NOISE EXPOSURE FORECAST STUDY – WINNIPEG INTERNATIONAL AIRPORT

FINAL SUMMARY REPORT | AUGUST 30, 2021

HM AERO
AVIATION CONSULTING

Landmark
Planning & Design Inc.

NOISE EXPOSURE FORECAST STUDY – WINNIPEG INTERNATIONAL AIRPORT

Final Summary Report

Province of Manitoba
Manitoba Municipal Relations

August 30, 2021

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Cover Image: Google Earth

Revision History

Rev.	Date	Status	Notes
0	February 17, 2021	Draft	Issued for internal review to the Province of Manitoba.
1	February 18, 2021	Final	Issued for use by the Province of Manitoba. Revisions made based on internal comments.
2	August 30, 2021	Final	Issued for use by the Province of Manitoba. Revisions made based on input received during the 45-day consultation period of the Proposed Airport Vicinity Protection Area Regulation and resultant changes to the August 12, 2021 Noise Exposure Forecast Study. Changes are as follows: • Increased the grid spacing resolution from 1,000 ft. x 1,000 ft. to 100 ft. x 100 ft. for all NEF contours; • Corrected a technical error in direction (left-hand vs. right-hand) and height of local circuit procedures; and • Corrected a technical error in the calculation of the Scenario 4 – Ultimate-Term Conceptual Conditions Peak Planning Day, from 1,082 movements to 1,245 movements.

1 INTRODUCTION

The aviation sector has experienced considerable growth in the 21st century as passenger and cargo air carriers, charter operators, air ambulance service providers, and other entities have increased their operations to meet the demand for domestic, transborder, and international travel. As a result, numerous Canadian airports have experienced similar growth as activity levels increase and new infrastructure is developed. Winnipeg James Armstrong Richardson International Airport (Winnipeg International Airport) is a critical air travel hub, serves as a major linkage in the domestic and international supply chain and logistics network, and generates an estimated $2.9 billion in direct economic output annually[1].

Residential, commercial, and industrial development in large municipalities such as Winnipeg has resulted in the outward expansion of urban areas towards airports. Increased aircraft movements can disrupt sensitive land uses such as residential neighbourhoods, schools, and retirement communities, among others. Appropriate planning that separates sensitive land uses from areas of high noise exposure can proactively minimize future conflicts.

In September 2020, the Province of Manitoba retained HM Aero Inc. (HM Aero) and its subconsultant, Landmark Planning & Design Inc. (Landmark Planning), to prepare a Noise Exposure Forecast Study for Winnipeg International Airport[2]. The Noise Exposure Forecast Study includes independently prepared noise contours that may inform land use planning in the area.

This Summary Report provides an overview of the key components of the Noise Exposure Forecast Study, including:

1. Aircraft movement forecasts to 2050 that have been prepared to estimate the amount of traffic that could be experienced at Winnipeg International Airport in the future;
2. The estimation of the annual aircraft movement capacity of Winnipeg International Airport's current two runways, as well as capacity in an 'ultimate-term' scenario that considers the addition of a new runway; and
3. Four noise contour scenarios:
    a. Baseline contours derived from 2019 aircraft movement statistics;
    b. Forecast conditions at the end of the planning horizon of the Winnipeg Airports Authority's 2033 Master Plan;
    c. Forecast conditions over a 30-year planning horizon to 2050, which aligns with the horizons of municipal and regional plans; and
    d. Conditions at an indeterminate time in the future where a third runway is implemented and the three-runway system operates at its maximum capacity (the 'ultimate-term' scenario).

The Summary Report is intended to serve as a high-level overview of the Noise Exposure Forecast Study and omits the detailed datasets, technical analyses, and assumptions that underly the noise contour scenarios.

