TORONTO PEARSON NOISE MITIGATION INITIATIVES

UPDATE ON ANALYSIS AND OPTION DEVELOPMENT

INTRODUCTION

Noise Mitigation Initiatives Engagement Plan

In June 2015, the GTAA announced a three-phase Noise Mitigation Initiatives Engagement Plan with Nav Canada to study six ideas that have the potential to reduce the noise impact of Toronto Pearson's operations on surrounding neighbourhoods.

Noise Mitigation Initiatives

Toronto Pearson

Six Ideas for Noise Mitigation

Together, NAV CANADA and the GTAA are studying six ideas we think will benefit the surrounding communities. Below is an overview of the ideas.

1 New approaches for night-time operations

During busy daytime periods, the safe management of air traffic necessitates certain restrictions. However, lighter traffic volumes at night provide options to improve descent profiles and reduce noise.

Proposed Approach: NAV CANADA designs new approaches for designated night-time operations.

2 New departure procedures for night-time operations

During lower traffic nighttime periods, departure procedures could be altered. Increasing the required altitude achieved before aircraft turns may deliver noise benefits.

Proposed Approach: NAV CANADA will design new departures for use during designated night-time periods.

3 Increase downwind arrival speeds

Changing the speed on the "downwind" portion of the arrival flight path from 200 knots to 210 knots may reduce noise by decreasing flap use (to slow airspeed) on larger aircraft.

Proposed Approach: NAV CANADA will study the noise benefits of increasing speeds.

4 Use new technology to reduce the need for low altitude leveling by arriving aircraft

Aircraft arriving at parallel runways require a level portion in the descent of each aircraft for safety. The power increase required to achieve low altitude level flight causes noise. New technologies could reduce the need for those level portions and permit quieter, constant descent operations.

Proposed Approach: NAV CANADA will study the potential use of new technologies

5 Weekend runway alternation

Traffic volumes on Saturdays and most of Sunday are lower than weekdays. Weekend runways could facilitate runway alternation, which could provide periods of weekend respite from noise for impacted communities.

Proposed Approach: NAV CANADA and GTAA will study the feasibility of establishing weekend runways.

6 Review of preferential runway system

Preferential runways exist to ensure that aircraft landing and departing overnight impact the fewest people. Alternating use of night-time preferential runways might result in sharing night-time noise impacts across more communities.

Proposed Approach: GTAA is currently reviewing the continued appropriateness of its existing nighttime preferential runways to ensure they meet the stated objectives.

Our objective in developing these concepts is to reduce the generation of noise in proximity to residential areas.

MEETING OUTLINE

- Share the status of the technical analysis for the six noise mitigation initiatives
- Outline the types of noise analysis being planned
- Obtain input and feedback that will be used to finalize options before noise analysis is conducted
- Review next steps

GUIDING PRINCIPLES

Noise Mitigation Objectives:

- Find opportunities to reduce the noise generated by Toronto Pearson arrivals and departures operating in proximity to residential areas
- Investigate opportunities to shift flight paths to non-residential areas

LURA Report:

- Development has referenced the input received during 2015 preliminary consultation
- Reference here by initiative

THIRD PARTY STUDY

- NAV CANADA will be contracting an outside party to undertake a review of Toronto airspace
- Intent is that the third party will:
  - study operations at comparable global hub airports to identify potential practices that could be applied in Toronto that are within NAV CANADA's authority and compliant with Canadian regulations
  - liaise directly with CENAC and community stakeholder groups to identify issues and concerns and review the various suggestions that have been made
  - identify additional opportunities to reduce community noise exposure beyond the 6 initiatives being discussed

THIRD PARTY STUDY

STATUS AND NEXT STEPS

- Several parties have been invited to submit proposals for the work
- We will announce the selected firm once a decision has been made
- Discussions on terms of reference and work planning, including timelines, will be finalized once a company has been retained

NIGHT TIME ARRIVALS
IDEA #1

Current Conditions:

- Aircraft fly the same STAR procedures and approaches all hours of the day
  - This leads to low altitude flat segments in proximity to residential areas

- Night time arrivals are conducted to a single runway, and therefore do not require the flat segments required for parallel arrival operations.

- This is not related to the Night Flight Restriction Program

NIGHT TIME APPROACHES

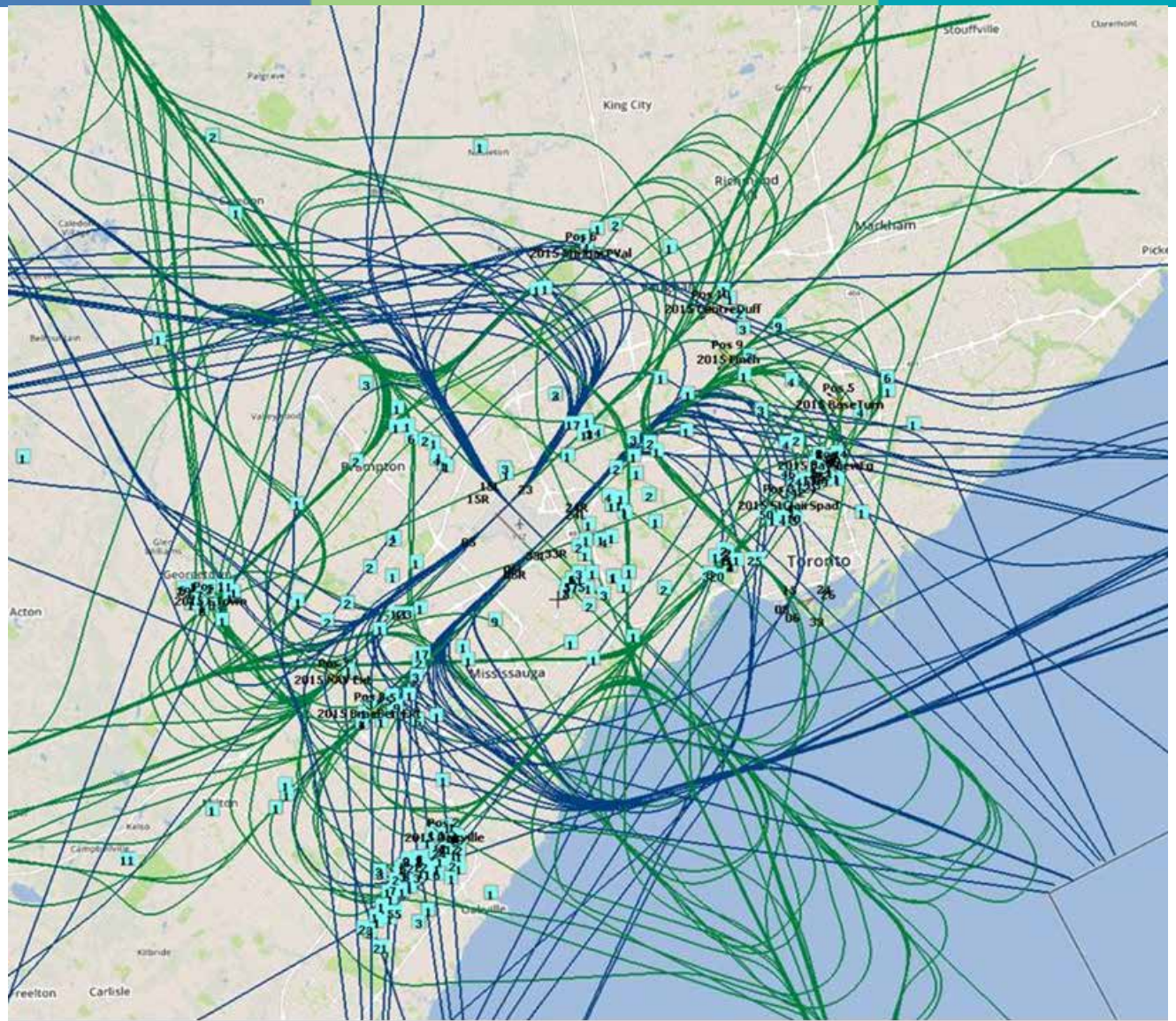
Design Principals

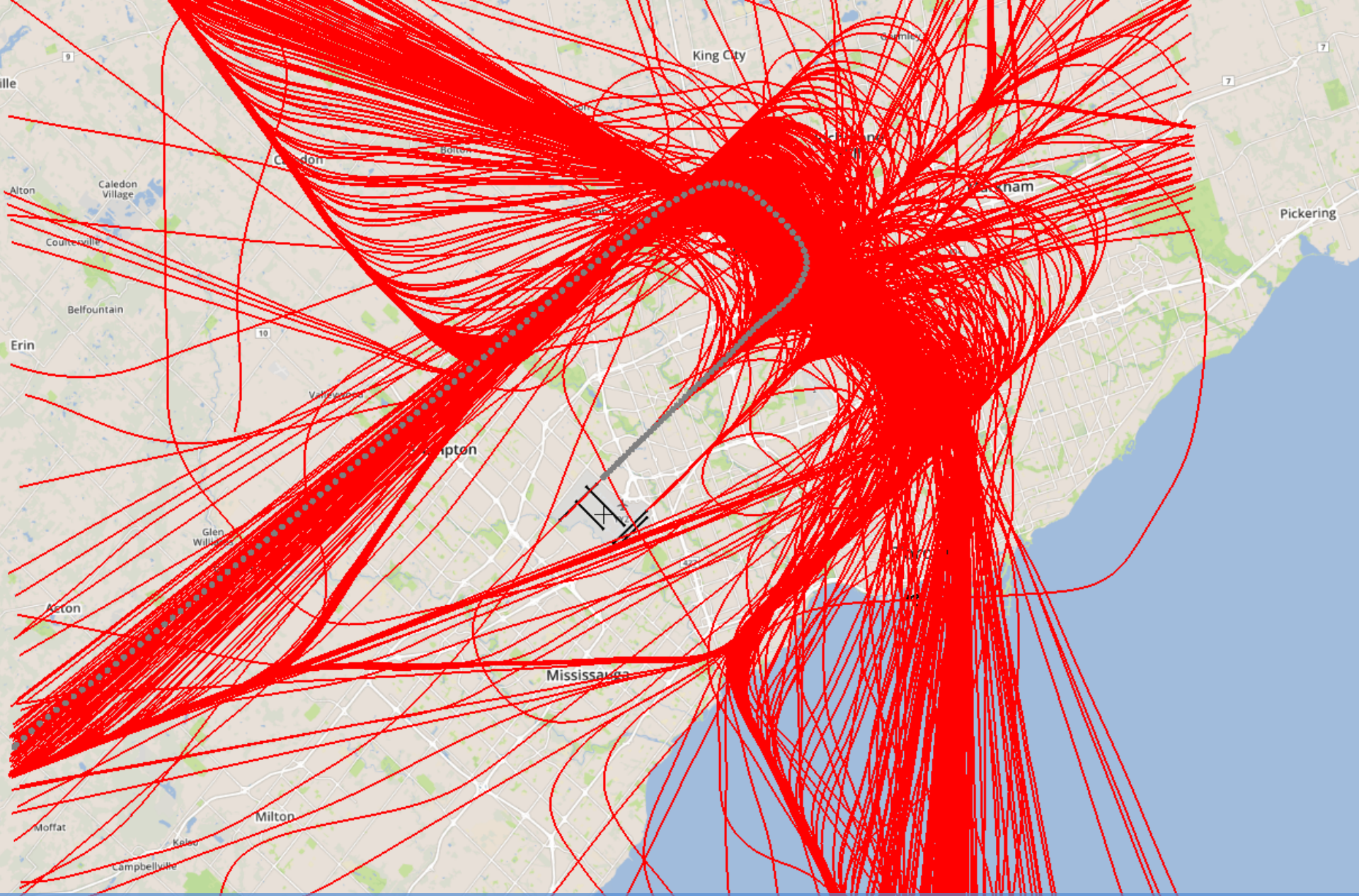
Night-time RNAV approach procedures:

- Utilize available technology to encourage constant descent below 6,000’ ASL
  - This keeps aircraft higher in the downwind and base legs
- May increase track miles flown, where the changes do not simply increase population overflown
- Will be subjected to objective noise analysis

NIGHT-TIME OPERATIONS

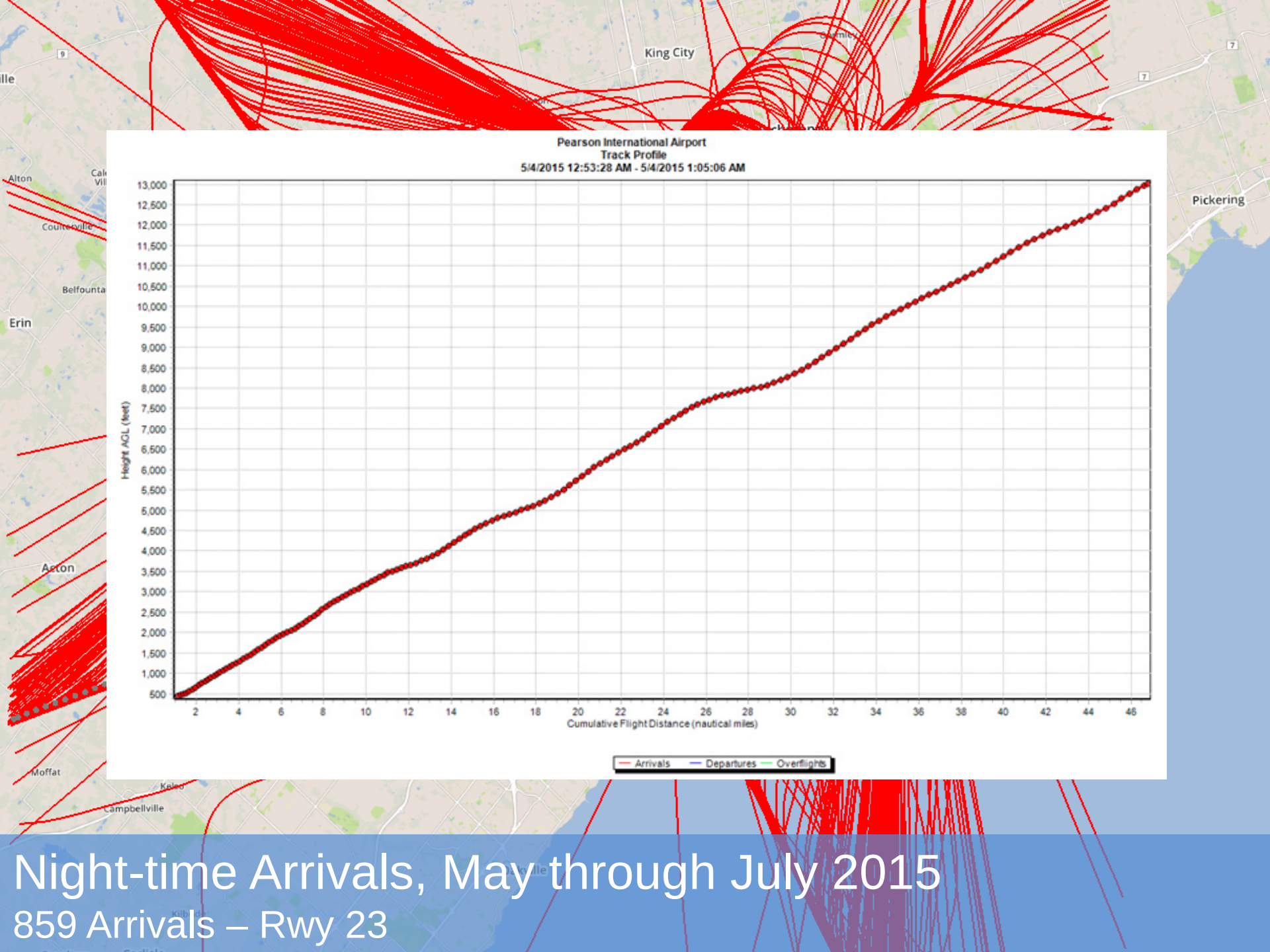
2015 Pref Hours Complaints





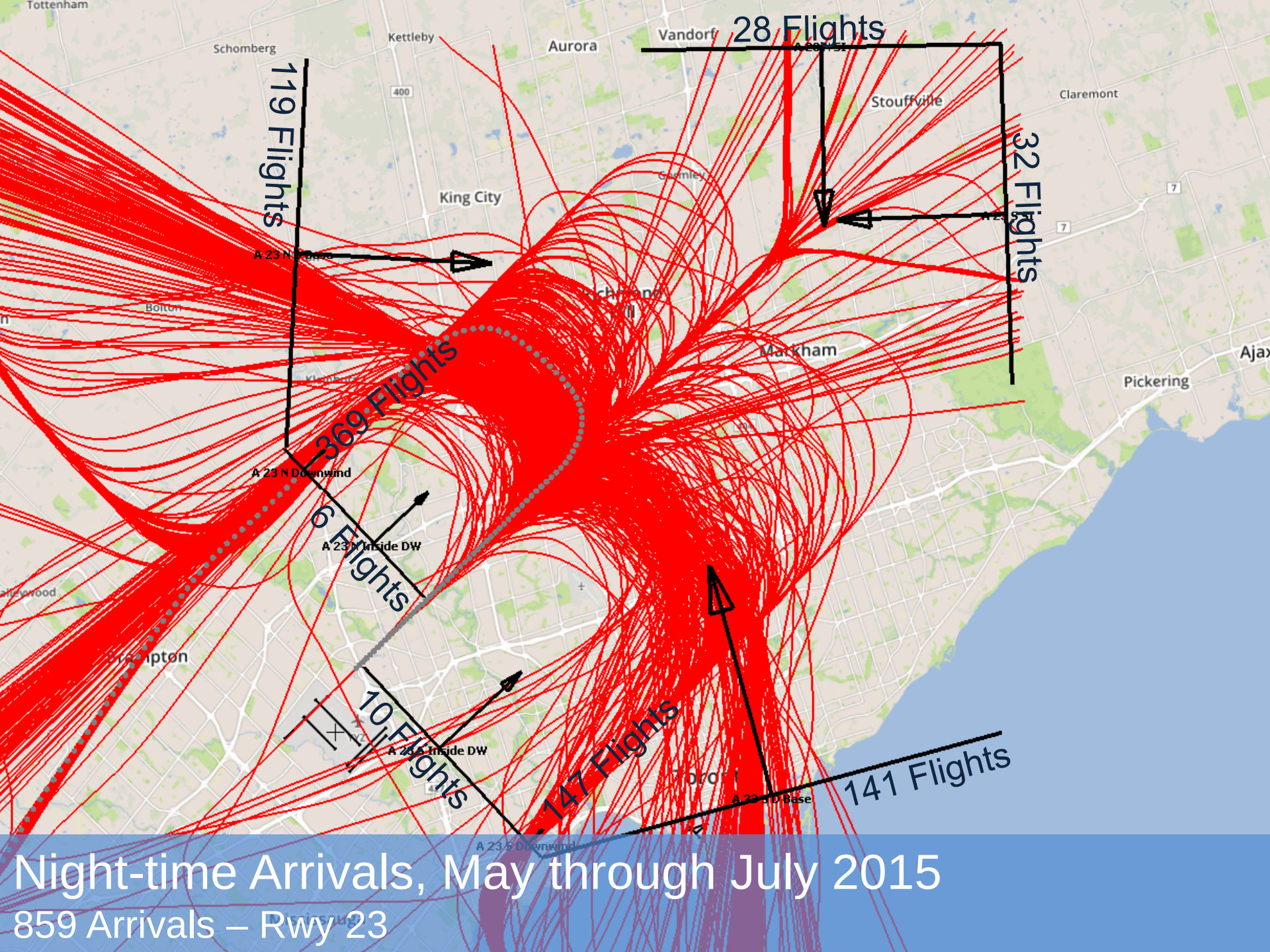
Night-time Arrivals, May through July 2015

