YVR: Your Airport 2027

20-Year Master Plan

VANCOUVER AIRPORT AUTHORITY

www.yvr.ca

VANCOUVER AIRPORT AUTHORITY

Vancouver Airport Authority is a community-based, not-for-profit organization that manages and operates Vancouver International Airport (YVR).

MISSION

To serve our community by building outstanding airports

VISION

Premier Global Gateway
The Airport Authority: Local Champion, Global Operator

PLANNING

To guide airport operations and development, the Airport Authority uses a five-tier planning process. The Strategic Plan establishes the mission, vision and values for YVR, while the Master Plan (this document) looks forward 20 years to ensure the best use of YVR's fundamental resource – land. The Capital Plan and Financial Plan allocate funding over a 10-year span and identify what infrastructure will be built and when. The Three-Year Business Plan looks three years out and provides the planning context for the Airport Authority's annual Business Plan, which outlines airport initiatives and objectives for a one-year period.

Recognizing the certainty of uncertainty, the Airport Authority reviews plans regularly, monitors external events closely, favours conservative timing for capital expenditures, builds infrastructure incrementally (whenever possible) and incorporates flexibility, transparency and open, honest communications into its planning activities.

You are viewing Vancouver Airport Authority's 2027 Master Plan entitled YVR: Your Airport 2027. Our mission is to serve our community by building outstanding airports, and this plan shares the vision of how YVR will meet the needs of our province twenty years from now. This plan is distinctive in that we consulted extensively to gain insight from community members and evaluated options based on a sustainability framework. Every recommendation in this plan was evaluated against our four pillars of sustainability: economic, environmental, social and governance.

The Master Plan is the second tier in the Airport Authority's five-tier planning process. It aims to determine the general location and timing of facilities and real estate needs to meet the demands for air travel in the future. The Master Plan is flexible in the face of changing circumstances because it does not commit to any particular project. Development decisions are made following extensive and detailed analysis, review and timing of future air travel needs.

In 2004, we started the planning process by looking long-term at the challenges and opportunities forty years into the future. We did this to ensure we had the right strategy and to avoid a short-term initiative that could preclude a long-term opportunity.

To understand the aspirations of British Columbians, the Airport Authority consulted extensively to engage everyone in the process who wished to participate – from business partners to members of the public. As well, we hosted three large consultation forums, namely, Forum '44, Generation YVR and B.C. Communities 2045. These conversations stimulated new ideas, provided important insight from key audiences and created some new connections.

By the end of 2006, we had a draft Master Plan including a revised Land Use Plan. This document was submitted to the Minister of Transport for review and approval in 2007. Approval was granted in 2008.

On behalf of the Airport Authority, I would like to thank all those who took the time to share their views with us. The Master Plan and YVR are stronger for it.

Larry Berg
President & CEO
Vancouver Airport Authority

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YVR: YOUR AIRPORT 2027: 20-YEAR MASTER PLAN

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1. Your Airport 2027: An Overview

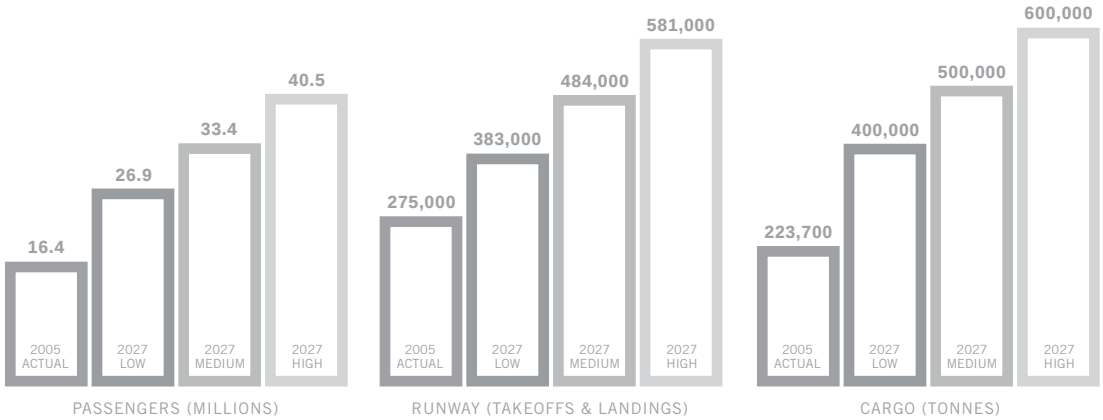
Vancouver International Airport (YVR) is Canada's second-busiest airport and the second-largest international passenger gateway on the West Coast of North America. In 2007, YVR served a record 17.5 million passengers, handled 275,000 aircraft takeoffs and landings on its runways and saw 226,233 tonnes of air cargo loaded on and off aircraft. YVR is a key economic contributor, creating 2.3% of total employment in Greater Vancouver and contributing $6.8 billion to B.C.'s economy.

Forecasts from governments, companies and agencies suggest that the global, national and local demand for air travel will grow between 2007 and 2027. To ensure it can meet future passenger and cargo needs, the Airport Authority has considered a range of possible air travel scenarios out to 2027 and developed low-, medium- and high-growth scenarios. A low-growth scenario could result from slower than anticipated economic growth, external health or security concerns or increasing fuel costs while a high-growth future could occur if the demand for air travel to and from emerging Asian markets grows more rapidly than expected.

Under a medium-growth scenario for the 20-year planning horizon, passenger, aircraft and cargo demands on YVR will increase to an estimated 33.4 million passengers, 484,000 aircraft arrivals and departures, and 500,000 tonnes of cargo annually. As with all projections, there are risks and uncertainties associated with these forecasts and they will require frequent review, discussion and adjustment.

As the closest major West Coast airport to Asia, YVR enjoys a significant competitive advantage. The Airport Authority's vision is to be a premier global gateway of choice, connecting the Asia-Pacific Region and the Americas. As a gateway of choice, YVR offers, and can continue to offer, better service in terms of destinations, frequency and airlines than the local market could otherwise support. This provides, and will continue to provide, additional opportunities for local business to participate in the global economy, for tourists to visit B.C. and for British Columbians to travel overseas.

To accommodate future passenger needs, meet the aspirations of the communities it serves and achieve its gateway strategy, the Airport Authority must have an effective and flexible 20-year plan.



2027 Forecasts—Low, Medium, High Growth Scenarios
VANCOUVER AIRPORT AUTHORITY

YOUR AIRPORT 2027: 20-YEAR MASTER PLAN

YVR's 20-Year Master Plan outlines how the Airport Authority will meet the needs of its stakeholders and the communities it serves over the medium-term (20-year period) while supporting YVR's longer-term viability and achieving key strategic objectives. While the Airport Authority's lease with Transport Canada requires that the Master Plan be updated every 10 years, the plan can be updated more frequently if necessary to respond to unforeseen changes, challenges or opportunities.

Though the Master Plan covers a 20-year period, the Airport Authority must ensure that this medium-term strategy does not rule out or preclude options over the longer term (a 40-year horizon). In preparing this 20-Year Master Plan, the Airport Authority first consulted with business partners, stakeholders and young members of the community to understand their long-term visions and aspirations for British Columbia and the region.

These consultations took place in three forums "Flying 40 Years into B.C.'s Future" namely: Forum '44, Generation YVR and B.C. Communities. Input received through these forums indicated that air travel would continue to be vital over the long-term, that YVR will remain a key economic generator for B.C. and that the airport will continue to play a central role as a Pacific gateway to North America. These views contributed to a long-term development study that concluded YVR should continue to be the region's principal, full-service airport and that the airport should remain located on Sea Island.

With a clear long-term vision, the Airport Authority then looked at YVR's medium-term future using a variety of forecasting tools to project airport demand through to 2027. This work identified what steps will be needed over the next 20 years to support the longer-term vision. The Airport Authority conducted extensive consultations with business partners, municipal, provincial and federal governments, First Nations, technical experts, passengers, and local communities.

Having gathered information on the needs and aspirations of the communities it serves for the planning period, the Airport Authority identified a number of options to meet those requirements, sought stakeholder feedback on the various options and measured each option against key sustainability criteria. Based on this analysis, the Airport Authority has created a list of recommendations for development at YVR to respond to British Columbia's growth to 2027.

At a high level, the Airport Authority's recommendations for the 2007-2027 planning horizon include:

1. YVR continues to be the region's principal, full-service airport located on Sea Island;
2. Maximizing efficiency of the existing runway and taxiway system by extending the parallel runways and by building a North-South Taxiway;
3. Building new passenger terminal facilities and customs hall;
4. Ensuring convenient access to the airport by maximizing use of the Canada Line, implementing demand management initiatives, reclaiming bridge capacity for airport users and making smart land-use decisions;
5. Protecting options for a future runway, if and when required to meet future demand.

Timing for these recommendations will depend on demand. Using the medium-growth forecasts, development of new infrastructure is estimated to be required at various intervals during the next 20 years, as shown in the timeline below.

This 20-Year Master Plan identifies key changes and upgrades that will be required to meet YVR's needs to 2027 and provides the Airport Authority's recommendations for meeting these needs. It outlines the influences and forecasts that will shape the airport's medium-term future, and summarizes the master planning consultation process and stakeholder feedback received. This document includes a timeline and description of recommended gateway development projects as well as the 2027 Airport Land Use Plan that was submitted to the federal Minister of Transport for approval as part of the master planning process.

GATEWAY DEVELOPMENT TIMELINE

YVR's future is shaped by a diverse range of factors including international, national, provincial and regional forecasts, aviation industry projections and the aspirations and expectations of stakeholders. The 20-Year Master Plan must align with the Airport Authority's mission, vision and corporate priorities and support its gateway strategy and sustainability objectives. This chapter outlines some of the many factors that have influenced and guided the development of this plan.

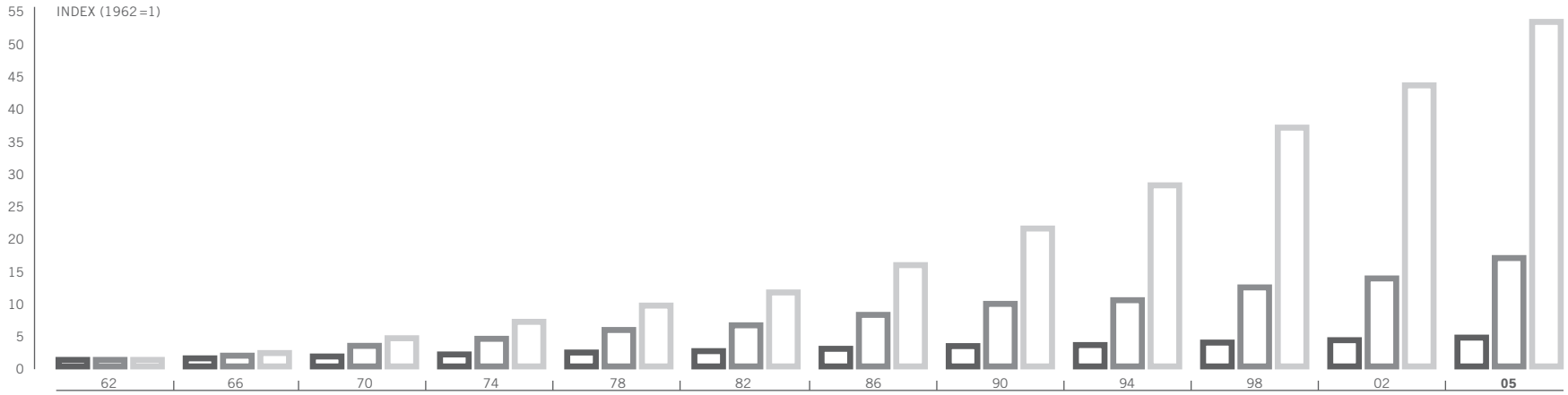
OUTLOOK 2027

In 2027, it is anticipated that eight billion people will inhabit the earth, that China will be the world's largest economy and that average temperatures will have risen due to projected increases in greenhouse gas concentrations.

In Canada, it is estimated that one in five Canadians will be over 65 years of age and the main source of population growth will have been immigration. Rates of growth in the aboriginal population are expected to be above average.

British Columbia will have a distinct culture embracing and reflecting a love of the land, cultural diversity, the province's geographic advantages and a resolution of relationships with First Nations people.

The Lower Mainland is expected to be home to 3.2 million people of diverse cultures, with proportionally more homes and jobs in the outer suburban areas.



Growth of Air Transport (1962–2005): WORLD GDP VERSUS AIR TRANSPORT DEMAND

VANCOUVER AIRPORT AUTHORITY 2005

Source: World Bank and International Civil Aviation Organization

AVIATION OUTLOOK 2027

While the world's gross domestic product (GDP) is expected to grow 2.9% annually between now and 2025, annual passenger growth will likely average 5.2% and annual cargo volumes, 6.2%. Increased worldwide travel will be stimulated by economic growth, lower fares, additional world trade and service improvements. Driven by declining costs and improved logistics systems, air cargo has grown at roughly three times the rate of the world economy (as seen in graph on page 6) and cargo transport is expected to increase at an average of 6.2% annually over the next 20 years.

To accommodate this growth, the world airliner fleet will grow to approximately 35,000 passenger and cargo jets by 2023, according to Boeing's 2005 Current Market Outlook.

