



AUCKLAND AIRPORT
2019 FINANCIAL YEAR ANNUAL NOISE MANAGEMENT REPORT
14 October 2019

EXECUTIVE SUMMARY

Designation 1100 requires Auckland International Airport Limited (AIAL) to report on its aircraft noise monitoring programme. The programme involves continuous 'on the ground' monitoring of aircraft noise levels at three sites, noise contour calculations for actual and projected aircraft activity, engine testing noise monitoring and noise complaint monitoring. This report has been prepared by Marshall Day Acoustics and provides an overview of the noise monitoring programme for FY19 (Jul 2018 – Jun 2019).

Aircraft operations during FY19 increased by 5% when compared to FY18 with night-time movements up 4% and daytime movements up 5%. Night-time movements made up 11% of the total movements in FY19 with the remaining movements (89%) occurring in the daytime. The runway usage during FY19 was within 1% of the typical average runway split (70%/30% Runway 23/05) in favour of Runway 23L.

The three required noise monitors have been operating satisfactorily throughout FY19 with no calibration problems experienced. There was a monitor malfunction at the Velodrome noise monitor between 20-26 June 2019 where the data was lost. A similar malfunction occurred at the Prices Rd noise monitor between 19-23 August 2018 and 6-12 May 2019 where data was lost. This would not impact the overall measured noise levels at this location. Compared with FY18, the measured noise levels for FY19 have increased by 0.3 dB at Puhinui School, 0.1 dB at the Velodrome and decreased by 0.9 dB at Prices Rd.

The three permanent noise monitors are located on the outer boundary of the High Aircraft Noise Area (HANA). The measurement results from all noise monitors demonstrate compliance with the 65 dB L_{dn} noise limit at the outer boundary of the HANA. The calculated noise contours based on actual FY19 aircraft operations show compliance with the 60 and 65 dB L_{dn} limits at all locations along the MANA and HANA boundaries respectively.

The projected Annual Aircraft Noise Contours (AANC) for FY20 (2020 AANC), which represents activity occurring in the coming year, shows a slight decrease (0.1-0.2 dB) in noise compared with the 2019 AANC. This information is utilised by the Noise Mitigation Programme for identifying properties eligible for sound insulation offers. This year no new properties are eligible for offers as the 2020 AANC are slightly smaller than the 2019 AANC.

Noise from engine testing activities has been compliant with the relevant noise limits throughout FY19. The highest recorded L_{dn} at each of the three measurement locations ranged from 42 to 44 dB, which is 11-13 decibels below the noise limit. It is noted that there is a gap in the data at the end of June 2019 due to AIAL upgrading equipment and reporting processes. It is expected from historical engine testing activity in late June and from trends in the 2019 financial year that the noise limit would not have been breached in this time.

There were 905 complaints received in FY19 made by 132 complainants. It is noted that 589 (65%) of the complaints received in FY19 were from 3 people. The total number of complaints received in FY19 has increased by 93% when compared to FY18. The total number of people complaining in FY19 has decreased by 14% when compared to FY18.

Although there have been more complaints in FY19 compared with FY18, the numbers are lower than the historical peak in FY14. There was a marked increase in the number of complaints in FY14 due to the trial of three new SMART approaches at the airport. The number of complaints and complainants has reduced appreciably since then but continues to be well above historical levels seen prior.

The complaints for FY19 were spread over South Auckland and the Central Suburbs, with a small number from other areas. Most people made less than 5 complaints with 15 people making more than 5 complaints during FY19.

There was a general correlation between the number of complaints and usage of Runway 05 - departures to the east. High runway 05R usage in February and March correlated with a higher number of complaints received in these months. A spike in complaints in April was due to a significant number of complaints made by one person. A spike in complaints in January was due to an increase in complaints about helicopters.

The noise reduction initiatives in FY19 have been summarised. Future initiatives for FY20 are summarised in a document presented to the ANCCG which are currently being reviewed by the group and industry.

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1.0 INTRODUCTION

Designation 1100 requires AIAL to report on its statutory aircraft noise monitoring programme. The programme involves continuous ‘in-field’ monitoring of aircraft noise levels at three sites, noise contour calculations for actual and projected aircraft activity, engine testing noise monitoring and monitoring of public noise complaints.

A Notice of Requirement has been lodged to update various Conditions of Designation 1100. Most of the amendments are minor with regard to the noise monitoring programme and do not impact the contents of this report. One improvement that has been proposed is to include a summary of past and future initiatives to reduce noise in the community. As the amendments to the NoR with regard to the noise monitoring programme are minor and provide improvements overall, the updated Conditions have been used for this report in preference to those that are currently operative.

The Notice of Requirement also seeks to update the Aircraft Noise Areas in the Designation to match those in the Auckland Unitary Plan. For this report, compliance has been assessed against both sets of noise contours. The noise contours proposed to be altered through the Notice of Requirement are shown in the report text and the operative noise contours as contained in Designation 1100 are shown as Appendixes for the ANC/AANC.

Designation 1100 is the framework within which the Airport operates. The designation sets out noise performance criteria and noise management obligations for the Airport to comply with. Condition 5(d) of Designation 1100 requires AIAL to undertake the following:

- Monitor noise from aircraft operations near the boundary of the High Aircraft Noise Area (HANA) to demonstrate that the Day/Night level of 65 dB L_{dn} is not exceeded outside the HANA
- Use the Integrated Noise Model (INM) and noise monitoring data to calculate whether the noise from aircraft operations exceeds 60 dB L_{dn} anywhere outside the Moderate Aircraft Noise Area (MANA)
- Calculate noise levels to ensure compliance with Condition 10 of the Designation relating to the Noise Mitigation Programme

Condition 13(b) of Designation 1100 requires the airport to calculate and report on the noise level from engine testing activities and Condition 9(c) requires the airport to report on the noise complaints it receives.

AIAL is required to prepare an Annual Noise Management Report each year under Condition 9(b) which summarises the measurements and modelling required by Condition 5(d) and identifies past and future initiatives for noise reduction.

This report has been prepared by Marshall Day Acoustics and provides an overview of the noise monitoring programme for the 2019 financial year (Jul 18 – Jun 19) including:

- A review of the noise monitoring system, calibration and results
- Calculation of noise contours for actual aircraft activity (ANC) to determine compliance
- Calculation of the Annual Aircraft Noise Contours (AANC) for projected aircraft activity to determine offers for the sound insulation programme;
- Summary of past and future initiatives to reduce noise in the community

A summary of the air traffic records for the 2019 financial year has also been included in this report along with flight path diagrams, calculation of noise from engine testing activities and a summary of noise complaints received.

A glossary of terminology is given in Appendix A.

2.0 AIR TRAFFIC RECORDS

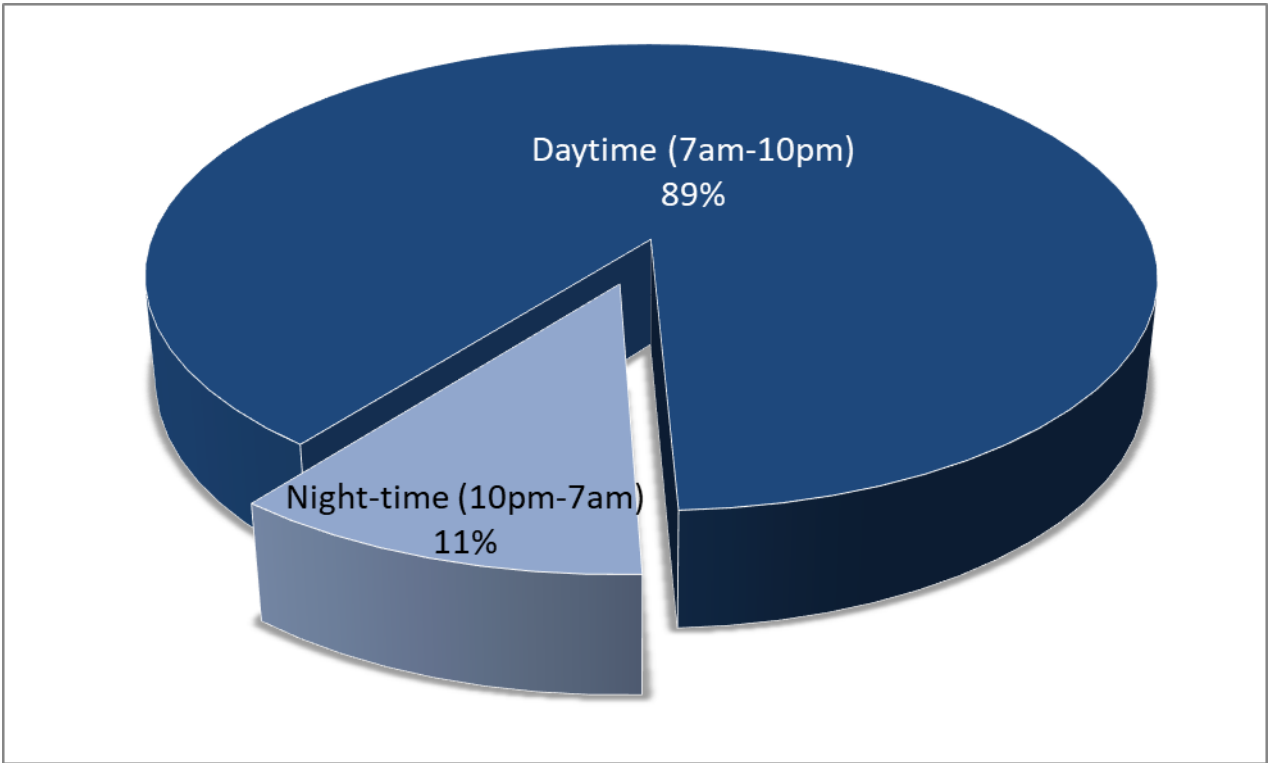
Table 1 shows a summary of aircraft movement numbers at Auckland Airport during FY19 (Jul-18 to Jun-19) with FY18 data (Jul-17 to Jun-18) included for reference.

Table 1: Aircraft Movements Numbers

	FY18	FY19	Difference	% Change
Total Movements	172,627	181,356	8,729	5%
Daytime Movements (7am to 10pm)	153,083	161,018	7,935	5%
Night-time Movements (10pm to 7am)	19,544	20,338	794	4%

Figure 1 shows the breakdown of movements for FY19 for daytime and night-time. This data was retrieved from the Airport’s noise monitoring system which uses air-traffic data provided by Airways Corporation NZ.

Figure 1: Aircraft Movements by Time of Day



It is noted that aircraft movement numbers from the monitoring system are slightly different than those reported on the Airport’s website. There was a discrepancy of 2,585 movements for FY19 which is about one percent difference. This discrepancy would have a negligible impact on noise levels reported from the monitoring system. Nonetheless this discrepancy is taken into consideration when preparing the noise contours as described in Section 5.0.

Overall, aircraft activity during FY19 increased by 5% when compared to the previous year. Night-time movements increased by 4% and movements in the daytime increased by 5%. Night-time movements made up 11% of the total movements in FY19 with the remaining movements (89%) occurring in the daytime.

Figure 2 shows the aircraft movements broken down by broad aircraft type. 58% of flights were jet aircraft with turboprops making up 38% of the total flights.

Figure 2: Aircraft Movements by Aircraft Type

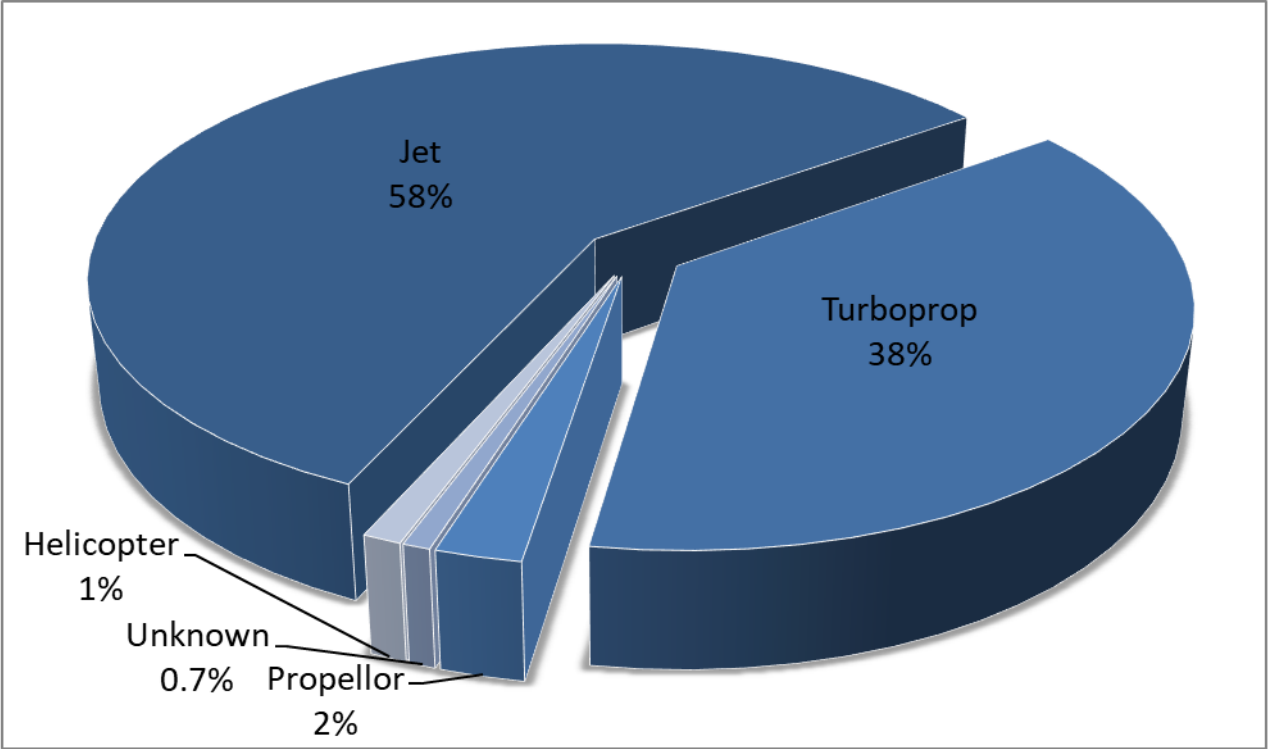


Table 2 below shows the runway usage for FY19. The typical average runway split is 70% Runway 23 (arrivals from the east, departures to the west) and 30% Runway 05 (arrivals from the west, departures to the east). The runway usage for FY19 was relatively similar to the long run average runway split with 71% Runway 23 usage and 29% Runway 05 usage. A small number of movements were helicopters and thus were not associated with a runway.

