

# 2006

## NOISE MANAGEMENT REPORT

Toronto Pearson International Airport



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# MESSAGE FROM THE CHAIR

**A**s Chair of the GTAA's Noise Management Committee (NMC), I am pleased to share this report on the progress that was made in 2006 with respect to noise management at Toronto Pearson International Airport.

The GTAA is sensitive to the issue of aircraft noise and how it affects our neighbours, and sees this community-based committee as a vital element of Toronto Pearson's noise management program.

Both resident and elected representatives from the Cities of Brampton, Mississauga, and Toronto continued to advocate on behalf of their communities to ensure that the impacts of aircraft noise are mitigated and understood. Last year, the NMC passed a resolution—subsequently backed by local Members of Parliament—which calls on Transport Canada to redirect fines they collect due to noise infractions to local noise mitigation efforts. In conjunction with the City of Mississauga, the committee also led the move to redesign and refurbish the aircraft noise warning signs found in some Mississauga neighbourhoods.

Part of Toronto Pearson's internationally recognized environmental accreditation (ISO

14001 certification) reflects the importance of noise mitigation in the daily operation of Canada's busiest airport. By following the three key elements to ISO registration, the GTAA is making considerable strides to strike a balance that benefits the airport, airlines, the travelling public, and surrounding communities. The GTAA and the NMC will be called upon to develop measures that bring both noise and environmental benefits to residents and neighbourhoods surrounding Toronto Pearson. To this end, the NMC has expanded their focus to include a greater emphasis on monitoring the impacts that aircraft and airport operations have on both the local and global environment.

I extend my thanks to the members of the NMC for their support and efforts relating to noise management at Toronto Pearson and for their continued service to their communities.

I look forward to the challenges that lie ahead with every confidence that through our partnerships and open dialogue, the GTAA will be able to serve the needs of the travelling public while effectively addressing concerns brought forth by our neighbours.



A handwritten signature in black ink, appearing to read 'S. Shaw', written in a cursive style.

Steve Shaw  
Chair, Noise Management Committee  
GTAA Vice President, Corporate Affairs





# TORONTO PEARSON INTERNATIONAL AIRPORT AND THE GTAA

The GTAA was incorporated in March 1993 as a corporation without share capital, and recognized as a Canadian Airport Authority by the federal government in November 1994. The GTAA is authorized to operate airports within the Greater Toronto Area (GTA) on a commercial basis, to set fees for their use and to develop and improve the facilities.

In accordance with this mandate, the GTAA currently manages and operates Toronto Pearson International Airport. The responsibilities of the GTAA for the operation, management and development of Toronto Pearson are set out in the ground lease with the federal government, which was executed in December 1996. The Ground Lease has a term of 60 years, with one renewal term of 20 years. The GTAA's priorities are to operate a safe, secure and efficient airport and to ensure that the facilities provide the necessary services, amenities, and capacity for current and future air travel requirements for the GTA.

The GTAA remains focused on providing quality aviation facilities at Toronto Pearson, recognizing that the region's current and future demand for air travel is expected to continue to grow. To meet this anticipated demand, the GTAA has undertaken the Airport Development Program (ADP), completed in January 2007.

The GTAA is committed to fulfilling its mandate in a fiscally responsible manner. This commitment is expressed in the GTAA mission statement:

"To develop and operate for the public benefit, an airport system which supports the economic development and cultural diversity of southcentral Ontario and Canada, providing aviation facilities and services that achieve:

- The highest standards of safety and security;
- Excellence in customer service;
- Environmental stewardship and sustainability; and
- Cost effectiveness and efficiency.

This mission will be achieved through:

- Developing a skilled and dedicated work force;
- Maximizing technology innovation; and
- Excellence in corporate governance."

Toronto Pearson remains Canada's busiest airport, handling nearly 31 million passengers in 2006. The next busiest Canadian airport processed approximately half that number.

On most days, more than 1,100 landings and departures take place. Forecasted figures depict a Toronto Pearson that could be called upon to manage the movement of 50 million passengers each year by 2025, which translates into a year over year increase of approximately 3 per cent.



The airport currently has 77 passenger airlines operating from Terminals 1 and 3 and 16 cargo airlines. From Toronto, passengers can connect directly to 27 Canadian destinations, 42 U.S. destinations, and 84 international destinations.

Toronto Pearson not only performs a gateway function serving the needs of travellers, it also acts as an enabler for surrounding businesses and residents. In a recent economic study, it was deduced that the output related to direct, indirect and induced activity at Toronto Pearson is \$26.4 billion. Up to 185,000 total jobs are attributed to the three aforementioned sectors. Taxes paid to all levels of government, based on the same three areas, total \$4.5 billion.

The GTAA believes in maintaining good relations with neighbouring communities. We are committed to complete transparency and the engagement of area residents in our discussions on the topic of noise mitigation. The GTAA meets with the community on a regular basis through the Consultative Committee (CC) and Noise Management Committee (NMC). We have also committed ourselves to the publishing of this report to inform stakeholders of the ongoing progress of initiatives and advances made in the consultative process with the community.

So dedicated is the GTAA to noise mitigation that we identified it as a significant aspect when the Airport Authority began the certification process towards ISO 14001, the internationally recognized standard for environmental performance. All three of the core principles of ISO registration are applied towards noise mitigation; prevention of pollution, continual improvement, and compliance with relevant legislation. Each year, targets are set to ensure conformance to the three principles. In 2006, two targets were set:

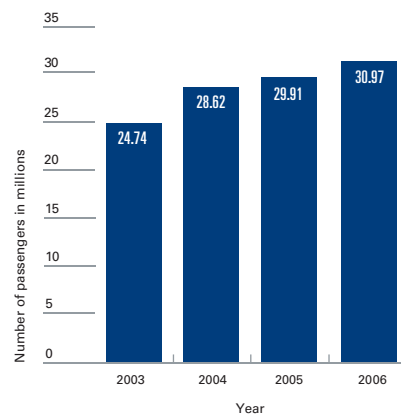
- Enhance public awareness of the GTAA's Noise Management Program, community issues, noise and complaint data, and future noise management initiatives by producing a public report addressing these items on an annual basis.

- Mitigate the noise impacts on communities by developing RNAV departure procedures.

This report is a direct result of the first target. The second target has a completion date for the end of summer 2008.

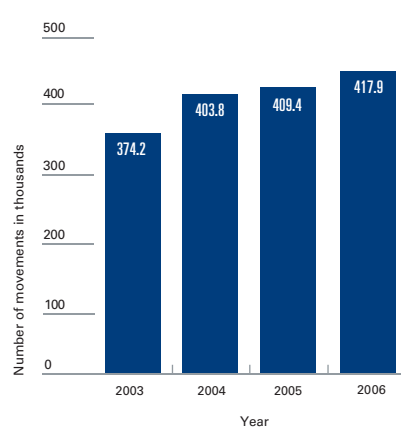
**Figure 1**

Passenger Volume



**Figure 2**

Aircraft Movements







**The Noise Management Committee passed a resolution in 2006 that recommended that fines collected by Transport Canada as a result of aircraft noise infractions at Toronto Pearson be reinvested in local aircraft noise management initiatives.**

## **NOISE MANAGEMENT AT TORONTO PEARSON**

**S**ince assuming management of Toronto Pearson, the GTAA has taken responsibility, in accordance with its Ground Lease with the federal government, for the management and mitigation of aircraft noise for aircraft operating to and from Toronto Pearson within a 10 nautical mile (18.5 km) radius of the airport.

The GTAA has a dedicated Noise Management Office that works toward noise mitigation by monitoring aircraft operations, investigating complaints, and identifying potential violations of operating restrictions and noise abatement procedures. The GTAA also works with the aviation community, neighbouring municipalities and local residents through the NMC to consult with these parties and to communicate its

ongoing efforts to manage and mitigate aircraft noise at Toronto Pearson. In addition, the GTAA discusses noise mitigation strategies within the GTAA Technical Noise Committee and the GTAA Consultative Committee, described later.

Ongoing initiatives aimed at mitigating aircraft noise at Toronto Pearson include:

- Restricting operating hours of all aircraft based on noise certification levels, such that quieter aircraft operate with fewer restrictions and noisier aircraft are more restricted during the night
- Managing the total number of nighttime movements to meet Transport Canada allowances
- Using departure and arrival procedures to minimize noise impacts in neighbouring communities by ensuring that pilots approach runways and depart runways on specified routes and operate their aircraft in ways to mitigate aircraft noise
- Working with surrounding municipalities to ensure that areas that are impacted by aircraft noise are zoned appropriately and that sensitive land uses, such as residential, are not permitted in higher noise-impacted areas
- Working with community representatives on the NMC to maintain public dialogue about aircraft noise through regularly scheduled committee meetings, a series of noise forums and educational workshops, and ongoing communications from the GTAA available on GTAA.com, including this annual Noise Management Report.

