Consultation Report – Vancouver Airspace Modernization Project

November 2025

Metro Vancouver Region and Southern Vancouver Island - Vancouver International Airport (YVR) Arrival Procedures

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Executive Summary

In 2019, NAV CANADA initiated a multi-year project to modernize the airspace and enhance safety for aircraft operating in the airspace surrounding Metro Vancouver and the Southern Vancouver Island areas. The main objective of the Vancouver Airspace Modernization Project is to enhance safety, ensuring the airspace structure meets Transport Canada design criteria. At the same time, the design brings positive environmental benefits, accommodates future air traffic, and leverages modern aviation navigation technologies. This has resulted in the creation of new arrival routes to Vancouver International Airport (YVR), which ultimately leads to changes to flight paths over some Lower Mainland communities. Flight paths associated with departure procedures and procedures used by aircraft operating under Visual Flight Rules (VFR) including helicopters, floatplanes, and small aircraft will not change due to this project.

As part of its responsibilities under the ANS Act, NAV CANADA has the designated authority and responsibility to design, maintain, and publish instrument flight procedures (including departure and arrival procedures). When undertaking this work, all instrument flight procedures must be designed in accordance with Canadian Aviation Regulations and the standards and criteria specified by Transport Canada, including those in the manual entitled TP308 - Criteria for the Development of Instrument Procedures.

The design of the new arrival procedures must follow national and international standards, which often constrains options regarding airspace structure and the location of flight paths. However, while undertaking the Vancouver Airspace Modernization Project, NAV CANADA made efforts to mitigate noise while reducing emissions by placing new flight paths over less populated areas, industrial lands, water, and park lands where practicable.

A key part of the Vancouver Airspace Modernization Project is to introduce new arrival procedures based on Required Navigation Performance (RNP) criteria. The proposed RNP AR procedures will allow aircraft to line up with the runway sooner than when using a typical procedure today. As a result, aircraft will fly a shorter distance and consume less fuel, therefore reducing Greenhouse Gas emissions. They will also be operating on a Continuous Descent profile, which enables an aircraft to descend on a quieter reduced engine setting.

These procedures also allow planes to descend in a smoother path, which have been proven to reduce noise by 1–5 decibels.

In 2022/2023, NAV CANADA presented initial proposed airspace designs that were the subject of community consultation, undertaken in collaboration with the Vancouver Airport Authority, to inform and receive comments from the community. The consultation period ran from December 6th, 2022, to February 3rd, 2023 and included the creation of a dedicated website with detailed information and maps showing the initial proposed designs, several public meetings in affected communities, and an online questionnaire to collect comments. In addition, meetings were hosted with city staff and elected officials at all three levels of government.

Following the close of the consultation period, NAV CANADA reviewed the community input and worked to identify potential mitigation measures to address areas of concerns wherever

feasible and safe. Subsequently, Transport Canada published new design criteria for flight procedures; this required the evaluation of proposed designs against updated standards and extended the project timeline. The finalized design for arrival procedures is scheduled for implementation in November 2025, following their publication in federal Aeronautical Publications.

This report provides information on the initial proposed arrival procedures, the final set of arrival procedures, noise modeling results, a summary of the community consultations, and timelines for the implementation of new arrival procedures. To skip straight to the final design, see Chapter 4.

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1.0 Purpose

The purpose of this document is to provide the reader with information on NAV CANADA's Vancouver Airspace Modernization Project and work to design new arrival procedures for Vancouver International Airport (YVR), as well as summarize the results of community consultations undertaken by NAV CANADA and guided by the provisions of the Airspace Change Communications and Consultation Protocol (ACCCP)1.

The following sections of the document include supporting background information, a summary of the initial proposed designs presented during community consultations, an overview of the final designs incorporating the latest design standards, new air traffic management technologies and measures to address community feedback, modeled noise impacts, a summary of the community consultation process, and implementation timelines and next steps.

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, plan, operate, maintain, and develop the Canadian civil air navigation system, 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, the right to plan and manage airspace, 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 safe, efficient, and innovative. NAV CANADA is self-sustaining with revenue coming primarily from the fees charged aviation customers for our services.

As part of its responsibilities under the ANS Act, NAV CANADA has the designated authority and responsibility to design, maintain, and publish instrument flight procedures (including departure and arrival procedures). When undertaking this work, all instrument flight procedures must be designed in accordance with *Canadian Aviation Regulations* and the standards and criteria specified by Transport

[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/

Canada, including those in the manual entitled TP308 - Criteria for the Development of Instrument Procedures.

2.2 Vancouver Airspace Modernization Project

In 2019, NAV CANADA commenced work on the Vancouver Airspace Modernization Project with a focus on modernization of the airspace and enhance safety of aircraft operations in the areas of Metro Vancouver and Southern Vancouver Island in anticipation of air traffic growth, while aiming to reduce the industry's environmental impacts. The last significant change to airspace in the Vancouver area occurred in 2007 when new arrival routes were introduced for YVR. Since that time, advances in navigation technology, procedures, and standards have provided the aviation industry with new opportunities to modernize operations systems to reduce flying times, pollution from aircraft landing and take-offs, and provide for quieter continuous descent operations.

While the project addressed airspace design and subsequent changes across the region, this report strictly focuses on the changes associated with the consultation and implementation at YVR.

The Vancouver Airspace Modernization Project will result in the creation of new arrival routes to YVR replacing the current routes, resulting in changes to flight paths over some communities. The new flight paths will be designed to accommodate the use of Area Navigation (RNAV) and Required Navigation (RNP) structures including the deployment of RNP Authorization Required (RNP-AR) approaches. As an important note, the flight paths associated with departure procedures and procedures used by aircraft operating under Visual Flight Rules (VFR) including helicopters, floatplanes, and small aircraft will not change due to this project.

When the new arrival routes are implemented, some residents may observe changes to air traffic patterns associated with certain operations in the region. Accordingly, NAV CANADA conducted community consultations to inform residents about potential changes in their area and gather feedback on the proposed changes.

2.3 YVR and the Vancouver Airport Authority

YVR is the country's second busiest airport and is located on the traditional, ancestral, and unceded territory of the Musqueam people. YVR is open 24 hours to serve the region's demand for air services and is located on Sea Island within the limits of the City of Richmond, approximately 11 kilometres South of the downtown core of the City of Vancouver. YVR enables the community to thrive by connecting people and places, cargo and markets from BC to the world, supporting human connectivity and enabling the flow of ideas, experiences, knowledge, goods, and investment. At its core, YVR exists to serve its community and the economy that supports it.

YVR is managed and operated by the Vancouver Airport Authority, a non-share capital private corporation that operates the airport in service to the community and economy that supports it. Vancouver Airport Authority assumed management of YVR in 1992 and operates the airport under a long-term ground lease agreement with the federal government and has the mandate to be a vital economic driver for the region by supporting the community's demand for air services.

The airport has two main parallel runways and a crosswind runway. The parallel runways, which includes the South runway (08R/26L) and the North runway (08L/26R), are aligned in an East-West

direction with magnetic headings of 083° and 263°. The crosswind runway (13/31) is oriented in a Northwest and Southeast direction with magnetic headings of 125° and 305°, and is used very infrequently throughout the year, generally only used during periods of high crosswinds conditions. Additionally, there are several helipads to support helicopter operations and floatplane bases to support float operations off the Middle Arm of the Fraser River.

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.

2.4 Aircraft Noise Management

Managing aircraft noise exposure on the community is a collective effort of several stakeholders, including:

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 has adopted the *Balanced Approach to Aircraft Noise Management* as its overarching policy to identify noise objectives and evaluate mitigation measures. This Policy recognizes that noise management is best done on a local basis, and mitigation measures typically fall within the following categories: noise reduction at source; land-use planning and management; and, noise abatement operational procedures and operating restrictions.

To reduce noise at the source, ICAO sets noise certification standards for aircraft in Annex 16 Volume I. These standards prescribe limits to the amount of noise created by aircraft and ensure manufacturers utilize the latest available noise reduction technologies for aircraft airframe and engine design. Based on this certification standard, many countries, including Canada, have prohibited older noisier jet aircraft from operating within their airspace to reduce noise exposure on communities.

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. Transport Canada is responsible for setting standards and criteria that govern how flight procedures and flight paths are designed.

The responsibilities of Transport Canada regarding aircraft noise include ensuring all aircraft operating in Canada meet international standards for noise and emissions set by ICAO,

reviewing and approving any new proposed Noise Abatement Procedures or noise control measures at airports, conducting investigations and enforcement of suspected violations to published Noise Abatement Procedures and applicable provisions in the *Canadian Aviation Regulations*, and providing guidelines for compatible land use planning around airports.

Airport Operators

Like most other international airports in Canada, Vancouver Airport Authority is assigned the responsibility to manage noise from is operations within a 10 nautical mile area around the airport under its ground lease with the federal government. To meet this requirement, the Vancouver Airport Authority maintains an Aeronautical Noise Management Program[3], which includes elements such as monitoring and reporting noise levels around the airport, maintaining an Aeronautical Noise Management Committee, checking for compliance with Noise Abatement Procedures, receiving and responding to community questions and concerns, and actioning initiatives in a five-year noise management plan.

Noise Abatement Procedures are designed to mitigate the impact of aircraft noise without compromising aviation safety. Noise Abatement Procedures at airports must be approved by Transport Canada, and as aviation is federally regulated, municipal noise by-laws do not apply to airport and aircraft operations, and Noise Abatement Procedures serve in this regard. The Noise Abatement procedures for YVR include use of a preferential runway system, prescribed use of noise abatement departure procedures, restrictions on the hours that certain runways can be used, and night-time restrictions for certain types of operations.

Vancouver Airport Authority also hosts and chairs the Aeronautical Noise Management Committee (ANMC)[4]. The ANMC is consultative in nature and does not have executive authority. Its main duties are to support noise management activities undertaken by the Vancouver Airport Authority by:

- Providing a forum for the exchange of relevant information amongst all stakeholders.
- Enhancing awareness and understanding of aeronautical noise management issues.
- Discussing, analysing, and providing advice on noise management plans and procedures.
- Reviewing summaries of noise concerns received by the Airport Authority and provide insight on trends. For privacy reasons, summaries will not include names and addresses of individuals.
- Providing a consultation forum for the discussion of proposed changes to airport noise control regulations.
- During planned changes to airspace, providing input on the communication and consultation plans to the proponent of the change.
- Providing input on communication plans and advisories related to extended planned airfield closures that affect runway operations.
- Providing recommendations on noise abatement practices to guide efforts of the YVR Aeronautical Noise Management Program.

[3] YVR Noise Management Program (https://www.yvr.ca/en/about-yvr/noise-management)
[4] YVR Aeronautical Noise management Committee (https://www.yvr.ca/en/about-yvr/noise-management/anmc)

Current membership on the ANMC includes municipal staff and citizen representatives, NAV CANADA, Transport Canada, Musqueam Indian Band, airlines, aircraft operators, and various industry associations.

NAV CANADA

NAV CANADA is responsible for the safe coordination and the efficient movement of aircraft and is also assigned the authority and responsibility by the federal government 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 Noise Abatement Procedures in effect at different facilities. Flight procedures designed and published by NAV CANADA also adhere to airport Noise Abatement Procedures.

Airlines, Manufacturers, and Other Operators of Aircraft

Airlines and other aircraft operators are responsible for conducting their operations in compliance with Transport Canada regulations and published Noise Abatement Procedures for the airport. Airline and air operator subject matter experts are also involved in various working groups and teams that support improvements to aviation safety, efficiency, and noise through responsible development of performance-based navigation and airspace design. Airlines are encouraged to use the quietest aircraft in their fleet or expedite the purchase of quieter aircraft, and Canadian airlines are working to achieve this through various methods. The International Civil Aviation Organization (ICAO) sets international noise standards that manufacturers must adhere to as defined in the ICAO Annex 16 regulation[5].

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, in alignment with national guidelines provided by Transport Canada for land use in the vicinity of airports. These guidelines serve to discourage non-compatible land uses (e.g. residential) in areas around the airport exposed to high level of noise, defined using the Transport Canada Noise Exposure Forecast metric.

2.5 Performance Based Navigation and Required Navigation Performance

There has been a significant shift in aviation technology over recent years with the advent of Global Navigation Satellite Systems (GNSS). The corresponding modernization of aircraft navigation and flight management systems has supported airspace modernization using Performance Based Navigation (PBN). The implementation of PBN is presently a high priority for ICAO and the global aviation community and is reflected in Transport Canada's PBN Mandate. PBN is an enabler for quieter continuous descent and continuous climb operations, offers more accurate track keeping,

[5] https://www.icao.int/environmental-protection/reduction-noise-source

enhances situational awareness and allows for shorter direct routes, as well as more efficient take-offs and landings. This reduces fuel burn, time in system, radio exchanges between pilots and air traffic control, and aircraft emissions.

Area Navigation (RNAV) is one type of PBN, and Required Navigation Performance (RNP) is a further sub-type of RNAV - the main difference being that RNP requires onboard aircraft performance monitoring and alerting ensuring greater accuracy and reliability, while RNAV does not. Essentially, RNP is a more advanced form of RNAV, through its self-monitoring capabilities.

While the current airspace structure surrounding YVR was last amended in 2007, the underlying system is still based on historic traffic patterns derived from the location of ground-based navigation aids and, as a result, increase the need for airspace restrictions and constraints. A full PBN environment will offer the opportunity to mitigate many of these constraints and leverage new technology to enhance the overall safety and efficiency of operations across the region.

One of the goals of the Vancouver Airspace Modernization Project is to design and implement a safe, efficient, environmentally responsible, fully integrated PBN environment. Consistent with other airspace modernization projects across Canada, this will include the use of Area Navigation (RNAV) and Required Navigation Performance (RNP) structures in the Vancouver terminal area as well as the deployment of RNP Authorization Required (RNP-AR)[6] approaches to all runways at YVR and eliminating the reliance on ground-based navigation aids.

