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Airport

MARSHALL DAY
Acoustics 

AUCKLAND AIRPORT
2018 FINANCIAL YEAR ANNUAL NOISE MANAGEMENT REPORT
28 August 2018

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 FY18 (Jul 2017 – Jun 2018).

Aircraft operations during FY18 increased by 1% when compared to FY17 with night-time movements down 1% and daytime movements up 1%. Night-time movements made up 11% of the total movements in FY18 with the remaining movements (89%) occurring in the daytime. The runway usage during FY18 differed from the typical average runway split (70%/30% Runway 23/05) by 7% in favour of Runway 05R.

The three required noise monitors have been operating satisfactorily throughout FY18 with no calibration problems experienced. There was a monitor malfunction at the Puhinui noise monitor between 28 October 2017 and 9 November 2017 where the data was lost. This would not impact the overall measured noise levels at this location. Compared with FY17, the measured noise levels for FY18 have decreased by 0.7 dB at Puhinui School, 0.6 dB at the Velodrome and 0.4 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 FY18 aircraft operations show compliance with the 60 and 65 dB L_{dn} limits at the MANA and HANA boundaries respectively.

The projected Annual Aircraft Noise Contours (AANC) for FY19 (2019 AANC), which represents activity occurring in the coming year, shows a slight increase (0.1-0.3 dB) in noise compared with the 2018 AANC. This information is utilised by the Noise Mitigation Programme for identifying properties eligible for sound insulation offers. This year some new properties are eligible for offers as the 2019 AANC are slightly larger than the 2018 AANC.

Noise from engine testing activities has been compliant with the relevant noise limits throughout FY18. The highest L_{dn} calculated was between 43 and 44 at the three measurement locations, this is 11-13 decibels below the noise limit.

There were 467 complaints received in FY18 made by 155 complainants. It is noted that 166 (36%) of the complaints received in FY18 were from 5 people. The total number of complaints received in FY18 has decreased by 20% when compared to FY17. 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 has reduced appreciably 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 FY18 the number of people complaining decreased by 69% then compared to FY14. The total number of people complaining in FY18 has increased by 115% when compared to the FY17.

The complaints for FY18 were spread over South Auckland, East Auckland and the Central Suburbs, with a small number from West Auckland and North Shore. Most people made less than 5 complaints with 13 people making more than 5 complaints during FY18.

There was a general correlation between the number of complaints and usage of Runway 05 - departures to the east. Complaints were high from October to March when there was an unusually high occurrence of easterly winds which resulted in departures tracking over east Auckland and central city suburbs.

The noise reduction initiatives in the FY18 have been summarised relating the implementation of Night STARS to move some night flights off the Isthmus and a restriction of night arrivals on the short southern arrival tracks.

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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, we have used the updated Conditions 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 we have assessed compliance with both sets of noise contours but have shown the noise contours proposed to be altered through the Notice of Requirement 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 are 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 2018 financial year (Jul 17 – Jun 18) 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 2018 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

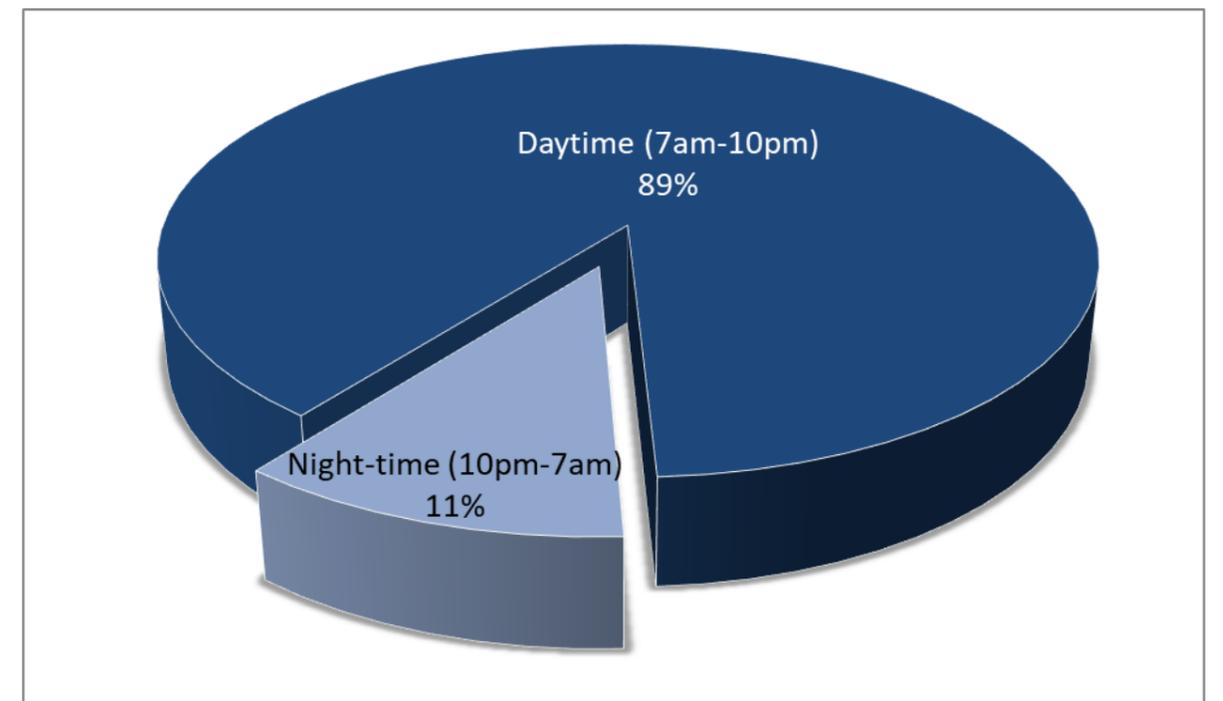
Table 1 shows a summary of aircraft movement numbers at Auckland Airport during the FY18 (Jul-17 to Jun-18) with the FY17 data (Jul-16 to Jun-17) included for reference.

Table 1: Aircraft Movements Numbers

	FY17	FY18	Difference	% Change
Total Movements	171,006	172,627	11,963	+1%
Daytime Movements (7am to 10pm)	151,241	153,083	12,570	+1%
Night-time Movements (10pm to 7am)	19,765	19,544	-607	-1%

Figure 1 shows the breakdown of movements for FY18 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 1649 movements for the FY18 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 the FY18 increased by 1% when compared to the previous year. Night-time movements decreased by 1% and movements in the daytime increased by 1%. Night-time movements made up 11% of the total movements in the FY18 with the remaining movements (89%) occurring in the daytime.

Figure 2 shows the aircraft movements broken down by broad aircraft type. 59% of flights were jet aircraft with turboprops making up 37% of the total flights.

Figure 2: Aircraft Movements by Aircraft Type

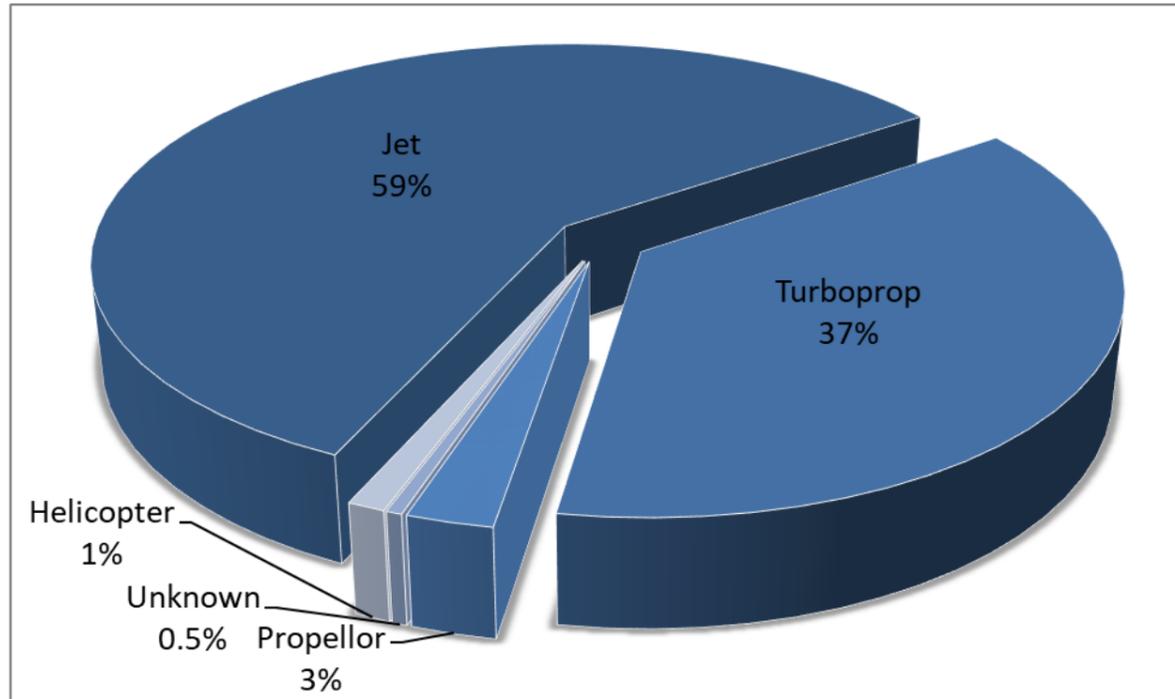


Table 2 below shows the runway usage for the FY18. The typical average runway split is 70% Runway 23 (arrivals from the east, departures to the west) and 30% Runway 05 (arrivals from the west, departures to the east). The runway usage for the FY18 was slightly different to the long run average runway split with 63% Runway 23 usage and 37% 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	FY17 Runway Split	Deviation
Runway Mode 23	70%	63%	7%
Runway Mode 05	30%	37%	

Figure 3: Individual Flight Paths for the Busiest RW23L Day (7am - 10pm) in the FY18

