Welcome

Toronto Pearson Residents’ Reference Panel on Noise Fairness and Airport Growth

Please sit where you like
We will get started at 9am
Peter MacLeod
Chair of the Toronto Pearson Residents’ Reference Panel
Provide clarity
Create momentum
Ensure everyone feels heard
Make this a productive conversation
Why now?
Pearson is planning a major expansion
Two major noise studies are underway

Pearson wants guidance on its next phase of growth to ensure that it manages the impact of its operations responsibly.

We are looking to you to suggest better ways to:

- provide new transit options for the airport and region
- manage and mitigate noise from aircraft
- engage and inform residents about our operations
- strengthen our commitment to the environment
The Reference Panel is one of six initiatives underway to gather the insights and concerns of residents:

- Residents’ Reference Panel
- Noise Experience and Fairness Survey
- Community Environment and Noise Advisory Committee
- Briefings with elected officials
- Public Workshops
- Stakeholder interviews and meetings
Your mandate

The Reference Panel is tasked with advising the GTAA on the measures, standards and commitments it should adopt to meet the needs of area residents and support regional growth.

Specifically, the Reference Panel will develop:

• A set of values which describe its vision of responsible growth;
• A list of issues which the GTAA should attempt to address within its growth plan
• Criteria for evaluating options to mitigate and manage aircraft noise
• Additional recommendations concerning transit options, noise management, environmental stewardship and public communications and engagement
Your task

Learn about aviation trends, airport operations and their impacts, international best practices

Consider contrasting perspectives and the wider regulatory environment in which the airport operates

Address the concerns those most impacted by aircraft operations

Recommend actions that can support responsible growth of the airport and the region
Members are asked to...

• Attend all sessions of the Reference Panel as well as at least one of the Public Workshops;
• Work to understand and represent the varied perspectives of all residents;
• Treat each other with respect and take an active role in the work of the Reference Panel; and
• Work collaboratively to achieve a strong consensus concerning the Panel’s recommendations.
<table>
<thead>
<tr>
<th>May 27</th>
<th>June 3</th>
<th>Sept 9</th>
<th>Sept 16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welcome &amp; Orientation</strong></td>
<td><strong>Mega-hubs: The Frankfurt Experience</strong>&lt;br&gt;Max Philipp Conrady</td>
<td><strong>Transit Perspectives</strong></td>
<td><strong>Drafting recommendations</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Toronto Pearson Operations 101</strong>&lt;br&gt;Cynthia Wood</td>
<td><strong>Break</strong></td>
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<tr>
<td><strong>Break</strong></td>
<td><strong>Understanding the GTAA:</strong>&lt;br&gt;History, structure, responsibilities, service volumes</td>
<td><strong>Environment Perspectives</strong></td>
<td></td>
</tr>
<tr>
<td><strong>What is the mega-hub vision:</strong>&lt;br&gt;Demand-led growth, implications, opportunities</td>
<td><strong>Fundamentals of Acoustics and Aircraft Noise</strong>&lt;br&gt;Colin Novak, Ph.D., P.Eng.</td>
<td><strong>Communications &amp; Engagement</strong></td>
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</tr>
<tr>
<td></td>
<td><strong>Airport Tour:</strong>&lt;br&gt;Introduction to Pearson, and understanding the passenger pathway</td>
<td><strong>Lunch</strong></td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
<td><strong>Managing the Toronto Pearson Airspace</strong>&lt;br&gt;Nick Boud, HELIOS</td>
<td><strong>Issues</strong></td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td><strong>Identifying issues and questions</strong></td>
<td><strong>Community Perspectives</strong>&lt;br&gt;Better Flights Paths&lt;br&gt;Markland Wood&lt;br&gt;Rockwood&lt;br&gt;Alderwood</td>
<td><strong>Break</strong></td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td><strong>Break</strong></td>
<td><strong>Noise fairness discussion</strong></td>
<td><strong>Priorities</strong></td>
<td><strong>Report</strong></td>
</tr>
<tr>
<td><strong>Adjourn</strong></td>
<td><strong>Roundtable Prep and Adjourn</strong></td>
<td><strong>Adjourn</strong></td>
<td><strong>Adjourn</strong></td>
</tr>
</tbody>
</table>

**Summer Public Workshops**
Help us host the public workshops

Each two-hour workshop will include a 30-minute presentation about the history of Toronto Pearson, the growth of the Greater Toronto and Hamilton area, and our vision for the future. You will then be invited to join a series of facilitated small group discussions with other local residents and members of the new Residents' Reference Panel, and suggest ways to:

• provide new transit options for the airport and region
• manage and mitigate noise from aircraft
• engage and inform residents about our operations
• strengthen our commitment to the environment