Table 2: Runway Usage

	Historical Runway Split	FY19 Runway Split	Deviation
Runway Mode 23	70%	71%	1%
Runway Mode 05	30%	29%	

3.0 FLIGHT PATHS

The flight paths that aircraft utilise are variable and depend on the aircraft type, aircraft weight, destination/origin, the weather at the time, other air traffic in the area and other factors. One major factor that influences flight paths is the wind direction. In Auckland, the prevailing wind is from the southwest and under these conditions aircraft use Runway Mode 23 where departing aircraft take off towards the west over the Manukau Harbour and arriving aircraft land on the eastern end of the runway, overflying Papatoetoe.

Figure 3 shows the flight paths for the busiest day (7am – 10pm) in FY19 when westerly winds were prevailing (21-Dec-18) and Figure 4 shows the flight paths for the busiest night (10pm – 7am) in FY19 when westerly winds were prevailing (21-Dec-18). Each flight path is coloured by altitude. Larger versions of these figures are shown in Appendix B along with figures for the busiest easterly wind day/night (8-Feb-19).

Figure 3: Individual Flight Paths for the Busiest RW23L Day (7am - 10pm) in the FY19

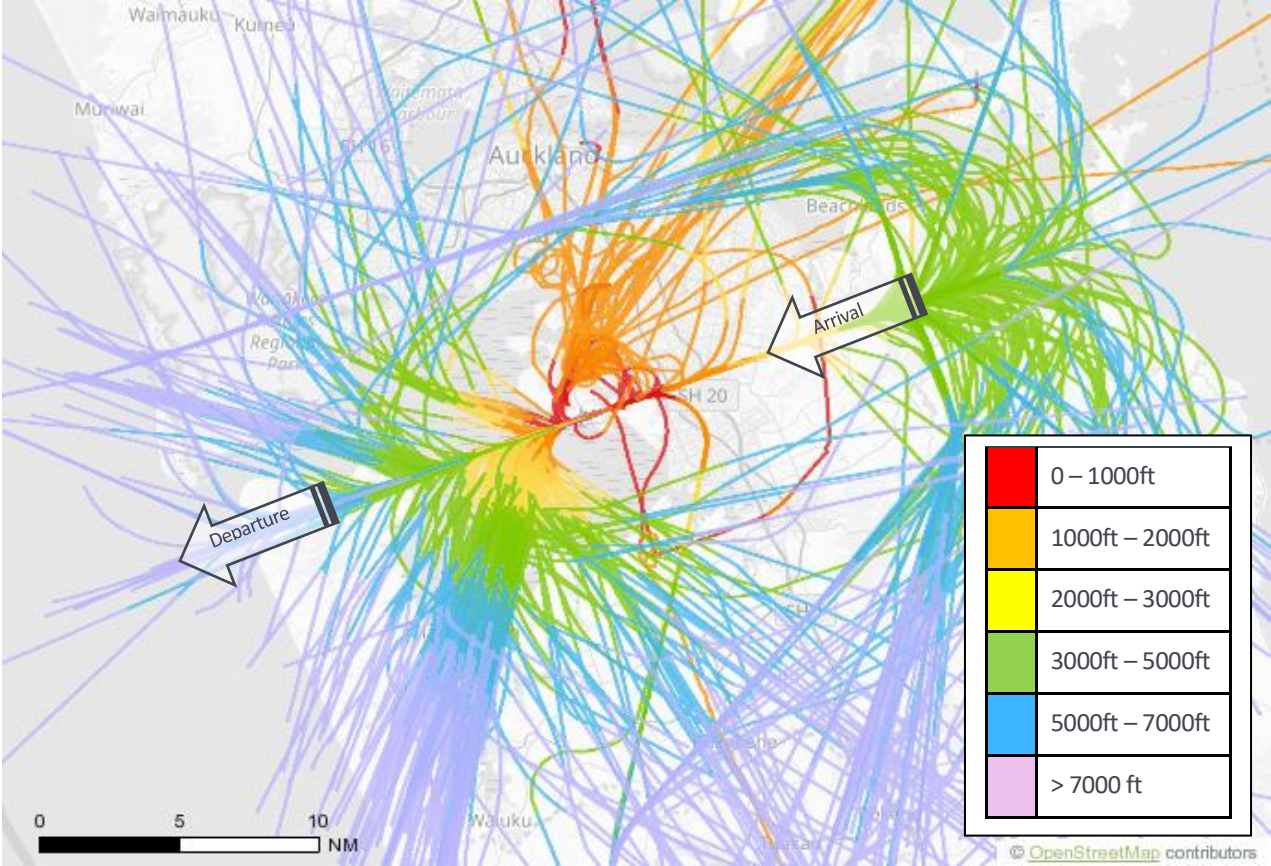
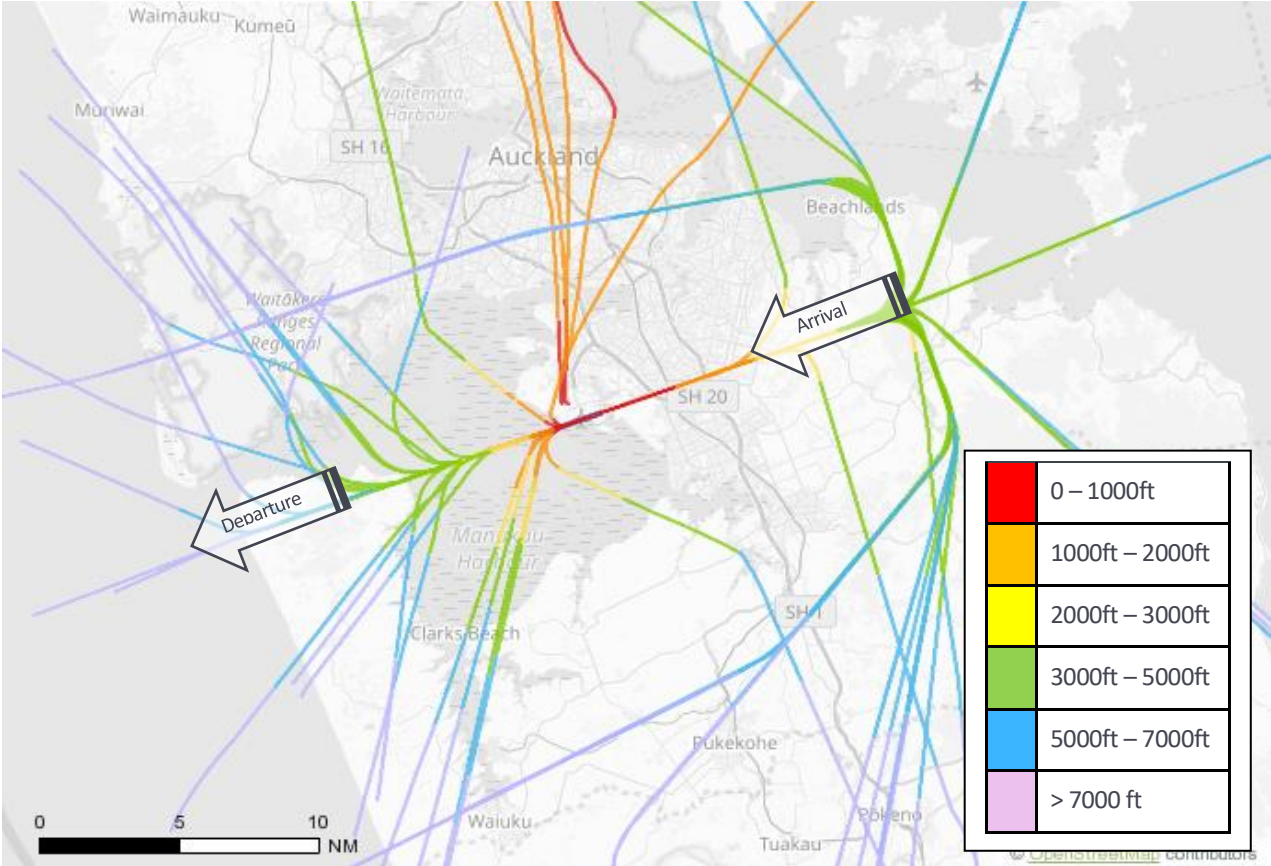


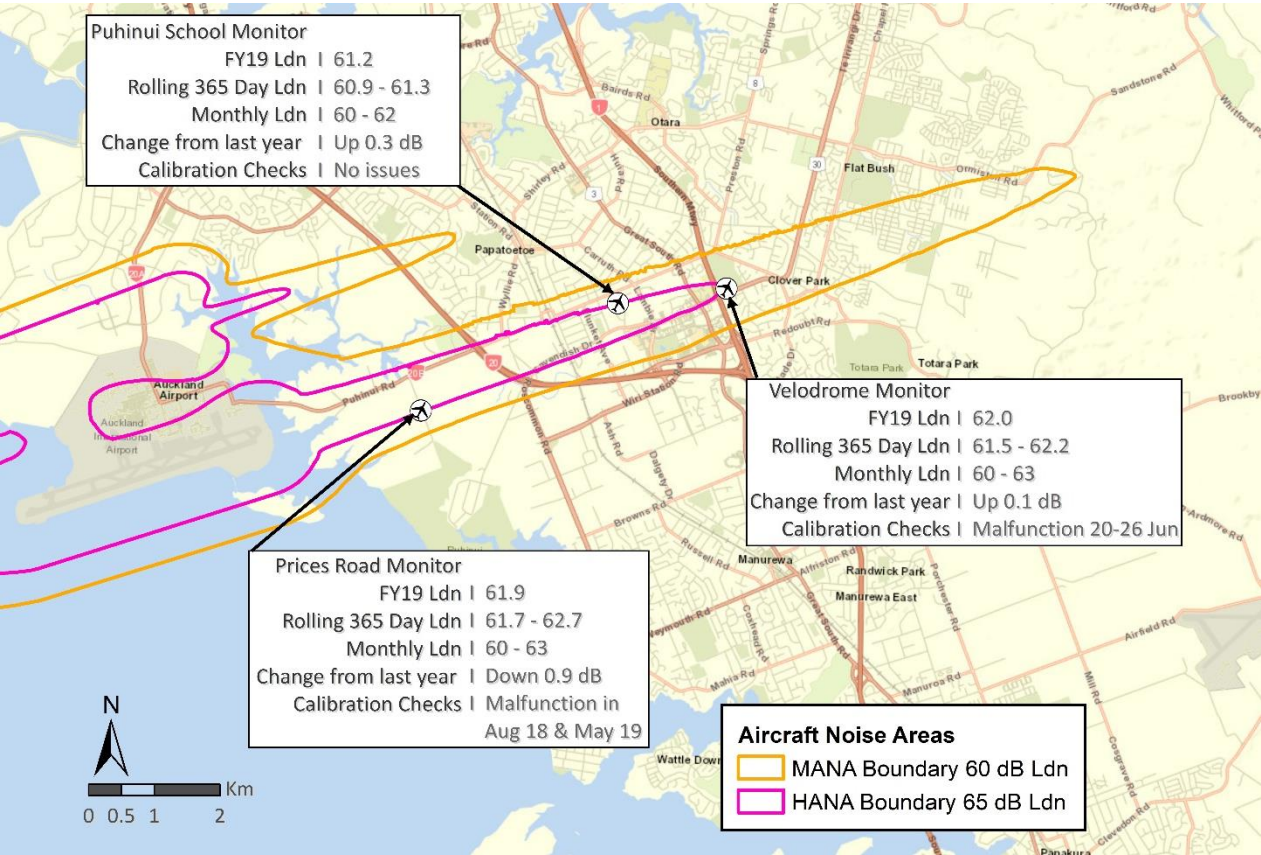
Figure 4: Individual Flight Paths for the Busiest RW23L Night (10pm - 7am) in the FY19



4.0 MONITORED NOISE LEVELS

AIAL has three permanent noise monitors located on the boundary of the HANA at; Puhinui School, the Velodrome and Prices Road. The location of the monitors is shown in Figure 5 along with a summary of the monitoring results for FY19 and the HANA and MANA boundaries proposed to be altered through the Notice of Requirement. The noise limit at the boundary of the HANA is 65 dB L_{dn} (365-day average).

