



**Noise Exposure Forecast Study and Planning Recommendations Report – Winnipeg International Airport**



# PROJECT TEAM

Project led by Manitoba Municipal Relations with supporting expertise provided by multiple government departments



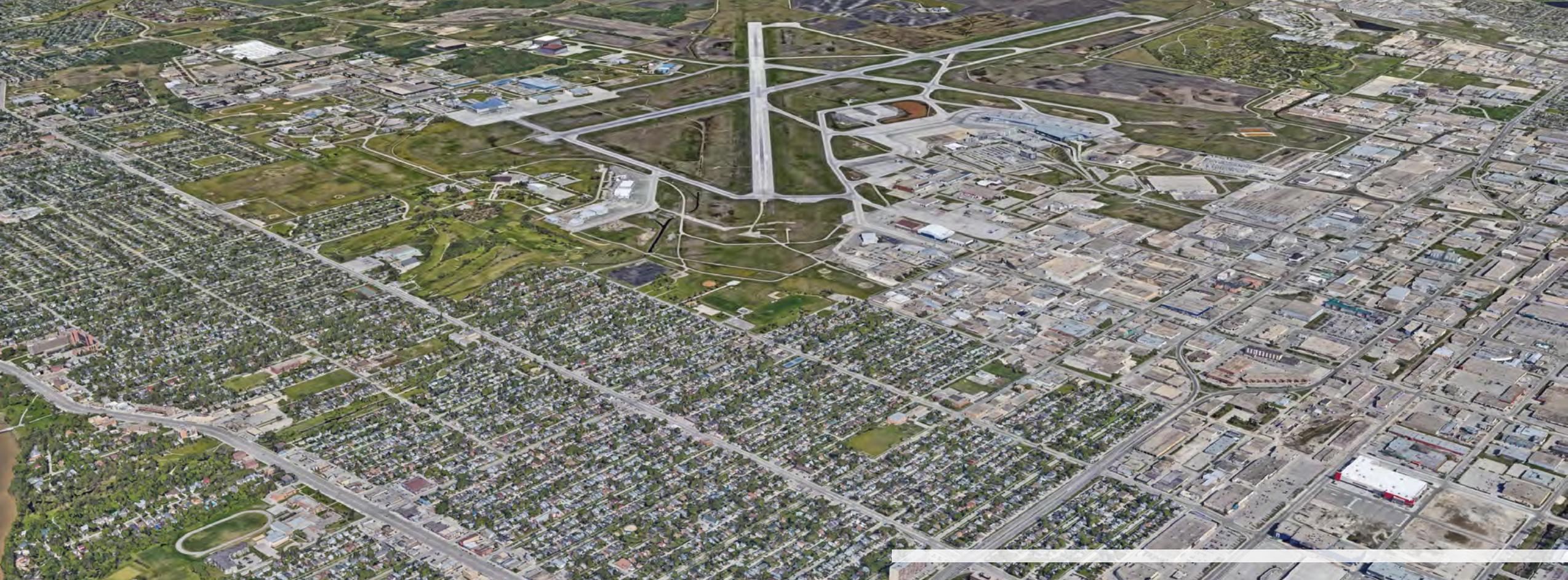
**HM AERO**  
AVIATION CONSULTING

- Ottawa-based airport consulting firm
- Primarily responsible for the Noise Exposure Forecast Study



**Landmark**  
Planning & Design Inc.

- Winnipeg-based planning and design firm
- Primarily responsible for the Planning Analysis and Recommendations Report



# Project Context and Objectives



# Project Context



# Project Objectives

## Noise Exposure Forecast Study

- Prepare independent aircraft movement forecasts to 2050
- Estimate the annual runway capacity of Winnipeg International Airport
- Prepare Noise Exposure Forecast (NEF) contours for four baseline and future scenarios

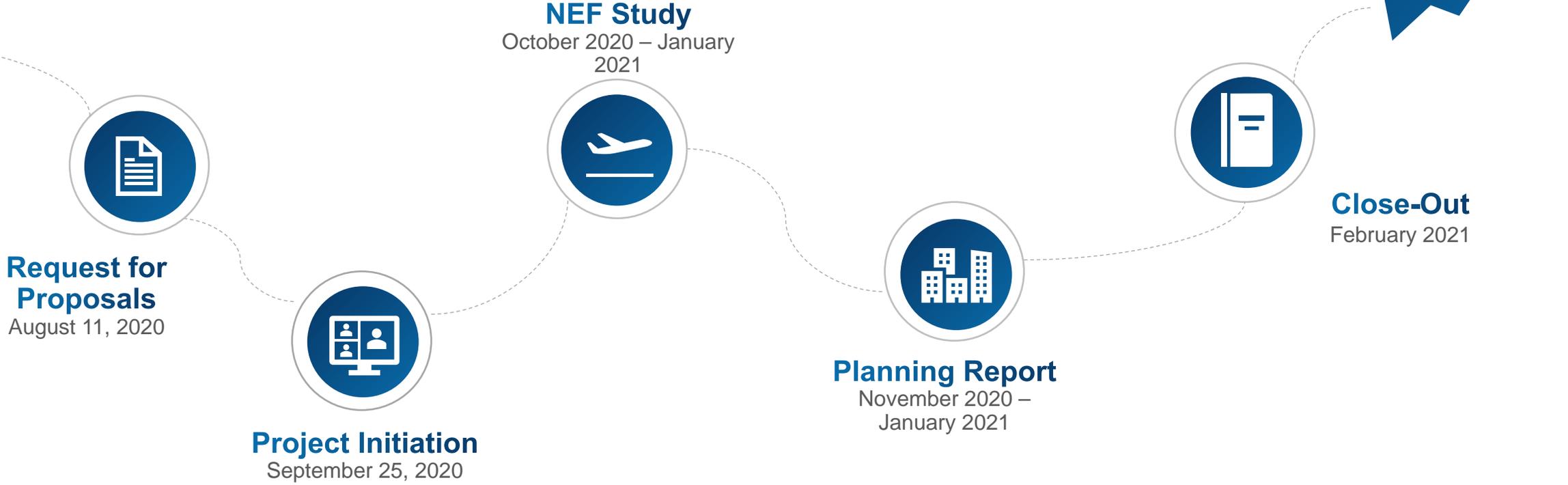


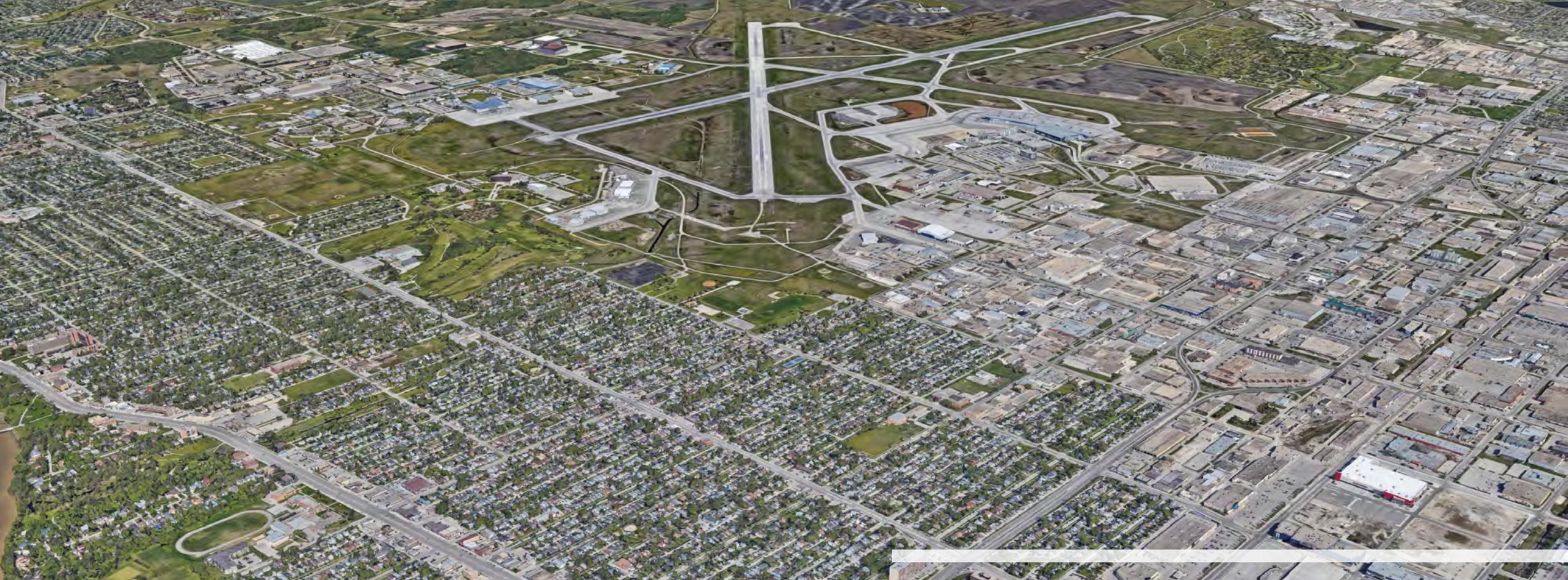
## Planning Analysis and Recommendations Report

- Review existing policy context
- Complete jurisdictional best practices scan
- Analyze land use implications of the NEF contour scenarios
- Provide recommendations at the federal, provincial, and municipal levels



# Project Process





# Noise Exposure Forecast Study



# Noise Exposure Forecasts



## Purpose

- Predict *perceived annoyance* of different land uses
- Guide airport compatible land use planning



## Interpretation

- Lines (contours) of constant levels of perceived annoyance
- Not the same as noise (dB)



