

Our ref: SF23/56508

Mr Jagjeet Shergill
Senior Environmental Planner
Port Authority of NSW
PO Box 25
Millers Point NSW 2000

11 May 2023

Subject: Helipad at Dyke Point, Carrington – DA21/17874 – Operational Noise Compliance Report

Dear Mr Shergill

I refer to your submission on 23 January 2023, requesting the Department's approval of the Operational Noise Compliance Report (rev 2, 21 Dec 2022) (ONCR) under Conditions A30-A34 of DA21/17874.

I note the ONCR:

- was prepared by a suitably qualified and experienced noise and vibration expert;
- was informed by seven continuous days of operational noise monitoring undertaken within three months of operation of the twin engine helicopters;
- proposed new, equivalent monitoring locations due to the challenges of replicating the SEE representative locations in-situ;
- confirmed noise generated by the twin engine helicopters was within Condition A28's noise limits and further noise and vibration measures are not required; and
- contains the information required by the conditions of approval.

Accordingly, as nominee of the Planning Secretary, I approve:

- the equivalent monitoring locations under Condition A31(c) of DA21/17874
- the ONCR (rev 2, 21 Dec 2022) under Condition A25 of DA21/17874.

You are reminded that if there are any inconsistencies between the ONCR and the conditions of approval, the conditions prevail.

Please ensure you make the ONCR and this letter publicly available on the project's website at the earliest convenience.

If you wish to discuss the matter further, please contact Amy Porter on amy.porter@planning.nsw.gov.au

Yours sincerely

A handwritten signature in black ink, appearing to read 'G. Brown', with a long horizontal flourish extending to the right.

Grant Brown
Team Leader
Infrastructure Management

As nominee of the Planning Secretary



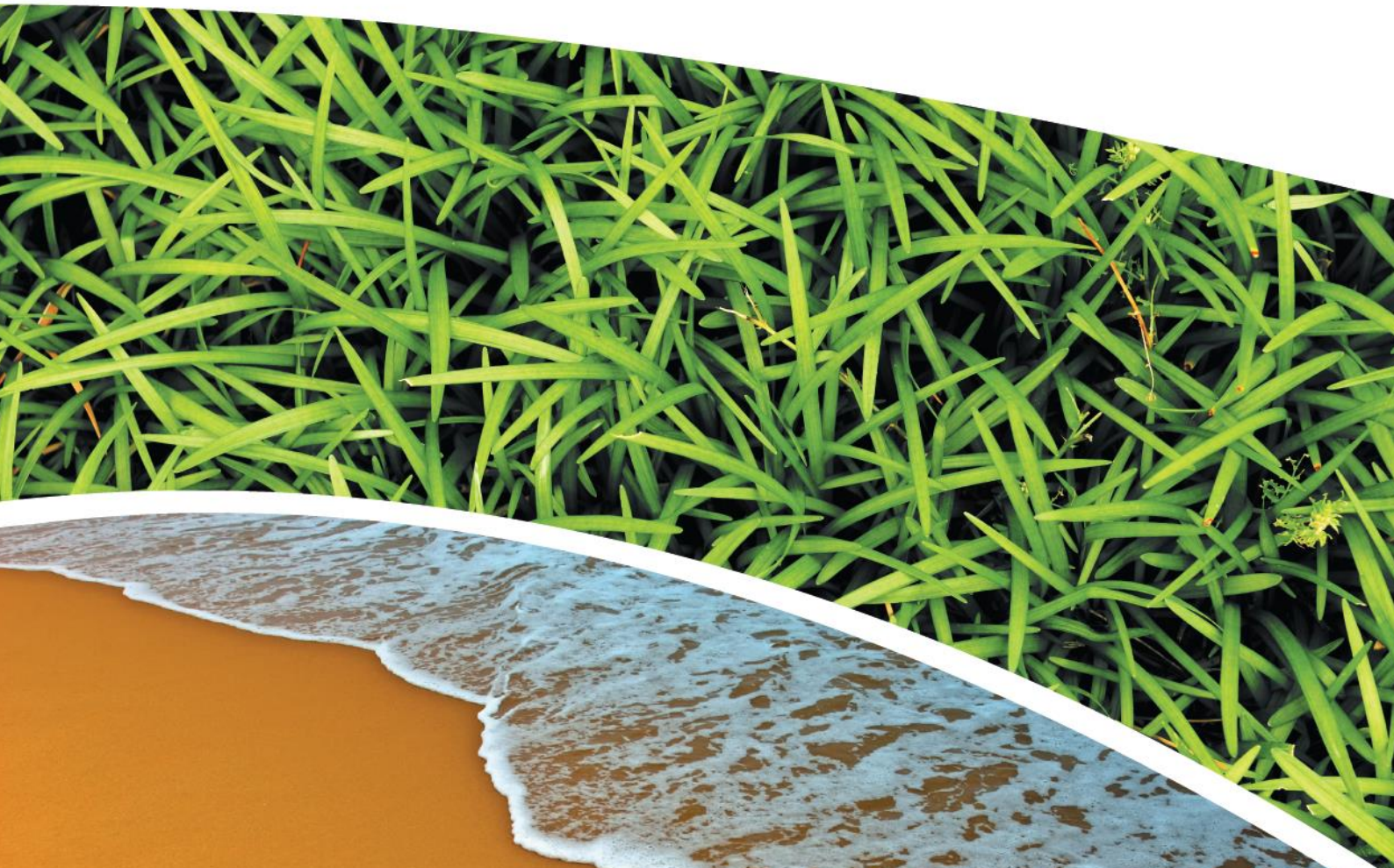
Operational Noise Compliance Report, Dyke Point Helipad

Prepared for Port Authority of NSW

Prepared by RCA Australia

RCA ref 15628a-401/2

December 2022



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APPENDIX A

NOISE MONITORING DATA (WITHOUT EXCLUSION ANALYSIS)

RCA ref 15628a-401.2



21 December 2022

Port Authority of New South Wales
PO Box 663 Newcastle,
NSW 2300

Attention: John-Paul Babbington

- [Geotechnical Engineering](#)
- [Engineering Geology](#)
- [Environmental Engineering](#)
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- [Construction Materials Testing](#)
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OPERATIONAL NOISE COMPLIANCE REPORT, DYKE POINT HELIPAD

1 EXECUTIVE COMPLIANCE SUMMARY

RCA Australia (RCA) have been engaged by the Port Authority of New South Wales (Port Authority) to undertake an operational noise compliance report (ONCR) for the use of twin engine helicopters from the Dyke Point Helipad, Carrington. This noise monitoring survey is a requirement within the consent conditions of DA21/17874.

This ONCR has been prepared in accordance with AS2363-1999 to be consistent with the noise report that supported the SEE and upon which the noise criteria stated in the consent conditions were derived.

AS2363-1999 states that noise measurements are not to be taken in wind speeds greater than 5 km/hr. This condition was not often met during the seven days of monitoring presented in this report. This executive summary first presents a compliance summary for all assessed locations in accordance with AS2363 including the 5 km/hr wind speed exclusion rule. Additional analyses are then provided for each location regardless of the wind speeds.

A dash ("-") in the below tables indicates there was no data to report for that period and flight path due to either extraneous noise sources present or high winds greater than 5 km/hr. A compliance summary for the Lee Wharf Apartments location in accordance with AS2363 is presented in **Table 1**.

Table 1 Compliance summary Lee Wharf

	Flight Path	Lee Wharf LAmax(Hel)	Lee Wharf LAeq,15 hr	Lee Wharf LAeq,9 hr	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	73	40	-	Yes
18/8 – 19/8	B	71	38	39	Yes

There were no exceedances reported at Lee Wharf Apartments during the measurement period in accordance with AS2363 and consent condition A31. A compliance summary for The Rydges is presented in **Table 2**.

Table 2 Compliance summary The Rydges

	Flight Path	Rydges LAmax(Hel)	Rydges LAeq,15 hr	Rydges LAeq,9 hr	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	72	39	-	Yes
18/8 – 19/8	B	74	39	41	Yes

There were no exceedances reported at The Rydges during the measurement period in accordance with AS2363 and consent condition A31. A compliance summary for The Nautilus is presented in **Table 3**.

Table 3 Compliance summary The Nautilus

	Flight Path	Nautilus LAmax(Hel)	Nautilus LAeq,15 hr	Nautilus LAeq,9 hr	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	66	34	-	Yes
18/8 – 19/8	B	70	34	37	Yes

There were no exceedances reported at The Nautilus during the measurement period in accordance with AS2363 and consent condition A31. A compliance summary for The Boltions is presented in **Table 4**.

Table 4 Compliance summary The Boltions

	Flight Path	The Boltions L _{Amax} (Hel)	The Boltions L _{Aeq,15 hr}	The Boltions L _{Aeq,9 hr}	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	70	34	-	Yes
18/8 - 19/8	B	71	35	33	Yes

There were no exceedances reported at The Boltions during the measurement period in accordance with AS2363 and consent condition A31. A compliance summary for Hunter Street is presented in **Table 5**.

Table 5 Compliance summary Hunter Street

	Flight Path	Hunter St L _{Amax} (Hel)	Hunter St L _{Aeq,15 hr}	Hunter St L _{Aeq,9 hr}	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	77	45	-	Yes
18/8 - 19/8	B	75	37	43	Yes

There were no exceedances reported at Hunter Street during the measurement period in accordance with AS2363 and consent condition A31. A compliance summary for Queen Street is presented in **Table 6**.

Table 6 Compliance summary Queen Street

	Flight Path	Queen St LA _{max} (Hel)	Queen St LA _{eq} ,15 hr	Queen St LA _{eq} ,9 hr	Compliance (Yes / No)
12/8 - 13/8	B	-	-	-	-
12/8 - 13/8	A	-	-	-	-
13/8 - 14/8	B	-	-	-	-
14/8 - 15/8	B	-	-	-	-
15/8 - 16/8	B	-	-	-	-
16/8 - 17/8	B	-	-	-	-
17/8 - 18/8	B	54	28	-	Yes
18/8 - 19/8	B	45	16	21	Yes

There were no exceedances reported at Queen Street during the measurement period in accordance with AS2363 and consent condition A31.

There were no non-compliances reported at any locations during the reporting period.

2 INTRODUCTION

RCA Australia (RCA) have been engaged by the Port Authority of New South Wales (Port Authority) to undertake an operational noise compliance report (ONCR) for the use of twin-engine helicopters for marine pilot transfer operations from the Dyke Point Helipad, Carrington. This noise monitoring survey is a requirement within the consent conditions of DA21/17874. The location of the Helipad, six noise monitoring locations and flight paths A and B are shown in **Figure 1**.

2.1 APPROPRIATELY QUALIFIED AND EXPERIENCED NOISE AND VIBRATION EXPERT

The advisory notes of the consent conditions define an appropriately qualified and experienced noise and vibration expert as a person who possess the qualifications to render them eligible for combined membership of the Australian Acoustical Society and Institution of Engineers Australia at grade member or is employed as a professional acoustic consultant or engineer by a firm eligible for membership of the Australian Association of Acoustic Consultants.

RCA is a member of the Australian Association of Acoustical Consultants (AAAC). This ONCR was prepared by Alex Rees, who is also a member of the Australian Acoustical Society. Alex holds a Bachelor of Science (Major in Physics) and a Master of Data Science degree.

3 NOISE RELATED CONSENT CONDITIONS

The noise related consent conditions from DA21/17874 are reproduced below.

A17. Within three months of:

- a) The submission of a ONCR under condition A33;
- b) The submission of an incident report under condition A12;
- c) The approval of any modification of the conditions of this consent or
- d) The issue of a direction of the Planning Secretary under condition A2 which requires a review,

The strategies, plans and programs required under this consent must be reviewed, and the department must be notified in writing that a review is being carried out.

A22. Compliance Reports must be submitted to the Department in accordance with the timeframes set out in the compliance Reporting Approval Requirements, unless otherwise agreed by the Planning Secretary. Noise measurements in the Compliance Reports must be prepared by a suitably qualified and experience noise and vibration expert.

NOISE LIMITS

A28. The noise level from twin-engine helicopter movements associated with the helipad must not exceed the following:

Location	LAFmax 24 Hours	7.00 am to 10.00 pm LAeq	10.00 pm to 7.00 am LAeq
At any residential or commercial premises and Sensitive Receivers	77 dB(A)	60.5 dB(A)	56 dB(A)

Noise from helicopters shall include noise from take-off and landing and any operations whilst on the helipad arising from start up, idle, power up and shutdown.

NOISE VERIFICATION AND MONITORING

A30. Within three months of the commencement of operation of the development, operational noise monitoring must be undertaken to compare actual noise performance of the development against the noise limits in condition A28.

An Operational Noise Compliance Report (ONCR) must be prepared by a suitably qualified and experienced noise and vibration expert. The ONCR must include, but not necessarily be limited to:

- a) Noise monitoring and compliance with the operational noise levels predicted in the SEE and the noise limits in condition A28; and
- b) Confirm that further noise and vibration mitigation measures are not required for the operation of the development to comply with condition A28.

A31. The ONCR monitoring must be undertaken:

- a) For a period of seven continuous days when the development is operating (the Measurement Period), and an allowance made in the noise analysis to account for maximum usage capacity;
- b) During all hours of operation during the Measurement Period;
- c) At the representative monitoring locations identified in the SEE or at equivalent receptor locations as approved by the Planning Secretary.

A32. In the event the monitoring results indicate a non-compliance with condition A28, the ONCR must investigate and identify noise and vibration mitigation measures required to achieve the noise limits set out in the condition A28 at the affected sensitive receivers, including:

- a) Timing of implementation of such mitigation measures;
- b) A consultation strategy to seek feedback from directly affected landowners on noise and vibration from the development; and
- c) Procedures for the management of noise and vibration complaints.

A33. The ONCR must be submitted to the Planning Secretary for approval within 60 days of completing the operational noise monitoring and made publicly available.

A34. The Applicant must implement the identified noise and vibration mitigation measures to the satisfaction of the Planning Secretary within one month of the date of the ONCR.

