YVR 2037
MASTER PLAN

VANCOUVER INTERNATIONAL AIRPORT

Beyond, Every Day.

As a community organization, consultation is fundamental to the Airport Authority's ability to connect with our community and to plan effectively in an open manner.

For the YVR 2037 Master Plan, we ensured the planning process included comprehensive multi-phase consultation to gather information, collect feedback and facilitate meaningful dialogue.

We would like to thank our community: our neighbours, employees, travellers, business partners and all our valued stakeholders who helped shape the future of our airport.

A special thank you to the people featured prominently on the cover and key areas of this plan:

- **David Grigg**
- **Hiroshi Takahashi**
- **Paula Kolisnek**
- **Priya Singh**
- **Stephanie Thorpe**
- **Dol Imnamkhao**
- **Iain McCarthy**
- **Peta Wolmarans**
- **Rob MacKay-Dunn**
- **Zeljko Travica**

Consultation and planning for the YVR 2037 Master Plan and Land Use Plan took place from 2015 to 2017.

YVR 2037 was submitted to the Minister of Transport, Government of Canada, in December 2017.

The Honourable Marc Garneau, Minister of Transport, approved YVR 2037 in May 2018.

All facts, figures and information contained herein was current as of December 2017.


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to introduce new amenities
visitors at our airport. Here is
on, as well as our existing amenit


YVR


Bob McArthur

ON BEHALF OF VANCOUVER AIRPORT AUTHORITY, IT IS MY PLEASURE TO PRESENT OUR NEW MASTER PLAN—YVR 2037—A COMPREHENSIVE, 20-YEAR ROADMAP FOR VANCOUVER INTERNATIONAL AIRPORT (YVR) BUILT WITH COMMUNITY AND PARTNER INPUT AT EVERY STAGE.

YVR 2037 is a key milestone in a long history of successful planning, a history that spans from designing the North Runway in the 1940s, five decades ahead of its actual construction, to establishing our vision to be a world class gateway through the North Star—Vancouver Airport Authority's first Strategic Plan.

This vision helped turn YVR into Canada's second busiest airport. In 2016, YVR welcomed a record 22.3 million passengers and to meet our ambitious goal of serving 25 million passengers by 2020. We see the potential for 35 million passengers by 2037 and we need to plan for this future growth, ensuring that we anticipate challenges and opportunities, while meeting the expectations of our passengers, communities and stakeholders.

WE GREATLY **APPRECIATE THE SUPPORT OF OUR COMMUNITIES AND PARTNERS**, WHOSE EFFORTS HAVE HELPED MAKE THIS MASTER PLAN A SUCCESS.

YVR 2037 does just this, addressing our future land use and the resources needed to accommodate our ambitious Capital Plan, which will include 75 major projects totaling $9.1 billion over the next 20 years. These projects range from a new district energy system and utilities building, which will consolidate YVR's energy needs under one roof and offer a range of sustainability features, to an incremental expansion of our terminal, a new parkade, improved ground access and an additional plane-spotting platform.

As a major transportation hub, YVR must weigh many factors such as expected growth, capital requirements and operational issues into its planning. To do this, we evaluated many options through a variety of lenses—from economic effects to environmental considerations. We also engaged in many conversations with our community, through our website and in-person at open houses, workshops and at pop-up booths in public markets. We received a lot of valuable feedback and have started incorporating this into our designs for the new terminal and airport lands. From bringing the outside into our terminal, to nap pods and more connections for walking and cycling—our community and partners have helped contribute to our future vision—and you'll be able to see some of these ideas brought to life in the next few years.

We greatly appreciate the support of all the individuals and organizations, whose efforts have helped make this Master Plan a success. As a community based, not-for-profit organization, YVR is committed to developing an airport that serves the best interests of our communities. Although YVR 2037 is a 20 year plan, the work has just begun. I want to thank you for your contribution to this plan and encourage you to stay involved. We will have many more ways for you to continue to shape our airport community in the future. This is just the beginning of our journey together.

Craig Richmond
President & Chief Executive Officer
Vancouver Airport Authority

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YVR OVERVIEW

WE ARE COMMITTED TO BEING A GLOBAL LEADER IN SUSTAINABILITY while creating an airport that British Columbia can be proud of—a premier global gateway, an economic generator, a community contributor and a hub of innovation.

WHO WE ARE

Vancouver International Airport (YVR) is Canada's second busiest airport and the gateway between Asia and the Americas. In 2017, we were recognized as the best airport in North America for a record eighth consecutive year by the Skytrax World Airport Awards, the global benchmark for aviation excellence. In 2016, we received the CAPA Centre for Aviation Award for Excellence for best airport in the world, an accolade that recognized YVR as an airport that has done the most to advance the progress of the aviation industry. YVR plays a significant role in the local, provincial and national economy—creating jobs and driving business activity throughout the region. More than 23,000 people work on Sea Island, making YVR one of the largest employment hubs in British Columbia.

We help facilitate $16.5 billion in total economic output, provide $8.4 billion in total GDP and $1.4 billion in total government revenue across B.C.

In 2017, Musqueam Indian Band and YVR signed the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement, a 30-year agreement based on the four pillars of sustainability—Economic, Social, Environment and Governance. The Agreement recognizes the evolving nature of the relationship between YVR and Musqueam through education, employment, revenue sharing, support of operations and an engagement protocol and provides Musqueam Indian Band with an important role in the long term future of the airport.

WHERE WE ARE

YVR occupies approximately 1,340 hectares of federal property on Sea Island in Richmond—15 kilometres from downtown Vancouver on lands traditionally occupied by Musqueam First Nations.

HOW WE'RE GOVERNED

YVR is managed by Vancouver Airport Authority, a not-for-profit organization. YVR is managed like a private organization and receives no government funding. We are accountable to the region through a Board of Directors appointed from the community whose focus is to ensure that YVR serves the best interests of the public and sets the vision for the future of the airport. All profit generated at the airport is reinvested back into operations, maintenance and future projects.

Vancouver Airport Authority has an 80 year lease with Transport Canada to operate the Vancouver International Airport. Vancouver Airport Authority receives no government funding, rather we pay annual rent as part of our ground lease with the federal government. In 2016, this payment amounted to $50.6 million. Additionally, we provided $16.2 million to the City of Richmond as payment in lieu of taxes.

IN THE PAST FIVE YEARS, **PASSENGER NUMBERS GREW 27% AND CARGO WEIGHT ROSE BY 26%.**

WHERE WE'RE GOING

Between 2013 and 2015, YVR passenger numbers increased, on average, by over one million per year. In 2016, those numbers grew by another two million. By year's end we saw a record setting 22.3 million passengers arrive, depart and connect via 55 airlines to more than 125 destinations worldwide.

With this ongoing rise in passenger numbers and an increase in cargo, YVR will need to manage growth and expansion safely and sustainably, while providing continued economic well-being to the region, support for the community and protection for the environment.

Given our unique geographic location, we are able to benefit from emerging trends in air travel. New technologically-advanced planes can fly further distances which helps strengthen our position as a premier gateway to the world. When we look to the future, we see tremendous opportunity for sustainable growth for YVR, our community and our region.

HOW WE'LL GET THERE

Good planning is at the heart of every decision we make at YVR. In fact, the North Runway was first sketched on a piece of paper 50 years before it was eventually built.

Our new Master Plan will ensure that we're ready to take advantage of opportunities as they arise over the next few decades. The YVR 2037 Master Plan helps us understand the best use for our most valuable asset—land—and is part of YVR's Flight Plan 2037, an overarching strategy to guide our 20-year operational planning at YVR.

The Airport Authority's lease with Transport Canada requires the Land Use Plan (found on page 158) to be updated every 10 years and submitted to the Minister of Transport for approval. We use this as an opportunity to engage with our communities and stakeholders and create a broader plan that will help guide planning for the next 20 years. The plan will be reviewed as necessary to respond to new changes, challenges and opportunities.

This document lays out the key decisions and highlights of the YVR 2037 Master Plan and provides a clear overview of our approach to protecting and strengthening YVR's position as a world class, connecting and sustainable hub for decades to come.


Anchorage
Beijing
Shenyang
Seoul
Qingdao
Nagoya
Tokyo (Narita)
Osaka
Tokyo (Haneda)
Zhengzhou
Nanjing
Chengdu
Shanghai
Hangzhou
New Delhi
Xiamen
Taipei
Kunming
Guangzhou
Hong Kong
Manila
Lihue
Honolulu
Kahului
Kona
Brisbane
Sydney
Melbourne
Auckland


Reykjavik
Yellowknife
Whitehorse
Fort McMurray
Edmonton
Saskatoon
VANCOUVER
YVR
Calgary
Regina
Winnipeg
Seattle
Portland
Minneapolis
Ottawa
Montreal
Halifax
Toronto
Hamilton
London
Chicago
Detroit
Boston
Newark
New York
Washington
Salt Lake City
Denver
San Francisco
San Jose
Las Vegas
Palm Springs
Los Angeles
Orange County
San Diego
Phoenix
Dallas
Fort Worth
Atlanta
Houston
Orlando
Grand Bahama
San Jose del Cabo
Mazatlan
Veradero
Santa Clara
Puerto Vallarta
Mexico City
Cancun
Manzanillo
Ixtapa/Zihuatanaejo
Huatulco
Montego Bay
Punta Cana
Saint Maarten
Glasgow
Dublin
Manchester
London (Heathrow)
London (Gatwick)
Amsterdam
Frankfurt
Paris
Munich
Zurich
British Columbia
Canada
Fort Nelson
Fort St. John
Dawson Creek
Prince
Rupert
Smithers
Masset
Terrace
Prince
George
Sandspit
Anahim
Lake
Quesnel
Bella Bella/Coola
Williams Lake
Port Hardy
Kamloops
Powell River
Campbell River
Comox
Sechelt
Kelowna
Tofino
Castlegar
Qualicum Beach
Penticton
Cranbrook
Nanaimo
Maple Bay
Trail
Victoria
Gulf Islands

STRATEGIC PLAN

SECTION 01

YVR'S MISSION IS TO CONNECT BRITISH COLUMBIA PROUDLY to the world. Our Strategic Plan identifies the vision, values and supporting objectives as well as the challenges to overcome and the opportunities that will help us succeed.

YVR TODAY...

YVR is located in one of the world's most spectacular destinations and is geographically positioned to provide easy connections between Asia and the Americas. Today, we welcome more than 24.2 million passengers a year, create jobs for 24,000 people and contribute more than $8.4 billion to the nation's GDP. At the same time, we are committed to minimizing our environmental impact by reducing greenhouse gas emissions, water consumption and waste.

... AND TOMORROW

We see significant opportunities for sustainable growth in the future and have set our goals accordingly. Our Strategic Plan sets an aggressive goal to bring 25 million passengers a year through YVR by 2020. In addition to advancing clean air aviation policies, we will continue to deliver award-winning customer experiences and bring even greater economic and social benefit to the people of British Columbia.

These goals are not ours alone—we've listened to the community of which we are a vital member. Our community wants an airport that is safe and secure—one that is a source of pride because of the connectivity it provides, the economic benefits it brings and the positive impression and distinct sense of place it creates for visitors and returning residents. Our community expects us to be a well-governed and sustainable organization that demonstrates leadership in financial, environmental, social and governance responsibility.

MISSION

Connecting British Columbia proudly to the world.

VISION

A world class sustainable gateway airport between Asia and the Americas.

VALUES

Safety, teamwork, accountability and innovation.

STRATEGY

As a world class and sustainable airport, YVR will grow to 25 million passengers in 2020 by creating a connecting hub between Asia and the Americas, advancing air policies, delivering remarkable customer experiences and bringing economic and social benefit to the people of British Columbia.

SUPPORTING OBJECTIVES

- CREATING A CONNECTION HUB
- DELIVER REMARKABLE CUSTOMER EXPERIENCES
- BE A LEADER IN SUSTAINABILITY
- BUILD OUR OWN EXCEPTIONAL FOUNDATION


AIR CANADA

SETTING THE DIRECTION

Our Strategic Plan provides YVR's direction. It educates and aligns the entire organization to the strategy for growing the business and guides us towards a prosperous and sustainable future. The Strategic Plan defines the mission, vision, values and supporting objectives of the organization and sets out the initiatives by which we will achieve them. The Strategic Plan that sets the foundation for planning principles for YVR 2037 Master Plan outlined a target of serving 25 million passengers per year by 2020. It defines four supporting objectives which underpin our approach: creating a connecting hub, delivering remarkable customer experiences, being a leader in sustainability and building on our exceptional foundation.

The Strategic Plan is a living document that looks ahead to the next five years. It is intended to evolve over time and keep pace with change. Every three years, we review the strategy to ensure that we are ready to meet new trends, opportunities and challenges as they arise. To ensure accountability, we provide ongoing updates to our board of directors.

STRATEGIC PLAN

Provides the big picture and the fundamental direction.

MASTER PLAN

Looks forward 20 years at the best possible allocation of YVR's land and the facilities needed to meet demand.

CAPITAL & FINANCIAL PLANS
Flight Plan 2037

Allocates funding and sets out what kind of airport infrastructure we will build and when.

ANNUAL BUSINESS PLANS

Lays out the specific initiatives we're working on to help deliver all our other plans.

ON THE GROUND...

Land is our fundamental resource and a primary consideration. While our future is limitless, there is a finite amount of land available on Sea Island. This reality requires us to keep pace with growth while remaining a leader in sustainability. To fulfill our mission over the course of the next 20 years, we must plan carefully and make informed choices.

The Master Plan builds upon the supporting objectives outlined in the Strategic Plan and provides a long-term framework for the implementation of our strategy. This framework allocates land uses and defines infrastructure requirements over the next 20 years.

The Master Plan guides land use decisions while considering our four pillars of sustainability—Economic, Social, Environment and Governance—at each step of the planning process. It ensures that we meet the needs of our communities, business partners and employees by setting the framework which will enable us to meet forecast demand for air travel by ensuring that the necessary resources are available.

Forecasts of passenger numbers, cargo volumes, runway movements and ground transportation requirements between now and 2037 provide the basis for the identification of infrastructure needs. Decision making about land development and infrastructure alternatives on Sea Island is informed by our supporting objectives. In this way, we are able to ensure that the Master Plan is aligned with YVR's overarching strategy to achieve an exciting future.

... AND AT 30,000 FEET

The Master Plan is aligned with Flight Plan 2037—YVR's newest integrated plan for growth.

Flight Plan 2037 provides an overarching blueprint for the future. It incorporates a Capital Plan, Terminal Plan and Financial Plan and sets out the path for implementation and phasing of the projects identified in the Master Plan.

Flight Plan 2037 identifies the best way to align our long-term capacity needs with our sustainability goals. Developed in consultation with stakeholders and through ongoing discussions with airline partners, it connects growth forecasts to facility capacity. Through Flight Plan 2037, $9.1 billion will be allocated to the development of essential infrastructure such as expanded terminals, new taxiways, a sustainable energy system and upgrades to the roads and bridges which provide access to Sea Island.

WITH A CLEAR STRATEGY, A LONG-TERM PLAN FOR THE LAND ON WHICH YVR IS BUILT AND THE FINANCIAL AND CAPITAL RESOURCES TO PUT OUR PLAN IN MOTION, WE ARE READY TO SERVE THE FUTURE NEEDS OF OUR COMMUNITY.

AIRPORT SUSTAINABILITY CONTEXT

SUSTAINABILITY IS PART OF YVR'S CULTURE and guides every decision we make. Our goal is to grow in a way that brings economic, environmental and social benefits to our community, our province and our country—not only for today, but for many years to come.

SECTION
02

SUSTAINABILITY TODAY

Sustainability is important to us. It is one of four supporting objectives that drives our strategic direction. Making financial, environmental and social choices that optimize environmental outcomes, create socio-economic benefit, spur innovation and enhance stakeholder relationships enable us to build on our success and create lasting value.

Built on four pillars—Economic, Social, Environment and Governance—our approach to sustainability places the safety and security of our passengers, community and employees above all other considerations. These priorities underpin the Master Plan and ensure that the development of infrastructure, the use of land and the policies that govern these activities support the long-term growth and well-being of our airport, our community and our region.

Although we consider all four pillars of sustainability in all decision making, the majority of our technical work in developing the YVR 2037 Master Plan focused on reducing the environmental impact of our land use. As a result, this document provides recommendations reflecting our environmental priorities. Information related to governance and the social and economic impacts of sustainability are available each year in our Annual & Sustainability Report, which can be found on our website at www.yvr.ca.

YVR is committed to ongoing authentic engagement with Musqueam Indian Band. The implementation of the Master Plan and Land Use Plan will be consistent with the obligations in the Musqueam Indian Band—YVR Airport Sustainability & Friendship Agreement.

KEY RECOMMENDATIONS: SUSTAINABILITY

Near-Term

- Perform lighting and building retrofits to reduce energy consumption.
- Explore onsite generation and distribution of alternative energy.
- Increase low emissions vehicle fleet.
- Optimize waste management systems to increase waste diversion rates.
- Continue to monitor and maintain local water quality and air quality conditions.
- Implement a sustainable energy system for heating and cooling of terminal buildings.

Mid-Term

- Explore rainwater capture and greywater use.
- Construct airside and groundside infrastructure that facilitates efficient operations.
- Explore opportunities for habitat enhancement while minimizing wildlife hazards to aviation safety.

In the Future

- Continue environmental measures, support innovative technologies and explore partnerships to reduce greenhouse gas emissions (GHG), water usage and waste.

OUR APPROACH TO SUSTAINABILITY IS BUILT ON THE PILLARS OF ECONOMIC, SOCIAL, ENVIRONMENTAL AND GOVERNANCE.

WHY IT MATTERS

YVR plays a vital role in the region's economic resilience, connecting British Columbia to a world of opportunity. As Canada's second busiest airport, we know how quickly that world moves. To keep pace and remain a premier global gateway, we need to make choices that enable us to grow sustainably while meeting the needs of our community and our environment.

ENVIRONMENTAL STEWARDSHIP

We strive to be a world class airport that values excellence in environmental management. We do this by reducing our impact on Sea Island and the surrounding environment through a variety of methods. These include the management of wildlife to keep birds and planes safe, management of storm water, protection of water quality and management of waste with diverse recycling and organics programs. We recently became the world's first Salmon-Safe certified airport, which speaks to our commitment to transform our land and water management practices.

Impact Reduction

In keeping with YVR's Environmental Management Plan (EMP), the Master Plan looks at the airside system, terminal expansion, ground access and utilities infrastructure with a view to prioritizing the reduction of GHG emissions, waste and potable water consumption and improving ecosystem health on Sea Island.

The Master Plan also looks at ways to minimize emissions from ground transportation by providing passengers, employees and business partners with low impact options that shorten travel times.

Climate Adaptation

Because of its location on Sea Island, YVR is particularly vulnerable to variations in climate, extreme weather events and rising sea levels. The Master Plan considers the impact to infrastructure and identifies areas where additional analysis is required. As an example, we are currently implementing a multi-year program to raise our dyke levels to 4.7 metres geodetic—a new height standard—and we are partners in the regional lower Fraser River flood management strategy. We also plan to develop a Climate Change Adaptation and Risk Management Plan to help us ensure the resiliency of our planning, policies and systems.

FINANCIAL STABILITY

The Airport Authority has no shareholders and reinvests all profits back into airport operations and development. YVR employs more than 24,000 people, generates $8.4 billion in total GDP and adds $16.5 billion in total economic output to the Canadian economy annually.

Revenue Diversification

In 2016, the Airport Authority generated $489.7 million in revenues, with aeronautical revenues (landing and terminal fees) accounting for 26 per cent of that figure, the Airport Improvement Fee (AIF) accounting for 31 per cent and non-aeronautical revenue (which includes concessions, such as duty free and advertising, car parking and terminal and land rents) accounting for 43 per cent. YVR focuses on maximizing non-aeronautical revenue to keep rates and charges competitive so that we can continue attracting new carriers and routes.

Innovation

Innovation is essential to the Airport Authority's ability to be a perceptive airport and has been a key driver in our economic sustainability since we sought to develop solutions for our business in 1996. By finding new and better ways of doing things, we can significantly enhance our efficiency, postpone the need for capital expenditure and unlock new sources of revenue. Our Master Plan identifies areas where innovation and automation can enable us to serve more passengers within our existing footprint, thereby reducing terminal expansion requirements.

We were the first airport to develop common-use self-service technology for passenger check-in, reducing airline space and staffing requirements. This was followed by the development of our BORDERXPRESS™ kiosks, which improve processing times and minimize the queuing space required within customs halls. YVR's Innovative Travel Solutions group designs and develops these kiosks to automate border processes and is the world's largest provider of non-registered, self-service border solutions. Kiosk systems such as Automated Border Control (ABC), Automated Passport Control (APC) and the newly introduced Primary Inspection Kiosks (PIK) reduce queuing and wait time, which increases processing speeds and enhances our capacity.

YVR's self-service border kiosk technology is in use at 39 airport and seaport locations around the world, serving more than 90 million passengers at more than 1,300 kiosks. YVR also recently partnered with Glidepath to develop the world's most accessible, efficient and intuitive self-service bag drop on the market, improving speed and ease of use for travellers. By selling these technologies around the world, we can increase our profitability and reinvest the net proceeds from these global sales in YVR, which ultimately benefits all British Columbians.

IN 2015, BORDERXPRESS™ KIOSKS WERE RECOGNIZED BY THE CAPA CENTRE FOR AVIATION AWARDS AS AIRPORT INNOVATION OF THE YEAR. WE MOST RECENTLY DEVELOPED BORDERXPRESS™ GLOBAL, THE WORLD'S FIRST SELF-SERVICE SOLUTION DESIGNED TO MEET THE IMMIGRATION NEEDS OF ANY GOVERNMENT IN THE WORLD. INNOVATION IS INTEGRAL TO OUR DAY-TO-DAY BUSINESS AND INCREASES THE EFFICIENCY OF PASSENGER PROCESSING, WITH 95 PER CENT OF OUR PASSENGERS USING THESE KIOSKS.


STOP
HV-0791

In 2013, we embarked in a partnership with McArthurGlen to develop a designer outlet centre on Sea Island. This shopping centre is a key tourism destination in our region and provides an amenity for the community and passengers. It is also a key economic driver for the airport, generating an additional source of non-aeronautical revenue that is reinvested back into the airport.

In 2014, we established Vancouver Airport Property Management LLP (VAPM), which owns and operates several multi-tenanted cargo and office facilities on Sea Island. The VAPM team manages these facilities with a focus on developing and expanding cargo business at YVR. Revenues earned from leases are reinvested into operations, maintenance and development of facilities.

