NOISE MANAGEMENT

HOME BUYER & OWNER GUIDE

YVR VANCOUVER INTERNATIONAL AIRPORT

Beyond, Every Day.

↗ Introduction

Vancouver International Airport ("YVR") is the second busiest airport in Canada and is open 24-hours a day to support the travel and business demands of the local region and Province. In 2014, YVR accommodated over 19.4 million passengers, and over 310,000 arrivals and take-offs. These numbers are forecasted to grow in the future to meet the community demand for increased air services.

YVR is located on Sea Island, within the City of Richmond, and is in close proximity to major urban residential developments. While YVR undertakes significant effort to mitigate noise from aircraft operations, it is practically impossible to eliminate aircraft noise exposure on residents located in high noise areas under the flight paths.

Purchasing a home is often the largest financial decision a person will make in their life. This material is aimed to help residents identify aircraft noise considerations when looking to buy a new home, and to provide existing owners with information on how to better sound insulate their home.

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Looking for more detailed information?

Visit us online for our more in-depth technical guide.

↗ New Home Buyers

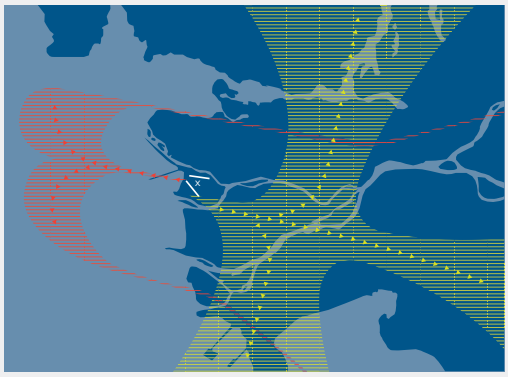
Airport Operations & Flight Paths – 101

YVR has three runways: the south runway, the north runway, and the crosswind runway. The south runway and the north runway are used most, and the crosswind runway is limited to use during high crosswind conditions, which happens very infrequently.

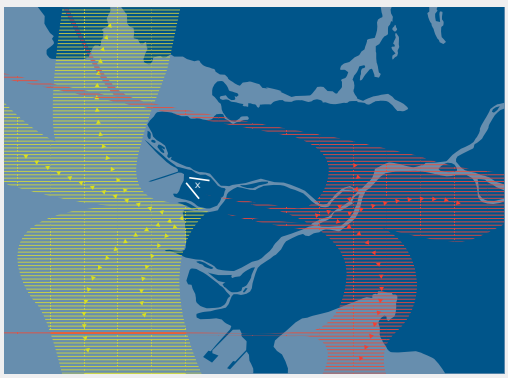
For safety reasons, landings and take-offs must occur into the wind. Consequently, the traffic patterns over the Lower Mainland will change based on the surface wind conditions at the airport. When the winds are from the west, planes will take-off to the west over the Strait of Georgia and arrivals will occur from the east over the City. When the winds are from the east, take-offs will occur to the east over the City and arrivals will occur from the west over the Strait of Georgia.

GENERALIZED RUNWAY TRAFFIC PATTERNS ASSOCIATED WITH WIND DIRECTION

RUNWAY 08 / WINDS FROM THE EAST



RUNWAY 26 / WINDS FROM THE WEST



= ARRIVALS = DEPARTURES

This figure is meant to illustrate how wind direction affects the direction of flights. It should not be used to assess over-flights of an area.

If you have questions about aircraft over-flights of an area you are interested in, please contact us – we are happy to discuss and provide you with custom information specific to the area.

At most airports, including YVR, aircraft often do not follow fixed flight paths. While there is consistency for some aircraft flight tracks, there is also a substantial degree of variation because the air traffic control environment is very dynamic. In many cases air traffic controllers move aircraft around the sky both horizontally and vertically to ensure adequate separation is provided between aircraft. In other cases, the pilot is responsible for navigation using visual reference to the ground. In all cases, managing and moving aircraft in the complex airspace over the Lower Mainland is a significant challenge, and it is not possible to route aircraft away from populated areas.

In addition to aircraft operating from the runways, YVR is also home to a very busy float plane base on the Middle Arm of the Fraser River and helicopters based on the south side of the airport. The flight paths for these aircraft are often less fixed than aircraft using the surface runways and they operate at very low altitudes over communities close to the airport.

