



Crystal Airport Joint Airport Zoning Board

July 13, 2022 – Meeting #4

Agenda

- **Welcome and Agenda Overview**
- Approval of Minutes from February 11 Meeting
- Goals for the Crystal Airport JAZB
- Presentation of Custom Zoning Factors
- Example Custom Zone for Discussion
- Public Comments
- Board Discussion on Custom Zoning Factors and Example Custom Zone
- Establish Next Meeting Date
- Adjourn



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Goals for the Crystal Airport JAZB

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



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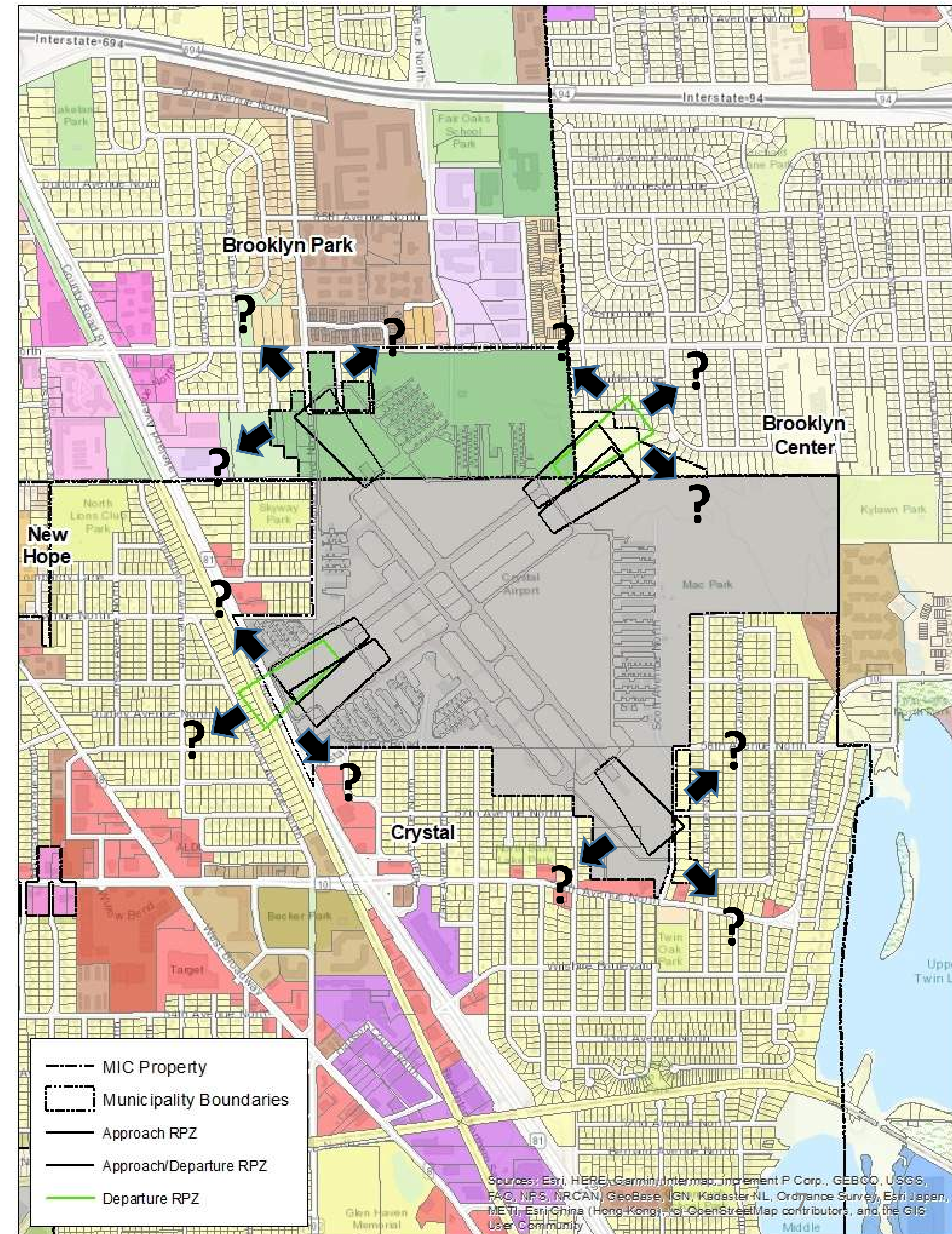
Custom Zoning Factors

Minnesota Statutes 360.0656, Subdivision 1(c)

“When developing and adopting custom airport zoning regulations...the municipality, county, or [JAZB] must include in the record a detailed analysis that explains how the proposed custom airport zoning regulations...ensure a reasonable level of safety...”

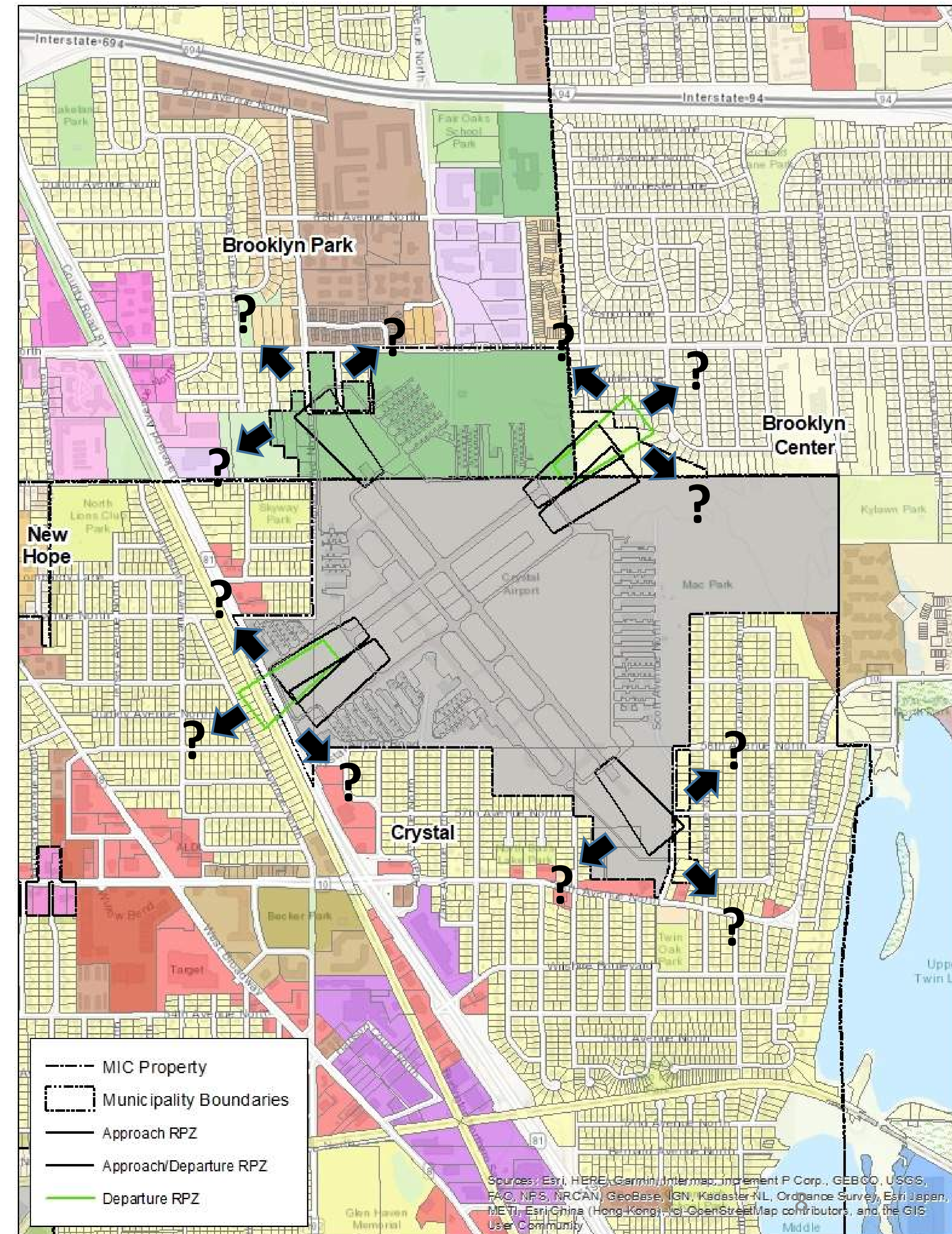
Minnesota Statutes 360.0656, Subdivision 2(a)

“...prior to adopting zoning regulations, the municipality, county, or [JAZB] must submit its proposed regulations and the supporting record to the commissioner for review. The commissioner must determine whether the proposed custom airport zoning regulations and supporting record (1) evaluate the criteria under subdivision 1, and (2) provide a reasonable level of safety.”



