COMMUNITY NOISE MITIGATION SUGGESTIONS

Toronto Pearson is one of North America's fastest growing global hub airports, handling nearly 40 million passengers today, and well on its way to reaching greater than 64 million passengers by 2033. As a significant contributor to the local and national economies, a job creator, and a facilitator for trade and foreign investment, Toronto Pearson knits Canada together and helps our country compete globally.

We recognize that airports have impacts, such as noise on local communities. While airplane noise can't be eliminated entirely, we know the community served by the airport expects us to be a good neighbour. One important way to do this is to lessen the impact of our operations on our neighbours by reducing aircraft noise where possible.

NAV CANADA and the GTAA are studying six ideas we think will have benefits for the communities surrounding Toronto Pearson and we've been out talking about them at Stakeholder Roundtables throughout the GTA.

The ideas that were reviewed as part of the Stakeholder Roundtables come, in part, from suggestions that have been provided by the community. The full list of community suggestions is below along with an explanation of how they are reflected in one or more of the six ideas under consideration, or why they were considered not feasible:

Suggestion	Assessment	Is suggestion reflected in the 6 Ideas currently under consideration?
Increase Downwind Altitudes: Suggestions to reduce noise in portions of the flight path by increasing altitude of aircraft operations on the downwind		
1. Lengthen the downwind to extend beyond the residential areas before turning base leg.	• This would increase altitudes over some communities overflown today, but would also overfly new neighbourhoods. • An Instrument Landing System (ILS) guides arriving aircraft to the runway. The strength of the ILS signal is not certified outside of 24 NM. Extending the downwind takes aircraft beyond the limit, and would require the aircraft controller to tactically maintain	Not reflected

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	vertical separation until the aircraft could be established on the ILS. • This would compromise parallel arrival operations, reducing capacity at the airport considerably.	
2. Have aircraft join final approach at 4000/5000' ASL instead of 3000/4000' ASL as they do today	• The requirement to intercept final approach at 3,000 ft ASL is a published noise abatement procedure. • Amending that procedure to intercept final approach at 4,000 ft ASL would extend the base leg out by 3 NM (5.5 km), over new communities and add 6 NM of flight distance to each flight. • While some communities on the downwind portion of the flight path would be overflown at slightly higher altitudes than today, the noise benefit of 1,000 ft of additional altitude is expected to be small (1-2 dBA at most). • Communities under the final approach would be overflown at the same altitudes experienced today.	Not reflected
3. Eliminate high/low arrival procedures	• There is a potential to eliminate high/low arrival procedures with the use of Required Navigation Performance (RNP) flight paths in the future. This would require the adoption of new separation standards and technology for RNP operations. • Without the high/low procedures, existing technologies do not allow non-RNP equipped arrivals to maintain safe separation in a parallel operation without significantly compromising capacity. • This is because safety standards require that separation between aircraft in the Terminal area be either 3 NM laterally or 1000 ft vertically until established on final	Yes. This is incorporated into Idea 4 - Use new technology to reduce the need for low altitude leveling by arriving aircraft

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	approach. • In parallel operations where the runways are closer than 3NM, such as at Toronto Pearson, vertical separation (altitude) must be used. • Eliminating high/low procedures would mean vertical separation would not be achieved, so all arrivals would have to meet lateral separation. This would require arrivals to be staggered , reducing the hourly airport arrival rate (the number of planes that can land in an hour) below the demand.	
4. Reverse high/low – make north of airport the low side and south of the airport the high side.	• Airport layout is a key driver for the design of airport operations. • In east-west operations, Toronto Pearson has one "north side" runway (runway 05/23) and two "south side" runways (24L/06R and 24R/06L). • Under normal daytime operations, the single runway on the north-end is operated as both a landing and departing runway. This requires larger spacing between arriving aircraft so that a departure can occur between arrivals. • On the south side, one of the south parallel runways is generally used for arrivals while the other is used for departures. As a result, minimal spacing can occur between arrivals in order to meet arrival rate demand. • Simulation has shown that using a higher altitude intercept on the south side decreases sequencing options. • Implementing this suggestion would be likely to reduce overall airport capacity below demand, and lower the	Not reflected

