

Lake Elmo Airport

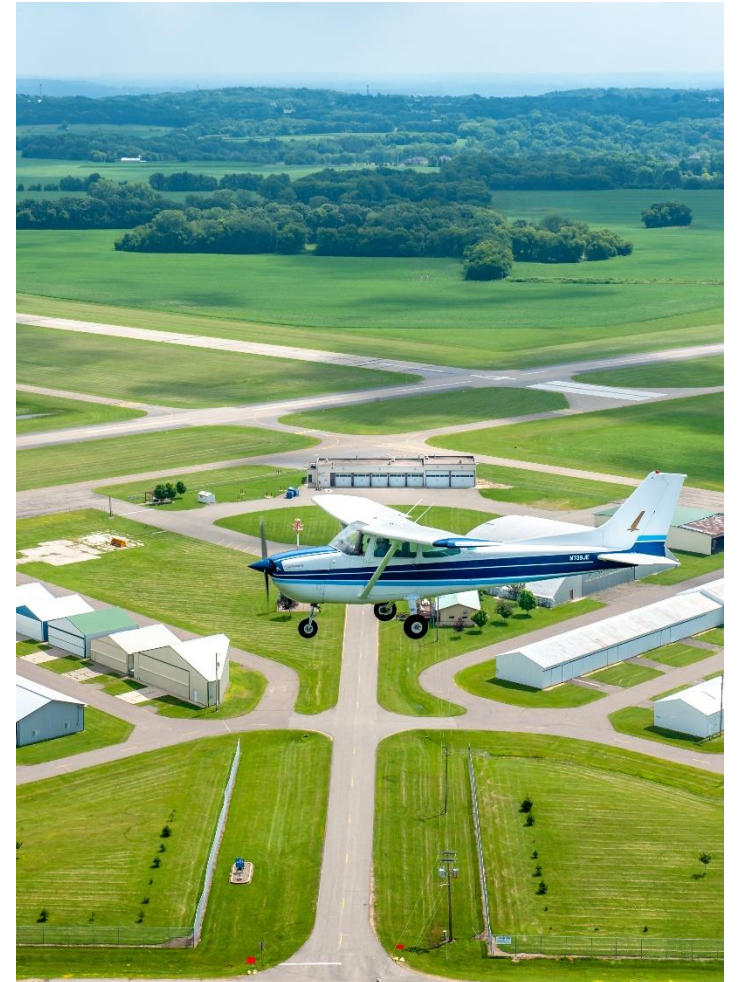
Joint Airport Zoning Board (JAZB)



17 October 2019
JAZB Meeting #3

Meeting Agenda

- **Chair Opening/Remarks**
- Approval of Minutes from August 29, 2019 Meeting
- JAZB Formation Items
- Presentation of Custom Standard Zoning Factors
- Example Custom Zone for Discussion
- Public Comments
- Board Discussion on Custom Zoning Factors and Example
- Establish Next Meeting Date
- Adjourn



JAZB Overview

Through a collaborative process, the JAZB seeks to develop an airport zoning ordinance that achieves a balance between providing for a reasonable level of safety while allowing for compatible community development.

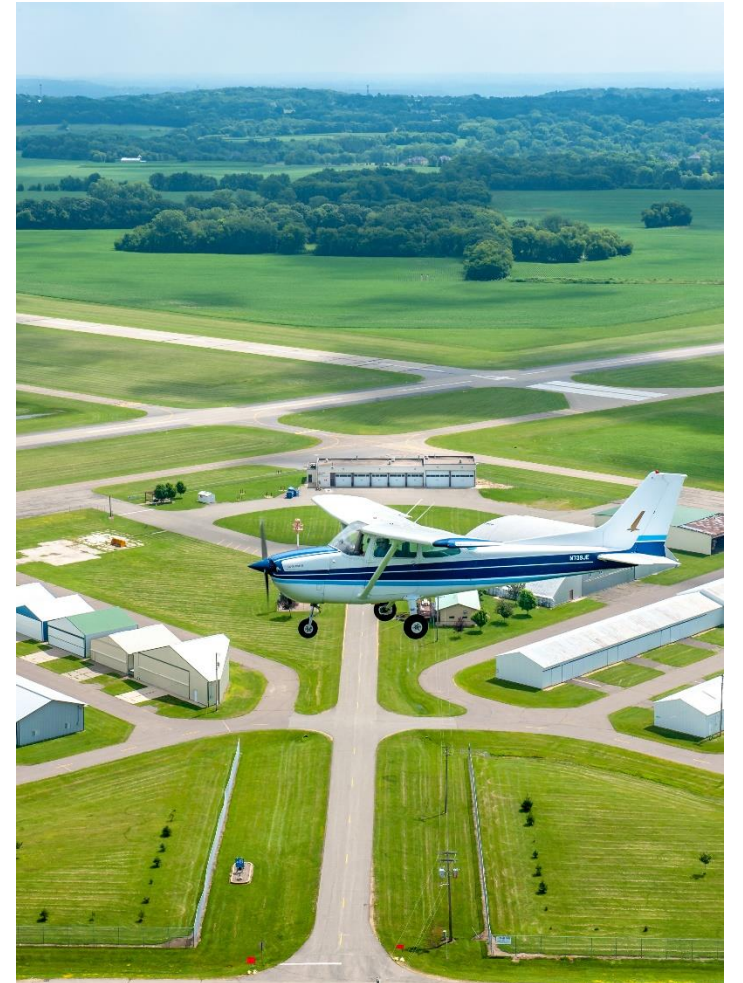
JAZB Goals

- Develop an Airport Zoning Ordinance for review and approval by the MnDOT Commissioner of Transportation
- Develop an Airport Zoning Ordinance that achieves a balance between providing for a reasonable level of safety while allowing for compatible community development
- Ensure that the Airport Zoning Ordinance is developed in a manner that includes meaningful stakeholder engagement



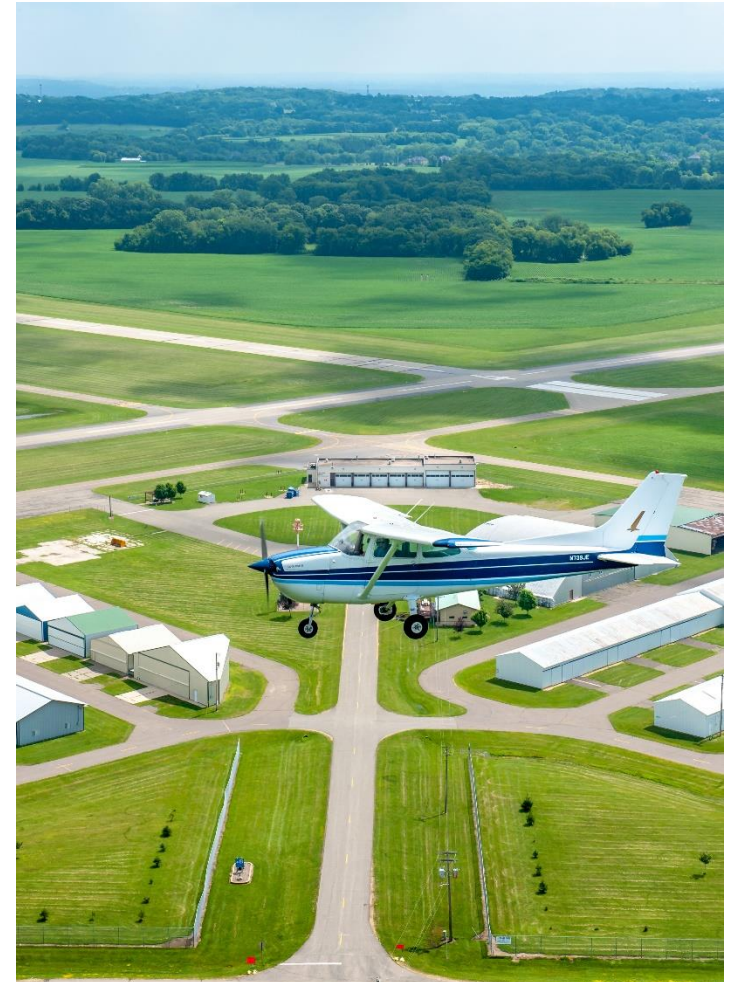
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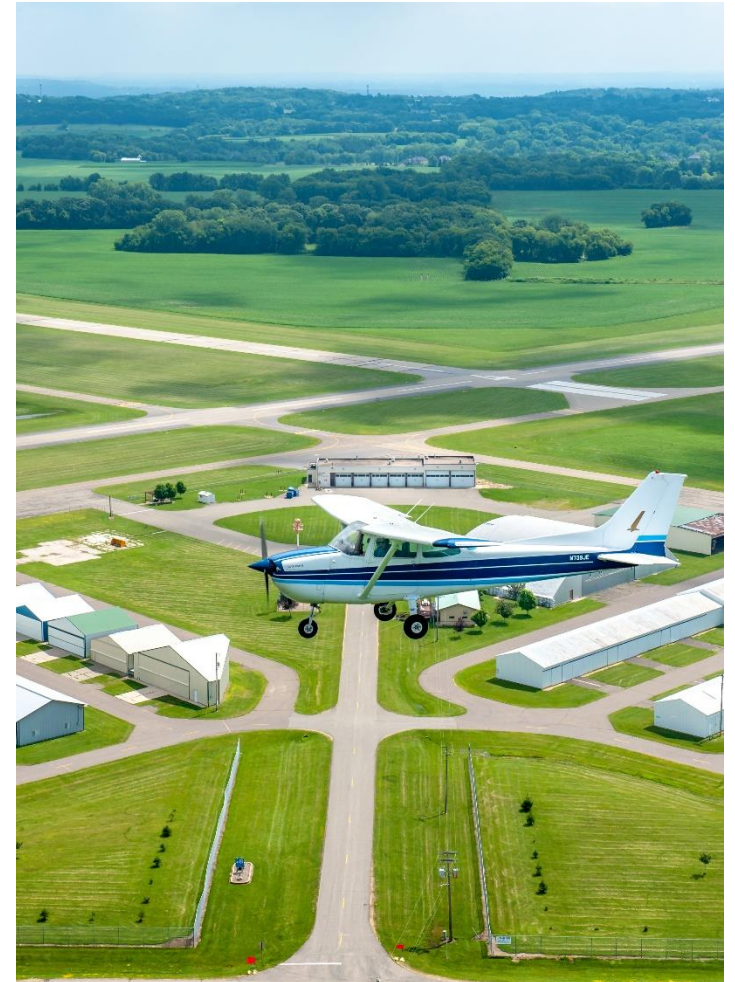
JAZB Formation Items

- JAZB Member Resolutions
- Ratification of JAZB Actions from June 25 and August 29, 2019 meetings



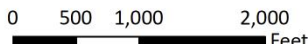
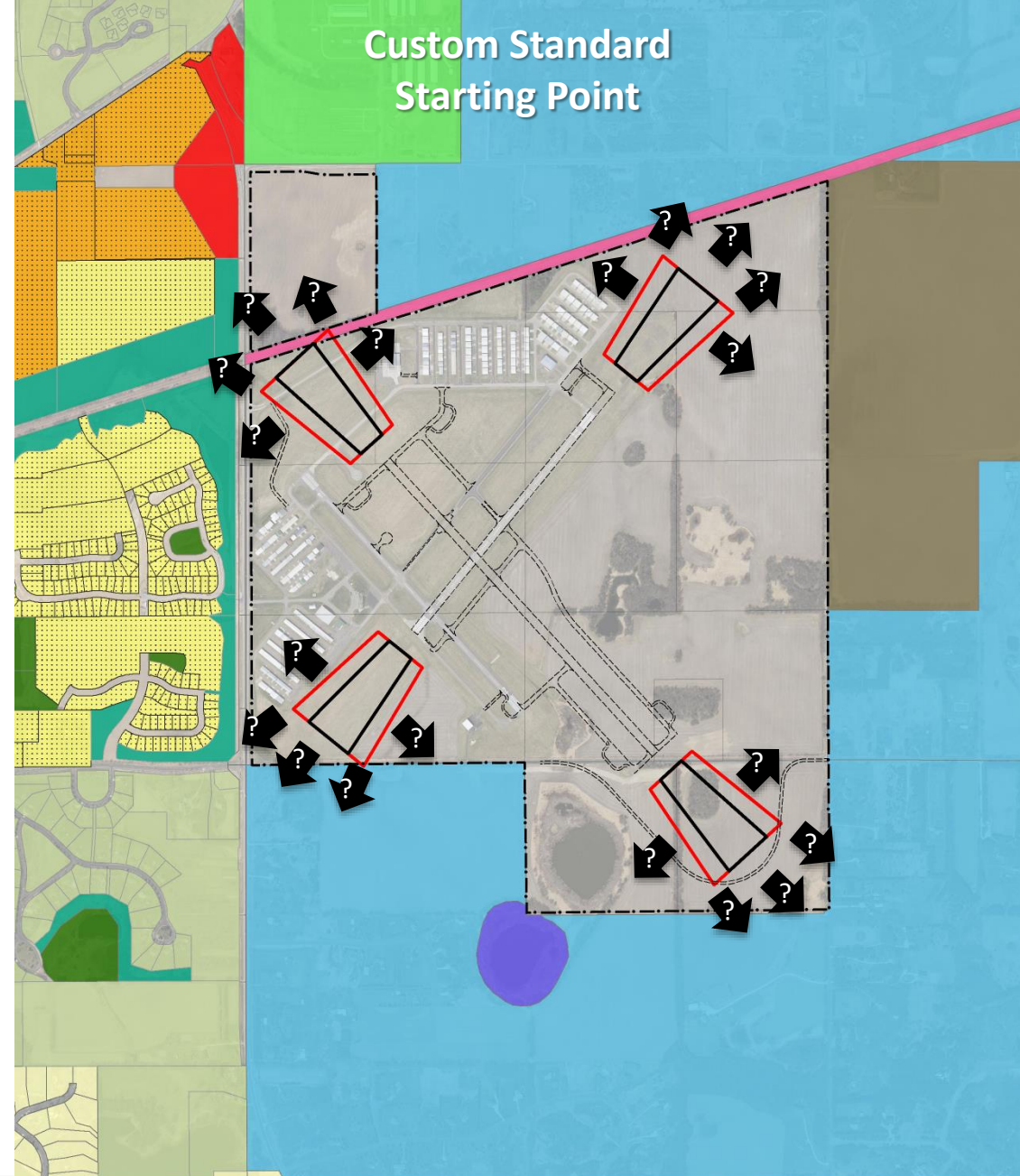
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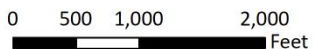
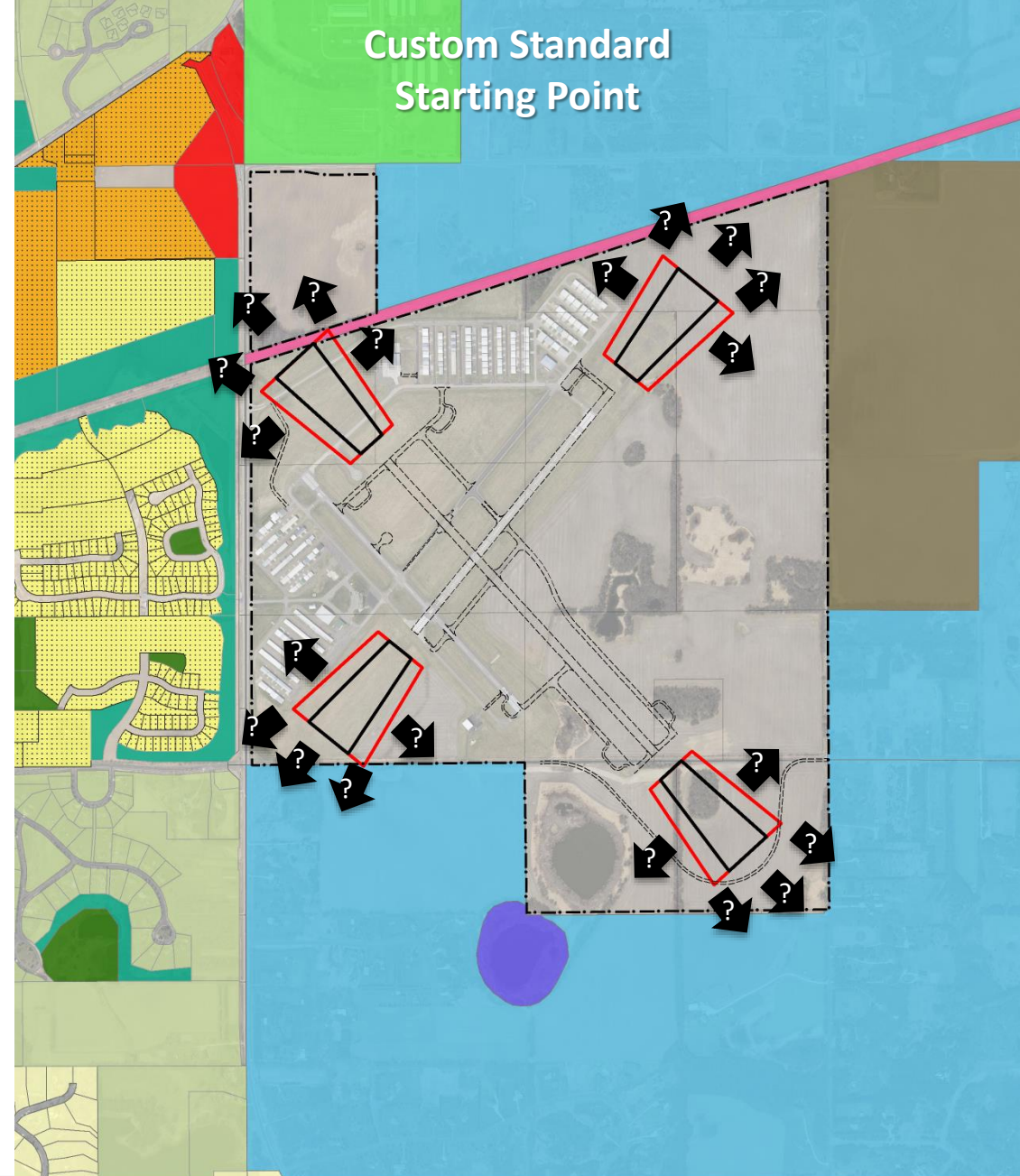
Custom Standard Factors

1. Location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport
2. Airport's type of operations and how the operations affect safety surrounding the airport
3. Accident rate at the airport compared to a statistically significant sample, including an analysis of accident distribution based on the rate with a higher accident incidence
4. Planned land uses within an airport hazard area, including any applicable platting, zoning, comprehensive plan, or transportation plan
5. Any other information relevant to safety or the airport



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Location, Character of Surrounding Land Uses

(1) the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:

(i) the location of vulnerable populations, including schools, hospitals, and nursing homes, in the airport hazard area;

(ii) the location of land uses that attract large assemblies of people in the airport hazard area;

(iii) the availability of contiguous open spaces in the airport hazard area;

(iv) the location of wildlife attractants in the airport hazard area;

(v) airport ownership or control of the federal Runway Protection Zone and the department's Clear Zone;

(vi) land uses that create or cause interference with the operation of radio or electronic facilities used by the airport or aircraft;

(vii) land uses that make it difficult for pilots to distinguish between airport lights and other lights, result in glare in the eyes of pilots using the airport, or impair visibility in the vicinity of the airport;

(viii) land uses that otherwise inhibit a pilot's ability to land, take off, or maneuver the aircraft;

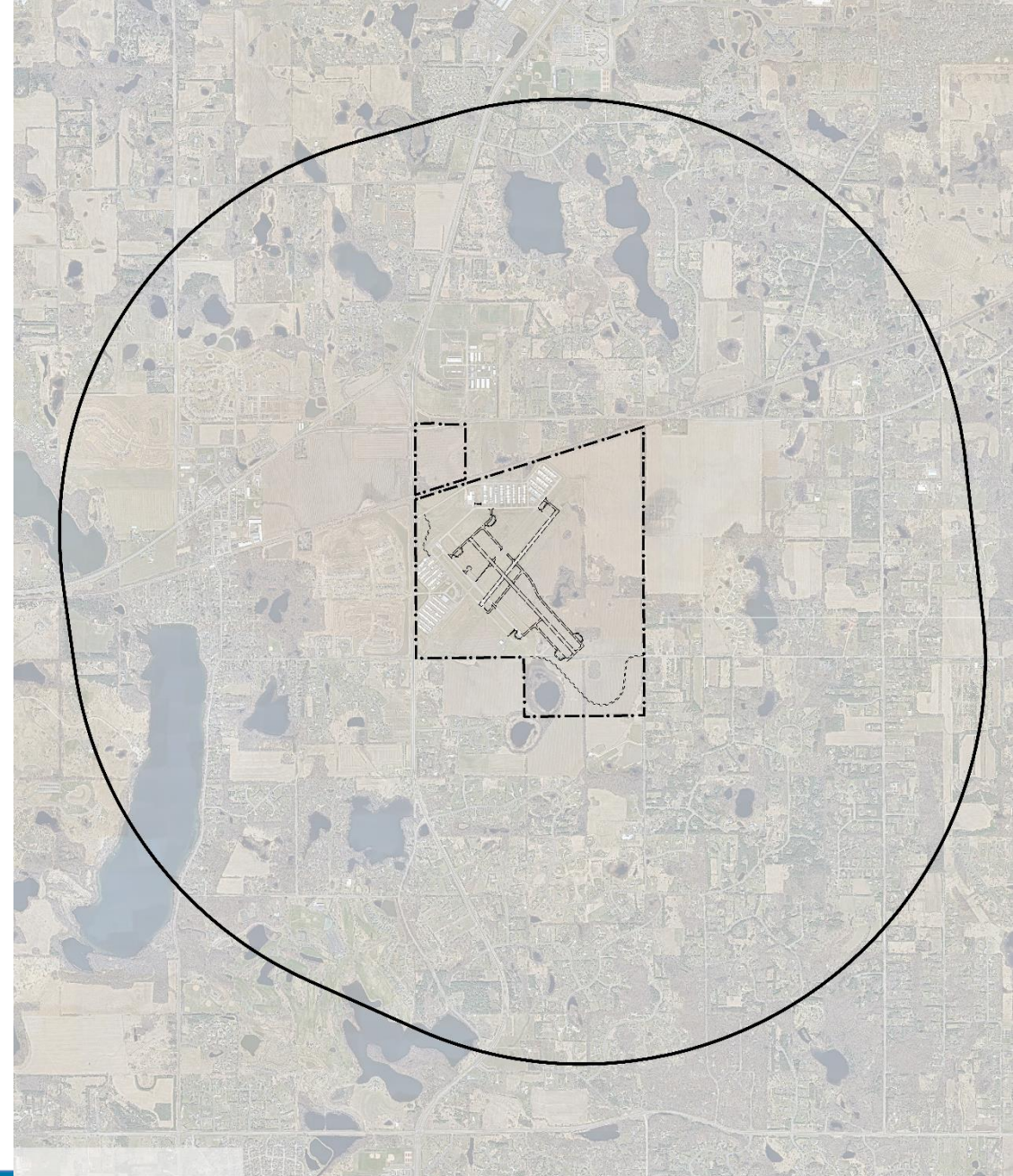
(ix) airspace protection to prevent the creation of air navigation hazards in the airport hazard area; and

(x) the social and economic costs of restricting land uses;

Location, Character of Surrounding Land Uses

- Airport Hazard Area
 - Any area of land or water upon which an airport hazard might be established if not prevented
 - The Airport Hazard Area is represented by the extent of the FAA airspace protection surfaces for Lake Elmo Airport

“Airport Hazard” means any structure, object of natural growth, or use of land, which obstructs the air space required for the flight of aircraft in landing or taking off at any airport or is otherwise hazardous to such landing or taking off.