In 2004, the Airport Authority commissioned a study by InterVISTAS Consulting Inc. to identify long-term aviation industry trends. Trends identified for the 20- to 40-year planning horizon include:

- The demand for passenger and cargo air transport will grow faster than the population or the economy. Passenger air travel will become more affordable, enabling more people to travel by air. However, the demand for air transport may be negatively impacted by fuel costs and the impact of global climate change.
- Major new markets for air travel will emerge. China is expected to become one of the largest generators of tourists, growing from 12 million outbound tourists in 2001 to 100 million by 2020. Other emerging outbound tourism markets include India and Latin America.
- A growing demand for air transport will put pressure on local and regional transportation systems. Airports will need to be integrated into regional transportation systems that utilize high-capacity mass transit to move people.
- As a result of government and industry initiatives, the noise impacts of aircraft have been reduced. Using new technologies, the aviation industry will continue to work towards minimizing noise impacts.
- Smart technologies will help to reduce costs, improve customer service and expedite the movement of passengers through borders, security and health screening processes.
- While it is difficult to predict just how the airline industry will be structured 20 years from now, it is clear that fundamental change is underway. Airports must be flexible enough to accommodate a changing airline marketplace, which may include consolidation and increased services from low-cost carriers.
- Future passenger and cargo needs will be addressed with a range of aircraft types, ranging from the 555-seat Airbus A380 to the smaller, long-range Boeing 787 Dreamliner, from regional jets with between 50 and 100 seats to 4-6 seat Microjets.
- More and more, airports are exploring creative solutions for managing growth, including expanding their boundaries or using lands outside current boundaries (such as off-site check-ins and other processes, or secondary airports).

YVR GATEWAY STRATEGY AND ECONOMIC IMPACT

The Airport Authority's vision is to be a premier global gateway of choice, capitalizing on YVR's unique geographic location as the closest West Coast airport to Asia, and connecting the Asia-Pacific region and the Americas.

Being an international gateway of choice creates significant economic benefits, along with creating opportunities for local business to participate in the global economy, tourists to visit B.C. and British Columbians to travel overseas. International flights create significantly more employment than domestic or transborder (U.S.) flights. According to the 2005 Economic Impact Study of the Vancouver International Airport distributed in March 2006, a twice-daily domestic flight generates 82 hours of employment per flight, or 38 person years annually. By comparison, a twice-daily international flight creates 795 hours of employment per flight. Over a year, this equals 369 person years of employment.


AIRBUS A340-600

A SUSTAINABILITY FRAMEWORK

Effective long-term planning is crucial to a successful future and the Airport Authority views good planning and sustainability as one and the same. Contributing to a sustainable and prosperous future while caring about the well-being of its surroundings, its people and its communities is fundamental to the Airport Authority's operating philosophy and central to its planning processes.

THE FOUR PILLARS OF SUSTAINABILITY

The Airport Authority's view is that there are four pillars to sustainability: economic, environmental, social and governance.

ECONOMIC: YVR is a major employment centre and economic generator. The Airport Authority's challenge is to sustain and promote economic growth while minimizing YVR's impact on its communities and the environment.

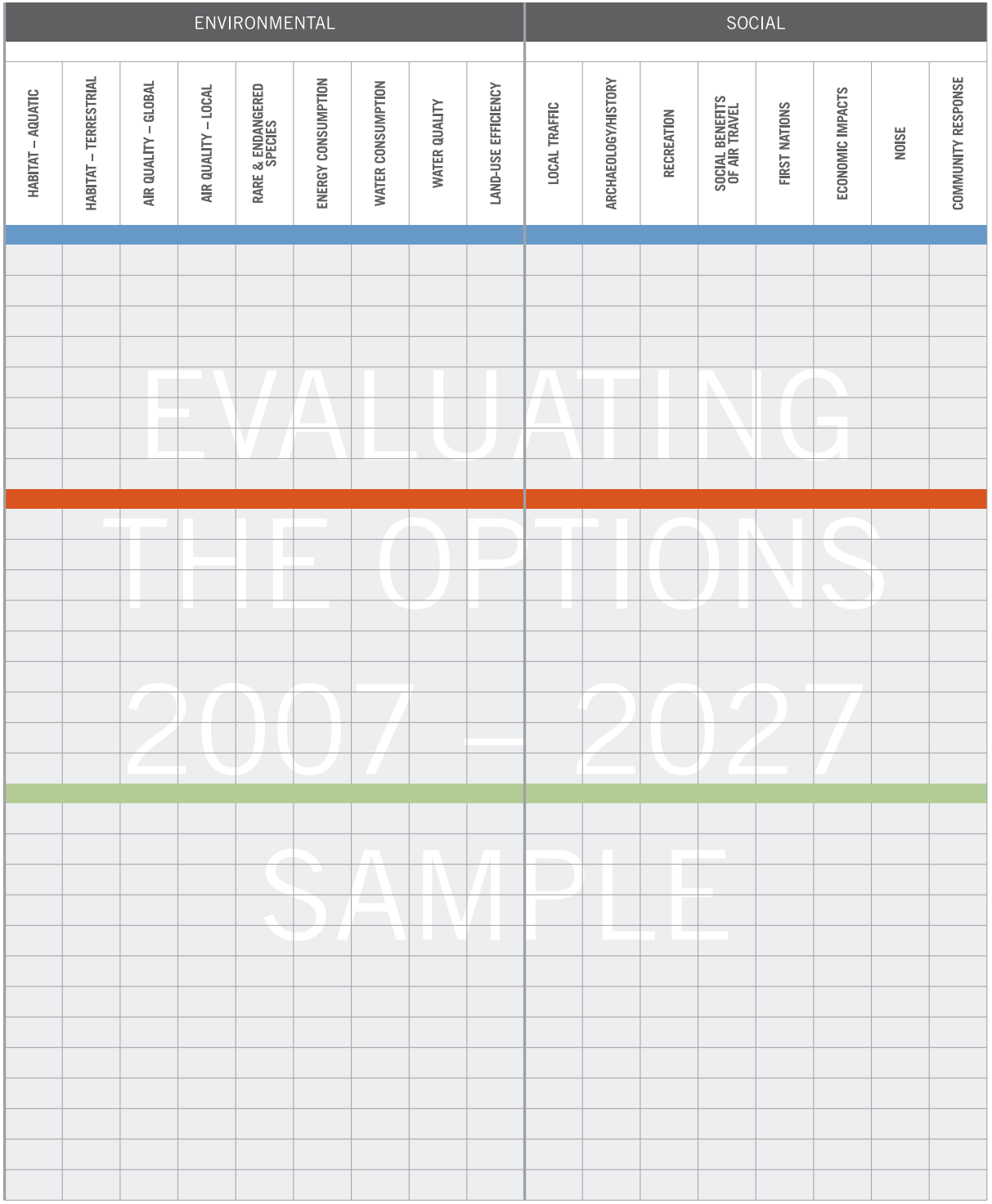
ENVIRONMENT: The Airport Authority is committed to managing the airport in an environmentally sound manner and balancing potential environmental impacts with the need for safe and efficient air travel. To eliminate, reduce, mitigate or manage environmental impacts wherever possible, the Airport Authority has developed an Environmental Policy and implemented an Environmental Management Plan.

SOCIAL: British Columbians frequently travel by air because of the unique geography of our province and our immigrant heritage. Affordable and accessible air travel allows people to stay connected and pursue personal interests. As an employer, the Airport Authority is committed to providing a quality work environment and the tools and resources to support a flexible, strong and capable team. Its commitment to accessibility recognizes the importance of meaningful access regardless of age or ability. The Airport Authority is also committed to engaging stakeholders, providing transparency in open, honest and timely communications to customers, business partners, the communities it serves and its employees.

GOVERNANCE: The Airport Authority has added governance to its sustainability framework to recognize the importance of local accountability for economic, environmental and social issues, while meeting the business objectives of the Airport Authority and the communities it serves.

< YVR's location as the closest major North American airport to Asia positions the airport as the ideal gateway connecting the Asia-Pacific Region and the Americas. In the coming years, the Airport Authority expects to add more Asian destinations and carriers as we continue to develop the YVR gateway.

		EVALUATION CRITERIA	GOVERNANCE			ECONOMIC													
			STRATEGIC			OPERATIONS								FINANCE		RISK			
	OPTIONS		MISSION / VISION / VALUES / OBJECTIVES	OPPORTUNITIES	PRECLUSIONS	CAPACITY	OPERATIONAL EFFICIENCY	REDUNDANCY	CUSTOMERS AND PARTNERS – PASSENGERS	CUSTOMER AND PARTNERS – BUSINESS PARTNERS	CUSTOMER AND PARTNERS – GOVERNMENT	CARGO	SECURITY / HEALTH	CAPITAL COST	REVENUE	DELIVERY TIME	TECHNOLOGY	FLEXIBILITY	FINANCIABILITY
Ref	AIRSIDE																		
A1	FORESHORE RUNWAY (RWY)																		
A2	SOUTH PARALLEL RWY (Short)																		
A3	SOUTH PARALLEL RWY (Long)																		
A4	NORTH PARALLEL RWY																		
A5	EXTEND NTH RWY WEST																		
A6	EXTEND NTH RWY EAST																		
A7	NORTH-SOUTH TAXIWAY																		
A8	DEMAND MANAGEMENT																		
	TERMINAL																		
T1	TRANSBORDER SOUTH EAST																		
T2	INTERNATIONAL WEST SATELLITE																		
T3	TRANSBORDER WEST SATELLITE																		
T4	TRANSBORDER NORTH EAST																		
T5	INTERNATIONAL NORTH EAST																		
T6	INTERNATIONAL "Y"																		
T7	TRANSBORDER "Y"																		
T8	DOMESTIC "Y"																		
T9	TERMINALS "A" AND "B"																		
	GROUND ACCESS & PARKING																		
G1	PARKING ON ISLAND																		
G2	PARKING OFF ISLAND																		
G3	DEDICATED ACCESS																		
G4	INCREMENTAL IMPROVEMENTS																		
G5	ONE-WAY COUPLET																		
G6	TEMPLETON-ARBUTUS CONNECTOR																		
G7	TEMPLETON-ALDERBRIDGE CONNECTOR																		
G8	TWIN ARTHUR LAING BRIDGE																		
G9	GRADE SEPARATED ACCESS TO HIGHWAY 99																		
G10	DEMAND MANAGEMENT																		
	CARGO																		
	UTILITIES																		
	TELECOM / IT																		



SUSTAINABILITY MATRIX

Sustainability is not just an abstract goal – it's integrated into the Airport Authority's day-to-day decision making and planning processes. As part of the master planning process, a sustainability matrix was created to measure the performance of the options identified for meeting YVR's medium-term needs against the Airport Authority's sustainability objectives. The matrix includes 34 different criteria based on the four pillars of sustainability.

Economic criteria included operational factors (capacity, efficiency, safety and health considerations), financial implications (costs and revenue) and risk factors (delivery time, flexibility).

Environmental criteria considered how each option would affect habitat, air quality, energy and water consumption, and impact water quality and land-use efficiency.

Social considerations included the impact of airport operations on the local community, economic impacts, noise and community response or input.

Governance criteria considered how well an option achieved the mission, vision and objectives of the Airport Authority and identified whether the option presented business opportunities or precluded other future development options.

SUSTAINABILITY MATRIX EVALUATION PROCESS

During the sustainability matrix evaluation process, each option was evaluated twice. The first evaluation measured an option's performance against each criterion in the matrix (Option A will cost $10 million, or Option B will impact 10,000m^2 of aquatic habitat). The second evaluation scored the option's performance relative to other available options (Option A will cost $10 million and Option B will cost $12 million. Therefore, Option A is the most affordable option, while Option B is the second most affordable.)

3. Your Airport 2027: Consultation Process

In developing this 20-Year Master Plan, the Airport Authority undertook its broadest-ever consultation program to promote open discussions about the multiple futures available to YVR. A diverse range of stakeholders was engaged, including Airport Authority staff, community-based interest groups, community associations, the Lower Mainland business community, Sea Island business partners, First Nations, managers from regional airports, the next generation of users, transportation authorities, municipal, regional, provincial and federal governments and the general public throughout B.C.'s Lower Mainland.

To reach the widest possible range of stakeholders, the Airport Authority utilized a variety of tools including presentations and meetings to gather information, technical expertise and forecasts, workshops, working groups, large forum events, a media kit, multi-media presentations, a 20-Year Master Plan section on the website, visual displays in shopping malls, public buildings and at the airport, open house events and printed materials.

CONSULTATION PRINCIPLES

To promote stakeholder involvement and support, the Airport Authority was guided by a set of consultation principles, including:

— A commitment to transparency, involving open, honest and timely communications;
— A broad and inclusive consultation process;
— Remaining flexible and responsive, and regularly reviewing the consultation process to ensure it was meeting project objectives and that any concerns were addressed;
— Creating overall awareness and excitement within B.C. about YVR's future.

FIVE STAGES OF MASTER PLANNING

The 20-Year Master Plan was developed in five stages. Stakeholder input gathered at each stage was fed into the planning process to inform subsequent stages.

FIVE STAGES OF CONSULTATION FOR 20-YEAR MASTER PLAN

STAGE 1:
2044 Aspirations of British Columbians
NOVEMBER 2004 – JUNE 2005
>

STAGE 2:
2027 YVR Options
JULY 2005 – JANUARY 2006
>

STAGE 3:
2027 Master Plan Draft #1
MAY – SEPTEMBER 2006
>

STAGE 4:
2027 Master Plan Draft #2 (refine)
SEPTEMBER – DECEMBER 2006
>

STAGE 5:
YVR Master Plan & Land Use Plan Submission & Approval
April 2007 – June 2008

STAGE ONE: ASPIRATIONS OF BRITISH COLUMBIANS: LOOKING AHEAD 40 YEARS (NOVEMBER 2004 – JUNE 2005)

To ensure that recommendations in the 20-Year Master Plan did not preclude the vision and activities of YVR for future generations, the Airport Authority needed to understand the longer-term (40-year) aspirations and expectations of YVR's stakeholders.