Figure 5: Noise Monitor Summary



The noise monitors at each site generally operated well throughout FY19. There was a monitor malfunction at the Velodrome noise monitor between 20-26 June 2019 where the data was lost. This was due to a malfunction of the firmware on the meter which needed to be updated manually. A malfunction occurred at the Prices Rd noise monitor between 19-23 August 2018 and 6-12 May 2019 where data was lost. The malfunction in August was due to a failure with the SD card, the malfunction in May was due to an issue with power connectivity to the logger. This would not impact the overall measured noise levels at this location. The rolling 365-day L_{dn} at the noise monitors was generally 2-4 decibels below the noise limit.

Table 3 compares the measured noise levels for FY18 with FY19. Noise levels in FY19 increased by 0.3 dB at Puhinui School, 0.1 dB at the Velodrome and decreased by 0.9 dB at Prices Rd. A change in noise level of 0.1-0.9 decibels is small and would generally not be perceptible to those living inside the Aircraft Noise Areas.

Table 3: Measured Noise Levels

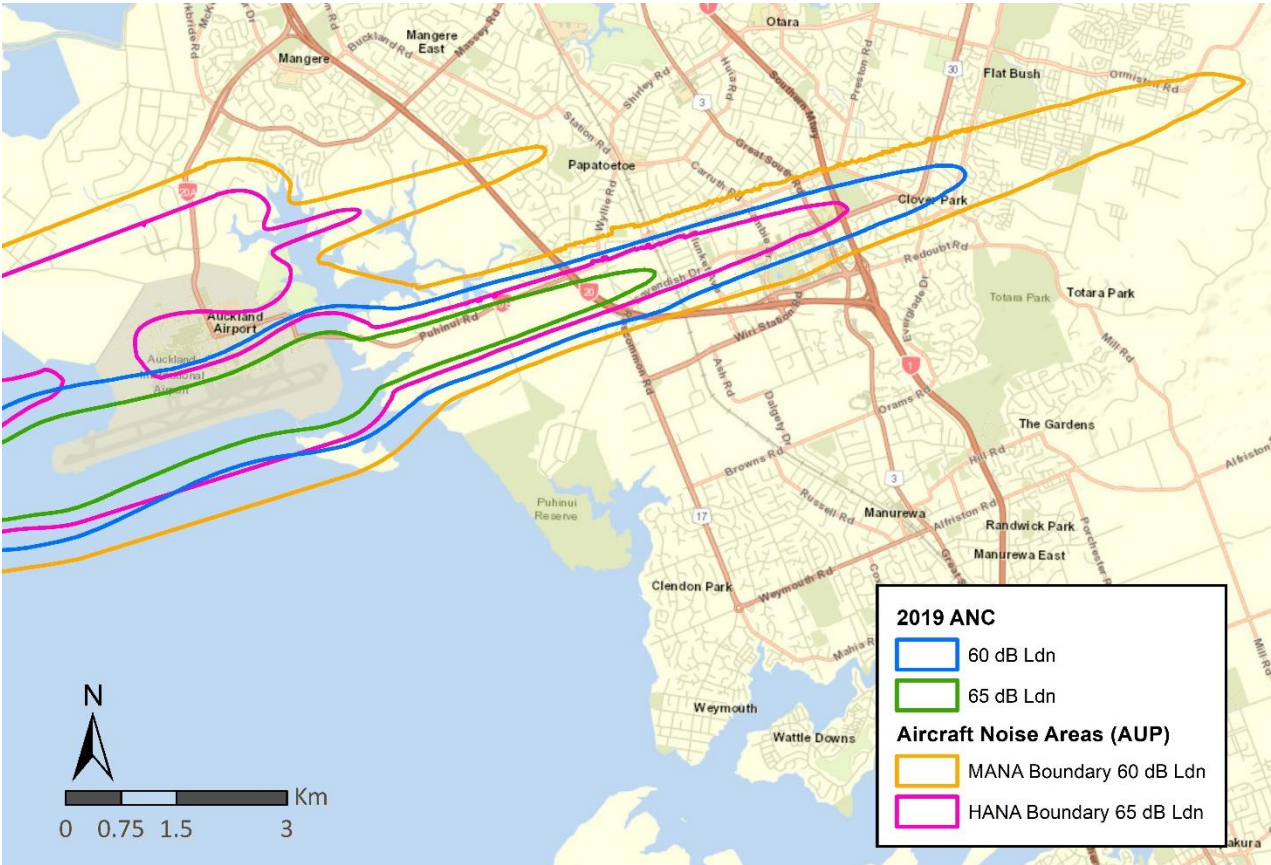
Monitor Location	FY18 dB L _{dn}	FY19 dB L _{dn}	Difference (dB)
Puhinui School	60.9	61.2	+0.3
Velodrome	61.9	62.0	+0.1
Prices Road	62.8	61.9	-0.9

5.0 2019 ACTUAL NOISE CONTOUR (ACTUAL ACTIVITY) - ANC

The ANC noise contours represent the actual aircraft activity occurring in FY19. The purpose of these noise contours is to assess compliance with the MANA and HANA each year. The noise contours have been calculated in the INM version 7.0d using aircraft movement data obtained from the noise monitoring system.

Figure 6 shows the calculated 60 and 65 dB L_{dn} contours for FY19. The HANA and MANA boundaries proposed to be altered through the Notice of Requirement are also indicated in Figure 6. A Figure showing the ANC contours compared to the operative HANA and MANA boundaries contained in Designation 1100 is shown in Appendix C. Noise from aircraft operations must not exceed 65 and 60 dB L_{dn} at the HANA and MANA Boundaries respectively.

Figure 6: 2018 Actual Noise Contour (ANC)



The calculated noise contours show that noise from aircraft operations in FY19 complied with the noise contours proposed to be altered through the Notice of Requirement and the operative noise contours as contained in Designation 1100. It is important to verify the noise model against the measured levels to ensure an acceptable tolerance. Table 4 lists the calculated noise level at each monitoring site compared with the actual measured noise level for FY19. In this case the model is within 2 dB of the measured levels at the three monitoring locations. This is a reasonable representation for a compliance assessment.

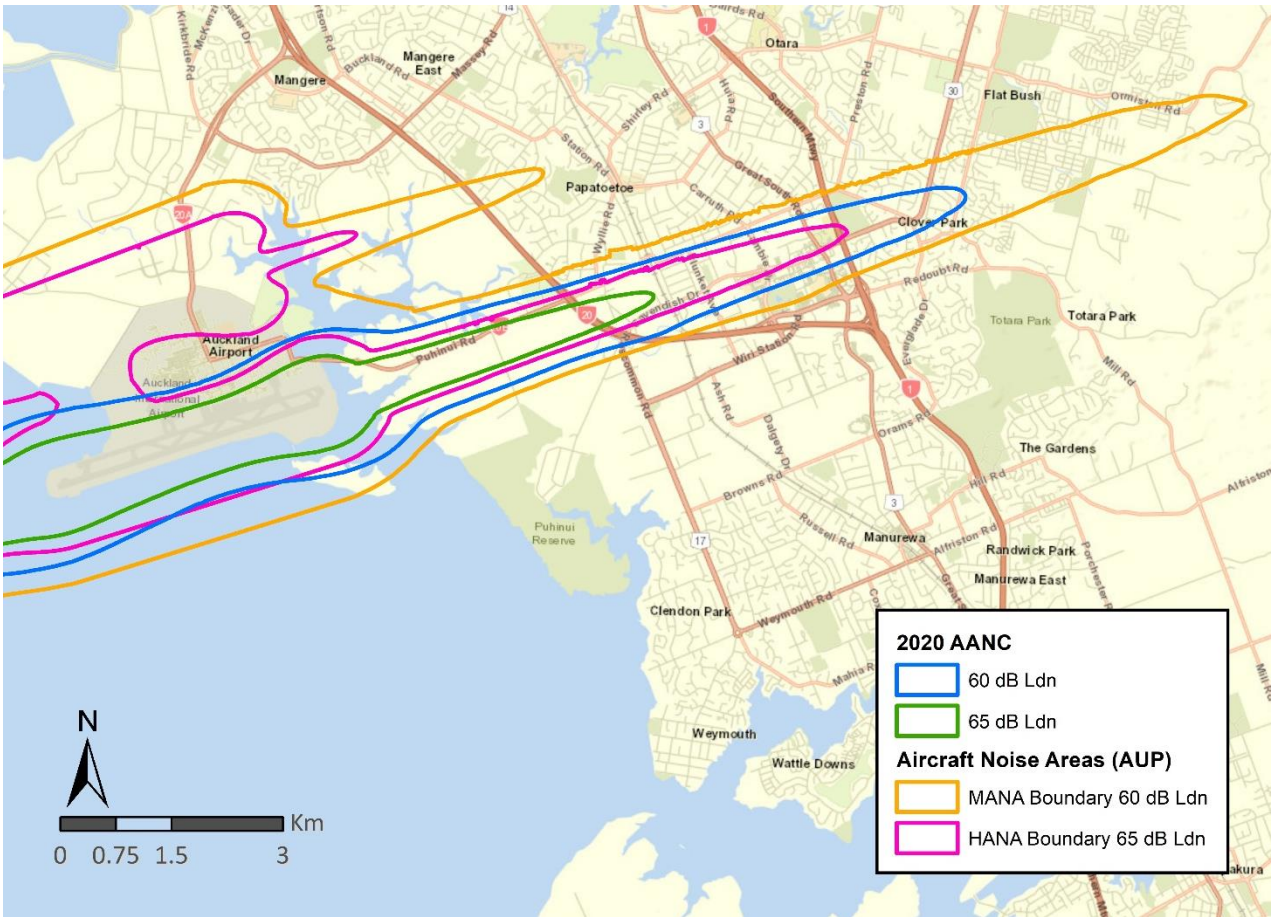
Table 4: Calculated and Measured Noise Levels (Actual Activity FY19)

Monitor Location	Measured Noise Level L _{dn} (dB)	Calculated Noise Level L _{dn} (dB)	Difference (dB)
Puhinui School	61.2	61.6	+0.4
Velodrome	62.0	61.8	-0.2
Prices Road	61.9	63.5	+1.6

6.0 2020 ANNUAL AIRCRAFT NOISE CONTOUR (PROJECTED ACTIVITY) - AANC

The Annual Aircraft Noise Contours (2020 AANC) will be published in October 2019 and represent noise from aircraft activity predicted to occur in the coming year. The purpose of these noise contours is to identify which properties are eligible to receive an offer for noise mitigation treatment. Figure 7 shows the published 2020 AANC contours compared to the HANA and MANA boundaries proposed to be altered through the Notice of Requirement. Appendix D shows the 2020 AANC contours compared to the operative HANA and MANA boundaries contained in Designation 1100.

Figure 7: 2020 Annual Aircraft Noise Contour (AANC)



Appendix E shows the 2019 AANC compared to the 2020 AANC. The 2020 AANC are generally smaller than the 2019 AANC. This is likely due to the fact that growth anticipated for the 2019 AANC was higher than what occurred in reality.

Table 5 lists the predicted noise levels at the monitoring sites for the 2019 AANC and 2020 AANC. The noise levels in the 2020 AANC are slightly lower than the 2019 AANC.

Table 5: 2020 AANC Calculated Noise Levels (Projected Activity)

Monitor Location	2019 AANC L _{dn} (dBA)	2020 AANC L _{dn} (dBA)	Difference
Puhinui School	61.8	61.6	-0.2
Velodrome	61.9	61.8	-0.1
Prices Road	63.7	63.6	-0.1

As noted above, the 2020 AANC are slightly smaller than the 2019 AANC therefore no new noise mitigation treatment offers are required to be made this year.

7.0 ENGINE TESTING

Engine testing noise emissions are limited to 55 dB L_{dn} (7 day rolling average) and 75 dB L_{max} (10pm – 7am) received in the “Identified Area” shown in Figure 5 of Designation 1100. Noise emissions from engine testing activities are calculated and assessed for compliance monthly at three key locations in the Identified Area (Res1, Res2, Res3). The calculations are based on records of engine testing activity provided by the airport users and established noise levels relating to each type of test.

Figure 8 shows the lowest, highest and average 7 day rolling L_{dn} noise level at each of the three measurement locations for FY19. The highest L_{dn} calculated at each of the three measurement locations ranged from 42 to 44dB, which is 11-13 decibels below the noise limit.