## UNDERSTANDING NOISE

Sound is transmitted through the air in waves, like ripples that move outward across a pond when a stone splashes in its midst. When we perceive sound, we judge it to be desirable or undesirable. Sounds deemed undesirable are often referred to as noise.

The decibel is the universally accepted measurement of sound amplitude or volume: in our example, amplitude represents the height of the ripples on the pond. Because the sounds we experience vary in volume between 1 and 100,000 units, the logarithmic scale of the decibel (dB) is used to express this range because it reduces perceivable sound volumes within a manageable scale of 20–120 dB.

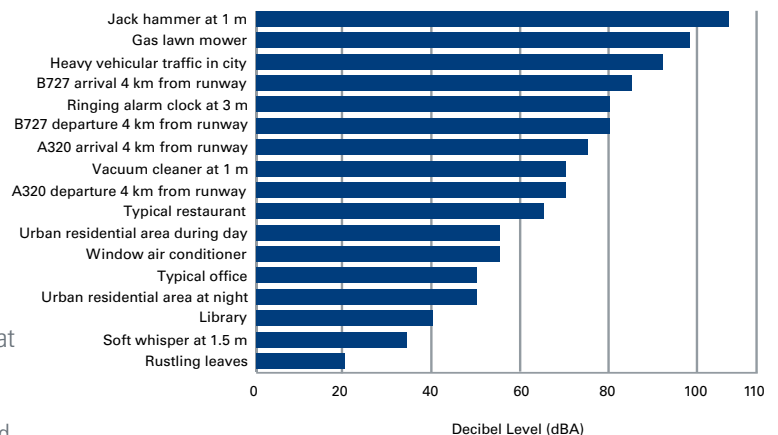
In addition, the human ear has greater sensitivity to a certain range of frequencies or pitches. Thus, sounds are usually measured in A-weighted decibels (dBA), which stresses the range of sounds that register most noticeably in the human ear.

Within the logarithmic A-weighted decibel scale, a 3 dBA decrease is barely perceptible to most people, while a 5 dBA decrease is clearly perceptible. Further, a decrease of 10 dBA is perceived as being half as loud. For example, a library that generates 40 dBA of ambient noise is considered half as loud as a typical office that generates 50 dBA of ambient noise.

Yet, noise is often considered annoying even when it occurs at much lower volumes than desirable sounds. For example, an arriving Airbus A320 flying overhead four kilometres from the runway may generate the same 70 dBA level as a vacuum cleaner one metre away, but the aircraft may seem more annoying because people expect to hear the noise of the vacuum and, therefore, are willing to accept it. In addition, quieter noises that occur frequently may be considered as annoying as infrequent, louder noises.

For comparison, the following chart displays average sound levels of different events:

**Figure 3**  
Common Sound Levels



It is also important to realize that sound volume can vary by up to 5 dBA depending on humidity, temperature and wind direction. Due to these factors, the sound of the same aircraft can appear to vary at the same location on different days.

# AIRCRAFT NOISE CERTIFICATION LEVELS

Over the past 30 years, improvements in aircraft design and technology have resulted in significant reductions in aircraft noise, which is caused by engines and by the movement of air over the frame of the aircraft. To date, noise reduction initiatives have focussed primarily on reducing engine noise. However, new airframe designs appear capable of cutting aircraft noise further.

The GTAA currently follows the aircraft noise management guidelines prescribed by Chapter 3 of the ICAO Standards and Recommended Practices—Aircraft Noise: Annex 16 to the Convention on International Civil Aviation, Volume I, which publishes standards for the global aviation industry. Chapter 3 noise reduction standards require that all subsonic jet aircraft types certificated after October 1977 meet more stringent maximum noise levels, reducing aircraft noise by 10 dBA over Chapter 2 standards. Aircraft that conform to Chapter 3 noise emission standards include the Boeing 747-400, new generation B737, B757, B777 and Airbus 319, A320, A330 and A340, among others.

Noisier, older aircraft, known as Chapter 2, include the McDonnell Douglas DC-9, Boeing 727, older model Boeing 737s, and older Learjet and Gulfstream business jets. Some of these jets were retrofitted or hushkitted to meet Chapter 3 standards. During 2006, two per cent of jet aircraft movements at Toronto Pearson involved these hushkitted Chapter 3 aircraft. In 2006, 99.7 per cent of all jet aircraft operations were by Chapter 3 aircraft.

Jets that are non-noise certificated are the oldest and noisiest models. These include military aircraft that make fewer than 100 visits to Toronto Pearson each year.

There are separate noise certification systems for small propeller aircraft and helicopters.

Since April 1, 2002, only the quieter Chapter 3 aircraft (greater than 34,000 kg) are permitted to operate at Toronto Pearson. Although the GTAA and the NMC have opposed the operation of Chapter 2 aircraft, Transport Canada retains the right to approve exemptions and permit some Chapter 2 aircraft to operate at Toronto Pearson.

In June 2001, on the basis of recommendations made during the fifth session of the Committee on Aviation Environmental Protection (CAEP/5), the ICAO Council adopted a new Chapter 4 noise standard that is more stringent than standards contained in Chapter 3. This new standard requires a 10 dBA cumulative reduction over Chapter 3, meaning that aircraft noise levels are reduced a total of 10 dBA when noise at the three takeoff, flyover and approach measurement points are summed. Since January 2006, this latest standard applies to newly manufactured aircraft and to Chapter 3 aircraft for which Chapter 4 certification is requested. At Toronto Pearson, approximately 80 per cent of jet aircraft meet this Chapter 4 standard.

**Figure 4**

Toronto Pearson Chapter 3  
Percentage (all jet operations)

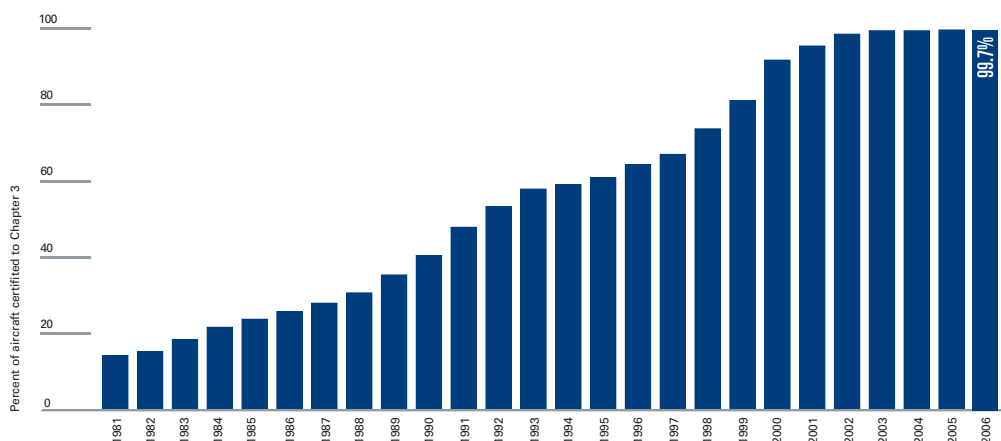


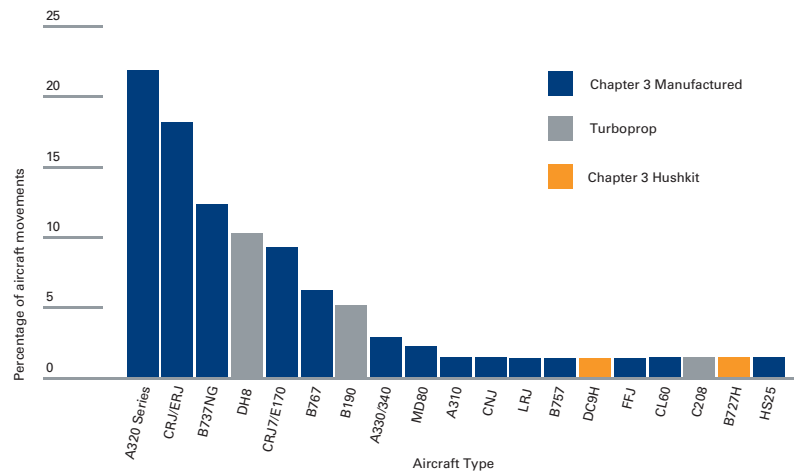


Figure 5 shows the annual percentage of movements by aircraft type that operated at Toronto Pearson in 2006. Operations by the Airbus A320 series, the Boeing 737 new generation (NG), Canadair Regional Jet (CRJ) and Embraer Regional Jet (ERJ) totalled over 50 per cent of all aircraft movements. These aircraft were all manufactured to meet Chapter 3 requirements and are among the quietest aircraft that operate at the airport.