— Airport Hazard Area

- - - 21D Property

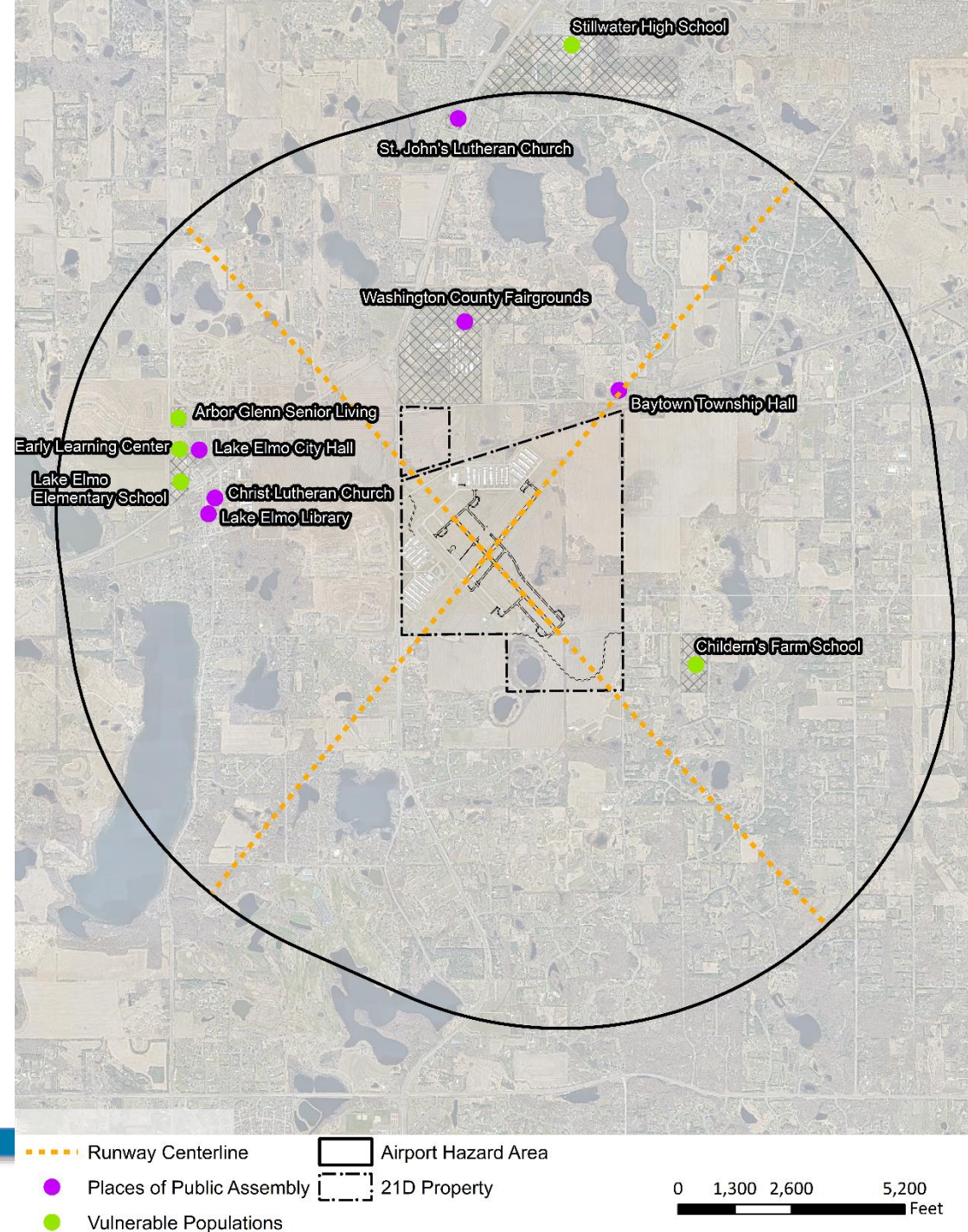
0 1,300 2,600 5,200 Feet

Location, Character of Surrounding Land Uses

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- (i) the location of vulnerable populations, including schools, hospitals, and nursing homes, in the airport hazard area;
- (ii) the location of land uses that attract large assemblies of people in the airport hazard area;

- Vulnerable populations: Arbor Glenn Senior Living, Lake Elmo Early Learning Center, Children's Farm School, Lake Elmo Elementary School, Stillwater High School (property only)
- Places of public assembly: Municipal Buildings, Churches, Fairgrounds



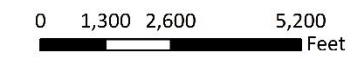
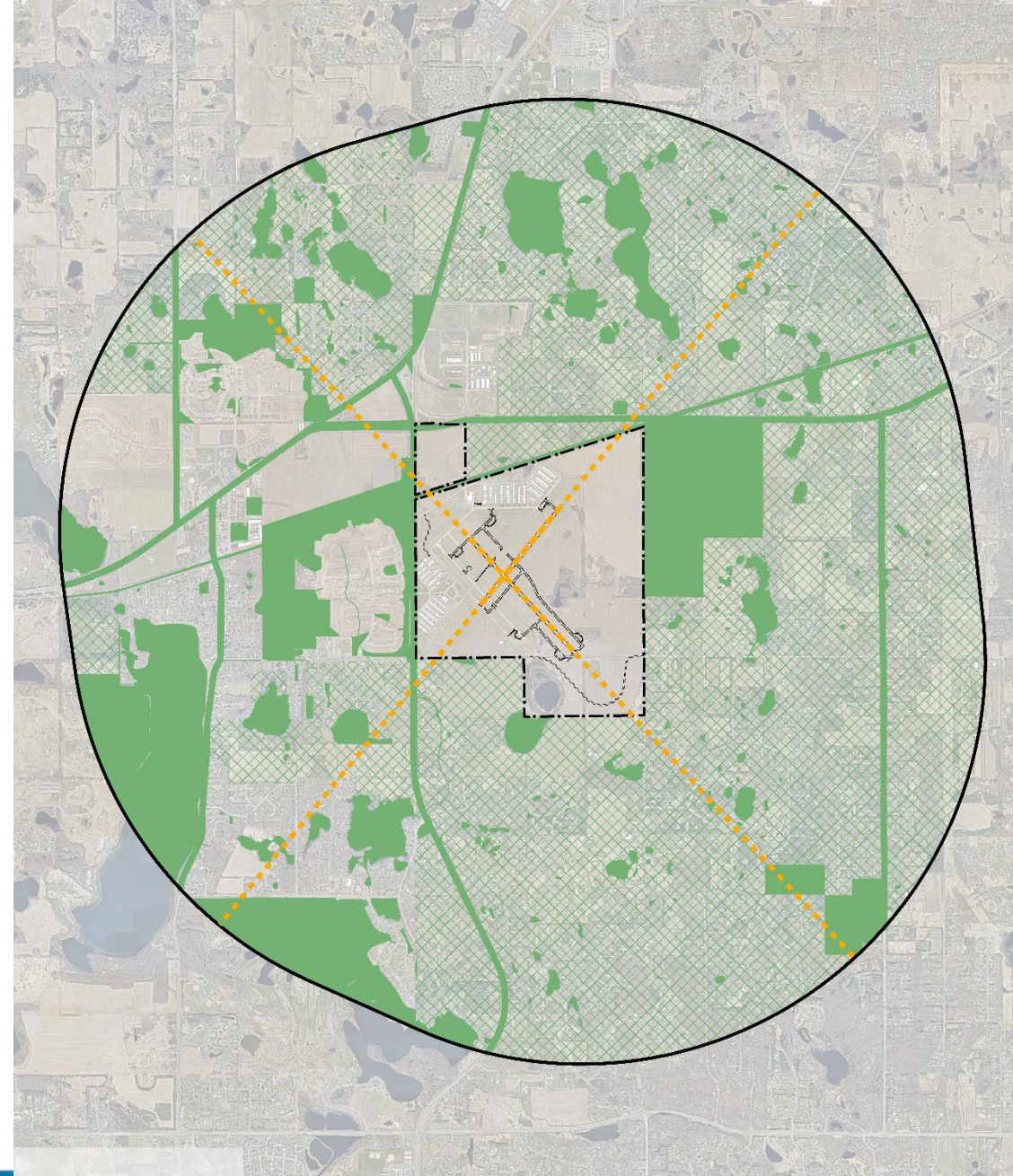
Location, Character of Surrounding Land Uses

(1) the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:

(iii) the availability of contiguous open spaces in the airport hazard area;

- Land guided as Public/Semi-Public (PSP) in the City of Lake Elmo
- Land guided as Park/Open Space (Park) in the City of Lake Elmo
- Land guided as Agricultural Preserve in Baytown Township
- Major Roadway and Railway right-of-ways
- Open Water

- Large bands of low-density residential development with 2.5 or more acres per dwelling unit

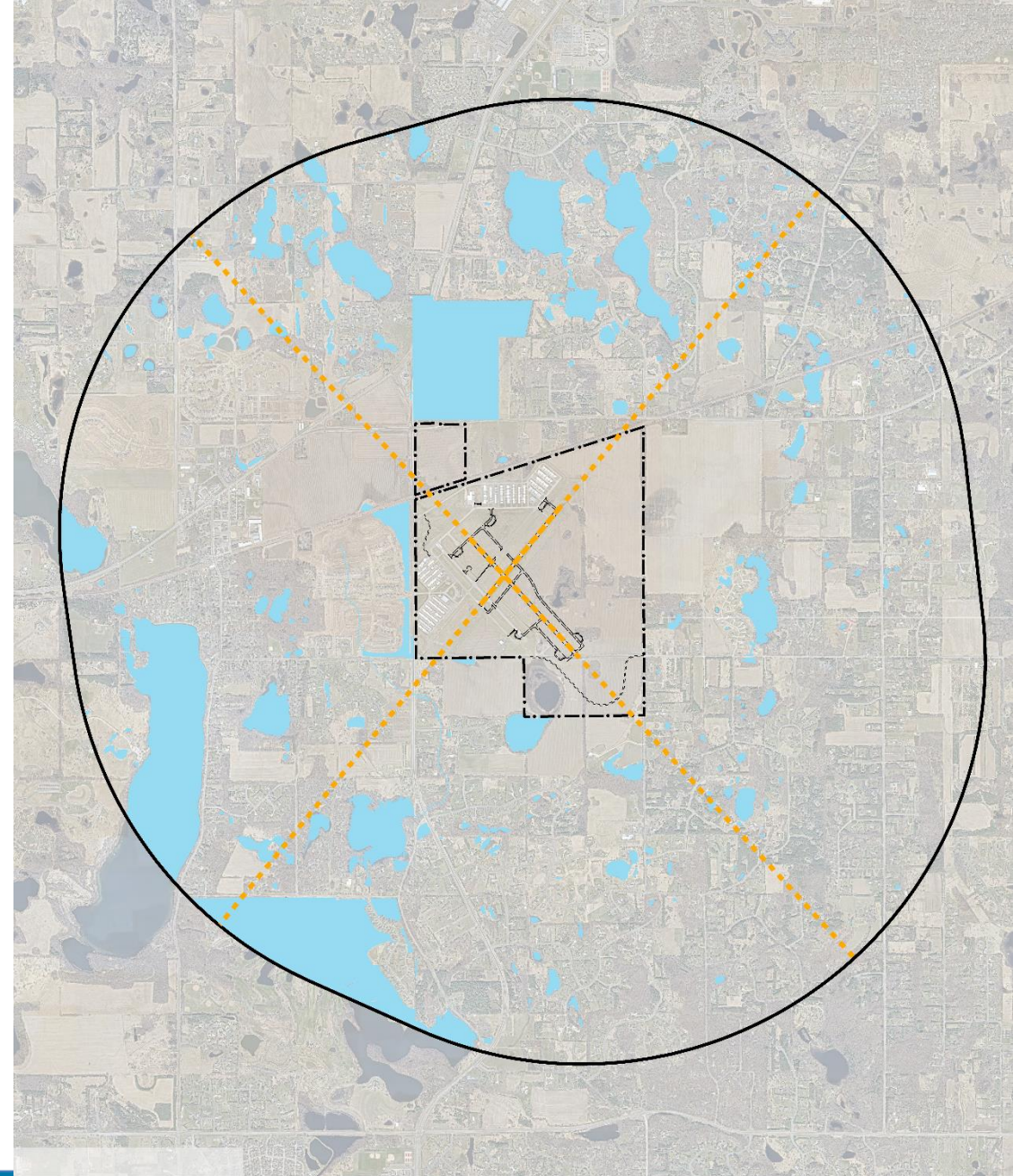


Location, Character of Surrounding Land Uses

(1) the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:

(iv) the location of wildlife attractants in the airport hazard area;

- Open water / wetland areas
- Fairgrounds
- Golf course
- No wastewater treatment facilities, landfills, or waste transfer stations

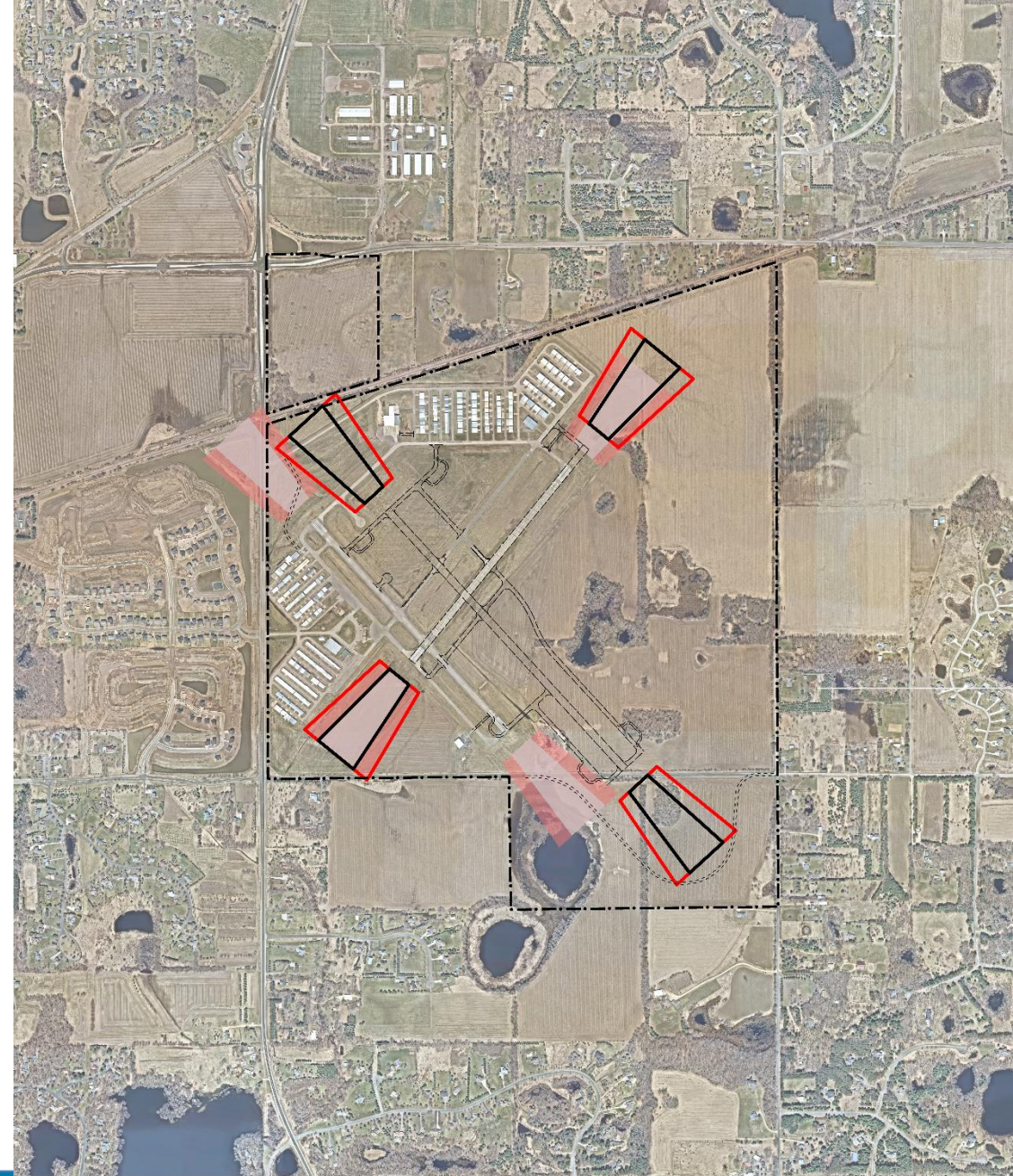


Location, Character of Surrounding Land Uses

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(v) airport ownership or control of the federal Runway Protection Zone and the department's Clear Zone;

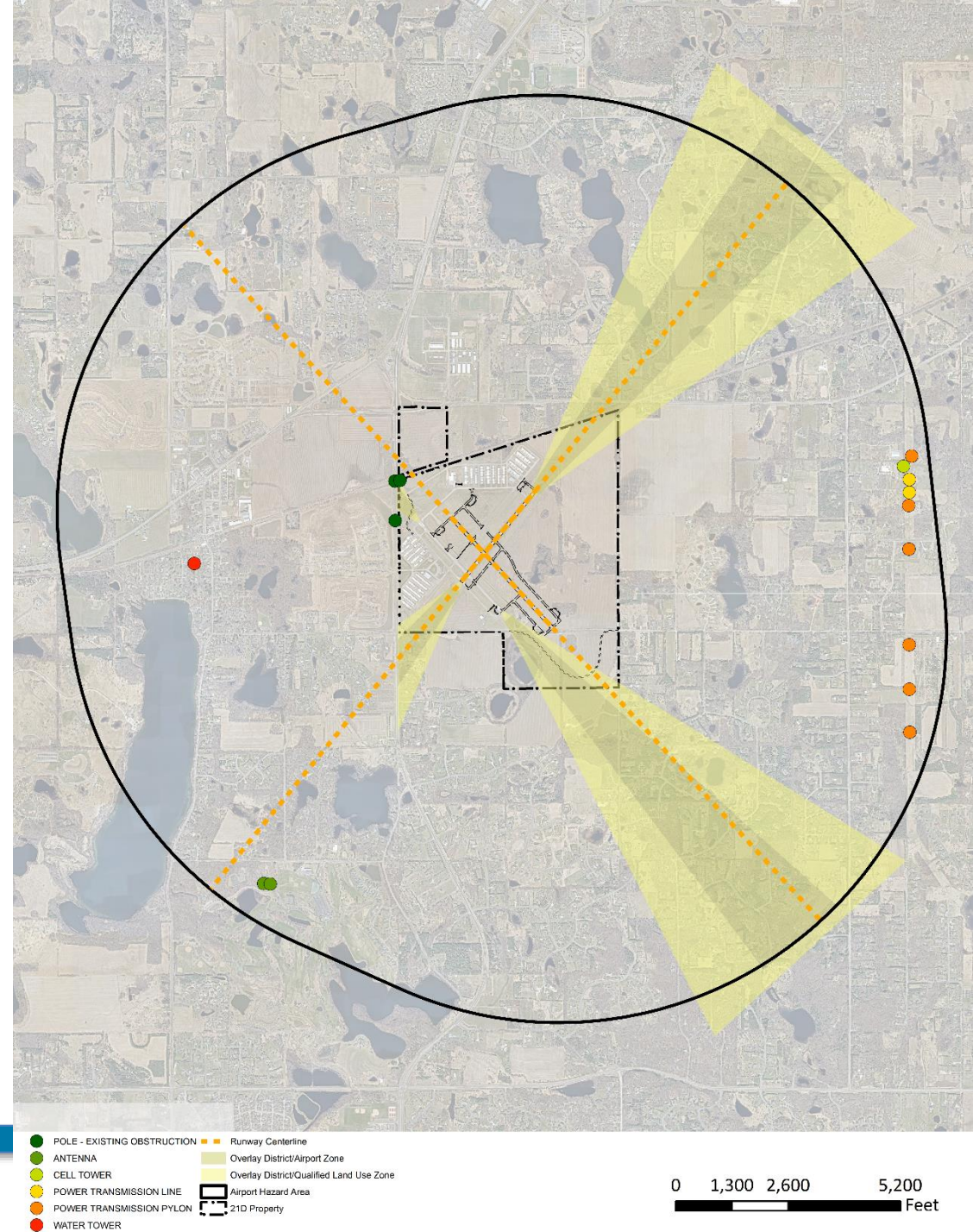
- Runway Protection Zone (RPZ)
 - Existing – 4.7 acres extend off-airport
 - Future – Fully contained on airport
- MnDOT Clear Zone
 - Existing – 8.2 acres extend off-airport
 - Future – 0.2 acres extend off-airport



