

2020 AERONAUTICAL NOISE MANAGEMENT REPORT

-VANCOUVER AIRPORT AUTHORITY-

EXECUTIVE SUMMARY

In 2020, the aviation industry was significantly impacted by the COVID-19 pandemic. Globally, passenger traffic dropped by 60%, and Canadian airlines reported a 71% reduction in passenger numbers from 2019.

At YVR, both aircraft movements and number of passengers declined substantially compared to 2019, by 52% and 72% respectively. The number of night operations and engine run-ups also decreased. Due to the reduction in aircraft traffic over the Lower Mainland, fewer aircraft-related noise events were measured at the 21 noise monitoring sites located in the surrounding communities compared to the previous year.

Despite the significant reduction in air traffic over the Lower Mainland, the Airport Authority still received noise concerns related to YVR aircraft operations. In 2020, a total of 2,808 concerns were registered by 107 individuals. This represents a 10% increase in the number of concerns but a 55% decrease in the number of individuals compared to 2019. Approximately 92% of the total concerns were received from three individuals, with one individual submitting 86% of the total concerns.

Although 2020 was a different year, the Airport Authority continued with its effort to manage noise from aircraft and airport operations. Highlights of noise management activities included:

- Shifting meetings of the Aeronautical Noise Management Committee to a virtual forum during the pandemic to continue to support the community-industry dialogue essential to issue identification and collaboration.
- Advancing the project submission for upgrading the noise monitoring terminal hardware and expanding the monitoring network;
- Supporting NAV CANADA on the Vancouver Airspace Modernization Project;
- Participating in the Canadian Airports Council Noise Working Group to exchange information and discuss local and national noise issues; and,
- Presenting the annual YVR Fly Quiet Awards to continue to raise awareness of noise issues in the aviation community.

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INTRODUCTION

Vancouver Airport Authority (“Airport Authority”) is a community based and financially independent non-government organization, which oversees the daily operations of the Vancouver International Airport (“YVR”) to ensure the airport runs safely and efficiently. The Airport Authority took over management of YVR from Transport Canada in 1992 under a long-term lease agreement and is committed to a positive long-term relationship with our surrounding communities and dedicated to operating YVR in a manner that minimizes negative impacts on the environment, while providing 24-hour airport services.

2020 was a significantly challenging year for the aviation industry worldwide due to travel restrictions and reduced demand for air services caused by the COVID-19 pandemic. While the first few months of the year saw relatively little impact from the effects of the pandemic, the decrease in aircraft movements and passenger numbers began in March and continued throughout the year.

While it is expected that the demand for air travel will recover in the coming years, challenges remain that will influence when the recovery starts and the rate at which air traffic levels return. 2021 is also forecasted to be another challenging year for air travel globally and at YVR.

Despite the decrease in air traffic, the Airport Authority remains committed to managing the impacts of aircraft and airport operations and uses a sustainability framework in its approach to noise management. This strategy integrates the economic, environmental, social and governance aspects of our business, and is essential to our success and provides a balanced approach for our business objectives and our commitment to the local community.

The objective of this report is to share information about activities of the YVR Aeronautical Noise Management Program, and to facilitate informed dialogue between stakeholders involved in managing aircraft noise. This report summarizes progress on noise management initiatives and includes data on aircraft operations and noise concerns received. Given the unique and significant decline in air traffic experienced in 2020, a comparison to 2019 data is given where possible to provide context to the level of reduced activity at the airport.

2020 NOISE MANAGEMENT ACTIVITIES

The Airport Authority has a comprehensive noise management program to manage noise from aircraft and airport operations while balancing the need of 24-hour airport access in the region. Annual work plans are guided by a broad set of initiatives contained in the YVR Noise Management Plan. This Plan is updated every five-years with input from the community and support from the YVR Aeronautical Noise Management Committee (“ANMC”), and the current Plan covers the years 2019-2023.

Despite the reduction in air traffic experienced in 2020, the Airport Authority remains committed to reducing impacts from aircraft and airport operations on the community. Below is a summary of noise management activities over the year.

NOISE MONITORING TERMINAL UPGRADE AND NETWORK EXPANSION PROJECT

To accurately monitor and assess aircraft noise in the region, the Airport Authority maintains a network of Noise Monitoring Terminals (“NMTs”). This network consists of 20 fixed and one portable NMT. The portable NMT was deployed to the Musqueam community in 2018 and is still located and collecting data at this site.

The hardware for the NMTs was installed in 2008, and a multi-year project plan was prepared in 2018 to upgrade the equipment and expand the monitoring network with an additional four NMTs. While budget for this project was approved and work was planned to start in 2020, this project was subsequently deferred along with a number of other airport projects due to the effects of the COVID-19 pandemic.

Throughout 2020, the project team continued to work with the equipment vendor to revise the project submission. The previous project proposal had work phased over a five-year period, whereas the new project proposal has an accelerated schedule with work planned over a two-year time period. The project will move forward in 2021.

NAV CANADA VANCOUVER AIRSPACE MODERNIZATION PROJECT

In May 2019, NAV CANADA¹ announced a major project to modernize the airspace over the Greater Vancouver Region and Southern Vancouver Island. The area affected by this project is

¹ NAV CANADA is a private, not for profit corporation that owns and operates the civil air navigation system (ANS) in Canada. It was established in accordance with the *Civil Air Navigation Services Commercialization Act*, and is

very large and encompasses about ten airports. The objective of this project is to enhance safety, modernize the airspace, and ensure future anticipated growth in air traffic can be accommodated in a safe and sustainable manner.

The project will explore opportunities to optimize a range of facets of the airspace infrastructure and operation, and new procedures introduced as part of this project must conform to national and international standards. These standards often leave very little flexibility on the flight path associated with a new procedure; however, efforts are undertaken to place new flight paths over less populated areas, industrial lands, water, and park lands where possible.

Where possible, the new procedures are also designed to minimize greenhouse gas emission to support efforts by the aviation industry to reduce its environmental impacts and to meet national and international commitments. This is often achieved through the introduction of Performance Based Navigation (PBN) procedures and accommodating continuous descent and climb operations.

While the overall project schedule was adjusted to reflect the impacts of the COVID-19 pandemic, the project remains a high priority for NAV CANADA, and the work continued throughout 2020. In 2020, a project briefing was provided to the YVR Aeronautical Noise Management Committee as well as City staff. The project will also include broader community engagement, and this is tentatively planned to occur in Fall 2021.

The Terms of Reference for the project can be found on the NAV CANADA website (www.navcanada.ca). This document provides a good overview of the project, including the overall scope of the project, background information, and a description of the methodology.

DISCUSSIONS WITH CANADIAN AIRPORTS

The Airport Authority continues to participate in the Canadian Airports Council Noise Working Group, which includes members from many airports in Canada and provides a forum for the exchange of information and discussion of local and national noise issues. Several teleconferences were hosted in 2020.

given the responsibility for maintaining the safe, orderly and efficient flow of air traffic in Canadian airspace. This includes creating air traffic routes and procedures that comply with national and international standards.

AERONAUTICAL NOISE MANAGEMENT COMMITTEE MEETINGS

The Aeronautical Noise Management Committee (ANMC), a key component of the YVR Noise Management Program, provides a forum for discussion and consideration of all aeronautical noise management issues at the airport. The membership includes a wide variety of stakeholders including: citizen representatives and city staff representatives from Richmond, Vancouver, Delta, and Surrey; Musqueam First Nation; airlines; industry associations; NAV CANADA; and, Transport Canada.

Due to the COVID-19 restrictions on in-person gatherings, ANMC meetings were shifted to an online forum to continue to support stakeholder dialogue on noise management activities at the airport. Four ANMC meetings were hosted online in 2020, and all meetings were well attended. Meeting minutes are posted on www.yvr.ca.

YVR FLY QUIET AWARDS

The 2019 YVR Fly Quiet Awards were presented at the annual YVR Chief Pilots Meeting. The goal of these awards is to support best behaviors and raise awareness of noise issues within the aviation community.

The winners included: Central Mountain Air (propeller aircraft category); Jazz Aviation (narrow-body jet aircraft category); and All Nippon Airways (wide-body jet aircraft category). Award winners for the past three years are presented in Table 1.

TABLE 1: YVR Fly Quiet Award Winners, 2017-2019

YEAR	AIRCRAFT CATEGORY		
	Propeller Aircraft	Narrow Body Jet Aircraft	Wide Body Jet Aircraft
2019			
2018			
2017			

IMPACTS OF COVID-19 ON AVIATION

In 2020, global passenger traffic dropped by 60%, from 4.5 billion passengers to 1.8 billion passengers, over the previous year, due to the impacts of COVID-19 on civil aviation world-wide. The decline in air travel demands started in January 2020 but was limited to only a few countries at first. However, as the virus continued its global spread, wide-scale lockdowns, border closures, and travel restrictions were put in place around the world, and air travel activities came to a near halt by the end of March 2020. While passenger traffic saw a moderate rebound in the summer, the upward trend was short-lived with a second wave of infections experienced in many regions.²

The pandemic also hit the Canadian aviation industry harder than any prior disruptions over the decades. In 2020, major Canadian airlines carried a total of 24.7 million passengers, down 71% from the previous year.³

The number of aircraft movements in Canada was also down from 5.9 million in 2019 to 3.8 million in 2020. The steepest declines in aircraft movement were observed at larger passenger hub airports while smaller general aviation (GA) and cargo airports recorded more moderate declines. Toronto Pearson International Airport, historically the busiest Canadian airport, experienced the largest decline in air traffic in 2020, down by 61.5% from 2019. The air traffic level at Montreal Trudeau International Airport was down by 59%.⁴

Similar trends were observed at YVR. The following sections provide the 2020 operational statistics at YVR and comparisons with the 2019 data to illustrate the level of impacts of COVID-19 at the airport.

