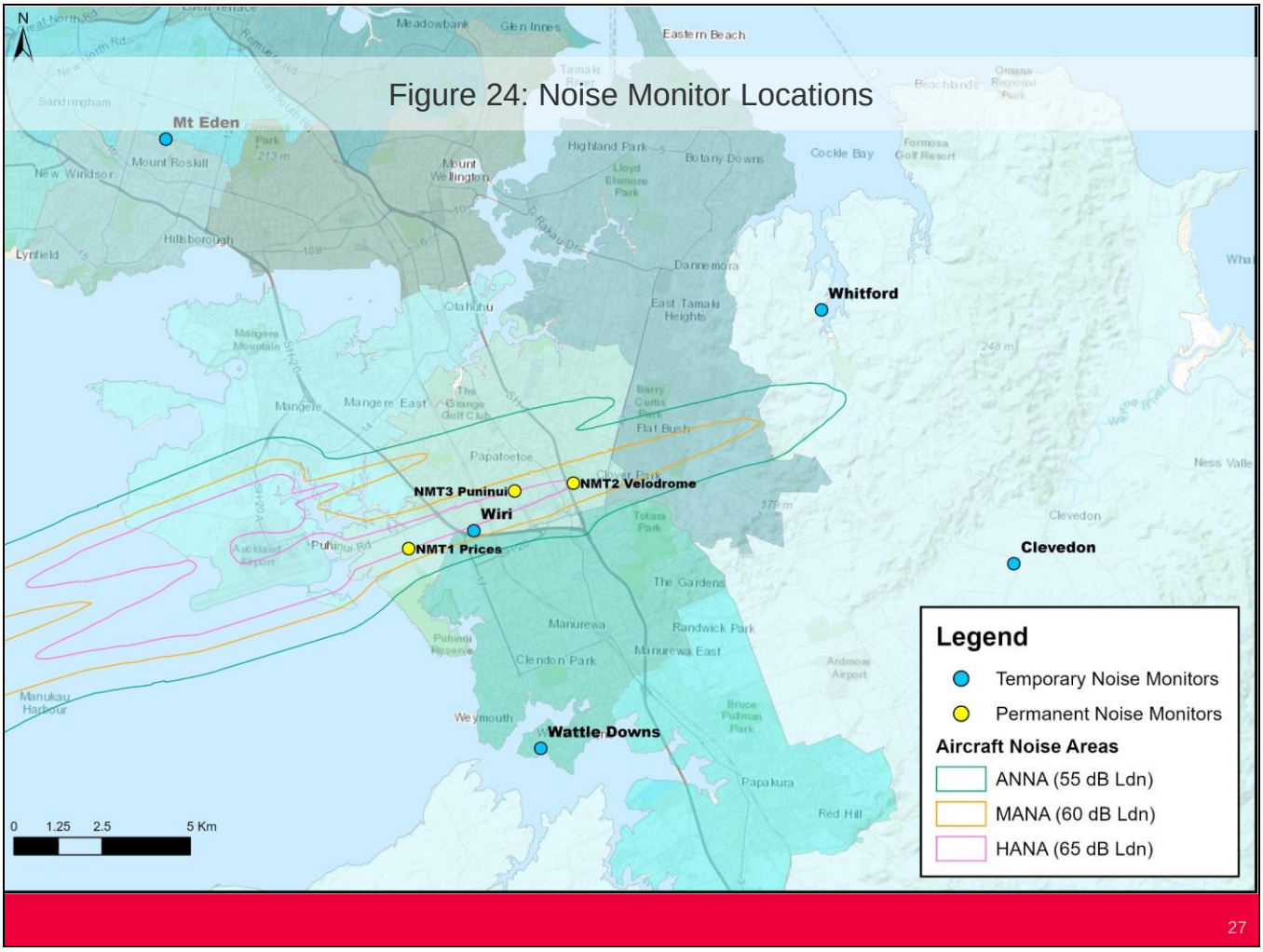

Figure 24 shows the location of Auckland Airport's three permanent and five temporary noise monitors.

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.

Table 4: Noise Monitor Maintenance Work

Prices Rd	30/05/2022 – Calibration check
	20/07/2022 – Calibration check
Wiri	11/05/2022 – Fixed microphone cable

Table 4 summarises any replacement, repair, or maintenance work undertaken on the noise monitors for the three-month period May 2022 to July 2022. The three permanent noise monitors and the two temporary monitors at Wiri and Clevedon are owned by Casper, who administer any works on these monitors as required. Marshall Day Acoustics carries out work on our three temporary monitors at Mt Eden, Whitford, and Wattle Downs.

The permanent Casper monitors at Velodrome and Puhinui school and the temporary Casper monitor at Clevedon required no maintenance work this quarter.

