Springbank Airport

Community Noise Study

October 2019

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EXECUTIVE SUMMARY

Springbank Airport (YBW) is a regional reliever airport for YYC Calgary International Airport (YYC). YBW supports general aviation activities, such as private and commercial light aircraft operations, pilot training, charter services and recreational flying. In the coming years, a projected growth in air traffic—in particular, traffic associated with pilot training—combined with expanding residential development in areas around the airport may increase the need to monitor noise impacts to communities close to YBW.

The Calgary Airport Authority (the Authority) operates both YBW and YYC, and is committed to being a good neighbour. The Authority conducted a community noise study in 2018 to establish a baseline for current noise levels in areas around YBW.

Aircraft and community noise levels were monitored at five sites between August and October 2018, for approximately one week at each site. The noise monitoring terminal measured noise levels at each location, and where applicable, correlated noise events with aircraft operations.

Noise Study Results:

The results indicated that average daily noise levels from aircraft were lower than average community noise levels at all noise monitoring sites. As expected, aircraft noise levels decreased at sites located further away from the airport runways.

Community noise levels were similar at all monitoring locations except one, where community noise was higher due to construction activity. Aircraft movements occurred mainly during the hours of 9:00 am – 9:00 pm, with very few nighttime flights. The study showed that average daily aircraft noise levels increased with a rise in air traffic volume, and were impacted less by the specific type of aircraft flown. Weather conditions heavily influenced air traffic, as traffic declined considerably during poor visibility conditions.

DEFINITIONS/ACRONYMS

dB	Decibel
dBA	A-weighted decibel (scaled to the human range of hearing)
Hz	Hertz
LAeq	Equivalent Sound Level
LAmax	Maximum noise level
LAmin	Minimum noise level
NMT	Noise Monitoring Terminal
YBW	Springbank Airport

1. INTRODUCTION

Springbank Airport (YBW) is a regional reliever airport for YYC Calgary International Airport, and is located approximately 10 km west of Calgary. YBW is Alberta's second-busiest airport in terms of aircraft movements, and the sixth-busiest aerodrome in Canada. It provides a base for both private and commercial light aircraft operations, including pilot training, charter services and recreational flying for both fixed-wing aircraft and helicopters.

In 2014, development began at the community of Harmony in areas adjacent to YBW. The population of Harmony is expected to reach approximately 10,000 when it is completed, which will significantly increase the number of local residents who experience aircraft overflights.

In 2018, YBW saw 137,019 aircraft movements, which represents 56 per cent of the airport's current infrastructure capacity. Air traffic is forecast to rise at YBW over the coming years, in particular because of an expected growth in pilot training, driven by the demand for new pilots.

The projected growth in the local population combined with the anticipated rise in air activity may increase the need to monitor noise in the communities in and around YBW. This report presents the results of a noise monitoring study conducted by The Calgary Airport Authority in 2018, which establishes a baseline of aircraft and community noise levels for local communities. It also provides an update to the previous YBW noise monitoring study, which was conducted in 2009.

Figure 1. Map of Springbank Airport.

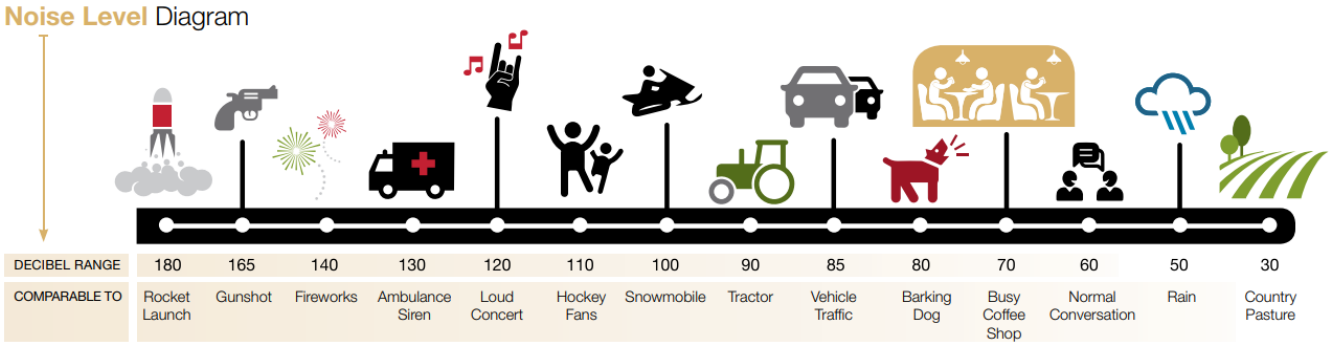
2. BACKGROUND INFORMATION ON NOISE

2.1 How Noise from Different Sources is Measured and Compared

The level of noise experienced at a given location may vary over time and come from many sources, one of which is aircraft operations. A Noise Monitoring Terminal (NMT) will measure noise and separate aircraft noise from community noise using the following parameters:

- Decibel (dB): This is the most basic noise measurement, which expresses the loudness of noise at any given instant.
- A-weighted decibel (dBA): This unit of noise measurement is scaled to the human range of hearing. **Figure 2** below illustrates the range of human hearing in dBA using examples of noise generated by various activities.
- LAeq: This is the average noise level in dBA over a period of time. In order to compare the loudness of different sounds accurately, it is necessary to also consider the duration of noise. For instance, aircraft noise may rise and fall from 60 dBA to 80 dBA and last 16 seconds, while a dog bark may be 80 dBA, but only last 2 seconds. LAeq measures both the duration of a noise, as well as its loudness.
- LAmax: This is the maximum intensity level of a given noise event. LAmax measures the maximum noise level heard (usually in dBA) during a single aircraft noise event. While the duration of an aircraft noise event near an airport generally lasts from 15 to 50 seconds, the LAmax will typically last only a few seconds.

Figure 2. Decibel Scale and Sound Level References.



2.2 Factors Influencing Noise Propagation

Noise and its propagation can be influenced by atmospheric conditions such as wind and humidity levels, as well as the topographical features of a given land area. Noise propagation did not form part of this study.

Wind carries sound waves, and lower levels of relative humidity increase sound propagation. Temperature inversion and altitudinal changes in wind conditions can refract sound waves to a location a considerable distance away from the noise source. Conversely, atmospheric conditions can also attenuate sound over a distance.

Topographic features and structural barriers that absorb, reflect, or scatter sound waves can impact noise levels. Echoes off topographical features or buildings can sometimes result in higher sound levels than normally expected.