² <https://www.icao.int/Newsroom/Pages/2020-passenger-totals-drop-60-percent-as-COVID19-assault-on-international-mobility-continues.aspx>

³ <https://www150.statcan.gc.ca/n1/daily-quotidien/210225/dq210225b-eng.htm>

⁴ <https://www150.statcan.gc.ca/n1/daily-quotidien/210225/dq210225c-eng.htm>

YVR OPERATIONS IN REVIEW

In 2020, operations were significantly impacted due to the global impact on the aviation system caused by COVID-19 pandemic travel restrictions and reduced demand for air services. The airport saw a decrease in the number aircraft movements, cargo tonnage, and the total number of passengers compared to 2019. **Table 2** presents the operational statistics for 2020 and 2019 and the year-over-year (YOY) comparison.

TABLE 2: Operational Statistics for YVR

	2019	2020	YOY % Change
Total Aircraft Movements	331,441	157,563	-52%
<i>Runway Movements</i>	<i>289,533</i>	<i>136,277</i>	<i>-53%</i>
<i>Non-Runway Movements</i>	<i>41,908</i>	<i>21,286</i>	<i>-49%</i>
Total Cargo (Tonnes)	304,078	240,514	-21%
Total Passengers	26,379,870	7,300,287	-72%

As shown, aircraft movements in 2020 decreased by 52% compared to 2019. Approximately 7.3 million passengers flew through YVR, representing a 19 million decline in passengers or a 72% decrease over the previous year. Passenger volumes were reduced across the domestic, transborder (US), and international sectors:

- The **Domestic sector** had 4.2 million passengers and was down 66.3% YOY. This sector made up 75.5% of the overall traffic at YVR.
- The **Transborder (US) sector** had 1.3 million passengers and was down 78.9% YOY. The bulk of this travel occurred in the first three months of the year when air travel was largely unrestricted.
- The **International sector** had 1.7 million passengers and was down 76.3% YOY. While passenger declines were due to government restrictions due to the COVID-19 pandemic and poor consumer confidence, there were students, friends and relative traffic heading outbound to Asia and inbound from India.

Figure 1 illustrates the historical trend of annual aircraft movements and passengers at YVR for the period of 1996-2020. The aircraft movements and passenger totals observed in 2020 are the lowest in the 24-year time period.

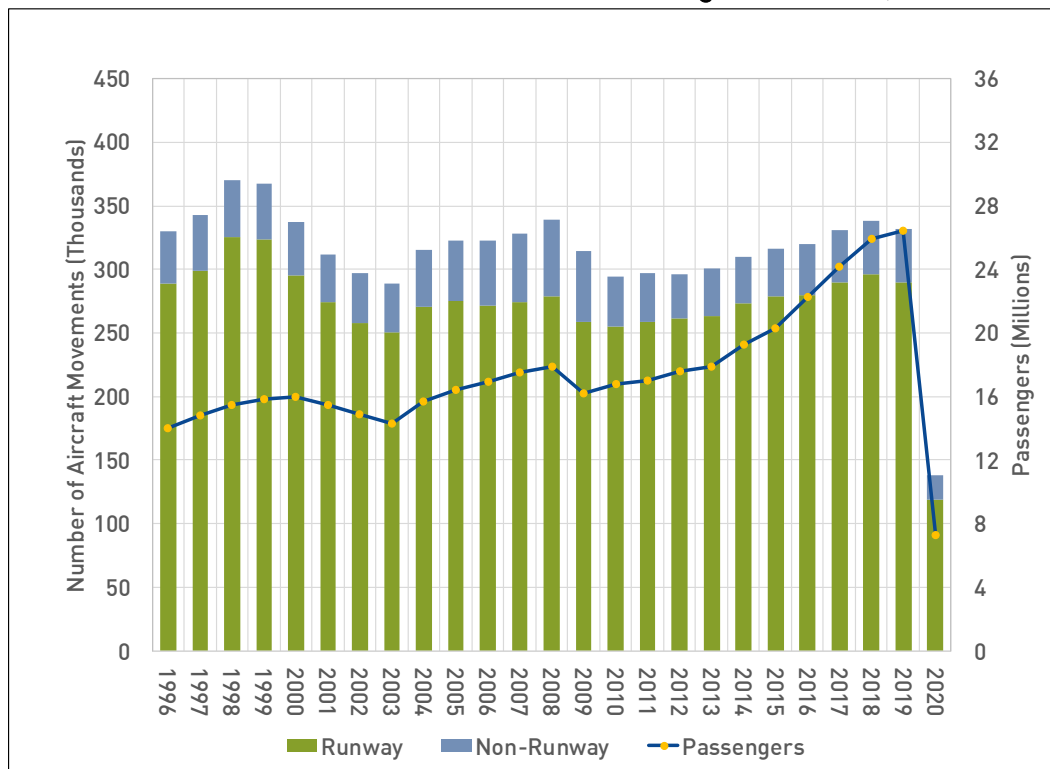
FIGURE 1: Annual Aircraft Movements & Passenger Statistics, 1996-2020⁵

Figure 2 illustrates the monthly number of aircraft movements between 2019 and 2020. The impacts on the reduced demand for air travel began to be experienced in late March 2020 and are reflected by a significant drop in aircraft movements in the following months.

The busiest months for aircraft operations at YVR have historically been July and August. During the months of July 2020 and August 2020, the number of aircraft operations decreased by 64% and 61% respectively compared to the same months in 2019.

Figure 3 illustrates the annual average hourly runway movements in 2020 compared to 2019. While the air traffic volume is seen to change throughout the day, the general trend of having the majority of aircraft movements occur during the daytime period is still observed.

⁵ This chart includes both runway and non-runway movements. Non-runway movements include helicopter and float plane operations.

FIGURE 2: Monthly Aircraft Movements, 2019 vs 2020

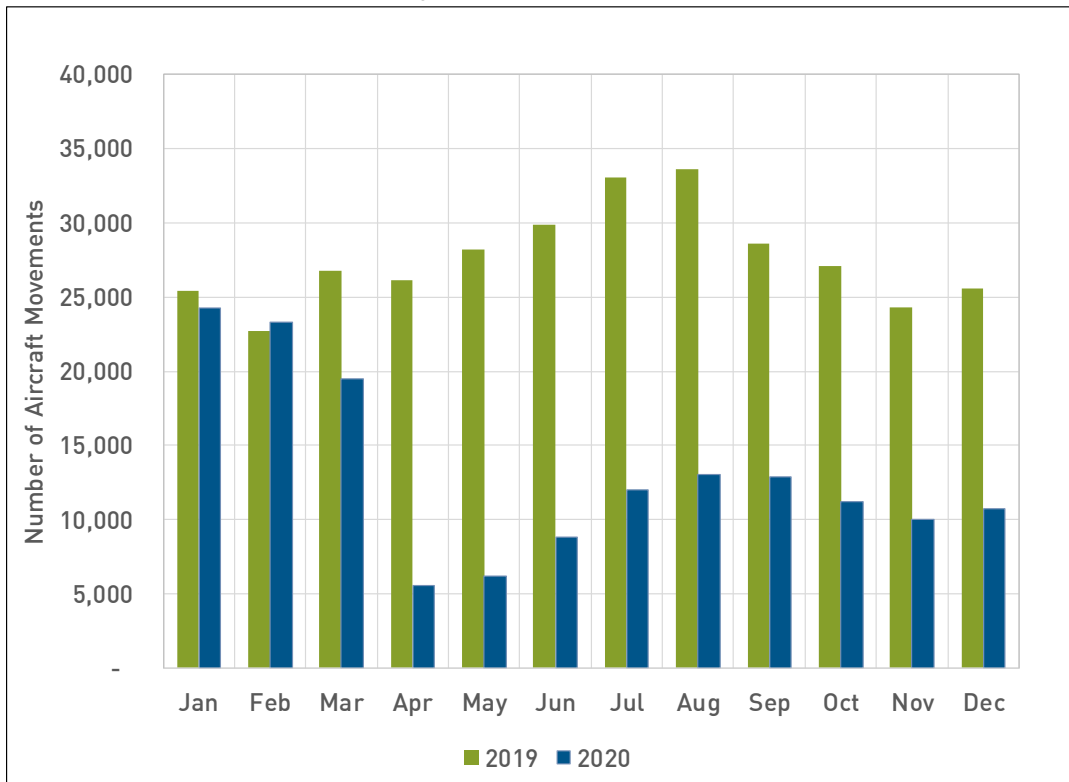
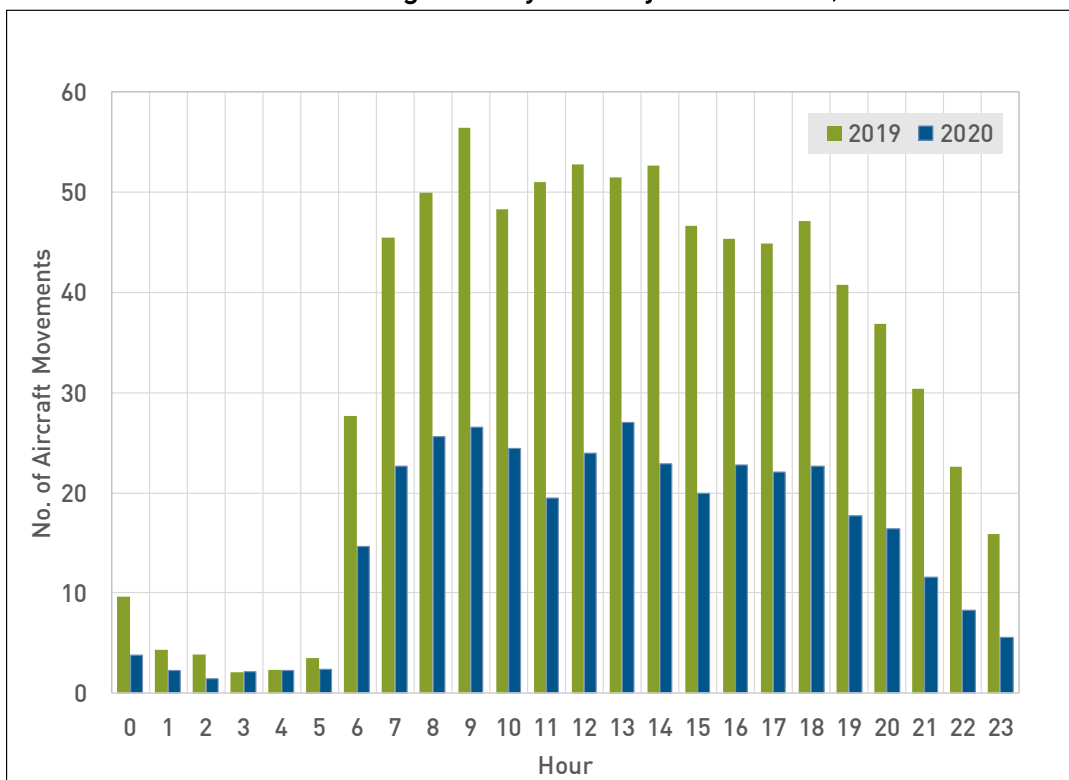