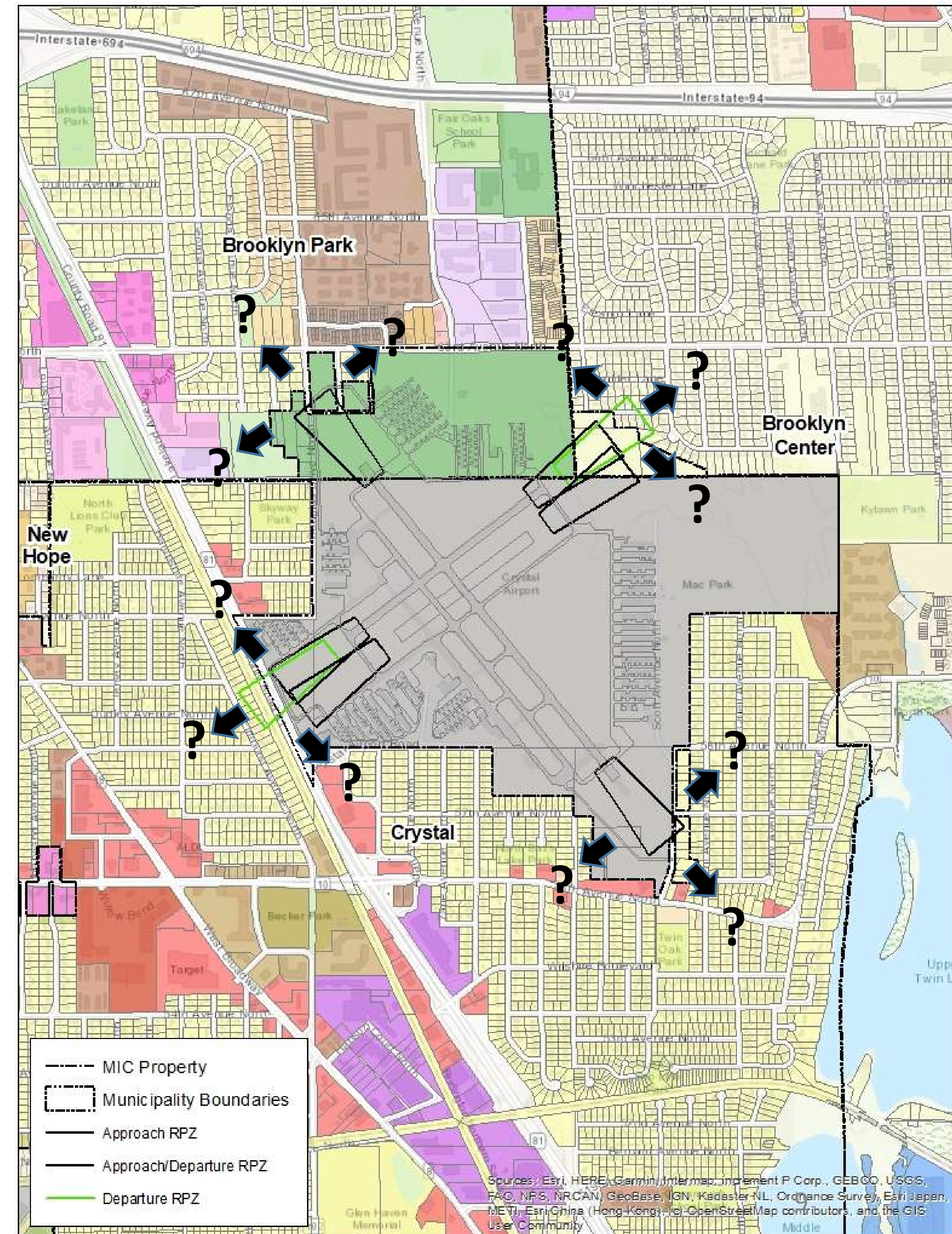
Custom Zoning Factors

1. The location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport.
2. The airport's type of operations and how the operations affect safety surrounding the airport.
3. The 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. The 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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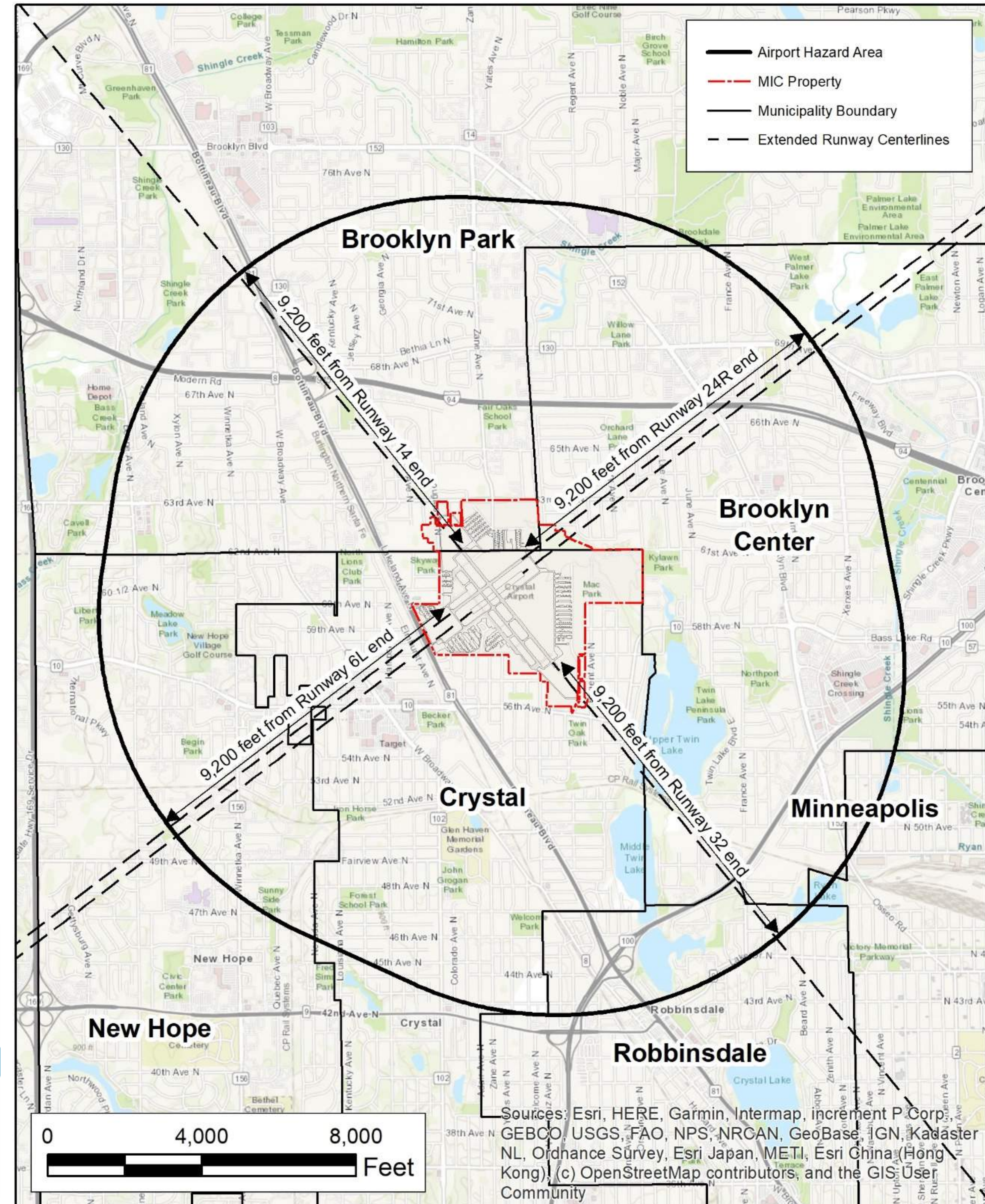
Location, Character of Surrounding Land Uses

- (1) The location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:
 - (a) The location of vulnerable populations, including schools, hospitals, and nursing homes, in the airport hazard area;
 - (b) The location of land uses that attract large assemblies of people in the airport hazard area;
 - (c) The availability of contiguous open spaces in the airport hazard area;
 - (d) The location of wildlife attractants in the airport hazard area;
 - (e) Airport ownership and control of the federal Runway Protection Zones and the department's Clear Zone;
 - (f) Land uses that create or cause interference with the operations of radio or electronic facilities used by the airport or aircraft;
 - (g) 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;
 - (h) Land uses that otherwise inhibit a pilot's ability to land, take off, or maneuver the aircraft;
 - (i) Airspace protection to prevent the creation of air navigation hazards in the airport hazard area; and
 - (j) The social and economic costs of restricting land uses.