## Inputs

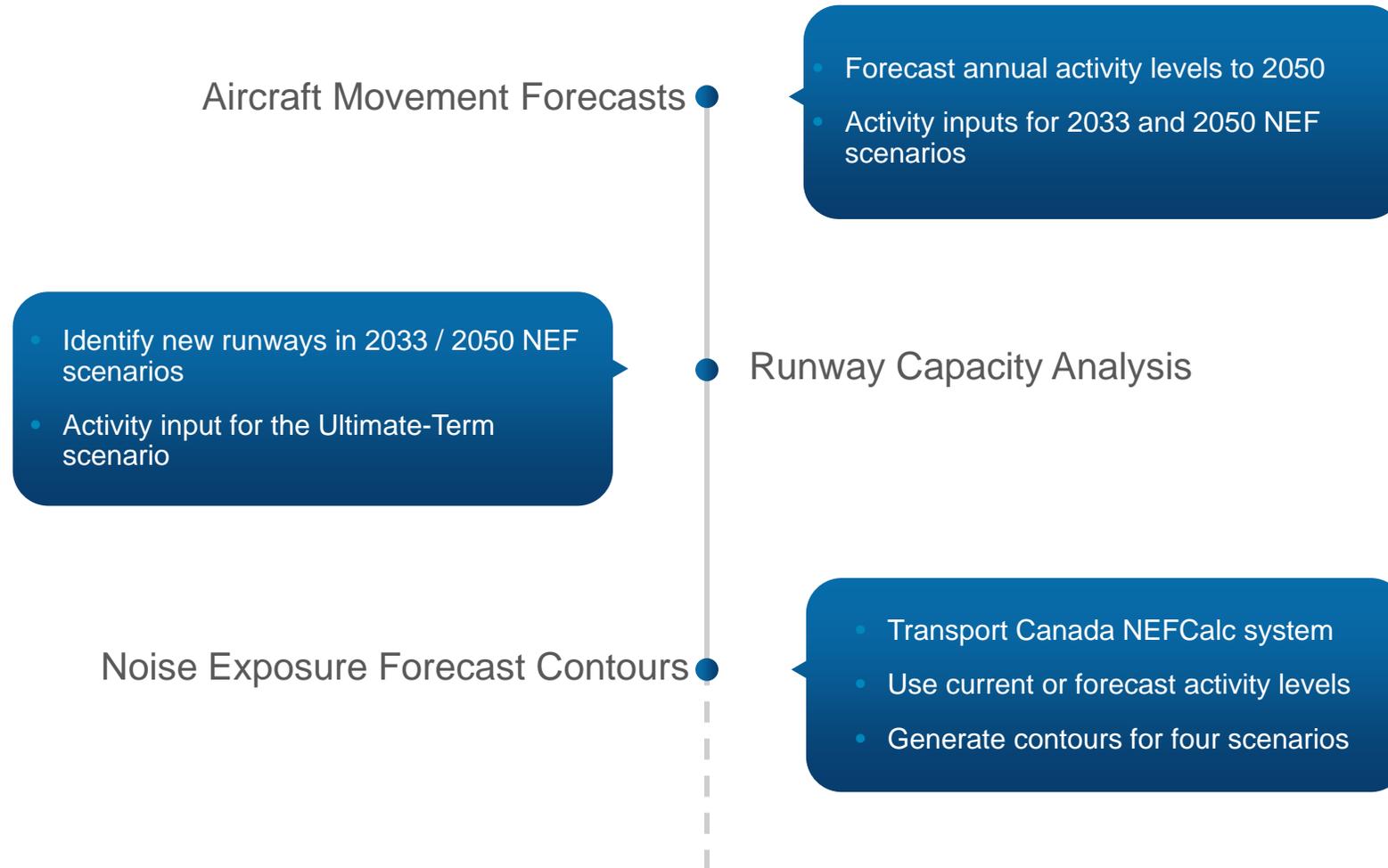
- 95<sup>th</sup> Percentile Busy Day
- Aircraft movements
- Day / night split
- Aircraft types
- Runway utilization (etc.)



## Use

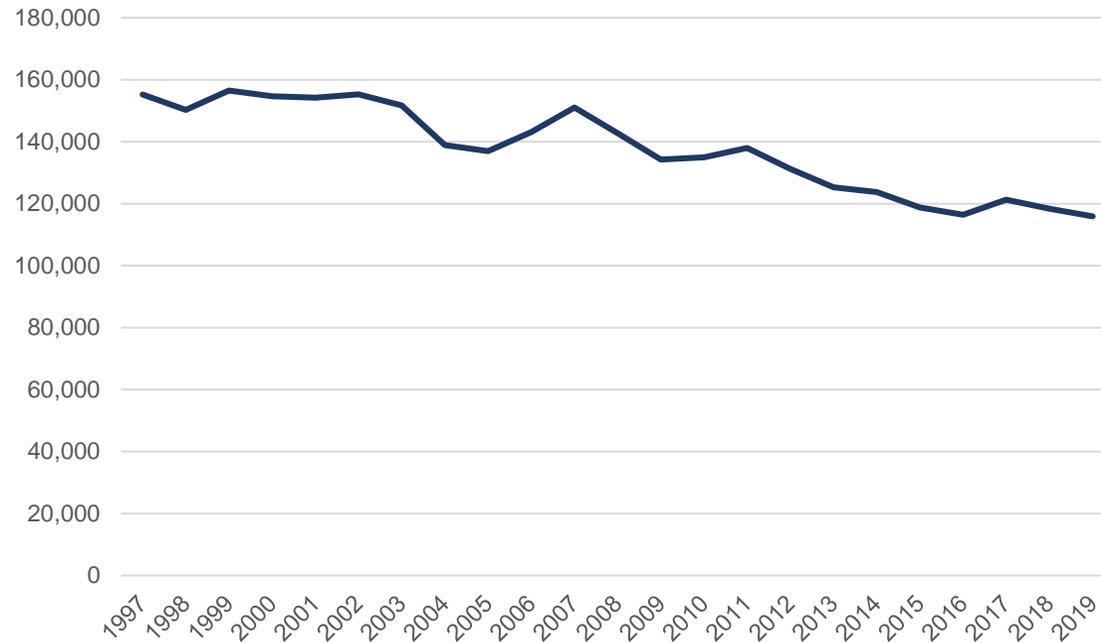
- Policy planning based on Transport Canada's guidelines on land use acceptability

# NEF Study Process



# Aircraft Movement Forecasts

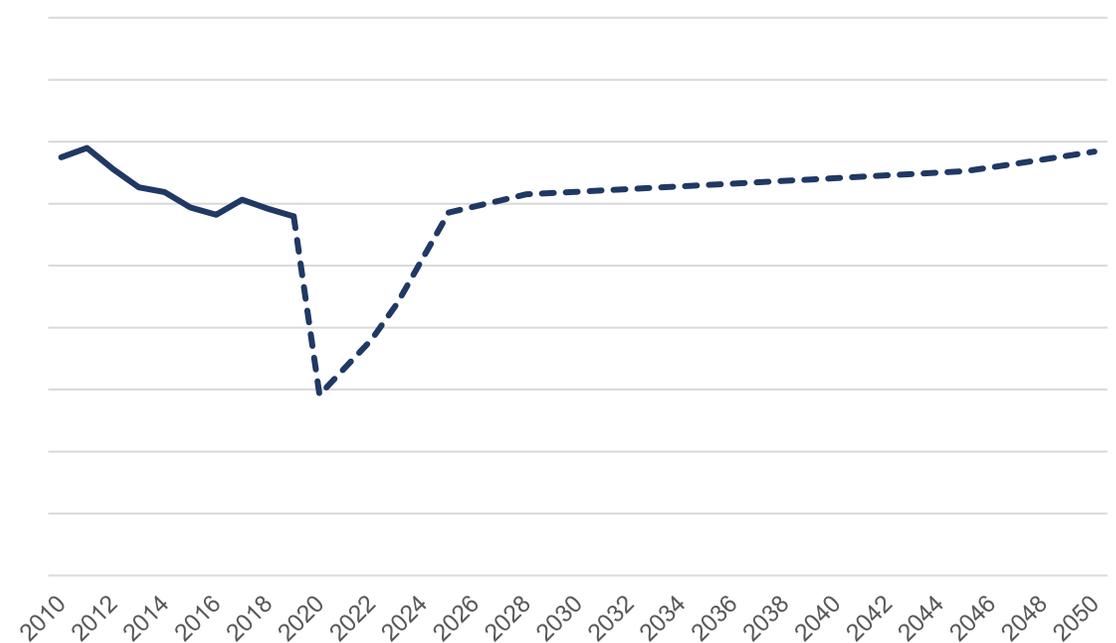
## Historical Aircraft Movements – 1997 to 2019



## Trends

- Historical decrease in aircraft movements: -1.2% per year
- Passenger and cargo activity not uniformly correlated with movements
- Increasing proportion of larger aircraft

## Forecast Aircraft Movements – 2020 to 2050



## Assumptions

- Aircraft movements recover from COVID-19 in 2025
- Modest annual growth rates between +0.4% and +1.0%
- Growth driven by passenger and air cargo movements

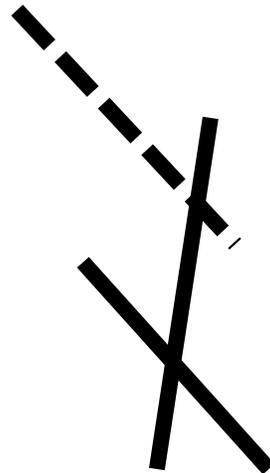




# Runway Capacity Analysis

## Baseline (2021) Runway Capacity

- Existing two-runway system
- Annual capacity estimated to be between 203,000 and 229,000 movements
- Capacity not exceeded by 2050 in project team's forecasts
- Interim capacity enhancement measures – e.g., new taxiways



## Ultimate-Term Runway Capacity

- Addition of northern parallel runway reserved in the Airport Land Use Plan
- Annual capacity estimated to be between 392,000 and 441,000 movements (used as input in Scenario 4 – Ultimate-Term Conceptual Conditions)

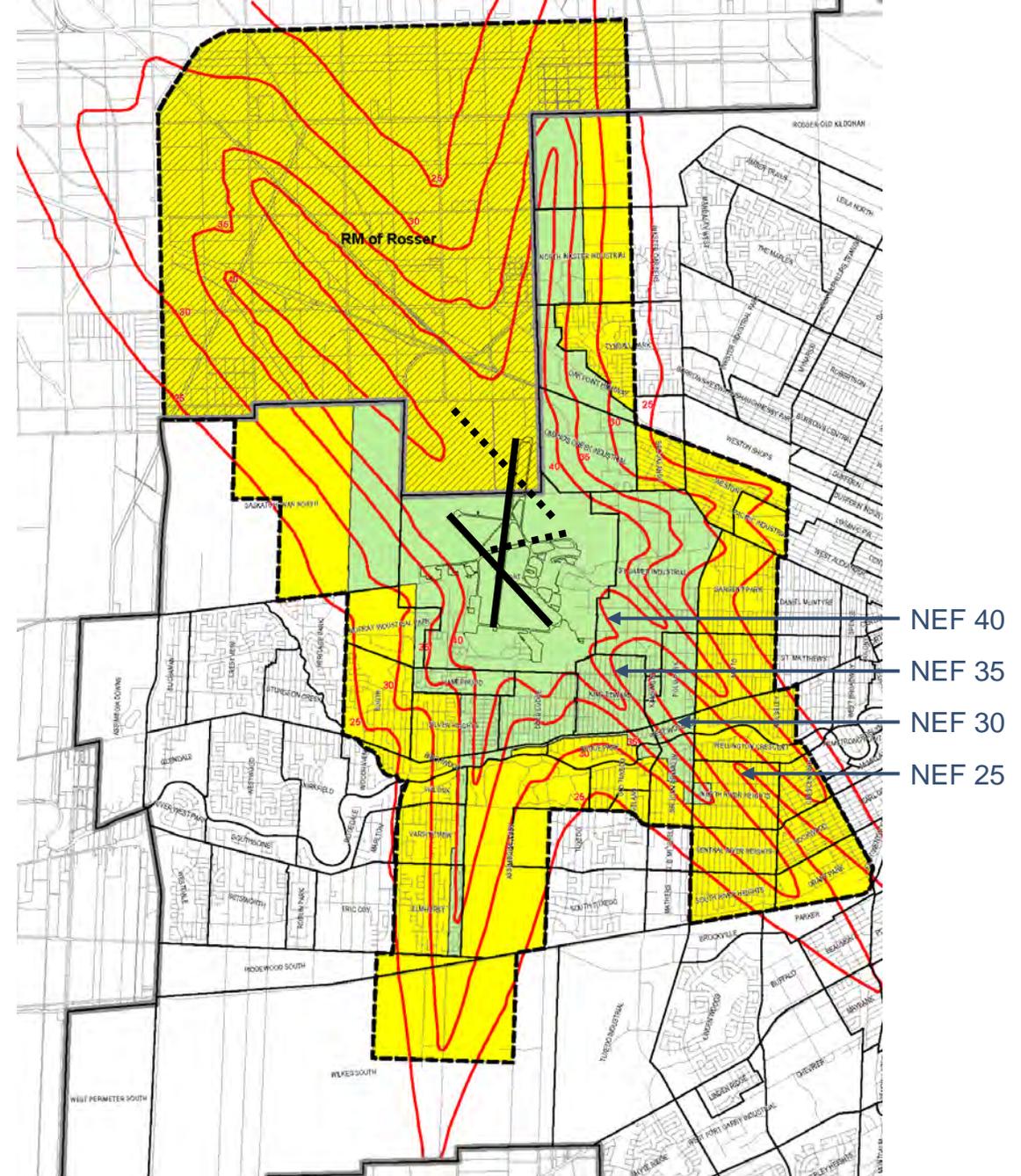


# Current AVPA – 1995 NEF Contours

- Informs the current Airport Vicinity Protection Area (AVPA) Plan
- Supporting assumptions and report not available
- Unknown number of aircraft movements, day / night split, aircraft types, etc.
- Four runway system:
  - Current Runways 18-36 and 13-31
  - Decommissioned east-west Runway 07-25
  - Potential future parallel runway

