Short Term Noise Monitoring Program, *Primrose Sands*

11 June 2024 – 12 December 2024

Version Control

Version	Date	Comments	Sections
1.0	12 December 2024	Initial Version	All

Summary

Deployment Purpose

This deployment aims to capture noise levels in support of the Noise Abatement Procedure (NAP) trial, which commenced in June 2024. Specifically, it focuses on capturing noise levels of arrivals using the RNP-AR approach and the longer RNAV approach to RWY 30.

Deployment monitoring Period

11 June 2024 – 12 December 2024

Monitoring Details

Capture zone: 2.5km radius x 8,202ft (2,500m) altitude.

Noise threshold settings by time of day: 00:00-07:59 = Threshold 51dB(A), 08:00-13:59 = Threshold 55dB(A), 14:00-20:59 = Threshold 52dB(A), 21:00-23:59 = Threshold 50dB(A)

Key Findings

- Noise Correlation

  92.6% of the aircraft from Hobart Airport, as per the focus group, generated noise events that correlated to the aircraft.
- Noise Daily Distribution

  The distribution of the maximum noise levels generated by aircraft falls within the following ranges:

  - 76.9% within the range of 60dB(A) to 70dB(A)
  - 22.2% greater than 70dB(A).
  - 0.9% below 60dB(A).
- Most Common aircraft

  The most prevalent aircraft type during the deployment period was the B738 aircraft.
- Top loudest noise events

  The top 10 noise events for this deployment originated from community sources. Additionally, the top 10 correlated noise events were associated with community sources in addition to aircraft noise.
- Busiest Day

  The purpose was to analyze the day that had the most significant impact on the community. The busiest day during the deployment period occurred on 11 June 2024.

Glossary of Terms

A	Arrivals
Background noise Level (L90)	The noise level in dB(A) that is exceeded 90% of the time. It is considered the background noise level of an environment.
Capture Zone	The region relative to the noise monitor that an aircraft can be within and be able to be correlated to a noise event.
Correlated Noise Event (CNE)	A noise event matched to an aircraft movement that flew through the capture zone.
D	Departures
Data Availability	The degree of data completeness achieved during the deployment period. The data availability percentage factors in any monitor outages that occur.
Day	6:00am-10:00pm
dB(A)	A-weighted decibel. It is an expression of the relative loudness of sounds as perceived by the human ear.
General Aviation	Movements other than scheduled commercial airline operations. This includes private, sports, charter and training operations.
H	Helicopter operations
LaMax	Each noise event will have a peak noise level which is referred to as the maximum sound level in dB(A) or LaMax
Movement	An aircraft operation, such as an arrival or departure
Night	10:00 pm to 6:00 am
NMT	Noise Monitoring Terminal also referred to as the noise monitor.
Noise Event	A noise event is created when the noise level exceeds the threshold settings for a specified period.
O	Overflight i.e. an aircraft movement that flew over the area but did not arrive or depart from the airport of concern.
Overall Correlation Percentage	The total number of correlated noise events (CNE) is divided by the total number of aircraft movements through the capture zone to calculate the overall correlation percentage.
RWY	Runway
T	An operation by an aircraft that arrives and departs on a runway without stopping or exiting the runway. It is also known as Touch and Go.
Threshold	The threshold represents the value that the noise level must surpass for a specified period to create a noise event.
YMHB	Hobart Airport, Tasmania

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1 Purpose

The short-term noise monitoring program targeted locations in suburbs chosen by Airservices Australia with consideration for community feedback. This deployment aims to capture noise levels in support of the Noise Abatement Procedure (NAP) trial, which commenced in June 2024. Specifically, it focuses on capturing noise levels of arrivals using the RNP-AR approach and the longer RNAV approach to RWY 30. Furthermore, an extensive analysis was conducted for the busiest day of the deployment period. This day was chosen for its potential to provide significant statistical data and insight into a day that had the greatest impact on the community during the deployment. The analysis provided details of the loudest noise events experienced and the most prevalent aircraft operations observed.

To adequately depict the variation in flight paths, weather conditions, and operational patterns from Hobart Airport movements during the trial, a monitoring period from 11 June 2024 to 12 December 2024 was deemed sufficient. However, the monitor will remain in place as part of the ongoing short term monitoring program.

This short-term monitor was deployed in Primrose Sands. The noise monitoring terminal (NMT) was positioned to capture aircraft within a three-dimensional cylinder capture zone. The zone spans a radius of 2.5km and extends to 8,202ft (2,500m) above the NMT site level as depicted in Figure 1. Considering that the focus group of aircraft operate below 5,000ft (1,524m), a ceiling of 8,202 (2,500m) was adopted to accommodate potential variations.

The Focus Group for this deployment consists of aircraft operating to the east of Hobart Airport which include:

- Fixed-wing jet aircraft arriving to runway 30 of YMHB.

