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AIRSPACE CHANGE
COMMUNITY CONSULTATION REPORT

Proposed RNP AR Approaches
Runway 05 and 23
Toronto Pearson Airport (CYYZ)

NAV CANADA
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The information and diagrams contained in this report are for illustrative purposes only and are not to be used for navigation.

Executive Summary

RNP AR is part of a family of technologies that leverages capabilities of modern flight management systems for safer and more efficient navigation; it is a significant piece of technology for meeting commitments made by the global aviation industry to reduce greenhouse gas emissions. RNP AR allows for flight path designs that reduce track miles an aircraft must fly to its destination while providing for a constant descent.

This report examines a proposal to implement Required Navigation Performance Authorization Required (RNP AR) instrument approach procedures to both ends of runway 05/23 at Toronto Pearson Airport (CYYZ) and reports on the community consultation undertaken as per the Airspace Change Communications and Consultation Protocol (ACCCP).

The consultation process ran from November 1, 2021, to December 22, 2021 (52 total consultation days), which was undertaken in collaboration with the Greater Toronto Airport Authority and was promoted through the airport authority's noise forum events, local newspaper ads, online advertising, and automated phone calls to homes within the Greater Toronto Area. Eight online public meetings and fourteen personalized information sessions designed to educate attendees on RNP AR approach procedures were held during the consultation period. A significant number of elected officials at all three levels of government were contacted with information and nineteen officials or their representatives were provided a direct briefing.

Feedback was gathered from the public through a self-administered internet questionnaire consisting of structured (closed-ended) and unstructured (open-ended) questions. Throughout the consultation, many participants voiced concerns related to aircraft overflight they already experience today versus proposed changes; this was echoed in the survey results. Many comments also related to historical changes to flight paths caused by past airspace changes in the region. Feedback about the proposal itself indicated residents preferred that flight paths be designed to avoid overflying populated areas where possible, and that aircraft altitude be higher for as long as possible.

Following the consultation, all input received was assessed and considered. Implementation of Required Navigation Performance Authorization Required (RNP AR) instrument approach procedures to both ends of runway 05/23 at Toronto Pearson Airport (CYYZ) should proceed with a target implementation date of November 2022. Adjustments will be made to the original proposal as a result of feedback; these include the location of the RNP AR runway 23 approach arc segment which connects the downwind to the final approach and an increase in descent gradient on both the RNP AR approach procedures to runway 05 and to runway 23.

NAV CANADA will continue to collaborate with the Greater Toronto Airport Authority on other community noise comments that were raised during the consultation.

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1.0 Purpose

This report examines the proposal by NAV CANADA to implement Required Navigation Performance Authorization Required (RNP AR) instrument approach procedures to both ends of runway 05/23 at Toronto Pearson Airport (CYYZ) and reports on the community consultation undertaken as per the Airspace Change Communications and Consultation Protocol (ACCCP) [1].

The report includes an overview of the proposed changes, expected quantitative environmental impacts (including emissions reductions and noise impacts), details public engagement activities and their results, and provides recommendations.

2.0 Background

2.1 NAV CANADA

NAV CANADA was incorporated in 1996 as a non-share capital corporation pursuant to Part II of the Canada Corporations Act to acquire, own, manage, operate, maintain, and develop the Canadian civil air navigation system (the ANS), as defined in the Civil Air Navigation Services Commercialization Act [2] (the ANS Act); it continued under the Canada Not-for-profit Corporations Act. Principles governing the mandate conferred on NAV CANADA by the ANS Act include the right to provide civil air navigation services and the exclusive ability to set and collect customer service charges for such services.

The core business of NAV CANADA is to provide air navigation services (primarily within Canada). NAV CANADA is responsible for helping aircraft safely navigate the 18 million square kilometres of Canadian airspace and the North Atlantic oceanic airspace under Canada's control. As one of the world's largest air navigation service providers, NAV CANADA typically oversees several million flights a year through a network of area control centres, air traffic control towers, flight service stations, flight information centres and navigation aids across the country. As a not-for-profit corporation, NAV CANADA invests directly into its operations, people and infrastructure to keep Canada's ANS as safe, efficient and innovative as it can be. NAV CANADA is self-sustaining with revenue coming primarily from the fees charged aviation customers for our services.

As part of its ANS Act responsibilities, NAV CANADA has been designated as the authority in Canada responsible for providing aeronautical information services. This responsibility included design, maintenance and publication of instrument flight procedures (including departure and arrival procedures). All instrument flight procedures in Canada are designed in accordance with Canadian Aviation Regulations and the standards and criteria specified by Transport Canada (including the manual entitled Criteria for the Development of Instrument Procedures).

[1] Airspace Change Communications and Consultation Protocol (https://www.navcanada.ca/en/aviation-industry-airspace-change-communications-and-consultation-protocol-en.pdf)
[2] Civil Air Navigation Services Commercialization Act (S.C. 1996, c. 20) https://laws-lois.justice.gc.ca/eng/acts/C-29.7/

2.2 Toronto Pearson Airport and the Greater Toronto Airport Authority

Toronto Lester B. Pearson International Airport (CYYZ) is the country's busiest airport[3] and in the decade before the COVID-19 pandemic, it was one of the fastest growing airports in Canada by passenger volume. It is located approximately 29 kilometres northwest of Toronto's central business district and is centrally located within the Greater Toronto Area. The Airport is connected to downtown Toronto and the balance of the Greater Toronto Area through an extensive network of expressways, arterial roads and public transit. The Airport sits within the second-largest employment zone in Canada. The Airport contributes to the productivity of industries across the country by linking Canadian firms with markets, commercial partners and investors worldwide.

The Airport is managed and operated by the Greater Toronto Airports Authority (GTAA), a Canadian airport authority and a corporation without share capital. In 1996, an agreement was reached with the federal government, as represented by the Minister of Transport, to transfer the operation and management of the Airport to the GTAA pursuant to a ground lease dated December 2, 1996. The 60-year Ground Lease expiring in 2056 governs the economic and operating relationship between the GTAA, as the tenant, and Transport Canada, as landlord, for the term of the Ground Lease. The GTAA is responsible for essentially all costs of operating the Airport. The GTAA's mandate includes developing, managing, and operating the Airport, setting fees for the use of the Airport and developing and improving the Airport facilities.

The Airport has five runways. To accommodate varying wind conditions, there are three parallel runways in roughly the east-west direction and two parallel runways in roughly the north-south direction. The east-west runways (05/23, 06L/24R, and 06R/24L) offer higher aircraft movement capacity than the north-south runways and are used more frequently because of the prevailing wind conditions. Since aircraft should land or take off into the wind, the two parallel north-south runways (15L/33R and 15R/33L) permit operations under high north-south wind conditions.

The airport is served by a variety of arrival and approach procedures, including Area Navigation (RNAV) Standard Terminal Arrival Route (STAR) procedures that provide a combination of Global Navigation Satellite Systems (GNSS)-based guidance and air traffic control instructions to a point where the pilot can intercept the glide path emanating from the existing ground-based Instrument Landing System (ILS). These navigation methods will continue to be used in the future, while additional RNP AR procedures are being added to the airspace infrastructure.

2.3 Noise Management

Managing aircraft noise exposure on a community is a collective effort of a number of parties.

[3] Based on aircraft movement statistics from 2019 prior to the COVID-19 pandemic.

International Civil Aviation Organization (ICAO)

ICAO is an agency of the United Nations and was created to promote the safe and standardized development of international civil aviation. ICAO sets standards and regulations necessary for aviation safety, security, efficiency and regularity, air navigation, and environmental protection (including noise and emissions). ICAO endorses a balanced approach to aircraft noise management which aims to identify aircraft noise and implement a variety of measures best suited to address aircraft noise at a particular airport. These typically fall within the following categories: noise reduction at source; land-use planning and management; and, noise abatement operational procedures and operating restrictions.

Transport Canada

Transport Canada is the regulator of aviation in Canada. Its role is to develop transportation policies and legislation that provide for a high level of safety and security and support a successful, stable aviation sector in Canada. The responsibilities of Transport Canada regarding noise include reviewing, approving, and publishing of new proposed noise control measures at airports, as well as conducting enforcement of suspected violations to published Noise Abatement Procedures and Noise Operating Restrictions. Transport Canada establishes noise and emissions standards and is responsible for setting the criteria that governs flight path design. Transport Canada must also review and approve any new or proposed changes to Noise Abatement Procedures at an airport.

Airport Operators

The GTAA maintains a Noise Management Program[4] as required under the Ground Lease. The GTAA continues to engage with and educate communities on the Airport's operations and how aircraft noise can be mitigated. While aircraft noise cannot be eliminated entirely, the GTAA's Noise Management Program, which includes a preferential runway system, prescribed approach and departure flight procedures, as well as restrictions on the hours that certain types of aircraft may use the Airport at night, is designed to mitigate the impact of aircraft noise. The GTAA also has a five-year Noise Management Action Plan (2018-2022) that guides implementation of the Noise Management Program and sets out standards and commitments designed to reduce aviation noise.

The GTAA hosts the Toronto Pearson Noise Management Forums: a series of briefings, tables and working groups that help the Airport work with its communities and collaborate with industry. In addition, the GTAA has worked with the neighbouring municipalities to create an Airport Operating Area ("AOA") surrounding the Airport. The AOA, which is based on noise contours, delineates an area within which certain land uses that are incompatible with Airport operations, including residential development and schools, are opposed by the GTAA.

[4] GTAA Noise Management Program (https://www.torontopearson.com/en/community/noise-management)

NAV CANADA

NAV CANADA is responsible for the safe coordination and the efficient movement of aircraft and is also responsible for planning and managing airspace, including flight paths and airways used by airlines. NAV CANADA operates and maintains navigation and approach aids and equipment. NAV CANADA publishes the Canada Air Pilot and Canadian Flight Supplement, two aviation reference publications that provide pilots with information on airport operations, including details on noise abatement procedures in effect at different facilities. Flight procedures designed and published by NAV CANADA adhere to Noise Abatement Procedures set by the Airport Operators.

Airlines and Other Operators of Aircraft

Airlines and other aircraft operators are responsible for conducting their operations in accordance with Transport Canada regulations and published Noise Abatement Procedures and Noise Operating Restrictions. Airline and air operator subject matter experts are also actively involved in working groups and teams that support improvements to aviation safety and efficiency through responsible development of performance-based navigation and airspace design.

Municipalities and Other Levels of Government

The role of municipalities is to ensure compatible development occurs around the airport through the development and exercise of land use planning controls. The AOA has been incorporated into the official plans of the cities of Toronto, Mississauga and Brampton, and the Region of Peel for the purpose of delineating areas within which certain land uses are defined as incompatible with airport operations. As the AOA is based on Transport Canada guidelines only, municipalities are not prevented from development within its boundary.

2.4 Performance Based Navigation (PBN) and Required Navigation Performance (RNP)

Modern aircraft avionics are providing new opportunities to design routes that are no longer bound by ground-based navigational aids. These opportunities, enabled by Global Navigation Satellite Systems (GNSS), allow for the design of routes that are often more precise, predictable, fuel efficient and environmentally friendly. The deployment of Performance Based Navigation (PBN) technologies has been encouraged by the ICAO [5]. At the 2007 36th ICAO General Assembly, States agreed to Resolution 36/23, which urges all States to implement routes and airport procedures in accordance with the ICAO PBN criteria. From a global perspective ICAO and IATA formed the Global PBN Task Force, where States and industry are collaborating on global solutions.

Transport Canada is supportive of and accepts the ICAO PBN initiative and the need for globally harmonized operations. Transport Canada, NAV CANADA and the Canadian aviation industry are

[5] ICAO PBN Overview (https://www.icao.int/safety/pbn/Pages/Overview.aspx)

working together to implement an ICAO State PBN plan for Canada[6]. Transport Canada is responsible for all regulatory aspects of PBN such as developing required regulations; standards; authorizations, advisory and training information; and defining equipment requirements.

Following guidance outlined in the Canadian PBN State Plan, NAV CANADA developed the Communication Navigation Surveillance (CNS) Operations Plan[7] which leverages Air Traffic Management advances as well as customer capabilities, to improve service delivery. The CNS Operations Plan recognizes Required Navigation Performance (RNP) as a significant piece of the technology for meeting commitments made by the global aviation industry to reduce greenhouse gas emissions. RNP achieves benefits in part by allowing for flight path designs that reduce the track miles that an aircraft must fly to its destination while providing for a constant descent compared to an approach that requires level flight segments.

Due to their unique design, RNP AR approach procedures can also provide fuel, noise, and environmental benefits at airports frequented by enough suitably authorized air operators. The increased complexities associated with RNP AR approach procedures require additional levels of control and authorization through more stringent RNP criteria, advanced aircraft capabilities and increased aircrew training.

RNP AR assures that aircraft can fly a highly predictable and specific flight path. This means that airspace designers have some degree of flexibility as to the flight path location, allowing them to place arrival procedures away from people, where these opportunities exist, while still meeting strict Transport Canada airspace design criteria. It often means being able to turn aircraft toward the airport sooner, reducing the distance flown and associated emissions, compared to more conventional approaches.