Location, Character of Surrounding Land Uses

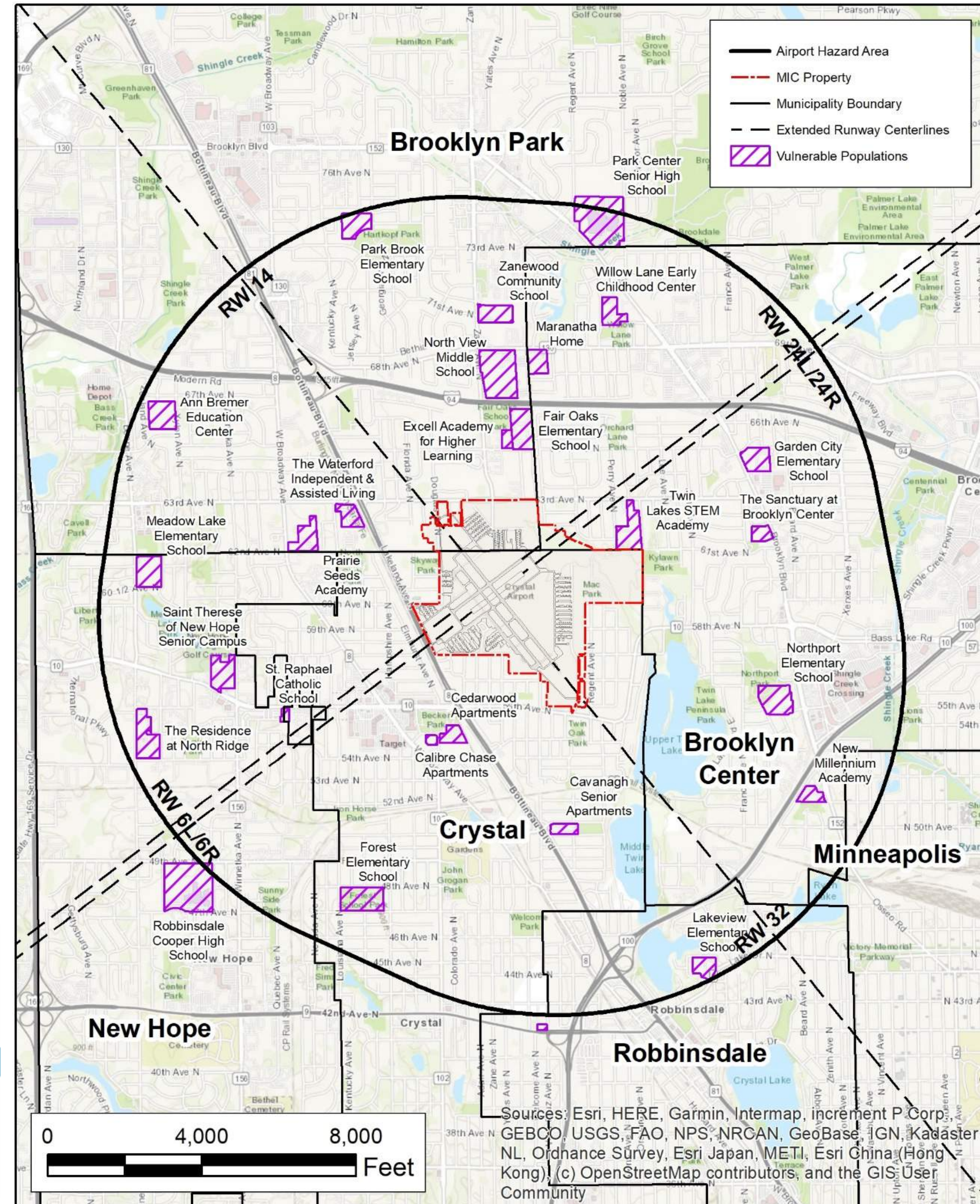
- Airport Hazard Area
 - Any area of land or water upon which an airport hazard might be established if not prevented
 - The Airport Hazard Area is represented by the extent of the FAR Part 77 imaginary airspace surfaces for Crystal Airport
 - “Airport Hazard” means any structure, object of natural growth, or use of land, which obstructs the airspace required for the flight of aircraft in landing or taking off at any airport or is otherwise hazardous to such landing or taking off