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	altitudes that aircraft fly in other areas of the GTA.	
5. Remove all descent guidance from the STAR at the beginning of the downwind and implement controller managed descent	• The current STAR provides common descent guidance, optimized for flights on a close in base leg, while allowing air traffic controllers to cancel STAR altitude restrictions when traffic warrants, such as when a longer downwind is required for sequencing purposes. • The absence of descent guidance in the STAR would require air traffic controllers to provide specific instructions to each pilot and for the instructions to be repeated back by each pilot, significantly increasing the complexity of the procedure, and pilot and controller workload and congestion on ATC radio frequencies. • In addition, there is no guarantee that these procedures would result in altitudes that are higher than those experienced today or that operations would be quieter. • In fact, evidence shows that aircraft tend to be higher today, at comparable places in the downwind portion of the approach than they were prior to 2012. • While it has been noted that several busy international airports continue to use controller managed descent it is not the trend, nor is it seen as best practice.	Not reflected
Adjust Arrival Flight Paths: Suggestions for relocating a portion of the flight path		
6. Move the current downwind that lies south of the airport further south	• While the downwind could conceivably be relocated further south, there are no viable locations to move the downwind that would result in the majority of the flight path being located over industrial or non/residential areas. • Depending on how much the flight path were to be moved, there would be impacts on operations at Billy	Not reflected

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	Bishop Airport. • This also has the potential to complicate sequencing procedures and create even longer level segments in the approach. (Level segments can result in an increase in noise.)	
7. Widen the downwind flight path to create more variation in where aircraft overfly	• Enabling aircraft to fly the downwind with variation (e.g. offsets) is not viable technically. This suggestion is not manageable from an air traffic controller or pilot perspective. • Small variation in the location of the flight path would be unlikely to result in material reductions in noise. • Removing flight paths entirely and resorting to air traffic controller vectoring would introduce variation but this would create safety, capacity issues and is contrary to the direction put forward by ICAO and is incompatible with the wider efficiencies of a PBN airspace system.	Not reflected
8. Create three or four alternate downwind flight paths in order to share the noise over various communities.	• Introducing variation in which STAR (arrival routes) pilots are to file and fly would introduce the potential for safety impacts to the operation. • This is not done in Canada and we are not aware of this being done anywhere in North America.	Not reflected
9. Overfly industrial areas, water/roads	• There are no viable options to connect industrial or non-residential areas in the Greater Toronto Area and meet instrument procedure design standards. • Placing flight paths over roads is not effective as a noise mitigation measure as the noise generated by an aircraft extends beyond the width of a highway.	Not reflected
10. Relocate the downwind over Lake Ontario	• In a normal east-west configuration, Canadian airspace over Lake Ontario is used for south, east and southwest	Yes. Elements (overnight period) incorporated into Idea 1 - New

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	bound climbing departure traffic and for the management of traffic flows to and from Billy Bishop Airport. It is not possible to safely accommodate Toronto Pearson arrival flight paths in this airspace as well. • While this concept is not possible during busy periods there may be opportunities to redesign arrival flight paths utilized at night, when departure traffic levels are lower and Billy Bishop airport is closed to commercial traffic. • It must be recognized however that the base leg portion of any new arrival path would overfly new neighbourhoods at night.	Approaches for night-time operations depending on final design
11. Create a new Pearson arrival STAR - LINNG direct to base leg (i.e. MAROD) that overflies Billy Bishop Airport	• A new STAR in this configuration is not possible during busy traffic periods due to crossing departure traffic from Toronto Pearson. Additionally it would reduce sequencing flexibility needed to manage high traffic volumes. • During overnight periods in which there are reduced arrival and departure volumes from Toronto Pearson and Billy Bishop airport is closed to commercial traffic, such a flight path may be viable. In fact, air traffic controllers already vector aircraft in this area on occasion. • It must be recognized however that the arrival path would overfly new neighbourhood, including neighbourhoods that are today impacted by aircraft operations from Billy Bishop Airport.	Yes. Elements (overnight period) incorporated into Idea 1 - New Approaches for night-time operations depending on final design
Runway Utilization: Suggestions involving changes to runway usage at Toronto Pearson.		
12. Increase the use of runways 15L/R and 33L/R	• The two north/south runways at Toronto Pearson have reduced capacity as compared to the three east /west runways. Often the capacity level of 15/33 operations would fall below the demand of daytime operations,	Not reflected