Tuesday, June 20
East of the airport
6:30 p.m. to 8:30 p.m.
Ismaili Centre
49 Wynford Drive
North York, Ontario M3C 1K1

Thursday, June 22
North of the airport
6:30 p.m. to 8:30 p.m.
Peel Art Gallery Museum & Archives
9 Wellington Street East
Brampton, Ontario L6W 1Y1

South of the airport
Wednesday, June 28
6:30 p.m. to 8:30 p.m.
Assembly Hall
1 Colonel Samuel Smith Park Drive
Etobicoke, Ontario M8V 4B6

Tuesday, July 4
Central
6:30 p.m. to 8:30 p.m.
Mississauga Living Art Centre
4141 Living Arts Drive
Mississauga, ON L5B 4B8

Thursday, July 6
West of the airport
6:30 p.m. to 8:30 p.m.
Harbour Banquet & Conference Centre
Bronte Room
2340 Ontario Street
Oakville, Ontario L6L 6P7
Last week
The Greater Golden Horseshoe
- 9.25 million people (26% of all Canadians)
- 4.5 million jobs (26% of all jobs in Canada)

The Greater Toronto Hamilton Area
- 7 million people (19% of all Canadians)
- 3.7 million jobs (21% of all jobs in Canada)
Our Region: By 2041...

The Greater Golden Horseshoe
- 9.25 million people (26% of all Canadians)
- 4.5 million jobs (26% of all jobs in Canada)
- 4.25 million more people
- 1.8 million more jobs

The Greater Toronto Hamilton Area
- 7 million people (19% of all Canadians)
- 3.7 million jobs (21% of all jobs in Canada)
- 2.7 million more people
- 1.1 million more jobs
work is changing too
Understanding the GTAA
Scott Armstrong, Director, External Communications, GTAA
Malton Airport 1937

Looking north on Sixth Line (Airport Road). National Steel Car and Village of Malton Four Corners can be seen in the top right.
Terminal 1: 1964 - 2004
Terminal 3 - 1991
Toronto Pearson at Transfer to GTAA – 1996

Managed and operated by the GTAA, a not-for-profit corporation, since 1996

Operated on a commercial basis

No taxpayer subsidy to fund operations or airport development
New Terminal 1
Opened 2004

Original T1

T2 Parking

T2
2nd stage of T1 Opened 2005
Growth Story

1970s
10.5 Million

1990s
21 Million

2016
44 Million
Passenger growth & aircraft movements

- **Passengers**
  - 2015: 41 Million
  - 2016: 44 Million (8% increase)

- **Movements**
  - 2015: 444,000
  - 2016: 457,000 (2.8% increase)

(Toronto Pearson)
1,500 GTAA employees

49,000 Toronto Pearson employees

300,000 jobs within the economic zone
Pearson Connects: Growing Canada with a mega hub airport

Eileen Waechter, Director, Planning, GTAA
Toronto Pearson is one of Canada's most important economic assets.
## Toronto Pearson’s significance on the world stage is increasing

<table>
<thead>
<tr>
<th>Airport</th>
<th>Passenger traffic, 2016, Millions</th>
<th>Change in passenger traffic between 2015 &amp; 2016, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dubai</td>
<td>83.7</td>
<td>+7.2%</td>
</tr>
<tr>
<td>London/Heathrow</td>
<td>75.7</td>
<td>+1.0%</td>
</tr>
<tr>
<td>Paris</td>
<td>65.9</td>
<td>+0.3%</td>
</tr>
<tr>
<td>New York JFK</td>
<td>60.6</td>
<td>+3.8%</td>
</tr>
<tr>
<td>Singapore</td>
<td>58.7</td>
<td>+5.9%</td>
</tr>
<tr>
<td>Pearson</td>
<td>44.3</td>
<td>+8.0%</td>
</tr>
</tbody>
</table>

Mega hubs of the world

Poised to be North America’s next mega hub.
Reaching the economic potential of Toronto Pearson

Global Hub
- 6.3% of Ontario GDP
- 332,000 jobs
- Connected to 67% of global economies

Regional transit network:
Connect to Southern Ontario with a multi-modal hub

Shorter wait times for passengers:
Increased funding for CATSA and CBSA

International Passenger
Supportive Policies:
Regulatory changes to support international passenger movement

Being a good neighbour:
Growing responsibly and sustainably

Mega Hub
- 8.5% of Ontario GDP
- Up to 700,000 jobs
- Connected to 80% of global economies

Toronto Pearson
Aviation demand challenge

49 million passengers is the present regional demand

110 million over the next 25 years
• Airports play important local roles and can support more passenger service, general aviation, cargo flights, etc.
• Better using capacity allows for the “highest and best use” of airport infrastructure to the region’s benefit
• High order transit connecting the region to its passenger airports reduces road congestion and keeps goods and people moving
Transit mode share