Location, Character of Surrounding Land Uses

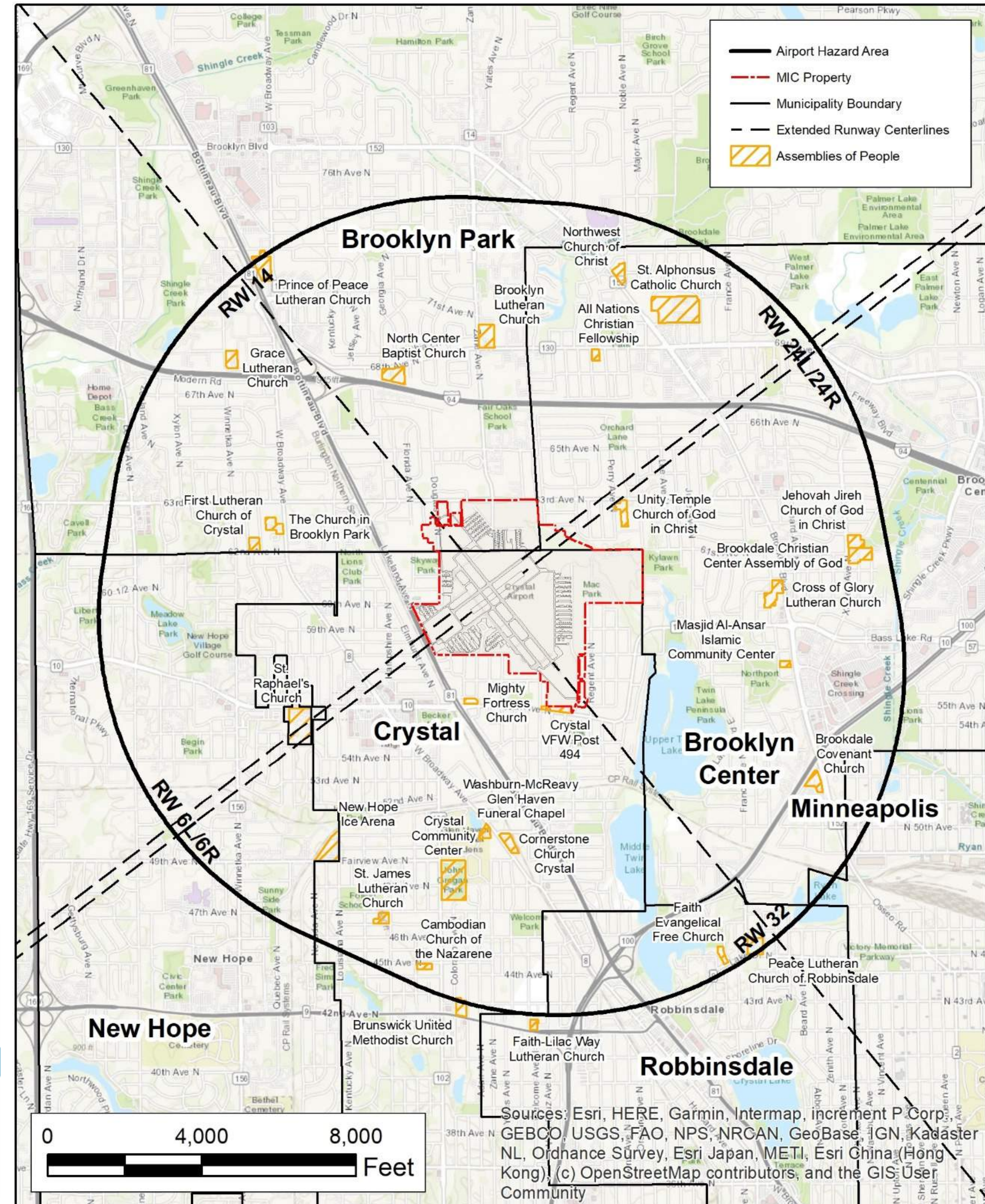
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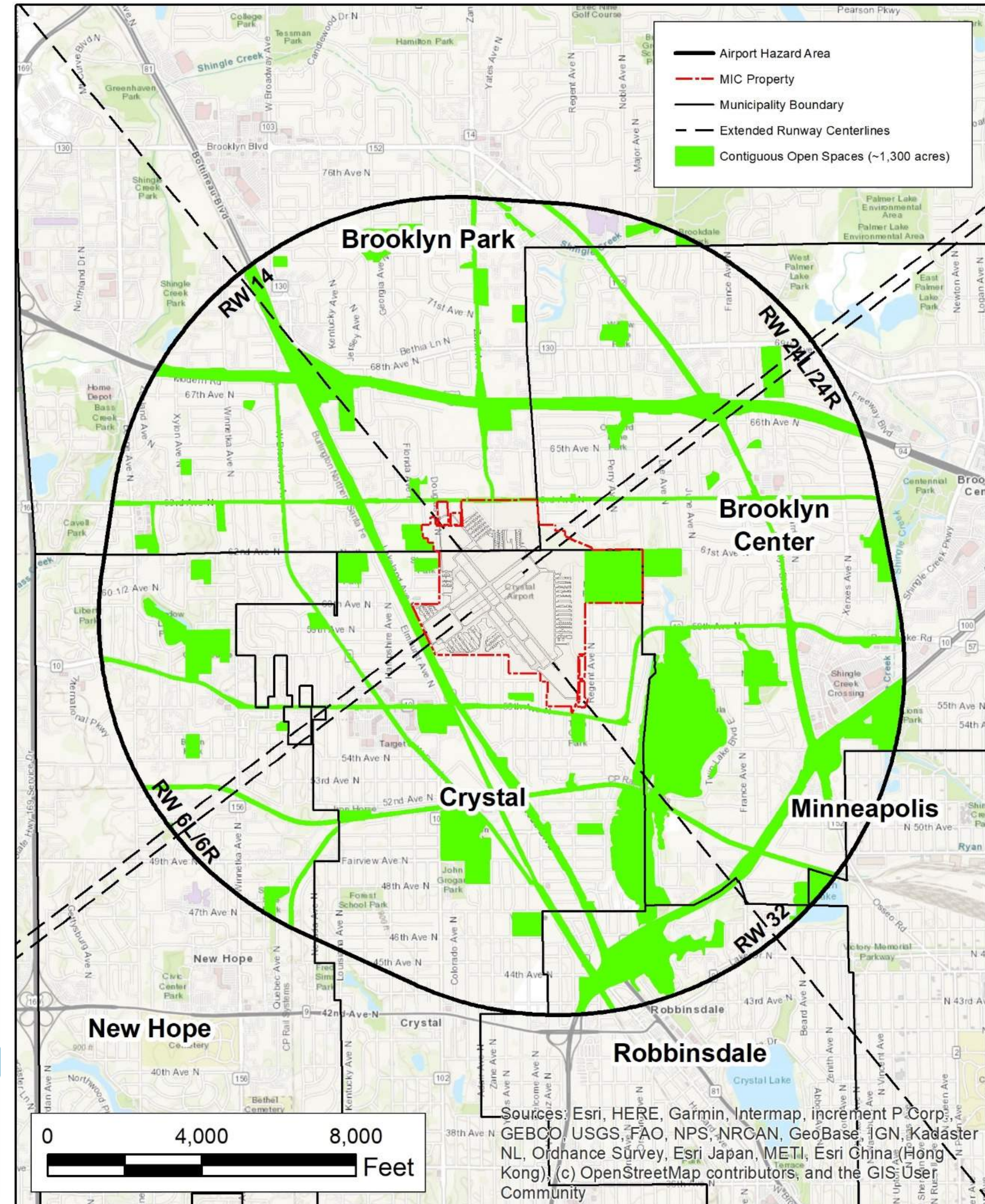
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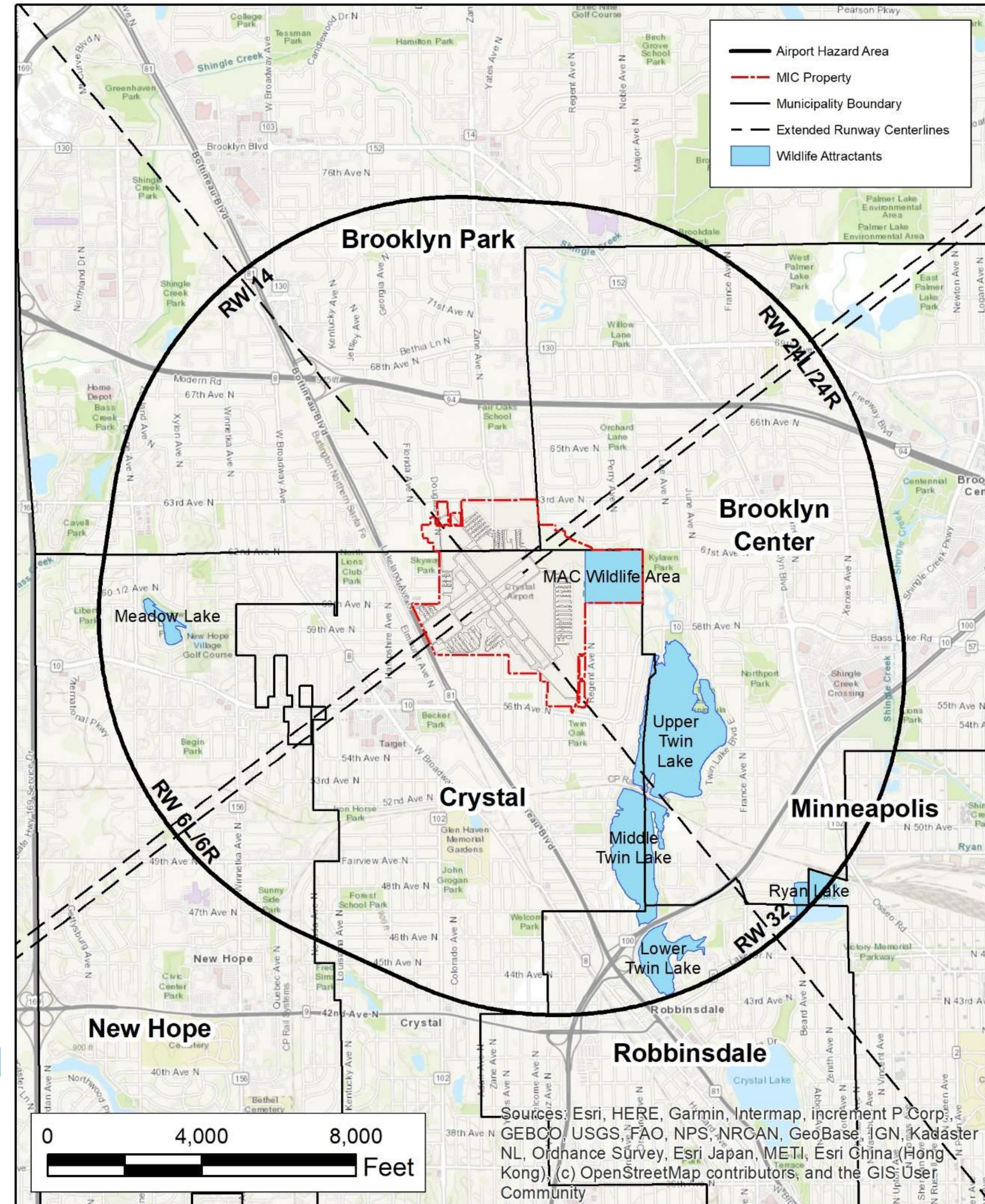
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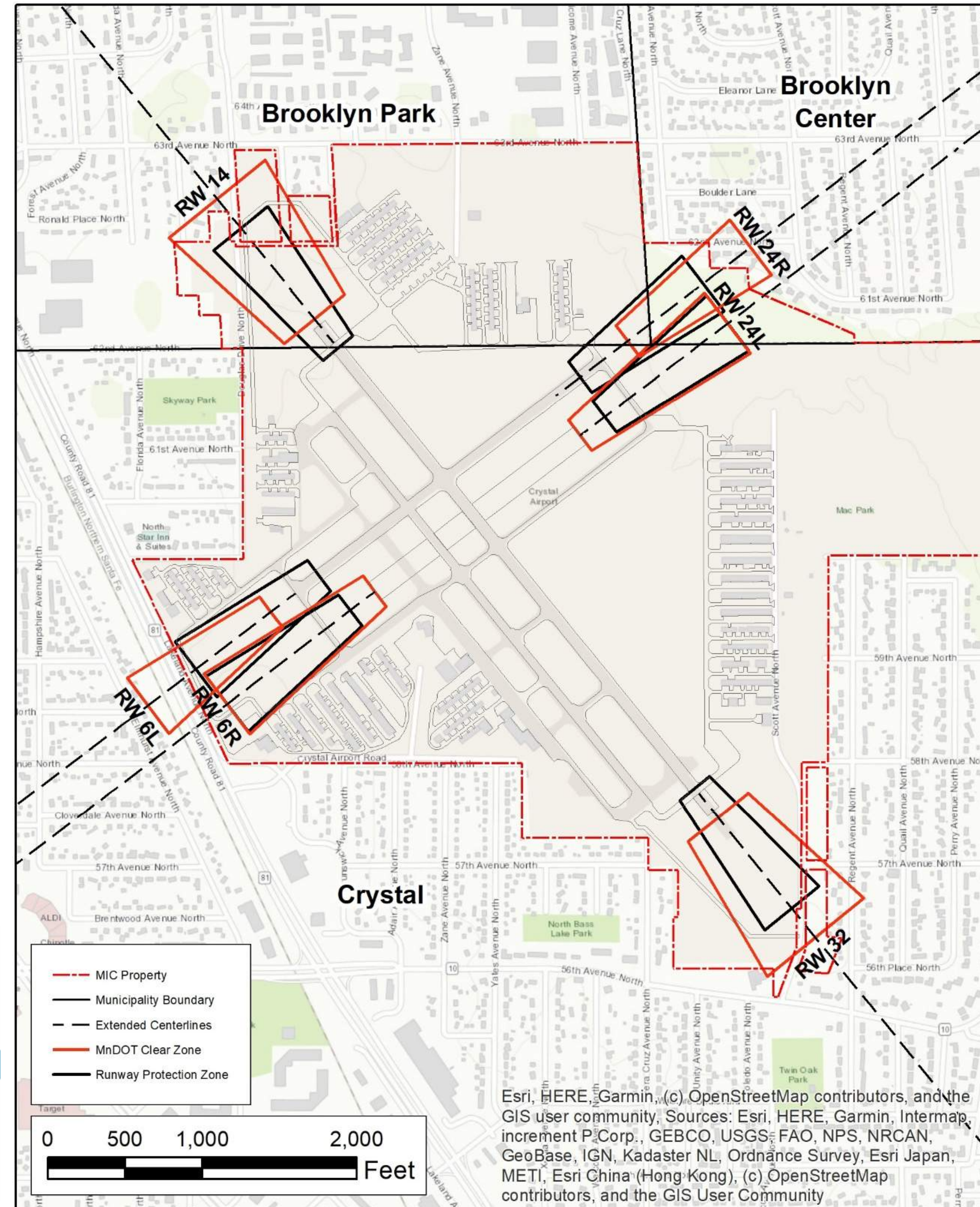
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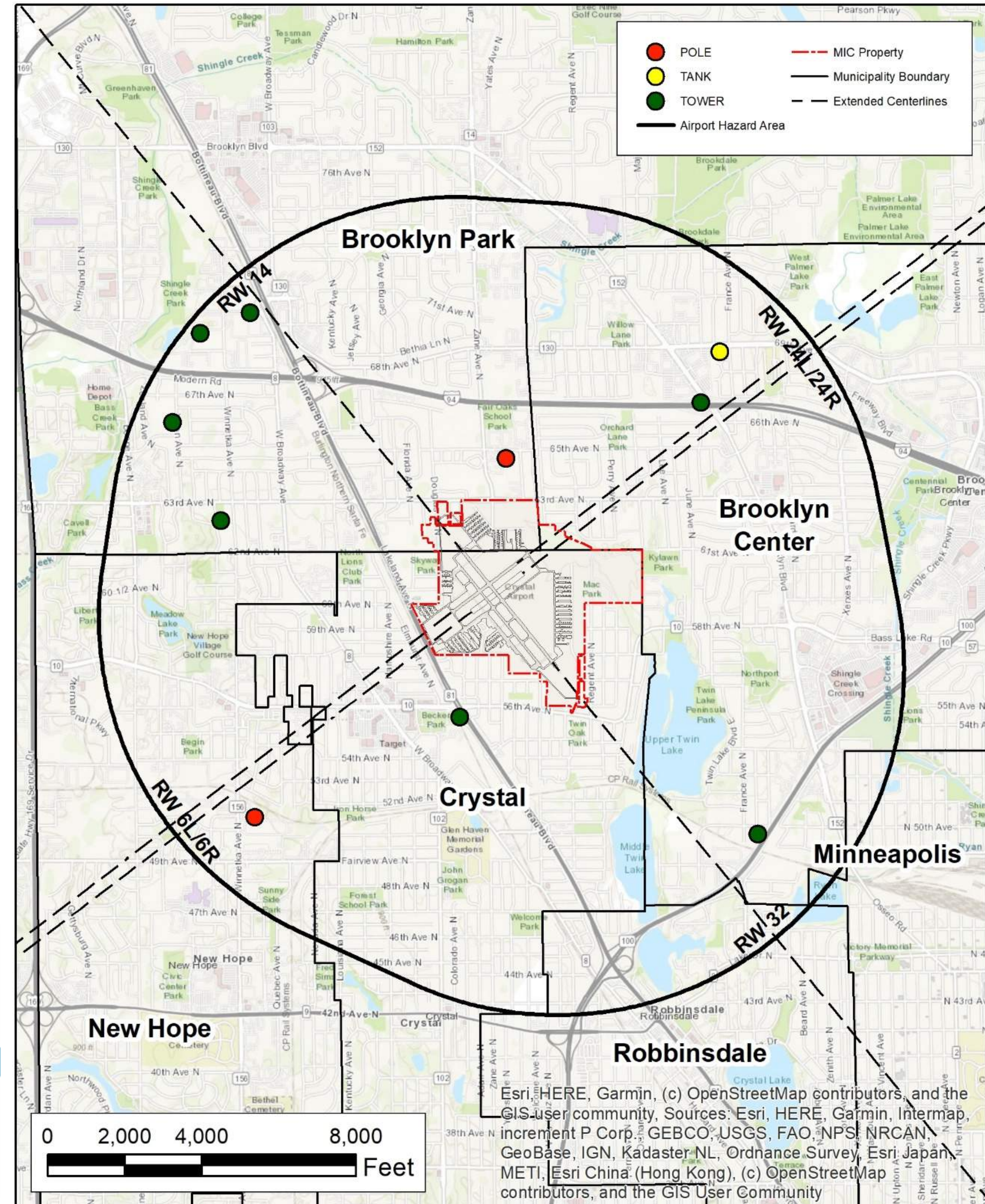
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Location, Character of Surrounding Land Uses