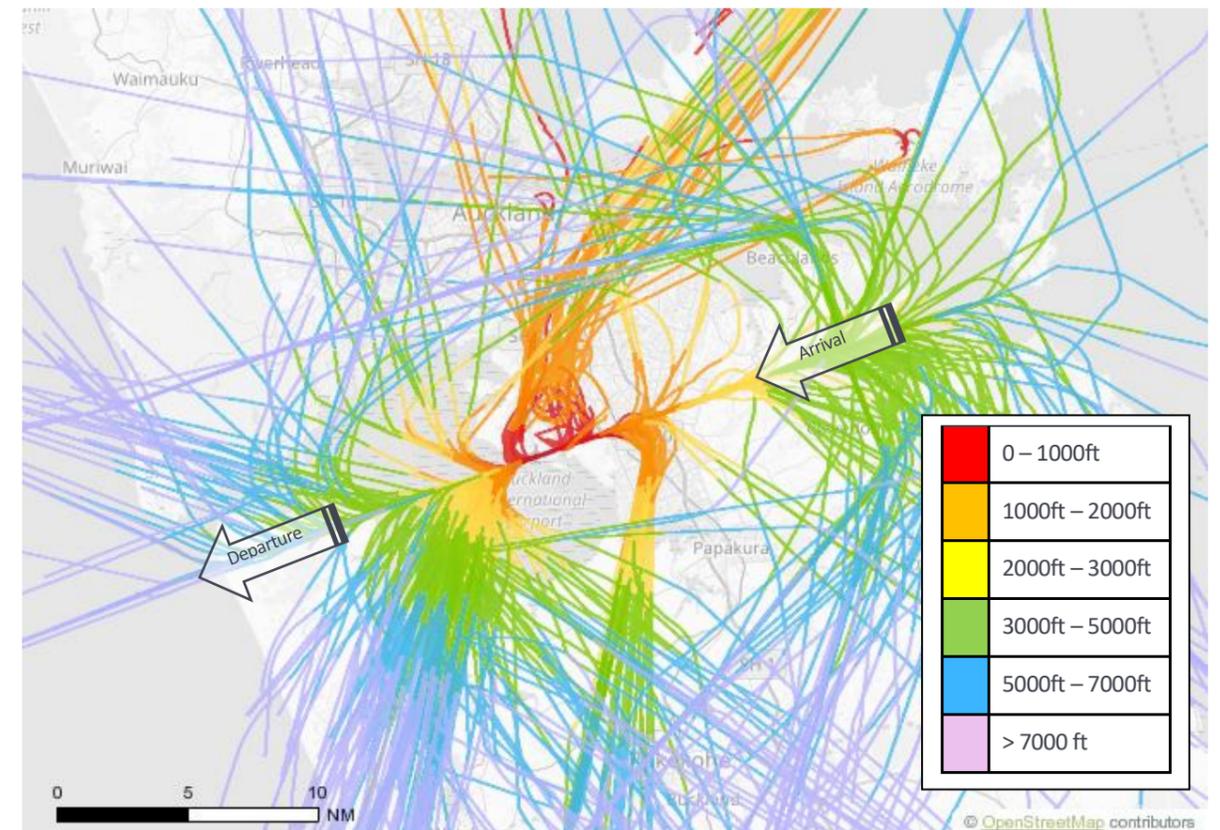
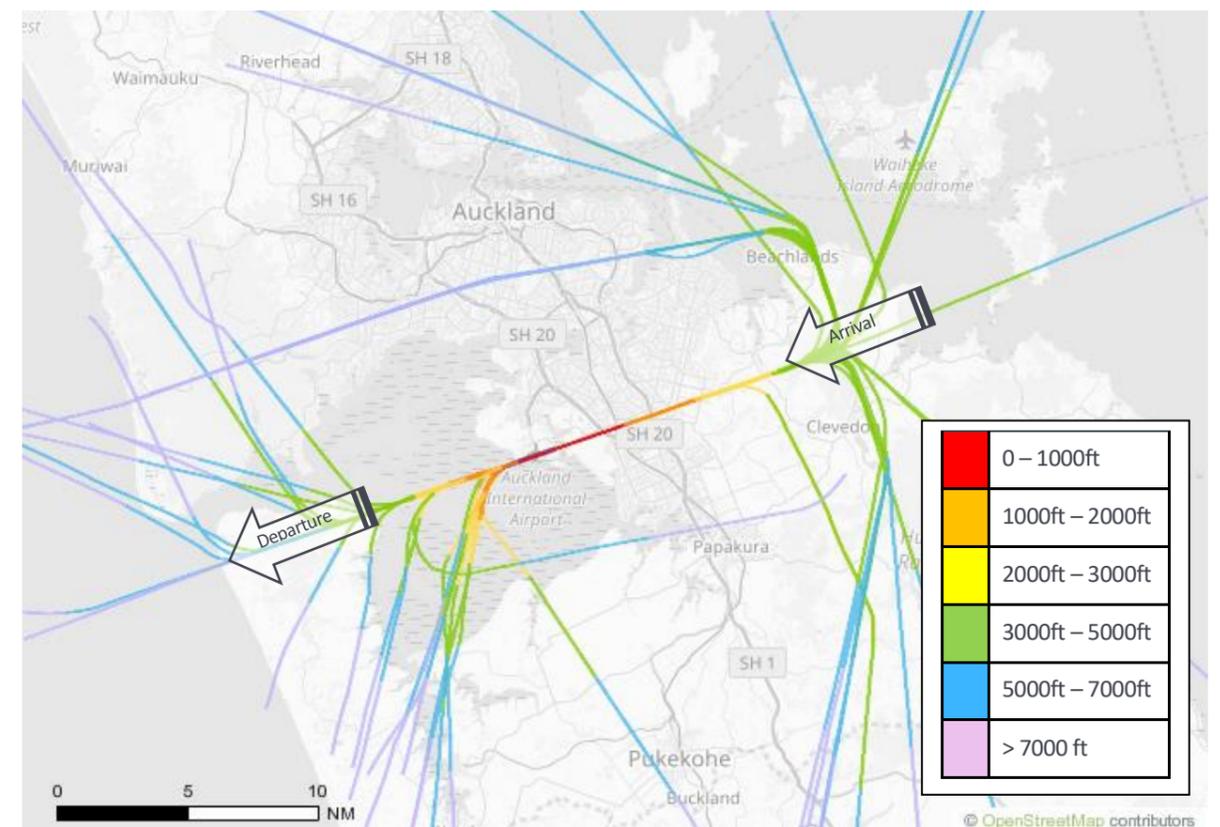


Figure 4: Individual Flight Paths for the Busiest RW23L Night (10pm - 7am) in the FY18



3.0 FLIGHT PATHS

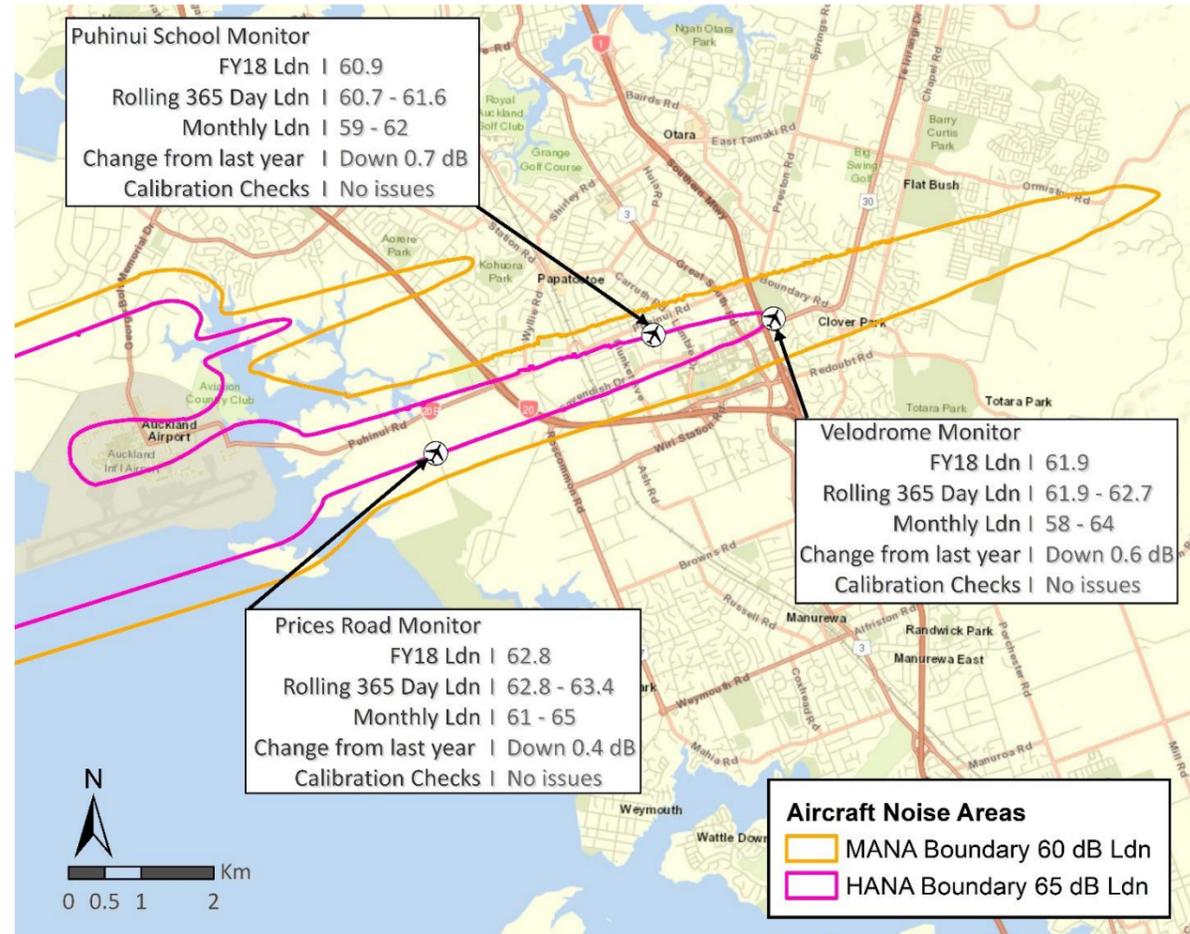
The flight paths that aircraft utilise are variable and depend on the aircraft type, aircraft weight, destination/origin, the weather at the time, other air traffic in the area and other factors. One major factor that influences flight paths is the wind direction. In Auckland, the prevailing wind is 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 FY18 when westerly winds were prevailing (23-Feb-18) and Figure 4 shows the flight paths for the busiest night (10pm – 7am) in FY18 when westerly winds were prevailing (23-Feb-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 (2-Mar-18).

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 FY18. 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 operated well throughout FY18 without any calibration issues. There was a monitor malfunction at the Puhinui noise monitor between 28 October 2017 and 9 November 2017 where the data was lost. This would not impact the overall measured noise levels at this location. The rolling 365-day L_{dn} at the noise monitors was generally 3-4 decibels below the noise limit.

Table 3 compares the measured noise levels for FY17 with FY18. Noise levels in FY18 decreased by 0.7 dB at Puhinui School and 0.6 dB at the Velodrome and 0.4 dB at Prices Rd. A change in noise level of 0.4-0.7 is small and would generally not be perceptible to those living inside the Aircraft Noise Areas.

Table 3: Measured Noise Levels

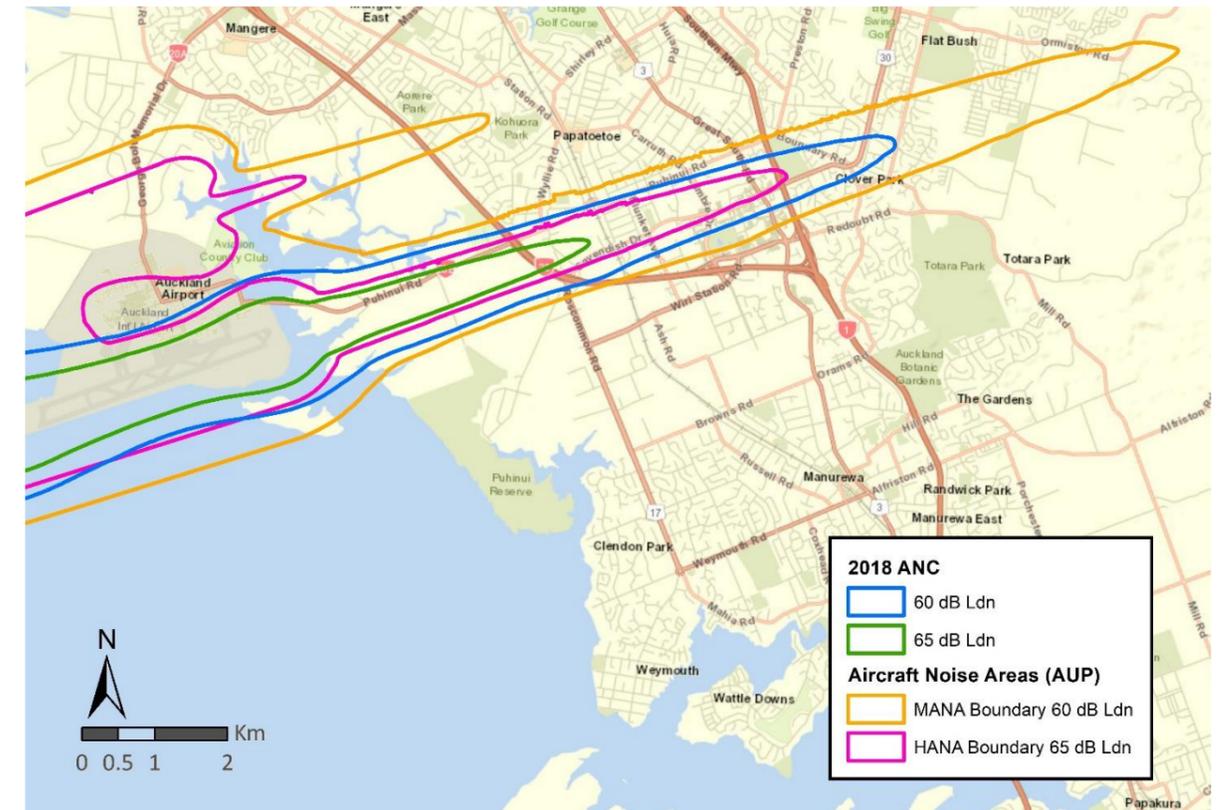
Monitor Location	FY17 dB L _{dn}	FY18 dB L _{dn}	Difference (dB)
Puhinui School	61.6	60.9	-0.7
Velodrome	62.5	61.9	-0.6
Prices Road	63.2	62.8	-0.4