SOCIAL ACCOUNTABILITY

Sustainability is about more than just reducing our impact—it is also about enhancing positive relationships with our neighbours. We are committed to engaging the community in the creation of a plan that supports our shared future. This is reflected in the consultative process and community input that helped to shape the Master Plan.

Connectivity

To support tourism and reinforce our role as a gateway to the rest of the province, the Master Plan supports retention of YVR's South Terminal, floatplane operations and our Crosswind Runway—all of which play an important role in connecting passengers and communities across British Columbia.

Accessibility

We want to ensure that everyone who wants to travel is able to do so at YVR. The Master Plan incorporates Universal Access for the terminal and ground transportation so that we can create an airport that welcomes everyone, including people with disabilities, seniors and those requiring mobility assistance. Beyond meeting standards and requirements, YVR is committed to creating world class facilities and programs that exceed expectations for Universal Access provisioning.

Noise Management

Noise management is a key consideration for our community and for us. The Master Plan includes consideration of noise impacts and supports new aviation technologies such as Required Navigation Performance (RNP), which will introduce the potential to reduce environmental and noise impacts even further by improving aircraft efficiency and precision.

YOU TOLD US YOU WANTED **SUSTAINABLE TRAVEL OPTIONS THAT REDUCED CARBON EMISSIONS** AND FOR YVR TO BE A SELF-SUSTAINING AIRPORT WITH A SMALLER ENVIRONMENTAL FOOTPRINT.

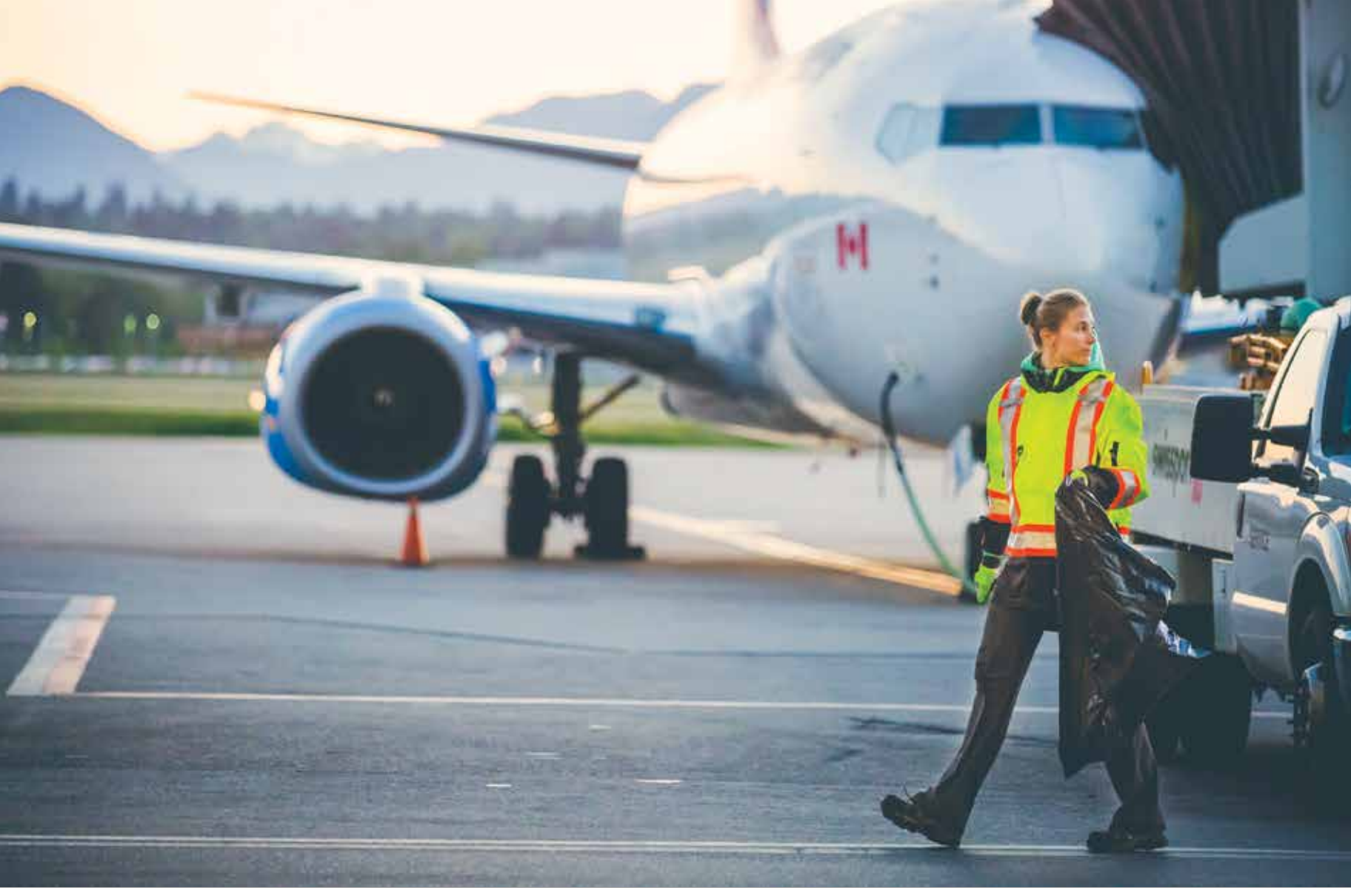
WISE GOVERNANCE

The way we plan, manage and lead at YVR is integral to our future success. Our Board of Directors is made up of members of the community who help ensure that YVR's plans support our collective, long-term success.

YVR has developed a comprehensive Enterprise Risk Management (ERM) system to safeguard the achievement of strategic and business objectives. The ERM system identifies and mitigates a broad range of risks with environmental, social, physical and business impacts. The risk registry is regularly updated to reflect changing issues and threats confronting the airport and the organization. In 2016, YVR was recognized for Best Practice in Enterprise Risk Management by the Governance Professionals of Canada for its important contribution to ERM. Risk management has become a key component in our organizational culture, embedded into everyday planning through our Board and Executive Team. Not only does it help us evaluate projects and understand how to mitigate potential risks, risk management also ensures that we take a broad view when planning a safe and accountable future.

Decision Framework

We are committed to being a leader in sustainability and have incorporated sustainability considerations into our decision making framework. The Airport Authority adopted decision support matrices to evaluate the impact of planned projects and initiatives on YVR's supporting objectives. These matrices provide a framework to examine competing options in the context of our supporting objectives and guide the discussion around the benefits and challenges of each. The Master Plan is aligned with this methodology and used these matrices to evaluate the impact of planned projects and initiatives against criteria based on the supporting objectives including sustainability.



Transparent and Effective Public Engagement

YVR maintains two long standing community and stakeholder-based committees that provide guidance on environmental issues, initiatives and noise management at YVR. These committees also provide input on capital projects and ongoing issues. The Environmental Advisory Committee (EAC) and Aeronautical Noise Management Committee (ANMC) are made up of a range of stakeholders, including community and environmental groups, industry, municipal government, the Musqueam First Nation, NAV CANADA and Transport Canada. A third consultative committee exists to gather feedback from the airlines, enabling them to vote on proposed capital projects and contribute to the ongoing strategy and decision making that shapes the airport.

YVR IS A PLACE TO BE PROUD OF—IT'S PART OF THE DESTINATION, NOT JUST AN AIRPORT TO PASS THROUGH. **I'VE APPRECIATED THE OPPORTUNITY TO PROVIDE INPUT ESPECIALLY AROUND INNOVATIVE ENVIRONMENTAL MANAGEMENT INITIATIVES.**

Rainwater collection and solar power harnessing are important options to explore. I'd like to see YVR use more recycled water than potable water where possible.

– HIROSHI TAKAHASHI

CONSULTATION

CONNECTING WITH OUR COMMUNITY is a core part of who we are and consultation is fundamental to our ability to engage and interact, collect feedback and communicate openly.

SECTION
03

CONSULTATION HIGHLIGHTS

60 MILLION IMPRESSIONS THROUGH ONLINE AND NEWSPAPER ADS

76,000 VISITORS TO THE YVR2037.CA WEBSITE

35,700 ATTENDEES AT 35 COMMUNITY EVENTS

2,994 RESPONDENTS WHO COMPLETED SURVEYS

2,000 PARTICIPANTS WHO POSTED ONLINE FEEDBACK

KEY RECOMMENDATIONS: CONSULTATION

Near-Term

- Commit to ongoing consultation and engagement.
- Gather public and stakeholder input on offerings within the terminal.
- Implement engagement protocol as outlined in the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement.
- Initiate a stakeholder working group for area plans.
- Align stakeholder and public engagement efforts with Transport Canada on potential new Airport Zoning Regulation.
- Consult with the public and stakeholders during the planning process for Sea Island area plans.
- Consult with the community on the plans for community amenities.
- Inform neighbouring communities and stakeholders about increased growth.
- Consider creating a community consultation committee.

Mid-Term

- Develop a comprehensive consultation program for airside capacity enhancement which include potential Foreshore or Close-In South Parallel Runway options.
- Update and share flight track maps and noise event (N70) contour maps.
- In partnership with NAV CANADA and in alignment with the Airspace Change Communications and Consultation Protocol, ensure communities are informed about airspace changes and given the opportunity to provide input in advance.

WHY IT MATTERS

We value the input and diverse perspectives that our neighbours, business partners and the general public generously share with us and it is our objective to take every opportunity to collect this information and use it to guide our planning process. As an airport that connects British Columbians proudly to the world, we have a responsibility to the communities we serve and the people who live in them. We are committed to maintaining an ongoing dialogue with our community to encourage participation, communicate openly and maintain accountability.

By gathering input that represents many different interests and perspectives, we can support anticipated growth and adapt to change in a respectful, inclusive and sustainable way.

OUR APPROACH

FOR THE YVR 2037 MASTER PLAN, WE EMBARKED ON A COMPREHENSIVE, TWO-YEAR STAKEHOLDER AND PUBLIC ENGAGEMENT AND CONSULTATION PROCESS. WE USED A VARIETY OF TOOLS AND METHODS TO ENGAGE PARTICIPANTS, GATHER INFORMATION AND ENCOURAGE FEEDBACK FROM COMMUNITIES, STAKEHOLDERS AND THE PUBLIC.

Our objective was to inspire our community to envision and contribute to the future of our airport. The program was designed in four phases to keep the community updated, provide ongoing opportunities for involvement and feedback and demonstrate the ways in which consultation input influenced the decision making process. This process continues as we share this information with our primary stakeholders and the public and identify key consultation milestones throughout the implementation of our Master Plan. This consultation focused on the Master Plan but we also engage with the community on a project-specific basis.

Reaching out

We encouraged participation across a range of online and offline channels. The YVR2037.ca website was the primary online source of information for stakeholders and the public and was updated at the end of each phase to reflect new developments and feedback. Offline, we met with stakeholders and the public through a series of outreach events including facilitated workshops, open houses, community roadshow events and stakeholder meetings. We also broadened awareness through earned media coverage and advertisements placed in local media and at the airport.

Listening in

Throughout the consultation process, we collected both qualitative and quantitative feedback from participants and visitors. Information gathered from in-person and online contributions, feedback forms, online surveys, emails and letters were aggregated and summarized in a report at the end of each consultation phase. This feedback helped us identify themes and focus areas to carry forward and explore during the next phase of the planning process.

PHASE 1: ENVISIONING OUR WORLD IN 2057 (MAY – SEPTEMBER 2015)

PHASE 1 OF THE CONSULTATION PROCESS FOCUSED ON UNDERSTANDING THE LONG-TERM ASPIRATIONS AND EXPECTATIONS OF OUR STAKEHOLDERS AND THE PUBLIC AS THEY LOOKED OUT 40 YEARS.

As part of the process, we hosted more than 40 stakeholder meetings with airlines, businesses, industry associations, chambers of commerce and boards of trade, community groups, environmental groups, transportation authorities and municipal, provincial and federal governments. We also attended 34 community events throughout the Lower Mainland, Prince George, Kelowna and Kamloops and achieved over 20 million impressions through online and newspaper advertising province wide.

During this phase of the consultation, we heard that participants envisioned:

- Greater connectivity, including more flight connections and more digital connectivity.
- Improved environmental practices, a self-sustaining airport and reduced carbon emissions.
- Better ground access throughout Metro Vancouver.
- Greater high-speed transit options and 24/7 accessibility.
- A sustainable, expanded facility with entertainment, restaurants and green space.
- A seamless travel experience at the airport through the integration of innovative technology.


ENVIRONMENT


ENVIRONMENT
NG, BREATHING AIRPORT
ENVIRONMENT – INITIATIVES

PHASE 2: BUILDING A WORLD CLASS SUSTAINABLE AIRPORT (SEPTEMBER – NOVEMBER 2016)

IN PHASE 2, THE CONSULTATION FOCUSED ON A 20-YEAR OUTLOOK TO REFLECT THE TIME HORIZON OF THE MASTER PLAN—YVR 2037.

The consultation process examined feedback and themes identified in Phase 1 and explored options to support the future our community envisioned. These options focused on six key components: terminals, airside and airspace, ground access, environment, amenities and land use. Our objective was to communicate complex, technical information in an accessible way, stimulate engagement and discussion, obtain further feedback and establish priorities.

During this phase, we hosted public workshops, stakeholder meetings, an open house and roadshow events in addition to gathering feedback through our online engagement portal, YVR2037.ca. We also partnered with Nikolas Badminton, a well-known futurist, who developed a series of design fiction stories to offer a glimpse into YVR's potential future. This activity attracted more than 40 million impressions through broadcast, print and online channels.

We heard that the public was appreciative of the opportunity to meet subject matter experts and engage them in dialogue regarding specific operations, regulations, processes and infrastructure at YVR. Overall, feedback was positive, with participants helping to identify a number of themes and priorities:

- Pride in calling YVR your own.
- Support for centralized terminal expansion plans.
- Support for an incremental and adaptive approach to growth.
- Innovative ideas for experiences and amenities to enrich YVR.
- Support for more infrastructure to reduce delays and provide more air services.
- Support for an airport that is sustainable, environmentally sound and mitigates noise impacts while supporting the airport's growth.
- Equal support for the Foreshore or Close-In South Parallel Runway, with many unformed opinions.
- Prioritize the importance of regional road connectivity and see congestion as a challenge.
- Prioritize public transit and request YVR to collaborate with TransLink and regional agencies.

PHASE 3: PRESENTING MASTER PLAN HIGHLIGHTS (JANUARY – MARCH 2017)

PHASE 3 OF THE CONSULTATION PROCESS PRESENTED HIGHLIGHTS FROM THE YVR 2037 MASTER PLAN, WHICH WAS DEVELOPED BASED ON INPUT RECEIVED DURING THE FIRST TWO CONSULTATION PHASES.

Phase 3 gave us an opportunity to check in with our stakeholders and the community to ensure that our planning process aligned with the future they envisioned.

We engaged the community through an online survey and a series of stakeholder meetings and public open houses.

In addition to sharing our plans for the six key focus areas explored in Phase 2 and the revised draft Land Use Plan, we presented flight track projections and N70 contours to communicate the impact of projected growth on noise levels. Overall, feedback was positive, with the community expressing appreciation for the comprehensive consultation program and planning efforts.

We heard that effectively managing noise remains a high priority, with the City of Delta expressing concern about noise impacts from increased traffic. In addition to our existing Aeronautical Noise Management Committee, we plan to set up a Delta-focused noise management discussion group that includes members of the Airport Authority and NAV CANADA and staff and citizen representatives of the City of Delta.

Musqueam noted and we concurred, that the Plan should acknowledge that there are recorded and unrecorded heritage resources on Sea Island. Musqueam is concerned about potential impacts of future runway expansion on heritage, resources, the environment and fisheries. Musqueam looks forward to engaging with YVR as outlined in the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement. We recognize the cultural significance of Sea Island for Musqueam and we are committed to updating our archaeological procedures, protecting archaeological resources on Sea Island, pursuing sustainability and to engaging with Musqueam in meaningful ways regarding future airport plans, development and authorizations in accordance with the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement.

We also heard that respondents want to be kept informed of the plans for upgraded road infrastructure and potential amenities. This was echoed by residents from Burkeville and staff from the City of Richmond who expressed interest in the Sea Island East Area Plan, plans to extend and/or create an interchange on Templeton Road as well as interest in the parcel of land beside BCIT on Russ Baker Way. As we work towards developing area plans for Sea Island, we plan to set up a stakeholder working group that includes municipal and industry representatives.

PHASE 4: CONTINUING THE DIALOGUE (2018)

We are now in the fourth and final phase of the consultation process for the YVR 2037 Master Plan. This phase will focus on sharing information with primary stakeholders and the public as well as identifying key milestones for future consultation as we begin to implement the Master Plan.

The consultation and engagement process has been enlightening and rewarding for us and feedback suggests that it has been an equally positive experience for our community, stakeholders and the public. As an organization, we recognize the importance of community engagement and consultation and will continue to engage with the community on area plans and on a project by project basis. Additionally, we will create ongoing mechanisms for collecting and addressing any remaining questions and concerns related to the Master Plan and we look forward to continuing the dialogue throughout the implementation phase.

SECTION
04

FORECASTS

WE KNOW YVR IS GROWING—but how much growth will we see and how do we prepare for it? Forecasting helps us to identify the variables, address the risks and plan the best way forward for YVR and our community.

FORECASTS TODAY

STATISTICAL FORECASTING IS A KEY PLANNING TOOL TO ENSURE WE HAVE THE FACILITIES AND OPERATIONAL CAPACITY IN PLACE TO MEET PASSENGER DEMAND.

For the YVR 2037 Master Plan, we used a probability based forecasting methodology, which enables us to account for changing conditions and unforeseen events. Thousands of potential scenarios are created by adjusting various risk factors to generate a range of possibilities. This helps us take a broader horizon approach to planning projects, such as terminal expansion or runways, that require longer lead times.

We also consulted with stakeholders, including national, global and regional airlines, cargo integrators and border agencies to ensure our forecasts were in line with their own expectations for the future.

WHY IT MATTERS

YVR is looking at a future where rising global demand for passenger travel and air cargo will be the key drivers for growth. New technologies and best practices will help us grow in a sustainable way while remaining a respectful member of our community.

THE NEXT TWO DECADES WILL SEE YVR STRENGTHEN ITS POSITION AS A GLOBAL HUB, BRINGING NEW LEVELS OF SOCIAL BENEFIT AND ECONOMIC VITALITY TO THE REGION. TO GAUGE THE OPPORTUNITY AND PLAN FOR GREATER CAPACITY, WE NEED TO ACCURATELY FORECAST THESE REQUIREMENTS.

Sound forecasting is integral to our planning approach, providing a context for our growth targets. By accurately predicting passenger numbers, runway movements and cargo volumes, we can identify and accommodate facility, infrastructure, ground transportation and land use requirements, which will ensure we are prepared for the future.

ADDRESSING RISK

The further into the future we look, the harder it is to forecast accurately. That's why it was important to choose our forecasting method carefully.

Our 2027 Master Plan used traditional econometric forecasting. We examined historical trends, such as gross domestic product, population growth, fuel costs and previous passenger growth, to create a mid-range estimate of future demand—with high and low estimates to cover potential variances.

While this is a useful and widely used approach, it relies on information about the past to project what will happen in the future. As a result, this method does not anticipate global events such as recessions, pandemics or regulatory changes that might dramatically influence short-term demand for travel.

For our 2037 Master Plan, we adopted a new, probability based forecasting methodology which more accurately accounts for changing conditions and unforeseen events. By running the forecasting model thousands of times, we were able to capture multiple "what if?" scenarios and use these to produce a range of estimates that take into account the levels of probability for each of the projected outcomes.

By adjusting various risk factors, we were able to achieve a more nuanced, realistic view of the future, which helps us to improve the way we plan for projects with high capital costs and long lead in times.

PREDICTING GROWTH

OUR FORECAST ANTICIPATES THAT WE WILL GROW BY ONE MILLION PASSENGERS PER YEAR IN THE SHORT TERM, WITH 25 MILLION PASSENGERS USING THE AIRPORT IN 2020.

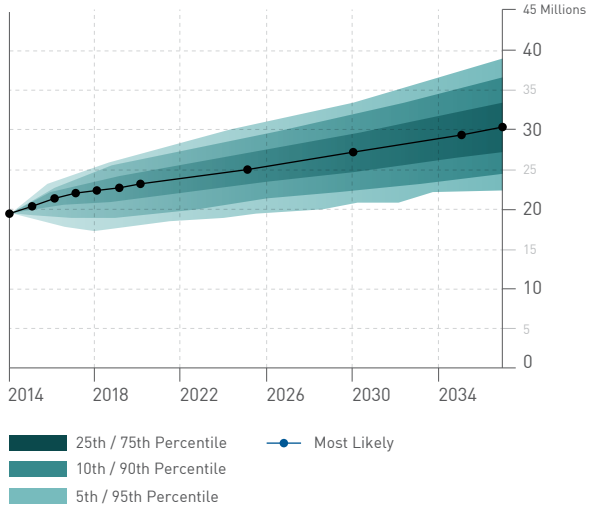
This level of growth reflects our supporting objective of being a connecting hub, but in order to deliver on our other supporting objectives (including delivering remarkable customer experiences, being a leader in sustainability and building on our exceptional foundation) we will need to invest in our facilities.

Passengers

In 2016, we served 22.3 million passengers. In 2037, we expect that number to grow to 35 million. This forecast growth is being used to plan our terminal and gate capacity.

Under the 85th percentile growth forecast, international passenger numbers are predicted to grow the fastest, increasing by 3.6 per cent per year to reach 10.5 million passengers by 2037. Transborder passengers (those who travel between Canada and the United States) will grow less quickly, increasing by 2.5 per cent per year to reach 8.4 million passengers by 2037. Domestic passengers, who make up the largest proportion of traffic, will grow at a slower rate of 2.2 per cent per year, reaching 16.8 million passengers by 2037.

Annual Total Passenger Growth



Cargo

In 2016, YVR handled 281,018 metric tonnes of air cargo (a 3.4 per cent increase over 2015). By 2037, we expect volumes to grow to 377,000 tonnes per year. This growth forecast is being used to plan for the facilities required to support cargo business at YVR, such as cargo buildings, aprons and vehicle parking.