Affected Property Areas (ac)

|           | 1995  | 2019 | 2033 | 2050 | Ultimate |
|-----------|-------|------|------|------|----------|
| NEF 25-30 | 6,308 |      |      |      |          |
| NEF 30-35 | 2,289 |      |      |      |          |
| NEF 35-40 | 3,069 |      |      |      |          |

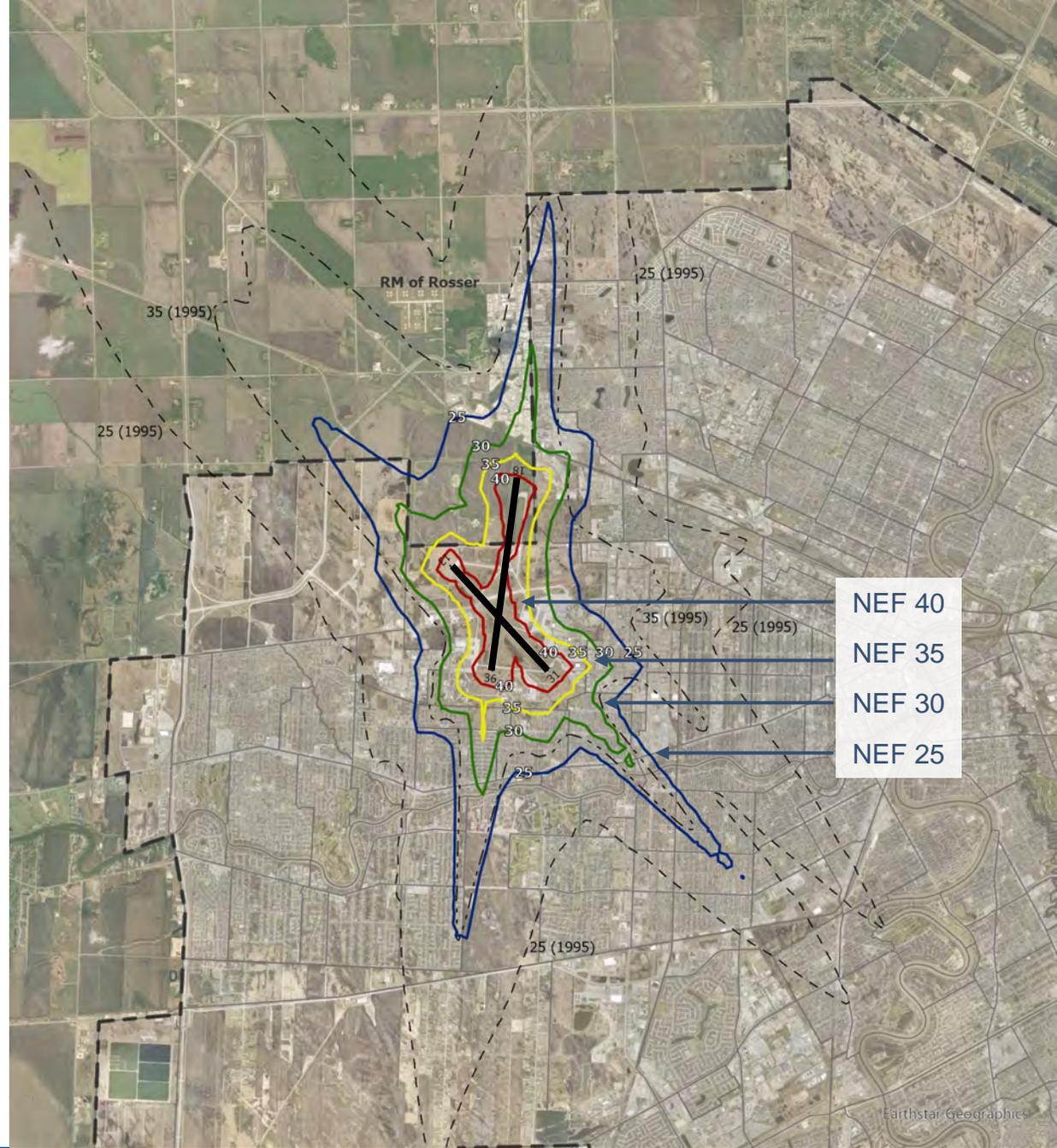


# Scenario 1 – 2019 Baseline Conditions

- Based on 2019 aircraft activity levels and 2018 runway distribution (due to runway construction in 2019)
- 2019 – 115,900 annual aircraft movements
- 95<sup>th</sup> Percentile Busy Day – 358 aircraft movements
- Two runway system:
  - Current Runways 18-36 and 13-31

Affected Property Areas (ac)

|           | 1995  | 2019  | 2033 | 2050 | Ultimate |
|-----------|-------|-------|------|------|----------|
| NEF 25-30 | 6,308 | 2,638 |      |      |          |
| NEF 30-35 | 2,289 | 1,130 |      |      |          |
| NEF 35-40 | 3,069 | 756   |      |      |          |



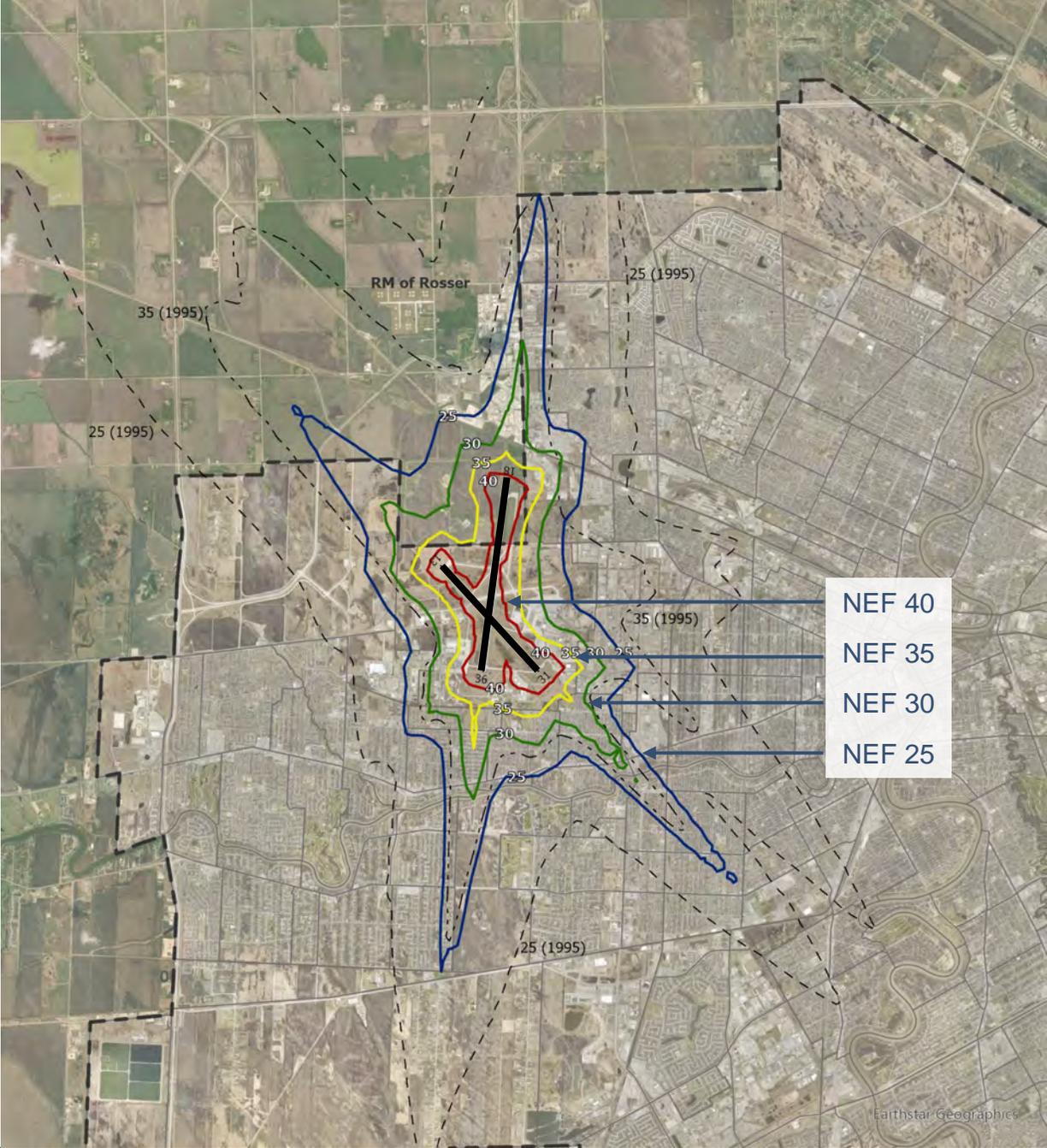
Earthstar Geographics

# Scenario 2 – 2033 Forecast Conditions

- Activity levels based on the project team’s independent aircraft movement forecast
- Model inputs (e.g., runway distribution, day / night split) based on 2019 data
- 2033 – 125,200 forecast annual aircraft movements
- 95<sup>th</sup> Percentile Busy Day – 387 aircraft movements
- No changes to existing Runways 18-36 and 13-31

Affected Property Areas (ac)

|           | 1995  | 2019  | 2033  | 2050 | Ultimate |
|-----------|-------|-------|-------|------|----------|
| NEF 25-30 | 6,308 | 2,638 | 2,774 |      |          |
| NEF 30-35 | 2,289 | 1,130 | 1,175 |      |          |
| NEF 35-40 | 3,069 | 756   | 770   |      |          |