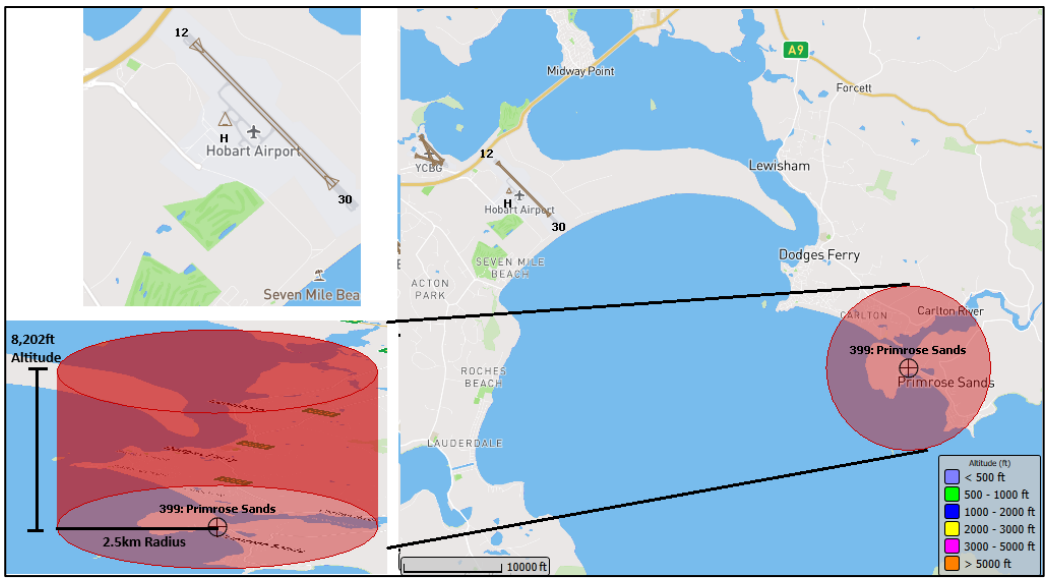

Figure 1: NMT Correlation Zone

2 Deployment Details

The Primrose Sands monitor was installed on 10 June 2024. Complete data is available from 11 June 2024 to 12 December 2024.

NMT ID	399
Deployment Period	11/06/2024 – 12/12/2024
Location	Carlton Bluff Road, Primrose Sands, 7173
NMT Altitude	65ft (20m)
Capture Zone	2.5km radius x 8,202ft (2,500m) altitude
Data Availability	98.1%
Threshold Settings[1]	The noise detection thresholds which have been selected: • 00:00-07:59 = Threshold 51dB(A) • 08:00-13:59 = Threshold 55dB(A) • 14:00-20:59 = Threshold 52dB(A) • 21:00-23:59 = Threshold 50dB(A)

Table 1: NMT Details

3 Findings

3.1. Noise Correlation Summary

The total number of aircraft correlated noise events (CNEs) that were captured by the noise monitor during the 6-month deployment period is shown in Table 2 below.

	All Movements[2]	Hobart Airport Movements	Hobart Airport Focus Group
Number of Movements through capture zone	1772	1571	1518
Number of CNE	1571	1430	1405
Correlation Summary	88.7%	91.0%	92.6%

Table 2: Aircraft correlation rate

88.7% of all operations that passed through the capture zone were Hobart Airport movements. A one-week sample of these movements is shown in Figure 2, below. Other operations included traffic from other airports, such as Hobart Cambridge and Edinburgh Airports. A correlation of 92.6% was achieved for the focus group of Hobart Airport movements.

[1] Threshold setting procedures are explained in section 6.1.1.
[2] All-movement tab accounts for operations to and from other airports (E.g. Hobart Cambridge and Edinburgh Airports) as well as YMHB operations.