[1] InterVISTAS Consulting Inc. (n.d.). *2020 Economic Impact Study Final Report: Winnipeg James Armstrong Richardson International Airport (YWG).*
[2] HM Aero Inc., Landmark Planning & Design Inc. (2021, August 12). *Noise Exposure Forecast Study – Winnipeg International Airport (Final Report).*

2 NOISE EXPOSURE FORECAST SYSTEM

Annoyance from aircraft noise includes factors beyond the one-time impacts of an overflying aircraft. For example, the number of flights that occur per day, the concentration and distribution of flights, the time of day that overflights occur, and the Effective Perceived Noise Levels of aircraft in use all contribute to annoyance. In Canada, the Noise Exposure Forecast (NEF) System has been used since 1971 to predict the overall subjective annoyance and reaction levels caused by aircraft operations on specific land uses. The Noise Exposure Forecast System generates noise contours, which are lines of constant levels of perceived annoyance caused by airport noise sources.

TP1247 – Land Use in the Vicinity of Aerodromes (9th Ed.) forms the basis for Transport Canada's recommendations on development controls near airports as a function of aircraft noise and perceived annoyance. These guidelines are widely used by Canadian municipalities to ensure that the development of noise sensitive facilities and residential areas is appropriately controlled. Included in TP1247 and as shown in Table 2.1 are predictions of community responses to commonly modelled NEF contours.

The NEF contours that currently inform the land use planning policy context in Winnipeg were prepared in 1995. The study supporting the development of the 1995 NEF contours was not available for review by the project team. However, a visual review of the contours indicates that the noise implications of a potential parallel runway were modelled. Additionally, the size of the 1995 NEF contours suggests that the 95th percentile planning day input may have been based on the maximum throughput capacity of the runway system – however, this cannot be confirmed by the project team.

Table 2.1 - Community NEF Response Prediction (Transport Canada)

Response Area	Response Prediction*
1 (over 40 NEF)	Repeated and vigorous individual complaints are likely. Concerted group and legal action might be expected.
2 (35-40 NEF)	Individual complaints may be vigorous. Possible group action and appeals to authorities.
3 (30-35 NEF)	Sporadic to repeated individual complaints. Group action is possible.
4 (below 30 NEF)	Sporadic complaints may occur. Noise may interfere occasionally with certain activities of the resident.
* The above community response predictions are generalizations based upon experience resulting from the evolutionary development of various noise exposure units used by other countries. For specific locations, the above response areas may vary somewhat in accordance with existing ambient or background noise levels and prevailing social, economic, and political conditions.	

3 AIRCRAFT MOVEMENT FORECASTS

An aircraft movement is defined as a take-off, landing, touch-and-go, or simulated approach. Activity at Winnipeg International Airport has decreased from approximately 155,000 aircraft movements in 1997 to 116,000 movements in 2019. This represents an average annual decrease of 1.2%. Air carriers have been responsible for the majority of the itinerant aircraft movements at Winnipeg International Airport. From 1997 to 2019, itinerant air carrier movements have decreased by an annual average of 0.4%. Aircraft movements at Winnipeg International Airport have decreased by 39% from March to November 2020 compared to the same period in 2019, primarily because of the COVID-19 pandemic.