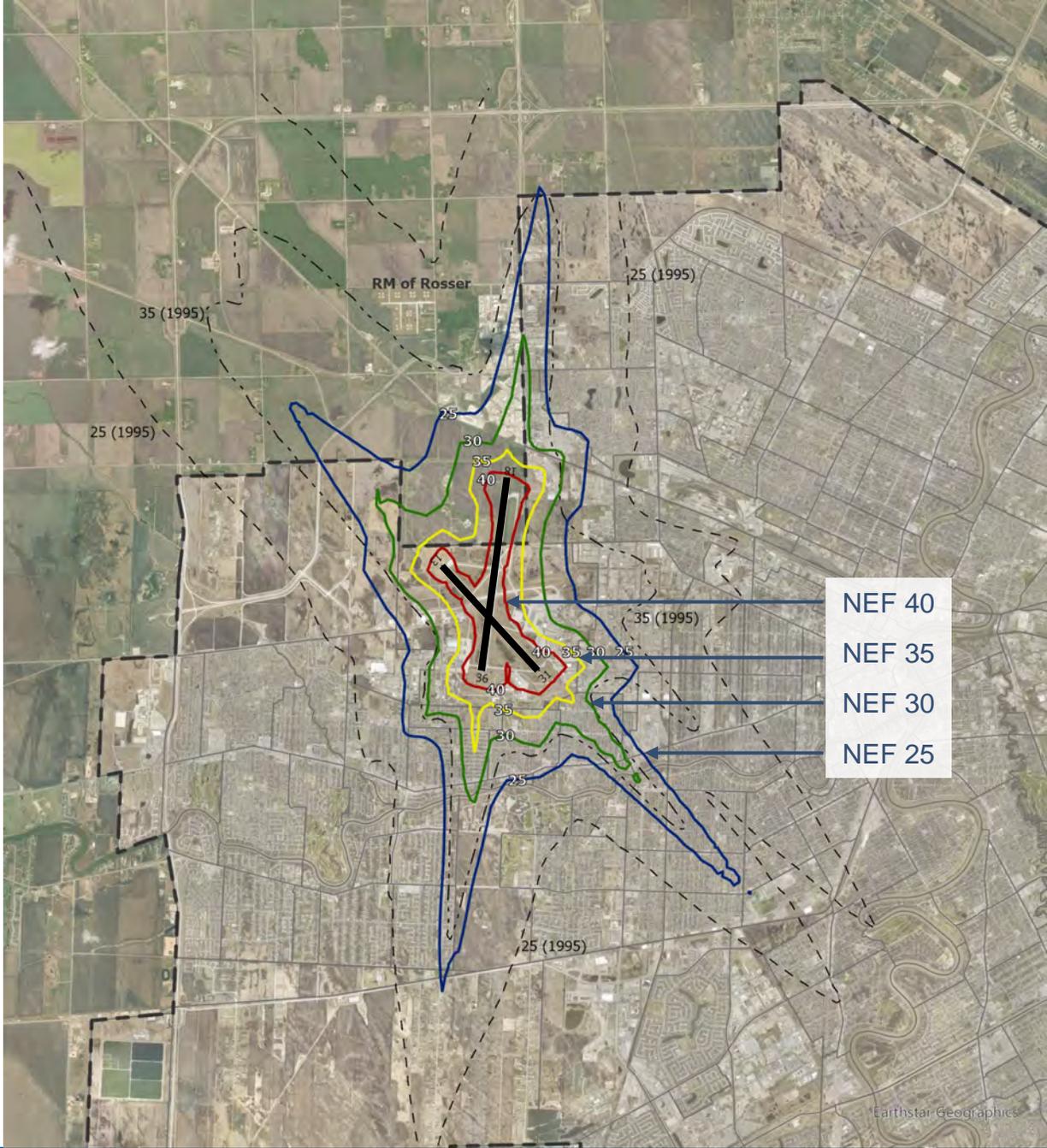


# Scenario 3 – 2050 Forecast Conditions

- Activity levels based on the project team’s independent aircraft movement forecast
- Model inputs (e.g., runway distribution, day / night split) based on 2019 data
- 2050 – 136,800 forecast annual aircraft movements
- 95<sup>th</sup> Percentile Busy Day – 423 aircraft movements
- No changes to existing Runways 18-36 and 13-31

Affected Property Areas (ac)

|           | 1995  | 2019  | 2033  | 2050  | Ultimate |
|-----------|-------|-------|-------|-------|----------|
| NEF 25-30 | 6,308 | 2,638 | 2,774 | 2,917 |          |
| NEF 30-35 | 2,289 | 1,130 | 1,175 | 1,244 |          |
| NEF 35-40 | 3,069 | 756   | 770   | 783   |          |



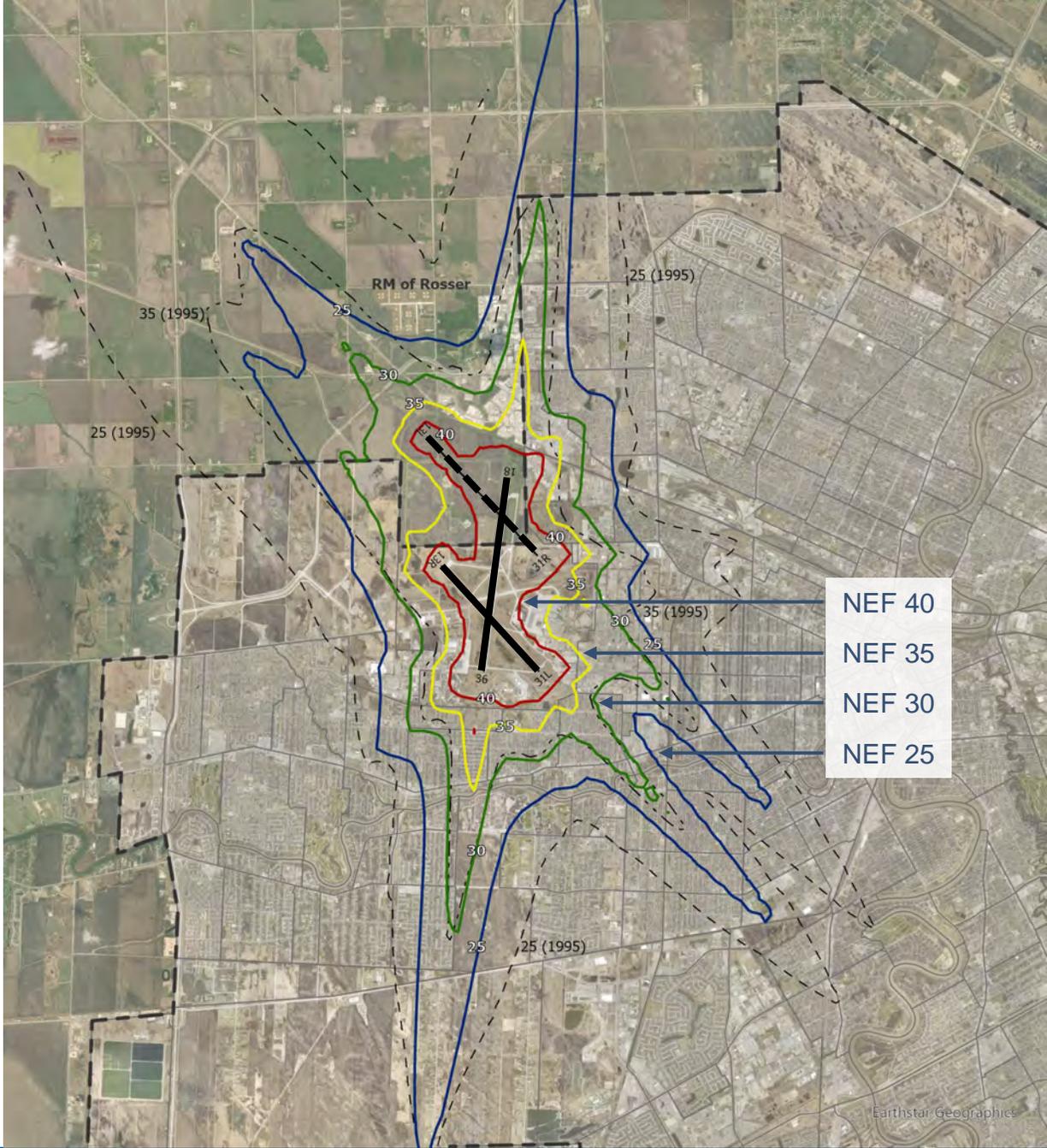
Earthstar Geographics

# Scenario 4 – Ultimate-Term Conceptual Conditions

- Hypothetical full-build of the airport and maximum utilization of the airfield based on its estimated practical capacity
- Estimated annual practical capacity of 415,800 aircraft movements
- 95<sup>th</sup> Percentile Busy Day – 1,082 aircraft movements
- Three runway system:
  - Current Runway 13-31
  - Runway 18-36 extended by 1,000 ft.
  - New 10,000 ft. northwest-southeast runway parallel to Runway 13-31

Affected Property Areas (ac)

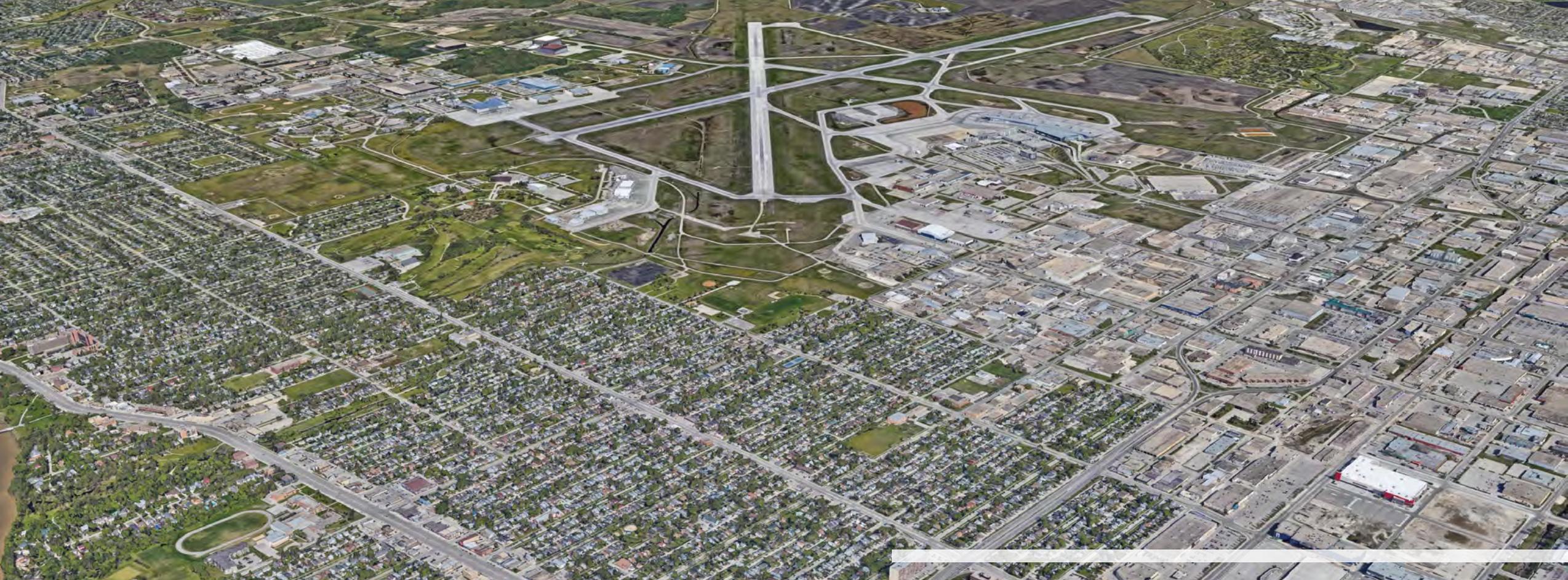
|           | 1995  | 2019  | 2033  | 2050  | Ultimate |
|-----------|-------|-------|-------|-------|----------|
| NEF 25-30 | 6,308 | 2,638 | 2,774 | 2,917 | 5,241    |
| NEF 30-35 | 2,289 | 1,130 | 1,175 | 1,244 | 2,547    |
| NEF 35-40 | 3,069 | 756   | 770   | 783   | 1,127    |