4 RELEVANT GUIDELINES

4.1 AUSTRALIAN STANDARD AS 2363-1999

AS 2363-1999: *Acoustics – Measurement of noise from helicopter operations* is the most relevant standard to this noise survey and was referenced in the noise report that supported the SEE. It is also noted that AS 2363 also refers to AS 1055 *Acoustics – Description and measurement of environmental noise*, which will be discussed further below.

AS2363 sets requirements for the measurement and the reporting of helicopter noise as well as noise monitoring equipment requirements. Items deemed of particular importance are outlined below.

DEFINITIONS

AS2363 provides important definitions for the reporting of helicopter noise. The most relevant for this ONCR are reproduced in the Glossary section of this report. In particular, AS 2363 defines the terms L_{Amax} (Event) and L_{Amax} (Hel). The L_{Amax} (Event) is the L_AF_{max} of any individual flight event. The L_{Amax} (Hel) is then the 24-hour energy average of all events for a given flight path. The modified noise criteria in DA21/17874 was based on the L_{Amax} (Hel) reported in the SEE, and it will be the L_{Amax} (Hel) measured in this ONCR survey that will be reported against the noise criteria.

DETERMINATION OF HELICOPTER NOISE LEVELS

AS 2363 provides two methods for determining helicopter noise from operational noise from existing sites. The first method is to directly measure all flight events over a full day and/or night, with removal of ambient (extraneous noise) components. The second method is to take sample measurements of flight events and then calculate results from the sampled data. The consent condition explicitly stated that the first method be adopted for determining helicopter noise from the Dyke Point operation. As such, this ONCR is based on seven full days of flight event data.

MEASURING EQUIPMENT

The standard requires that a Type 1 sound level meter is used for noise measurements in accordance with AS 1259.1 and AS 1259.2. The sound level meter is to be set to 'A' frequency weighting and 'Fast' time response. The standard requires that the sound level meter be laboratory calibration carried out at intervals not exceeding 2 years, and that field calibration checks are performed at the beginning and end of the survey using a hand-held pistonphone calibrator. These requirements were all satisfied in preparing this ONCR.

MICROPHONE POSITION

The standard states that "the preferred measurement height is between 1.2 m and 1.5 m above the ground, and whenever possible in an area with flat ground, no nearby obstacles and at least 3.5 m from any reflecting structure other than the ground." This measurement condition was not always possible. AS 1055 provides guidance on applying a correction to simulate free-field conditions and is discussed later. While RCA believe a correction is fair for the Lee Wharf location, it has been demonstrated that this location complies without the correction.

ENVIRONMENTAL CONDITIONS

The standard states that "the test shall be done in calm air or in no more than light wind conditions (5 km/h)". The reason is that wind can become a source of extraneous noise and may lead to erroneous results. RCA have discarded events from the compliance summary table where wind speeds are greater than 5 km/hr but present analysis for these events further below in this report. 10-minute averaged wind data has been sourced from the automatic weather station at Dyke Point.

4.2 AUSTRALIAN STANDARD AS 1055

AS 1055-2018 *Acoustics – Description and measurement of environmental noise* states that when a measurement location cannot be more than 3.5 m from reflecting structures "an adjustment may be necessary where an approximation of the free field incident level is required". The following advice could be applied for the noise logger deployed on the balcony of the Lee Wharf Apartments since AS 2363 requires that measurements be undertaken in free field conditions however no correction was applied since compliance at this location was determined without applying the correction.

AS 1055 advises that if “measurements are performed 1 m from the façade of a building and the sound is directly incident on that façade, an approximation of the free-field incident level may be obtained by subtracting 2.5 dB from the measured level”. In the case of the Lee Wharf balcony location, the logger is more than 1 m from the façade, however a reverberant field is created due to the multiple nearby reflective surfaces: timber decking, rendered soffit above the microphone, glass balustrade and glass window and sliding door behind the microphone. RCA believe that a subtraction of 2.5 dB is a fair correction for this reverberant space. As stated above, compliance was achieved without applying the correction and so no correction was applied.

5 METHODOLOGY

Consent condition A31 states that the survey is to be for a period of seven continuous days, during all hours of operation and at the representative monitoring locations identified in the SEE (of which there were six) or at equivalent receptor locations. The only approach to concurrently satisfy all conditions is to use unattended monitoring at these locations.

The unattended noise monitoring locations are shown in **Figure 2**. Unattended noise loggers were first deployed in July but this data was discarded due to atypical harbour movements during “fresh water events” after heavy rain. The loggers were then redeployed and retrieved in a staggered schedule in August depending on access availability of individual locations. Flight events analysed for this report occurred between midnight 12th of August and midnight 19th of August 2022.

Assessment locations are consistent with the Noise Report that supported the Statement of Environmental Effects prepared by ADW Johnson (November 2021). While RCA endeavoured to find the most suitable monitoring locations, property access and logger security were practical constraints which limited the location options. **Table 7** provides notes on monitoring locations reported in this ONCR.

Table 7 Assessment locations

Assessment ID	Representative monitoring location	Notes
Lee Wharf Apartments	Balcony of Lee Wharf Apartments with direct line of sight to Dyke Point.	A -2.5 dB reflection correct could be applied to this data but has not been.
Crown Plaza Apartments (now called Rydges)	Rydges playground area with direct line of sight to Dyke Point.	-
Nautilus Apartments	Rooftop of Port of Newcastle building, 256 Wharf Road Newcastle	Note that the Nautilus now have new apartments built in front. RCA received no response to property access requests from the building in front and 256 Wharf Road was the next most representative location.
The Boltons	Balcony on Church Street Newcastle, with direct line of sight to the harbour.	RCA letterbox dropped multiple houses on Church Street. The preferred location was not suitable due to residential construction.
Hunter Street, Stockton	Stockton Skiff Club rooftop	RCA letterbox dropped houses on Hunter Street and received no response. The Skiff Club rooftop was considered a representative alternative.
Queen Street, Stockton	Private property on Queen Street	Two property owners responded to RCA's letterbox drop. The chosen property was chosen based on security. This property however has dogs which will need to be considered when reviewing the measurement results.

Photos of each of the unattended noise monitoring setups are provided below. Additional information on all noise monitoring equipment is provided in **Table 8**. Calibration checks were performed periodically throughout the survey period. Each calibration check was found to be equal to 94 ± 1 dB each time. All loggers used were set to A-weighted fast recording with a 500 ms logger step. Over 116 flight events occurred during the measurement period providing a sizeable and comprehensive dataset for analysis and reporting against the consent conditions.

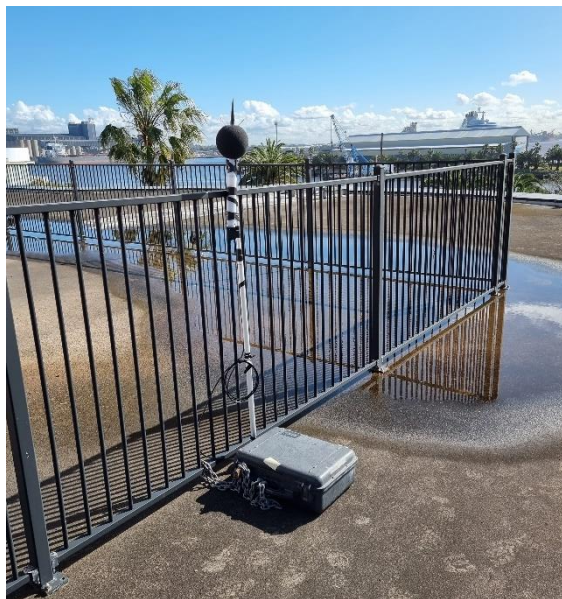
Lee Wharf Apartments



Rydgcs



Nautilus (Port of Newcastle rooftop)



The Boltons (Church St)



Hunter St (Skiff Club rooftop)



Queen St



Figure 1 Photos of each logger setup



- LEGEND**
- Dyke Point helipad
 - 'A' Alternate flight path
 - 'B' Preferred flight path

- Logger Locations**
- Hunter Street
 - Lee Wharf
 - Nautilus
 - Queen Street
 - Rydges
 - The Boltons

Note: Aerial image taken from ArcGis Base Map



**LOGGER LOCATION PLAN
DYKE POINT HELIPAD**

CLIENT	Port Authority	RCA Ref	15628a-401/0	
DRAWN BY	RR	SCALE	1:20,000 (A3)	DRAWING No 1 REV 0
APPROVED BY	AR	DATE	28/11/2022	OFFICE NEWCASTLE

Table 8 *Noise monitoring equipment*

Location reference	Make / Model	Serial No.	Last Calibrated
Lee Wharf Apartments	Svantek / 977	97563	12/08/2022
Rydges Apartments	Svantek / 971	39170	12/08/2022
Nautilus Apartments	Svantek / 979	98851	12/08/2022
The Boltons	Svantek / 957	14566	12/08/2022
Hunter Street	Svantek / 971	55582	12/08/2022
Queen St	Svantek / 971	55580	12/08/2022
-	Rion NC73 Calibrator	10196883	December 2021
-	Svantek SV33B Calibrator	86489	December 2021

6 EXAMPLE FLIGHT EVENTS

Before presenting analysis for each assessment location, we present example graphs of flight events recorded in both calm and windy conditions. In the absence of extraneous noise, the time trace clearly shows the flight event, which typically has a profile characterised by a build-up (as the helicopter approaches or climbs from take-off) and then decay of noise (as the helicopter moves away or turns engines off).

The 10-minute average wind speed in **Figure 4** was 40 km/hr. It is seen that in general, windy conditions make it difficult to visually identify the helicopter event, indicating that the wind has become a significant extraneous noise source.

In all graphs, the dashed red line represents the L_{Amax} 77 dBA target. The graphs showing calm conditions at least demonstrate that the operation can comply with the consent conditions during calm wind conditions (noting that AS 2363 directs measurements to be undertaken in calm conditions).

We note in **Figure 3** that the helicopter noise levels barely rise above the background levels at Queen Street, remaining 30 dBA below the L_{Amax} target of 77 dBA. It seems very unlikely then, that any potential noise exceedances reported at Queen Street are due to the helicopter and are much more likely to be due to local extraneous noise sources such as the dogs on the property.

Port Authority provided flight data including take-off and landing times. These times are included in the title above each graph and is typically within a minute or two of the measured peak helicopter noise from that event.