Figure 8: FY19 Engine Testing Monitoring Summary

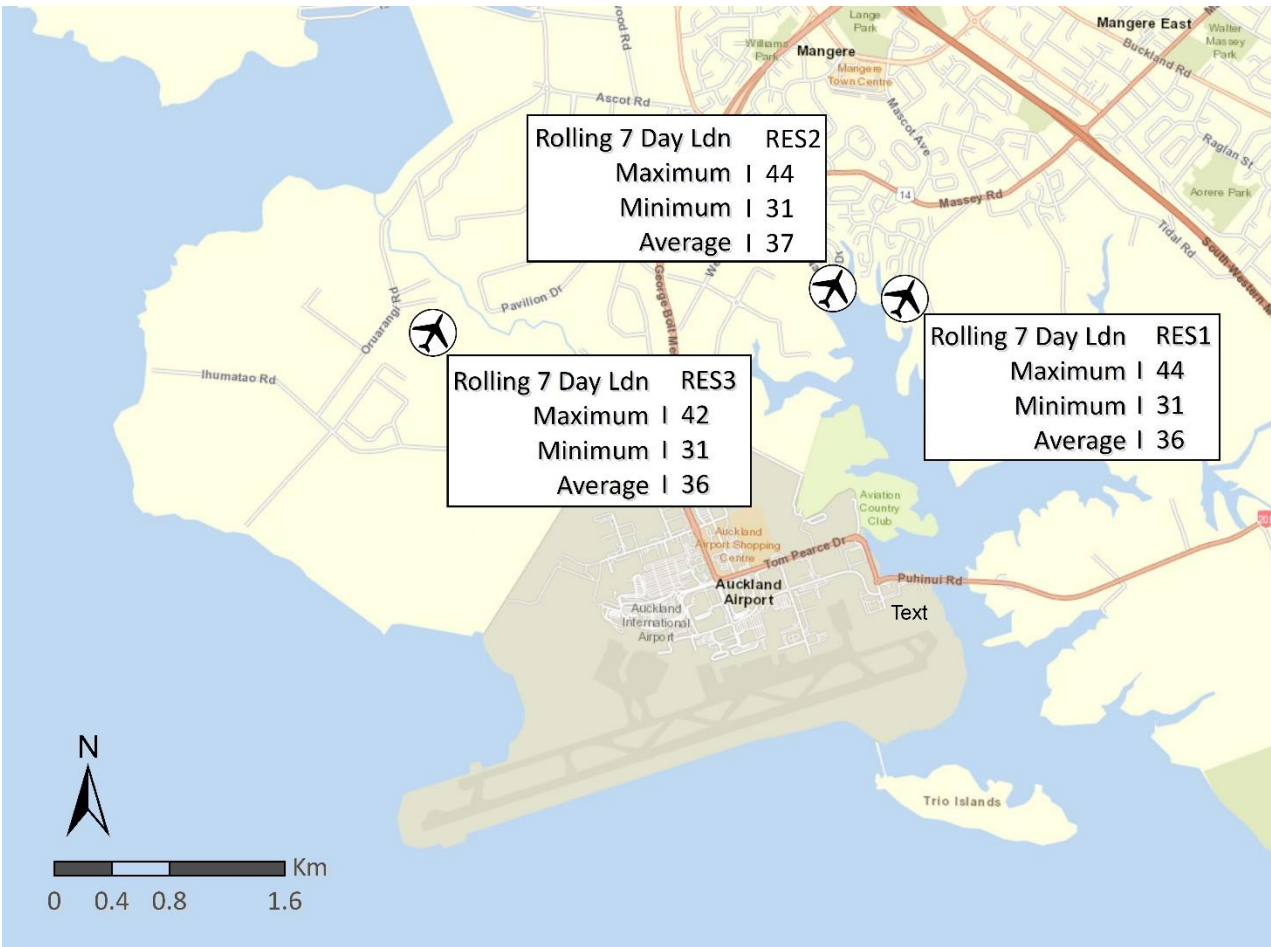
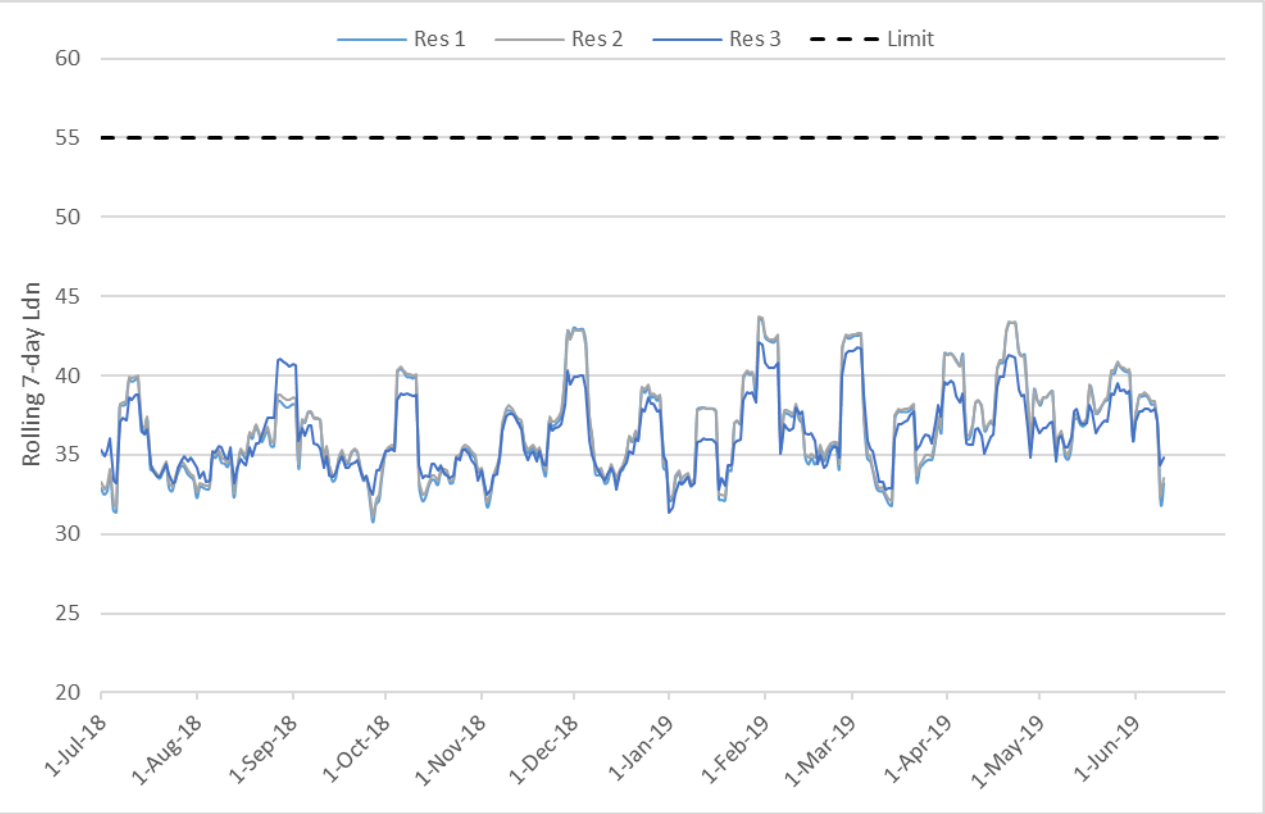


Figure 9 shows a graph of the 7-day rolling L_{dn} noise level at the three measurement locations for each day. Generally, the noise levels were below 40 dB L_{dn}. It is noted that there is a gap in the data at the end of June 2019 due to AIAL upgrading equipment and reporting processes. It is expected, from historical engine testing activity in late June and from trends in the 2019 financial year, that the noise limit would not have been breached in this time.

The purpose of the L_{max} limit is to control the maximum noise level during engine testing at night to protect against sleep disturbance. The L_{max} level during a test depends on the aircraft type, power setting and propagation conditions but is not affected by the duration of testing. Marshall Day Acoustics has previously ascertained that all aircraft undergoing engine testing at Auckland Airport comply with the 75 dB L_{max} limit at the three assessment locations for all power settings.

Figure 9: Engine Testing Noise Emissions (Rolling 7 Day Ldn)



8.0 NOISE COMPLAINTS

People may make multiple complaints during the year and each complaint could relate to either a specific aircraft overflight or a more general issue such as increased overflights at night. Therefore, the terminology used in this report when summarising the statistics is as follows:

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

During FY19 the airport received 905 noise complaints from 132 people, 764 (84%) of these were specific complaints, 128 (14%) were generic complaints and 13 (1%) were question enquiries.

The complaints for FY19 came predominantly from South Auckland and the Central Suburbs, with a small number from other areas of Auckland.

Table 6 shows the noise complaints and number of people complaining over the past 5 years.

Table 6: Summary of Complaints since 2015

	FY15	FY16	FY17	FY18	FY19
No. Complaints	3,425	1,980	581	467	905
No. People Complaining	251	123	72	155	132

It is noted that 589 (65%) of the complaints received in FY19 were from 3 people and one person made 318 (35%) of the complaints. The total number of complaints received in FY19 has increase by 93% when compared to FY18. There was a marked increase in complaints in FY14 due to the trial of three new SMART approaches at the airport. The number of complaints has reduced by 74% since then but continues to be well above historical levels seen prior.

The number of people complaining also increased in FY14 due to the SMART trial. In FY19 the number of people complaining decreased by 74% when compared to FY14. The total number of people complaining in FY19 decreased by 14% when compared to FY18.

Figure 10 shows the number of complaints made in each month of FY18 and FY19. The number of complaints received per month ranged between 21 and 287 in FY19. The complaints received each month in FY19 was higher than in FY18 for most months apart from September and January where the number of complaints was lower in FY19. The spike in the number of complaints in April was due to a significant number of complaints made by one person. There were generally more complaints in the months of January, February and March.

Figure 10: Aircraft Noise Complaints in FY18 and FY19

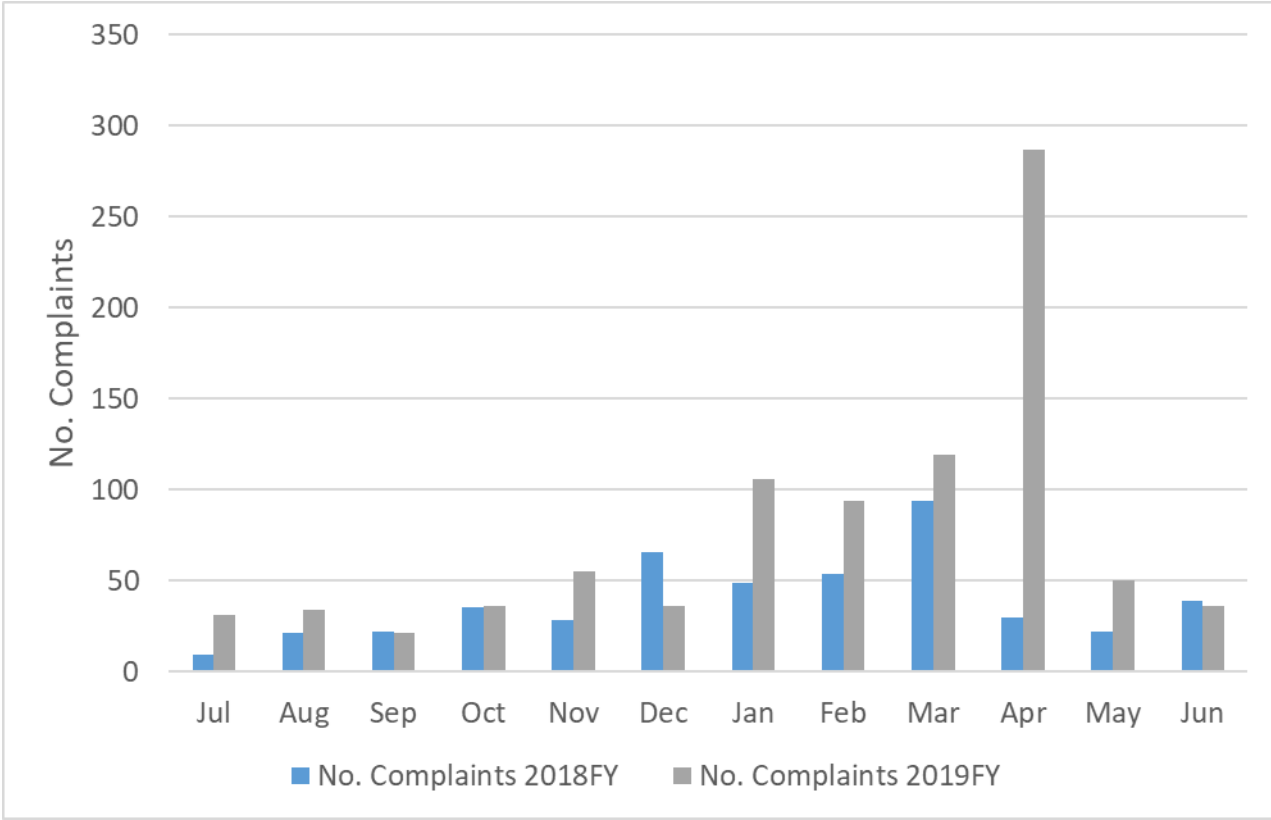


Figure 11 shows the number of people that complained in each month of FY18 and FY19. Each month the number of people making the complaints ranged between 11 and 24 during FY19.