FIGURE 3: Annual Average Hourly Runway Movements, 2019 vs 2020



NIGHT OPERATIONS

Like most international airports around the world and all international airports in Canada, YVR is open 24-hours a day to serve travel and business demands of the region. While movements at night are typically associated with cargo and courier services, there are also several long-haul international passenger flights using large wide body aircraft.

In 2020, there were 5,247 runway movements during the night-time period⁶, representing a 44% decrease compared to 2019 (n=9,385).

- Of these movements, approximately 58% were arrivals, which are generally quieter than departures.
- On average, there were approximately 14 runway movements each night in 2020, this compares to approximately 26 runway movements each night in 2019.

YVR has always been open 24-hours a day, including when the airport was managed by Transport Canada prior to the transfer to the Airport Authority in 1992. For comparative purposes, **Figure 4** illustrates the annual night-time runway movements at YVR for the years 1989 to 2020.

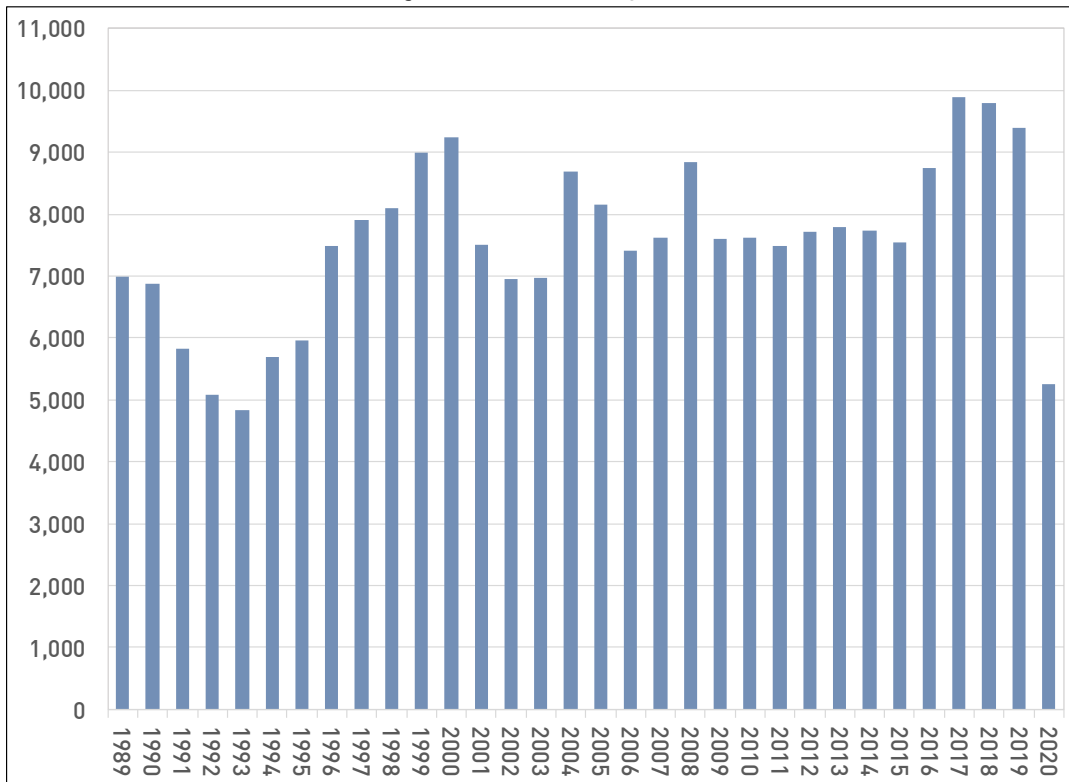
While the number of night-time runway movements decreased compared to 2019, the observed number of movements in 2020 is comparable with the number of movements observed in the early 1990s.

The published YVR Noise Abatement Procedures includes the following procedures and practices to minimize noise at night:

- A prior approval requirement for departures of jet aircraft rated over 34,000 kg (maximum take-off weight) between midnight and 6 AM.
- Use of preferential runways to keep arriving and departing aircraft over the Strait of Georgia (weather permitting).
- Early turn and vectoring procedures for aircraft on certain routes to minimize over-flights of populated areas.
- Closure of the north runway between the hours of 10 PM and 7 AM (except in the event of an emergency or maintenance).

⁶ For this report, the night-time period are the hours between midnight and 6:00AM local time.

FIGURE 4: Annual Night-time Runway Movements, 1989-2020



JET FLEET MIX BY NOISE CERTIFICATION

The International Civil Aviation Organization (“ICAO”) is an agency of the United Nations and establishes principles and techniques for the planning and development of international air transportation to ensure safe and orderly growth. The ICAO Committee on Aviation Environmental Protection (“CAEP”) prescribes standards for noise with the goal of promoting reduction at the source. These standards are contained in *Annex 16: Volume I Environmental Protection - Aircraft Noise* and categorize jet aircraft as either Chapter 2, Chapter 3 or Chapter 4 depending on three measured noise levels (take-off, landing, and sideline) obtained during prototype development⁷.

The Chapter 14 noise standard was confirmed at the 9th meeting of CAEP in February 2013. This standard applies to new aircraft types over 55 tonnes (55,000kg) certified after 2017 and to new aircraft types less than 55 tonnes after 2020. To meet the Chapter 14 standard, aircraft must be at least 7 EPNdB (Effective Perceived Noise in Decibels) quieter than the current Chapter 4 standard. This reduction is cumulative over the three measurement points: take-off, landing, and sideline.

In 2020, approximately 93% of the movements by jet aircraft with a Gross Take-off Weight over 34,000kg were with an aircraft type that met Chapter 4 or Chapter 14 noise certification standards, with the remaining 7% meeting Chapter 3 standards. In addition, approximately 88% of movements by jet aircraft with a Gross Take-off Weight over 34,000 kg operating between the hours of midnight and 6:00 AM were with an aircraft type that met Chapter 4 or Chapter 14 noise certification standards, with the remaining 12% meeting Chapter 3 certification standards.

Airlines worldwide continue to invest billions of dollars to upgrade their aircraft fleets. These new aircraft types have improved noise and emissions benefits compared to the older aircraft types they replace.

⁷ The Government of Canada legislated the phase-out of older noisier Chapter 2 jet aircraft over 34,000kg from operation in Canada by 2002. These aircraft are no longer permitted to operate in Canada and were either retired from operation or modified to meet Chapter 3 standards. A few exemptions were granted for aircraft operating from airfields in northern Canada.

AIR TRAFFIC FLOW

YVR has two parallel runways and a crosswind runway. The parallel runways, which include the south runway (08R/26L) and the north runway (08L/26R), are aligned in an east-west direction with magnetic headings of 083° and 263°. The crosswind runway (13/31) is oriented in a northwest and southeast direction with magnetic headings of 125° and 305°.

The active runways are determined by wind conditions at the airport as aircraft must take-off and land into the wind for safety reasons. The predominant winds at YVR are typically in an easterly or westerly direction; therefore, the parallel runways are the primary runways in use. Based on historical observations, traffic flow in an easterly direction (Runway 08L and 08R) is more common during the fall and winter months, and traffic flow in a westerly direction (Runway 26L and 26R) is more common during the spring and summer months.

The published YVR Noise Abatement Procedures prescribes westerly flow of traffic as the preferred mode of operation whenever possible to reduce noise exposure on the community as departures, the noisiest type of operation, are routed over the Strait of Georgia. In addition, NAV CANADA will attempt to accommodate two-way flow between the hours of 11:00PM and 6:00AM to keep both arriving and departing aircraft over the Strait of Georgia to minimize over-flights and noise on the community. However, the use of two-way flow is dependent on traffic volume, airfield activities, and weather conditions and cannot be used all the time.