Another feature of RNP AR approach procedures is the capability for aircraft to fly a specific fixed-radius curved path—called a radius to fix or "RF" leg—when an accurate, repeatable, and predictable path is required. RNP AR capability requires specific aircraft performance, design, operational processes, training, and specific procedure design criteria to achieve the required target level of performance.

3.0 Overview of Proposed Changes (RNP AR Flight Path)

NAV CANADA is proposing the addition of new RNP AR approach procedures at Toronto Pearson Airport. The proposed procedures would be deployed to two runway ends only: runway 05 and runway 23. Existing arrival procedures for these runways will continue to be used by aircraft either not equipped or not certified for RNP AR and as required for traffic management purposes. The broader airspace structure and all existing arrival procedures will remain in place; no changes proposed for

[6] Canadian PBN State Plan (https://tc.canada.ca/en/aviation/commercial-air-services/commercial-business-aviation/performance-based-navigation-pbn-state-plan-canada)
[7] NAV CANADA Communication, Navigation, and Surveillance (https://www.navcanada.ca/en/flight-planning/communication-navigation-and-surveillance.aspx)

departure procedures. It is estimated that 30-40% the total aircraft fleet at Toronto Pearson Airport is equipped to fly an RNP AR approach procedure, and this percentage is expected to grow gradually as airlines modernize fleets and acquire newer aircraft.

Designing RNP AR approach procedures for more runways may be technically feasible, but given the large population and nature of residential development surrounding Toronto Pearson Airport, such opportunities are limited. NAV CANADA and the GTAA are investigating enhancements in a manner that mitigates noise and are cautious toward changes to the overall soundscape. Runway 05 and runway 23 offer opportunities to leverage non-residential use land.

3.1 Runways 05 RNP AR Arrivals

Figure 1 depicts the proposed RNP AR approach procedure path to runway 05 and—for reference—historical tracks of aircraft approaching the same runway using existing approach procedures. It shows typical altitudes of aircraft above sea level at various points on approach. Note these altitudes are expected elevations and actual altitudes will vary based on conditions and altitude restrictions present on the approach at the time. This procedure will be used by some aircraft arriving from the southwest, northwest, or northeast.

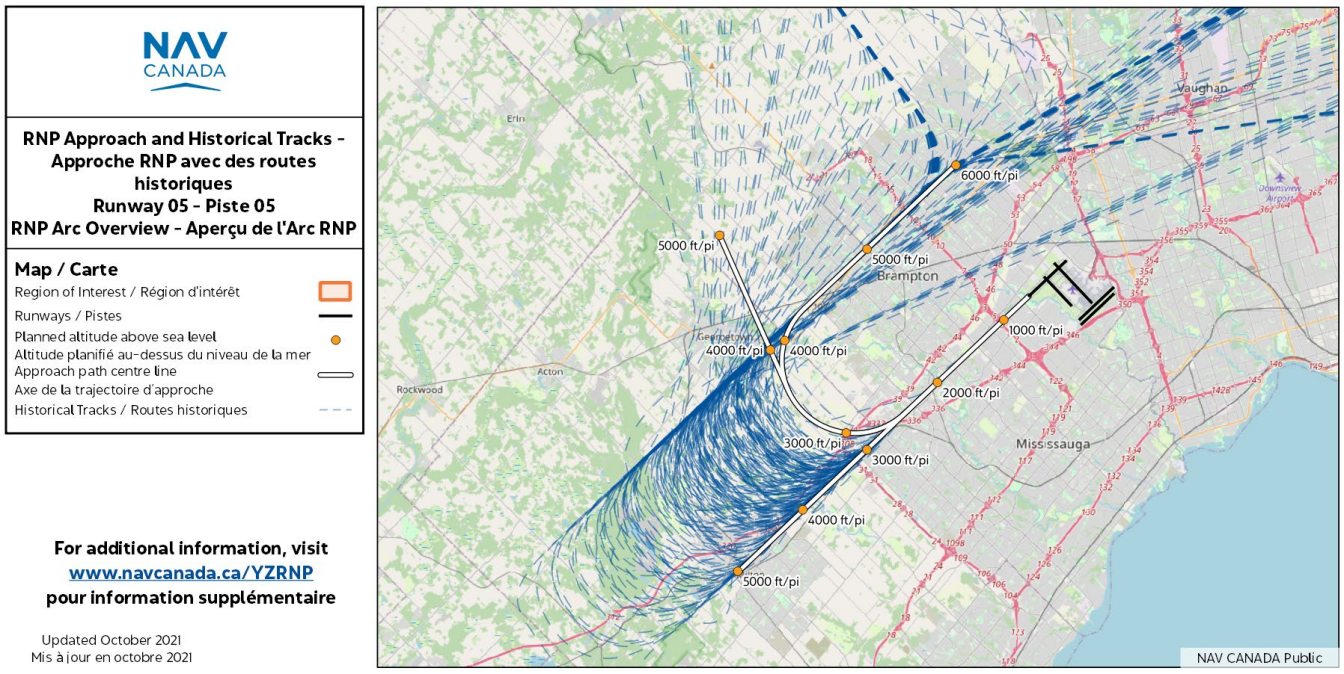

Figure 1: RNP AR runway 05 approach – Approach overview

Note the curved segment of the approach where aircraft turn from the downwind leg to the final approach leg and the aircraft lines up with the runway as depicted in Figure 2. The placement of the curved segment between the communities of Brampton and Georgetown over rural or non-residential lands where possible. While this will not preclude residential areas located at some distances adjacent to the flight path from experiencing overflight, the procedure reduces overflight of residential areas overall. It is estimated that 45 to 74 aircraft per day will utilize the curved segment of the approach

procedure and an estimated 21 to 35 aircraft per day will use the tangent segment of the approach procedure[8]. Figure 3 shows the number of aircraft estimated to fly over certain areas using current approach procedures as well as the proposed RNP AR approach procedure.

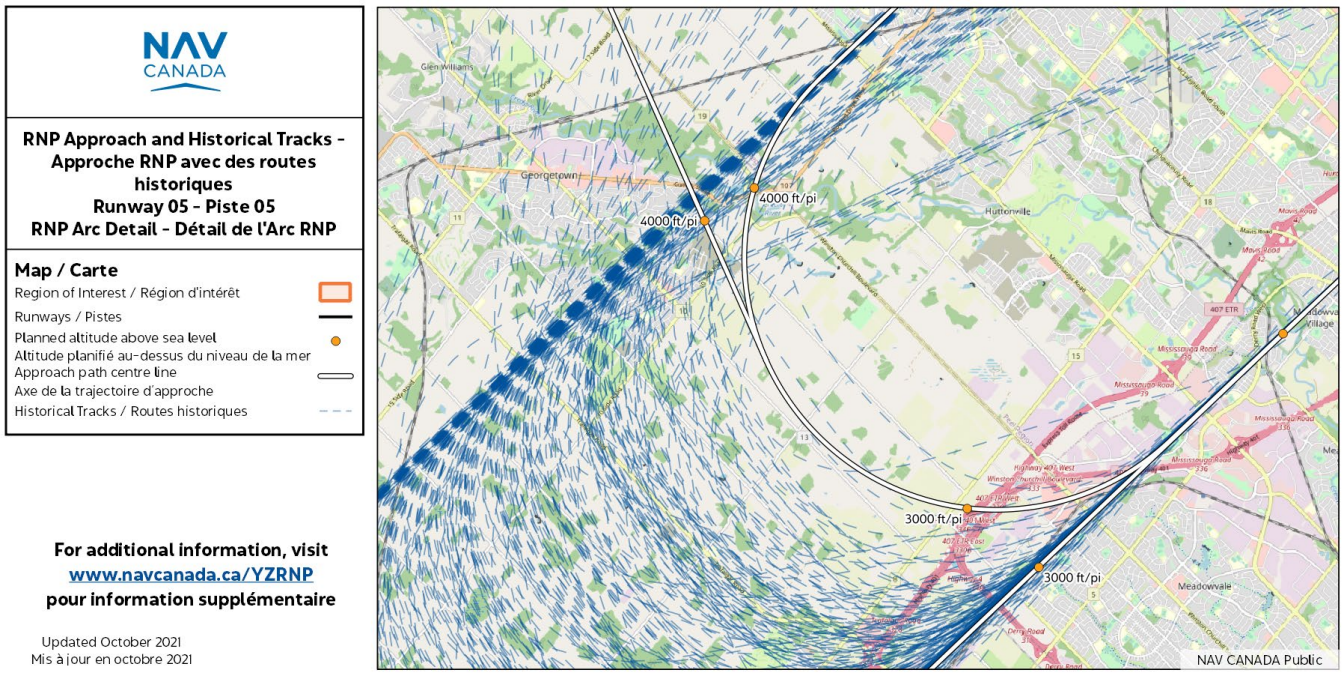

Figure 3: RNP AR runway 05 approach – Arc segment detail

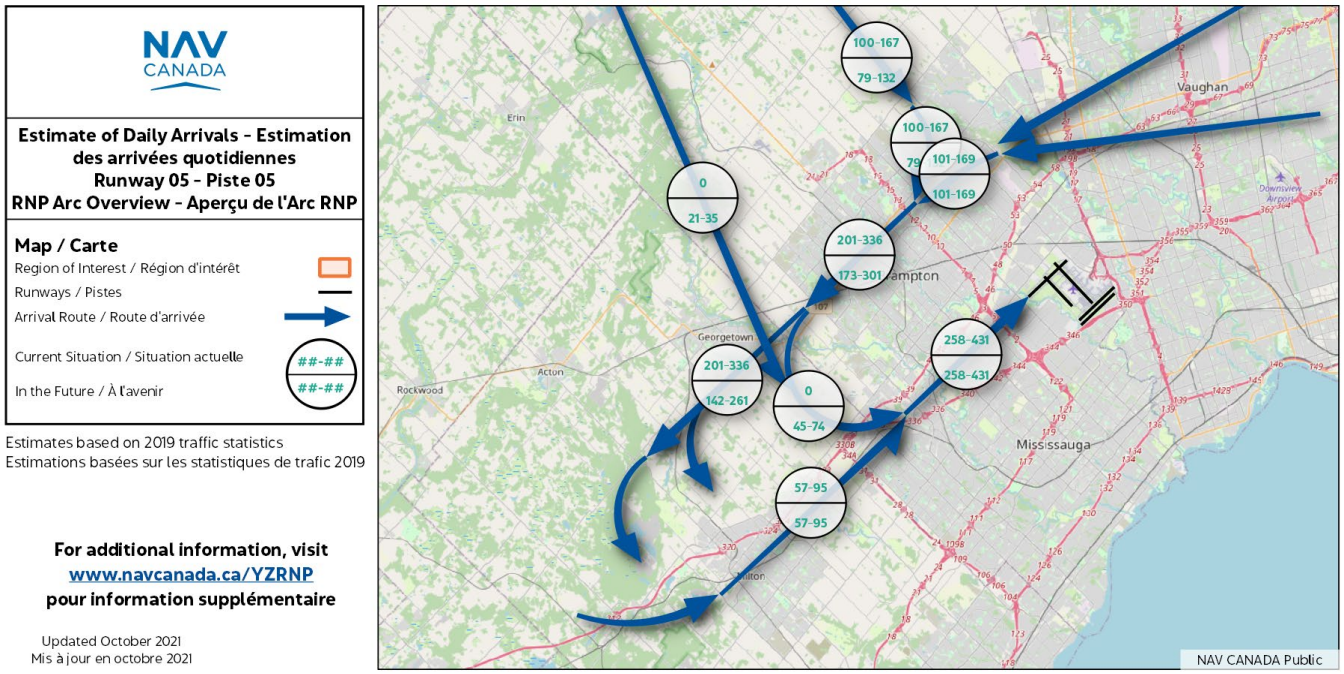

Figure 2: RNP AR runway 05 approach – Estimate of daily arrivals by approach segment

[8] Based on 2019 pre-pandemic aircraft movement statistics, airline fleet composition, and aircraft equipage.

The tangent segment of the procedure was designed to serve aircraft arriving from the northwest and allows aircraft to avoid using the downwind, providing noise mitigation to areas under the downwind. Aircraft are sometime directed (or "vectored") to operate off the procedures to ensure safe sequencing or provide for more direct routing and will continue in the future; however, aircraft given clearance to fly the proposed RNP AR approach procedure will navigate precisely along the approach centreline.

3.2 Runways 23 RNP AR Arrivals

Figure 4 depicts the proposed RNP AR approach procedure path to runway 23 and—for reference—historical tracks of aircraft approaching the same runway using existing approach procedures. It shows typical altitudes of aircraft above sea level at various points on approach. Note these altitudes are expected average elevations and actual altitudes will vary based on conditions and altitude restrictions present on the approach at the time. This procedure will be used by some aircraft arriving from the southwest, northwest, or northeast.