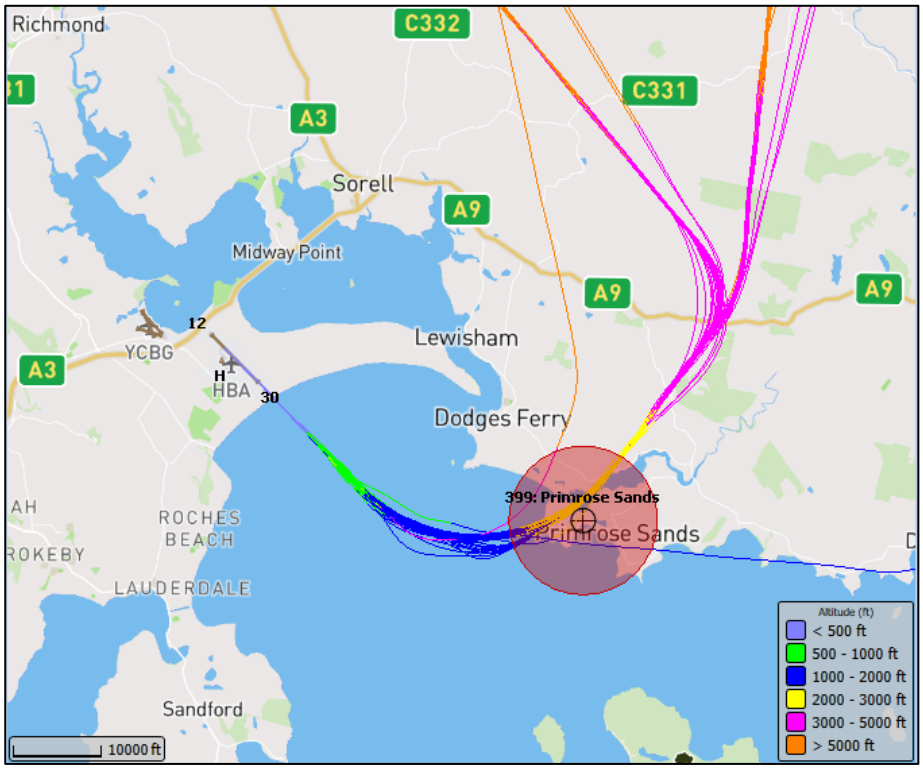

Figure 2: One week of Hobart Airport flight tracks passing through the correlation zone

The findings obtained during the short-term deployment at Primrose Sands are as follows:

- Arrival runway 30 accounts for 98.3% of the operations from Hobart Airport over the noise monitor.
- Departure runway 12 accounts for 0.8% of the operations from Hobart Airport over the noise monitor.
- The average LaMax and highest LaMax for arrival and departure runways are detailed in Table 3, below.

Operation Type	Runway	Average LaMax noise dB(A)	Highest LaMax dB(A)
Hobart Airport Arrival	30	69.3	84.7
Hobart Airport Departure	12	62.4	66.6

Table 3: Average LaMax and highest LaMax noise levels corresponding to each runway.

3.2. Daily Distribution of Correlated Noise Events

A summary of the total number of correlated noise events by time of day, and the minimum to maximum number of CNE on any day, are summarized below in Table 4.

Correlated Noise Event (CNE)	Day Time Count (6:00am-10:00pm)	Night-time Count (10:00pm-6:00am)	Min number of CNE per day	Max number of CNE per day
N- Above[3] 50 dB(A) (N50+[4])	1449	4	1	18
N- Above 60 dB(A) (N60+[4])	1435	4	1	17
N- Above 70 dB(A) (N70+[4])	334	0	0	9

Table 4: Total correlated noise events during deployment period by time

Examination of the N-above distribution values in Figure 3 and Figure 4 (below) show that the highest daytime noise levels (N70+) were recorded on 11 June 2024. 76.9% of the maximum noise level generated by aircraft falls within a range of 60dB(A) to 70dB(A), 0.9% of the maximum noise level generated by aircraft is less than 60dB(A) and 22.2% of the maximum noise level generated by aircraft is greater than 70dB(A).

[3] N-above (or Number-above) is defined as the number of noise event with a LaMax above the specified (eg.N50+) value.
[4] N50+, N60+, N70+ are expressed as number of noise events with a LaMax above 50dB(A), 60 dB(A) and 70 dB(A), respectively.