Stage one of the 20-Year Master Plan process started off in 2004 by looking at potential futures for YVR and B.C. through to 2044. The Airport Authority held extensive meetings with municipal governments, business leaders, and industry experts to gain insight into the strategic planning and forecasting being undertaken by the aviation industry, YVR's business partners and B.C. communities. Stage one activities included:

— Forum '44 – Flying 40 Years into B.C.'s Future: A two-day event in November 2004 designed to launch the master planning consultation process, promote discussions and dialogue with a diverse range of stakeholders and key business leaders, gather information about how the community envisions its future and the role of YVR, and understand the trends, pressures and themes that will influence YVR's future. As part of Forum '44, a community session was held with local Sea Island businesses.
— Generation YVR and B.C. Communities 2045: Following the success of Forum '44, two subsequent forum events were held. Generation YVR – 30 and Under Flying 40 Years into B.C.'s Future, engaged younger British Columbians who will be the leaders of the future. A second forum, B.C. Communities 2045 – Flying 40 Years into B.C.'s Future, brought together community leaders and airport management from across B.C.

During stage one, the Airport Authority identified future airport facility requirements and potential expansion needs over a 40-year planning horizon. Studies were conducted to explore whether the existing lands leased by the Airport Authority provided sufficient space for the necessary systems and infrastructure.

Based on an examination of potential markets and growth patterns, the Airport Authority developed a scenario that suggested annual passenger traffic could be in the range of 45 million, and there could be as many as 600,000 aircraft takeoffs and landings each year by 2044.

STAGE ONE OUTCOMES:

Based on the studies and consultation conducted, the Airport Authority determined that:

— Stakeholders viewed YVR as a vital and growing part of their communities. YVR is B.C.'s airport and will need ongoing upgrades to support projected increases in passenger traffic, aircraft takeoffs and landings and air cargo.
— Sustainability was of vital concern to local and global stakeholders. The Airport Authority identified sustainability as a key goal of the master planning process and developed a sustainability matrix as a tool to measure options and inform decision-making.
— Sea Island could accommodate projected airport activity in 2044, and there was sufficient area for additional terminals and runways.
— All development strategies should incorporate demand management initiatives.
— Ground access to Sea Island would be an ongoing issue best addressed by rapid transit, vigorous demand management and initiatives to preserve bridge capacity for airport-related traffic.

STAGE TWO: YVR 2027 OPTIONS (JULY 2005 – JANUARY 2006)

Based on preliminary stakeholder input and the range of internal and external considerations outlined in chapter 2 of this document, the Airport Authority developed low-, medium- and high-growth forecasts for passenger, aircraft and air cargo traffic through to 2027. To meet this forecast demand, runway, terminal, ground transportation and other infrastructure needs were identified and options formed to meet those needs while supporting the long-term development possibilities noted in stage one. Details about these options can be found in chapters 5 through 13 of this document.

In fall 2005, a second comprehensive round of consultations was held to seek stakeholder input on these options. The Airport Authority continued its conversations with industry partners, government agencies and other interested parties and held a series of public information sessions, open houses and community meetings as well as providing information and feedback opportunities on YVR's website.

A display of potential 20-Year Master Plan options toured Lower Mainland shopping malls, public buildings and the Union of B.C. Municipalities conference to gather public input, and a brief questionnaire was made available to the public to elicit their feedback. Approximately 20,000 people viewed the displays and 680 people provided completed questionnaires and written feedback.

The Airport Authority then analyzed each development option using the sustainability matrix to determine how well each option performed against the criteria. Stakeholder input was incorporated into the matrix evaluation, where it played an integral role in informing Airport Authority decisions and recommendations.

STAGE TWO ACHIEVEMENTS:

- The Airport Authority developed a range of options that met YVR's medium-term needs, without precluding the longer term-vision;
- The Airport Authority consulted with thousands of stakeholders to obtain their input on the various options being considered;
- Each option being considered was evaluated to identify how well it performed in relation to key economic, environmental, social and governance criteria.

STAGE THREE: DRAFT 20-YEAR MASTER PLAN (MAY – SEPTEMBER 2006)

Based on the feedback and information received during stages one and two and the results of the sustainability matrix evaluation, the Airport Authority prepared a 20-Year Master Plan Technical Report, which outlines the infrastructure and development necessary to meet YVR's needs to 2027, documents the process used to analyze and evaluate each option and presents the Airport Authority's recommended options.

Based on the Technical Report, a draft 20-Year Master Plan was prepared to facilitate further stakeholder consultation and seek stakeholders' review and comments on the Airport Authority's recommendations. Feedback was received from stakeholder groups, and the draft was refined to create a second draft.

STAGE FOUR: REFINE DRAFT 20-YEAR MASTER PLAN (SEPTEMBER – DECEMBER 2006)

Stage four of the master planning consultation process sought final comments on the second draft of the 20-Year Master Plan. The necessity for, and extent of, stage four consultation activities was determined by stakeholder feedback received during stage three.

STAGE FIVE: COMMUNICATION OF THE APPROVED AIRPORT LAND USE PLAN (2008)

The final draft of YVR: Your Airport 2027: A 20-Year Master Plan, including the proposed 2027 Airport Land Use Plan, was submitted to the federal Minister of Transport for approval in 2007. The Minister approved the 2027 Airport Land Use Plan in 2008.

< Forum '44 brought leaders in business, community and government together for some thought-provoking conversation about the future of YVR in the context of the local and global environment in 2044, and examined the airport's role in supporting a sustainable future for the Lower Mainland, B.C. and Canada.

4. Your Airport 2027: Requirements and Recommendations

Increased numbers of passengers and cargo volumes at YVR will mean greater demand for airside capacity, terminals, cargo facilities and ground transportation access to Sea Island. Airport support services and utilities will also need to be upgraded to accommodate projected volumes through the planning horizon.

The following chapters outline key changes or upgrades that will be needed to meet requirements to 2027 based on demand scenarios and forecasts. Each chapter includes information about the forecasts and planning approach used, stakeholder feedback received and the Airport Authority's recommendations as to how to proceed. A range of cost estimates for terminal and runway options is included in those chapters. It should be noted that these are order of magnitude cost estimates only.

Given the uncertainty inherent in forecasting and planning, the Airport Authority takes a conservative approach to development by building incrementally whenever possible, and only as demand for additional facilities is realized.

5. Airside System

YVR's existing airside system includes two parallel runways (the North and South runways), a Crosswind Runway and a network of connecting taxiways that enable aircraft to move between the runways, passenger terminals and other airport facilities.

In 2007, 275,000 aircraft used the runways at YVR, either arriving or departing. Current annual runway capacity at YVR is approximately 400,000 aircraft takeoffs and landings. Capacity could be increased to more than 450,000 takeoffs and landings by using each of the parallel runways simultaneously for arrivals and departures. This would require improvements to the taxiway system.

Projections indicate that by 2027, the airport will need to accommodate 484,000 takeoffs and landings annually. To accommodate this increase an additional runway will be required.

PLANNING APPROACH

The 20-Year Master Plan airside system analysis was preceded by long-term development studies that suggested approximately 600,000 runway movements would take place by 2044, and that a new runway would be required to accommodate the projected activity. The long-term study identified a number of options for meeting the forecasted long-term demand.

To identify airside needs to 2027, the Airport Authority created a projected fleet mix, using six broad categories of aircraft, to estimate the required number of takeoffs and landings by passenger aircraft. This estimate was applied to runway capacity estimates developed using International Air Transport Association standards and benchmarks from selected airports. Both NAV CANADA and the Massachusetts Institute of Technology were consulted on projected gains in capacity that may result from future technologies.

The Airport Authority used the sustainability matrix to evaluate each runway option identified during the long-term development studies. Runway options were also evaluated for compatibility with the various passenger terminal options identified in chapter 6 of this document.

REQUIRED AIRSIDE IMPROVEMENTS FOR 2027

Above and beyond the airside projects specified in YVR's current 10-Year Capital Plan, improvements will be necessary to enhance the flow of traffic on taxiways and increase runway and taxiway capacity to 2027.

TAXIWAY IMPROVEMENTS

In order to derive maximum capacity from the runways, it is essential to have adequate taxiway capacity. The construction of a North-South Taxiway (NST) connecting the east ends of the parallel runways would add capacity while significantly reducing taxi distance, saving time, fuel and minimizing emissions.

RUNWAY CAPACITY

To defer the need for additional runways as long as possible, it is essential to maximize capacity of the existing runways.

MAXIMIZING EXISTING RUNWAY CAPACITY

Unlike the South Runway, which is used for both arrivals and departures, YVR's North Runway has been used primarily as an arrivals runway, other than when demand approaches capacity, such as during peak traffic periods. By using the North Runway for both departures and arrivals, YVR could increase runway capacity by 15%, double its departure capacity and better manage demand on both runways.

To enable both the North and South runways to be used efficiently for arrivals and departures, YVR's taxiway system must have sufficient capacity and flow paths to allow aircraft to move efficiently to and from the runways without congestion.

To realize the full capacity potential of YVR's existing runway system, the following options were identified and considered:

1. Build a North-South Taxiway to allow for simultaneous takeoffs and landings on both the North and South Runways.
2. Extend the North Runway by 600 m (2,000 ft) to enable long-range aircraft departures. This would improve efficiency, better balance departure demand between the parallel runways and reduce taxi distances.
3. Implement peak-hour demand management measures (such as pricing mechanisms, quotas, air traffic flow control) to shift arrivals and departures to off-peak periods and other airports.
4. In anticipation of future Transport Canada requirements for extended Runway End Safety Areas (RESA), extend the North and South runways accordingly. Anticipated extension range will be 150-300 m (500-1,000 ft).

ADDING RUNWAY CAPACITY

Depending on the success of demand management programs and the rate of passenger growth, capacity enhancement initiatives will provide relief to 2023-4 at best. At that time, a new runway may be needed to create additional capacity.

As part of its long-term development studies, the Airport Authority explored a range of new runway options, each providing sufficient capacity for YVR to accommodate up to 600,000 takeoffs and landings each year. After each option was assessed using the sustainability matrix, four possible runway options were retained.

1. The Foreshore Runway: This new 4,270 m (14,000 ft) runway, extending westward from the Sea Island dyke onto the foreshore of the ocean, would be used for arrivals and departures and would add capacity of approximately 210,000 takeoffs and landings to YVR's annual capacity at an estimated cost of $1.2 billion. The Foreshore Runway would provide the required length for current and future aircraft. While it would impose a significant footprint into the foreshore with subsequent aquatic habitat impacts, it would also minimize aircraft noise impacts on the community.
2. The North Parallel Runway: A new, 2,740 m (9,000 ft) runway, parallel to and north of the existing North Runway, that would add capacity of approximately 148,000 additional takeoffs and landings at an estimated cost of $310 million. This runway would be an arrivals only runway, with the existing runways serving departures. It would intrude into the Sea Island Conservation Area and Musqueam Lands, move noise closer to Vancouver residential areas and occupy lands previously designated for commercial development. The North Parallel Runway option would require changes to aircraft approach path zoning.
3. The South Parallel (Long) Runway: A new, 2,740 m (9,000 ft) runway, parallel to and south of the existing South Runway, that would add capacity of approximately 158,000 takeoffs and landings each year at an estimated cost of $300 million. The South Parallel (Long) Runway would operate as an arrivals only runway, with the existing runway serving departures. It would intrude on, and create potential environmental impacts for, the Fraser River Middle Arm riparian area and increase noise exposure for Richmond residential areas. The runway would occupy land that is currently used for commercial activities and occupied by tenants at Airport South.
4. The South Parallel (Short) Runway: This modification of the South Parallel (Long) Runway option would be a new, 2,130 m (7,000 ft) parallel runway south of the existing South Runway. It would add capacity of approximately 158,000 annual takeoffs and landings at a cost of $235 million. Although it would not penetrate the dyke or intrude on the Fraser River Middle Arm riparian area, this runway would operate as an arrivals only runway but could not accommodate all types of aircraft.

STAKEHOLDER INPUT AND FEEDBACK

When asked for comments on the runway options, the public favored the Foreshore and South runways over the North Parallel Runway option. As expected, there was both positive and negative response to all options, although feedback on the Foreshore Runway option indicated greater support from respondents than the other options. Issues raised during consultation included cost, impact on the environment and existing facilities. There was, however, recognition that airside capacity should be added to prevent congestion and delays.

AERONAUTICAL NOISE EVALUATION

To compare noise impacts of the various runway options, the Airport Authority conducted an aeronautical noise management analysis. In Canada, the official metric for the assessment of aircraft noise is the noise exposure forecast (NEF). NEF contours are created using software developed by Transport Canada.