3. METHODOLOGY

3.1 Ambient Noise Monitoring Approach

The noise monitoring program was conducted in the vicinity of YBW between August 15 and October 18, 2018. The NMT was positioned in five different locations, for one week at a time at each location, in the following order:

1. Range Road 33
2. Munro Road
3. The community of Harmony
4. Rocky Range View
5. Lariat Loop

Four of the monitoring locations were on residential properties. The exception was Harmony, where the NMT was positioned on a community wastewater treatment plant.

At each location, data was collected continuously over eight days (the first and last days of the monitoring period were only partial days).

The NMT was a Larson Davis Hand-held Analyzer 831C (see Figure 3), consisting of a microphone with a windscreen connected to a sound level meter. The NMT was positioned on the ground in a waterproof protective case. A solar panel at ground level provided electrical power to the monitoring system. Prior to deployment at each site, the NMT's microphone was calibrated to ensure data accuracy. Sound data was sampled once per second throughout the duration of each monitoring period.

Figure 3. Larson Davis Hand-held Analyzer 831C.

3.2 Data Processing

Raw data from each location was downloaded remotely every night and processed through EnvironmentalVue software (Harris Inc.). Data processing involved correlating noise event recorded by the NMT with aircraft flight information from NAVCANADA, to determine whether a noise event was caused by an aircraft operation or another source in the community.

3.3 Noise Monitoring Locations

Figure 4 illustrates the five monitoring locations:

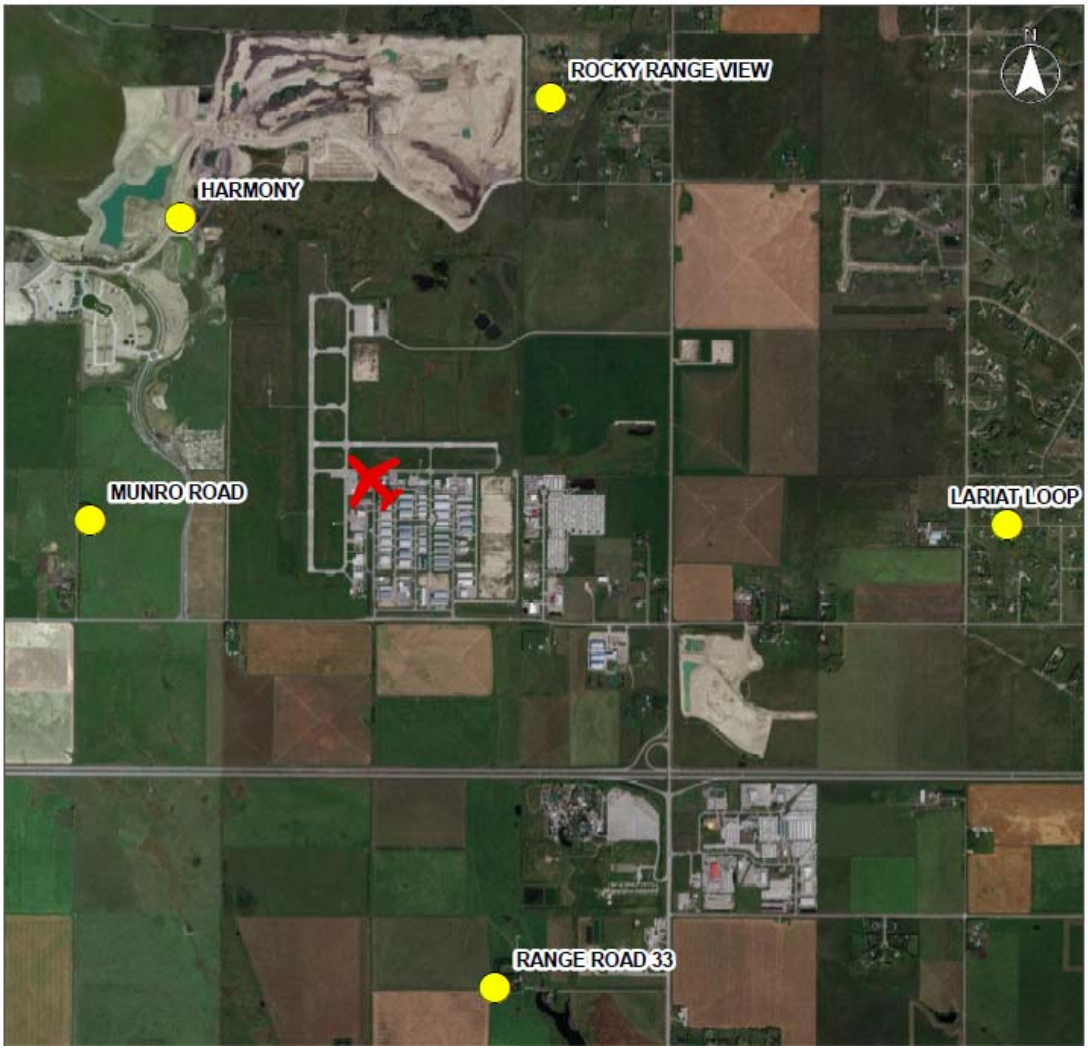


Figure 4. YBW Noise Monitoring Locations.

Table 1 lists the start and end dates for noise monitoring at each NMT location:

Table 1. Noise Monitoring Locations and Measurement Periods.

Monitoring Location	Site ID	Start Date (2018)	End Date (2018)
Range Road 33	YBW3	August 15	August 22
Munro Road	YBW4	September 5	September 12
Harmony	YBW5	September 12	September 19
Rocky Range View	YBW6	September 19	September 26
Lariat Loop	YBW2	October 10	October 18

4. RESULTS AND DISCUSSION

4.1 Comparison of Community and Aircraft Noise Levels

The sections below summarize the data collected at each noise monitoring location. Each section includes the following information:

a) **Noise levels:** the daily (24-hour) equivalent noise levels (LAeq) from aircraft compared with general community noise

b) **Aircraft movements:** the corresponding number of daily aircraft movements, differentiated by aircraft type; and

c) **Weather conditions:** the prevailing daily weather conditions, which influence the number of aircraft movements.

Noise Levels:

Average daily aircraft noise levels were lower than average daily community noise levels at every NMT location. Average daily aircraft noise levels ranged from 0 to 49 dBA, while community noise levels were generally higher, ranging from 42 to 69 dBA.

At the Munro Road location, the highest average daily aircraft noise level recorded during the week (46 dBA on September 8) did exceed the lowest average daily community noise level recorded during the week (42 dBA on September 9). However, the daily measurement of community noise levels remained consistently higher than the daily measurement of aircraft noise levels throughout the monitoring period.