RNP-AR procedures assure that appropriately equipped and certified aircraft fly a highly predictable and specific flight path. This means that airspace designers have some flexibility as to the flight path location, allowing them to locate aircraft away from populated areas wherever possible, while still meeting Transport Canada design criteria. It also often means being able to turn arriving aircraft toward the airport sooner, reducing the distance flown and associated emissions, compared to more conventional approaches.

Another feature of RNP-AR procedures is the capability for aircraft to fly a specific fixed-radius curved path, called a radius-to-fix or “RF” leg, to line up with the runway whenever an accurate, repeatable, and predictable path is required.

3.0 Overview of Initial Proposed Designs

This section provides information on current operations and the initial proposed designs for new arrival routes, that were subject to community consultations between December 6th, 2022, and February 3rd, 2023, where residents were invited to provide feedback and comments. Following a thorough review of the comments, several changes were made to the initial proposed designs, resulting in the final designs outlined in Chapter 4 of this report.

The design of arrival routes and procedures must comply with strict Transport Canada design standards to ensure a high level of safety. Given the local geography of the region, it is not possible to create new routes that completely avoid residential areas; however, NAV CANADA attempted to place

[6] RNP AR refers to a specific type of instrument approach procedure within the PBN framework that requires special authorization from aviation authorities for both the aircraft equipment and the air crew.

the new routes over industrial and commercial areas, park areas, bodies of water, and less populated areas where technically feasible and consistent with safe operations.

The new arrival routes will be a combination of RNAV and RNP-AR procedures; however, RNP-AR procedures can only be used by aircraft that have specific equipment on board and have trained aircrew. It is estimated that approximately 50-60 percent of the aircraft operating at YVR are equipped and certified to fly an RNP-AR procedure – this percentage should only increase over time. While this percentage varies based on aircraft type and associated avionics, origin airport/country, and airline operator, it is expected to grow gradually as airlines renew their fleets and acquire more modern and quieter aircraft. The new RNAV procedures will be used by aircraft that are either not equipped or not certified for RNP-AR or as required for traffic management purposes.

While air traffic control may regularly direct (or “vector”) aircraft to operate off of the approach procedure to ensure safe sequencing or provide more direct routing, the intent of aircraft given clearance to fly the proposed RNP-AR approach procedure is to allow precise navigation along the flight path prescribed by the procedure, ideally with little or no further direction from air traffic control.

While the broader airspace structure will be adjusted to accommodate the new approach procedures, no changes are proposed for departure procedures or the routes and procedures used by aircraft flying in accordance with Visual Flight Rules (VFR). For more information about routes that are not changing as part of VAMP, please see section 3.6 of this document.

3.1 Current Operations

YVR operates a dual runway system, with two main runways that are parallel to one another in an east-west direction. Aircraft must take off and land into the wind for safety reasons. Depending on the wind conditions at the airport, aircraft will either land from the east or the west. The historical prevailing wind conditions at YVR are from the east about 50% of the time - more common during the fall and winter months, and from the west about 50% of the time - more common during the spring and summer months. However, as the airport is located on the coast it is very common that the wind direction may change throughout the day; the direction of operations and runways in use will switch accordingly when the tailwind exceeds a specified value, typically 5 knots.

When the winds are from the East, Runway 08R and Runway 08L are in use and aircraft will approach the airport from over the Strait of Georgia, and **FIGURE 1** illustrates current flight tracks of YVR arriving aircraft when Runway 08R/L is in use. When the winds are from the west, Runway 26R and Runway 26L are in use and aircraft will approach the airport from over the City of Richmond, and **FIGURE 2** illustrates current flight tracks of YVR arriving aircraft when Runway 26R/L is in use.

The figures illustrate aircraft entering Vancouver airspace from multiple directions, determined largely by their points of origin and the assigned air routes specified in their flight plans. These aircraft then follow published arrival routes and instructions from air traffic control to approach the airport in an organized and safe manner. Additionally, air traffic control may deviate from the standard routing to safely sequence aircraft for landing or to optimize flight durations. This “vectoring” of aircraft is an effective and necessary practice that will continue after the new procedures are implemented.

FIGURE 1: Current YVR arrival flight tracks when Runway 08R/L is in use

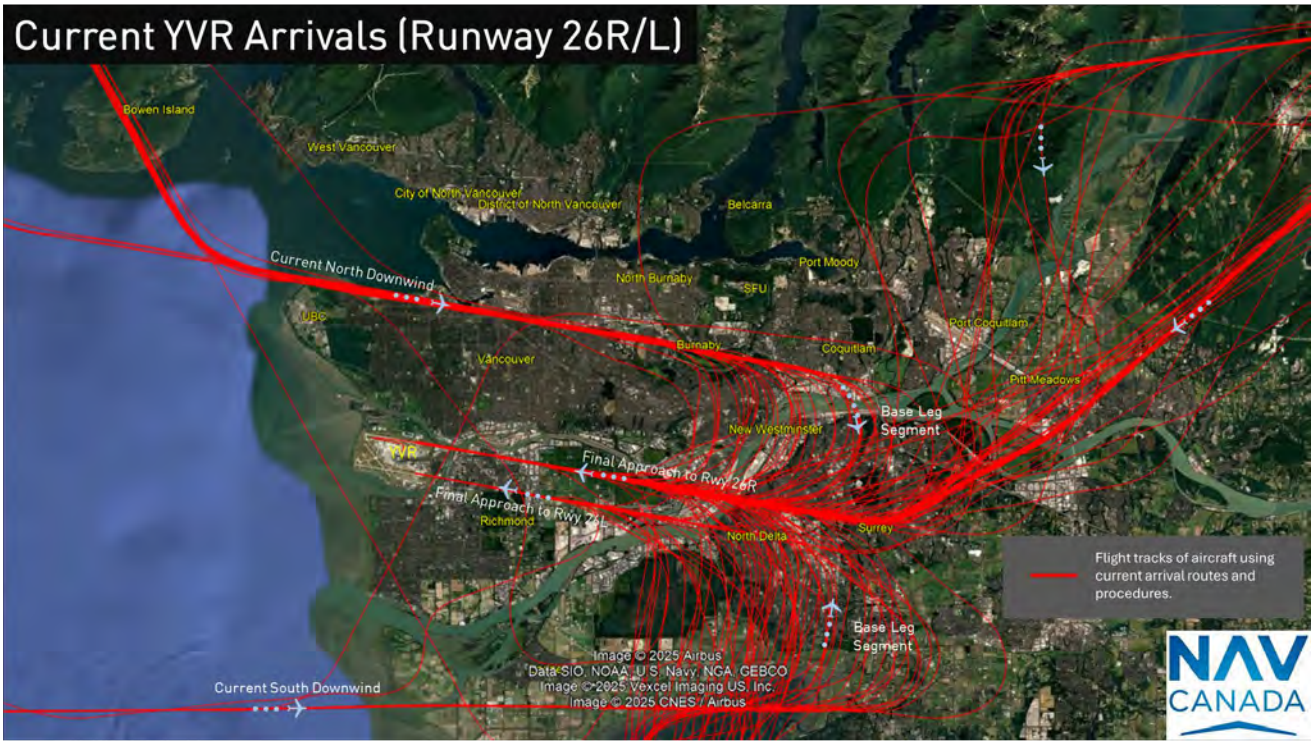

FIGURE 2: Current YVR arrival flight tracks when Runway 26R/L is in use

3.2 Initial Proposed Routes - Metro Vancouver Area (Runway 08R/L in use)

FIGURE 3 and **FIGURE 4** illustrate the initial proposed arrival routes (white lines) that were subject to community consultations, in areas to the North/Northeast and East/South/Southeast of YVR, respectively, when Runway 08R/L are in use. For reference, the figures also show current flight tracks of aircraft (red lines) approaching the same runway using existing approach procedures.

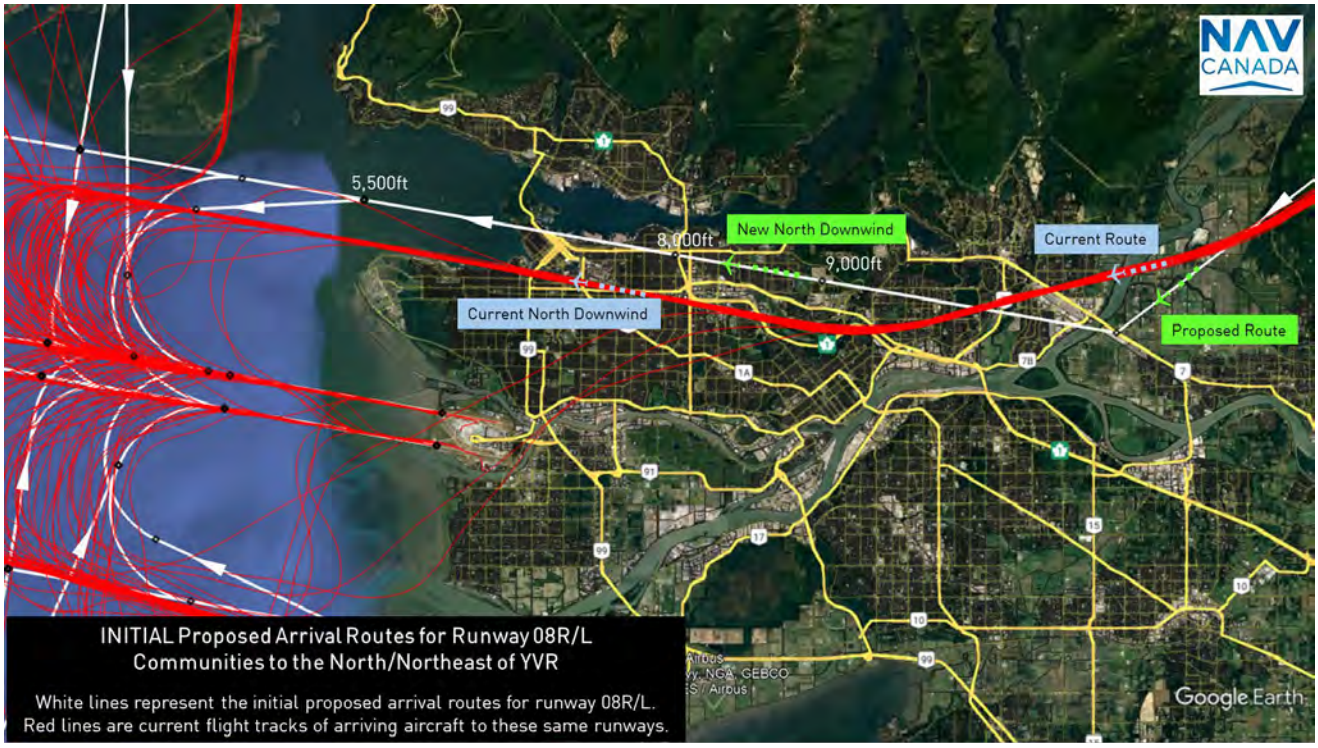

FIGURE 3: Initial proposed arrival routes and current arrival tracks for Runway 08R/L - Communities located to the North and Northeast of YVR

FIGURE 4: Initial proposed arrival routes and current arrival tracks for Runway 08R/L - Communities located to the East, South, and Southeast of YVR

While the figures show expected altitudes in feet of aircraft above sea level at various points on the proposed arrival routes, the actual altitude of aircraft may vary based on operating conditions and altitude restrictions present on the arrival at the time.

As illustrated in **FIGURE 3:**

- The proposed routes will shift the current North downwind segment of the approach laterally to the North. The downwind is an important segment of the approach as it allows air traffic control to properly sequence and provide required spacing for aircraft as they approach the airport from multiple directions.

As illustrated in **FIGURE 4:**

- The proposed routes will shift one of the current arrival paths, used primarily by aircraft approaching YVR from the South, further to the North away from the community of Tsawwassen and over less populated areas.

3.3 Initial Proposed Routes – Metro Vancouver Area (Runway 26R/L in use)

FIGURE 5 and **FIGURE 6** illustrate the initial proposed arrival routes (white lines) that were subject to community consultations, in areas to the North/Northeast and East/South/Southeast of YVR, respectively, when Runway 26R/L are in use. For reference, the figures also show current flight tracks of aircraft (red lines) approaching the same runway using existing approach procedures.