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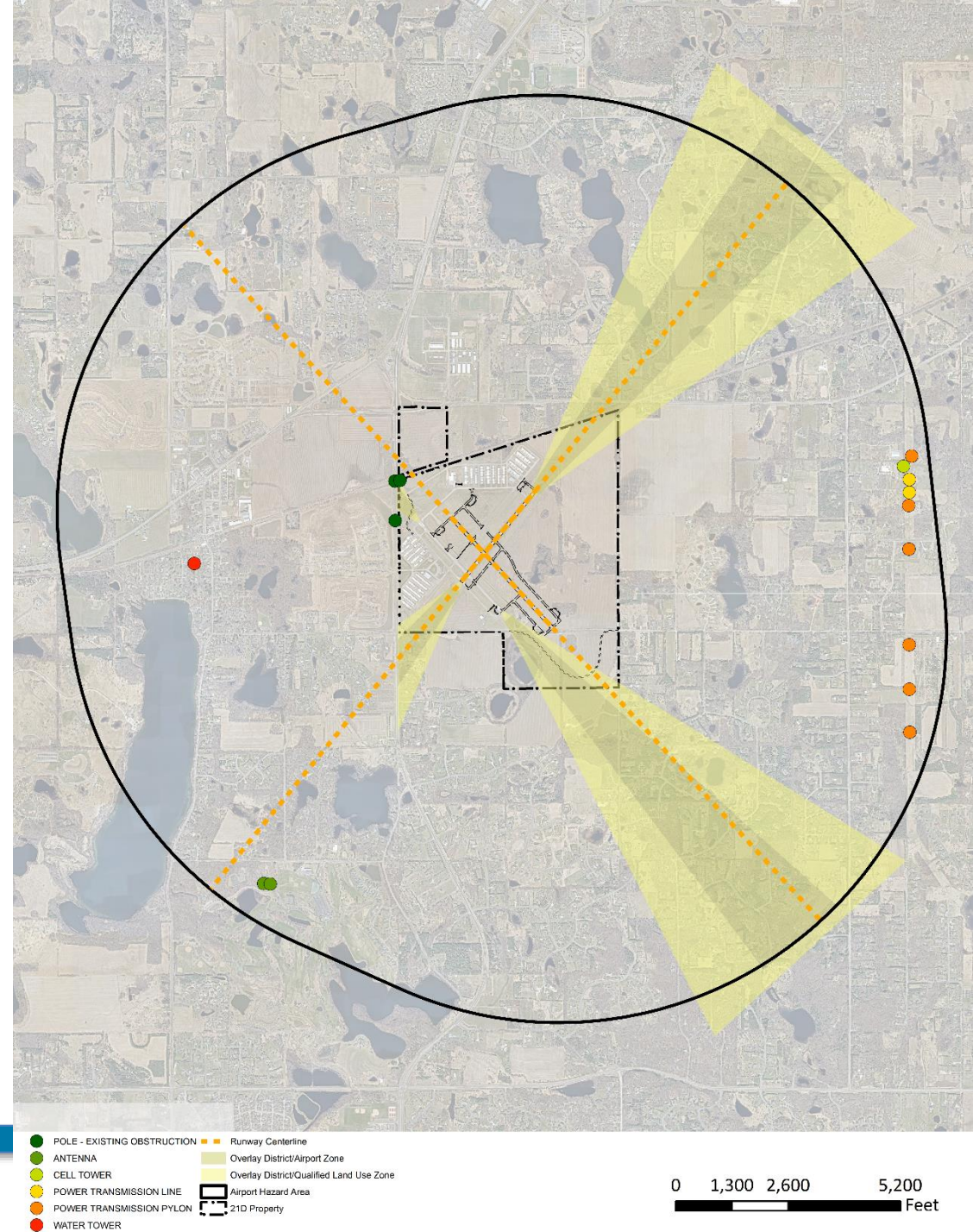
- (vi) land uses that create or cause interference with the operation of radio or electronic facilities used by the airport or aircraft;
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- (viii) land uses that otherwise inhibit a pilot's ability to land, take off, or maneuver the aircraft;
- (ix) airspace protection to prevent the creation of air navigation hazards in the airport hazard area;



Location, Character of Surrounding Land Uses

(1) the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:

- Airport Overlay District (Airport Zone)
 - Prohibits growth, construction, maintenance, or alteration of trees and structures above airspace surfaces.
 - This zone has been effective in preventing air navigation hazards.
- Airport Overlay District (Qualified Land Use Zone)
 - Prohibits structures or uses that will cause assembly of persons, manufacturing or storage of materials which will explode on contact, or the storage of flammable liquid above ground.
 - Further prohibits educational, institutional, amusement, and recreational uses as well as any use that would result in electrical interference with radio communications, airport light interference, or impaired visibility.
 - This zone has been effective in preventing interfering land uses.



Location, Character of Surrounding Land Uses

(1) the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:

(x) the social and economic costs of restricting land uses;

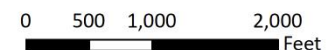
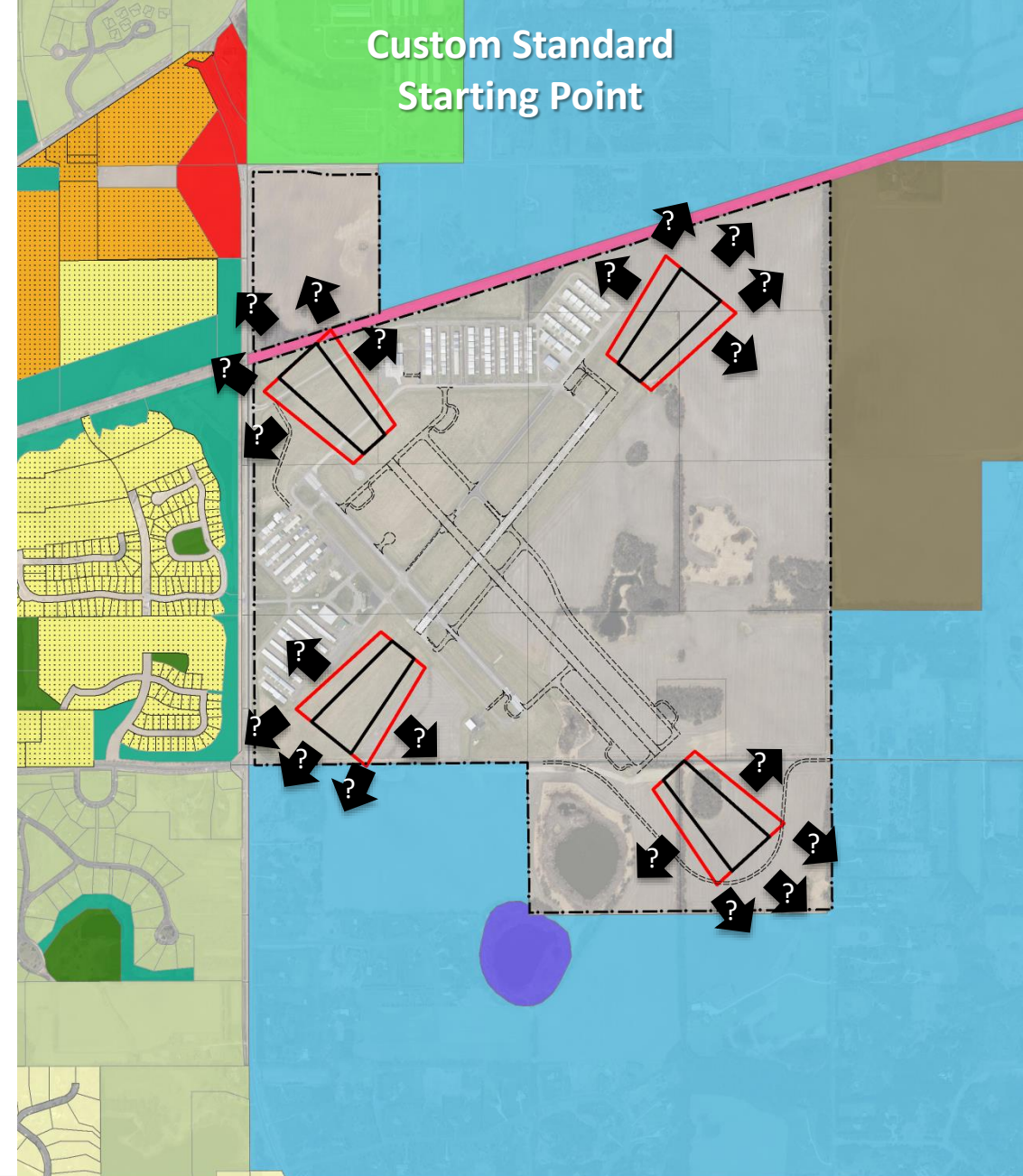


Social and Economic Cost Considerations:

- Opportunity for building development
 - Residential
 - Commercial
 - Land Value
- Property tax generation
- Employment potential

Custom Standard Factors

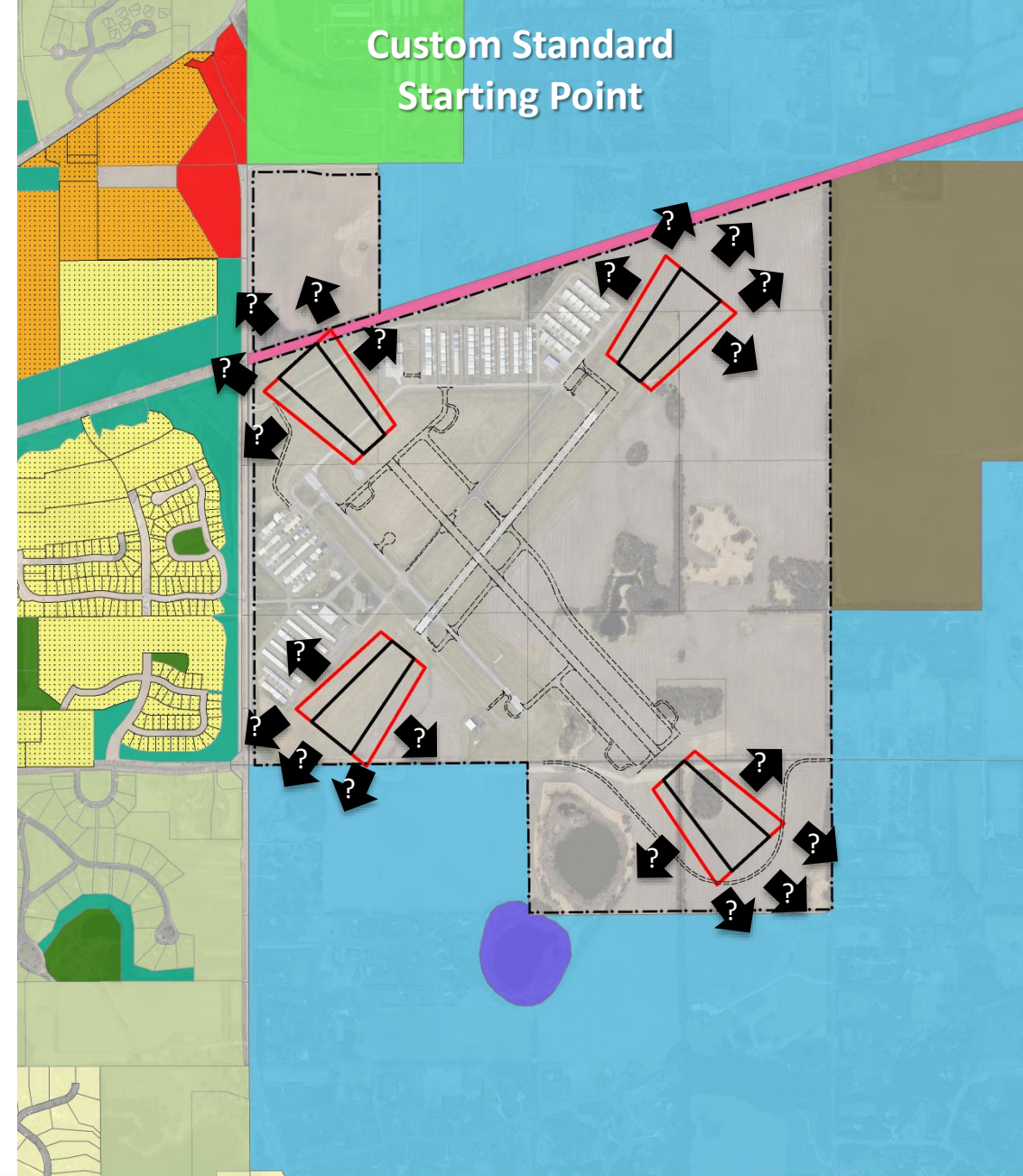
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**National Transportation Safety Board
Aviation Accident Data Summary**

Location:	St. Paul, MN	Accident Number:	CEN10LA064
Date & Time:	11/28/2009, 1145 CST	Registration:	N4031
Aircraft:	KRUSMARK DAVID HOMER SEAREY	Injuries:	1 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis
During takeoff, attempted to la airport perimeter. Examination of engine was test reason for the l

Flight Events

Takeoff - Loss of
Emergency des

Probable Cause
The National Tr
The pilot's dela
not producing f

Findings

Aircraft-Aircraf
Not determined

Pilot Informati

Certificate:
Airplane Rating(s):
Other Aircraft Rati
Flight Time:



**National Transportation Safety Board
Aviation Accident Data Summary**

Location:	Lake Elmo, MN	Accident Number:	CEN10FA519
Date & Time:	09/03/2010, 1605 CDT	Registration:	N333HK
Aircraft:	KWECH GLASAIR RG SUPER 115	Injuries:	1 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis
The pilot was de
Witnesses in the
a tree line, pass
subsequently de
departure runw
knobs gusting to
anything regard
evidence of med

Flight Events

Takeoff - Loss of
Uncontrolled de

Probable Cause
The National Tr
The pilot's failur
resulted in a col

Findings

Personnel issue
Environmental

Pilot informati

Certificate:
Airplane Rating(s):
Other Aircraft Rati
Flight Time:



**National Transportation Safety Board
Aviation Accident Data Summary**

Location:	Lake Elmo, MN	Accident Number:	CEN16LA061
Date & Time:	12/11/2015, 1400 CST	Registration:	N78067
Aircraft:	GLOBE GC 1B	Injuries:	2 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot reported that, before departure, he performed an engine run-up with carburetor heat applied, and no anomalies were noted. The pilot departed for the personal local flight, and when the airplane reached about 100 ft above ground level, the engine power decreased from 2,400 to 1,600 rpm, so he executed a forced landing to a field.

A postaccident examination of the airplane and engine revealed that the throttle body separated from the air intake manifold due to overload likely associated with impact. The fuel nozzle and primary venturi were missing from the carburetor and were not located. Although the engine could likely have started without these components installed, it is unlikely that it could have produced much more than idle power. Sliding marks on the sides of the throttle body revealed evidence of contact with the legs of the primary venturi. The contact marks had areas free of black deposits whereas areas adjacent to the marks were covered with deposits, indicating that a primary venturi had been installed until recently. The deposits on either side of the marks were not disturbed, indicating that the primary venturi did not rotate out of position; therefore, the primary venturi either fractured in service or was separated and lost from the throttle body after the carburetor was disassembled during the initial postaccident examination.

The Federal Aviation Administration had previously issued an airworthiness directive (AD), which required that the accident make and model carburetor be inspected at each annual, 100-hour, or progressive inspection to determine if the primary venturi was loose or missing. According to the maintenance logbooks, the last inspection conducted in accordance with the AD occurred about 1.5 months and 1 flight hour before the accident.

Although the weather conditions at the time of the accident were conducive to the formation of carburetor icing at cruise power, it is not likely that carburetor ice caused the venturi or fuel nozzle to break because the pilot had used carburetor heat during the run up and the engine was operating at takeoff power. The accident is consistent with a loss of engine power due to the carburetor's primary venturi, fuel nozzle, or both separating after takeoff. The reason for the separation could not be determined.

Flight Events

Initial climb - Loss of engine power (partial)
Emergency descent - Collision with terr/obj (non-CFIT)

Safety Risk Analysis

25-Year Historical Accident Rate (per 100k aircraft operations)

- Lake Elmo Airport (1994-2018)
 - 10 accidents associated with airport operations
 - 0.84 accidents/100k operations
- State of Minnesota (1994-2018)
 - 502 accidents associated with airport operations
 - 0.89 accidents/100k operations

Safety Risk Analysis

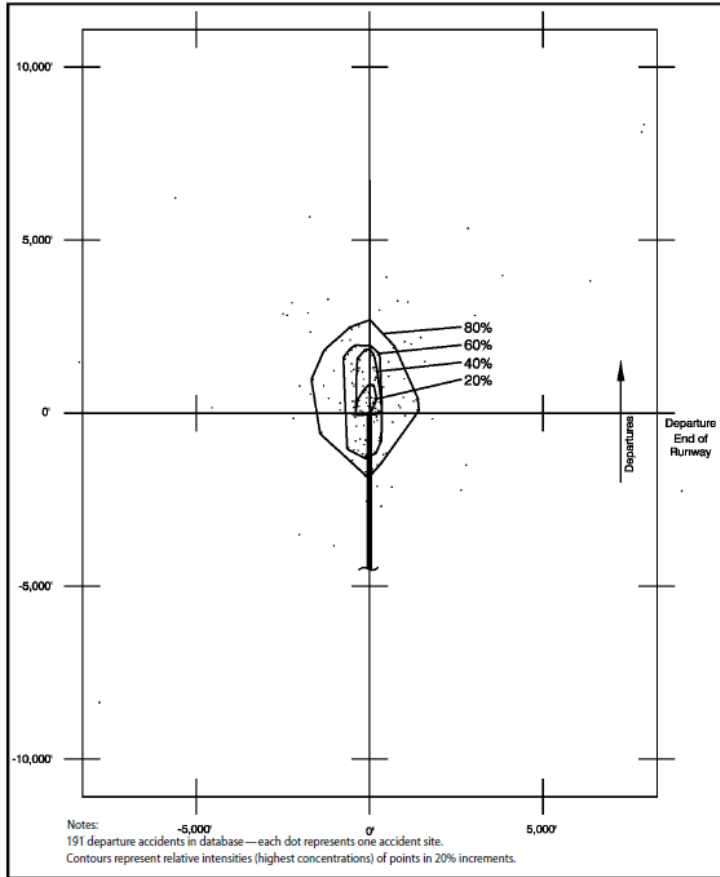


FIGURE F5
General Aviation Accident Distribution Contours –
Departure Accidents on Runways of Less than 4,000 Feet

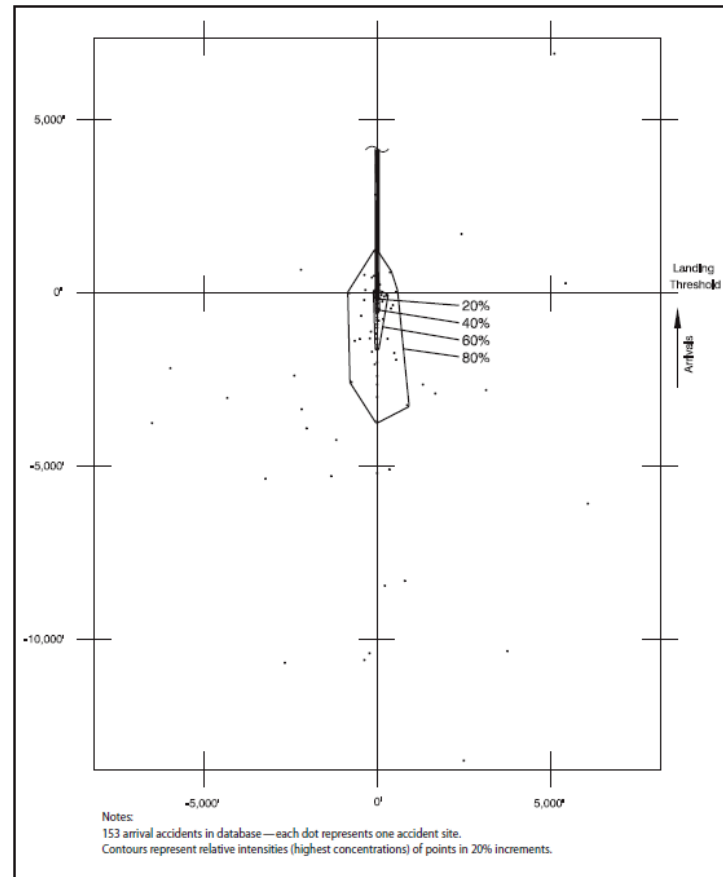


FIGURE F4
General Aviation Accident Distribution Contours –
Arrival Accidents on Runways of Less than 4,000 Feet