5.0 2018 ACTUAL NOISE CONTOUR (ACTUAL ACTIVITY) - ANC

The ANC noise contours represent the actual aircraft activity occurring in FY18. 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. The computer modelling has been validated against from the noise monitoring system, to verify the measured 12-month L_{dn} level at each monitoring site.

Figure 6 shows the calculated 60 and 65 dB L_{dn} contours for FY18. 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 FY18 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 FY18. In this case the model is within 1 dB of the measured levels at the three monitoring locations. This is a reasonable representation for a compliance assessment.

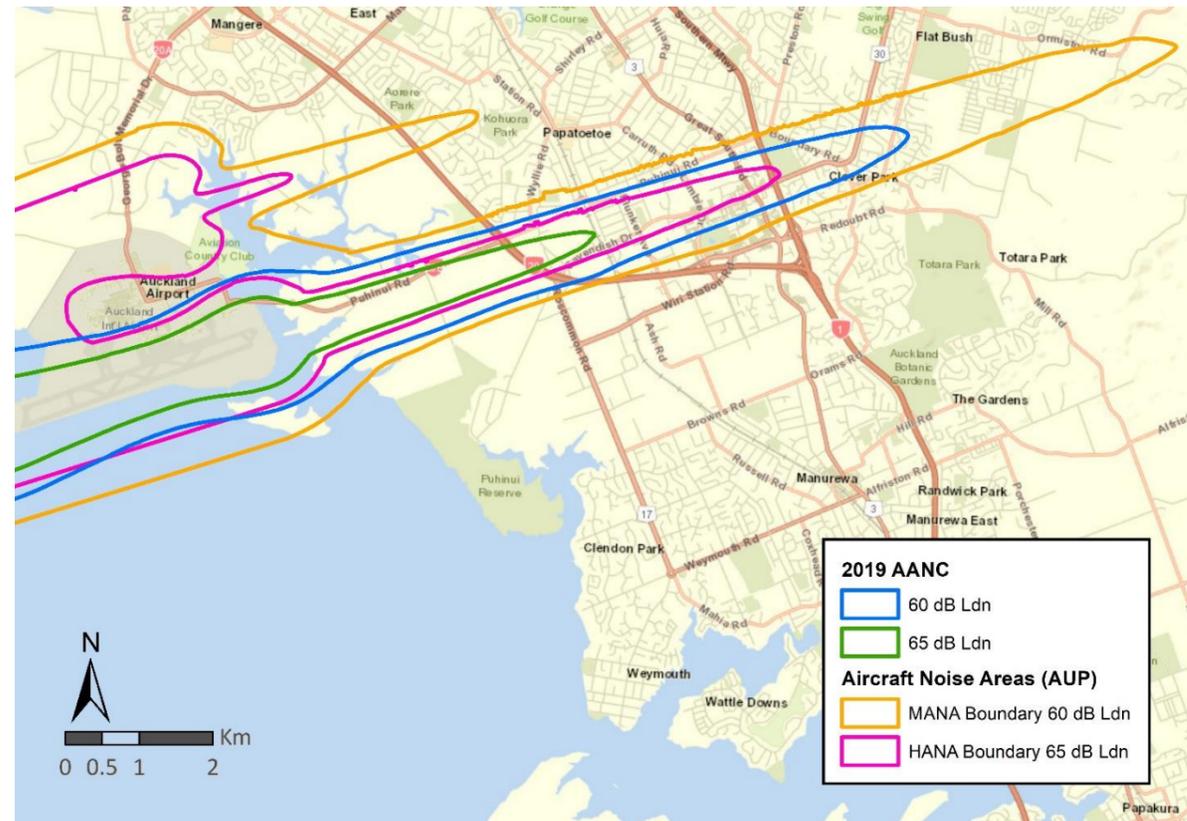
Table 4: Calculated and Measured Noise Levels (Actual Activity FY18)

Monitor Location	Measured Noise Level L _{dn} (dB)	Calculated Noise Level L _{dn} (dB)	Difference (dB)
Puhinui School	60.9	61.5	+0.6
Velodrome	61.9	61.6	-0.3
Prices Road	62.8	63.8	+1.0

6.0 2019 ANNUAL AIRCRAFT NOISE CONTOUR (PROJECTED ACTIVITY) - AANC

The Annual Aircraft Noise Contours (2019 AANC) will be published in October 2018 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 2019 AANC contours compared to the HANA and MANA boundaries proposed to be altered through the Notice of Requirement. Appendix D shows the 2019 AANC contours compared to the operative HANA and MANA boundaries contained in Designation 1100.

Figure 7: 2019 Annual Aircraft Noise Contour (AANC)



Appendix E shows the 2018 AANC compared to the 2019 AANC. The 2019 AANC are slightly larger than the 2018 AANC. This is likely due to the growth forecast for FY19.

Table 5 lists the predicted noise levels at the monitoring sites for the 2018 AANC and 2019 AANC. The noise levels in the 2019 AANC are slightly higher than the 2018 AANC.

Table 5: 2019 AANC Calculated Noise Levels (Projected Activity)

Monitor Location	2018 AANC L _{dn} (dBA)	2019 AANC L _{dn} (dBA)	Difference
Puhinui School	61.6	61.8	+0.2
Velodrome	61.8	61.9	+0.1
Prices Road	63.4	63.7	+0.3

As noted above, the 2019 AANC are slightly larger than the 2018 AANC therefore some new offers are required to be made at 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 FY18. The highest L_{dn} calculated was between 42 and 44 at the three measurement locations, this is 11-13 decibels below the noise limit.

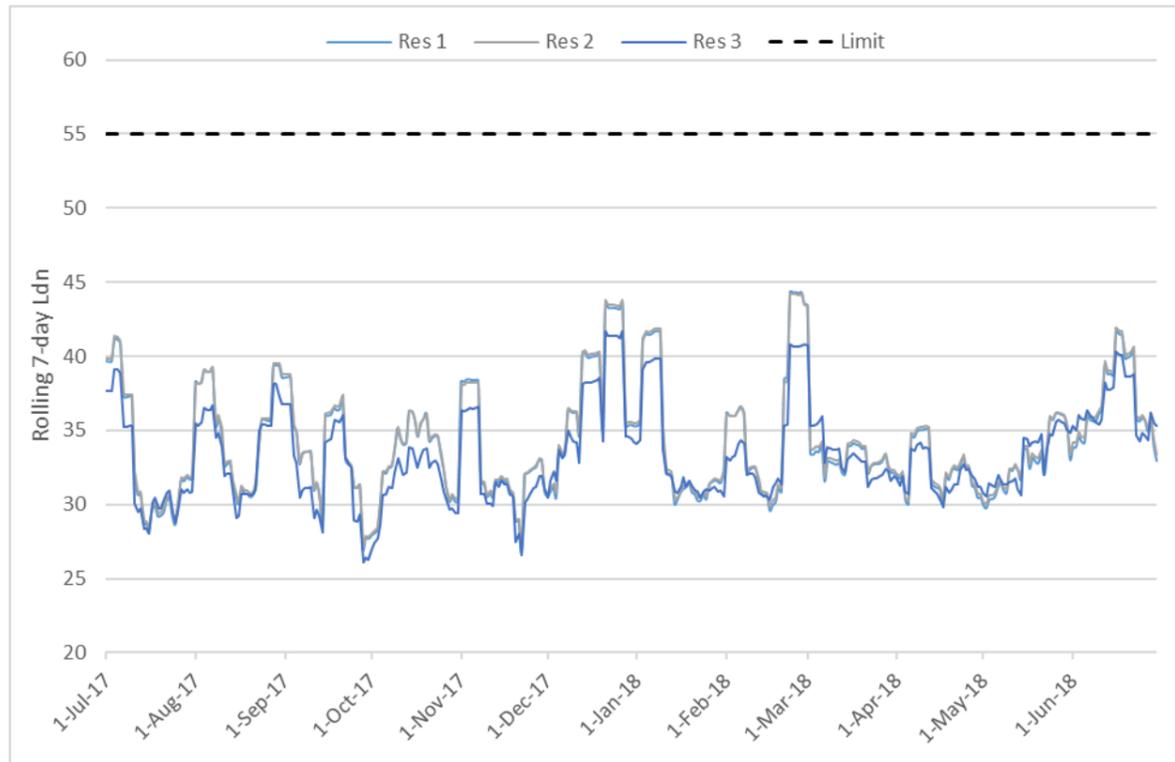
Figure 8: FY18 Engine Testing Monitoring Summary



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}.

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. We have 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)



It is noted that 166 (36%) of the complaints received in FY18 were from 5 people. The total number of complaints received in FY18 has decreased by 20% when compared to FY17. 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 88% 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 FY18 the number of people complaining decreased by 69% when compared to FY14. The total number of people complaining in FY18 has increased by 115% when compared to FY17.

Figure 10 shows the number of complaints made in each month of FY17 and FY18. The number of complaints received per month ranged between 9 and 94 in FY18. The complaints received each month were lower than in FY17 for most months apart from the October to March period (excluding February) where the number of complaints was larger in FY18. This is likely due to a high usage of Runway 05R during this time which is discussed more below.

