April-June 2020

CONTINUOUS DESCENT OPERATIONS MONITORING

At Toronto Pearson International Airport

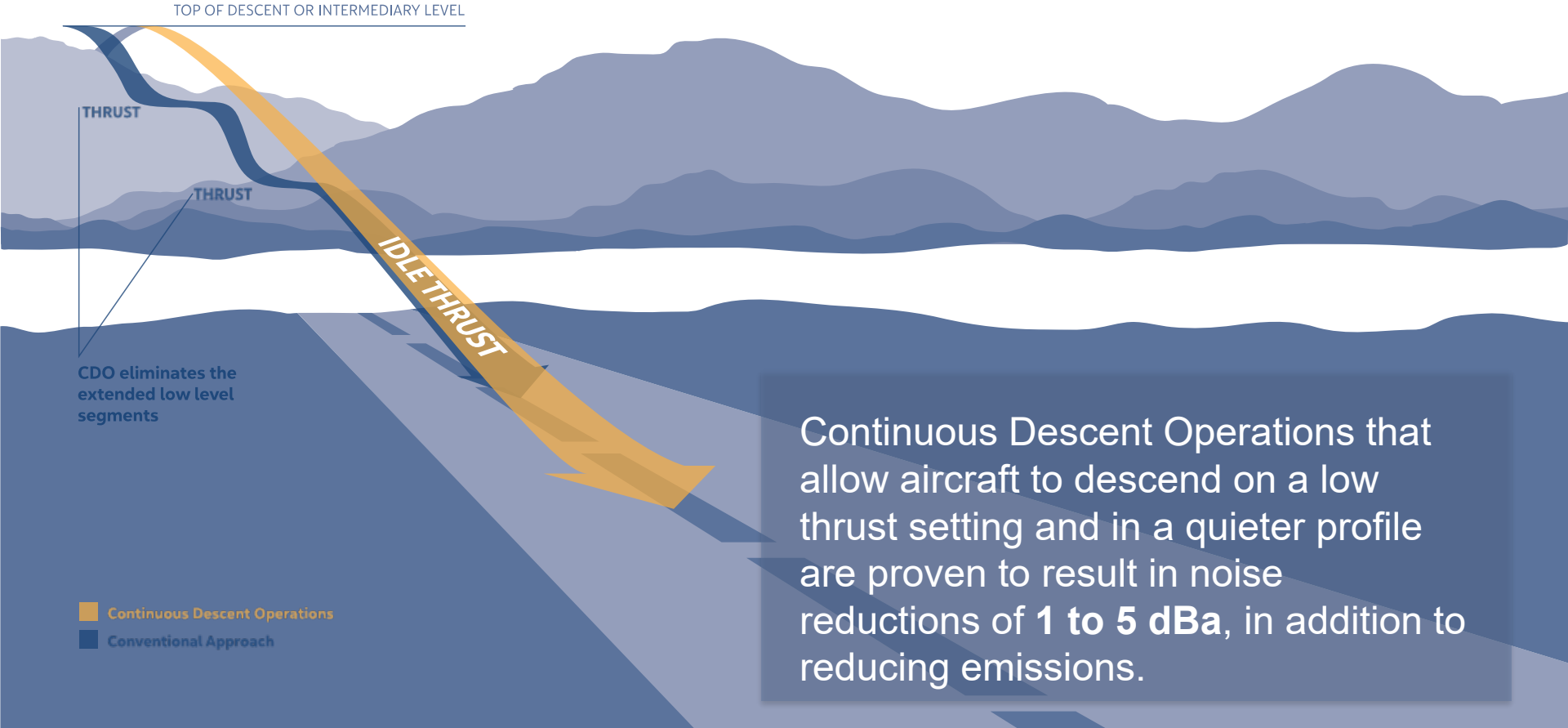
Serving a world in motion
navcanada.ca

NAV CANADA

BACKGROUND

- In summer 2016, NAV CANADA announced a review of Toronto airspace to determine whether all reasonable actions to reduce aircraft noise were being considered with respect to design and operation of the Toronto area airspace for aircraft operating in and out of Toronto Pearson. NAV CANADA responded and accepted or partially accepted all of the recommendations from the report. One of those recommendations was to publish the percentage of arrival flights achieving Continuous Descent Operations (CDO) performance at Toronto Pearson. CDO helps reduce the noise impacts on communities as a result of the aircraft descending on reduced thrust and in a quieter profile.
- Achieving CDO is a multifaceted effort that requires a mix of navigation procedures, aircraft operating procedures and front line awareness to help move the performance yardstick. The ***Quieter Operations: A Guide for Pilots and Controllers***, a cross-industry effort that promotes effective pilot-controller communications to enable increased use of CDO, is an important tool to help increase awareness of good practices.
- In order to analyse CDO operations, NAV CANADA developed a custom tool to process large volumes of flight data.