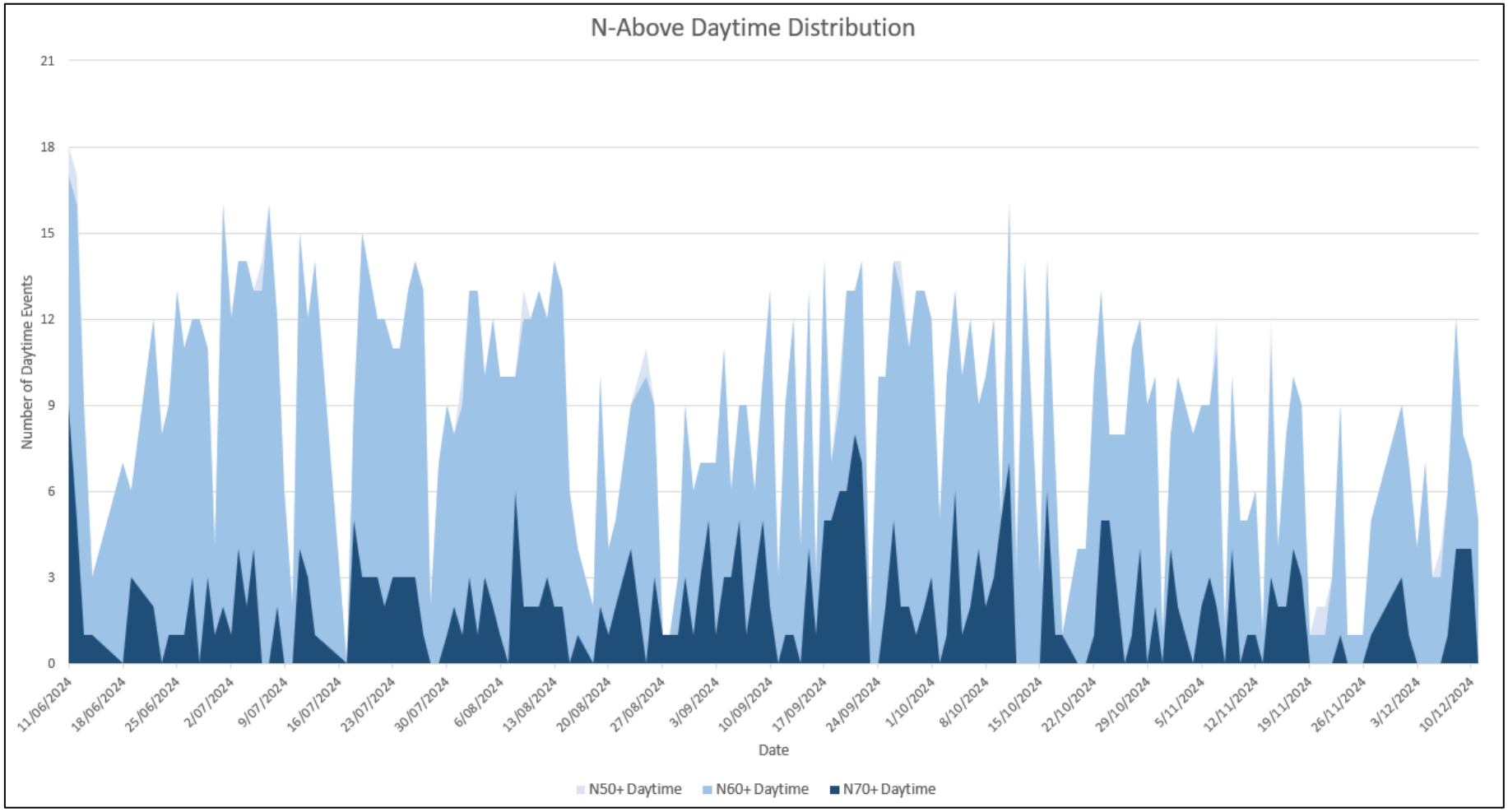

Figure 3: Daytime Daily N-Above Distribution Graph

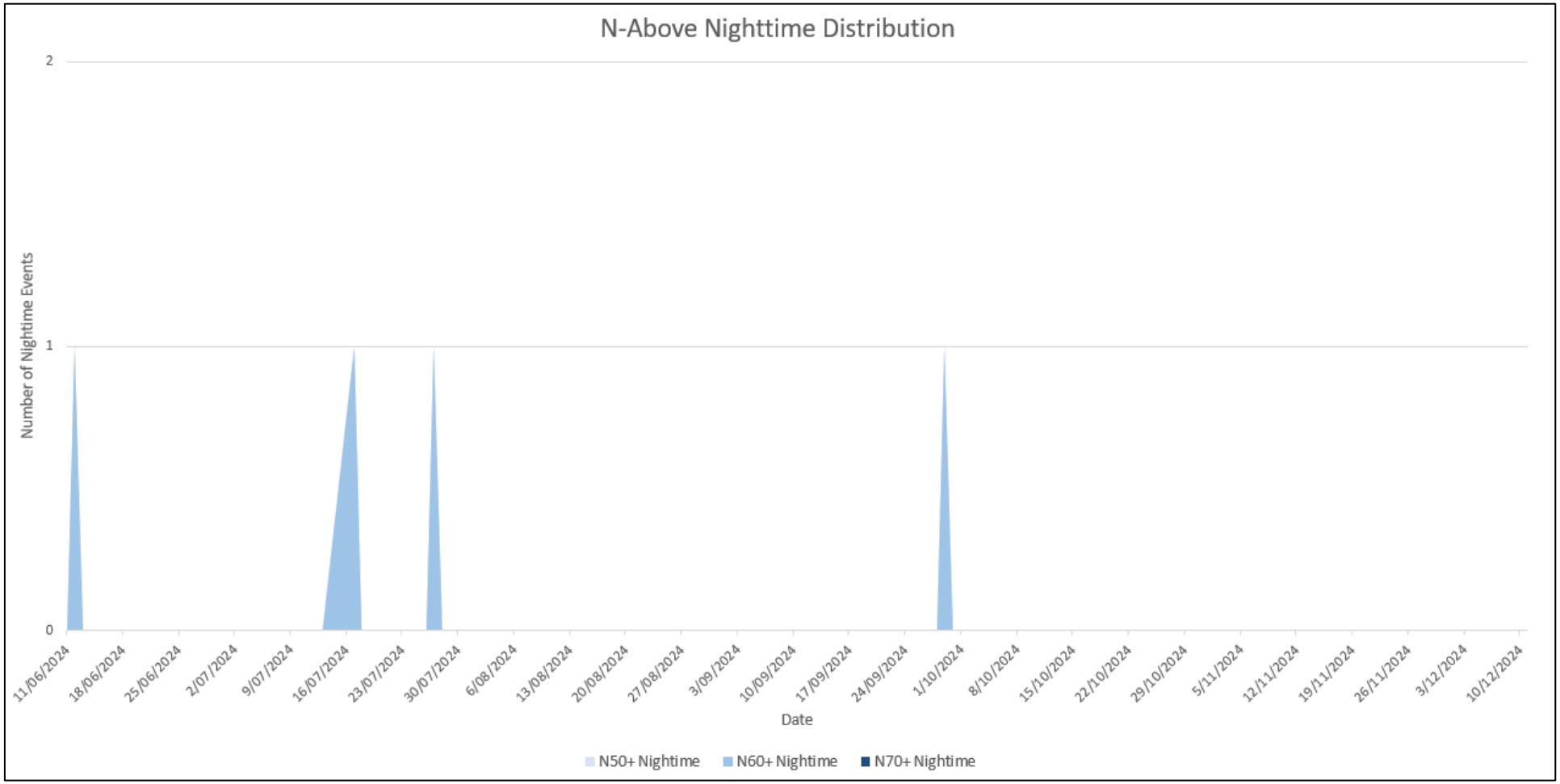

Figure 4: Nighttime Daily N-Above Distribution Graph

3.3. Most Common Aircraft

The most common aircraft type that flew through the zone during the deployment period is a B738 aircraft as shown in Table 5, below.

Hobart Airport Operation Type	Operations	Correlated %
Arrival	832	93%
Departure	2	50%
Touch and Go	0	0%
Overflight	0	0%

Table 5: B738 correlation percentage across the deployment period

3.4. Top 10 Correlated Aircraft

The following table shows the top 10 average and maximum noise levels of correlated noise events (CNEs) for the deployment period from 11 June 2024 to 12 December 2024. The highest average LaMax of 70 dB(A) is attributed to BCS3 jet arriving to runway 30, shown in Table 6.

Aircraft Type	Aircraft Category	Airport Code	Operation Type	Runway	Total CNE	Average LaMax dB(A)	Max[5] dB(A)
B738	J	YMHB	A	30	826	69.8	84.7
A320	J	YMHB	A	30	375	68.8	77.8
BCS3	J	YMHB	A	30	58	70	83.5
SF34	T	YMHB	A	30	47	67.2	73.5
B712	J	YMHB	A	30	44	67.6	72.8
E190	J	YMHB	A	30	34	68.8	72.2
BE20	T	YMHB	A	30	22	63.9	66.8
A21N	J	YMHB	A	30	20	67.8	72
A321	J	YMHB	A	30	18	68.7	74.8
BE20	T	YMHB	D	12	10	61.4	64

Table 6: Top 10 aircraft in the deployment period by total CNE

Aircraft Category: *J = Jets, T = Turboprop.* ***Operation Type:*** *D = Departure, A = Arrival*

[5] Correlated noise events contaminated by community noise have not been uncorrelated, so it remains possible that the maximum dB value should be lower, as the Maximum Lmax value in the table may be caused by community noise rather than the aircraft. Examples shown in Figure 5.

3.5. Noise Event Analysis

The audio verification process involved listening to and confirming the accuracy of the top 20 loudest (LaMax) noise events.