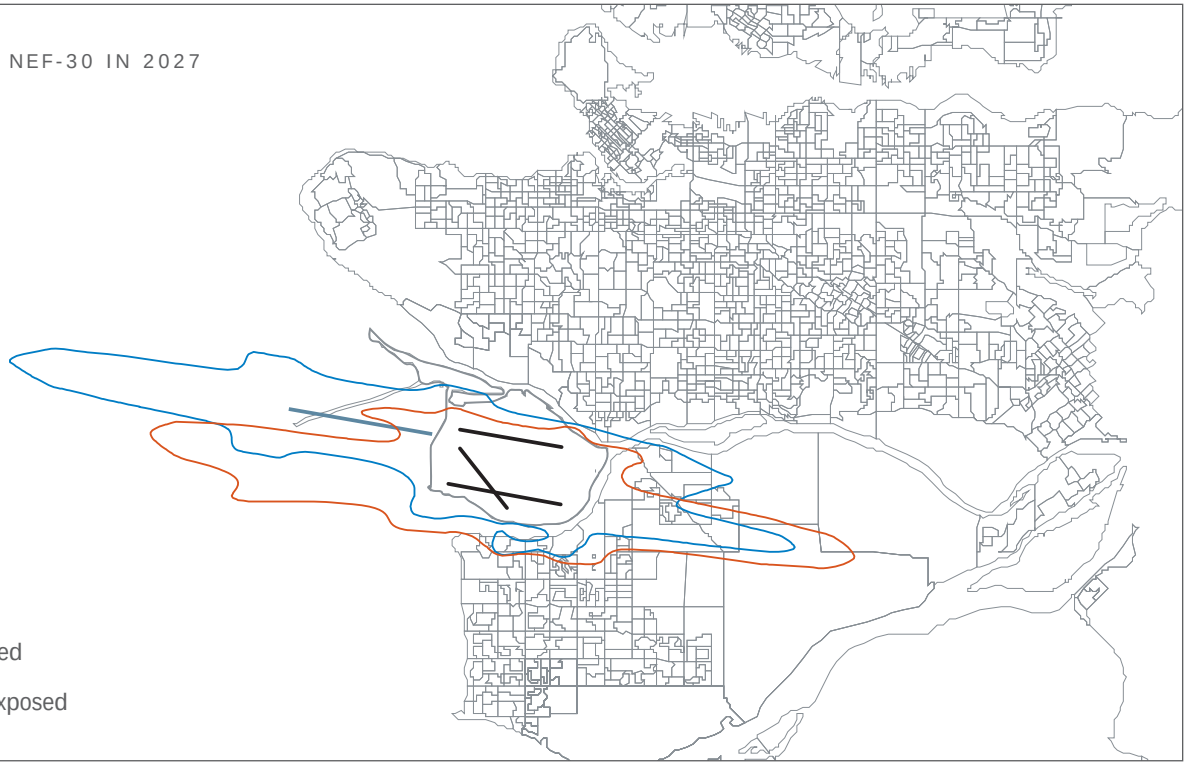
NEF contours are modeled by time-averaging the annual aircraft operations, with consideration given to the fleet mix, stage length, aircraft range, runway utilization, flight path and time of day.

Since Transport Canada guidelines prescribe that no new residential developments should occur in areas exposed to greater than 30-NEF, this 30-NEF benchmark was used in comparing master plan options. Forecasted populations of people living within the 30-NEF area for the years 2017 and 2027 were used to compare the NEF contours of the various runway options.

A base case forecast for 2027 population within the area of the existing runway system was used to measure the change in distribution of noise for each of the new runway options. The results of the new runway assessments indicate that only the Foreshore Runway decreased the number of people living inside the 30-NEF zone, achieving a 7.6% reduction. The North and South Parallel Runway options resulted in increases of those inside the 30-NEF zone ranging up to 12%.

Examples of NEF contours for the Foreshore and South Parallel (Long) runways are shown on page 21.

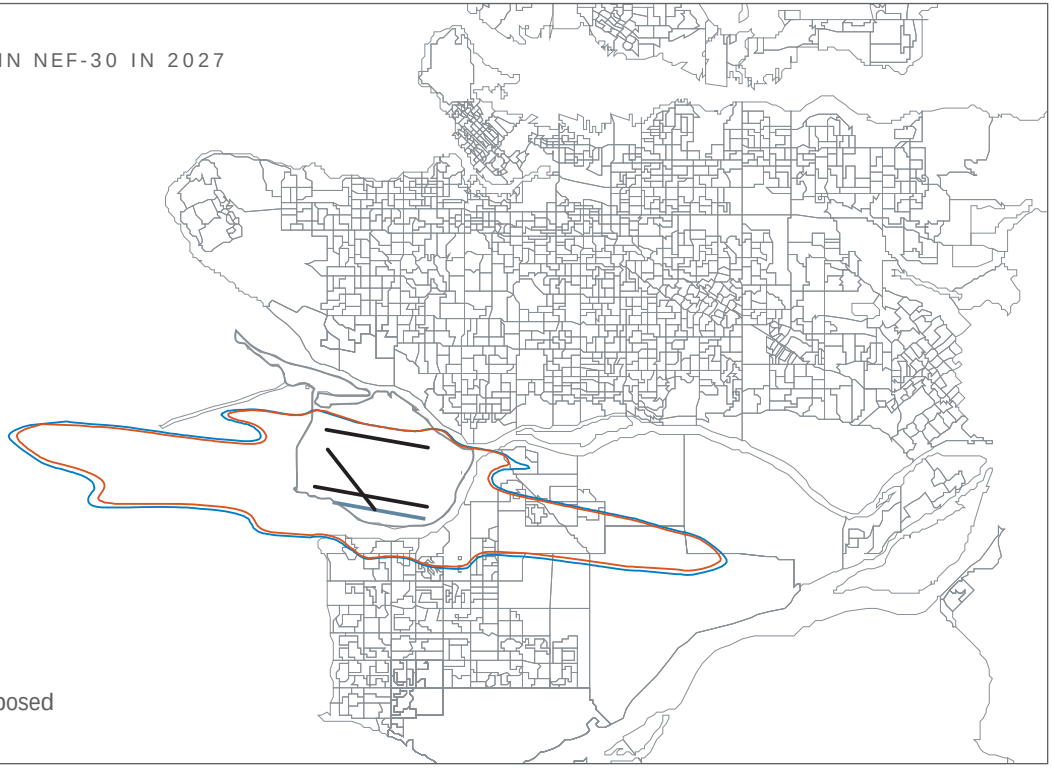
FORESHORE RUNWAY CONTOUR – PEOPLE EXPOSED WITHIN NEF-30 IN 2027



Existing airside system in 2027 = 21,980 people exposed

Foreshore Runway scenario in 2027 = 20,030 people exposed

SOUTH PARALLEL (LONG) RUNWAY CONTOUR – PEOPLE EXPOSED WITHIN NEF-30 IN 2027



Existing airside system in 2027 = 21,980 exposed

South Parallel (Long) Runway scenario in 2027 = 24,620 people exposed

EVALUATION AND RECOMMENDATIONS

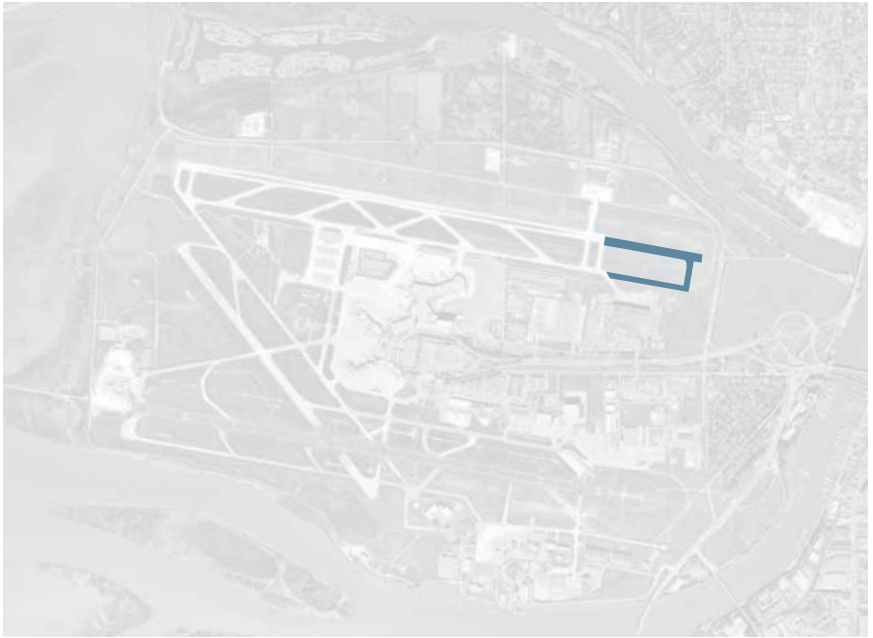
Based on sustainability matrix evaluation results, the Airport Authority recommends:

1. Implementing demand management measures to conserve YVR's airside capacity.
2. Proceeding with the North-South Taxiway (NST) to augment the existing taxiway system and improve system efficiency. The NST should be completed prior to the opening of phase 1 of a new passenger terminal in 2015 or sooner.
3. Proceed with extending the North Runway to the east, in combination with implementing the anticipated Runway End Safety Area (RESA) requirements on the North and South runways. The Airport Authority recommends extending the North Runway to the east, because a western extension would generate greater environmental impact.
4. When taxiway improvements are complete and both parallel runways are being used for arrivals and departures, the Crosswind Runway will contribute no additional capacity and should be closed.
5. Protecting for the Foreshore, South Parallel (Long) and South Parallel (Short) runway options by allocating these areas to airside operations use in the 2027 Airport Land Use Plan, creating leasing policies that reserve the areas for future airside operations and implementing the necessary aeronautical zoning regulation applications required to protect the South Parallel and Foreshore Runway options.

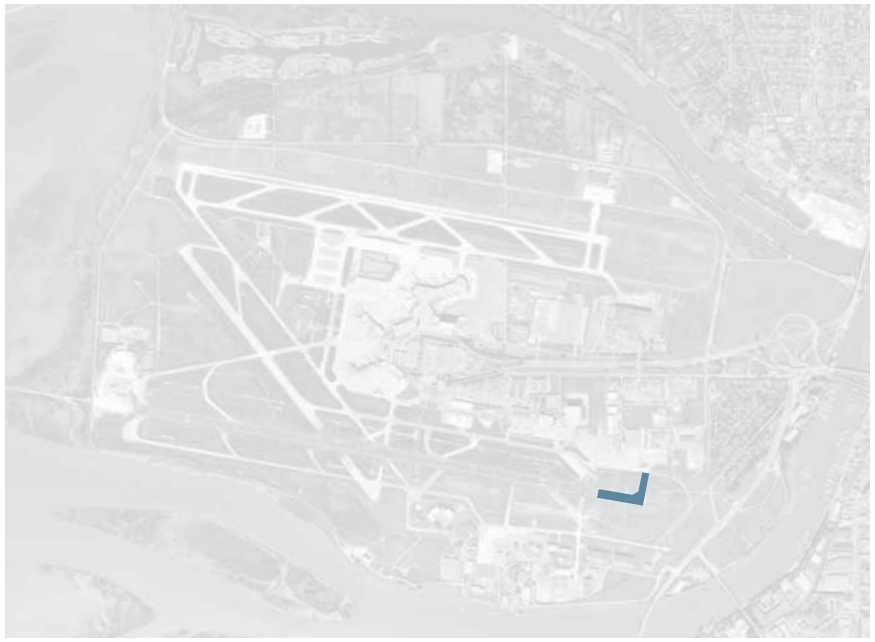
Land reserved for the airside system is indicated in blue on the 2027 Airport Land Use Plan on page 50.

NORTH-SOUTH TAXIWAY

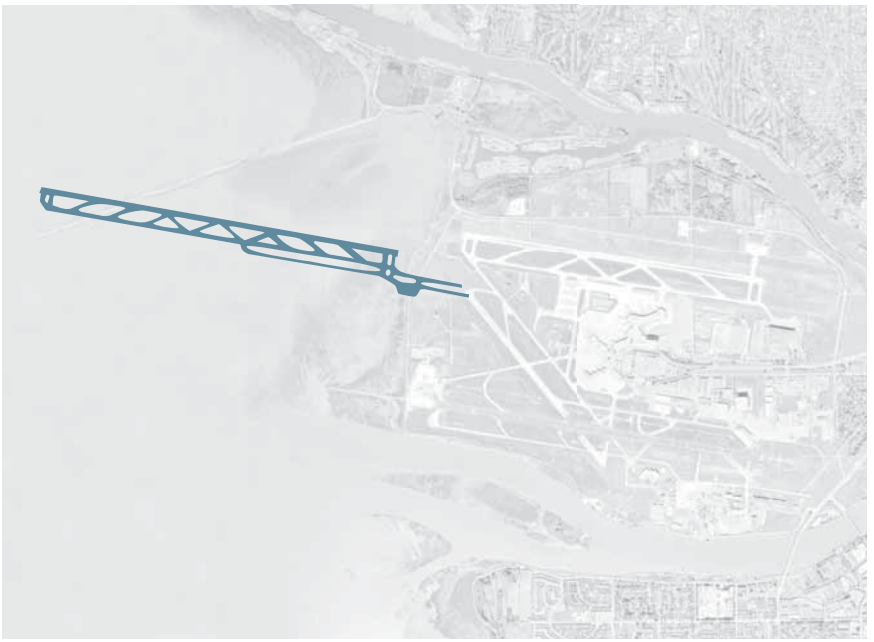
NORTH RUNWAY EXTENSION – EAST OPTION



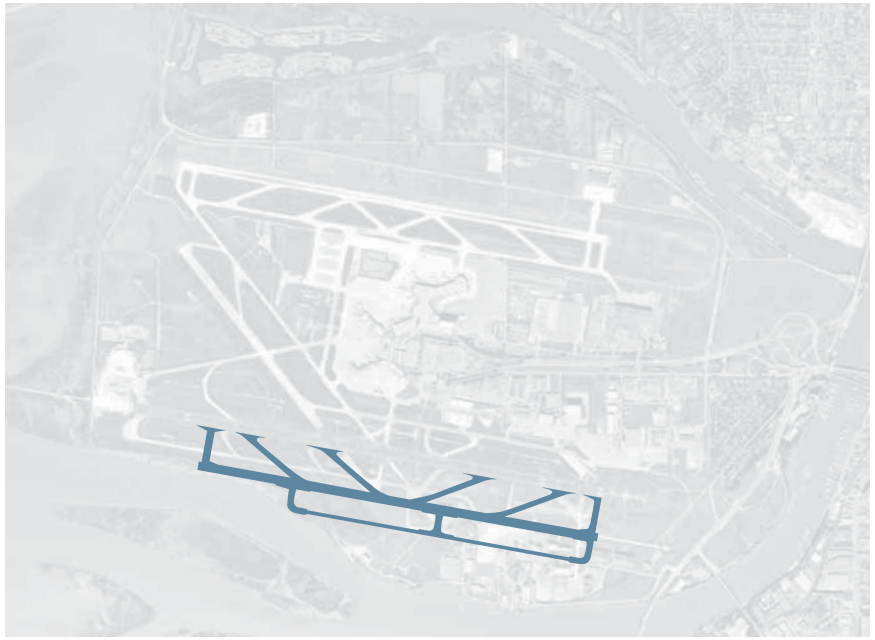
SOUTH RUNWAY – RUNWAY END SAFETY AREA (RESA)