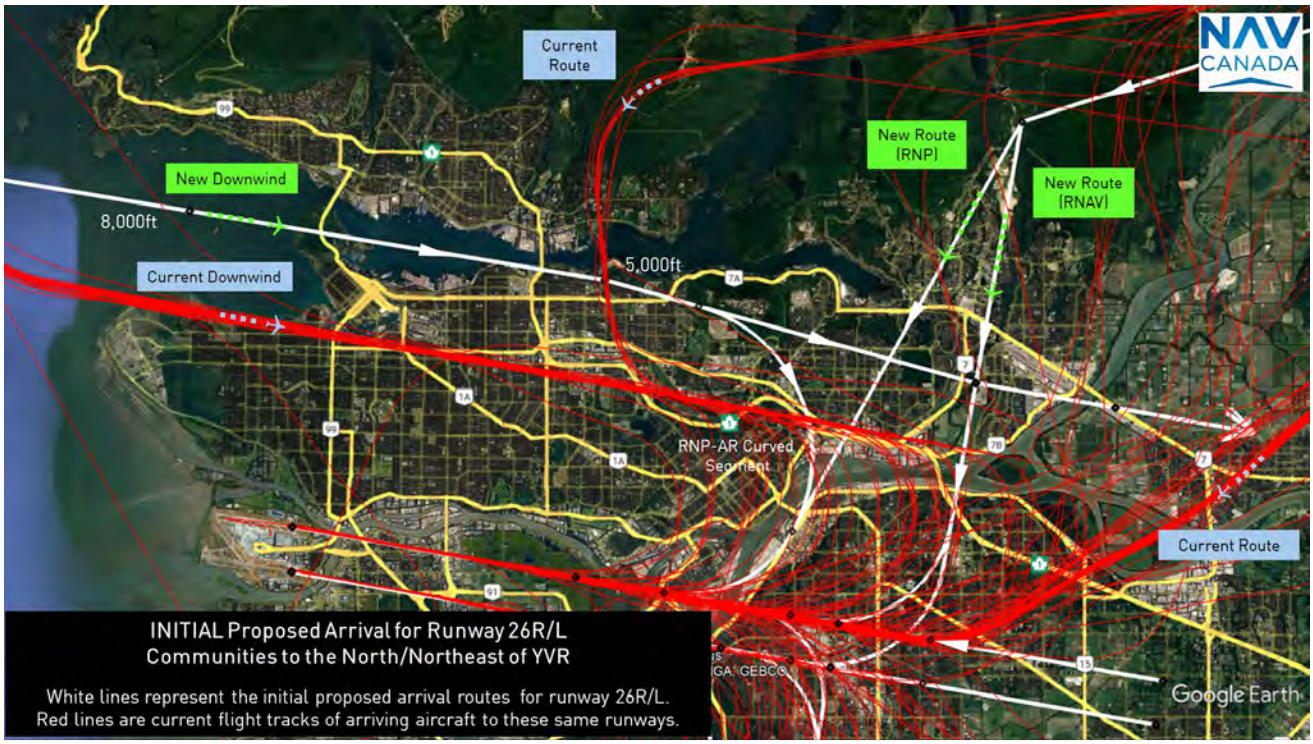

FIGURE 5: Initial proposed arrival routes and current arrival tracks for Runway 26R/L - communities located to the North and Northeast of YVR

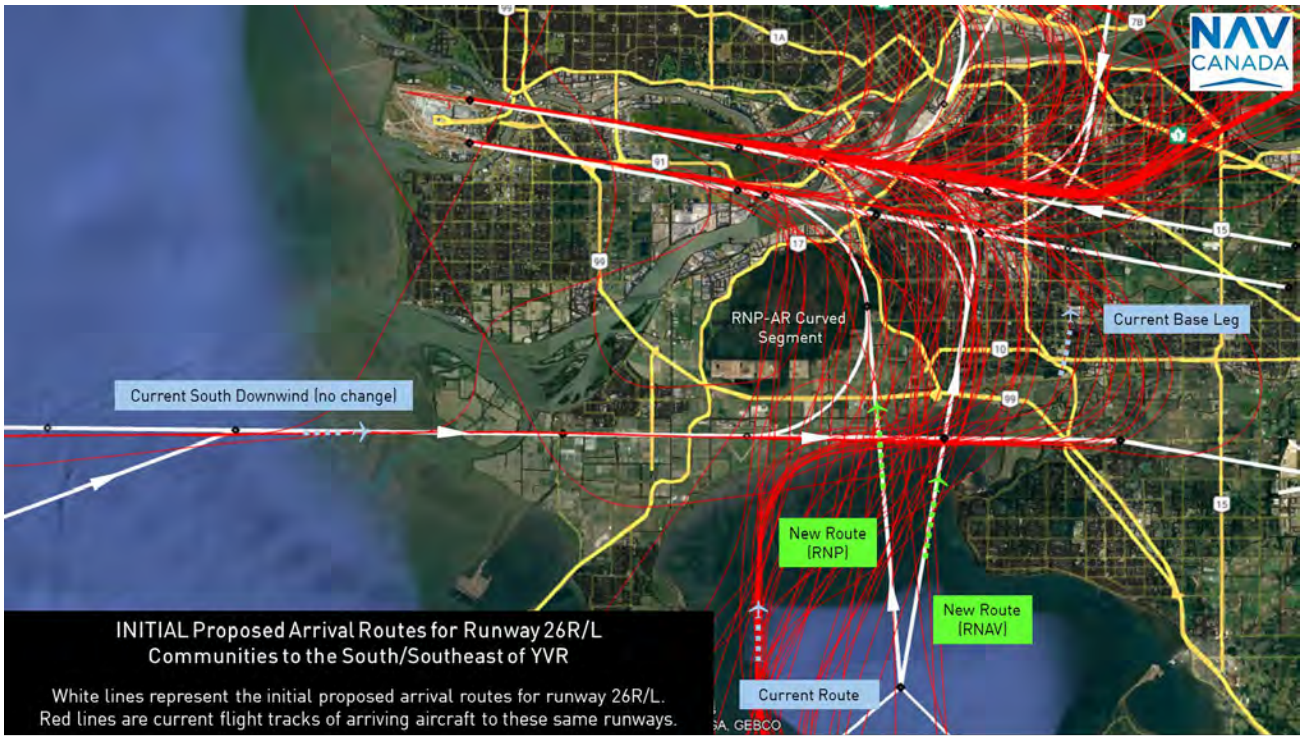

FIGURE 6: Initial proposed arrival routes and current flight tracks for Runway 26R/L - communities to the East, South, and Southeast of YVR

While the figures show expected altitudes in feet of aircraft above sea level at various points on the proposed arrival routes, the actual altitude of aircraft may vary based on operating conditions and altitude restrictions present on the arriving aircraft at the time.

As illustrated in **FIGURE 5**:

- The initial proposed routes would shift the current North downwind segment of the approach further to the North laterally, closer to Burrard Inlet. All efforts were made to locate the new downwind as far North as possible to track over Burrard Inlet; however, the designed routes must meet regulatory requirements and design criteria set by Transport Canada, which afford airspace designers limited flexibility. In addition, the rising terrain to the North poses significant challenges for the designs as the operation currently demands that YVR departures heading North systematically remain below the arrivals until they clear the North downwind segment. This limits the space available for aircraft to climb before encountering the rising mountainous terrain. There is a finite space available due to geographic and design constraints and this position of the downwind is pushed as close to Burrard Inlet as allowed and feasible.
- The initial proposed routes also introduced two new arrival routes over the Tri-Cities for aircraft approaching YVR airspace from the Northeast. These are no longer a part of the final design. Reasoning for this change is further explained in Chapter 4.
- Aircraft flying along the North downwind segment and using the RNP-AR approach will follow the depicted curved path to join their final approach. Other aircraft will remain on the North downwind segment until instructed by air traffic control to turn for final approach. Since the turn initiation point will vary, these aircraft will be dispersed over a wide area.

As illustrated in **FIGURE 6**:

- The initial proposed routes for aircraft arriving from the South over Boundary Bay would shift the current approach routes to the East, closer to the shoreline of South Surrey, but would remain over Boundary Bay. As illustrated by the historical flight tracks (in red) using the current routes and procedures, aircraft presently operate very close to the shoreline and over the South Surrey area.
- There is no proposed change to the Southern downwind segment from its current location.

Note the curved segment of the RNP-AR approach where aircraft turn from the downwind leg to the final approach leg as the aircraft lines up with the runway. The placement of the Northern curved segment, between the communities of New Westminster and Surrey, and Southern curved segment was meant to reduce overflights of populated areas by designing and locating the curved segments over less populated areas, such as industrial lands and Burns Bog. While this will not preclude residential areas located at some distances adjacent to the flight path from experiencing overflights, the procedure reduces overflight of residential areas overall.

3.4 Initial Proposed Routes – Sunshine Coast

FIGURE 7 and **FIGURE 8** depict the initial proposed arrival routes that were subject to community consultations, over the Sunshine Coast Communities when Runway 08R/L and Runway 26R/L are in use, respectively. For reference, historical tracks of aircraft approaching the same runway using existing approach procedures are also illustrated.

FIGURE 7: Initial proposed arrival routes and current flight tracks for Runway 08R/L - Sunshine Coast Communities

FIGURE 8: Initial proposed arrival routes and current flight tracks for Runway 26R/L - Sunshine Coast Communities

As illustrated in **FIGURE 7**:

- The shift of the downwind further north for aircraft arriving from the west relocates traffic further away from populated shoreline areas.
- Aircraft arriving from the north will no longer be routed over the east of Bowen Island, and arrival paths have been shifted to fly over water and unpopulated areas. Both of these points affect traffic patterns during a 08 landing operation.

As illustrated in **FIGURE 8**:

- Aircraft arriving from the west are pushed further south of Sechelt and Gibsons.
- Aircraft arriving from the north have been relocated to the east, but are at a higher altitude than is currently seen for runway 26 arrivals. Noise modeling indicates no new noise footprint for these arriving aircraft over Bowen Island.

3.6 Initial Proposed Routes – Southern Vancouver Island

FIGURE 9 and **FIGURE 10** depict the initial proposed arrival routes that were subject to community consultations, over the Southern Vancouver Island area when Runway 08R/L and Runway 26R/L are in use, respectively. For reference, historical tracks of aircraft approaching the same runway using existing approach procedures are also illustrated.

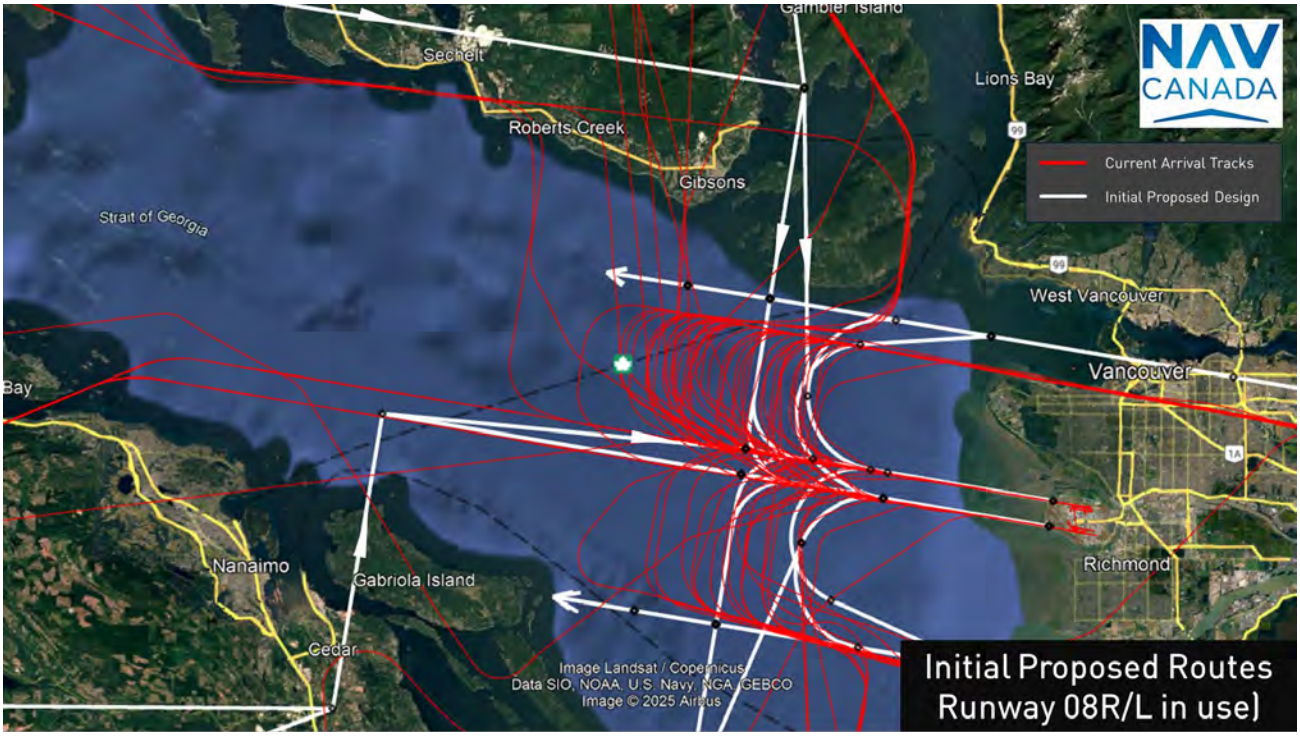

FIGURE 9: Initial proposed arrival routes and current flight tracks for Runway 08R/L – Southern Vancouver Island Area

As illustrated in **FIGURE 9**:

- When Runway 08R/L is in use, the sequencing of aircraft arriving from points West of Vancouver Island is a challenge due to the relative ‘straight in’ direction of the arrival routing. Accordingly, the intent of the initial proposed routes, which would have added a route with roughly 90° turns Southeast of Nanaimo and North of Gabriola Island, was to provide air traffic controllers tools to reduce aircraft speeds and manage sequencing more effectively before setting up the aircraft for its final approach to YVR.