Table 7 outlines the top 10 noise events from all sources. The maximum noise levels (LaMax) of the noise events for this deployment originated from community sources such as people, rain, birds, sirens and vehicle noise.

Table 8 outlines the top 10 correlated noise events (that is, correlated with aircraft noise). The maximum noise levels (LaMax) of correlated noise events for this deployment originated from other nearby local airport movements (Overflights) as well as Hobart Airport movements.

Some correlated noise events were associated with community sources in addition to aircraft. This can be seen in the 'noise source' details in Table 8 and Figure 5. Consequently, there may be a benefit in conducting further noise monitoring in this location to explore and confirm the spectrum of noise levels attributed to aircraft, with the exclusion of any impact from community noise contamination.

Future aircraft noise monitoring in the Primrose Sands area can achieve greater precision by:

- Choosing a location further away from the main road to minimise contamination of the aircraft noise events from the community.

Start Date/Time	Correlated to Aircraft?	LaMax dB(A)	Noise Source	Aircraft Type[6]	Operation Type	Runway
22/08/2024 14:22	No	116.5	People talking	-	-	-
22/08/2024 14:22	No	110.8	People talking	-	-	-
01/09/2024 12:52	No	102.8	Birds	-	-	-
27/11/2024 10:19	No	99.0	Sirens	-	-	-
17/07/2024 15:54	No	98.5	Birds	-	-	-
21/09/2024 16:04	No	93.4	Motorbike	-	-	-
27/11/2024 10:26	No	93.4	Sirens	-	-	-
21/09/2024 10:16	No	91.5	Motorbike	-	-	-
14/09/2024 13:08	No	90.8	Rain	-	-	-
04/08/2024 9:13	No	90.7	Motorbike	-	-	-

Table 7: Top 10 loudest noise events during the deployment period by LaMax

[6] Dash (-) indicates the details are not publicly available.