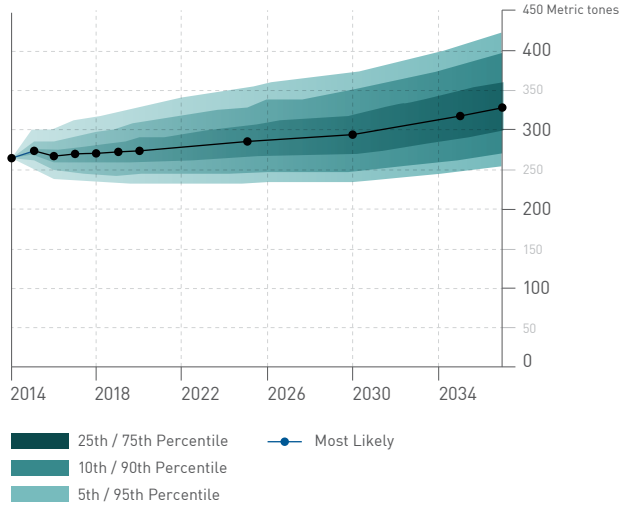
Integrators such as DHL, FedEx, Purolator and UPS, which offer door-to-door parcel services, account for most of this growth, with cargo volumes increasing by 3.1 per cent per year, reaching 196,500 tonnes by 2037. Non-integrator cargo, which includes cargo travelling in the belly of aircraft and on freighters, is anticipated to grow more slowly at 0.5 per cent per year, reaching 180,000 tonnes in 2037.

However, our carriers have indicated their intention to take advantage of the enhanced belly cargo capacity of newer aircraft (such as the B777-200 and B777-300) and as a result, non-integrator growth may occur faster than forecast.

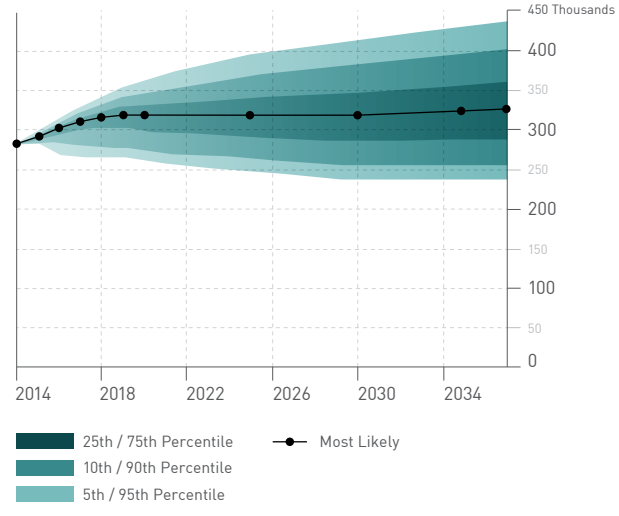
Runway Movements

In 2016, we saw 280,124 runway movements at YVR, including cargo aircraft and passenger carriers and 39,469 non-runway movements by helicopters and floatplanes. In 2037, we expect to see an increase to 372,730 runway movements, while non-runway movements are expected to decline. This forecast growth is being used to plan our airside capacity and airfield usage.

Annual Total Cargo Growth



Annual Total Aircraft Movement



AS A REPRESENTATIVE OF THE GREATER VANCOUVER BOARD OF TRADE, WHAT'S ENCOURAGING IS THAT YVR IS WELL POSITIONED TO LEVERAGE THE **TREMENDOUS OPPORTUNITY OF BECOMING THE PREFERRED GATEWAY AND HUB FOR TRADE BETWEEN ASIA AND THE AMERICAS**.

YVR's strong financial footing and commitment to impeccable customer service, complements its geographic positioning. It was fantastic being able to dream big about the future possibilities for YVR!

– ROB MACKAY-DUNN

SECTION 05

YVR'S AIRSIDE SYSTEM COMPRISES A NETWORK OF RUNWAYS, taxiways and aprons. Airside land is essential to airport operations, enabling aircraft to land, depart and deliver passengers and cargo to their destinations. The airside system ensures the safety, efficiency and sustainability of our operations.

AIRSIDE & AIRSPACE

AIRSIDE & AIRSPACE TODAY

YVR HAS TWO PRIMARY PARALLEL RUNWAYS (THE NORTH AND SOUTH RUNWAYS), A CROSSWIND RUNWAY AND WATER RUNWAY.

The longer South Runway is used for arrivals and departures 24 hours a day. The shorter North Runway is primarily used for arrivals and is typically closed between 10 p.m. and 7 a.m. During the occurrence of strong crosswinds, aircraft make use of the Crosswind Runway. The south side of the airport hosts the helipads and the floatplane terminal where the Fraser River provides the runway for floatplane services.

New generation aircraft are capable of flying longer distances and holding more passengers and belly cargo. Due to YVR's geographic location, we currently experience pronounced peaks in runway and gate demand. Airside congestion and delays can occur during these peak periods. Congestion and resulting delays can have time and cost implications for airlines and passengers, while also negatively impacting the environment, regional economy and YVR's competitiveness as a connecting hub.

KEY RECOMMENDATIONS: AIRSIDE & AIRSPACE

Near-Term

- Construct Runway End Safety Areas on the North Runway to meet anticipated regulations.
- Realign Taxiway M to accommodate large aircraft and alleviate congestion.
- Protect airspace for both future runway options—the Foreshore or Close-In South Parallel Runway. Apply for new Airport Zoning Regulations with Transport Canada.
- Use the North and South Parallel Runways equally for arrivals and departures to enhance system capacity during peak periods.
- Construct taxiway fillets to better enable larger aircraft to manoeuver on the airfield.
- Support NAV CANADA and airline implementation of aircraft technology improvements and increase adoption of Required Navigational Performance (RNP).

Mid-Term

- Construct new high-speed exit taxiways on the South Runway to improve efficiency.
- Construct a North-South Taxiway (NST) on an overpass linking the east end of the North and South Runway.
- Implement airside capacity enhancement initiatives to maximize existing infrastructure in advance of any future runway development.

In the Future

- Determine which future runway option—the Foreshore or Close-In South Parallel Runway—provides maximum benefit to airport capacity and assess that option against cost, cultural heritage, community and environmental impacts through studies and consultation.
- Implement the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement engagement protocol for the future potential runway option—the Foreshore or Close-In South Parallel Runway.
- Begin the planning process to obtain all necessary approvals to construct the preferred runway option.

WHY IT MATTERS

As a world class, sustainable gateway between Asia and the Americas, YVR plays a pivotal role in helping people and cargo reach destinations and markets worldwide. Supporting global connections requires an airside system that can accommodate large, more efficient aircraft and meet forecast demand for air travel while minimizing delays, emissions and noise levels.

THE CHALLENGE

Over the past 20 years, the number of passengers YVR served increased by 51 per cent, from 14.8 million in 1997 to 22.3 million in 2016. Although we were affected by the global decrease in demand for air travel that occurred post 9/11 in 2001 and again post-recession in 2008, our passenger numbers have surged in recent years, increasing from 17 million passengers to 22.3 million passengers between 2011 and 2016—an increase of 27 per cent.

The demand for air cargo transport at YVR was also affected by world events. The total cargo tonnage handled at YVR declined by 15 per cent between 1997 and 2006 and the 2008 recession also had an impact. However, by 2011, the trend began to reverse. From 224,000 tonnes of cargo in 2011, the volume rose to 257,000 tonnes by 2014—an amount that nearly matched the peak in 1997. By 2016, cargo volumes had exceeded that peak and reached 281,000 tonnes—a 26 per cent increase over five years.

As the volume of passengers, cargo and flights grows, so does the impact on YVR's airside system.

Our existing airside system will be challenged to accommodate the forecast increase in the number of aircraft. Restricting departures to a single runway results in more airside congestion, particularly during peak periods. This is forecast to result in increased departure delays, adding to aircraft taxi emissions and airline costs and undermining YVR's competitiveness. In addition, several of YVR's taxiway, runway and apron intersections need to be updated to meet design requirements for large aircraft (such as the B777 and A380), which will represent a greater proportion of the total aircraft fleet at YVR in future.

Peak periods at airports are similar to the rush hour on a road network. Peaks reflect the times during which most people want or need to travel, and airlines and passengers require efficient connections at these times. YVR's geographic location, travel times to international destinations and airline slots at other airports further restrict our ability to shift demand to different times of day. As a global hub, it is important that YVR helps to maximize airline network connectivity by accommodating departures and arrivals at times best suited to airlines and passengers.

A SOLUTION FOR THE FUTURE

MAKING BETTER USE OF EXISTING INFRASTRUCTURE, LEVERAGING NEW TECHNOLOGIES AND ENSURING WE HAVE ROOM TO GROW WILL HELP US PROTECT YVR'S POSITION AS A WORLD CLASS, SUSTAINABLE HUB.

Optimize Existing Infrastructure

By using our current airside more efficiently, we can postpone the need to build a new runway. Increasing use of the North Runway for departures will allow us to reduce runway congestion and delays by accommodating more flights, especially during peak times. We will continue our close collaboration with NAV CANADA to explore procedures that enhance airfield efficiency and will construct infrastructure to enable and support these efforts.

For example, we will work with NAV CANADA to refine use of Simultaneous Parallel Independent Runway Operations (SPIRO), which will allow departures and arrivals to take place simultaneously on both the South and North Runways, and will support these efforts by constructing the North-South Taxiway. We predict that SPIRO will improve capacity by about 20 per cent, easing congestion and delays during peak periods and delaying the need for an additional runway.

To support more aircraft, we will realign and reconstruct some of our taxiways to create a dual parallel taxiway system. This will provide room for safe manoeuvring of more aircraft.

In the 2027 Master Plan, we considered the possibility of decommissioning the Crosswind Runway to allow for other uses of the airfield and we re-evaluated this option as part of our 2037 Master Plan. While this runway accounts for a small percentage of overall arrivals and departures, small and medium sized aircraft need to use the Crosswind Runway when strong crosswinds make the parallel runways challenging. We plan to retain the Crosswind Runway to enable our passengers to continue to connect to destinations across British Columbia during adverse wind conditions, thereby supporting the reliability and sustainability of the airside system. In the future, we will balance the need for the Crosswind Runway with other uses.

Build New Features

We heard from the community that they are in favour of new airside infrastructure to support more connections and destinations. In addition to making the existing airside system more efficient, we plan to construct other features that will improve traffic flow, enhance safety and accommodate large aircraft.

In 2017, we completed the construction of Runway End Safety Areas (RESAs) on the South and Crosswind Runways. RESAs are specialized areas at the end of a runway that protect passengers, crew and aircraft in the unlikely event of an overrun or undershoot. RESAs are internationally mandated and are likely to become a Transport Canada requirement in the near future. In the spring of 2017,

we consulted with our community about the options for building RESAs on the North Runway. Although we don't plan to extend the North Runway as part of the North Runway RESA project, we may consider a runway extension in the future to help accommodate a wider range of aircraft on the North Runway. This would enable us to further reduce congestion, taxi distances, emissions and carrier costs.

In our 2027 Master Plan, we first introduced the community to the idea of an elevated taxiway that would connect the east ends of our parallel runways by allowing aircraft to taxi over Grant McConachie Way and the Canada Line guideway. This North-South Taxiway (NST) will help reduce congestion and decrease aircraft taxi time by providing an alternate route to the runway ends and will support the more efficient use of the parallel runways. The NST will enable reductions in greenhouse gas emissions and decrease the costs associated with aircraft taxiing.

We will build new high-speed exit taxiways on the South Runway, allowing arriving aircraft to clear the runway quickly and increasing the number of aircraft that can use the runway on an hourly basis. These new taxiways will help to improve runway efficiency.

We will also construct taxiway fillets to widen the intersections between taxiways and runways. This will enable our airside to meet the requirements of large aircraft, expedite arrivals and departures and reduce taxi distance and emissions.

BY RETAINING THE CROSSWIND RUNWAY, WE CAN HELP **AS MANY AS 55,000 PASSENGERS** PER YEAR TO CONNECT RELIABLY TO BC DESTINATIONS SUCH AS **VICTORIA, PRINCE GEORGE, TERRACE, BELLA BELLA** AND **WILLIAMS LAKE** IN 2037.

FUTURE AIRSIDE DEVELOPMENT

- Proposed North-South Taxiway (NST)
- Potential Foreshore Runway
- Potential Close-In South Parallel Runway
- RESA

Leverage Technology

Next generation aviation technologies will bring more precision and control to air traffic. NAV CANADA is the agency that oversees airspace and air traffic control in Canada. We will work with our airline partners and NAV CANADA to support the adoption of technologies that enable the broader use of Required Navigation Performance (RNP) procedures. RNP uses Global Positioning System (GPS) technology and aircraft avionics to keep aircraft on defined flight paths.

RNP enables the use of Continuous Descent Approaches for landing aircraft. This allows a smoother path and reduced engine thrust during the approach, which improves fuel efficiency, lowers GHG emissions and reduces noise. Where possible, RNP approaches can be designed to minimize overflights of residential communities.

NEVERTHELESS, BECAUSE RNP IS MORE PRECISE, CERTAIN COMMUNITY MEMBERS MAY BE MORE IMPACTED BY NOISE AS AIRCRAFT WILL FLY A CONSISTENT ROUTE.

We heard from our community that they believe the role of the airport is to continue to grow, but that it is important to balance growth with the needs of the community. This includes noise management. More information about noise can be found in the Aeronautical Noise Exposure section on page 141.

Protect Room to Grow

In addition to making better use of the existing airside system, we also plan to protect the land and airspace needed for future runways. In our 2027 Master Plan, we identified two potential future runways—the Close-In South Parallel Runway and Foreshore Runway.

While we will likely only need one of these future options, we will continue to preserve both to give us flexibility in accommodating growth.

As part of our public consultation, we heard that there was equal support for both runway options and that many people were undecided. We recognize the need to engage our community in a much more detailed process around these two options. Because the design, consultation, environmental approvals and construction of a new runway can take upwards of 10 years, we are closely monitoring growth in passenger and runway movements. This will help us determine when we need to begin the planning process. At that time, we will initiate in-depth engagement with the public and our stakeholders to gather input for the design, construction and use of a new runway that meets diverse needs. A full Government of Canada Environmental Assessment would be required under current Canadian Environmental Assessment Agency Act or future legislation.

Address Climate Change

Climate change is a challenge that could impact the use of airside infrastructure in a number of ways. Sea level rise and storm events will likely impact our foreshore dykes. More frequent and intense precipitation could overtax existing airside drainage systems. Extreme weather may also affect wind speed and direction, resulting in potential changes in Crosswind Runway use. Increases in average and extreme air temperatures may affect runway length requirements while high temperatures could also impact airside pavement. We will assess and monitor these impacts on an ongoing basis so that we can develop strategies that help us prepare to change.

PASSENGER TERMINALS

SECTION
06

AS WE EXPAND TERMINAL CAPACITY TO MEET AN INCREASE IN PASSENGER NUMBERS in the years ahead, how do we maintain YVR's distinctive sense of place and retain our exceptional customer experience?

PASSENGER TERMINALS TODAY

YVR HAS TWO TERMINALS TODAY. THE MAIN TERMINAL HAS FIVE PIERS AND SUPPORTS THE MAJORITY OF OUR AIRLINE SERVICE WHILE THE SOUTH TERMINAL FOCUSES ON REGIONAL AIR TRAFFIC.

The South Terminal handled approximately 300,000 passengers in 2016, representing 1.4 per cent of our total passengers.

At YVR, our main terminal is operated according to a sector-based approach. This means that passengers and flights are organized by travel destination: domestic (within Canada), transborder (to the United States) and international (all other routes). YVR has seen exceptional growth—a record-breaking 22.3 million passengers in 2016. Our current terminal configuration can accommodate 25 million passengers, which means we are rapidly approaching capacity. By 2037, we expect to attract as many as 35 million passengers.

KEY RECOMMENDATIONS: PASSENGER TERMINALS

Near-Term

- Evaluate and incorporate consultation feedback into terminal expansion design.
- Construct Pier D expansion to accommodate growth in international traffic.
- Provide additional pre-board screening, customs and check-in facilities to accommodate passenger growth.
- Provide additional baggage infrastructure.
- Begin planning for transborder gate expansion.

Mid-Term

- Design and begin terminal expansion to accommodate growth in domestic and transborder traffic.
- Continue to upgrade and expand passenger and baggage processing facilities as required to accommodate growth across all sectors.
- Enhance retail, food and beverage offerings.

In the Future

- Continue to provide infrastructure to accommodate forecast passenger traffic during the peak periods to the end of the planning horizon through a centralized terminal expansion.

WHY IT MATTERS

Every day, thousands of travellers pass through YVR. For many, our airport terminals are a first glimpse of British Columbia, a unique part of the passenger journey and an opportunity for guests to enjoy award-winning art and architecture and sample the province's distinctive landscape and people.

YVR houses the largest private collection of First Nations art on public display in the world, a 114,000 litre aquarium showcasing 5,000 species and many other spectacular elements that live on in the memories of visitors long after they have returned home.

During consultation, we heard a number of ideas about different types of amenities and innovations to consider in our next terminal expansion. Ideas ranged from adding more art to include Musqueam First Nation pieces, sleeping pods and showers to kinetic energy collection as well as a wider variety of healthy food options that reflect the best of British Columbia.

Most important was the role of accessibility in future terminal design. There was also a desire for passengers to be able to experience the outdoors—an idea that is now being explored and implemented in our Pier D expansion.

YVR's terminals also need to guide visitors safely and efficiently on their travels while maintaining our award-winning customer service and exceptional experience, whether their final destination is Metro Vancouver or beyond. YVR strives to be a perceptive airport—one that anticipates customers' needs and wants. Each year, we make great progress towards integrating an innovative use of technology and aligning our digital tools in support of a more engaging customer experience. Our terminal design, technology and services help millions of passengers navigate check-in, pre-board screening, customs and border services and baggage collection or connections.

THE CHALLENGE

In order to continue delivering remarkable customer experiences, we need our infrastructure to accommodate higher passenger volumes while maintaining YVR's unique sense of place. We also want to ensure that the airport's strategic, commercial and operational needs are supported in areas such as safety, security, accessibility, customer service and retail offerings.

We have limited land resources on Sea Island, so we must make wise choices. Our approach needs to be flexible and sufficiently robust to accommodate changes in passenger demand and volume, technological advances, regulatory changes and other variables.

A SOLUTION FOR THE FUTURE

We used forecasting to determine what is likely to happen in the future and a multi-stage planning process that prioritizes solutions that:

- Exceed safety and customer service requirements.
- Facilitate operational efficiency.
- Provide maximum flexibility for expansion and change.
- Protect enough land to meet terminal expansion needs.
- Follow sustainable building design and operation practices.

To prepare for the 35 million passengers forecast to pass through YVR annually by 2037, we used modelling tools to examine passenger flows through the airport terminal during peak times. We looked at the impact on gate demand, check-in, customs, baggage systems and security screening. And we factored in some of the changes we expect to see, including an increase in the number of large aircraft serving YVR, technological advances and regulatory changes.

Aircraft gates are our most valuable terminal asset. Aircraft size, load factors, the number of available gates and peak passenger flows all affect gate demand. Each of these elements were factored into our analysis.

Our current configuration of 57 bridged gates and 21 apron gates at the main terminal is capable of processing 25 million passengers each year. Looking to the future, we anticipate that between 88 and 100 gates will be required at the main terminal to accommodate anticipated peak periods.

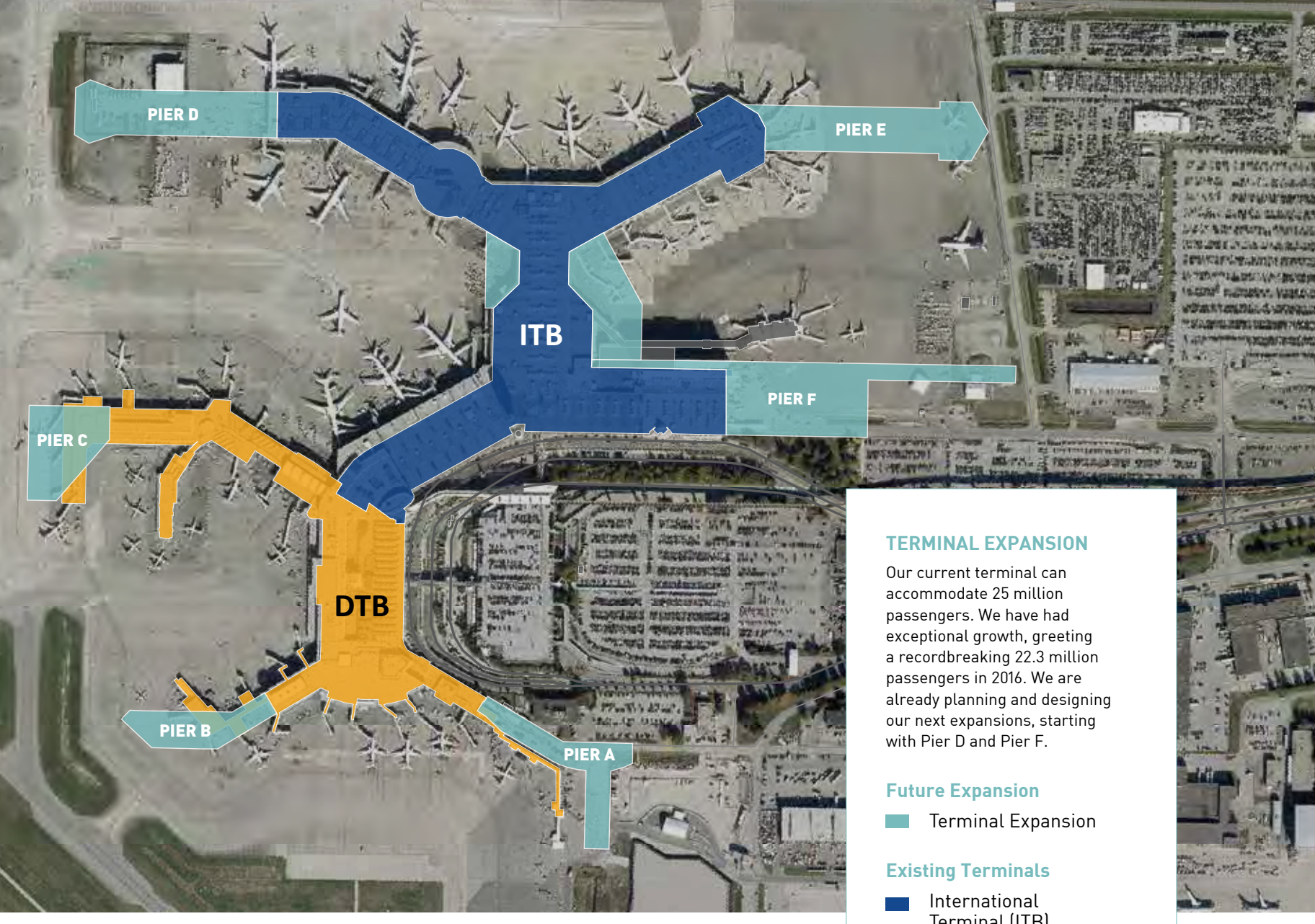
We looked at three potential terminal expansion options to accommodate the forecast increase in the number of gates required by 2037:

1. Expand the terminal eastward (an option that was explored in our 2027 Master Plan).
2. Create an in field satellite terminal to the west of the existing facility.
3. Expand the existing terminal by extending each of the piers (the centralized expansion option).