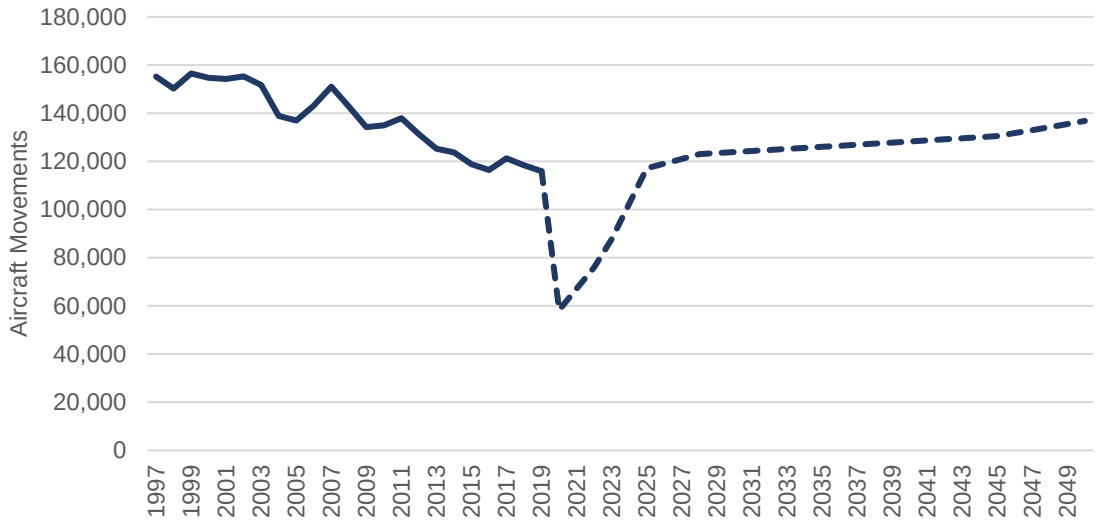
Despite the historical decrease in air carrier movements, passenger and air cargo activity has generally increased at Winnipeg International Airport. Annual passenger throughput, for example, increased from 3.4 million in 2009 to 4.5 million in 2019. This trend is a result of factors such as improved aircraft utilization and the deployment of aircraft with higher capacities. Future growth in air cargo and passenger activity is not expected to correspond uniformly with increases in aircraft movements – i.e., increases in aircraft movement activity may lag behind growth in passenger and cargo activity.

Aircraft movements to 2050 have been independently forecasted by the project team to approximate the level of traffic that could occur at Winnipeg International Airport in the future, which informs the noise contours described in this report. Key forecast assumptions include:

- The recovery of passenger air carrier movements from COVID-19 by 2025 and growth in subsequent years tied to forecast increases in Gross Domestic Product;
- Continued growth in air cargo movements by 1% annually; and
- Minimal change in other categories, such as private, government, and local movements.

Based on the assumptions described above, aircraft movements are forecast to grow by between 0.2% and 1.0% annually from 2021 to 2050, reaching approximately 137,000 forecast annual movements in 2050 (Figure 3.1). This represents a reversal of approximately 20 years of annual decreases and a return to 2012 activity levels.

Figure 3.1 - Aircraft Movement Forecast



4 RUNWAY CAPACITY ANALYSIS

The capacity of an airfield is defined as the number of aircraft movements that can be accommodated within a given timeframe. The purpose of calculating the capacity of the runway system for the Noise Exposure Forecast Study is twofold:

1. To assist in determining whether an additional runway may be required within the 30-year horizon of this study; and
2. To inform the preparation of the 'ultimate-term' noise contour set, which considers the maximum utilization of the Airport including the addition of a new runway.

The Winnipeg Airports Authority completed a robust analysis of airside system capacity as part of the 2033 Master Plan, which found that the airfield, in its 2013 configuration, had a practical annual capacity of approximately 204,000 aircraft movements. The 2033 Master Plan found that sufficient capacity should exist to meet the Airport Authority's "most likely" aircraft movement forecast (167,500 movements in 2033), and that demand in the "high" aircraft movement forecast (194,300 movements in 2033) could result in significant and frequent delays beyond five minutes. A range of measures (e.g., taxiway improvements) could improve capacity to approximately 227,000 annual movements without the addition of a new runway.

The project team's independent baseline capacity analysis considers the infrastructure of Winnipeg International Airport as it exists in 2020 and is calculated assuming full operations occur from 7:00 AM to 11:00 PM, outside of the overnight hours that are subject to operational restrictions. The baseline practical capacity of Winnipeg International Airport is estimated to be between 203,000 and 229,000 annual aircraft movements. Based on the consideration of forecast annual aircraft movements (137,000) versus the practical capacity of the runway system, sufficient residual runway capacity is expected to exist in 2050.