1097 Arrivals – Rwy's 24L/R & 23



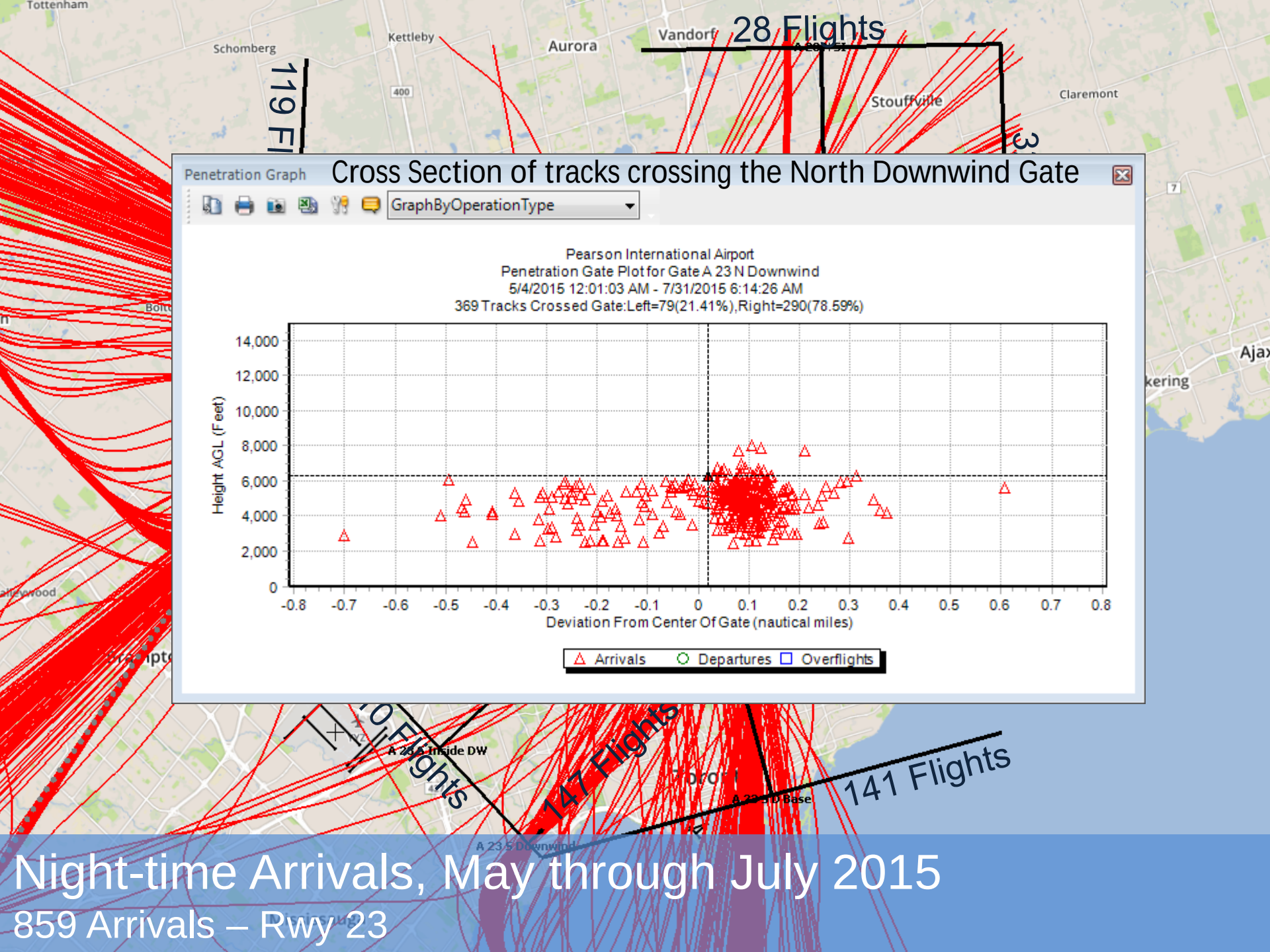
Night-time Arrivals, May through July 2015