We developed and evaluated 57 different conceptual layouts based on these themes. Then we collected feedback from our stakeholders to identify a shortlist for further analysis.

The shortlisted options were developed in more detail with operational models developed to simulate how each option might function. The shortlisted options were evaluated against 20 criteria that align with our four supporting objectives: create a connecting hub, deliver remarkable customer experiences, be a leader in sustainability and build on our strong foundation.

Through this process, we confirmed the third option—centralized expansion of the existing terminal complex—as the solution that best meets our supporting objectives, matches the objectives of our business partners and serves the needs of those who will use it.



TERMINAL EXPANSION

Our current terminal can accommodate 25 million passengers. We have had exceptional growth, greeting a recordbreaking 22.3 million passengers in 2016. We are already planning and designing our next expansions, starting with Pier D and Pier F.

Future Expansion

- Terminal Expansion

Existing Terminals

- International Terminal (ITB)
- Domestic Terminal (DTB)

Rendering of the expansion of the International Terminal Building—Pier D.

The project is the largest terminal expansion since 1996. The project incorporates feedback received during consultation including a range of new amenities such as digital art, energy-saving devices, new food and beverage options, and plenty of seating.

The expansion will feature the beauty of BC, with an island forest that is open at the top—if it is raining or snowing, you will see it coming down into the centre of the terminal. This concept was inspired by comments from our community with a desire to bring the west coast outdoors into the terminal experience.

"EXCEPTIONAL CUSTOMER EXPERIENCE THROUGH INCREASED EFFICIENCY AND CAPACITY IS PART OF THE VISION FOR YVR'S FUTURE."

Centralized expansion is the most cost effective and the most flexible option—it enables us to continue adapting the plan in response to changes in demand. It provides the shortest connection times, the clearest wayfinding and the best customer and baggage experience and it also offers the most convenient access and a high degree of security.

As part of the centralized expansion of the terminal complex, which will be phased in over the next 20 years, we plan to:

- Maintain the South Terminal Building to support our regional connectivity.
- Protect adequate land, including vehicle parking, for ongoing operation of the floatplane terminal.
- Consider the impacts of climate change and the need for mitigation and adaptation in the design of new terminal facilities.
- Continuously update the terminal expansion phasing plan in response to regular updates of passenger forecasts.
- Engage with our community and stakeholders to help guide the development of the new terminal.


Canada

I SEE ELEMENTS EMBODIED IN THE MASTER PLAN THAT REPRESENT THE COLLECTIVE VOICES DURING THE CONSULTATION PROCESS. **YVR HAS PUT TOGETHER A VERY APPEALING PUBLIC AMENITIES PLAN** AND WHEN IMPLEMENTED WILL DRAW THE REGIONAL COMMUNITY TO THE AIRPORT AS A **RECREATIONAL DESTINATION FOR PLANE-SPOTTING AND CYCLING.**

I feel the plan will achieve this by providing the necessary family-friendly infrastructure for connecting the terminal with green space and amenities.

– DAVID GRIGG

SECTION 07

FOR PASSENGERS AND GOODS, THE NETWORK OF ROADS, bridges and transit infrastructure that connect to Sea Island is an integral part of the YVR experience. Ensuring safe, sustainable and reliable access to Sea Island and the airport is a top priority for us and for our community.

GROUND ACCESS & PARKING

GROUND ACCESS & PARKING TODAY

We are responsible for most of the road network on Sea Island, including the Arthur Laing and Dinsmore Bridges. Other bridges providing access to Sea Island include the Moray Bridge and Airport Connector Bridge, which are owned and maintained by the Province and No. 2 Road Bridge, which is owned and maintained by the City of Richmond. The City of Richmond also owns and maintains several roads on Sea Island. Ensuring we maintain a comprehensive and diverse road network that includes cycling and pedestrian infrastructure is important to us. For more details on the cycling, pedestrian and multi-use pathways that are part of our Master Plan, please see the Community Amenities section on page 111.

KEY RECOMMENDATIONS: GROUND ACCESS & PARKING

Near-Term

- Improve capacity at the intersection of Grant McConachie Way and Templeton Street with a grade-separated interchange.
- Replace or seismically upgrade the Dinsmore Bridge with separated bicycle and pedestrian infrastructure.
- Prepare for the possible integration of ride sharing services.
- Work co-operatively with TransLink to address YVR Airport Station platform capacity issues and to implement travel demand management measures.
- Work with our partners (the Province, City of Richmond and City of Vancouver) to improve east-west access and travel times from Highway 99.
- Manage parking demand through variable pricing.
- Construct phase 1 of a new parkade and expand car rental facilities.
- Expand electric vehicle charging station network as part of Airport parking infrastructure, keeping pace with anticipated demand.
- Incorporate pedestrian and cycling infrastructure into ongoing road network improvements.

Mid-Term

- Work closely with regional agencies to develop and implement a region-wide mobility pricing strategy.
- Work co-operatively with TransLink to improve east-west transit connections to Sea Island.
- Explore options for the provision of dedicated access for airport traffic including an airport-bound high priority vehicle lane on Russ Baker Way and/or the southward extension of Templeton Street to Russ Baker Way.
- Construct phase 2 of the new parkade.
- Construct a new Ground Transportation Centre with additional commercial curb space.
- Further expansion of car rental facilities.

Implement Strategy to

- Address impacts and severity of climate change risks for ground access to and from Sea Island.
- Monitor and assess potential implications of automated vehicles and peer-to-peer car rental options for ground access and infrastructure.

Specific recommendations on pages 75-79.

WHY IT MATTERS

Ensuring safe, sustainable, efficient, convenient and reliable access to and from Sea Island is a priority for the Airport Authority, our partners and our passengers. During consultation, we heard that ground access was at the forefront of public and stakeholder concerns. For the public, it is about broadening travel options and enhancing the experience. For our partners, it is about reliable and efficient access for passengers, employees and cargo. And for YVR, it is a way to support environmentally friendly choices, strengthen our position as a connecting hub and improve the customer experience while building the necessary infrastructure to support our growth. We want to maintain YVR's position as the leading airport in North America for passenger and employee transit mode share, while ensuring that convenient and reliable access is still available to those for whom private vehicles are the only viable mode of travel to Sea Island.

THE CHALLENGE

In the next few years, regional access and access to Sea Island will undergo significant changes due to:

- Population growth, particularly in the area south of the Fraser River.
- Increased vehicle traffic on regional roads and bridges.
- Transit and road network improvements.
- Regional mobility pricing proposals.
- New transportation trends and technologies, including automated vehicles, ride sharing and electric vehicles.
- Demand and competition from commuter (non-airport) traffic on Sea Island roads and bridges.
- Evolving consumer preferences.

Public transit, car sharing and ride sharing offer alternatives to private vehicles and may offset the need for parking at YVR while increasing demand on the curb and transit platforms. However, population growth in areas which are less transit accessible could contribute to increased congestion on the road network. Mobility pricing (particularly time-of-day pricing) could affect the costs of travel and incentivize off-peak travel, potentially reducing congestion in the region, particularly during peak periods.

We need to plan for a dynamic and uncertain future while remaining flexible enough to respond to changes.

A SOLUTION FOR THE FUTURE

WE KNOW WE HAVE A SIGNIFICANT ROLE TO PLAY IN THE FUTURE OF THE REGION'S TRANSPORTATION NETWORKS. WE ARE RESPONSIBLE FOR THE MAJORITY OF THE ROAD NETWORK ON SEA ISLAND AND THE ARTHUR LAING AND DINSMORE BRIDGES. WE ALSO HAVE INVESTED $300 MILLION IN THE CANADA LINE EXTENSION THAT CONNECTS TO SEA ISLAND AND PROVIDES DIRECT ACCESS TO YVR.

As we look ahead to the next 20 years, we are prioritizing sustainable solutions that maximize the capacity of our existing ground access infrastructure to support anticipated growth in the volume of passengers, cargo and Sea Island employees.

Since 2015, YVR has undertaken several ground access studies to understand current traffic flows and predict how long-term growth and planned changes could affect ground access to the airport.

These studies, along with traffic forecasts, tell us that we will need to make some significant changes between now and 2037.

TRAVEL TIMES TO AND FROM SEA ISLAND IN 2037 COULD POTENTIALLY DOUBLE WITHOUT ANY IMPROVEMENTS TO THE ROAD NETWORK. DEMAND ON BRIDGE CROSSINGS IS EXPECTED TO GROW BY 17%.

Roads and Bridges

Between 2011 and 2037, traffic on our road bridge crossings is expected to increase by 17 per cent. In 2037, commuters (non-airport) traffic is expected to account for 59 per cent of the traffic on Sea Island bridges in the morning peak. To ensure that we can maintain reasonable travel times for passengers, cargo and employees, we propose to:

- Reserve the option to add an airport high priority vehicle lane on Russ Baker Way.
- Reserve the option to extend Templeton Street to Russ Baker Way to provide an alternate route for Airport traffic.
- Take immediate steps to improve capacity at the intersection of Grant McConachie Way and Templeton Street and to provide a grade-separated interchange within the next 10 years.
- Replace or upgrade the Dinsmore Bridge to seismic standards while maintaining a two lane structure with the addition of separated cycling and pedestrian pathways.
- Collaborate with the BC Ministry of Transportation and Infrastructure and the City of Richmond to improve travel times between Highway 99 and Sea Island, through replacing the Moray Channel Bridge, introducing network improvements and implementing supportive land use policies along Bridgeport Road and Sea Island Way.
- Collaborate with BC Ministry of Transportation and Infrastructure, the City of Richmond and the City of Vancouver to monitor the impacts of the new George Massey Bridge, Highway 99 improvements to address congestion and airport access. We will work cooperatively on further road network improvements, which are needed to improve Sea Island travel times.
- Collaborate with regional agencies in the development and implementation of a region wide mobility pricing strategy that addresses the Arthur Laing Bridge capacity issues and ensures sufficient ground access to YVR.
- Continue to integrate upgraded cycling infrastructure in the road maintenance program.

During consultation, we heard strong support for building and enhancing road networks that would help alleviate congestion. We examined options that included an interchange at Templeton Street and Grant McConachie Way, a high priority vehicle lane for airport users on Russ Baker Way and an extension of Templeton Street to connect to Russ Baker Way. As part of the third phase of our consultation process, we listened to concerns from our neighbouring community of Burkeville and City of Richmond about the extension of Templeton Street. We are committed to engaging in an ongoing dialogue with our municipal partners and Burkeville before exploring this option further.

"REGIONAL CONNECTIVITY AND PUBLIC TRANSIT TO AND FROM YVR IS A TOP PRIORITY."

WE ARE COLLABORATING WITH THE PUBLIC, REGIONAL AGENCIES AND AUTHORITIES TO FIND TRANSIT, TRANSPORTATION AND POLICY SOLUTIONS.

Parking and Curbside

Despite declining rates of vehicle ownership amongst millennials and relatively high transit mode sharing for trips to and from Sea Island, parking demand is forecast to increase over the next 20 years. With existing passenger parking lots already near capacity and an anticipated reduction in the number of existing stalls proposed as a result of future construction projects, YVR faces a parking deficit and curbside congestion in the passenger pick-up and drop-off areas. To address the issue, we plan to:

- Work with TransLink to make ongoing improvements to the Canada Line, including station platform capacity and service levels on Sea Island.
- Construct a new parkade in phases, providing additional stalls at remote Sea Island locations.
- Manage parking demand through the introduction of variable pricing.
- Provide additional curbside pick-up for taxis, shuttles and commercial vehicles.
- Increase the length of the Level 3 curb for drop-off services as part of terminal expansion.
- Build a new Ground Transportation Centre between the existing and proposed new parkades, with car rental customer service booths and information booths for buses and shuttles.
- Incorporate ready-return facilities into the new Parkade, expand the existing quick-turnaround facilities and relocate the car rental service centres.

GROUND ACCESS & PARKING

- Public Parking (Existing)
- Canada Line
- Canada Line Station
- YVR Airport-Terminal Canada Line Station Proposed Platform/ Station Improvements
- 1 New Parkade & Ground Transportation Centre
- 2 Public Parking
- 3 Potential Russ Baker Way Public Parking
- New Electrical Vehicle Charging Stations
- Improved East-West Access
- Proposed Intersection Improvements
- Proposed Bridge Upgrade/ Replacement
- Other Potential Airport Access Improvements
- A High Priority Vehicle Lane
- B South Templeton Street Extension

KM
0 0.125 0.25 0.5 0.75 1

Rendering of the expanded parkade to improve capacity, efficiency and customer experience. The six-storey parkade will include automated guidance systems that directs drivers to the nearest open stall, additional electric vehicle charging stations, a rainwater harvesting system to collect water that will help meet our conservation goals and provide emergency firefighting water and a fully enclosed walkway from International Arrivals to the parkade to improve passenger experience and minimize vehicle idling times, while improving traffic flow.

Transit Connections

During consultation, we heard that many people want to use public transit for travel to Sea Island. We support improved transit options for air passengers, employees, cargo and visitors in collaboration with TransLink and regional agencies. We plan to:

- Identify and support the implementation of improved east-west transit connections to Sea Island.
- Further explore the implementation of travel demand management measures such as communication and marketing strategies, discount fares and new transit station features.
- Improve the Canada Line experience by proactively addressing YVR Airport Station capacity issues and providing more ticket vending opportunities, more fare gates and enhanced platform capacity.

PUBLIC TRANSIT ACCOUNTS FOR 25% OF TRAVEL TO AND FROM YVR—**THE HIGHEST SHARE OF ANY NORTH AMERICAN AIRPORT.**

Alternative Transportation

New transportation trends and technologies, including ride sharing services, automated vehicles and widespread adoption of electric vehicles, could have a significant impact on travel demand and parking requirements in the future. To keep pace with future transportation trends, we will:

- Continue to add electric vehicle charging facilities to our parking infrastructure to meet demand.
- Monitor and assess the potential for ride sharing services and peer-to-peer car rentals at YVR in consultation with the provincial government and other stakeholders while working with the taxi industry to create a level playing field for fair competition.
- Develop the necessary regulations, permitting processes, curbside infrastructure and staging areas to support requirements of alternative transportation options.
- Further support and develop walking and cycling opportunities on Sea Island.

Climate Change

Climate change could impact YVR's ground transportation system in a number of ways. Higher summer temperatures and more intense rainfall could impact the integrity of paved road surfaces, disrupt ground transportation services, affect passenger comfort and cause flooding of transportation infrastructure. We plan to:

- Develop a climate change strategy which takes into account the risks, impacts and severity of rising summer temperatures and extreme winter rainfall events on Sea Island.

AS A CONSULTANT TO THE MASTER PLAN TEAM, I **REALLY APPRECIATED YVR'S EVIDENCE BASED APPROACH TO DECISION MAKING WHICH COMBINES DATA, MODELS AND TECHNICAL ANALYSIS WITH CAREFUL CONSIDERATION OF STAKEHOLDER AND COMMUNITY CONCERNS**.

YVR is a dynamic and responsible business, able to successfully balance the public good with revenue generation. **For me, the airport is a point of connection: it brings the world closer to us, it provides the intersect between humans and technology and enables us to connect with one another.**

- PETA WOLMARANS


Use Caution
Attention

SECTION 08

CARGO

CARGO REPRESENTS A SIGNIFICANT AND GROWING PART of our business. Our geographic location connects markets in Asia and the Americas with time and cost efficient transport options. As a gateway facility, we must find ways to support the rapidly growing needs of businesses in British Columbia and worldwide.

CARGO TODAY

YVR has three existing cargo locations on Sea Island. Cargo Village, located south of Miller Road and east of the domestic terminal building, contains the largest concentration of cargo activity. The South Templeton area includes Purolator and FedEx facilities, which serve air and truck-to-truck cargo. And Airport North, home to UPS and Canada Post, supports air, ground and sea-to-air cargo movements and processing.

In 2016 the total value of goods exported through YVR was $2.7 billion, contributing to the GDP and jobs in Canada.

KEY RECOMMENDATIONS: CARGO

Near-Term

- Reinforce YVR's gateway function by maintaining and enhancing its role in the global supply chain network.
- Support the retention of Cargo Village in its current location, including renovating buildings on Miller Road and upgrading the Canada Border Services Agency commercial inspection facility.
- Support expansion of cargo/integrator facilities in the South Templeton Area.

In the Future

- Give further consideration to a tail-to-tail air cargo facility to serve international belly cargo.
- Increase the cargo apron and aircraft parking space at Cargo Village.
- Reserve airside land at Airport North for potential future cargo expansion.

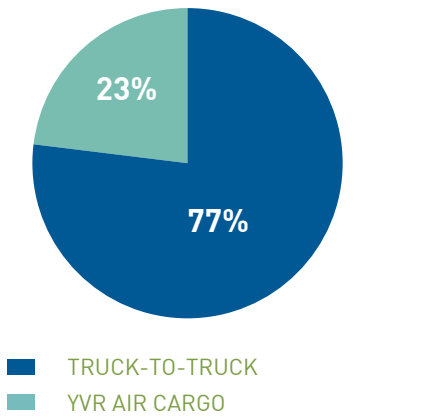
WHY IT MATTERS

The movement of goods through YVR benefits our region socially and economically. Our cargo facilities help local businesses establish bigger markets for their products while making a wider range of products from around the world available to consumers here at home. Cargo carried in the belly of passenger aircraft can also increase profitability or viability for airlines.

Air cargo also contributes to our strategic goals. Air trade between North America, Asia and Latin America is expected to more than double, reaching 10.6 million tonnes by 2037. In the coming years, we aim to strengthen YVR's position as a premier global gateway by enhancing our contribution to the international supply-chain network. We also intend to increase our cargo capacity so that we can continue to support the growing number of businesses that rely on air and ground cargo services located on Sea Island. In addition, the larger belly cargo capacity of newer passenger aircraft (such as the B777) will provide further opportunities for the expansion of cargo business at YVR and enable air carriers to supplement their revenues, potentially offsetting passenger cost.

As a global gateway, YVR accommodates belly and freighter cargo providers as well as integrators (businesses such as Purolator, FedEx and UPS that offer integrated "door-to-door" parcel delivery services). We also offer the convenience of on-site Canada Border Services Agency (CBSA) services, proximity to the terminal, convenient access from cargo areas to the runways and ground access areas and a cohesive turnkey Cargo Village comprised of industry tenants that offer carriers and business services multiple options for moving their products around the world.

CARGO VOLUME (TONNES) BREAKDOWN BY TYPE



A further unique feature of the cargo business at YVR is the truck-to-truck component, which accounts for approximately 77 per cent of the total cargo tonnage processed on Sea Island. This reflects the desire for integrators and non-integrators to concentrate their operations at their Sea Island location.

YVR's advantages have enabled us to grow our cargo business faster than our competitors, despite the fact that we have not made a significant capital investment in our cargo facilities. Between 1992 and 2016, YVR's annual cargo volumes almost doubled—from 144,000 to 281,000 tonnes. Between 2000 and 2015, San Francisco, Seattle, Los Angeles and Ontario all saw declines in cargo volumes, while cargo at YVR grew by 7.8 per cent over the same period.

THE CHALLENGE

Boeing forecasts that world air cargo traffic will more than double over the next 20 years. Based on a long-term average annual growth rate of 1.7 per cent, our forecasts indicate that cargo at YVR could reach 377,300 tonnes by 2037. To stay competitive and relevant as a strategic gateway, we will need to find ways to support the forecast demand.

YVR already makes efficient use of its existing cargo facilities. Our productivity levels are within the industry standards set by the International Air Transport Association and the Airport Cooperative Research Program (ACRP) and are broadly comparable with benchmark airports. This means that to accommodate tomorrow's higher cargo volumes, we must increase the footprint of our facilities.

A SOLUTION FOR THE FUTURE

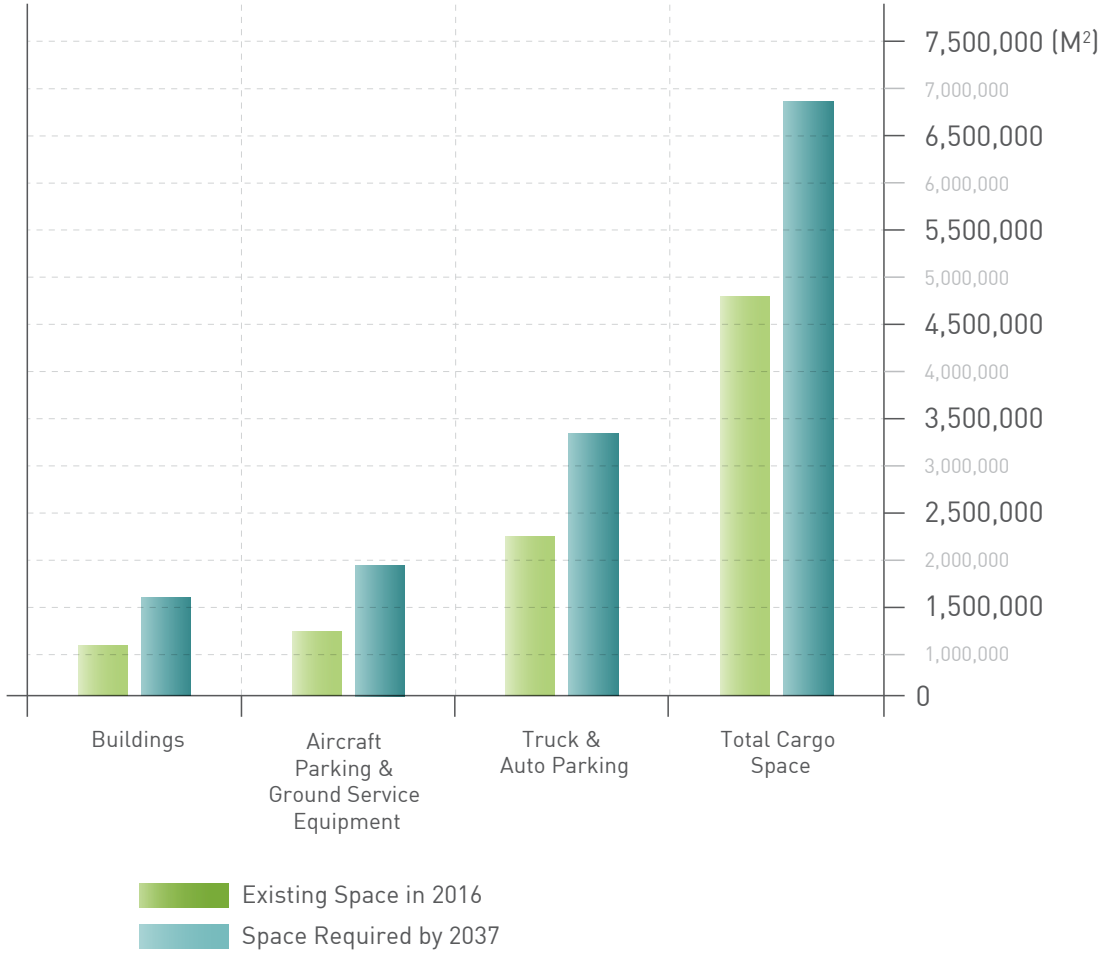
TO ACCOMMODATE FUTURE DEMAND, WE WILL NEED TO INCREASE THE AVAILABILITY OF APRON SPACE AND CARGO AIRCRAFT PARKING AT YVR. WE ALSO NEED TO RESERVE ENOUGH SPACE TO RECEIVE, STORE AND PROCESS CARGO, WHILE ENSURING WE HAVE ADEQUATE DOCKING AND PARKING SPACE TO ACCOMMODATE GROUND SHIPMENTS TO AND FROM THE AIRPORT.