Community noise at the Lariat Loop location was unusually high on October 11, 2019, with a peak of 69 dBA. A review of the sound recordings from that day revealed that the elevated noise levels were caused by a group of coyotes howling during the night.

The Harmony location experienced higher average community noise levels compared with the other NMT sites, largely because of nearby construction activities.

Apart from these exceptions, community noise levels measured during the study were as anticipated, and representative of a quiet countryside setting like Springbank.

Aircraft movements:

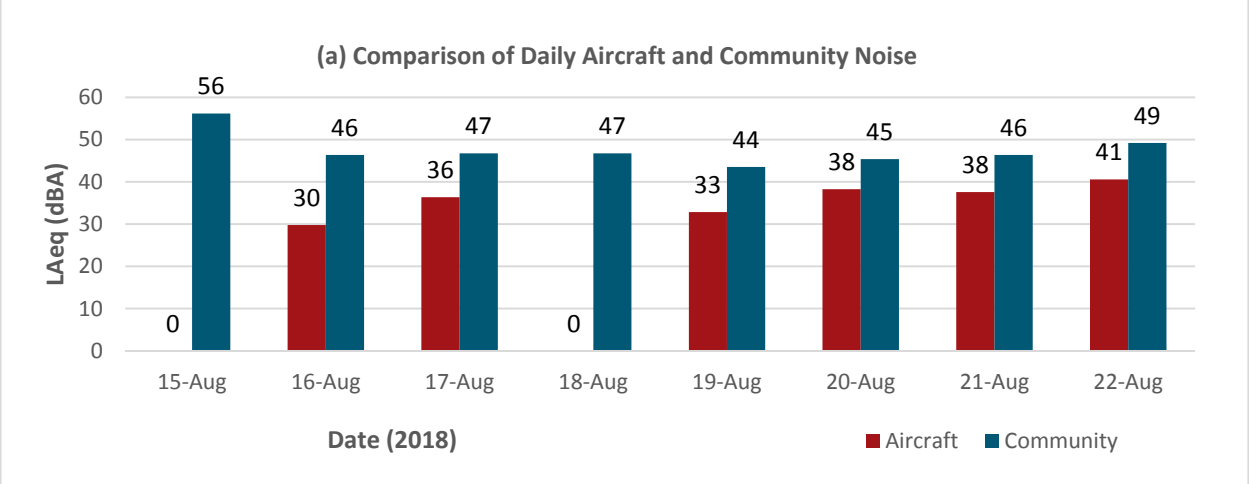
The majority of aircraft movements over the monitoring period were attributed to propeller planes and helicopters. There were relatively few turboprops and even fewer jets. These movements are consistent with the aircraft fleet mix that fly in and out of YBW. Turboprops were detected at Munro Road, Harmony and Lariat Loop, and jets were only recorded at Harmony and Lariat Loop.

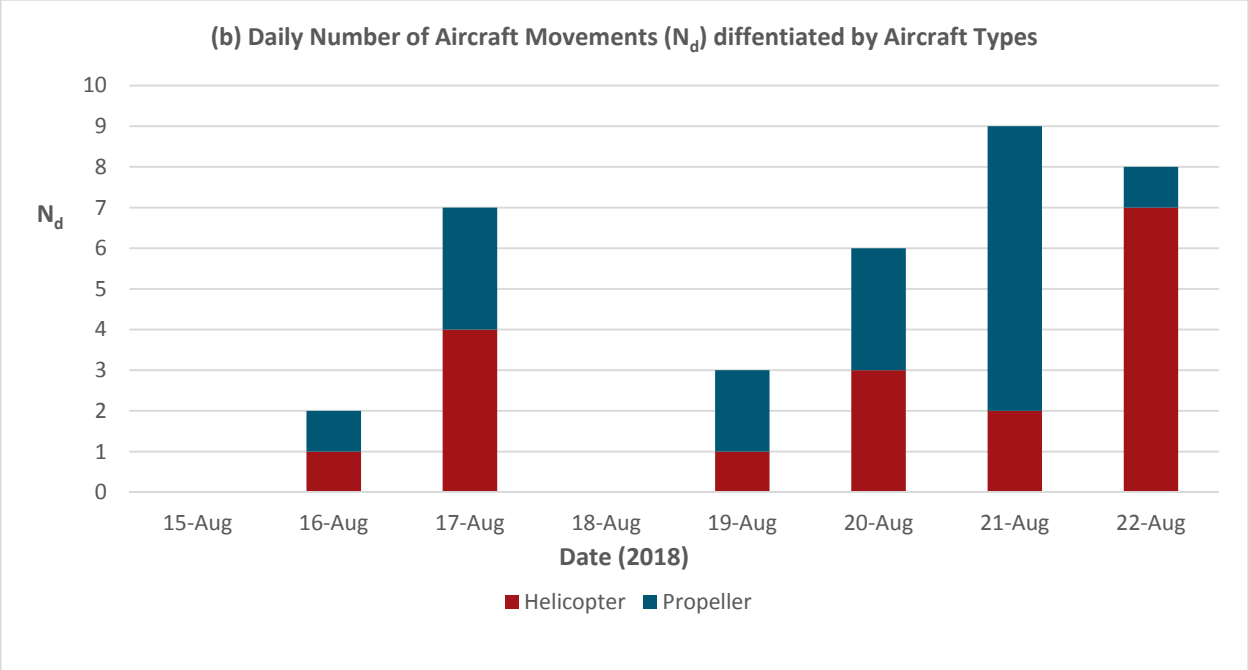
In general, the data suggests that average aircraft noise levels increased with a rise in air traffic volume, and not because of specific aircraft types. Propeller planes and helicopters contributed the most to average noise levels due to their high number of movements, while turboprops and jets contributed less, because there were fewer movements of this type of aircraft.

Weather conditions:

The data showed that weather conditions played a significant role in air operations. YBW has a large number of aircraft movements associated with flight training activity, which does not take place when visibility is reduced. Over the monitoring period, most aircraft movements occurred during warm days with clear skies. There was noticeably less air traffic on cloudy days, and even less on foggy or snowy days. In August, when the noise monitor was located at Range Road 33, the hazy conditions caused by forest fires in British Columbia substantially reduced aviation activities.