Non-jet aircraft operations were 16 per cent of total aircraft movements in 2006. The most popular turboprop aircraft operating at Toronto Pearson was the twin engine De Havilland Dash 8 representing 10% of all movements at the airport.

**Figure 5**

Annual Percentage of Specific Movements by Aircraft Type



## NOISE MITIGATION MEASURES

### Regulations and Policies

Regulations and policies pertaining to noise management originate from various organizations, including those standards set by the ICAO, Transport Canada and the GTAA.

The federal Aeronautics Act and the Canadian Aviation Regulations (CARs) support the ICAO standards and set Canadian procedures relating to aircraft noise certification and operations. It is important to note that aviation is federally regulated, and therefore municipal bylaws, such as noise bylaws, are not applicable to aviation activity.

Specific sections governing operations of the airport include:

**Aeronautics Act - Section 4.9(f)** The federal government may make regulations respecting aeronautics and noise emanating from airports and aircraft.

**Canadian Aviation Regulations** - No person shall operate an aircraft at or near an airport except in accordance with the applicable noise abatement procedures and noise control requirements specified by the Minister in the Canada Air Pilot or Canada Flight Supplement.

These documents issued by the federal government describe the rules that pilots must follow to abide by the airport's noise management program, including the procedures and requirements relating to the following:

- Preferential runways;
- Minimum noise routes;
- Hours when aircraft operations are prohibited or restricted;
- Arrival procedures;
- Departure procedures;
- Duration of flights;
- The prohibition or restriction of training flights;
- Visual flight rules or visual approaches;
- Simulated approach procedures; and
- The minimum altitude for the operation of aircraft near the airport.

## Noise Operating Restrictions

### Time of Day Restrictions

The GTAA is required to develop and maintain a comprehensive aircraft Noise Management Program that includes a plan for managing the number of flights during restricted hours, between 12:30 a.m. and 6:30 a.m. To ensure that flights during the restricted period remain proportionate to overall traffic levels, Transport Canada has imposed annual limits on the total number of restricted period flights at Toronto Pearson, calculated between November and October. Operating the only airport in Canada with these restrictions, the GTAA carefully manages these flights to ensure that the limit is not exceeded.

Effective June 10, 2004, Toronto Pearson's night flight restrictions were amended to apply to all aircraft. The noisiest and older non-noise certificated jet aircraft are prohibited from operating between 8 p.m. and 8 a.m., while Chapter 2 and equivalent aircraft are prohibited from operating between midnight and 7 a.m. The quieter Chapter 3 and equivalent aircraft may be scheduled between 6:30 a.m. and 12:30 a.m. A limited number of Chapter 3 or equivalent aircraft operate as exemptions that are scheduled within the restricted hours (12:30 a.m. to 6:30 a.m.). Their approval is conditional upon the GTAA's ability to remain within the annual limit for restricted period flights.

The GTAA may grant operating extensions on the day of operation for flights delayed by weather, emergencies, security, air traffic control issues or mechanical difficulties. Chapter 3 air-

craft greater than 34,000 kg Gross Take Off Weight (GTOW) may operate until 3 a.m., depending upon existing circumstances and runway availability.

Daily requests for Chapter 3 jet aircraft less than 34,000 kg GTOW and equivalent propeller aircraft may be approved to operate in the restricted hours up to a daily limit. Noisier Chapter 2 aircraft, non-noise certified aircraft and equivalent operations are not granted operating extensions.

### Preferential Runway Assignment

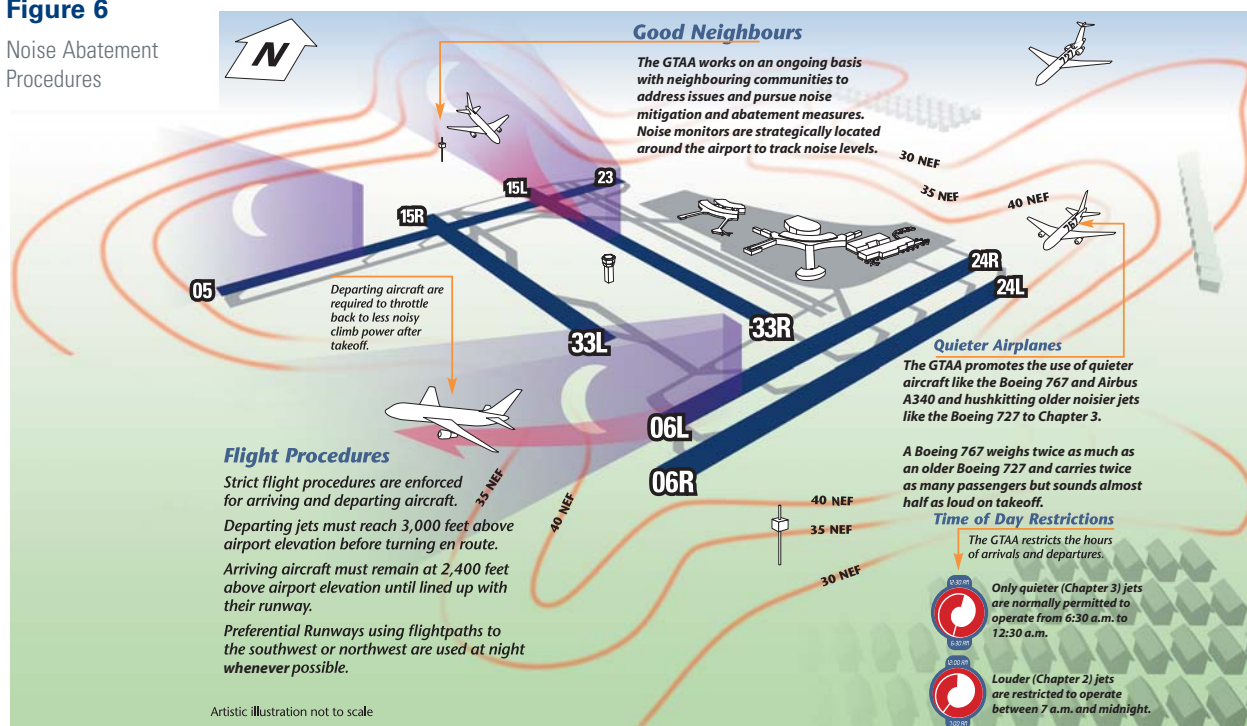
Runways are labelled by the first two digits of their compass bearings. For example, a pilot approaching Toronto Pearson from the southwest and cleared to land on Runway 05 would follow compass heading 057.

Toronto Pearson has five runways: 05–23, 06R–24L, 06L–24R, 15R–33L, and 15L–33R. Each runway has two designators as each runway can be used in either direction. The right (R) and left (L) designators identify which of a pair of runways a pilot is cleared to use.

Aircraft using these runways take off and land into the wind for safety reasons; therefore, runway use is dependent on the direction and speed of the wind. In addition, weather, runway conditions, and approach aid availability may affect NAV Canada's determination of which runways will be used at any time. To minimize noise, the GTAA works with NAV Canada to maintain strict flight procedures for arriving and departing aircraft.

**Figure 6**

Noise Abatement Procedures





Subject to existing conditions, preferential runways have been allocated for use between midnight and 6:30 a.m. The following runways are preferred for aircraft departures in the following order of priority: Runways 23, 33R and 24R. The following runways are preferred for aircraft arrivals in the following order of priority: Runways 05, 15L and 06L. Operations on other runways are limited as much as possible during this time period.

Preferential runway assignments have been in practice for many years to ensure that the fewest number of people in the surrounding communities are impacted by aircraft operating at night.

### **Engine Run-ups**

Occasionally, airline maintenance staff are required to perform engine run-ups after engine repairs have been completed. At all times, these run-ups must be approved by the GTAA in advance and conducted at designated times and locations determined to minimize their impact on the surrounding communities.

Between midnight and 7 a.m., engine run-ups are approved only for aircraft scheduled to depart that morning at locations farthest from residential areas. Engine run-ups are prohibited for all noisier Chapter 2 aircraft between 2 a.m. and 5 a.m.

### **Noise Abatement Procedures**

Noise abatement procedures governing flights operating at Toronto Pearson are approved by Transport Canada and are legally binding on aircraft operators.

### *Departures*

Pilots of jet aircraft are required to throttle back from take-off power to less noisy climb power shortly after take-off and must follow specified headings or ground tracks to 3,000 feet (914 m) above airport elevation before making en-route turns. Pilots of propeller aircraft must comply with jet procedures between 11 p.m. and 7 a.m. During the day, these pilots may turn as low as 500 feet (152 m) above airport elevation to accommodate increased hourly operations.

A new procedure for smaller, quieter Chapter 3 jet aircraft was established in 2001 and formalized in 2005 after four years of trials and analysis. Using this new early turn procedure, pilots of these aircraft can turn to assigned headings at 500 feet (152 m) above airport elevation between 7 a.m. to 11 p.m. when departing on Runways 05, 06R, 06L, 23, 24R and 24L.