RUNWAY USE

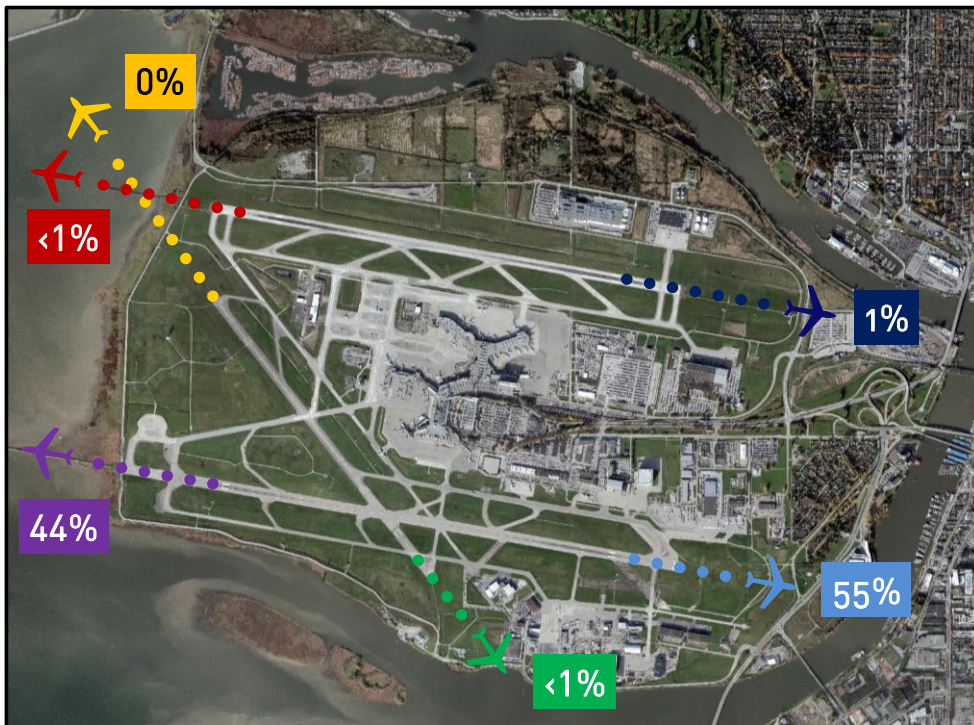
At YVR, the south runway is the main 24-hour runway. The north runway is normally closed between the hours of 10:00 PM and 7:00 AM (except during emergencies and airfield maintenance) and is used primarily for landings between 7:00 AM and 10:00 PM. The north runway can also be used during the day for departures when the airport approaches capacity limits to reduce delay, such as during peak times.

The crosswind runway is used infrequently and is generally reserved for periods of high crosswind conditions. **Figure 5** and **Figure 6** illustrate the distribution of arrivals and departures on all runways in 2020.

FIGURE 5: Runway Arrival Distribution, 2020



FIGURE 6: Runway Departure Distribution, 2020



ENGINE RUN-UPS

Transport Canada standards require that aircraft undergo regular maintenance to ensure safe operations. Engine run-ups are a critical part of maintenance work and involve running the engines at various power settings to stress components and to simulate flight conditions. This ensures work has been done properly and that the aircraft is safe to return to service.

To ensure a high level of safety on the airfield and to reduce community noise exposure from run-ups, the Airport Authority maintains directives and procedures that prescribe how, when, and where run-ups can be performed. All approved run-ups are logged, and these records are routinely analyzed to track run-up activities and identify trends. **Table 3** provides the number of run-ups performed each year at YVR between 2016-2020.

TABLE 3: Number of Run-ups Performed at YVR, 2016-2020

Year	Number of Approved Run-ups
2016	4,584
2017	4,939
2018	4,739
2019	4,094
2020	3,318

In 2020, there were 3,318 run-ups performed at YVR, an average of nine run-ups per day. This is a 19% decrease from 2019. A decreasing trend in the number of run-ups has been observed since 2017, and the decline in air traffic due to COVID-19 was one of the factors contributing to the decreased number of run-ups in 2020. However, the number of run-ups did not drop as much as the aircraft movements by percentage compared to 2019. This is because aircraft still require regular maintenance and run-ups even when parked on the ground. Further analysis of run-ups in 2020 shows:

- 50% of the run-ups were performed at idle, 33% at above idle, and 17% at full power.
- 19% of the total run-ups were performed during the night-time hours between midnight and 6 AM. While run-ups are performed at all times of the day, some run-ups do occur at night since maintenance work on aircraft is often performed in the evening and at night as most aircraft are flying during the day.
- The Ground Run-up Enclosure (GRE) remains the preferred location for high power run-ups on the south airfield. In 2020, approximately 1,100 run-ups were conducted in the GRE facility, which accounted for 88% of high power run-ups performed on the south airfield.

NOISE CONCERNS

One of the goals of the YVR Aeronautical Noise Management Program is to provide the community with up-to-date information on airport operations and noise management initiatives. The community can contact the Airport Authority with their questions and concerns through a variety of means, including:

- Dedicated e-mail (noise@yvr.ca)
- YVR Website (www.yvr.ca)
- Real-time flight and noise tracking system ([WebTrak](#))
- 24-hour YVR Noise Information Line - (604) 207-7097

Information provided by residents and results of investigations are logged in a database, which is used to analyze and identify trends. A summary of concerns is provided to the YVR Aeronautical Noise Management Committee at each meeting for review and discussion.

NUMBER OF CONCERNS

In 2020, the Airport Authority received 2,808 noise concerns from 107 individuals across the Greater Vancouver area, which has a population of 2.4 million⁸. This represents a 10% increase in concerns but a 55% decrease in the number of individuals compared to 2019. **Figure 7** represents a breakdown on the number of concerns and individuals for the past five years.

There are several individuals who register multiple concerns throughout the year. In 2020, approximately 92% (2,596) of the total concerns were received from three individuals. **Figure 8** provides a further breakdown of the number of concerns and individuals between 2016 and 2020, identifying the number of concerns associated with the three individuals registering the most concerns each year. Of the three individuals, one individual registered 86% (2,404) of the total concerns received in 2020. The Airport Authority has offered to meet with these individuals to discuss their concerns and provide information on aircraft operations over the area, but the offers were declined.

Excluding concerns from top three individuals, a total of 212 concerns were received from 104 individuals. Over 50% (107) of 212 concerns were received in the first three months in 2020, which equates to an average of 36 concerns each month. The remaining 105 concerns were received over the nine-month period between April and December 2020, which equates to an average of 12 concerns a month. While there are likely many factors that influenced this trend,

⁸ 2016 Statistics Canada's Census (<https://www12.statcan.gc.ca>)

the decrease in the number of aircraft movements since mid-March due to COVID-19 could be one of the factors in the decrease in the number of concerns.

FIGURE 7: Number of Noise Concerns and Individuals, 2016-2020

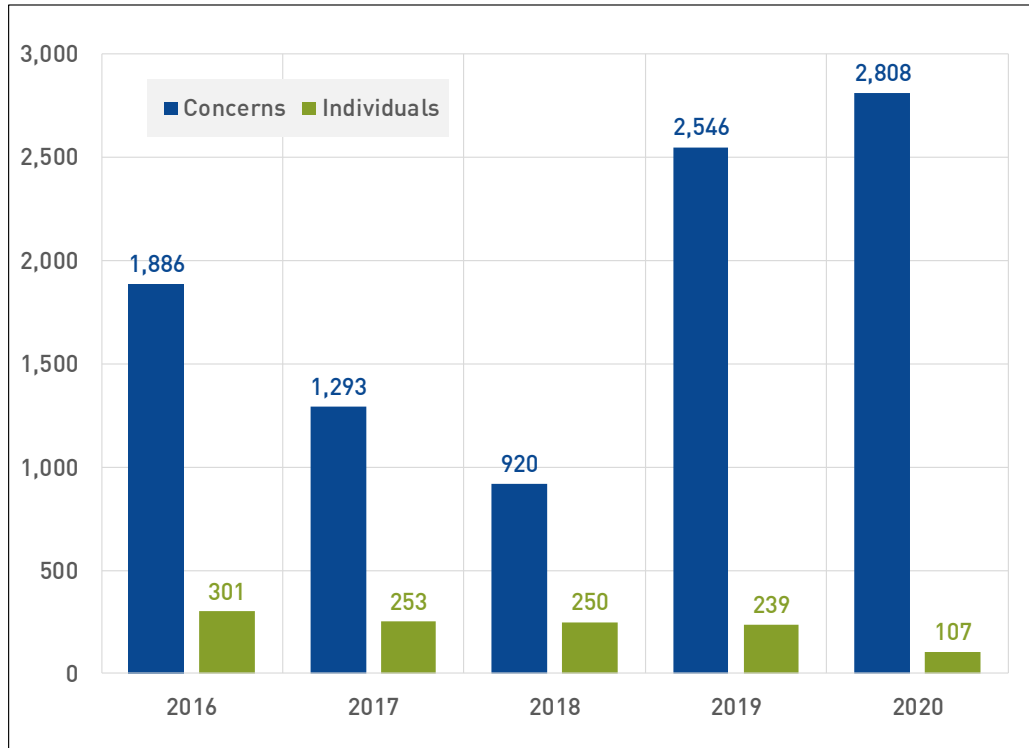
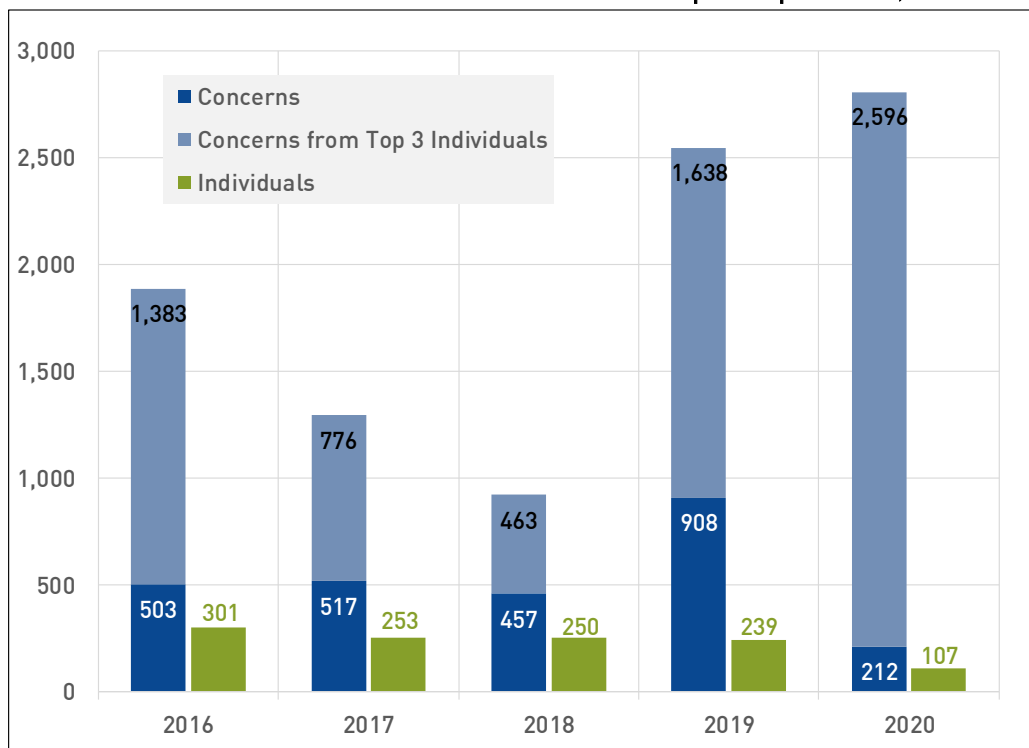