The MDA monitor at Wattle Downs went offline on 27 July which was rectified on 5 August through a firmware update.
There was no active maintenance work required for the other MDA monitors in this three-month period.

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

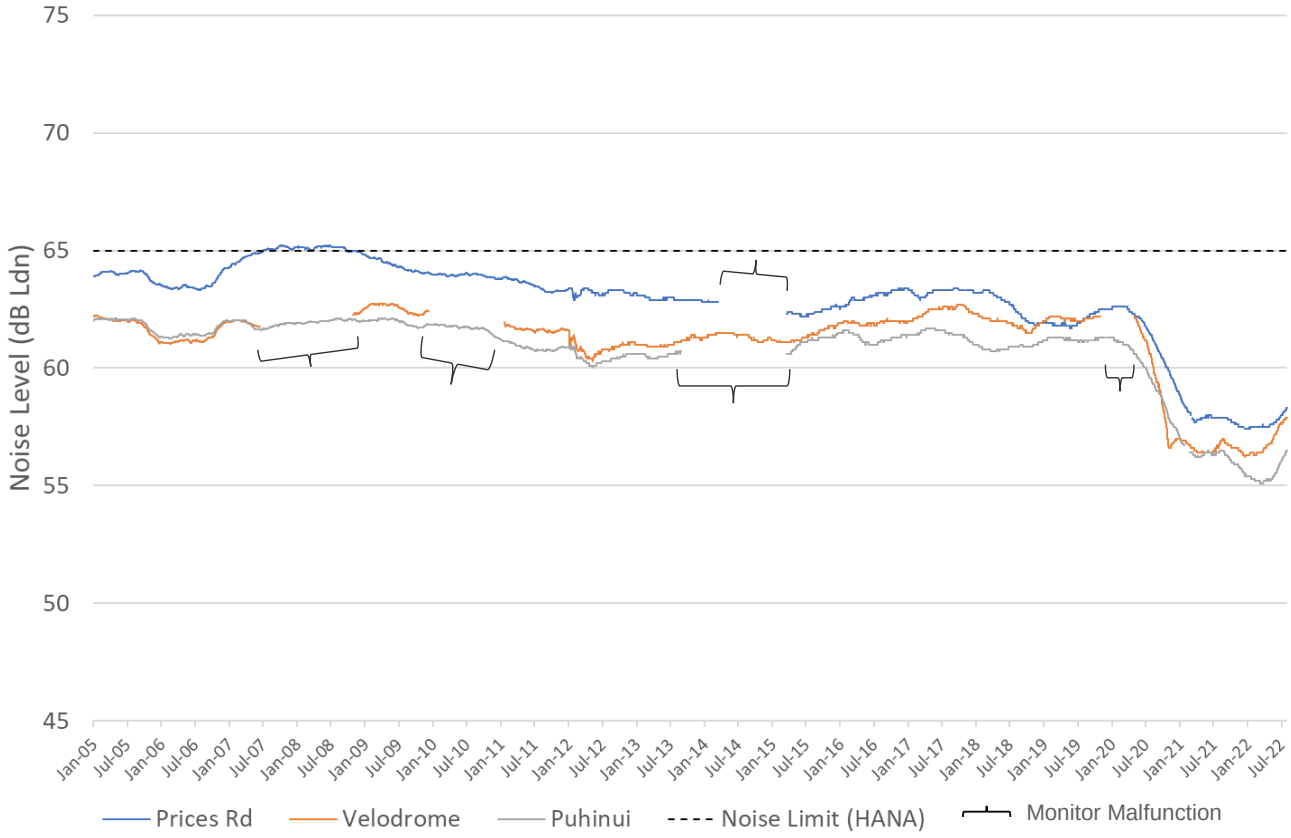

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Figure 25 shows the rolling 365-day Noise Exposure (L_{dn}) at the permanent noise monitors since January 2005.

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 2005 represents the average L_{dn} noise level from 1 January 2005 to 31 December 2005.

The rolling 365-day L_{dn} was below the 65 dB L_{dn} noise limit in the three-month period May 2022 to July 2022.

The noise levels in the three-month period have increased by 0.4 dB at Prices Rd, 1.2 dB at Velodrome and 0.1 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