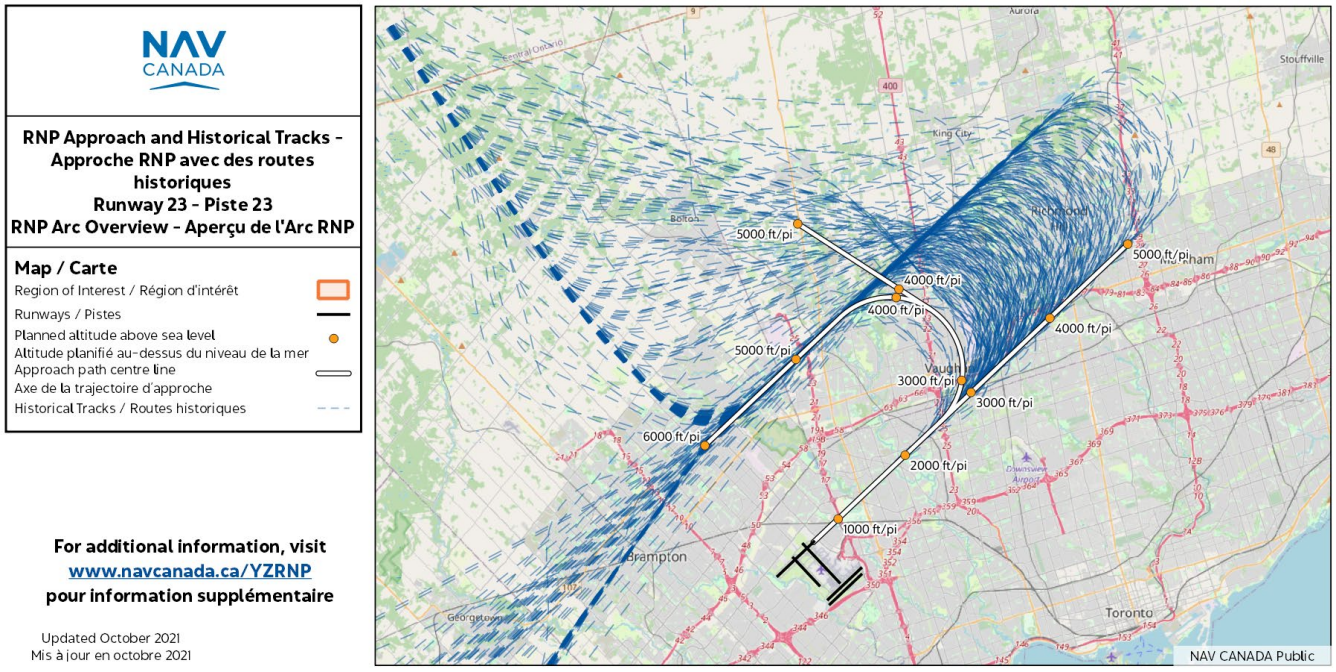

Figure 4: RNP AR runway 23 approach – Approach overview

Note the curved segment of the approach where aircraft turn from the downwind leg to the final approach leg and the aircraft lines up with the runway as depicted in Figure 5. The placement of the curved segment over non-residential lands in the City of Vaughan. While this will not preclude residential areas located at some distances adjacent to the flight path from experiencing overflight, the procedure reduces overflight of residential areas overall. An estimated 29 to 48 aircraft per day will utilize the curved segment of the approach procedure and an estimated 21 to 35 aircraft per day will use the tangent segment of the approach procedure. Figure 6 provides details of the number of

aircraft estimated to fly over certain areas using current approach procedures as well as the proposed RNP AR approach procedure.

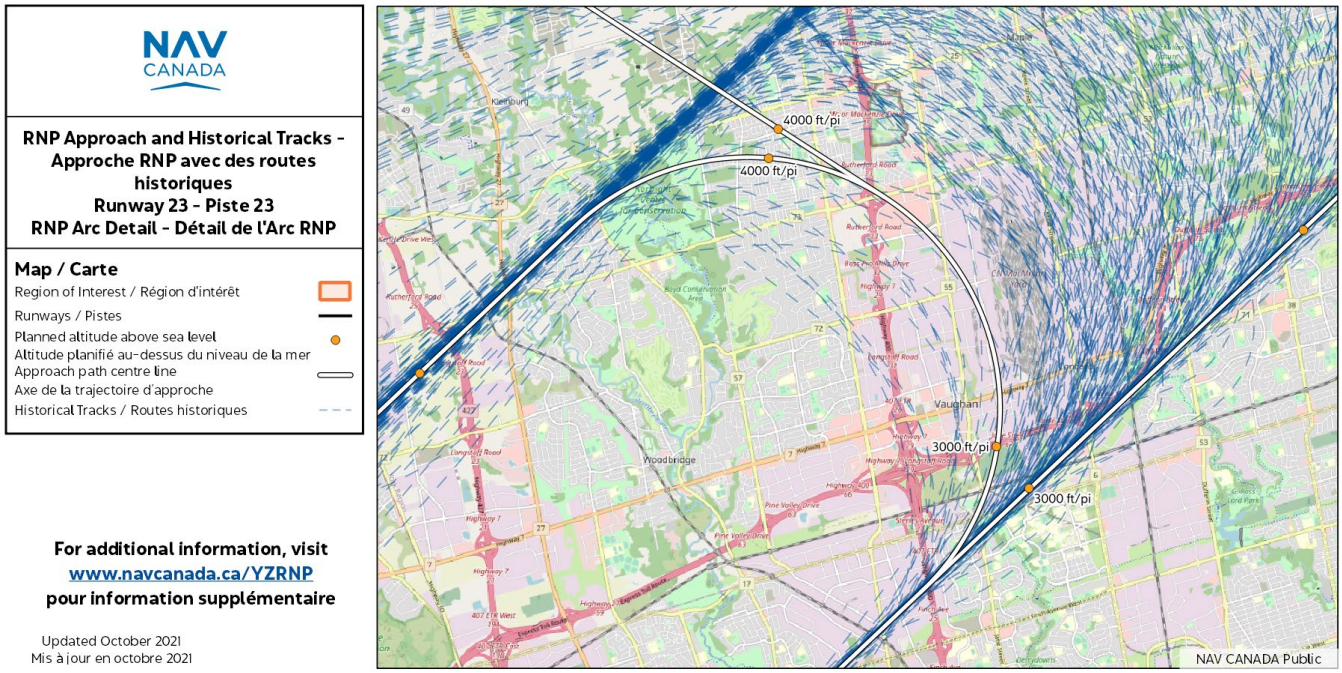

Figure 6: RNP AR runway 23 approach – Arc segment detail

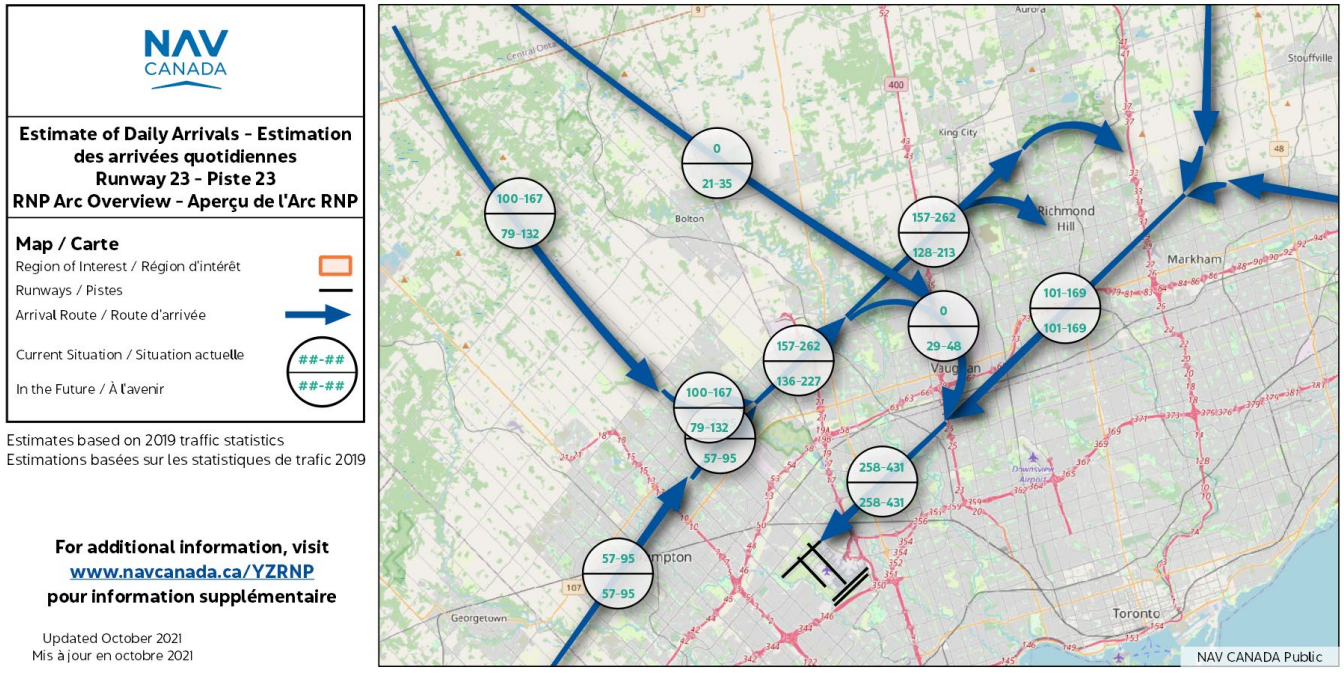

Figure 5: RNP AR runway 23 approach – Estimate of daily arrivals by approach segment

The tangent segment of the procedure was designed to serve aircraft arriving from the northwest and allows aircraft to avoid using the downwind, providing noise mitigation to areas under the downwind. Aircraft are sometime directed (or "vectored") to operate off the procedures to ensure safe sequencing

or provide for more direct routing and will continue in the future; however, aircraft given clearance to fly the proposed RNP AR approach procedure will precisely along the approach path centreline.

4.0 Environment

When flight path design changes are expected to result in changes to the frequency of aircraft overflying areas around airports or aircraft flying at different altitudes, residents and local municipal governments in the affected areas are informed to build awareness and understanding.

In the case of this proposal, environmental impact analysis considered anticipated noise and emissions, including the number of people likely to be affected, flight frequency, and distribution of traffic.

Due to the nature of the airspace and air traffic environment in the vicinity of Toronto Pearson Airport, very few areas experience no aircraft overflight. In addition to significant reductions in greenhouse gas emissions—a key focus of the industry and governments working toward greater environmental sustainability in the transportation sector—an important design consideration for the proposed RNP AR approach procedures was reducing the number of homes and people overflown by arriving aircraft.

4.1 Noise Modelling

The analysis in this section provides an overview of noise modeling related to the proposed RNP AR approach procedures.

4.1.1 Background and Methodology

Analysis of noise emissions was completed using the U.S. Federal Aviation Administration's Aviation Environmental Design Tool software system.

A-weighted noise levels—expressed in decibels as dB(A)—were used for noise level metrics. It is used extensively for measuring and predicting community and transportation noise. The Boeing 737-800 was selected for noise model generation as it's the most prevalent aircraft type at Toronto Pearson Airport able to fly the RNP AR approach procedure. Older or louder aircraft were not selected for the modelling since these types of aircraft are not typically equipped with RNP technology and thus unable to fly the procedure. Quieter RNP-equipped aircraft such as the Boeing 737 MAX series or Dash-8 Series 400 (Q400) turboprops were not used. Noise metrics were computed for the proposed RNP AR approach procedures to runway 05 and runway 23 such as:

- **Maximum Sound Level (L_{Amax}).** Single-event noise level metrics represent the maximum noise level at a receptor location, considering a particular set of aircraft operations. This is found by calculating the maximum noise level due to each single flight path segment and then computing maximum noise level at a receptor location through the analysis of all the individual flight path segment noise contributions.

- **Day Night Average Sound Level (DNL).** Average noise metrics such as DNL are computed by finding the number of operations associated with each period coupled with the time-of-day weighting factors. These sound exposures for each flight path segment are summed, time-averaged over a 24-hour period, and then converted to their equivalent decibel value. DNL values were developed using the broader fleet mix prevalent in 2019.

To better reflect the expected changes as a result of the proposed RNP AR approach procedures, aircraft movement statistics and data from 2019 were used due to the greatly reduced levels of air traffic since the start of the COVID-19 pandemic. This is to ensure the noise modelling more closely reflects any anticipated noise footprints from the proposed RNP AR approach procedures when air traffic levels return to pre-pandemic levels.

4.1.2 Noise Modelling Results

Figure 7 and Figure 8 below depict the approach path centrelines of the proposed RNP AR approach procedures to runway 05 and runway 23 and the associated Maximum Sound Level (L_{Amax}) noise profiles between 55 dB(A) and 75 dB(A). Figure 9 depicts the Day Night Average Sound Level (DNL) at various magnitudes with the use of RNP AR approach procedures (dashed lines) and without their use (solid lines).