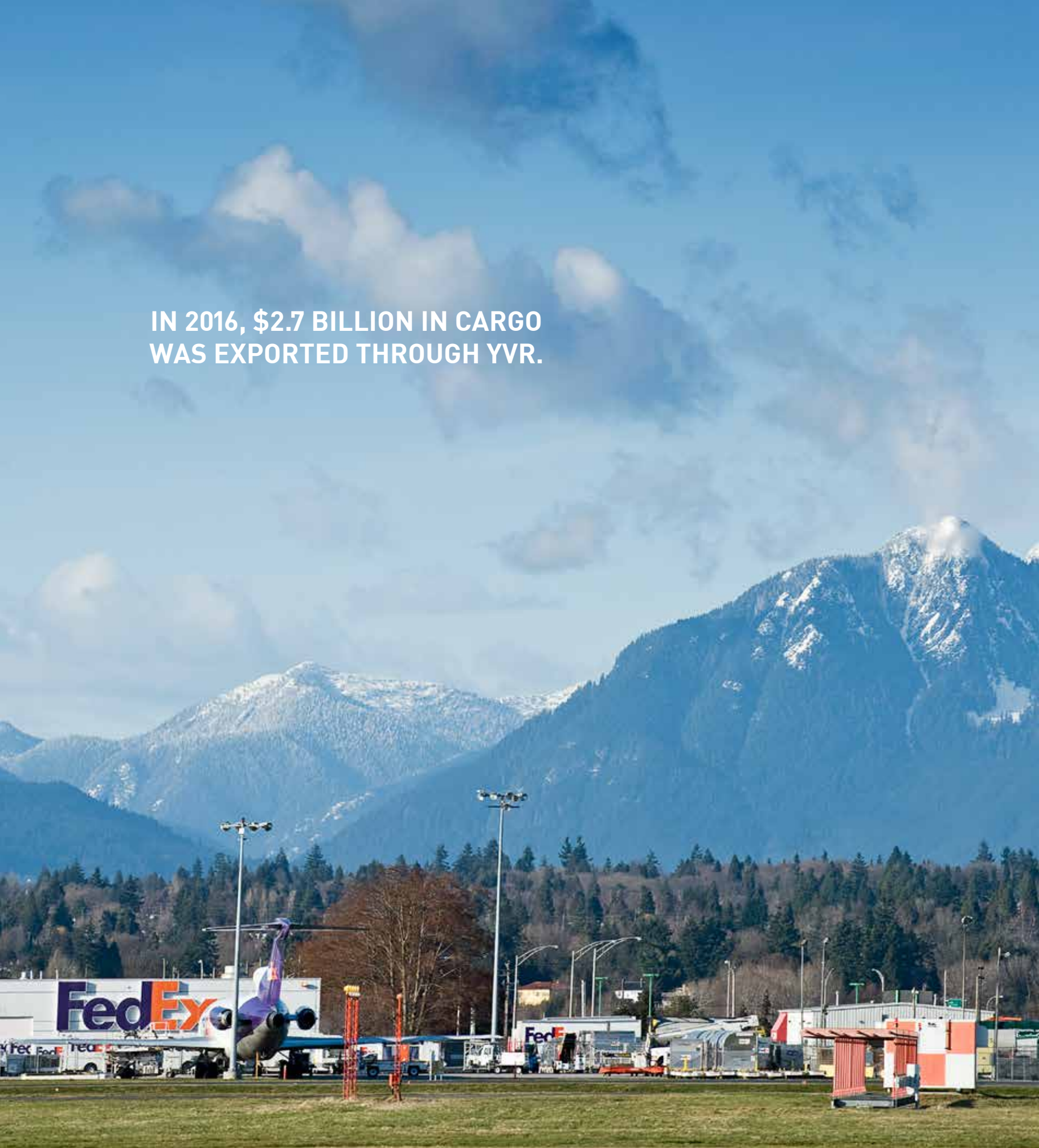
To assess the demand for cargo facilities at YVR over the next 20 years, we used the air cargo model developed by the Airport Cooperative Research Program. This model was calibrated to YVR's current capacity and validated by an independent air cargo consultant. Model inputs included air cargo forecasts, while the outputs included estimates of the future building footprint and site requirements. These outputs were informed by and verified through consultation with cargo partners.

Based on the model outputs, we have developed a plan for the expansion of our facilities that will enable us to meet the needs of the cargo businesses throughout the forecast period.

- Business partner input informed us that retaining Cargo Village as a single entity was important. Our evaluation told us that its current location was the best option as it provided sufficient space to accommodate growth. As a result, we will retain Cargo Village in its current location, with space being protected to the east for expansion and migration beyond 2037.
- Analysis showed that additional aircraft apron parking was urgent and essential. YVR will add more cargo aircraft parking for non-integrator businesses next to Cargo Village. We will also improve the existing aircraft apron designated for our integrator businesses.
- The old Templeton Building location and land at Airport North is available and designated as airside for uses that require direct access to the airfield, such as cargo facilities. This provides the opportunity for an expansion of the facilities for cargo related businesses.

In addition to these expansion plans, we will transition from our existing tenancy model, in which we act as the landlord and overseer of the cargo facilities, to an enhanced participation model that will help us plan for and execute on sustainable growth in this business area. Enhanced participation will see us actively exploring measures that could be implemented by the Airport Authority to stimulate and encourage cargo traffic growth. This will include renovation of the Cargo Village buildings on Miller Road, expansion and improvement of the existing CBSA commercial inspection facility, servicing of the Templeton site to enable its use for Integrator cargo operations and further consideration of a tail-to-tail air cargo facility to serve international belly cargo.




IN 2016, $2.7 BILLION IN CARGO
WAS EXPORTED THROUGH YVR.
FedEx

AIRPORT OPERATIONAL SUPPORT SERVICES

SECTION 09

AS YVR GROWS, A WIDE RANGE OF SUPPORTING SERVICES are required to ensure the safe and efficient movement of aircraft, passengers and employees. Our priority is to make sure that we allocate enough land and resources to maintain high service levels.

AIRPORT OPERATIONAL SUPPORT SERVICES TODAY

Airport operational support services include the security screening of non-passengers and their vehicles, aircraft de-icing and runway snow clearing, aircraft emergency response services, airport maintenance, wildlife management, construction, service coordination and monitoring, air traffic and apron control and Vancouver Airport Authority administration.

Some of these services are delivered directly by the Airport Authority, while others are contracted to third parties or are delivered by YVR in partnership with third-party contractors. For all operational support areas, YVR is responsible for providing the facilities and space required for the delivery of services.

KEY RECOMMENDATIONS: AIRPORT OPERATIONAL SUPPORT SERVICES

Near-Term

- Protect space for additional de-icing facilities.
- Protect space for a secondary aircraft emergency response services building to accommodate either of the two future runway options.
- Work with NAV CANADA to ensure they have sufficient facilities to conduct air traffic control today and in the future.

In the Future

- Construct new de-icing bays as required to meet growth.

*Specific recommendations on pages 94 and 95.

WHY IT MATTERS

While they're not always visible to our passengers, operational support services are integral to safe, secure and efficient operations. Services such as de-icing, aircraft emergency response services, airport maintenance, air traffic control and security screening ensure that risks are minimized and that passengers, baggage and cargo can travel securely and efficiently.

THE CHALLENGE

Looking ahead, the increase in the volume of passengers, cargo and aircraft passing through YVR will impact the demand for airside operational support services. For example, we will need more security checkpoints, more de-icing pads and more aircraft parking positions. We may also need to relocate some of our existing operations to make room for new infrastructure. To continue offering the same level of service, efficiency and safety, we need to provide sufficient space, the necessary infrastructure and the required resources. We will do so by balancing multiple requirements to ensure the efficient use of existing infrastructure and optimal land use allocation while protecting room to grow.


NOZZLE
BURDA

A SOLUTION FOR THE FUTURE

PASSENGER, RUNWAY MOVEMENT AND CARGO FORECASTS PROVIDED THE STARTING POINT IN IDENTIFYING THE INFRASTRUCTURE REQUIRED TO MAINTAIN AIRSIDE OPERATIONAL SUPPORT ACTIVITIES.

By examining existing capacity and anticipated needs between now and 2037, exploring the regulatory, technological and other changes that might affect service requirements and evaluating our existing land and facilities, we identified the best way to meet the forecast demand.

Non-Passenger and Vehicle Screening

Transport Canada requires employees and their vehicle to be subject to a security search when entering a restricted area.

To address the increased screening volumes at peak times, achieve greater efficiency and address the other proposed developments on existing facilities, we plan to expand these screening facilities.

Snow Clearing and De-Icing

Winter weather can slow operations. Runways need to be cleared of snow and aircraft need to be inspected and de-iced prior to take-off. Today, YVR maintains two de-icing locations, but in the future as aircraft movements grow we will need to increase capacity.

Based on aircraft movement forecasts for 2037, our current de-icing capacity will enable us to accommodate only 76 per cent of total anticipated demand on a winter day with our current facilities. In addition, we will need to relocate some our existing de-icing facilities due to terminal expansion. To address these issues, we will:

- Add two de-icing bays to the West De-icing Pad.
- Protect space for additional de-icing facilities in the West Airfield.

Aircraft Rescue and Firefighting

Operating 24 hours a day and 365 days a year, the Vancouver Airport Authority Emergency Services team ensures that YVR complies with aviation regulations for aircraft emergencies. Our existing facility at the Airside Operations Building enables us to meet the highest levels of regulatory compliance and respond to the midpoint of each of our runways within three minutes. However, the addition of a foreshore runway would require additional facilities. To plan for this, we will:

- Reserve airfield space for additional aircraft rescue and firefighting facilities as required to meet regulated response times to runway emergencies.

WINTER SUPPORT INFRASTRUCTURE

1. Primary De-Icing Location
2. Secondary De-Icing Location
3. Potential De-Icing Location

Operations Centre

The Integrated Operations Centre (IOC) relies on communications and visual monitoring equipment to coordinate all airport operations, including IT, terminal operations, terminal security, ground transportation and airfield operations. It also provides 24-hour response for emergencies or incidents, including airside incidents that require activation of the Emergency Operations Centre (EOC). We will monitor the space requirements of the facility carefully to ensure it continues to support our growth.

Air Traffic Management

YVR's air traffic management services are provided by NAV CANADA, Canada's not-for-profit air navigation provider. In the future, as aircraft activity grows, apron control services will be required.

The Airport Authority will work closely with NAV CANADA to ensure they have sufficient facilities to conduct air traffic control today and in the future.

THE EMERGENCY RESPONSE TEAM IS REQUIRED TO RESPOND WITHIN THREE MINUTES TO THE MID-POINT IN EACH RUNWAY.

BETWEEN 2015 AND 2037, **THE NUMBER OF VEHICLES REQUIRING SCREENING COULD INCREASE BY 80%.**

Airport Authority Offices and Facilities

Airport Authority employees are based in four primary locations on Sea Island: the Link Building and Pier D offices in the main terminal, the Aylmer Road Complex (ARC) and the Airside Operations Building. These facilities are nearing capacity, and in the next 20 years, we will need to monitor our office and facility space requirements carefully to ensure they keep pace with our growth. To determine the footprint we will need, we plan to initiate a study to determine the number of employees that the Airport Authority will need by 2037.

AVIATION RELATED COMMERCIAL

YVR PROVIDES SPACE FOR A NUMBER OF BUSINESSES that require close proximity to aircraft, including those that provide food and beverage preparation for airline passengers, services for private and chartered aircraft and aircraft maintenance.

SECTION
10

AVIATION RELATED COMMERCIAL TODAY

Aviation related commercial businesses support airline and passenger needs and contribute to the region's economy. These businesses include flight kitchens, fixed-base operators and aircraft maintenance organizations. While they are owned and operated by third parties, YVR is responsible for ensuring that there is adequate space for these businesses to operate.

Currently, there are two flight kitchens that provide catering services for the airlines serving YVR. Three fixed-base operators, which provide services and support for private and chartered aircraft, occupy buildings and apron space at Airport South. A total of 10 aircraft maintenance facilities are located throughout Sea Island.

KEY RECOMMENDATIONS: AVIATION RELATED COMMERCIAL

- Protect space next to the Air Canada North Hangar for airside uses, including potential aircraft maintenance facilities.
- Protect space at Airport North for airside uses, including potential aircraft maintenance facilities.

WHY IT MATTERS

Aviation related commercial services are essential to aircraft operations at YVR. From the flight kitchens that prepare food and beverages for air travellers to the maintenance support that ensures aircraft are flight ready, these services enhance the safety, efficiency and quality of the passenger experience.

While YVR does not directly manage these businesses, we are responsible for providing the space required for the delivery of these services. By forecasting the space requirements for these businesses, we can support service delivery over the long-term and ensure that YVR can fulfill its vision to be a world class sustainable connecting hub.

THE CHALLENGE

As we plan for the future, we will need to balance the land requirements of a wide range of resources and services. Aviation related commercial services are essential to the passenger experience and the goals set out in the Strategic Plan.

To support vital YVR based aviation related businesses over the long-term, we have forecast future demand, calculated the anticipated impact on space requirements and prioritized competing demands for airside space.

A SOLUTION FOR THE FUTURE

TO DETERMINE THE BEST WAY FORWARD, WE EVALUATED OPTIONS USING A DETAILED DECISION MATRIX. THE MATRIX EXAMINED A SET OF CRITERIA RELATED TO THE SUPPORTING OBJECTIVES IN THE STRATEGIC PLAN AND TOOK INTO ACCOUNT THE STRATEGIC VALUE OF THESE BUSINESSES COMPARED TO THAT OF OTHER ACTIVITIES ON SEA ISLAND.

Flight Kitchens

Flight kitchens provide food and beverage service to airlines, ranging from first class, full service meals to snacks and beverages served in economy. Demand is primarily driven by passenger volumes, but also by each airline's catering policy, which can vary depending on the type of flight. A full service, first class international flight can require a variety of labour-intensive fresh meals and beverage options, while a short, low-cost domestic flight may not require food service at all. Currently, YVR flights are serviced by two kitchens: CLS Catering Services and Gate Gourmet.


BRITISH AIRWAYS

YVR PROVIDES **650,000 SQUARE FEET OF HANGAR AND MAINTENANCE SPACE** ON SEA ISLAND.

Fixed-Base Operations

Fixed-base operators (FBOs) provide services and support to general aviation clients, including private and chartered aircraft—small corporate aircraft, large government aircraft and private aircraft that do not arrive or depart from the main terminal. Services can include refuelling, short-term hangar rental and concierge style services such as hotel and rental car bookings.

FBOs at YVR occupy building and apron space at Airport South. With the number of operators and the space they require expected to remain relatively stable over the forecast period, we plan to retain the FBOs in their existing location.

Aircraft Maintenance

YVR accommodates a wide range of maintenance services, from aircraft engine overhaul to preventative maintenance on the smallest to the largest of aircraft. Additional space may be required for expanded aircraft maintenance operations over the next 20 years and we plan to:

- Preserve space next to the Air Canada North Hangar for aircraft maintenance facilities.
- Preserve space in Airport North for aircraft maintenance facilities that may need to be developed beyond the lifespan of this Master Plan.

GROUNDSIDE COMMERCIAL

SECTION 11

GROUNDSIDE SPACE ON SEA ISLAND SUPPORTS MANY COMMERCIAL ENDEAVOURS. While aviation related businesses take precedence, groundside commercial has the potential to support a range of valuable and innovative developments that ultimately support the airport.

GROUNDSIDE COMMERCIAL TODAY

MANY DIFFERENT BUSINESSES SHARE AIRSIDE AND GROUNDSIDE SPACE ON SEA ISLAND.

Because airside land is both limited and extremely valuable, it is reserved for businesses and development that require access to the airfield such as aircraft maintenance and cargo related functions.

Commercial businesses that don't require direct access to the airside system are situated groundside, beyond the perimeter of the airside area. These businesses are divided into two types—aviation dependent and aviation compatible.

Aviation dependent businesses specifically benefit from close proximity to the airport and provide services that facilitate or enhance air travel. Fuel storage facilities, for example, need to be close enough to the airport to enable efficient fuel delivery, but such facilities don't require direct airside access.

Aviation compatible businesses are not directly related to air travel, but support the ongoing development of YVR as a sustainable gateway and connecting hub. The McArthurGlen Designer Outlet Vancouver Airport, a successful joint venture between the Airport Authority and McArthurGlen, is one of the more recent examples of this type of business and one that has increased YVR's groundside commercial development significantly. Revenues derived from aviation compatible businesses are reinvested back into the airport facility to offset the costs of ongoing operations and long-term capital projects.

Currently, aviation dependent and aviation compatible commercial businesses occupy 51 hectares of Sea Island. These businesses include the agricultural leasehold on Airport North and the mixed-use commercial development at the corner of Russ Baker Way and Dinsmore Bridge. Other commercial developments built on private land on Sea Island include the Pacific Gateway Hotel and the Lysander Lane Office Building. Subject to airport zoning constraints, there are approximately 97 hectares of unleased, vacant land that could support a range of commercial uses.

KEY RECOMMENDATIONS: GROUNDSIDE COMMERCIAL

- Pursue value added, aviation dependent and aviation compatible commercial developments on Russ Baker Way and Templeton South sites.

WHY IT MATTERS

Groundside development offers new opportunities for the airport and the surrounding community. The ongoing demand for commercial, industrial and retail space, coupled with improved accessibility offered by the Canada Line, makes Sea Island a more attractive location for a range of businesses.

Groundside commercial development provides potential new sources of non-aeronautical revenue, which enhances YVR's competitiveness, improves the financial viability of the airport, boosts the airport's contribution to the regional economy and potentially limits the increases to fees and charges that air carriers and passengers must pay.

THE CHALLENGE

YVR benefits from a location that offers many business advantages, including proximity to rapid transit. However, there are a number of criteria that restrict groundside commercial development activity. This type of development must not interfere with airport zoning, airfield or airside operations, nor be located within an area required for airfield or airside expansion.

In addition, as part of our sustainability framework, we need to compare the potential financial returns of a new groundside commercial development against the impacts of additional vehicle traffic that the development will generate and ensure development activities align with regional and municipal plans.


POLO RALPH LAUREN

GROUNDSIDE COMMERCIAL DEVELOPMENT

Land Available for Groundside Development

GROUNDSIDE COMMERCIAL IN THE FUTURE

WE CONSIDERED THE SUITABILITY OF A RANGE OF VACANT SITES ON SEA ISLAND FOR GROUNDSIDE USES. EACH LOCATION WAS EVALUATED TO ENSURE THAT DEVELOPMENT WOULD NOT ADVERSELY AFFECT AIRPORT OPERATIONS.

We also ensured that the locations were not required for airside uses for the duration of the Master Plan, that they offered good groundside access and that no alternative revenue generating use had been identified for them. Based on these criteria, we determined that the Russ Baker Way and South Templeton sites are best suited to groundside commercial development over the forecast period.

We propose to develop these sites for aviation dependent and aviation compatible commercial uses. These sites, or portions of them, will also be considered for additional airport parking.

Many business partners and community members indicated they were interested in being consulted about the development of these sites. This consultation will be the next step in our Master Plan. Of greatest interest is the parcel of land between BCIT and Dinsmore Bridge, across from Larry Berg Flight Path Park, which will be considered within the Sea Island East Area Plan.

We heard that people are concerned about additional traffic that may accompany the development of this site. We also received valuable input from the community, including residents of Burkeville and neighbouring municipalities, which offered ideas for potential community amenities to be considered as part of future development. As part of the Sea Island East Area Plan development, we plan to conduct an inclusive consultation process to capture stakeholder and community views on the future of these sites.

I AM ONE OF MANY LOCAL AVIATION ENTHUSIASTS WHO VISIT AND ENJOY THE AMENITIES AT YVR. DURING THE YVR 2037 MASTER PLAN CONSULTATION PROCESS, **I WAS PLEASED TO LEARN YVR HAS SOME EXCITING PLANS THAT DIRECTLY CATER TO THE PLANE-SPOTTING COMMUNITY.**

In particular, I am looking forward to a new plane-spotting platform on the north side or eastern end of the airport.

– ZELJKO TRAVICA

SECTION 12

WHILE YVR IS AN ECONOMIC GENERATOR, we are also a community contributor. Part of our role as a good community steward involves providing world class amenities, including a range of attractions and recreational offerings on Sea Island.

COMMUNITY AMENITIES

COMMUNITY AMENITIES TODAY

AMENITIES ON SEA ISLAND CONSIST OF RECREATIONAL AND COMMUTER CYCLING ROUTES, WALKING PATHS, PARK SPACE, NATURAL AREAS, PLANE-SPOTTING AREAS AND COMMUNITY AND PUBLIC SPACES.