Range Road 33



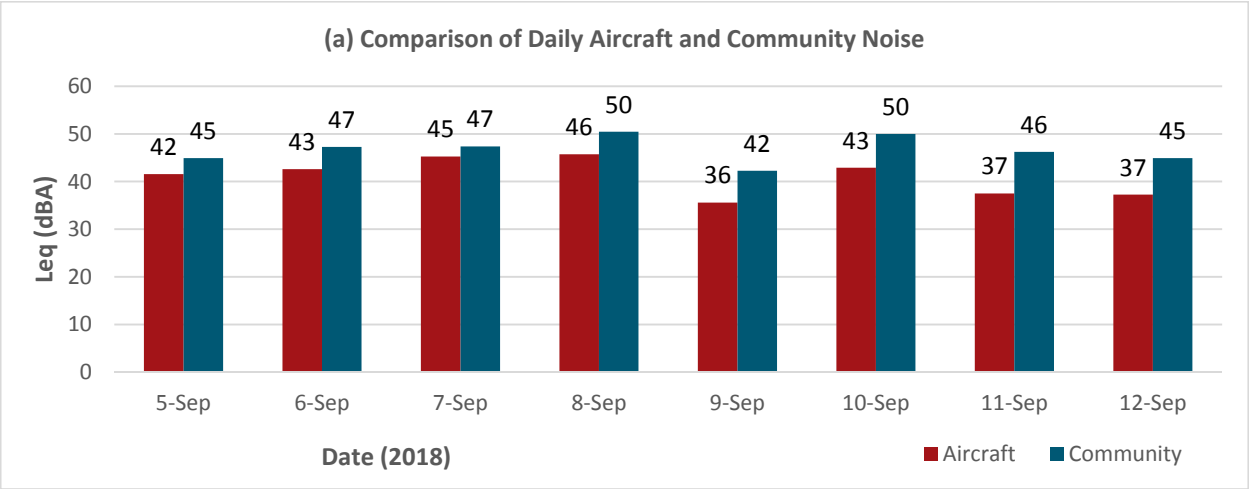


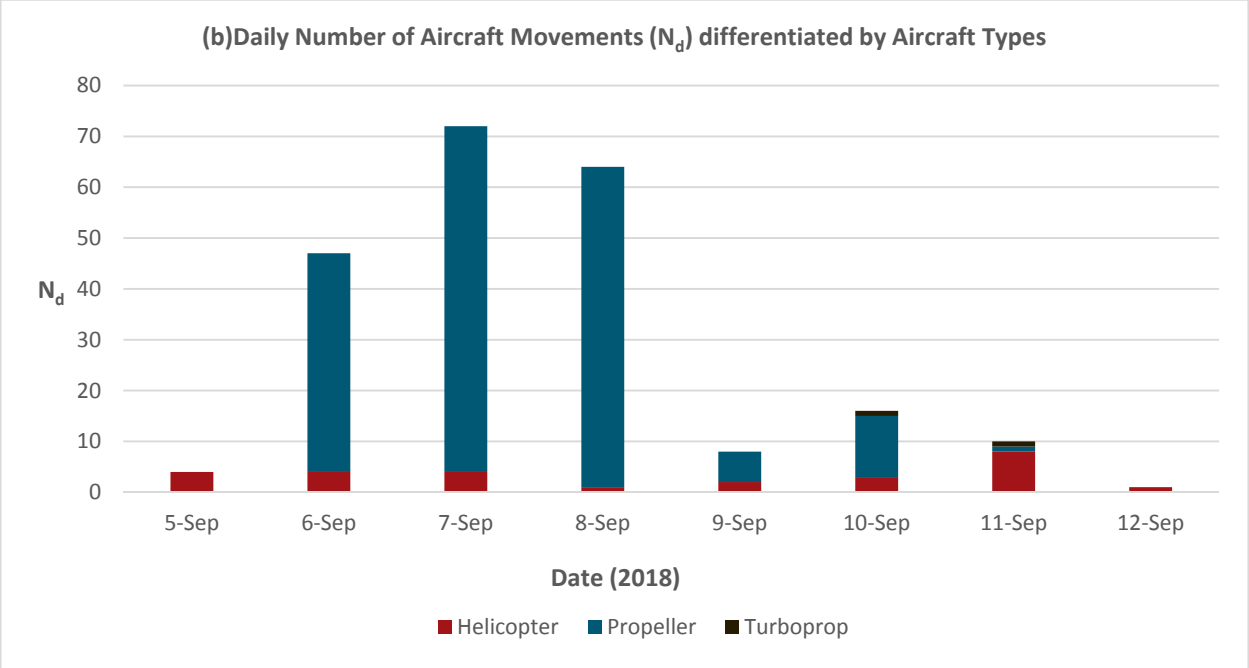
(c) Daily Weather Conditions

Date (2018)	15-Aug	16-Aug	17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug
Mean Temp (°C)	19.6	19.3	20	13.5	11.7	15	16	20.6
Total Precipitation (mm)	0	0	0	0	0	0	0	0
Sky Condition	Smoke	Smoke	Smoke	Smoke	Smoke	Smoke	Smoke	Smoke

Figure 5. Measured Data at Range Road 33.