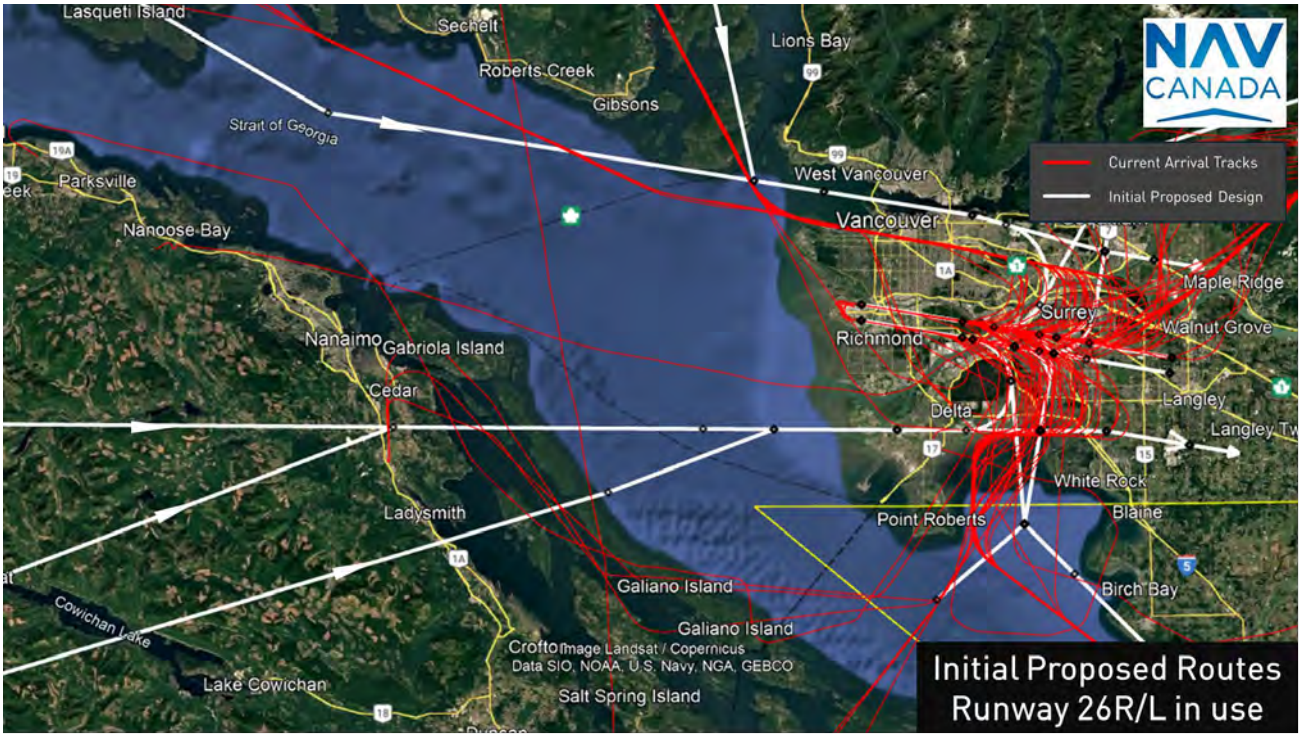

FIGURE 10: Initial proposed arrival routes and current flight tracks for Runway 26R/L – Southern Vancouver Island Area

As illustrated in **FIGURE 10**:

- The initial proposed routes would shift aircraft arriving from northern routes further away from the communities of Gibsons and Sechelt.
- Proposed altitudes are also 1,000-2,000 feet above current routes over Vancouver Island and the islands to the east of Vancouver Island.

3.7 Operational Procedures and Flight Paths Not Affected

The proposed changes described in the preceding sections pertain exclusively to instrument arrival procedures for YVR aircraft operating under Instrument Flight Rules (IFR). Existing procedures and flight paths associated with YVR departures, as well as non-YVR aircraft operating under Visual Flight Rules (VFR) within the vicinity, will remain unchanged.

FIGURE 11 and **FIGURE 12** illustrate the general flight patterns of YVR departing aircraft (green lines) when Runway 08R/L and Runway 26R/L are in use, respectively. When departing YVR under IFR, aircraft follow a published Standard Instrument Departure Procedure (SID) and directions from air traffic control. The published SIDs for YVR provide altitude and heading guidance for pilots to follow upon take-off. For jet aircraft, the general procedure is to climb to 3,000 feet before following instructions from air traffic control who will safely guide the aircraft out of the Vancouver airspace and towards their assigned enroute airway. Some propeller aircraft may initiate a turn soon after take-off at lower altitudes depending on the assigned SID.

Generally speaking, departure flight paths are not as precise as arrival routes. The actual path taken by an aircraft will vary due to various factors including instructions provided by air traffic control, aircraft climb rate and turn performance, weight of the aircraft, separation from other traffic in the area, and weather conditions.

FIGURE 11: Flight tracks of aircraft departing YVR when Runway 08R/L is in use (take-off direction to the East over the City of Richmond)

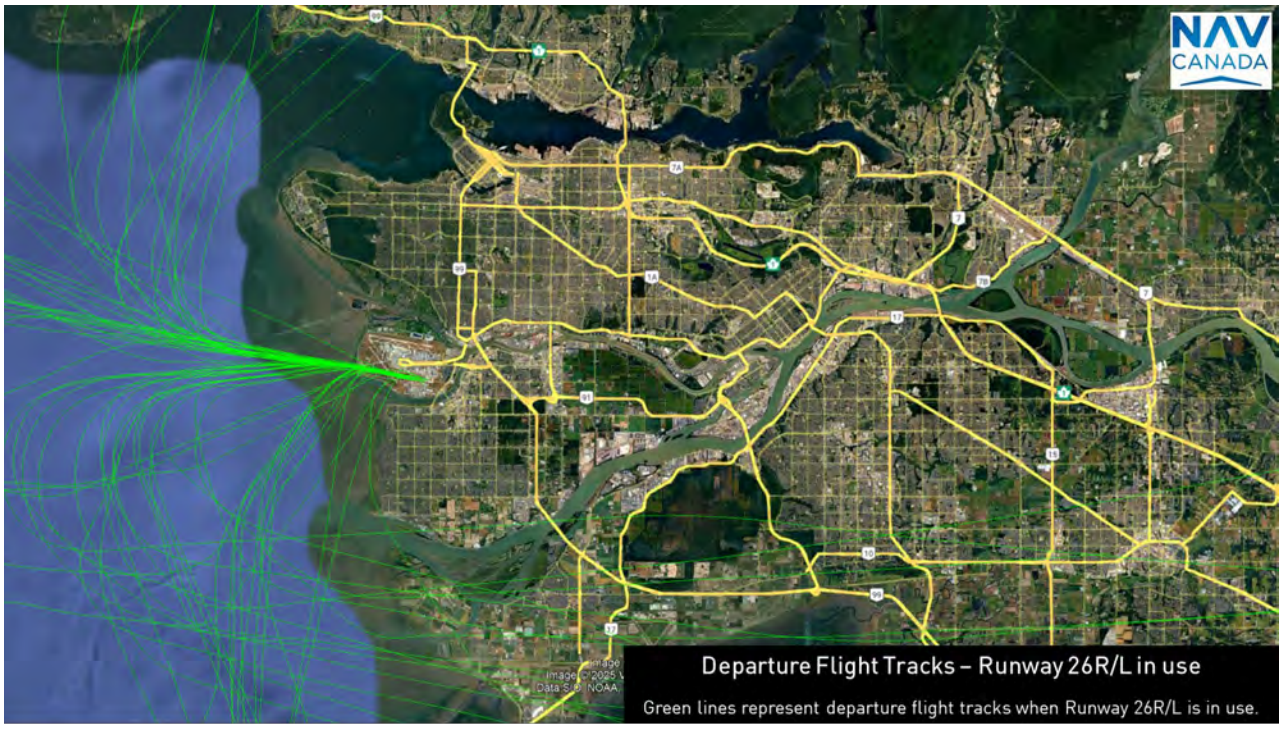

FIGURE 12: Flight tracks of aircraft departing YVR when Runway 26R/L is in use (take-offs direction to the West over the Strait of Georgia)

In addition to YVR, the Metro Vancouver region is home to many smaller airports, and the area is subject to low level overflights from aircraft using these airports. These non-YVR aircraft generally operate under VFR where pilots are responsible for their own separation with other aircraft as well as conducting navigation by following visual references and landmarks on the ground rather than the onboard aircraft navigation instruments. These aircraft typically operate in lower-level airspace and at altitudes below YVR aircraft.

FIGURE 13 illustrates typical overflights of the Metro Vancouver area by non-YVR aircraft that operate out of other smaller airports in the area, including Boundary Bay Airport (ZBB), Pitt Meadows Regional Airport (YPK), Vancouver Harbour (YHC), Langley Regional Airport (YNJ). These aircraft are generally associated with flight training activities or transiting through Vancouver airspace to other airports or to designated areas for flight training activities.

FIGURE 13: Typical flight tracks of non-YVR aircraft operations over the Lower Mainland

3.8 Community Consultations

NAV CANADA and industry partners are committed to community consultation of relevant flight path changes and efforts to minimize the impact of aircraft noise to local communities while ensuring first and foremost the safety and efficiency of airport operations. The objective of community consultations is to ensure residents have information available to learn about the proposed changes and to provide an opportunity to receive comments and feedback on the proposed designs before they are finalized.

Aspects of the community consultation process is guided by the Airspace Change Communications and Consultation Protocol (ACCCP), which was created jointly between NAV CANADA and the Canadian Airports Council to serve as a voluntary protocol for community engagement around changes to airspace. The premise of the ACCCP is to promote providing opportunities for residents to learn about changes to airspace over their areas and to provide input prior to implementing changes.

Between December 6th, 2022 and February 3rd, 2023 NAV CANADA, with the support of the Vancouver Airport Authority, hosted a 60-day community consultation period to gather feedback on the initial proposed designs from affected communities. More information on the community consultation process can be found in **APPENDIX A**.

Following the consultation period, feedback was assessed by NAV CANADA. Recently adopted air traffic management technologies were also evaluated to identify possible revisions to the initial proposed designs while remaining compliant with the latest Transport Canada design standards. This work resulted in a set of final designs that are further explained in the following chapter.

While the final designs do not address all feedback and concerns about the initial proposed routes, improvements to several aspects of the initial designs were incorporated and they represent a best effort to minimize noise and overflights of populated areas within the criteria prescribed by Transport Canada's design standards.

4.0 Overview of FINAL Designs

4.1 FINAL Routes - Metro Vancouver Area (Runway 08R/L in use)

FIGURE 14 illustrates the final arrival routes (green lines) in areas to the North/Northeast of YVR when Runway 08R/L are in use. **FIGURE 15** illustrates the final arrival routes (green lines) in areas to the East/South/Southeast of YVR when Runway 08R/L are in use. For reference, the figures also show historical current flight tracks of aircraft (red lines) approaching the same runway using existing approach procedures.

As illustrated in **FIGURE 14** and **FIGURE 15**, the final designs are very similar to the initial proposed designs depicted in **FIGURE 3** and **FIGURE 4**.

As illustrated in **FIGURE 15**:

- The final arrival routes still provide relief to residents of Tsawwassen by moving the current routing over that community further North over less populated areas of the City of Delta.

FIGURE 14: FINAL DESIGN for arrival routes and current flight tracks for Runway 08R/L – communities to the North and Northeast of YVR

FIGURE 15: FINAL DESIGN for arrival routes and current flight tracks for Runway 08R/L – communities to the East, South, and Southeast of YVR

4.2 FINAL Routes - Metro Vancouver Area (Runway 26R/L in use)

FIGURE 16 illustrates the final arrival routes (green lines) in areas to the North/Northeast of YVR when Runway 26R/L are in use. **FIGURE 1**7 illustrates the final arrival routes (green lines) in areas to the East/South/Southeast of YVR when Runway 26R/L are in use. For reference, the figures also show historical current flight tracks of aircraft (red lines) approaching the same runway using existing approach procedures. The route coming in from the north in green is rarely used, only during times when traffic and complexity from the straight-in route from the east dictates a need to use it – it acts as a release valve for controllers to create spacing by taking some aircraft on the main straight-in route – and allows for more efficient sequencing of arriving aircraft.

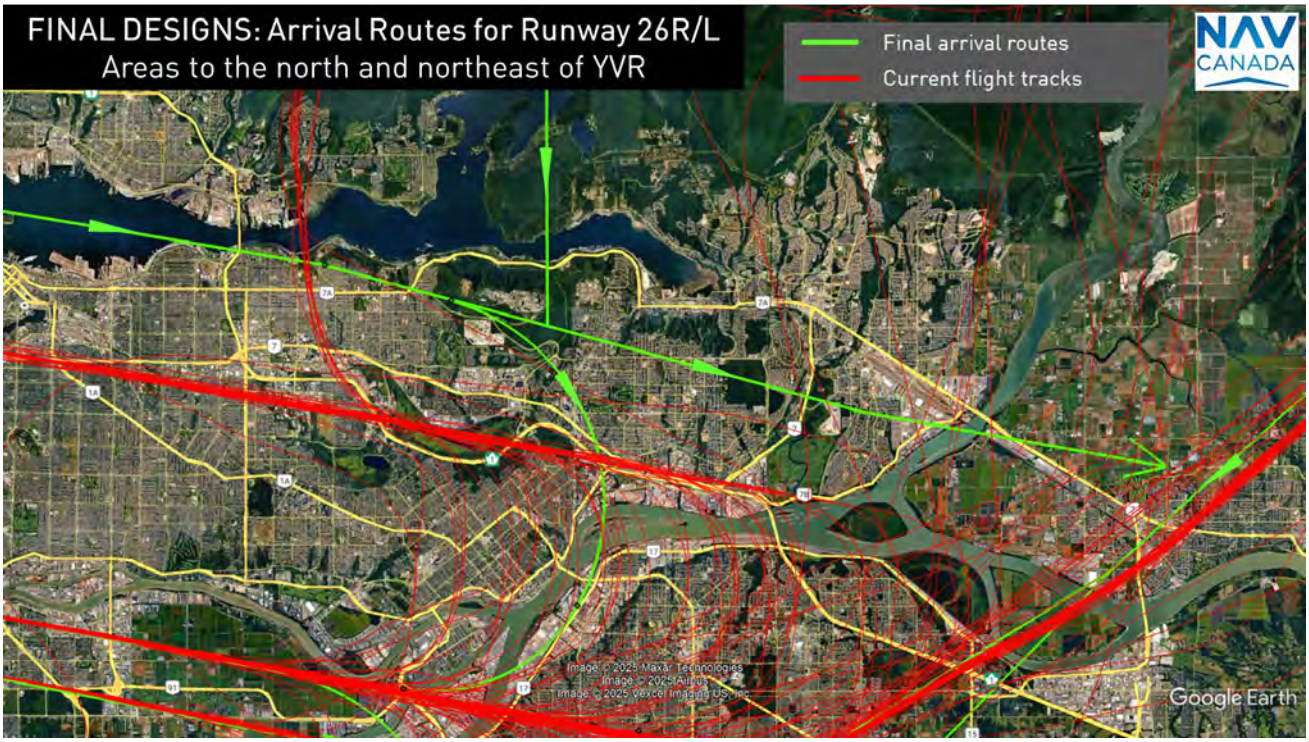

FIGURE 16: FINAL DESIGN for arrival routes and current flight tracks for Runway 26R/L – communities to the North and Northeast of YVR