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	causing significant delays for aircraft and passengers. Today, approximately ninety-two per cent of the time, daytime operations use the east/west runways. • Land use directly south of the airport is not zoned to accommodate noise levels associated with significantly higher aircraft traffic. There is a potential that an increase in traffic could mean an extension of the 30NEF contour into this area which is incompatible with residential land use.	
13. Review Preferential Runways	• Preferential runways exist in an effort to have aircraft operating at night affect the fewest residential neighbourhoods. • A review of Toronto Pearson's night time preferential runway system is being undertaken. Among other factors, this review will consider land development patterns around the airport since the preferential runways were established.	Yes. This principle is incorporated into Idea 6 – Night-time preferential runway review
Management of Traffic during Quiet Hours: Suggestions to improve how traffic is managed during overnight period		
14. Provide night relief by improving the design of flight paths used at night	• During lower traffic periods at night, air traffic is often managed by landing on one runway and departing on the other. This provides some opportunity to change how traffic is managed. • For example, we may be able to improve descent profiles to eliminate the need for level flight segments. (Level segments can result in an increase in noise.) • It is believed that improved approaches and departures can be designed for use during lower traffic periods at night.	Yes. This principle is incorporated into Ideas 1 – New approaches for night-time operations, and Idea 2 – New departure procedures for night-time operations
Capacity Limits: Suggestions involving limiting traffic levels at the airport		

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15. Increase the CYYZ restricted night flight period to cover more hours than currently (12:30-6:30).	• Toronto Pearson operates around-the-clock, seven days a week. Generally, only 3 per cent of our flights taking off and landing at Toronto Pearson occur between 12:30 a.m. and 6:30 a.m. • The number of flights permitted at night is capped annually under an agreement with Transport Canada, which has been in place since 1997. We call this the budget. Toronto Pearson is the only North American airport with a budget. • Toronto Pearson always has – and will continue – to work diligently to manage night flights to ensure that only those flights that must operate at night take off and land between 12:30 a.m. and 6:30 a.m.	Ideas 1, 2 and 6 look for opportunities for nighttime noise relief.
16. Prescribe limits on traffic during hours adjacent to night flight period	• While the restricted hours are in effect between 12:30 a.m. and 6:30 a.m., the Preferential Runway system is in effect between *12:00 a.m*. and 6:30 a.m. Traffic isn't limited prior to the restricted hours, but it is handled differently through the use of the Preferential Runway system under which runways are used that impact the fewest people. • A review of the Preferential Runway system is reflected in Idea 6 - Night-time preferential runway review	Ideas 1, 2 and 6 look for opportunities for nighttime noise relief.
17. Eliminate all night flights other than emergency flights (e.g. medevac)	• Toronto Pearson reviews each night flight request and approves or denies the requests on a case-by-case basis. • A variety of factors are considered when approving scheduled flights which account for 80 per cent of the budget. Factors include: environmental and community impacts, economic impact and alignment with our mandate to support the economic development of the	Ideas 1, 2 and 6 look for opportunities for nighttime noise relief.