Notwithstanding the foregoing, sufficient land continues to be reserved at the north side of the Airport for a new runway parallel to the existing Runway 13-31. The potential parallel runway is protected at the federal level by the Winnipeg International Airport Zoning Regulations and by the 2033 Master Plan's Land Use Plan that was approved by the Minister of Transport in 2015. The inclusion of the parallel runway reserve in the Land Use Plan indicates that the federal government, as the landowner of Winnipeg International Airport, has a long-term interest in protecting for such a facility in the future.

The project team has prepared an independent estimate of the ultimate-term runway capacity of Winnipeg International Airport in a potential three-runway system. Consistent with the baseline capacity analysis, the ultimate-term capacity analysis calculates annual capacity assuming full operations occur from 7:00 AM to 11:00 PM. The ultimate-term practical capacity is estimated to be between 392,000 and 441,000 annual aircraft movements.

5 NOISE CONTOUR SCENARIOS

Noise contours are developed using a structured process that was developed by Transport Canada and the National Research Council. Noise contours are representative of a near to worst-case 24-hour period and are based on the number of aircraft operations for a Peak Planning Day. As defined by Transport Canada, the Peak Planning Day is a 95th percentile day, where only 5% of the days of the year have more aircraft movements than this day. The NEF software package uses an embedded database of aircraft types and their associated perceived noise levels in combination with inputs such as flight paths, flight distances, and time of day.

The following inputs were utilized in the preparation of the baseline noise contours and subsequent scenarios:

- Winnipeg International Airport aircraft movement datasets for 2017, 2018, and 2019;
- Aircraft movement forecasts for 2020 to 2050 (Section 3); and
- The ultimate-term runway capacity estimate of Winnipeg International Airport (Section 4).

Noise contours for historical traffic in 2019; forecast traffic in 2033 and 2050; and activity in a conceptual ultimate-term scenario at an indeterminate time have been prepared:

1. **2019 Baseline Conditions (Figure 5.1)**

   The 95th percentile busy day for 2019 consisted of 22 local movements and 336 itinerant movements, for a total of 358 movements.

2. **2033 Forecast Conditions (Figure 5.2)**

   Based on the aircraft movement forecasts presented in Section 3, the 95th percentile busy day for 2033 is assumed to consist of 24 local movements and 363 itinerant movements, for a total of 387 movements. The forecast aircraft movement growth rate was applied to the 2019 95th percentile busy day, resulting in the same proportion of aircraft types, flight paths, ranges, and day/night split as 2019, but with forecast aircraft movements representative of 2033.

3. **2050 Forecast Conditions (Figure 5.3)**

   The 95th percentile busy day for 2050 was forecast to consist of 423 total movements, including 26 local movements and 397 itinerant movements. As with Scenario 2, the 2050 aircraft movement growth rate was applied based on the 2019 95th percentile day.

4. **Ultimate-Term Conceptual Conditions (Figure 5.4)**

   The 95th percentile busy day for Scenario 4 – Ultimate-Term Conceptual Conditions includes 77 local movements and 1,168 itinerant movements, for a total of 1,245 movements. A new parallel runway is assumed to be in operation and Runway 18-36 is assumed to have been extended 1,000 feet (305 metres) to the north based on consultations with Winnipeg Airports Authority.

The land use implications of the above-noted NEF contours are analyzed separately in the Planning Analysis and Recommendations Report[3].

[3] HM Aero Inc., Landmark Planning & Design Inc. (2021, August 30). *Planning Analysis and Recommendations – Winnipeg International Airport (Final Report).*