Figure 11: Number of People Complaining about Aircraft Noise in FY18 and FY19

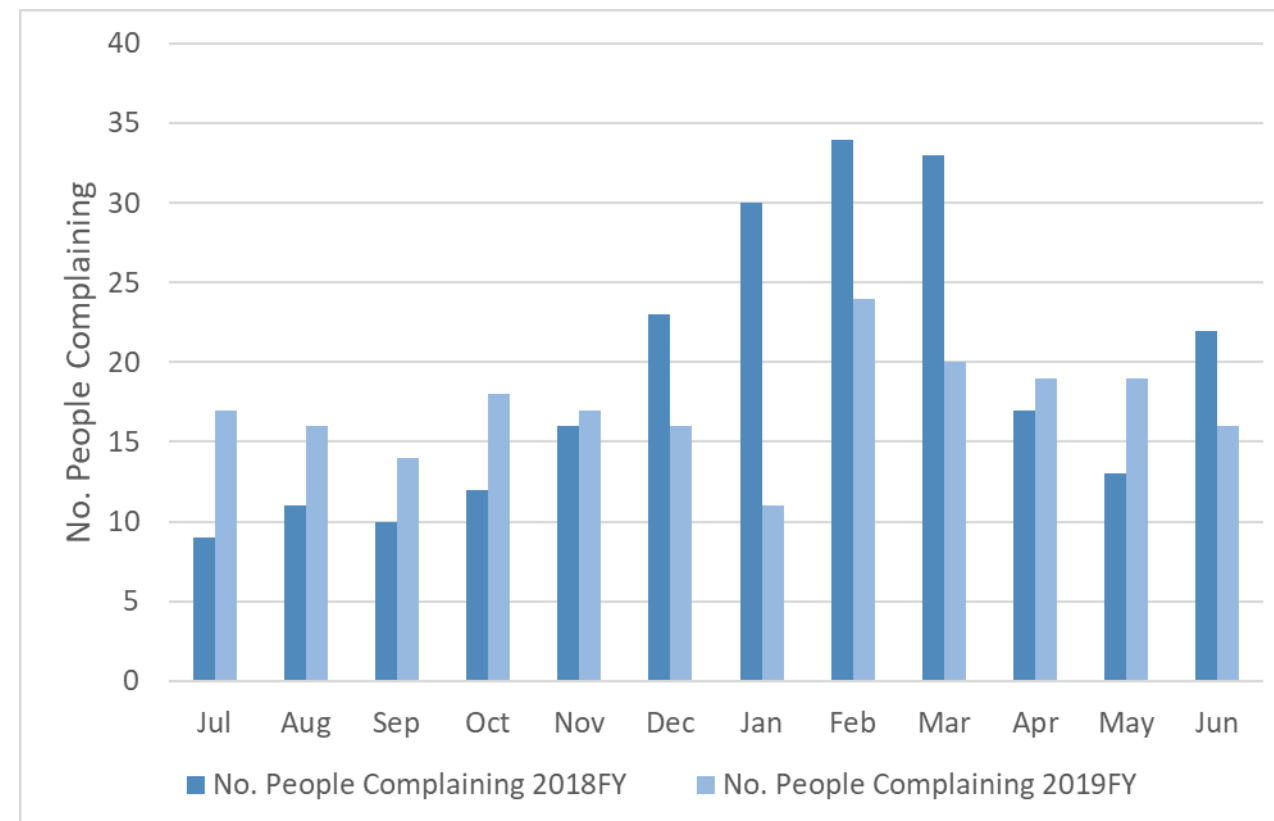
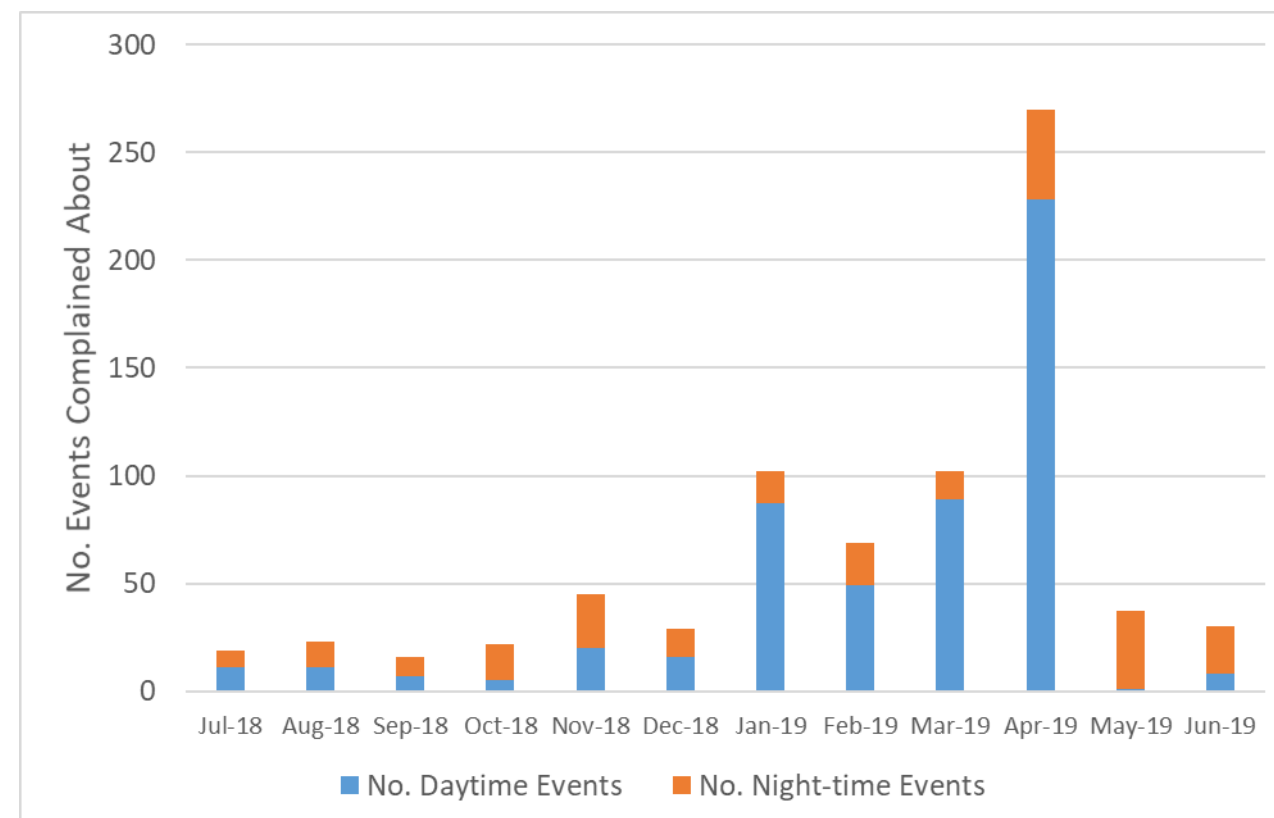


Figure 12 shows the specific complaints at night-time (10pm-7am) compared with daytime for each month in FY19.

Figure 12: Number of Specific Complaints (by time of day)



Daytime flights made up 70% of the aircraft overflights complained about in FY19 with the remaining 30% relating to aircraft events at night-time. There is some correlation between complaints and frequency of aircraft movements, with more complaints being received in the busy morning and evening periods (7-9am and 5-7pm).

Figure 13 shows the percentage usage of Runway 05 compared to the number of specific complaints. There is a general correlation between runway use and the number of complaints received. High Runway 05R usage in February and March correlated with a higher number of complaints received in these months.

The spike in April is due to a significant number of complaints made by one person. There was also a higher number of complaints received in January but this period had a relatively low usage of Runway 05R. The increased complaints in this month were mainly due to an increase in complaints about helicopters, mainly those that did not originate from Auckland Airport. The summer period is a busy time for scenic and charter helicopter flights in Auckland and thus increases in helicopter traffic over the isthmus is likely the cause of these complaints.

Historically it has been found that the airport receives a higher number of complaints when Runway 05 is used (departures over East Auckland). The increased disturbance caused when Runway 05 is in use is most likely because departures overfly the Central and Eastern suburbs under these conditions. Departure flight tracks are more dispersed and therefore overfly a larger area of the central and eastern suburbs than arrivals. This is demonstrated by comparing the flight tracks in Appendix B. Also, departures have a different noise character and can be louder than arrivals as the aircraft are climbing under power.

Figure 13: Number of Aircraft Noise Complaints vs. Usage of Runway 05

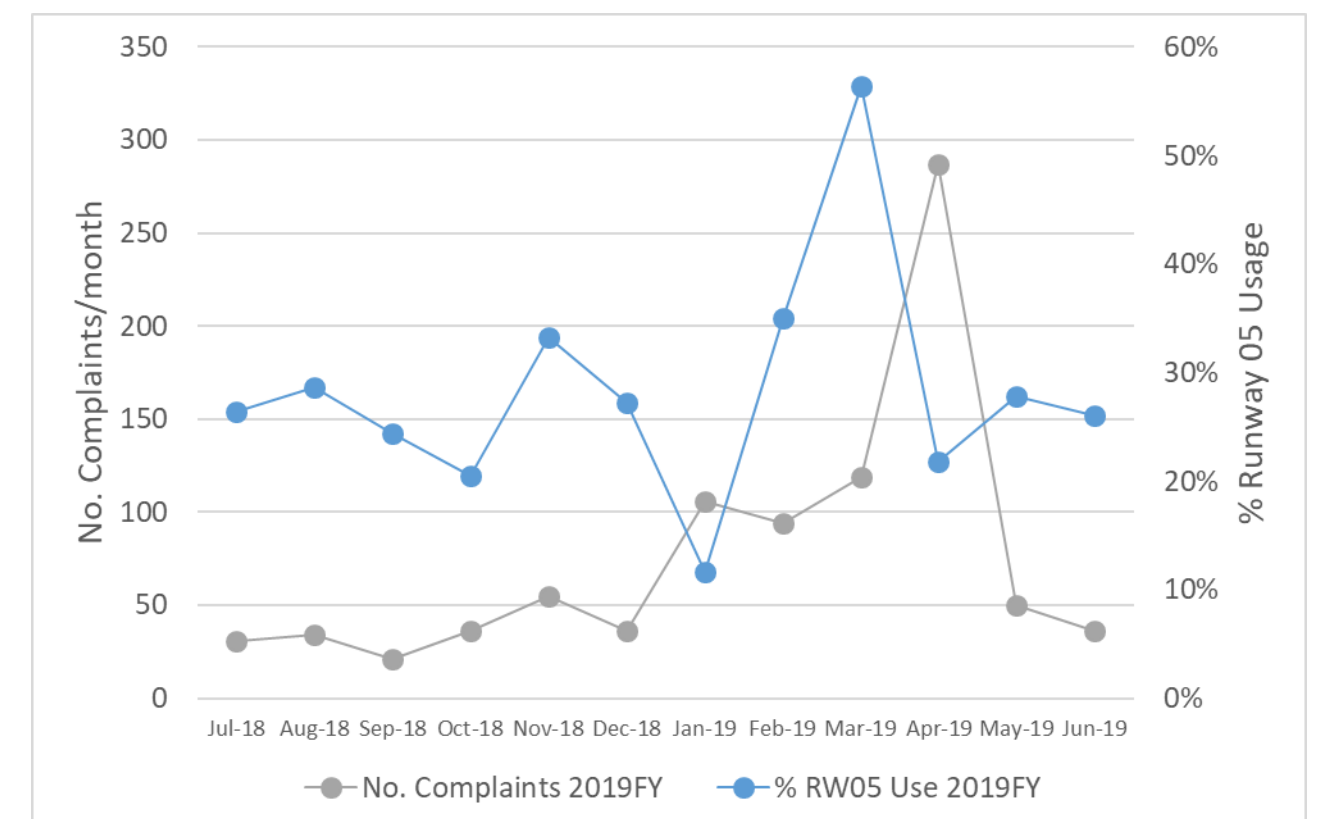


Figure 14 shows the number of complaints received by area. Appendix F gives more detail on the number of complaints received from each suburb. Papatoetoe, Manukau Heads and Mt Eden residents made the largest number of complaints (67%) with the remaining complainants spread over 59 suburbs. The complaints in Mt Eden were made by 2 people and the complaints in the Manukau Heads were made by one person.