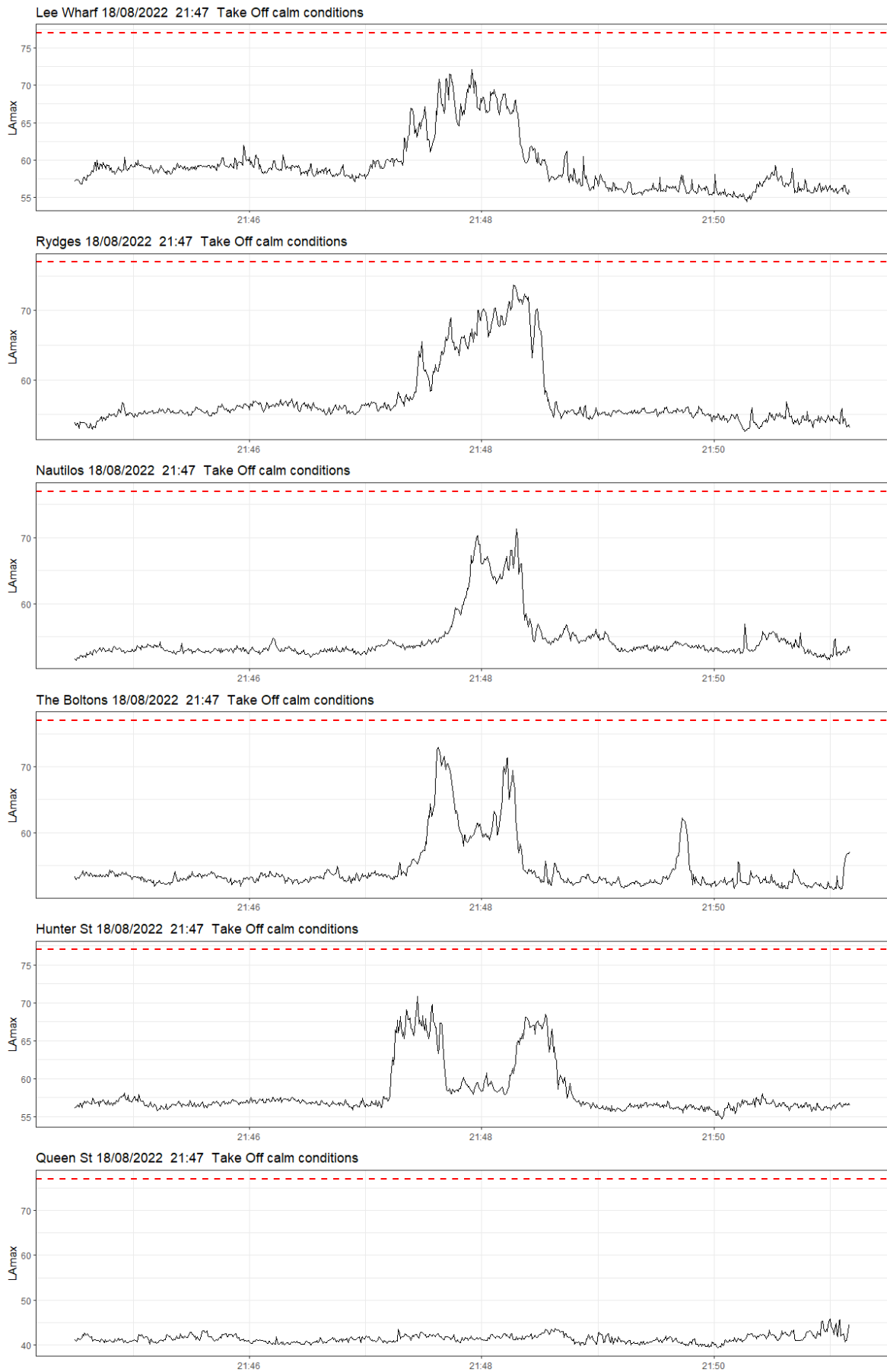


Figure 3 Take off 18/8/2022 21:47 calm conditions, flight path B

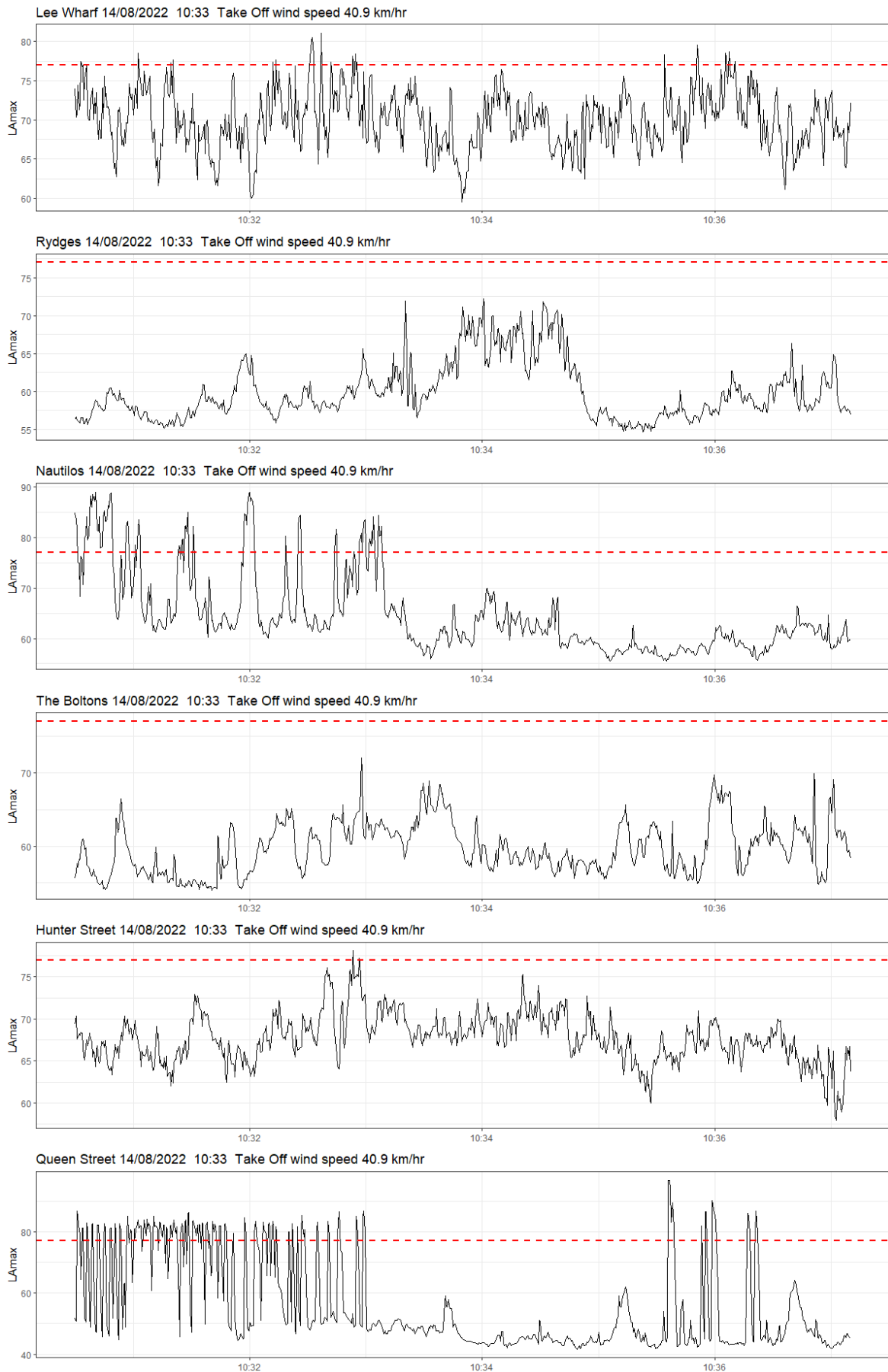


Figure 4 Take off 14/8/2022 10:33 in windy conditions, flight path B

7 ANALYSIS APPROACH

All datasets discussed below include flight events between midnight 12th August 2022 through to midnight 19th of August 2022. This is seven 24-hour periods in accordance with Consent Condition A31.

For each location, initial results are first presented prior to investigating whether extraneous noise was present or whether the wind speed was above the limits prescribed in AS2363. The final results after applying any appropriate exclusions are presented in the Executive Compliance Summary in **Section 1**. The analysis process for each location is summarised in **Figure 5**.

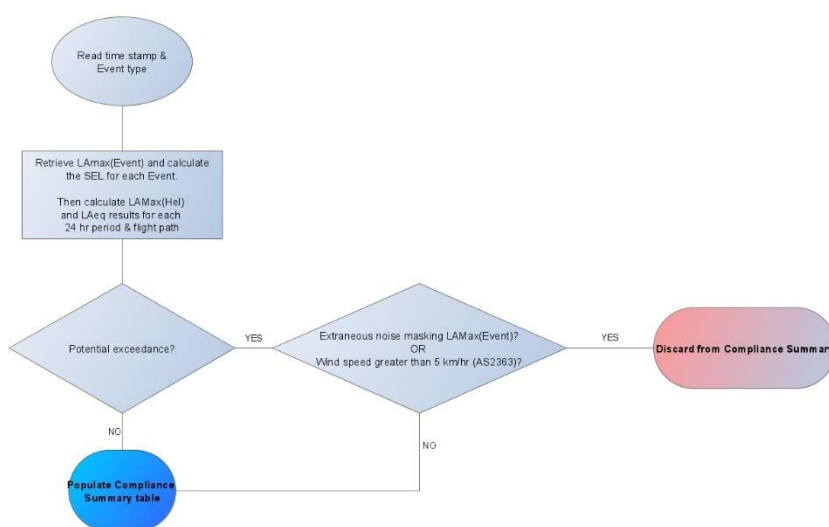


Figure 5 Analysis flow chart

8 LEE WHARF APARTMENTS ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for the Lee Wharf location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 9**. Any potential exceedances are shaded.

Table 9 *Initial Lee Wharf results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	74	45	43
12/8 - 13/8	A	76	41	-
13/8 - 14/8	B	76	47	45
14/8 - 15/8	B	76	52	46
15/8 - 16/8	B	76	50	45
16/8 - 17/8	B	75	45	48
17/8 - 18/8	B	73	47	47
18/18 – 19/8	B	79	52	44

Before checking for extraneous noise or whether wind speeds were above 5 km/hr we see that there was potentially a single day where the L_{Amax}(Hel) was above the target of 77 dBA. This day will be closer inspected and discussed below. All other days are below the L_{Amax}(Hel) and L_{Aeq} consent criteria, and we therefore do not need to inspect for extraneous noise or consider wind speeds on those days.

There were 20 flight events during the 24-hour period between midnight 18th of August and midnight 19th of August. These events are tabled below. Charts of flight events where the L_{Amax}(Event) may have exceeded 77 dBA are shown below **Table 10**.

Table 10 *Flight events of interest Lee Wharf Apartments*

Date & Time	Event	Flight Path	Wind km/hr	Potential L _{Amax} (Event) dBA	Note
18/08/2022 0:35	Take Off	B	9.6	73.8	L _{Amax} (Event) below 77 dBA
18/08/2022 0:56	Landing	B	11.8	70.9	L _{Amax} (Event) below 77 dBA
18/08/2022 7:05	Take Off	B	18.5	74.3	L _{Amax} (Event) below 77 dBA
18/08/2022 7:36	Landing	B	18.5	74.3	L _{Amax} (Event) below 77 dBA
18/08/2022 8:07	Take Off	B	19.0	69.9	L _{Amax} (Event) below 77 dBA
18/08/2022 8:25	Landing	B	20.9	84.4	Isolated spike appears to be extraneous noise. Also note that wind speed ~21 km/hr

Date & Time	Event	Flight Path	Wind km/hr	Potential L _{Amax} (Event) dBA	Note
18/08/2022 9:05	Take Off	B	23.3	73.5	L _{Amax} (Event) below 77 dBA
18/08/2022 9:23	Landing	B	21.1	73	L _{Amax} (Event) below 77 dBA
18/08/2022 10:43	Take Off	B	17.6	78.9	L _{Amax} (Event) appears to be > 77 dBA, however wind speed is ~18 km/hr
18/08/2022 10:51	Landing	B	22.3	69.7	L _{Amax} (Event) below 77 dBA
18/08/2022 11:21	Take Off	B	19.1	78.0	Appears to be extraneous noise
18/08/2022 12:05	Landing	B	22.2	72.5	L _{Amax} (Event) below 77 dBA
18/08/2022 13:58	Take Off	B	24.2	76.3	L _{Amax} (Event) below 77 dBA
18/08/2022 14:37	Landing	B	29.4	83.8	Appears to be extraneous noise
18/08/2022 16:30	Take Off	B	15.2	87.8	Appears to be extraneous noise
18/08/2022 17:05	Landing	B	21.3	75.8	L _{Amax} (Event) below 77 dBA
18/08/2022 21:05	Take Off	B	7.7	74	L _{Amax} (Event) below 77 dBA
18/08/2022 21:24	Landing	B	6.6	72.2	L _{Amax} (Event) below 77 dBA
18/08/2022 21:47	Take Off	B	1.5	72.1	L _{Amax} (Event) below 77 dBA
18/08/2022 22:10	Landing	B	3.4	70.8	L _{Amax} (Event) below 77 dBA

There were potentially two flight events out of twenty on the 18th of August where the L_{Amax}(Event) appeared to be above the target of 77 dBA. The event occurring at 8:25 am appears to be extraneous noise, characterized by an isolated sharp spike. This logger was deployed on the apartment balcony and was subject to local noise sources.

In any event, both events are excluded from the final results because the wind was greater than 5 km/hr. All events on all other days analysed, produced a L_{Amax}(Event) that was less than 77 dBA, despite the wind conditions.

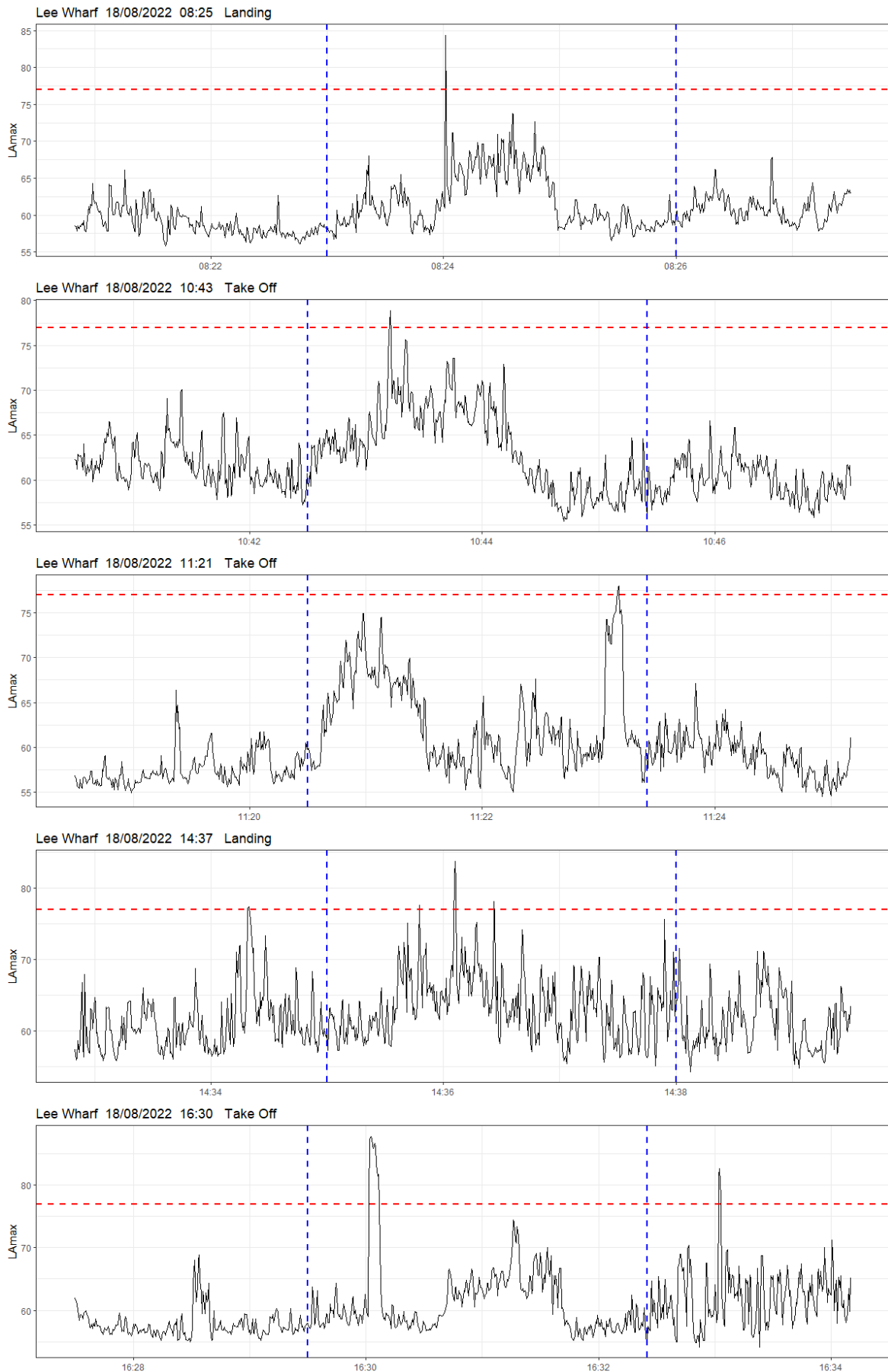


Figure 6 Flight event analysis Lee Wharf Apartments

9 THE RYDGES ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for The Rydges location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 11**.

Table 11 *Initial The Rydges results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	76	45	43
12/8 - 13/8	A	76	39	-
13/8 - 14/8	B	74	47	45
14/8 - 15/8	B	75	48	43
15/8 - 16/8	B	75	49	45
16/8 - 17/8	B	75	43	47
17/8 - 18/8	B	73	46	49
18/18 – 19/8	B	76	51	45

We see that each 24-hour period analysed meets both the L_{Amax}(Hel) and L_{Aeq} criterion without considering extraneous noise or wind speeds. Therefore, no further analysis for this location is required.