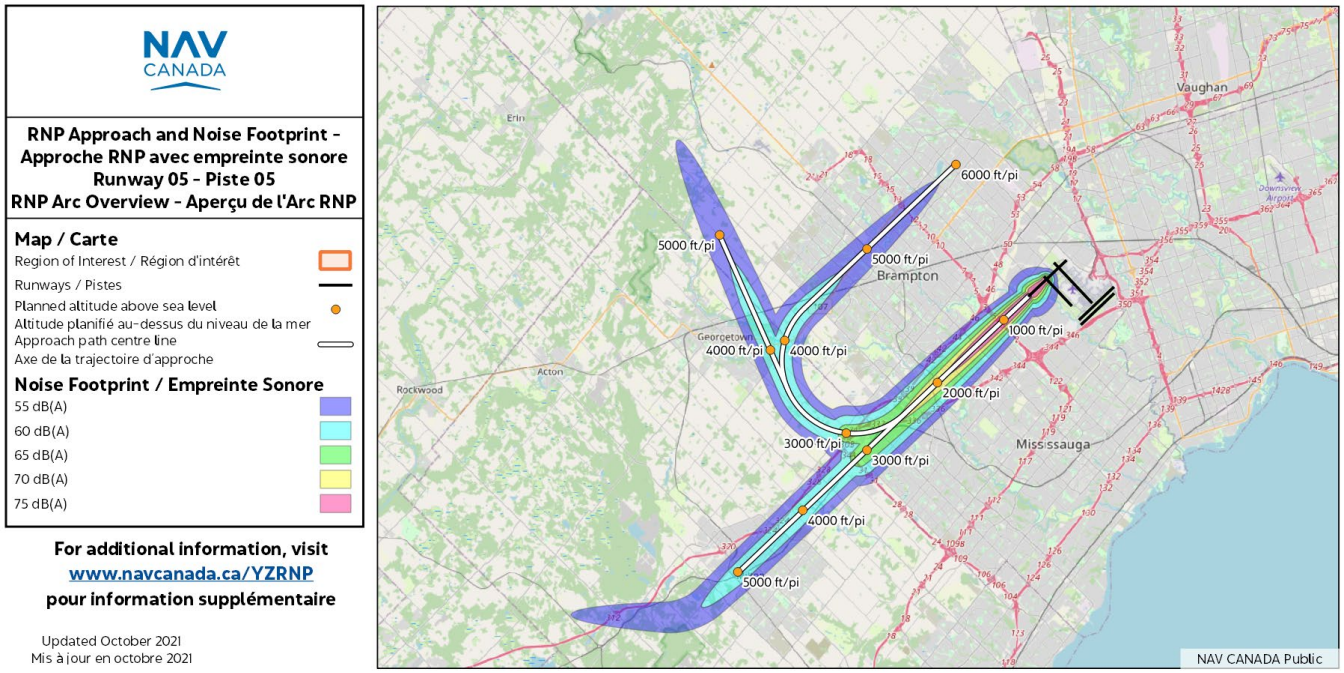

Figure 7: RNP AR runway 05 approach – Noise footprint

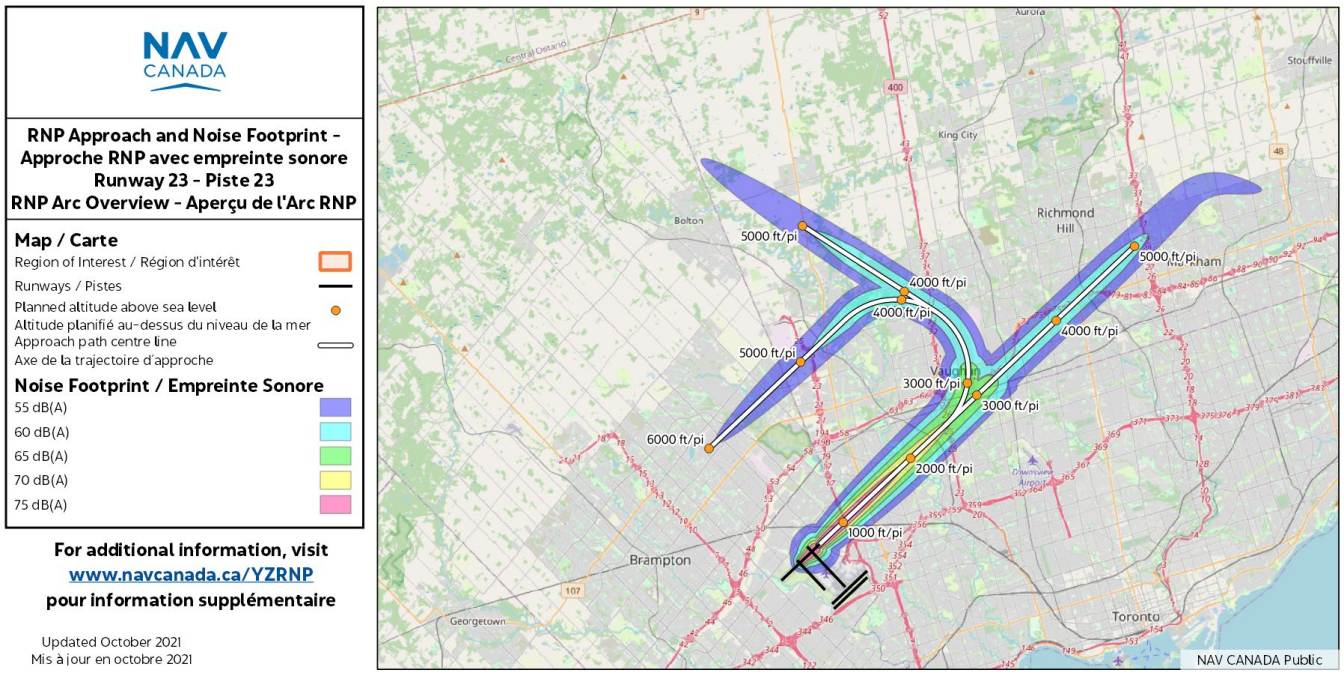

Figure 8: RNP AR runway 23 approach – Noise footprint

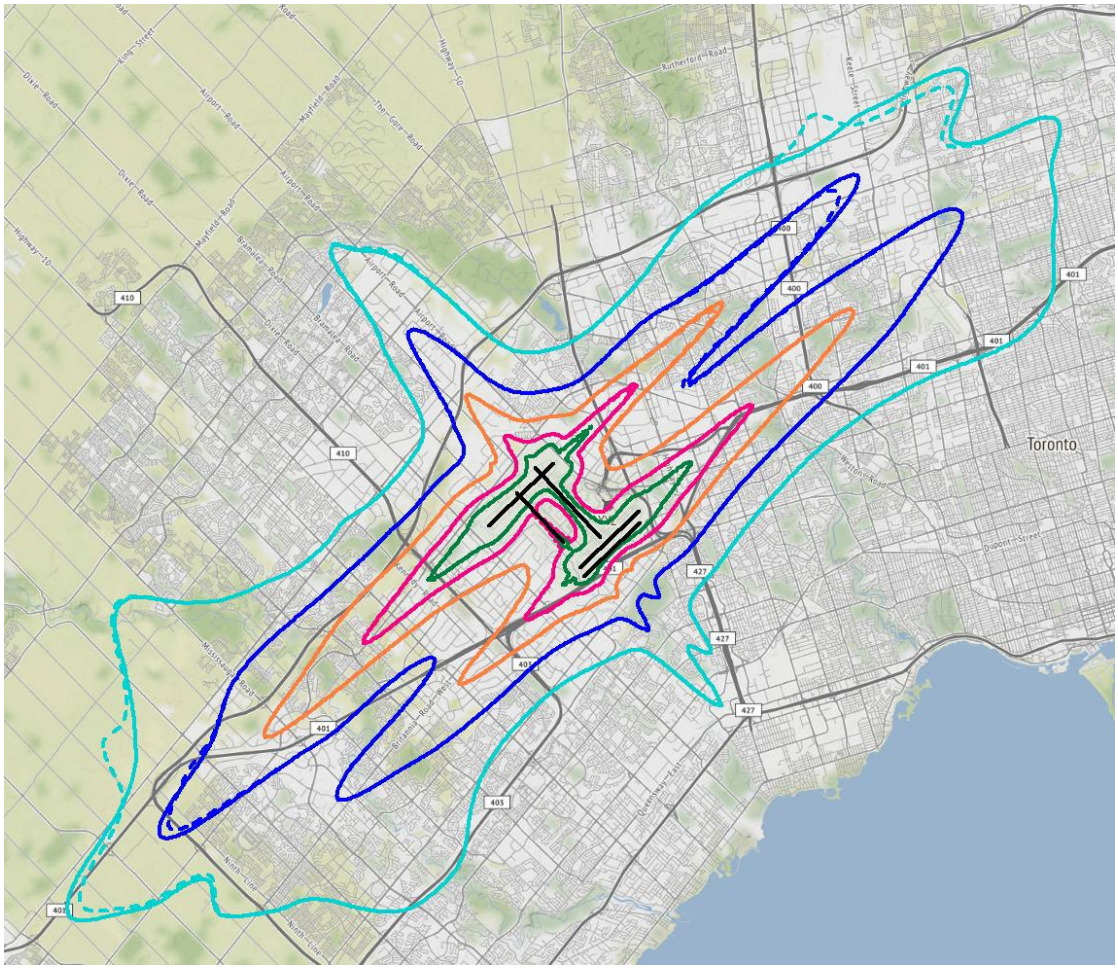

Figure 9: Conventional vs. RNP AR Approach – Day Night Average Sound Level Comparison

4.1.3 Impact on Community Noise

Most areas surrounding the airport will continue to observe many of the aircraft operations they do today whether they are associated with arrivals or departures. Entirely avoiding residentially populated areas is simply not possible and some residents may observe aircraft operating more regularly in certain areas than they had before; however, modelling of DNL predicts most areas are expected to experience no material change to cumulative noise levels with increase anticipated in primarily in either rural or predominantly non-residential areas based on the metric.

The overall community noise impacts of the proposed changes are expected to be positive, largely due to:

- **Reduced population overflown as a direct result of aircraft using the RNP rather than the traditional RNAV to ILS procedure.** Much of the new portion of the flight path (the curved RNP base leg) has been designed to overfly non-residential land use. This represents a reduction in population overflown from the typical arrival routing that would either fly further southwest over Georgetown only to turn and arrive on runway 05 after flying over Milton, or, further northeast only to turn and land on runway 23 after flying over northern Vaughan and Richmond Hill. For aircraft operating on straight in approaches, there will be no change.
- **RNP provides aircraft with guidance for constant descent operations.** The roughly 3-degree descent gradient that RNP provides has been shown to result in reduced noise as compared to equivalent flights that are required to fly a level segment before intercepting the final approach glide path.
- **Increase in altitude for some aircraft in the south downwind.** Communities to the south such as Toronto, Mississauga, and Oakville impacted by Runways 06L/R and Runways 24L/R will benefit due to RNP. Usage of RNP AR approach procedures for the northern runway (05/23) will allow some arriving aircraft on the southern runways (06L/24R and 06R/24L) to stay up to 1,000 feet higher due to assured track location of aircraft arriving north of the airport. This benefit will be applied tactically, based on the traffic situation at any given time.

It is estimated that 30-40% of the overall aircraft fleet arriving at Toronto Pearson Airport is equipped to fly an RNP AR procedure, and this percentage is expected to grow gradually as airlines modernize their fleets and acquire more modern and quieter aircraft. Table 1 below provides details regarding the reductions in the number of people and homes estimated to be overflown at noise levels at or above 60 dB(A) when the RNP AR approach procedures are used compared to an existing approach procedure.

Approach procedure	Aircraft approaching from:	Change in population overflown	Change in number of homes overflown
RNP Runway 05	West (via north downwind)	(-31,521)	(-13,871)
	North (via tangent segment)	(-44,291)	(-17,498)
	East (straight in)	(-12,348)	(-3,729)
RNP Runway 23	East (via north downwind)	(-24,579)	(-7,947)
	North (via tangent segment)	(-30,999)	(-9,505)
	West (straight in)	(-541)	(-212)

Table 1: Estimated change to people and homes overflown while using RNP AR approach procedures

For communities that are overflown by the proposed RNP flight path, some increase in the amount of daily traffic experienced can be expected; however, the actual decibel level from each RNP overflight will, in many cases, be quieter than the decibel level from aircraft already operating in that area today.

4.2 Greenhouse Gas Emissions

The implementation of Performance-Based Navigation in Canada—of which RNP is a component—is an objective of Canada's Action Plan to Reduce Greenhouse Gas Emissions from Aviation[9] due to its potential to reduce fuel burn and associated emissions from aircraft operations. The Action Plan was the Government of Canada's response to the International Civil Aviation Organization's (ICAO) Assembly Resolution A37-19, which encourages Member States to submit national plans detailing the measures they are taking to address aviation emissions.

In addition to safety benefits for pilots and air traffic controllers resulting from improved predictability of operations during one of the busiest phases of flight, it is estimated that the earlier turn from the downwind leg will reduce flight track distance for appropriately equipped aircraft by approximately 12 to 30 kilometres per flight. Over the course of ten years following implementation, this is equivalent to approximately 10.9 million fewer kilometres flown and a reduction of approximately 178,500 metric tonnes of greenhouse gas emissions.

5.0 Community Outreach and Engagement

NAV CANADA and industry partners are committed to engaging with the public on changes to airspace design that may have a material impact on residential communities. The Airspace Change Communications and Consultation Protocol (ACCCP) describes when consultation should be considered and the approach to be taken for engagement with stakeholders and communities in

[9] Canada's Action Plan to Reduce Greenhouse Gas Emissions from Aviation (https://tc.canada.ca/en/corporate-services/policies/canada-s-action-plan-reduce-greenhouse-gas-emissions-aviation)

which we operate. The protocol promotes opportunities for residents to provide input prior to implementing material changes.