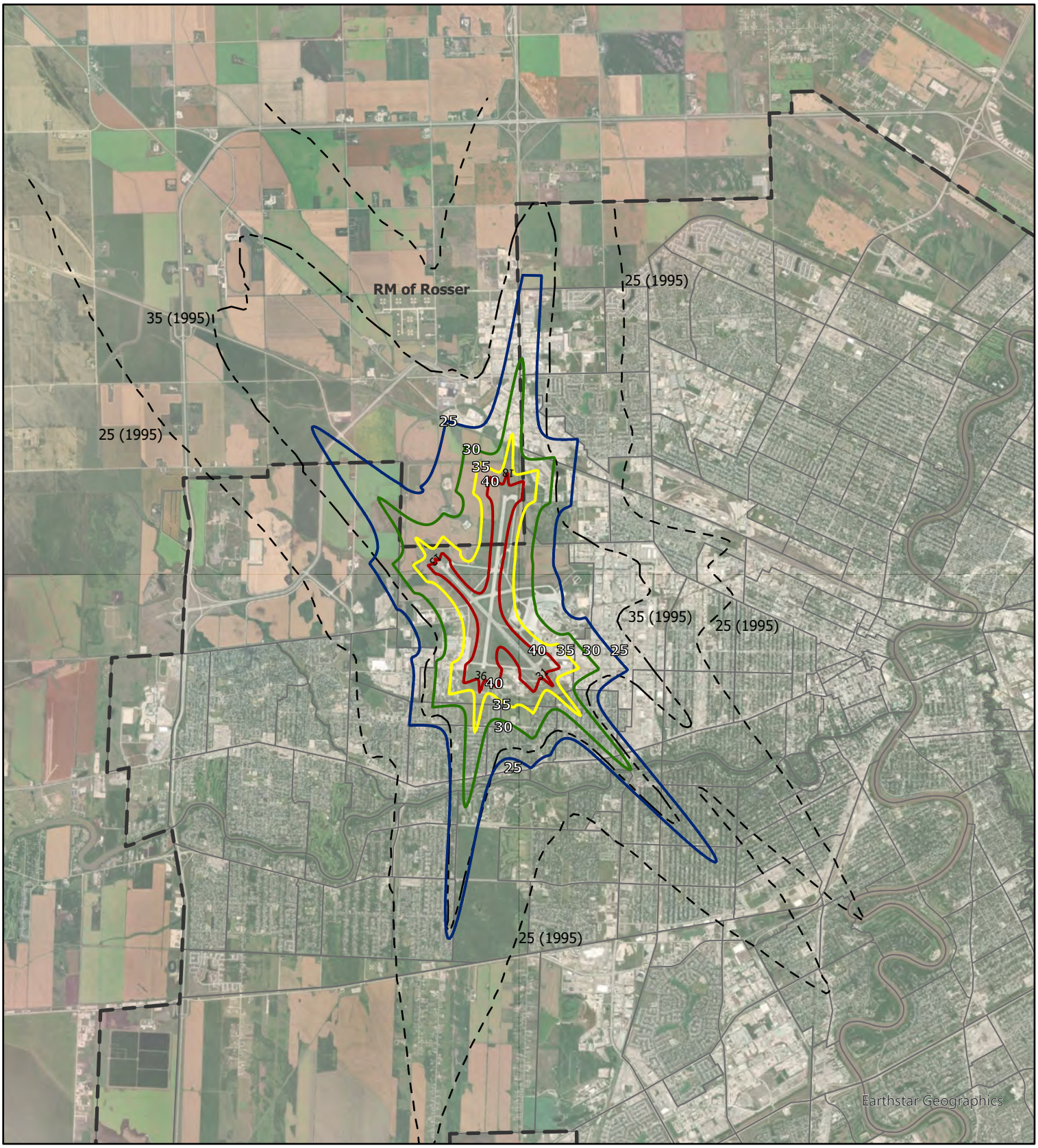


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FIGURE 5.1 - 2019 BASELINE CONTOURS