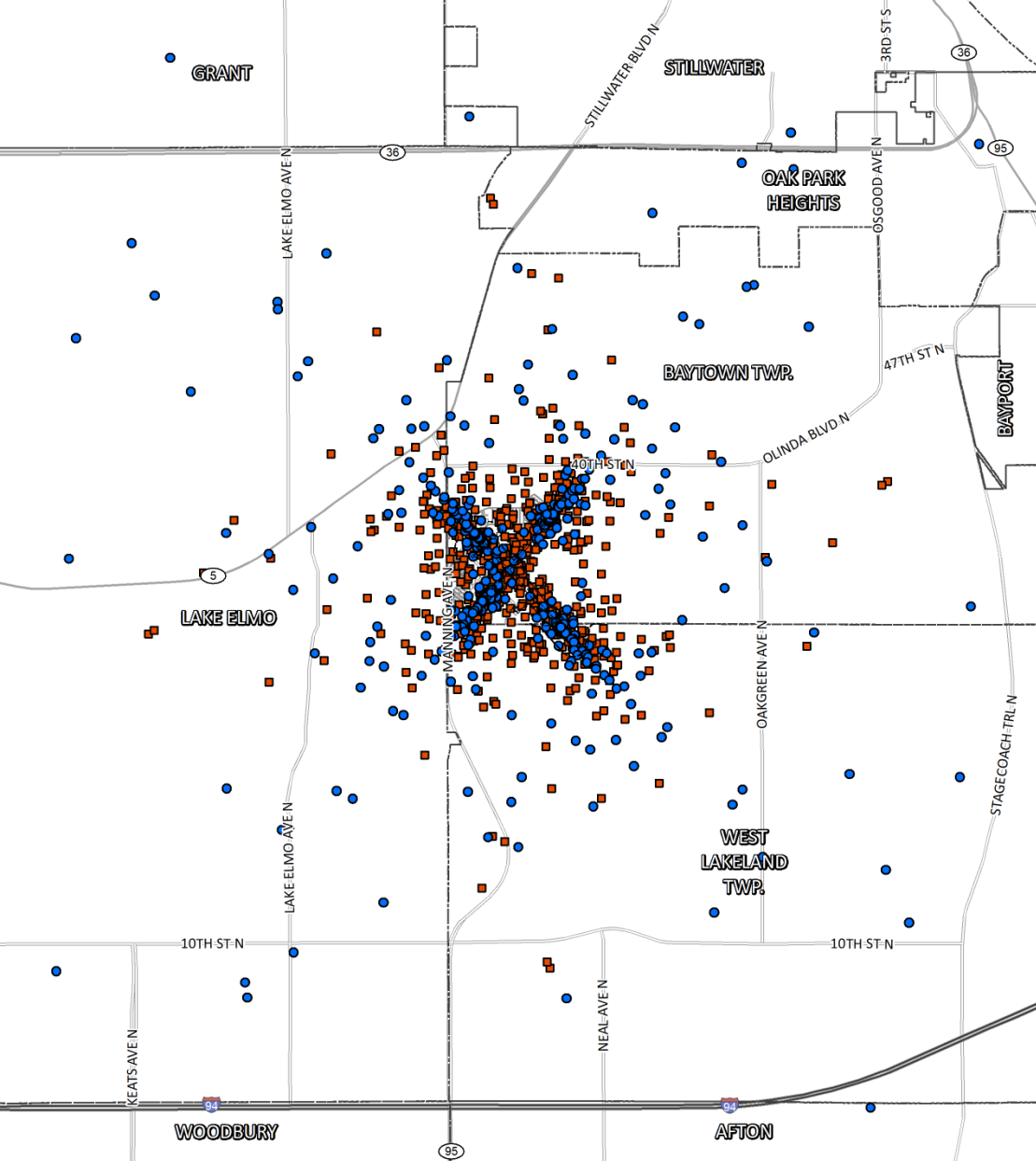
Accident Location Data

- Source: California Airport Land Use Planning Handbook (2002 & 2011)
- Studied General Aviation aircraft accident locations with off-airport land use compatibility implications
- Different data sets based on runway length
 - < 4,000-foot runway length data set for Lake Elmo Airport
 - Proposed runway lengths at Lake Elmo Airport are 3,500 feet (primary) and 2,750 feet (crosswind)

Safety Risk Analysis

Accident Potential Distribution

- Accident locations from California Study superimposed on Lake Elmo runway ends
 - Arrivals – blue circles
 - Departures – red squares
- Shows locations where accidents have occurred nationwide
 - **NOT** actual accidents at Lake Elmo!



NOT ACTUAL LAKE ELMO AIRPORT ACCIDENT LOCATIONS

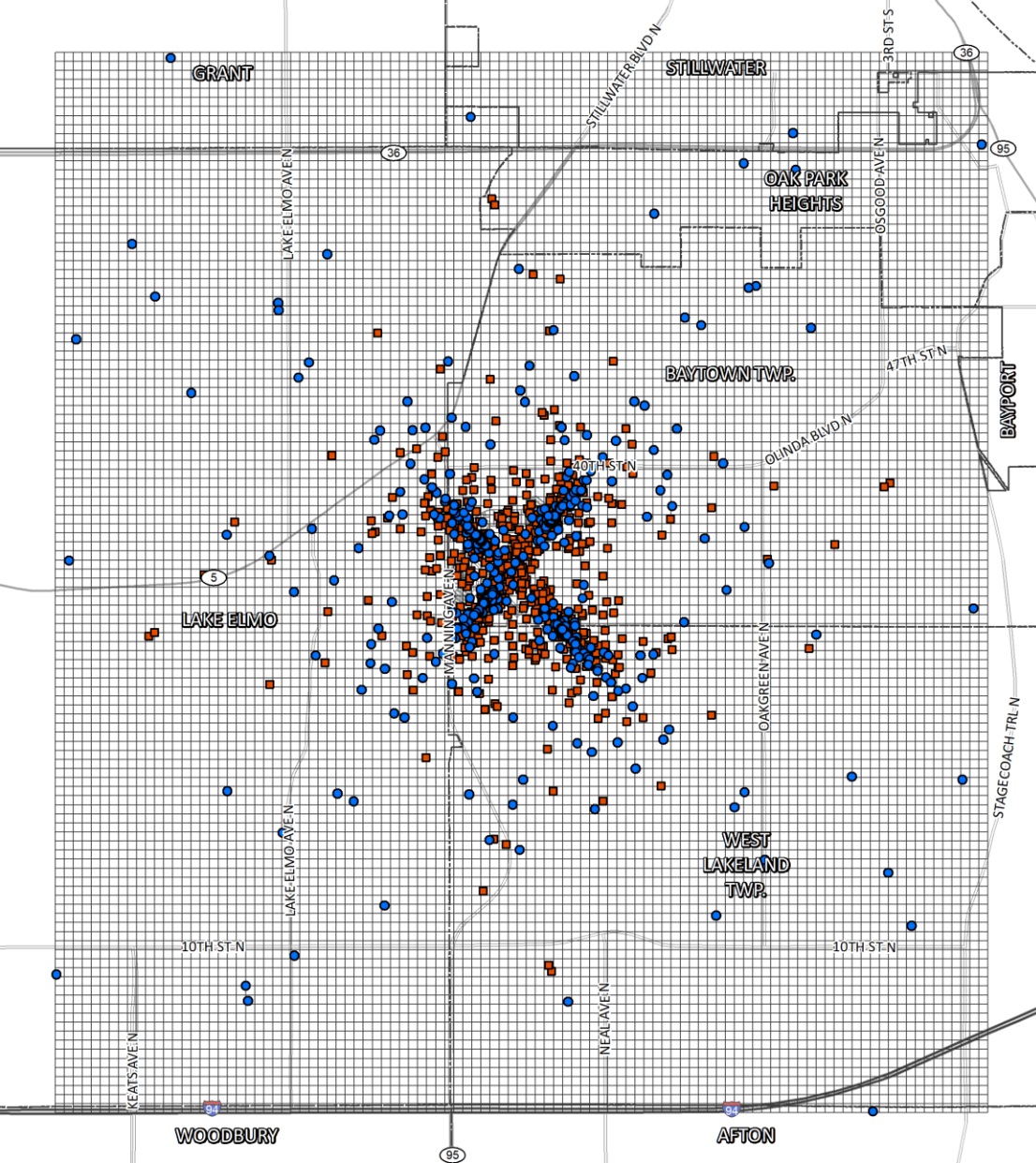
- Arrival Accident
- Departure Accident

0 2,500 5,000 10,000 Feet

Safety Risk Analysis

Accident Potential Distribution

- Accident locations from source study superimposed on Lake Elmo runway ends
 - Arrivals – blue circles
 - Departures – red squares
- Shows locations where accidents have occurred nationwide
 - **NOT** actual accidents at Lake Elmo!
- Used to calculate accident probability in areas around the airport
 - “Spread” accident locations over a grid system
 - 300 x 300-foot grid (2+ acres)
 - Avoids an implication of precision



NOT ACTUAL LAKE ELMO AIRPORT ACCIDENT LOCATIONS

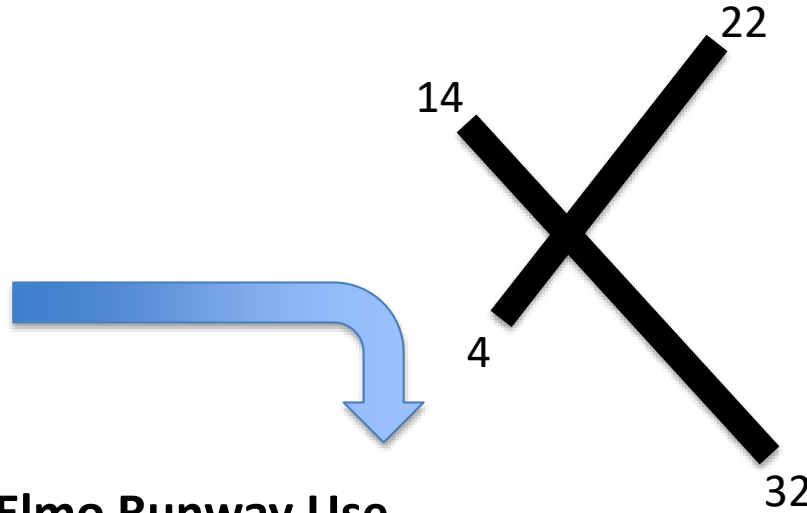
- Arrival Accident
- Departure Accident
- Accident Grid

0 2,500 5,000 10,000 Feet

Safety Risk Analysis

Lake Elmo Runway Use %

Runway	% Arrivals	% Departures
14	27%	33%
32	48%	43%
04	5%	8%
22	19%	16%
Total	100%	100%



Normalized Lake Elmo Runway Use

Runway	Aircraft Operations		Accident Data Set		Final Weighting	
	Arrivals	Departures	Arrival Points	Departure Points	Arrivals	Departures
14	3,629	4,403	153	191	1.23	1.19
32	6,426	5,744	153	191	2.17	1.55
04	718	1,061	153	191	0.24	0.29
22	2,537	2,101	153	191	0.86	0.57
Total	13,310	13,309	612	764	---	---

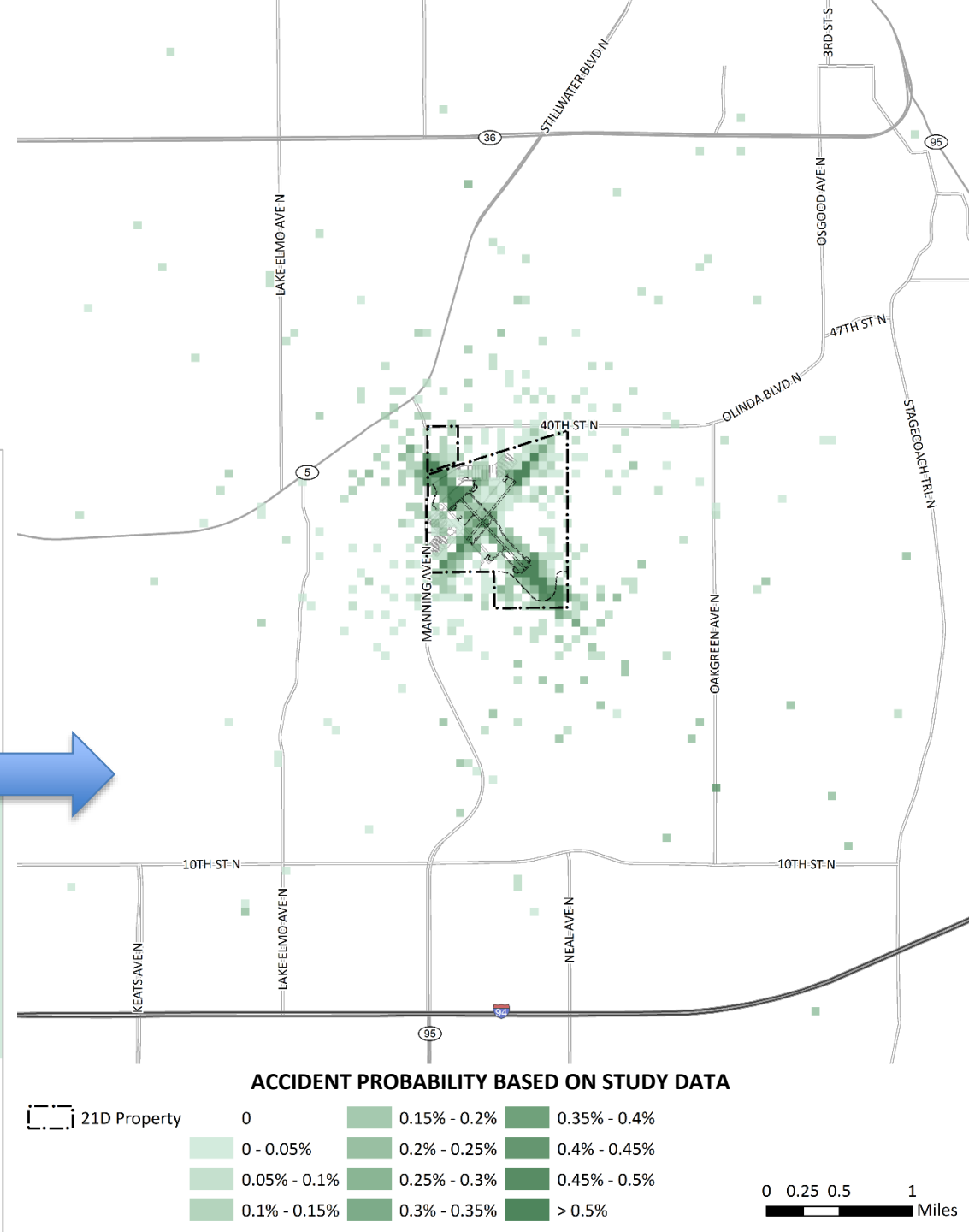
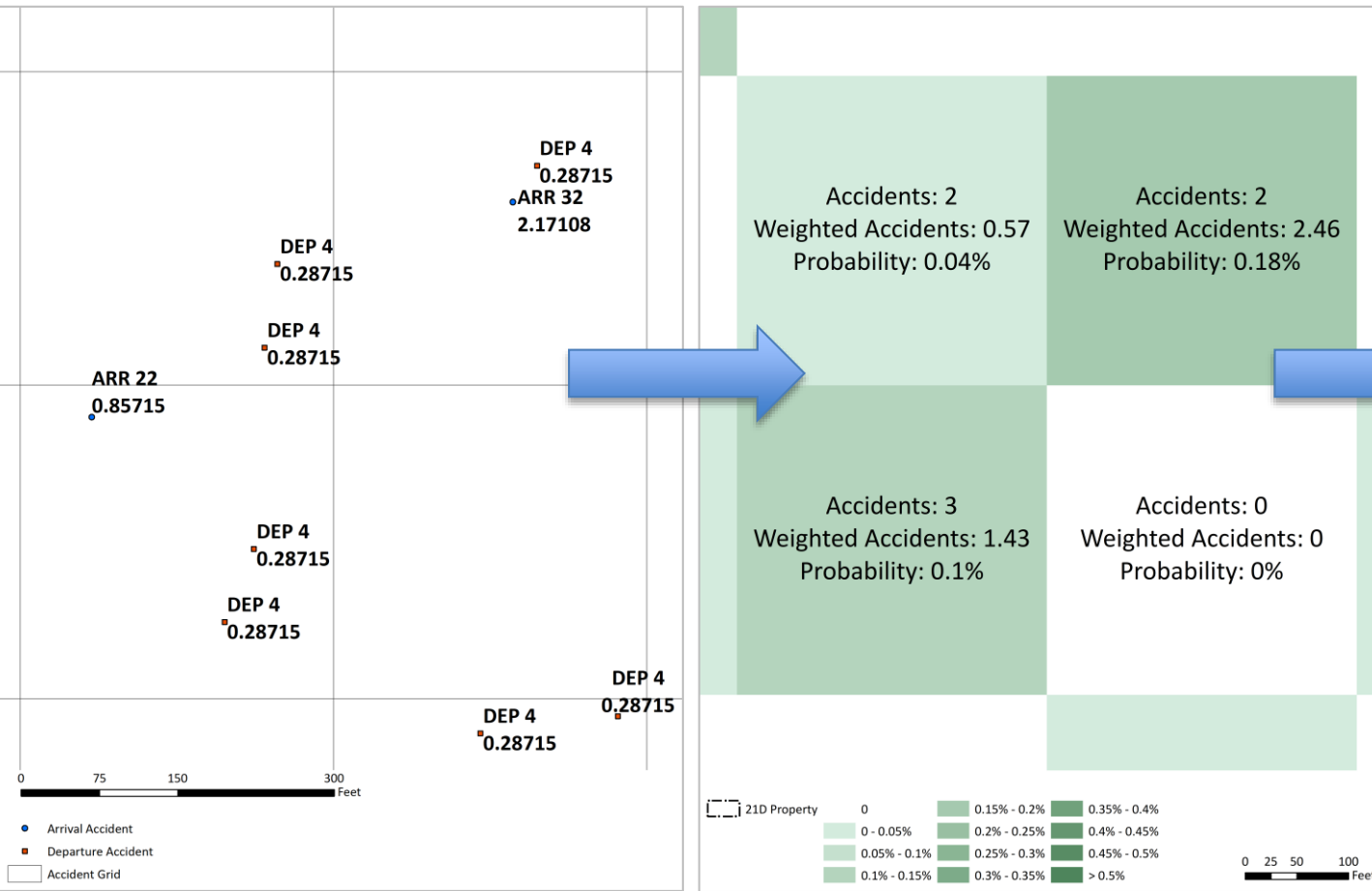
Runway Use

- Runway use percentages
- “Normalize” accident location data to account for runway use patterns