859 Arrivals – Rwy 23



Night-time Arrivals, May through July 2015

859 Arrivals – Rwy 23

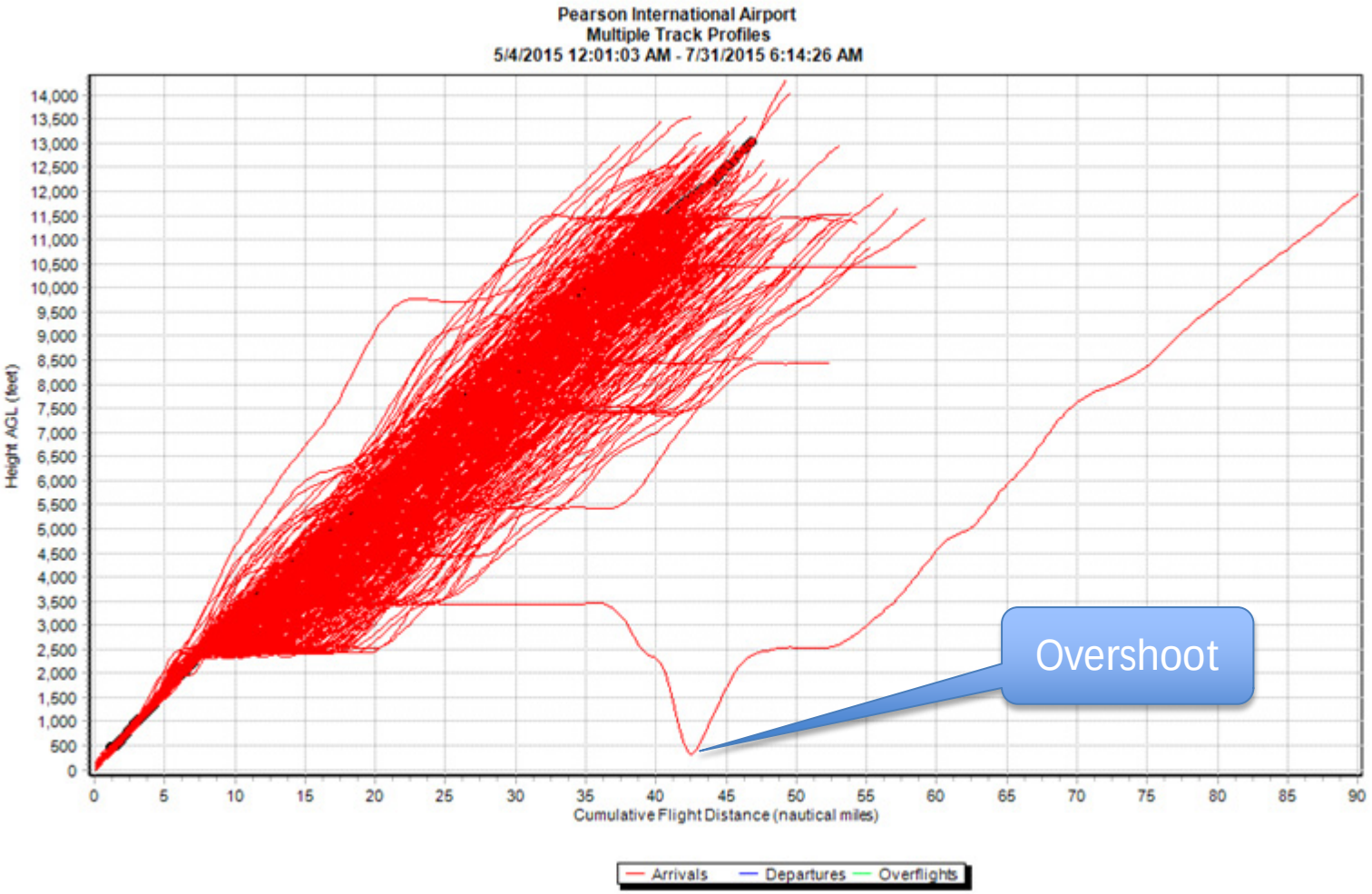


Night-time Arrivals, May through July 2015

859 Arrivals – Rwy 23

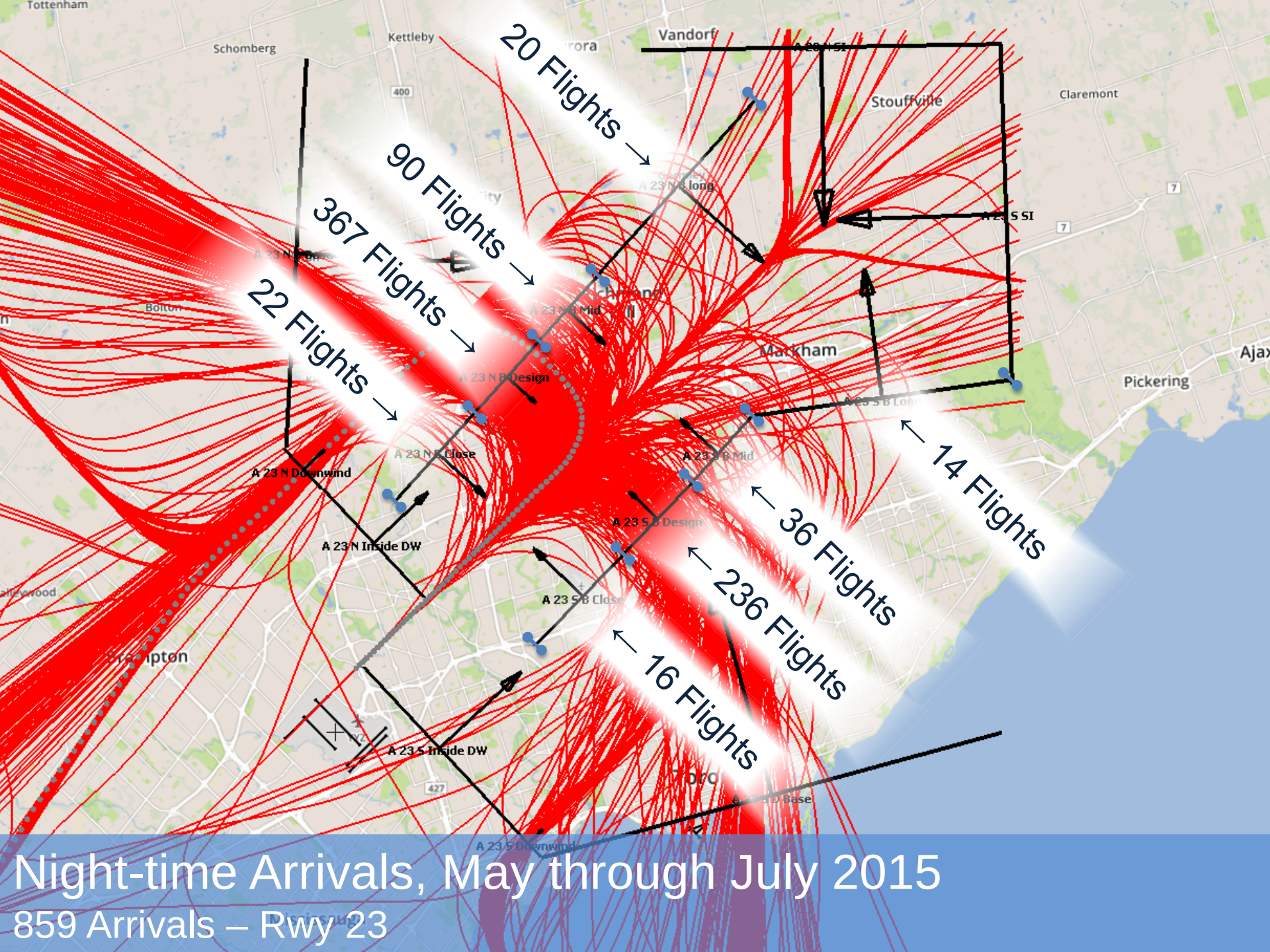
Tracks Only

Profile View of tracks in the North Downwind



Night-time Arrivals, May through July 2015

859 Arrivals – Rwy 23

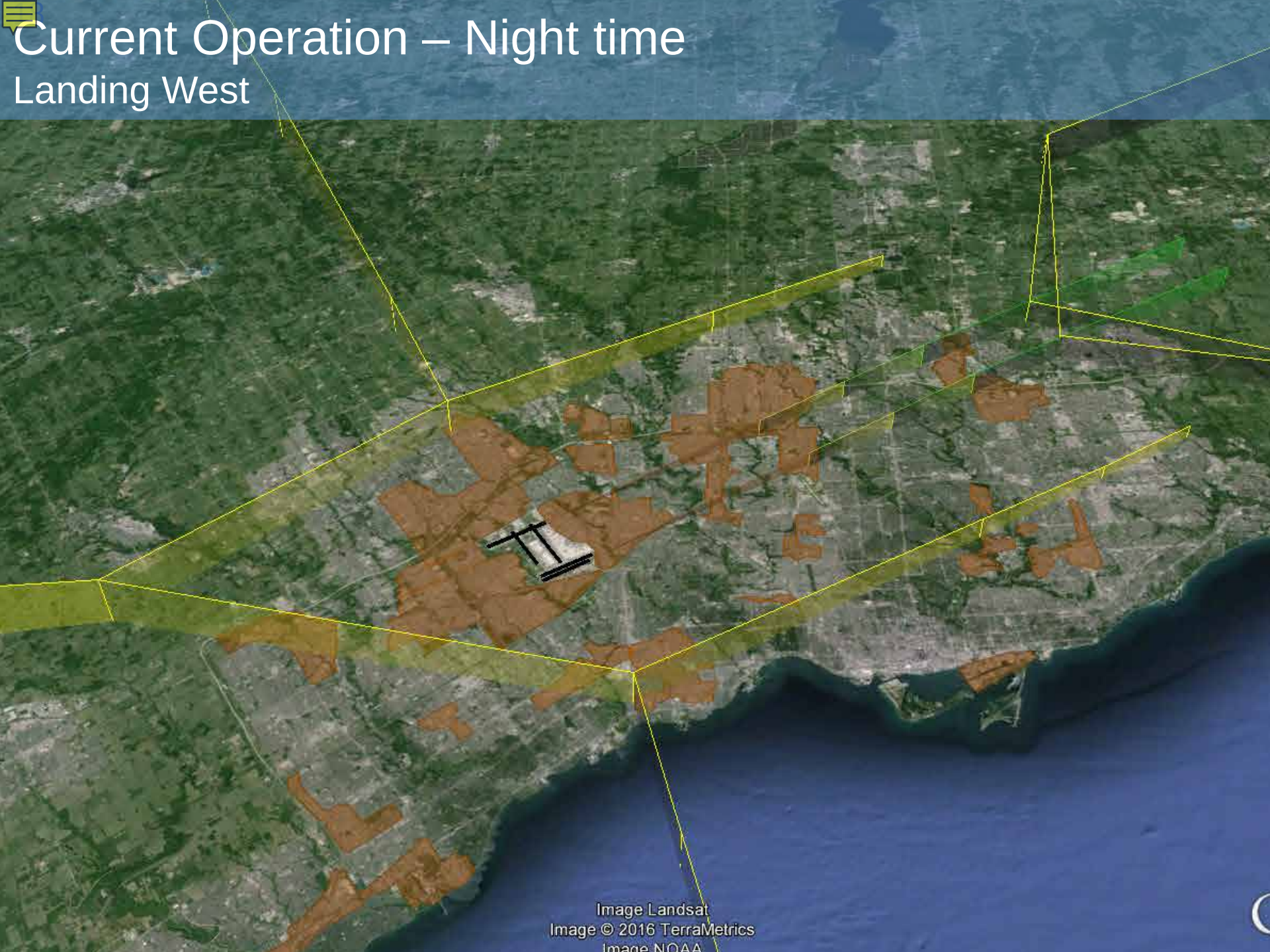


Night-time Arrivals, May through July 2015

859 Arrivals – Rwy 23

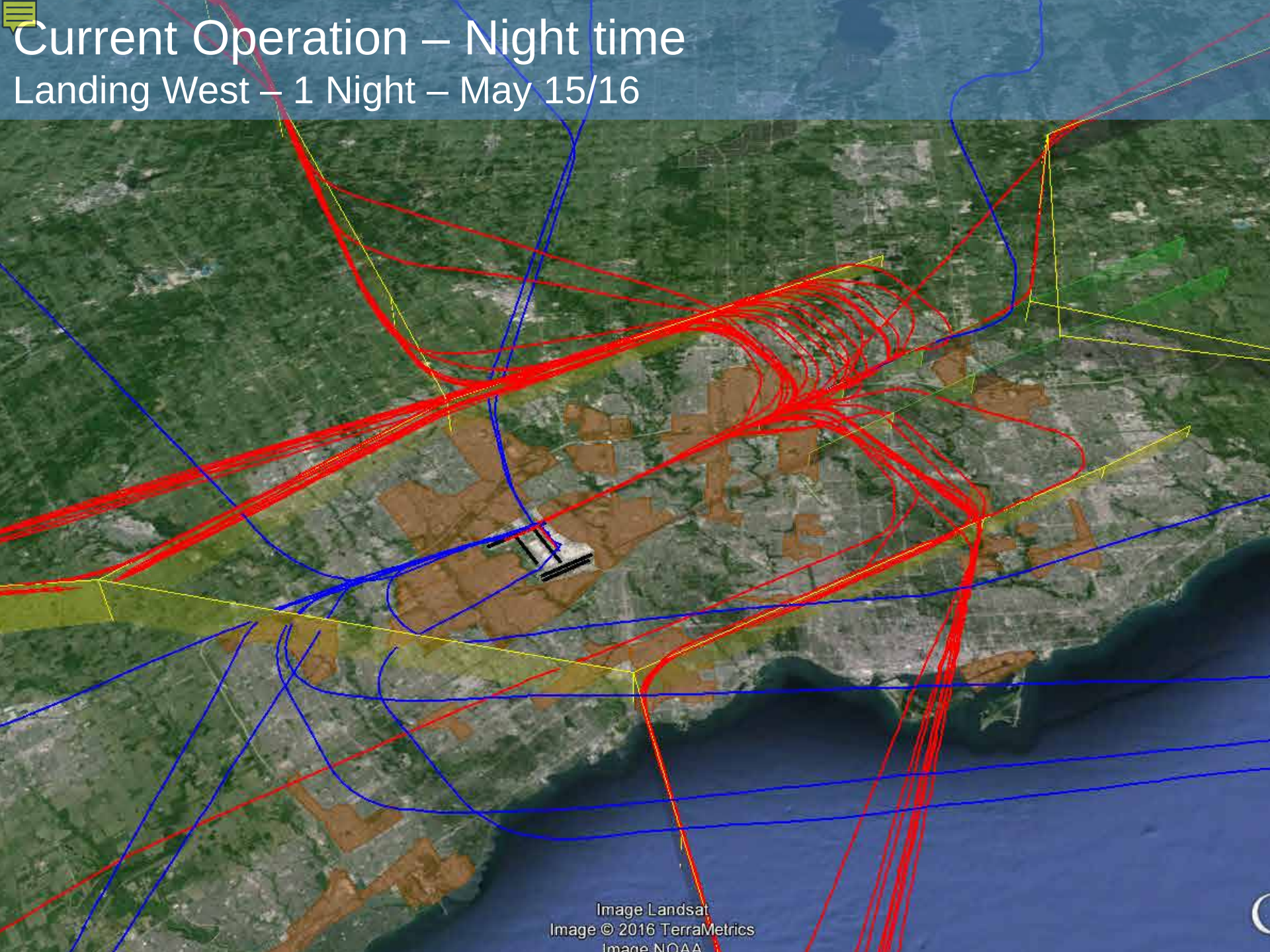
Current Operation – Night time

Landing West



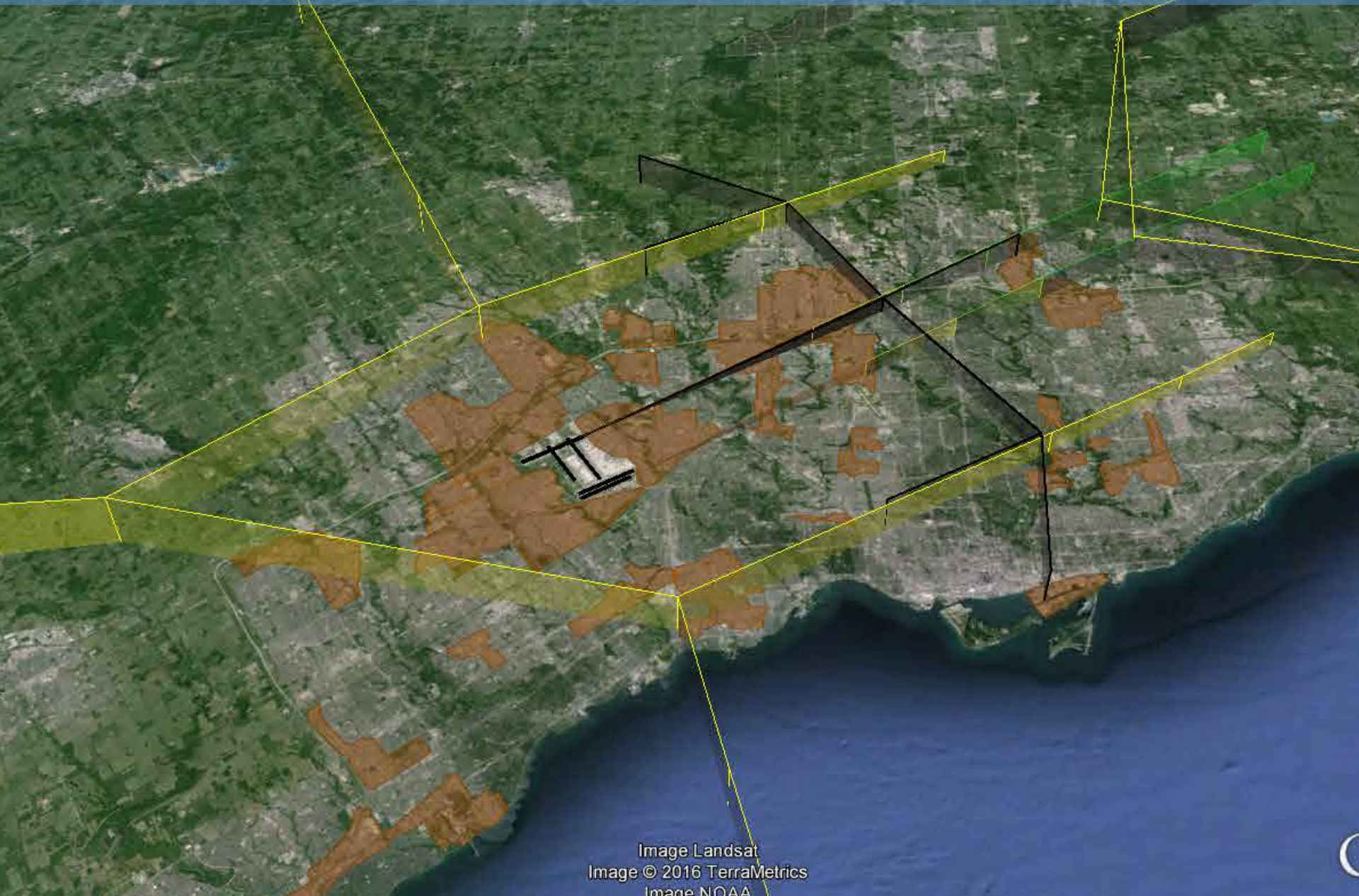
Current Operation – Night time

Landing West – 1 Night – May 15/16



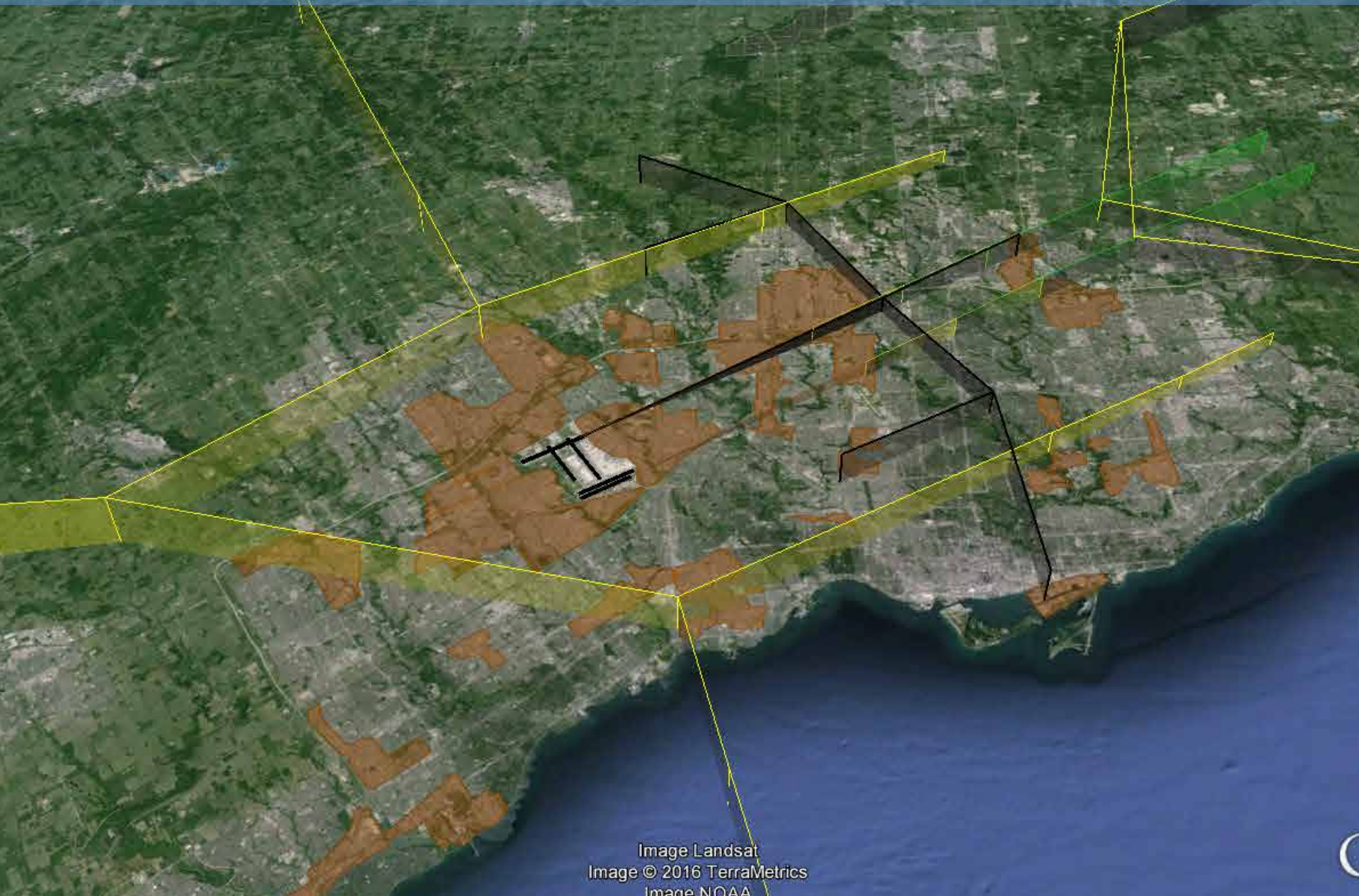
Option Case #1 – Night time RNAV Approaches

Rwy 23 - Existing Downwinds



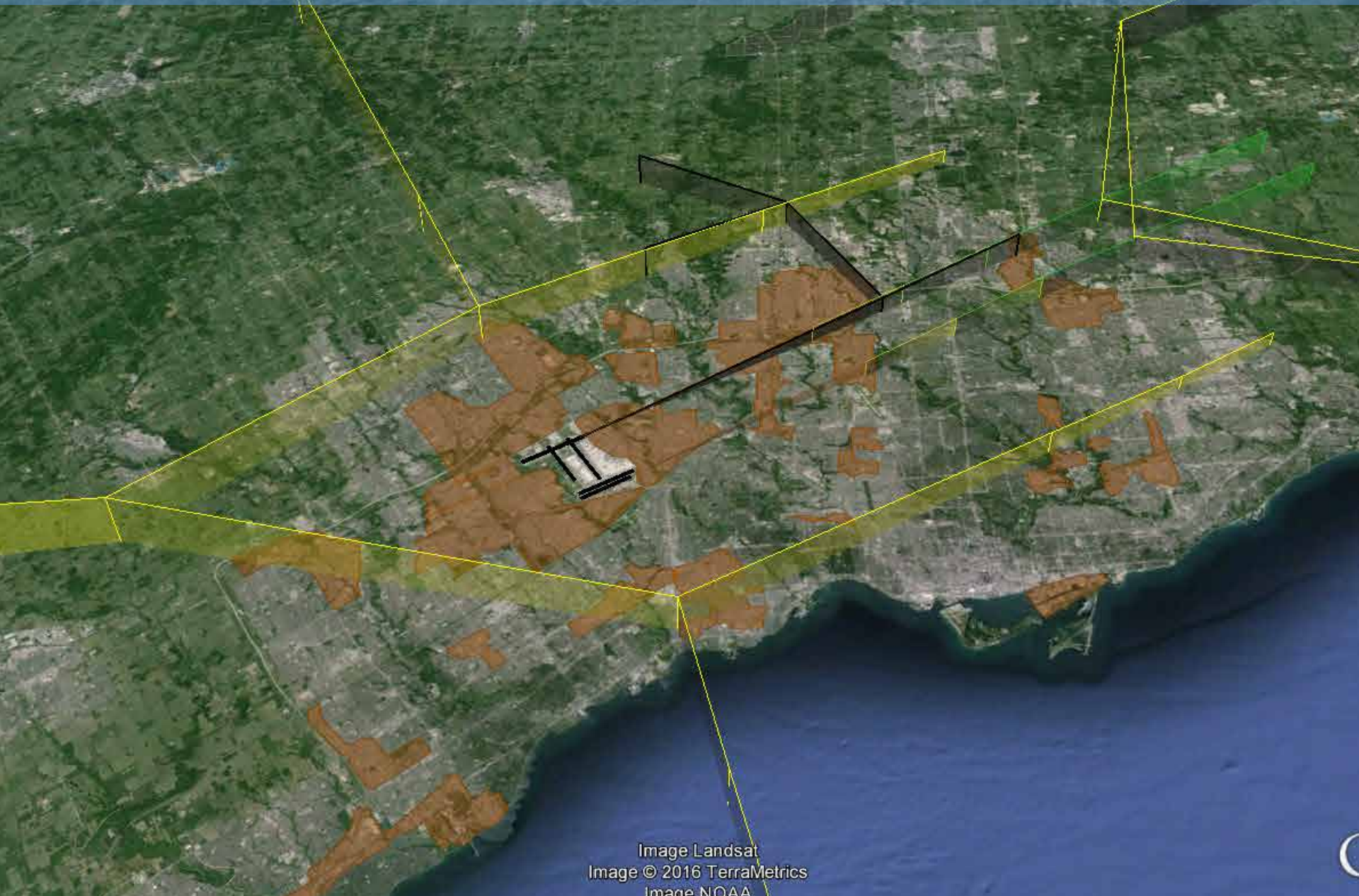
Option Case #2 – Night time RNAV Approaches

Rwy 23 - 5 NM offset downwind



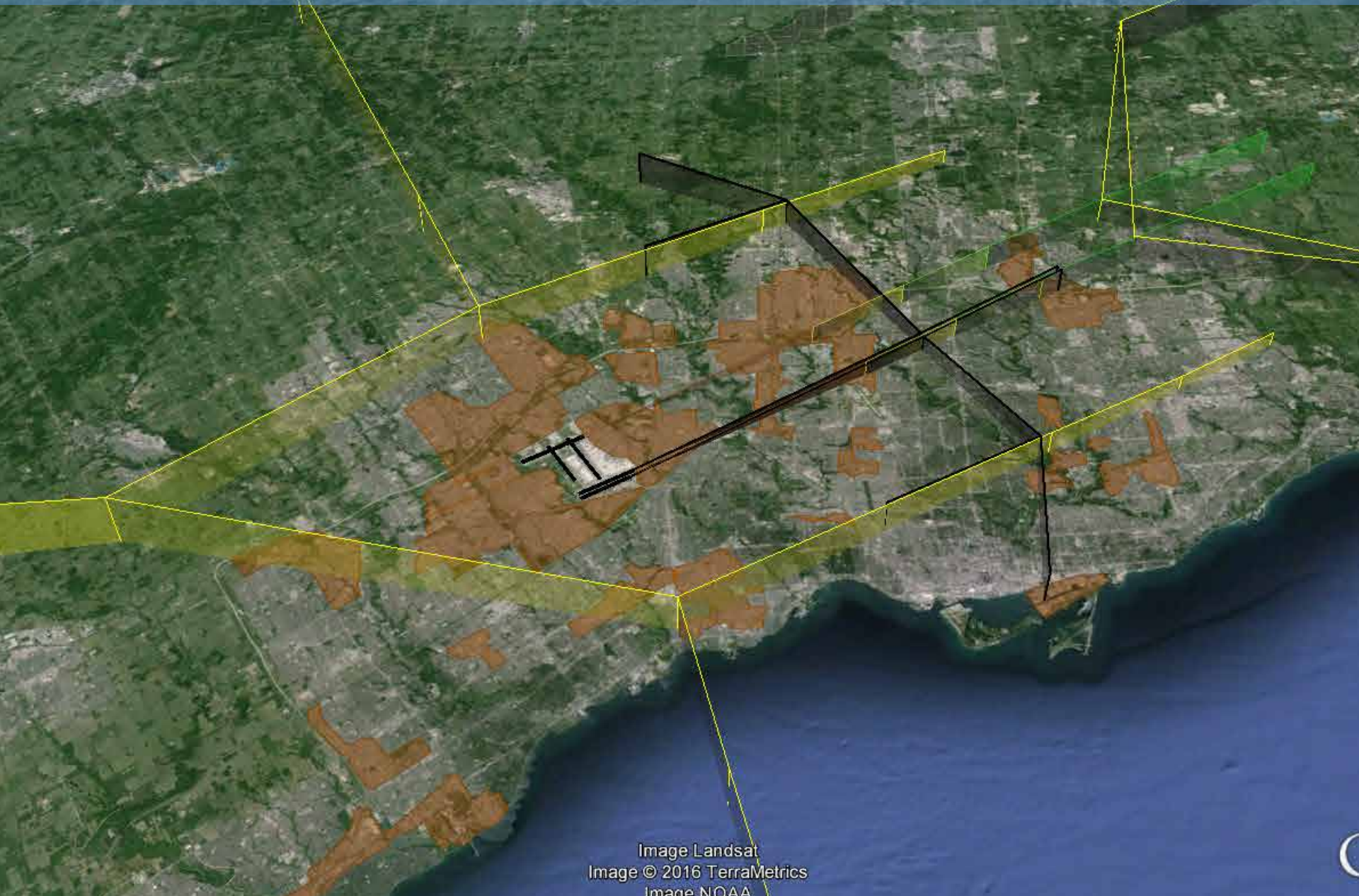
Option Case #3 – Night time RNAV Approaches