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(j) The social and economic costs of restricting land uses;



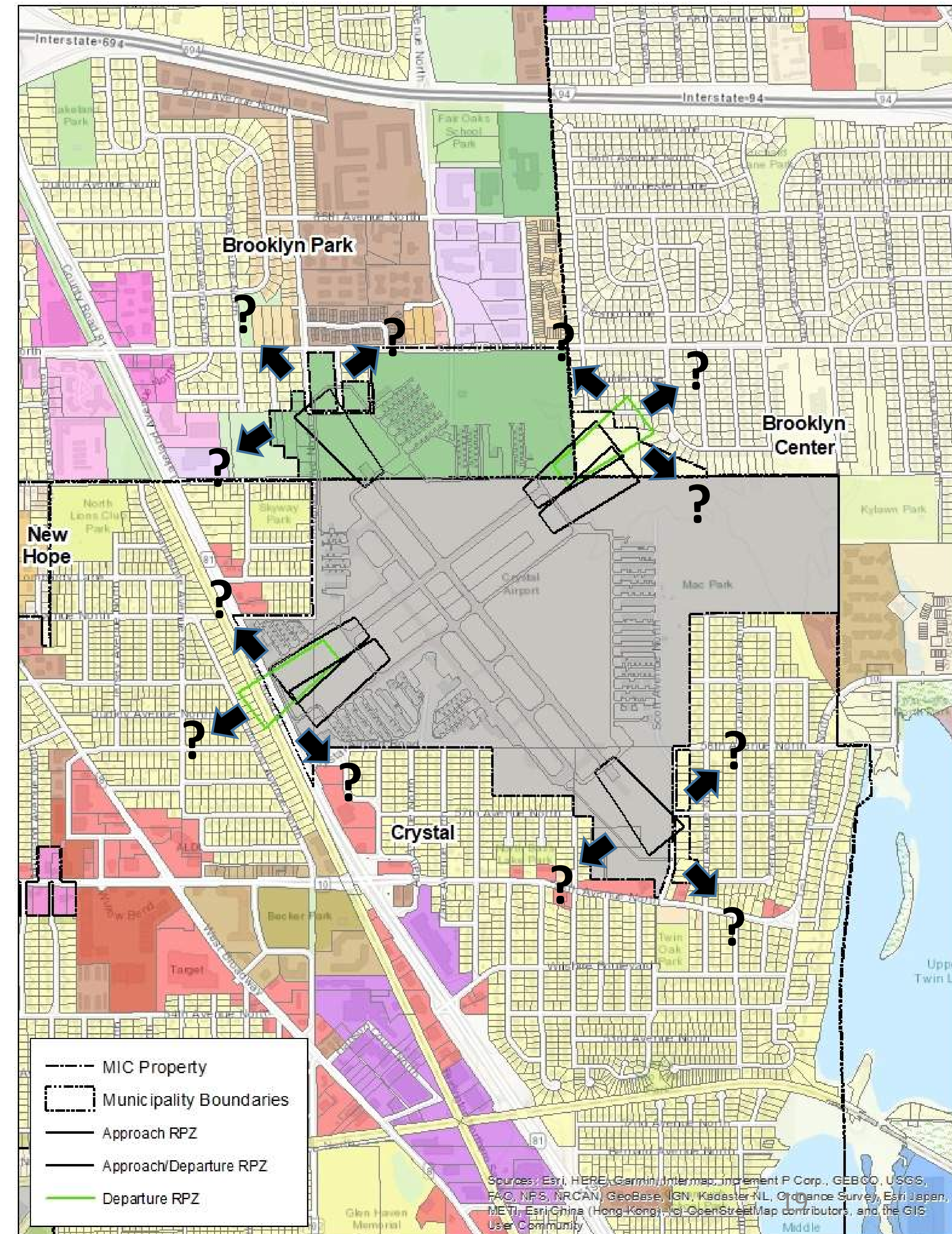
Social and Economic Cost Considerations:

- Interferes with market driven growth
- Restrains land value
- Limits property tax revenue
- Exposes cities to potential takings claims



Custom Zoning Factors

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Type of Operations

- Crystal Airport accommodates personal, recreational, educational, and business general aviation users.
- There is also occasional military use by the Civil Air Patrol.
- The airport has 130 based aircraft, comprised of 123 single engine, three helicopters, and four multi-engine aircraft.

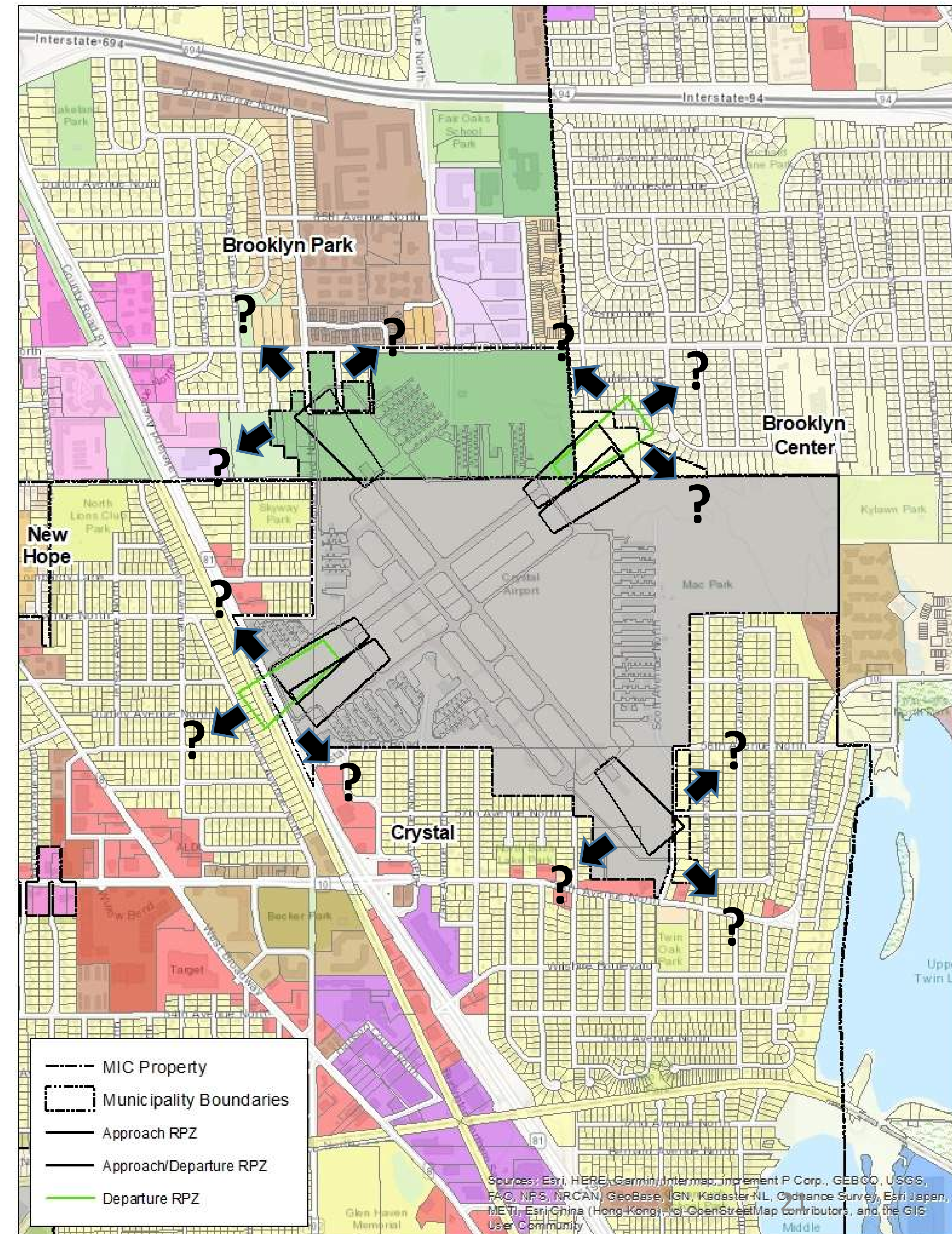
Annual Aircraft Operations at Crystal Airport (2017-2021)								
Year	Itinerant Operations				Local Operations			Total Aircraft Operations
	Air Taxi	General Aviation	Military	Total Itinerant	Civil	Military	Total Local	
2021	423	19,076	55	19,554	17,892	16	17,908	37,462
2020	420	19,152	28	19,600	17,708	14	17,722	37,322
2019	458	21,520	46	22,024	19,495	22	19,517	41,541
2018	523	19,796	245	20,564	17,500	45	17,545	38,109
2017	505	18,253	68	18,826	15,347	50	15,397	34,223
Average	466	19,559	88	20,114	17,588	29	17,618	37,731

Source: FAA Air Traffic Activity Data System (ATADS)



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Safety Risk Analysis

- Crystal Airport (1997-2021)
 - 14 accidents associated with airport operations
 - 0.72 accidents/100k operations
- State of Minnesota (1997-2021)
 - 466 accidents associated with airport operations
 - 0.89 accidents/100k operations



National Transportation Safety Board Aviation Accident Final Report

Location:	Crystal, Minnesota	Accident Number:	CEN09FA363
Date & Time:	June 16, 2009, 22:02 Local	Registration:	N214BN
Aircraft:	Cirrus Design Corporation SR22	Aircraft Damage:	Destroyed
Defining Event:	Lo:		
Flight Conducted Under:	Pa:		

Analysis

The pilot reported having reported that it appeared to close and departed the airport when the accident very loud. He then heard around. He stated that his airplane engulfed in flame of the accident. Another stalled. The airplane was airplane and engine failed cross country flight about hours and 17 minutes duri

Probable Cause and

The National Transportatio The pilot's failure to maint around. Factors associate to heavy rain, and fatigue.

Page 1 of 9



National Transportation Safety Board Aviation Accident Final Report

Location:	Brooklyn Park, Minnesota	Accident Number:	CHI02LA271
Date & Time:	September 4, 2002, 21:50 Local	Registration:	N48969
Aircraft:	Cessna 152	Aircraft Damage:	Substantial
Defining Event:			
Flight Conducted Under:	Pa:		

Analysis

While on approach the air the pilot performed a force at 1815 cdt, with approxim prior to making a precauti stated there "appeared to l pilot reported that the flig minutes and determined t departed at 2110 and whil The pilot reported he "beli he was approximately 1.25 to the airport. The airplan The pilot reported acciden the winds aloft forecast an checked prior to the origin

Probable Cause and

The National Transportatic The pilot's inadequate pre the loss of engine power. trees.