Munro Road



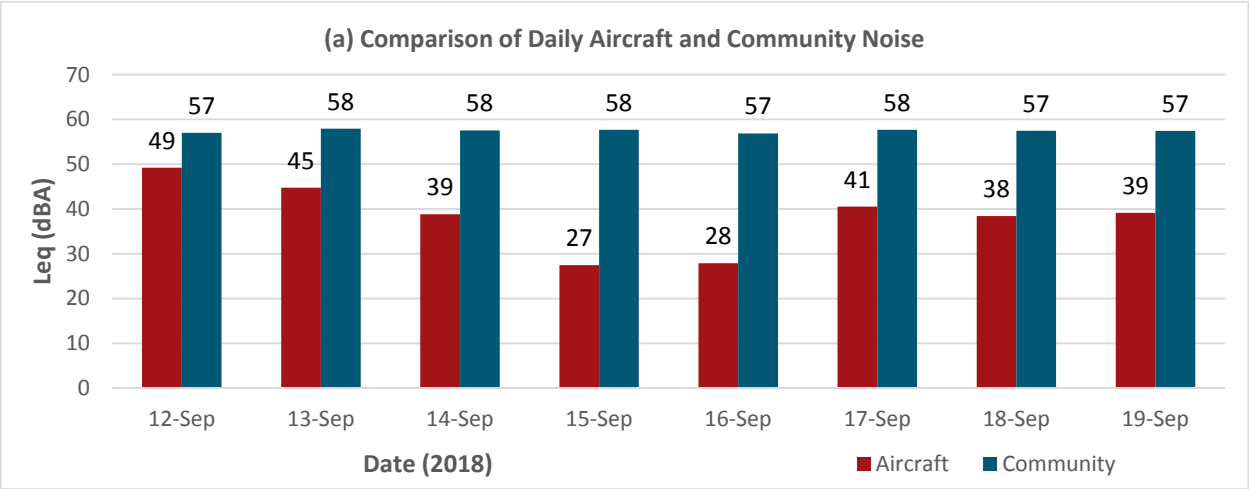


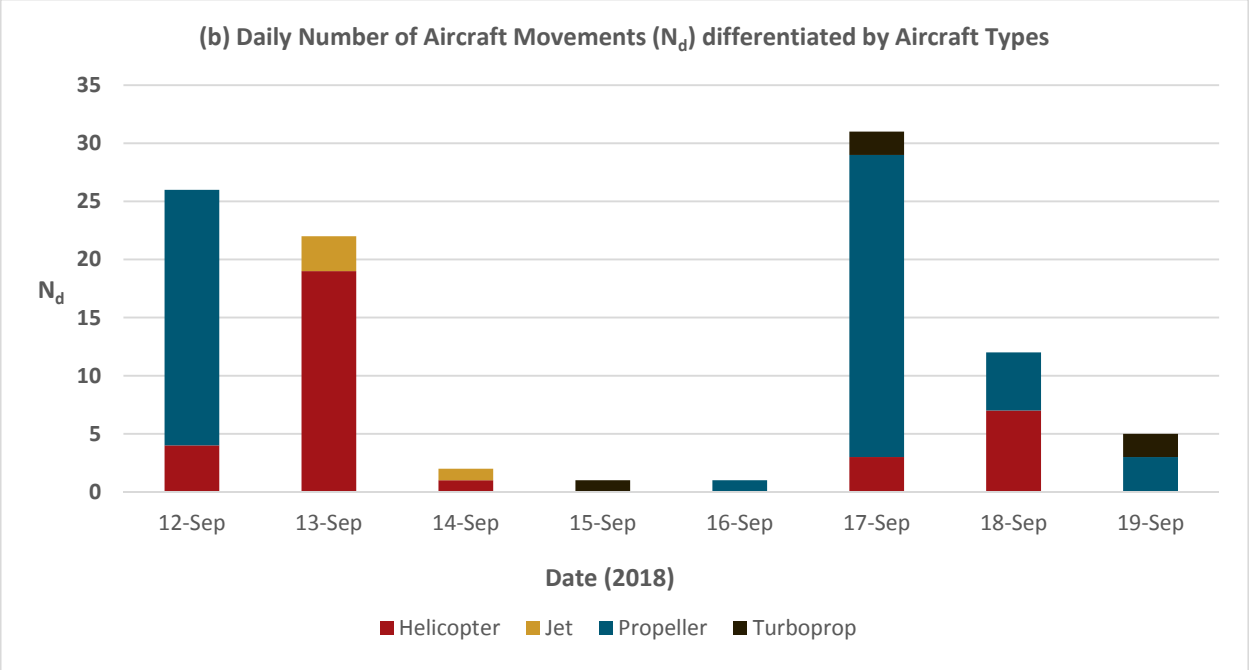
(c) Daily Weather Condition

Date (2018)	5-Sep	6-Sep	7-Sep	8-Sep	9-Sep	10-Sep	11-Sep	12-Sep
Mean Temp (°C)	12	14.5	17.7	16.3	13	11.6	10.8	4.2
Total Precipitation (mm)	0	0	0	0	Trace	5.4	0.8	0
Sky Condition	Clear	Clear	Clear	Cloudy/Clear	Cloudy	Cloudy with showers	Cloudy with showers	Cloudy

Figure 6. Measured Data at Munro Road.