The public consultation began November 1, 2021, and was initially scheduled to conclude on December 17, 2021, for a total of 47 days. In mid-December 2021, the consultation period end date was extended by five days to December 22, 2021 (inclusive) for a total of 52 consultation days.

5.1 Published Information

A page was added to the NAV CANADA public website[10] to provide specific information about the proposed RNP AR approach procedures and associated consultation. Information about the public consultation was also made available on the GTAA website[11] with links directly to the NAV CANADA website. Webpage analytics shows that this section of the website received 4,312 unique page views and the PDF informational documents were downloaded a total of 5,490 times. Consultation materials added to the website included:

- PDF documents detailing:
  - General information about RNP approach procedures and explaining the potential changes and their benefits in plain language.
  - Information for communities near the proposed RNP approach to runway 05 with tailored maps.
  - Information for communities near the proposed RNP approach to runway 23 with tailored maps.
  - Information about changes to management of air traffic under the south downwind as a result of the use of RNP procedures to the north runway.
- A schedule of virtual consultation events and a recording of a virtual consultation event for those unable to attend a live event.
- Access to the feedback mechanism, consisting of a survey with open- and close-ended questions.
- Information about how to contact NAV CANADA with additional questions.

5.2 Consultation Promotion

5.2.1 Print Media (Public Notices)

Notices of the public consultation were published in print media through several newspapers. Details of the publications, their distributions, and the notice publication dates can be found below in Table 2.

[10] Changes to flight paths at Toronto Pearson Airport – RNP AR (https://www.navcanada.ca/en/air-traffic/airspace-reviews/toronto-pearson---rnp-ar.aspx)
[11] Join the conversation on proposed airspace changes in northern GTA (https://www.torontopearson.com/en/community/get-involved/community-conversations/join-the-conversation-on-proposed-airspace-changes-in-northern-gta)

Publication	Weekly distribution[12]	Weekly readership[12]	Insertion dates
Georgetown Independent & Free Press	22,600	28,400	November 4 and 11, 2021
Vaughan Citizen	58,000	68,100	November 4 and 11, 2021
Orangeville Banner/Erin Advocate	21,300	31,000	November 4 and 11, 2021
Caledon Enterprise	18,600	27,000	November 4 and 11, 2021
Brampton Guardian	147,100	203,500	November 4 and 11, 2021
Alliston Herald	21,600	33,400	November 4 and 11, 2021

Table 2: Public notice print media publication

5.2.2 Automated Calls

Automated phone calling was employed between November 16, 2021, and November 23, 2021, to reach households in the vicinity of the proposed RNP AR approach procedure flight paths. A total of 82,016 calls were attempted to 55,733 phone numbers with a focus on areas around and to the north of the airport as detailed in Table 3 below.

Community	Phone numbers called	Listened to full message	Listened to part of message[13]
Brampton	33,911	16,203	19,144
Woodbridge / Kleinburg	14,045		
Georgetown / Norval	2,869		
Maple / Concord / Thornhill	1,680		
Nobleton / Bolton / Palgrave	1,162		
North York	676		
Caledon / Caledon Village	639		
Mississauga	403		
Terra Cotta / Cheltenham / Inglewood	348		

Table 3: Automated calls by Postal Code Forward Sortation Area (FSA)

5.2.3 Social Media

NAV CANADA launched a series of digital advertisements such as those shown in Figure 10 below on November 15, 2021, in both English and French on Facebook and Instagram.

[12] Source: Star Metroland Media
[13] Recipients who listened to part of the message were in addition to (exclusive of) those who listened to the entire message.

The campaign goal was to increase awareness of the proposed RNP AR approach procedures and promote participation in the public consultation. NAV CANADA social media posts were also shared through GTAA social media channels to increase their visibility and promote the public consultation. Digital advertising was targeted via Postal Code FSA to the same areas as the Automated Calling campaign. The series of social media campaign advertisements were seen 556,111 times by 170,917 unique individuals.

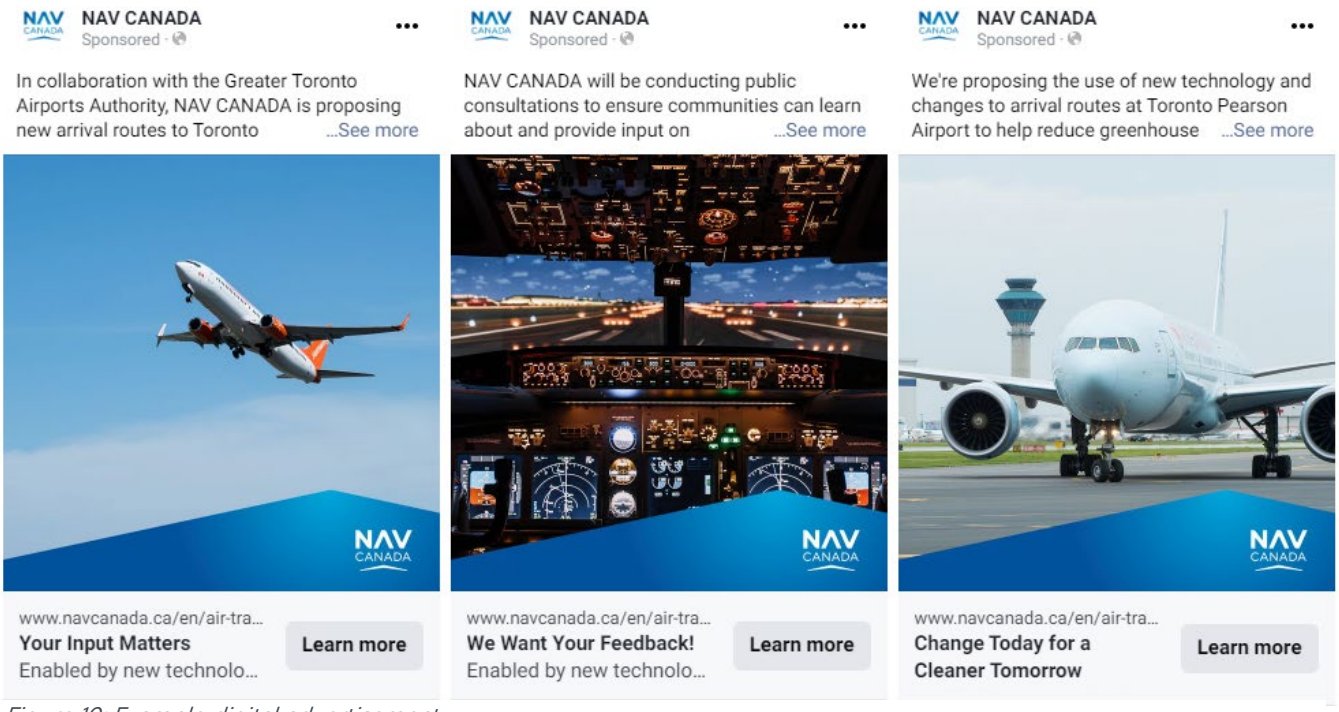

Figure 10: Example digital advertisement

5.3 Stakeholders and Community Engagement

Stakeholders including members of the communities surrounding the airport provided their feedback through online survey feedback forms, emails, and other methods of correspondence during consultation. Stakeholder input assisted NAV CANADA in understanding priorities and concerns related to the proposal.

Community engagement activities included Noise Management Forum meetings, online public consultation events, and personalized information sessions. Engagement opportunities were aligned with project milestones to ensure that stakeholder input, advice, and concerns could be taken into consideration prior to publishing any procedure designs. The following section provides a synopsis of the engagement methodologies that were used to generate stakeholder input.

Due to public health restrictions in place during the consultation period resulting from the ongoing COVID-19 pandemic, required that all consultation events and personalized information sessions be held virtually.

5.3.1 Noise Management Forum Meetings

The GTAA has established Noise Management Forums, a series of organized briefings, presentations, and working groups that help the airport authority work with communities and collaborate better with industry partners. The Noise Management Forums consist of:

- **Pearson Public Meetings** where members of the public are welcome to attend a meeting to learn more about airport operations, hear about noise management efforts, and provide feedback to industry partners;
- **The Noise Accountability Board** where members of industry meet in the form of a working group that helps set the strategic direction of noise management at Pearson, including the delivery of our Noise Management Action Plan, and other initiatives related to airport growth;
- **Neighbourhood Tables** to provide a forum for community stakeholders who represent residents or ratepayer associations and community groups who have knowledge of and interest in airport operations; and
- **Political Briefings** to inform all levels of government on noise management initiatives.

During initial planning for the proposed implementation of RNP AR approach procedures, extensive communication was conducted by NAV CANADA as an attendee of the Noise Management Forum events to ensure group members and public attendees were aware of the proposal and associated public consultation.

Meetings at which the proposed RNP AR approach procedures or associated public consultation were discussed are detailed below in Table 4.

Forum type	Meeting instances which included RNP AR information or discussion	
Pearson Public Meetings	• September 24, 2020 • December 2, 2020 • April 15, 2021	• September 23, 2021 • December 2, 2021
Noise Accountability Board	• June 16, 2020 • April 6, 2021	• September 14, 2021
Neighbourhood Tables	• September 23, 2020 • December 2, 2020 • April 14, 2021	• September 22, 2021 • December 1, 2021
Political Briefings	• September 22, 2020 • December 1, 2020 • April 13, 2021	• September 21, 2021 • November 30, 2021

Table 4: Meetings with RNP AR information or discussion

5.3.2 Public Consultation Events

Eight public consultation events were held during the consultation period. The events were designed to educate attendees on the proposed RNP AR approach procedures including sufficient background information to support residents in the provision of feedback. All events attendees were directed to provide feedback through the publicly accessible online feedback survey.

Two types of information sessions were conducted: general information sessions and community-specific information sessions.

- General Information Sessions were designed and intended for residents from any community surrounding the airport with information designed to be relevant to all areas around the airport within the consultation area.
- Community-Specific Information Sessions were tailored to specific cities or communities with information and maps focused on a smaller geographic area.

Table 5 below outlines purpose, area, and timing of each public consultation. In total, 560 residents registered to participate in the events.

Consultation event type and purpose	Consultation event name	Consultation event date
General Information Session	General Information Session #1	November 22, 2021
	General Information Session #2	December 7, 2021
Community-Specific Information Session	Halton Hills and surrounding area (including Terra Cotta and Cheltenham)	November 23, 2021
	Brampton	November 24, 2021
	Caledon and King (including Bolton and Nobleton)	November 25, 2021
	Vaughan	November 29, 2021
	Oakville and southwest Mississauga	November 30, 2021
	High Park, Parkdale, Mid-Town Toronto, Leaside, Don Mills	December 6, 2021

Table 5: Public consultation event schedule

General Information Session #1 was recorded and made available on the NAV CANADA RNP AR website to ensure members of the public could access the presentation if they were unable to attend an event.

Following each Consultation Event, a follow-up email was sent to the email address used to register for the session with links to the online survey feedback form and the registration page for the Personalized Information Sessions.

5.3.3 Personalized Information Sessions

An opportunity to book personalized information sessions was made available to attendees of all eight public consultation events at the end of each session. This provided attendees requiring additional information or had questions specific to their location an opportunity to have them addressed. Due to online-only nature of the consultation, the goal of the personalized information sessions was to replicate the ability of individuals to approach NAV CANADA or GTAA staff with questions as would be possible during an in-person event following the presentation.

A total of 114 half-hour time slots were made available for booking between November 23, 2021, and December 10, 2021. Public consultation event attendees were provided a link to register for a session both during the event and as a follow-up via email once the session had concluded. A total of fourteen personalized information sessions were booked and held during the consultation period.

5.3.4 Direct Queries

During the consultation period, a dedicated email address (yzrnpconsult@navcanada.ca) was set up to answer queries from the public regarding the proposed RNP AR approach procedures and the associated consultation. The NAV CANADA Customer and Stakeholder Services team also answered telephone queries received through the toll-free number for inquiries.

5.4 Elected and Senior Administrative Official Engagement

Federal, provincial, and municipal elected and administrative officials were contacted in regions near proposed the proposed RNP AR approach procedures flight paths. Tailored briefings were delivered to federal MPs, provincial MPPs, municipal councillors, and municipal administrative officials or their delegated representatives. The number of offices contacted, and number of briefings held are detailed below in Table 6.

Level of government	Officials/Offices contacted	Officials/Offices provided a briefing
Federal Elected Officials	23	4
Provincial Elected Officials	21	3
Municipal Elected and Administrative Officials	71	12

Table 6: Engagement with elected and administrative officials

Elected officials were appreciative of the effort to inform and typically favourable of changes that would result in improvements for their constituents. Several indicated that they were happy to have a contact to direct inquiries should they receive questions from the public.

5.4.1 Discussions With City of Vaughan Planning Officials

During briefings with City of Vaughan elected officials, a request was made for NAV CANADA to brief senior City of Vaughan administrative officials on the consultation and routing of the proposed RNP AR approach procedures. The City of Vaughan's interest lay primarily in the proximity of the proposed runway 23 RNP AR approach procedure to the Vaughan Metropolitan Centre (VMC). The briefing was attended by City Planning Policy, Development Engineering, and Development Planning staff.