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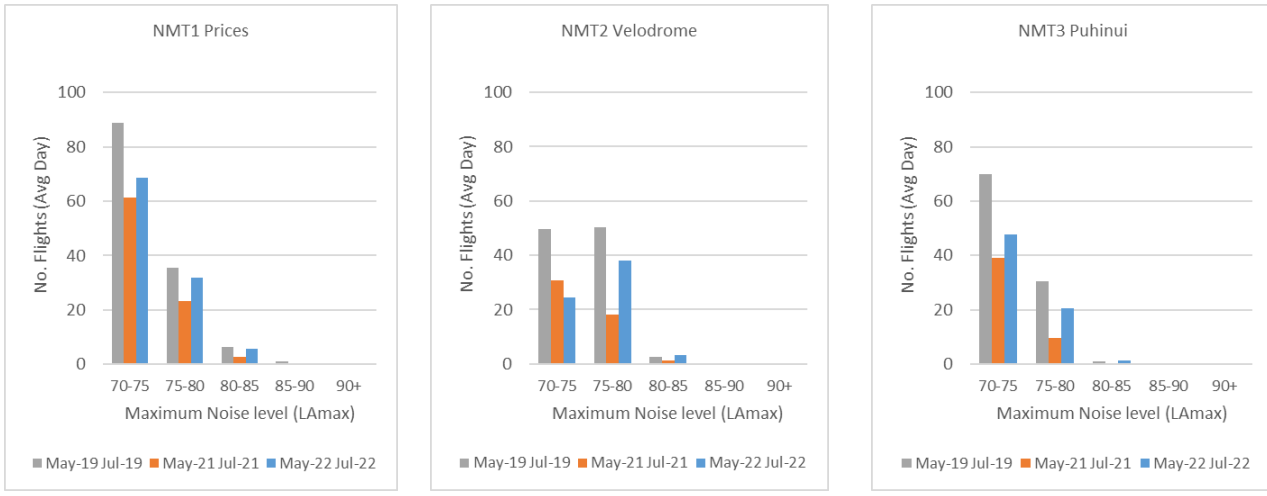
Table 5 shows the Noise Exposure (L_{dn}) at the permanent noise monitors for each financial year (1 Jul – 30 June) since 2008

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 Puhunui 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.

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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 2022 to July 2022 (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 66-106 events above 70 L_{Amax} during this three-month period. The same quarter last year saw 49-87 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	13,538	8,461	8,999
No. Aircraft Operations Captured by Monitors	11,317	6,144	8,663
Correlation	84%	73%	96%

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.

The lower-than-normal correlation at the Velodrome monitor has been investigated by Casper, who have produced a report detailing their findings. Note the calibration rate for the monitor has remained high.

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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 2022 to July 2022.

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.

The Velodrome monitor has generally been correlating below the 80% threshold since the onset of COVID-19 impacts at Auckland Airport. Casper have investigated the issue and prepared a report, which concludes that the cause of the correlation issue is the greater proportion of turboprop flights vs jet flights at the monitor due to international flight reductions caused by the pandemic. The turboprop aircraft are quieter and so aren't captured by the monitor as consistently as jet aircraft, and with a greater proportion of turboprop aircraft, the overall correlation decreased. The report also details some parameter changes that can be implemented to improve correlation rates.

Last quarter the Velodrome monitor had a correlation rate of 70%, giving an improvement of 3% this quarter.

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	2679	38	62
Wiri	4-Aug-17	1917	58	74
Wattle Downs	23-Dec-17	1678	46	67
Clevedon	10-Mar-18	1604	31	58
Whitford (Trig)	1-Dec-19	1057	42	60

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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 2022).

The measured L_{dn} for aircraft noise ranges from 31-46 dB L_{dn} across all the temporary monitor locations, except for the noise monitor in Wiri where noise levels were 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 9-24 dB below the 55 dB L_{dn} New Zealand Standard, except for the noise monitor in Wiri.

The noise levels measured at the Wiri noise monitor are 3 dB above the NZS 6805 guideline which is why this location is within the Moderate Aircraft Noise Area.

The average L_{Amax} ranges from 58-67 dB L_{Amax} across the various monitors except for the noise monitor in Wiri where the average is 74 dB L_{Amax}.

The average L_{Amax} is calculated by averaging the maximum 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.

There was less than one flyover above 70 dB L_{Amax} per day recorded at the temporary monitors, except Wiri and Wattle Downs which recorded 36 and 8 respectively.