Start Date/Time	Movement Airport[7]	LaMax dB(A)	Noise Source	Aircraft Type[8]	Operation Type[9]	Runway
27/08/2024 12:00	Hobart	84.7	Aircraft and birds	B738	A	30
28/09/2024 11:18	Hobart	83.5	Aircraft and motorbike	BCS3	A	30
09/11/2024 13:44	Overflight	80.6	Aircraft (Heli) and motorbike	B06	O	-
25/10/2024 08:28	Overflight	80.2	Aircraft (Heli)	B412	O	-
13/09/2024 17:41	Hobart	78.3	Aircraft	PC21	A	30
11/07/2024 08:20	Hobart	77.8	Aircraft and birds	A320	A	30
18/09/2024 09:51	Hobart	77.4	Aircraft	B738	A	30
30/10/2024 16:53	Overflight	77.2	Aircraft (Heli)	B412	O	-
19/09/2024 12:24	Hobart	77.2	Aircraft and wind	B738	A	30
21/08/2024 11:44	Hobart	76.7	Aircraft and birds	B738	A	30

Table 8: Top 10 loudest aircraft correlated noise events during the deployment period by LaMax

[7] Overflights refers to movements from Hobart Cambridge and Edinburgh Airports etc.
[8] Dash (-) indicates the details are not publicly available
[9] Operation types A = Arrival, D = Departure, O = Overflight, T = Touch and Go

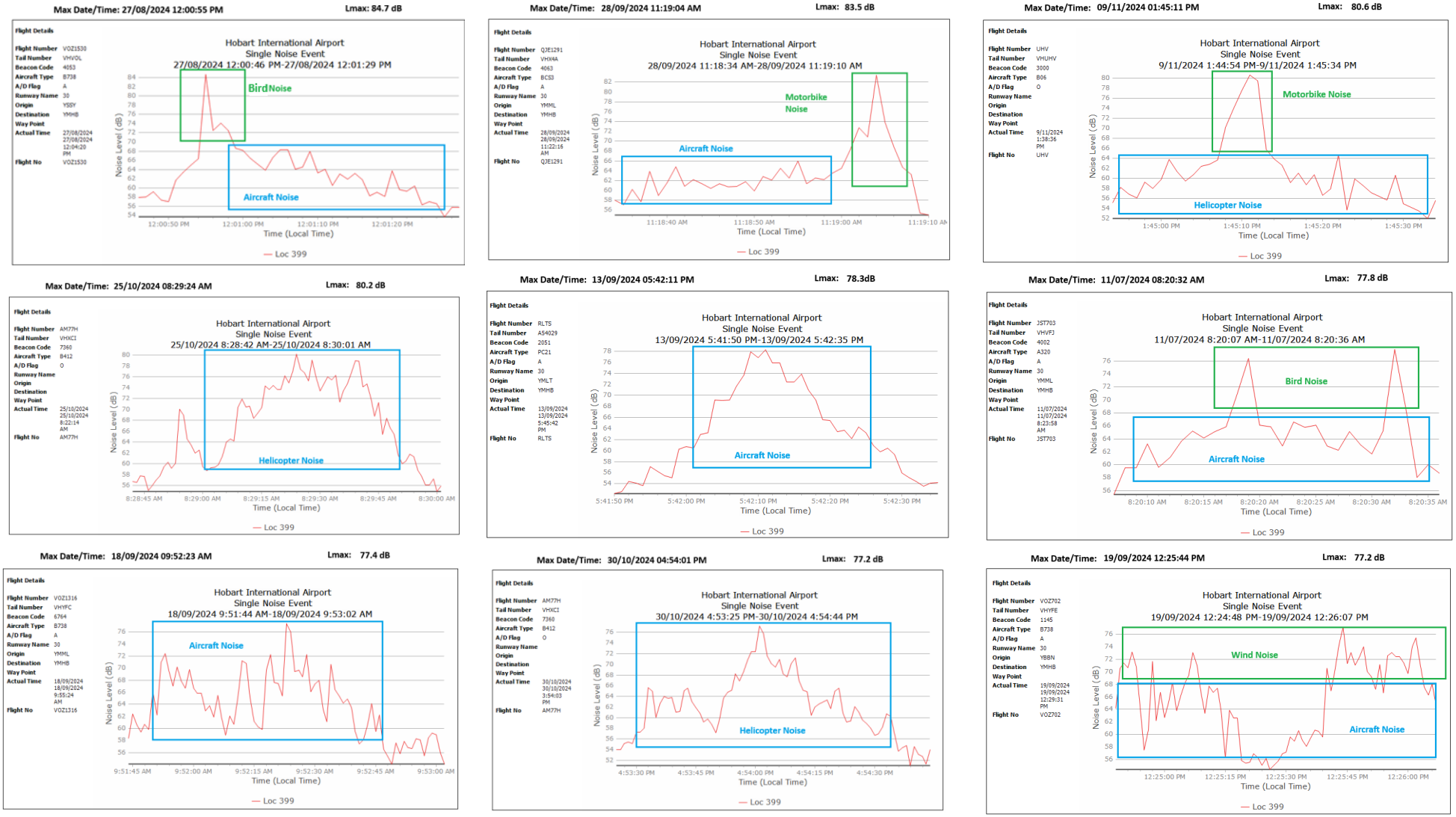

Figure 5: Top 9 correlated noise event from Table 8 graphed and analysed.