10 NAUTILOS APARTMENTS ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for The Nautilus location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 12**.

Table 12 *Initial Nautilus results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	71	40	38
12/8 - 13/8	A	67	32	-
13/8 - 14/8	B	72	40	41
14/8 - 15/8	B	87	56	42
15/8 - 16/8	B	83	50	39
16/8 - 17/8	B	68	37	40
17/8 - 18/8	B	67	41	42
18/18 – 19/8	B	76	48	40

We see that there were two 24-hour periods (14th – 15th and 15th – 16th of August) where the initial L_{Amax}(Hel) may potentially exceed the criterion of 77 dBA. These periods will be inspected closer and discussed below.

There were 14 flight events during the 24-hour period between midnight 14th of August and midnight 15th of August. These events are tabled below. Charts of flight events where the L_{Amax}(Event) may have exceeded 77 dBA are shown below **Table 13**.

Table 13 Flight events of interest The Nautilus 14/8/2022

Date & Time	Event	Flight Path	Wind km/hr	Potential L _{Amax} (Event) dBA	Note
14/08/2022 4:16	Take Off	B	27.6	71.1	L _{Amax} (Event) below 77 dBA
14/08/2022 4:38	Landing	B	29.8	79.3	L _{Amax} (Event) appears to be > 77 dBA, however wind speed is ~30 km/hr
14/08/2022 10:33	Take Off	B	40.9	84.4	Appears to be extraneous noise
14/08/2022 10:54	Landing	B	34.5	86.5	Appears to be extraneous noise
14/08/2022 14:40	Take Off	B	39.7	94.9	Appears to be extraneous noise
14/08/2022 15:05	Landing	B	39.3	87.4	Appears to be extraneous noise. Multiple peaks either side of event.
14/08/2022 15:57	Take Off	B	40.9	64.9	L _{Amax} (Event) below 77 dBA
14/08/2022 16:46	Landing	B	30.6	93.8	Appears to be extraneous noise. Multiple peaks either side of event.
14/08/2022 19:25	Take Off	B	20.7	68.4	L _{Amax} (Event) below 77 dBA
14/08/2022 19:45	Landing	B	19.5	76	L _{Amax} (Event) below 77 dBA
14/08/2022 20:49	Take Off	B	20.7	67.6	L _{Amax} (Event) below 77 dBA
14/08/2022 21:13	Landing	B	24.2	69.5	L _{Amax} (Event) below 77 dBA
14/08/2022 22:34	Take Off	B	31.0	67.8	Appears to be extraneous noise
14/08/2022 22:42	Landing	B	30.9	68	L _{Amax} (Event) below 77 dBA

The six events with a reported L_{Amax}(event) above 77 dBA are graphed below. Five of the six potential exceedances were found to be due to extraneous noise. The L_{Amax}(Event) at 04:38 appears to be greater than 77 dBA, however is excluded from the final results due to the wind speed being greater than 5 km/hr (was approximately 30 km/hr).

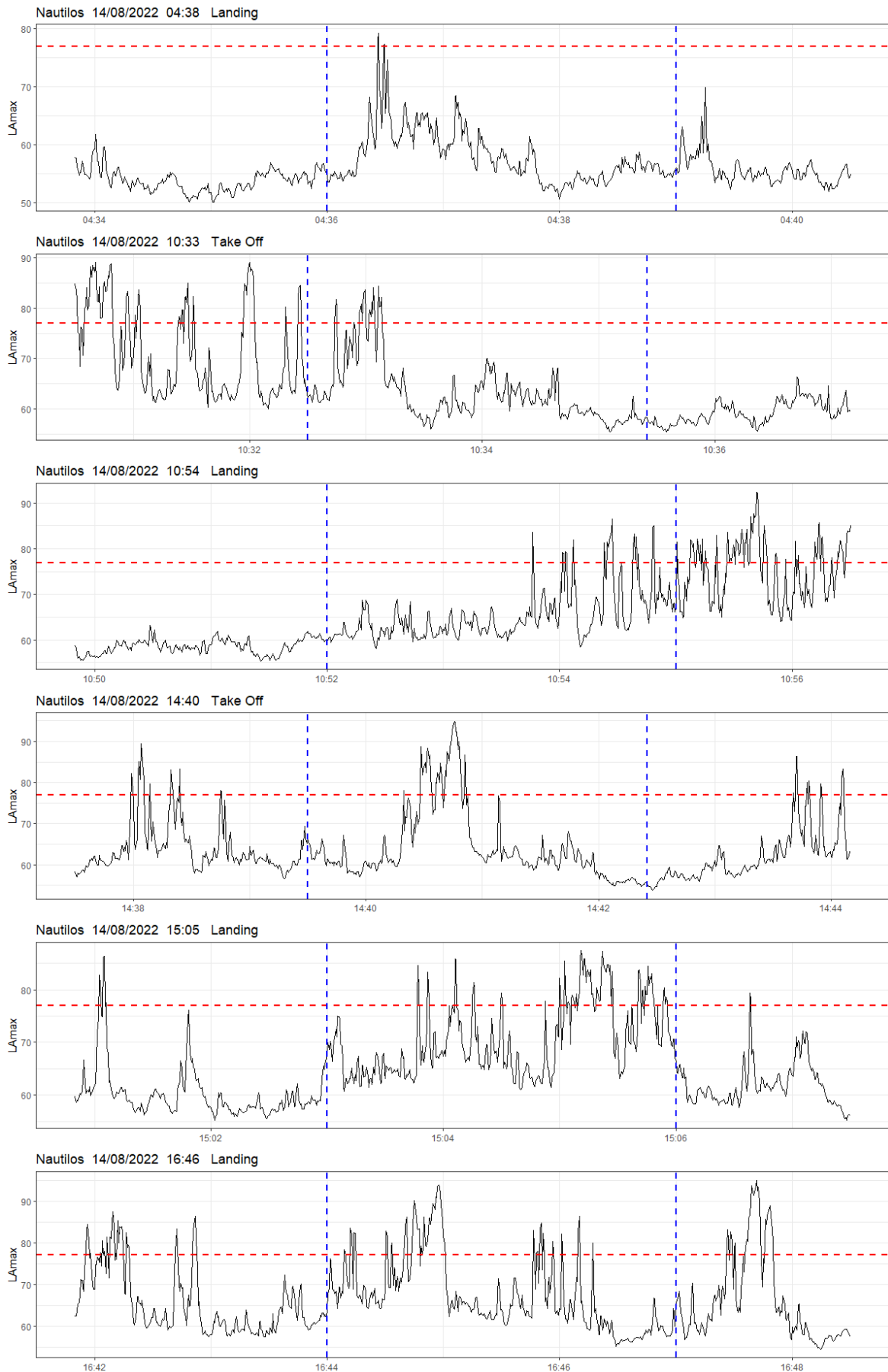


Figure 7 Flight event analysis The Nautilus

There were 14 flight events during the 24-hour period between midnight 15th of August and midnight 16th of August. These events are tabled below. Charts of flight events where the LA_{max}(Event) may have exceeded 77 dBA are shown below **Table 14**.

Table 14 Flight events of interest The Nautilus 15/8/2022

Date & Time	Event	Flight Path	Wind km/hr	Potential LA _{max} (Event) dBA	Note
15/08/2022 5:05	Take Off	B	26.8	67.4	LA _{max} (Event) below 77 dBA
15/08/2022 5:30	Landing	B	23.3	56.1	LA _{max} (Event) below 77 dBA
15/08/2022 7:05	Take Off	B	16.1	91.2	Appears to be extraneous noise
15/08/2022 7:57	Landing	B	25.4	72.2	LA _{max} (Event) below 77 dBA
15/08/2022 9:19	Take Off	B	27.1	83.9	Appears to be extraneous noise
15/08/2022 9:39	Landing	B	33.6	80.1	Appears to be extraneous noise
15/08/2022 12:29	Take Off	B	34.1	71.9	LA _{max} (Event) below 77 dBA
15/08/2022 13:01	Landing	B	41.9	87.8	Appears to be extraneous noise
15/08/2022 15:04	Take Off	B	23.7	66.3	LA _{max} (Event) below 77 dBA
15/08/2022 15:49	Landing	B	22.2	75.7	LA _{max} (Event) below 77 dBA
15/08/2022 15:52	Take Off	B	22.2	87.8	Appears to be extraneous noise
15/08/2022 16:11	Landing	B	20.5	71.9	LA _{max} (Event) below 77 dBA
15/08/2022 22:25	Take Off	B	14.0	61.9	LA _{max} (Event) below 77 dBA
15/08/2022 22:43	Landing	B	15.6	68.8	LA _{max} (Event) below 77 dBA

The five events with a reported LA_{max}(event) above 77 dBA are graphed below. They each appear to be due to extraneous noise (most likely wind gusts), as each potential exceedance is typically characterised by an isolated sharp spike. This noise profile was not observed in the events during calm wind conditions graphed in **Section 6**. Once these extraneous events are removed all 24-hour periods assessed at The Nautilus comply with the criteria stated in the consent conditions.

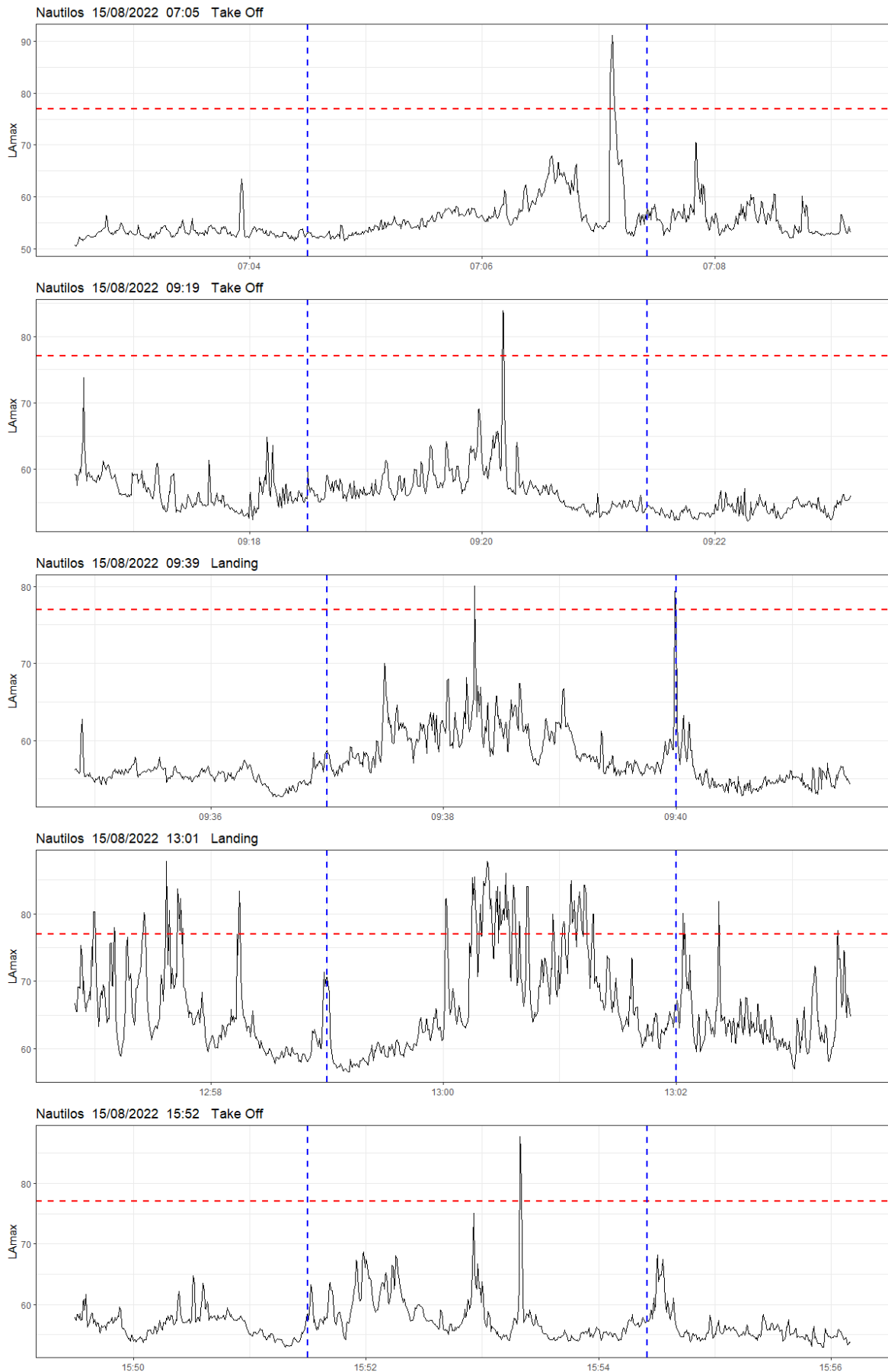


Figure 8 Flight event analysis The Nautilus

11 THE BOLTONS ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for The Boltons location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 15**.

Table 15 *Initial The Boltons results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	79	44	38
12/8 - 13/8	A	66	32	-
13/8 - 14/8	B	71	42	38
14/8 - 15/8	B	71	44	39
15/8 - 16/8	B	77	48	39
16/8 - 17/8	B	72	40	40
17/8 - 18/8	B	74	42	42
18/18 – 19/8	B	74	48	38

We see that there was a single 24-hour period (12th – 13th of August) where the initial L_{Amax}(Hel) may potentially exceed the criterion of 77 dBA. This period will be inspected closer and discussed below. There were 7 flight events during the 24-hour period between midnight 12th of August and midnight 13th of August. These events are tabled below. Charts of the two flight events where the L_{Amax}(Event) may have exceeded 77 dBA are shown below **Table 16**.