Home Buying Considerations – Exposure to Aircraft Noise

If you are wondering about aircraft noise when buying a home in a particular area, please consider the following:

- Noise levels in the community will vary on a daily basis and will depend on a number of factors that influence sound propagation. These factors include: which runways are being used; wind direction; air temperature; humidity; cloud cover; and temperature inversions.
- YVR is a 24-hour facility. While trying to take advantage of the Strait of Georgia by having both arrival and take-offs occur over the water during the night-time hours when traffic levels permit, in some cases, aircraft will need to land or take-off over the City due to the wind conditions.
- While all parts of the Lower Mainland are exposed to some level of aircraft over-flights, certain areas will experience a greater number of operations than others. If you are interested in learning about aircraft operations over a specific area, you can contact us and we would be pleased to provide information on the nature and level of aircraft activity.
- You can use our online flight tracking system (www.yvr.ca/en/community-environment/Noise-management/Webtrak.aspx) to obtain a general understanding of air traffic over a particular area.
- Figure out where the home is located in relation to the extended centerline of the runways. In general, when close to the airport, these areas will be exposed to a greater number of over-flights than other areas.
- Aircraft maintenance and engine testing activities are required to keep aircraft air worthy, and these activities are often done at night. Homes located adjacent to the airport will be exposed to noise from these activities. Noise from landed aircraft using thrust reverse to assist braking may also be heard in residential areas adjacent to the airport.

↗ Sound Insulating Your Home

Aircraft noise can enter your home through numerous different paths. The significance of an individual path depends on the material and its sound transmission loss characteristics, and the size of the exposed area. In general, Figure 1 shows some of the main paths by which aircraft noise may enter a home.

The following information is intended to provide high level and general guidance only. Home owners should consult with professional contractors and acoustical consultants before undertaking work to discuss their specific needs and requirements. Additional and expanded information can be found in this guide. Factors to consider when upgrading home sound insulation:

As it is often difficult to rank which path is most significant, homeowners often have a challenging decision on where to spend available funds to achieve the greatest overall benefit. Some questions to consider when making this decision include:

WHICH INDIVIDUAL ROOMS ARE THE MOST NOISE SENSITIVE?
Most municipalities require that new homes be designed to achieve lowest interior noise levels in bedrooms, with slightly higher levels permitted in living, dining, recreation rooms and dens. Noise levels in kitchens, bathrooms and hallways can be slightly higher still.

WHAT IS THE COST-BENEFIT OF ALTERNATIVE NOISE CONTROL MEASURES?
Replacing a large picture window in a living room could be very expensive, and if the room is used infrequently, it may be better to replace smaller windows in one or more bedrooms for a similar cost, in an effort to reduce sleep disturbance.

Adding or improving weather-stripping to an exterior door is relatively inexpensive but replacing the door or adding a storm door may only be worthwhile if the door opens directly into a family room as opposed to a hallway.

Insulating an attic could provide a modest reduction in aircraft noise to all rooms in the home for a relatively low cost.

WHAT IS THE ORIENTATION OF THE HOUSE RELATIVE TO THE AIRCRAFT FLIGHT PATH?
Homes located almost directly beneath a flight path will have roughly equal noise exposure on all sides, whereas homes that are well off to the side of a flight path or off to the side of the airport will have greater exposure on the near side than on the far side. In this case, priority should be given to the more exposed facades and roof of the house than to the facade that is somewhat shielded from aircraft noise.

1 Open Chimney / Open Ventilator

- Entry of aircraft noise into homes via fireplace chimneys can be reduced somewhat by closing the flue, but a more convenient approach is to install airtight glass doors at the fireplace opening.
- Attic vents may or may not be a significant concern depending upon many factors including the type, size and location of the vents, the amount of insulation in the attic and the type of ceiling beneath the attic.
- Large gable vents in attic walls can significantly degrade overall sound insulation, and built in-place baffles could be used on the inside of gable vents to reduce this noise intrusion.
- Range hood vents may provide a significant path for aircraft noise to enter kitchens particularly if the duct work to the exterior is short and without any bends. Duct work for range exhausts cannot be acoustically lined or silencers added due to the presence of grease in the exhaust air. The best option from a noise control perspective would be to install a ductless (recirculating) range hood which filters out grease and odours without ducting exhaust air to the exterior.
- Noise entry via bathroom exhaust vents could be reduced by locating the exterior outlets on the underside of soffits and/or by installing sheet metal duct work with internal acoustic lining.

2 Roof

- Provide relatively thick insulation (e.g. R40 which is 240 mm thick) over the entire attic space.
- Roofs that are flat, or post and beam construction (where there is no attic space), could be a very significant path for aircraft noise to enter the home.

3 Windows / Sky Lights

- The most important parameters that govern the acoustic rating of windows includes the thickness of the individual panes of glass, the depth of the airspace in double glazed units, and the type of glass.
- In general, increasing the thickness of glass and increasing depth of airspace will help reduce sound through this path.
- In order to substantially increase the acoustic rating for a window, it is generally necessary to provide an exterior or interior storm window and/or reduce the size of the window.
- The use of laminated glass is most beneficial in controlling high frequency sound so it offers only marginal improvement for controlling aircraft noise, which tends to be mostly low to mid frequency in nature.