Safety Risk Analysis

Calculated Accident Probability per Grid Region

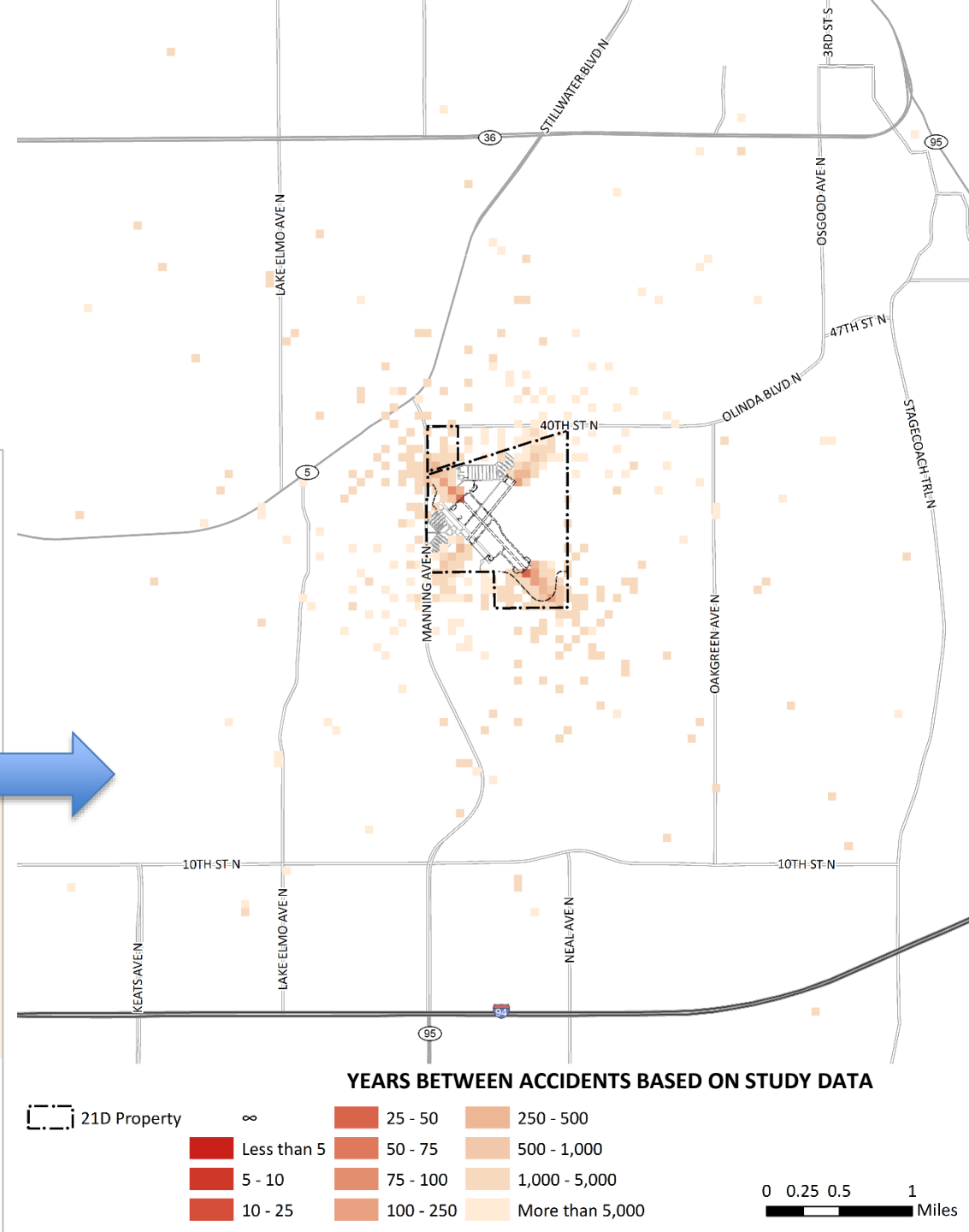
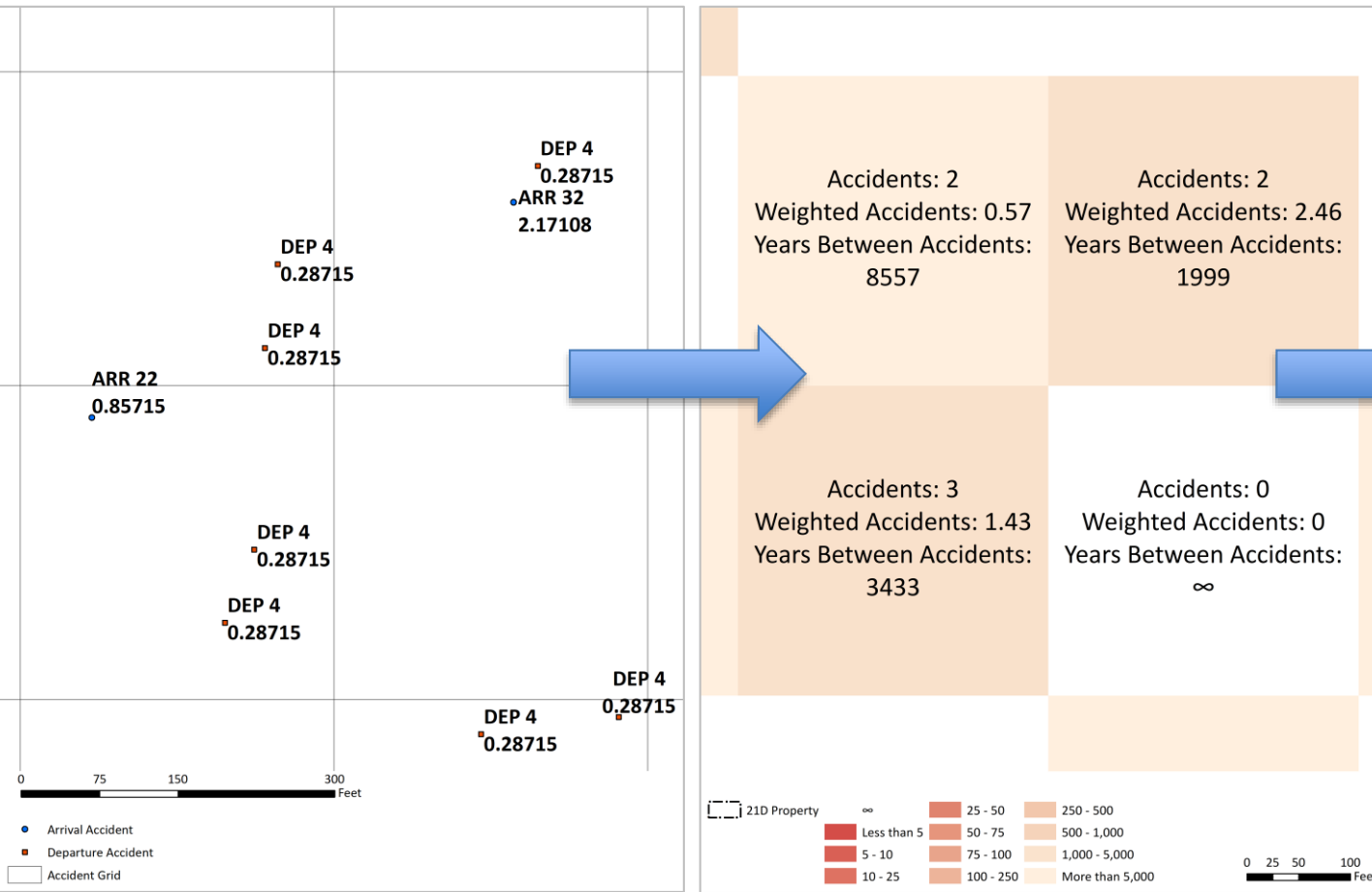
- Sum of all grid probabilities is "100%"



Safety Risk Analysis

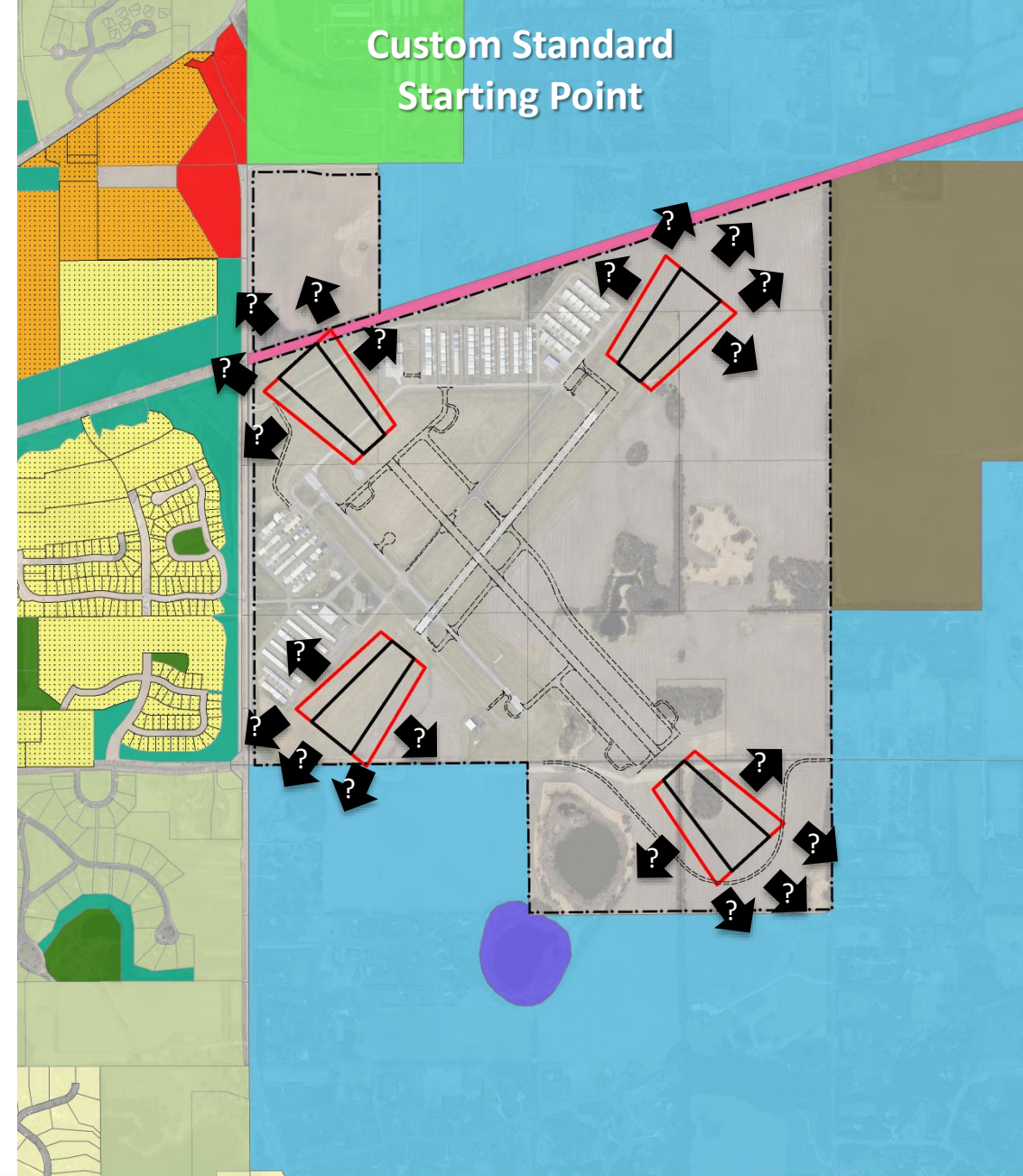
Calculated Accident Frequency per Grid Region

- Expressed in terms of “years between” accidents
- Based on accident rate per 100k operations (0.89)



Custom Standard Factors







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Planned Land Uses

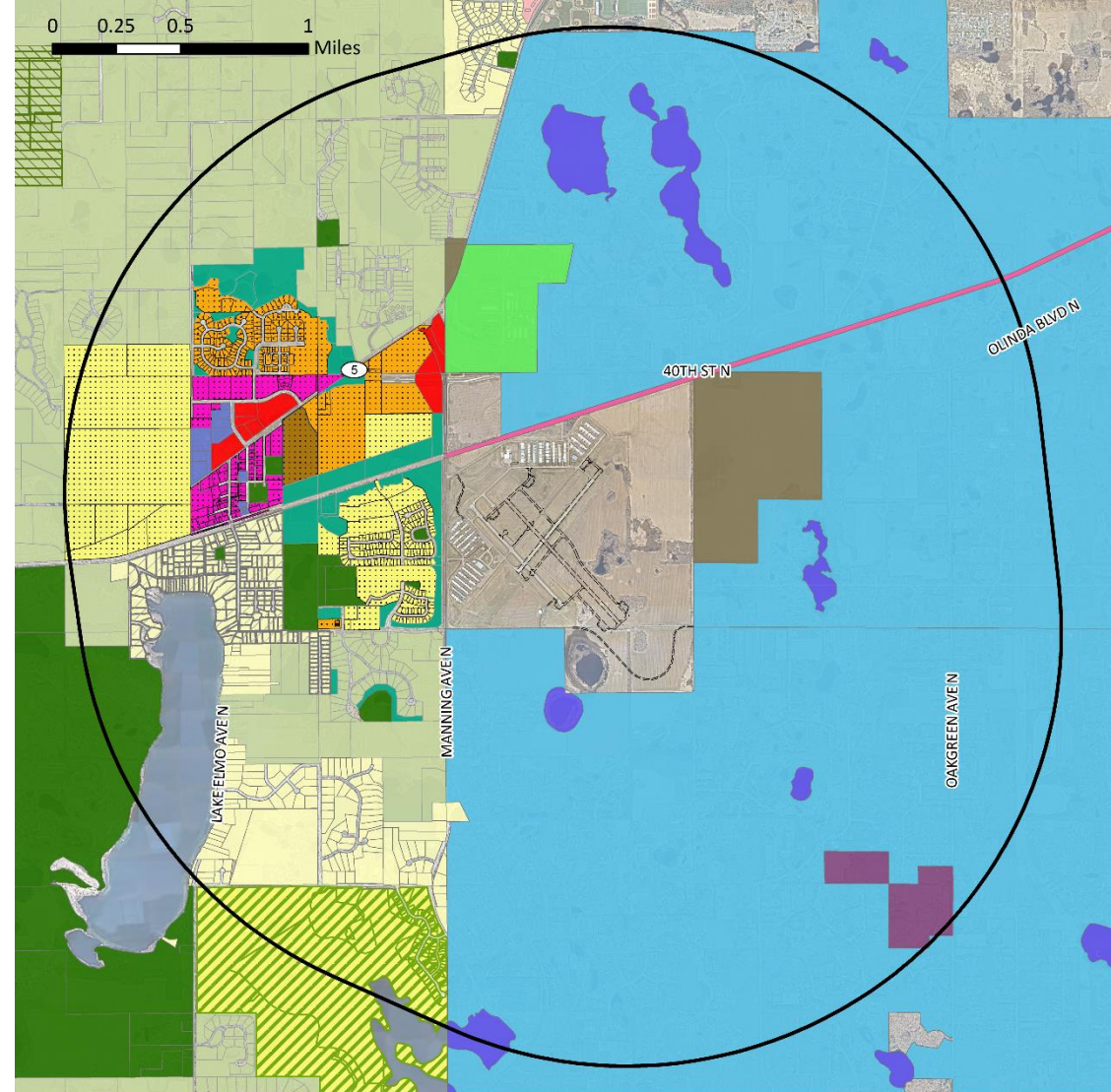
FUTURE LAND USE

Met Council Future Land Use



-  Agricultural Preserve (1du per 40 acres)
-  Open Water
-  Public
-  Railway
-  Single Family Residential (1 unit per 2.5 acres or more)
-  Undeveloped / Agriculture

Lake Elmo 2040 Future Land Use






-  Commercial (C)
-  Public / Semi-Public (PSP)
-  Park
-  Rural Area Development (RAD), .1 units per acre
-  Right of Way (ROW)
-  Rural Single Family (RSF), 0.1 - 2.0 units per acre
-  Village Low Density Residential (V-LDR), 1.5 - 3.0 units per acre
-  Village Medium Density Residential (V-MDR), 3.0 - 8.0 units per acre




















Met Council Future Land Use

-  Agricultural
-  Open Water
-  Public
-  Railway
-  Single Family Residential
-  Undeveloped / Agriculture

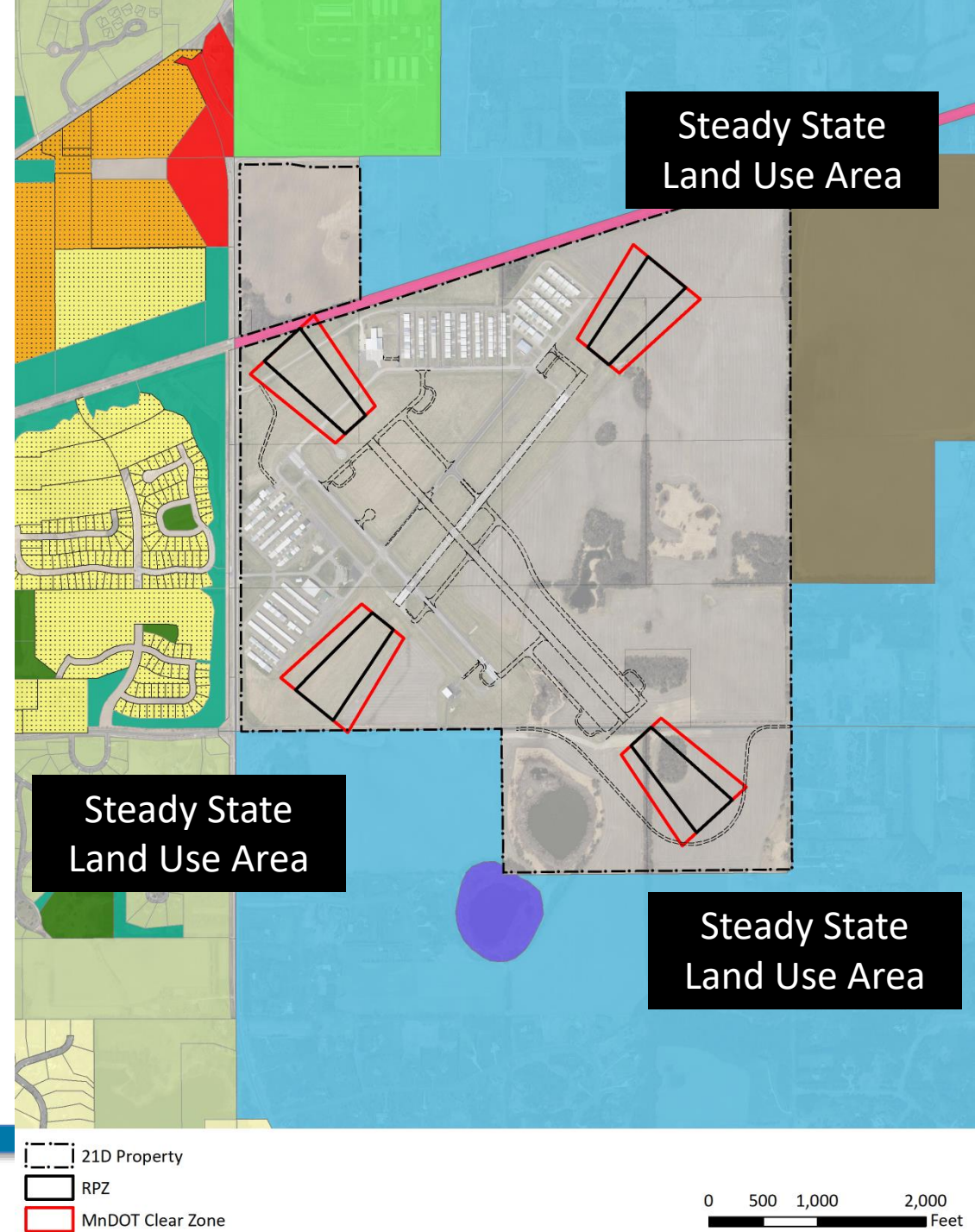
Lake Elmo Future Land Use

-  AP
-  RAD
-  RSF
-  RSFS
-  GC

-  LDR
-  MDR
-  HDR
-  MU-BP
-  MU-C
-  V-LDR
-  V-MDR
-  V-HDR
-  V-MU
-  BP
-  C
-  LB
-  Institutional
-  PSP
-  Park
-  Closed Landfill
-  ROW

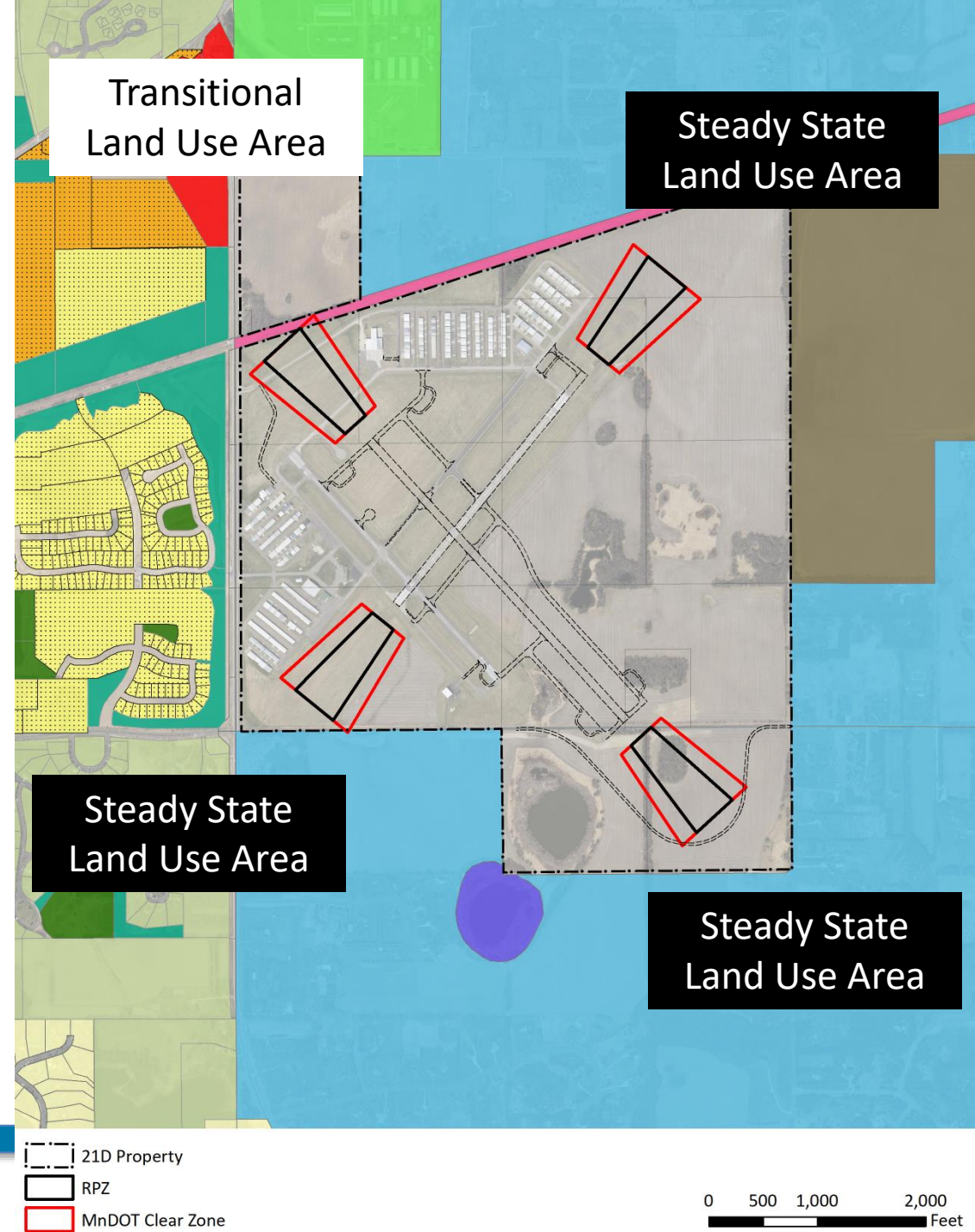
Planned Land Uses

- **Steady-State Land Use Areas**
 - Fixed land use patterns, unlikely to change based on future land use guidance
 - Residential areas to the northeast, southeast, and southwest
 - Zoned for low-density single-family residence @ 1 dwelling unit per 2.5 acres (or greater)
 - Land use pattern not guided to change