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

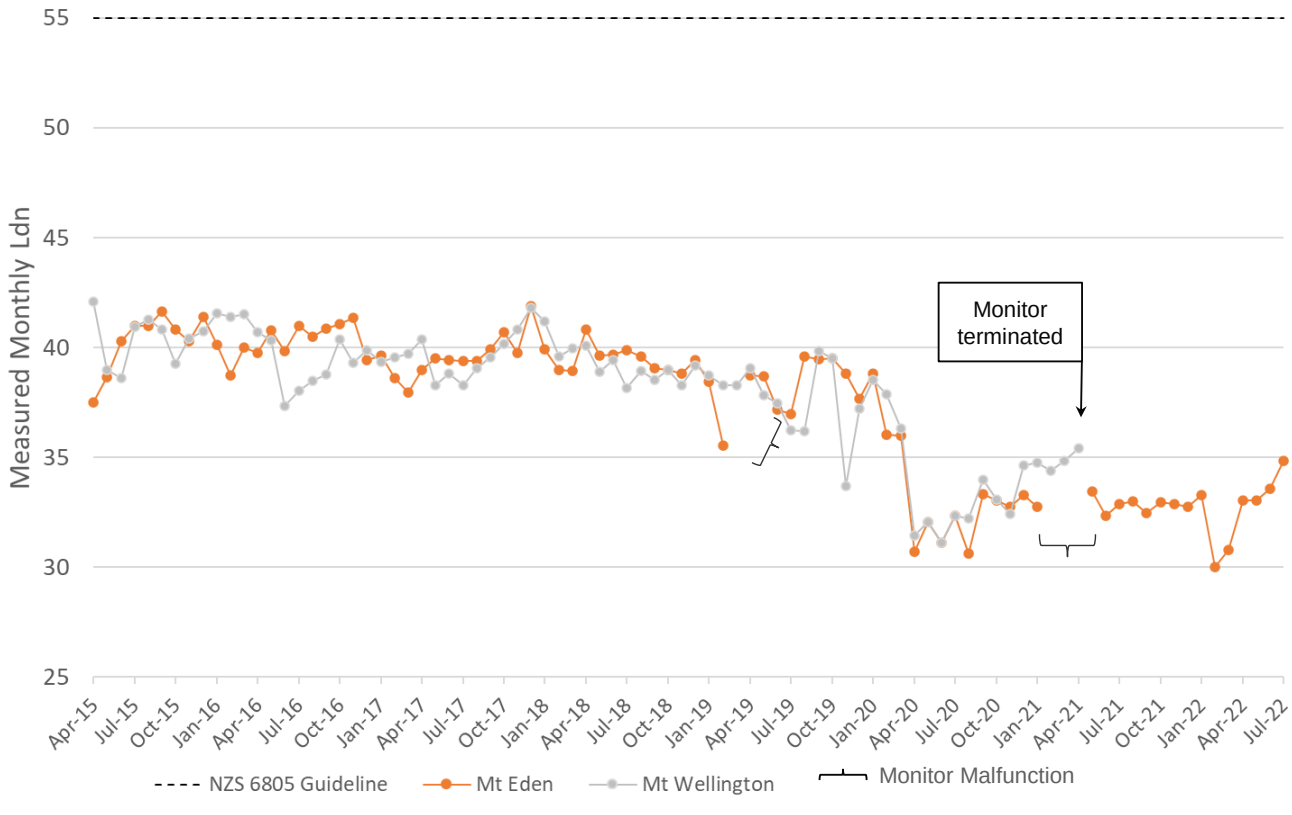

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Figure 27 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitor in the Central Suburbs since its deployment.

The L_{dn} fluctuates month on month by 12 dB at the Mt Eden noise monitor depending on aircraft operations, wind direction and other factors.

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 1 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