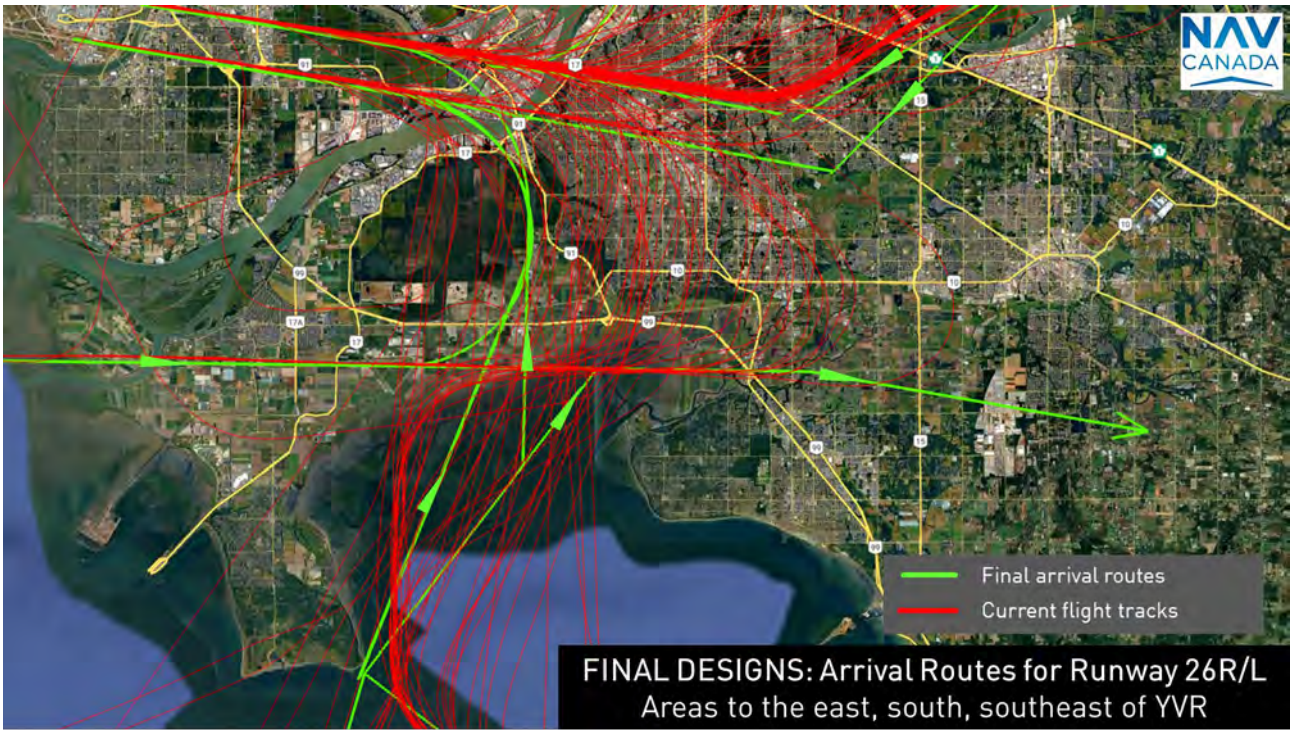

FIGURE 17: FINAL DESIGN for arrival routes and current flight tracks for Runway 26R/L – communities to the East, South, and Southeast of YVR

For areas to the North and Northeast of YVR, comparing the final designs illustrated in **FIGURE 16** with the initial proposed designs illustrated **in FIGURE 5**, several changes were accommodated by leveraging recent upgrades to air traffic management technologies and systems that allow for more design and operational flexibility. Wherever possible, these new technologies and systems were used to revise the initial proposed designs to address community concerns received during the consultation process.

Comparing the final and initial proposed designs, the following observations can be made:

- The final designs eliminate the need for the initial proposed arrival routes over the Tri-Cities. The initial proposed routes are now replaced by maintaining the existing straight-in arrival path for most traffic arriving from the North-East.

- The arrival route over North Vancouver will shift slightly to the East, but only a small number of aircraft will use this path. It is estimated that About 90-95% of aircraft arriving from the East will use the straight-in path (the solid red line from the east on **FIGURE 16**).

- A key element of the initial proposed design was the need to relocate the Northern downwind segment, which would shift aircraft from using the current Northern downwind segment, which overflies areas of Central Burnaby, to over the shoreline of North Burnaby. When assessing the design of the new North downwind, for Runway 26R/L arrivals, the location of this route was moved as far North as possible to fly over the Burrard Inlet, to avoid more populated residential areas, while remaining compliant with Transport Canada design standards.

For areas to the East, South, and Southeast of YVR, comparing the final designs illustrated in **FIGURE 17** with the initial proposed designs illustrated **in FIGURE 6**, several changes can be observed. These include the following revision to the initial proposed route over Boundary Bay to address concerns received from the South Surrey / White Rock area:

- The initial proposed route over Boundary Bay was revised to move the route further away from the South Surrey / White Rock shoreline. It is important to note, that the revised routes introduce additional track miles flown by aircraft, resulting in increased fuel burn, compared to the proposed designs and that air traffic controllers may still guide some arriving aircraft over the South Surrey / White Rock area, as happens today, to set-up for a safe approach to the airport.

4.3 FINAL Designs – Southern Vancouver Island and Sunshine Coast

FIGURE 18 and **FIGURE 19** depict the final arrival routes (green lines) over areas of Southern Vancouver Island and the Sunshine Coast when Runway 08R/L and Runway 26R/L are in use, respectively. For reference, historical tracks of aircraft (red lines) approaching the same runway using existing approach procedures are also illustrated.

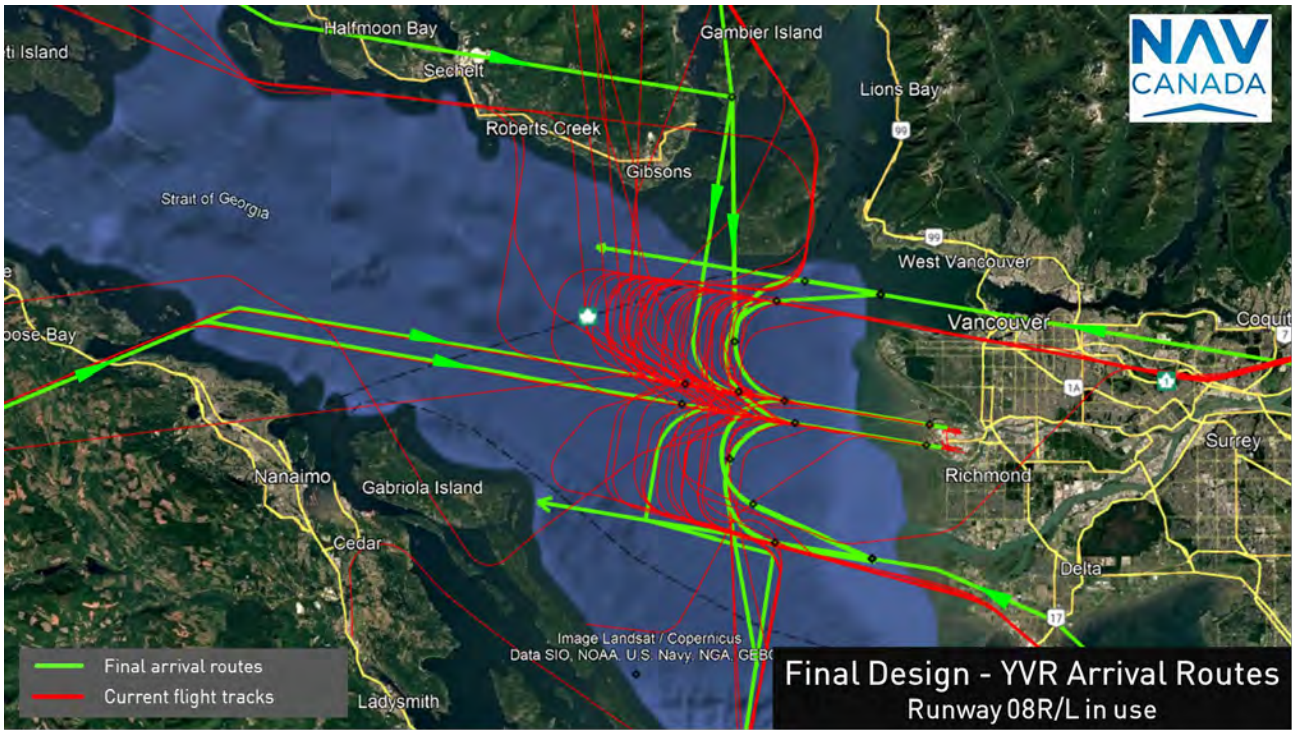

FIGURE 18: FINAL DESIGN for arrival routes and current flight tracks for Runway 08R/L – communities of Southern Vancouver Island and Sunshine Coast

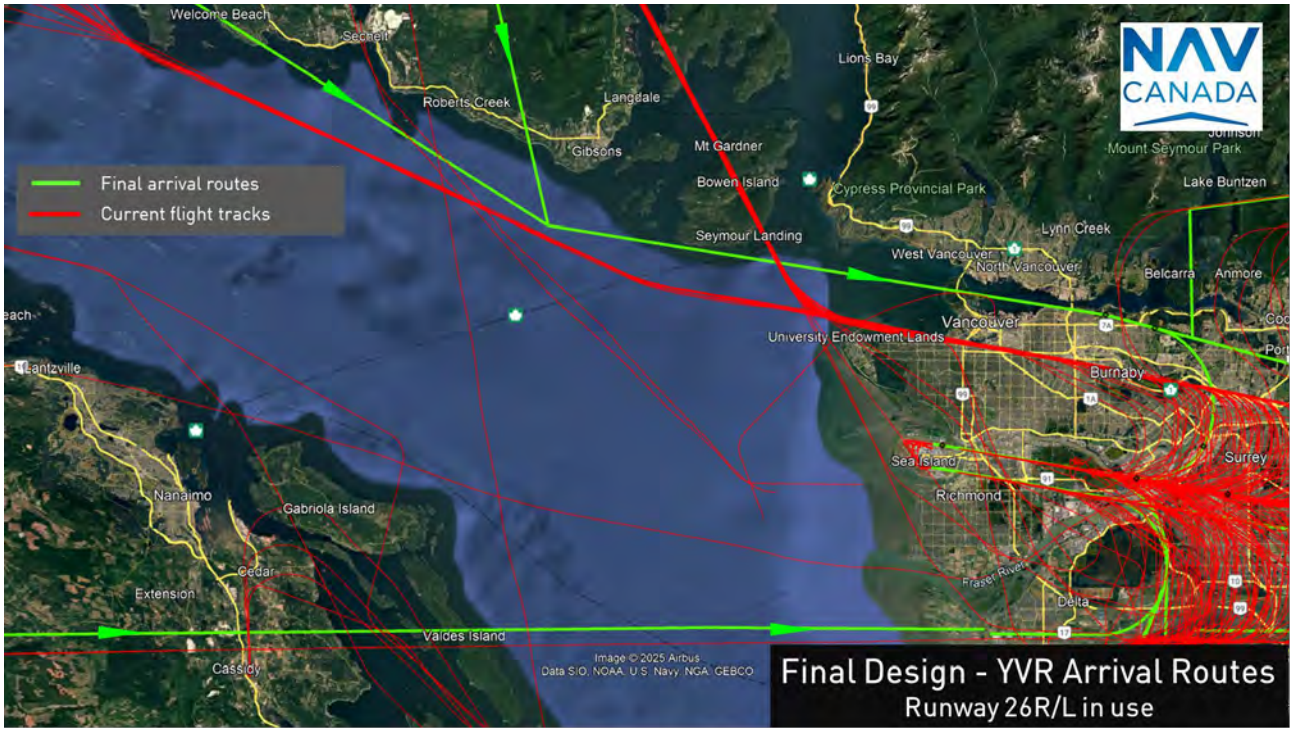

FIGURE 19: FINAL DESIGN for arrival routes and current flight tracks for Runway 26R/L – communities of Southern Vancouver Island and Sunshine Coast

As depicted in **FIGURE 18**:

- The final design eliminates the route with 90° turns Southeast of Nanaimo and North of Gabriola Island, as depicted in **FIGURE 9**, as the current “straight-in” route will be maintained as part of the final designs. This accommodated feedback received from residents of the areas around the Nanaimo and Gabriola Island and was achieved by leveraging recently implemented arrival management systems to better sequence aircraft at greater distances.

5.0 Noise Modelling and Assessment

When flight path changes are expected to affect aircraft frequency or altitude over nearby areas, residents and local municipal governments in the affected areas are informed to build awareness and understanding. Noise modelling was completed to support this discussion and help communicate the anticipated noise levels associated with the proposed arrival procedures.

5.1 Background and Methodology

Anticipated sound levels from aircraft using the new RNP approach procedures were modelled using the U.S. Federal Aviation Administration’s Aviation Environmental Design Tool (AEDT) software, generating noise contours in A-weighted decibels (dBA).

For this analysis, Maximum Sound Level (LA_{MAX}) contours were modelled to represent the peak noise experienced at a receiver's location on the ground during the flyover of a single aircraft. The Boeing 737-800 aircraft was selected for the study, as it is among the most frequently operating aircraft types at YVR and is appropriately equipped for the RNP approach procedure. Although classified as a narrow-body jet, the landing sound levels of the Boeing 737-800 are generally comparable to those of larger widebody jets. This similarity is attributed to engines operating at low power or idle during landing, with airframe drag serving as the predominant source of noise.