# NEF Study – Key Points

- NEF – an attempt to predict the subjective factor of *annoyance*
  - Contours vary depending on the assumptions used – two NEF Studies may differ
- Gradual decline in aircraft movements at Winnipeg International Airport from 1997 to 2019 despite passenger and cargo growth
- Independent forecasts indicate that aircraft movements *may* increase
- Four NEF scenarios based on baseline (2019), forecast (2033 and 2050), and conceptual (ultimate-term) activity levels
- Potential third runway is a significant factor – additional capacity may not be required, but lands continue to be reserved by Transport Canada





# Planning Analysis and Recommendations Report



# Planning Hierarchy Review

## Federal

- TP1247 – Land Use in the Vicinity of Aerodromes
- Winnipeg International Airport Zoning Regulations (SOR/81-708)
- Transport Canada Aeronautical Assessment Process
- NAV CANADA Land Use Program

## Provincial

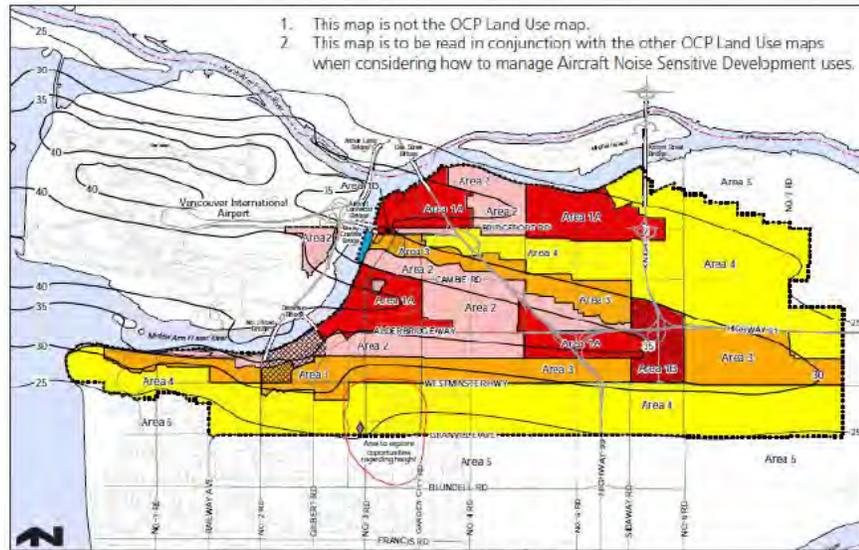
- Provincial Planning Regulation (81/2011)
- Inland Port Special Planning Area Regulation (48/2016)
- City of Winnipeg Charter (S.M. 2002)

## Municipal

- OurWinnipeg Plan (67/2010)
- OurWinnipeg Complete Communities Direction Strategy (68/2010)
- Winnipeg Transportation Master Plan (October 2011)
- Winnipeg Airport Vicinity Development Plan (As Amended)
- Airport Vicinity Acoustics Insulation By-law No. 6419-94
- Zoning By-law No. 200/2006
- Airport Vicinity Protection Area Planned Development Overlay
- Airport Area West Secondary Plan (By-law No. 8097/2002)
- South Interlake Planning District Development Plan (No. 310)

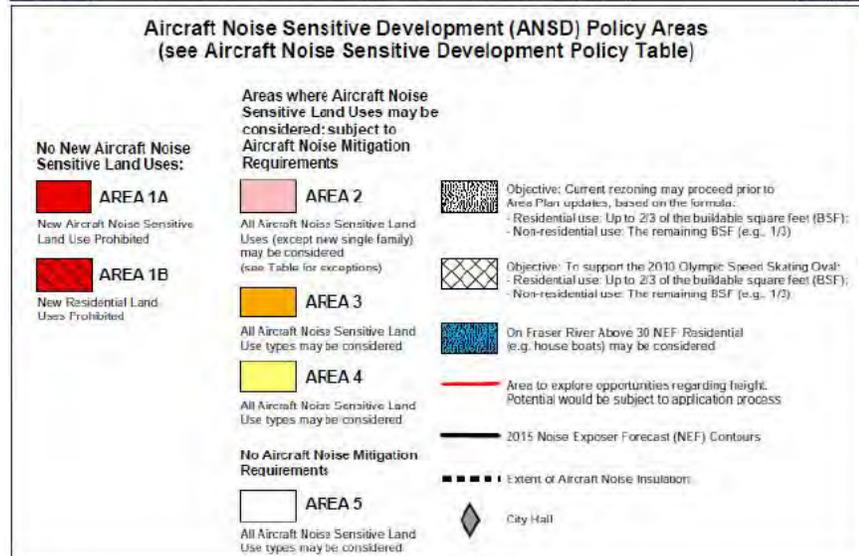


# City of Richmond (Vancouver International Airport)

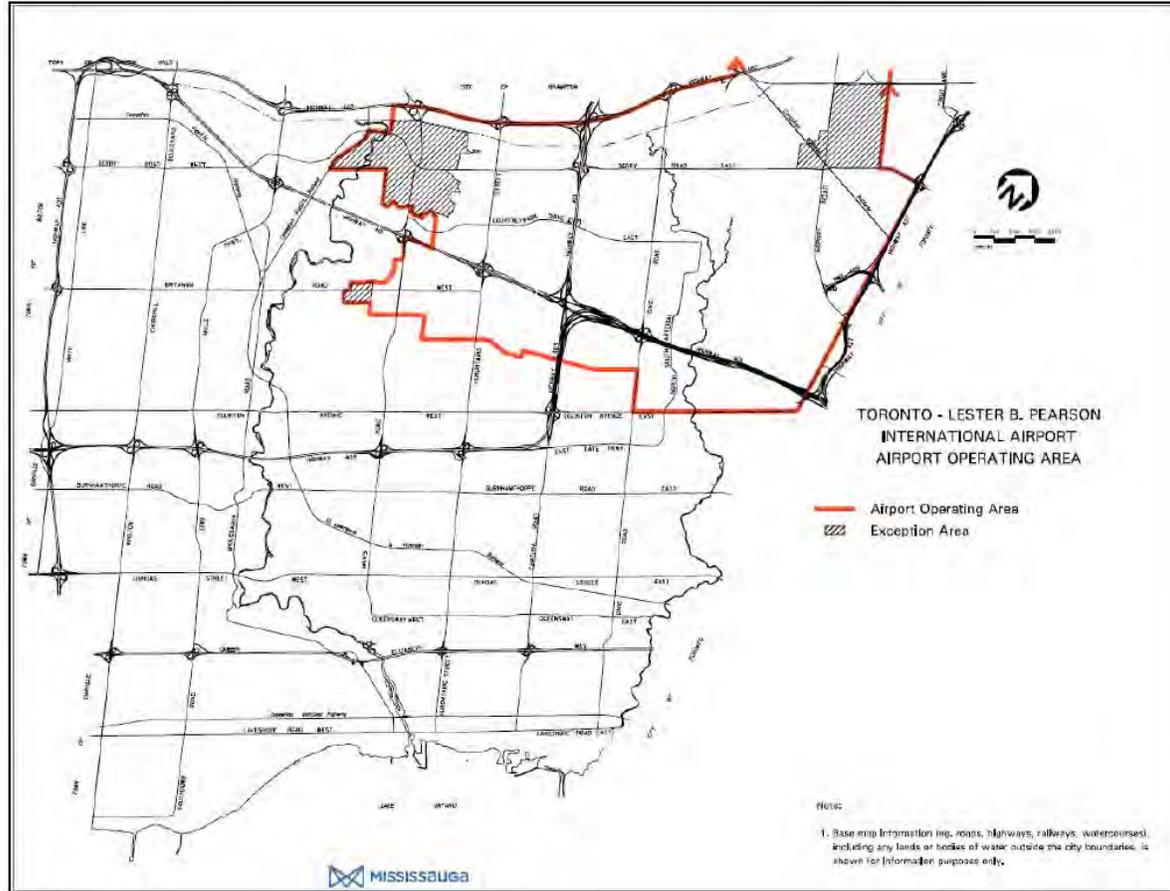


## The City of Richmond Official Community Plan (By-law 9000)

- Allows for some multi-family development within up to the NEF 40 Contour
- Sets maximum decibel level (35db in bedrooms) within dwellings
- Requires noise study prepared by an engineer as permit requirement
- Requires restrictive covenant registered on title



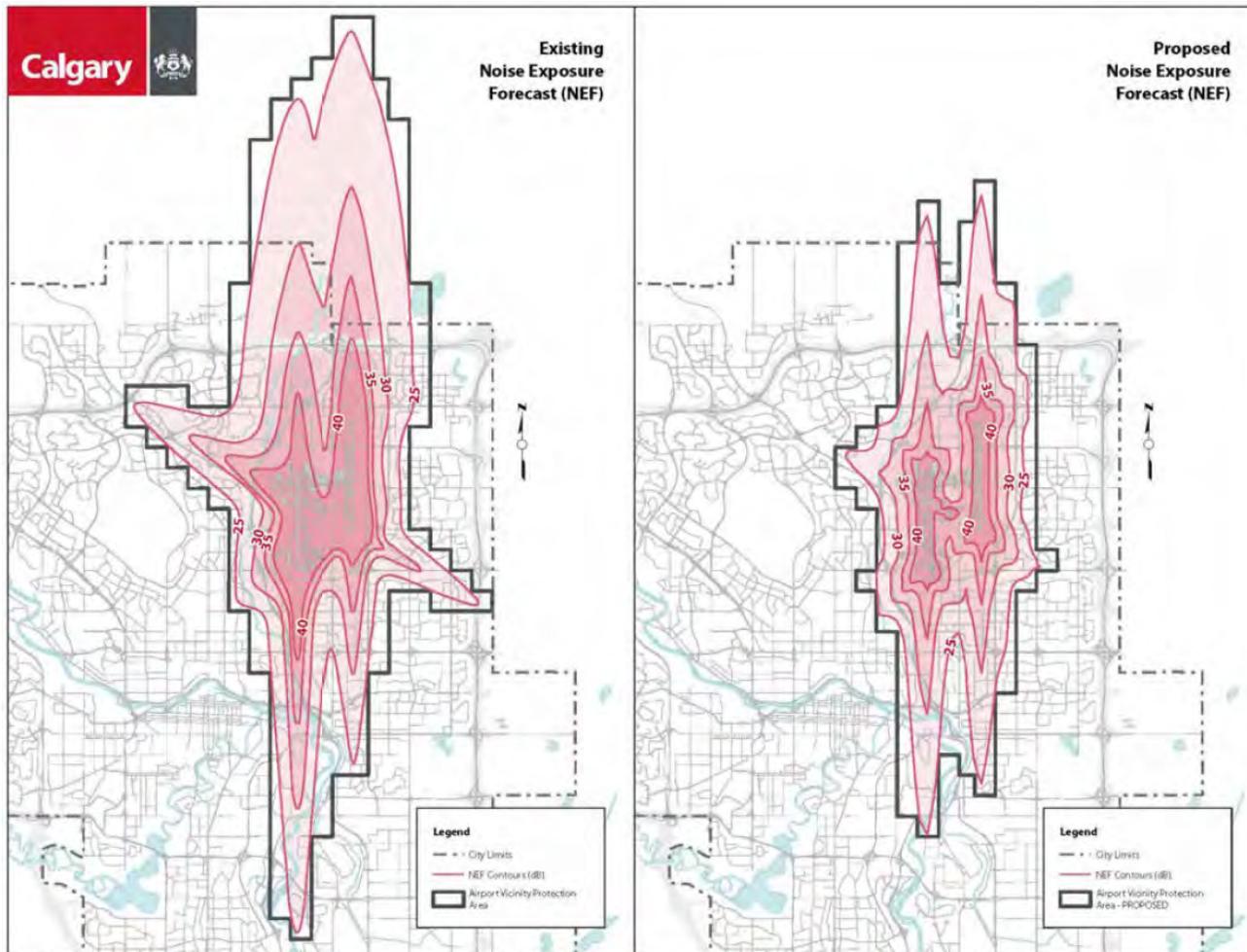
# City of Mississauga (Lester B. Pearson International Airport)