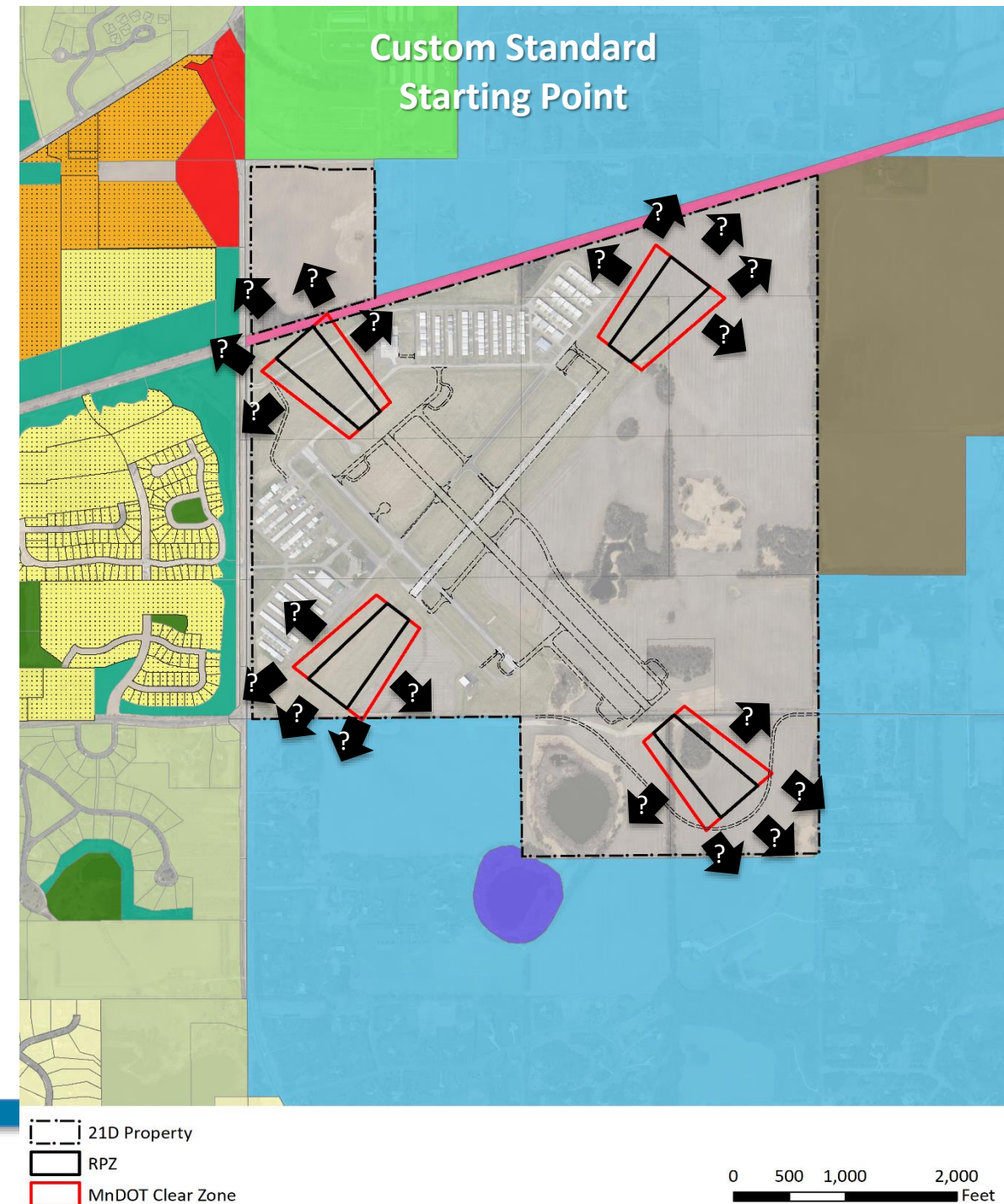
Planned Land Uses

- **Steady-State Land Use Areas**
 - Fixed land use patterns, unlikely to change based on future land use guidance
 - Residential areas to the northeast, southeast, and southwest
 - Zoned for low-density single-family residence @ 1 dwelling unit per 2.5 acres (or greater)
 - Land use pattern not guided to change
- **Transitional Land Use Areas**
 - Land use patterns are guided to transition from rural-type uses to more densely developed residential and commercial uses
 - Area to the northwest is guided to transition from rural to urban uses



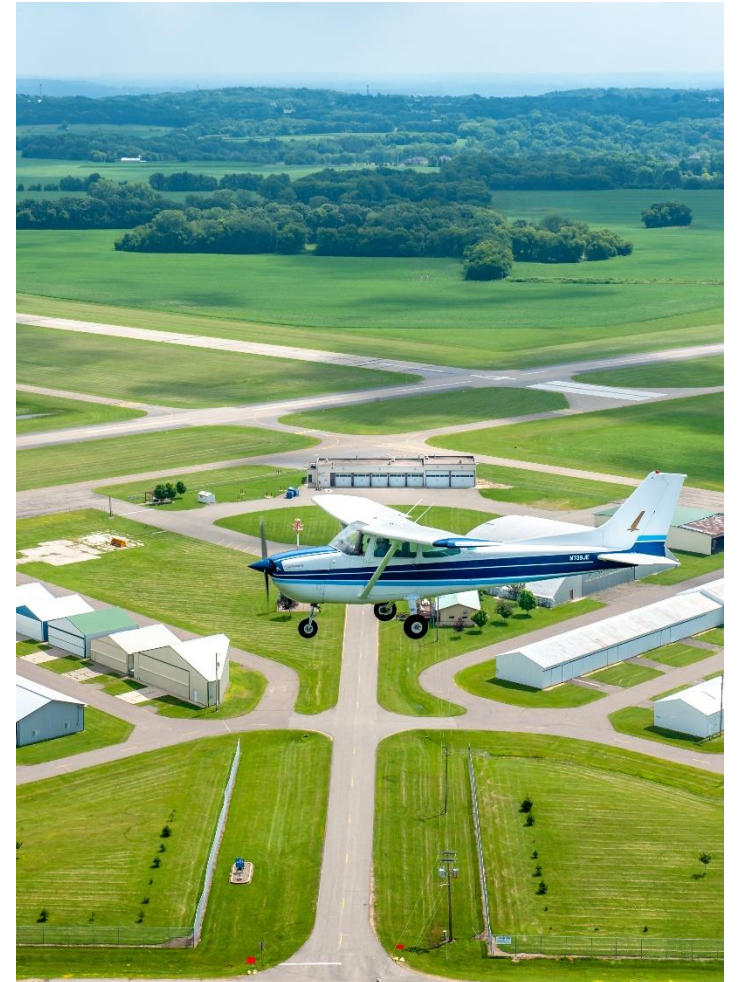
Custom Standard Factors

1. Location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport
2. Airport's type of operations and how the operations affect safety surrounding the airport
3. Accident rate at the airport compared to a statistically significant sample, including an analysis of accident distribution based on the rate with a higher accident incidence
4. Planned land uses within an airport hazard area, including any applicable platting, zoning, comprehensive plan, or transportation plan
5. **Any other information relevant to safety or the airport**



Meeting Agenda

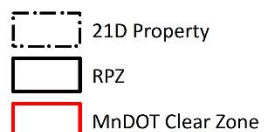
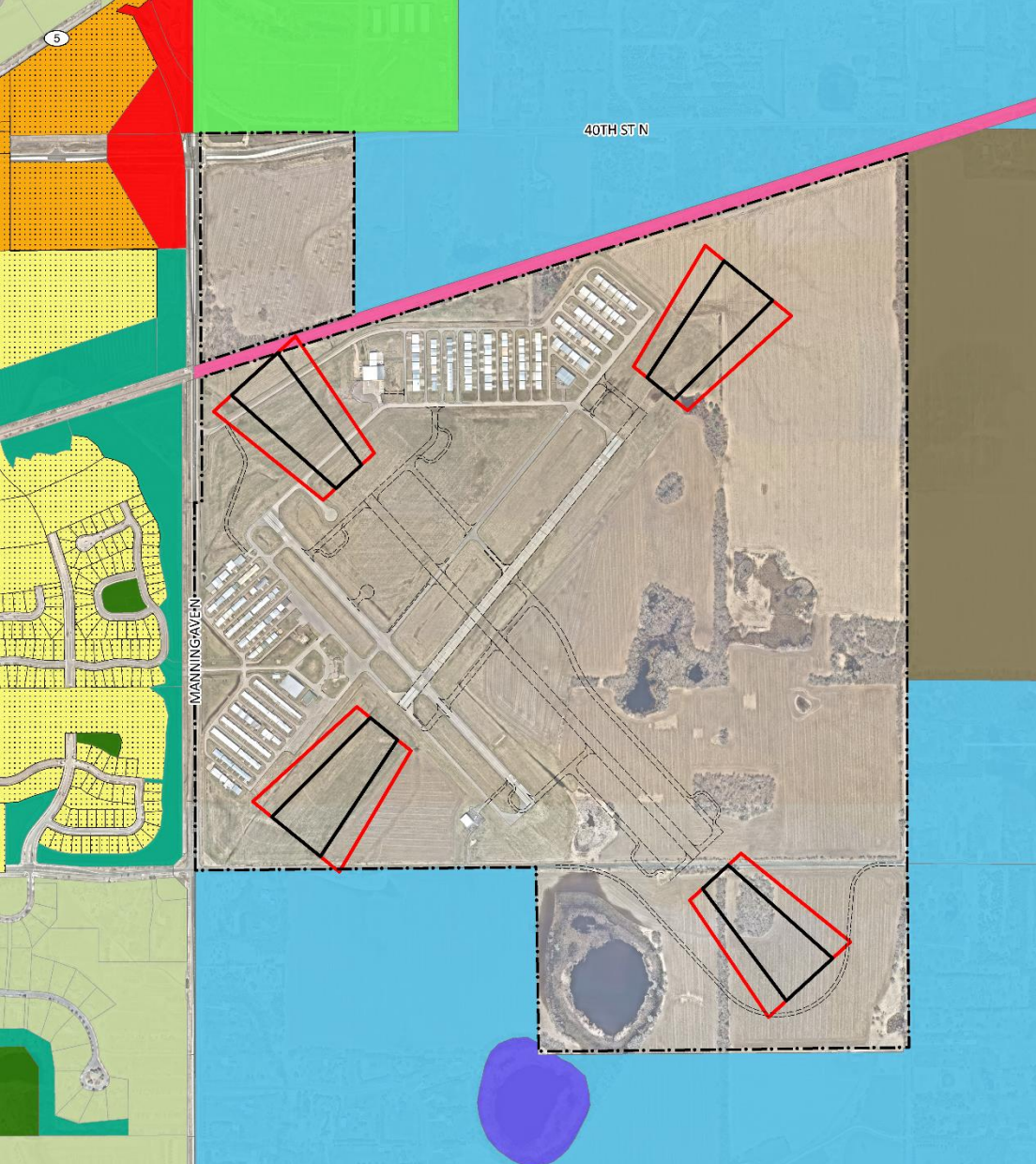
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- Adjourn



Example Custom Zone

Example Custom Zone Criteria

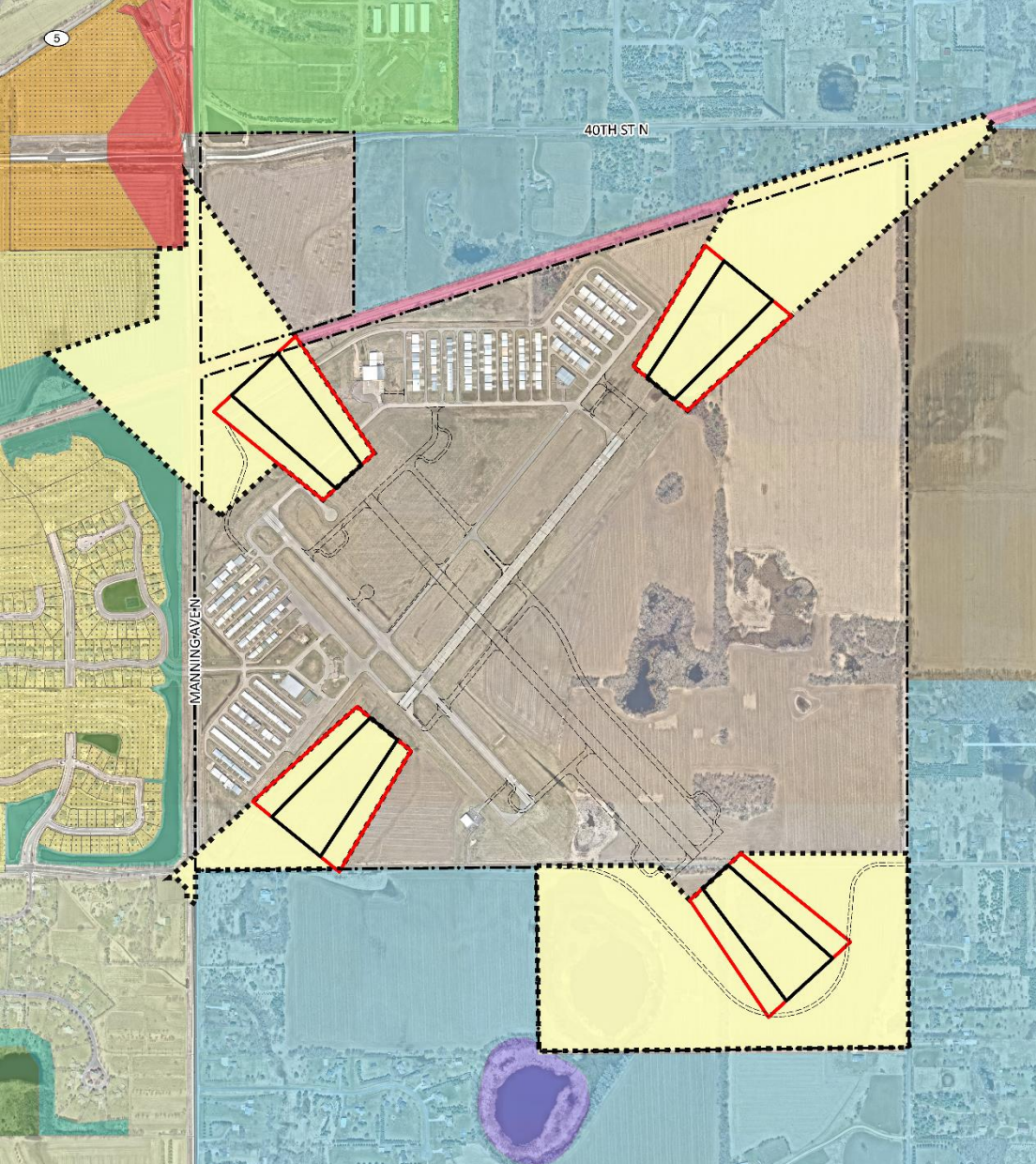
- Maximize use of airport-owned property and off-airport property guided for non-occupant uses
 - Airport-owned property
 - Outside perimeter fence
 - Under approach surfaces (existing and future)
 - Not guided for Non-Aeronautical development
 - Township Agricultural Preserve
 - City Public/Semi-Public (PSP)
 - Roadway & Railroad right-of-way



Example Custom Zone

Example Custom Zone Criteria

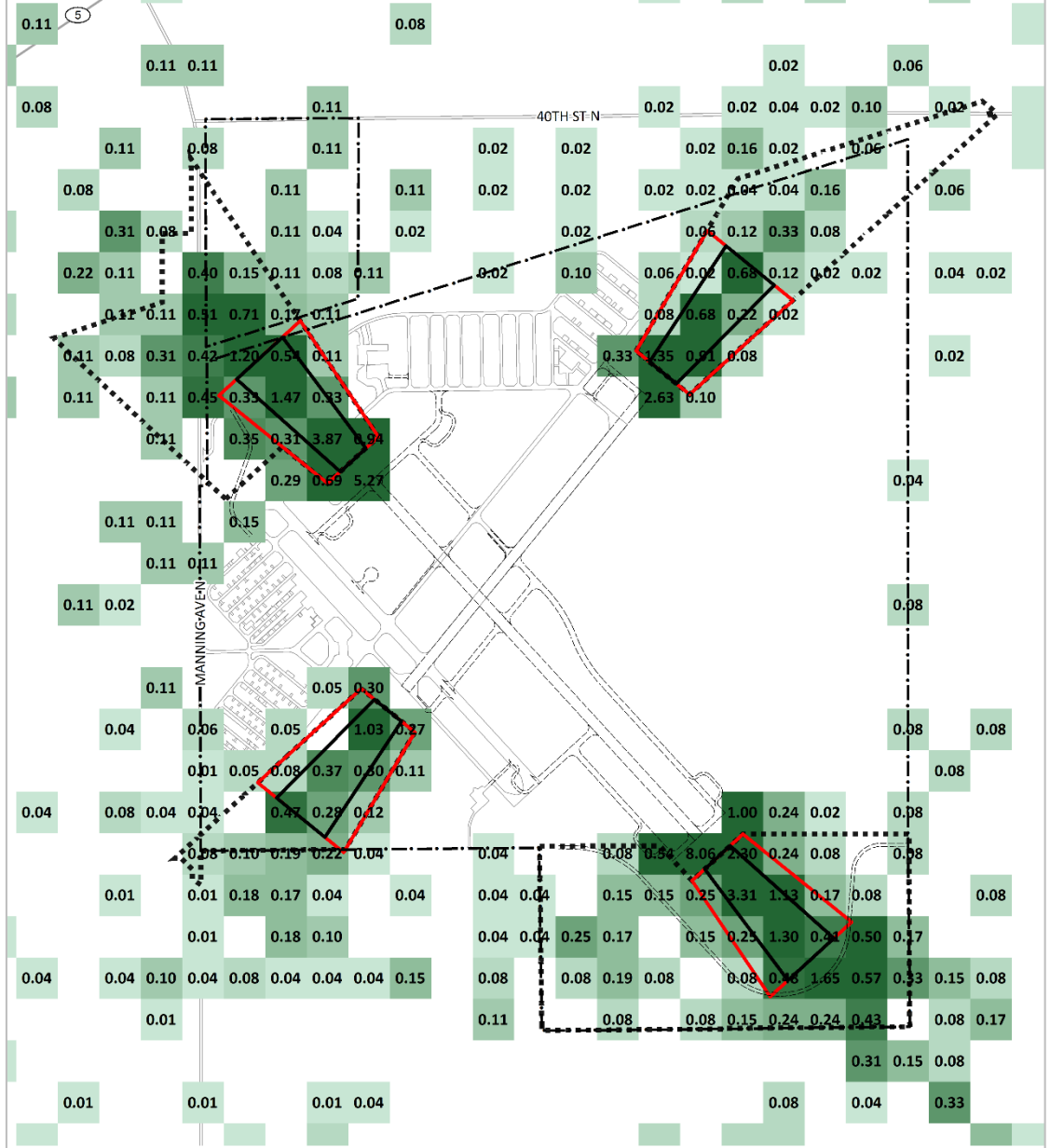
- Maximize use of airport-owned property and off-airport property guided for non-occupant uses
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- 21D Property
- RPZ
- MnDOT Clear Zone
- Example Zone 1

0 500 1,000 2,000
Feet

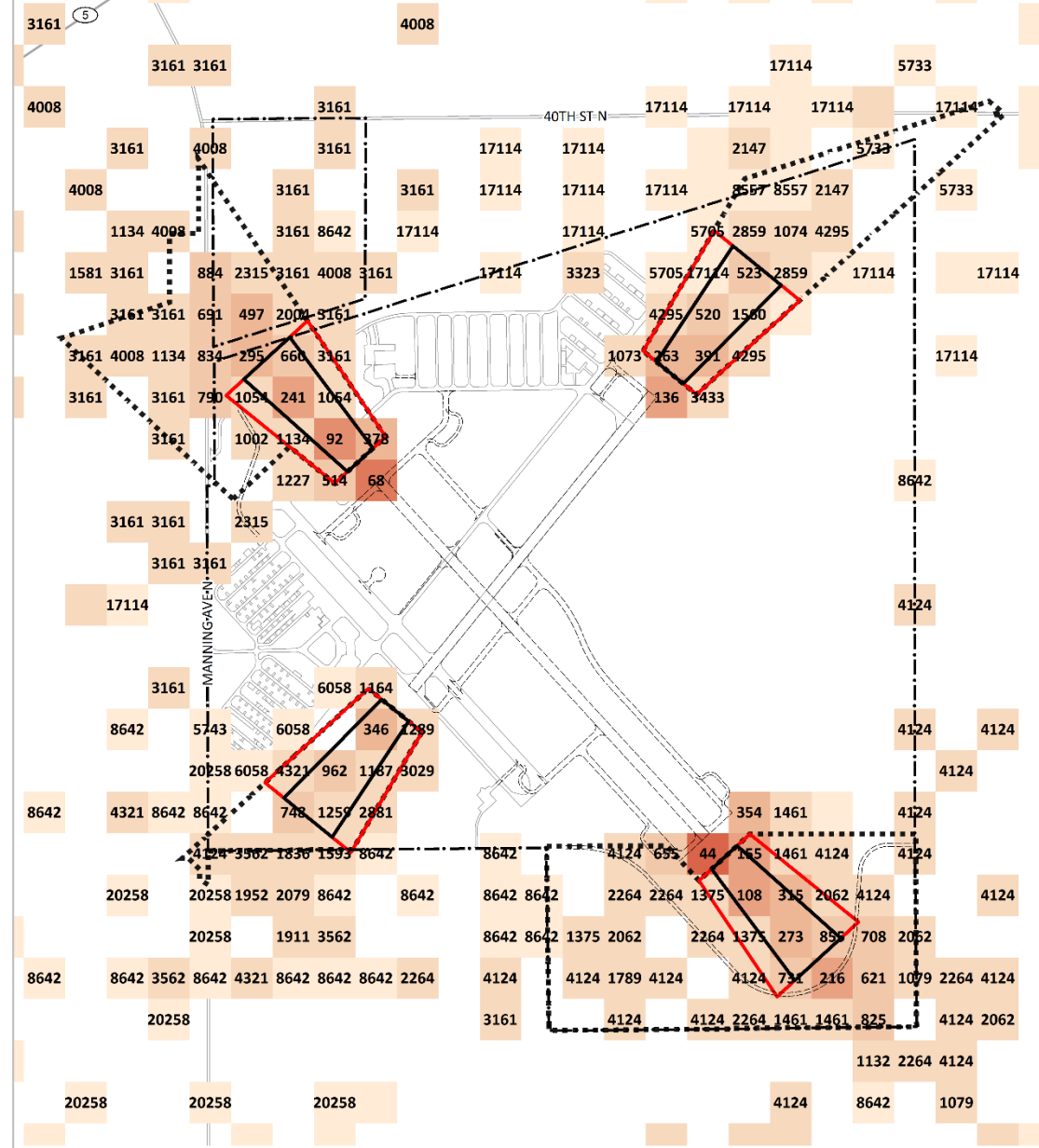
Example Custom Zone – Accident Probability by Grid