Harmony



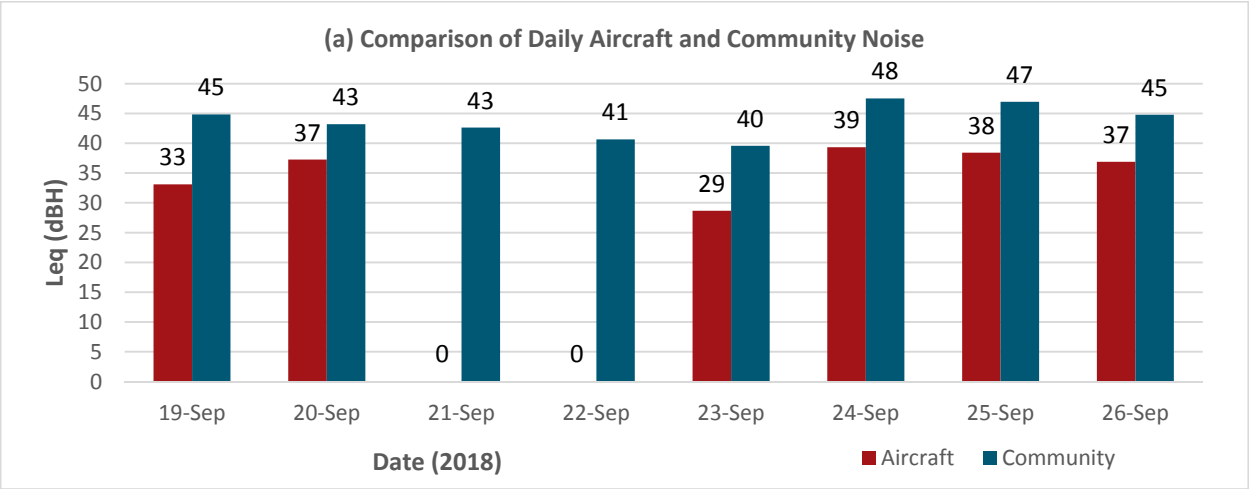


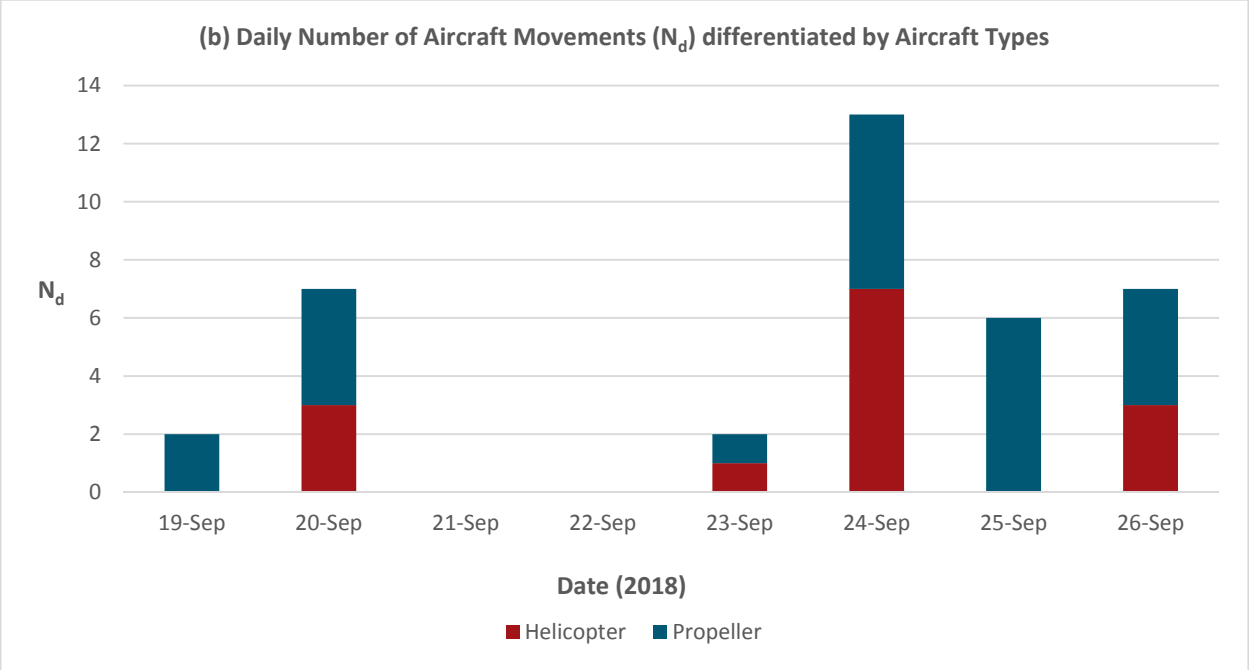
(c) Daily Weather Condition

Date (2018)	12-Sep	13-Sep	14-Sep	15-Sep	16-Sep	17-Sep	18-Sep	19-Sep
Mean Temp (°C)	4.2	0.3	1.1	3.5	2.6	6.9	4.8	7.4
Total Precipitation (mm)	0	0.2	0.2	0.6	1	0.8	0.4	0.6
Weather Condition	Cloudy	Snow grains/ Cloudy	Freezing Drizzle, Fog	Drizzle, Fog	Drizzle, fog	Clear	Fog/ Haze	Mostly Cloudy/ Haze

Figure 7. Measured Data at Harmony.

Rocky Range View



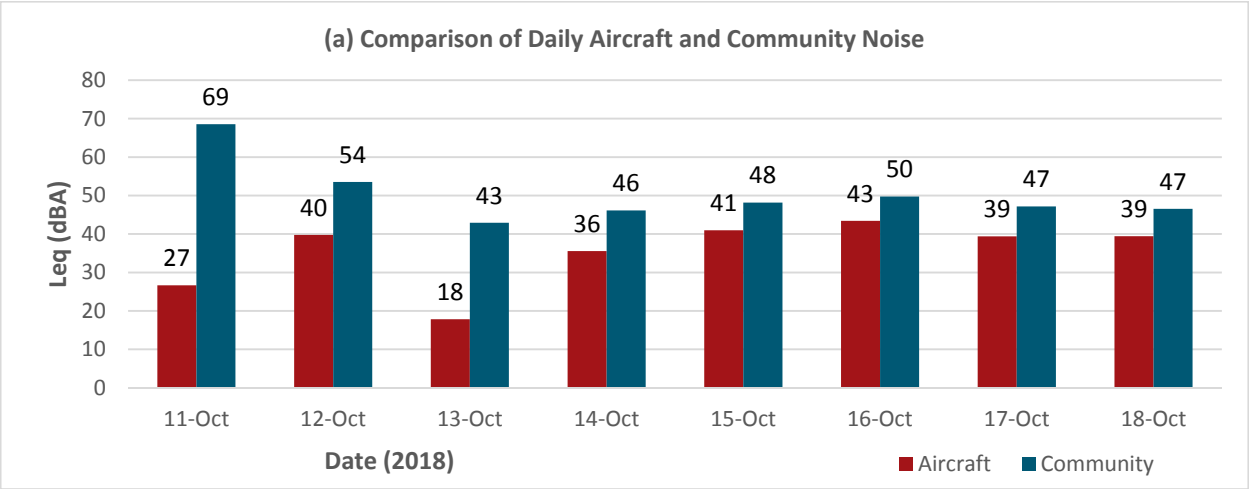


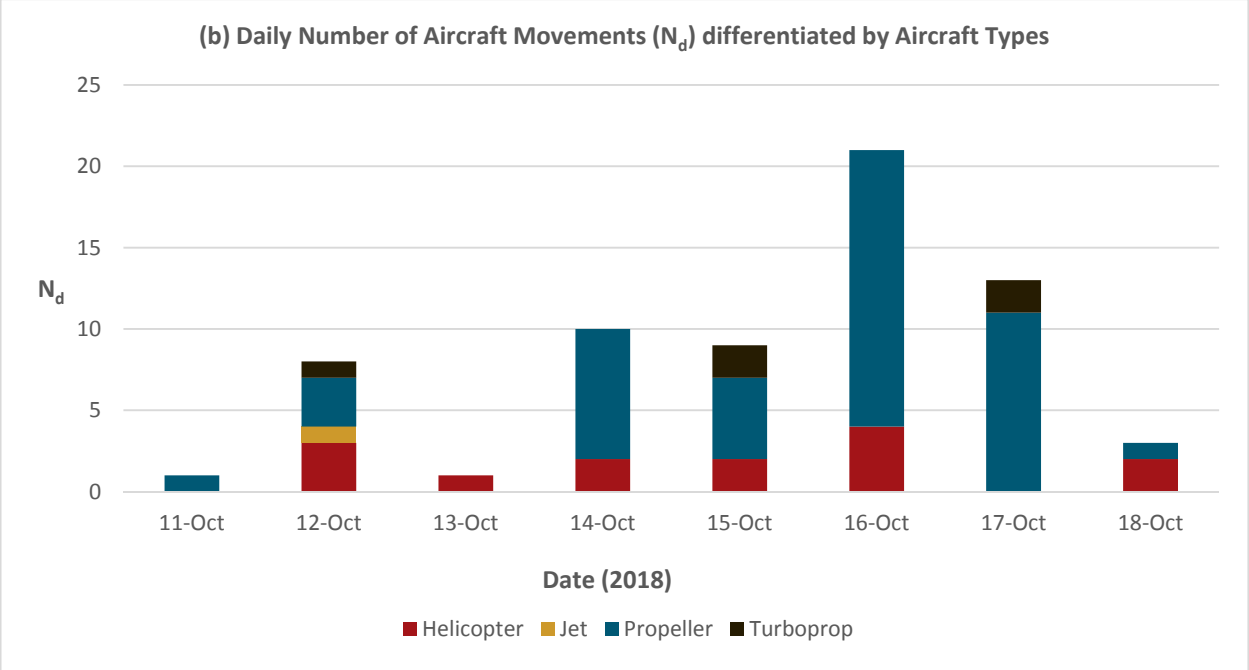
(c) Daily Weather Condition

Date (2018)	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep
Mean Temp (°C)	7.4	5.1	2.8	0.2	3.3	8.8	10.5	10.3
Total Precipitation (mm)	0.6	0	4.2	1.4	0.8	1.8	Trace	1.6
Sky Condition	Fog/Cloudy	Fog	Drizzle, Fog	Freezing Drizzle, Fog	Fog	Mainly Cloudy	Mainly Cloudy	Cloudy

Figure 8. Measured Data at Rocky Range View.