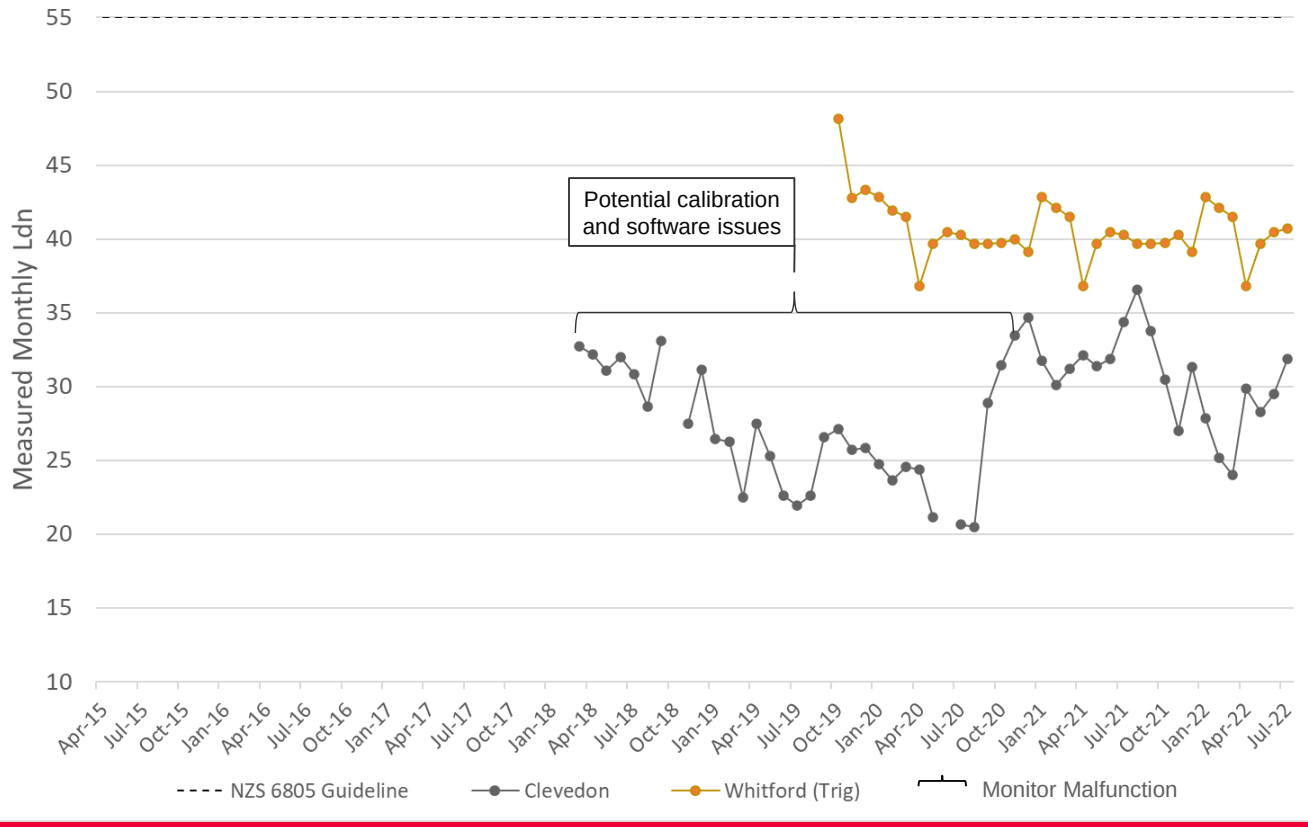


Figure 28 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitors in East Auckland since their deployment.

The L_{dn} fluctuates month on month by 11-16 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 20-48 dB L_{dn} per month across the 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 levels measured at these monitors in the Eastern Suburbs is 7-35 dB below this level.

The quarterly L_{dn} has decreased by 3 dB at the Clevedon monitor and is the same for the Whitford monitor, when compared to the same quarter last year.

Clevedon monitor data from deployment to October 2020 may be unreliable, due to instances of higher-than-normal calibration deviations and potential software setup issues. However, Casper have noted that the period May 2019 – July 2019 had robust and accurate data.