Less than 10% of passengers at YYZ take public transit

36% London Heathrow
40% Amsterdam Schiphol
50% Hong Kong Kai Tek
60% Shanghai Pudong
Toronto Pearson is well situated to connect jobs and innovation centres across the Greater Golden Horseshoe
Today

• The Frankfurt Experience
• Toronto Pearson Operations 101
• Fundamentals of Acoustics
• Revising our values
• Lunch
• Managing Pearson’s Airspace
• Community Perspectives
• Noise issues
• Public workshops
Mega-hubs: The Frankfurt Experience
Max Philipp Conrady

Vice-president, Airside and Terminal Management, Corporate Safety and Security, Environmental Impact Noise and Air Quality, Frankfurt Airport
Toronto Pearson Operations 101

Cynthia Woods
Manager, Noise Management Office, Stakeholder Relations and Communications
Toronto Pearson
Operations & Noise Management

Resident Reference Panel
June 3, 2017
Runways
Toronto Pearson Runways
How Runways are Selected

NAV CANADA assigns runways based on the following considerations:

**Wind, Weather, Surface Conditions:** In calm wind Air Traffic Control can assign any operationally suitable runway regardless of wind direction; “Into the wind” runway configurations are required in windier conditions. When runways are wet, covered in snow/ice, the crosswind threshold is reduced. Runways may be selected to avoid aircraft flying toward a storm.

** Preferential runway system:** Between 12:00am and 6:30am as set out in the Canada Air Pilot (CAP)

- **Arrivals:** 05, 15L, 06L; **Departures:** 23, 33R, 24R
- Under review as part of Toronto Noise Mitigation Initiatives – Idea #6

**Demand/Capacity:** Traffic levels vary throughout the day. Weekends and overnight= lower traffic so more configuration options. Weekend Runway Alternation under consideration – Idea #5

**Runway Length:** Pilots can request a specific runway based on operational requirements; Runway 15L/33R (a North/South Runway) is the longest runway, and is requested at times by long haul (heavy) aircraft

**Runway Availability:** Short term and longer term maintenance can affect runway configuration. Examples: airport surface closures (maintenance, snow clearing) or equipment outages (navigation aides, lighting)

**East/West configurations are the most common:**
1) Can use up to 3 runways at once
2) Aligned with prevailing wind direction (westerly)

Safety is #1 Priority when assigning runways!
## 2016 Runway Usage

<table>
<thead>
<tr>
<th>Rwy</th>
<th>Arrivals</th>
<th>Departures</th>
</tr>
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<tbody>
<tr>
<td>05</td>
<td>52,906</td>
<td>18,613</td>
</tr>
<tr>
<td>06L</td>
<td>16,653</td>
<td>56,764</td>
</tr>
<tr>
<td>06R</td>
<td>10,160</td>
<td>1,235</td>
</tr>
<tr>
<td>15L</td>
<td>2,520</td>
<td>1,660</td>
</tr>
<tr>
<td>15R</td>
<td>1,572</td>
<td>486</td>
</tr>
<tr>
<td>23</td>
<td>49,091</td>
<td>81,413</td>
</tr>
<tr>
<td>24L</td>
<td>21,257</td>
<td>801</td>
</tr>
<tr>
<td>24R</td>
<td>64,446</td>
<td>49,164</td>
</tr>
<tr>
<td>33L</td>
<td>9,170</td>
<td>762</td>
</tr>
<tr>
<td>33R</td>
<td>959</td>
<td>13,812</td>
</tr>
</tbody>
</table>
Arrivals follow Standard Terminal Arrival Route (STAR) to runway
Departures follow Standard Instrument Departure (SID) procedures
Flight Paths
Westerly Configuration
Flight Paths
Northerly Configuration
Noise Management Program
Noise Management Program

Elements of our Noise Management Program

**Noise Operating Restrictions**
- Night Flight Restriction Program
- Engine Run-Up Restrictions
- Preferential Runway Assignment (midnight-6:30 a.m.)