Lariat Loop





(c) Daily Weather Condition

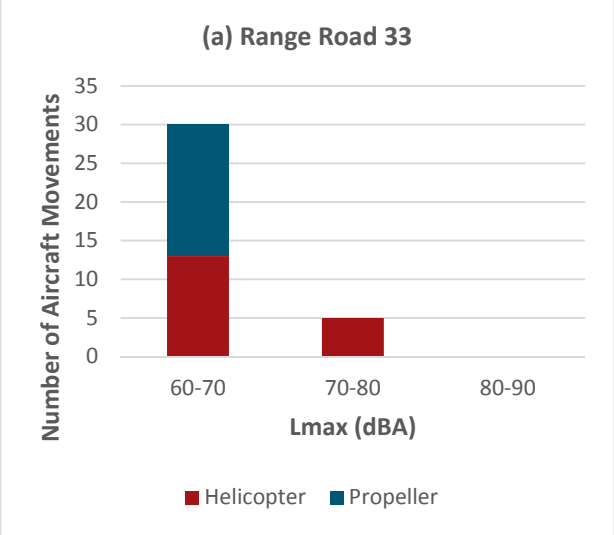
Date (2018)	11-Oct	12-Oct	13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct
Mean Temp (°C)	1.4	6.9	-1	3.4	10.1	10.5	11.7	10.4
Total Precipitation (mm)	Trace	9.8	0.2	0	0	0	0	0
Sky Condition	Mostly cloudy	Cloudy with showers	Snow	Mostly Cloudy	Mostly Cloudy	Clear	Clear	Cloudy

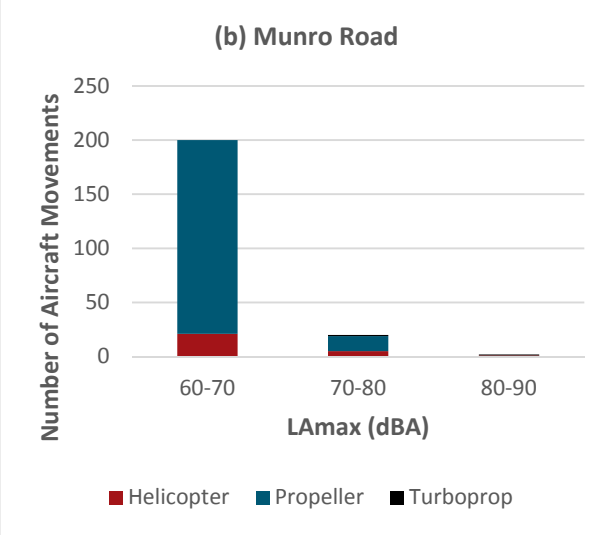
Figure 9. Measured Data at Lariat Loop.

4.2 Aircraft Noise Events

Figure 10 summarizes the volume of aircraft movements and the associated maximum noise levels (LAmax) at each of the five monitoring locations. Maximum noise levels seldom exceeded 70 dBA, and even more rarely, 80 dBA—the level at which aircraft noise can potentially be heard indoors.

The majority of aircraft movements were associated with propeller aircraft and helicopters, both of which emitted maximum noise levels in the range of 60 to 70 dBA. There were relatively few movements by turboprop aircraft, which usually created noise levels in the range of 70 to 80 dBA. There were even fewer jet events, which usually produced noise levels in the range of 80-90 dBA.