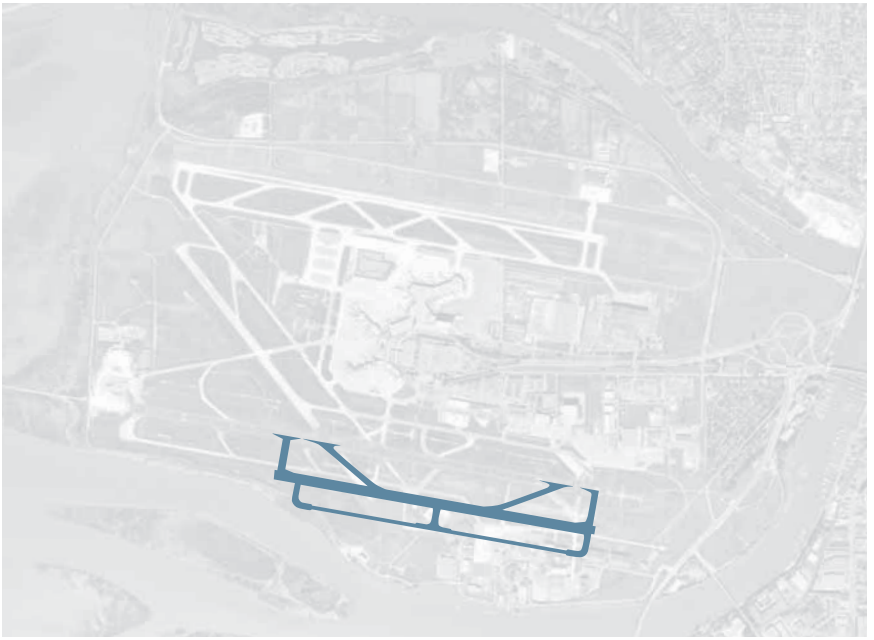
FORESHORE RUNWAY



SOUTH PARALLEL (LONG) RUNWAY



SOUTH PARALLEL (SHORT) RUNWAY



6. Passenger Terminals

Terminals are central to passengers' experiences at YVR and key to the success of the Airport Authority and its business and government partners. YVR's terminals are highly regarded by passengers and the community for their amenity, efficiency and distinctive sense of place. A record 17.5 million passengers passed through YVR in 2007 and medium-growth projections indicate that YVR will need to accommodate approximately 33.4 million passengers by 2027.

Passenger terminal planning is influenced by numerous factors including border and security policies, air carrier business plans and operations, technology and retail opportunities, all of which are subject to change. After the September 11, 2001 terrorist attacks, for example, more rigorous border checks reduced the passenger processing rate by almost one-third, impacting the space required for that function. In the domestic and transborder (U.S.) sectors, the check-in process has largely shifted from counters to automated kiosks, and the average size of aircraft flying between YVR and Asia fell by 22% since 2001, impacting aircraft gate utilization.

Some developments, such as the advent of off-site kiosk check-ins, tend to reduce the footprint of passenger terminals while others, such as baggage screening and new border regulations, necessitate larger passenger terminal spaces.

There are currently three main passenger terminals at YVR: the International Terminal Building (ITB), the Domestic Terminal Building (DTB) and the South Terminal Building (STB), which serves intra-B.C. airline traffic on the airport's south side. There is also a common-use floatplane dock at Airport South.

As of 2007, the ITB and DTB offered 58 bridged gates and 16 ramp loading positions for smaller aircraft. There were a further eight ramp loading positions at the South Terminal Building. Medium-growth forecasts indicate that a total of 73 bridged gates will be required by 2017 and 87 gates by 2027 together with an estimated 32 ramp loading positions, distributed between the ITB, DTB and STB.

While adjustments to airport operations may be able to squeeze additional capacity out of YVR's infrastructure for a time, passenger traffic will likely exceed terminal capacity sometime between 2013 and 2015. Additional terminal facilities, beyond those already planned for, will be required.

PLANNING APPROACH

The 20-Year Master Plan passenger terminal planning process was designed to exceed safety and customer service requirements, meet the operational efficiency needs of facility users, provide maximum flexibility for expansion and change, protect adequate land to meet terminal expansion needs, and utilize sustainable building design and operation practices. It balanced terminal and airside system development to achieve maximum efficiency and capacity of the combined systems.

The terminal planning process incorporated an analysis of demand and capacity. It considered the Airport Authority's strategy of providing common-use facilities (check-in counters, aircraft gates and baggage carousels) and creating infrastructure that supports an effective link between passengers and baggage and allows for incremental expansion. The process factored in the seasonality of some airport operations and the understanding that external changes will continue to affect terminal development and operations.


AIR CA

TERMINAL OPTIONS FOR CONSIDERATION

The Airport Authority identified three areas into which the existing terminal complex could be expanded: to the north east of the ITB, to the south east of the DTB and to the west of the existing terminal complex in either a satellite or a Y-shaped pier. Within each of these broad physical options were a number of alternatives for how the terminal would be utilized. For example, a north east expansion could accommodate transborder or international flights, both transborder and international flights, or flights of just one carrier or airline alliance. The terminal options evaluated were:

1. TRANSBORDER NORTH EAST: Expand the terminal complex to the north east of the ITB to accommodate transborder traffic.
2. INTERNATIONAL NORTH EAST: Expand the terminal complex to the north east of the ITB to accommodate international traffic.
3. INTERNATIONAL/TRANSBORDER NORTH EAST: This option is a variation of other north east terminal options, accommodating both international and transborder traffic.
4. TRANSBORDER SOUTH EAST: Expand the terminal complex to the south east of the DTB to accommodate transborder traffic.
5. INTERNATIONAL WEST SATELLITE: Construct an in-field satellite terminal west of the existing complex for international traffic, connected to the main terminals by a people mover.
6. TRANSBORDER WEST SATELLITE: Construct an in-field satellite terminal west of the existing complex for transborder traffic, connected to the main terminals by a people mover.
7. INTERNATIONAL Y: Construct a new international pier by western expansion of the existing Pier C.
8. TRANSBORDER Y: Construct a new transborder pier by western expansion of the existing Pier C.
9. DOMESTIC Y: Construct a new domestic pier by western expansion of the existing Pier C.
10. HUB CARRIER Y: Construct a new hub through incremental development and expansion of the existing Pier C complex.
11. TERMINALS A & B: Terminals allocated by airline carrier or alliance serving the necessary sectors.
12. CHARTER/LOW-COST CARRIER TERMINAL: This option reflects an emerging trend in terminal planning where terminals are organized by product type rather than by sector.

ACCESSIBILITY

The Airport Authority is a world leader in creating accessible air terminal facilities. This commitment to accessibility recognizes the importance of meaningful access, regardless of age or ability, as a fundamental aspect of good customer service. Along with a facility design policy that utilizes the highest applicable building code requirements for access for people with disabilities, the Airport Authority retains an independent access consultant to review all new construction and retail projects. These rigorous standards for providing quality access for all would be reflected in any new terminal facility.

PEOPLE MOVERS

As YVR expands, so do walking distances for passengers. Public input shows that minimizing walking distances within terminals is a priority. To continue to provide a high level of service, the Airport Authority recognizes that some form of people mover (shuttles, buses or Skytrain-type technologies) will be required to facilitate movement within the terminals and to respond to the needs of the changing demographics of travellers.

Most types of people movers can be integrated into a terminal complex, although some may be more difficult to incorporate than others. Future terminal expansion and renovation projects will consider walking distances and consider the appropriate people mover technologies to minimize them.

SOUTH AIRPORT

SOUTH TERMINAL BUILDING (STB)

As long as there is demand from passengers and air carriers serving small regional destinations in B.C., the STB will continue to operate. It is not anticipated that significant STB expansion will be required, and the terminal reserve set out in the 1995 Master Plan should be adequate to 2027. Should the Airport Authority pursue a South Parallel Runway option, the existing South Terminal Building would be impacted.

FLOATPLANE TERMINAL

In the middle arm of the Fraser River, the Airport Authority's common-use floatplane dock is operated by a third party. Harbour Air also has its own passenger terminal and dock on the river. Assuming the floatplane terminal continues to operate on a common-use basis, sufficient space will need to be set aside for adjacent vehicle parking and terminal facilities. There may be an opportunity to combine the floatplane terminal and parking facilities within the STB, especially if floatplane passengers are required to undergo pre-board screening.

TERMINAL FACILITIES AT TEMPLETON STATION

During stage two consultations the possibility of locating select terminal facilities, such as passenger and baggage check-ins, at Templeton Station was identified. Under this system, passengers could choose to check themselves and their baggage in before riding the Canada Line to the main terminal for pre-board screening. This would help address the significant public demand for additional curbside pick-up and drop-off space, reduce emissions by shortening vehicle trips, relieve congestion at DTB and ITB curbs and parking facilities and maximize the Airport Authority's investment in the Canada Line. The Airport Authority believes this option offers numerous benefits and discussed it with stakeholders during stage three of the 20-Year Master Plan consultation process.

STAKEHOLDER INPUT AND FEEDBACK

During the consultation process, feedback on the various terminal options was solicited from air carriers, government agencies, passengers and the general public.

The public primarily favored the South East and North East terminal options and also supported the Western Y terminal options. The separated Western Satellite Terminal option was least favored.

Air carrier business partners were primarily interested in operational efficiency and minimizing capital costs and disruptions during construction. Carriers also indicated a preference for consolidated operations wherever possible.

The need for additional passenger pick-up and drop-off curb space at the DTB and ITB was a recurring theme during consultation. This challenge will likely persist until YVR's terminals are expanded, although locating terminal facilities at Templeton Station may offer some interim relief.

EVALUATION AND RECOMMENDATIONS

The Airport Authority evaluated the terminal options using the sustainability matrix. The West Satellite options were penalized because they were difficult to build incrementally, did not provide additional curb space and received negative public response. While the Western Y options performed strongly during analysis, their construction complexity and lack of curb space worked against their selection.

The Transborder South East option performed more strongly than western expansion options during evaluation, partly because of its location adjacent to the South Runway, which is used for transborder flights. This terminal option would require relocation of cargo operations on Miller Road, and Canada Line access would not be as direct or convenient as some other options.

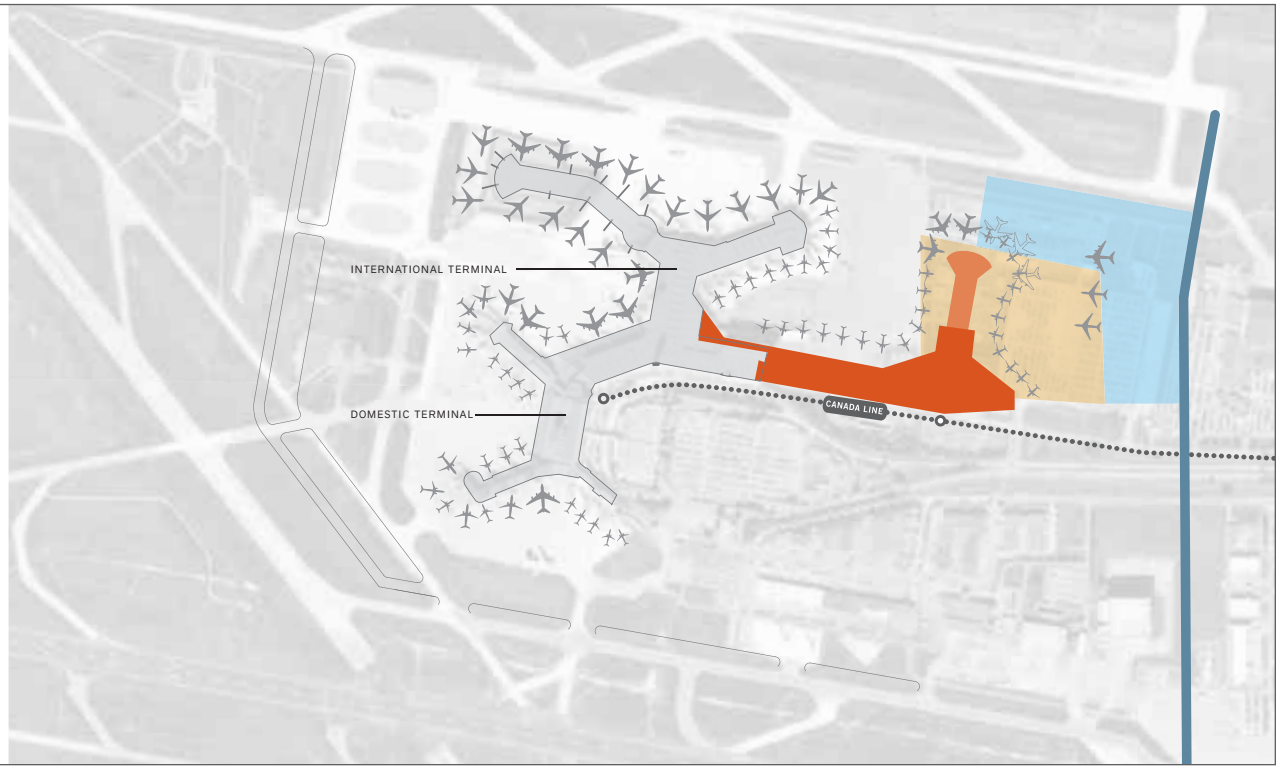
The North East terminal options rely on the construction of the North-South Taxiway to provide an acceptable taxiing distance to the South Runway. Benefits of these options include ease of construction, short delivery times and the opportunity for incremental development. All reduce risk and financial exposure and provide adequate curb space and good access to Canada Line. Order of magnitude costs for the North East terminal options range from $1.24 billion and $1.34 billion.