Existing amenities include:

- Larry Berg Flight Path Park—a park near the South Runway that's open to the public for plane-spotting, picnics and gatherings.
- McArthurGlen Designer Outlet Vancouver Airport—an open air, village style shopping centre located near Templeton Station on the Canada Line.
- Cycling infrastructure, including cycling lanes on the Arthur Laing Bridge and most major roadways and separated multi-use pathways adjacent to Russ Baker Way and under the Arthur Laing Bridge.
- Walking paths in Chester Johnson Park and adjacent to Sea Island Conservation Area.

COMMUNITY AMENITIES

- Existing Cycling Infrastructure (Bicycle Lanes & Shared Use Lane)
- Future Cycling Infrastructure Improvements/ Extensions
- Existing Multi-Use Pathway
- Proposed Multi-Use Pathway Improvement/ Extension
- Proposed Bicycle Parking/End of Trip Facilities
- Proposed Plane-Spotting Platform
- Existing Plane-Spotting Platform
- Children's Playground/ Green Space

KEY RECOMMENDATIONS: COMMUNITY AMENITIES

- As part of our area planning initiatives we will work with our community to help prioritize amenities for the near, mid and long-term while integrating community amenities into capital projects.
- Protect for and prioritize construction of an Active Transportation Ground Access Network and a Recreation Network on Sea Island.
- Prioritize amenities projects that are fundamental to the Sea Island Community Amenities Vision and connect to near-term capital plan projects.
- Build a plane-spotting platform for the North Runway.
- Work with partners and stakeholders to develop amenities that are multi-jurisdictional.
- Work with Musqueam and partners to develop Sea Island signage with cultural and historical information, fast facts and wayfinding.

*Specific recommendations on pages 116 and 119.

WHY IT MATTERS

We are committed to making the community a better place and one that recognizes the traditional heritage and helps to provide recreational amenities on Sea Island.

During consultation, we heard that Sea Island's history and public spaces are important to the local community. We share these priorities and we will ensure that adequate green space and other amenities are incorporated into projects as we continue to grow. In collaboration with other organizations that govern land use in the region, we will actively seek out opportunities to improve community access to Sea Island and enhance the public's experience of this unique area. Our regional government partners highlighted the importance of connecting pathways and networks and we will continue to work with the City of Richmond, City of Vancouver, Metro Vancouver and other partners to help create more cohesive networks and recreational opportunities.

THE CHALLENGE

Developing amenities around airports involves special considerations. YVR's amenities must protect or enhance secure areas and maintain airspace safety by minimizing anything that attracts birds or wildlife that would be hazardous to aircraft. In particular, our commitment to sustainability and environmental stewardship requires us to create amenities that support a water-sensitive and salmon-safe environment and that can be accessed by transit, bicycle and on foot. Also, not all recreational areas fall under our jurisdiction: some are owned and maintained by Metro Vancouver or the City of Richmond. The Sea Island Conservation Area (SICA), which is dedicated to the conservation of wildlife and habitat, belongs to Environment Canada. To deliver a sustainable, integrated experience, we need to bring these individual interests together and balance the interests and priorities of stakeholders, the community and the general public to create a single vision.

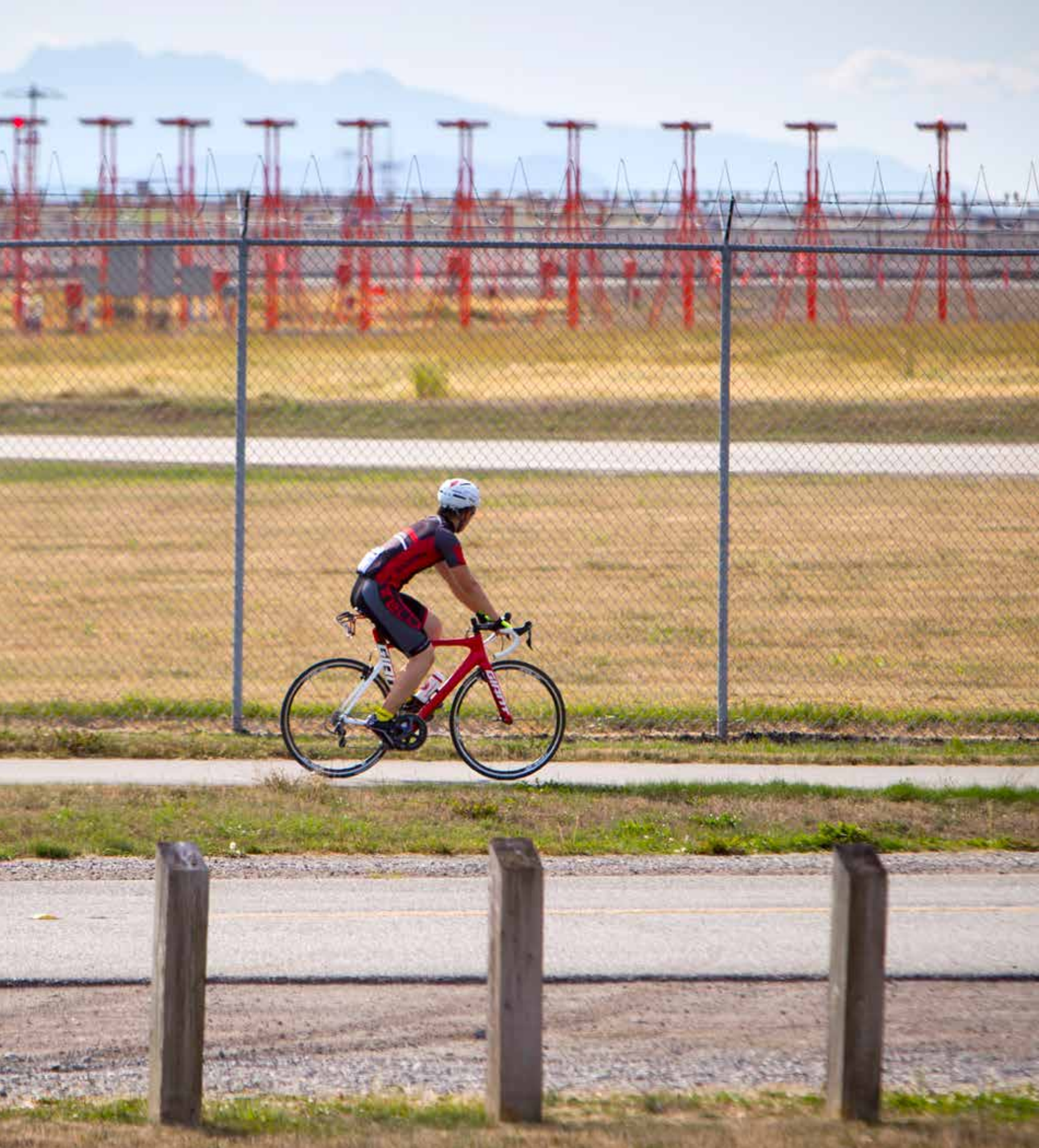
A SOLUTION FOR THE FUTURE

AS PART OF OUR MASTER PLAN, WE HAVE CREATED A UNIFIED VISION FOR SEA ISLAND'S COMMUNITY AMENITIES BETWEEN NOW AND 2037.

To create this vision, we engaged the community directly to identify their priorities and used this input to develop three core objectives:

- Create an Active Transportation Ground Access Network to provide sustainable ground access options for passengers, employees and business partners through a range of active transportation options including cycling, walking and universal access corridors.
- Create a Sea Island Recreational Network to provide airport passengers with world class experiences, employees with enhanced working conditions and local residents with strong, connected communities.
- Create an Inspiration and Education Network that highlights the role that YVR plays as an economic generator and showcases the airport's role in protecting the natural environment and cultural heritage of Sea Island.


rouge



DURING THE CONSULTATION PROCESS, WE LEARNED THAT MANY PEOPLE WERE UNAWARE OF THE RECREATIONAL OPPORTUNITIES ON SEA ISLAND. **WE LOOK FORWARD TO SHARING THIS INFORMATION AND INCREASING AWARENESS OF EXISTING AMENITIES.**

These objectives will be used to guide the development of a range of attractions and developments. These include recreational and commuter cycling routes and facilities, multi-use pathways, walking paths, park space, natural areas, plane-spotting areas and community and public spaces. In addition, we will work with partners and stakeholders to develop amenities that extend beyond Sea Island and benefit the wider community.

Over the forecast period, we plan to:

- Design and construct a plane-spotting platform with parking for the North Runway.
- Construct a multi-use pathway to connect the Russ Baker Way pathway to Cessna Drive, thereby connecting Flight Path Park, BCIT Aerospace and Technology Campus and the riverfront dyke trail.
- Construct an accessible, two-way active transportation corridor on the east side of Templeton Street to provide access between Burkeville, Templeton Canada Line Station and the Designer Outlet Centre.
- Widen and improve the Inglis Drive pathway to better accommodate pedestrians and cyclists.
- Identify opportunities and initiatives as part of Area Plan consultation on the east side of Sea Island including a multi-use pathway between No.2 road and the Airport Connector Bridge and engaging with City of Richmond on a vision for both sides of Middle Arm.
- Provide natural space near the main terminal and construct an accessible two-way active transportation corridor from the terminal to McArthurGlen Designer Outlet Vancouver Airport.
- Install bicycle parking facilities and improve access to these locations.
- Explore partnerships and collaborate with neighbouring jurisdictions to improve recreational access around and to the Sea Island Conservation Area and establish connections to Sea Island via improved bridge crossings.
- Work with Musqueam and partners to develop Sea Island Signage with cultural and historical information, fast facts and wayfinding.

I'M OPTIMISTIC ABOUT THE FUTURE OF YVR BECAUSE THERE IS A **WELL THOUGHT OUT PLAN THAT WAS DRIVEN BY PUBLIC CONSULTATION.**

The dialogue between YVR and the public has formed a real partnership. I look forward to seeing how the space will benefit children and families. This is what matters to me.

– PRIYA SINGH

SECTION 13

UTILITIES

TO PROVIDE CONTINUOUS, RELIABLE SERVICE, YVR must develop sustainable utility infrastructure and technologies capable of supporting the expected volume of activity that will take place on Sea Island over the next 20 years.

UTILITIES TODAY

THE MANAGEMENT AND PLANNING OF UTILITY SERVICES ARE AN ESSENTIAL PART OF YVR'S ONGOING OPERATIONS.

The utility systems included in our Master Plan are electrical power, heating sources, potable water, sanitary sewage, storm water and drainage, aviation fuel, Sea Island dykes and waste and information technology.

YVR's Environmental Management Plan and Energy Plan, both completed in 2014, set out various priorities, goals and initiatives that influence utility planning. Our Master Plan builds on that foundation by forecasting our long-term utility requirements and exploring ways to meet them while minimizing our environmental footprint.

We consulted and continue to work with other regional agencies such as FortisBC, BC Hydro, the City of Richmond and Metro Vancouver, all of which contribute to the systems and delivery of utilities to Sea Island.

** Concept Rendering Only

KEY RECOMMENDATIONS: UTILITIES

Near-Term

- Proceed with the implementation of a sustainable energy system for heating and cooling of terminal buildings.
- Develop and apply new energy-efficiency standards to new development on Sea Island.
- Explore sustainable energy generation options for power and heat such as solar thermal and photovoltaic systems, heat recovery and geo exchange.
- Renew the existing water supply network and existing sanitary system and replace aging infrastructure.

Mid-Term

- Plan major water and energy system improvements in coordination with other utility projects or expansion projects.

In the Future

- Plan for phased construction of two new 25kV electrical feeds to Sea Island.

FROM 1.4 BILLION LITRES IN 2007,
YVR'S ANNUAL AVIATION FUEL CONSUMPTION IS EXPECTED TO **GROW TO 2.25 BILLION LITRES BY 2037.**

WHY IT MATTERS

By anticipating our long-term utility requirements and future system capacity, we can ensure continuity of service and consistent service levels as our operations grow. Just as important, we can demonstrate leadership in sustainability—one of the four key supporting objectives of our Strategic Plan.

For the Airport Authority, sustainability is achieved through a balance of environmental, social, economic and governance aspects. Our goal is to build capacity to meet the forecast demand for utility services on Sea Island while reducing our environmental footprint. This includes finding ways to reduce waste, GHG emissions and the use of potable water.

THE CHALLENGE

To ensure that we can continue to deliver reliable service, we must address two key challenges. The first is to mitigate the risks posed by climate change, extreme weather events and seismic activity, which can affect the utility system in a number of ways. Extreme weather could overburden our dykes and storm drains or cause electrical outages that disrupt electricity and IT, while an earthquake could damage our electricity, natural gas, potable water and sanitary sewer systems.

We must also address our forecast growth and the challenge of reducing our environmental impact. By 2037, the consumption of electrical power, heating fuels, potable water and aviation fuel on Sea Island is predicted to increase. The amount of sanitary sewage produced by activities on Sea Island is also predicted to increase.

A SOLUTION FOR THE FUTURE

RATHER THAN A TRADITIONAL PREDICT AND PROVIDE APPROACH TO UTILITIES SERVICE PROVISION, WE HAVE ADOPTED A PLAN, MONITOR AND MANAGE APPROACH.

Instead of simply providing capacity with current methods for future demand, this approach involves assessing and integrating sustainable approaches to the provision of utility services.

This approach enables us to make the best use of our existing utility supply and infrastructure, maintain supply reliability and achieve our sustainability objectives.

We forecast future peak demand, taking into account passenger growth and development on Sea Island. We adjusted this forecast to reflect the demand management measures that we plan to put in place. We then assessed the capacity of the current supply technology and infrastructure to accommodate the forecast peak loads and identified the timelines and costs involved in expanding our existing infrastructure to meet the predicted demand. In addition, we looked at ways to minimize that demand through energy reduction initiatives and other means. We also made sure that our plans were capable of coping with the effects of climate change on supply and demand.

Electrical Power

YVR's electricity is supplied by BC Hydro. The Airport Authority purchases electricity for its own use and for redistribution to Sea Island tenants. The terminal is the Airport Authority's largest consumer of electricity, with power required for interior and exterior lighting, baggage systems, cooling systems, electronics and computers, moving walkways and elevators, ventilation, air conditioning systems, vehicles and power used by aircraft when gated.

To ensure we have enough electricity to maintain our existing services over the next 20 years, we plan to:

- Monitor the impact that electric vehicle charging requirements will have on our electrical infrastructure.
- Proceed with the implementation of the Electrical Infrastructure Project. This will address any shortfall in the amount of electricity required to service the main terminal as well as address seismic vulnerability that could affect the reliability of the electricity supply and backup capacity over the planning horizon.
- Explore the application of alternative technologies to offset conventional power consumption. Initially, we will focus on the potential of solar and electrical energy storage.
- Work with BC Hydro to secure a reliable and cost-efficient supply of electricity to Sea Island in the future. We will evaluate the option to upgrade our existing 69kV supply or to convert to a 25kV system.

Natural Gas

Natural gas is the primary fuel used to heat the main terminal buildings and other buildings on Sea Island that are occupied and need to be maintained at comfortable temperatures throughout the year. All natural gas mains are owned, operated and maintained by FortisBC.

To reduce both our emission levels and our reliance on non-renewable energy sources, we examined the feasibility of implementing a sustainable district energy system (DES), which generates heat at a central plant, transfers it to a fluid and distributes it through a network of pipes to buildings where it is used for space and water heating or cooling.

We expect the proposed DES to be operational by 2021 and we anticipate that it will significantly reduce our annual natural gas consumption.

To meet our peak heating and cooling requirements while reducing our environmental footprint, we plan to:

- Proceed with the implementation of a sustainable district energy system to heat and cool the terminal buildings.
- Develop new standards for energy efficient buildings and apply them to all new development on Sea Island.
- Continue to explore low-carbon alternatives, including solar thermal systems, a Sea Island sewage heat exchange, waste-to-energy co-generation and tri-generation and an ocean/river heat exchange.

Potable Water

We purchase water from the City of Richmond for use in our facilities and for resale to tenants on Sea Island. Our water distribution system includes approximately 42 km of water pipes, some of which were laid before the 1960s. To understand our system better, we are building a spatial database that identifies the year each pipe was built, the diameter, the material type, the anticipated lifespan and other key criteria.

We must ensure that our water supply system can deliver sufficient water for domestic and industrial uses as well as for fire response, which includes in-building sprinkler systems and street hydrants. We also need to build in redundancy so that our water supply is continuous and able to withstand local disruptions. And to maintain the quality of our drinking water, we need to create a system that recovers and reconditions water in a closed-loop system.

Given the Airport Authority's focus on sustainability, making efficient use of the potable water supply is a key consideration now and for the future. We must also look at ways to strengthen our water distribution system, minimize waste and reduce reliance on the potable water supply. We plan to:

- Renew the existing water supply network and replace aging infrastructure.
- Complete the spatial database and undertake hydraulic modeling to inform sound infrastructure planning, decision making and capital planning.
- Conduct further studies to determine the required investment in post-disaster water supply infrastructure and rainwater harvesting to offset municipal potable water use.
- Verify fire hydrant performance and identify areas requiring remedial action by conducting field fire-flow testing.
- Expand the existing metering program to meter non-revenue water and help to identify opportunities to reduce water usage.
- Plan major water system improvements in coordination with other utility projects or expansion projects to minimize disruption and reduce cost.
- Explore initiatives to advance water conservation within the terminals and across Sea Island.

Sanitary Sewerage

The sanitary sewage system owned and operated by the Airport Authority on Sea Island transports liquid waste through a network of pipes to Metro Vancouver's Iona Island Wastewater Treatment Plant.

Our sanitary assets include 24 owned and operated pump stations on Sea Island. The earliest sewer mains on record were constructed in 1969, and significant expansions to the system occurred in 1971, 1983 and 1994, with the international terminal building completed in 1996. Today, the sanitary system includes approximately 52 kilometres of sewer pipes made of asbestos cement, plastic, concrete, steel, cast iron or vitrified clay, depending on their vintage.

We are developing a spatial database that captures key criteria. While the data is not yet complete, we can estimate the replacement value of the system. We are also able to estimate the lifespan of various elements of our system.

Based on an examination of the existing system and forecast requirements, we plan to:

- Continually renew the existing sanitary system.
- Implement projects to enhance system resilience, including force-main twinning and new connections to enhance redundancy.
- Consider upgrading flow metering to an hourly cadence.
- Commission an inflow and infiltration study to improve quantification of sanitary flows, assist in future pumping station sizing and verify remaining capacity of the existing system.
- Conduct inspection programs to identify defects and prioritize rehabilitation for linear and non-linear assets.

Storm Water and Drainage

Parts of Sea Island lie below the high tide level, which is why it is surrounded by a dyke system. Drainage is provided by a series of enclosed storm sewers, open channels and culverts that lead to flood-boxes and pump stations. When the river water levels rise during storm events, the pump stations, combined with ditch storage, provide additional drainage.

Over the forecast period, we may see a greater frequency of extreme weather events that could generate more runoff than the pump stations can handle. To strengthen our drainage systems and prepare for the future, we plan to:

- Upgrade the drainage system to reduce the water levels throughout Sea Island and reduce the flooding risk for the 1:100 year event, as identified in the Capital Plan.
- Undertake ongoing maintenance to ensure optimal performance of the drainage system.
- Review and update drainage standards as our understanding of climate change and the impacts of extreme weather events evolves and modify the capital and maintenance programs accordingly.

Dykes

The low elevations of Sea Island make it vulnerable to flooding from both the Fraser River and the Strait of Georgia. A 15-kilometre perimeter dyke system is designed to protect Sea Island from floods and erosion. This system will need to protect the area from high tides, global sea level rise, storm surge and wave action. To protect Sea Island from these threats over the forecast period, we plan to:

- Conduct ongoing maintenance to maintain levels of protection afforded by the existing dyke system.
- Progressively raise the dyke crest elevation to 4.7 metres geodetic to align with the standard adopted by the City of Richmond.
- Monitor and revisit this standard as new information becomes available regarding climate change, sea level rise and extreme weather events and as accepted standards of dyke crest elevation change.

Waste

Waste reduction is a priority at YVR. We are committed to reducing, reusing and recycling the waste generated by our offices, terminals, operations, passengers, in-terminal tenants and airport construction projects wherever possible. We also support the efforts of our tenants on Sea Island to reduce the waste they produce.

Between 2014 and 2016, we reduced waste generated at the terminal that went to landfill by 11 per cent and improved our diversion rate from 35 per cent to 51 per cent. We believe we can improve even further. We plan to:

- Divert more organics and recyclables from the landfill through continuous engagement with our tenants.
- Make strategic investments in technology and equipment that support our waste reduction and greenhouse gas reduction goals.
- Introduce initiatives to reduce the overall amount of waste produced.

Information Technology

Information technology (IT) is core to the service we provide in our terminals and across Sea Island. Our IT system consists of both passive infrastructure and active services.

The passive infrastructure, which consists of the ducts, communication rooms, cables, fibre optics and antennas, is variously owned and maintained by the Airport Authority and third-party providers. The active services, which are provided by both the Airport Authority and third-party providers, include phone, radio, television, CCTV cameras and other means of transferring voice, video and other types of data.

Over the forecast period, we are committed to enhancing the security and stability of our telecommunications services and ensuring that voice, video and data services are available to employees and affiliates in any location on Sea Island. We plan to:

- Manage, maintain and expand the passive infrastructure on Sea Island to meet the demand and in accordance with CRTC regulations, industry standards and Airport Authority standards.
- Continue to support wired and wireless connectivity across Sea Island.
- Monitor new technologies and emerging capabilities that provide an opportunity to leverage existing and future telecommunications and network infrastructure at lower cost.

Aviation Fuel

For aircraft using the Main Terminal, fuel service is provided by the Vancouver Airport Fuel Facilities Corporation (VAFFC). The main source of aviation fuel is a pipeline operated by Kinder Morgan Canada, which pumps fuel into a series of tanks on Sea Island. Fuel is also transported by truck from Washington state refinery. Fuel is stored in tanks and then delivered to aircraft through a hydrant fuelling system or via tanker truck. Currently over 1,200 tanker trucks are required to make round-trip journeys of 150 kilometres per month—a situation that contributes to traffic congestion and increased emissions.