Continuous Descent Operations



Continuous Descent Operations that allow aircraft to descend on a low thrust setting and in a quieter profile are proven to result in noise reductions of **1 to 5 dBa**, in addition to reducing emissions.

ANALYSIS CONSIDERATIONS

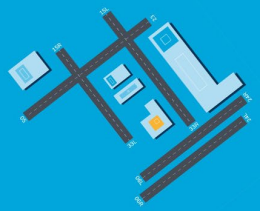
What's considered a CDO operation?
A Continuous Descent approach is achieved when the aircraft descends with no segment of level flight greater than 2.0 nautical miles.

What areas are we capturing?
Our analysis begins at the downwind entry points defined in the RNAV arrival routes in the Canada Air Pilot (CAP) aeronautical publication and extend approximately 25 nautical miles. (Aircraft on the final approach, when they are lined up with the runway, already achieve CDO due to ILS guidance.)

Which runways are being monitored for CDO use?
Performance was monitored on the downwind portion of final descent to the East/West runways (05/23, 06L/24R, 06R/24L) at Toronto International Airport.

This data was provided by NAV CANADA's Corporate Performance team.

RUNWAY OPERATIONS



A number of factors are considered in determining which runways will be used at a given time, including:

- meteorological conditions such as wind direction, wind speed and weather
- runway conditions and availability (e.g. construction, maintenance, snow removal)
- operational efficiency and capacity
- aircraft type
- time of day

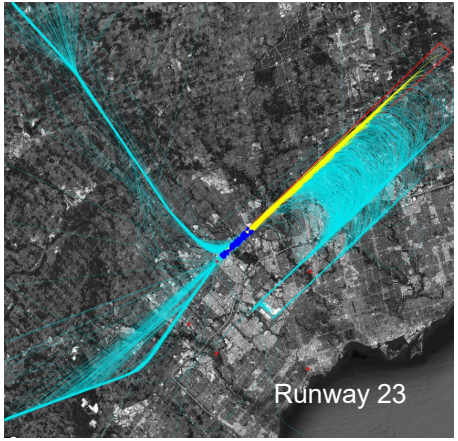
During calm winds, any of the five runways at Toronto Pearson can be used, and so factors such as capacity needs or runway availability come into play.

As the prevailing winds in the area are from the west, the most common runway configuration at Toronto Pearson supports a westerly flow, which means arrivals from the east and departures to the west using Runways 23, 24 Left, and 24 Right.

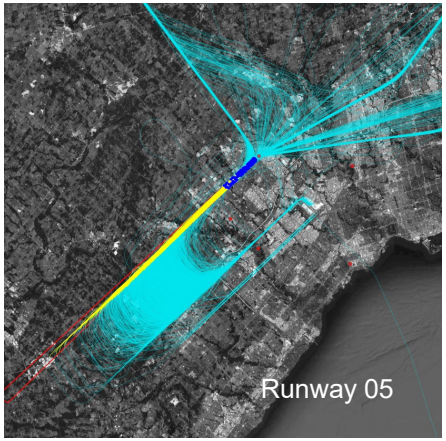
The second most common configuration supports an easterly flow, with arrivals from the west and departures to the east using Runways 05, 06 Left and 06 Right. The three east/west runways also provide the most capacity.