To meet YVR's forecast terminal needs, the Airport Authority recommends:

1. Selecting the North East location for the next phase of terminal expansion, maintaining the flexibility to service the international, transborder and/or airline alliance sectors.
2. Reserving land to the south east in the event that the passenger growth rate is high, or that terminal expansion to the south east is required for a discount/low-cost carrier terminal, or to accommodate special requirements associated with the 2010 Winter Olympics.
3. Considering placing select terminal facilities at Templeton Station and allocating land for this purpose.
4. Maintaining the South Terminal Building (STB) as long as it is required by air carriers and passengers, and protecting sufficient land to accommodate STB growth or address impacts of the proposed South Parallel Runway.
5. Protecting adequate land, including vehicle parking, for a floatplane terminal. Should implementation of the South Parallel Runway option mean a new STB is required, the Airport Authority should consider the feasibility of co-locating a floatplane terminal with a new STB.

Lands allocated or reserved for current or future terminal use are indicated in red on the 2027 Airport Land Use Plan on page 50.

NORTH EAST TERMINAL PHASE 1 & 2



- North East Terminal Phase 1
- North East Terminal Phase 2
- Apron Expansion Phase 1
- Apron Expansion Phase 2
- North-South Taxiway

7. Ground Access and Parking

Passengers, cargo carriers and employees must be able to get to and from the airport easily and conveniently. The cost, time, certainty and reliability of ground access can significantly affect a passenger's or shipper's choice of airport.

YVR's ground transportation system is made up of infrastructure (bridges, roads and vehicle parking and storage facilities), vehicles (cars, buses, trucks and bicycles) and users (airport-related and non-airport related).

YVR GROUND TRANSPORTATION SYSTEM

Planning the future of YVR's ground transportation system is challenging, since many routes are shared by airport-related users such as passengers, employees, cargo vehicles and airport visitors as well as non-airport-related users such as commuters. For example, roughly two-thirds of the vehicles using the Arthur Laing Bridge (the main link to Vancouver) are not airport-related. Furthermore, different governments or authorities have jurisdiction over different bridges and road systems.

An estimated 20.2 million airport-related vehicle trips were made in 2005. Forecasts indicate that, even with a projected 15% of passengers and 18% of employees using the Canada Line, the number of airport-related vehicle trips will grow to 25.9 million in 2017 and 30.6 million in 2027.

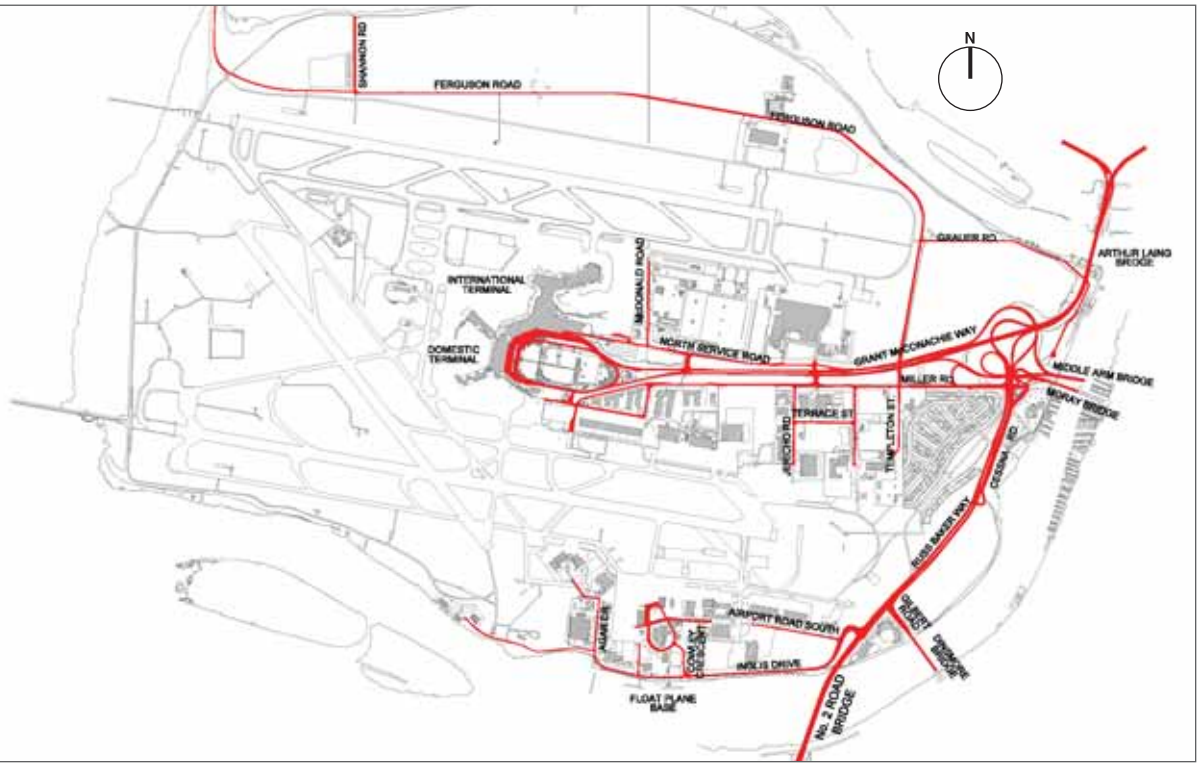
Detailed analysis shows the existing bridge infrastructure is adequate to serve airport-related demand to 2027 but this will displace non-airport-related traffic. Even with the implementation of the Canada Line, the Airport Authority will need to introduce measures to ensure easy access to the airport for passengers, businesses and employees.

PLANNING APPROACH

In developing and evaluating ground transportation solutions, the Airport Authority's objectives were to ensure a range of available access choices, to move people and goods safely and effectively, to ensure integration with the transportation plans of partner agencies and governments, to minimize environmental impacts (such as vehicle emissions) and to remain flexible to respond to changing demand over the planning horizon.

The Airport Authority's multi-agency planning approach included developing a transportation demand model for 2027 and integrating it into the regional transportation demand model, developing parking demand forecasts, conducting workshops with the cities of Vancouver and Richmond, the Greater Vancouver Transportation Authority and the Government of B.C. and consulting extensively with business partners, stakeholders and the general public.

GROUND TRANSPORTATION SYSTEM,
ACCESS TO AND FROM SEA ISLAND



OPTIONS FOR CONSIDERATION

The Airport Authority developed 10 ground access options for consultation with government agencies, stakeholders and the general public. Broadly speaking, the options fall into two groups – parking options and ground access. Ground access options are further divided into those that maximize existing capacity and those that add new capacity.

PARKING OPTIONS

1. Continue to provide parking for passengers and employees on Sea Island, with possible new long-term public and employee parking near Templeton Station.
2. Provide some public and employee parking off Sea Island (in Richmond and Vancouver), and bring passengers and employees to YVR using the Canada Line.

GROUND ACCESS OPTIONS

ENHANCING EXISTING ROUTES

3. Dedicate a portion of existing routes and lanes to airport traffic only, or implement tolls for commuter traffic on routes such as the Arthur Laing Bridge.
4. Enhance the capacity of existing routes through improvements, such as building an overpass at the Templeton/Grant McConachie Way intersection, improving merge lanes at the south end of the Arthur Laing Bridge, or building a traffic bypass on SW Marine Drive.
5. Implement one-way systems, such as designating the Arthur Laing Bridge a southbound route and the Oak Street Bridge a northbound route exclusively.

ADDING NEW CAPACITY

6. Build a four-lane Templeton-Arbutus connector from the north end of Templeton Street on Sea Island to West Boulevard in Vancouver.
7. Create a Templeton-Alderbridge connector by extending Templeton Street south and twinning the Dinsmore Bridge to connect to Alderbridge and No. 3 Road.
8. Twin the Arthur Laing Bridge and dedicate the additional lanes exclusively to airport use.
9. Improve access between YVR and Highway 99 by replacing at-grade intersections with overpasses and replacing the existing Middle Arm Swing Bridge.

DEMAND MANAGEMENT

10. Maximize efficient use of existing routes and bridges with a combination of economic measures and traffic flow strategies. It should be noted that demand management alone will not be sufficient to satisfy traffic projections to 2027.

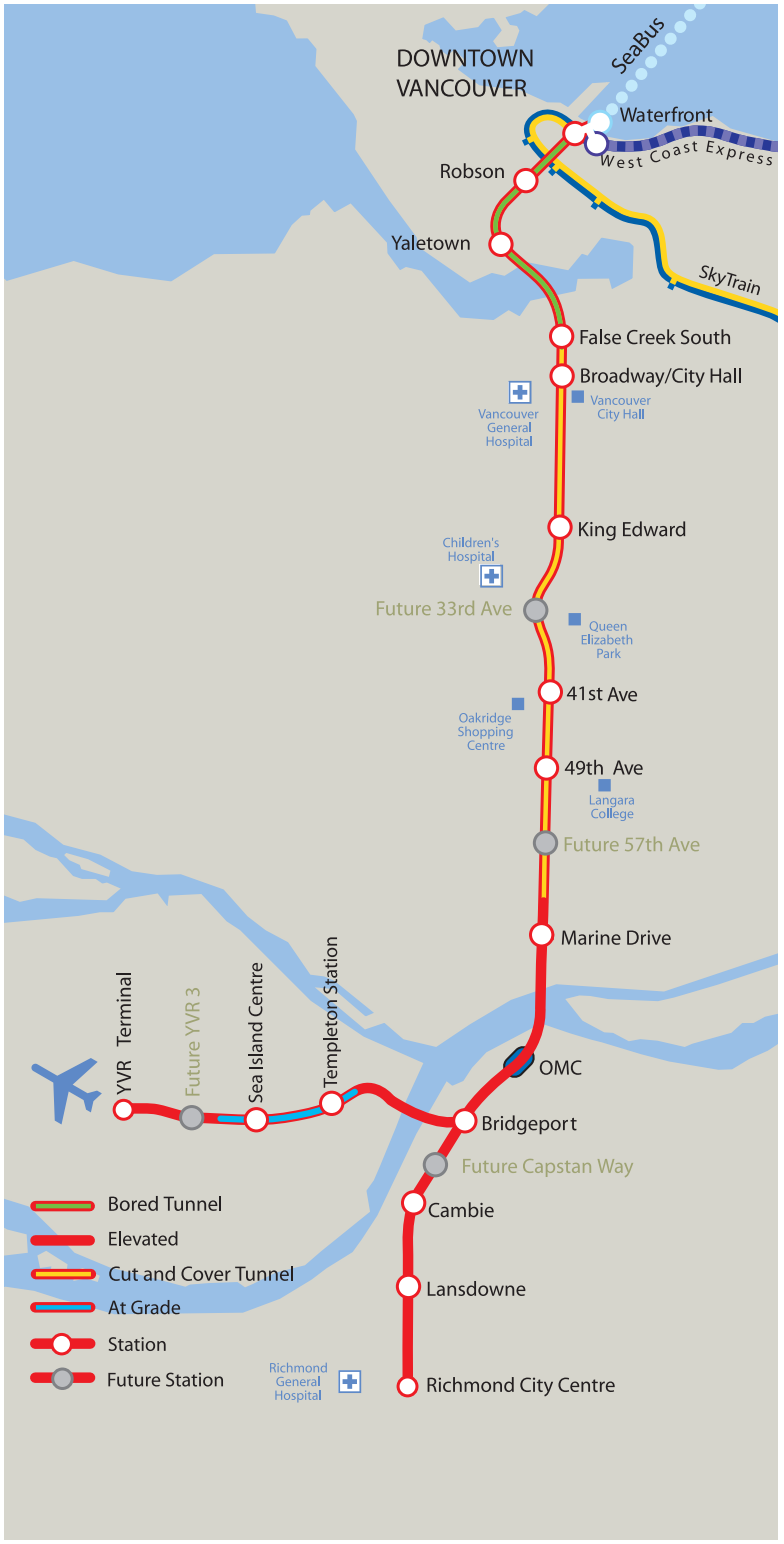
STAKEHOLDER INPUT AND FEEDBACK

Consistent with the feedback received from Airport Authority business partners, members of the public recognized that transportation on and off Sea Island posed a significant challenge in future planning. Business partners need access to a sufficient labour pool and, in the case of the cargo community, good access to Highway 99 is required. For the integrators (courier companies), timely access to downtown Vancouver and business parks is important.