Table 16 *Flight events of interest at The Boltons 12/8/2022*

Date & Time	Event	Flight Path	Wind km/hr	Potential L _{Amax} (Event) dBA	Note
12/08/2022 4:41	Take Off	B	6.2	73.9	L _{Amax} (Event) below 77 dBA
12/08/2022 5:12	Landing	B	8.7	69.2	L _{Amax} (Event) below 77 dBA
12/08/2022 7:02	Take Off	B	9.0	73.5	L _{Amax} (Event) below 77 dBA
12/08/2022 7:50	Landing	B	9.4	72.2	L _{Amax} (Event) below 77 dBA
12/08/2022 13:40	Take Off	B	11.3	85.2	Appears to be extraneous noise
12/08/2022 14:00	Landing	B	10.9	79.0	Appears to be extraneous noise
12/08/2022 20:14	Landing	B	15.5	72.5	L _{Amax} (Event) below 77 dBA

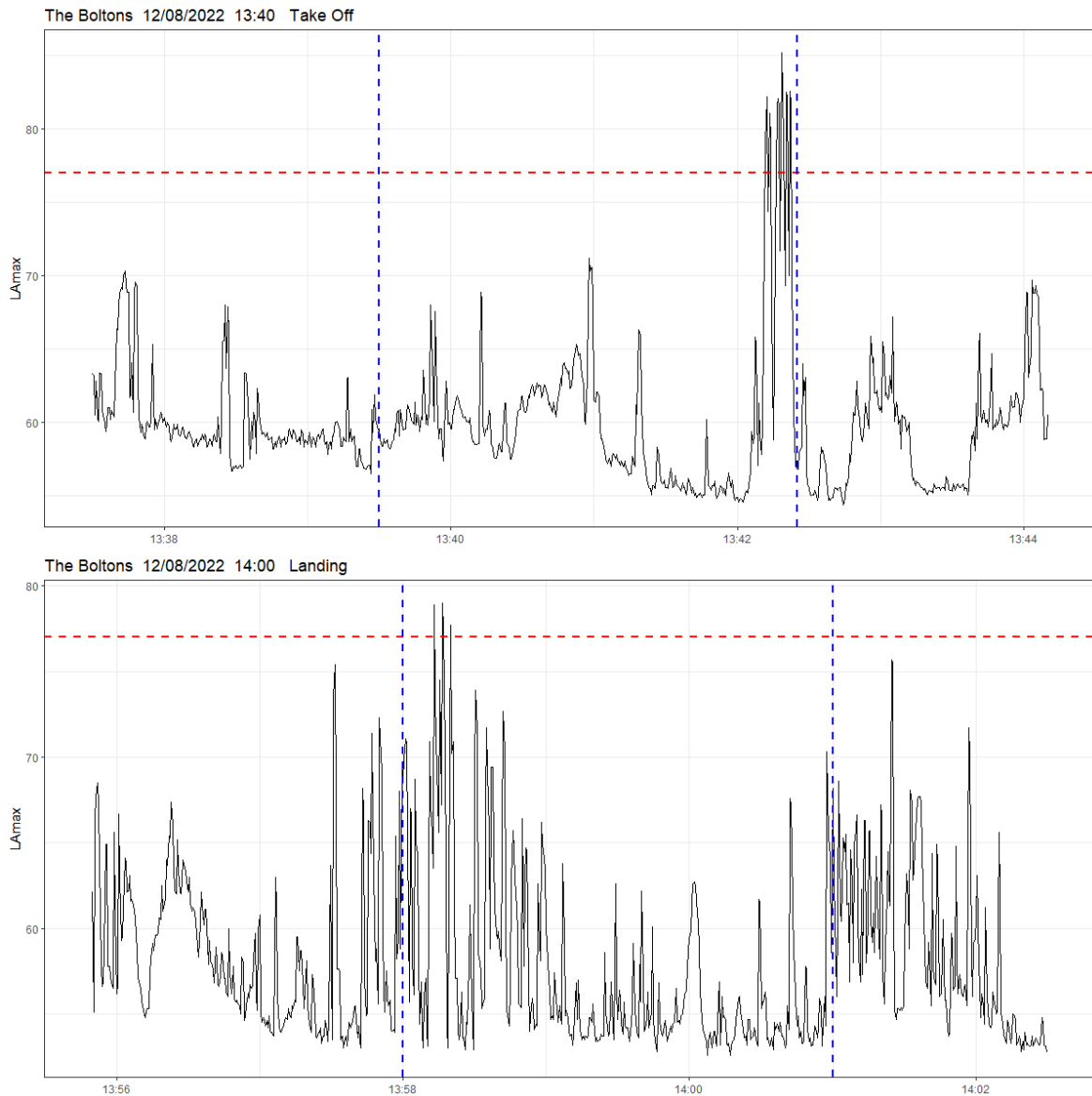


Figure 9 *Flight event analysis at The Boltons*

Extraneous noise appears in both of the events graphed above. Once these two events are removed, all 24-hour periods at The Boltons comply with noise criteria stated in the consent conditions.

12 HUNTER STREET ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for the Hunter Street location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 17**.

Table 17 *Initial Hunter Street results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	74	44	44
12/8 - 13/8	A	69	31	-
13/8 - 14/8	B	76	47	49
14/8 - 15/8	B	79	53	50
15/8 - 16/8	B	78	53	47
16/8 - 17/8	B	75	46	48
17/8 - 18/8	B	77	51	51
18/18 – 19/8	B	78	53	45

We see that there were three 24-hour periods where the initial L_{Amax}(Hel) may potentially exceed the criterion of 77 dBA. These periods will be inspected closer and discussed below.

There were 14 flight events during the 24-hour period between midnight 14th of August and midnight 15th of August. These events are tabled below. Charts of the two flight events where the L_{Amax}(Event) may have exceeded 77 dBA are shown below **Table 18**.

Table 18 *Flight events of interest 14/8/2022 at Hunter Street*

Date & Time	Event	Flight Path	Wind km/hr	Potential L _{Amax} (Event) dBA	Note
14/08/2022 4:16	Take Off	B	27.6	75.9	L _{Amax} (Event) Below 77 dBA
14/08/2022 4:38	Landing	B	29.8	78.9	High wind
14/08/2022 10:33	Take Off	B	40.9	78.1	High wind
14/08/2022 10:54	Landing	B	34.5	75.8	L _{Amax} (Event) Below 77 dBA
14/08/2022 14:40	Take Off	B	39.7	75.1	L _{Amax} (Event) Below 77 dBA
14/08/2022 15:05	Landing	B	39.3	80.2	High wind
14/08/2022 15:57	Take Off	B	40.9	73.5	L _{Amax} (Event) Below 77 dBA
14/08/2022 16:46	Landing	B	30.6	80.2	High wind

Date & Time	Event	Flight Path	Wind km/hr	Potential LA _{max} (Event) dBA	Note
14/08/2022 19:25	Take Off	B	20.7	73.0	LA _{max} (Event) Below 77 dBA
14/08/2022 19:45	Landing	B	19.5	86.6	High wind
14/08/2022 20:49	Take Off	B	20.7	73.5	LA _{max} (Event) Below 77 dBA
14/08/2022 21:13	Landing	B	24.2	74.0	LA _{max} (Event) Below 77 dBA
14/08/2022 22:34	Take Off	B	31.0	74.5	LA _{max} (Event) Below 77 dBA
14/08/2022 22:42	Landing	B	30.9	75.8	LA _{max} (Event) Below 77 dBA

The five potential exceedances during the 14th of August are graphed below. In all cases these events are excluded from the final results due to occurring during high winds.

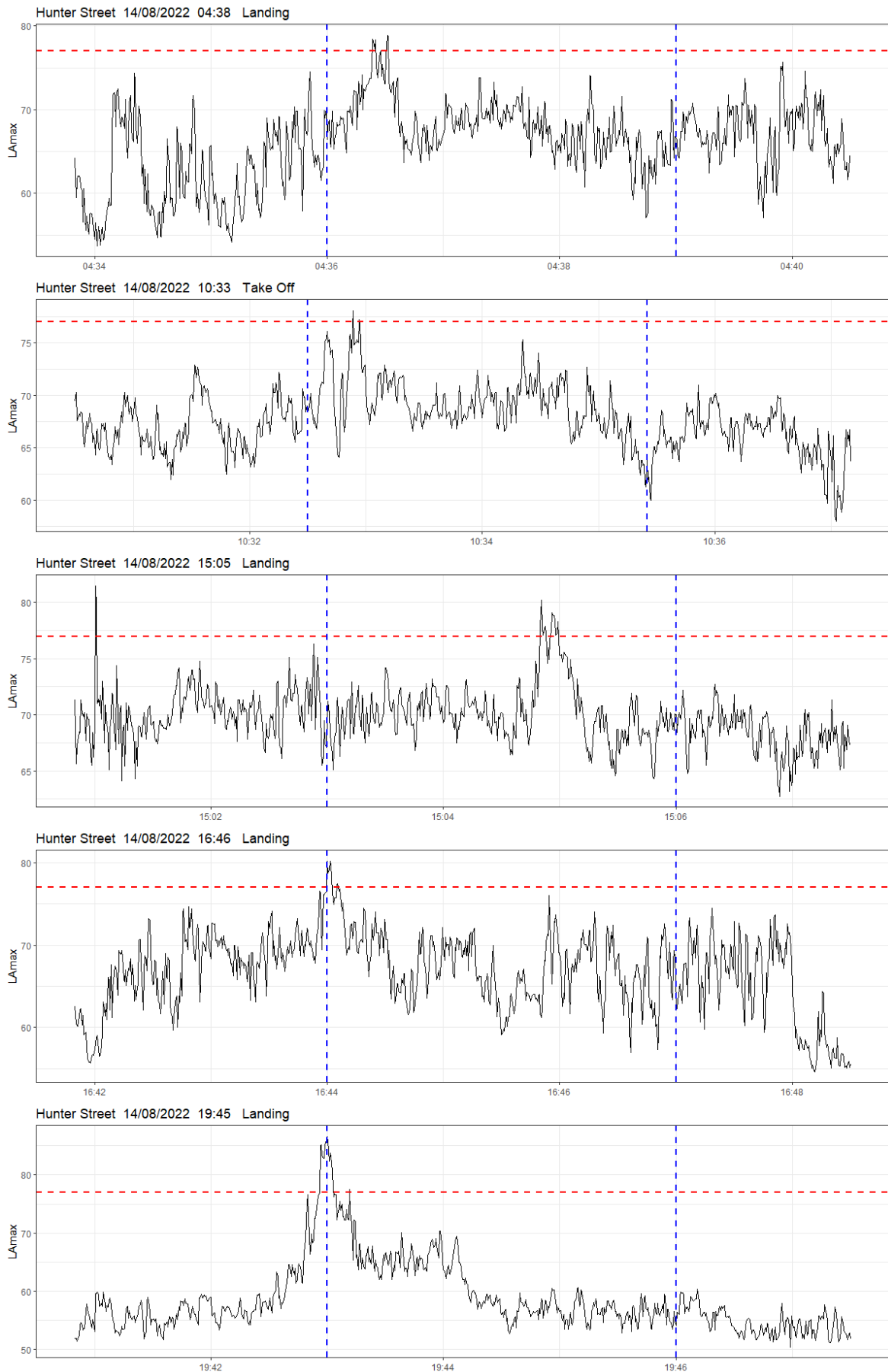


Figure 10 Flight event analysis Hunter Street 14/8/2022

There were 14 flight events during the 24-hour period between midnight 15th of August and midnight 16th of August. These events are tabled below. Charts of the two flight events where the LA_{max}(Event) may have exceeded 77 dBA are shown below **Table 19**.

Table 19 Flight events of interest Hunter Street 15/8/2022

Date & Time	Event	Flight Path	Wind km/hr	Potential LA _{max} (Event) dBA	Note
15/08/2022 5:05	Take Off	B	26.8	75.1	LA _{max} (Event) Below 77 dBA
15/08/2022 5:30	Landing	B	23.3	71.4	LA _{max} (Event) Below 77 dBA
15/08/2022 7:05	Take Off	B	16.1	79.7	High wind
15/08/2022 7:57	Landing	B	25.4	75.0	LA _{max} (Event) Below 77 dBA
15/08/2022 9:19	Take Off	B	27.1	76.5	LA _{max} (Event) Below 77 dBA
15/08/2022 9:39	Landing	B	33.6	83.6	High wind
15/08/2022 12:29	Take Off	B	34.1	74.9	LA _{max} (Event) Below 77 dBA
15/08/2022 13:01	Landing	B	41.9	83.3	High wind
15/08/2022 15:04	Take Off	B	23.7	73.1	LA _{max} (Event) Below 77 dBA
15/08/2022 15:49	Landing	B	22.2	76.6	LA _{max} (Event) Below 77 dBA
15/08/2022 15:52	Take Off	B	22.2	74.4	LA _{max} (Event) Below 77 dBA
15/08/2022 16:11	Landing	B	20.5	79.8	High wind
15/08/2022 22:25	Take Off	B	14.0	75.2	LA _{max} (Event) Below 77 dBA
15/08/2022 22:43	Landing	B	15.6	76.3	LA _{max} (Event) Below 77 dBA

The four potential exceedances during the 15th of August are graphed below. In all cases these events are excluded from the final results due to occurring during high winds.