Figure 14: Complaints by Suburb

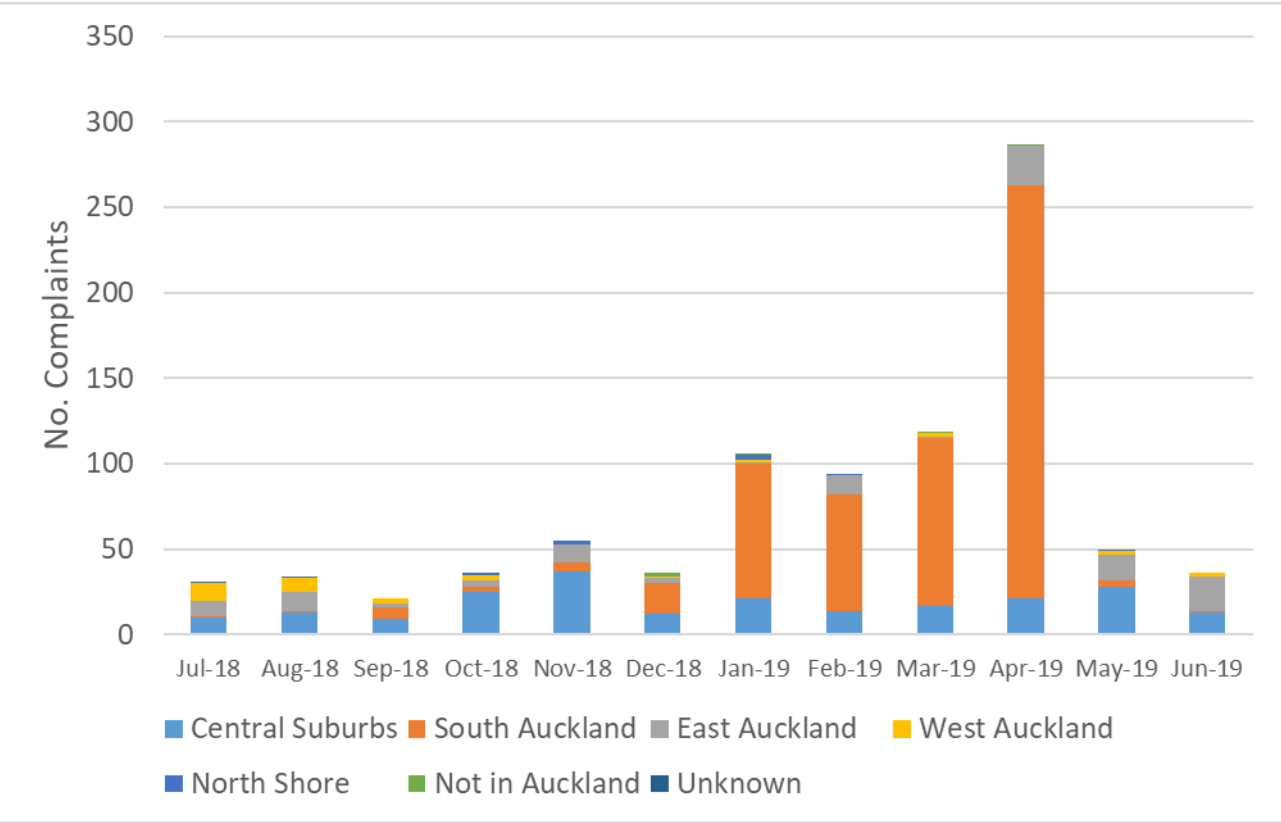
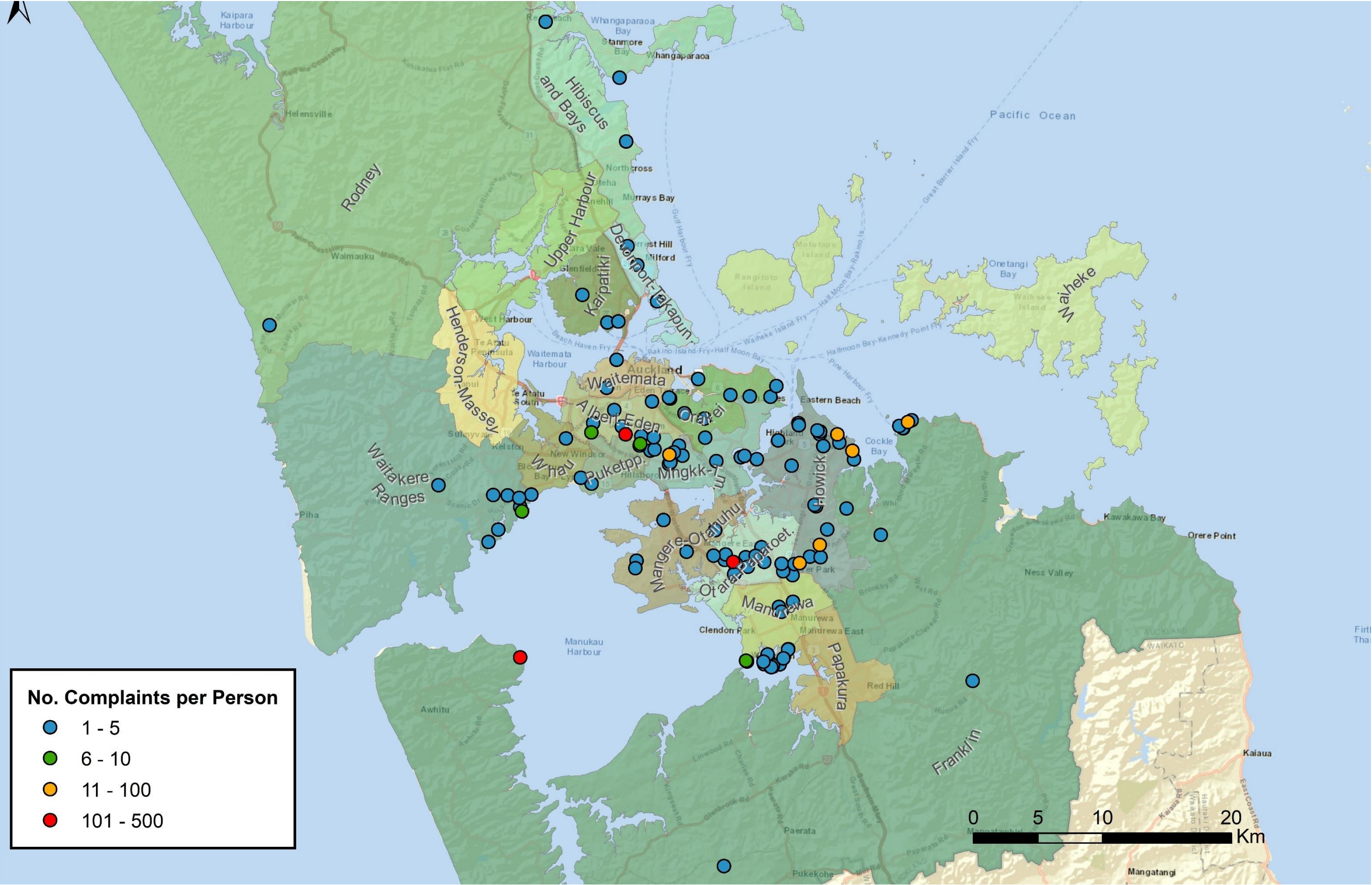


Figure 15 shows the locations of people complaining in FY19 coloured to represent the number of complaints made by that person, the local board outlines are shown behind.

The map shows that the location of complainants is mostly spread over South Auckland, and the Central Suburbs, with a small number from West Auckland and North Shore. Five complaints from north of Auckland and one complaint in Huntly are not shown on the map. Most people made less than 5 complaints (blue dots) with 15 people making more than 5 complaints during FY19.

Figure 15: Number of Complaints per Person in FY19



9.0 NOISE REDUCTION INITIATIVES

Condition 9(b) requires AIAL to report on any initiatives to reduce aircraft noise in the community for both the financial year being reported on and the forthcoming financial year. AIAL is required to detail the outcomes of initiatives investigated in the financial year being reported on. This section gives details of these initiatives.

Airways Route Structure Upgrade

In 2019 Airways New Zealand undertook a review of the Standard Instrument Departures (SIDs) and Standard Instrument Arrivals (STARs) coming into and out of Auckland Airport to ascertain whether tracks could be optimised to fly higher and avoid residential areas. Enhancements to some key tracks were made which were based upon:

- Increased climb on initial departure
- Avoidance of built up areas where possible
- Aircraft profile efficiencies

Changes to the SIDs also included allowance of an unrestricted climb for jets to lessen the noise impact. For the non-jet SIDs, climbing clear of populated area was achieved as far as practicable and an allowance to climb unrestricted to 5000ft was implemented.

Changes to the STARs included changes to the Runway 23 arrival from the south to no longer overfly Pukekohe. For Runway 05 arrivals approximately half now fly seaward of the coast to the final approach, avoiding land.

The specific routes where changes were made are summarised below:

- 23L jet departures south – track altered to avoid the Awhitu Peninsula by turning earlier.
- 23L non-jet departures south – track moved east slightly to avoid Clarks Beach. Aircraft can now climb to 5000ft instead of 3000ft.
- 23L non-jet departures north – point where aircraft diverge to fly to their specific destination moved north over rural land in the Waitakere’s to avoid overflying west Auckland (Henderson etc). The aircraft now climb to 5000ft instead of 3000ft.
- 05R non-jet departures north - point where aircraft diverge to fly to their specific destination moved north over the sea to avoid overflying the Auckland Isthmus. The aircraft now climb to 5000ft instead of 3000ft.
- 23L jet arrivals south – track moved to the east to avoid overflying the Pukekohe township
- 23L non-jet arrivals south – short track moved east to avoid the Pukekohe township. Long track moved east to avoid Tuakau.
- 05R arrivals from south - point where aircraft converge to fly to their specific destination moved south over the west coast to avoid overflying Waiuku and Tuakau.

Future Initiatives

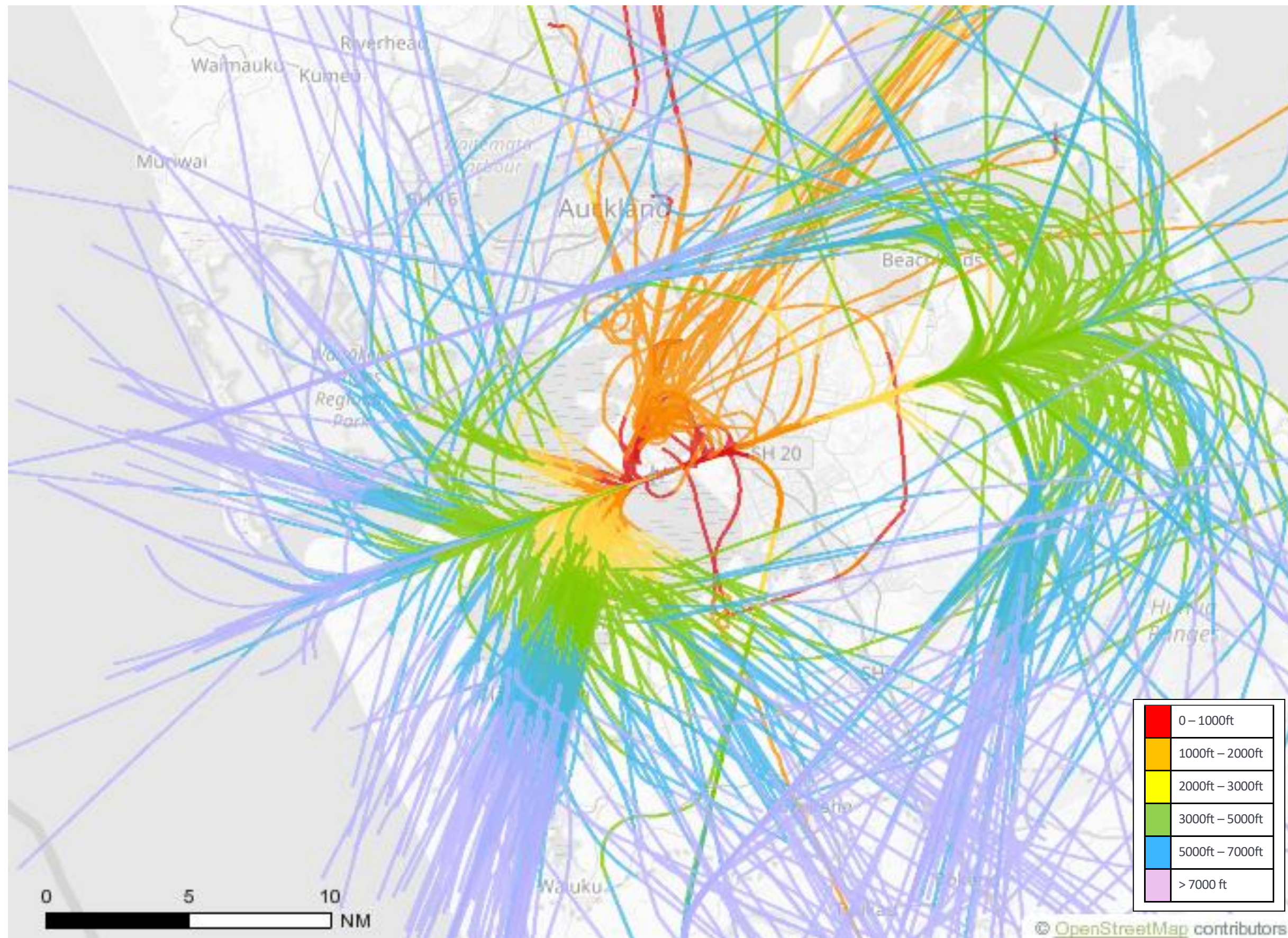
The Independent chair of the Aircraft Noise Community Consultative Group (ANCCG) prepared a document in May 2019 summarising potential focus areas for 2019-2020. In this document a number of areas have been identified where noise reduction initiative could be investigated and implemented. The ANCCG are currently reviewing this document and will discuss in upcoming meetings the specific areas that will be targeted and investigated. The Airport and Industry representatives will then put a work plan in place on whether these noise reduction initiatives can be investigated and implemented. This will form the basis of the future noise reduction initiatives at the Airport in the financial year 2020.