### *Arrivals*

Pilots of arriving jet aircraft must remain at 2,400 feet (732 m) above airport elevation until they line up with their runways, generally 7 to 10 nautical miles (13 to 18.5 km) from the airport. They must then maintain a three-degree glide slope approach until touchdown, and minimize noisy reverse thrust after touchdown. Pilots of propeller aircraft must comply with jet arrival procedures between 11 p.m. and 7 a.m.

While the Airport and airlines act to minimize noise during departures and arrivals, sometimes they may have to deviate from noise abatement procedures when prevailing conditions, such as thunderstorms, dictate.



# LAND USE PLANNING

To ensure that compatible land uses are planned and developed near the Airport, the GTAA works closely with surrounding municipalities to ensure that areas impacted by aircraft noise are zoned appropriately and that sensitive land uses, such as residential, are restricted in higher noise-impacted areas.

be viewed under the Noise Management section of [www.gtaa.com](http://www.gtaa.com).

Transport Canada has taken the position that areas as low as 25 NEF may be affected by aircraft noise. Areas of 30 NEF or greater are considered incompatible for sensitive land uses, such as residential development.

## Noise Exposure Forecast

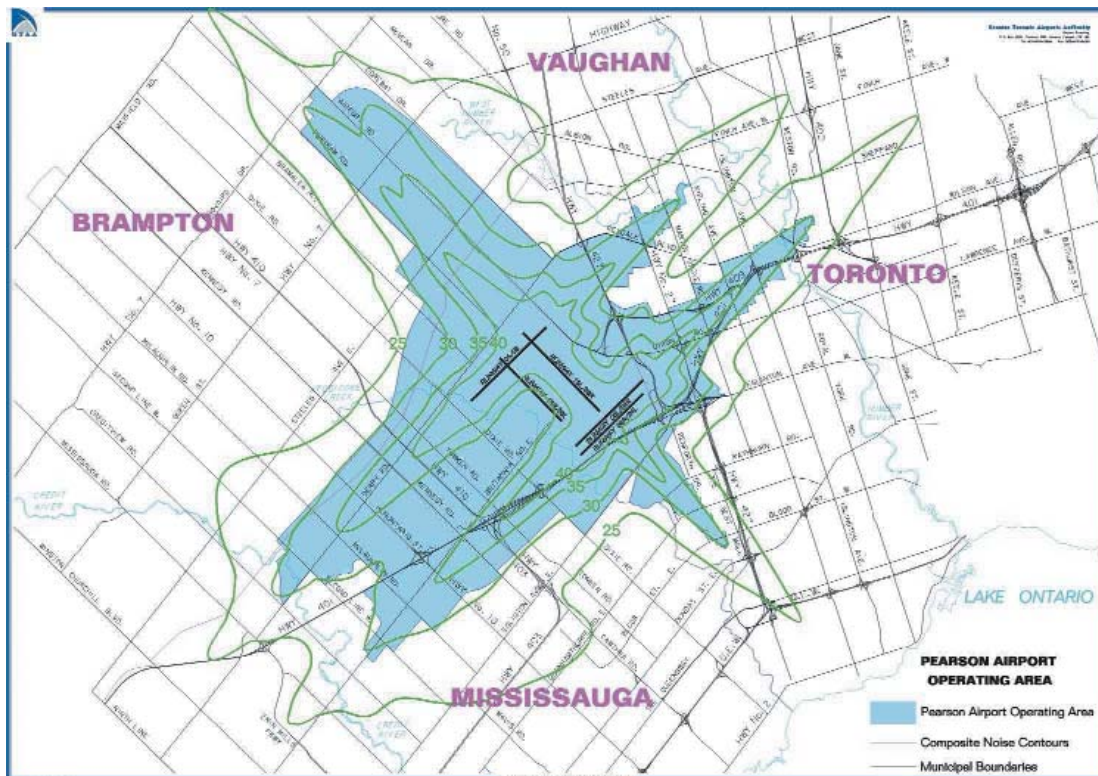
Transport Canada has developed a Noise Exposure Forecast (NEF) model to calculate long-term aircraft noise exposure based on actual and forecasted flights, and the assessed level of noise annoyance in those areas. Contour lines are drawn on a map (Figure 7) connecting points of equal noise impact representing 25, 30, 35 and 40 NEF. It is important to remember that the NEF contour does not measure decibel levels for individual flights, but is a cumulative noise value of overall actual and forecasted flights, and noise annoyance. Figure 7 can also

## Airport Operating Area

The GTAA has established the Toronto Pearson Airport Operating Area (AOA), which uses well-defined natural and human-made boundaries to approximate the 30 NEF contour on the ground. Surrounding municipalities have included this operating area in their official plans and have approved associated policies that limit incompatible land uses within these areas.

**Figure 7**

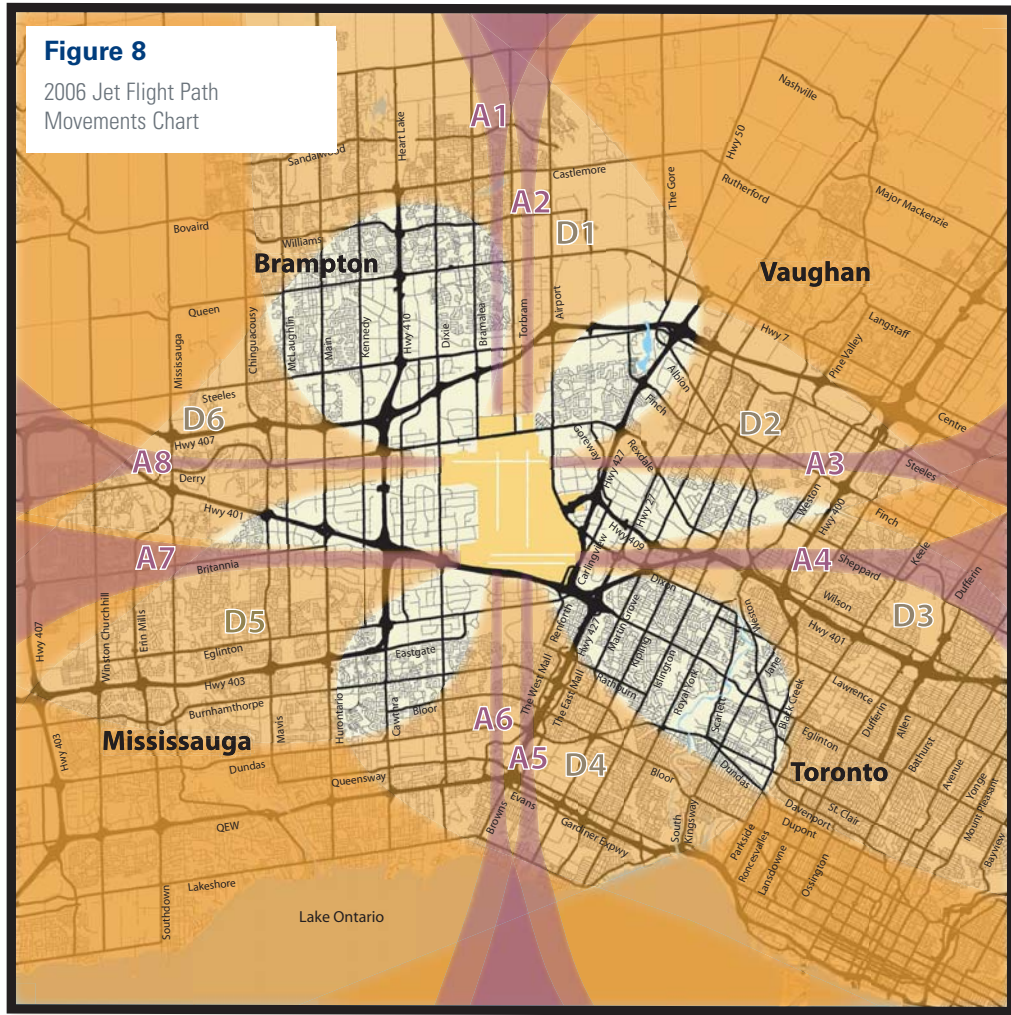
Airport Operating Area



### Jet Flight Path Movements Chart

In an effort to better communicate with local residents and provide new tools that describe aircraft activity near Toronto Pearson, the GTAA has developed a Jet Flight Path Movements Chart to illustrate the general flight patterns of the majority of Toronto Pearson's jet aircraft operations.

While this chart does not indicate the level of noise generated by aircraft activity in an area nor the level of community annoyance, it does provide valuable information when used in conjunction with other traditional aircraft noise maps and resources. This new chart is based on a program successfully employed at Sydney Airport in Australia and on input from the NMC.