Figure 10: Aircraft Noise Complaints in FY17 and FY18

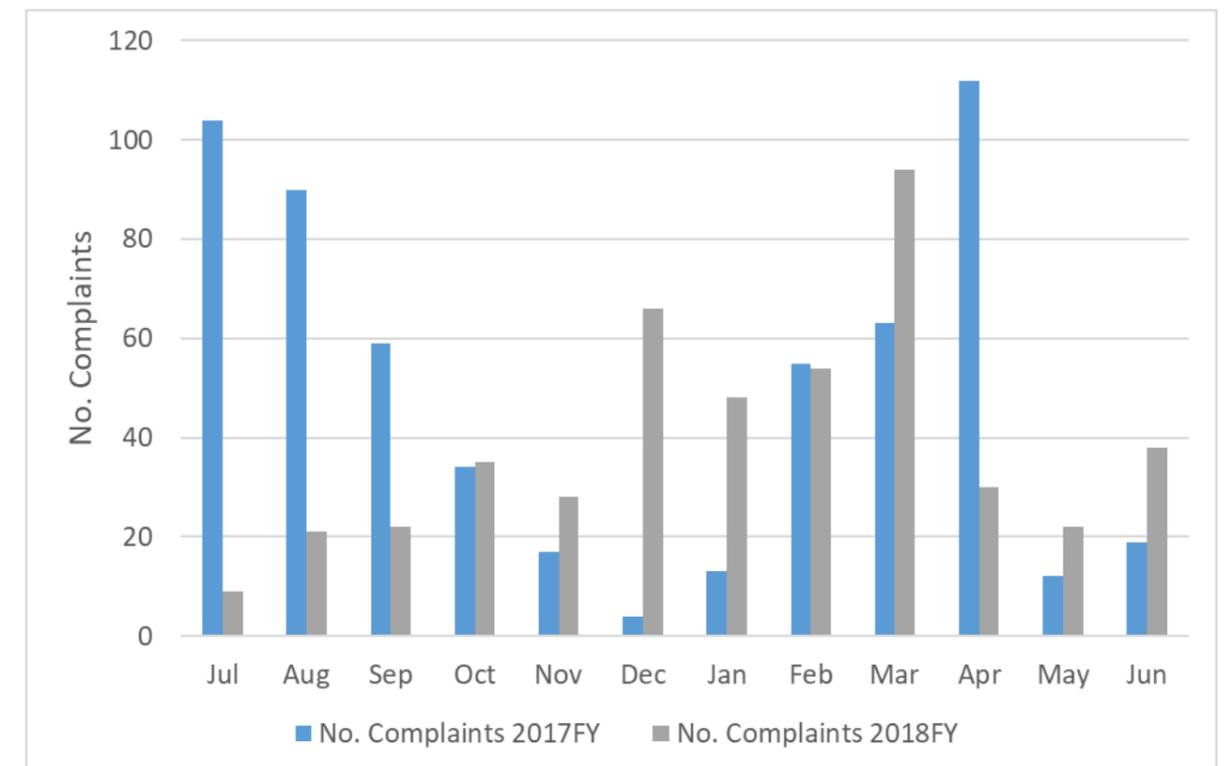


Figure 11 shows the number of people that complained in each month of FY17 and FY18. Each month the number of people making the complaints ranged between 9 and 34 during FY18. In FY18 the number of people complaining increased during the October to March period. This is likely due to a high usage of Runway 05R during this time which is discussed more below.

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 FY18 the airport received 467 noise complaints from 155 people, 298 (64%) of these were specific complaints, 147 (31%) were generic complaints and 22 (5%) were question enquiries.

The complaints for FY18 came predominantly from South Auckland, East Auckland and the Central Suburbs, with a small number from West Auckland and North Shore

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

Table 6: Summary of Complaints since 2014

	FY14	FY15	FY16	FY17	FY18
No. Complaints	3,955	3,425	1,980	581	467
No. People Complaining	506	251	123	72	155

Figure 11: Number of People Complaining about Aircraft Noise in FY17 and FY18

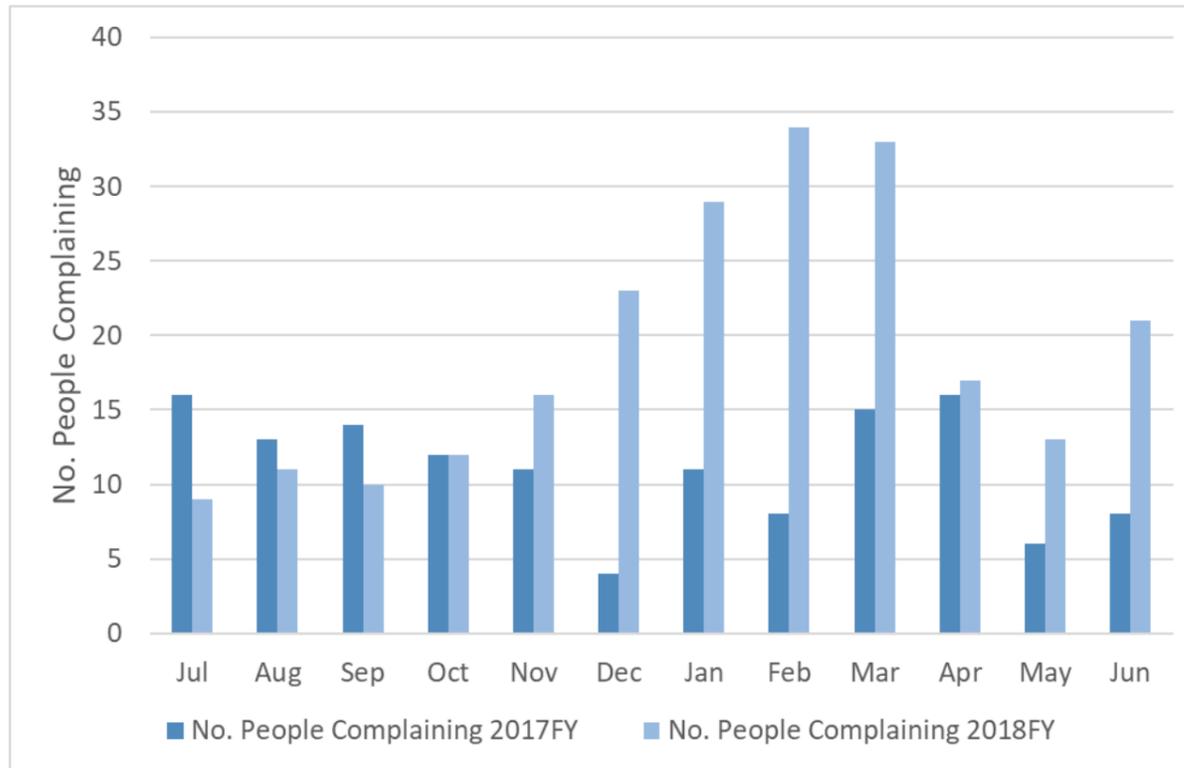
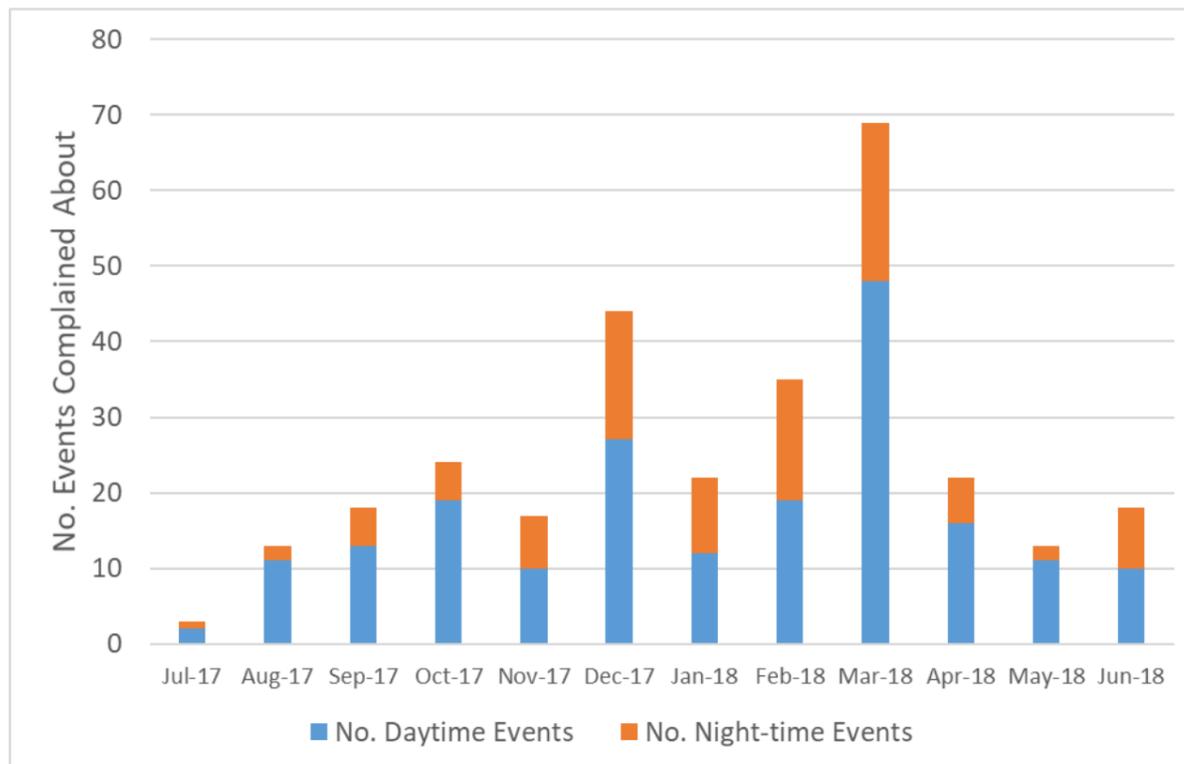


Figure 12 shows the specific complaining at night-time (10pm-7am) compared with daytime for each month in FY18.

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



Daytime flights made up 66% of the aircraft overflights complained about in FY18 with the remaining 34% relating to aircraft events at night-time. There is some correlation between movements at the airport and the number of complaints received in the busy shoulder period (7-9am and 5-7pm). The number of aircraft event complaints was higher between October and March, this is discussed further below.

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.

Historically it has been found that the airport receives a higher number of complaints when Runway 05 is used (departures over East Auckland) and this explains the high number of complaints in October to March. 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

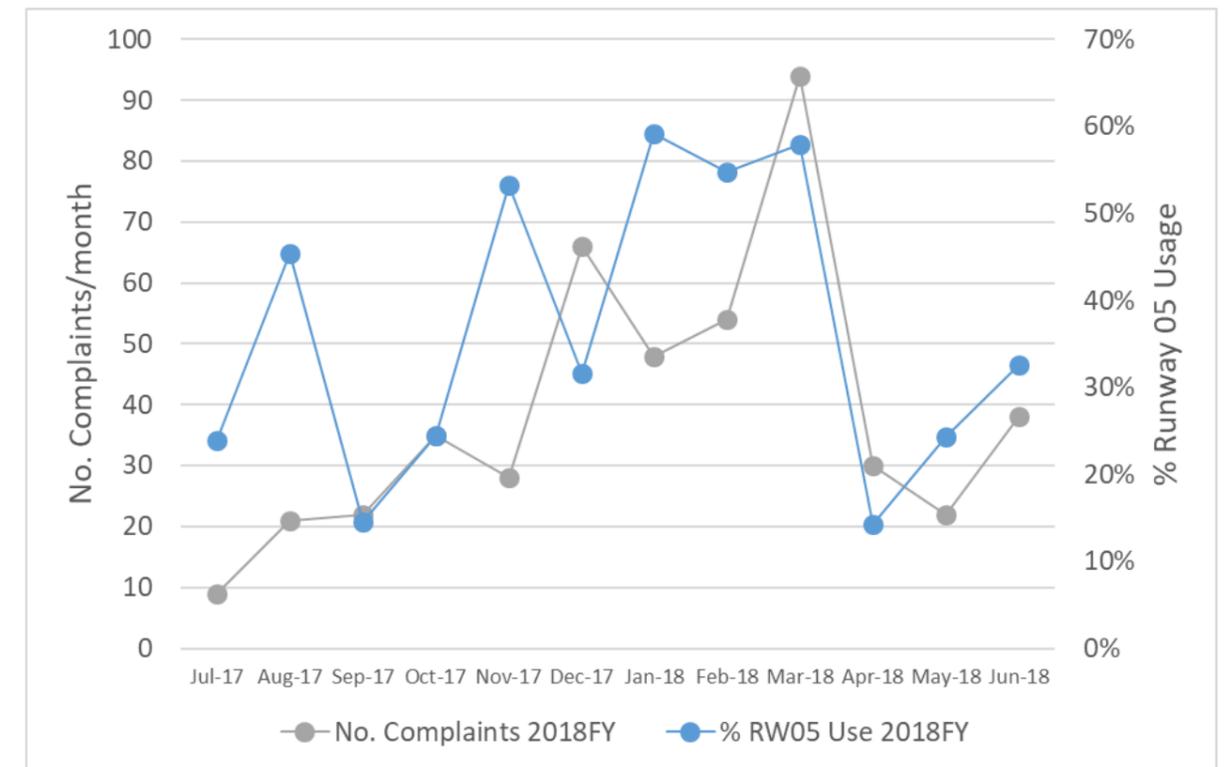


Figure 14 shows the number of complaints received by area. Appendix F gives more detail on the number of complaints received from each suburb. Greenlane and Onehunga residents made the largest number of complaints (21%) with the remaining complainants spread over 62 suburbs. The complaints in Greenlane and Onehunga were mainly made by two people.