FIGURE 8: Number of Concerns and Individuals (Top 3 Separated), 2016 – 2020



NOISE CONCERNS BY LOCATION

Whenever possible, individuals are asked to provide information on the location of their residence to better understand the distribution of concerns across the region. **Figure 9** illustrates the number of concerns and individuals in 2020 by various communities.

FIGURE 9: Number of Concerns and Individuals by Location

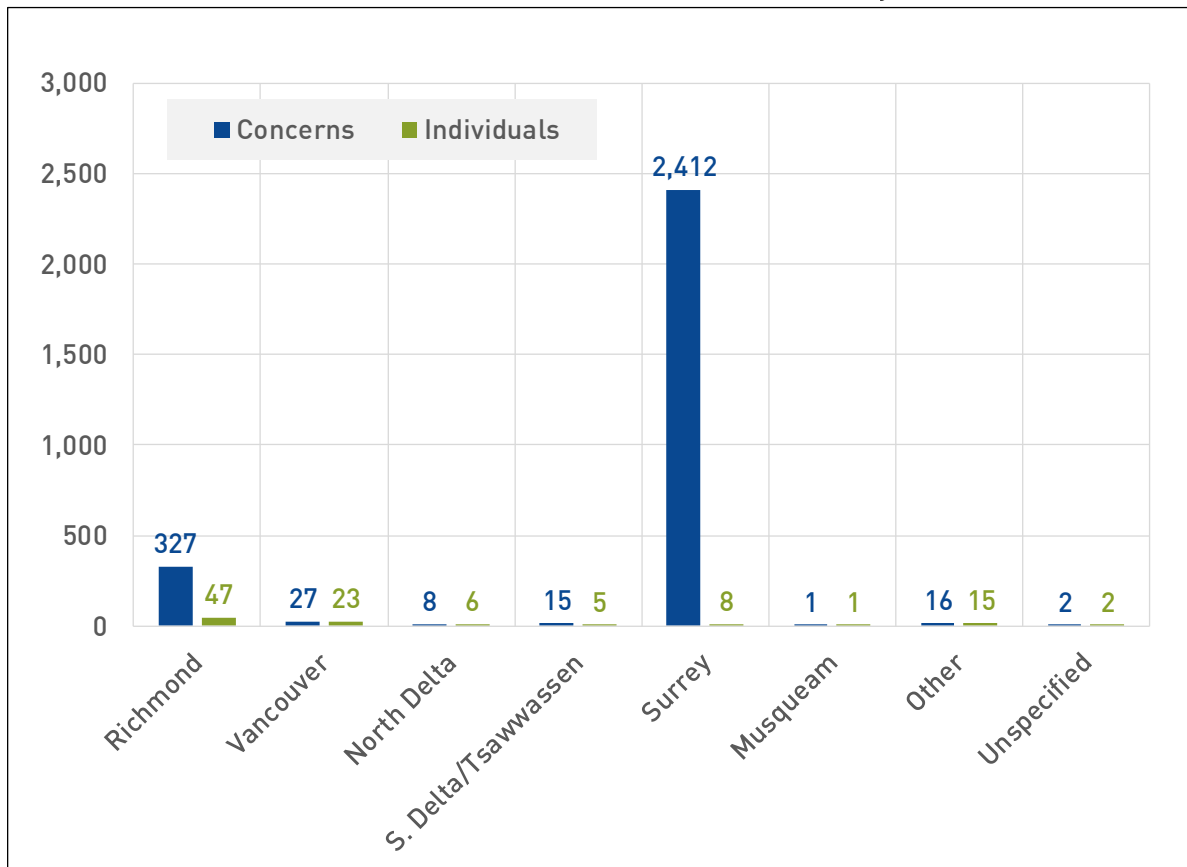


Figure 10 illustrates the geo-distribution of noise concerns across the Greater Vancouver area in 2020 based on address and postal code information. Locations closer to the airport generally exhibit a greater density of noise concerns due to the lower altitude of aircraft and higher frequency of aircraft activity.

Figure 11 illustrates the geo-distribution and the frequency of concerns in the Greater Vancouver area in 2020. The size and colour of each dot represent the volume of concerns originating from that specific postal code. As illustrated, while most individuals registering frequent concerns were located close to the airport, some of these individuals are located in the communities further away from the airport.

FIGURE 10: Geo-distribution of Noise Concerns

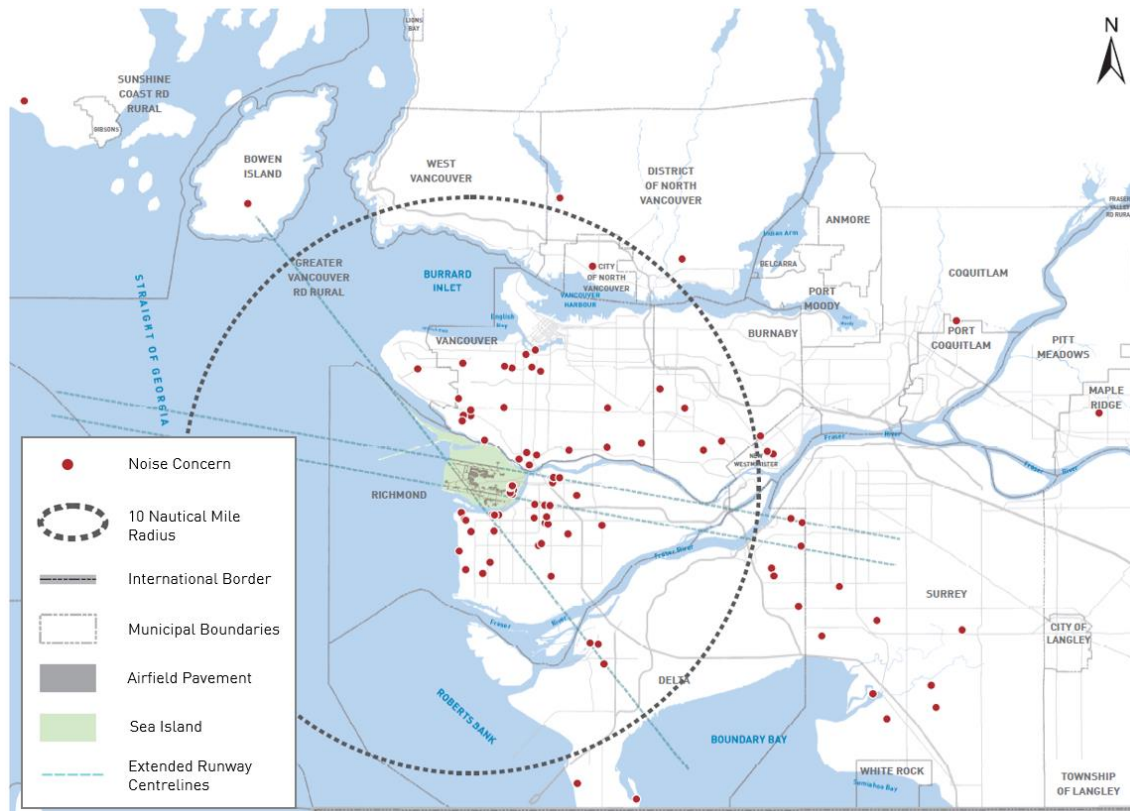
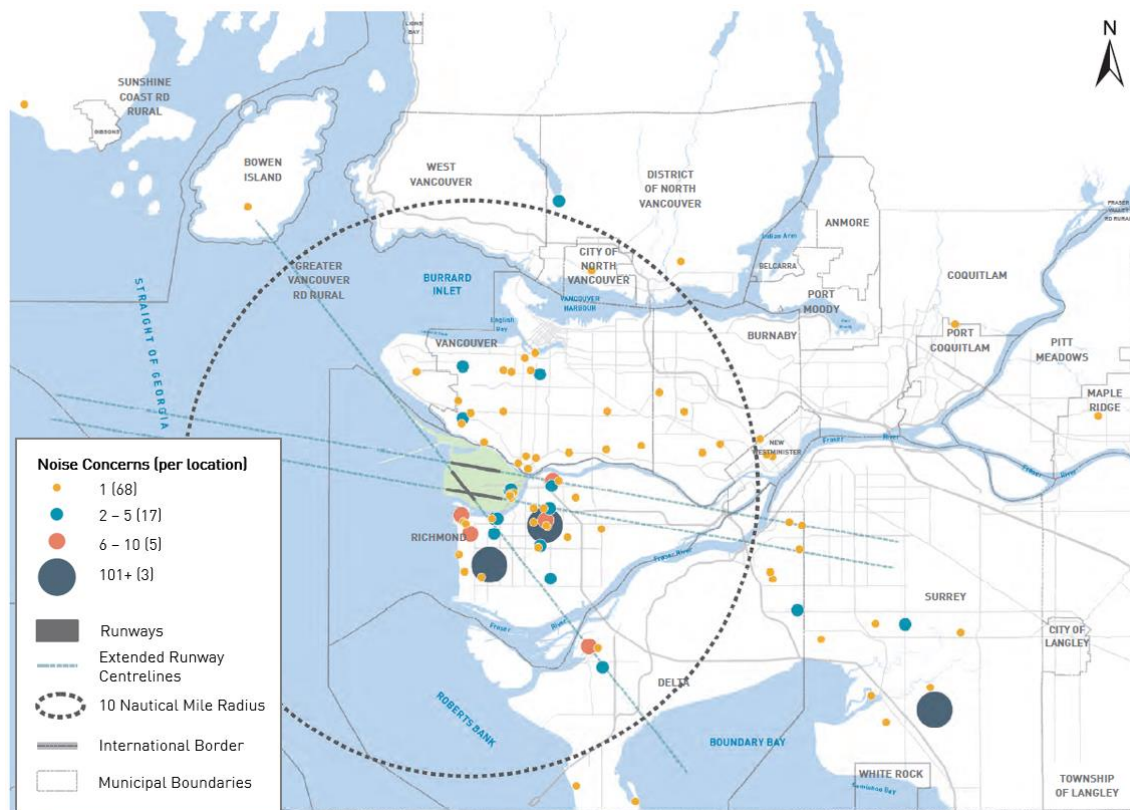