## Mississauga Official Plan

- Allows for some residential development in the > 35NEF Contour in designated areas
- Requires noise study prepared by an engineer as permit requirement
- Requires aircraft noise warning agreement registered on title

# City of Calgary (Calgary International Airport)



## Calgary International Airport Vicinity Protection Area Regulation (177/2009)

- Restricts residential development (with some minor infill exceptions) in > 30 NEF Contours
- Currently undertaking a review of NEF Contours
- Proposed new contours substantially reduce the land area with restricted development

# Case Study Findings

|   | Richmond             | Mississauga               | Calgary      | Winnipeg         |
|---|----------------------|---------------------------|--------------|------------------|
| NEF Contour Year                              | 2015                 | 1996 and 2000 (composite) | N/A          | 1995             |
| Land Use Restrictions                         | Yes                  | Yes                       | Yes          | Yes              |
| Planning Boundaries                           | Geographic Areas     | Geographic Areas          | NEF Contours | Geographic Areas |
| New Development Permitted in NEF Contour > 35 | Yes, with conditions | Yes, with conditions      | No           | No               |
| Sound Study/Insulation Requirements           | Yes                  | Yes                       | No           | Yes              |
| Airport Review of Development Applications    | N/A                  | Yes                       | Yes          | Yes              |
| Notes Registered on Title                     | Yes                  | Yes                       | No           | No               |

# Case Study Findings

- Winnipeg's AVPA Plan is **more restrictive** compared to the plans of Richmond and Mississauga, but is more permissive when compared to Calgary
- The utilization of Area I and Area II within the AVPA Plan to delineate policy areas is **simple and easy** to interpret
- Additional mechanisms such as registering caveats on title, entering into agreements, and notifying purchasers of airport noise considerations are **tools that could be utilized** in addition to land use restrictions in the Winnipeg context
- The noise mitigation requirements and calculations included in the Airport Vicinity Acoustics Insulation By-law appear **complicated**. This is particularly evident when compared to Richmond's approach of requiring an engineering report / sound study and setting decibel levels that must be achieved within dwellings.



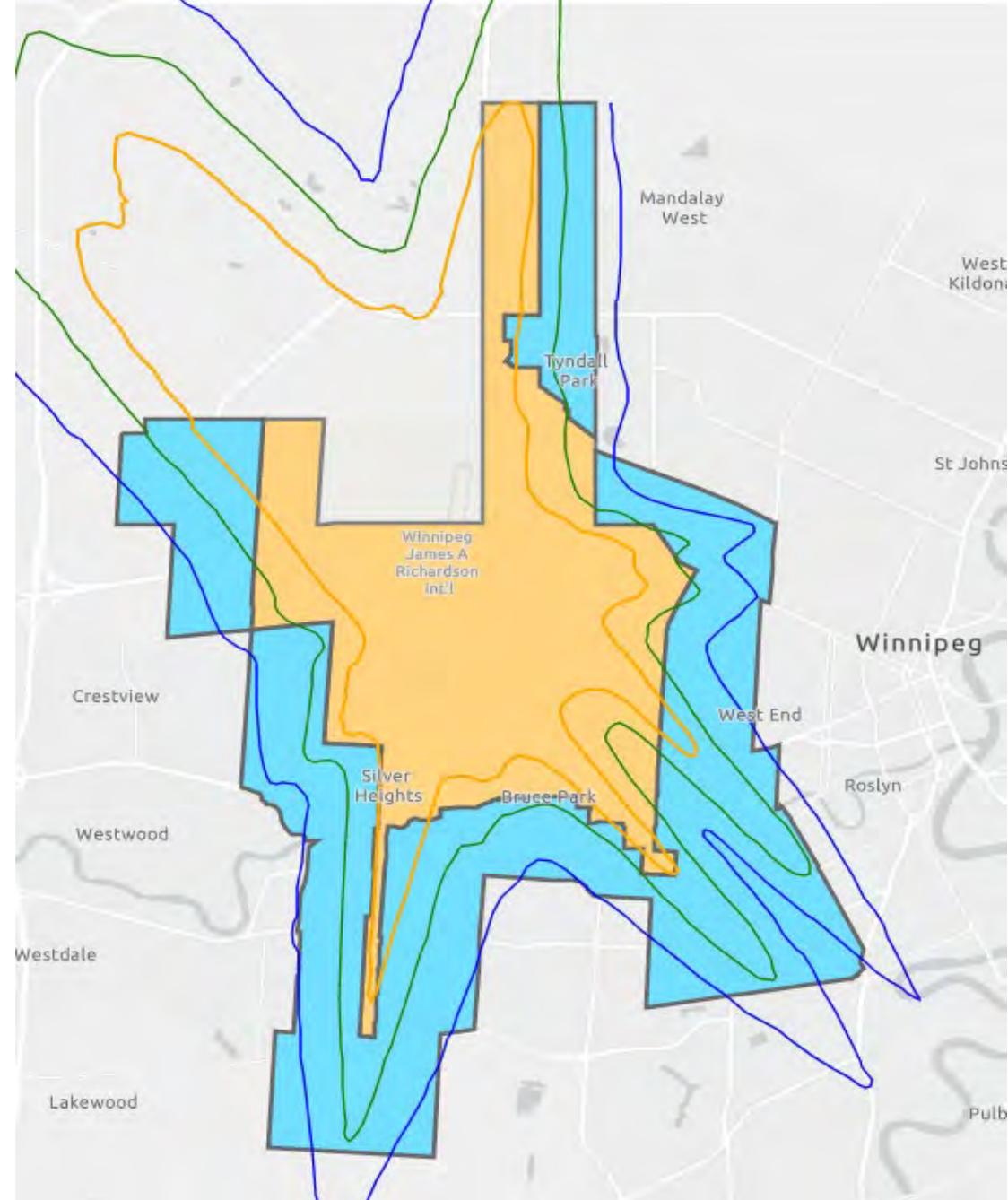
# AVPA vs. Federal Guidance (TP1247)

| NEF Range       | TP1247                            | AVPA  |
|-----------------|-----------------------------------|---|
| 25 NEF – 30 NEF | Multi-family uses allowed         | Multi-family uses limited to 35 units/acre, may be allowed over 35 units/acre through a conditional use application |
| 30 NEF – 35 NEF | Multi-family uses not recommended |   |
| 35 NEF – 40 NEF | No multi-family uses              | No multi-family uses  |

*\* As per TP1247 local authorities can allow residential development in the >30 NEF contours with conditions including a sound study and acoustic insulation*