Figure 14: Complaints by Suburb

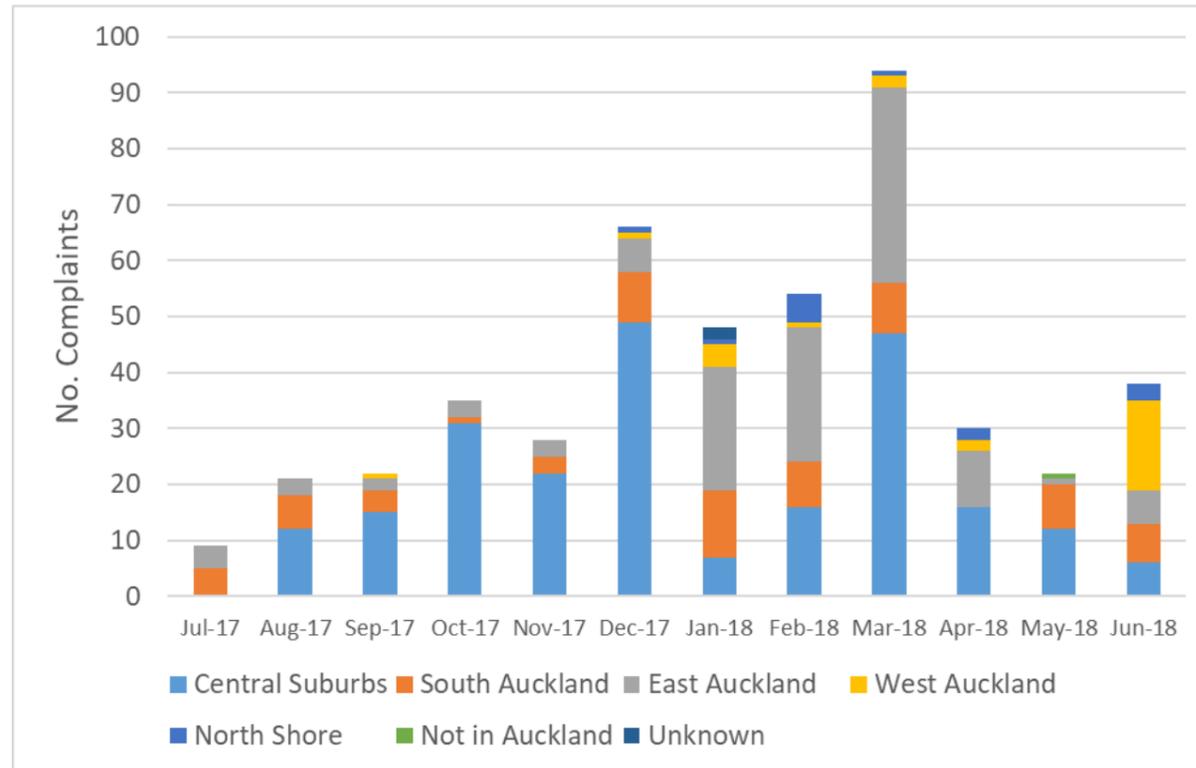
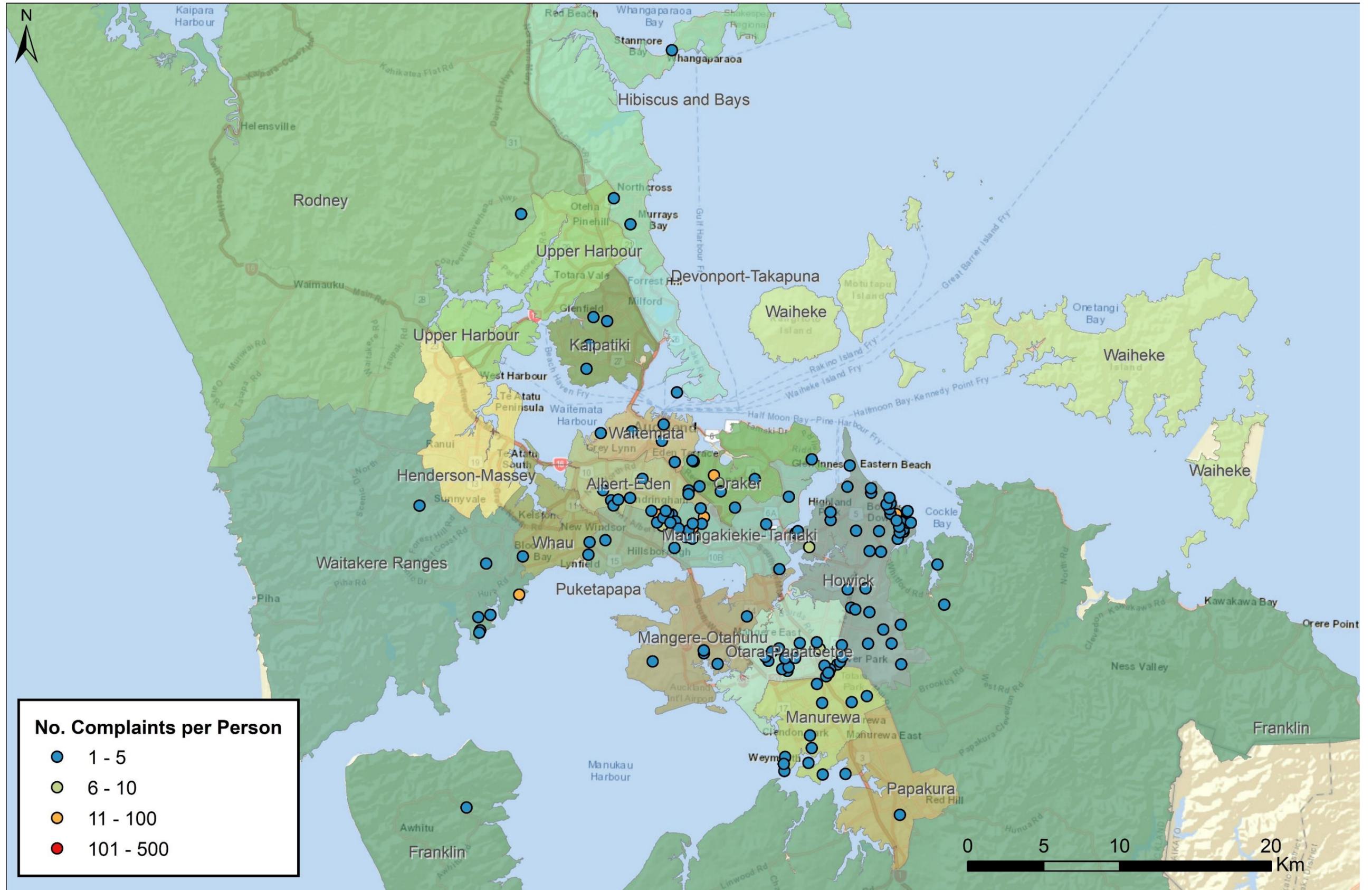


Figure 15 shows the locations of people complaining in FY18 coloured to represent the number of complaints made by that person, the local board outlines are shown behind.

The map shows that the location of complainants is mostly spread over South Auckland, East Auckland and the Central Suburbs, with a small number from West Auckland and North Shore. Most people made less than 5 complaints (blue dots) with 18 people making more than 5 complaints during FY18.

Figure 15: Number of Complaints per Person in FY17



9.0 NOISE REDUCTION INITIATIVES

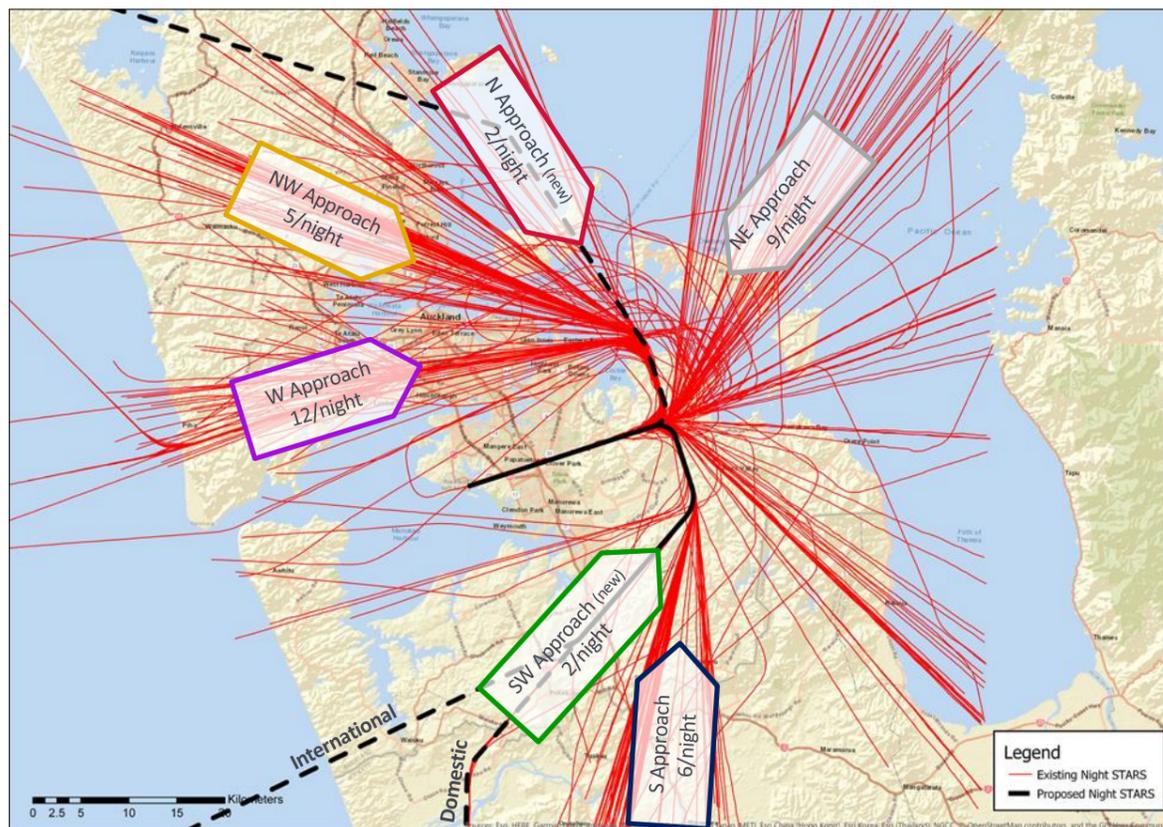
Condition 9(b) requires AIAL to report on any initiatives to reduce aircraft noise in the community in the financial year being reported on and the forthcoming financial year. For initiatives investigated in the financial year being reported on, AIAL are required to detail the outcomes of these initiatives.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

Night STARS

In the FY18 a significant noise reduction initiative was developed by AIAL and Airways and is due to be implemented by the end of 2018. This initiative relates to the flight tracks used by arriving aircraft at night-time between 10pm and 7am.