Subsequent to the briefing, the City of Vaughan provided formal feedback on aspects of the proposed runway 23 RNP AR approach procedure. Details of the feedback can be found below in Section 6.2.1 (Feedback Received from the City of Vaughan).

6.0 Community Feedback

The decision being considered during this consultation was whether to implement RNP AR approach procedures for runway 05 and runway 23 as well as any potential modifications to designs based on community feedback. To support this decision-making, the objective of NAV CANADA research was to determine public beliefs and attitude toward the proposed change and identify areas of concern related to potential implementation. To achieve this objective, a survey was one of the methods selected for collecting data.

6.1 Survey Methodology

A self-administered internet questionnaire was made available through links provided on the NAV CANADA website and directly to consultation event attendees. Internet surveys allow for collection of responses from large audiences in a consistent, effective, and user-friendly manner. The survey consisted of 13 structured (closed-ended) questions and 2 unstructured (open-ended) questions. Survey responses were collected once from each respondent at a single point in time between November 1, 2021, and December 22, 2021; respondents were not asked to repeat the survey at a later date.

6.2 Survey Results and Other Feedback

A total of 163 respondents provided feedback consisting of 153 completed surveys and 10 partial responses. Figure 11 below depicts the approximate location of respondents who chose to provide a postal code and details of responses received for individual questions can be found in Appendix A (Feedback Survey Response Details).

Overall, the number of survey respondents may appear to be relatively low when considering the significant visibility effort and the overall population of the surrounding communities; however, it is in line with expectations based on the number of participants who attended one of the information sessions and historical trend in community participation on airspace change topics.

During other interactions with members of the public such as email/telephone conversations, one-on-one information sessions, and conversations during public meetings, there was a mix of support and opposition to the implementation of RNP AR approach procedures.

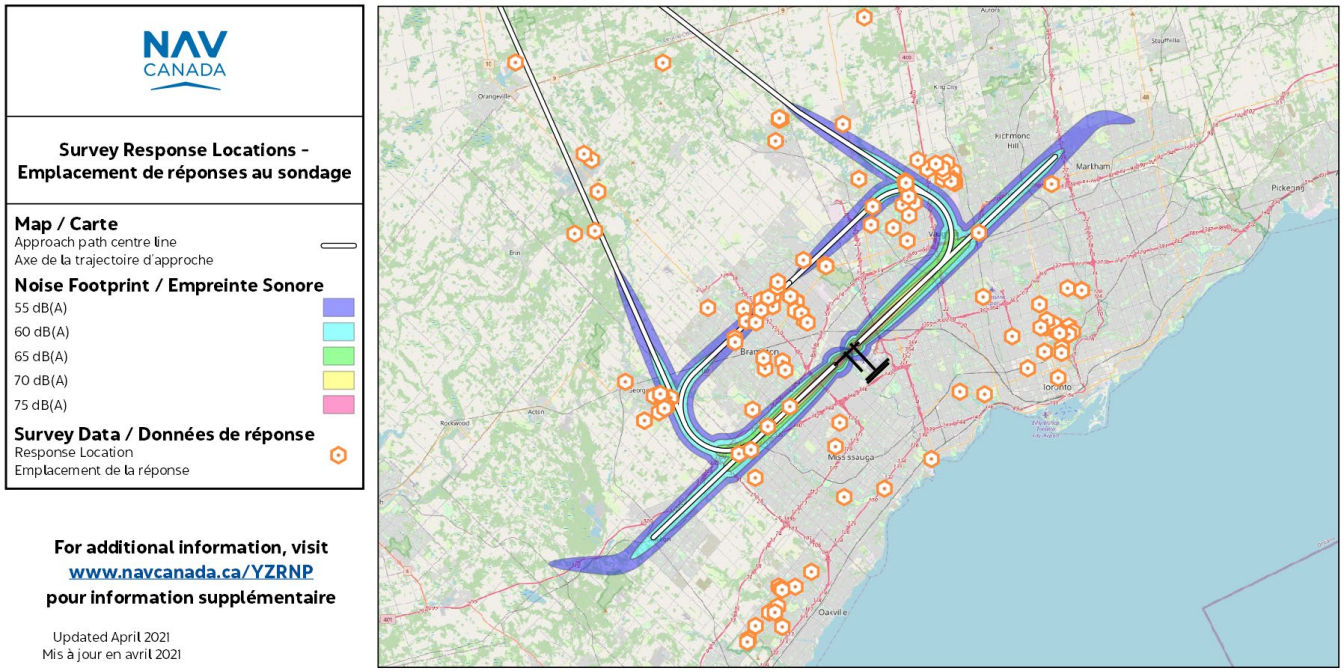

Figure 11: Location of survey respondents

Many participants took the opportunity to voice concerns related to aircraft overflight they experience today, versus proposed changes; this was echoed in the survey results. Many of these comments related to historical flight path or airspace changes in areas unrelated to the location of the proposed RNP AR approach procedures.

Below are some highlights and findings from the survey responses:

- Over 50% of respondents consider reducing aircraft fuel burn and associated greenhouse gas emissions to be one of the top three important factors to consider when designing flight paths;
- About 47% of respondents who are concerned with current levels of aircraft noise expect levels to decrease or stay the same based on the proposed RNP AR approach procedures;
- About 5% of respondents completed the survey but indicated they did not review any of the materials, attend and information session, or plan to attend an information session in the future;
- On average, respondents considered community noise exposure to be a more important factor than safety of aircraft when designing flight paths;

6.2.1 Feedback Received from the City of Vaughan

NAV CANADA received feedback from City of Vaughan administrative officials on the location of the proposed RNP AR approach procedures and the associated expected noise footprint relative to the existing Vaughan Metropolitan Centre (VMC) (Figure 12 and Figure 13 respectively).

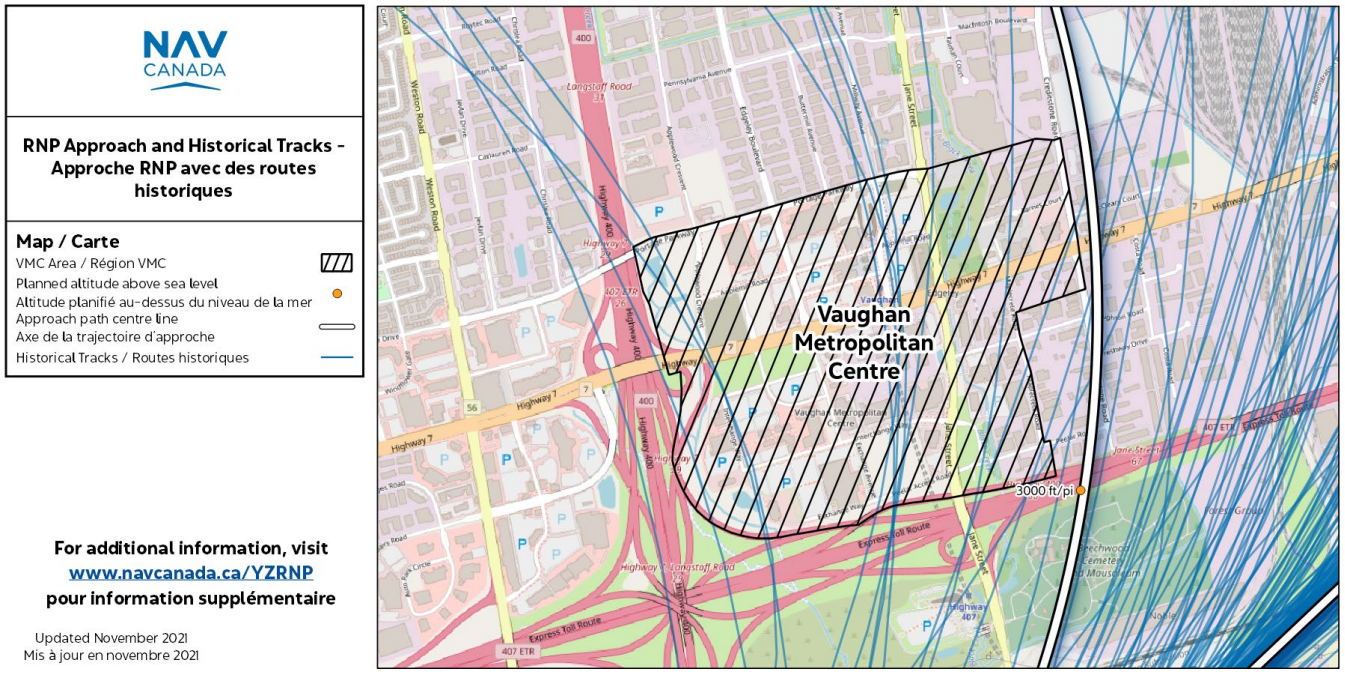

Figure 13: RNP AR runway 23 approach – Location relative to VMC

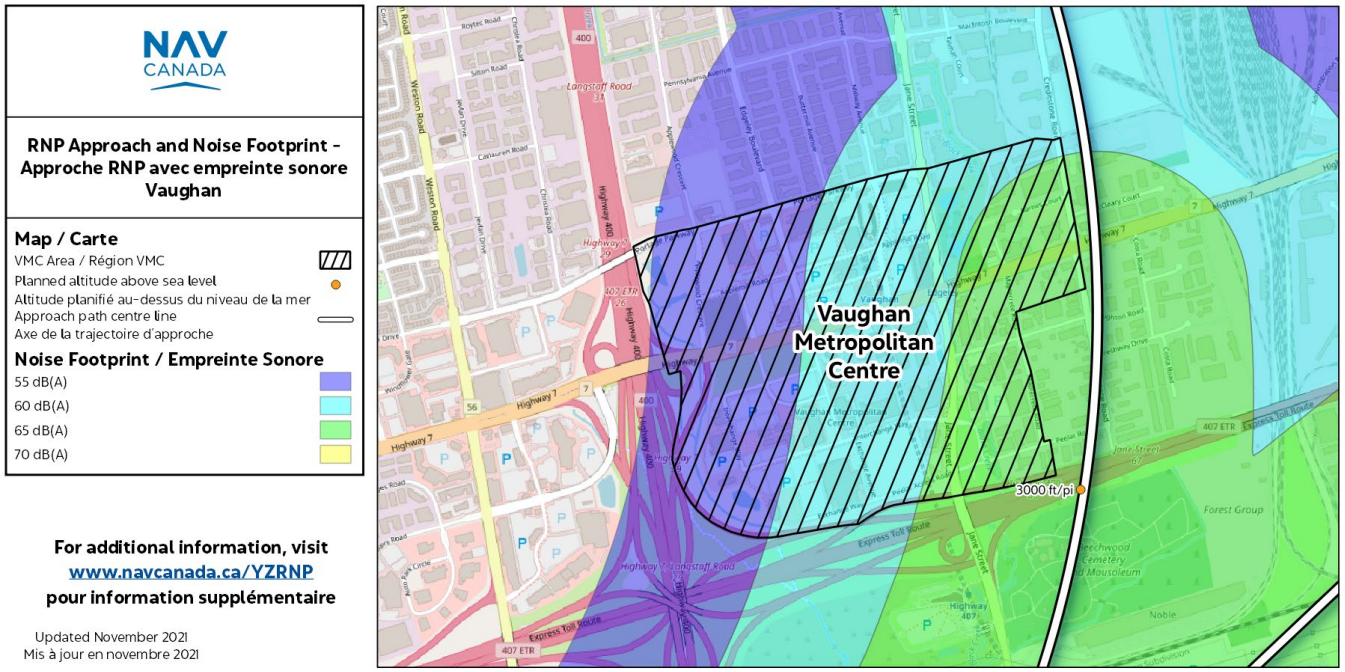

Figure 12: RNP AR runway 23 approach – Noise footprint relative to VMC

The City advised it is positioning VMC to be the financial, innovation and cultural centre of Vaughan with the offer of subway and rapid bus transit with equal access to downtown and the suburbs. They indicated that VMC is exceeding originally proposed targets of 12,000 residential units, 1.5 million square feet of office space, and 750,000 square feet of new retail space by 2031. Based on developments currently occupied and under construction, the projected population of residents living in the VMC is estimated to be 12,925 by 2023. The City expects that more than 66,000 residents in over 33,000 residential units will reside in the VMC area; all existing development applications and proposals are approved.

The City of Vaughan is preparing an update to the VMC Secondary Plan area including a boundary expansion in the north and southeast quadrants with the southeast expansion area being in closer proximity to the proposed RNP flight path. As a result, City planning officials requested NAV CANADA consider relocation of the RNP arc segment further east to reduce the impact on the VMC area.

6.3 Consideration of Proposed Mitigations

Consultation related to the proposed RNP AR approach procedures revealed many concerns from respondents about the location of flight paths and altitude of aircraft along the approaches, particularly in the downwind, base, and final approach segments. Feedback received indicated residents preferred that flight paths be designed to avoid overflying populated areas where possible, and that aircraft altitude be higher for as long as possible. The following sections detail mitigation considered based on feedback received from residents during the information sessions and from survey respondent feedback.