APPENDIX A GLOSSARY OF TERMINOLOGY

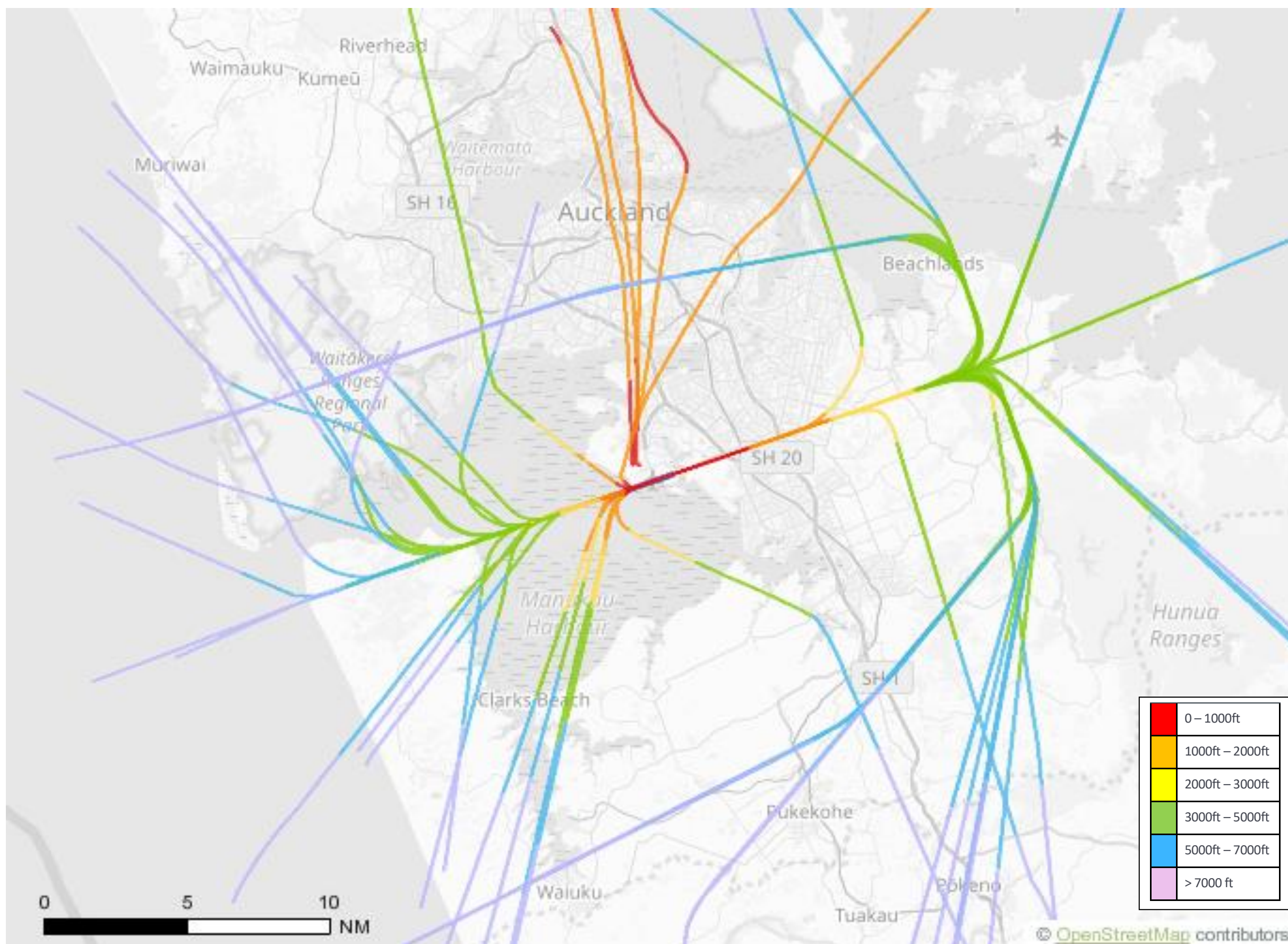
dBa	A measurement of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
Leq	The time averaged sound level (on a logarithmic/energy basis) over the measurement period (normally A-weighted).
Ldn	The day-night sound level which is calculated from the 24 hour Leq with a 10 dBA penalty applied to the night-time (2200-0700 hours) Leq (normally A-weighted).
Lmax	The maximum sound level recorded during the measurement period (normally A-weighted).
Noise	A sound that is unwanted by, or distracting to, the receiver.
Ambient Noise	Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.
NZS 6805:1992	New Zealand Standard NZS 6805:1992 “Airport Noise Management and Land Use Planning”

APPENDIX B FLIGHT TRACK DIAGRAMS

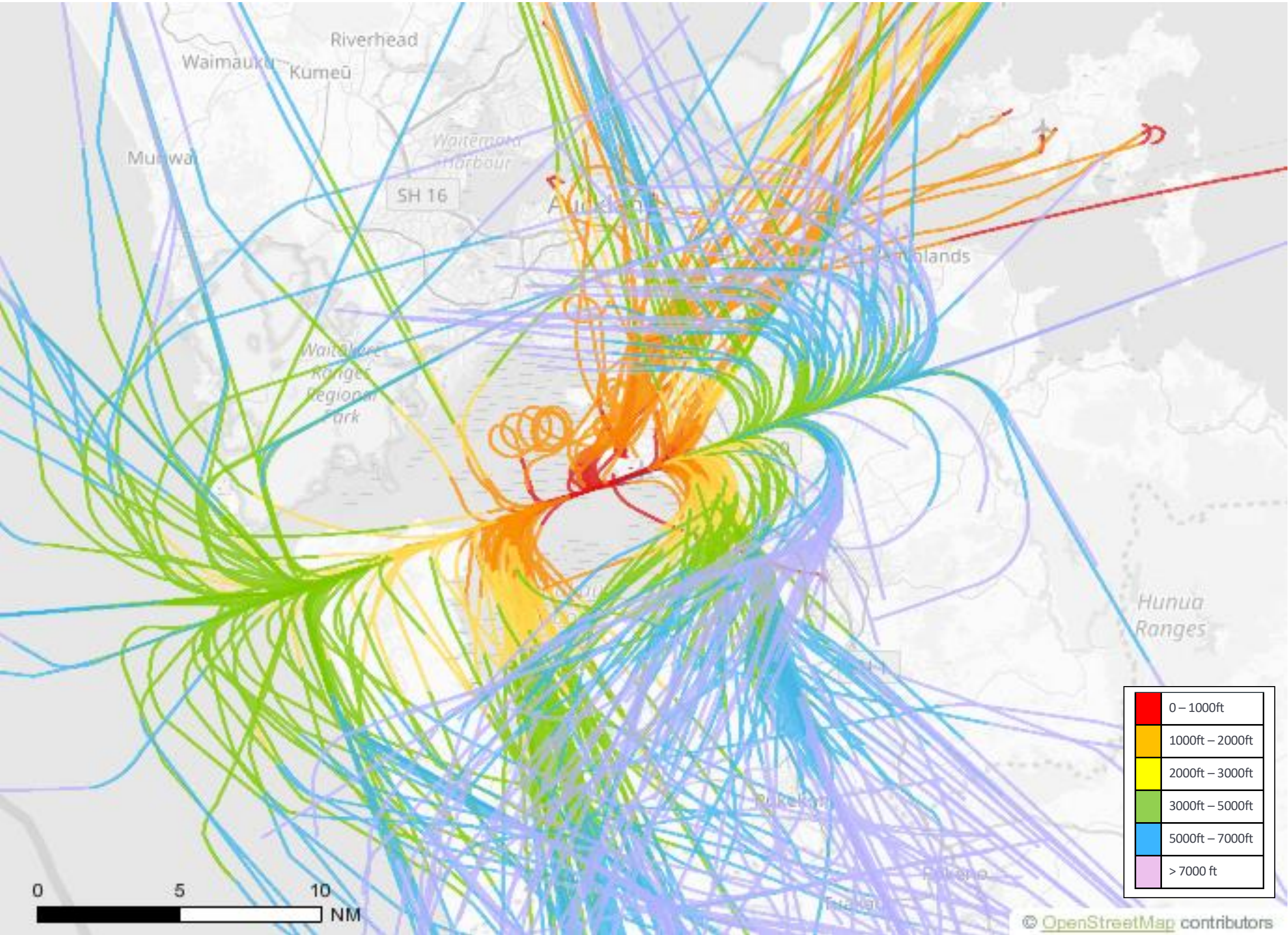
B1 Individual Flight Paths for the Busiest RW23L Day (7am - 10pm) in FY19



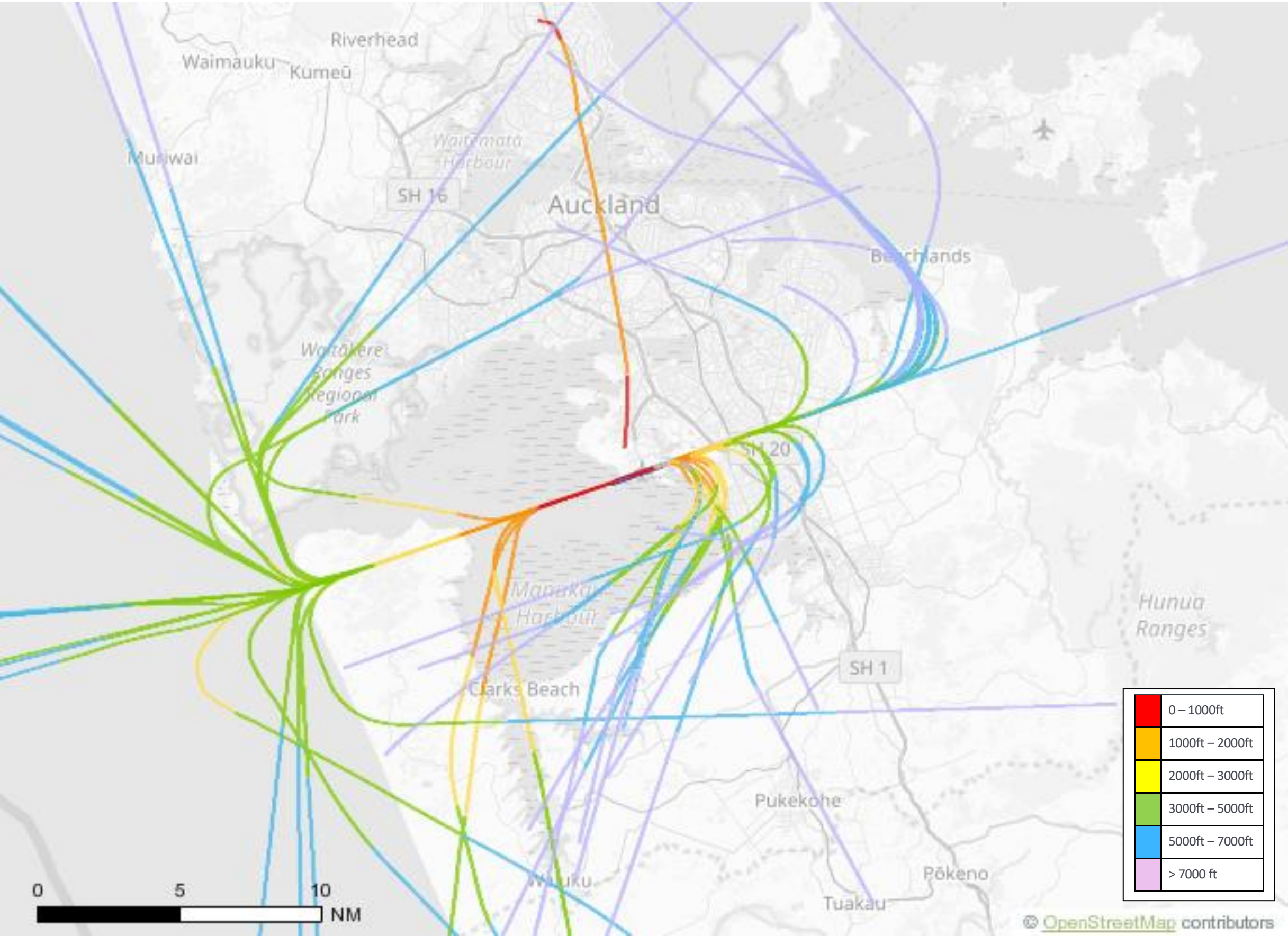
B2 Individual Flight Paths for the Busiest RW23L Night (10pm - 7am) in FY19