There are two new night-time approaches that are proposed to provide an alternative to the existing western and north-western night-time approaches that overfly the isthmus. The existing and proposed approaches are shown below in red and black respectively with the existing number of flights on these tracks shown.

Figure 16: Existing and Proposed Night STARS



It is proposed that flights using the north-western approach over Takapuna would be moved onto the new northern approach over Stillwater (on average 5 flights per night). This approach has been designed to overfly less populated areas, diverting approaches away from residential areas on the North Shore. It is likely not all flights would be moved to the proposed approaches with some remaining on the existing approaches due to scheduling, traffic or other reasons.

A third of the existing aircraft using the western approach over the Central Suburbs would stay on this approach with the remaining two thirds split between the proposed northern and south-western approaches. The existing approaches from the north-east over Waiheke Island and from the south over the Hunuas would remain unchanged.

Marshall Day Acoustics undertook an assessment to determine the noise impact of the proposed changes. Overall the proposed night-time approaches over Stillwater and Pukekohe overfly fewer dwellings than the existing approaches over Takapuna and the Central Suburbs and are thus desirable from a noise point of view for the overall community.

The Pukekohe and Stillwater areas will experience a small increase in aircraft overflights. The Takapuna and Central Suburbs will experience a small decrease in overflights with some aircraft remaining on the western approach.

The proposed approaches overfly 'new' areas which are currently not regularly overflown at night-time. This includes approximately 5,100 dwellings in the residential areas of Stillwater/Arkles Bay/Torbay, 450 rural dwellings between Stillwater and the Kaipara Harbour and 18,000 rural dwellings from Clevedon to Port Waikato. These residents would experience 'new noise' if the approaches were implemented.

This small increase in noise is counteracted by a small reduction in noise for a larger number of people in Takapuna and the Central Suburbs.

It is important to emphasize that the areas affected by these changes experience very low levels of aircraft noise. The noise level in most of these areas will be low (50-55 dB L_{Amax} Stillwater/56-58 dB L_{Amax} Pukekohe) and therefore the noise effects negligible.

Night Curfew Short Southern Track

The calculated compliance contour for 2016 (2016 ANC) showed a minor non-compliance of 0.1 dB on the southern boundary of the Moderate Aircraft Noise Area (MANA) (see Figure 1). This was mainly due to night arrivals on the short southern tracks RNP Yankee 23 and the short southern visual track used by turboprops shown in Figure 18 below.

Figure 17: 2016 ANC 60 dB L_{dN} Contour & Moderate Aircraft Noise Area (Operative Plan 2002)

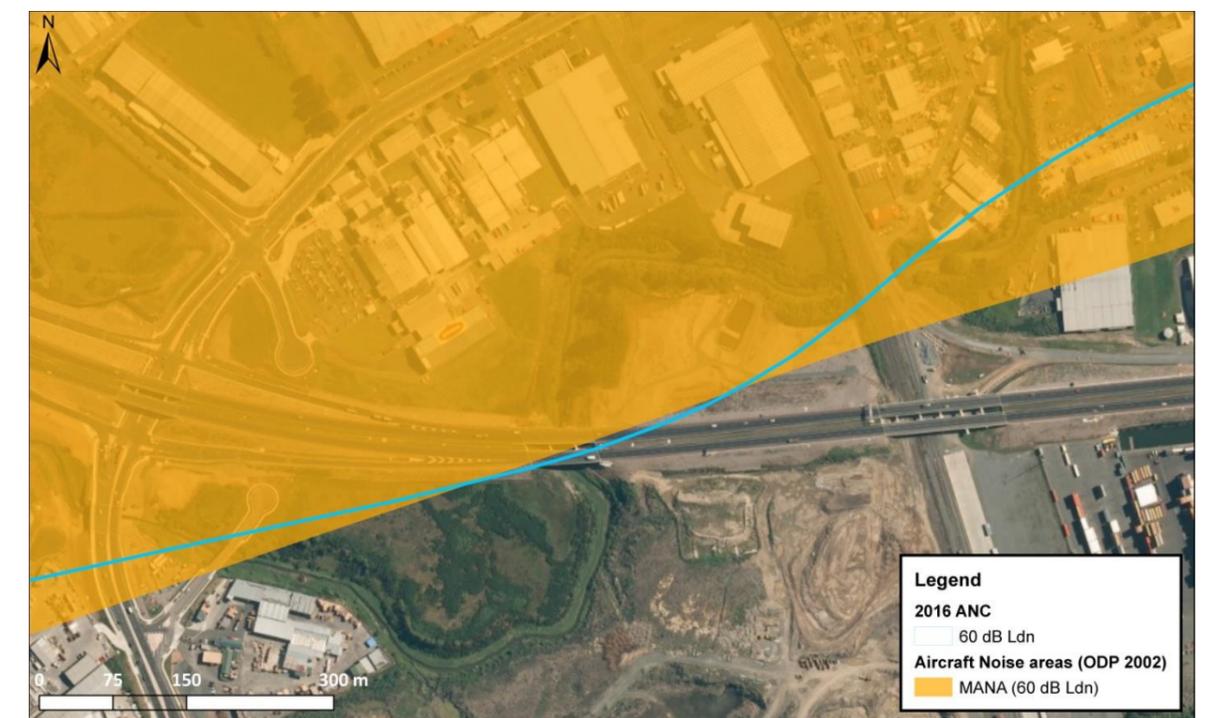
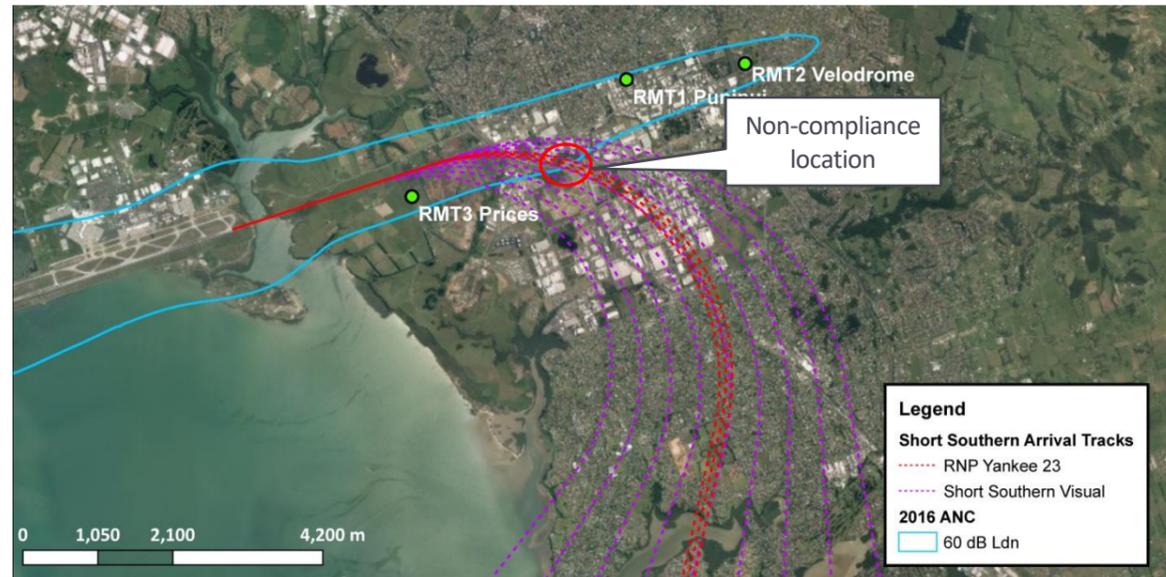


Figure 18: Short Southern Arrival Tracks



At the time potential noise reduction initiatives were investigated to ensure a breach would not occur in the future. These investigations resulted in a voluntary curfew being put on all aircraft arriving at night-time on these arrival tracks.

In addition to this a noise monitor was installed in May 2017 near the 'bulge' to continuously monitor noise levels in this location to ensure a breach does not occur. The noise level for FY18 were 1.3 dB under the noise limit at this location and noise modelling has confirmed the noise levels are compliant in all other locations.

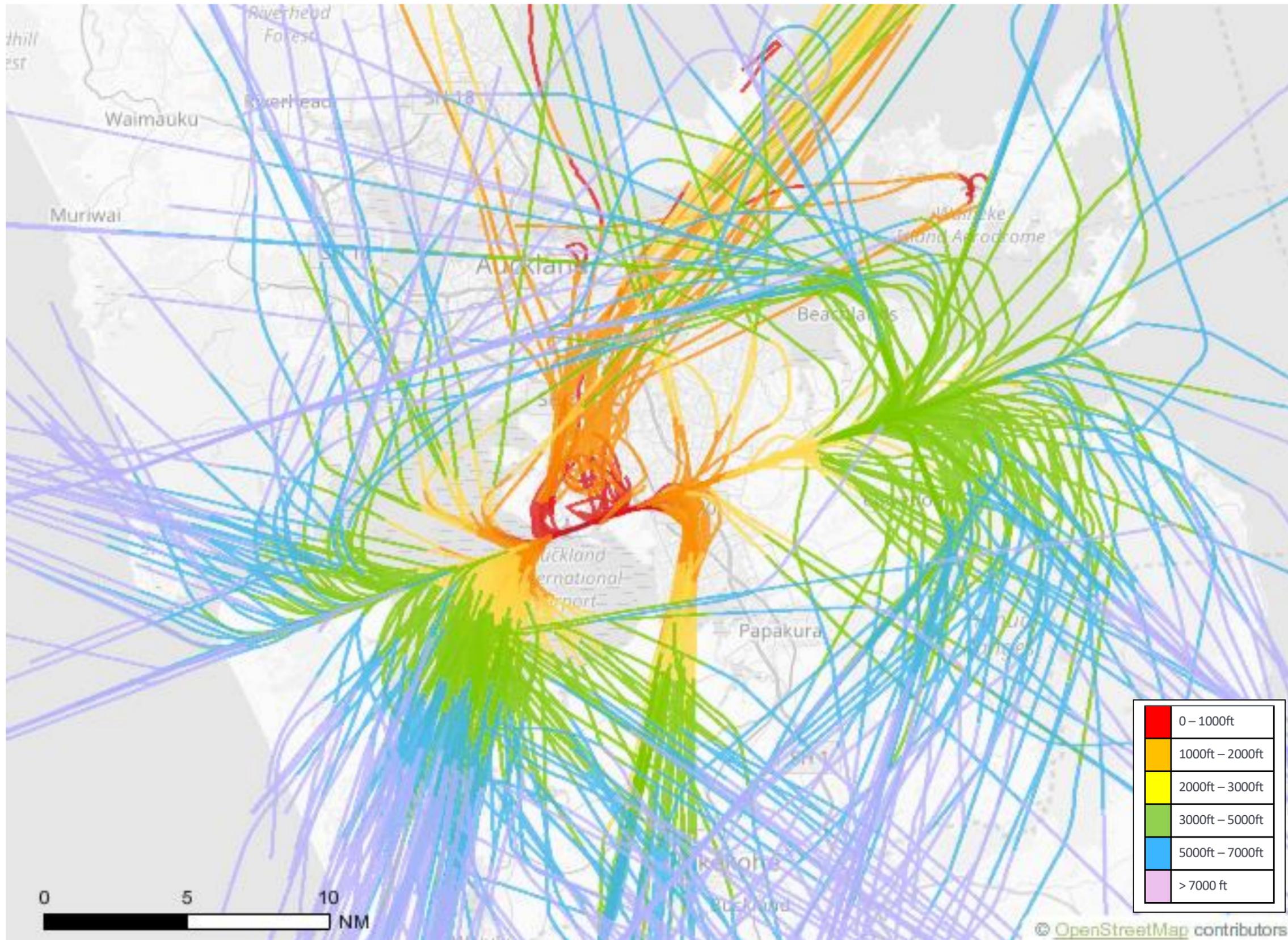
The noise level at this location will continue to be monitored closely and further restrictions on flights in this area implemented if a breach is predicted to occur.