Rwy 23 – Everyone joins from the North



Option Case #1 – Night time RNAV Approaches

Rwy 24L & 24R - Existing Downwinds



Option Case #2 – Night time RNAV Approaches

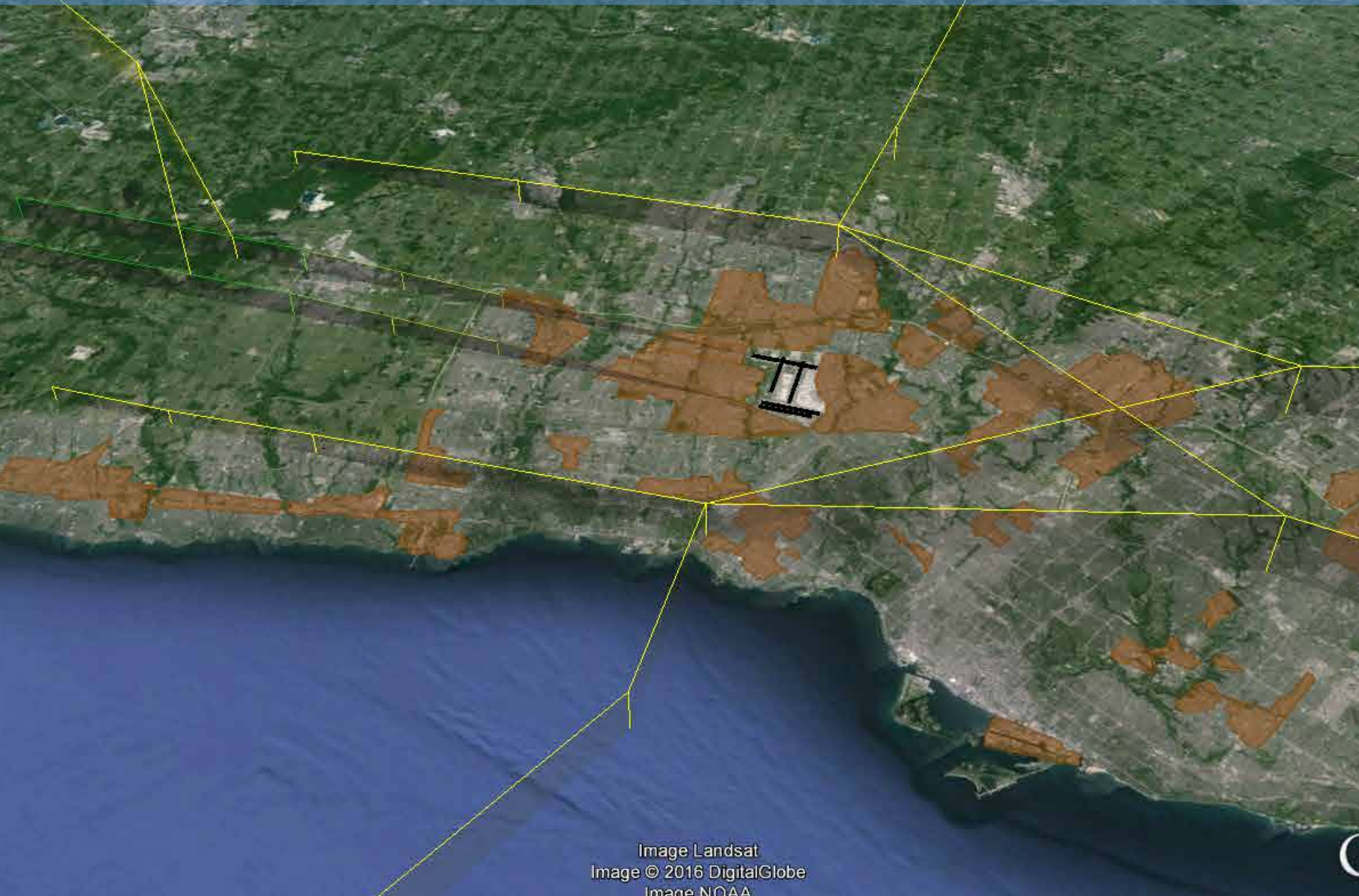
Rwy 24L & 24R - 5 NM offset downwind

Option Case #3 – Night time RNAV Approaches

Rwy 24L & 24R – Everyone joins from the North

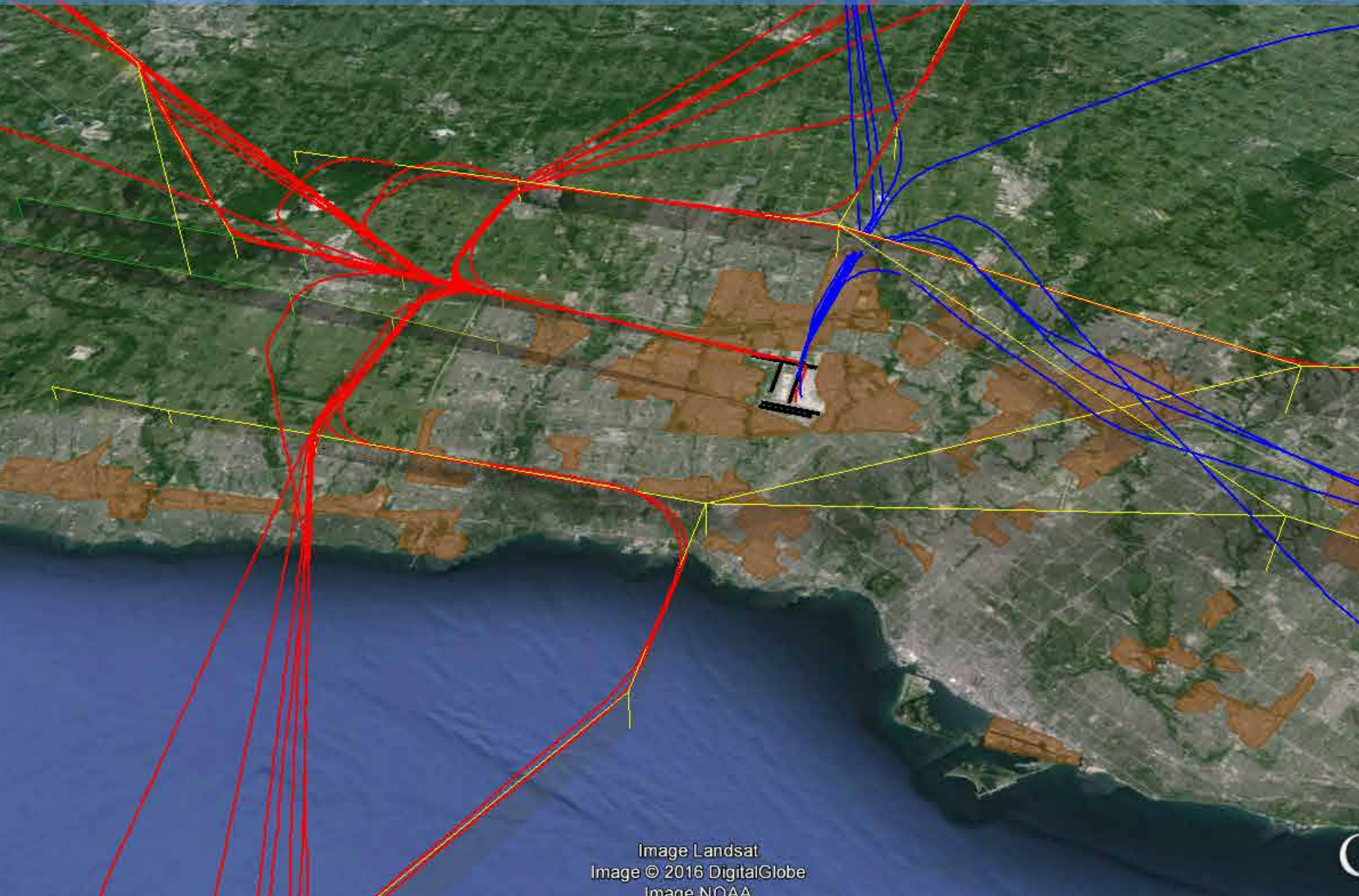
Current Operation – Night time

Landing East



Current Operation – Night time

Landing East – 1 Night – May 17/18



Option Case #1 – Night time RNAV Approaches

Rwy 05 - Existing Downwinds

Option Case #2 – Night time RNAV Approaches

Rwy 05 - 5 NM offset downwind

Option Case #3 – Night time RNAV Approaches

Rwy 05 – Everyone joins from the North

Option Case #4 – Night time RNAV Approaches

Rwy 05 – Everyone joins from the South

Option Case #1 – Night time RNAV Approaches

Rwy 06L & 06R - Existing Downwinds

Option Case #2 – Night time RNAV Approaches

Rwy 06L & 06R - 5 NM offset downwind

Option Case #3 – Night time RNAV Approaches

Rwy 06L & 06R – Everyone joins from the North

Current Operation – Night time

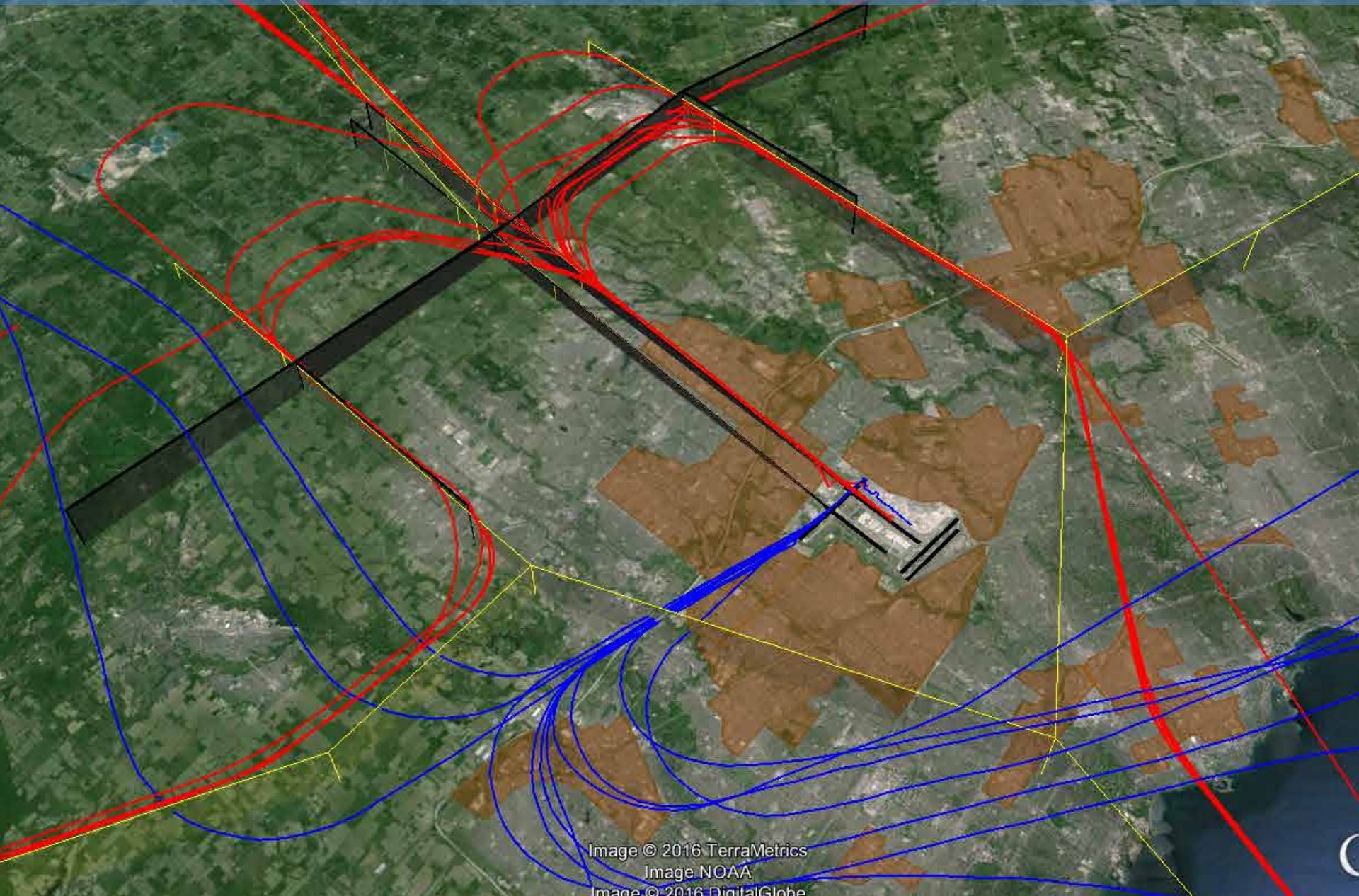
Landing South

Current Operation – Night time

Landing South – 1 Night – May 2/3

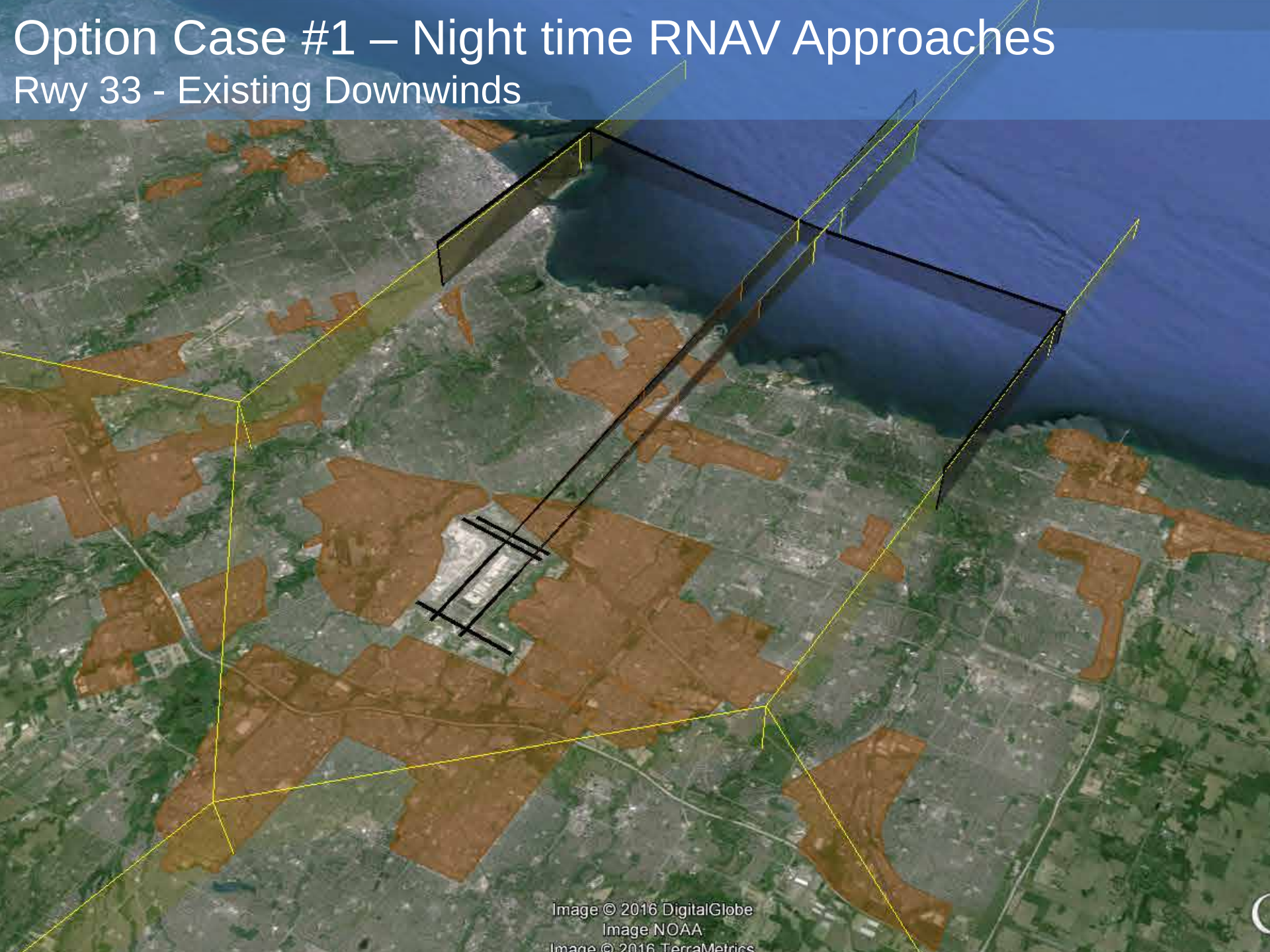
Option Case #1 – Night time RNAV Approaches

Rwy 15 - Existing Downwinds



Option Case #1 – Night time RNAV Approaches

Rwy 33 - Existing Downwinds



NIGHT-TIME APPROACHES

UNKNOWNS

Once design options are finalized:

- Determine maximum flight frequency that can be accommodated with this approach system
- Determine what hours this system could be utilized?
  - *Can we start earlier than midnight?*
- Identify the interdependencies with other airports
- Assess the impact of mandating GPS during applicable hours (*GPS is required to conduct these approaches*)
- Confirm capability of aircraft to transition from STAR to Approach

NIGHT-TIME APPROACHES

ANALYSIS

Once design options are finalized:

- Engage independent party to conduct noise modelling analysis
  - Change in noise generation – base case to option case
  - Population over flown by decibel band (ie. 55-65 dB)
  - Cumulative noise impact
  - Environmental impact
  - Impact/Benefit by community

NIGHT-TIME APPROACHES

ANALYSIS

- These procedures are not associated with the Night Time Flight Restriction Program
- Potential to disperse traffic in conjunction with night time preferential runways
- To accomplish the constant descent profiles, there is lateral concentration of flight paths
- Assess how traffic volume impacts potential hours of use looking forward to 2018 & 2023

- Should consultation support implementation, acoustic measurements will be taken before and after to confirm results