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NEF25 — 1995 NEF25 – –

NEF30 — 1995 NEF35 —

NEF35 City of Winnipeg Limits

NEF40

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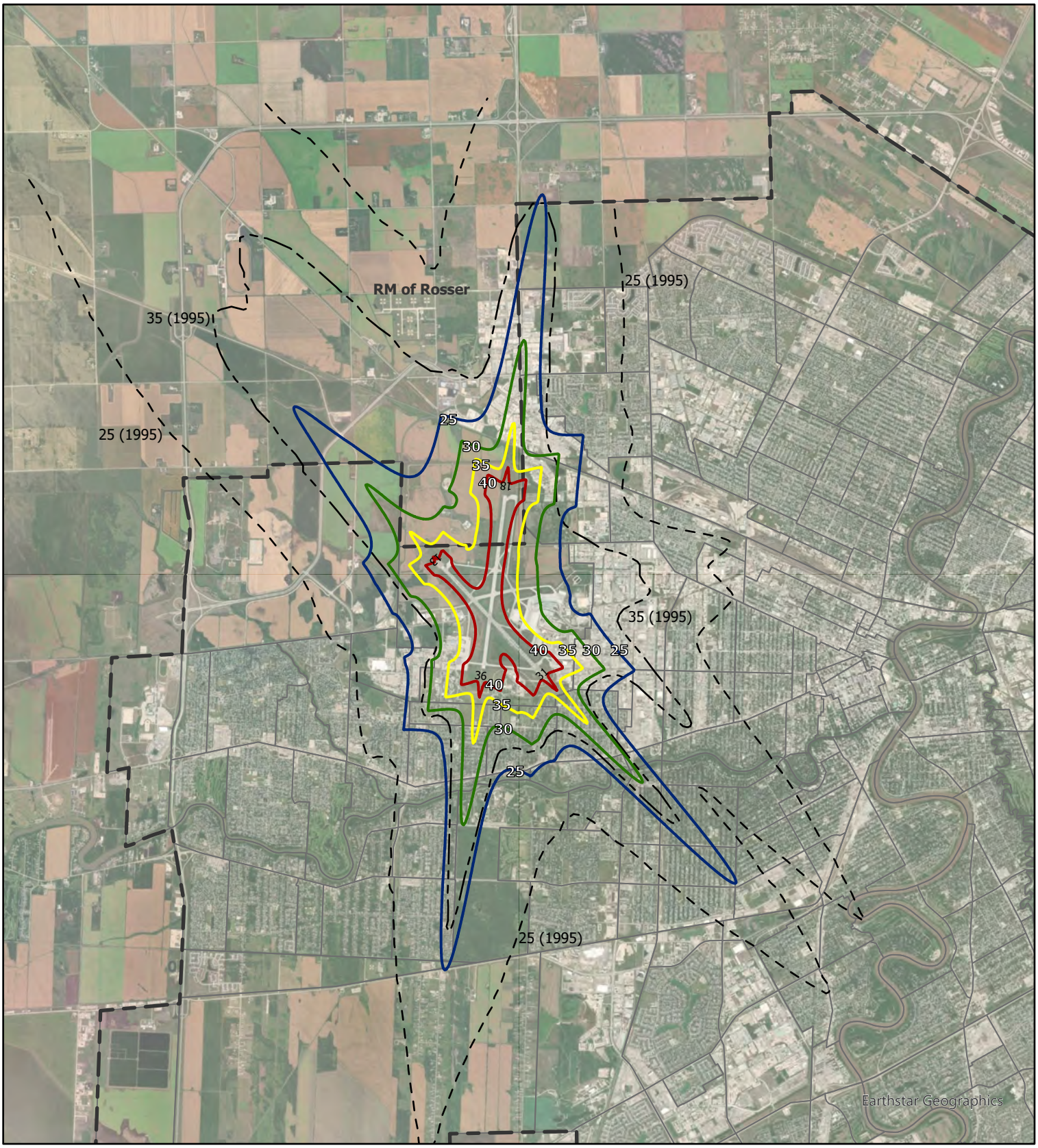

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FIGURE 5.2 - 2033 CONTOURS

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NEF30
NEF35
NEF40
1995 NEF25
1995 NEF35
City of Winnipeg Limits