FIGURE 11: Frequency and Geo-distribution of Noise Concerns



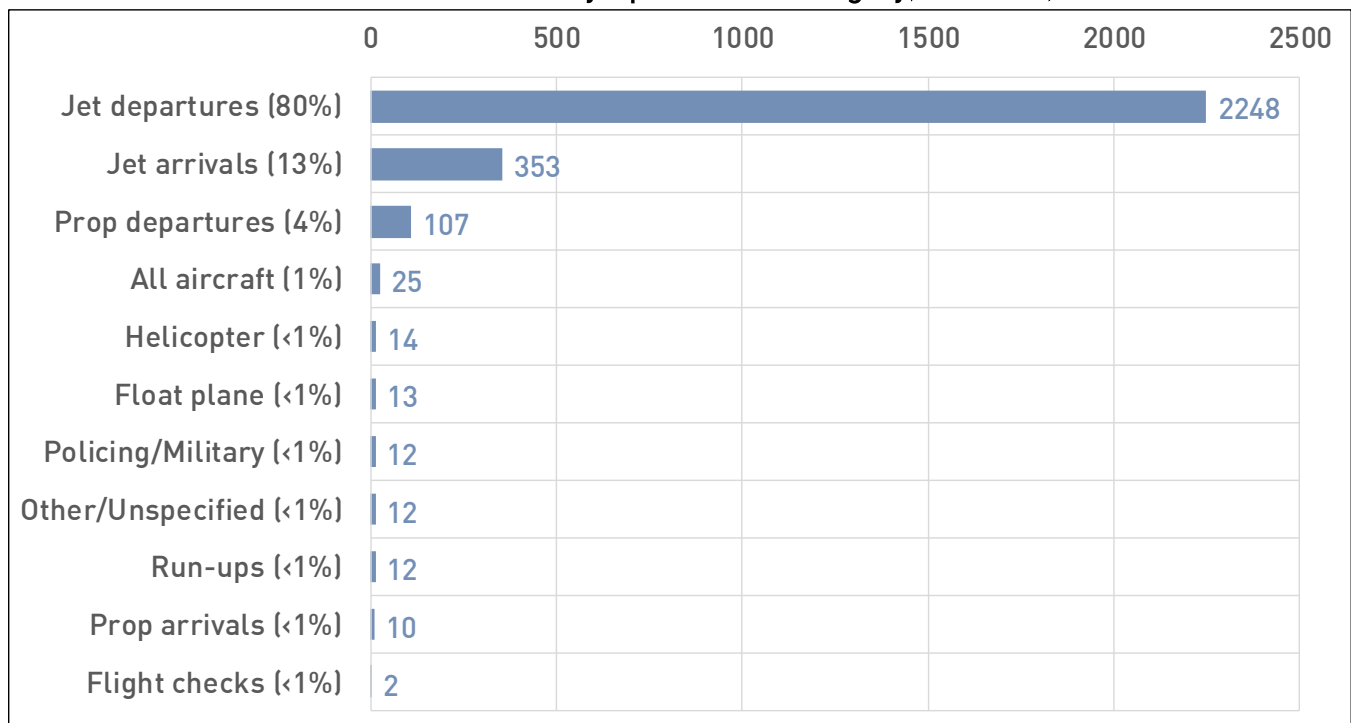
NOISE CONCERN BY OPERATION TYPE

When reporting noise concerns, individuals generally provide details of date, time, and location of the noise event. Based on the information provided, each concern is categorized into an operation type such as jet departure, jet arrival, helicopter and run-ups. General concerns that cannot be matched against a specific operation type are categorized as “All aircraft”. Concerns that cannot be correlated to any aircraft activities at the time provided by the individuals are categorized as “Other/Unspecified”.

While all areas of the region are exposed to some level of aircraft activity, the level of exposure will vary depending on the location of the area in relation to the airport and its proximity to flight paths. As such, depending on the location of each individual, the category of concerns will vary. **Figure 12** illustrates the breakdown of all noise concerns received in 2020 by operational category.

As illustrated, the three operational categories associated with the most concerns in 2020 were jet departures, jet arrivals, and prop departures, accounting for 96% (2,708) of the total concerns, with 96% of these concerns registered by three individuals submitting the most concerns in 2020.

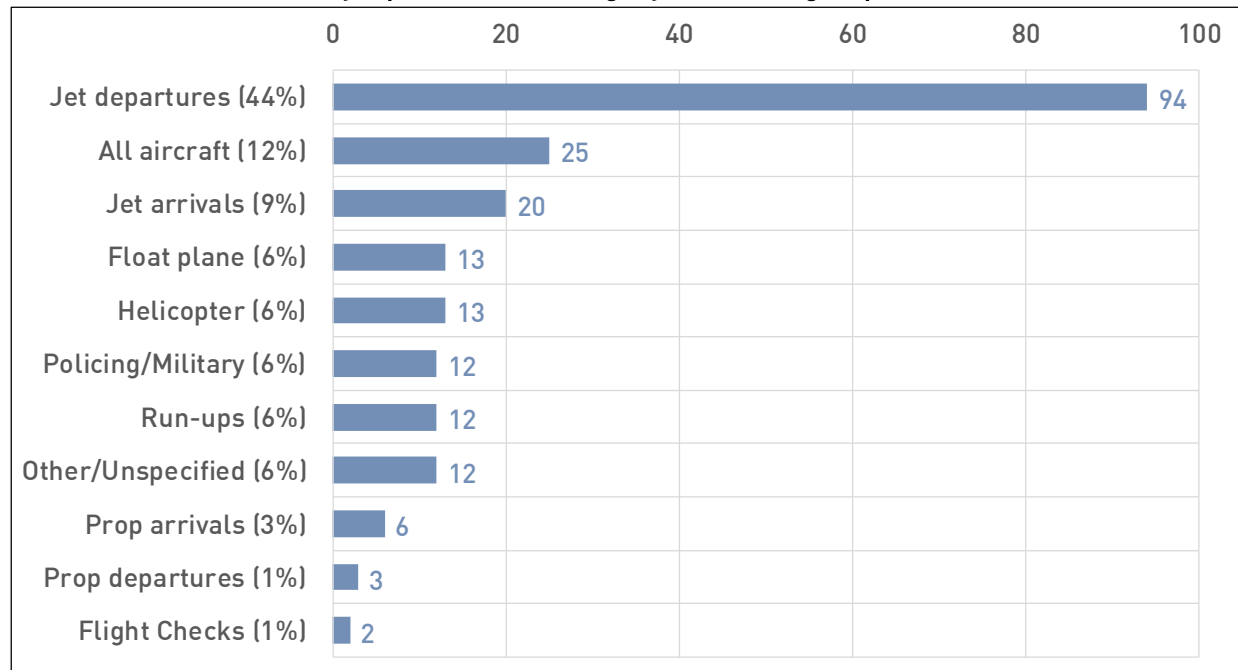
FIGURE 12: Concerns by Operational Category, Total = 2,808



When a small number of individuals register multiple concerns, this can distort the data analysis. Therefore, to better understand the nature and trends of concerns from the majority,

further analysis was done excluding the 2,596 concerns from the three individuals with the most concerns. **Figure 13** illustrates the remaining 212 concerns received from 104 individuals by operation type.