APPENDIX A GLOSSARY OF TERMINOLOGY

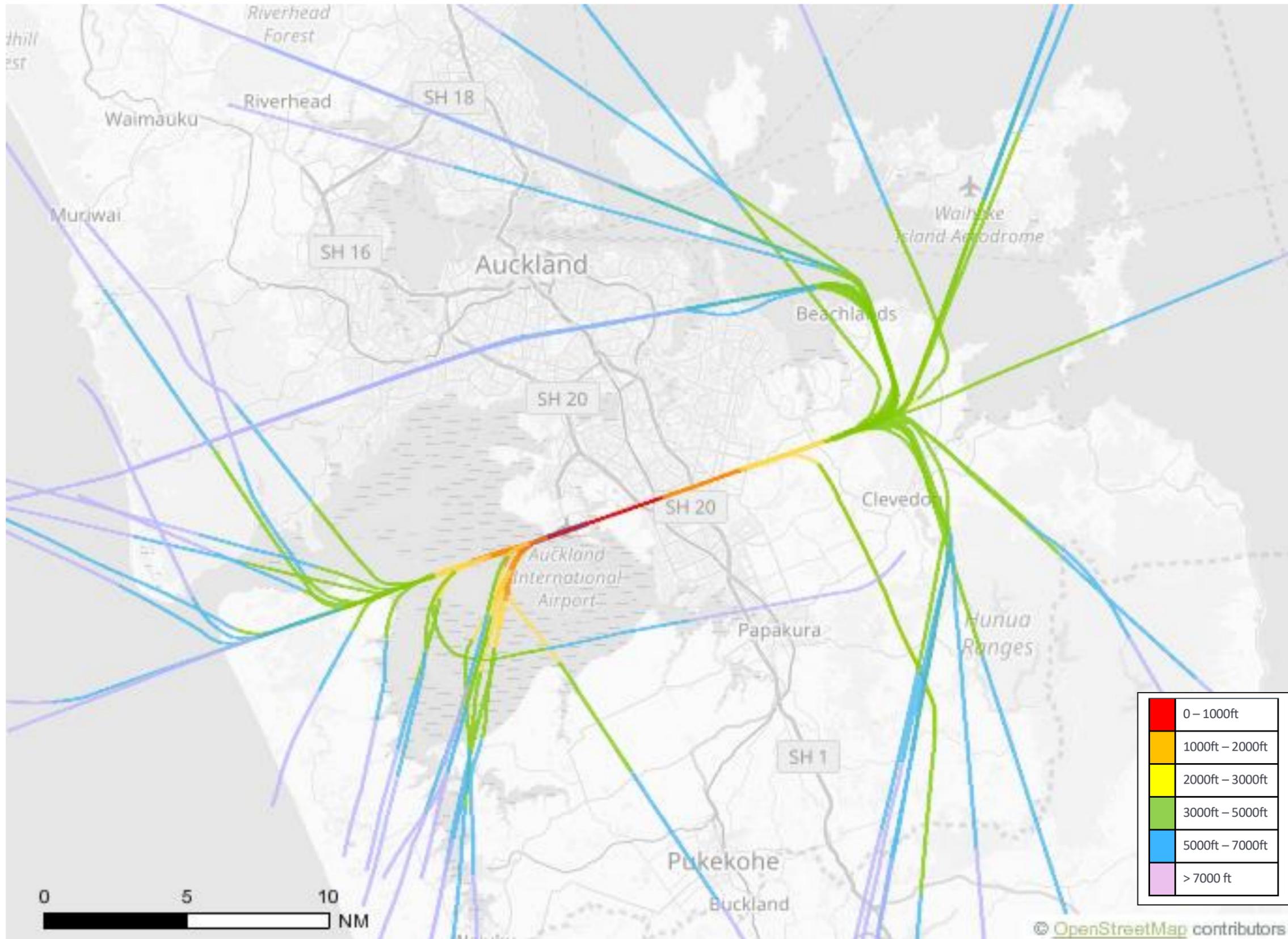
dB(A)	A measurement of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
L_{eq}	The time averaged sound level (on a logarithmic/energy basis) over the measurement period (normally A-weighted).
L_{dn}	The day-night sound level which is calculated from the 24 hour L_{eq} with a 10 dB(A) penalty applied to the night-time (2200-0700 hours) L_{eq} (normally A-weighted).
L_{max}	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

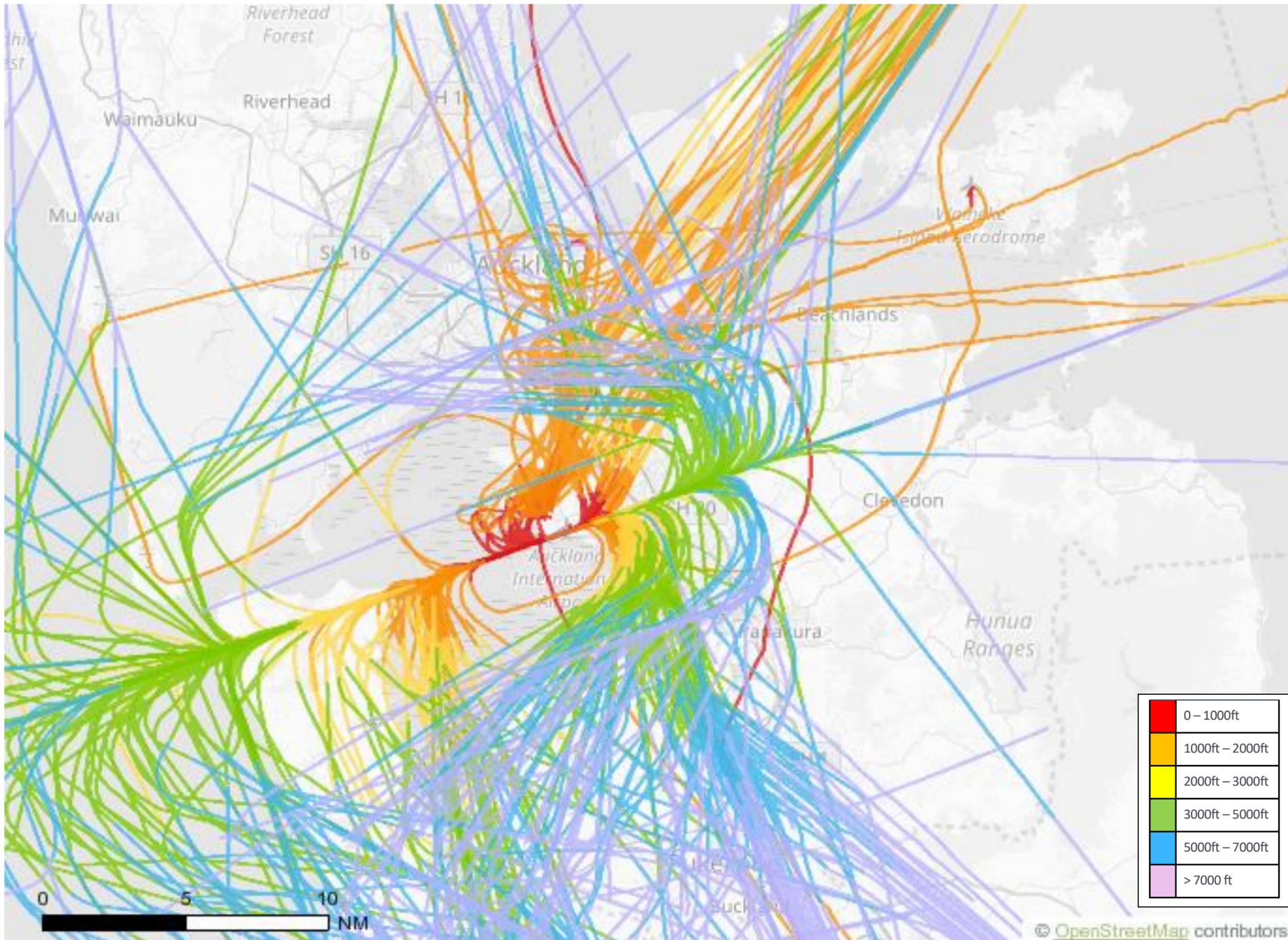
B1 Individual Flight Paths for the Busiest RW23L Day (7am - 10pm) in the FY18



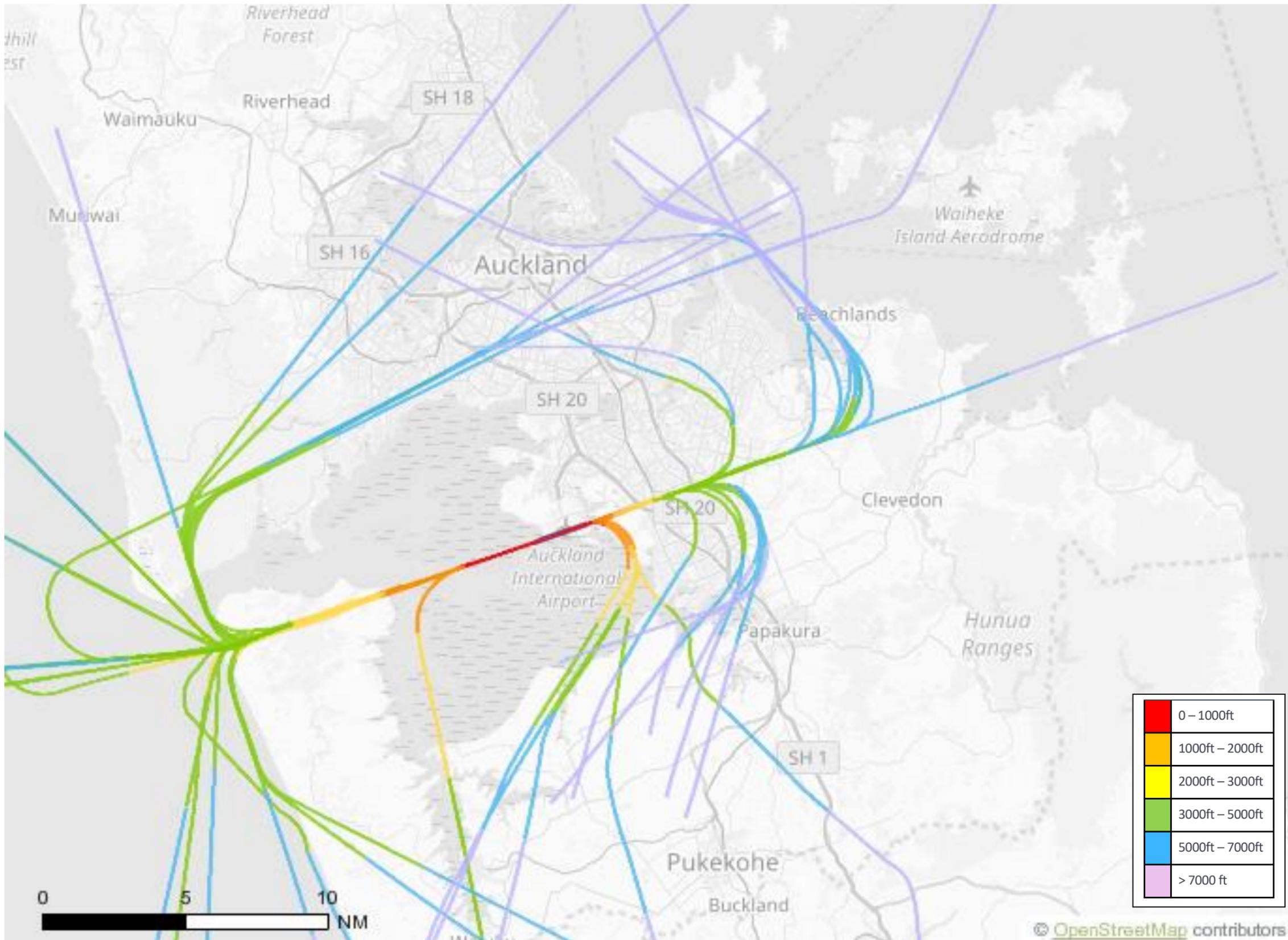
B2 Individual Flight Paths for the Busiest RW23L Night (10pm - 7am) in the FY18