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	region • We reserve approximately 20 per cent of our budgeted flights to allow for situations outside of our control, such as weather delays, medevac flights, mechanical delays and for security reasons. • Toronto Pearson always has – and will continue – to work diligently to manage night flights to ensure that only those flights that must operate at night take off and land between 12:30 a.m. and 6:30 a.m.	
18. Limit traffic volumes on weekends and holidays	• There is growing demand from travellers and businesses in the GTHA, Ontario and across Canada for more flight options. To constrain traffic would affect the ability of the airport to meet the growing demands for traffic which would have negative implications for the economy. • Traffic levels are lower during much of the weekend than they are at other times. Current levels provide some opportunity to manage traffic differently on weekends than during other peak times.	Managing weekend traffic differently incorporated in Idea 5 – Establish Weekend Runway Alternation
Procedure Design: Suggestions that involved specific changes to the design of arrival or departure procedures.		
19. Eliminate early turns on departure	• Early turns are in effect for select eligible jet types between 7:00 a.m. and 11:00 p.m. and for propeller aircraft between 6:30 a.m. and 11:30 p.m. only. • These early turns are critical to the overall capacity of the airport. • Elimination of this procedure would require significant increases in spacing between departing aircraft to accommodate wake turbulence, and the differing speed and climb performance between aircraft types causing significant flight delays.	Not reflected

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20. Increase downwind speed to reduce the need for flaps/speed brakes by pilots	• Increased speeds do not preclude the use of flaps or speed brakes by pilots but may contribute to the reduced need for them in some instances. • In 2012, the downwind speed was increased from 190 kts to 200 kts. That speed is sufficient for most aircraft fleet types operating at Toronto Pearson to operate in a clean configuration (without the need for flaps/speed brakes). • New design criteria now in place enable that speed to be increased to 210 kts. Note: While 220 kts has been suggested by some parties, that speed is not permitted by design criteria and it is believed that would have the impact of simply moving the location on the flight path where speed brakes are deployed by pilots.	Yes. This principle is incorporated into Idea 3 – Increase downwind arrival speeds
Other		
21. Eliminate altitude anchor points on the downwind portion of the STAR	• Anchor altitudes exist on the STAR to ensure the aircraft flight management system provides the pilot with appropriate descent guidance to enable early base leg turns. • The location of the anchor point has been designed to provide constant descent guidance from the downwind to the 3,000 ft glide path intercept point. • When traffic sequencing requirements necessitate an extended downwind, these altitude restrictions are often cancelled by air traffic controllers so that aircraft can remain higher, longer. • The integration of RNP procedures into Toronto airspace in the future may alter the need for anchor points, however until that time they are a necessary component of the airspace design.	Not reflected

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22. Keep aircraft at clean speed until base or final approach	• A "clean configuration" refers to an aircraft with its flaps, speed brakes, and landing gear retracted – resulting in the aircraft operating with minimal drag. This configuration is believed to reduce, but not eliminate, airframe noise – the noise caused by air moving over the aircraft. • The speed at which a "clean configuration" is possible varies for different aircraft fleet types and even from day-to-day, according to wind conditions. • Toronto Pearson has a broad mix of aircraft fleet types that operate every day. During busy traffic periods in particular, speed must be consistent between forward and trailing aircraft in order to reduce the risk of loss of separation. • In some instances, when traffic levels are lower, air traffic controllers will cancel published speed restrictions in order to enable the pilot to choose an appropriate speed for their operation. This does not guarantee that a "clean configuration" speed will be flown. • The concept of increasing the published speed in a portion of the flight path in order to increase the number of aircraft that can operate clean is included in Idea 3.	Yes. This principle is incorporated into Idea 3 – Increase downwind arrival speeds
23. Analyze best practices in noise management at other international airports	• NAV CANADA and the Greater Toronto Airports Authority regularly work with air traffic services and airport operators in other countries to share best practices. • We intend to send a study team to several international airports to review noise abatement procedures and other operational practices in 2016. Airports referenced by community groups will be included in this project.	Yes. Incorporated in all Ideas.