FIGURE 13: Concerns by Operational Category, Excluding Top 3 Individuals, Total = 212



Jet departures remained the top operational category, accounting for 44% of 212 concerns, while prop departures accounted for 1% (3) of 212 concerns. Further analysis shows that:

- 79% of concerns related to jet aircraft departures were registered by residents in Richmond.
- 6% (12) of 212 concerns were regarding maintenance run-ups. All associated run-ups were approved and performed at their assigned location and heading.
- Two concerns, one from Musqueam and one from unspecified location, were related to the instrument landing system (ILS) flight check aircraft. ILS flight checks are performed regularly to ensure the systems meet certification standards. The flight checks often involve low level circuits from various angles and unusual flight paths.

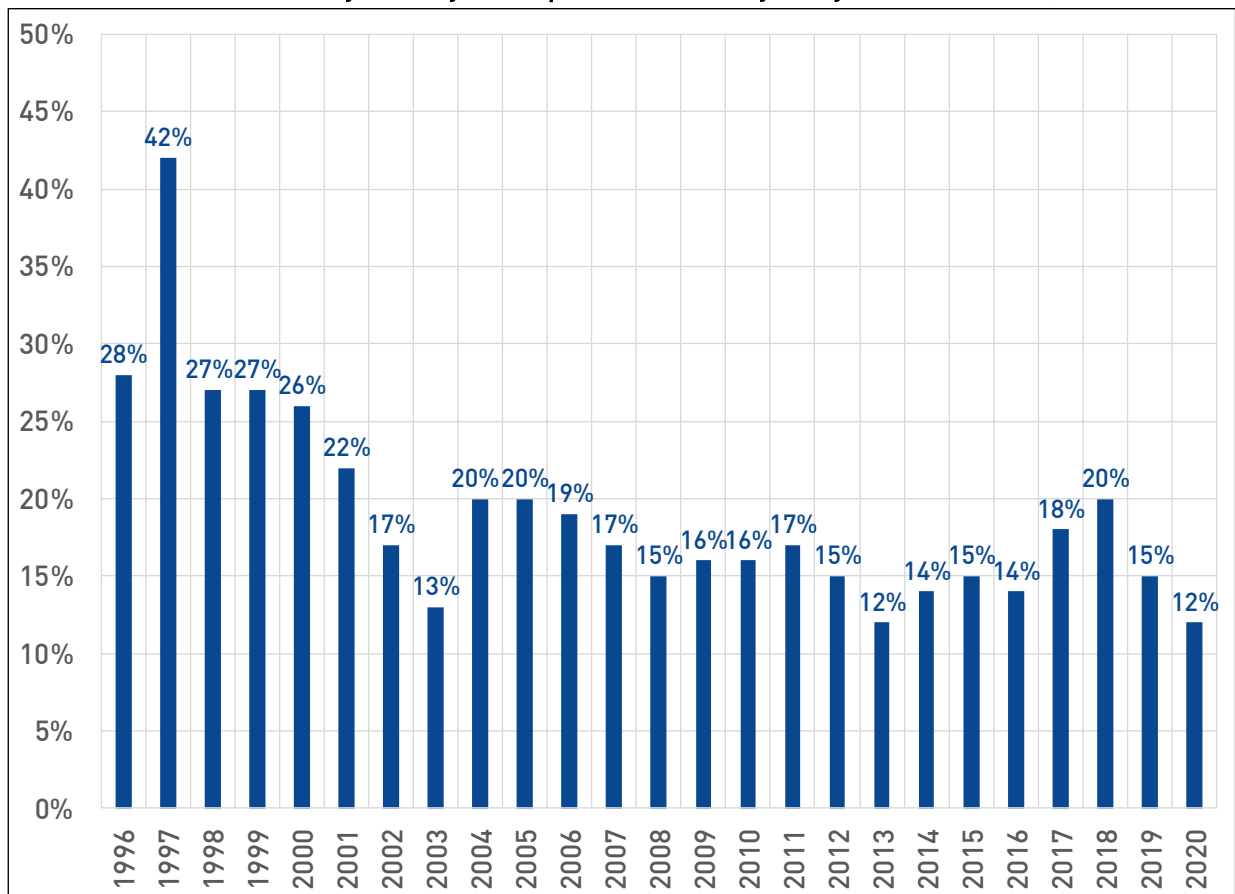
COMMUNITY SURVEY

Since the mid-1990s, the Airport Authority has commissioned a third-party survey to track public attitudes and opinions about YVR on several topics including aircraft noise. The community survey represents the opinions of approximately 1,000 residents selected at random from across communities in the Greater Vancouver area provides one gauge of aircraft noise annoyance.

When asked, “*While you have been at home during the past year, have you been annoyed by aircraft noise in your neighbourhood?*” approximately 12% of the survey respondents in 2020 stated that they were annoyed by aircraft noise, this is a decrease from 15% cited in 2019.

Figure 14 illustrates the trend since 1996.

FIGURE 14: Community Survey - Respondents Annoyed by Aircraft Noise, 1996-2020



NOISE MONITORING DATA

The monitoring of noise levels and aircraft activity in communities around the airport is a major component of the YVR Aeronautical Noise Management Program. To achieve this, the Airport Authority uses the Aircraft Noise & Operations Monitoring System (“ANOMS”) to provide an objective assessment of aircraft noise levels in the communities.

ANOMS combines noise data collected at NMTs and radar flight tracking data provided by NAV CANADA, which allows an understanding of the contribution of aircraft noise at each site.

Figure 15 illustrates the NMT network and their relationship to runways at YVR. The network of NMT consists of 20 fixed NMTs with one portable unit that can be deployed as required. In 2018, the portable NMT was deployed for long term monitoring in Musqueam, and data collected at this site throughout 2019 is summarized in this report along with data from the other stations.

FIGURE 15: NMT Locations in the Greater Vancouver Area



ANNUAL AVERAGE NOISE LEVELS (LEQ)

One common metric for community noise assessment is the equivalent sound level, or average noise level (“Leq”), measured over a given period. **Table 4** presents the annual average Leq, measured in units of A-weighted decibel or dBA, at each NMT location for the last five years. It is important to note that the average noise levels, presented below, include contributions from all sources in the community, including aircraft, motor vehicles, people, lawn mowers, barking dogs, etc.

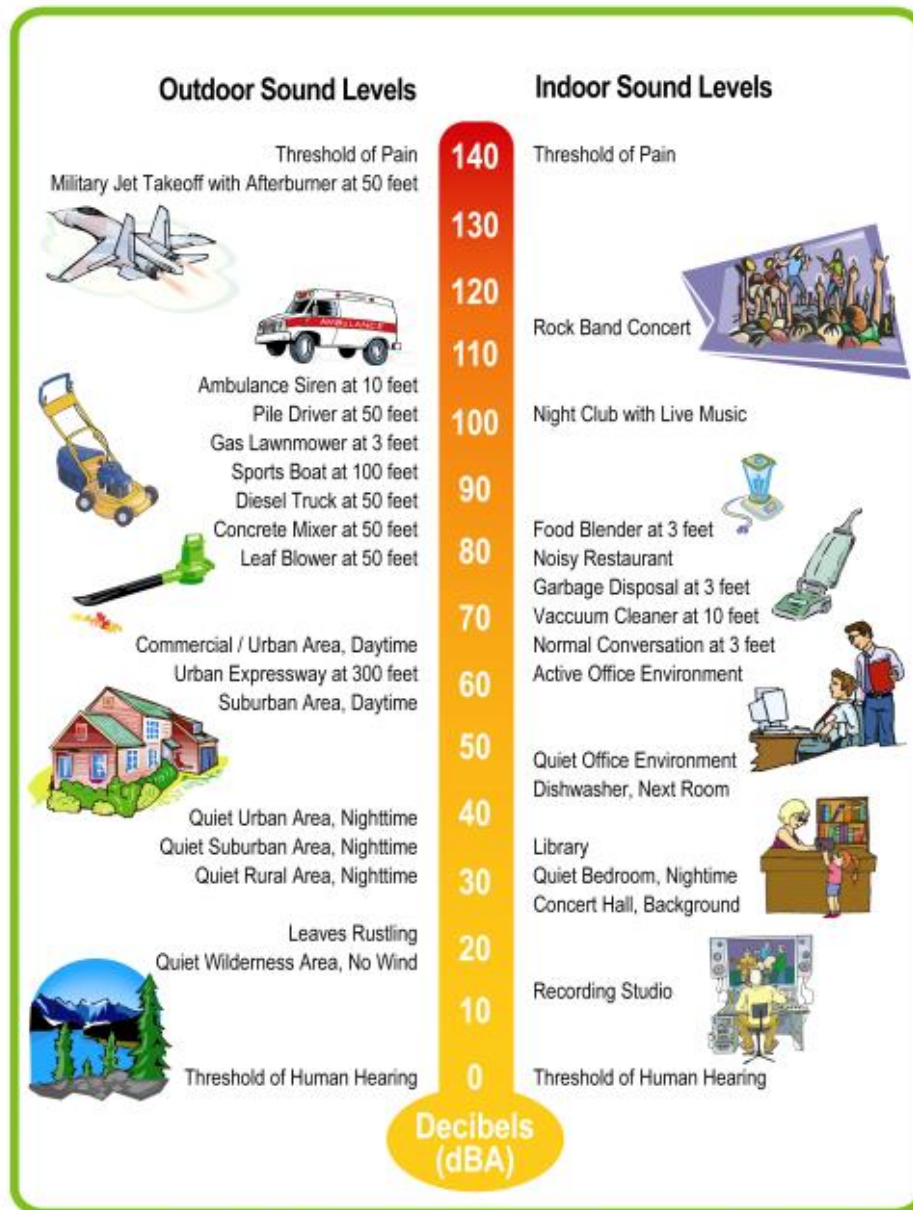
To provide context on sound exposure, **Figure 16** illustrates example sounds levels ranging from 0 to 130 dBA associated with typical sources. As a note, a 3 dBA increase in noise level is achieved by doubling equal noise sources and is the smallest difference in noise level that is perceptible by a receiver. A 6 dBA increase in noise level is clearly perceived, and a 10 dBA increase is perceived as being twice as loud.