- Legend**
- Pearson International Airport
  - Arrival Flight Zone
  - Departure Flight Zone
  - Body of Water
  - Areas with Less Frequent Jet Over Flights
  - Overlapping Arrival Flight Zones
  - Overlapping Departure Flight Zones

Table for 2006 Jet Flight Path Movements Chart

Flight Zone Names	Daily Average Movements	Percentage of All Movements	Daily Range of Movements	Days With No Movements	Associated Runway(s)
A1	6	0.6%	0-298	339	15R
A2	11	1.2%	0-202	190	15L
A3	103	10.9%	0-310	71	23
A4	152	16.1%	0-408	73	24L & 24R
A5	2	0.2%	0-45	294	33R
A6	21	2.2%	0-385	295	33L
A7	79	8.4%	0-327	122	06L & 06R
A8	98	10.3%	0-436	100	05
D1	47	5.0%	0-430	73	33L & 33R
D2	43	4.5%	0-218	142	05
D3	117	12.4%	0-426	139	06L & 06R
D4	6	0.6%	0-314	271	15L & 15R
D5	119	12.6%	0-414	75	24L & 24R
D6	142	15.0%	0-425	55	23
<b>Arrivals (A1-A8)</b>	<b>473</b>	<b>50.0%</b>			
<b>Departures (D1-D6)</b>	<b>473</b>	<b>50.0%</b>			
<b>Total Jet Movements</b>	<b>946</b>	<b>100.0%</b>			

- Notes:
- 1) The flight zones illustrated are intended to reflect the general flight path patterns of the majority of Pearson's jet aircraft operations. Some jet operations do occur outside these zones.
  - 2) The information presented excludes non-jet aircraft (piston and turboprop) using Pearson, and any over flights unrelated to Pearson (en route aircraft flying through the area) to maximize the clarity of the presentation and to focus on the types of operations with the most significant noise impact.
  - 3) The arrival flight zones reflect primarily the final approach phase of the arrival, excluding any earlier phases that may pass through the airport vicinity prior to joining the final approach path.
  - 4) The departure flight zones do not reflect the flight paths of the smaller, quieter jet aircraft that are permitted to conduct early departure turns (similar to non-jet aircraft), although these operations are included in the table above.
  - 5) Although the yellow map areas, 'Areas with Less Frequent Jet Over Flights' are not within arrival or departure flight zones, they are not completely free of over flights. These areas may be over flown by jet aircraft operating outside of the general jet flight zones (see Note 1), non-jet and over flights not associated with Pearson (see Note 2), arrivals prior to joining the final approach path (see Note 3), and early turn jet departures (see Note 4).
  - 6) The information reflects traffic levels and flight zones for the year 2006 only. It does not project future airport operations. Overall traffic volumes can be expected to increase as demand for air travel services increases in the future.
  - 7) This map only presents the general location and number of jet aircraft operations at Pearson and is provided for general information purposes only. It does not quantify the noise impacts associated with those operations. The noise associated with operations within any of the flight zones may be heard outside of the zone itself. This information does not replace the Noise Exposure Forecast system used for land use planning purposes.

# NOISE MANAGEMENT COMMITTEE

The Noise Management Committee (NMC) will provide a consultative / communication forum for community stakeholders to meet with GTAA Management and other aviation community representatives. The committee will discuss issues relating to the mitigation of aircraft noise in the community and the operation of Toronto Pearson International Airport in an environmentally responsible manner.

The NMC will be an advisory body for the GTAA Chief Executive Officer. The committee will include representatives of the three surrounding municipalities and allow for the GTAA to hear concerns expressed in a public forum and to take action as considered appropriate.

## Committee Responsibilities

### Mandate

The NMC mandate is set out in the Ground Lease (section 8.12.02) as follows:

*“The Tenant shall ensure that mitigation of noise emanating from aircraft in the takeoff, ascent, descent, approach and terminal phases of flight is a part of the mandate of a noise management committee which the Tenant shall establish and which shall include at a minimum, the Tenant, the Minister or his designate, aviation industry representatives and appropriate provincial and municipal government representatives.”*

The NMC will also examine environmental issues related to the ongoing operation of Toronto Pearson International Airport

### Communication and Dissemination / Education of Stakeholders

The NMC will act in an advisory capacity to the GTAA on all issues relating to Toronto Pearson’s Noise Management and Environment Policies with a view to improving the GTAA’s noise mitigation and environment programs, and promote the objectives of the Authority respecting all aspects of noise and environment management.

The NMC will provide a forum for the discussion of noise and environment related matters and will decide on the best methods of distributing information to stakeholders and to stakeholder groups on an issue by issue basis. The NMC will issue a report on an annual basis summarizing the GTAA’s ongoing noise mitigation initiatives and the work of the NMC.

### Linkages

The NMC members that represent community stakeholders will be required to actively seek the opinions of their constituents on noise related matters and to represent these concerns in the committee forum. Similarly, committee members will be required to disseminate the results of committee discussions to their constituent bodies.

Linkage to the GTAA Consultative Committee (CC), Toronto Pearson’s main consultative communication forum, will be provided through common membership. The GTAA will continue to perform this liaison through the committee chair.

The NMC will also have linkage to the Technical Noise Committee (TNC) to provide a two-way communication on the operational aspects of noise monitoring, enforcement, and mitigation. This linkage will be provided through the GTAA Vice President, Operations and Chief Engineer.

The NMC will provide the communication liaison between the community and the GTAA Board of Directors through GTAA management.

### Scope

The NMC will advise on matters related but not limited to the following:

- Aircraft Operation procedures impacting aircraft noise in Toronto Pearson’s Operating Area
- The examination of alternatives for noise mitigation
- The enforcement of aircraft noise violations
- Municipal land use within the GTAA operating area
- The review of the GTAA’s environmental programs and adherence to ISO targets
- The examination of potential environmentally sensitive measures at Toronto Pearson

The NMC will report and make recommendations to the GTAA Chief Executive Officer. The CEO may refer recommendations to the appropriate committee of the GTAA Board of Directors, to the GTAA CC, to the Technical Noise Management Committee or other bodies as appropriate for consideration.

Members will have the opportunity to vote on recommendations and minutes will show conclusion and resolution.





Minutes will be published in a timely fashion. The Committee will be given feedback on these recommendations.

The NMC may appoint ad-hoc sub-committees to deal with specific issues as they arise.

Terms of Reference will be reviewed and updated as required to ensure that the GTAA NMC mandate and membership remain current and appropriate.

### **Membership**

#### **CHAIR:** (Voting)

- The GTAA President and CEO or his designate (one): Committee Chair

#### **COMMUNITY MEMBERS:** (Voting)

- City of Brampton (three): one elected representative, one resident, and one additional to be appointed at Council discretion
- City of Mississauga (five): two elected representatives, two residents, and one additional to be appointed at Council discretion
- City of Toronto (three): one elected representative, one resident, and one additional to be appointed at Council discretion

Municipalities will be permitted to designate alternates when a member is unable to attend a meeting. Councillors, residents, or councillors' staff representatives are permitted to stand-in as an alternate for an elected representative who is unable to attend a meeting. Designated alternates are encouraged to attend meetings regularly and can vote in absence of the regular member.

Each nominating body will set the term of membership with a suggested minimum of two years.

#### **RESOURCE MEMBERS:** (Non-Voting)

- Transport Canada regional staff representative
- NAV Canada representative
- ATAC representative
- One staff representative from each of the Cities of Brampton, Mississauga, and Toronto
- Province of Ontario Staff representative

Resource Members will support the NMC and will be appointed to the committee by their constituent group.

#### **GTAA MEMBERS:** (Non-Voting)

- As Required

### **Procedures/Operation**

By the last meeting of the calendar year, the committee will approve a meeting schedule for the following year. Meetings will be held at least on a quarterly basis in the Administrative Offices of the GTAA. Meetings can be rescheduled at the discretion of the committee at least two weeks in advance of the scheduled meeting date. The meeting schedule, and any subsequent changes, shall be made publicly available.

There will be a published agenda, which will be delivered one week in advance of published meetings dates. Items for discussion should be submitted to the Committee Chair prior to meeting.

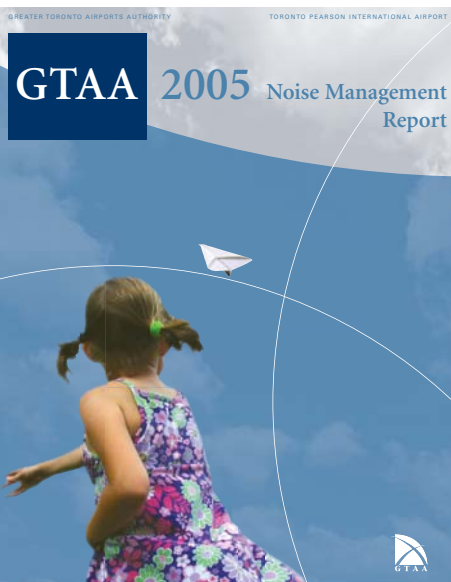
Quorum shall consist of six voting members, including the chair. In the event quorum is not attained, meetings will proceed on an informal basis. Regular attendance is expected of members. If a member, and/or their alternate, misses more than two consecutive regularly scheduled meetings, then the appointing community will be advised.