5.2 Noise Modelling Results – Final Designs

FIGURE 20 and **FIGURE 21** depict the modeled LA_{MAX} contours for the Boeing B737-800 flying along the established flight paths associated with the proposed RNP procedures to runways 26L and runway 26R, respectively.

The LA_{MAX} contours present sound level values with the range between 55 dBA and 75 dBA. The highest sound levels are observed close to the airport where the aircraft is in its final stages of the approach before landing. This is due to the aircraft being at a low altitude and having additional noise created from drag associated with having the landing gear lowered and flaps extended.

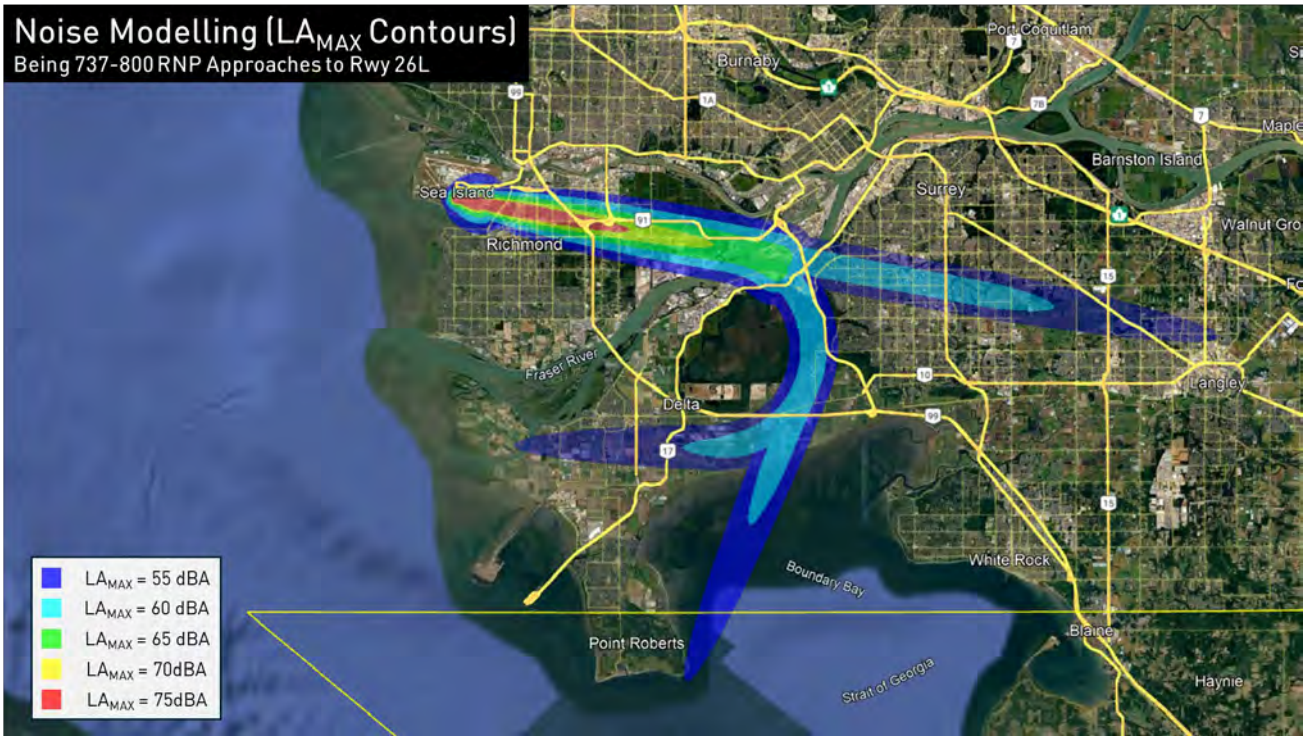

FIGURE 20: LA_{MAX} Contours for B737-800 using the RNP Approach Procedure for Runway 26L

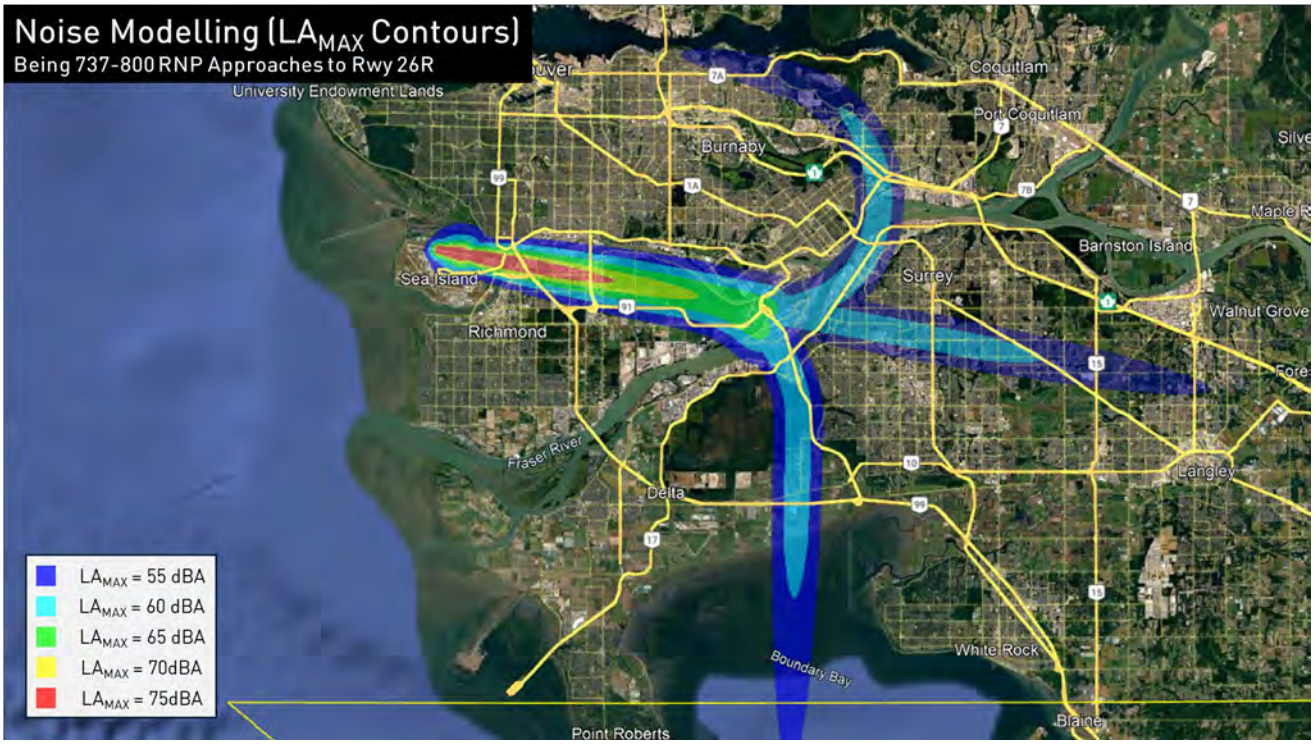

FIGURE 21: LA_{MAX} Contours for B737-800 using the RNP Approach Procedure for Runway 26R

Based on the results of noise modeling, the expected impacts of the final designs are:

- **Reduced overall number of residents and homes overflown.**
  As a direct result of aircraft using the RNP approach rather than the traditional approach procedure (RNAV to ILS procedure), the overall population is reduced as the curved segments of the RNP approach are located over commercial, industrial, and other non-residential areas wherever possible.

- **Reduced noise from aircraft flying the RNP procedure and continuous descent operations.**
  The RNP approach, which enables a low-power, continuous descent at a roughly 3-degree gradient, reduces noise compared to traditional procedures that often require level flight segments with increased engine power before final approach.

- **Changes to aircraft patterns in areas of North Burnaby.**
  The new North downwind section for runway 26R/L will shift about 4.2 km North from its current location, creating a new arrival route over the Burrard Inlet shoreline, bringing arriving aircraft using the North downwind overhead during periods when runway 26R/L are in use. This keeps aircraft over non-residential areas at a higher altitude for a longer period of time before those aircraft begin their turn on course to final approach.

  The location of the new North downwind was moved as far North as possible, and the location has aircraft flying over a smaller population compared to the current location.

- **Reduced exposure to aircraft in South Surrey / North Delta**.
  Parts of South Surrey and North Delta will see fewer aircraft overhead when runway 26R/L are in use, as planes using the RNP approach will follow a curved path over Burns Bog instead of flying over more populated areas as they initiate their base turn to line up with the runway.

- **Comparison of the initial proposed and final designs.**
  - The final design exposes significantly less residents to overflight and noise due to the elimination of the initial proposed routes over the Tri-Cities area.
  - For aircraft arriving from the South over Boundary Bay when runway 26R/L are in use, the final design moves the approach further over Boundary Bay and away from South Surrey / White Rock, which results in a shift of noise footprint away from these areas.

5.3 Noise Monitoring

At the time of publishing this report, the City of Burnaby has been approached and is evaluating a request from the Vancouver Airport Authority to install noise monitoring equipment on City owned property in the North Burnaby area.

This equipment would be part of a larger noise monitoring network that is owned and maintained by the Vancouver Airport Authority. Data collected is integrated with radar flight data, which then allows the aircraft component of the overall sound environment to be determined and separated from the contribution of other community sources. This objective measurement and analysis provide scientific understanding of potential aircraft noise exposure and informed discussions since human responses to noise varies greatly.

As aircraft that operate in Canada meet noise and emission standards set by the ICAO and meet all airworthiness requirements set by Transport Canada, collected noise data is used for information and education purposes only, and there is no enforcement, fines, or change to procedures based on the measured values.

If the City ultimately grants permission for the installation of this equipment, the data collected would be summarized in annual noise reports, displayed on the airport's public noise and flight tracking system (https://ca.webtrak.aero/yvr5), and a summary would be included in NAV CANADA's 180-post implementation review report.

6.0 Next Steps and Implementation

To fulfill the goals and objectives of the Vancouver Airspace Modernization Project, NAV CANADA will implement the final designs of the arrival routes, effective November 2025 following their introduction in federal Aeronautical Publications this fall.

This report has been released in advance of implementation to advise the community of the final designs and scope of the changes, and how the initial proposed designs evolved following the community consultation process. This report will be made available on the NAV CANADA project website (www.navcanada.ca/vamp).

Additionally, NAV CANADA will initiate a review 180 days following implementation of the new procedures and this review will also be published on the NAV CANADA project website.

NAV CANADA wishes to thank all residents and community officials for their thoughtful participation and engagement in the consultation process. Your feedback played a vital role in shaping the final design and will continue to inform efforts to balance the community's growing demand for air services with the industry's efforts to enhance safety and environmental responsibility.

APPENDIX A: Summary of Community Consultations

A1. Community Outreach and Engagement

NAV CANADA and industry partners are dedicated to consulting the public on airspace design changes that could affect residential areas. The Airspace Change Communications and Consultation Protocol (ACCCP), developed jointly between NAV CANADA and the Canadian Airports Council, guides community engagement efforts and serves to ensure residents can learn about and provide input on proposed airspace adjustments before they take effect.

Adhering to the spirit of the ACCCP, community consultations on the initial proposed designs began on December 6th, 2022 and concluded on February 3rd, 2023 for a total of 60-days (inclusively).

A1.1 Availability of Project Information

A dedicated Vancouver Airspace Modernization Project page was created on the NAV CANADA public website[7] to provide specific information about the project and the proposed flight path changes over various communities. Due to the large scale and complex nature of the project, information was further catered for smaller sub-areas of the region to allow residents to focus on changes affecting their specific neighbourhoods.

Consultation materials added to the website included:

- PDF documents that provided:
  - General information about the protect and RNP approach procedures explaining the potential changes and their benefits in plain language.
  - Information for communities located near areas where changes were proposed, including detailed maps showing the proposed procedures.
- Information and schedule of in-person community consultation meetings.
- Information and a schedule of virtual community consultation meetings
- A video recording of the first virtual community consultation session for those residents who were unable to attend one of the virtual or in-person meetings.
- 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.

Supporting information on the Vancouver Airspace Modernization Project was also made available on the YVR website[8] with links directing residents to NAV CANADA's project page. Webpage analytics shows that project page on the NAV CANADA website received 17,391 page views from 15,199 unique visitors.

[7] NAV CANADA Vancouver Airspace Modernization (https://www.navcanada.ca/en/air-traffic/airspace-reviews/vancouver-airspace-modernization.aspx)
[8] Airspace – Vancouver Airspace Modernization Project (https://www.yvr.ca/en/about-yvr/noise-management/airspace)

A1.2 Promotion of Consultations

NAV CANADA used multiple tactics and media tools, described in the following sections, to raise awareness about the Vancouver Airspace Modernization Project, its proposed changes, and to encourage participation in the community consultation process.

A1.2.1 Print Media Campaign (Public Notices)

Notices of the community consultation were published in print media through multiple newspapers on two circulation dates. Details of the newspapers, their distributions, and the publication dates of the notices is summarized in TABLE A1.