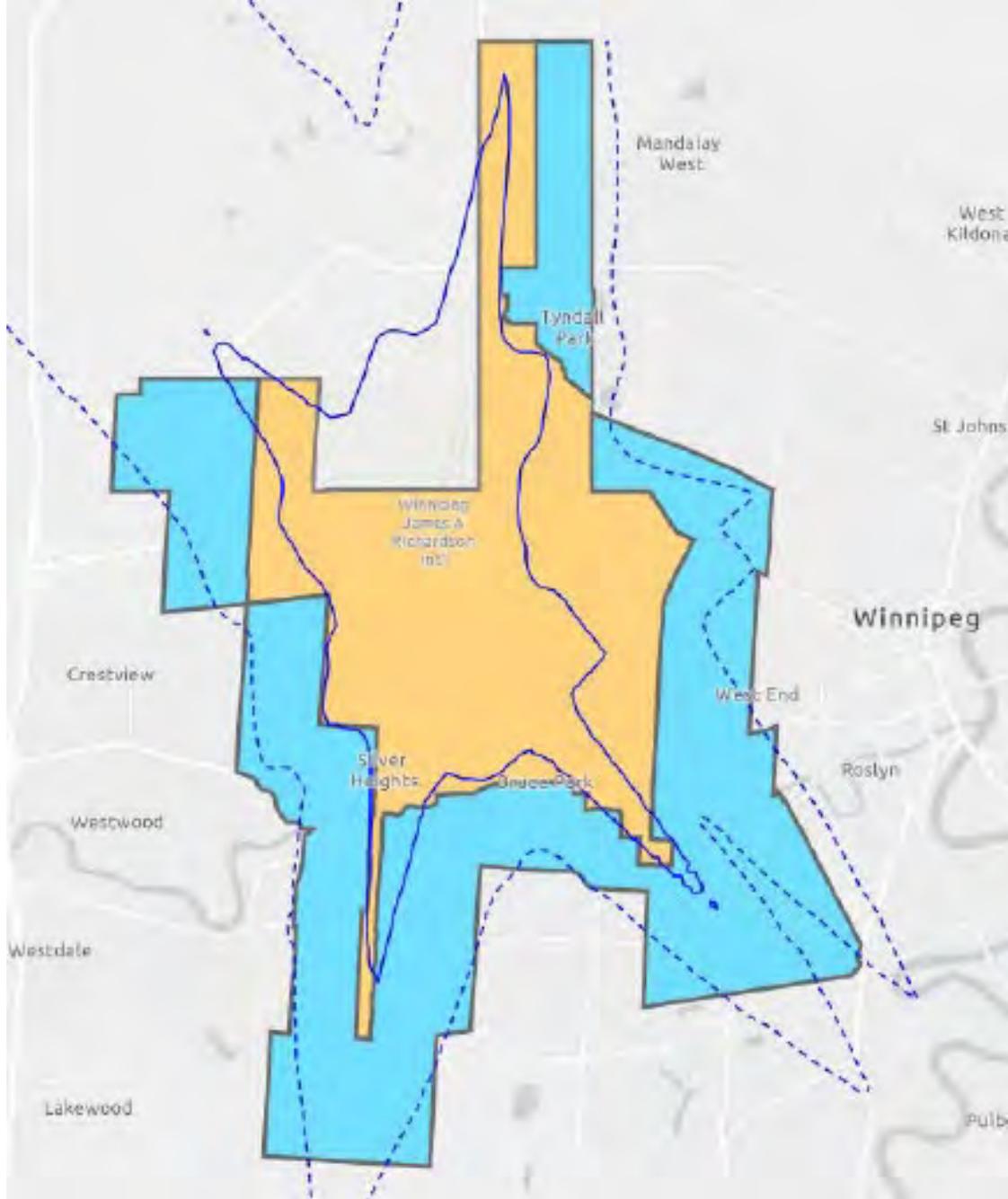
# Existing AVPA and 1995 NEF Contours

- Area I and Area II boundaries reflect the 25NEF, 30NEF and 35NEF contours



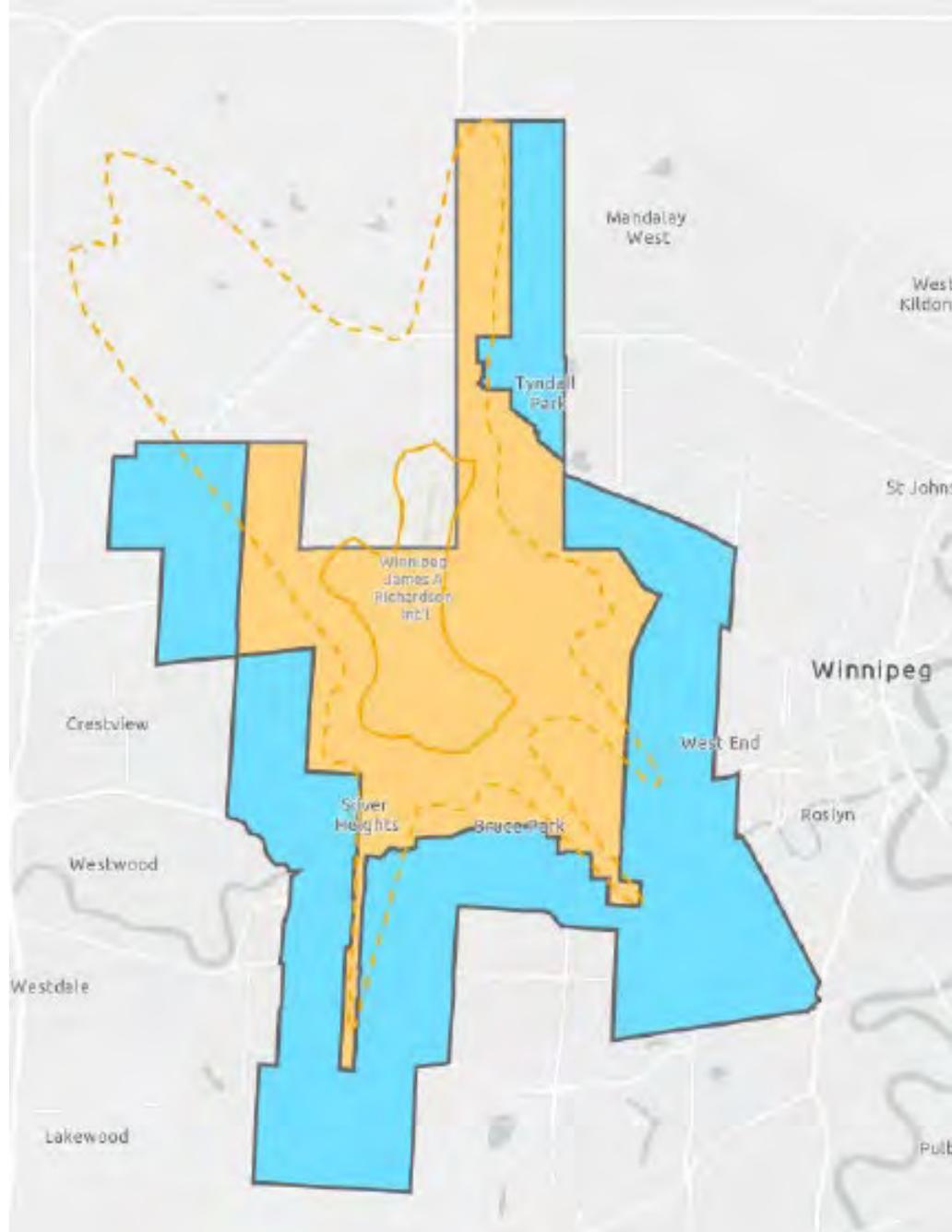
# 1995 vs. 2019: NEF 25 Contour

- The 25 NEF contour reduces in size from 1995 to 2019



# 1995 vs. 2019: NEF 35 Contour

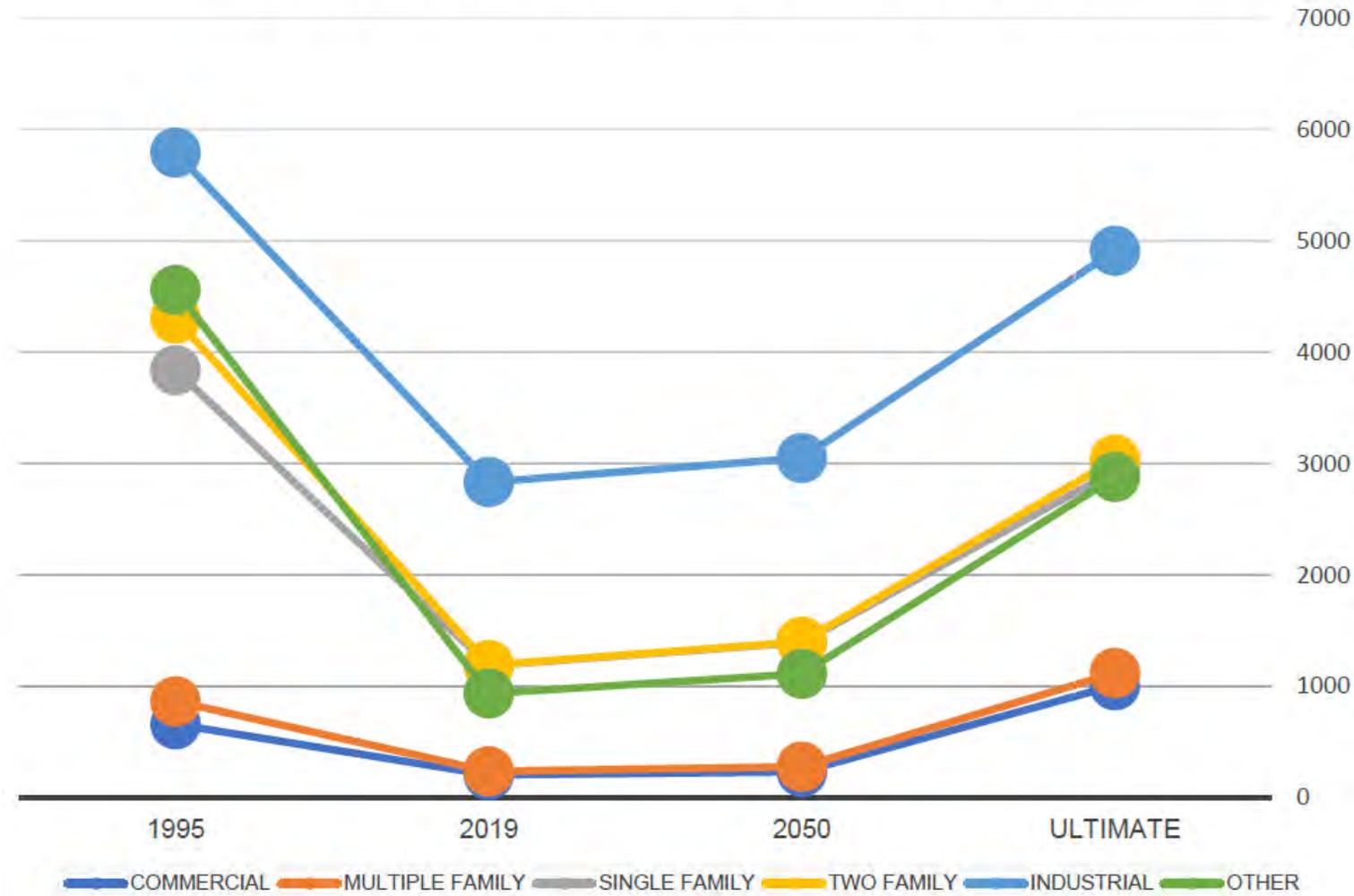
- The 35 NEF contour also reduces in size from 1995 to 2019



# Changing NEFs and Land Supply

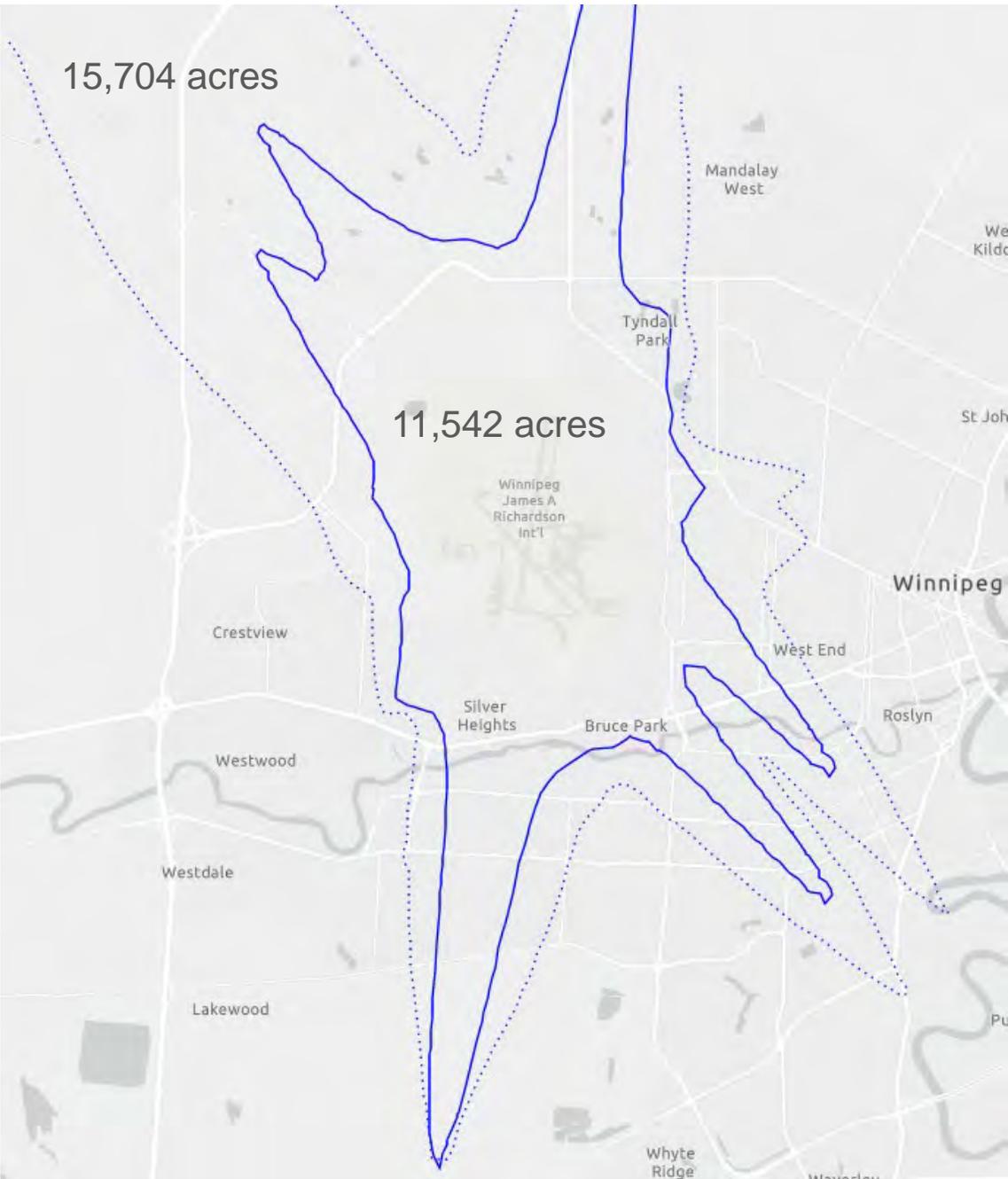
- Aircraft movement activity has decreased over the past 25 years
- Movement levels are projected to increase marginally over the next 30 years
- “Ultimate-Term” conceptual conditions significantly increase aircraft movements
- The amount of land ‘captured’ within each NEF level varies accordingly