For most NMC business, a consensus approach will be followed. For those issues where a vote is requested, only "community" members and the committee chair will have voting rights. Items requiring a vote will be outlined on the agenda and, where possible, material will be provided to members in advance of meetings.

Meetings will be open to the public and to the media.

Minutes of the meetings will be circulated to NMC members as early as possible after each meeting. Further distribution of the minutes will be decided by the NMC.

The GTAA Corporate Affairs Department will provide secretariat services. The GTAA will provide a budget for the administrative support of this Committee.



# PUBLIC CONSULTATION AND EDUCATION

## 2006 Schedule

- NMC Meeting Wednesday, January 11
- NMC Workshop Wednesday, March 1
- NMC Meeting Wednesday, April 5
- NMC Forum Wednesday, April 26
- NMC Meeting Wednesday, June 14
- NMC Meeting Wednesday, September 27
- NMC Forum Wednesday, November 1
- NMC Meeting Wednesday, December 6

## Working with the Community

In an effort to educate and consult with local residents, the GTAA hosted a public workshop and two public forums in 2006. These sessions, in addition to the regularly scheduled NMC meetings, allowed the GTAA and area residents to exchange information related to the Noise Management Program.

On March 1, 2006, the GTAA hosted a workshop, entitled Managing Noise at Toronto Pearson, which aimed to educate residents on the GTAA's Noise Management Program and the work of the Noise Management Committee. Participant input from the workshop was forwarded to the NMC for review and

was analyzed by the GTAA in order to improve the effectiveness of the GTAA's Noise Management Program.

On April 26, 2006, the GTAA hosted a public forum where local residents visited the GTAA to learn more about aircraft noise issues. Information detailing the potential effects of the 2006 summer construction schedule on aircraft activity was also made available at the April session. A second public forum was held on November 1, 2006, where local residents were afforded another opportunity to review the GTAA's efforts to mitigate noise and environmental impacts.

All of these sessions provided a forum for community members to express comments and concerns to representatives of the GTAA, NAV Canada, Transport Canada and the airline industry.

The GTAA is committed to public consultation and looks forward to continuing to work with neighbouring residents to improve the Noise Management Program at Toronto Pearson.

## Annual Noise Management Report

This annual Noise Management Report summarizes the aircraft noise mitigation efforts of the GTAA and the NMC. This report continues to be an effective tool to educate and communicate with the surrounding communities. The report is available online at [www.gtaa.com](http://www.gtaa.com) and is distributed to interested residents and all local elected officials.

### Technical Noise Committee

Another important component of the Noise Management Program at Toronto Pearson is the Technical Noise Committee (TNC). The TNC meets on a regular basis to assess the effectiveness of existing noise abatement procedures and to discuss the technical merits of proposed noise mitigation initiatives that are generated by individual members, the NMC, and public input from workshops or forums.

The committee consists of many airport and aviation stakeholders, including representatives from the GTAA, Transport Canada, NAV Canada, and the airlines. The TNC is a valuable round-table forum where industry specialists consider new technologies and proposals that could be used to augment the airport's noise mitigation program. Specific discussion topics include aircraft and airport operating procedures, Toronto Pearson's night flight restriction program, aircraft noise monitoring systems, and noise mitigation enforcement processes.

On an ongoing basis, the TNC investigates and debates proposed initiatives and reports findings to the GTAA and the NMC.

### GTAA Consultative Committee

The GTAA also holds regularly scheduled Consultative Committee meetings that provide an important forum for airport stakeholders to discuss issues affecting Toronto Pearson and its surrounding communities and businesses. Aircraft noise issues and noise mitigation initiatives may be discussed by this committee, which is given regular updates on the work of the NMC.

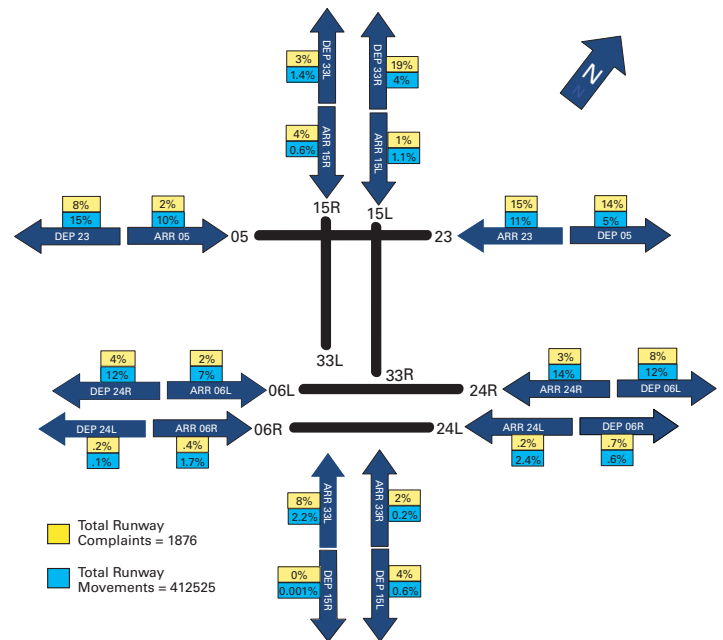
Membership on this committee consists of city councillors, regional staff, board of trade representatives, and local residents. Resource members from the GTAA, the airline industry, Transport Canada, NAV Canada, and city staff also attend meetings.

and its community-based Noise Monitoring Terminals, described below. In addition, NMO staff register aircraft noise complaints using a database system that categorizes noise complaints and automatically correlates these complaints with flight tracking data and complainant data. Staff then investigate complaints, report their findings, and respond to complainants.

Staff of the NMO also respond to NMC inquiries, provide information and analysis as required, research noise mitigation initiatives, and provide technical expertise for committee meetings and committee members. This ongoing collaboration between the NMO and the NMC is a key element of the Noise Management Program at Toronto Pearson.

**Figure 9**

Comparison of Noise Complaints by Runway Operation



# NOISE MANAGEMENT OFFICE

The GTAA Noise Management Office (NMO) monitors airport operations in relation to the Noise Management Program using the Airport Noise Monitoring and Flight Tracking System



**Figure 10**

Comparison of Aircraft Movements and Complaints by Runway Operation

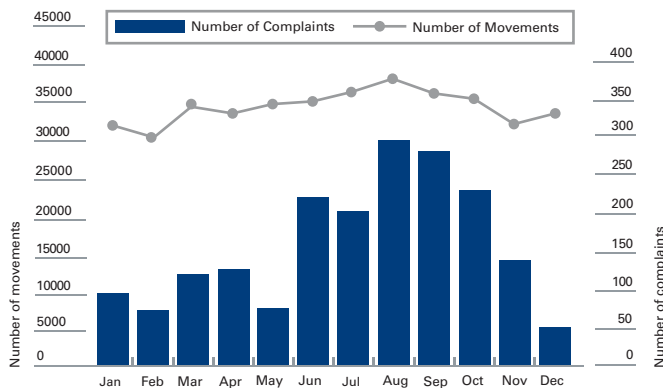
ARRIVALS			DEPARTURES		
Runway	Movements	Complaints	Runway	Movements	Complaints
Arrive 23	43637	290	Depart 05	18733	269
Arrive 24R	58580	54	Depart 06L	47907	159
Arrive 24L	9933	4	Depart 06R	2608	14
Arrive 33R	900	34	Depart 15L	2530	74
Arrive 33L	9116	142	Depart 15R	3	0
Arrive 06R	6919	8	Depart 24L	546	3
Arrive 06L	27614	37	Depart 24R	49834	80
Arrive 05	42280	36	Depart 23	63232	147
Arrive 15R	2472	70	Depart 33L	5641	65
Arrive 15L	4544	28	Depart 33R	15496	362
<b>Total Arr</b>	<b>205995</b>	<b>703</b>	<b>Total Dep</b>	<b>206530</b>	<b>1173</b>
<b>Total All Runways</b>				<b>412525</b>	<b>1876</b>
<b>Non Runway Complaints*</b>					<b>44</b>
<b>Total Complaints</b>					<b>1920</b>

1,876 complaints were registered against a particular runway operation.

\*The remaining 44 complaints were registered against missed approaches, ILS inspections, maintenance runups, helicopter operations and unknown sources.