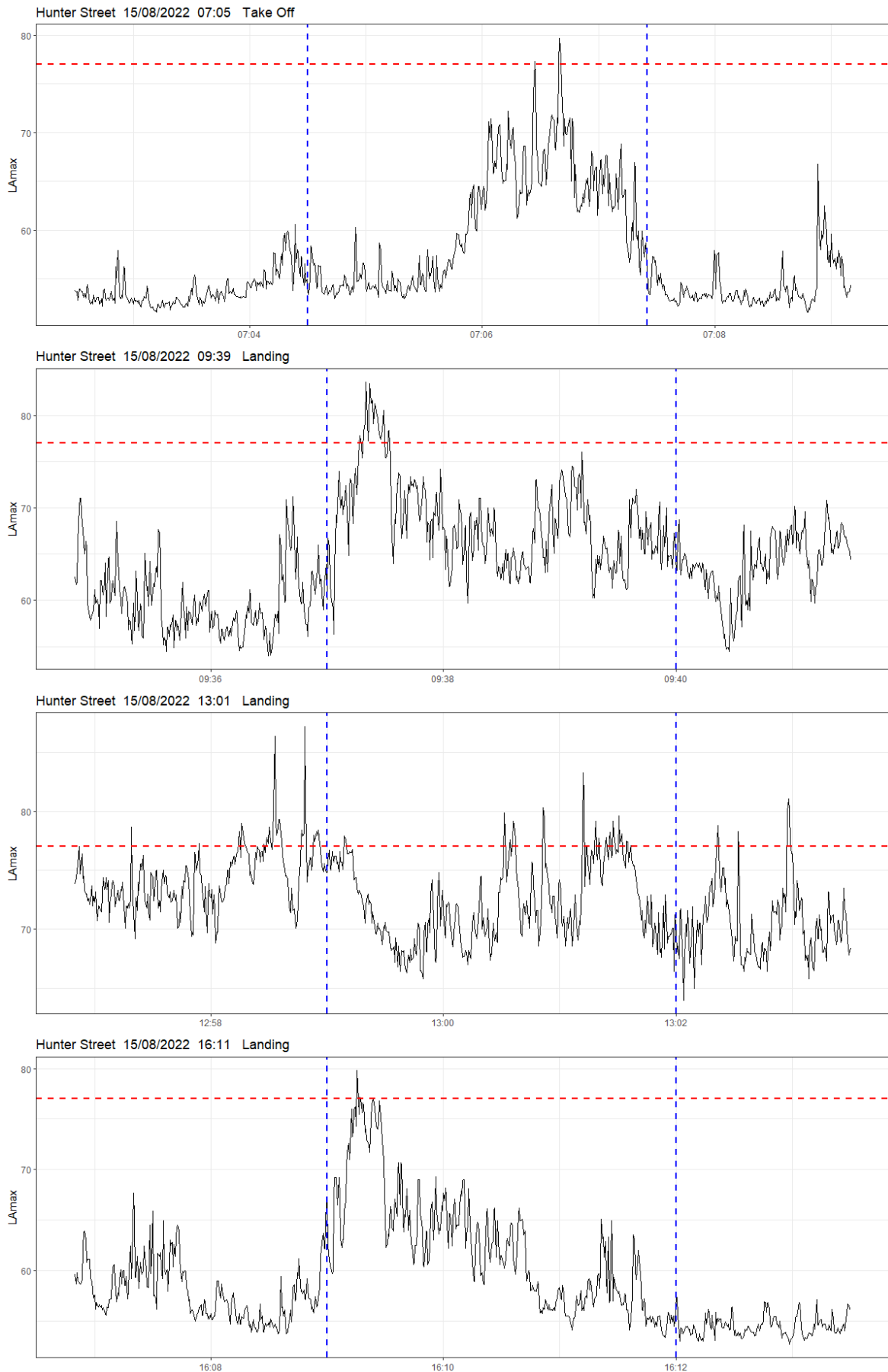


Figure 11 Flight event analysis Hunter Street 15/8/2022

There were 20 flight events during the 24-hour period between midnight 18th of August and midnight 19th of August. These events are tabled below. Charts of the two flight events where the LA_{max}(Event) may have exceeded 77 dBA are shown below **Table 20**.

Table 20 Flight events of interest Hunter Street 18/8/2022

Date & Time	Event	Flight Path	Wind km/hr	Potential LA _{max} (Event) dBA	Note
18/08/2022 0:35	Take Off	B	9.6	74.6	LA _{max} (Event) Below 77 dBA
18/08/2022 0:56	Landing	B	11.8	71.9	LA _{max} (Event) Below 77 dBA
18/08/2022 7:05	Take Off	B	18.5	75.3	LA _{max} (Event) Below 77 dBA
18/08/2022 7:36	Landing	B	18.5	78.8	High wind
18/08/2022 8:07	Take Off	B	19.0	78.7	High wind
18/08/2022 8:25	Landing	B	20.9	77.5	High wind
18/08/2022 9:05	Take Off	B	23.3	78.3	High wind
18/08/2022 9:23	Landing	B	21.1	82.6	High wind
18/08/2022 10:43	Take Off	B	17.6	74.7	LA _{max} (Event) Below 77 dBA
18/08/2022 10:51	Landing	B	22.3	75.4	LA _{max} (Event) Below 77 dBA
18/08/2022 11:21	Take Off	B	19.1	78.9	High wind
18/08/2022 12:05	Landing	B	22.2	80.2	High wind
18/08/2022 13:58	Take Off	B	24.2	74.4	LA _{max} (Event) Below 77 dBA
18/08/2022 14:37	Landing	B	29.4	78.3	High wind
18/08/2022 16:30	Take Off	B	15.2	85.7	High wind
18/08/2022 17:05	Landing	B	21.3	75.5	LA _{max} (Event) Below 77 dBA
18/08/2022 21:05	Take Off	B	7.7	71.0	LA _{max} (Event) Below 77 dBA
18/08/2022 21:24	Landing	B	6.6	75.9	LA _{max} (Event) Below 77 dBA

The nine potential exceedances during the 18th of August are graphed below. In all cases these events are excluded from the final results due to high winds.

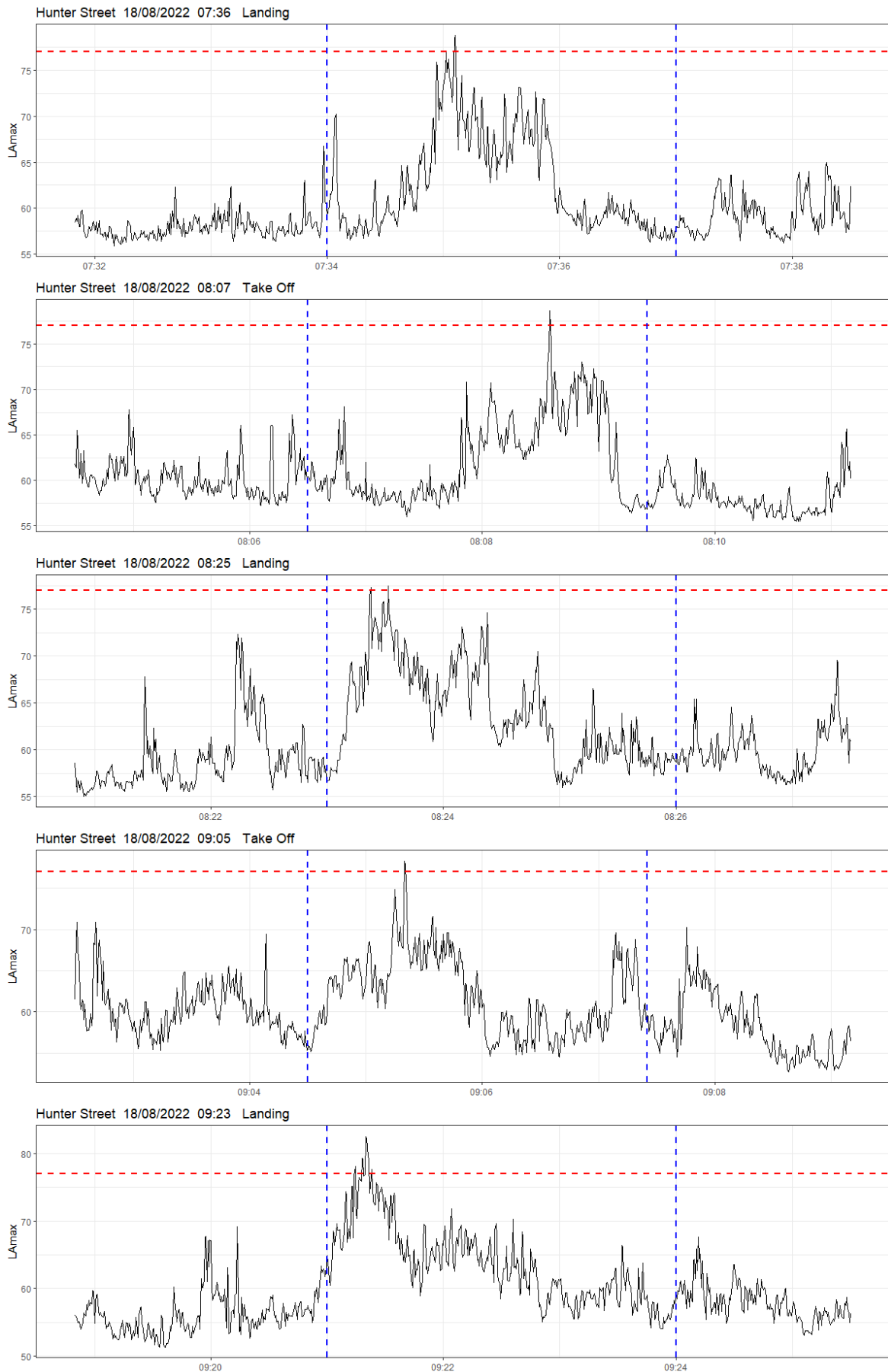


Figure 12 LAmax(Event) at Hunter Street 18/8/2022

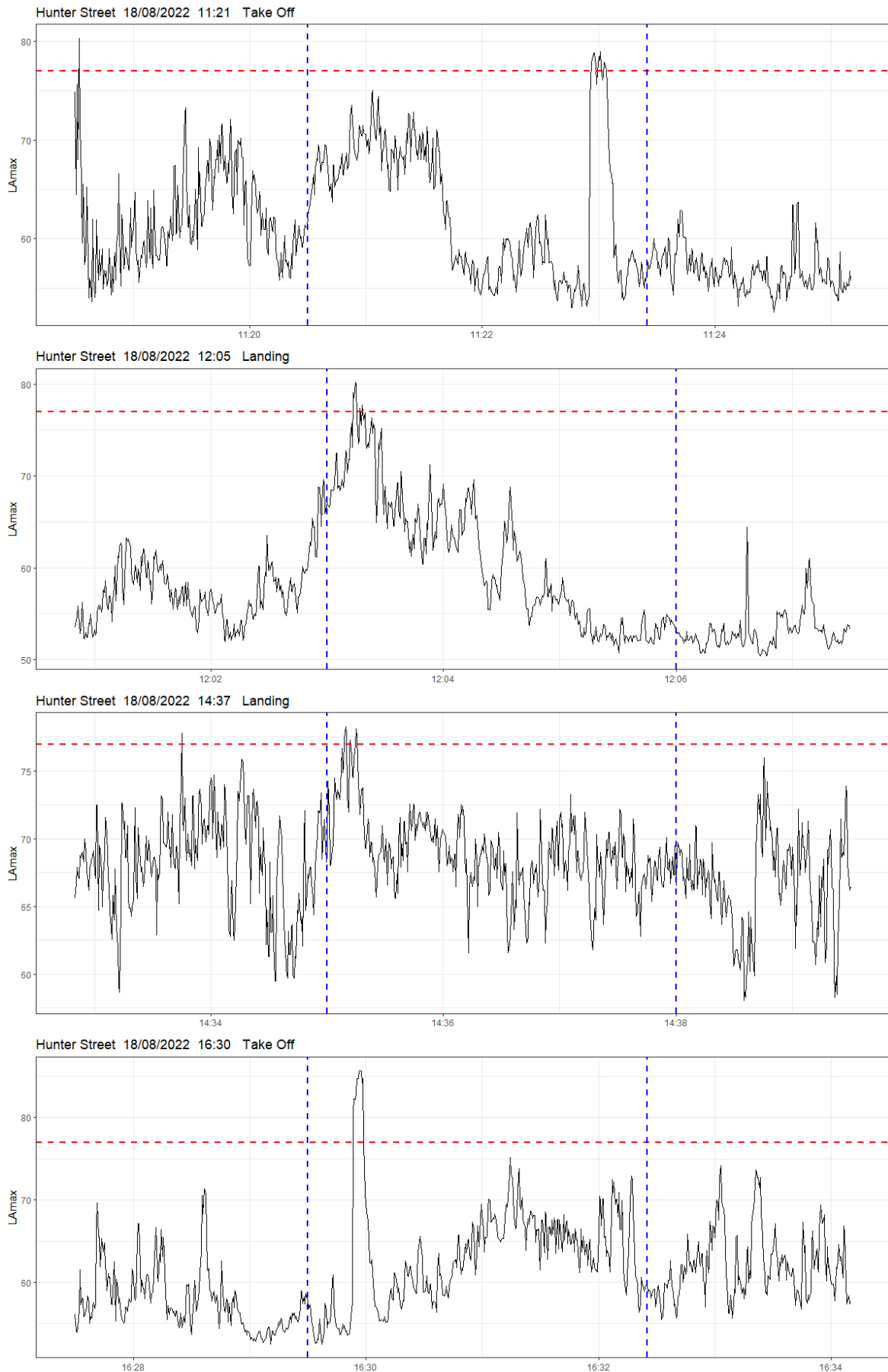


Figure 13 LAmax(Event) at Hunter Street 18/8/2022

12.1 HUNTER STREET HIGH WIND ANALYSIS

The L_{Amax}(Event) levels at Hunter Street appear to be more affected by high winds than the other locations. **Table 21** presents the number of L_{Amax} events that were measured to be above the target of 77 dBA for various wind speed categories.

Table 21 *Wind speed effect on high L_{Amax}(event) levels, Hunter Street*

Wind speed (km/hr)	Number of L _{Amax} (Event) above 77 dBA
0 - 5	0
5 - 10	0
10 - 15	1
15 - 20	8
Greater than 20	16

It is clear that high winds drive higher L_{Amax}(Event) levels.

13 QUEEN STREET ANALYSIS

L_{Amax}(Hel) and L_{Aeq} levels were initially calculated for the Queen Street location prior to considering whether any exclusions due to extraneous noise or high wind were necessary. The initial results are presented in **Table 22**.

Table 22 *Initial Queen Street results prior to exclusions*

24- hr Period (midnight to midnight)	Flight Path	L _{Amax} (Hel), dBA	L _{Aeq} ,15 hr (Day)	L _{Aeq} ,9 hr (Night)
12/8 - 13/8	B	82	44	27
12/8 - 13/8	A	60	25	-
13/8 - 14/8	B	95	54	63
14/8 - 15/8	B	76	42	30
15/8 - 16/8	B	99	63	26
16/8 - 17/8	B	89	48	32
17/8 - 18/8	B	67	38	32
18/18 – 19/8	B	85	48	25

We see that there were five 24-hour periods where the initial L_{Amax}(Hel) or L_{Aeq} may potentially exceed the relevant criterion. These periods will be inspected and potential exceedance events will be presented in

Table 23.