Over the forecast period, aircraft fuel requirements at YVR are predicted to grow considerably. From a rate of 1.4 billion litres in 2007, YVR's annual aviation fuel consumption is expected to reach 2.25 billion litres by 2037. To address the growing need for fuel, minimize the environmental impact and support a safe, consistent and sustainable fuel supply, we plan to:

- Proceed with permitting that will enable construction of a VAFFC fuel pipeline to deliver fuel to Sea Island and eliminate the need for regular tanker truck deliveries.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AS YVR CONTINUES TO GROW AND SUPPORT AN INCREASING NUMBER OF GLOBAL CONNECTIONS, **IT'S IMPORTANT THAT WE HAVE THE OPPORTUNITY TO SHARE OUR THOUGHTS ON THE FUTURE OF THE AIRPORT. YVR'S AIRSIDE SYSTEM IS VITAL TO THE AIRPORT'S DAY-TO-DAY OPERATION.**

I look forward to engaging in ongoing discussions around long-term decisions such as the potential Foreshore and Close-In South Parallel Runway options.

- DOL IMNAMKHAO

SECTION 14

WE ARE COMMITTED TO FINDING WAYS to balance the need for safe, convenient 24-hour air travel with enjoyable urban living. As we look to a future of continued growth, managing noise and addressing community expectations will remain a key consideration.

AERONAUTICAL NOISE EXPOSURE

AERONAUTICAL NOISE EXPOSURE TODAY AND IN THE FUTURE

MINIMIZING AERONAUTICAL NOISE HAS ALWAYS BEEN AN AREA OF FOCUS FOR YVR AND IT WILL CONTINUE TO BE A PRIORITY IN THE FUTURE.

To illustrate and compare current noise levels with potential future noise levels associated with our forecast growth in air traffic, we used a combination of three metrics to create a generalized projection and overview of noise and flight patterns around YVR over the forecast period:

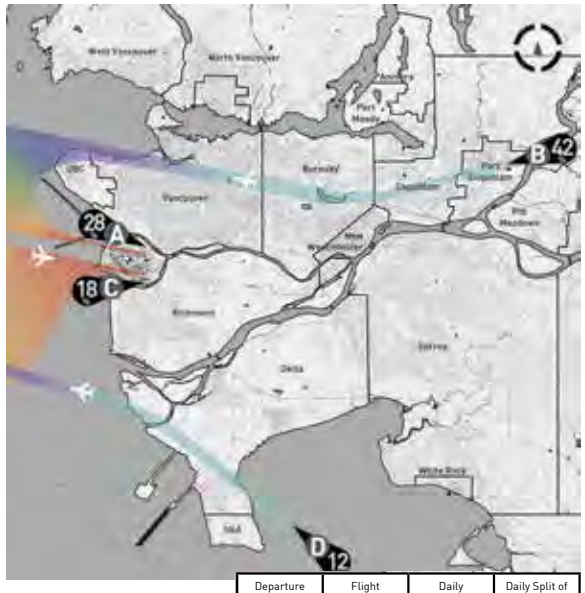
- **Long-Term Planning Noise Exposure Forecast (NEF) Contours:** The NEF is the official metric used by Transport Canada for the assessment of aircraft noise. These contours are created using special software made available by Transport Canada. The NEF provides an indication of the actual and forecast aircraft noise in the vicinity of airports. The sole purpose of the NEF is to help aviation planners and those responsible for developments adjacent to airports to implement compatible land use practices. The current NEF contour that YVR uses for long-term land use planning was created in 1994 using 20-year forecast period extending to 2015.
- **Flight Path Projections:** All areas in Metro Vancouver are exposed to some level of aircraft over flights, even in areas that are not immediately under the major flight paths or are located far away from the airport. Flight path projections create a graphical representation of the common arrival and departure routes used by the majority of aircraft. We developed these projections to help our community better understand the potential change in distribution of daily aircraft movements over Metro Vancouver. We compared traffic activity during a peak planning day in 2015 (actual) to a peak planning day in 2037 (forecast), which included future aircraft types and growth in traffic services. This presentation of information makes it easier to see and understand where aircraft fly, unlike the NEF contours that do not show the flight paths and typical operating altitudes of aircraft.

- **N70 Contours:** N70 contours represent the number of aircraft noise events that exceed 70 dBA over a 24-hour period. A dBA is a decibel unit that is weighted to reflect the fact that the human ear is more sensitive to high-frequency sounds and less sensitive to low-frequency sounds emitted at the same decibel level. The value of 70 dBA was chosen because it may interrupt activities such as having a conversation or watching television inside a home if the windows are open. N70 contours were created for a 24-hour period using a peak planning day in 2015 (actual) and a peak planning day in 2037 (forecast).

  Note: The flight path projections and N70 contours were created using current flight paths, operating procedures and technologies and did not account for future changes to airspace flight paths and procedures, as these remain unknown at this time. While changes to flights path are expected to accommodate emerging air navigation technologies such as Required Navigation Performance (RNP), nothing has been finalized to date. In the event of any potential changes to flight paths, we will work with NAV CANADA to ensure the community is kept updated and informed.

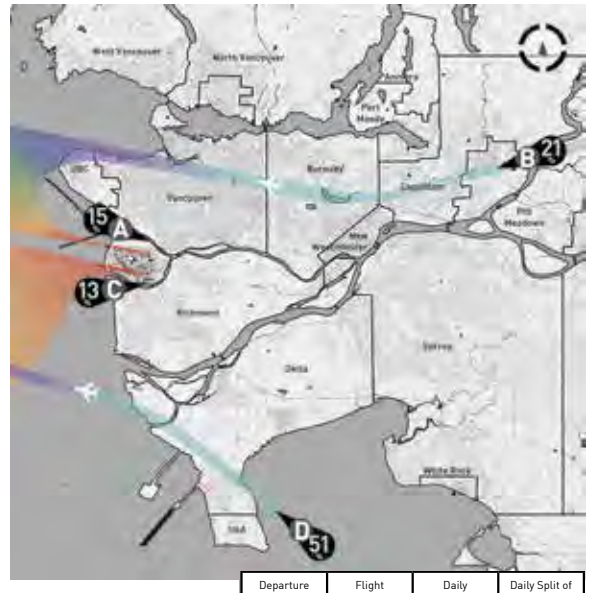
FLIGHT TRACK MAPS
RUNWAY 08

ARRIVALS



2015

Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
08L	A	128	28%
	B	195	42%
08R	C	83	18%
	D	58	12%



2037 PROJECTION

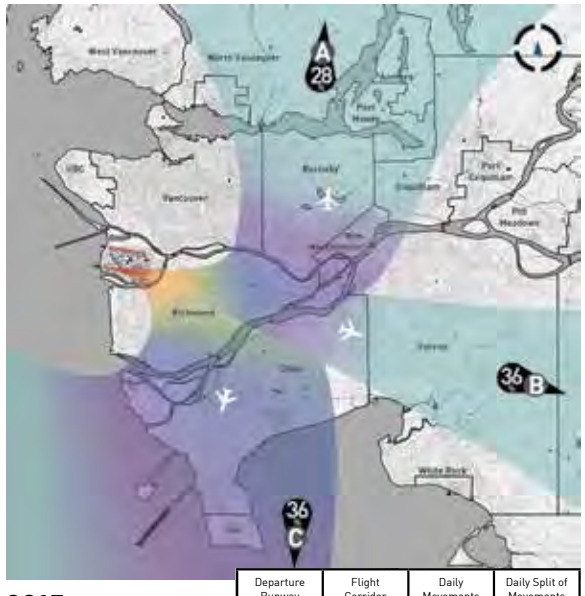
Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
08L	A	91	15%
	B	128	21%
08R	C	79	13%
	D	312	51%

LEGEND

- 0'-1000'
- 1000'-2000'
- 2000'-3000'
- 3000'-4000'
- 4000'-5000'
- 5000'+

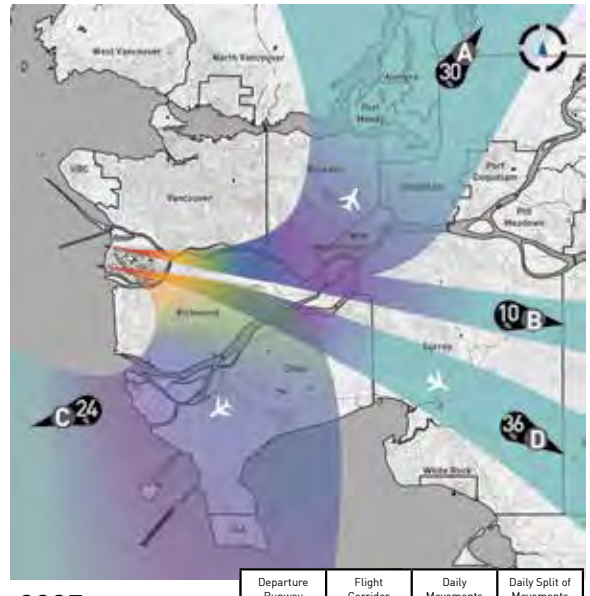
All Altitudes Above Mean Sea Level [AMSL]

DEPARTURES



2015

Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
08R	A	132	28%
	B	170	36%
	C	172	36%

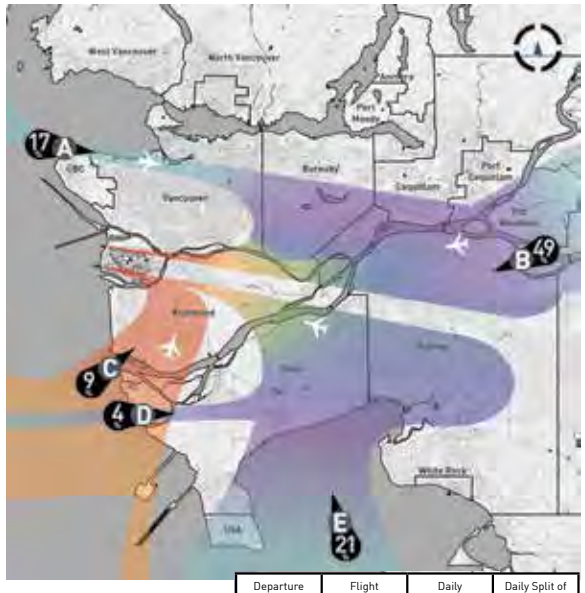


2037 PROJECTION

Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
08L	A	188	30%
	B	60	10%
08R	C	147	24%
	D	227	36%

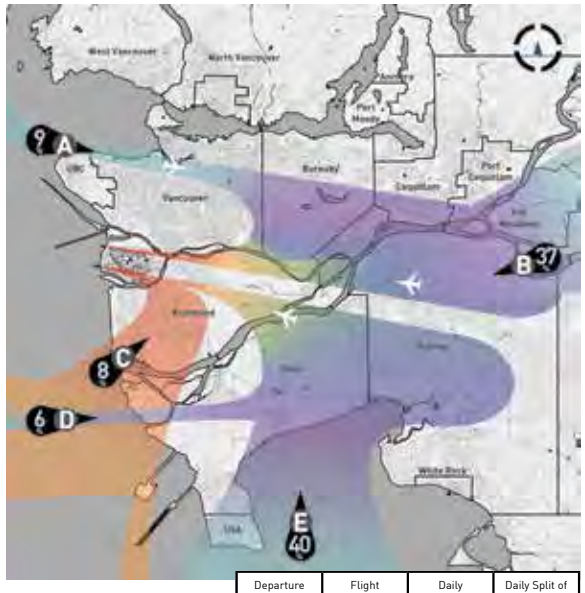
FLIGHT TRACK MAPS
RUNWAY 26

ARRIVALS



2015

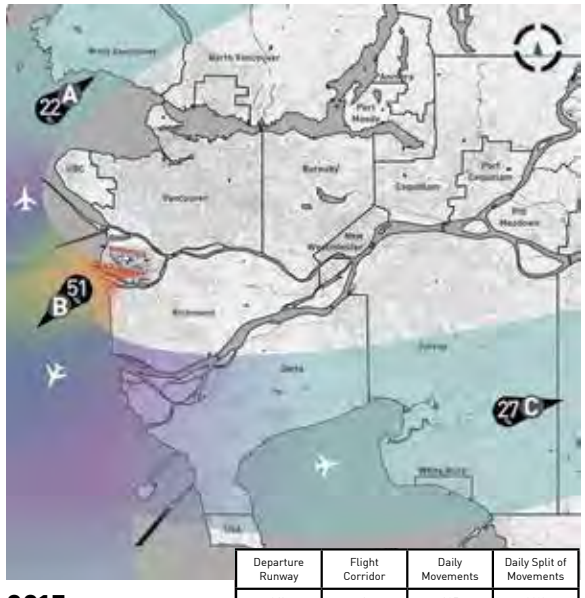
Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
26R	A	79	17%
	B	226	49%
26L	C	43	9%
	D	19	4%
	E	97	21%



2037 PROJECTION

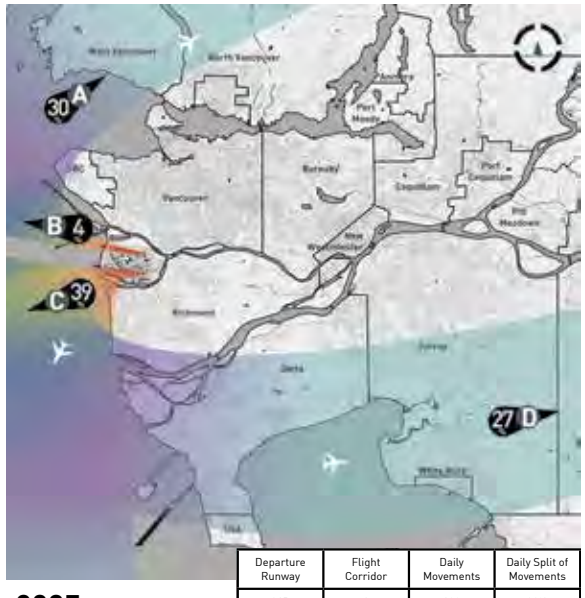
Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
26R	A	53	9%
	B	224	37%
26L	C	48	8%
	D	38	6%
	E	247	40%

DEPARTURES



2015

Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
26L	A	105	22%
	B	243	51%
	C	126	27%



2037 PROJECTION

Departure Runway	Flight Corridor	Daily Movements	Daily Split of Movements
26R	A	188	30%
	B	24	4%
26L	C	241	39%
	D	169	27%

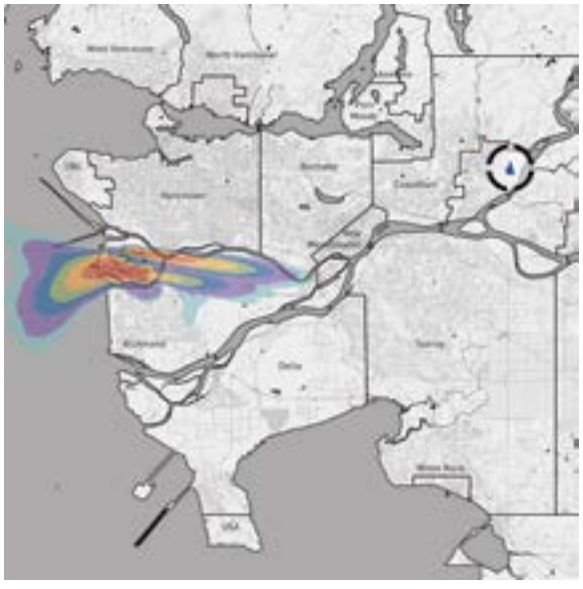
LEGEND

- 0'-1000'
- 1000'-2000'
- 2000'-3000'
- 3000'-4000'
- 4000'-5000'
- 5000'+

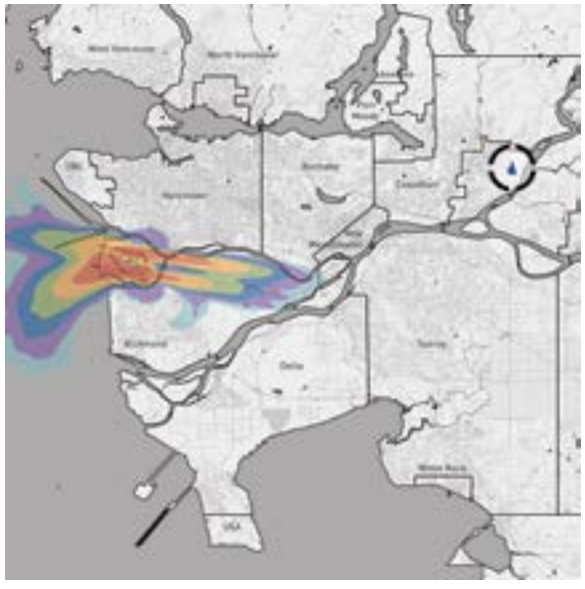
All Altitudes Above Mean Sea Level [AMSL]

N70 CONTOURS
NUMBER OF EVENTS OVER 70 d(BA)

RUNWAY 26



2015



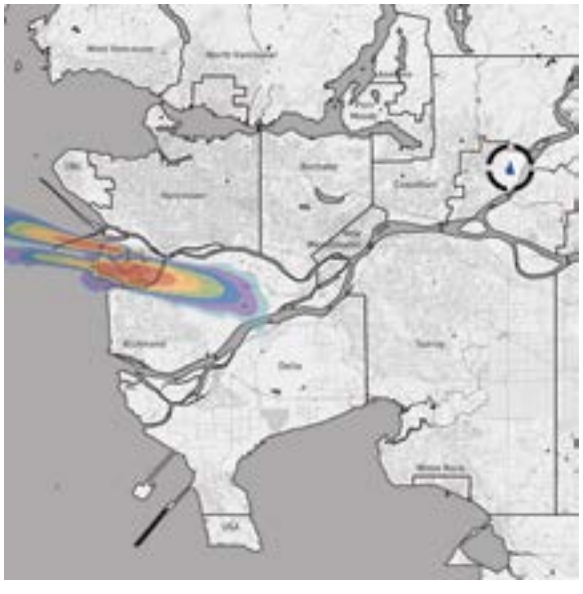
2037 PROJECTION

LEGEND

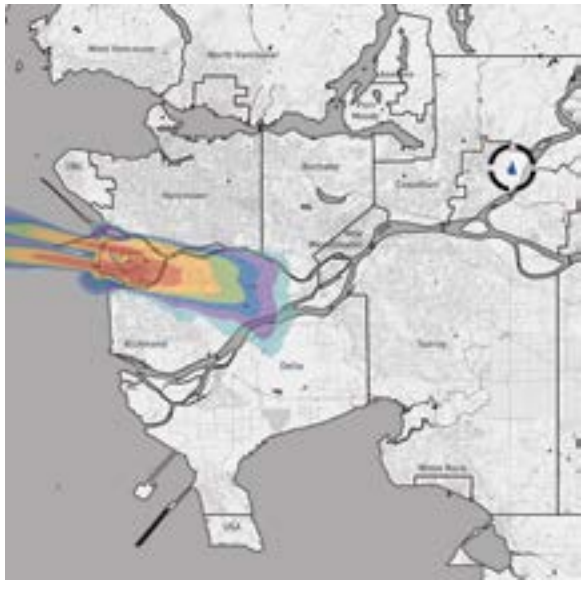
Number of Events
Above 70dB(A)

- 200-399
- 100-199
- 50-99
- 25-49
- 10-24
- 5-9

RUNWAY 08



2015



2037 PROJECTION

EXAMPLES OF SOUND dB(A)

EMERGENCY SIREN
140 + dB(A)

PNEUMATIC DRILL
95 dB(A)

HEAVY DIESEL TRUCK
83 dB(A)

MODERN TWIN-ENGINE JET TAKE-OFF AT A DISTANCE OF 152M
81 dB(A)

PASSENGER CAR
70 dB(A)

OFFICE ENVIRONMENT
60 dB(A)

ORDINARY CONVERSATION
50 dB(A)

LIBRARY READING ROOM
40 dB(A)

QUIET BEDROOM
35 dB(A)

THRESHOLD OF HEARING
0 dB(A)

Source: Perth Airport Master Plan 2014, page 213

KEY RECOMMENDATIONS: AERONAUTICAL NOISE EXPOSURE

- Continue efforts to manage noise through the YVR Aeronautical Noise Management Program and create proactive plans that incorporate new technologies and responds to community concerns.
- Retain the existing 2015 Noise Exposure Forecast (NEF) contours for long-term compatible land use planning purposes.
- Provide current and future flight path projections and N70 noise contours to help communicate possible changes to the noise environment associated with forecast growth.
- Update flight path projections and the N70 noise contours as required to account for new flight paths and advancements in aircraft noise reduction technologies.
- Work with regional municipalities to address specific concerns related to projected growth in aircraft traffic and noise impacts for their community along with our partners at NAV CANADA and the YVR Aeronautical Noise Management Committee.
- Work with NAV CANADA during the design of new routes, procedures and technologies to explore options to reduce noise impacts where possible and communicate changes to the community in advance.