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

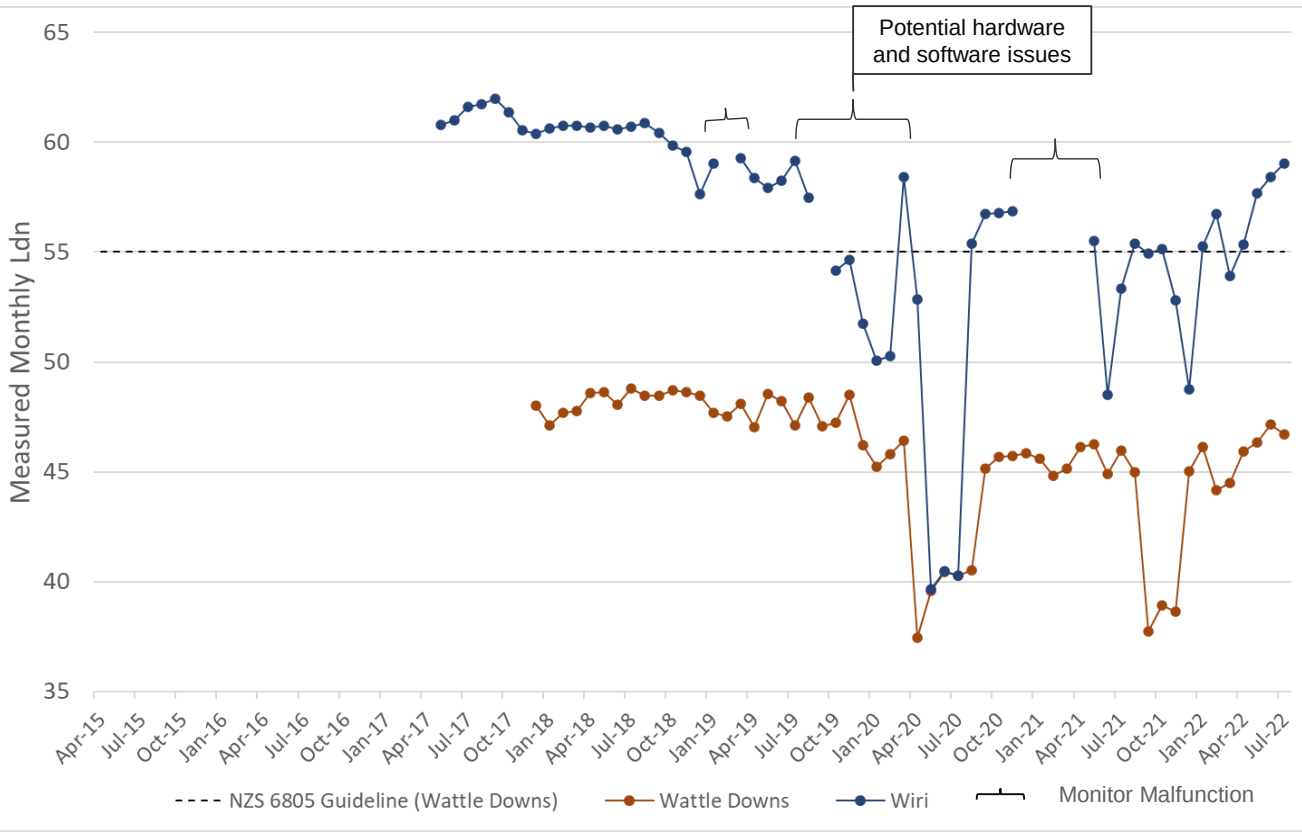


Figure 29 shows the monthly Noise Exposure (L_{dn}) trends for aircraft noise at the temporary noise monitors in South Auckland since their deployment.

The L_{dn} fluctuates month on month by around 11-22 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.

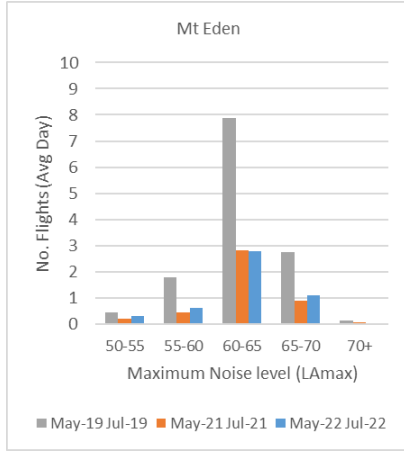
New Zealand Standard NZS 6805 states that areas exposed to noise levels below 55 dB L_{dn} are suitable for residential development.

The noise level measured at the Wattle Downs noise monitor is 9 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 1 dB at Wattle Downs and increased by 5 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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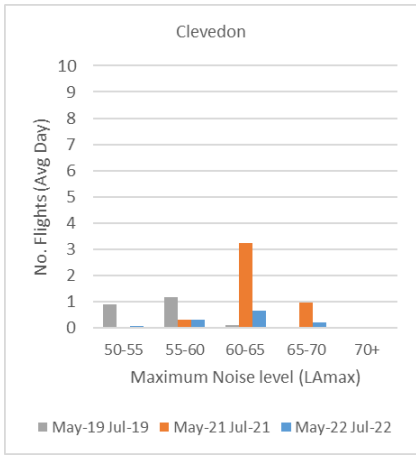
Figure 30 shows the average daily number of aircraft that overflew the Mt Eden noise monitor in each noise band in the three-month period May 2022 to July 2022 (blue bars), the same quarter last year (orange bars), and the same quarter from 2019 (grey bars).

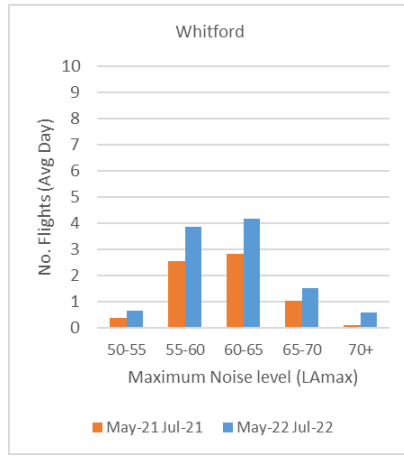
We note that the Mt Wellington monitor is no longer deployed, so Mt Eden is only active monitor in the Central Suburbs.

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.