Table 23 *Flight events of interest Queen Street*

Date & Time	Event	Flight Path	Wind km/hr	Potential LA _{max} (Event) dBA	Note
12/08/2022 13:40	Take Off	B	11.3	90.2	Extraneous noise
13/08/2022 18:38	Take Off	B	14.8	99.5	Extraneous noise
13/08/2022 23:15	Take Off	B	26.2	103.4	Extraneous noise
15/08/2022 9:19	Take Off	B	27.1	102.7	Extraneous noise
15/08/2022 9:39	Landing	B	33.6	98.3	Extraneous noise
15/08/2022 12:29	Take Off	B	34.1	109.6	Extraneous noise
15/08/2022 15:49	Landing	B	22.2	84	Extraneous noise
16/08/2022 11:36	Landing	B	16.1	79.9	Extraneous noise
16/08/2022 11:45	Take Off	B	17.7	99.1	Extraneous noise
18/08/2022 16:30	Take Off	B	15.2	98.3	Extraneous noise

The ten events above are graphed below. Extraneous noise is responsible for the high levels in all cases. Once these events are removed, all 24-hour periods comply with the noise criteria stated in the consent conditions.

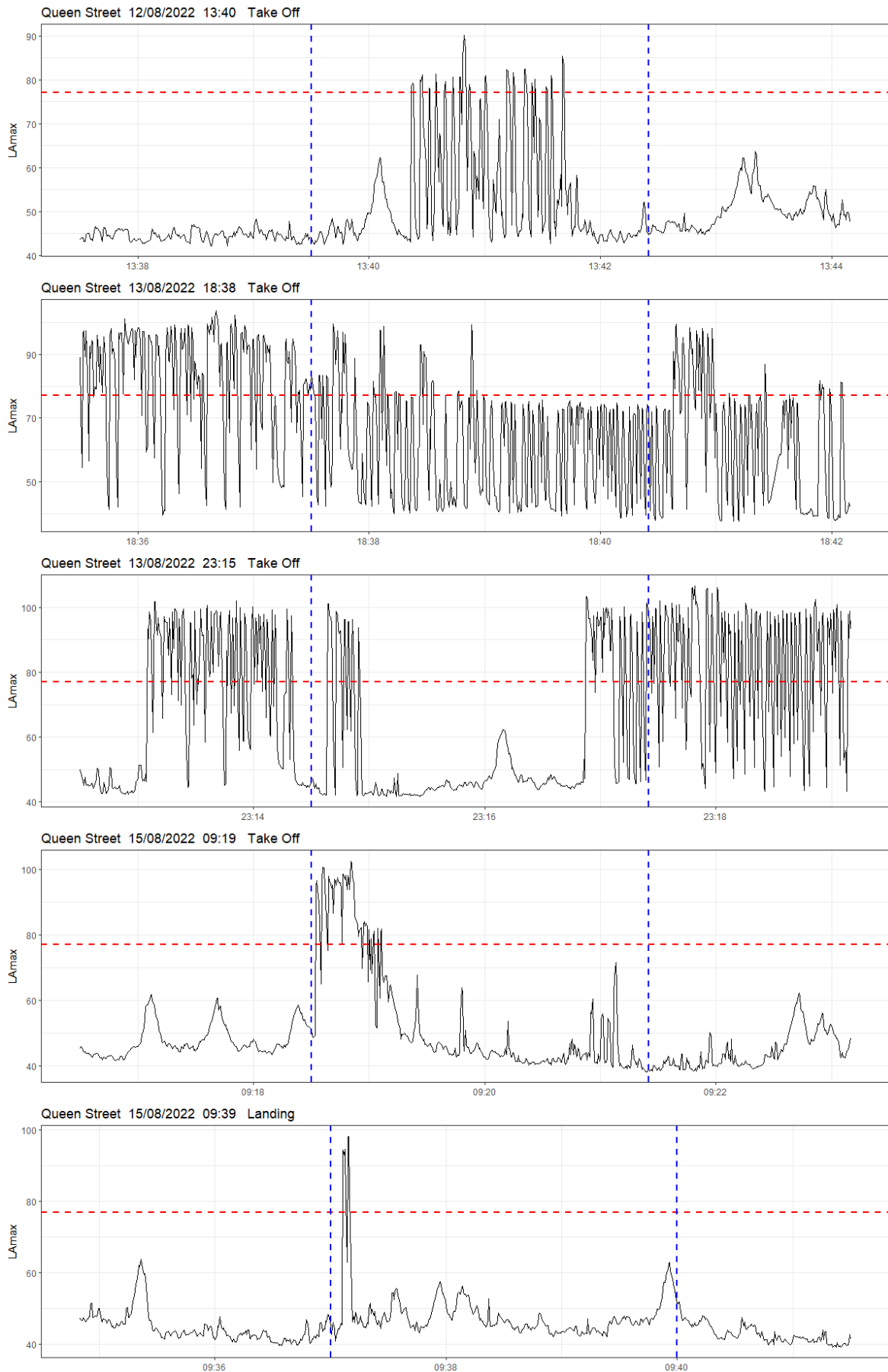


Figure 14 Flight event analysis Queen St

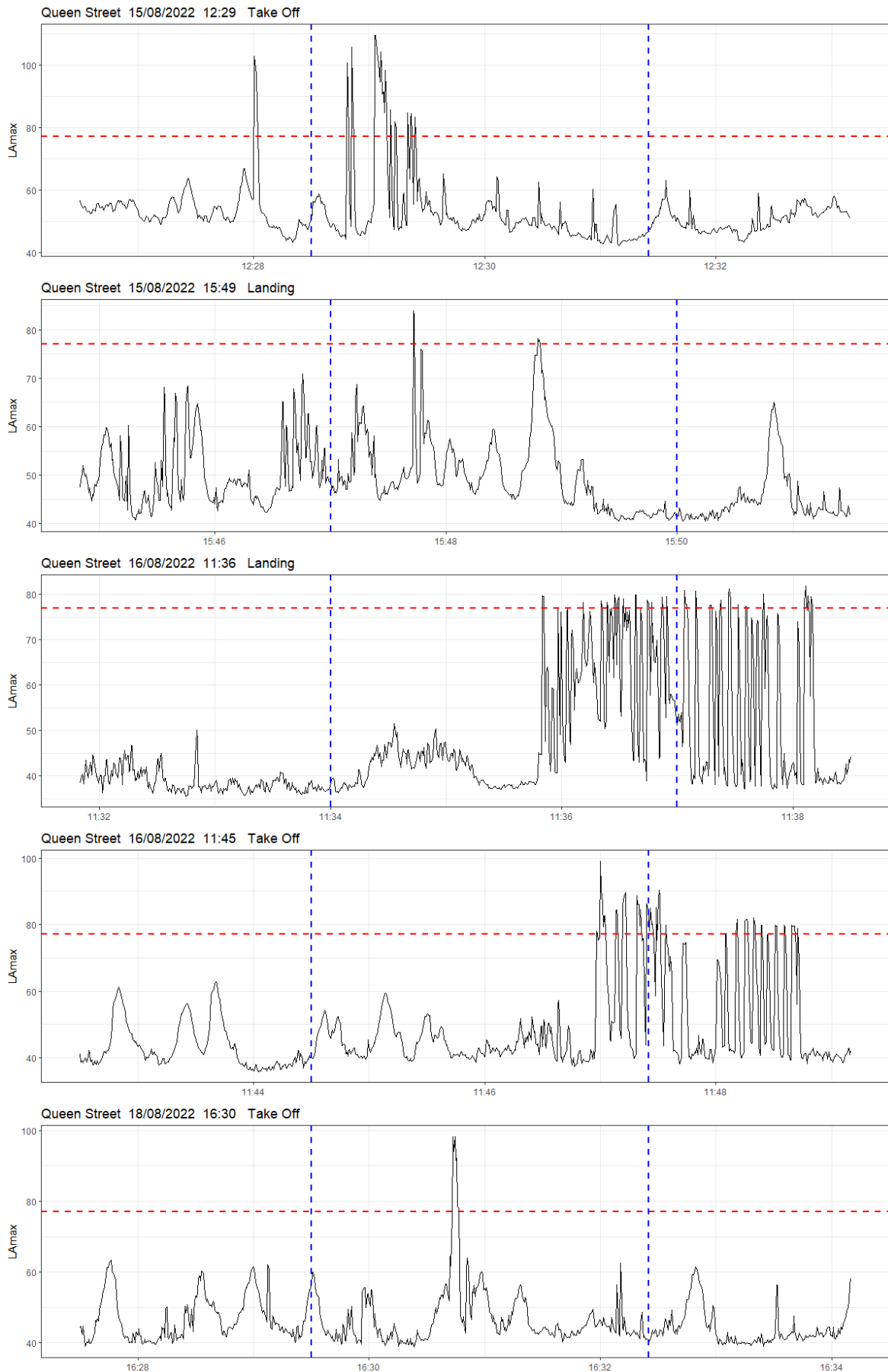


Figure 15 Flight event analysis Queen St

14 CONCLUSION

RCA were engaged by Port Authority of NSW to prepare this ONCR for the marine pilot transfer operating at Dyke Point, Carrington. This ONCR has been prepared in accordance with AS2363 to be consistent with the SEE and found no non-compliances against the criteria stated in the consent conditions during the measurement period.



Yours faithfully
RCA AUSTRALIA

Alex Rees
Acoustics Manager

GLOSSARY

- A-weighted The A-weighting filter was designed to process a sound signal to attenuate the lower and higher frequencies of the audible range. This is done to replicate the way people hear sound.
- dB Decibel, which is 10 times the logarithm (base 10) of the ration of a given sound pressure to a reference pressure.
- L_{Aeq} The A-weighted equivalent continuous sound level in decibels measured over a stated period of time.
-

Definitions from AS2363

- $L_{Aeq,T}$ (Hel) the totally encompassing measured or predicted sound contribution at a given site over a period T, composed of sound from the helicopter relevant to the investigation, calculated as the time average A-weighted sound pressure level
- L_{Amax} (Event) the maximum sound pressure level occurring during a discrete test of a given operational mode, measured as the maximum A-weighted sound pressure level using 'F' time-weighting
- L_{Amax} (Hel) the energy average of the L_{Amax} (Event) levels for each mode of operation for each flight path