6.3.1 Reduce the number of aircraft using the airport

Aircraft operators schedule flights to arrive and depart the airport based on their operational requirements and work with the airport authority to ensure there is adequate capacity available. The role of NAV CANADA as the air navigation service provider is to ensure the safe, orderly, and expeditious flow of aircraft arriving and departing Toronto Pearson Airport in line with what has been scheduled.

NAV CANADA does not have the authority to place limits on the number of aircraft permitted to depart or arrive from the airport other than what is necessary to ensure the safe movement of aircraft in accordance with conditions prevalent at the time. For example, weather such as strong winds may require use of the north/south runways which in turn limits the rate at which NAV CANADA air traffic controllers can line up aircraft for arrival.

Reducing the overall number of aircraft who plan to use the airport on a scheduled basis is not within the scope of NAV CANADA responsibility and will not be considered as a proposed mitigation.

6.3.2 Avoid overflying communities / Fly over more non-residential lands

NAV CANADA is sensitive to the fact that overflight of residential areas can be perceived as a nuisance for communities. As such, it makes efforts to balance the requirements for safe air navigation, the

interests of surrounding communities and the need to reduce the environmental impact of the industry.

Due to the location of airports in relation to communities, flight path design criteria and operational requirements, it is not always possible to avoid overflying residential areas. As much as possible, the company designs flight paths that overfly commercial and non-residential areas in a manner that respects Transport Canada-approved design criteria.

Some of the suggestions to move existing flight paths were unrelated to RNP AR and beyond the scope of this consultation. With respect to the proposed RNP AR approach procedures, discussion centred around: moving the north downwind further north and south downwind further south; and moving the location of the arc segment which takes aircraft from the downwind onto the final approach.

Moving the Downwind Further North/South

There are often suggestions to move the north downwind several miles to the area north of Brampton and Vaughan and to move the south downwind over Lake Ontario. Relocating the downwind legs to be further away from the airport poses several challenges and introduces some unintended consequences.

Airspace in the Greater Toronto Area is extremely structured–both laterally and vertically–to allow simultaneous arrival and departure operations not only at Toronto Pearson Airport but also several satellite airports such as Toronto/City Centre, Toronto/Buttonville, Hamilton, and Kitchener/Waterloo. Changes to this structure with the intention of mitigating a certain issue can often result in one or many new issues. In the case of relocating the downwind for Toronto Pearson, the new issue which arises is a limitation of the ability for departures to continue climbing after departure.

Airspace structure and the separation of arrival traffic from departure traffic mean departing aircraft remain below arriving aircraft until they are laterally separated and able to continue climbing. The current airspace structure provides an excellent compromise between the ability of arrivals to descend at a safe rate and the ability of departures to keep from flying long distances at low-level altitudes before continuing their climb. If the downwind legs were relocated much further away from the airport, departing aircraft would be, "stuck" underneath arrivals for a longer distance. While this means some residents would experience a reduction in noise from arriving aircraft, they would likely also experience nearby departing aircraft at lower altitudes and relocation of noise to other areas. As departing aircraft tend to be louder than arriving aircraft due to higher thrust settings, this results in one type of noise being exchanged for a different type of noise for no net benefit.

Another consequence of moving the downwind is the increased distance that aircraft need to fly on the perpendicular base leg. This increased distance can make sequencing arriving aircraft more difficult and result in longer distances that aircraft fly in the downwind and final approach segments. This would also increase the overall time aircraft spend overpopulated areas, reduce airport capacity, and increase their associated fuel burn and greenhouse gas emissions.

Relocating the RNP AR Arc Segments

The location of the arc segments which take aircraft from the downwind onto the final approach attempts to strike a balance between several factors. The arc location should keep the total approach length short enough to minimize the amount of time the aircraft is in the air generating noise and emissions while keeping it long enough to allow aircraft to descend at a suitable, safe rate. For each unit of distance, the arc is moved further away from the airport, the total distance required to be flown is increased by double that distance. For example, moving the arc segment 1,000m further from the airport increases the total distance aircraft need to fly by 2,000m.

Increasing total length of the approach also introduces escalating challenges when dealing with sequencing arriving aircraft as it becomes more difficult to predict their precise location further in the future if they are flying an extremely long approach path. Despite these challenges, adjusting the location of the RNP AR approach procedure arc segment is a potentially viable mitigation proposed by consultation participants to mitigate noise in certain areas; especially if a small change can result in a large net benefit and adherence to Transport Canada instrument procedure design criteria can be maintained.

6.3.3 Increase Altitude of the Aircraft

NAV CANADA understands the intent of proposals to keep aircraft higher to provide noise mitigation. Proposals received during the consultation can generally be grouped into two categories: increase the minimum altitude of aircraft in the downwind leg and increase the descent gradient or glide path angles for aircraft on their approach to keep them higher for longer.

Increase the Minimum Altitude of Aircraft in the Downwind Leg

Altitude is an important separation tool and not being able to utilize lower altitudes such as 3,000 and 4,000 feet limits the options for air traffic controllers to provide separation when it is busy at the airport. It can also require keeping some aircraft even higher and running a significantly extended downwind which pushes aircraft noise into a different community as descent would still be required at some point. Having aircraft intercept the instrument landing system at higher altitudes would necessitate that these aircraft join the standard 3° glide slope much further from the airport.

Increase the Descent Gradient of Aircraft (Increase Approach Glide Path Angle)

Achieving continuous descent operations (CDO) requires significant coordination between pilot and controller and, at this time, trying to achieve it through tactical intervention on the base leg where the altitude difference is the main mechanism for providing separation would introduce safety concerns. Due to the high / low split altitude split used when conducting parallel approach operations, we require the confidence that aircraft are approaching the final leg established at the appropriate altitude.

Increasing the glide path angle on Instrument Landing System (ILS) approaches to a value greater than 3.0° could impact airport accessibility in poor weather/visibility during Category II/III ILS approaches. These types of approaches provide pilots with the ability to continue to safely operate during periods

of low visibility. NAV CANADA will not consider any change that would reduce the ability of pilots to safely operate in poor weather and therefore limit accessibility of Toronto-Pearson airport. Any adjustments to glide path angles on RNP AR approach procedures would not necessarily result in a corresponding change to glide path angles on ground-based ILS approach procedures.

The RNP AR approach procedures being consulted on represent the best opportunity to achieve a constant descent profile as they are encoded as part of the procedure, helping ensure equipped and certified aircraft systematically descend using CDO and associated noise-reducing engine and flap settings. Adjusting descent gradients on the RNP AR approach procedures is a potentially viable mitigation if approach procedures can continue to meet all regulatory and operational requirements.

7.0 Decision

Following the consultation, all input received was assessed and considered. RNP procedures have been flown at other airports since 2008 and its use has been successful in providing a shorter flight path, reducing the population overflown and reducing emissions. Based on community feedback and the anticipated benefits such as reduced track mileage and the associated reduction in GHG emissions, implementation of Required Navigation Performance Authorization Required (RNP AR) instrument approach procedures to both ends of runway 05/23 at Toronto Pearson Airport (CYYZ) should proceed with the following adjustments to the original proposal.

7.1 Post-Consultation Adjustments

As a result of stakeholder consultation and additional technical analysis, adjustments will be made to the original proposal. This section provides additional detail of those adjustments and the expected outcome.

7.1.1 RNP Runway 23 Approach - Arc Segment Location

Input received from residents through the information sessions and feedback survey along with discussions with City of Vaughan administrative officials meant a relocation the arc segment of the RNP AR approach procedure to runway 23 was investigated for technical and operational feasibility.

It was determined the arc segment could be relocated approximately 600 m further east as shown in Figure 14 below. This adjustment places the RNP approach flight path further away from the Vaughan Metropolitan Centre development area and closer to the CN MacMillan train yard.

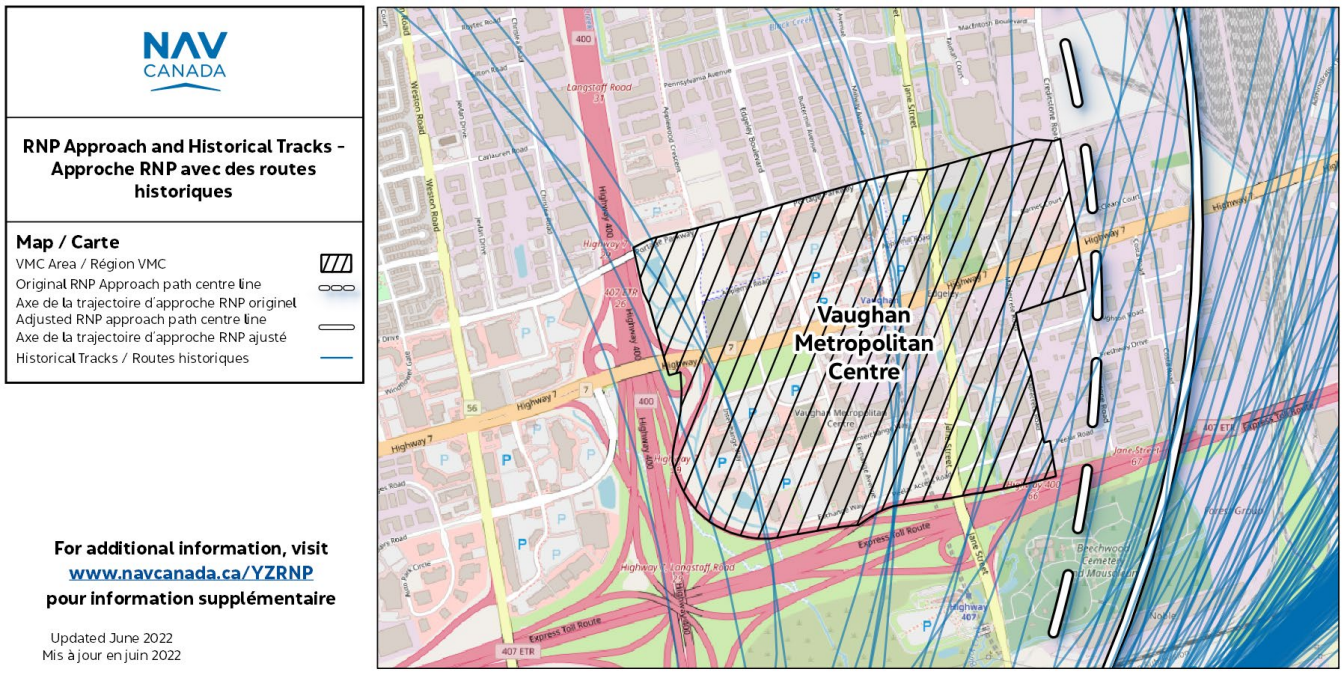

Figure 14: Adjusted RNP AR runway 23 approach – Location relative to VMC

7.1.2 Steeper Descent Gradient

During technical assessment of the proposed RNP AR approach procedures, simulation exercises identified the requirement for a steeper descent gradient. This adjustment lowers the engine power settings required for aircraft to maintain their constant descent. Practically, this means aircraft will stay at a higher altitude for a longer period while on the downwind leg prior to starting to descend on the RNP approach procedure.

7.1.3 Expected Result of Adjustments

As a result of relocating the arc segment for the runway 23 approach and the increased (steeper) descent gradient for both the runway 05 and the runway 23 approaches, an additional reduction is expected in the number of people and homes estimated to be overflown when the RNP AR approach procedures are used compared to an existing approach procedure. The location and Maximum Sound Level (L_{Amax}) noise profile of the adjusted RNP AR approach procedures are shown below in Figure 15 and Figure 16. For the RNP AR approach procedure to runway 23, the adjustments further reduce estimated overflight at noise levels at or above 60 dB(A) by 4,645 people and 1,296 homes when the procedure is in use.

For the runway 05 approach, the adjustments result in an estimated further reduction of 152 people in 45 homes overflown at noise levels at or above 60 dB(A) when the procedure us in use.