CONTINUOUS DESCENT MONITORING

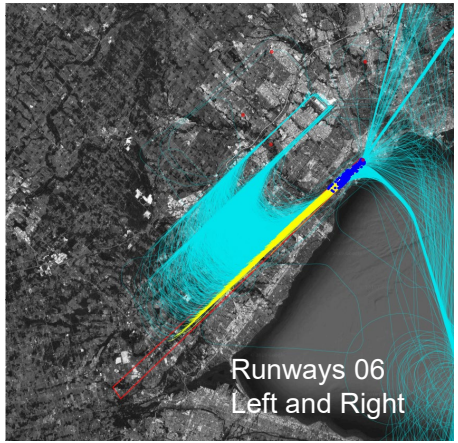
Downwind flight profile



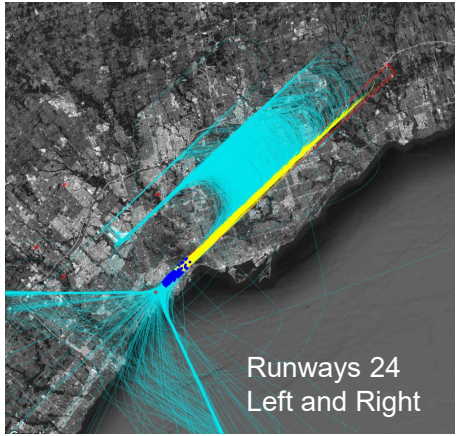
CDO usage on this downwind for April averaged 72%; for May averaged 71% and for June averaged 80%.



CDO usage on this downwind for April averaged 73%; for May averaged 70% and for June averaged 73%.



CDO usage on this downwind for April averaged 71%; for May averaged 74% and for June averaged 74%.



CDO usage on this downwind for April averaged 61%; for May averaged 64% and for June averaged 57%.

Radar Tracks

Downwind Capture Area

Capture Area Radar Tracks

Capture Area Entry Points

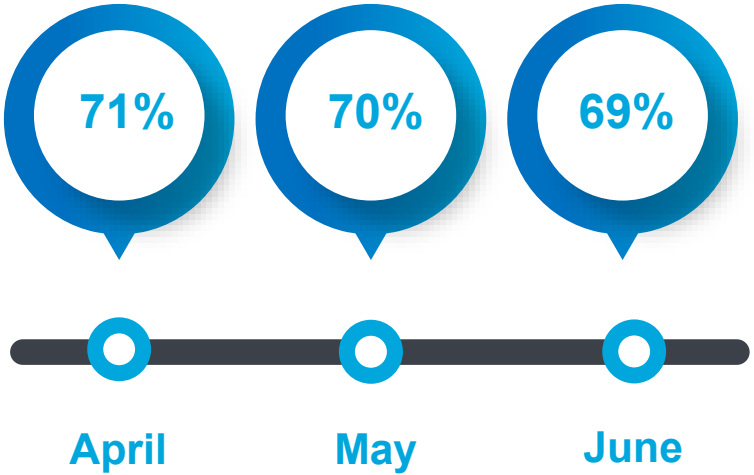
Flights highlighted in light blue represent data over a month long period in 2019.

Aircraft not employing the downwind have been filtered out for the purpose of this analysis.

This data was provided by NAV CANADA's Corporate Performance team.

PERCENTAGE OF AIRCRAFT USING CDO PROCEDURES

New CDO arrival procedures for the downwind segments were implemented February 28, 2019.
Current traffic levels and seasonality may influence usage of CDO.

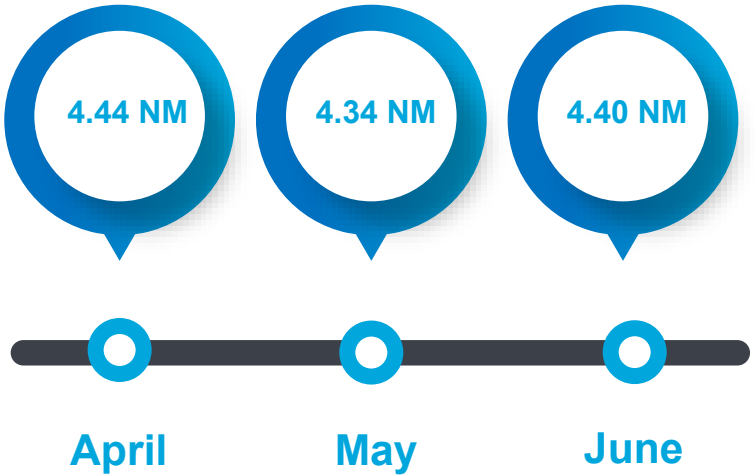


● Percentage of aircraft using CDO procedures **post-implementation**

This data was provided by NAV CANADA's Corporate Performance team.

AVERAGE LEVEL SEGMENT DISTANCE*

*For aircraft not achieving CDO



● Average level segment distance **post-implementation**

This data was provided by NAV CANADA's Corporate Performance team.

NEW NIGHTTIME APPROACHES

USING AREA NAVIGATION (RNAV), NEW SATELLITE-BASED TECHNOLOGY

While traffic levels are significantly lower at night than during the day, aircraft noise events can be more noticeable for some residents during these periods as ambient community and household noise levels are typically lower.