TABLE 4: Annual Average Noise Level (in dBA), 2016-2020

NOISE MONITORING TERMINAL										
YEAR	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
2016	61.2	65.3	53	62.4	58.4	58.1	58.4	55.8	51.3	56.7
2017	61	64.9	54.1	59.9	58.5	57.1	57.5	51.4	50.1	55.1
2018	61.3	66.3	52.8	60.5	58.5	57.4	58.4	54.2	50.4	56.3
2019	66.2	66.7	53.6	60.6	58.3	57.6	58.7	59.9	50.5	56.7
2020	74.4	62.8	51.7	59.6	56.3	56.0	57.6	51.4	49.3	60.6

YEAR	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20	#21
2016	60.6	66.9	61.4	56.1	53.8	54.6	54.1	53.8	56.3	60.6	
2017	61.1	73.3	61.8	58.9	53.3	54.3	54.2	53.7	55.3	61.1	
2018	60.9	72.8	62.1	56.4	55	54.3	53	54.3	56.5	60.9	
2019	61.3	71.9	62.3	60.2	53.9	54.4	53.9	53.9	60.5	53.2	52.5
2020	58.3	68.7	59.8	55.4	55.4	58.5	53.9	53.5	55.1	52.6	51.0

FIGURE 16: Example Sound Level and Associated Sources



Source: URS Corporation, 2008

NUMBER OF EVENTS - SINGLE EVENT NOISE LEVEL

Another metric used to assess noise is the single event noise level ("SEL"), measured in dBA. For an aircraft fly-over, either a landing or take-off, the SEL represents the total acoustic energy above a prescribed reference threshold and is typically 10 dBA greater than the maximum noise level experienced during the aircraft fly-over. The primary use of the SEL is to provide a comparison of noise events with different noise levels and durations.

Each individual NMT has a reference threshold setting according to the ambient noise levels in that area. Thresholds are typically set between 65 and 70 dBA during the day (7:00AM to 10:00PM) and between 55 and 60 dBA during the night (10:00 PM to 7:00 AM).

Noise events collected are categorized as either correlated or uncorrelated. Correlated events are those associated with aircraft and uncorrelated events are those associated with other sound sources in the community. For those NMTs located under flight paths and where aircraft operate at lower altitudes, the captured noise events tend to be more associated with aircraft than community sources. Conversely, for those NMTs located farther away from the airport or where aircraft tend to operate at higher altitudes, the captured noise events tend to be more associated with community sources.

Figure 17 illustrates the daily average number of aircraft versus community noise events⁹ captured at the NMTs in 2020.

Figure 18 illustrates the average daily number of aircraft noise events observed in 2020 compared to 2019. As presented earlier in this report, the air traffic level at YVR was significantly reduced in 2020 due to the COVID-19 pandemic. As a result, there were fewer aircraft noise events registered at most NMT sites in 2020 than in the previous year.

⁹ Noise Events with durations less than 60 seconds and a SEL greater than 70dBA are included in this count.

FIGURE 17: Average Daily Number of Noise Events at NMTs, 2020

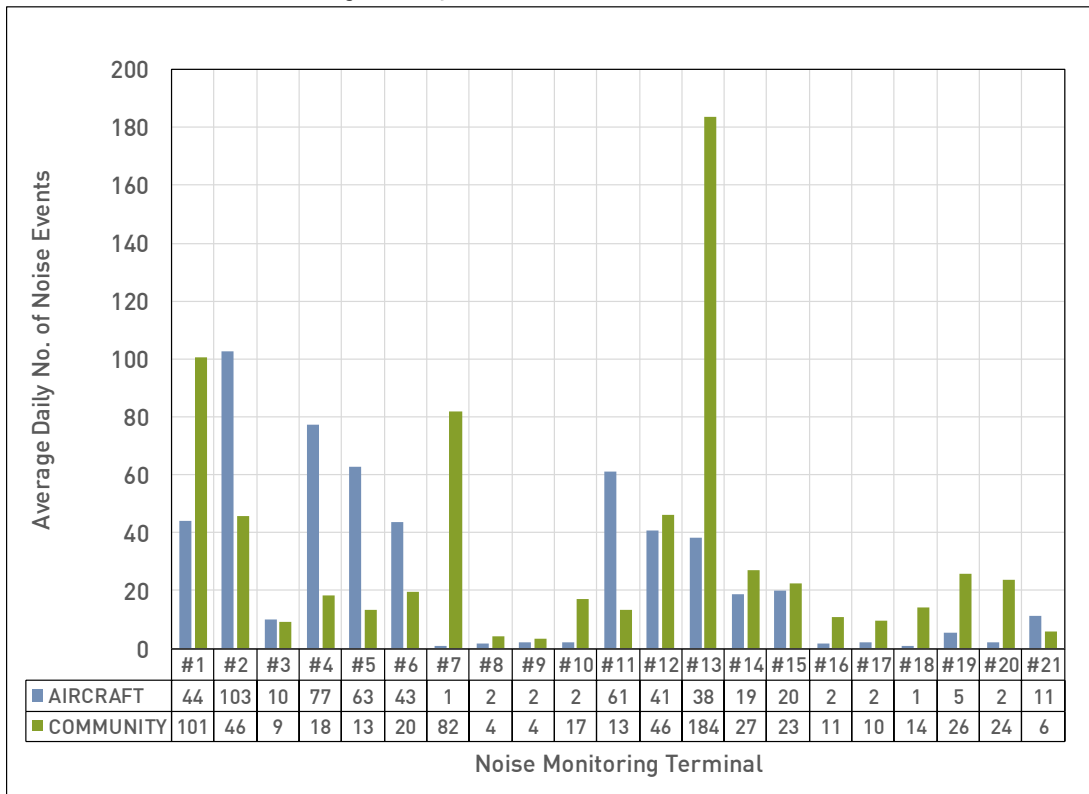
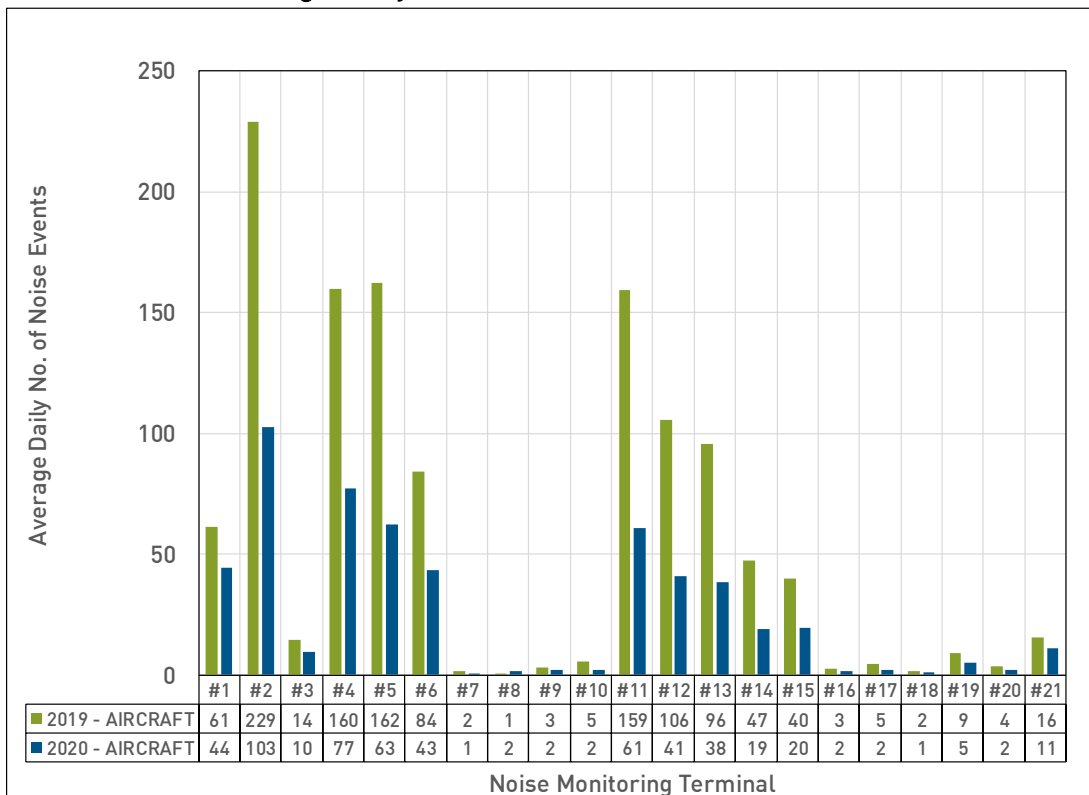


FIGURE 18: Average Daily Number of Aircraft Noise Event, 2019 vs 2020



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Note on Reported Figures and Data:

The Airport Authority receives aircraft operations data from NAV CANADA. This data includes daily aircraft arrivals and departures at YVR as well as aircraft transiting through the Vancouver Control Zone. Every effort is made to verify and correct anomalies in the dataset, and numbers stated in this report may vary slightly from those reported by others.

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