NIGHT TIME DEPARTURES
IDEA #2

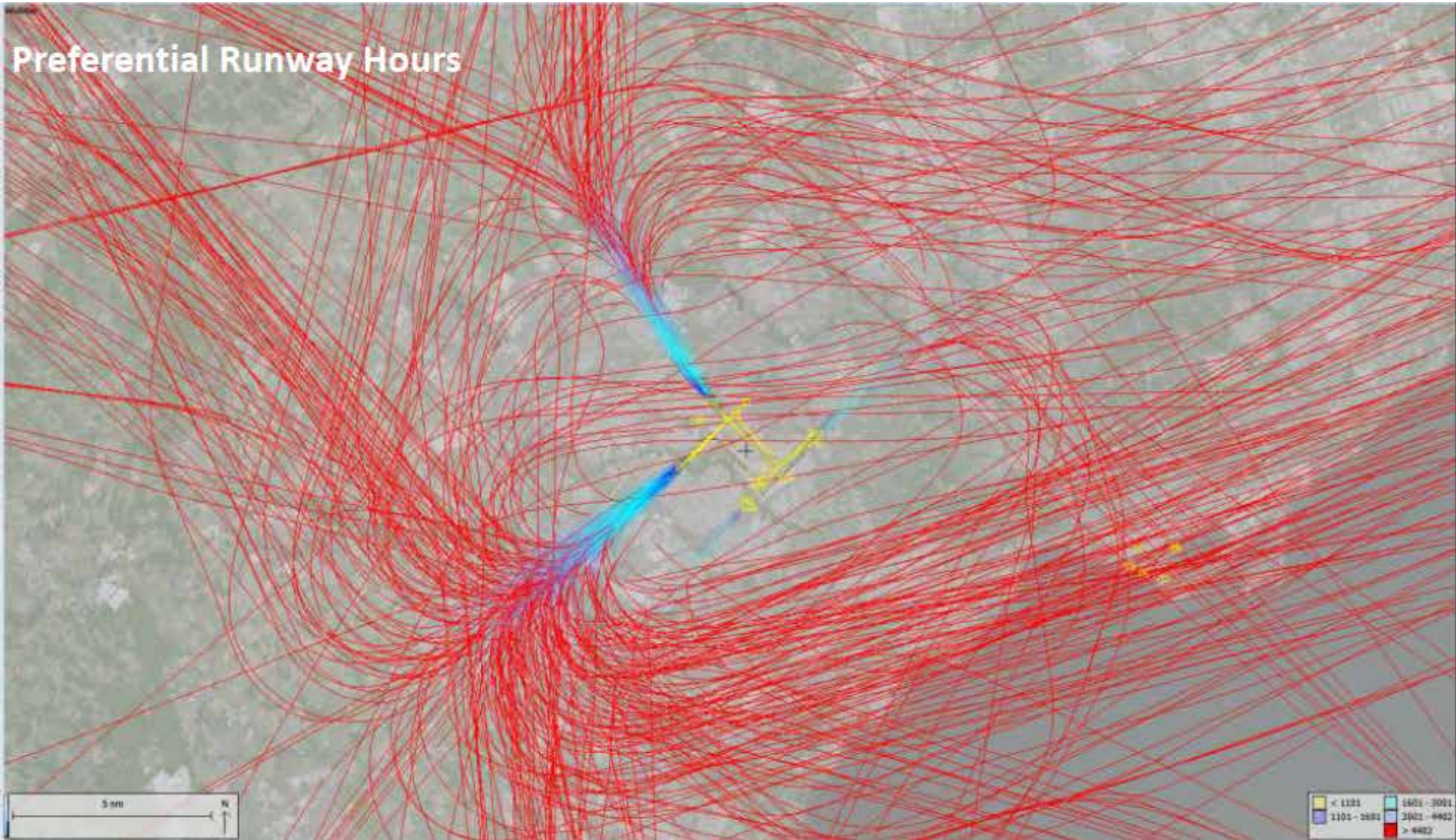
Current Conditions:

- Between 11:00 pm and 6:00 am all aircraft that depart, climb on the Standard Instrument Departure (SID) to 3,600’ ASL before they are eligible to turn towards their destination
- Some of these aircraft climb to 5,000’ ASL before starting a turn

- Could noise in residential areas be reduced if all aircraft are directed to climb to 5,000’ ASL before turning?

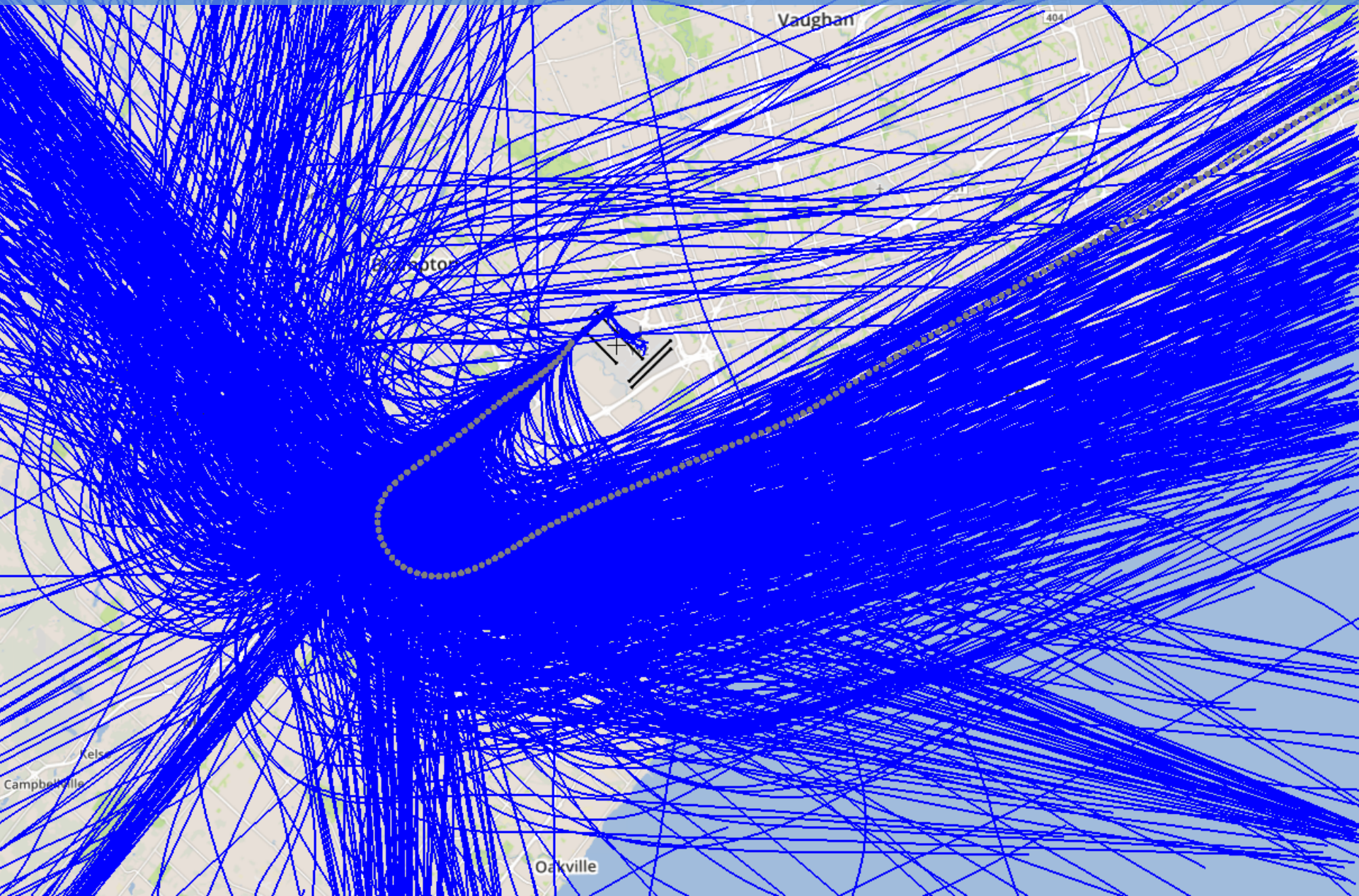
NIGHT-TIME DEPARTURE TRAFFIC

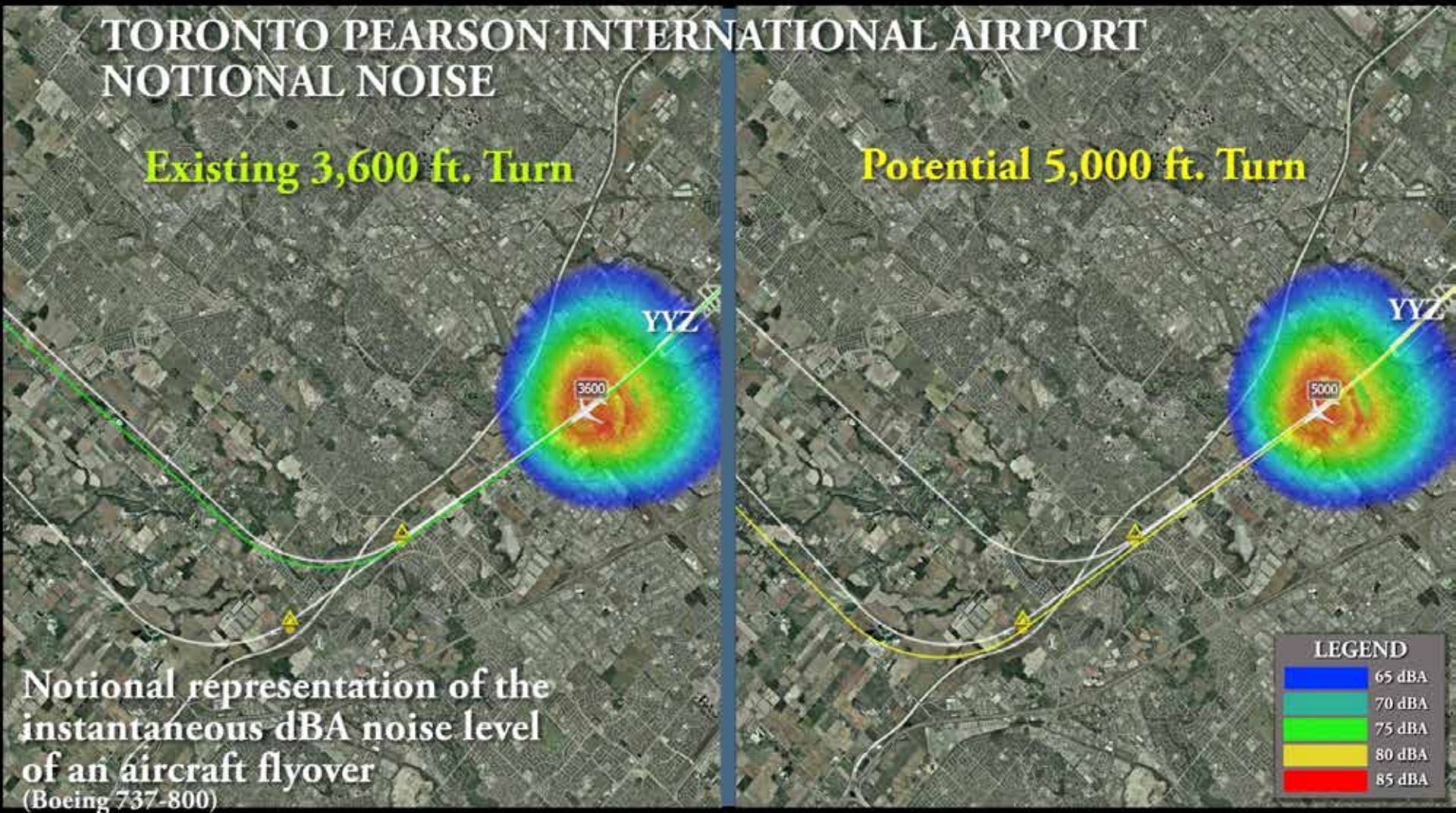
436 OPERATIONS MARCH 2015



Night-time Departures, May through October 2015

1312 Departures – Rwy 23




TORONTO PEARSON INTERNATIONAL AIRPORT
NOTIONAL NOISE
Existing 3,600 ft. Turn
Potential 5,000 ft. Turn
YYZ
YYZ
3600
5000
LEGEND
65 dBA
70 dBA
75 dBA
80 dBA
85 dBA
Notional representation of the instantaneous dBA noise level of an aircraft flyover
(Boeing 737-800)

NIGHT-TIME DEPARTURES

ANALYSIS

- We are planning to study this idea in conjunction with the amended headings (next)
- Engage independent party to conduct noise modelling analysis
  - Change in noise generation – base case to option case
  - Population over flown by decibel band (ie. 55-65 dB)
  - Cumulative noise impact
  - Environmental impact
  - Impact/Benefit by community

NIGHT-TIME DEPARTURES

ANALYSIS

- These procedures are not associated with the Night Time Flight Restriction Program
- Base Case Analysis from Runway 23 indicated that about 42% of flights currently climb to 5,000’ before turning
- Tracks cannot be assigned, so weather conditions will result in some variation in ground tracks
- Assess how traffic volume impacts potential hours of use looking forward to 2018 & 2023

- Should consultation support implementation, acoustic measurements will be taken before and after to confirm results

NIGHT-TIME DEPARTURES
IDEA #2

Current Conditions:

- Aircraft fly the same SID procedures and approaches all hours of the day
  - These SID procedures for East/West departures provide 10° of divergence for parallel operations

- Night-time departures are conducted from a single runway, and therefore do not require the divergence associated with parallel departure operations.

- This is not related to the Night Flight Restriction Program

NIGHT-TIME DEPARTURES

Design Principals

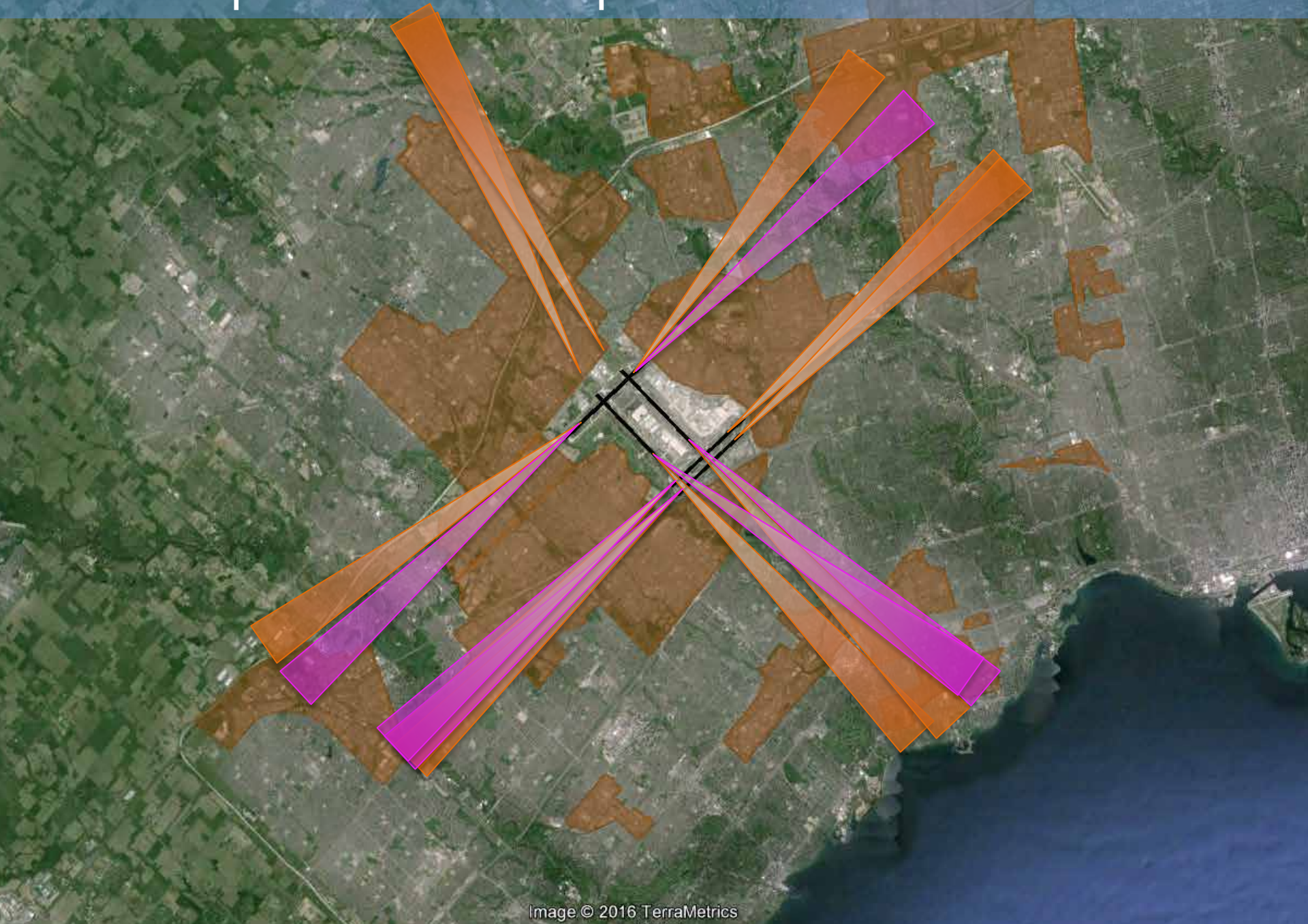
Night-time amended departure tracks:

- Flight crews manually amend their headings at night to reduce residential area over flights
- Look for opportunities to use headings that route aircraft away from residential areas

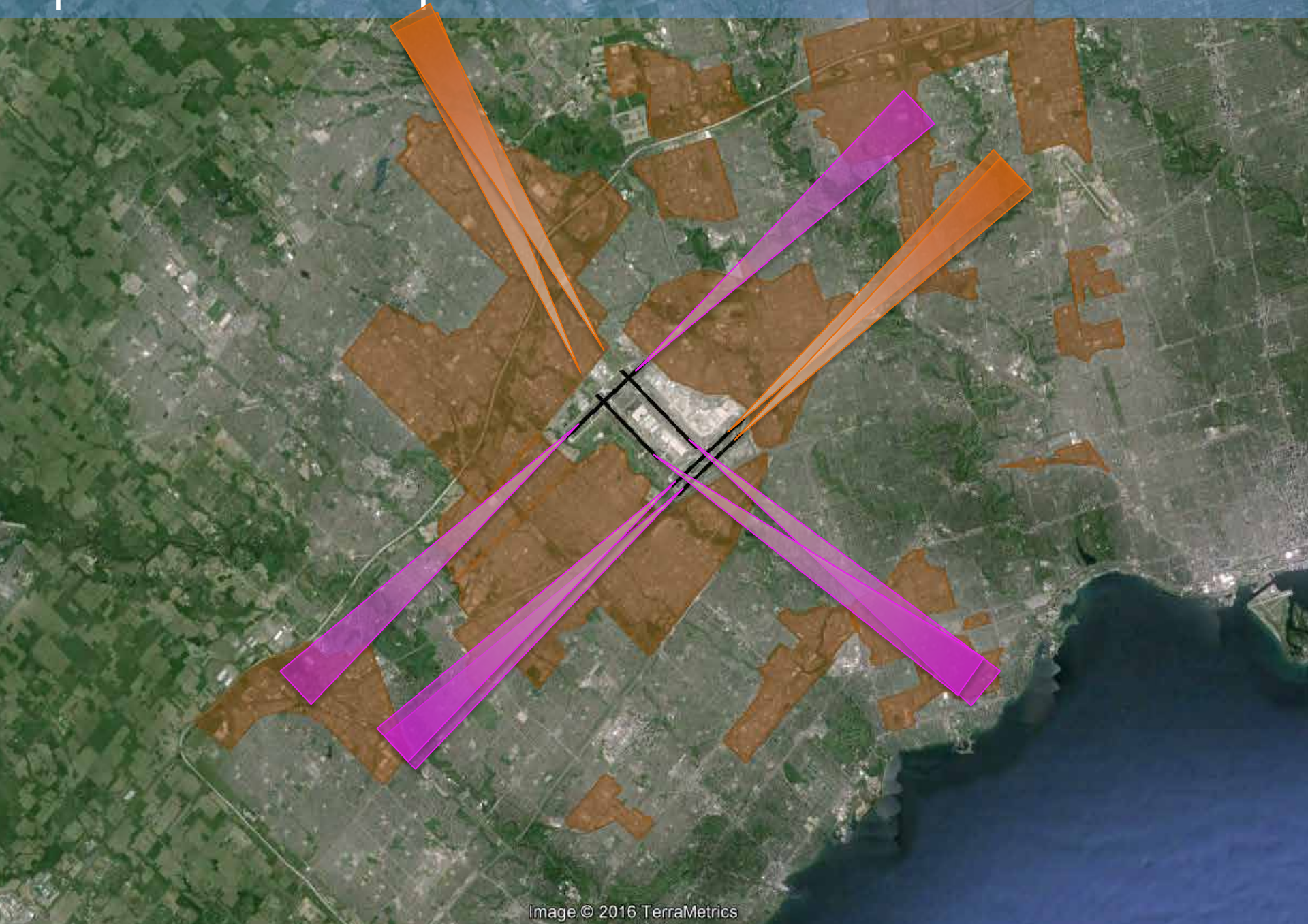
Note: The following show the no-wind tracks and do not account for associated drift on any given day which can affect how aircraft track across the ground.