Lower demand and fewer aircraft in Toronto Pearson's airspace at night provide the opportunity to employ routes that impact fewer people.

On November 8, 2018, NAV CANADA implemented new Area Navigation (RNAV) procedures to enable continuous descent. These new procedures enable aircraft to be higher on portions of the approach to the airport.

Total RNAV Benefits to 2020

2,084,000 metric tonnes CO_2e reduction

This data was provided by NAV CANADA's Corporate Performance team.

12:30 a.m. – 6:30 a.m.

New nighttime approaches are being used between these hours (or earlier if possible)

7,150

number of times new nighttime approaches have been used since implemented

A WORK IN PROGRESS

- With enhanced procedures that enable Continuous Descent Operations having been implemented in Toronto airspace this past February, the potential of this quieter approach is only at the early stages of being realized.
- NAV CANADA remains committed to safely managing our country's skies while identifying opportunities to reduce the industry's impact on our communities and the environment. With the creation of this new, custom CDO analysis tool, NAV CANADA will continue publishing CDO rates on a quarterly basis, while looking to enhance insights that can be garnered from the data.

ADDRESSING AIRCRAFT NOISE FOR RESIDENTS

NAV CANADA has produced a number of recent studies and reports related to noise mitigation:

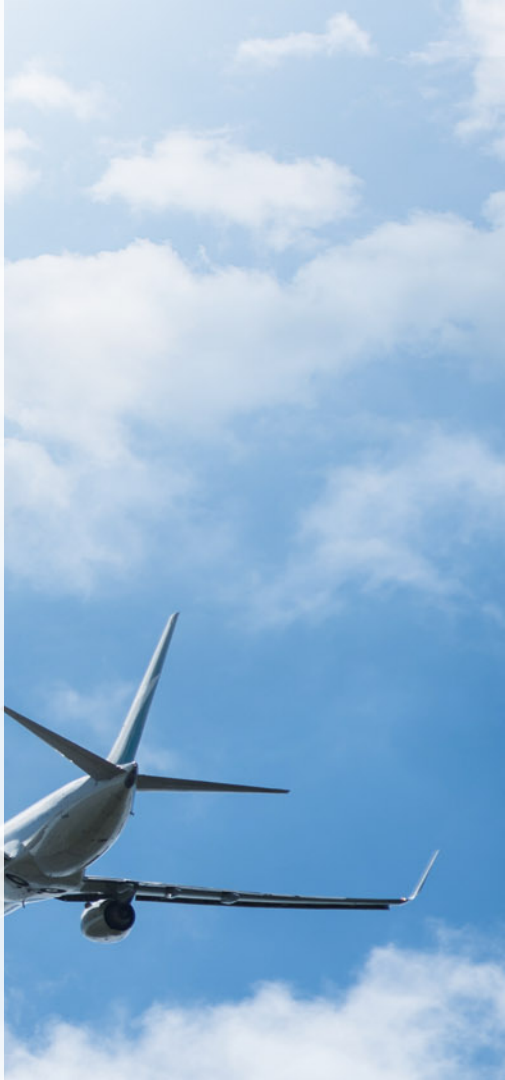
Quieter Operations: A Guide for Pilots and Controllers
In December 2018, the Industry Noise Management Board published a cross industry guideline that encourages pilots and air traffic controllers to safely employ noise-sensitive operating practices at Toronto Pearson in consideration of their impacts on communities.

Independent Toronto Airspace Noise Review*
In summer 2016, NAV CANADA announced a review of Toronto airspace, to determine whether all reasonable actions to reduce aircraft noise were being considered with respect to design and operation of the Toronto area airspace for aircraft operating in and out of Toronto Pearson.

NAV CANADA Response to Independent Toronto Airspace Noise Review
This document outlines NAV CANADA's response to the recommendations of the Independent Toronto Airspace Noise Review and provides information on implementation plans and timelines.

Airspace Change Communications and Consultation Protocol (ACCCP)
In June 2015, the Canadian Airports Council and NAV CANADA developed and adopted the Airspace Change Communications and Consultation Protocol, a voluntary framework that ensures broad public engagement is undertaken prior to the implementation of airspace changes.

*This report was commissioned by NAV CANADA, but the study and report was conducted by a Third Party




NAV
CANADA
www.navcanada.ca