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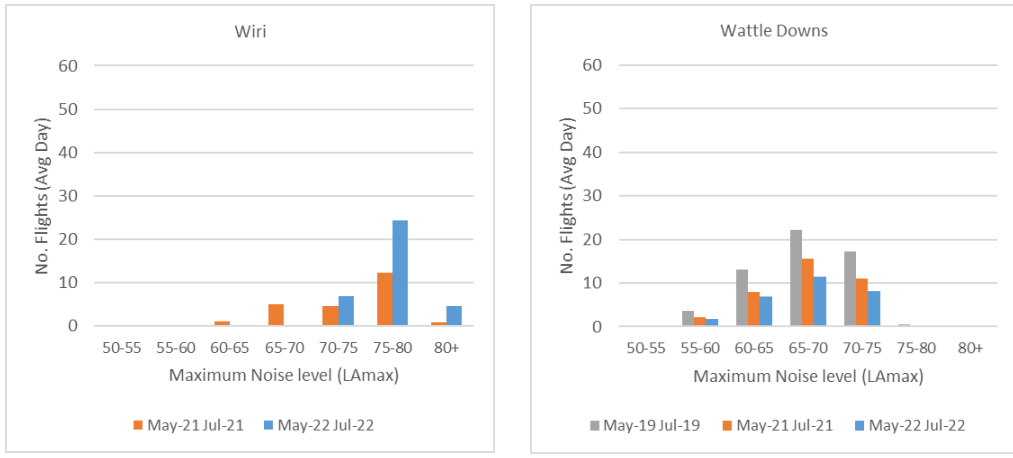
Figure 31 shows the average daily number of aircraft that overflew each of the Eastern Suburbs temporary noise monitors in each noise band in the three-month period May 2022 to July 2022 (blue bars), the same quarter last year (orange bars), and for Clevedon the same quarter from 2019 pre-pandemic (grey bars). As noted however, data from the Clevedon monitor from 2019 (and through to October 2020) may be unreliable due to instances of higher-than-normal calibration deviations and potential software setup issues, apart from the period May 2019 – July 2019 which was robust and accurate. 2019 data for Whitford is not included as it was deployed in December 2019.

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

These noise monitors received less than one event above 70 L_{Amax} per day.

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 2022 to July 2022 (blue bars), the same quarter last year (orange bars), and for Wattle Downs the same quarter from 2019 pre-pandemic (grey bars). Some of the Wiri data from the same quarter in 2019 pre-pandemic was potentially 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 Wattle Downs and Wiri monitors recorded approximately 8 and 36 flyovers per day above 70 dB L_{amax} respectively.