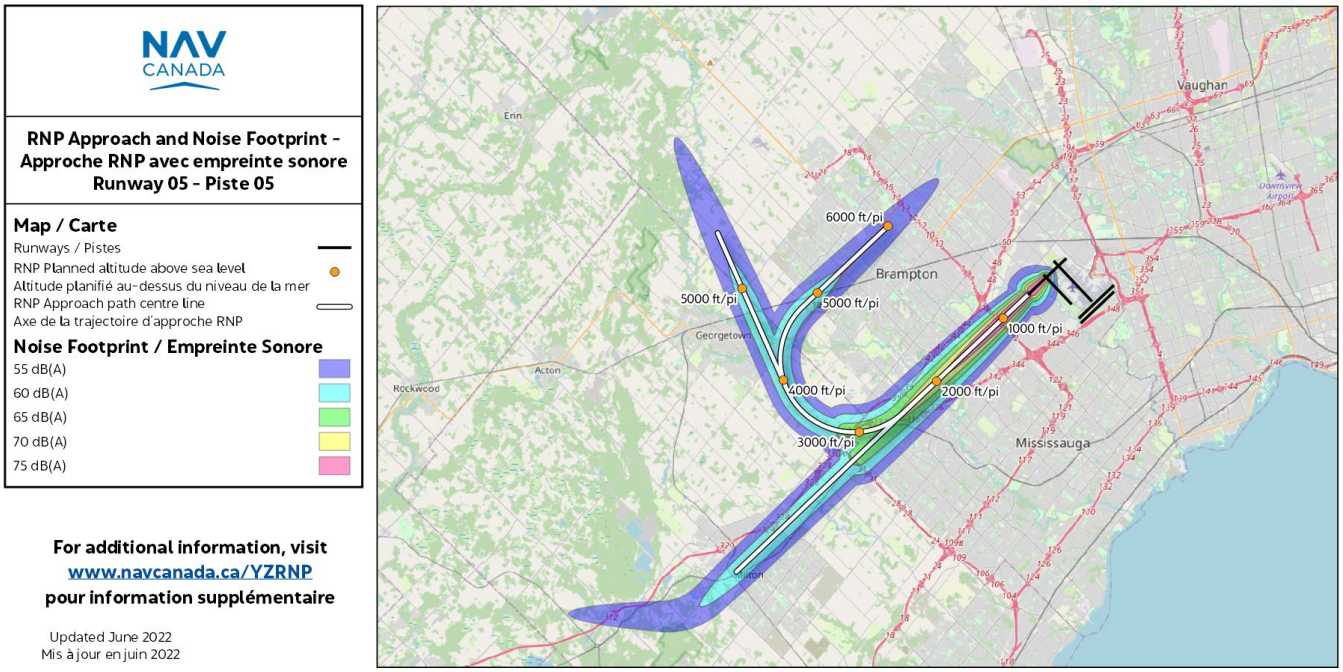

Figure 16: Adjusted RNP AR runway 05 approach – Noise footprint

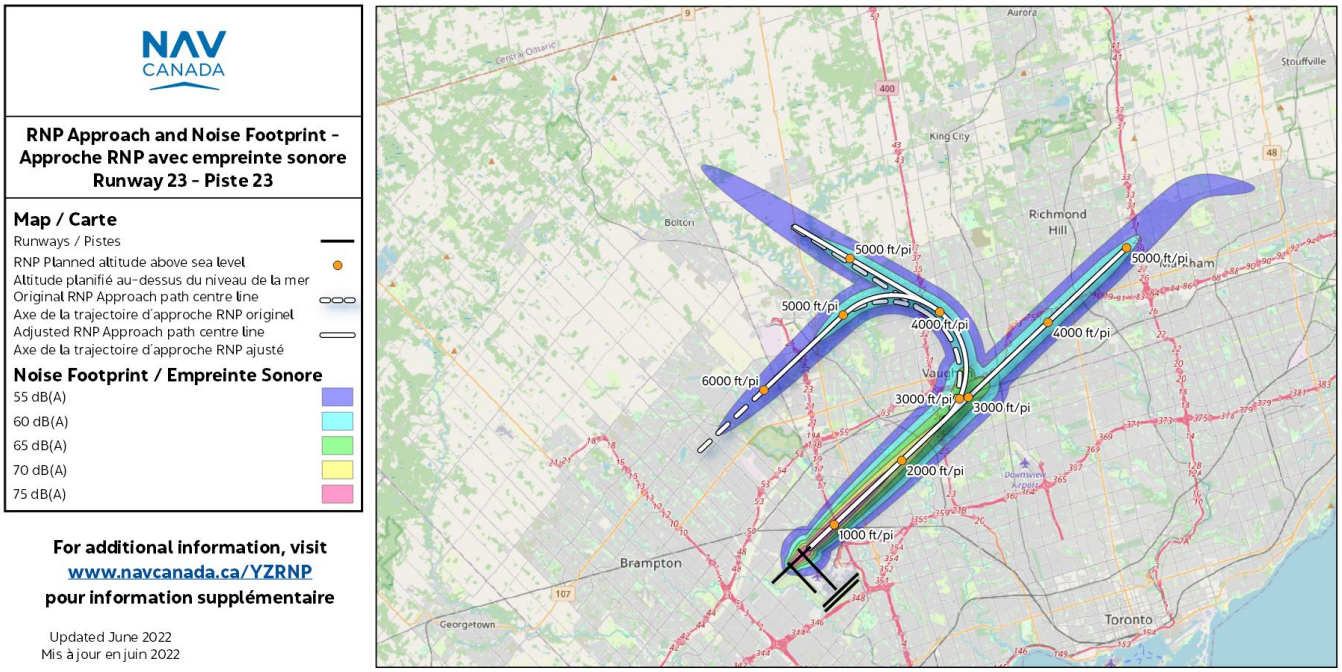

Figure 15: Adjusted RNP AR runway 23 approach – Noise footprint

7.2 Other Considerations

Starting in April 2022, Toronto Pearson temporarily closed east/west runway 06L/24R, the airport's second-busiest runway, for a full rehabilitation. The work is scheduled to last to late fall 2022 with impacts varying with the phase of work and how it affects runway utilization and operations. To avoid additional complications with this project or cause confusion amongst residents about the nature of any changes to noise patterns, the proposed RNP AR procedures will not be implemented earlier than fall 2022.

8.0 Communication

As per the Airspace Change Communications and Consultation Protocol, NAV CANADA will communicate the decision by posting this report on both the NAV CANADA and GTAA websites at least three weeks prior to implementation.

9.0 Post-Implementation Review

An assessment of the change will be made by NAV CANADA and the GTAA reviewing the 180-day period following implementation of the RNP AR approach procedures. The 180-day review will be shared with GTAA Noise Forum participants and published on NAV CANADA's website.

APPENDIX A

Feedback Survey Response Details

1. Please select the municipality you reside in:

Choice	Number of responses	% of respondents
City of Brampton	37	22.7%
City of Toronto	33	20.3%
City of Vaughan	28	17.2%
Town of Oakville	16	9.8%
Town of Caledon	15	9.2%
Town of Halton Hills	14	8.6%
City of Mississauga	11	6.8%
Other (Ontario)	5	3.1%
Township of King	2	1.2%
City of Markham	1	0.6%
Town of Milton	1	0.6%
Total responses and respondents	**163**	**100.0%**

2. Please provide your postal code.

   Of the 163 total survey responses received, 137 respondents elected to provide a postal code. More detailed geographic analysis may be found in Section 6.2 (Survey Results and Other Feedback).

3. How often do you travel by air?

Choice	Number of responses	% of respondents
1 to 5 times per year	64	39.3%
Once every 2 to 5 years	50	30.7%
5 to 10 times per year	19	11.7%
Never	18	11.0%
More than 10 times per year	12	7.4%
Total responses and respondents	**163**	**100.0%**

4. Are current levels of aircraft noise a concern to you?

Choice	Number of responses	% of respondents
Yes	123	75.5%
No	40	24.5%
Total responses and respondents	**163**	**100.0%**

5. What do your concerns about current levels of aircraft noise relate to?

Choice	Number of responses	% of respondents
Aircraft on approach to landing (arrivals)	97	54.2%
Aircraft taking off (departures)	66	36.9%
I don't know / I'm not sure	16	8.9%
Total responses and respondents	**163**	**100.0%**

6. How would you describe your current exposure to aircraft noise (1-Low to 5-High)?

Choice	Number of responses	% of respondents
4	57	35.8%
5	47	29.6%
3	32	20.1%
2	17	10.7%
1	6	3.8%
Total responses and respondents	**159**	**100.0%**

7. What do you think should be considered when designing flight paths?

Choice	Weighted average response score
Community noise exposure	6.52
Safety	6.4
Land use under the flight path (residential vs. commercial/industrial)	5.26
Air quality/pollution	4.69
Reducing fuel burn/greenhouse gas emissions	4.51
Shortening flight times	3.15
Reducing delays	2.99
Increasing airspace capacity	2.48
Total responses and respondents	**159**

8. How did you learn about this public consultation for the proposed RNP AR approaches at Toronto Pearson?

Choice	Number of responses	% of respondents
Advertisement on a social media (Facebook/Instagram)	50	32.7%

Automated phone call	30	19.6%
Notice in a print newspaper	26	17.0%
A family member, friend, or neighbour	12	7.8%
The GTAA website	11	7.2%
Information received from an elected official	11	7.2%
The NAV CANADA website	11	7.2%
An email newsletter from the GTAA or NAV CANADA	8	5.2%
Through Eventbrite's website or advertisements	6	3.9%
Other	5	3.3%
Total responses[14]	**170**	
Total respondents	**153**	

9. Have you reviewed the informational material related to the proposed RNP AR approaches?

Choice	Number of responses	% of respondents
Yes	135	88.2%
No	18	11.8%
Total responses and respondents	**153**	**100.0%**

10. Have you attended one of the eight online public information sessions?

Choice	Number of responses	% of respondents
No	53	34.6%
Yes	47	30.7%
Planning to attend an information session in the future.	31	20.3%
I have watched a pre-recorded information session.	14	9.2%
I didn't know I could attend an information session.	8	5.2%
Total responses and respondents	**153**	**100.0%**

11. Which materials did you find most useful to understand what is changing and how it may affect you?

Choice	Number of responses	% of respondents
NAV CANADA website	89	58.2%
Public information sessions	44	28.8%

[14] Total responses exceed respondents because they were permitted to select as many options as applicable.

Information from a NAV CANADA or GTAA representative	32	20.9%
I don't know / I'm not sure	11	7.2%
Did not find any information useful	5	3.3%
Email / telephone inquiries	3	2.0%
Total responses[15]	**184**	
Total respondents	**153**	

12. Do you expect aircraft noise to increase, decrease, or stay the same for you based on what you understand about the proposed RNP AR approaches at Toronto Pearson?

Choice	Number of responses	% of respondents
Increase	70	45.8%
Stay the same	47	30.7%
Decrease	36	23.5%
Total responses and respondents	**153**	**100.0%**

13. Please explain why you expect noise to increase.

Response	Number of responses	% of respondents
Aircraft will be closer or there will be more air traffic overall	44	67.7%
Expectations of change related to historical issues, past changes, or other factors not related to the proposed change	11	16.9%
Increases in air traffic unrelated to the proposed change (ex. post-pandemic traffic recovery)	8	12.3%
Increase in concentration of aircraft (more aircraft in smaller areas)	7	10.8%
Due to existing noise in the area	6	9.2%
Aircraft flying at lower altitudes than currently	5	7.7%
Total responses[16]	**81**	
Total respondents	**65**	

14. Please explain why you expect noise to decrease.

[15] Total responses exceed respondents because they were permitted to select as many options as applicable.
[16] Responses to this question were open-ended (free text) and coded for categorization and analysis. Total responses exceed respondents because they were permitted to select as many options as applicable.

Response	Number of responses	% of respondents
Aircraft will be further away or there will be less traffic overall	19	54.3%
Aircraft flying at higher altitudes than currently	10	28.6%
Expectations of change related to historical issues or other factors not related to the proposed change	7	20.0%
Use of continuous descent operations	4	11.4%
Total responses[16]	**40**	
Total respondents	**35**	

15. What do you believe are the advantages of implementing RNP AR approaches at Toronto Pearson?

Response	Number of responses	% of respondents
Reduced fuel use and greenhouse gas emissions	64	43.5%
There are no benefits for my community	50	34.0%
Reduced noise over my/some communities	49	33.3%
Benefit to the airport and/or improved airport capacity	45	30.6%
Reduced costs for airlines and support for recovery	38	25.9%
I don't know / I'm not sure	34	23.1%
Reduced flight times	34	23.1%
Safety benefit	24	16.3%
Reduced number of people overflown	23	15.6%
Improved predictability of flights	17	11.6%
Total responses[17]	**378**	
Total respondents	**147**	

16. What do you believe are the disadvantages of implementing RNP AR approaches at Toronto Pearson?

Response	Number of responses	% of respondents
Increase in aircraft overhead and related noise	69	47.9%
Condensing of traffic over some areas	63	43.8%
Decreasing home values	48	33.3%
Lower aircraft	46	31.9%

[17] Total responses exceed respondents because they were permitted to select as many options as applicable.

Quality of life or health concerns	44	30.6%
New communities being affected	43	29.9%
I don't know / I'm not sure	41	28.5%
Concerns about safety	30	20.8%
Damage to the environment	22	15.3%
Total responses[17]	**406**	
Total respondents	**147**	

17. Do you have any additional feedback about the proposed RNP AR approaches at Toronto Pearson?

Response	Number of responses	% of respondents
Concerns about noise levels and/or quality of life	18	20.9%
Feedback unrelated to the proposed RNP AR approach procedures	15	17.4%
Positive feedback on the RNP AR initiative and/or its associated benefits	13	15.1%
Comments about the consultation process or about participation in the consultation process	12	14.0%
Request to move one or more flight path(s) to different neighbourhoods	12	14.0%
Request to reduce concentration of flights and/or Diversify routes	12	14.0%
Concern about noise over new areas (picked the area because of how quiet it seemed)	11	12.8%
Comment or concern about overnight flights	10	11.6%
Request for aircraft to fly higher on an existing path	8	9.3%
Comment on the location and/or altitude of aircraft using the southern downwind	5	5.8%
Total responses[18]	**116**	
Total respondents	**88**	

[18] Responses to this question were open-ended (free text) and coded for categorization and analysis. Total responses exceed respondents because they were permitted to select as many options as applicable.