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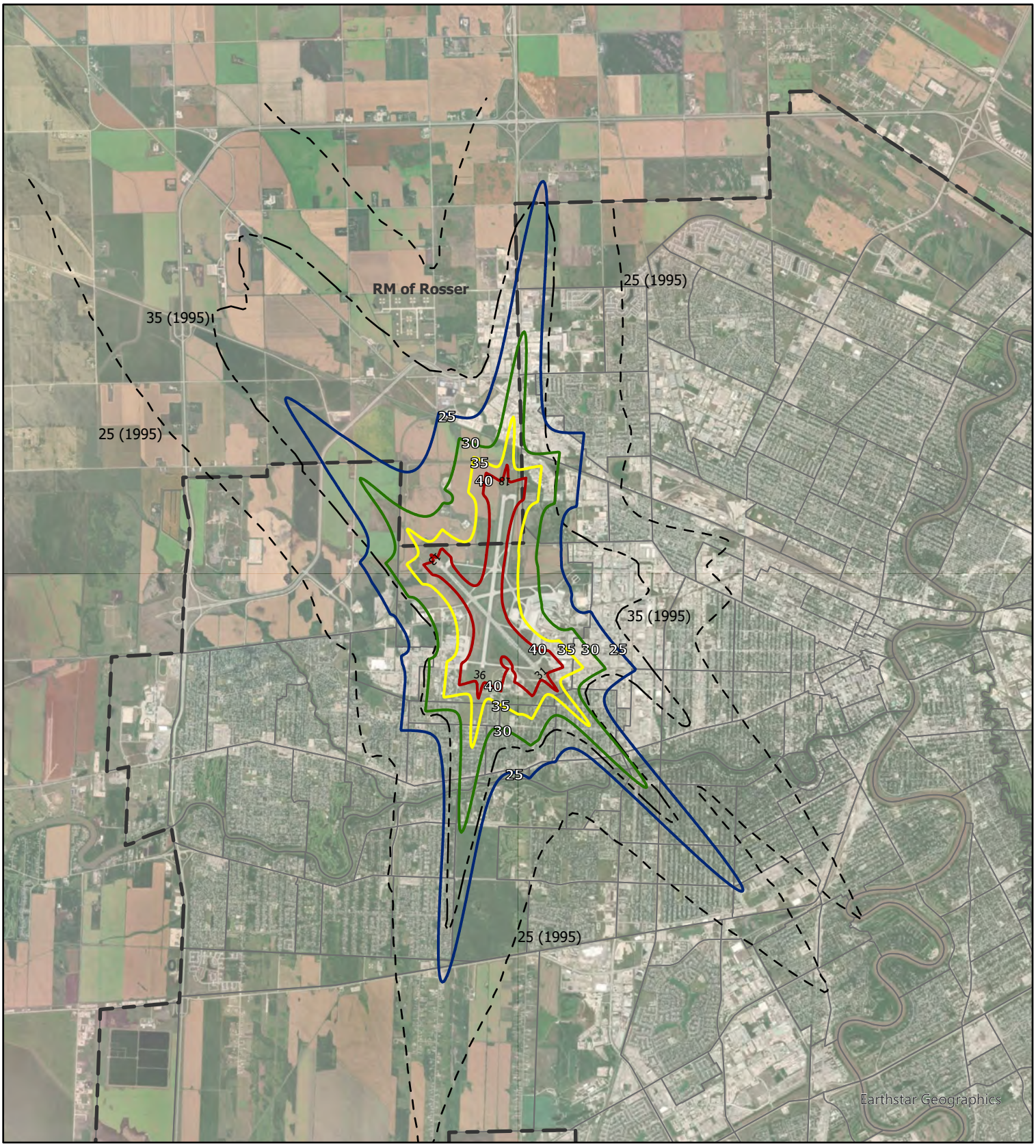

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FIGURE 5.3 - 2050 CONTOURS

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1995 NEF25
1995 NEF35
City of Winnipeg Limits