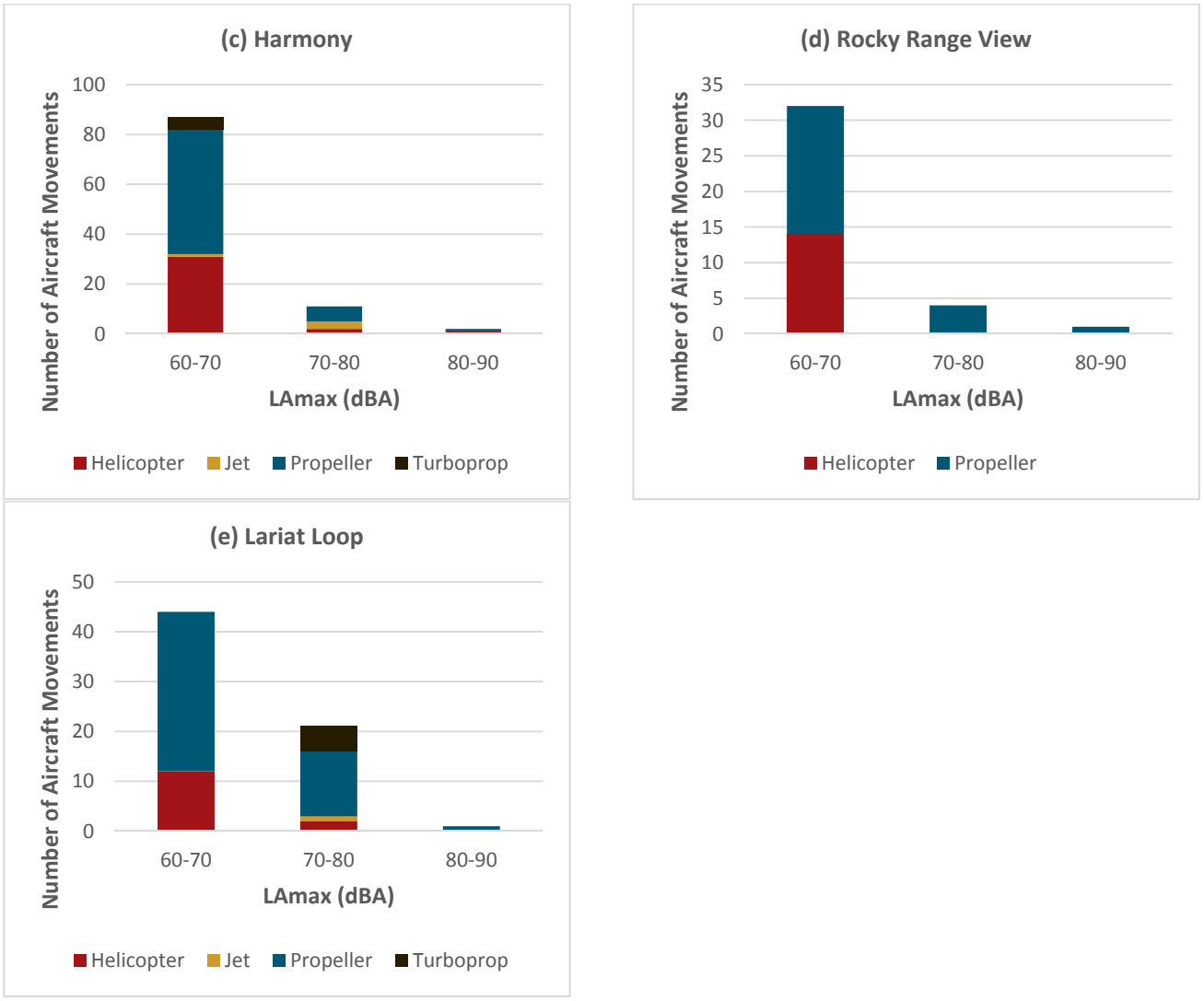


Figure 10. Aircraft Noise Events Classified by Maximum Noise Levels (LAmax).

4.3 Hourly Aircraft Movements

Aircraft movement data from all monitoring sites was combined and analyzed by hour to illustrate the time of day at which the sites experienced the highest number of overflights (Figure 11). For instance, the hour at which the most overflights were recorded at the Munro Road site was 10:00 - 11:00 am. Air traffic mainly occurred during daytime and evening hours, between 9:00 am and 9:00 pm. There were only three overnight movements recorded during the entire study period.

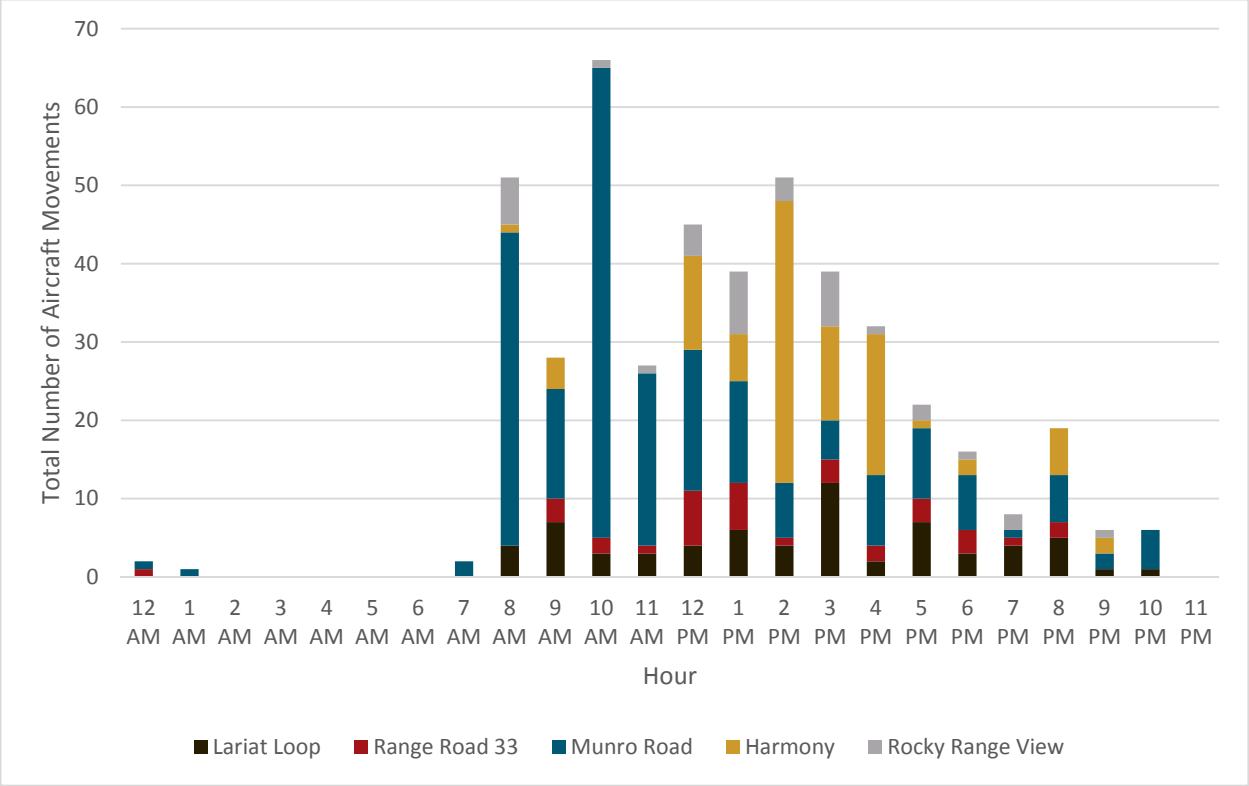


Figure 11. All Aircraft Movements over Monitoring Periods Separated by Hour and Site Location.

5. CONCLUSION

This study monitored ambient aircraft and community noise levels in five locations surrounding Springbank Airport in an effort to better understand current conditions in neighbouring communities.

The results of the study suggest that while all sites experienced aircraft overflights, average daily aircraft noise levels did not exceed daily community noise levels. However, some monitoring sites did experience more aircraft noise than others. For example, the sites at Munro Road and Harmony recorded louder aircraft noise than the Range Road 33 and Lariat Loop sites. As expected, aircraft noise decreased with distance from the airport runways.

In general, the number of aircraft movements over a monitoring site was a stronger indicator of aircraft noise than the type of aircraft flown, even though certain aircraft emit louder noise than others. The majority of air traffic occurred during the day, with very little activity between the hours of 11:00 pm and 6:00 am.

Air traffic was also heavily influenced by weather conditions. Aircraft movements tend to be lower on days with cloudy, foggy or snowy conditions. The ab initio flight training at YBW requires visual flight rules (VFR), and cannot be conducted during low visibility and nighttime hours.

This study provides a baseline for future studies that may investigate potential changes in YBW's noise footprint in the coming years. Future noise studies should be undertaken every five years, or more frequently if there are changes in the airport's airspace design or aircraft fleet mix.