The vast majority of stakeholders believe transportation demand management is a necessity. Many supported the idea of parking at facilities remote from the terminal (at a lower price) and riding the Canada Line to the airport, and some business partners pointed out that remote employee parking is common at other large airports. The City of Vancouver reiterated its policy that no new arterial road capacity into the city be added.

Most respondents supported building new roads and bridges, although they opposed some options, including the Templeton-Arbutus and Templeton-Alderbridge connectors. While dedicated airport access lanes received some support, some stakeholders had reservations.

Feedback from Lower Mainland residents and YVR passengers indicated substantial support for the Canada Line rapid transit link between the airport, downtown Vancouver and Richmond. Many also suggested encouraging alternative modes of transportation, such as adding bike lanes for airport access routes, particularly for airport employees.


DOWNTOWN VANCOUVER
SeaBus
Waterfront
West Coast Express
Robson
Yaletown
SkyTrain
False Creek South
Broadway/City Hall
Vancouver General Hospital
Vancouver City Hall
King Edward
Children's Hospital
Future 33rd Ave
Queen Elizabeth Park
41st Ave
Oakridge Shopping Centre
49th Ave
Langara College
Future 57th Ave
Marine Drive
YVR Terminal
Future YVR 3
Sea Island Centre
Templeton Station
OMC
Bridgeport
Future Capstan Way
Cambie
Lansdowne
Richmond City Centre
Richmond General Hospital
Bored Tunnel
Elevated
Cut and Cover Tunnel
At Grade
Station
Future Station

EVALUATION AND RECOMMENDATIONS

In the sustainability matrix evaluation, options that utilized existing infrastructure performed better than those that added new capacity. Of the proposed new capacity options, an improved corridor between YVR and Highway 99 performed best.

The Airport Authority recommends:

- Pursuing a comprehensive demand management program which maximizes Canada Line rapid tranist use, considers toll or dedicated access lanes and relocates some airport parking off of Sea Island;
- Working with partner agencies and governments to ensure priority for airport traffic as non-airport demands for bridge capacity intensify;
- Implementing a dedicated airport access lane northbound on Russ Baker Way;
- Not pursuing an extension of Templeton Street south to the Dinsmore Bridge;
- Protecting the Middle Arm Bridge access (Sea Island Connector/Moray Channel Bridge) from encroachment by non-airport traffic, working with government partners to replace the Moray Channel Swing Bridge and improving access to Highway 99;
- Offering an array of public parking products and accommodating the requirements of the car rental industry on Sea Island;
- Adding capacity to and improving Sea Island road system intersections;
- Reviewing commercial ground transportation policies to reduce unnecessary shuttling over bridges;
- Ensuring that the business case for any non-airport-related commercial development on Sea Island considers the impact of incremental vehicle traffic on bridge capacity.

The above recommendations are contingent on the Canada Line's actual impact on the demand for ground access to YVR, which will be closely monitored.

Lands allocated to YVR's ground transportation system are indicated in grey on the 2027 Airport Land Use Plan on page 50.

8. Cargo

Although YVR is primarily a passenger facility, cargo is a major business at the airport. Most air cargo facilities at YVR are located in an area known as Cargo Village on Miller Road. Other cargo facilities are located in the Jericho Road subdivision and Airport North.

Cargo processed at YVR is carried in the belly of passenger aircraft (belly cargo), by all-cargo aircraft (freighters), or by companies such as UPS, FedEx and Purolator, known as integrators because their operations include integrated "door-to-door" shipping services.

In 2007, 226,233 tonnes of cargo were loaded and unloaded from aircraft at YVR. By 2027, the annual projected volume of cargo passing through YVR is 500,000 tonnes. The volume of cargo coming from international markets is forecast to increase significantly over the planning period, as is the percentage of cargo carried by freighters.

Due to the intermodal nature of cargo, significant volumes of cargo processed at YVR facilities arrive and depart by truck, and are therefore not factored into air cargo statistics. This cargo does affect the planning process and has been considered on the 2027 Airport Land Use Plan (under Airside Commercial).

A considerable amount of YVR land is devoted to processing relatively small volumes of cargo. Over the planning period, the Airport Authority will work with its business partners to increase the productivity of cargo facilities.

In planning the future of cargo processing at YVR, consideration must be given to potential mandatory pre-board screening of belly cargo and the possibility that inbound cargo will need to undergo security and health inspections. Furthermore, the implementation of the North-South Taxiway and any future South East terminal expansion will affect future cargo operations at YVR.

PLANNING APPROACH

In evaluating YVR's future cargo needs, the Airport Authority considered the projected land, facility and circulation demands of YVR's cargo operations, identified alternative locations to accommodate projected growth of air cargo facilities and worked to reserve the necessary lands for cargo facility expansion and operations growth.


Purolator
FedEx
FedEx

CARGO OPTIONS

To accommodate projected cargo operations over the 20-year planning horizon, the Airport Authority will need to reserve land for a belly cargo campus with good airside road access to the international passenger aircraft ramp, and an integrator campus with good access to airside as well as the regional highway system. Saving valuable minutes in the delivery of packages is especially important in Vancouver because of the long distances from, and time-zone differences with, the main sorting hubs of the integrators. It will likely be necessary to relocate the existing Cargo Village to make room for terminal expansions and/or related ground access and parking facilities.

Three areas are available for the proposed cargo campuses: the Northlands, the West Infield and the Jericho/Templeton area south of Miller Road. The Northlands offer good highway and airfield access, especially if the North-South Taxiway is built. The eastern end of the Northlands area is within acceptable, industry-standard distance of the international passenger ramp.

Should the Crosswind Runway be decommissioned as part of airside improvements, a substantial parcel of suitable land in the West Infield could be developed, subject to the feasibility of a road access tunnel under the approach to the North Runway. Airside vehicle access to the passenger terminal and airfield access for aircraft would be very good, so the West Infield could be well-suited for a belly cargo campus.

Developing the Jericho/Templeton area would mean relocating the Airport Authority departments that operate out of the Templeton Building and consolidating the land immediately to the north. Highway and airside access is good from this location making this area well-suited to accommodate integrator growth.

The Canadian Air Transport Security Authority (CATSA) is currently developing policies and procedures related to the screening of outbound air cargo. While the integrators will be able to meet the requirements individually, smaller cargo handling companies and freight forwarders may find it too expensive to do so and the Airport Authority may need to examine the feasibility of a centrally located, common-use cargo screening facility.

STAKEHOLDER INPUT AND FEEDBACK

Extensive consultations were undertaken with the principal integrators, freight forwarders and brokers, facility developers, air carriers and government agencies such as Transport Canada, CATSA, and the Canada Border Services Agency (CBSA).

Given the rapidly changing nature of the cargo industry, stakeholders stressed the need for flexibility. Business partners processing belly cargo need facilities located reasonably close to the passenger terminal, preferably no more than 2.5 kilometres away. Integrators require self-contained facilities but also have business partners in Cargo Village.

During public consultation, concerns were raised about the compatibility of cargo facility development adjacent to residential neighborhoods.

EVALUATION AND RECOMMENDATIONS

To meet YVR's projected cargo needs, the Airport Authority recommends:

1. In consultation with cargo business partners, increasing the production efficiency of existing cargo buildings.
2. Approximately 70 hectares of cargo processing lands will be required in 2027, assuming an increase in the efficiency of cargo buildings. Depending on the availability of suitable land, and in consultation with the industry, greater efficiency rates may need to be realized.
3. Reserving approximately 15 hectares of airport Northlands for a new Cargo Village, to be created if existing facilities are displaced by terminal expansion. The new facility should be located within a distance of the passenger aircraft ramp acceptable to the industry. Freighter parking positions would need to be developed adjacent to the new Cargo Village, which should also provide for the development of a centrally located, common-use outbound cargo screening facility.
4. Incremental integrator land requirements, estimated at 55 hectares, should be accommodated in the Jericho Road subdivision (including the site of the existing Templeton Maintenance Building) and in Airport North subject to further discussion with integrator business partners.

Lands allocated for cargo operations at YVR are included in the Airside Commercial allocation, indicated in yellow on the 2027 Airport Land Use Plan on page 50.

9. Airport Support Services

A variety of airport services support safe and efficient aircraft operations at YVR, and the 20-Year Master Plan must allocate sufficient lands to allow for the expansion of these services to meet projected growth in passengers, aircraft and cargo demands.

AIRPORT OPERATIONS CENTRE

Equipped with communications and visual monitoring equipment, YVR's Operations Centre is the nerve centre that coordinates all airport operations. Operations Centre staff constantly monitor the spectrum of airport operations including passenger terminals and baggage systems, airfield status, roads and bridges and assistance calls. The Operations Centre is equipped with a dedicated facility to oversee the response to emergency situations at the airport.

AIR TRAFFIC CONTROL

A number of the recommendations in this document may impact NAV CANADA's air traffic control system and air navigation aid requirements. The detailed design of future facilities must consider control tower sight lines and radar as well as the potential for interference with navigation aids.

AIRCRAFT DE-ICING

As aircraft operations at YVR increase, the airport's de-icing capacity will need to be expanded. The required capabilities for de-icing and the environmentally sound containment, recovery and recycling or disposal of de-icing fluids will be designed into the taxiway system and apron layout at appropriate locations.

WILDLIFE CONTROL

Wildlife can pose a significant threat to safe aircraft operations, and YVR's wildlife control systems capabilities will be configured to address wildlife hazards associated with increased aircraft traffic and airside development.

AIRCRAFT RESCUE & FIRE FIGHTING (ARFF)

YVR maintains aircraft rescue and firefighting (ARFF) services to the standards required by Transport Canada for aircraft in all categories, including those for the Airbus A380. Relocation of the Firehall may be required to accommodate new facilities. This will be undertaken without compromise to operational capability.

AIRPORT MAINTENANCE

YVR's Templeton Road maintenance facility is reaching the end of its useful life and will need to be replaced over the 20-year horizon. Further study will be undertaken to identify a suitable location for the various Templeton facility functions.

10. Commercial Operations

Commercial operations at YVR fall under two categories: airside (commercial operations with direct access to airside system) and groundside (commercial operations without direct access to the airside system). This chapter provides the Airport Authority's recommendations for accommodating commercial operations to 2027.

AIRSIDE COMMERCIAL

Over the last twenty years, the Airport Authority has leased an average of 1.6 hectares of airside commercial land per year, including facilities for cargo processing. Excluding cargo, average leased land has been 0.5 hectares per year. YVR has sufficient airside land to accommodate the likely demand from non-air cargo airside commercial uses such as aircraft maintenance and Fixed Base Operators over the planning period.


AKE 20170MU
AKE24444MU
AKE24198MU
AKE32450 BA
BRITISH AIRWAYS WORLD CARGO
AKE 34921 BA
AKE24405MU
AKE 33234 BA
AKE32695 BA
AKE 33753 BA
AKE 34407 BA
CHINA EASTERN

GROUNDSIDE COMMERCIAL

Groundside commercial land can be sub-divided into airport-related uses and non-airport related uses. The average amount of groundside commercial land leased over the last twenty years has been 0.7 hectares per year, the vast majority of which has been for aviation-related purposes.

FLIGHT KITCHENS

Two companies – Cara Operations and CLS Catering Services – provide flight kitchen services at YVR. Combined, their facilities occupy 67.1 hectares in Airport Centre on Miller Road. Given the airline industry trend toward limiting complimentary food services, the number of airline meals required has decreased. Even with forecasted growth in longer-haul flights, there is sufficient unused capacity in the current flight kitchen facilities to meet demand over the planning horizon.

NON-AVIATION-RELATED COMMERCIAL

Historically, very little airport land has been used for non-aviation related development. However, local commercial real estate trends suggest that demand for suburban office and industrial space will remain strong, and the Canada Line rapid transit enhances the accessibility of Sea Island, which may open up new commercial development possibilities.

As part of the master planning process, the Airport Authority examined regional commercial and industrial real estate trends, assessed the potential implications of the Canada Line, non-aviation-related commercial practices at other airports, and, at a high level, reviewed the financial implications of development. Subject to meeting the needs of aviation-related uses, it is recommended that the Airport Authority pursue value-added, non-aviation related commercial developments that are compatible with airport operations, consistent with regional and municipal plans and that do not generate a significant amount of additional non-airport related traffic.

Lands allocated as Airside Commercial are indicated in yellow and lands allocated as Groundside Commercial are indicated in brown in the 2027 Airport Land Use Plan on page 50.


CLS
CATERING SERVICES
SKY Chefs

11. Utilities

While not top-of-mind for most travellers, utilities such as electricity, heating, water, sanitation, telephones and information technology, dykes, storm water drainage and fuel services are vital to the safe, effective operation of YVR.

The master planning process sought to ensure continuity of service by estimating future demand for the various utilities, evaluating system capacities and identifying alternatives as necessary. A demand-capacity analysis was prepared for each utility by Airport Authority staff, consultants and suppliers in a series of workshops that identified demand, deficiencies and proposed solutions. Detailed plans for these services have been developed to ensure that all systems have the required capacity to meet forecast demands.

RESOURCE EFFICIENCY PROGRAM

The resource efficiency program seeks to reduce overall energy consumption at the airport. Although the terminal buildings expanded in area by 44% between 1997 and 2003, total energy consumption increased by only 6% over the same period. The Airport Authority's Energy Reduction Team is a cross-departmental committee whose mandate is to identify and implement energy-reduction initiatives through energy-efficient work activities, purchasing choices and the design of future facilities.