Publication	Circulation[9]	Ad #1 Date	Ad #2 Date
Burnaby Now	44,165	Thu Dec 8, 2022	Thu Jan 5, 2023
Coast Reporter	11,615	Fri Dec 9, 2022	Fri Jan 6, 2023
Delta Optimist	17,000	Thu Dec 8, 2022	Thu Jan 5, 2023
Ladysmith Chronicle	3,907	Thu Dec 8, 2022	Thu Jan 5, 2023
Maple Ridge News	31,329	Fri Dec 9, 2022	Fri Jan 6, 2023
Nanaimo News Bulletin	30,165	Wed Dec 7, 2022	Wed Jan 4, 2023
New Westminster Record	16,946	Thu Dec 8, 2022	Thu Jan 5, 2023
North Shore News	60,000	Wed Dec 7, 2022	Wed Jan 4, 2023
Peace Arch news	28,753	Thu Dec 8, 2022	Thu Jan 5, 2023
Richmond News	46,464	Thu Dec 8, 2022	Thu Jan 5, 2023
Surrey Now Leader	66,107	Thu Dec 8, 2022	Thu Jan 5, 2023
Tri-City News	52,000	Thu Dec 8, 2022	Thu Jan 5, 2023
Vancouver Is Awesome (Metro Vancouver)	111,200	Thu Dec 8, 2022	Thu Jan 5, 2023

TABLE A1: Public notices in print media

A1.2.2 Automated Call Campaign

Automated phone calling was employed in early January 2023 to reach households in the areas affected by the proposed changes. The automated calls provided a recorded message with information about the Vancouver Airspace Modernization Project, publicized the information sessions, as well as how to provide input into the community consultation process.

[9] Source: Glacier Media Group and Black Press Media

Automated calls were attempted to a total of 100,522 phone numbers with a focus on areas of Metro Vancouver, the Sunshine Coast, and around Southern Vancouver Island. The areas and the calls placed is summarized in TABLE A2. Of the 100,522 phone numbers called, approximately 64% (n=64,323) individuals directly answered the automated phone calls, and 63% (n=40,942) of these individuals listened to the full message.

Calling Area	Listened to full message	Listened to part of message[10]
Burnaby		
Coquitlam		
Delta		
Nanaimo Area (incl. Ladysmith and Gabriola Island)		
North Vancouver		
Port Coquitlam		
Port Moody		
Sunshine Coast Area (incl. Gambier and Bowen Islands)	40,942	23,381
Surrey (incl. South Surrey)		
Vancouver		
West Vancouver		
White Rock		
Other Areas		

TABLE A2: Distribution of automated calls by community

A1.2.3 Social Media Campaign

Between December 16th, 2022, to February 3rd, 2023 NAV CANADA ran a social media advertising campaign through a series of digital advertisements. The campaign was hosted on Facebook and Instagram, in both English and French. See **FIGURE A1** for a sample of the advertisement.

NAV CANADA's social media posts were also distributed through YVR's social media channels to broaden reach related to the community consultation process. Digital advertising was directed using postal codes corresponding with those in the Automated Call Campaign. The advertisements generated over 1.9 million impressions and reached more than 447,000 unique individuals.

[10] Recipients who listened to part of the message were in addition to (exclusive of) those who listened to the entire message.

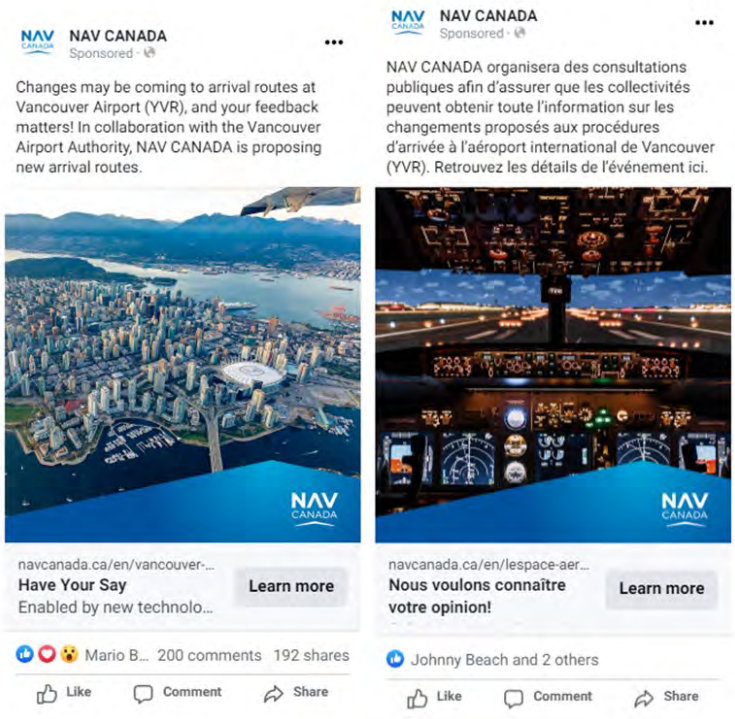

FIGURE A1: Example of digital media advertisements

A1.3 Stakeholder and Community Engagement

Stakeholders including residents provided their feedback through online survey forms, emails, and other methods of correspondence during the consultation process. This input assisted NAV CANADA in understanding priorities and concerns related to the Vancouver Airspace Modernization Project and the proposed changes.

Community engagement activities included presentations to the YVR Aeronautical Noise Management Committee, online public consultation events, and hosting in-person open house meetings. Engagement opportunities were aligned with project milestones to ensure that stakeholder input, advice, and concerns could be taken into consideration prior to finalizing designs for the procedures. The following section provides a synopsis of the engagement methodologies that were used to generate stakeholder input.

A1.3.1 YVR Aeronautical Noise Management Committee Meetings

The role of the YVR Aeronautical Noise Management Committee is to provide a forum where stakeholders can discuss aeronautical noise management issues associated with YVR aircraft operations. Committee members are independently appointed by respective stakeholder groups, which include NAV CANADA, Transport Canada, municipalities (both staff and citizen representatives), Musqueam Indian Band, airlines and aircraft operators, and industry associations[11]. Information and updates about the Vancouver Airspace Modernization Program were shared at the following meetings and input was sought from the group on various aspects of the plans for community consultations:

- Thursday, September 16, 2021
- Thursday, December 2, 2021
- Thursday, September 15, 2022
- Thursday, November 22, 2022
- Thursday, September 7, 2023

A1.3.2 Community Consultation Events

A total of fourteen community consultation events were hosted during the consultation period including eight in-person open house-style information sessions and six online information sessions. Staff from NAV CANADA and Vancouver Airport Authority attended to explain the proposed changes and give residents enough information to offer informed feedback.

Attendees at the sessions were asked to provide their feedback and comment through the online feedback survey so it could be consolidated and tracked appropriately.

Two types of information sessions were conducted: general information sessions that were designed and intended for residents from any community who wanted to learn about the Vancouver Airspace Modernization Project and changes affecting all areas of the region; and, community-specific sessions where information was tailored to a specific city or community with materials and maps focused on a much smaller geographic area.

TABLE A3 outlines purpose, area, and timing of each public consultation. In total, 400 residents attended the in-person consultation events with an additional 208 attending the online sessions. General Information Session #1 was recorded and made available on the NAV CANADA website to ensure members of the public could access the presentation if they were unable to attend any of the subsequent events.

[11] YVR Aeronautical Noise Management Committee (https://www.yvr.ca/en/about-yvr/noise-management/anmc)

Following each consultation event, a follow-up email was sent to attendees, via the email address used to register for the session, providing links to the online survey feedback form and the registration page for the Personal Information Sessions, bookable sessions where community members could book a 20 minute session during which NAV CANADA subject matter experts to further explain the proposed changes in a one on one setting.

Consultation event type and purpose	Consultation event name	Consultation event date
General Information Session	General Information Session #1 *(online, recorded and made available on the NAV CANADA project website)*	December 19, 2022
	General Information Session #2 *(online)*	January 23, 2023
	General Information Session #3 *(online)*	January 30, 2023
Community-Specific Information Sessions	West Vancouver *(in person)*	January 9, 2023
	North Vancouver *(in person)*	January 10, 2023
	Vancouver *(in person)*	January 11, 2023
	Burnaby *(in person)*	January 12, 2023
	Tri-Cities *(in person)*	January 16, 2023
	New Westminster / North Surrey / North Delta *(in person)*	January 17, 2023
	Ladner / Tsawwassen / Delta *(in person)*	January 18, 2023
	South Surrey / White Rock *(in person)*	January 19, 2023
	Nanaimo *(online session)*	January 24, 2023
	Sunshine Coast *(online session)*	January 25, 2023
	Richmond *(online session)*	January 26, 2023

TABLE A3: Community consultation event schedule

As mentioned, 400 residents attended the eight in-person information meetings. The attendees by location where the sessions were hosted is illustrated in **FIGURE A2**.

A1.3.3 Direct Queries

During the community consultation period, a dedicated email address (consultation@navcanada.ca) was set up to receive and answer queries from the public regarding the proposed changes and the associated consultation process. NAV CANADA's Customer and Stakeholder Services team also answered telephone queries received through the toll-free number for inquiries. Additionally, queries received by the Vancouver Airport Authority were provided to NAV CANADA to consolidate will all other feedback.

A1.3.4 Elected and Administrative Official Engagement

As part of the community consultation process, NAV CANADA reached out to 51 municipal, provincial, and federal levels of government, including Members of Parliament, municipalities, universities and Indigenous communities in the Metro Vancouver, the Sunshine Coast, and Southern Vancouver Island areas.

Regular information updates were provided to government officials, including information about the Vancouver Airspace Modernization Project and proposed changes, timelines, and offers for in-depth briefings. As such, NAV CANADA hosted 20 briefings with government officials or members of their staff. These briefings included a mix of in-person discussions, presentations to city councils, and online presentations, and attendees had the opportunity to provide comments on the proposed changes.

NAV CANADA kept open channels with officials and responded to various requests for further information. Some government officials also elected to attend the community information sessions, where they were able to engage directly with NAV CANADA staff.

Overall, officials were appreciative of the effort to inform the community and were generally 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.

During briefings with elected officials, requests were received for NAV CANADA to further brief other administrative or planning officials on the Vancouver Airspace Modernization Project. This provided opportunities to meet with planning officials and provide tailored information about the proposed changes. After these briefings, several municipalities also took the opportunity to provide formal feedback on aspects of the proposed changes. More information can be found about these concerns in section A2.1.2.

A1.4 Community Consultation and Enhanced Engagement

Following the close of the initial community consultation period, all input received was reviewed and mitigation measures were assessed and considered to address areas of concern where feasible and safe.

A second round of engagement with officials was conducted in April of 2024, with briefings provided to officials in affected communities. These included:

- An in-person meeting with the City of Coquitlam on April 8, 2024
- An in-person meeting with the City of Port Moody on April 11, 2024
- An online meeting the MP for Port Moody-Coquitlam on April 24, 2024
- An online meeting with the City of Burnaby on April 29, 2024
- An online meeting with the MP for Coquitlam-Port Coquitlam on May 23, 2024

Meeting offers were also extended to the Cities of White Rock and Surrey, as well as the MP for Burnaby North-Seymour but no responses were received.

Shortly after these meetings, the design criteria prescribed by Transport Canada were changed and portions of the initial proposed designs had to be re-assessed against the new criteria adding additional time and complexity to the review.

Following the review, a final set of procedures were developed with several revisions to the initial proposed designs to address feedback received where possible and leverage new air traffic management technologies. A final round of engagement with officials was hosted in August/September 2025 to present the final designs and discuss next steps towards implementation.

A2. Community Feedback

The objectives of collecting feedback from the community was to better understand the concerns about the proposed airspace changes, determine public beliefs and attitude toward the proposed change, identify concern related to implementation, and collect input to help assess any potential modifications to the proposed designs. To support the collection of this data, NAV CANADA created an online survey.

A2.1 Online Survey

A self-administered online survey was made available through links provided on the NAV CANADA website and directly to individuals that attended community consultation events. The survey allowed for the collection of responses from large audiences in a consistent, effective, and user-friendly manner. The survey consisted of eleven structured (closed-ended), three unstructured (open-ended) questions, and four additional survey categorization questions. Survey responses were collected between December 6, 2022, and February 3, 2023.

A total of 3,004 respondents completed the survey. **FIGURE A3** depicts the approximate location of the 2,938 respondents who provided information about their location (either municipality or a valid postal code). Details of responses received for individual questions are provided in the following sections.

Overall, the number of survey respondents 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 community such as email/telephone conversations, and one-on-one conversations at information sessions there was a mix of support and opposition to the Vancouver Airspace Modernization Project and the proposed changes depending primarily on resident's location.

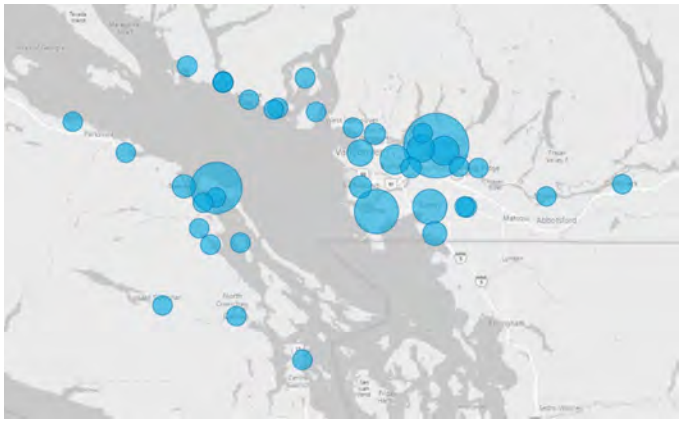

FIGURE A3: Distribution of survey respondents

Many residents took the opportunity to voice concerns related to current aircraft activity they experience today, rather than the proposed changes and many comment relate to activities not related to the Vancouver Airspace Modernization Project or the proposed changes.

Below are some highlights and findings from the survey responses:

- About 23% of respondents who are concerned with current levels of aircraft noise expect the noise levels to decrease or stay the same based on the proposed changes;
- About 9% of respondents completed the survey but indicated they had not reviewed any of the materials, did not attend any of the information sessions, and did not plan to attend any information session in the future;
- On average, respondents considered community noise exposure to be a more important factor than aircraft safety when designing flight paths.

A2.2 Online Survey Responses

Q1. Please provide your email address.

Email addresses were collected for the purpose of providing project updates to respondents.

Q2. Would you prefer to provide your postal code or the name of your municipality?

Survey respondents were given the option to provide either their postal code or municipality. For the purposes of this survey summary, postal codes information from Q3 was summarized and combined with municipality information from Q4.