21D Property	0	0.15% - 0.2%	0.35% - 0.4%
RPZ	0 - 0.05%	0.2% - 0.25%	0.4% - 0.45%
MnDOT Clear Zone	0.05% - 0.1%	0.25% - 0.3%	0.45% - 0.5%
Example Zone 1	0.1% - 0.15%	0.3% - 0.35%	> 0.5%

0 250 500 1,000 Feet

Example Custom Zone – Accident Frequency by Grid (Years Between)



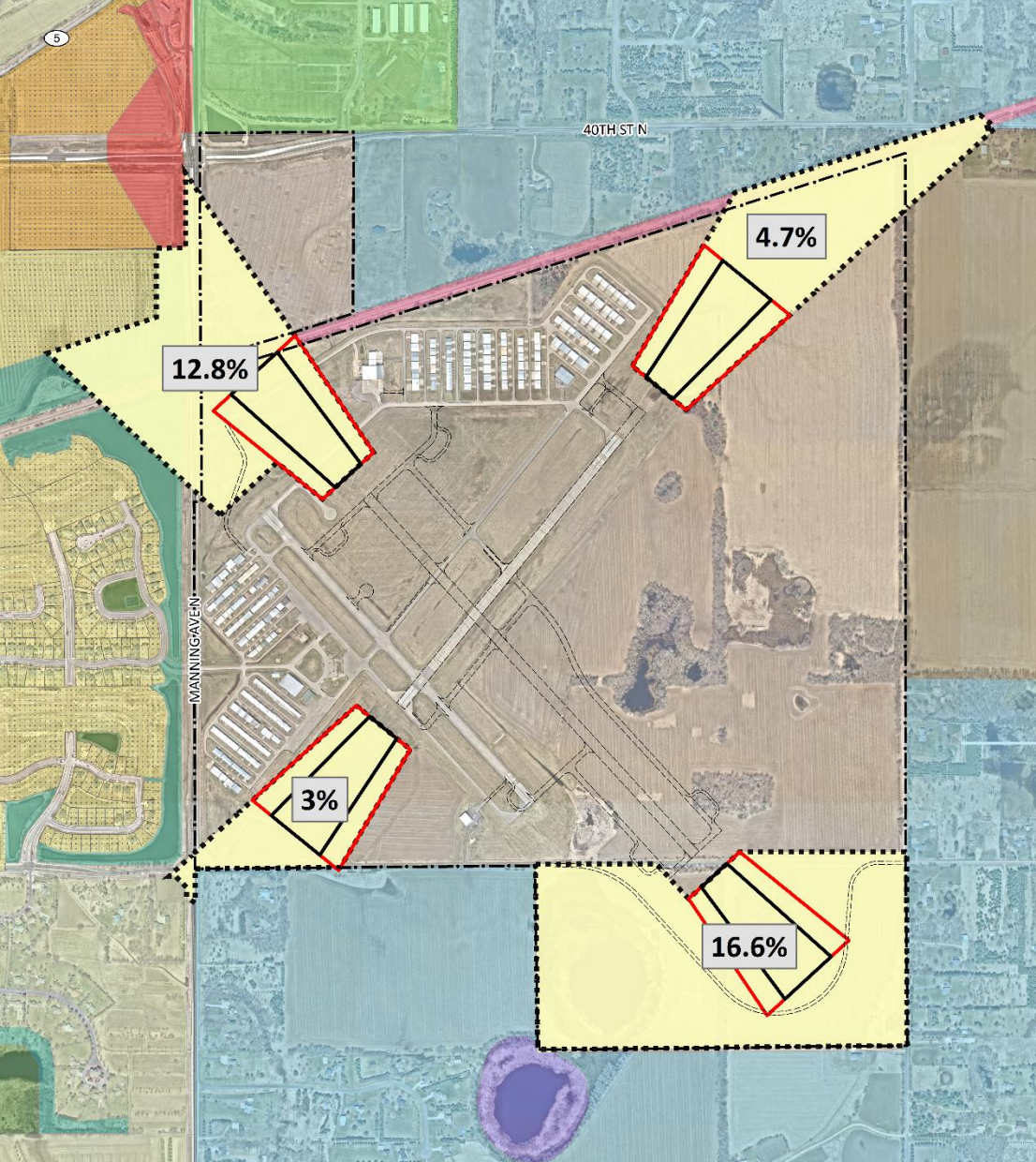
21D Property	∞	25 - 50	250 - 500
RPZ	Less than 5	50 - 75	500 - 1,000
MnDOT Clear Zone	5 - 10	75 - 100	1,000 - 5,000
Example Zone 1	10 - 25	100 - 250	More than 5,000

0 250 500 1,000 Feet

Example Custom Zone

Example Custom Zone Only Accident Probability

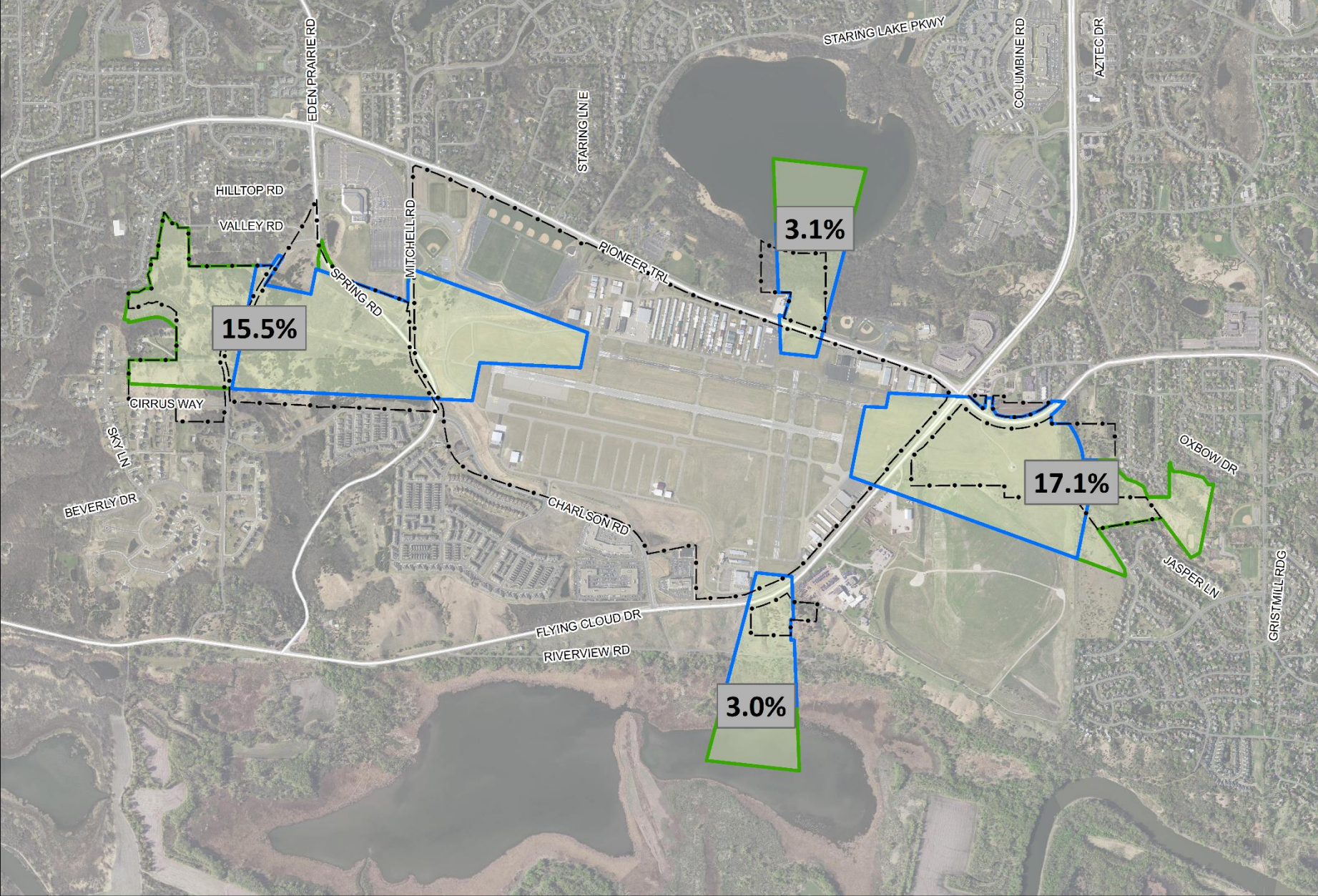
- ~37.2% Accident Probability captured within Example Custom Zone
 - If an accident occurs at Lake Elmo Airport, there is a 37% chance it will be in the Example Custom Zone
- ~9.6 Years Between Accidents within Example Custom Zone
 - Overall accident frequency probability is one every four years



Flying Cloud JAZB Zones

FCM Final JAZB Zones

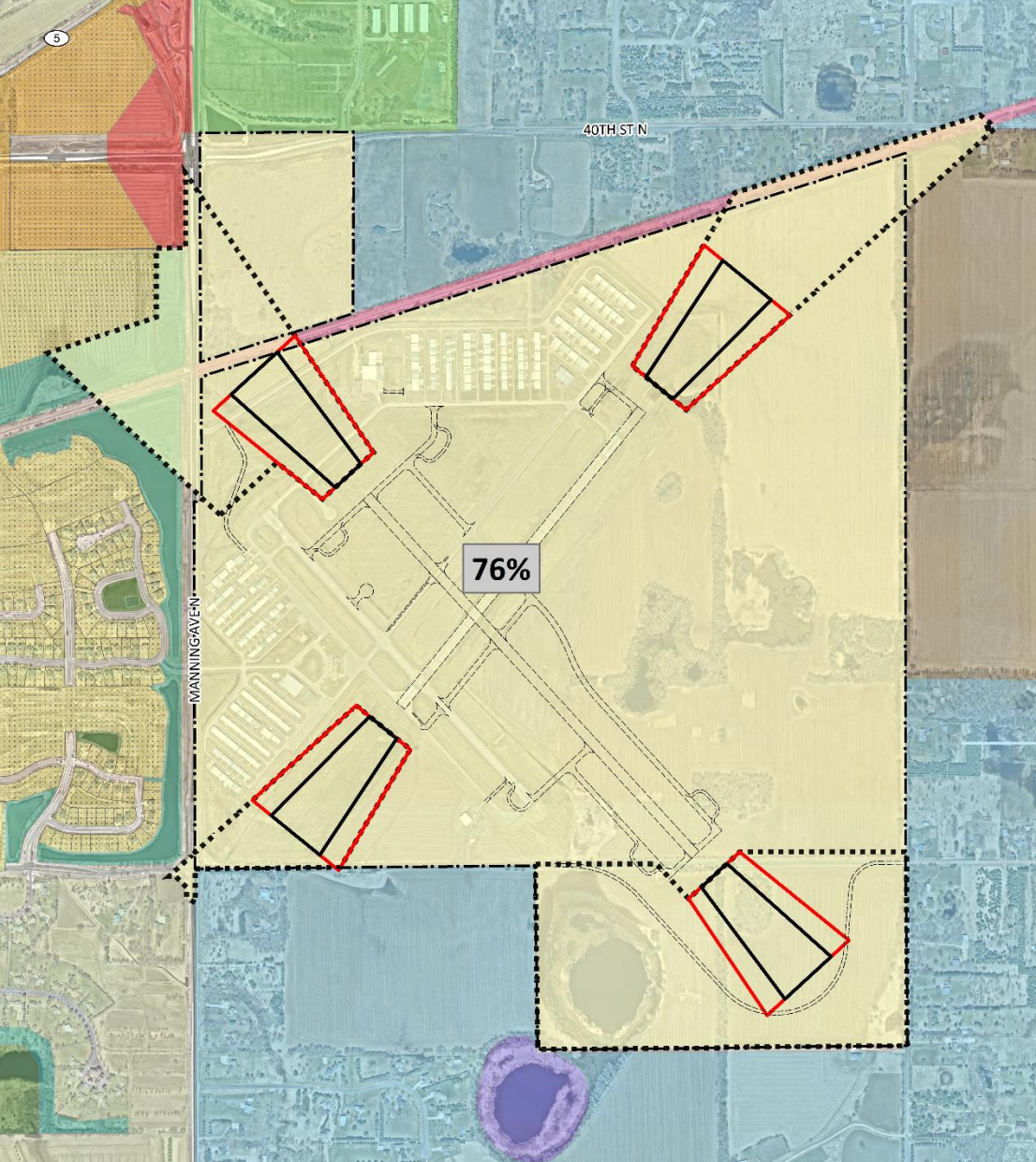
- ~38.8% Accident Probability captured within FCM JAZB Zones
 - If an accident occurs at Flying Cloud Airport, there is a 39% chance it will be in the JAZB Zones
- ~2.6 Years Between Accidents within FCM JAZB Zones
 - Overall accident frequency probability is one per year



Example Custom Zone

Example Custom Zone + Airport Property Accident Probability

- ~76.0% Accident Probability captured within Example Custom Zone and airport property line
 - There is a 76% chance that an accident will be in the Example Custom Zone or on airport property
 - Leaves a 24% chance that an accident will be elsewhere
- ~4.7 Years Between Accidents within Example Custom Zone and airport property line
 - Overall accident frequency probability is one every four years



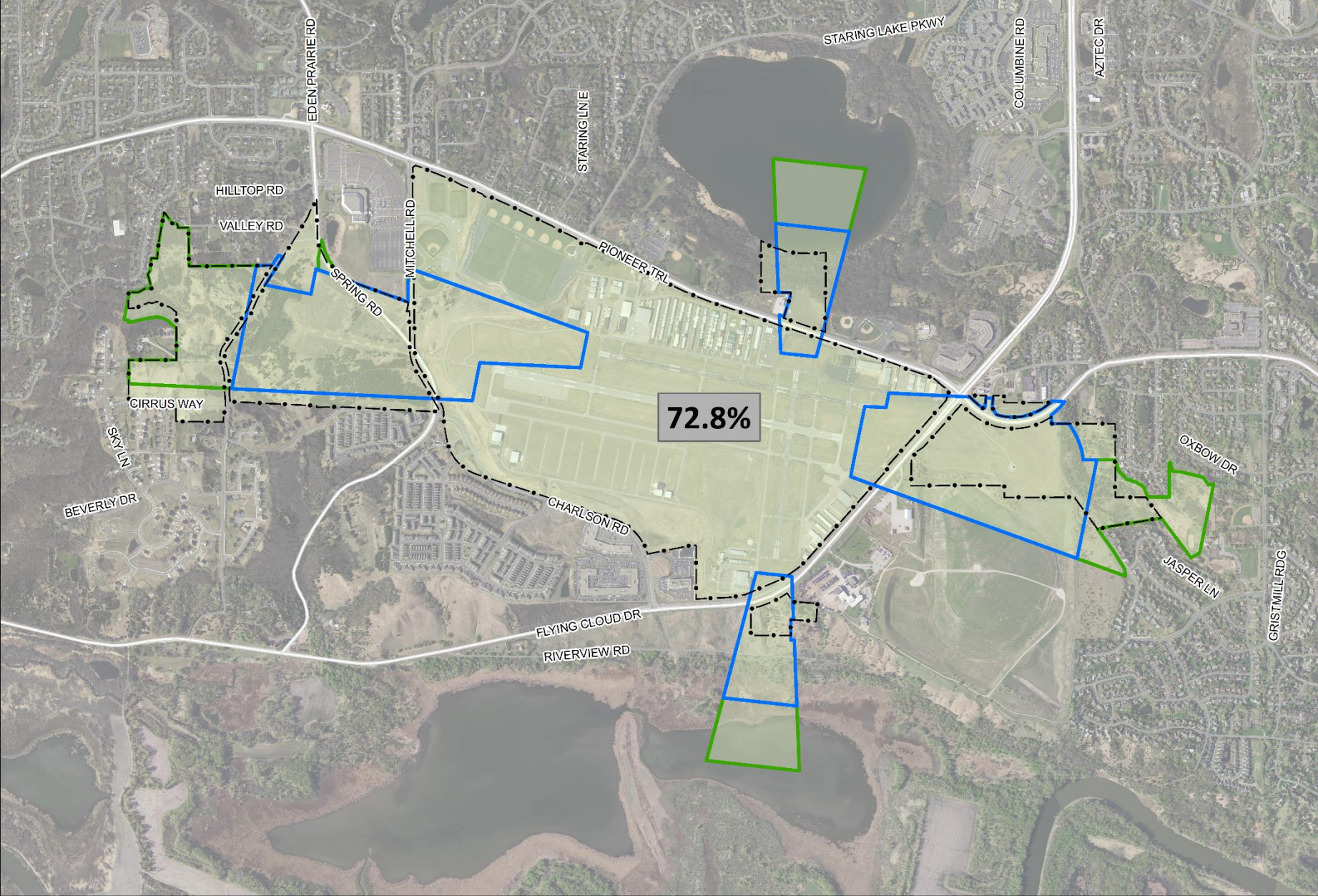
- 21D Property
- RPZ
- MnDOT Clear Zone
- Example Zone 1

0 500 1,000 2,000
Feet

Flying Cloud JAZB Zones

FCM Final JAZB Zones

- ~72.8% Accident Probability captured within FCM JAZB Zone and FCM property line
 - If an accident occurs at Flying Cloud Airport, there is a 73% chance it will be in the JAZB Zones or on airport property
- ~1.4 Years Between Accidents within FCM JAZB Zones or on FCM property
 - Overall accident frequency probability is one per year



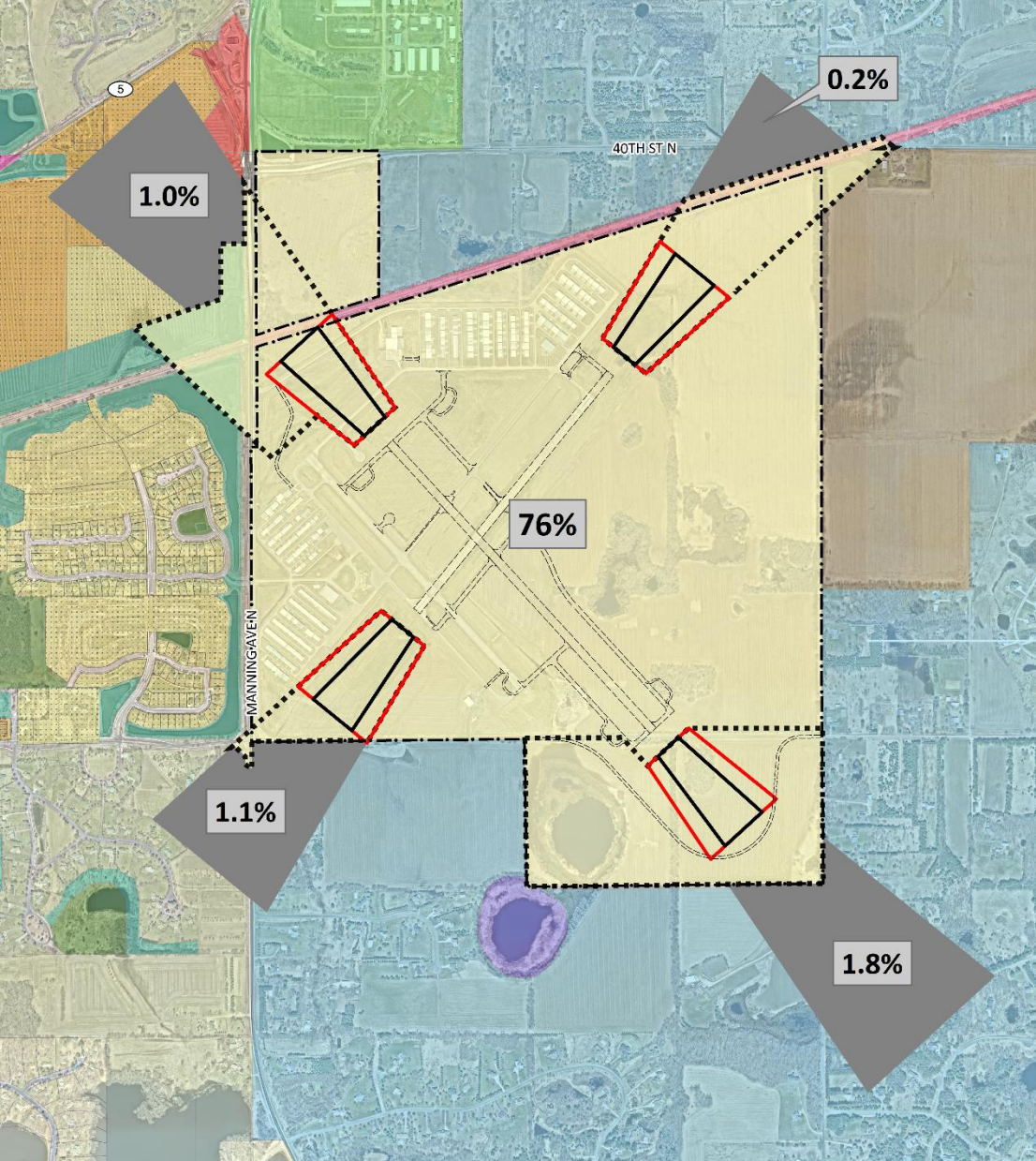
Example Custom Zone

Accident Probability Outside of Example Custom Zone Area

- Under the approach surface for the length of the runway

Runway End	Accident Probability	Years Between Accidents
14	1.0%	352
32	1.8%	200
4	1.1%	326
22	0.2%	1,556
Total	4.1%	87 Years

A reasonable level of safety?