Page 1 of 6



National Transportation Safety Board Aviation Accident Final Report

Location:	CRYSTAL, Minnesota	Accident Number:	CHI97FA059
Date & Time:	January 22, 1997, 13:26 Local	Registration:	N5AS
Aircraft:	Cessna 401	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After landing at the airport, the airplane was taxied to a fixed base operator to pick up a passenger. Rime ice, as thick as two inches was seen on the airplane, and the pilots of the airplane attempted to manually remove the ice. The airplane was topped off with fuel before departure. During departure from runway 31R, the airplane collided with a fence. Numerous areas of ice were found on the airplane following the accident. Both propellers had similar damage. The pilots had reported to the FAA that the left engine had sustained a loss of power. The passenger reported that he did not notice any loss of power from either engine. No preimpact part failure or malfunction of the left engine was found.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the pilot-in-command to ensure adequate removal of airframe ice from the aircraft during preflight.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. (C) AIRCRAFT PREFLIGHT - INADEQUATE - PILOT IN COMMAND
2. (C) AIRFRAME - ICE
3. (C) ICE/FROST REMOVAL FROM AIRCRAFT - INADEQUATE - PILOT IN COMMAND
4. OBJECT - FENCE

Page 1 of 7

Safety Risk Analysis

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 Crystal Airport

F RISK CONCEPTS

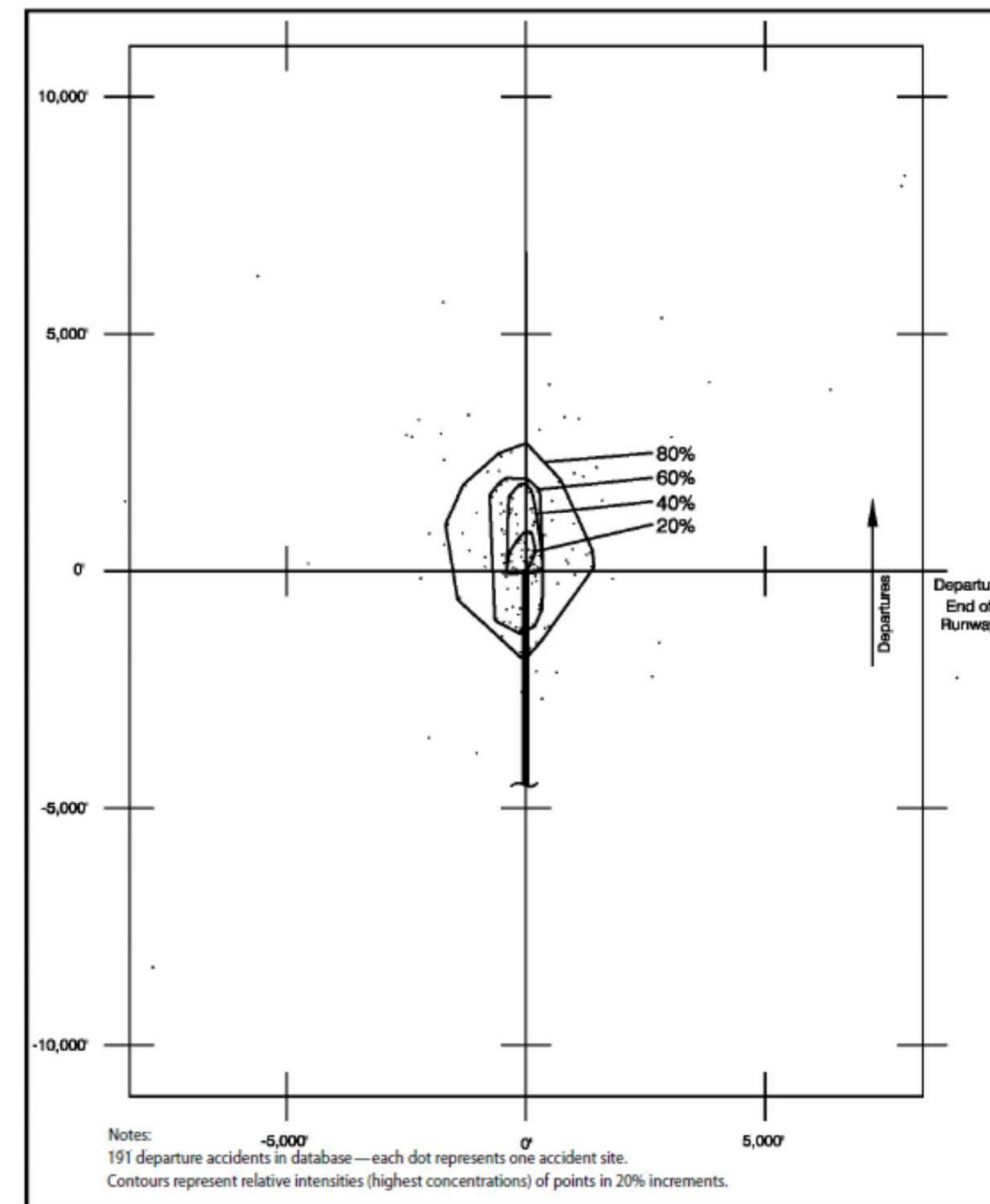


FIGURE F5
General Aviation Accident Distribution Contours –
Departure Accidents on Runways of Less than 4,000 Feet

F-20

California Airport Land Use Planning Handbook

RISK CONCEPTS F

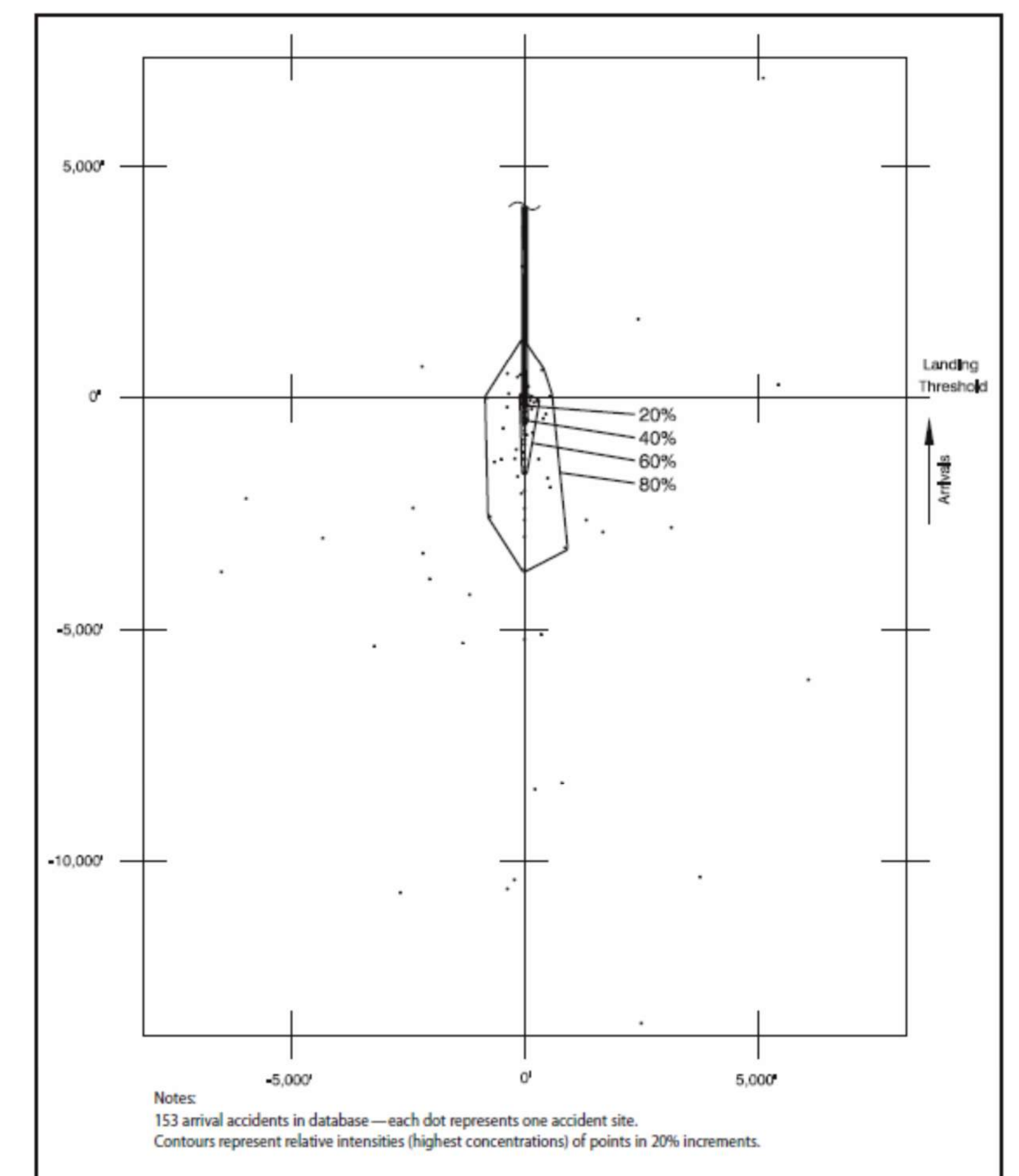


FIGURE F4
General Aviation Accident Distribution Contours –
Arrival Accidents on Runways of Less than 4,000 Feet