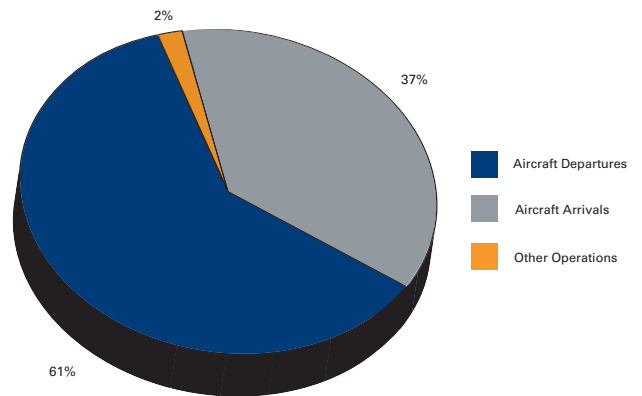
**Figure 11**

Monthly Comparison of Runway Movements and Noise Complaints



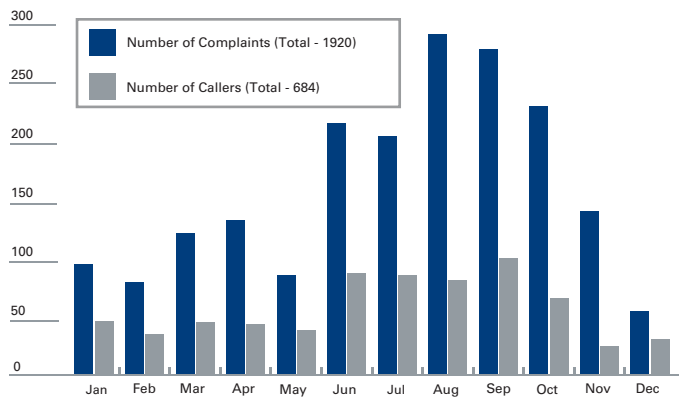
**Figure 12**

Noise Complaints by Operation



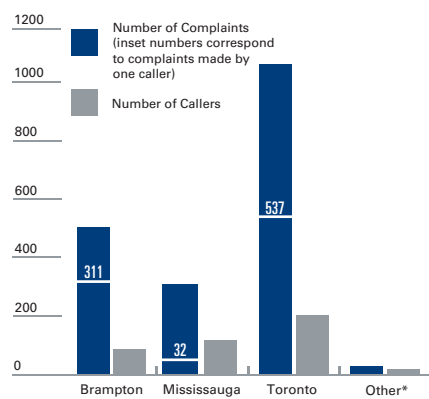
**Figure 13**

Monthly Comparison of Noise Complaints and Callers



**Figure 14**

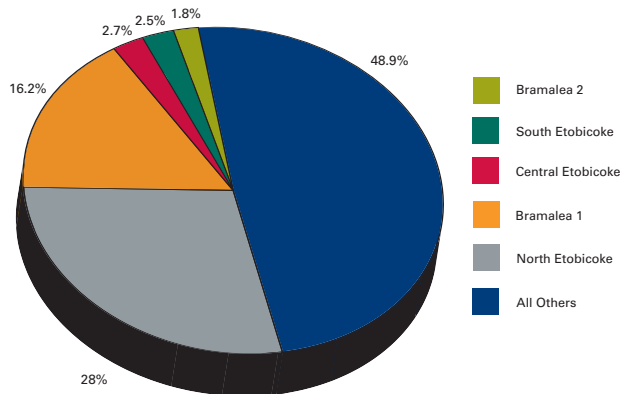
Comparison of Noise Complaints by Municipality



\*Thirty other complaints registered from: Halton Hills, Oakville, Vaughan and, Caledon

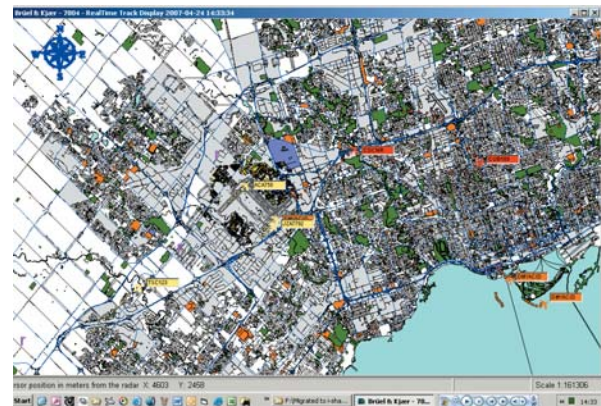
**Figure 15**

Top Five Callers vs. All Other Callers



**Figure 16**

Realtime Noise Monitoring Display



**Airport Noise Monitoring and Flight Tracking**

The GTAA utilizes a sophisticated Airport Noise Monitoring and Flight Tracking System that combines radar flight tracking data from NAV Canada with mapping data from a Geographic Information System (GIS). This data is then correlated with noise readings collected at the Noise Monitoring Terminals (NMTs) in the surrounding communities. Figure 16 is a screen

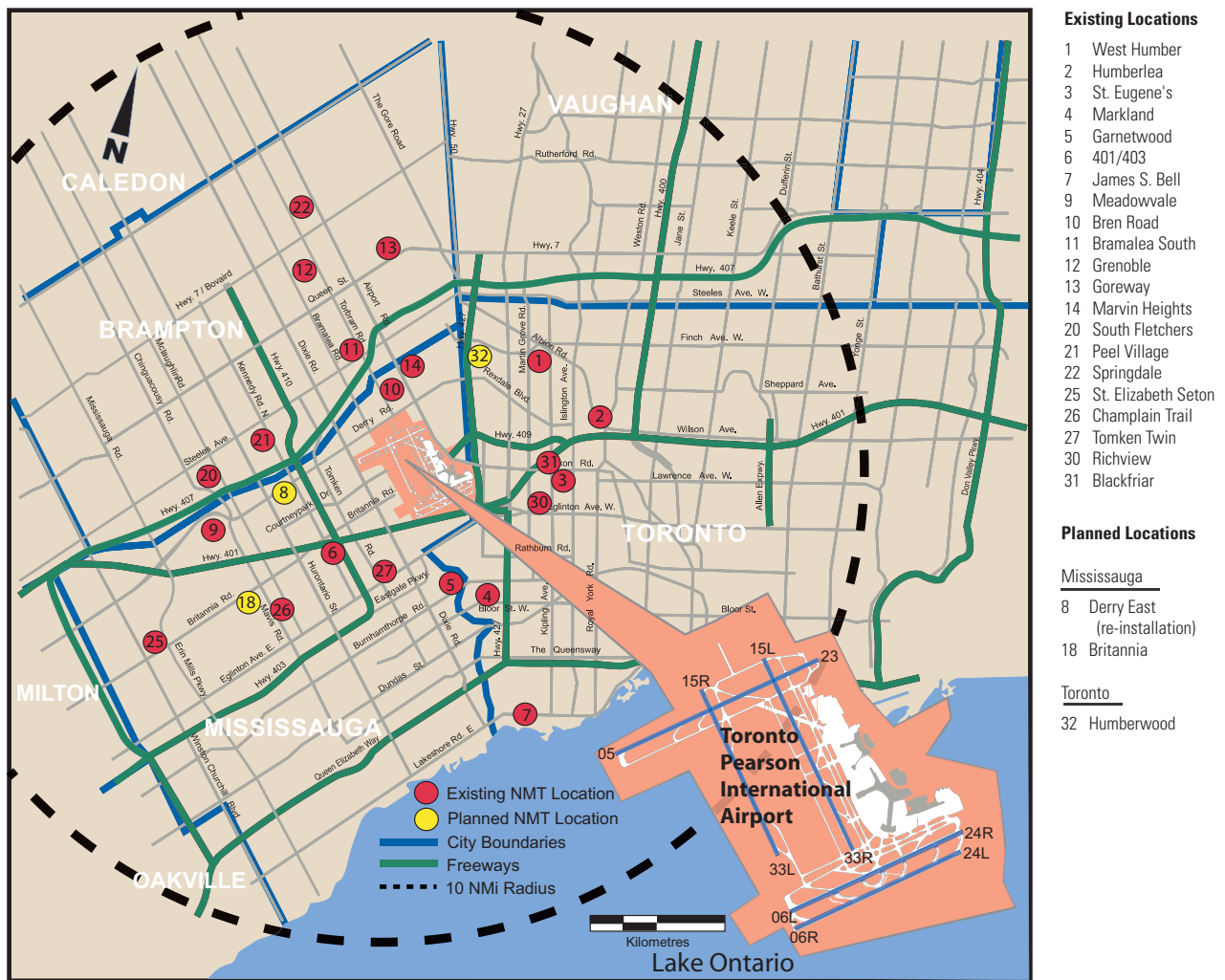
shot of the system's real-time display mode that provides the GTAA with the following information respectively in descending order: aircraft identification; current altitude above sea level; aircraft type; ground speed; transponder code; origin; and destination. Aircraft arriving at Toronto Pearson are shown in yellow, while departing aircraft are shown in red.