Q3. Please provide your postal code.

Of the 3,004 total survey responses received, 1,716 respondents provided their postal code.

Q4. Please select the municipality you reside in:

Of the 3,004 total survey responses received, 1,222 respondents provide their municipality.

Municipality Selected by Respondent	Number of responses	% of respondents
Coquitlam	780	27%
Gabriola Island Area (incl. Mudge Island)	548	19%
Delta	417	14%
Surrey	256	9%
Burnaby	174	6%
Port Coquitlam	171	6%
Port Moody	138	5%
Vancouver	118	4%
White Rock	78	3%
Nanaimo Area (incl. Cedar)	67	2%
Richmond	46	2%
North Vancouver	32	1%

Sechelt Area (incl. Halfmoon Bay and Roberts Creek)	25	1%
Gibsons Area (incl. Bowen Island, Elphinstone, and Gambier Island)	20	1%
New Westminster	19	1%
Ladysmith Area (incl. Cassidy and Thetis Island)	12	< 1%
West Vancouver	9	< 1%
Other (>100 km from CYVR or from change areas)	8	< 1%
Langley (City and Township)	8	< 1%
Maple Ridge and Pitt Meadows	6	< 1%
Parksville Area (incl. Nanoose Bay and Qualicum Beach)	4	< 1%
Duncan	2	< 1%
Total responses and respondents[12]	**2,938**	**100.0%**

Q5. Are current levels of aircraft noise a concern to you?

Choice	Number of responses	% of respondents
Yes	1,609	54%
No	1,395	46%
Total responses and respondents	**3,004**	**100.0%**

Q6. What do your concerns about current levels of aircraft noise relate to?

Choice	Number of responses	% of respondents
Aircraft on approach to landing (arrivals)	1,131	46%
Aircraft taking off (departures)	770	32%
Other	325	13%
I don't know / I'm not sure	213	9%
Total responses[13]	**2,439**	**100.0%**
Total respondents	**1,609**	

Q7. How would you describe your current exposure to aircraft noise (1-Low to 5-High)?

Choice	Number of responses	% of respondents
1 – Low	614	20%
2	719	24%
3	810	27%
4	522	17%
5 – High	339	11%

[12] Total includes all responses and respondents from both Q3 and Q4.
[13] Total responses exceed respondents because they were permitted to select as many options as applicable.

Total responses and respondents	**3,004**	**100.0%**

Q8. What do you think should be considered when designing flight paths?

Choice	Weighted average response score
Community noise exposure	5.8
Safety	5.2
Land use under the flight path (residential vs. commercial/industrial)	4.9
Air quality/pollution (reducing greenhouse gas emissions)	4.4
Reducing delays	2.6
Shortening flight times	2.6
Increasing airspace capacity	2.4
Total responses and respondents	**3,004**

Q9. 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	1,474	49%
Online (virtual) information session	1,047	35%
Information from a NAV CANADA or YVR representative	671	22%
In-person open house information session	493	16%
Other	479	16%
Email / telephone inquiries	473	16%
Total responses[14]	**4,637**	
Total respondents	**3,004**	

Q10. How did you learn about this public consultation for the proposed changes?

Choice	Number of responses	% of respondents
From a friend or family member	1,182	39%
Advertisement on social media (like Facebook or Instagram)	1,140	38%
Notice in a print newspaper	691	23%
Other	313	10%
The NAV CANADA website	285	9%
Automated phone call	195	6%
Information received from an elected official	161	5%
The YVR website	118	4%
Total responses[15]	**4,085**	
Total respondents	**3,004**	

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

Q11. Have you reviewed the informational material related to the proposed changes available at navcanada.ca/VAMP?

Choice	Number of responses	% of respondents
Yes	2,469	82%
No	535	18%
Total responses and respondents	**3,004**	**100.0%**

Q12. Have you attended one of the eight in-person public information sessions or one of the six online sessions?

Choice	Number of responses	% of respondents
No	1,364	45%
I didn't know I could attend an information session.	616	21%
I am planning to attend an information session in the future.	442	15%
I have watched the pre-recorded information session.	306	10%
Yes	276	9%
Total responses and respondents	**3,004**	**100.0%**

Q13. Do you expect aircraft noise to increase, decrease, or stay the same for you based on what you understand about the proposed changes?

Choice	Number of responses	% of respondents
Increase	2,315	77%
Stay the same	467	16%
Decrease	222	7%
Total responses and respondents	**3,004**	**100.0%**

Q14. Please explain why you expect noise to increase.

Responses to this question were open-ended (free text). Of the 2,315 responses received from respondents who expect aircraft noise to increase because of the proposed changes, 41% believed the new flight paths would be closer to or over their community and 25% believed an increase of aircraft expected to fly along existing flight paths in their community.

Q15. Please explain why you expect noise to decrease.

Responses to this question were open-ended (free text). Of the 222 responses received from respondents who expect aircraft noise to decrease because of the proposed changes, the majority believe the cause will be flight paths moving further away from their community or aircraft being able to descend continuously.

Q16. What do you believe are the advantages of implementing these changes?

Response	Number of responses	% of respondents
There are no benefits for my community	2,012	67%
Benefit to the airport and/or improved airport capacity	715	24%
Reduced fuel use and greenhouse gas emissions	479	16%
I don't know / I'm not sure	383	13%
Reduced flight times	344	11%
Reduced noise over my/some communities	326	11%
Safety benefit	236	8%
Improved predictability of flights	174	6%
Reduced number of people overflown	140	5%
Total responses[16]	**4,809**	
Total respondents	**3,004**	

Q17. What do you believe are the disadvantages of implementing these changes?

Response	Number of responses	% of respondents
Increase in aircraft overhead and related noise	2,457	82%
Quality of life or health concerns	2,010	67%
Decreasing home values	1,606	53%
Concentration of traffic over some areas	1,488	50%
Damage to the environment	1,264	42%
New communities being affected	1,254	42%
Lower aircraft	1,125	37%
Concerns about safety	1,092	36%
I don't know / I'm not sure	204	7%
Total responses Error! Bookmark not defined.	**12,500**	
Total respondents	**3,004**	

Q18. Do you have any additional feedback about the proposed changes or the public consultation?

Responses to this question were open-ended (free text). The content of the responses varied broadly without any specific trends other than general opposition to the proposed changes.

A2.1.2 Feedback from Municipal Officials

City of Burnaby

NAV CANADA met and corresponded with City of Burnaby staff to provide supplemental information requested by staff to help prepare their assessment and comments on the proposed changes.

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

In summary, City of Burnaby comments included the following:

- Expressed the most concern about the proposed changes to the approach procedures to runway 26L and runway 26R, including the relocation of the Northern downwind leg as well as the curved segment of the RNP-AR approach.
- Provided comments related to the proposed changes and the associated expected noise footprint relative to existing and planned development in areas of the City.
- Requested additional information and data regarding the utilization and frequency of aircraft using existing and future arrival routes to better understand overall changes to community noise levels.
- Requested NAV CANADA work with the City to understand the impact to residents in tall buildings in key areas of the City (such as the planned 80-storey mixed-use development in the Lougheed Town Centre area).
- Proposed the collection of noise measurement data including exploring the installation of noise monitoring terminals near flight paths in Burnaby.

City of Coquitlam

Feedback from City of Coquitlam included requests for additional information related to the noise levels of aircraft expected to use the initial proposed arrival routes over the Tri-Cities area, especially in key areas where population growth is expected in the future, as well as noise impacts on those living in apartment towers, and consideration for impacts due to urban densification.

City of Port Coquitlam

Feedback from the City of Port Coquitlam included requests NAV CANADA explore shifting the initial proposed arrival routes over the Tri-Cities area to over less populated areas such as waterways, highways, and industrial and commercial areas.

City of Port Moody

Feeback from the City of Port Moody raised concern about the initial proposed arrival routes over the Tri-Cities area including the necessity of the routes, the impact on residents, and the anticipated resulting noise pollution.

Regional District of Nanaimo (Electoral Area A)

Feedback from the Regional District of Nanaimo (Electoral Area A) focused on concerns received by community members about anticipated noise impacts, which were in addition to noise experienced from current aircraft operations at Nanaimo Airport (YCD). The Regional District requested that NAV CANADA explore moving the flight paths further North and East over areas of water and utilize higher aircraft altitudes when safely possible.

A3. Responses to Comments and Proposed Mitigation Measures

The results of the community consultation process revealed concerns from residents and elected officials about the location of the proposed flight paths and altitudes of aircraft along the approaches, particularly in the areas of Gabriola Island, North Burnaby, the Tri-Cities, and White Rock/South Surrey. Feedback received indicated residents preferred that flight paths be designed to avoid overflying populated areas where possible, and that aircraft altitudes along the approach be kept as high as possible.

The following sections summarizes the main themes of the feedback received during consultation process, as well as NAV CANADA's responses, including any mitigation measures that are considered as part of the final design.

Theme 1: Reduce the number of aircraft using the airport

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. 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 YVR in line with what has been scheduled. Reducing the overall number of aircraft who plan to use the airport on a scheduled basis is not within the scope of NAV CANADA's responsibility and will not be considered as a proposed mitigation.

Additionally, airlines and aircraft operators schedule flights at the airport based on several factors, including aircraft and crew availability, airport slot constraints, access to connecting flights, turnaround times, flight routes, and must work with the airport to ensure that flights are scheduled according to set rules outlined by the International Air Transport Association.

Theme 2: Avoid overflying communities / Fly over more non-residential lands

Because of proximity of YVR to nearby communities, air traffic control requirements, safety considerations, regional geography, and Transport Canada's design standards, it is not always feasible to design routes that avoid flying over residential areas without a serious compromise to aviation safety.

NAV CANADA remains sensitive to the fact that overflight of residential areas can be perceived as a nuisance for communities. As such, during work to design the new arrival routes, NAV CANADA endeavored to design and locate flight paths over less populated areas such as commercial, industrial, and park zones whenever feasible. The final designs balance the requirements for safe and efficient air navigation, the interests of surrounding communities, and the need to reduce the environmental impact of the industry.

Theme 3: YVR departure flight paths and VFR routes

Some of the comments related to moving existing YVR departure flight paths and VFR routes. These are unrelated to the proposed changes and beyond the scope of the Vancouver Airspace Modernization Project. Additionally, the procedures and flight paths associated with these operations must fit within the entire airspace structure to ensure safe separation of air traffic.

Theme 4: Move the proposed arrival routes over the Tri-Cities for aircraft approaching from the Northeast during Runway 26 operations

The final design eliminates the initial proposed arrival routes over the Tri-Cities area. This was enabled due to recent air traffic management technology change that helps air traffic control to better sequence and manage aircraft arriving from the Northeast.

The initial proposal for the routes over the Tri-Cities was meant to address issues with aircraft arriving flying in an Easterly direction along the North downwind merging with other aircraft approaching from the Northeast. This created a challenging conflict point in the vicinity of Pitt Meadows and Northeast Surrey. However, with the recent introduction of air traffic management technology, air traffic controller can better sequence and manage this merging traffic, making the initial proposed routes over the Tri-Cities unnecessary.

Theme 5: Moving the location of the proposed South and North downwind segments

Many comments were received about moving the location of the proposed North downwind segment further to the North beyond West Vancouver and North Vancouver and moving the location of the proposed South downwind segment further to the South over the Strait of Georgia or Boundary Bay.

The proposed locations of the proposed downwind segments will remain as moving their location will significantly impact departure operations. Airspace over Metro Vancouver is extremely structured to allow simultaneous arrival and departure operations. Moving the downwind segments limits the ability for departing aircraft to continue climbing during the departure phase, as departing aircraft are often required to level-off at specified altitudes below inbound traffic while traversing approach routes. Once adequate lateral separation from arriving aircraft is achieved, departures are subsequently cleared to continue their climb.

If the downwind legs were relocated much further from their proposed locations, departing aircraft would be, “stuck” underneath arrivals for a longer distance. As such, residents would be subject to departing aircraft flying at lower altitudes in a very noisy configuration. This would result in overflights and higher noise exposure over a greater area. Additionally, there is also practical limitations when considering the relocation of the North downwind segment due to rapidly increasing ground elevation and mountainous terrain.

Through the design work, the location of the new North downwind segment is moved as far North while remaining compliant with Transport Canada design criteria and allowing departing aircraft heading North to safely clear the rising terrain of the North Shore mountains or avoid having to fly long distances at a low-level altitude before continuing their climb.

Theme 6: Relocating the RNP-AR arc segments

Comments were received about moving the proposed location of the RNP-AR arc segments, which serves to take aircraft from the downwind segment onto the final approach segment.

The proposed RNP-AR arc segments will remain in the location as they were designed to primarily fly over commercial, industrial, and park areas to minimize impact on residential areas as much as possible.

The location of the arc segment keeps the total approach length short 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 continuous, suitable, safe rate. Additionally, moving the arc further away from the airport also means increasing total length of the approach, which introduces challenges for air traffic control to sequence aircraft as it is more difficult to predict the aircraft's precise location as they fly a longer approach path.

Theme 7: Increase altitude of aircraft along the approach path

Comments received can generally be grouped into two categories: increasing the minimum altitude of aircraft on the downwind segment and increasing 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 segment

Altitudes along the arrival routes are an important tool to properly separate aircraft, and not being able to utilize airspace at lower altitudes serves to limit options for air traffic controllers to provide the required separation when the airport and airspace is busy.

Keeping aircraft at higher altitudes will result in a significantly longer downwind segment, which then extends overflights and noise exposure over more communities.

Increase the descent gradient of aircraft (i.e. increase the approach glide path angle)

Increasing the glide path angle on the runway's (ILS) approaches from the widely accepted industry standard 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 and poor weather. NAV CANADA will not consider any change that would reduce the ability of pilots to safely operate in poor weather and limit accessibility of YVR. Additionally, 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.