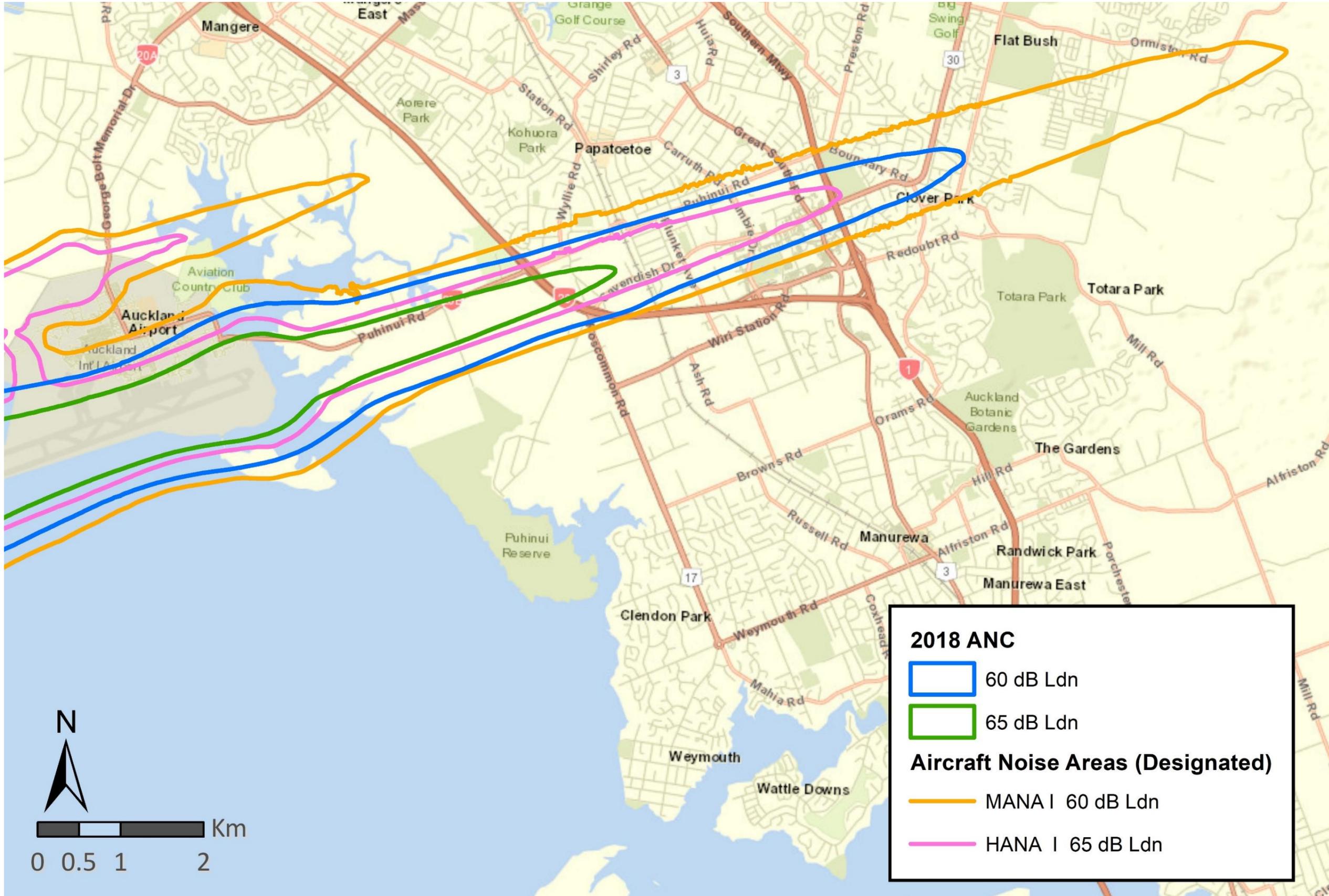
B3 Individual Flight Paths for the Busiest RW05R Day (7am - 10pm) in the FY18



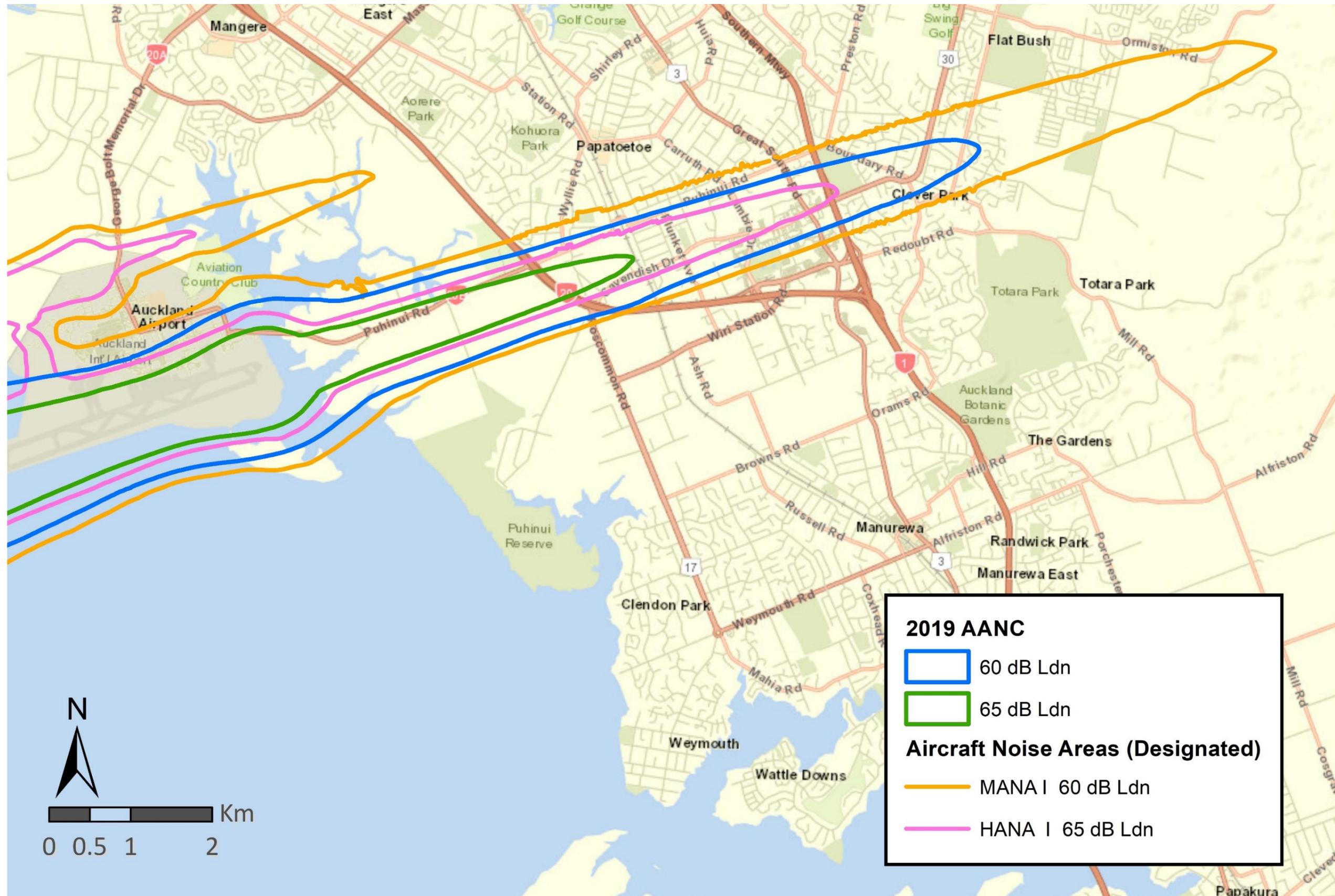
B4 Individual Flight Paths for the Busiest RW05R Night (10pm - 7am) in FY18



APPENDIX C 2018 ACTUAL NOISE CONTOURS (ANC) & OPERATIVE HANA/MANA BOUNDARIES CONTAINED IN DESIGNATION 1100



APPENDIX D 2019 ANNUAL AIRCRAFT NOISE CONTOURS (AANC) & OPERATIVE HANA/MANA BOUNDARIES CONTAINED IN DESIGNATION 1100





APPENDIX F NOISE COMPLAINTS BY SUBURB

Suburb	No. Enquiries	Suburb	No. Enquiries	Suburb	No. Enquiries	Suburb	No. Enquiries
Auckland	2	Glenfield	4	Newmarket	1	Royal Oak	9
Birkdale	1	Goodwood Heights	19	Northcross	1	Saint Johns	2
Blockhouse Bay	1	Greenlane	49	Northpark	2	Sandringham	3
Botany Downs	10	Half Moon Bay	4	One Tree Hill	31	Shamrock Park	2
Bucklands Beach	4	Henderson Valley	1	Onehunga	47	Shelly Park	10
Chatswood	1	Howick	3	Oratia	1	Stanley Point	1
Clover Park	9	Laingholm	5	Otahuhu	1	Sunnyhills	1
Coatesville	3	Mangere	10	Otara	1	Takanini	1
Cockle Bay	44	Mangere East	1	Pakuranga	10	The Gardens	3
East Tamaki	1	Manukau Heads	1	Papakura	1	Titirangi	14
East Tamaki Heights	2	Manurewa	4	Papatoetoe	13	Wattle Downs	3
Ellerslie	8	Mellons Bay	7	Point England	1	Westmere	2
Epsom	28	Mount Albert	2	Pollok	1	Weymouth	6
Farm Cove	1	Mount Eden	4	Ponsonby	4	Whangaparaoa	1
Flat Bush	19	Mount Roskill	2	Remuera	37	Whitford	2
Glendowie	2	Mount Wellington	1	Rothestay Bay	1	Wiri	1