**Noise Abatement Procedures** – Pilots are required to comply with these procedures designed to minimize noise impacts

**Land Use Planning** – We work with municipalities to restrict residential development in the highest noise impacted areas (the Airport Operating Area)

**Enforcement Office** – All flights operating to/from Toronto Pearson are monitored for compliance to Noise Abatement and Noise Operating Restrictions

**Noise Management Office** – Staff respond to questions and concerns about aircraft noise, register and report on noise complaints

**Consultation and Outreach** – program to meet with residents in various ways – CENAC meetings, community open houses, publication of monthly community e-newsletter, airport events such as Street Festival/Runway Run

**Noise Management Action Plan** – the purpose of the initiatives of the Noise Management Action Plan is to ensure continuous improvement of the Noise Management Program. Recent/current initiatives include NMT Review and the Noise Management Benchmarking Study
How we Communicate

Noise Complaints
Residents can register noise complaints using any of the following means:

- **Online:** Using [WebTrak](#) to investigate aircraft operations and register complaints, or our online Complaint Form
- **Phone:** (416) 247-7682

CENAC Meetings
- Held four to five times per year.
- CENAC committee is comprised of community and Elected official representatives
- Technical advisors (NAV CANADA, Transport Canada, acoustician, airline)

Community Open Houses/Events
- Meet community members at community open houses and community events

Monthly E-Newsletter
- **Checking In** includes relevant information about Toronto Pearson including airport events, activities, noise mitigation initiatives and public consultations.
## Noise Complaints - 2016

<table>
<thead>
<tr>
<th>Federal Riding</th>
<th>Complaints</th>
<th>Callers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaches-East York</td>
<td>119</td>
<td>2</td>
</tr>
<tr>
<td>Bramalea - Gore - Malton</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Brampton Centre</td>
<td>437</td>
<td>38</td>
</tr>
<tr>
<td>Brampton East</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Brampton North</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Brampton South</td>
<td>58</td>
<td>23</td>
</tr>
<tr>
<td>Brampton West</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Burlington</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Davenport</td>
<td>39</td>
<td>4</td>
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<tr>
<td>Don Valley East</td>
<td>5086</td>
<td>17</td>
</tr>
<tr>
<td>Don Valley North</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Don Valley West</td>
<td>2276</td>
<td>47</td>
</tr>
<tr>
<td>Dufferin-Caledon</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>Eglinton-Lawrence</td>
<td>260</td>
<td>19</td>
</tr>
<tr>
<td>Etobicoke - Lakeshore</td>
<td>266</td>
<td>48</td>
</tr>
<tr>
<td>Etobicoke Centre</td>
<td>2918</td>
<td>109</td>
</tr>
<tr>
<td>Etobicoke North</td>
<td>2643</td>
<td>32</td>
</tr>
<tr>
<td>Humber River-Black Creek</td>
<td>89</td>
<td>48</td>
</tr>
<tr>
<td>King-Vaughan</td>
<td>92</td>
<td>18</td>
</tr>
<tr>
<td>Markham-Stouffville</td>
<td>858</td>
<td>2</td>
</tr>
<tr>
<td>Markham-Thornhill</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Markham-Unionhill</td>
<td>9</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Federal Riding</th>
<th>Complaints</th>
<th>Callers</th>
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<tbody>
<tr>
<td>Mississauga Centre</td>
<td>5</td>
<td>4</td>
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<tr>
<td>Mississauga East-Cooksville</td>
<td>198</td>
<td>37</td>
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<tr>
<td>Mississauga-Bram. South</td>
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<td>1</td>
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<tr>
<td>Mississauga-Erin Mills</td>
<td>40</td>
<td>13</td>
</tr>
<tr>
<td>Mississauga-Lakeshore</td>
<td>69</td>
<td>13</td>
</tr>
<tr>
<td>Mississauga-Malton</td>
<td>270</td>
<td>33</td>
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<tr>
<td>Mississauga- Streetsville</td>
<td>891</td>
<td>44</td>
</tr>
<tr>
<td>Oakville</td>
<td>2610</td>
<td>67</td>
</tr>
<tr>
<td>Oakville North-Burlington</td>
<td>11606</td>
<td>88</td>
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<tr>
<td>Parkdale-High Park</td>
<td>14756</td>
<td>35</td>
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<tr>
<td>Richmond Hill</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Scarborough Centre</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Scarborough-Agincourt</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Scarborough-Guildwood</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Scarborough-Rouge Park</td>
<td>639</td>
<td>1</td>
</tr>
<tr>
<td>Spadina-Fort York</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Thornhill</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Toronto-Danforth</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Toronto-St. Paul's</td>
<td>991</td>
<td>19</td>
</tr>
<tr>
<td>University-Rosedale</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Vaughan-Woodbridge</td>
<td>207</td>
<td>9</td>
</tr>
<tr>
<td>Wellington-Halton Hills</td>
<td>5431</td>
<td>23</td>
</tr>
<tr>
<td>Willowdale</td>
<td>73</td>
<td>10</td>
</tr>
<tr>
<td>York Centre</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>York South-Weston</td>
<td>3</td>
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</tbody>
</table>