UTILITY SYSTEM CORRIDORS

Major utility corridors have been established on the 2027 Airport Land Use Plan to ensure that right-of-ways are protected for future expansion.

AVIATION FUEL SUPPLY AND STORAGE OPTIONS

Fuel for aircraft at YVR is provided by Vancouver Airport Fuel Facilities Corporation (VAFFC), a consortium of airline companies. By 2010, daily maximum aviation fuel consumption is forecast to exceed the daily capacity of the airport's fuel delivery system and Sea Island's existing fuel storage capacity will not be able to ensure the recommended four-day operational reserve.

The Airport Authority concurs with VAFFC's proposal that YVR's daily fuel supply capacity be doubled by 2017 and tripled by 2027, and that VAFFC's controlled storage capacity be increased to accommodate the corresponding four-day operational reserves.

VAFFC has been considering the options for increasing the supply of fuel to the airport. A list of possible options was developed for review and three options have been retained for further consideration. They are:

— Increasing pipeline capacity by replacing or twinning the existing pipeline;
— Delivering aviation fuel directly to Sea Island by ocean tanker or barge;
— Identifying a location on the main arm of the Fraser River for delivery by tanker or barge to a new on-site VAFFC tank facility with connecting VAFFC pipeline system to YVR.

The Airport Authority will continue to work with VAFFC to select a sustainable fuel-supply option that meets the needs of the airport and surrounding communities.

12. Recreational Areas

While Sea Island is home to YVR, it is also an area of recreational interest for local community residents, airport employees, airplane spotters, picnickers and wildlife enthusiasts. The Airport Authority will continue to work with the City of Richmond and local communities to ensure that, whenever possible, amenities such as bicycle paths, playing fields and public washrooms are provided to enhance the public's enjoyment of Sea Island.

Lands allocated for recreational areas are indicated in green on the 2027 Airport Land Use Plan on page 50.

13. Regional Airport System

In addition to YVR, five other airports operate in B.C.'s Lower Mainland: Abbotsford International Airport, Boundary Bay Airport, Chilliwack Municipal Airport, Langley Regional Airport and Pitt Meadows Regional Airport. Each airport is operated by an independent body with a specific mandate and charter to cater to community needs.

While no formal structure unites the Lower Mainland airports into a defined airport system, it is widely recognized that growing populations and increasing aviation demands require a regional approach to airport planning. This view was frequently expressed at the Airport Authority's long-term planning forums and at various consultation events.

The Airport Authority has consulted with other airport operators in the Lower Mainland to work on consistency of plans for the future of the region.

To create the most effective and efficient airport system, the Airport Authority recommends establishing an ongoing mechanism for coordinating Lower Mainland airport activities and encouraging dialogue at both the operational and senior management/ governance levels. The Airport Authority, perhaps in conjunction with the provincial government and Transport Canada, is prepared to play a key role in this initiative.

AIRPORTS IN LOWER MAINLAND

14. 2027 Airport Land Use Plan and Gateway Development Projects

2027 AIRPORT LAND USE PLAN

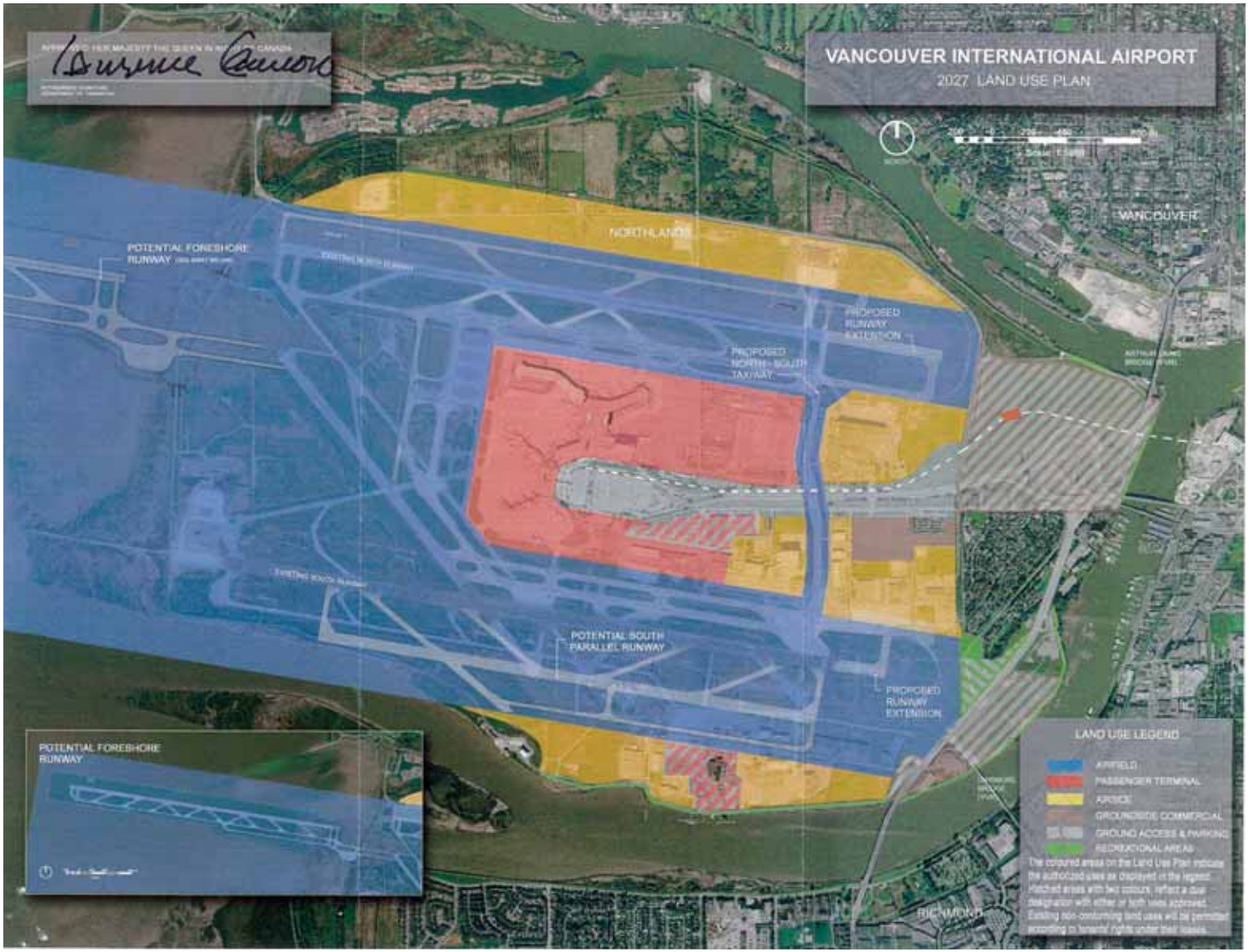
The Airport Authority must submit an Airport Land Use Plan to the federal Minister of Transport for approval. The 2027 Airport Land Use Plan protects existing operations areas and allocates sufficient land for the potential upgrades or expansions that may be required during the 20-year planning horizon.

To reflect changes to the current Airport Land Use Plan, necessitated by the gateway development recommendations outlined in this chapter, the Airport Authority has developed a 2027 Airport Land Use Plan.

2027 AIRPORT LAND USE PLAN FOR YVR

Key land use areas allocated on the plan include:

- AIRSIDE: includes YVR's runways and the lands required for airside operations, including taxiways, airside roads and navigation aids.
- PASSENGER TERMINAL: includes land required for terminal expansion in both the medium and long terms.
- GROUND ACCESS & PARKING: includes bridges, roads, the Canada Line, public and employee parking, commercial transportation and car rental facilities.
- AIRSIDE COMMERCIAL: includes those commercial lands that have direct access to the airside system (such as air cargo facilities, aircraft maintenance facilities, commercial and business aviation operators and commercial helicopter and floatplane services) and Airport Authority operational needs.
- GROUNDSIDE COMMERCIAL: includes designated commercial land uses without airside system access (such as, flight kitchens, car rental service facilities, fuel storage facilities and other non-airport related, but airport-compatible commercial development activities).



AIRFIELD

PASSENGER TERMINAL

AIRSIDE

GROUNDSIDE COMMERCIAL

GROUND ACCESS & PARKING

RECREATIONAL AREA

— INFIELD OPERATIONAL SUPPORT: refers to the lands in the infield that may in future be required for various "back-of-house" functions

— RECREATIONAL AREA: designates lands for recreational uses. The 2027 Airport Land Use Plan shows the recreational area south of Burkeville is also designated for possible ground access and transportation uses in the future.

— SEA ISLAND CONSERVATION AREA: This land is managed by Environment Canada, and is not addressed by this 20-Year Master Plan.

A conceptual drawing showing how key Airport Authority recommendations fit into the proposed 2027 Airport Land Use Plan is shown above.

GATEWAY DEVELOPMENT AND TIMING

As outlined in this plan, a number of major development projects are needed to support YVR's growth over the 20-year planning period. Brief descriptions and timing estimates of the Airport Authority's major recommendations are provided below.

ESTIMATED TIMELINE FOR GATEWAY DEVELOPMENT REQUIREMENTS

The timing for all recommendations is based on a medium-growth scenario. Actual timing will be subject to actual growth in demand.

GATEWAY DEVELOPMENT

2007	LINK BUILDING AND RUNWAY END SAFETY AREA (RESA) REGULATION: Completion of the current Link Building project and expected regulation changes by Transport Canada to extend runway end safety areas to the North and South runways.
2009	INTERNATIONAL TERMINAL BUILDING EXPANSION: Completion of current expansion project providing an additional nine aircraft gates.
2009	CANADA LINE: Completion of rapid transit connection between the airport, downtown Vancouver and Richmond.
2010	AVIATION FUEL SUPPLY: Additional supply and storage capacity required to meet growing demand and restore operational reserve to the required four-day supply.
2010	SEA ISLAND ROAD SYSTEM: Reorganize the Sea Island road system to accommodate the Canada Line and proposed North-South Taxiway.
2010 – Ongoing	ARTHUR LAING BRIDGE CONGESTION RELIEF (GROUND ACCESS, VANCOUVER): Once the Canada Line is in service, the Airport Authority's transportation demand management program will build progressively to reduce the vehicle demand on Arthur Laing Bridge and other Sea Island bridges. A dedicated "YVR Access" lane could be introduced.
2014	NORTH-SOUTH TAXIWAY: This taxiway is required to enhance aircraft flow on the airfield, increase efficiency and reduce costs and aircraft emissions.
2015	NORTH EAST TERMINAL – PHASE I: Phase I of the proposed North East Terminal will include a new customs hall, provide 11 additional aircraft gates, a Canada Line station and an additional parkade if required.
2015 – 2020	AIRSIDE ENHANCEMENT PROGRAM: Once the North-South Taxiway is complete and both parallel runways are used for simultaneous takeoffs and landings, airside capacity will increase by approximately 12% and allow the Crosswind Runway to be closed.
2023	NORTH EAST TERMINAL – PHASE II: An additional 14 gates, providing a total of 87 jet gates at YVR, is expected to be required to meet demand.
2025	NEW RUNWAY: Medium-growth forecasts indicate that YVR may require an additional runway around 2025. The requirement will depend upon actual passenger growth and the size of aircraft in use. Also, it is assumed that non-essential air traffic will be moved to other airports to preserve YVR capacity. The runway options will be protected by implementing aeronautical zoning in the appropriate areas with the Minister of Transport's approval of the 2027 Airport Land Use Plan.
2026	MIDDLE ARM (MORAY BRIDGE) CROSSING (GROUND ACCESS – RICHMOND): Increasing congestion on this YVR-Highway 99 link will have serious implications for commercial traffic. Along with transportation demand management, access between YVR and Highway 99 will need to be improved.

2007-2027 - AVIATION AND NON-AVIATION RELATED LAND DEVELOPMENT

In addition to the specific requirements mentioned above, a number of land development issues need to be considered.

Grauer Lands development will be driven by the construction of Templeton Station and the associated facilities and services, which could include Airport Authority offices as well as some terminal and parking facilities.

The Jericho/Templeton area, located in the vicinity of Jericho Road (Airport Centre), has been designated for airside commercial development should YVR's Templeton maintenance facility and offices be relocated. Expansion of the electrical power sub-station complex located in this area is expected to require some additional land during the planning period.

The Northlands area has been designated as airside commercial with an emphasis on cargo facilities, particularly at the eastern end to accommodate a new cargo facilities complex, once existing leases in Cargo Village expire.

Airport South lands have been designated to recognize the need to protect for the South Parallel Runway option together with an expanded terminal reserve. To assist implementation, tenant leasing policies should be introduced early in the planning period recognizing that the closure of the Crosswind Runway will open up additional lands west of the Airport South terminal reserve for commercial development.

ENVIRONMENTAL IMPACT STUDIES

Under Airport Authority policy, all major construction projects undergo an environmental review prior to approval. Some projects may require review under the Canadian Environmental Assessment Act, particularly those projects that involve work in the Fraser River or on Sturgeon Bank, where federal Fisheries Act authorizations will also be required.

As of the publishing of this document, detailed environmental impact assessment studies have not been completed for the recommended projects, as they are still in the conceptual planning stage. In several cases, multiple options have been proposed to fill a single need.

The Airport Authority recognizes the need for, and commits to, conducting detailed environmental impact assessment studies for all recommendations outlined in the 20-Year Master Plan. For some larger projects proposed in this document, such as the new runway, environmental studies will involve separate consultation processes that may take years to complete. The necessary studies will begin well before projects are implemented.

We encourage you to read this document and visit our website. If you have any questions or would like further information, please use the contact information below.

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