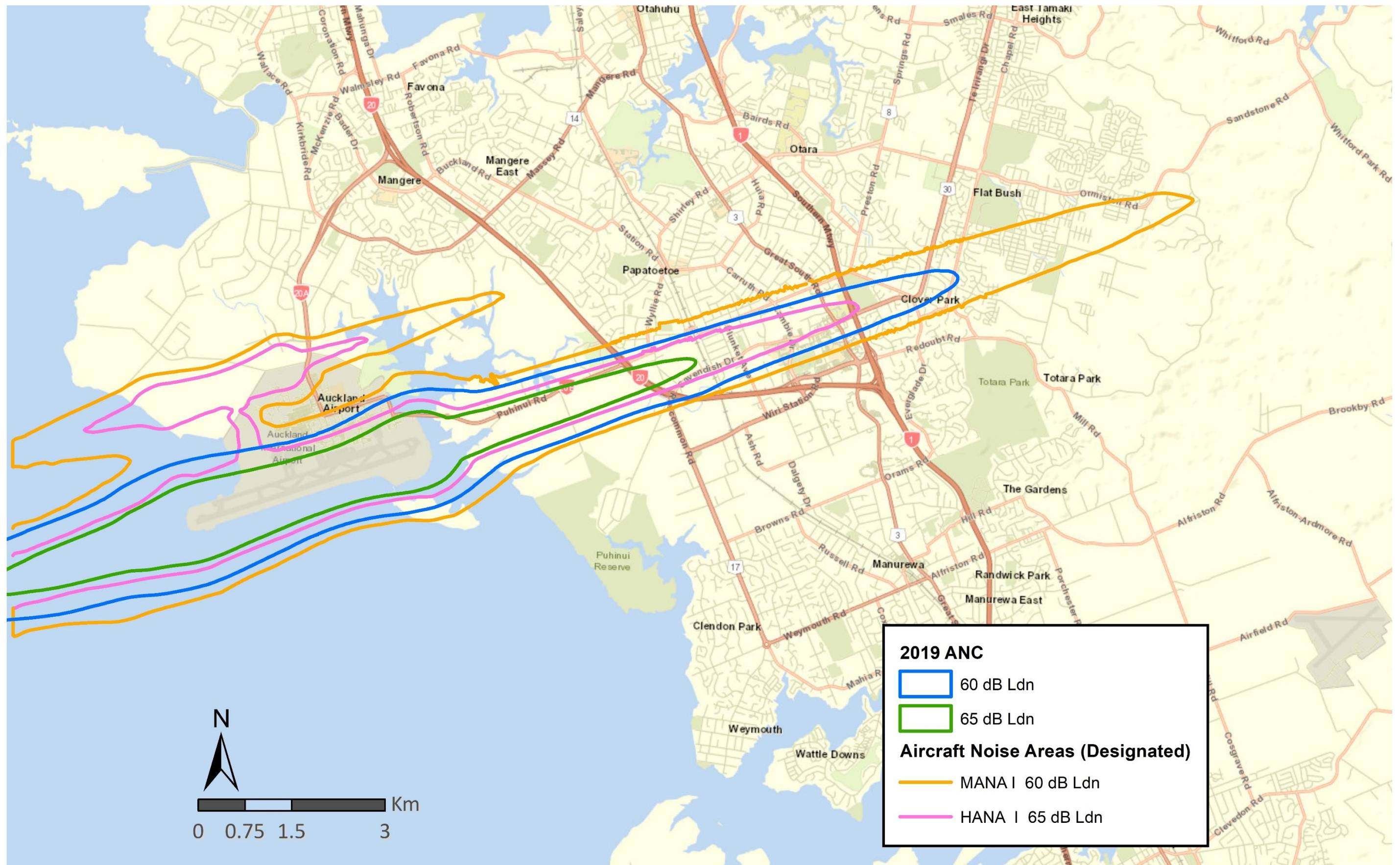
B3 Individual Flight Paths for the Busiest RW05R Day (7am - 10pm) in FY19



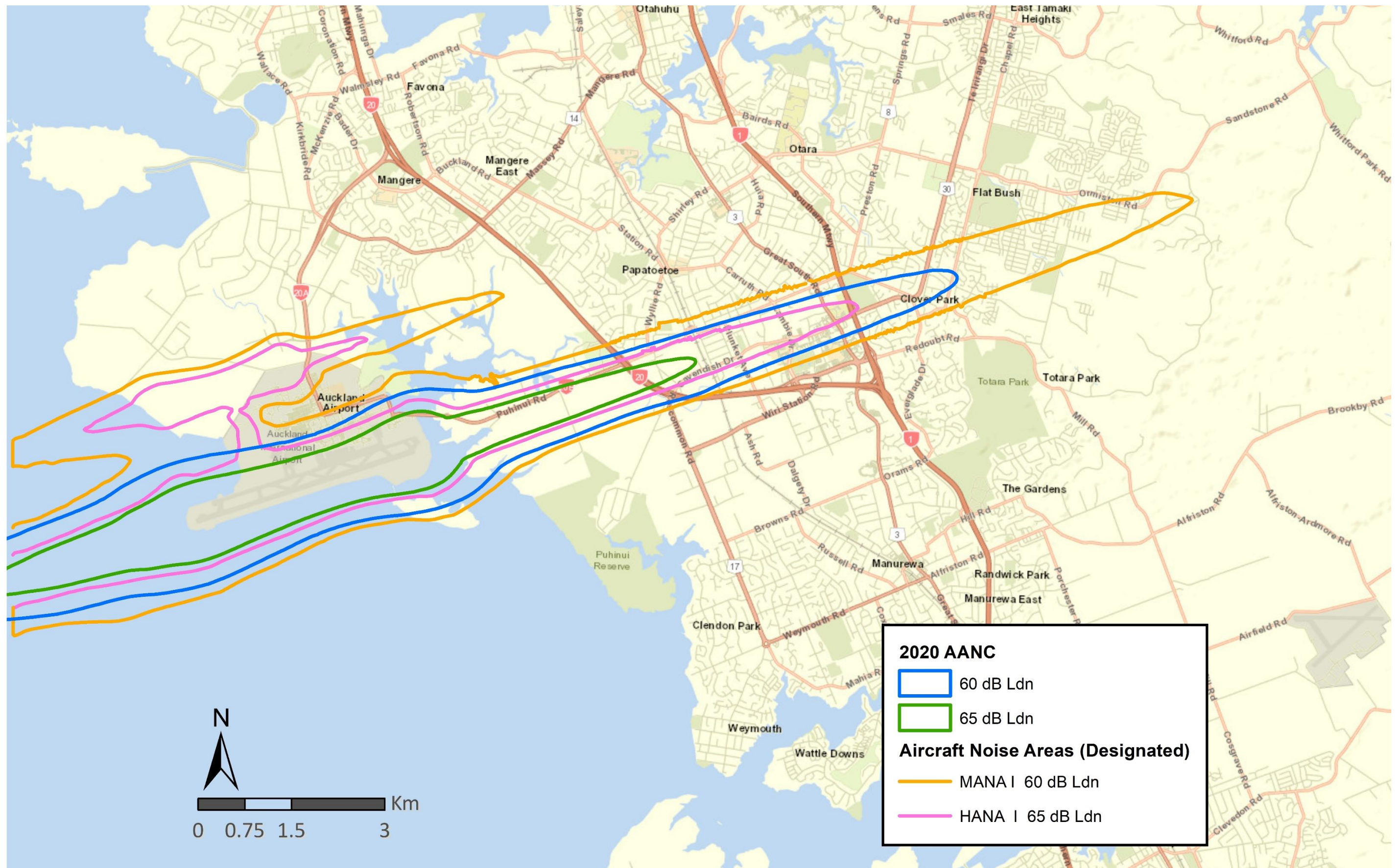
B4 Individual Flight Paths for the Busiest RW05R Night (10pm - 7am) in FY19

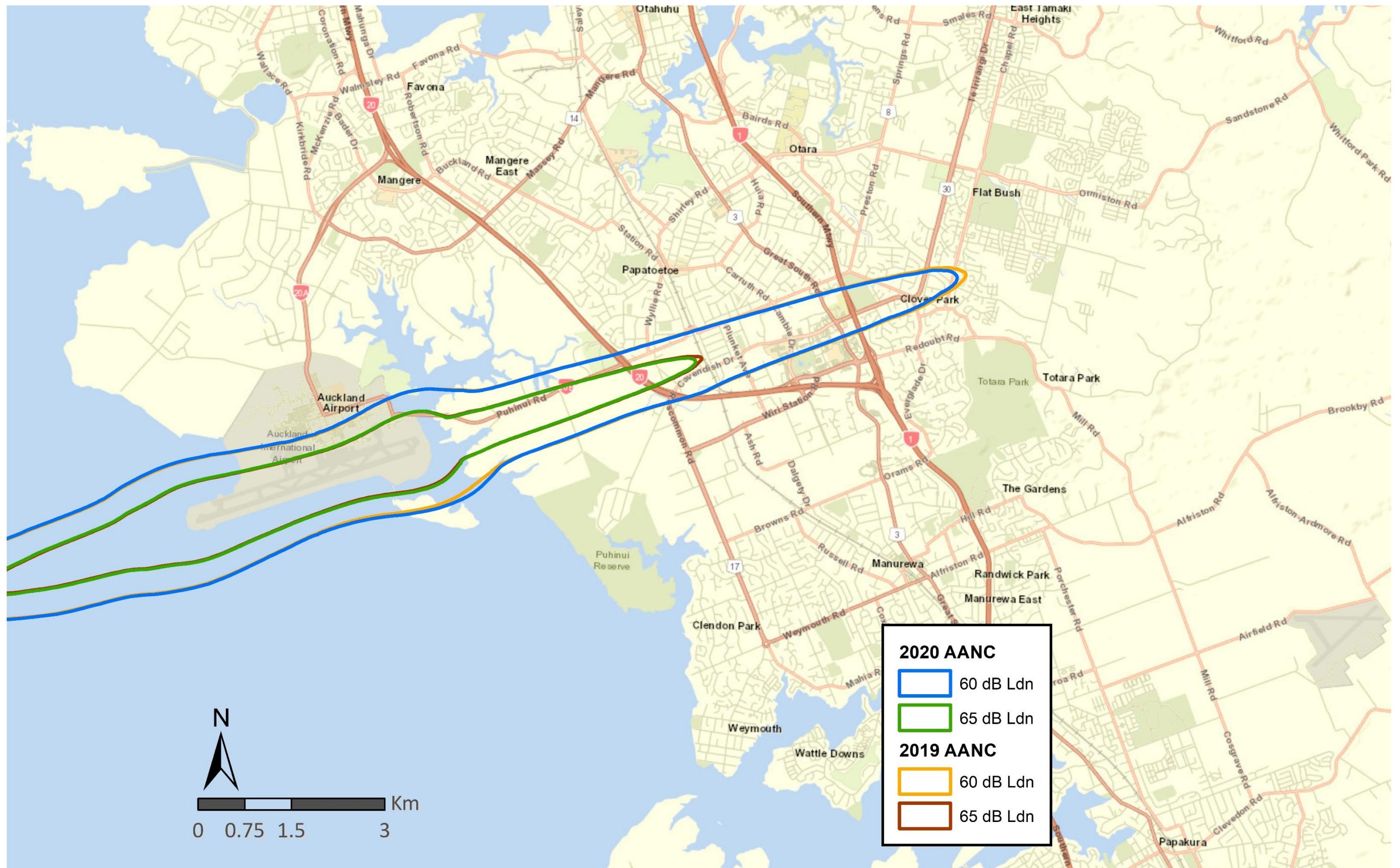


APPENDIX C 2019 ACTUAL NOISE CONTOURS (ANC) & OPERATIVE HANA/MANA BOUNDARIES CONTAINED IN DESIGNATION 1100



APPENDIX D 2020 ANNUAL AIRCRAFT NOISE CONTOURS (AANC) & OPERATIVE HANA/MANA BOUNDARIES CONTAINED IN DESIGNATION 1100





APPENDIX F NOISE COMPLAINTS BY SUBURB

Suburb	No. Complaints	Suburb	No. Complaints	Suburb	No. Complaints	Suburb	No. Complaints
Arkles Bay	1	Greenlane	4	Mellons Bay	13	Patumahoe	1
Avondale	1	Grey Lynn	1	Milford	1	Remuera	7
Beachlands	19	Half Moon Bay	2	Mount Albert	10	Royal Oak	3
Birkdale	1	Hauraki	2	Mount Eden	118	Saint Heliers	2
Birkenhead	1	Howick	4	Mount Roskill	1	Saint Marys Bay	1
Bucklands Beach	1	Huntly	1	Mount Wellington	4	Sandringham	1
Clover Park	2	Hunua	1	Muriwai	1	Shelly Park	1
Cockle Bay	12	Laingholm	2	Newmarket	1	Silverdale	2
East Tamaki Heights	3	Long Bay	1	Northcote Point	1	Snells Beach	1
Ellerslie	1	Lynfield	1	One Tree Hill	47	Titirangi	15
Epsom	11	Mangere	10	Onehunga	4	Wattle Downs	20
Farm Cove	1	Mangere Bridge	1	Orakei	1	Weymouth	12
Flat Bush	49	Mangere East	2	Oratia	1	Whangaripo	1
Forrest Hill	1	Manukau	2	Pakuranga	2	Whitford	2
Glendowie	3	Manukau Heads	156	Pakuranga Heights	1		
Goodwood Heights	1	Manurewa	3	Papatoetoe	329		