**Grand Total** | 53135 | 880 |
Complaints & Runway Movements
All Hours

Complaints by Runway Movements
Total = 53,001

Runway Movements
Total = 453,444

72% of the complaints were for Arrivals
28% of the complaints were for Departures

Throughout the year, we also receive complaints against non-runway operations, including Helicopter, Instrument Landing Checks Overshoots, and Run Ups

Non-Runway Complaints Total = 134
Noise Experiences
Low and Loud
Noise Experiences
High Traffic Levels
Noise Experience

Nighttime Noise

<table>
<thead>
<tr>
<th>Runway</th>
<th>Arrivals</th>
<th>Departures</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>5,759</td>
<td>361</td>
</tr>
<tr>
<td>06L</td>
<td>559</td>
<td>302</td>
</tr>
<tr>
<td>06R</td>
<td>73</td>
<td>7</td>
</tr>
<tr>
<td>15L</td>
<td>1,696</td>
<td>100</td>
</tr>
<tr>
<td>15R</td>
<td>114</td>
<td>126</td>
</tr>
<tr>
<td>23</td>
<td>4,631</td>
<td>2,541</td>
</tr>
<tr>
<td>24L</td>
<td>91</td>
<td>0</td>
</tr>
<tr>
<td>24R</td>
<td>1,103</td>
<td>116</td>
</tr>
<tr>
<td>33L</td>
<td>89</td>
<td>28</td>
</tr>
<tr>
<td>33R</td>
<td>216</td>
<td>1,962</td>
</tr>
</tbody>
</table>

Preferential Runways in order of priority:
Arrivals – 1) 05 2) 15L 3) 06L; Departures – 1) 23, 2) 33R, 3) 24R
Note high usage of non-preferential runways due to prevailing westerly wind.
Noise Experiences
Nighttime Noise (downwind)
Issues/Trends
Night Flights

Night Flight Budget

• Night Flight = A flight that operates between 12:30 and 6:30 am
• In 1997, Transport Canada established a budget for the annual increase of night flights
• Formula - night flight movements can increase at the same rate as passenger growth.
• Only airport in Canada with a budget

2013 Night Flight Budget Amendment

• In 2011 following public consultation, the GTAA submitted a request to Transport Canada for an amendment to the Night Flight budget to accommodate growing demand. Transport Canada approved amendment in June 2013
• Amendment includes a “trigger” for three 10% bump-ups IF the annual actual night flight movements reaches 95% of the budget
• Bump up has not been required

Community Concern

• General concerns about night flights
• Formula based on passenger growth, not movements (passenger growth is higher)
• Concern about pending bump-up

<table>
<thead>
<tr>
<th>Type of Flight</th>
<th>2017 Budget</th>
</tr>
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<tbody>
<tr>
<td>Pre-Scheduled “Exemptions”</td>
<td>14,200</td>
</tr>
<tr>
<td>Unscheduled Day of “Extensions”</td>
<td>4,004</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18,204 (7.57% increase)</td>
</tr>
</tbody>
</table>
2012 Airspace Changes

On February 9, 2012, NAV CANADA implemented a change to routings for the **Toronto-Ottawa-Montreal Corridor**

**Purpose:**
- To increase efficiency and consistency of the airspace while reducing controller/pilot complexity, track miles, fuel burn & GHG emissions

**Local Impacts:**
- When redesigning the airspace, NAV CANADA had to comply with Transport Canada’s latest design criteria which required a wider turn radius on the base turn
- This meant the downwind for 06L/R and 24L/R moved 1 NM south (the downwind for other runways already met the criteria)
Airspace Change Protocol

In June 2015, NAV CANADA and the Canadian Airports Council published the Airspace Change Communications & Consultation Protocol to ensure residents:

1. Have the opportunity to know that a change may be taking place and why the change is necessary
2. Have the ability to learn and understand how the change may affect them, and
3. Are able to provide input that will be taken into consideration as part of the design process
Questions?
## Noise Mitigation Initiatives