### Community Noise Monitoring Terminals

The GTAA uses NMTs within the Noise Management Program to quantify aircraft noise throughout the Airport Operating Area. Using specialized software, NMO staff collect and analyze noise levels generated by aircraft operating in and out of Toronto Pearson. A total of 21 NMTs are currently in operation. The NMT data is used by NMO staff when investigating resident complaints.

The GTAA has committed to the NMC that it will strategically place NMTs in each of the surrounding municipalities to improve the monitoring of aircraft noise and increase the effectiveness of aircraft noise analysis. The most recently added NMT locations were recommended by the NMC and the location of every NMT was selected to establish a comprehensive NMT footprint across the communities surrounding Toronto Pearson. Over the years, the number of NMTs in neighbourhoods around Toronto Pearson has continued to increase.

**Figure 17**  
NMT Location Map





**Figure 18**

NMT LEQ Data

NMT	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Toronto</b>													
1	West Humber	60.5	60.1	58.9	59.0	60.0	59.7	59.6	59.5	88.9	60.3	59.5	60.2
2	Humberlea	59.1	58.8	58.6	58.7	59.2	-	61.1	61.6	65.8	65.8	60.1	60.0
3	St. Eugene's	58.1	59.3	58.1	-	56.2	56.4	53.9	54.2	55.3	56.1	55.0	56.2
4	Markland	56.4	56.4	56.5	-	56.7	56.5	54.8	54.9	56.7	57.4	-	-
7	James S. Bell	55.8	57.0	56.4	-	56.4	57.5	57.0	57.6	56.6	55.4	54.3	54.5
31	Blackfriar	64.3	64.7	65.0	64.6	64.1	65.4	-	-	64.0	64.6	64.4	65.0
<b>Mississauga</b>													
5	Garnetwood	-	-	-	-	55.6	-	54.9	-	-	56.9	54.9	54.6
6	Hwy 401 & Hwy 403	60.9	-	66.8	-	-	-	-	-	-	62.7	62.7	-
8	Derry East	-	-	-	-	-	-	-	-	-	-	-	-
9	Meadowvale	58.0	58.1	58.4	59.0	59.9	58.4	-	59.7	59.2	58.9	58.6	58.2
10	Bren Road	56.1	56.3	56.7	56.6	65.2	65.7	64.9	63.9	64.4	63.2	-	62.5
14	Marvin Heights	56.9	-	-	-	57.4	57.3	56.3	57.0	60.9	64.7	60.2	64.7
26	Champlain Trail	-	-	59.7	64.0	-	58.2	56.5	55.8	66.1	58.9	59.1	-
27	Tomken Twin	60.8	63.0	61.2	62.1	57.9	57.6	59.5	57.5	57.5	58.9	57.5	58.4
<b>Brampton</b>													
11	Bramalea South	59.1	58.1	58.4	57.4	57.9	58.4	57.3	56.4	57.0	58.5	-	55.2
12	Grenoble	55.9	56.2	56.2	54.5	54.1	54.1	51.9	55.2	57.3	56.5	52.3	53.7
13	Goreway	-	-	-	-	-	58.2	55.7	-	54.6	55.8	54.4	54.4
20	South Fletchers	63.1	63.4	62.7	-	62.5	61.8	62.1	61.9	62.3	63.0	63.0	62.9
21	Peel Village	-	-	59.0	-	58.5	55.0	55.2	54.1	55.9	59.8	54.1	65.0

1. NMT #6 out of service April - August 2006 due to construction near the site.
2. NMT #8 out of service due to new building on the property. To be re-installed in 2007.
3. Noise level data provided for NMTs that were active over 75% of the time.

Figure 18 shows the measured monthly average noise levels at each Noise Monitoring Terminal. Noise data presented includes the contribution of all noise sources, and not simply aircraft generated. The varying locations of the NMTs in the community contribute to the variation in noise levels, where some NMTs may be closer than others to regular arrival and departure flight paths (see Fig. 17).

### Registering Complaints

To register an aircraft noise complaint within 10 nautical miles (18.5 km) of Toronto Pearson, contact the NMO at (416) 247-7682. Noise complaints can also be registered through the GTAA web site at [www.GTAA.com](http://www.GTAA.com).

For complaints concerning en route aircraft or those beyond 10 nautical miles (18.5 km) of the airport, call Transport Canada at (416) 952-0335.

### Investigations and Enforcement

The GTAA investigates potential violations of noise abatement procedures, restricted hours operations and maintenance engine run-ups. Investigations conducted by the GTAA result from both registered public complaints and ongoing tracking and monitoring carried out by the GTAA.

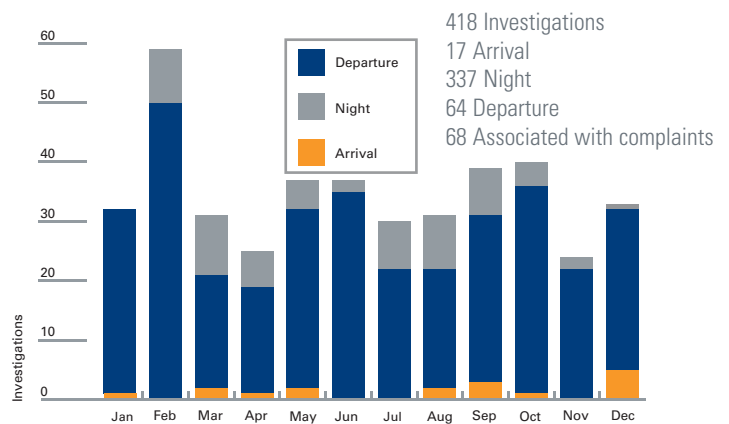
If GTAA staff believes that a violation has occurred, the details of the case are forwarded to Transport Canada for final disposition, as it has the sole authority for determining financial penalties. For any violation, Transport Canada can assess a maximum fine of \$25,000 against a company and \$5,000 against a pilot. In addition, at the urging and in sup-

port of the NMC, Transport Canada publishes the names of corporations violating the Aeronautics Act and the Canadian Aviation Regulations, including noise violations, on its web site:

<http://www.tc.gc.ca/civilaviation/regserv/enforcement/publications/corporate/summary.htm>

**Figure 19**

Monthly Enforcement Investigations



# GLOSSARY

**Airport elevation** 569 feet above sea level

**ATAC** Air Transport Association of Canada

**CAEP** Committee on Aviation Environmental Protection

**CARs** Canadian Aviation Regulations

**Chapter 2** Noise certification class for jet aircraft built after 1977 with noisier low-bypass and early high-bypass turbofan engines

**Chapter 3** Noise certification class for jet aircraft built after 1995 with newer, quieter high-bypass turbofan engines; required standard for jet aircraft operating in Canada since April 1, 2002

**Chapter 4** Noise certification class for jet aircraft built after January 1, 2006, with latest, quietest engine technology

**CRJ** Canadair Regional Jet

**dBA** A-weighted decibel scale that defines sound volume within the range perceptible by the human ear

**Glide slope** Descent profile during final approach

**GTA** Greater Toronto Area

**GTAA** Greater Toronto Airports Authority

**GTOW** Gross Take-Off Weight

**Hushkit** Engine modification to reduce Chapter-2-certified jet aircraft noise to Chapter 3 standards

**ICAO** International Civil Aviation Organization

**ILS** Instrument Landing System

**Leq** Continuous equivalent sound level (average noise level)

**Movement** Aircraft arrival or departure

**NEF** Noise Exposure Forecast

**NMC** Noise Management Committee

**Nmi** Nautical mile (1.152 statute mile or 1.853 kilometres)

**NMO** Noise Management Office

**NMT** Noise Monitoring Terminal

**Non-noise certificate** Noise certification class for jet aircraft, such as military and historical aircraft, that use the noisiest and often the oldest engine technology

**Power plant** Propeller, turboprop, turbojet, or turbofan engine

**Rwy** Runway

**Runway 05/23** 11,120-foot east-west runway (heading 057 degrees and 237 degrees magnetic)

**Runway 06R/24L** 9,000-foot east-west runway (heading 057 degrees and 237 degrees magnetic)

**Runway 06L/24R** 9,697-foot east-west runway (heading 057 degrees and 237 degrees magnetic)

**Runway 15R/33L** 9,088-foot north-south runway (heading 147 degrees and 327 degrees magnetic)

**Runway 15L/33R** 11,050-foot north-south runway (heading 147 degrees and 327 degrees magnetic)

**Subsonic** Relating to speeds less than the speed of sound

**Threshold** First usable portion of a runway for landing

**TNC** Technical Noise Committee

**Transponder** Radio receiver/transmitter



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