4 Busiest Day Analysis

4.1. Discussion

The busiest day during the deployment period occurred on 11 June 2024, with a total of 486 noise events. The noise events consisted of jet, turboprop, bird and wind noise. There were 17 aircraft captured passing through the zone from Hobart Airport movements, of which 16 aircraft were from the focus group. The predominant movement over the capture zone was from jet operations (94%).

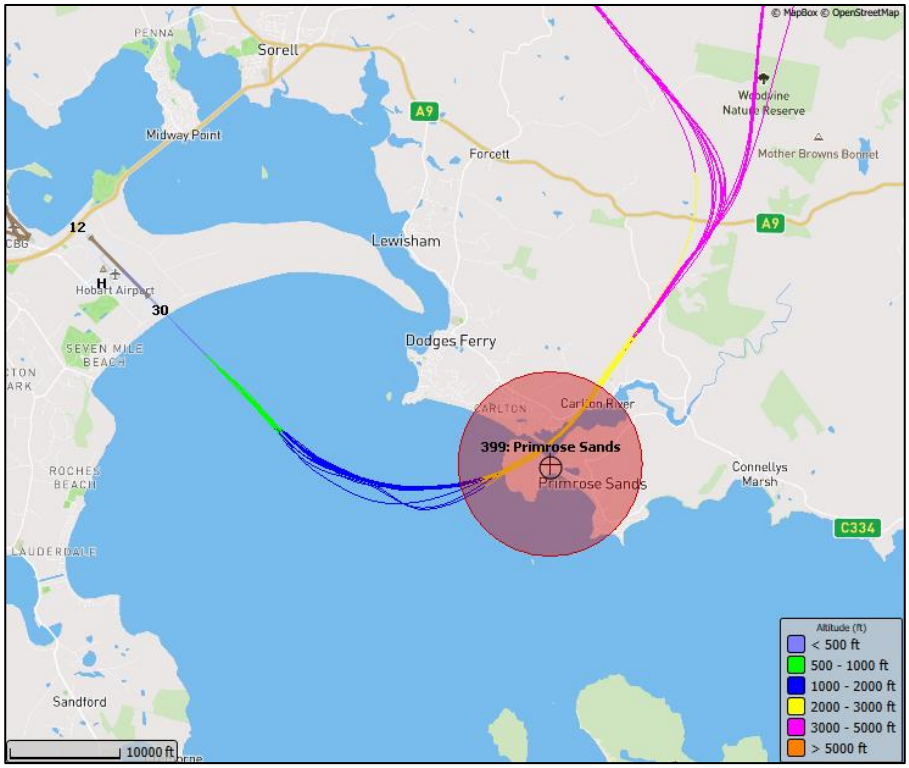

Figure 6: Busiest day flight tracks

4.2. Busiest Day Graph

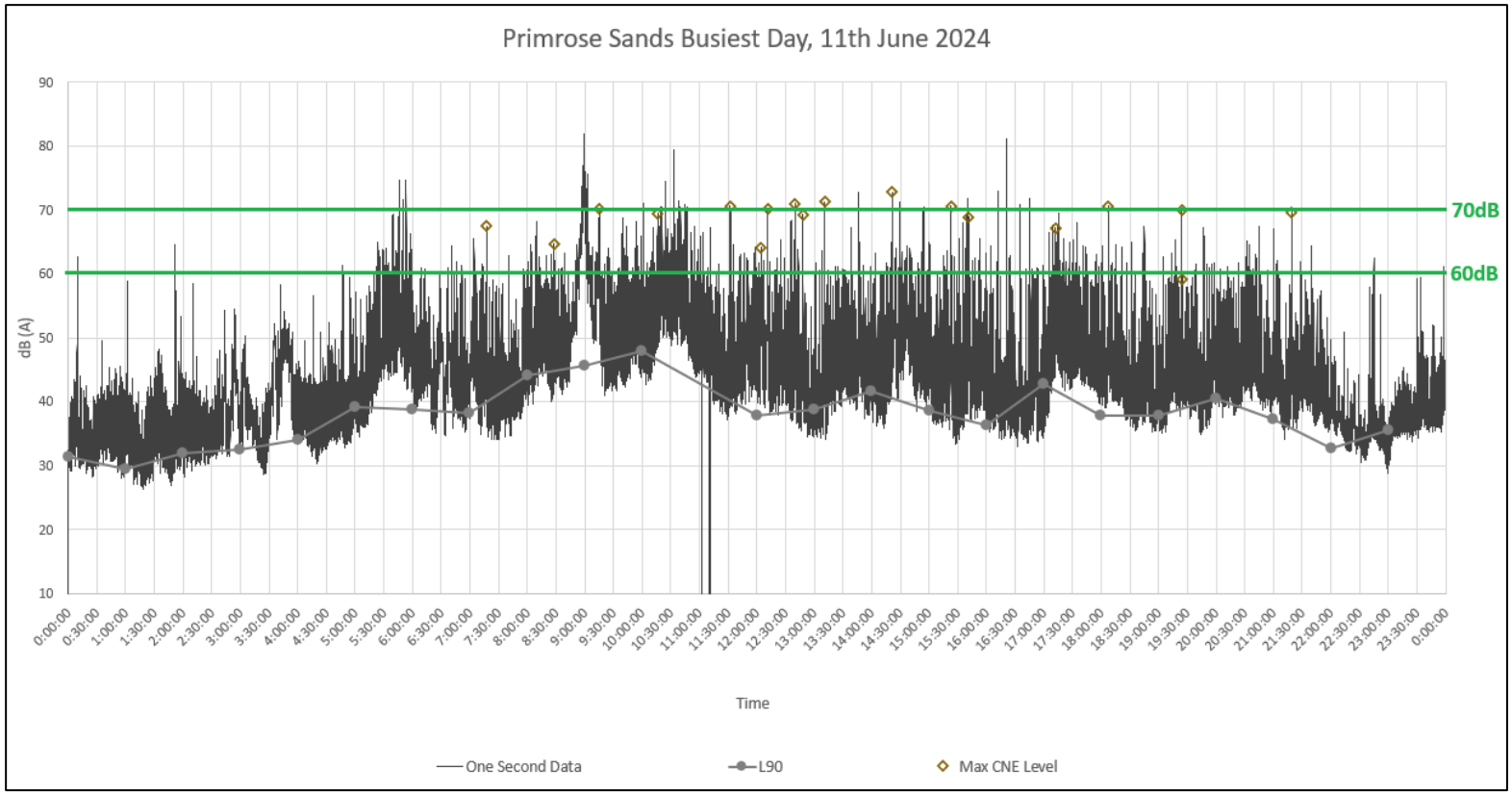

Figure 7: Distributions of hourly L90, max CNE level and one-second noise data on the busiest day. Hourly L90 refers to background noise levels; see Section 6.1.1 for more information. Max CNE level refers to the maximum noise level of the noise event, known as LaMax, which occurs when the aircraft is within the capture zone of the noise monitor; see Section 6.1.2 for more information. One-second noise data refers to the sound levels that are recorded every second by the noise monitor.

4.3. Busiest Day Noise Levels

The loudest event on the 11 June 2024, reaching a maximum noise level of 72.9(A) at 08:59:33 in the morning, lasting for 80 seconds. This audio event is not present in order to determine the type of community noise.

5 Further Information

The following platforms provide further information on Hobart aircraft noise monitoring.

5.1. Airservices Australia

Information on the noise and flight path monitoring system including approach to noise monitoring and frequently asked questions:
https://www.airservicesaustralia.com/community/environment/aircraft-noise/monitoring-aircraft-noise/

5.2. WebTrak

Aircraft noise data is displayed from live noise monitors across Hobart, along with historical data:
https://webtrak.emsbk.com/hba3

6 Appendix

6.1. Noise Event Detection Details:

ISO 20906 provided technical guidance in this short-term noise monitoring. The NMT (i.e., sound level monitor) used for testing passed the Class 1 periodic calibration tests outlined in clauses of IEC 61672-3:2013 and IEC 61260-3:2016. The placement of NMT considered the vicinity of reflective surfaces and the height of the NMT relative to the target aircraft operations to minimise potential unintended anomalies. The NMT height is fixed on a supporting pole and the captured noise events were observed acceptable throughout the deployment. The background noise levels were taken into account in the monitoring area, to appropriately capture aircraft noise levels.