Appendix A

*Noise monitoring data (without exclusion
analysis)*

Date.Time	Event	Flight.Path	Wind.km	Wind.Above.5km	LeeWharf.SEL	LeeWharf.LAmaxEvent	Rydges.SEL	Rydges.LAmaxEvent	Nautilos.SEL	Nautilos.LAmaxEvent	Boltons.SEL	Boltons.LAmaxEvent	Queen.SEL	Queen.LAmaxEvent	Hunter.SEL	Hunter.LAmaxEvent
12/08/2022 4:41	Take Off	B	6.174	Above 5km	85.4	73.9	85.5	80	80.9	74.1	80.7	73.9	70.9	64.3	86.05060995	74.2
12/08/2022 5:12	Landing	B	8.676	Above 5km	85.5	73.3	85	74.7	79.9	67.7	79.6	69.2	66.4	55.2	86.83376258	75.7
12/08/2022 7:02	Take Off	B	8.982	Above 5km	84	72	82.6	73.5	78.6	73.1	79.6	73.5	66.3	58.4	85.31742891	73.3
12/08/2022 7:50	Landing	B	9.378	Above 5km	85.2	74.4	86.1	75.1	81.8	71.2	81.9	72.2	73.1	61.7	85.49888034	74.8
12/08/2022 13:40	Take Off	B	11.25	Above 5km	85.8	75.4	87.9	77.7	80.3	71.4	88.5	85.2	91.1	90.2	82.91196442	71.1
12/08/2022 14:00	Landing	B	10.908	Above 5km	81	74.2	76.4	65.7	76.4	66.2	82.8	79	69.6	61	72.67739829	56.2
12/08/2022 19:00	Take Off	A	9.774	Above 5km	88.7	76.5	86.5	76.3	79.7	67.4	79.1	65.5	72.3	60	77.87951436	68.6
12/08/2022 20:14	Landing	B	15.534	Above 5km	87	75.6	85.7	72.5	82.2	69.8	80.9	72.5	74	65.8	87.18978622	77
13/08/2022 5:09	Take Off	B	6.372	Above 5km	84	72.7	84.2	74.2	80.2	69.1	77.8	67.9	62.2	50.4	86.35994536	72
13/08/2022 5:57	Landing	B	11.016	Above 5km	83.4	72.2	81.9	69.9	76.2	70.7	75.5	63.1	68.8	62.5	89.49280538	77.2
13/08/2022 10:00	Take Off	B	33.174	Above 5km	87	76.8	85.7	74.6	80.2	65.2	84.5	71.2	76.1	67.3	87.21273416	75.9
13/08/2022 10:59	Landing	B	26.406	Above 5km	85.5	72.9	86.7	76.9	81.7	79.1	82.6	72.7	71.2	61.8	88.57702078	75
13/08/2022 15:56	Take Off	B	22.302	Above 5km	86.6	80.4	84.5	73.8	76.3	64.8	79.4	75.5	69	63.9	86.96196344	76.9
13/08/2022 16:43	Landing	B	22.842	Above 5km	85.9	74.3	85.7	73	79.2	64.4	78.4	67.2	68.7	60.1	85.62080868	77.3
13/08/2022 18:38	Take Off	B	14.796	Above 5km	86.2	76.3	83.5	72.8	77.9	67.2	79.1	71.2	101.2	99.5	82.65402374	71.7
13/08/2022 19:05	Landing	B	11.718	Above 5km	87.5	73.9	88.8	76.7	81	68.7	80.9	69.6	61.9	48.9	85.48983744	74.9
13/08/2022 23:15	Take Off	B	26.208	Above 5km	85.1	75.6	84.3	73	80.7	70.7	77.8	68.7	108.5	103.4	87.0604741	74.9
13/08/2022 23:34	Landing	B	22.194	Above 5km	83	71.7	85.2	74.8	80.2	73.9	77.9	65.4	69.9	75.6	89.1270092	79.3
14/08/2022 4:16	Take Off	B	27.612	Above 5km	86.7	75.4	84.6	74.9	81.3	71.1	77.7	64.4	68.3	52.8	90.04466318	75.9
14/08/2022 4:38	Landing	B	29.808	Above 5km	84.2	71.9	83.7	74.1	82.5	79.3	79	67.4	70	57.7	90.68702582	78.9
14/08/2022 10:33	Take Off	B	40.86	Above 5km	92.2	81.1	85.7	72.2	90.2	84.4	83.6	72	87.8	86.7	91.58504854	78.1
14/08/2022 10:54	Landing	B	34.524	Above 5km	89.3	74.4	87	76.2	90.7	86.5	82.7	70.1	77	64.6	91.33839619	75.8
14/08/2022 14:40	Take Off	B	39.672	Above 5km	91.5	78.5	84.8	73.3	99.1	94.9	79.5	65.7	78.6	66.9	90.97480788	75.1
14/08/2022 15:05	Landing	B	39.276	Above 5km	90.5	79.4	87.6	76.7	96.5	87.4	83	67.7	71.5	57.9	92.96966023	80.2
14/08/2022 15:57	Take Off	B	40.932	Above 5km	87.7	77.7	80.2	66.1	79.6	64.9	81.9	67.6	74.4	60	89.38064706	73.5
14/08/2022 16:46	Landing	B	30.564	Above 5km	88.2	74.8	87.6	74.6	99.1	93.8	83.4	71.3	80.1	76.2	90.7018723	80.2
14/08/2022 19:25	Take Off	B	20.664	Above 5km	84.9	71.5	83.6	72.1	79.7	68.4	79.9	72.7	68.7	58.9	85.71707648	73
14/08/2022 19:45	Landing	B	19.458	Above 5km	86	73.6	87.4	81.4	82.2	76	82	78.5	66.4	56.1	89.89169803	86.6
14/08/2022 20:49	Take Off	B	20.718	Above 5km	85.1	74.4	83.7	72.3	79.3	67.6	77.4	63.7	64.3	45.8	86.14922356	73.5
14/08/2022 21:13	Landing	B	24.246	Above 5km	86.1	74	84.4	74.1	80.4	69.5	78.8	68	69.4	64.3	84.32229101	74
14/08/2022 22:34	Take Off	B	31.014	Above 5km	85.4	73.7	76.2	61.3	78.7	67.8	75.5	60.5	68.7	54.5	88.29138511	74.5
14/08/2022 22:42	Landing	B	30.942	Above 5km	80.7	66.2	78.6	64.3	80.8	68	77.7	61	67	51.5	88.45889757	75.8
15/08/2022 5:05	Take Off	B	26.784	Above 5km	85.3	72.1	86.6	79.7	79.8	67.4	77.5	63.8	64.7	48.6	88.57989259	75.1
15/08/2022 5:30	Landing	B	23.256	Above 5km	79.9	61.4	78.6	66.4	75.4	56.1	73.9	59.9	66.3	58.4	82.68907875	71.4
15/08/2022 7:05	Take Off	B	16.146	Above 5km	84.5	73	85.8	76.2	88.9	91.2	80.5	72.1	69.2	73.5	86.37983567	79.7
15/08/2022 7:57	Landing	B	25.398	Above 5km	86.5	73.3	86.5	73.7	83.3	72.2	84.5	74	68.3	54.3	87.76215633	75
15/08/2022 9:19	Take Off	B	27.126	Above 5km	86.4	74	83.5	70.6	82	83.9	79.2	65.8	106.4	102.7	88.92366011	76.5
15/08/2022 9:39	Landing	B	33.552	Above 5km	86.9	80.4	87.2	76.2	83.4	80.1	83.2	70.4	93.8	98.3	92.78229183	83.6
15/08/2022 12:29	Take Off	B	34.056	Above 5km	85.9	73.1	85.7	76.9	80	71.9	85	68.8	107.7	109.6	91.45613225	74.9
15/08/2022 13:01	Landing	B	41.904	Above 5km	92.5	80.5	85.8	74.9	95.3	87.8	91.2	86	76.2	62.2	94.86949628	83.3
15/08/2022 15:04	Take Off	B	23.724	Above 5km	89.1	77.8	86.3	76.8	79.4	66.3	87.5	80.9	67.5	57.2	87.94674718	73.1
15/08/2022 15:49	Landing	B	22.176	Above 5km	85.4	80.8	85.6	72	82.3	75.7	85.4	75.7	83.4	84	88.77800922	76.6
15/08/2022 15:52	Take Off	B	22.176	Above 5km	85.5	73.5	85.8	75	84.6	87.8	82.5	71.3	70.9	63	86.46542933	74.4
15/08/2022 16:11	Landing	B	20.538	Above 5km	85.1	71.5	85.6	73.6	80.7	71.9	83.6	78.6	76.8	72.2	88.36527972	79.8
15/08/2022 22:25	Take Off	B	13.986	Above 5km	83.2	72.2	82.8	75.8	76.2	61.9	75.6	61.8	64.3	46.3	83.11542459	75.2
15/08/2022 22:43	Landing	B	15.624	Above 5km	85.8	72.3	85.8	72.5	80.3	68.8	81.4	67.7	66.5	52.6	86.63951402	76.3
16/08/2022 5:49	Take Off	B	20.412	Above 5km	85.7	74.3	84.8	73.4	78.5	67.2	78.4	70.5	71.1	63.9	85.65660503	71.7
16/08/2022 6:11	Landing	B	16.434	Above 5km	85.7	70.7	85.9	73	81.2	69.9	81.1	72.7	73.9	65	85.85206069	72.7
16/08/2022 11:20	Take Off	B	16.632	Above 5km	84.8	73.2	84.6	77.2	76.7	66.8	76.7	68.4	64.4	56.5	87.02939527	72.5
16/08/2022 11:36	Landing	B	16.128	Above 5km	86.3	76.5	84.6	73.3	80.9	73	81.5	70.5	86.8	79.9	89.28846866	79.4
16/08/2022 11:45	Take Off	B	17.658	Above 5km	85.2	74.3	82.4	71.1	77.6	66.7	83.1	79.1	94.8	99.1	87.18097337	76.6
16/08/2022 12:24	Landing	B	14.76	Above 5km	87	78.3	83.6	71.1	78.3	65.4	80.2	70.1	68.9	65.2	83.75976824	72
16/08/2022 22:12	Take Off	B	19.296	Above 5km	81.6	70	82.5	77	72.9	63.3	72.8	63.9	67.1	53.4	85.79458674	73.8
16/08/2022 22:30	Landing	B	22.59	Above 5km	86.5	76.5	85	77.5	76	67.2	76.8	65.8	65.3	51.1	85.36085815	72.6
16/08/2022 23:20	Take Off	B	16.308	Above 5km	83.1	71.1	83.4	76.8	73.4	64.1	72.1	63	66.6	47.7	84.91032137	73.2
16/08/2022 23:40	Landing	B	18.036	Above 5km	85	72.6	84.3	76.5	74.9	63.8	75	66.6	65.5	57.2	86.36911605	75.8
17/08/2022 0:16	Take Off	B	18.054	Above 5km	82	73.4	84.8	74.1	74.3	66.5	71.9	62.6	70.7	62.7	85.91874344	74.8
17/08/2022 1:05	Landing	B	22.05	Above 5km	84.7	76.7	84	74.6	75.7	64.5	73.5	67.1	68.2	56.3	88.55148474	80.7
17/08/2022 5:50	Take Off	B	7.65	Above 5km	82.6	72.5	83.1	73.4	75	62	74.1	62	68.4	57.9	84.37149595	76.4
17/08/2022 6:09	Landing	B	7.524	Above 5km	85.1	72	86.8	72.5	80.8	69.4	78.7	68.9	71.2	62.1	85.98071523	72.2
17/08/2022 8:37	Take Off	B	10.584	Above 5km	85.6	71.5	80.1	66.8	78.3	66.1	77.8	69.9	67.8	61	84.88812202	73.3
17/08/2022 8:55	Landing	B	11.79	Above 5km	86.3	75.6	82.6	73	77.4	64.1	78.2	75.4	72.6	62.2	86.68144267	76
17/08/2022 9:35	Take Off	B	10.872	Above 5km	83.8	73.6	82.6	74.1	75.6	63.1	76.5	77.7	70.9	62.4	86.39313251	75.1

17/08/2022 9:57	Landing	B	18.306	Above 5km	82.3	71.7	80.8	76.3	76.5	63.8	82.9	79.5	74.7	70.7	91.1143529	83
17/08/2022 12:51	Take Off	B	21.888	Above 5km	81.8	74.8	83.3	72.2	77.8	67.8	78.5	80.9	72.8	62.4	88.90787863	78.6
17/08/2022 13:52	Landing	B	20.376	Above 5km	81.9	71.4	84.7	76.3	75.5	61.1	79.3	78.2	73	61.3	88.63671316	78.4
17/08/2022 15:58	Take Off	B	18.432	Above 5km	76	62.8	69.3	53.7	75.3	62.6	69.8	61.8	70.2	57	76.57104499	60.5
17/08/2022 16:17	Landing	B	15.282	Above 5km	75.2	60.3	69.3	53.4	76.1	60.5	73	71.8	75.5	64.7	77.0875382	65.1
17/08/2022 18:08	Take Off	B	13.716	Above 5km	79.8	66.7	78.2	70.4	75	66	75.2	68.9	79.8	78	83.14307907	72.9
17/08/2022 18:25	Landing	B	11.682	Above 5km	81.7	72.7	79.6	71.2	73.4	60.2	77.7	68.2	72.3	64.3	86.18082026	75.2
17/08/2022 21:04	Take Off	B	5.634	Above 5km	84.5	76.7	84.4	74.1	80.1	71.5	77.7	72.2	68.4	60.9	86.47900554	72.8
17/08/2022 21:39	Landing	B	4.572	Below 5km	85	74	84	70.4	79.1	65.3	78.4	69.5	71.6	52.3	88.98166769	76.1
17/08/2022 21:59	Take Off	B	2.736	Below 5km	83.2	71.5	82.2	72.6	78.2	67.1	78.2	70	73.1	55.7	88.97852515	77.4
17/08/2022 22:19	Landing	B	9.126	Above 5km	84	70.8	84.1	71	79.3	68.6	79.2	75.7	69.6	50.6	89.28586481	75.9
17/08/2022 23:24	Take Off	B	6.444	Above 5km	85.5	73.6	87.6	77.8	80.3	70.4	83	73.6	62.6	45	86.02873434	76.8
17/08/2022 23:46	Landing	B	10.314	Above 5km	83.7	72.1	86.1	71.3	80.9	69	79.2	69.5	65	51.8	89.10510076	79.3
18/08/2022 0:35	Take Off	B	9.63	Above 5km	85.9	73.8	84.1	75.9	78	71.3	78.9	69.3	64.8	48	85.90986341	74.6
18/08/2022 0:56	Landing	B	11.826	Above 5km	84	70.9	84.1	70.5	77.5	69.4	77.2	67.6	63.9	44.3	81.89966929	71.9
18/08/2022 7:05	Take Off	B	18.468	Above 5km	85.3	74.3	82.8	73.8	81.4	72.5	79.5	66.6	73.1	63.3	86.28236189	75.3
18/08/2022 7:36	Landing	B	18.522	Above 5km	83.6	74.3	83.6	70.7	81.1	69.5	80.5	69.1	77.7	66.5	88.02976616	78.8
18/08/2022 8:07	Take Off	B	18.972	Above 5km	83.8	69.9	82.6	69.8	82.4	68.5	80.1	65.3	72.2	61.2	86.44268189	78.7
18/08/2022 8:25	Landing	B	20.916	Above 5km	85.8	84.4	85.6	73.5	81.2	67.4	80.8	70.3	75.8	66.1	88.30825001	77.5
18/08/2022 9:05	Take Off	B	23.292	Above 5km	86.3	73.5	85.3	73	82.7	80.5	86.1	78.1	68.3	56.7	85.91909751	78.3
18/08/2022 9:23	Landing	B	21.06	Above 5km	85.4	73	86.5	73.7	83	71.2	82.5	68.6	71.1	60.2	89.25263173	82.6
18/08/2022 10:43	Take Off	B	17.622	Above 5km	87.7	78.9	85.4	74.9	82.1	79.4	80	67.7	75.4	64.8	87.91577043	74.7
18/08/2022 10:51	Landing	B	22.32	Above 5km	84	69.7	85	75.7	80.6	71.6	78	64.2	75.7	68.3	87.43955825	75.4
18/08/2022 11:21	Take Off	B	19.098	Above 5km	87.7	78	87.6	78.2	84.6	77.7	89.1	83.5	75.3	62.9	89.61088176	78.9
18/08/2022 12:05	Landing	B	22.248	Above 5km	83.7	72.5	82.4	70.1	79	66.8	79.7	66.8	79	66.4	88.62639274	80.2
18/08/2022 13:58	Take Off	B	24.192	Above 5km	86.3	76.3	82.5	72.4	78.1	65.4	81.6	72.4	65.9	65.4	86.34360813	74.4
18/08/2022 14:37	Landing	B	29.376	Above 5km	87.2	83.8	84	73.7	86.2	84.1	83.6	73.8	70.2	65.6	91.24635616	78.3
18/08/2022 16:30	Take Off	B	15.246	Above 5km	92.8	87.8	91.2	85.5	87.3	82.1	85.5	80.7	95	98.3	91.91279564	85.7
18/08/2022 17:05	Landing	B	21.276	Above 5km	85.5	75.8	83.4	72.4	80	65.6	78.8	68.9	71.3	68.2	85.48334214	75.5
18/08/2022 21:05	Take Off	B	7.686	Above 5km	84.8	74	85.1	75.9	78.9	65.7	78.3	70.9	65.1	46.6	83.20253965	71
18/08/2022 21:24	Landing	B	6.552	Above 5km	84.9	72.2	86.4	73.4	80.9	68.7	80.2	67.7	65.3	55.2	88.3653159	75.9
18/08/2022 21:47	Take Off	B	1.548	Below 5km	85.3	72.1	86	73.7	81.7	71.3	82.7	72.9	63.5	43.7	83.86063335	70.8
18/08/2022 22:10	Landing	B	3.438	Below 5km	84.3	70.8	86.1	75.1	82.3	68.5	78.6	66.2	65.7	46.6	87.64822082	77