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
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| **Toronto Airspace Noise Review**          | Commissioned by NAV CANADA  
• Led by Helios  
• Review of Toronto airspace, to determine whether all reasonable actions to reduce aircraft noise are being considered with respect to design and operation of the Toronto area airspace.                                                                                                                                                                                                 |  
• Helios undertook a consultation and public engagement process to gather public input.  
• Deadline for input was March 30th, however, due to increased interest in the study the public comment period has been extended to May 31, 2017. |
| **Toronto Noise Mitigation Initiatives**   | NAV CANADA and the GTAA are studying six noise mitigation ideas:  
1. New Approaches for night-time operations  
2. New Nighttime departure procedures  
3. Increase downwind arrival speeds  
4. Use new technology to reduce need for low altitude leveling of arriving aircraft  
5. Weekend Runway Alternation  
6. Review of Preferential Runway System                                                                                                                                                                                                 |  
• The GTAA expects to begin consultation on Ideas 5 & 6 later this fall.                                                                                                                                     |
| **Noise Management Benchmarking Study**    | Commissioned by GTAA  
• Initiative of the Noise Management Action Plan,  
• Working with Helios to benchmark Toronto Pearson Noise Management Program and identify potential new programs or initiatives to pursue.                                                                                                                                                                                                 |  
• This study is expected to be completed by Summer 2017.                                                                                                                                                      |
The Six Ideas
In June 2015, the GTAA announced a three-phase Noise Mitigation Initiatives Engagement Plan with NAV CANADA to study six ideas that have the potential to reduce the noise impact of Toronto Pearson’s operations on surrounding neighbourhoods.

- These ideas are in response to feedback that has been provided by the community.

1. New Approaches for night-time operations – improved descent profiles
2. New Departure Procedures for night-time operations – higher altitude requirements for turns
3. Increase downwind arrival speeds to reduce flap use
4. Use of RNP to allow for constant descent in parallel operations
5. Weekend Runway alternation
6. Preferential Runway Review

- Stakeholder roundtable sessions held in summer 2015
- Technical Briefing May 2016
The final phase of construction for the second North/South Runway at Toronto - Lester B. Pearson International Airport is underway. On completion, this runway will be 8500 ft in operational length with a lateral separation of 3500 ft from the existing Runway 15L/33R. Approximately 6200' of the runway’s total length is expected to be completed by late 1996, and construction of the balance of the runway will resume in the spring of 1997. It is anticipated that the runway will be operational by fall 1997.

Airport management is proposing to use the new runway (15R/33L) primarily for landings to minimize noise impacts and has furthermore committed that operations on the new runway will be limited to those periods when weather mandated (strong crosswinds incapable of use of the parallel east/west runways) or required due to other exceptional circumstances (existing north/south runway out of service, disabled aircraft, or other safety concerns). With the new runway, the airport’s crosswind capability will increase from approximately 50 to 70 movements per hour.

Historical wind data indicate that mandatory usage of north/south runways will be for approximately 5% of the time for arrivals from the south and 1% of the time for arrivals from the north. When north/south operations are required, the airport’s capacity drops from approximately 90 (arrival and departure) movements per hour (during east/west parallel runway operations) to 50 movements per hour. These numbers are determined by including attendant delays and congestion on the runways and within the terminals at LBPIA as well as other airports in the national system. With the addition of a second north/south runway, crosswind capability will increase to allow approximately 30 landings per hour on the new runway and 40 departures on the existing runway for a total of 70 movements per hour.
Fundamentals of Acoustics and Aircraft Noise

Colin Novak, Ph.D., P.Eng.

Akoustik Engineering Limited
Fundamentals of Acoustics and Aircraft Noise
Residents' Reference Panel

Colin Novak Ph.D., P.Eng.
Akoustik Engineering Limited
June 03, 20157
Why is it important to consider environmental noise?

- Studies have shown that approximately 20% of the world population is exposed to unacceptable environmental noise.

- As cities grow, residential areas are encroaching on transportation routes and industrial sources.

- While regulatory requirements are becoming more prominent, many inconsistencies and lack of understanding still exist.
Terminology of Sound

• There are many ways to describe and quantify sound, it is important to understand the applicability of each, including:
  • Sound Pressure level (dB or dBA)
  • Sound Power level (dB)
  • Sound Intensity level (dB)
  • Loudness (Phons or Sones)
  • Effective Perceived Noise Level - EPNL (dB)
  • Statistical Parameters - Ln (dB)

• It is important to also refer to the physical quantities of sound when describing levels and the impact of changing levels
What is sound?

What is the definition of sound?

• Sound is the propagation of a disturbance through a medium. For air, sound propagates at the speed of sound or approximately 340 m/s at STP.

How would you define noise?

• Noise is generally considered to be any unwanted sound.
• Environmental Noise is generally referred to as unwanted sound produced by human activities which interfere with communication, work, rest, recreation and sleep.
What is sound?

Pressure [Pa]

101 000 Pascal

Time
• Magnitude of sound pressure affecting the ear varies from $2 \times 10^{-5}$ Pa at the threshold of perception to 200 Pa at instantaneous damage.

• To account for this, a log scale is used to describe sound pressure level which gives the units of dB.
It is important to understand how the propagation of noise varies with distance.