6.1.1. Threshold Settings

Noise monitor threshold settings are established by collecting hourly average L90 data over a period of two to five days following installation of the noise monitor. L90 represents noise level which are exceeded 90% of the time. It is considered the background noise level of an environment. For instance, if the L90 hourly noise level reads 50dB(A), it means that for 90% of that hour, the noise level is above 50dB(A). The threshold is set close to the average L90+10dB(A). The addition of 10dB(A) effectively filters out most community noise, such as birds and animal sounds, machinery, and vehicle noises. As a result, the created noise event will predominantly contain aircraft noise with minimal community noise.

6.1.2. Aircraft and Noise Event Correlation

The correlation of a noise event with an aircraft requires meeting the following conditions:

- The aircraft passes through the defined capture zone set by the monitor as shown in Figure 1.
- The rise and fall time of the measured event matches a sound pattern representative of an aircraft flyover.
- Noise levels are greater than the specified threshold for a specified period when aircraft flies over, this creates a noise event.
- Maximum noise level of the noise event known as LaMax must occur while the aircraft is within the capture zone of the noise monitor.

Aircraft that flew within the vicinity of the monitor but did not trigger a correlated noise event may have failed to meet some of the parameters above. In other instances, this could be attributed to the lack of air traffic control data (ATC). This occurs when aircraft do not have an operating transponder or when there are radar outages. Despite a noise event being created by the aircraft, without available ATC data, there will be no aircraft to correlate with the noise event.

6.2. Calibration Check

The integrity of the noise monitor relies on regularly verifying the accuracy of the microphone recording levels and time synchronisation of samples with radar data. The microphones are replaced with laboratory certified microphones every 12 months and electrostatic calibration tests are automatically performed daily to ensure data quality.