Acres of Land within 25-35 NEF Contours Over Time



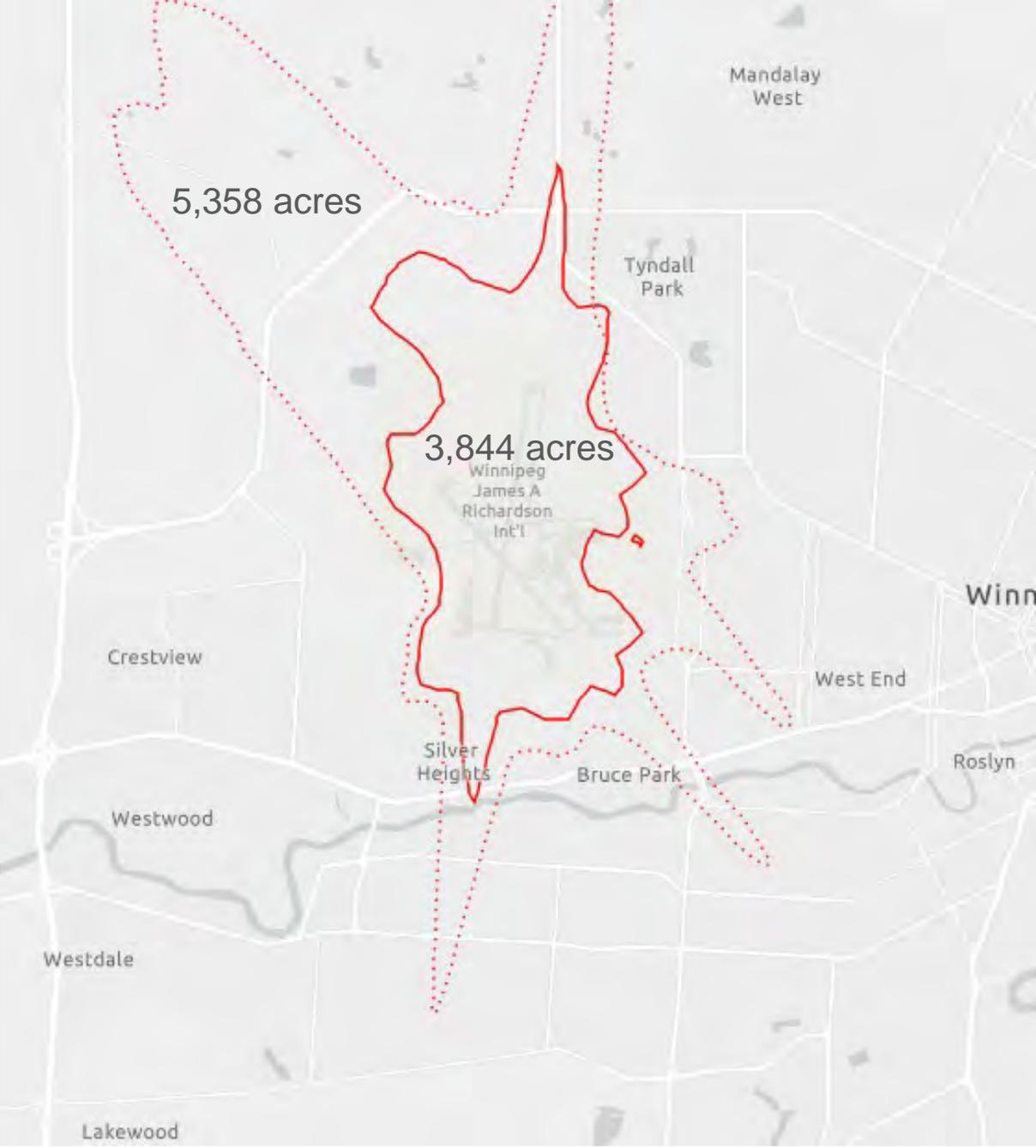
# Changing NEFs and Land Supply

- This graphic shows the reduction in the 25 NEF between 1995 and the Ultimate Projection
- A total of 4,162 acres will no longer be regulated



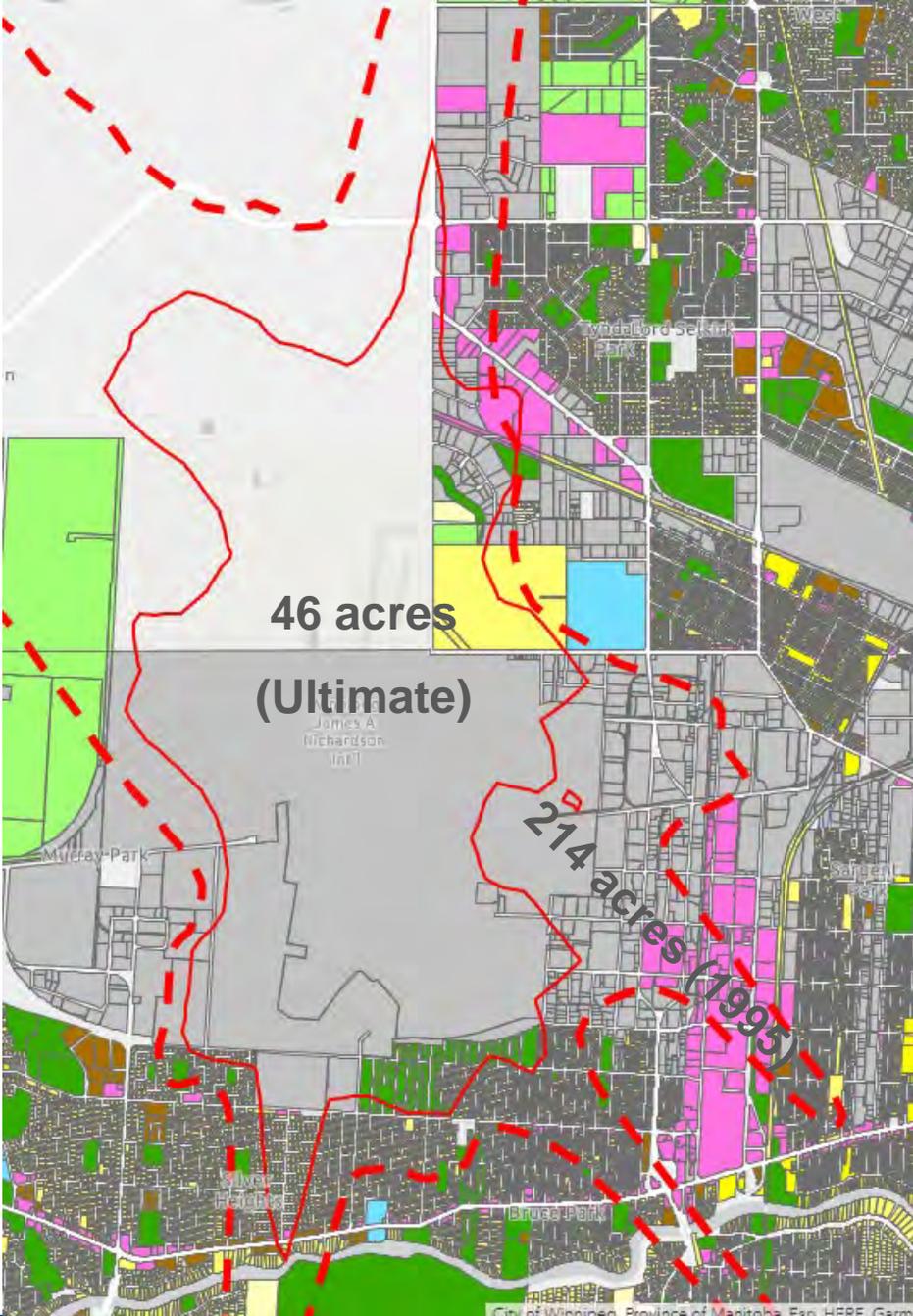
# Changing NEFs and Land Supply

- This graphic shows the reduction in the 35 NEF between 1995 and the Ultimate Projection
- A total of 1,514 acres will no longer be in the most restricted lands



# Changing NEFs and Land Supply

- This graphic shows that 168 acres of commercial lands (pink) will ultimately no longer be in the most restricted lands area



# Changing NEFs and Land Supply

1995 to Ultimate-Term, 25 NEF – 35 NEF

|                 | Change<br>(acres) | 1995         |              | Ultimate     |             |
|-----------------|-------------------|--------------|--------------|--------------|-------------|
|                 |                   | 25-35 NEF    |              | 25-35 NEF    |             |
|                 |                   | Parcels      | Acres        | Parcels      | Acres       |
| COMMERCIAL      | 351               | 659          | 659          | 459          | 1009        |
| MULTIPLE FAMILY | -95               | 293          | 206          | 109          | 111         |
| SINGLE FAMILY   | -1155             | 21712        | 2972         | 13789        | 1817        |
| TWO FAMILY      | -366              | 4881         | 463          | 957          | 97          |
| INDUSTRIAL      | 384               | 700          | 1490         | 653          | 1874        |
| OTHER           | -1677             | 581          | 4556         | 366          | 2879        |
|                 | <b>-2559</b>      | <b>28826</b> | <b>10346</b> | <b>16333</b> | <b>7787</b> |



# Supplementary Noise Mitigation Measures

## Building Design and Standards

- Widely used (including Winnipeg)
- Can be straightforward – set maximum decibel level to achieve
- Should include report/study prepared by engineer or qualified professional

## Legal and Notification Mechanisms

- Widely used in other jurisdictions
- Can include notes on title, caveats, indemnity agreements
- May require Provincial amendments to Real Property Act for use in Manitoba



# Planning Recommendations

## Federal and Provincial

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### Federal Recommendations

- Review and update provincial and municipal resources per TP1247
- Review Winnipeg International Airport Zoning Regulations and consider initiating an amendment to match the planned airfield and re-examine height limits

### Provincial Recommendations

- Explore incorporating land use regulations at the Provincial level as per the City of Winnipeg Charter ((269 (1)(a))
- Include NEF Contours in all plans (City of Winnipeg, RM of Rosser, Inland Port SPA)
- Review and potentially amend Real Property Act to facilitate airport-related notes on title



# Planning Recommendations

## Municipal

- Align with Provincial Regulations (if required)
- Consider consolidating all airport-related regulations into a single document
- Review AVPA to include updated NEF Contours, re-draw Area I and Area II areas, review land use regulations within each Area
- Review noise insulation regulations and consider simplifying to require maximum decibel level within dwellings with an engineering report as condition of building permit
- Explore legal and notification mechanisms:
- Working with industry stakeholders on non-regulatory mechanisms
- Incorporate notes on title and regulatory mechanisms if provided for in Real Property Act