Base Case – Departure Procedures

Base & Option Case – Departure Procedures



Option Case – Departure Procedures



NIGHT-TIME DEPARTURES

UNKNOWNS

Once design options are finalized:

- Determine what hours this system could be utilized?
  - *Can we start earlier than 11:00 pm?*
- Identify the interdependencies with other airports
- Affect of fleet renewal on climb gradients
  - How much will this affect flight paths?

Once design options are finalized:

- Engage independent party to conduct noise modelling analysis
  - Change in noise generation – base case to option case
  - Population over flown by decibel band (ie. 55-65 dB)
  - Cumulative noise impact
  - Environmental impact
  - Impact/Benefit by community

NIGHT-TIME DEPARTURES

ANALYSIS

- These procedures are not associated with the Night Time Flight Restriction Program
- Potential to disperse traffic in conjunction with night time preferential runways
- Can be implemented in conjunction with, or independent of, amended night-time turn altitude.
- Assess how traffic volume impacts potential hours of use looking forward to 2018 & 2023

- Should consultation support implementation, acoustic measurements will be taken before and after to confirm results

SPEED RESTRICTIONS
IDEA #3

Current Conditions:

- Standard Terminal Arrivals (STAR) procedures have published speed restrictions
- The published speed restrictions are developed based on aircraft performance capabilities, and design criteria
- As the aircraft on the downwind reach the point where they are ready to start turning back towards the airport, the published speed restriction is 200 kts
- ATC does tactically assign higher or lower speeds based on actual traffic conditions

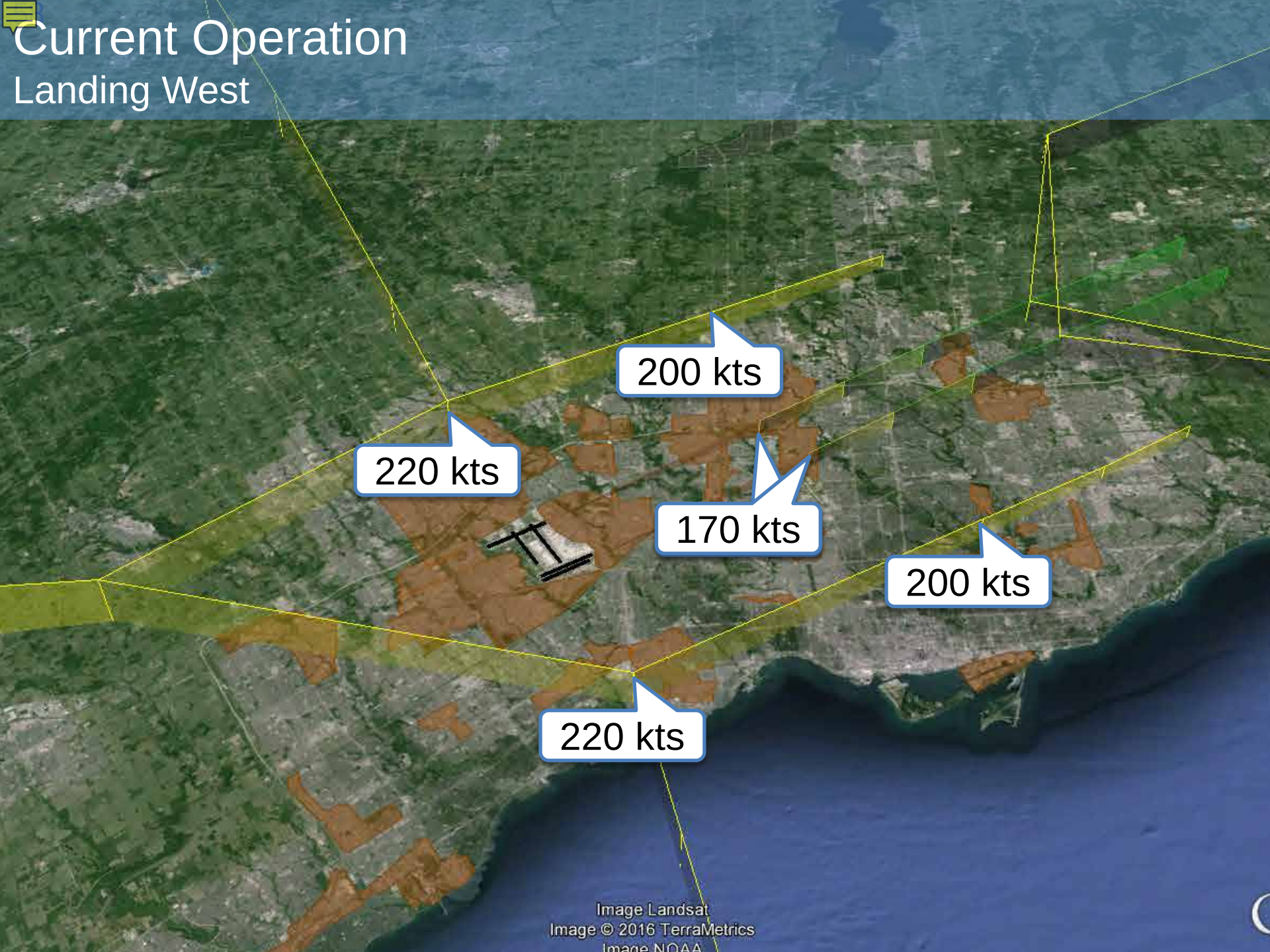
SPEED RESTRICTIONS

Design Principals

- Maximizing the published speed restrictions increases the opportunity for flight crews to maintain a clean wing in the downwind leg
  - Could reduce the need for flaps
  - Could reduce the need for speed brakes
- Examine design criteria to determine if it can support an increase in published speeds

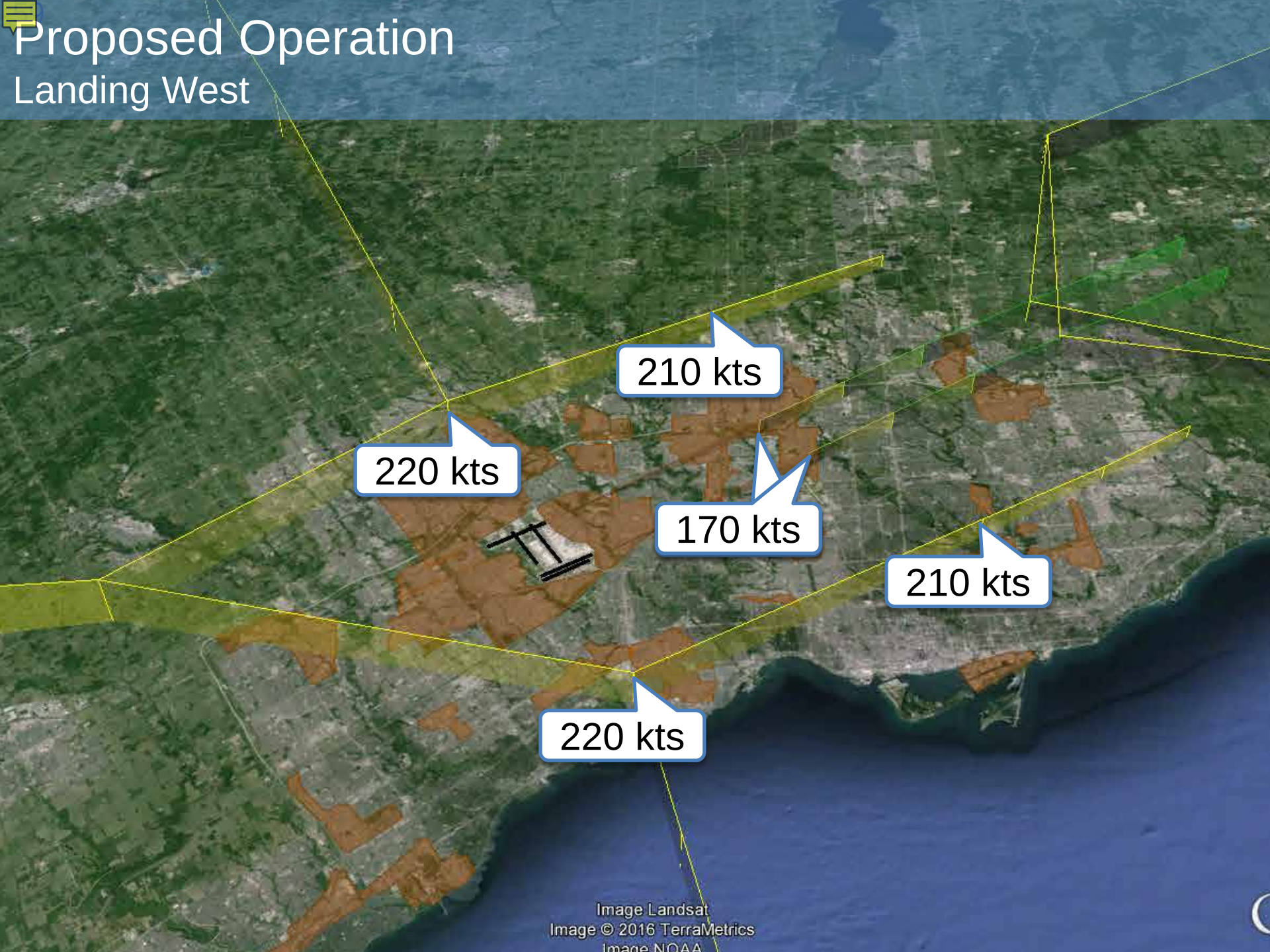
Current Operation

Landing West



Proposed Operation

Landing West



Current Operation

Landing East

Proposed Operation

Landing East

SPEED RESTRICTIONS

UNKNOWNS

- There is limited ability to model noise differences associated with speed to categorically determine noise impact / benefit
- This change does not directly determine flap or speed brake use. When flaps or speed brakes are deployed is determined by flight crews
  - Airline Standard Operating Procedures may require continued use of flaps even with this change
- ATC sequencing requirements may necessitate speed assignments different from the STAR

ARRIVAL SPEED RESTRICTIONS

ANALYSIS

- The latest update to the procedure design criteria does permit speeds greater than the limits in the previously in force criteria
- Criteria assessment indicates that it is possible to amend the downwind speed restrictions to 210 kts

CONSTANT DESCENT
IDEA #4

Current Conditions:

- Regulations don’t permit constant descent operations where there is parallel arrival traffic
- In the presence of parallel arrival traffic, one of the aircraft must fly a low altitude flat segment to maintain safe separation from the parallel traffic
  - More often the flat segment is flown by the aircraft arriving on the south runway
- This flat segment generates noise as the aircraft engines power up to maintain level flight

CONSTANT DESCENT

Design Principals

- Constant Descent Approaches (CDA) are the quietest method of approaching an airport
- Identify an opportunity to operate parallel CDA approaches to Toronto
- Required Navigation Performance (RNP) approaches are being deployed globally and can be used to construct CDA profiles to runways
- RNP approach procedures offer course guidance so precise that they are being contemplated for use in parallel arrival operations

RNP ELSEWHERE

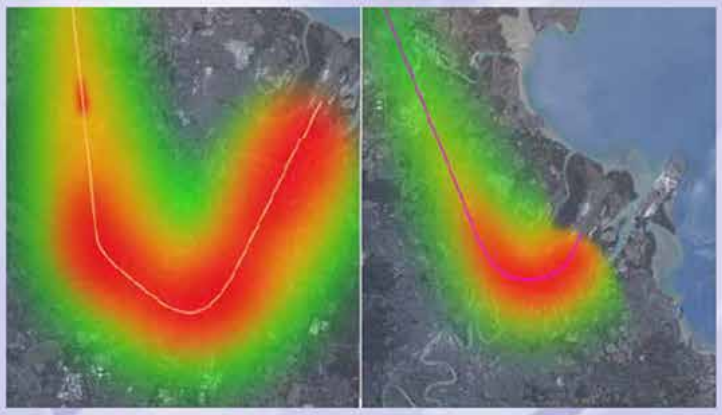
OUTCOMES IN OTHER JURISDICTIONS

RNP ELSEWHERE

OUTCOMES IN OTHER JURISDICTIONS

Implementation of Terminal Area RNP

The Brisbane Trial – Noise Footprint



Standard ILS Approach RNP Approach

AIRSERVICES AUSTRALIA

Brisbane Trial

- RNP operations commenced Jan 07
- Data collection and monitoring installed to support regulatory change
- RNP operations limited to Qantas B737NG
- By Oct 08 10,915 RNP AR approaches
- 3,402 flights saving:
- 8952 minutes (149hrs / 6 days!)
- 39,391 track miles
- 492,388kg of fuel
- 1,575,640kg of CO2

CONSTANT DESCENT

Design Principals

- RNP Approaches are being considered within the distribution of current arrival operations
  - Aren't being planned to fly over areas that aren't accustomed to arrival flight paths
- The advantage of RNP is that it converts the flat segments in current flight paths to constant descent
  - Expecting a reduction in the generation of noise
- For some arrival runways, RNP approach paths can be tailored to minimize/reduce track miles over residential areas
  - These opportunities may require changes to noise abatement procedures

CONSTANT DESCENT

UNKNOWNS

- Work is underway with Transport Canada to establish the required rules in Canada for parallel RNP operations
  - Timeline for completion is unknown
- The number of aircraft that would be able to take advantage of the Constant Descent Approaches is dependent on;
  - Airlines/Aircraft types equipped & trained
  - Traffic conditions & volume
- If the favored RNP path requires a change to noise abatement rules, there is a specific process that must be followed

Once design options are finalized:

- Engage independent party to conduct noise modelling analysis
  - Change in noise generation – base case to option case
  - Population over flown by decibel band (ie. 55-65 dB)
  - Cumulative noise impact
  - Environmental impact
  - Impact/Benefit by community

CONSTANT DESCENT
ANALYSIS

- To accomplish constant descent profiles, there is lateral concentration of flight paths
- Not all aircraft operating at Toronto Pearson are equipped. Looking forward to 2023 what will be equippage rates?
- Need to assess how traffic volume impacts potential utilization of the procedure

IDEA 5:
WEEKEND RUNWAY ALTERNATION

Ideas 5 and 6 RFP Update

- **The GTAA has been working toward Request for Proposal (RFP) for the technical analysis of**
  - Idea 5 (Weekend Runway Alternation)
  - Idea 6 (Review of the Preferential Runway System)

- **Work to date has included developing the inputs for the technical review**

- **At the current state, we would like to review with our community stakeholders to ensure we've captured all relevant inputs**

Factors Involved in Runway Assignment

- Surface wind
- Winds aloft
- Demand/Capacity
- Runway conditions/availability
- Navigational aid availability
- Aircraft performance
- Active weather - thunderstorms, icing, windshear, etc.

Idea 5: Weekend Runway Alternation

Investigate if there are opportunities to alternate runways on weekends in order to provide periods of respite from noise.

- ***Why weekends only?***
  - *Traffic volumes on Saturday and most of Sunday tend to be lower than other days of the week*
  - *Required runway configuration is one dedicated landing runway and a different dedicated departure runway*
  - *Above certain traffic levels, we move into dual operations*

Criteria for Investigation

Timeframe: May 1st – October 31st

- Winter operations (November – April) require greater flexibility in order to accommodate any potential weather events that could impact capacity

Hourly Capacity Limitation

- Simulate procedure at various traffic levels. Determine potential hours of use based on simulation results.

Noise Exposure Forecast (NEF 30) and Airport Operating Area

- Option cases cannot exceed NEF 30 contour

Example of Runway Alternation

Runway alternation programme – 2016 landings

For the communities living beneath the flight paths used by incoming aircraft, runway alternation provides predictable periods of noise relief.

At its heart, runway alternation is straightforward: for part of the day we use one runway for landings and the other for take-offs. Halfway through the day we switch over. If you were living or working under an incoming flight path during the morning, you're unlikely to be under one during the afternoon. And vice versa.