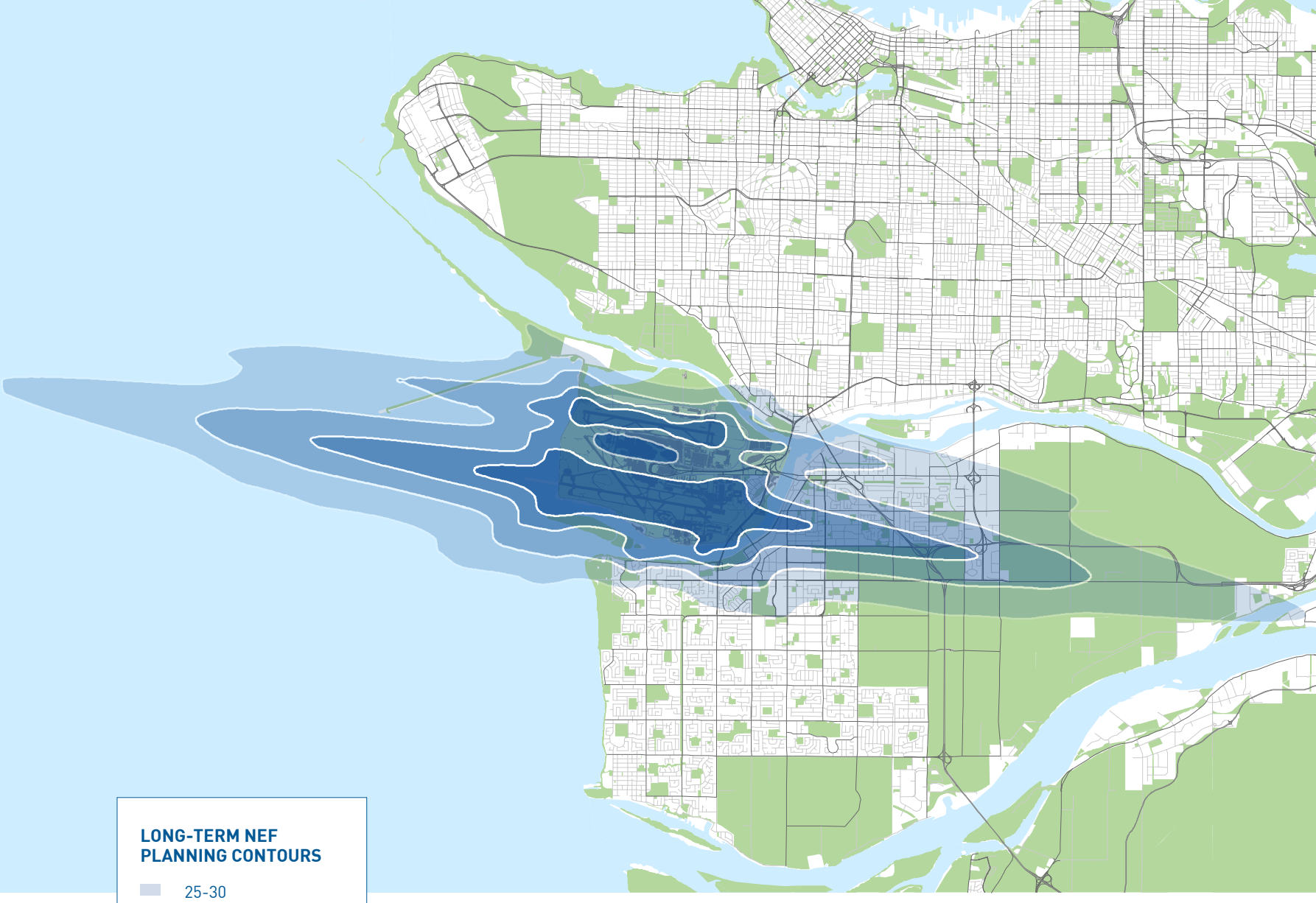
WHY IT MATTERS

As a community-based organization, we want to treat our neighbours with respect and consideration. We heard from our business partners and community that they are supportive of our growth but want us to continue to address the implications of that growth—including noise—as a good community steward. Managing noise is also built into the supporting objectives of our Strategic Plan and the inclusion of the NEF noise forecasts in the Master Plan is a required condition of our ground lease.

THE CHALLENGE

As we look to continued growth in the future, we know that changes to runway usage and the development of a potential new runway may alter flight and noise patterns. At the same time, new technologies in aviation, such as RNP, will increase efficiency and reduce noise exposure by ensuring that aircraft follow an efficient and more precise flight path.

We need to understand how these trends impact noise and aircraft flight paths today and over the forecast period so that we can work with NAV CANADA to design new routes that minimize noise impacts whenever possible, keep our neighbours informed and updated and continue our work with the YVR Aeronautical Noise Management Committee.



PROTECTING FOR THE FUTURE

Ensuring that areas around the airport are developed in a compatible manner is a key component in managing noise. Efforts to reduce noise through advancements in aircraft technologies and operational procedures can be negated if non-compatible developments are allowed to occur in areas exposed to noise levels. When local municipalities are equipped with accurate noise forecasts for air traffic and airport infrastructure, it enables them to plan developments in a way that protects their communities from these noise impacts.

MANAGING AIRCRAFT NOISE HAS BEEN OUR PRIORITY SINCE WE ASSUMED RESPONSIBILITY FOR THE AIRPORT IN 1992.

The current long-term planning NEF contour used to assist municipalities with land use planning around YVR was created in 1994 using a forecast period extending to 2015. As part of the YVR 2037 Master Plan, we assessed the option of using this contour for long-term planning, given the revised traffic forecasts and the potential for new runways and airfield infrastructure. As we looked at the possible changes in noise exposure for a number of different scenarios, including traffic growth and new runway options, we determined that the continued use of the 2015 NEF contour should be maintained as it adequately protects future growth. The use of the NEF contour will also ensure consistency with city land use planning policies currently in place. To reflect the continued use of the 2015 NEF contour over the next 20-year planning period, it will be renamed the 2037 NEF contour going forward.

The City of Delta expressed concerns regarding the forecast increase in air traffic over their community and the City of Richmond expressed concerns about increased noise impacts that could impact nearby residents as a result of the potential Close-In South Parallel Runway. YVR is committed to maintaining ongoing dialogue and consulting on any substantial projects or airspace changes in partnership with NAV CANADA.

Based on the noise assessments completed for the YVR 2037 Master Plan process, we plan to:

- Retain the existing 2015 NEF contour for planning purposes, as it provides adequate protection for future growth, and rename it the 2037 NEF contour.
- Provide additional supporting noise metrics to the community so that our neighbours have accessible and transparent information about the noise impacts of planned activities.
- Provide timely and relevant updates to both the flight path projections and the N70 noise contours as new information about future runways or air navigation becomes available.
- Proactively identify and work with impacted communities to communicate any changes and consult in conjunction with NAV CANADA.

SECTION 15

YVR AND SIX ADDITIONAL AIRPORTS in the Lower Mainland must coordinate activities, share airspace and support one another to serve different communities and meet their aeronautical needs today and in the future.

REGIONAL AIRPORT SYSTEM

REGIONAL AIRPORT SYSTEM TODAY

Our regional airport system offers a diverse and flexible array of aviation services. While YVR is the largest airport operating in the Lower Mainland, the smaller airports play an integral role in serving the needs of local communities. YVR handled 319,593 aircraft movements and 22.3 million passengers in 2016 and our runway movements make up close to one third of BC regional aircraft movements. In addition to YVR, the regional airport system includes:

Vancouver Harbour Flight Centre (YHC)

YHC is a private seaplane terminal consisting of seaplane docks and terminal facilities. Located near Canada Place in downtown Vancouver, YHC handled 57,103 aircraft movements in 2016.

Boundary Bay Airport (YDT)

Originally a Canadian Forces Station, YDT re-opened in 1983 to handle flight-school traffic that YVR was no longer able to support. Today, YDT provides general aviation services and is a flight-training hub for local and international pilots. Owned by the City of Delta and operated under lease by Alpha Aviation Inc., YDT handled 172,191 aircraft movements in 2016.

Pitt Meadows Airport (YPK)

YPK is a general aviation satellite airport that supports flight training, aircraft maintenance, commercial charter operations and recreational flying. Located along the Fraser River south of the Lougheed Highway, it includes three runways and a floatplane launch with a dock. YPK handled 109,188 aircraft movements in 2016.

Langley Regional Airport (YNJ)

Located off Highway 1A next to the Langley Township, YNJ supports flight training and helicopter operations. It is also home to the Canadian Museum of Flight and the RCMP Air Services. Owned and operated by the Township of Langley, YNJ handled 62,790 aircraft movements in 2016.

Abbotsford International Airport (YXX)

YXX, located south of the City of Abbotsford, is the second largest airport in the Lower Mainland. Owned by the City of Abbotsford and operated by the Abbotsford Airport Authority (AAA), YXX handled 126,570 aircraft movements and served 530,643 passengers in 2016.

Victoria International Airport (YYJ)

YYJ is an international airport located on Vancouver Island in the municipality of North Saanich. YYJ is the second busiest airport in BC after YVR and the 10th busiest in Canada. YYJ is owned by the Canadian Federal Government and is operated by the Victoria Airport Authority, a locally managed not-for-profit organization. YYJ handled 137,431 aircraft movements and served 1.9 million passengers in 2015.

REGIONAL AIRPORTS

Airports

Designated Airport Land

WEST VANCOUVER

NORTH VANCOUVER

NORTH VANCOUVER DISTRICT

BELCARRA

ANMORE

COQUITLAM

PORT MOODY

PORT COQUITLAM

PITT MEADOWS

MAPLE RIDGE

MISSION

VANCOUVER HARBOUR FLIGHT CENTRE (YHC)

VANCOUVER

BURNABY

VANCOUVER INTERNATIONAL AIRPORT (YVR)

NEW WESTMINISTER

PITT MEADOWS AIRPORT (YPK)

RICHMOND

DELTA

SURREY

LANGLEY TOWNSHIP

LANGLEY CITY

LANGLEY REGIONAL AIRPORT (YNJ)

BOUNDARY BAY AIRPORT (YDT)

ABBOTSFORD

ABBOTSFORD INTERNATIONAL AIRPORT (YXX)

VICTORIA INTERNATIONAL AIRPORT (YYJ)

VICTORIA

KEY RECOMMENDATIONS: REGIONAL AIRPORT SYSTEM

- Continue ongoing discussions with regional airports to address potential areas of airspace conflict.

WHY IT MATTERS

YVR's mission is to connect British Columbia proudly to the world and the regional airport system helps us to deliver on this mission. Together, these airports provide a range of regional and international flight options in other municipalities as well as flight-school training, recreational flights, commercial charter operations and other aviation-related services and amenities.

By coordinating our efforts with those other airports in the region, we can supplement capacity, enhance efficiency and ensure the airport system offers more choice and greater efficiency to everyone who relies on it.

THE CHALLENGE

While other local airports enhance YVR's capacity, they also impose constraints, particularly with respect to the regional airspace. Airspace conflicts do exist, yet total aircraft movements and airspace demand in the region is lower today than in 2008. If, as is likely, demand for these regional airport services increases over the forecast period, this could create more frequent conflicts over the available airspace unless activities can be coordinated effectively.

A SOLUTION FOR THE FUTURE

To determine the best way forward, we examined the regional airport system to identify both the contribution it has to make to the region's airport capacity and the potential areas of overlap or conflict with YVR.

As part of the analysis, we benchmarked YVR against other global airports that operate within a regional airport system, including Toronto (YYZ), Seattle-Tacoma (SEA), Brussels (BRU), London Heathrow (LHR), Melbourne (MEL) and Sydney (SYD).

Our benchmark data showed that YVR hosts a high percentage of small aircraft (turbo props such as the Bombardier Dash-8 or Beechcraft Super King Air) compared to our peers. For example, while small aircraft accounted for 48 per cent of YVR's daily traffic on a given day, it accounted for only 21 per cent at Toronto Pearson, 22 per cent at Seattle Airport and just 8 per cent at Melbourne Airport.

As a result of this high percentage, our average number of passengers per aircraft is lower, which in turn reduces the volume of passengers we can serve with our current airside and airspace. While YVR accommodates an average of 79 passengers per aircraft movement, Melbourne Airport can accommodate 140, London Heathrow 160, Seattle Airport 111 and Toronto Pearson 106.

Ultimately, it is the airlines that decide which airports to serve. Given YVR's superior connectivity and its proximity to the City of Vancouver, it is unlikely that the airlines will choose to migrate their smaller aircraft to other regional airports in the foreseeable future.

AIRCRAFT MOVEMENTS AT BOUNDARY BAY AIRPORT, VANCOUVER HARBOUR FLIGHT CENTRE AND PITT MEADOWS AIRPORT CAN CAUSE POTENTIAL AIRSPACE CONFLICTS WITH YVR, WHICH CAN CREATE DELAYS AS AIRCRAFT WAIT FOR THE AIRSPACE TO CLEAR.

After reviewing the potential for coordination and conflicts across the regional airport system, we have concluded that:

- Ongoing collaboration between regional airports involving Transport Canada will help to manage challenges and congestion, but no formalized regional airport system is required.
- Ongoing communication is required between NAV CANADA and regional airports to further define, understand and manage airspace conflicts.

AS RESIDENTS OF THE BURKEVILLE COMMUNITY, WE APPRECIATE BEING INCLUDED AS PARTNERS IN THE DEVELOPMENT OF SEA ISLAND. **WE FEEL PROUD OF THE HISTORY OF OUR NEIGHBOURHOOD, THE AIRPORT AND SEA ISLAND'S AVIATION HERITAGE.**

We think of YVR as "our" airport and feel the mix of a residential community with the airport and green spaces benefits everyone.

- IAIN MCCARTHY & STEPHANIE THORPE

SECTION 16

THE LAND YVR OCCUPIES ON SEA ISLAND IS LIMITED and we must plan carefully to make the best use of this resource. The 2037 Land Use Plan will guide all infrastructure initiatives and developments for the next 10 years.

LAND USE PLAN

OVERVIEW

As part of the Airport Authority's ground lease with Transport Canada, we submit a Land Use Plan to the Federal Minister of Transport in addition to our Master Plan.

We are required to update and submit this Land Use Plan for approval every 10 years. The 2027 Land Use Plan, submitted in 2007, made substantial changes to the land use proposed in the previous plan, including planning for a proposed new additional runway and continued terminal expansion. For the 2037 Land Use Plan, only minor revisions were required.

YVR recognizes that Sea Island holds historical and cultural significance to Musqueam and that recorded and unrecorded heritage resources are present. The implementation of the Master Plan and Land Use Plan will be consistent with the obligations in the the Musqueam Indian Band - YVR Airport Sustainability & Friendship Agreement.

WHY IT MATTERS

The Land Use Plan outlines where we will build and how we will use airport lands in a way that respects our operations, our environment and our community. This plan sets priorities based on the value the land has in supporting core airport functions. It evolves with the changing needs of the airport and its passengers, partners and vendors.

By prioritizing and safeguarding the land on Sea Island in a way that supports our future needs, we can make informed and efficient investments in development and infrastructure that, in many cases, will have a lifespan that extends beyond the 20-year timeframe covered by the Master Plan.

PRIORITIES

With many competing demands placed on a finite land resource, we need to establish clear priorities to guide decision making. Some types of land are more valuable to our core operations and must be preserved for those uses.

In descending order of priority, these are the key land designations our Land Use Plan addresses:

1. **Airfield** land use requirements take precedence over all other land uses, as these are essential to the airport's core function of enabling the safe and efficient arrival and departure of aircraft.

2. **Terminal** requirements are the second most important land use, with terminal building expansion considered after airfield needs, but ahead of other requirements.

3. **Airside** is our third priority, given that airside land and airside access is critical for many airport functions and is in limited supply.

4. **Ground Access and Parking** is our fourth priority, reflecting the importance of ensuring reliable, efficient and sustainable access to, from and around Sea Island for people and goods.

5. **Groundside** land is suited to both commercial and non-commercial endeavours that don't require access or proximity to airfield, terminal or airside areas.

6. **Recreational** land supports activities that, while not essential to airport operations, enrich passenger, employee and public experiences on Sea Island and enhance perceptions of the airport and its surrounding environment.

DEFINITIONS

To capture the changing requirements for our land use and allocation, we have updated the definitions for some of our land designations:

Airfield

In the YVR 2037 Master Plan, airfield is defined as the land that supports the safe movement of aircraft and it includes runways, runway end safety areas, taxiways, airside roads, navigational aids and other facilities.

- ***What's new?***
  The definition now reflects the importance of safety in the movement of aircraft and includes Runway End Safety Areas (RESAs) in the definition. Interim uses of this land are also allowed.

Terminal

In the YVR 2037 Master Plan, terminal land is defined as land for existing and future passenger terminal facilities, aprons and ancillary commercial and operational uses.

- ***What's new?***
  The definition has been expanded to include aprons and to clarify that the allocation includes future anticipated passenger terminal requirements. Previously designated Passenger Terminal, it is now renamed Terminal to reflect the broader role of the terminal facility.

Airside

In the YVR 2037 Master Plan, airside is defined as the land required for existing and future uses that require direct access to the airfield. First priority is given to uses requiring access to aircraft (such as cargo buildings and aircraft maintenance hangars), with second priority given to uses requiring vehicle access to the airfield.

- ***What's new?***
  The definition now prioritizes uses requiring access to aircraft over those requiring vehicle access to reflect the fact that this critical land type will increasingly be in short supply.

Ground Access and Parking

In the YVR 2037 Master Plan, this designation is defined as land that enables the flow of goods and people to, from and around Sea Island including bridges, roads, the Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals.

- ***What's new?***
  The definition now includes uses that enable the flow of goods and people and adds cycling and walking to the list of access options.

Groundside Commercial

In the YVR 2037 Master Plan, this designation has been updated to better define various uses that do not require direct access to the airfield but support the aviation business.

What's new?

- The definition now covers uses that do not require direct airfield access but are aviation related (directly related to ongoing airport operations), aviation dependent (improved by close access to aviation services) and aviation compatible (supportive of YVR's role as a sustainable gateway and connecting hub).

Recreational

In the YVR 2037 Master Plan, this designation includes recreational uses that are not essential to airport operations but enrich passenger, employee and public experiences on Sea Island and enhance perceptions of the airport and its surrounding environment.

- No changes have been made to this designation since the 2027 Master Plan.

Groundside Commercial/Ground Access and Parking

In the YVR 2037 Master Plan, this designation is defined as land for both groundside commercial and ground access and parking uses. This is land that enables the flow of goods and people to, from and around Sea Island such as bridges, roads, Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals. This also includes land for uses not requiring direct access to the airfield. Uses can be aviation related, aviation dependent and/or aviation compatible.

What's new?

- This designation has been added to identify that both land uses are permitted in this area. While the 2027 Master Plan did show areas as hatched with multiple colours, it did not specifically identify the land uses that were permitted.

Terminal/Ground Access and Parking

In the YVR 2037 Master Plan, this designation area is defined as land for existing and future passenger terminal support facilities, ancillary commercial and operational uses and land that enables the flow of goods and people to, from and around Sea Island. This includes bridges, roads, Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals.

What's new?

- This designation has been added to the YVR 2037 Master Plan to identify that both land uses are permitted in this area. While the 2027 Master Plan did show areas as hatched with multiple colours, it did not specifically identify the land uses that were permitted.

Potential Foreshore Runway (see inset below)

Proposed Runway Extension

Proposed North-South Taxiway

Potential South Parallel Runway

North

0 0.25 0.5 1 1.5 2 Km

Approved by Minister of Transport in May 2018

LAND USE PLAN 2037 MAP

Airfield
Land for existing and future airfield to support the safe movement of aircraft. Includes runways, runway end safety areas, taxiways, airside roads, navigational aids and other facilities.

Terminal
Land for existing and future passenger terminal facilities, aprons and ancillary commercial and operational uses.

Airside
Land for existing and future uses that require direct access to the airfield. Priority to be given to those uses requiring access for aircraft (cargo buildings, aircraft maintenance, etc.) and then to those uses requiring vehicle access to the airfield.

Ground Access and Parking
Land that enables the flow of goods and people to, from and around Sea Island. Includes bridges, roads, Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals.

Groundside Commercial
Land for uses not requiring direct access to the airfield. Uses can be:

1. Aviation Related: Uses that are directly related to ongoing airport operations.
2. Aviation Dependent: Uses that benefit from close access to aviation services.
3. Aviation Compatible: Uses that support the ongoing development of YVR as a sustainable gateway and connecting hub.

Recreation Area
Designates lands for recreational uses.

Groundside Commercial/Ground Access and Parking
Land for both groundside commercial and ground access and parking uses.

a) Land that enables the flow of goods and people to, from and around Sea Island. Includes bridges, roads, Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals.

b) Land for uses not requiring direct access to the airfield. Uses can be:

1. Aviation Related: Uses that are directly related to ongoing airport operations.
2. Aviation Dependent: Uses that benefit from close access to aviation services.
3. Aviation Compatible: Uses that support the ongoing development of YVR as a sustainable gateway and connecting hub.

Terminal/Ground Access and Parking
Land for existing and future passenger terminal support facilities, ancillary commercial and operational uses and land that enables the flow of goods and people to, from and around Sea Island. Includes bridges, roads, Canada Line, cycling and walking corridors, public and employee parking, commercial transportation and car rentals.

YVR recognizes that Sea Island holds historical and cultural significance to Musqueam and that recorded and unrecorded heritage resources are present.

CONCLUSION

SECTION 17

TOGETHER, WE HAVE CREATED A ROADMAP for the future. Together, we will take the next steps.

WE ARE **GRATEFUL FOR THE CONTINUED AND GENEROUS PARTICIPATION OF OUR COMMUNITY** IN THIS CRITICAL PLANNING PROCESS.

Together, we have created a roadmap for the future. Together, we will take the next steps to build the airport of our future.

As an award-winning airport and global gateway, YVR plays a vital role in ensuring the connectivity and prosperity of our community and our region. And when we look towards the future, we see the potential to generate even greater positive social and economic benefit.

In 2016, we served 22.3 million passengers and helped over 271,000 metric tonnes of cargo reach its destination. With every movement of people and goods, we are not only serving a vital function in the global economy but sharing British Columbia's unique sense of place, its products and its culture with the world.

The forecasts we developed for the Master Plan tell us that over the next 20 years, the need for air travel will grow and so will our global impact. At the same time, new technologies will enable us to build our capacity sustainably and reduce our environmental impact.

While this brings exciting opportunities, it also creates challenges. In the coming years, we must find a way to address rapid change and greater complexity, including higher volumes of passenger and cargo traffic, climate change, regulatory change and global trends that influence consumer and business air travel.

The YVR 2037 Master Plan is a roadmap that will help us navigate the emerging landscape, explore new possibilities and confidently face the challenges the future has in store. We are proud of the resourcefulness and creativity that this document represents and much of the credit belongs to the wider community who have contributed their ideas, experiences and vision for the future of YVR throughout the consultation process.

Passengers, airlines, partners, businesses, municipalities, environmental groups and members of the general public have all taken the time to share a wealth of insight that has enriched our understanding and helped to shape YVR's plans for the future. These diverse perspectives have helped us balance and refine the priorities, while making choices that enhance our competitiveness, protect the environment and enrich the community.

We are grateful for the continued and thoughtful participation of our community in this critical planning process. Together, we are writing the next chapter in our shared story—a story of sustainability, collaboration, innovation and stewardship that will continue to unfold for many years to come as we work together to build the airport of our future.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AS THE CITY OF DELTA'S STAFF REPRESENTATIVE ON YVR'S AERONAUTICAL NOISE MANAGEMENT COMMITTEE, MY ROLE IS TO SHARE MY COMMUNITY'S AIRCRAFT NOISE AND AIRSPACE CONCERNS. **I BELIEVE THE BIGGEST CHALLENGE FACING YVR IS BALANCING THE FORECASTED GROWTH IN THE YVR MASTER PLAN WITH ASSOCIATED AIRSPACE IMPLICATIONS.**

When an airspace change is required to support the number of aircraft movements forecasted in the YVR 2037 Master Plan, Delta wants and needs to be part of the airspace planning process to ensure there is minimal impact to our community.

– PAULA KOLISNEK