- 21D Property
- RPZ
- MnDOT Clear Zone
- ... Example Zone 1

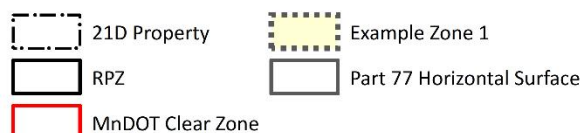
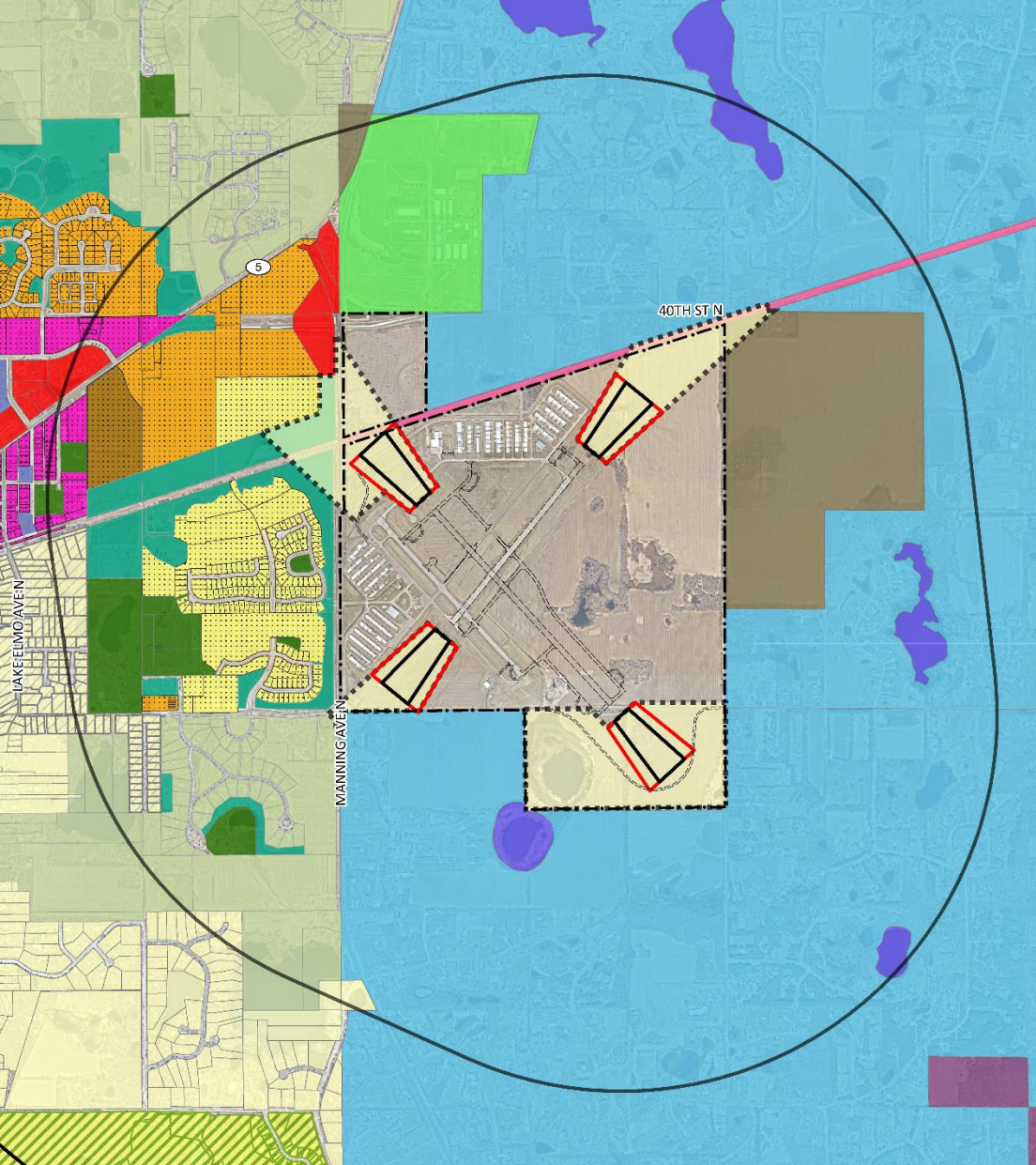
0 625 1,250 2,500
Feet

Example Custom Zone

Example “Non-Interference Zone”

Black ellipsoid line

- Based on FAA/MnDOT Horizontal Airspace Zone
- Less restrictive land use zone
- General prohibitions against land uses that would:
 - Create or cause interference with the operations of radio or electronic facilities
 - Create or causes interference with radio or electronic communications between airport and aircraft
 - Make it difficult for pilots to distinguish between Airport lights and other lights
 - Result in glare in the eyes of pilots using the airport
 - Impair visibility in the vicinity of the airport
 - Otherwise endanger the landing, taking off, or maneuvering of aircraft in the runway approach areas.



Airspace Zoning

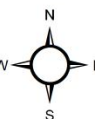
Height limitations



Based on FAA Airspace criteria

- Limits the height of structures and vegetation under Lake Elmo Airport airspace surfaces.
- Penetrations to the Airspace Zones will require a variance issued by a Board of Adjustment



21D Airspace Zones



 21D Property
 Part 77 Contours

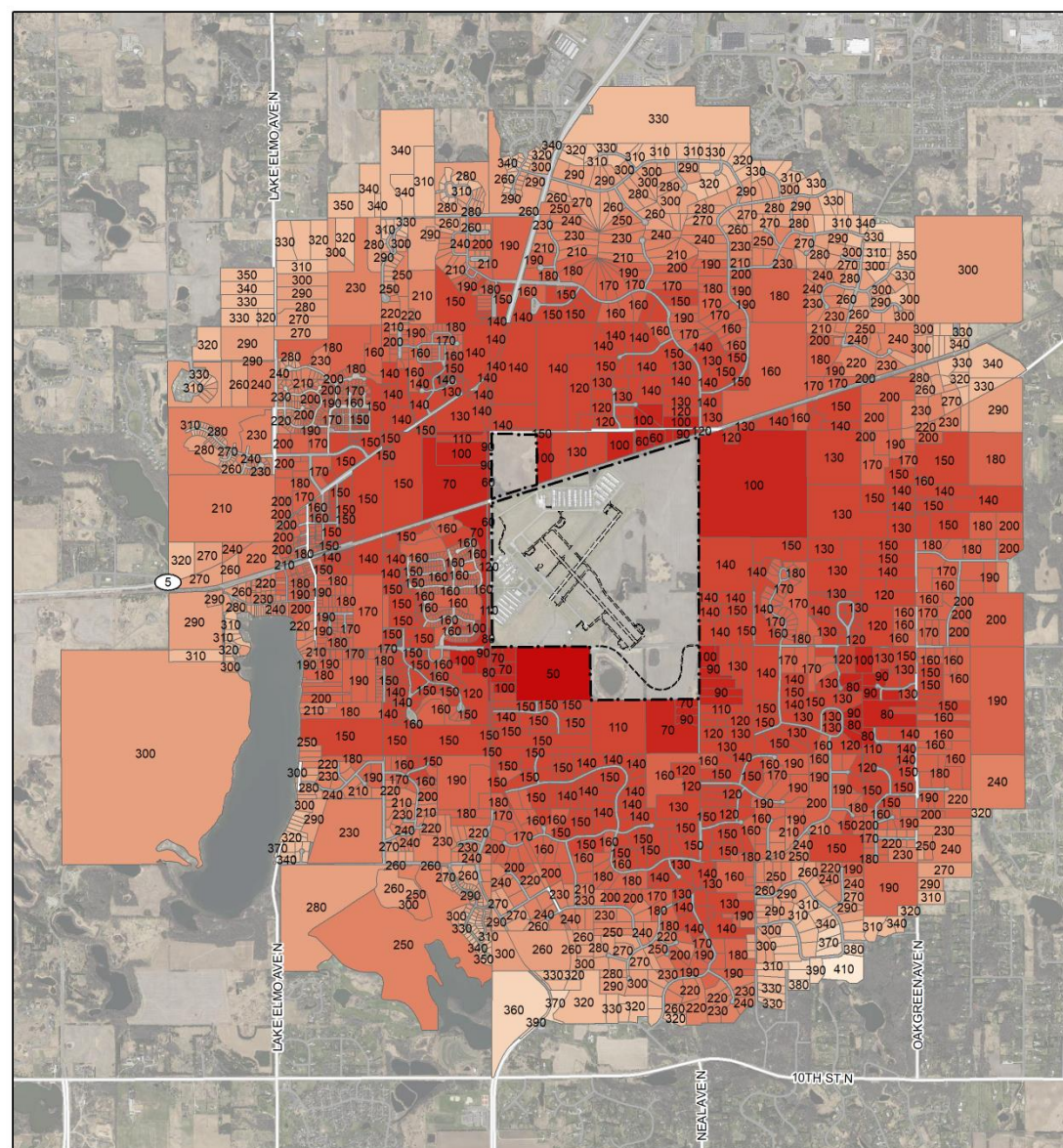
0 2,000 4,000
Feet

Airspace Zoning

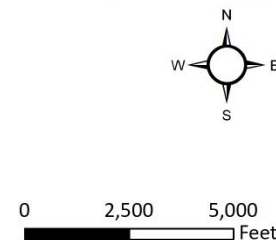
Height limitations

Based on FAA Airspace criteria

- Uses 1-foot airspace contours and ground elevation contours
- Heights are expressed above ground level
- Exceeding the Maximum Construction Height Without Permit will require an Airport Zoning Permit from the Local Zoning Administrator
- In most cases, the airport zoning height limitations are expected to be less restrictive than maximum heights allowed in municipal zoning codes

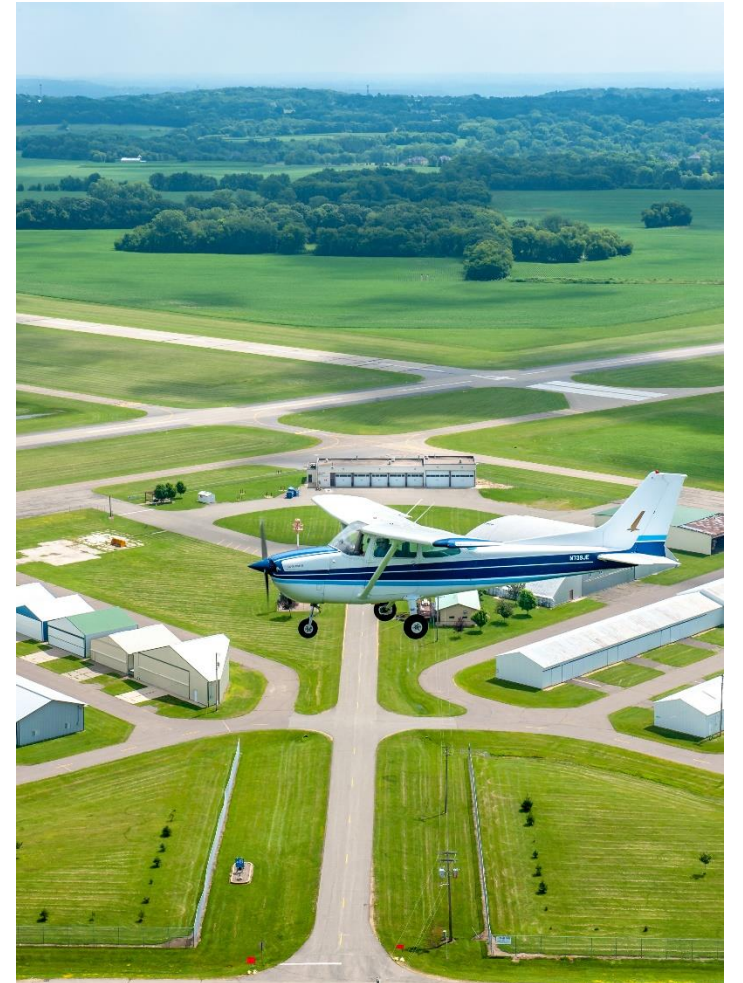


21D Maximum Construction Height



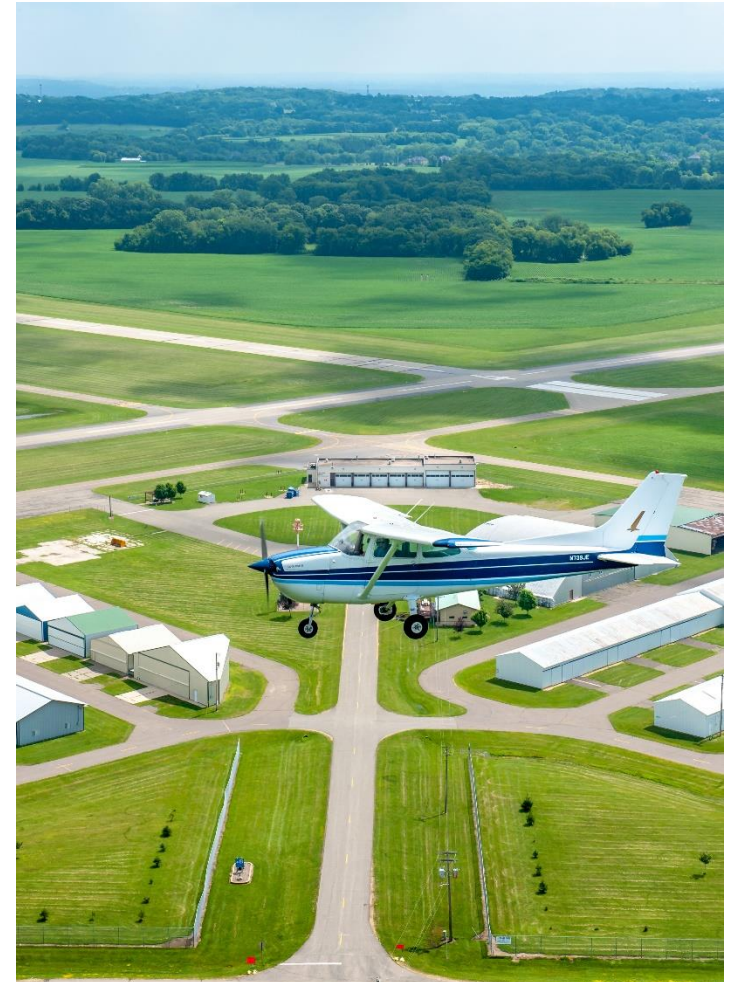
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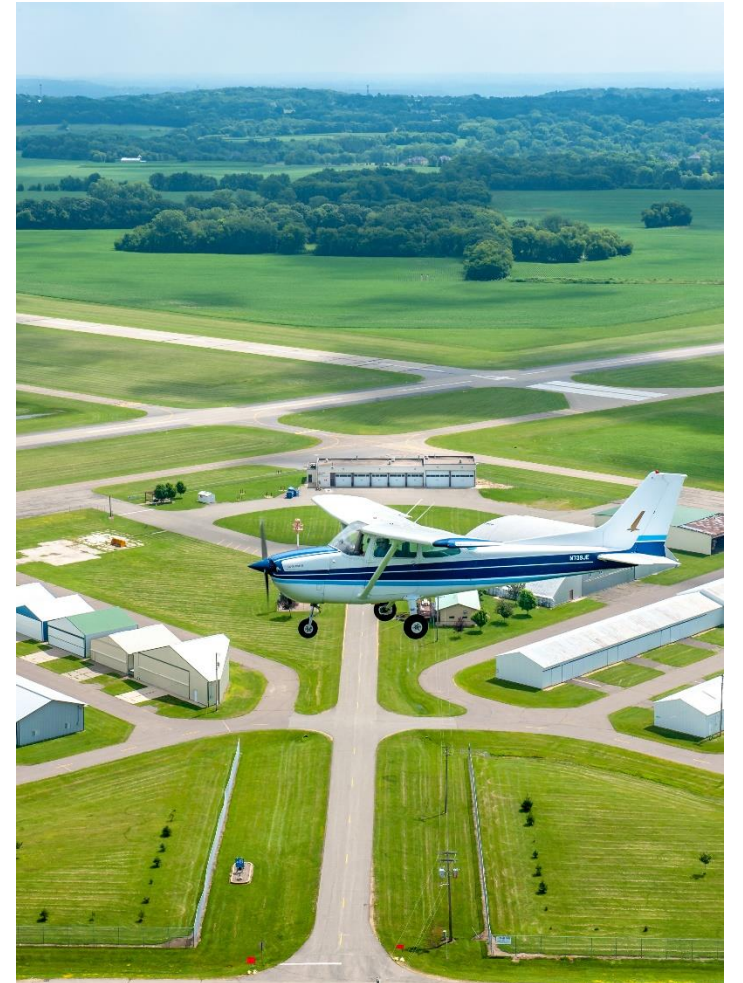
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Meeting Outlook

Meeting 1 (June 25, 2019): ✓

- Welcome and Agenda Overview
- Board Member Introductions
- JAZB Overview
- Selection of Chairperson
- Organizational Logistics
- Goals for Lake Elmo Airport JAZB
- Summary of New State Airport Zoning Statute
- Initial Meeting Plan

Meeting 2 (August 29, 2019): ✓

- Presentation and Work Session – Custom vs. Commissioner’s Standards
- Board member input on zoning standard selection

Board Selection of Custom Standard Process



Meeting 3:

- Presentation of Custom Zoning Factors and Methodology
- Presentation of Example Custom Zone for Discussion

Meeting 4:

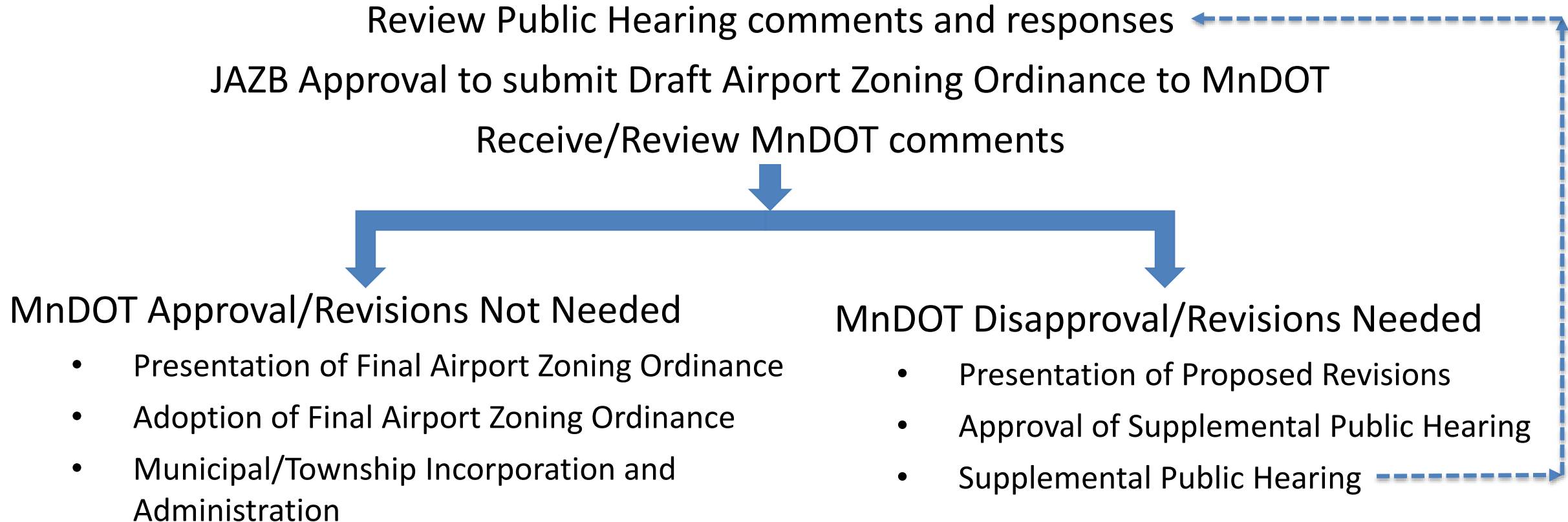
- Discuss Options/Outline for Draft Lake Elmo Airport Zoning Ordinance
- Timeline for Approval of Draft Lake Elmo Airport Zoning Ordinance for Public Hearing #1

CUSTOM STANDARD

PUBLIC HEARING

Meeting Outlook

JAZB Steps After Public Hearing



Meeting Agenda

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