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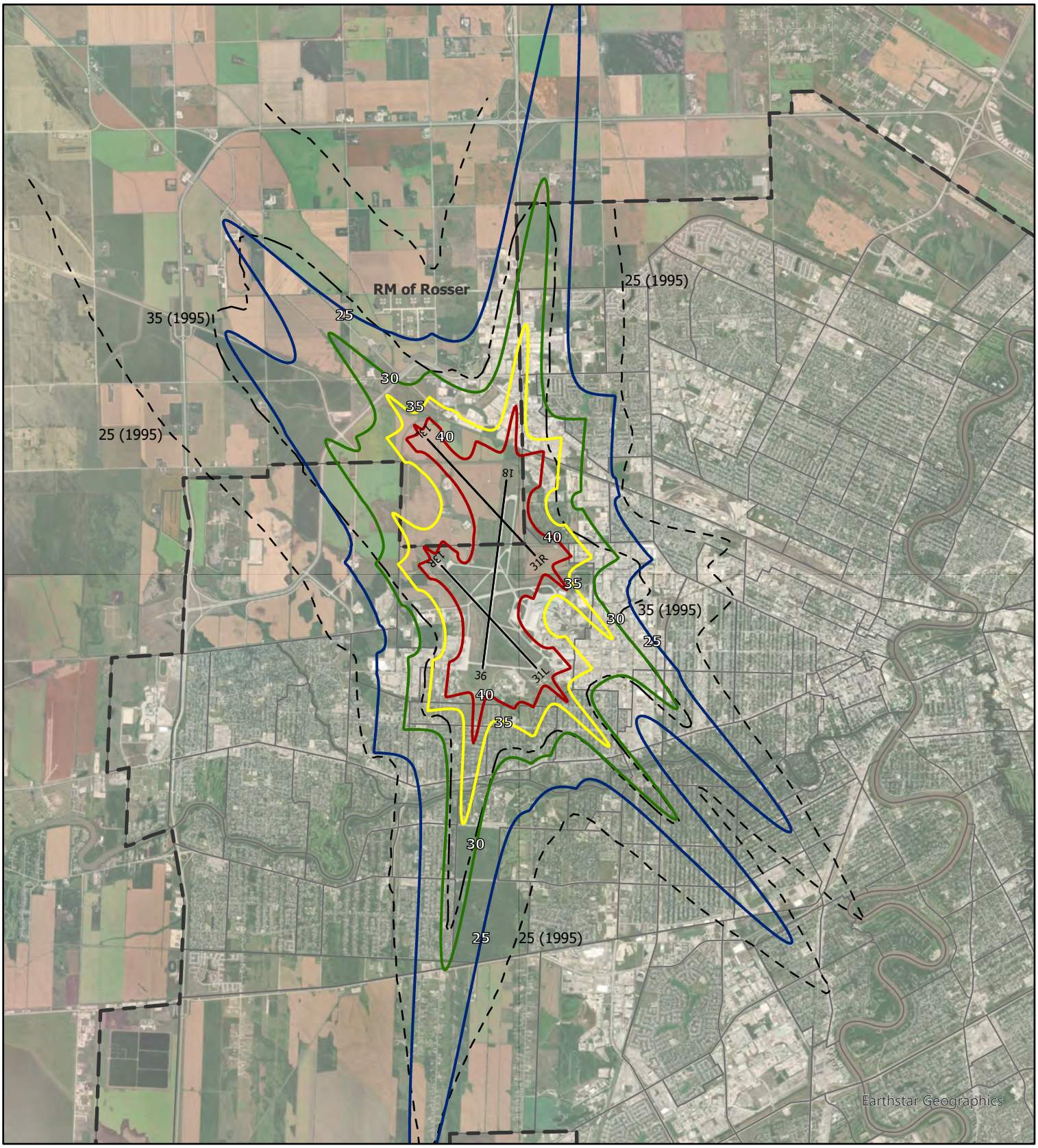

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FIGURE 5.4 - ULTIMATE-TERM CONCEPTUAL CONTOURS

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City of Winnipeg Limits

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