Ideally, we should experience a 6 dB reduction per doubling of distance. Most real sources DO NOT behave this way.
Frequency
### Perception of Sound

<table>
<thead>
<tr>
<th>Change in Sound Level (dB)</th>
<th>Change in Perceived Loudness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Just perceptible</td>
</tr>
<tr>
<td>5</td>
<td>Noticeable difference</td>
</tr>
<tr>
<td>10</td>
<td>Twice (or 1/2) as loud</td>
</tr>
<tr>
<td>15</td>
<td>Large change</td>
</tr>
<tr>
<td>20</td>
<td>Four times (or 1/4) as loud</td>
</tr>
</tbody>
</table>
Sources of Aircraft Noise

- Mechanical and Fluid Dynamic Noise
  - Fan and Compressor
  - Turbine and Combustion
  - Jet
- Aerodynamic Noise
  - Landing gear
  - Flaps
  - Air brakes

Each source has its own characteristic amplitude, frequency and directivity that contributes to the aircrafts overall noise.
Sources of Aircraft Noise on Approach

- On approach, engine noise is generally the largest contributor to noise
- Most significant engine noise is from the fan and turbine
- Aerodynamic noise from landing gear and flaps can also be significant
- To reduce EPNL at approach, fan noise and airframe noise must be reduced
Propagation of Aircraft Noise

- The simplified statement of 6 dB attenuation of sound for each doubling of distance that the sound travels is an unrealistic over estimation.
- The attenuation from propagation is the result of many variables (many of which are non-linear) and is also frequency dependent, these include:
  - Degree of the uniformity of spherical spreading of the noise source
  - Atmospheric absorption and reflection,
  - Ground absorption and reflection
  - Atmospheric turbulence
  - Refraction due to wind
  - Temperature inversion
Managing Aircraft Noise

- Aircraft noise abatement has traditionally focused on:
  - Replacement of older aircraft and engine retrofit
  - Implementation of flight operations including:
    - Minimize overflying in high population areas
    - Minimize flying at sensitive times
    - Quieter procedures
    - Discourage new development

- These efforts have lessened or controlled the growth of ground level noise level contours
- However, present noise contour sizes will likely increase due to forecasted capacity demands
Quantifying Aircraft Noise

- Community noise exposure is presently measured using engineering noise metrics eg., $L_{DN}$, CNEL, Leq, SEL, TA, NA etc.
- These metrics are only some of the factors to quantify community annoyance
  - There is question to their true correlation to annoyance
Other Factors Driving Annoyance

- Noise level is not the only factor to drive annoyance of aircraft noise
  - Relative difference between aircraft noise level to ambient noise level
  - Frequency of aircraft flyover events
  - Higher concentration of aircraft flying a narrower slot due to improved navigation
  - Higher frequency component to aircraft noise is psychoacoustically less desirable
  - Time of day/week - night time and weekend operations
  - Demographics and geographic location
Thank you for listening!
Reviewing our values
Lunch
Managing the Toronto Pearson Airspace
Nick Boud
Principal Consultant, HELIOS
GTAA Resident Reference Panel
Saturday 3rd June
Agenda

1. Who are Helios and who am I
2. Comparison of airport throughput and geographic footprints
3. Role of NAV CANADA
4. Toronto Airspace
5. Independent Toronto Airspace Review
6. Noise modelling for Initiatives 5 & 6
Who are Helios and who am I

- UK aviation consultancy, owned by Egis
- Approx. 65 employees
- Airports, Air navigation services, Institutions
- World wide experience
- Reputation for excellence and quality

- Nick Boud
- Aviation consultant
- 25 years aviation experience
- Airport planning
- Aviation noise
- Air space change
- Consultation
- Policy
Role of NAV CANADA

- Provides air navigation services across Canada
- Accountable for the safe & efficient management of aircraft within controlled airspace
- Design the airspace structure and flight paths
- Publish information to support the safe & efficient use and operation of Canadian airspace
Airspace

- Airspace is a 3D jigsaw with many pieces
- Toronto’s is no more or less complex
- Airspace is different at every airport as every airport is different
- The safest airspace is the most predictable airspace
- Airspace and air traffic control is very “systemised”
- NAV CANADA’s operation is heavily manual / eye balling
- One unusual element is a 3000ft hard anchor on the south downwinds
Arrival flight paths

2010

2016
Arrivals

2010

2016
Departures

2010

Departure vector area

Initial climb path

Airport

2016

Departure vector area

Departure vector area

Departure vector area

Departure vector area
Change in arrival flight path density
Average July day 2016 vs 2010
Change in departure flight path density
Average July day 2016 vs 2010
Independent Toronto Airspace Review

- Purpose to identify additional mitigations to reduce the impact of aviation noise.
- Will recommend mitigations where they will reduce noise e.g. keeping aircraft higher for longer.
- Options for noise sharing will be identified but require further consultation.
- Only able to make recommendations against NAV CANADA
- Further information: www.TorontoAirspaceReview.ca
Noise mitigation initiatives 5 & 6

- **5 = Weekend runway alternation**
  - Investigation of different scenarios that may allow aviation noise at weekends to be shared, on a pre-determined basis, across different communities.
  - Number of options being investigated and noise modelling undertaken.
  - GTAA would have to undertake community consultation before implementing.
  - Noise sharing means some communities get less noise than they currently do but other communities get more.
  - Noise sharing can be a very emotive topic amongst communities.