Engine Testing

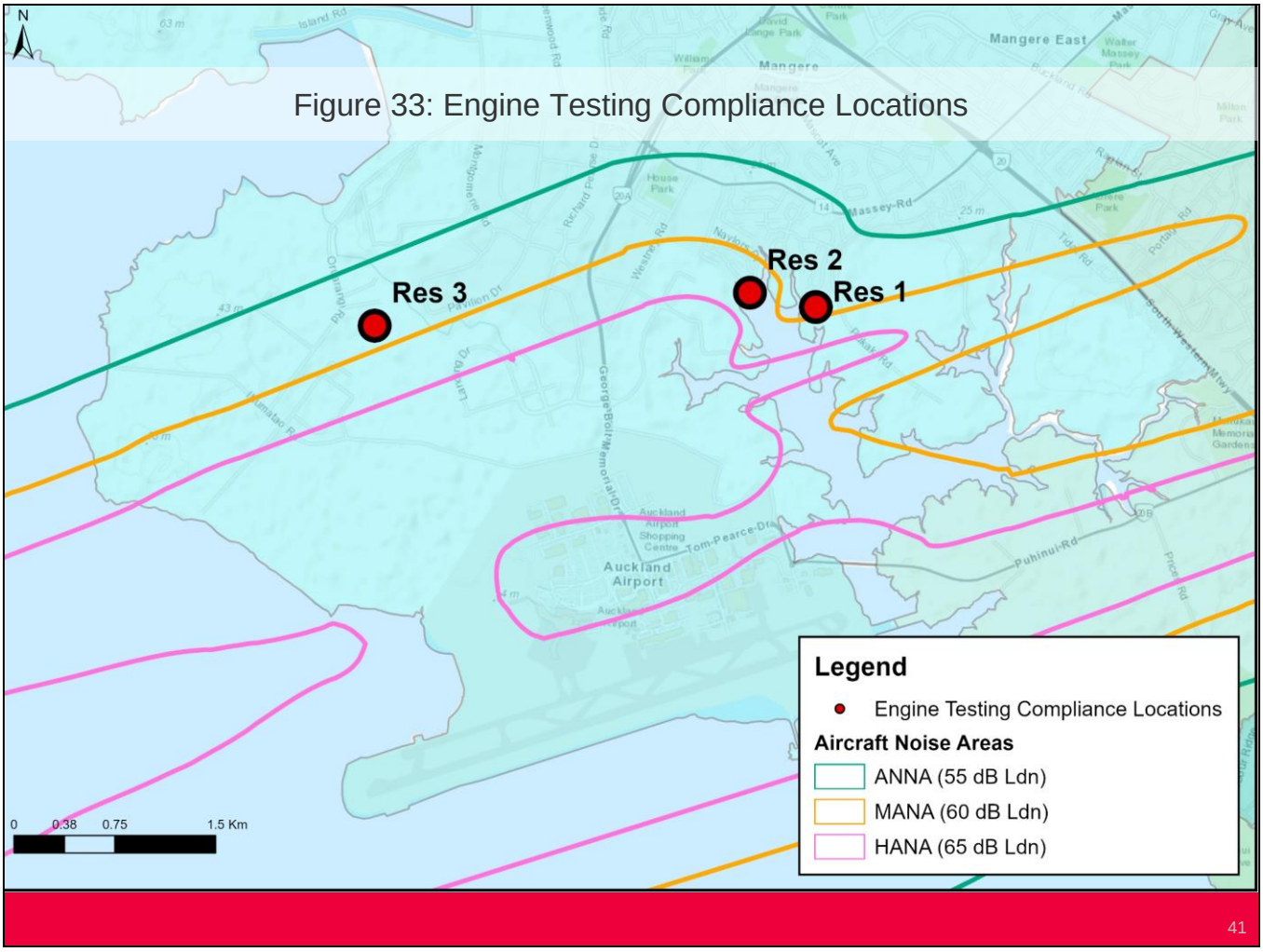
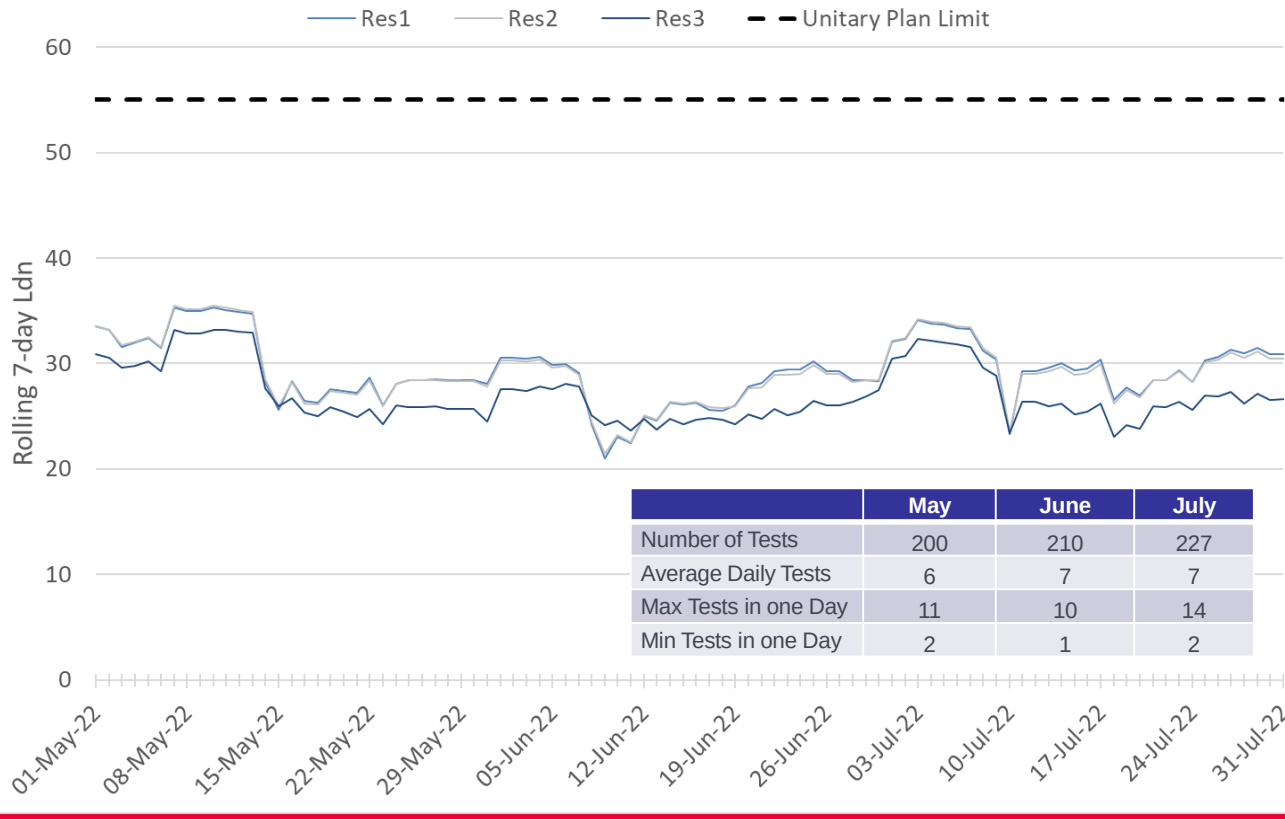


Figure 33 shows the three locations where compliance with the engine testing noise rule is calculated.

Figure 34: Engine Testing Summary



	May	June	July
Number of Tests	200	210	227
Average Daily Tests	6	7	7
Max Tests in one Day	11	10	14
Min Tests in one Day	2	1	2

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Figure 34 shows the rolling 7-day average noise level for engine testing activity at the airport in the three-month period May 2022 to July 2022.

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 Tamaki	East Auckland
East Tamaki 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
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
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	Not in Auckland
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
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	Not in Auckland
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	Not in Auckland
Whitford	East Auckland
Wiri	South Auckland