To help our neighbours plan ahead, we produce this annual schedule of runway alternation. Although we do our best to adhere to the programme, it's not always possible. Sometimes delays mean some arrivals can land out of the alternation pattern, or occasionally we have to suspend runway alternation due to bad weather or emergency repairs to one of the runways.

Day-time runway alternation

Day-time runway alternation happens only when we're on what's known as 'westerly operations'. During westerly operations the wind usually blows from the west and aircraft arrive from the east over London. Westerly operations account for about 70% of the year at Heathrow.

At Heathrow, 'day-time' runs from 06:00 till the last aircraft departs at the end of the day. The halfway point – the time when we switch runways – is 15:00.

Daytime runway codes

The day-time schedule uses the runway codes 27R and 27L.

27R = aircraft approaching the northern runway from the east
27L = aircraft approaching the southern runway from the east

Day-time runway alternation

Date (week commencing)	06:00 - 15:00	15:00 until last departure
4 Jan	27L	27R
11 Jan	27R	27L
18 Jan	27L	27R
25 Jan	27R	27L
1 Feb	27L	27R
8 Feb	27R	27L
15 Feb	27L	27R
22 Feb	27R	27L
29 Feb	27L	27R
7 Mar	27R	27L
14 Mar	27L	27R
21 Mar	27R	27L
28 Mar	27L	27R
4 Apr	27R	27L
11 Apr	27L	27R
18 Apr	27R	27L
25 Apr	27L	27R
2 May	27R	27L
9 May	27L	27R
16 May	27R	27L
23 May	27L	27R
30 May	27R	27L
6 Jun	27L	27R
13 Jun	27R	27L
20 Jun	27L	27R
27 Jun	27R	27L

Date (week commencing)	06:00 - 15:00	15:00 until last departure
4 Jul	27L	27R
11 Jul	27R	27L
18 Jul	27L	27R
25 Jul	27R	27L
1 Aug	27L	27R
8 Aug	27R	27L
15 Aug	27L	27R
22 Aug	27R	27L
29 Aug	27L	27R
5 Sep	27R	27L
12 Sep	27L	27R
19 Sep	27R	27L
26 Sep	27L	27R
3 Oct	27R	27L
10 Oct	27L	27R
17 Oct	27R	27L
24 Oct	27L	27R
31 Oct	27R	27L
7 Nov	27L	27R
14 Nov	27R	27L
21 Nov	27L	27R
28 Nov	27R	27L
5 Dec	27L	27R
12 Dec	27R	27L
19 Dec	27L	27R
26 Dec	27R	27L

Heathrow
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Example of Runway Alternation

Runway alternation programme – 2016 landings

Night-time runway alternation

Since so few aircraft take off or land at night, there's more scope for runway alternation. It doesn't matter whether aircraft are coming in to land from the east or the west, we can still alternate runways.

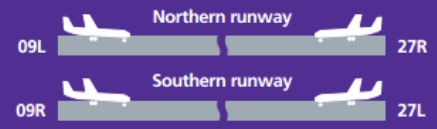
That flexibility gives us the ability to operate night-time runway alternation on a four-weekly cycle.

- **Week 1**: Aircraft fly in from the west to land on the southern runway
- **Week 2**: Aircraft fly in from the east to land on the northern runway
- **Week 3**: Aircraft fly in from the west to land on the northern runway
- **Week 4**: Aircraft fly in from the east to land on the southern runway.

Since weather conditions could interfere with this pattern, we always specify a primary and a secondary (alternative) runway in our schedule. The secondary runway is not actually a different runway. It's the primary runway approached from the opposite direction.

Night-time runway codes

The night-time schedule uses the runway codes 09L, 27R, 09R and 27L.



09L = aircraft approaching the northern runway from the west
27R = aircraft approaching the northern runway from the east
09R = aircraft approaching the southern runway from the west
27L = aircraft approaching the southern runway from the east

Night-time runway alternation (from after the last departure until 06:00am)

Date (week commencing)	Runway to be used (primary)	Alternative (secondary)	Date (week commencing)	Runway to be used (primary)	Alternative (secondary)
4 Jan	27L	09R	4 Jul	27R	09L
11 Jan	09L	27R	11 Jul	09R	27L
18 Jan	27R	09L	18 Jul	27L	09R
25 Jan	09R	27L	25 Jul	09L	27R
1 Feb	27L	09R	1 Aug	27R	09L
8 Feb	09L	27R	8 Aug	09R	27L
15 Feb	27R	09L	15 Aug	27L	09R
22 Feb	09R	27L	22 Aug	09L	27R
29 Feb	27L	09R	29 Aug	27R	09L
7 Mar	09L	27R	5 Sep	09R	27L
14 Mar	27R	09L	12 Sep	27L	09R
21 Mar	09R	27L	19 Sep	09L	27R
28 Mar	27L	09R	26 Sep	27R	09L
4 Apr	09L	27R	3 Oct	09R	27L
11 Apr	27R	09L	10 Oct	27L	09R
18 Apr	09R	27L	17 Oct	09L	27R
25 Apr	27L	09R	24 Oct	27R	09L
2 May	09L	27R	31 Oct	09R	27L
9 May	27R	09L	7 Nov	27L	09R
16 May	09R	27L	14 Nov	09L	27R
23 May	27L	09R	21 Nov	27R	09L
30 May	09L	27R	28 Nov	09R	27L
6 Jun	27R	09L	5 Dec	27L	09R
13 Jun	09R	27L	12 Dec	09L	27R
20 Jun	27L	09R	19 Dec	27R	09L
27 Jun	09L	27R	26 Dec	09R	27L

Please note: There is a transitional period from a Sunday to Monday morning – this means that Monday morning flights before 06.00 will still be following the previous week's runway pattern.

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Data to Provide to Consultant

2015 “Base Case” Data

- List of actual departure and arrival movements
- Originating airport for arriving flights
- Destination airport for departing flights
- Aircraft types
- Weather data

Data to Provide to Consultant (cont'd)

Forecasted Data for Option Case Years 2018 & 2023

- Total forecasted aircraft movements
- Time of day of flights
- Aircraft types
- Originating airport for arriving flights
- Destination airport for departing flights

Idea 5 – Option Case 1 – Defined Configurations

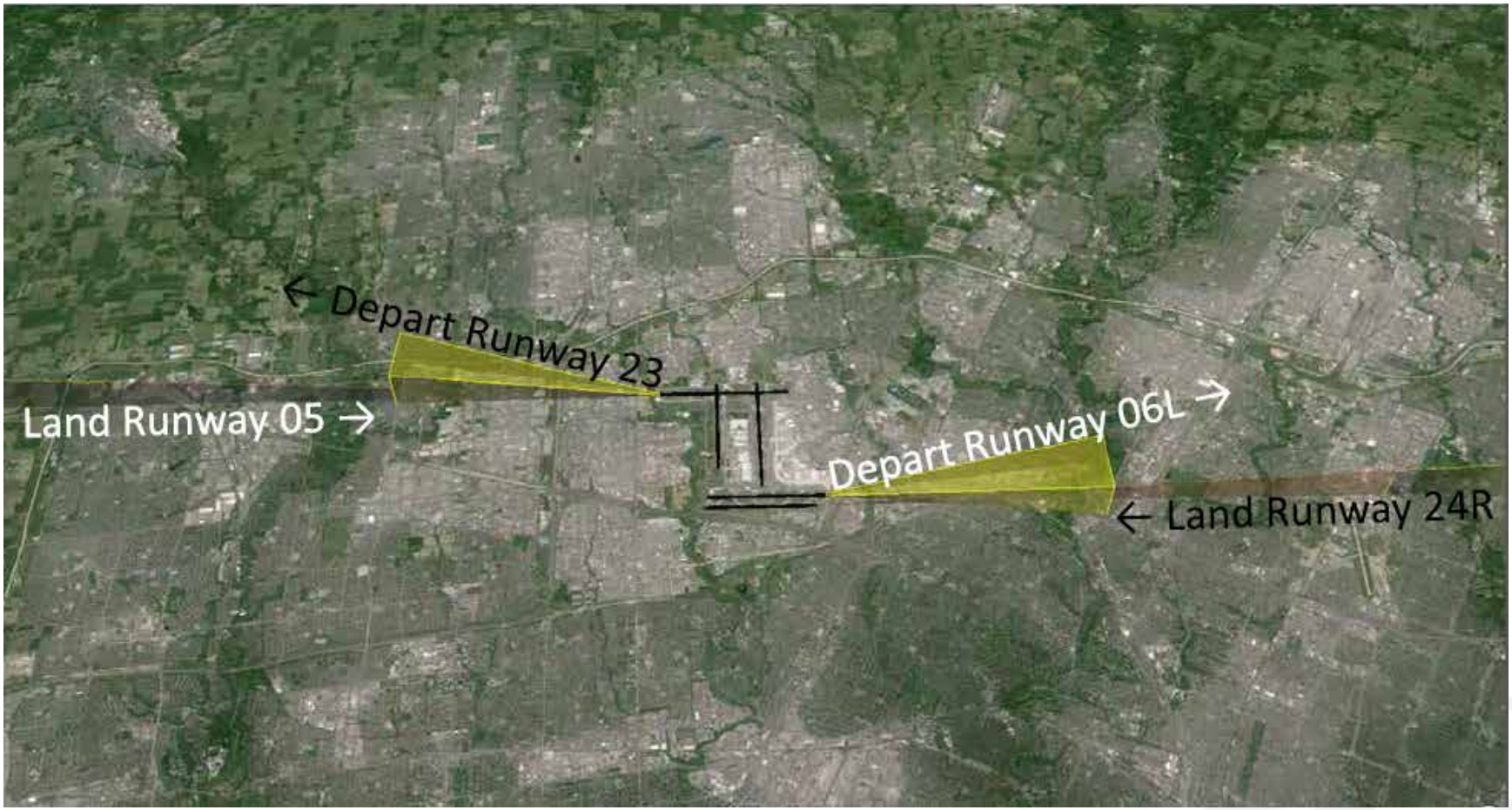
WEEKEND #	SATURDAY CONFIG	SUNDAY CONFIG
1 (May 1-2)	a	a
2	c	c
etc…		
36 (Oct 31-Nov 1)	y	y

The consultant's analysis will inform the actual schedule of runway usage

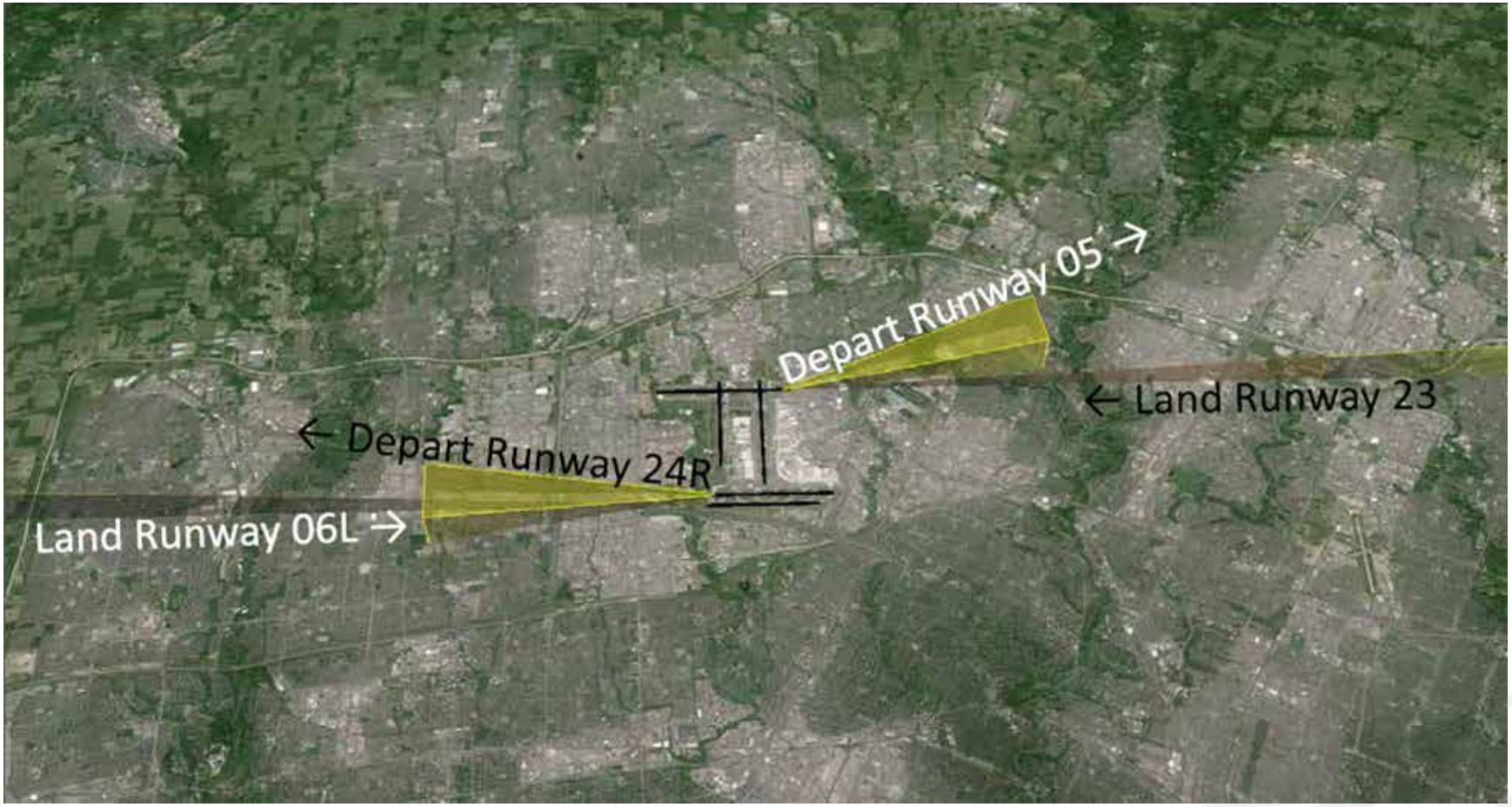
Where configurations are defined as follows:

- a = Land 05 / Depart 06L
- b = Land 24R / Depart 23
- c = Land 23 / Depart 24R
- x = Land 06L / Depart 05
- y = Land 33L / Depart 33R
- z = Land 15R / Depart 15L

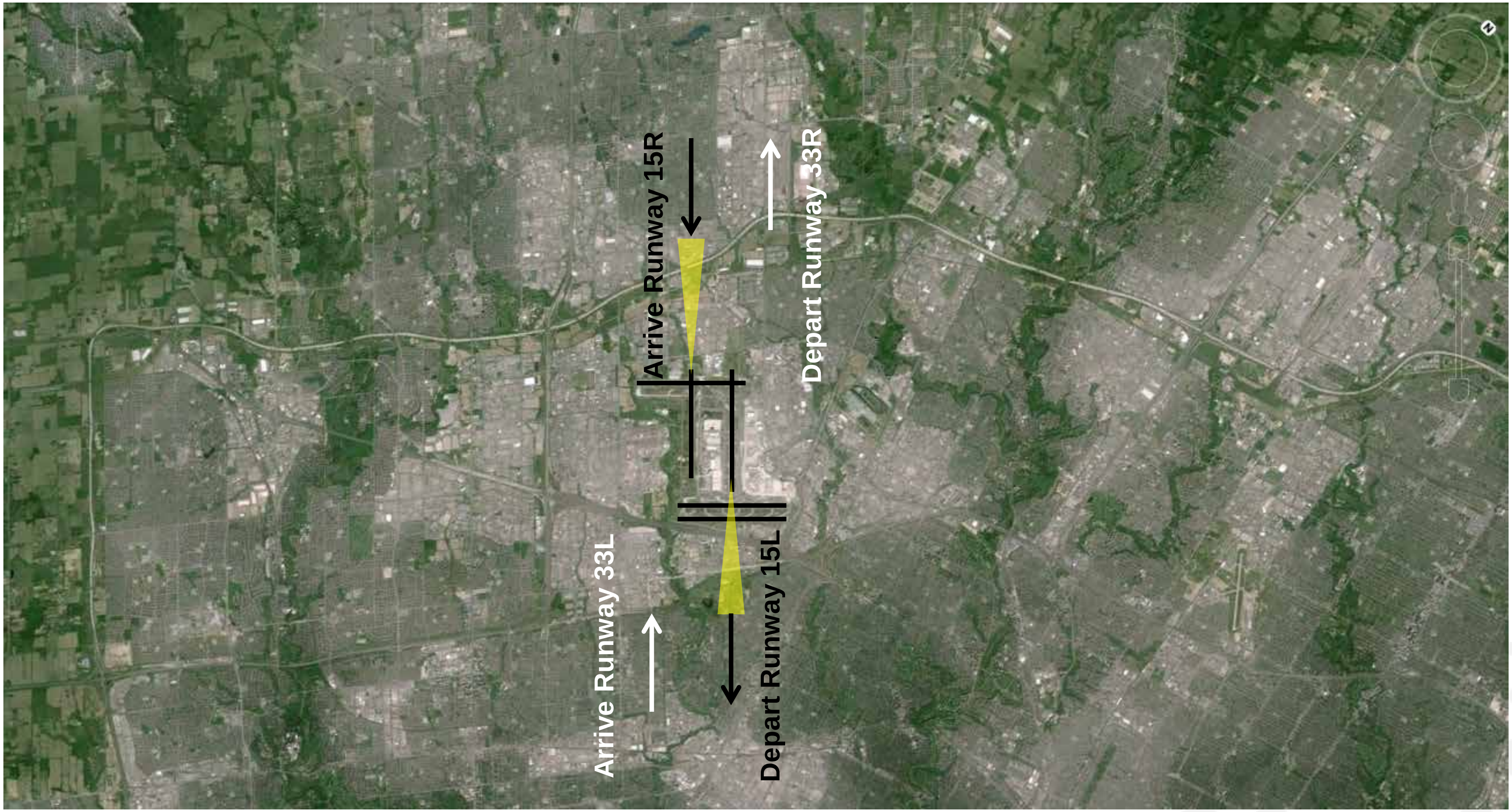
Idea 5 – Option Case 1 – Defined Configurations



Idea 5 – Option Case 1 – Defined Configurations



Idea 5 – Option Case 1 – Defined Configurations



Idea 5 – Option Case 2 – Points System

Runway Config	Arrival Runway	Departure Runway
a	05	06L
b	24R	23
c	23	24R
x	06L	05
y	33L	33R
z	15R	15L

- **Points assigned to each runway per daytime movement**
- **At night, runway movements are weighted**
  - *The consultant shall establish the weighting; it would be linked to the preferential runway system*

Metrics to be Analyzed

- Weather, including surface and upper winds to facilitate runway usage analysis
- Population overflown by decibel band
- Number of aircraft movements in the timeframe being analyzed
- Aircraft fleet mix
- Weighting criteria to be established

Additional Option Cases

In addition to analyzing the two option cases proposed by the GTAA, the Consultant shall propose two additional options for alternating runways on the weekend and provide an analysis.