- **6 = Review of night preference runways**
  - The current night preference runways have not changed or been reviewed in many years.
  - Demographics have change substantially, what are the least impacting night runways now?
  - No preference runway for flights landing or taking off from the east to the west, although significant night operations in this direction due to winds.
Large industrial areas around Pearson
Average noise contour
2015 Actual Weekend 17.5LAeq
Time Above contours
2015 Actual weekend TA 70dB LAmax
Number Above contours
2015 Actual weekend NA 70dB LAmx
Community Perspectives

Joe Silva, Rockwood Homeowners Association

Jane Stygall, Alderwood Airplane Noise

Richard Macklin, Better Flight Paths

Richard Boehnke and Donald Beggs, Markland Wood Homeowners Association
The Panel’s mandate

The Reference Panel is tasked with advising the GTAA on the measures, standards and commitments it should adopt to meet the needs of area residents and support regional growth.

Specifically, the Reference Panel will develop:

• A set of values which describe its vision of responsible growth;
• A list of issues which the GTAA should attempt to address within its growth plan;
• Criteria for evaluating options to mitigate and manage aircraft noise;
• Additional recommendations concerning transit options, noise management, environmental stewardship and public communications and engagement.
RADIO FREQUENCIES

Unless otherwise authorized by the controlling unit
(e.g. Ground Control & Apron Advisory)
North Apron - 121.850 - (North of AK)
South Apron - 121.900 - (South of AK)
Centre Ground - 119.100 (Tower Back-up - 118.000)
North Apron, All T3 Gates, T3 Satellite, T1 Gates 101 to 128, 131, 133, 135, 137, 139, 140 to 142 and IFT, FedEx and Cargo 1, 2, 3 - 122.275
South Apron & AviaSta/SkyServe/3 Bay Hangar, T1 Gates 132, 134, 136, 138, 143 to 145, gates 160 to 183, gates 244 to 272 and all H gates - 122.075
Apron Coordinator - 122.875
T1 and T3 Apron Back-up - 122.825
Pad Control (CDF) - 131.175
Iceman South - 131.575 (Pads 1, 2, 3) and Iceman North - 129.625 (Pads 4, 5, 6)
Back-up (CDF) - 131.950
Hangar Decontamination Facility (HDF) - 130.675

At no time shall a vehicle cross an illuminated red strobe. Be alert to runway crossing instructions. Readback of all hold short instructions is required.
Residents' Air Noise Group of Oakville (RANGO)
Two tasks...

What are the top six issues concerning noise as you understand them?

Propose three principles that should guide the GTAA’s approach to managing and mitigating noise...
Help us host the public workshops

Each two-hour workshop will include a 30-minute presentation about the history of Toronto Pearson, the growth of the Greater Toronto and Hamilton area, and our vision for the future. You will then be invited to join a series of facilitated small group discussions with other local residents and members of the new Residents’ Reference Panel, and suggest ways to:

- provide new transit options for the airport and region
- manage and mitigate noise from aircraft
- engage and inform residents about our operations
- strengthen our commitment to the environment

Tuesday, June 20
East of the airport
6:30 p.m. to 8:30 p.m.
Ismaili Centre
49 Wynford Drive
North York, Ontario M3C 1K1

Thursday, June 22
North of the airport
6:30 p.m. to 8:30 p.m.
Peel Art Gallery Museum & Archives
9 Wellington Street East
Brampton, Ontario L6W 1Y1

South of the airport
Wednesday, June 28
6:30 p.m. to 8:30 p.m.
Assembly Hall
1 Colonel Samuel Smith Park Drive
Etobicoke, Ontario M8V 4B6

Tuesday, July 4
Central
6:30 p.m. to 8:30 p.m.
Mississauga Living Art Centre
4141 Living Arts Drive
Mississauga, ON L5B 4B8

Thursday, July 6
West of the airport
6:30 p.m. to 8:30 p.m.
Harbour Banquet & Conference Centre
Bronte Room
2340 Ontario Street
Oakville, Ontario L6L 6P7
Thank you

Don’t worry. Don’t fester.

Call us: 1-844-788-5803
torontopearson.com/rrp

We’ll see you next week!