4 Walls

- Exterior walls are unlikely to be a significant sound transmission path relative to windows and doors if the exterior siding is relatively heavy (e.g. stucco, fibre-cement, brick or brick veneer) and if the wall is well insulated with fibreglass, mineral wool or loose fill cellulose insulation.
- Exterior walls with lightweight aluminum or vinyl siding and/or closed-cell rigid insulation are more likely to provide significant transmission paths into the house.

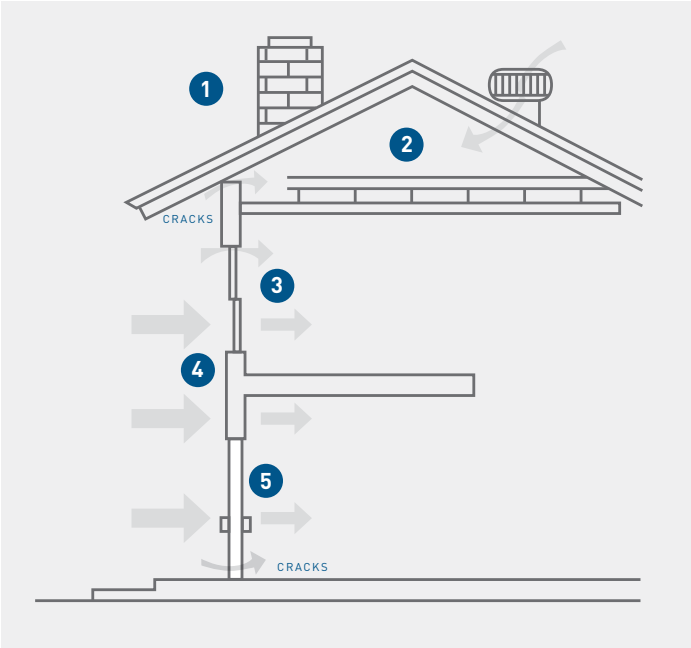


FIGURE 1

- Upgrading existing walls is not easy and can be very expensive since it generally requires application of heavier siding or modifications to the interior side of the wall.
- Upgrading the exterior siding has the advantage that it will benefit all rooms in the house but upgrading the interior side of the wall may be more cost-effective if only a few rooms (e.g. bedrooms) require improvement.

5 Doors

- Lightweight or poorly aligned exterior doors should be replaced with pre-hung, solid core wood doors equipped with effective weather-stripping, particularly if the door opens directly into a frequently utilized space such as a family room.
- Although steel doors can provide as much sound insulation as solid core wood doors, some steel doors intended for residential use are relatively light weight with inadequately insulated cores and it may be difficult to judge their acoustic effectiveness unless the supplier can provide the acoustic rating.
- If an existing solid core wood door is well aligned in its frame, then it should be possible to upgrade the weather-stripping without replacing the door.
- For sound attenuation, compression seals are better than sweep seals and sponge neoprene or neoprene "bubble" seals are better than felt or other porous materials.
- Any openings in the door, such as mail slots or pet doors should be avoided.
- If there is glazing in, beside or above the door, it will likely be a more significant sound transmission path than the door itself unless the glazing is upgraded.

↗ Methods for Acoustic Rating of Sound Insulation

The ability of a material to reduce noise is commonly rated in terms of its Sound Transmission Class ("STC"). An open window would have an STC rating of 0 whereas closed windows could have STC ratings in the 25 to 40 range. The STC was originally developed to assess the attenuation of speech through interior walls so it places most importance on speech frequencies.

Exterior noise from transportation sources contain lower frequency sound than speech so a different rating system, called the Outdoor-Indoor Transmission Class ("OITC"), was developed for rating exterior assemblies such as windows. However, while some window manufacturers publish both STC and OITC data, OITC ratings are rarely provided for exterior doors or other building components.

The overall attenuation of aircraft noise from outside to inside a particular room will depend both upon the OITC rating of each building component and the area of each. However, if interior noise is being controlled primarily by one component, for example, a window, then improving the window will provide a directly corresponding reduction in interior noise level.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AIR CANADA

GENERAL CONTACT INFORMATION

For more information please refer to our website:
www.yvr.ca,

or send us an email at:
noise@yvr.ca.

Vancouver Airport Authority claim no responsibility for decisions homeowners may make based on the information contained in this guide. Any modifications completed by homeowners are the sole responsibility of the homeowner.

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