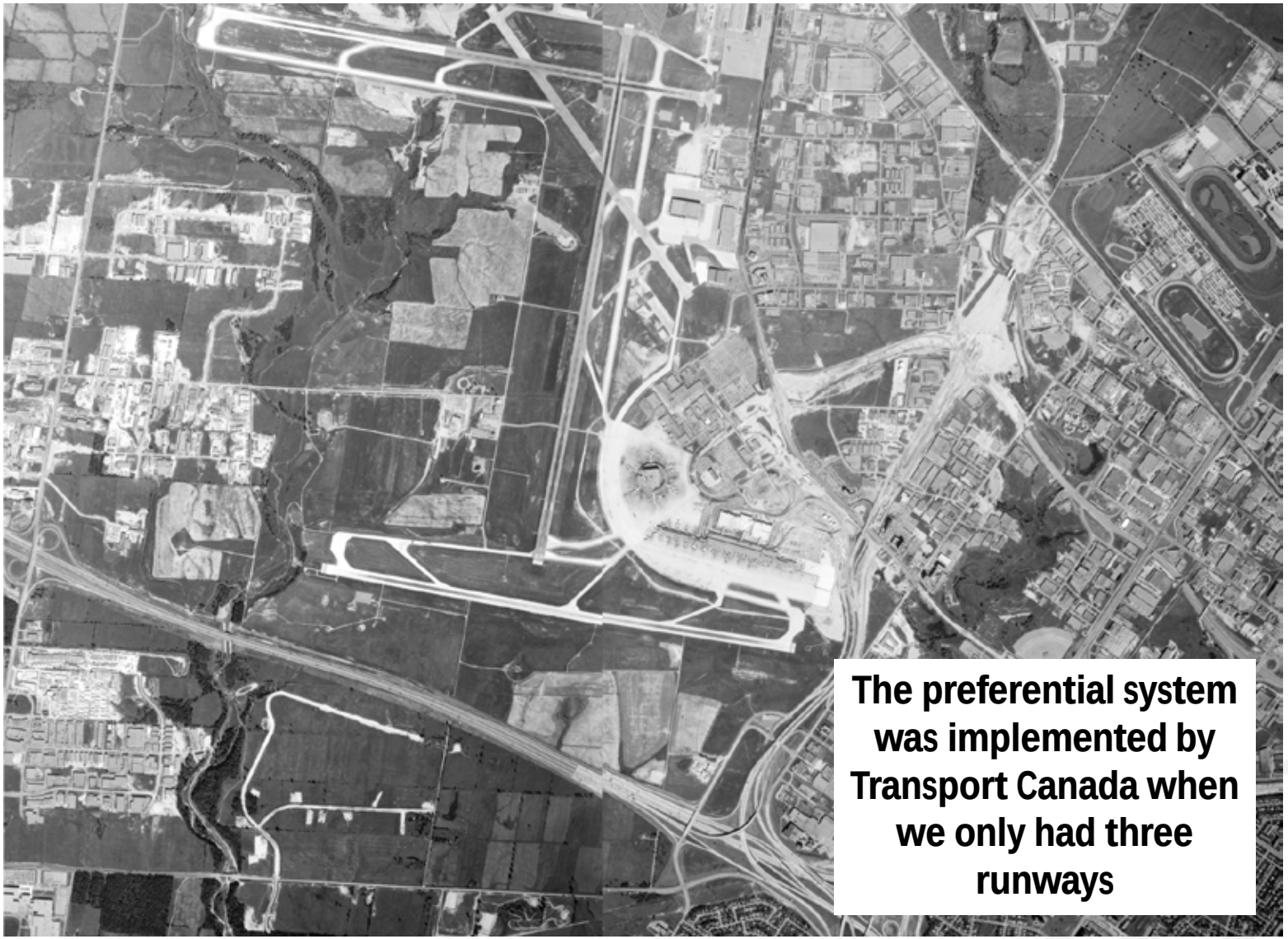
IDEA 6:
REVIEW OF PREFERENTIAL RUNWAY SYSTEM

Idea 6: Review of Preferential Runway System

The objective of this idea is to build a preferential runway system responsive to current and future operations.

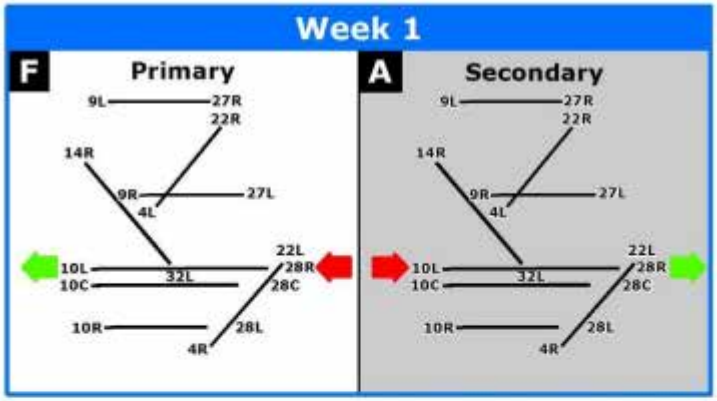
- ***What is Toronto Pearson's preferential priority standard?***
  - *The preferential runway system at Toronto Pearson exists to ensure that aircraft landing and departing during the preferential runway hours impact the fewest people.*

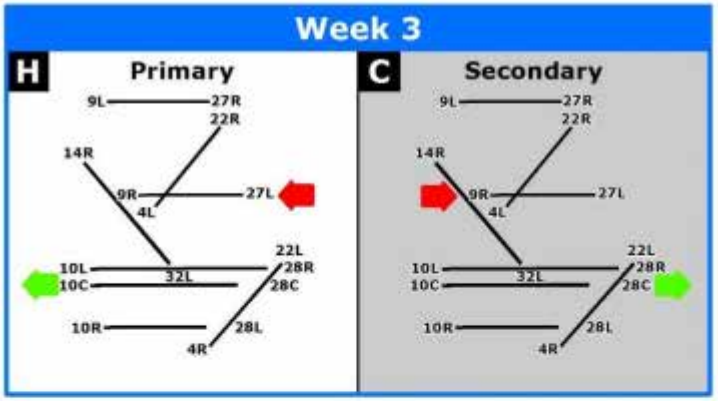
History of the Preferential Runway System

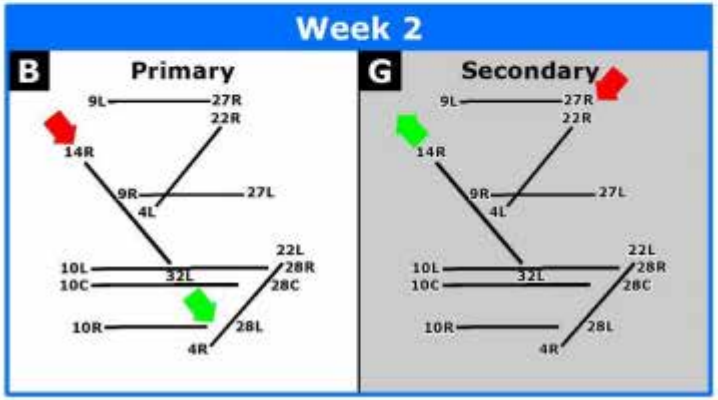


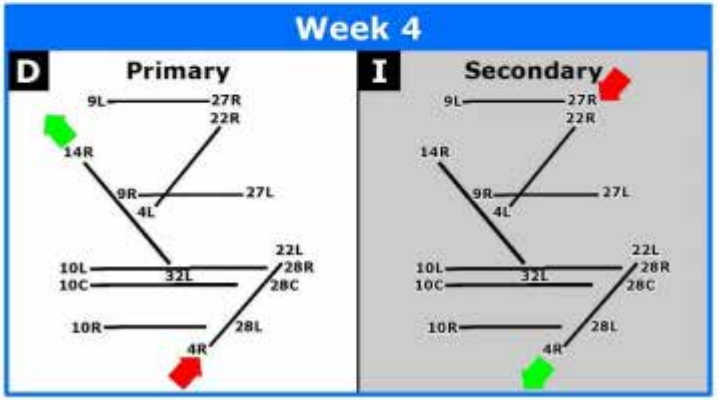
The preferential system was implemented by Transport Canada when we only had three runways

Example of a Preferential Runway System
Chicago O'Hare (ORD)

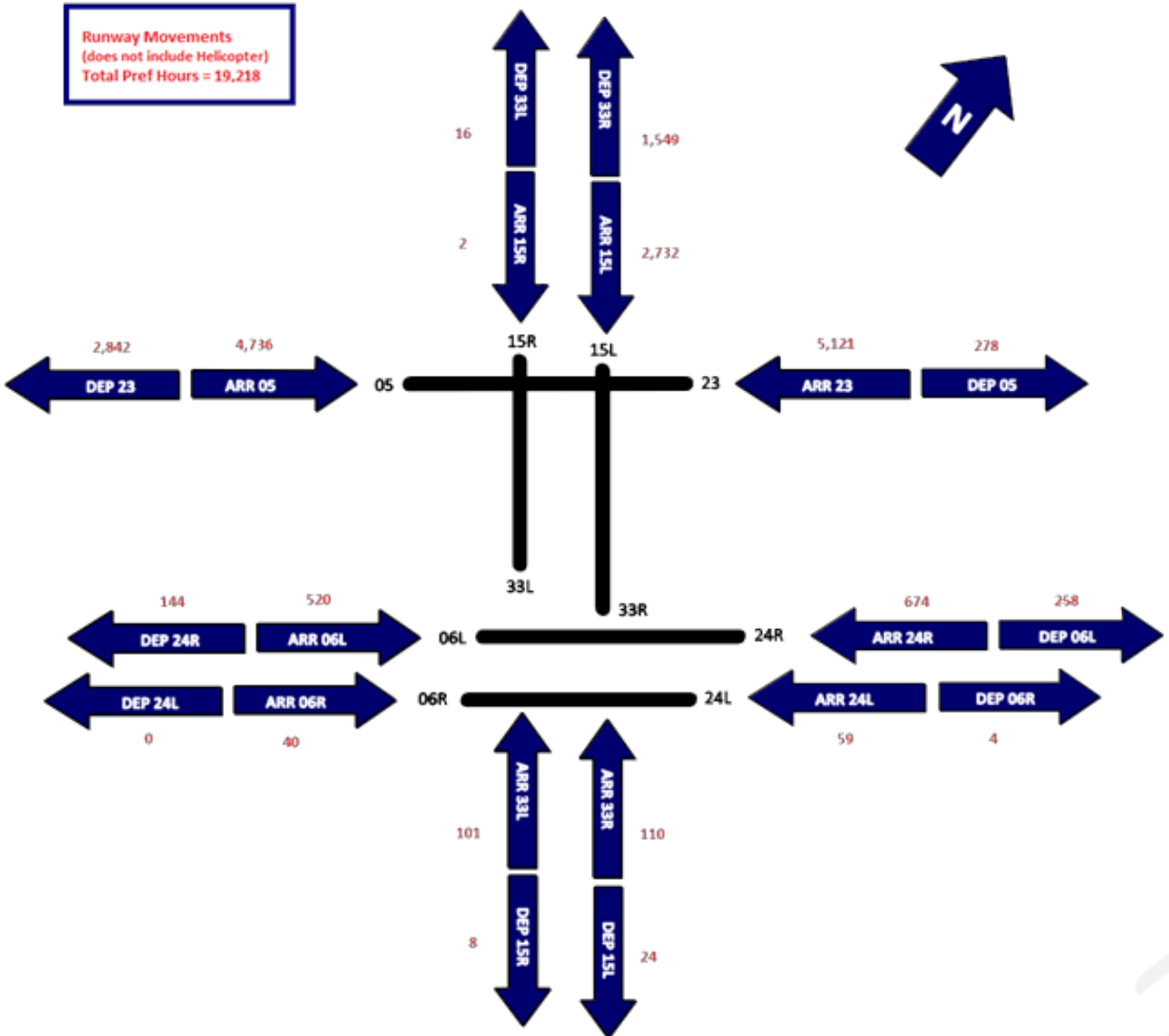








Base Case:
2015 Preferential Hours Runway Usage



ARRIVALS: 14,095

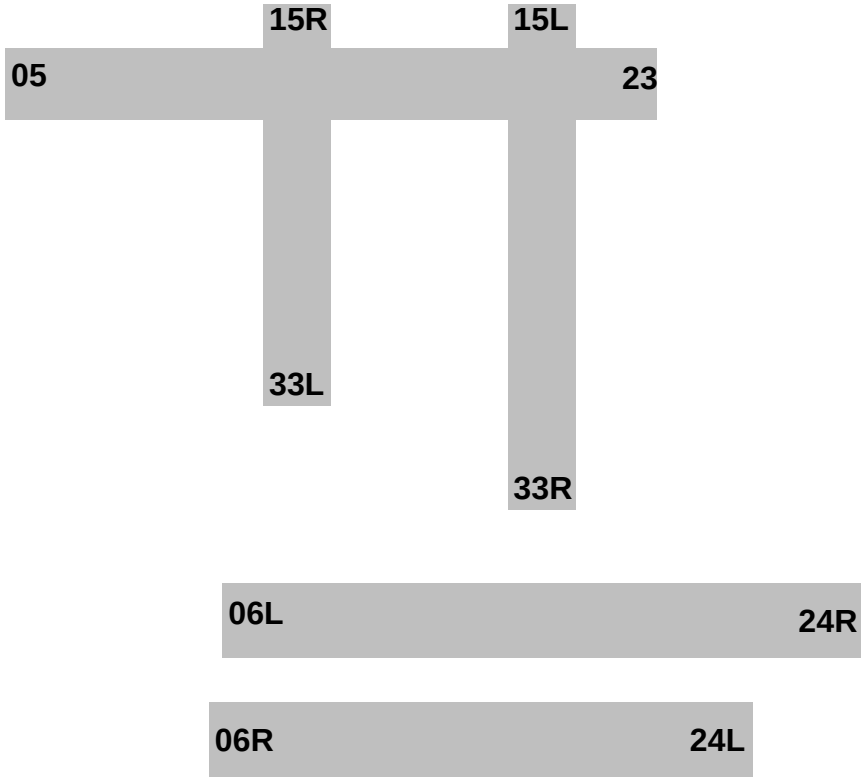
36% Rwy 23
34% Rwy 05
19% Rwy 15L
5% Rwy 24R & 06L

DEPARTURES: 5,123

55% Rwy 23
30% Rwy 33R
5% Rwy 05 & 06L
3% Rwy 24R

Base Case:
2015 Preferential Hours Runway Usage

Priorities of Runway Use During Preferential Hours		
Rank	Land	Depart
#1	05	23
#2	15L	33R
#3	06L	24R



Criteria for Investigation

- **Any proposed change requires Transport Canada approval**
- **Preferential runway hours remain unchanged (0000-0630)**
- **All ten runway ends shall be identified as eligible for preferential runway status**
- **Opposing runway configurations are prohibited**
  - *(ex. cannot Land Runway 05 & Depart Runway 23)*
- **Stable approach configuration is always required**
- **Runways shall be weighted according to noise impact**
  - *The higher the noise impact, the higher the weighting*
- **Noise Exposure Forecast (NEF) and Airport Operating Area**
  - *Option cases cannot exceed the NEF 30 contour*

Data to Provide to Consultant

2015 “Base Case” Data

- List of actual departure and arrival movements
- Originating airport for arriving flights
- Destination airport for departing flights
- Aircraft types
- Weather data
- Night flight budget numbers

Data to Provide to Consultant (cont'd)

Forecasted Date for Option Case Years 2018 & 2023

- Total forecasted aircraft movements
- Time of day of flights
- Aircraft types
- Originating airport for arriving flights
- Destination airport for departing flights

Idea 6 – Option Case 1

All 10 Runways (Weighted Points)
Dedicated Mode Runway Utilization (Land 1 / Depart 1)

Option Case 1

- Runway configuration shall be analyzed daily
- Points could be assigned by number of movements per runway, or based on aircraft type
- Points are calculated and tracked separately for each runway for departures and arrivals

Idea 6 – Option Case 1

ARRIVAL RUNWAY

Runway	# Arrivals	# Arrivals Points	# of Days Runway Used
05		LOWEST	
15L			
06L			
06R			
23			
24R			
24L			
33R			
33L			
15R		HIGHEST	

DEPARTURE RUNWAY

Runway	# Departures	# Departure Points	# of Days Runway Used
23		LOWEST	
33R			
24R			
33L			
24L			
05			
06L			
06R			
15L			
15R		HIGHEST	

EXAMPLE

Idea 6 – Option Case 2

All 10 Runways (Weighted Points)
Single Mode Runway Utilization (Land/Depart 1)

Option Case 2

- Points for arrivals and departures will be assigned separately.
- The arrival and departure points will be added together, for a combined total of points per runway.
- Runway selection is based on that combined total of points.

Idea 6 – Option Case 2

ARRIVAL & DEPARTURE RUNWAY

Runway	# Arrivals	# Arrival Points	# Departures	# Departure Points	# days runway usage	Total # of Points / Runway
05						LOWEST
15L						
06L						
06R						
23						
24R						
24L						
33R						
33L						
15R						HIGHEST

EXAMPLE

Metrics to be Analyzed

Metrics to be analyzed:

- **Weather, including surface and upper winds to facilitate runway usage analysis**
- **Population overflown by decibel band**
- **Aircraft fleet mix**

A Ranking of preferential runways from 1-10 for departures and 1-10 for arrivals, and weighting criteria to be established based on analysis of metrics.

- *The consultant will analyze and identify the weighting criteria and outcome*

Additional Option Cases

In addition to analyzing the two option cases proposed by the GTAA, the Consultant shall propose two additional scenarios for the preferential runway system and provide an analysis.

Next Steps:

- RFP and hire 3rd party for technical analysis.
- Once the technical analysis is complete, subsequent noise modeling analysis is required
- Public Consultation to review technical analysis