F-19

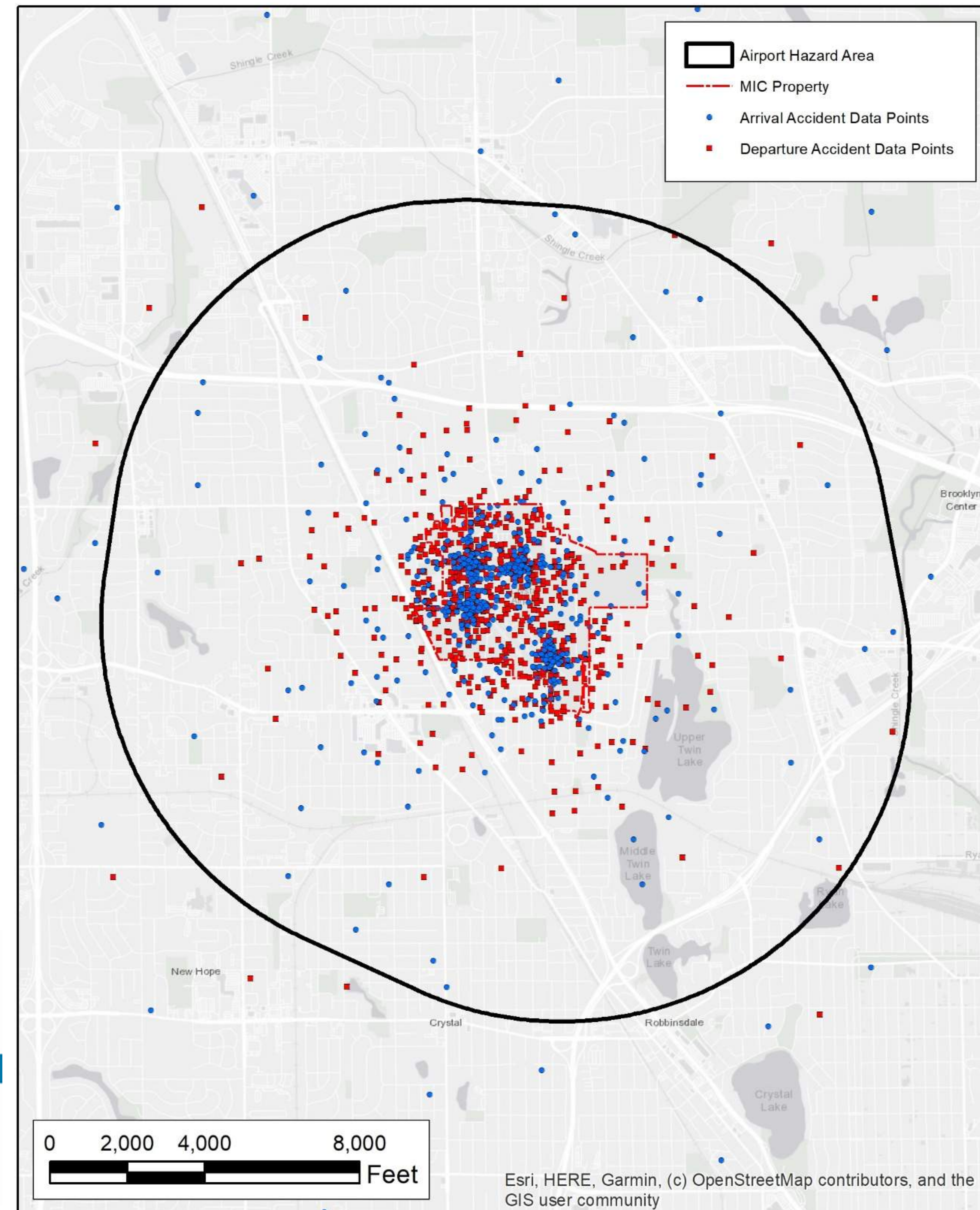
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Safety Risk Analysis

Accident potential distribution

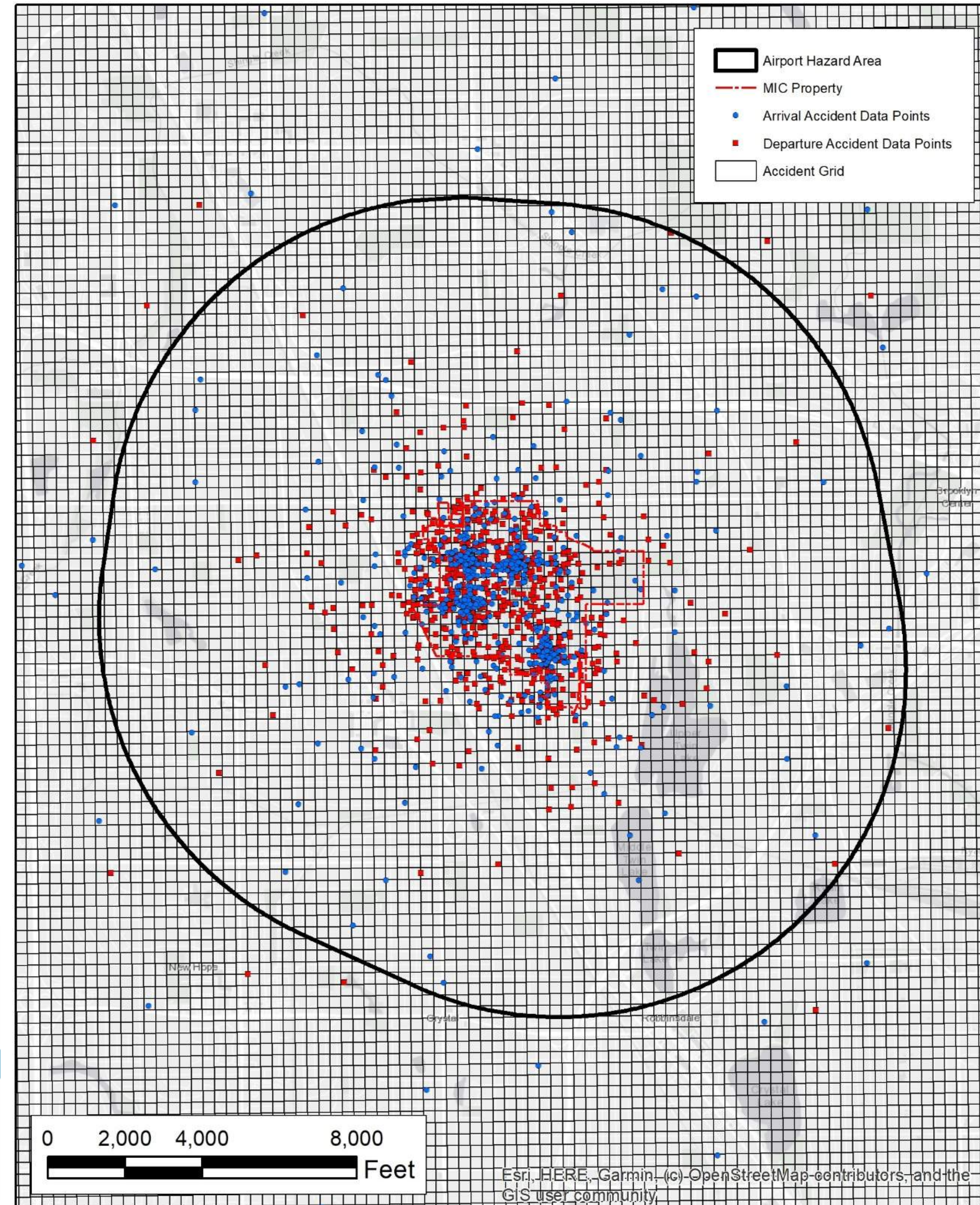
- Accident locations from California Study superimposed on Crystal runway ends
 - Arrivals – blue circles
 - Departures – red squares
- Shows locations where accidents have occurred nationwide
 - NOT actual accidents at Crystal!



Safety Risk Analysis

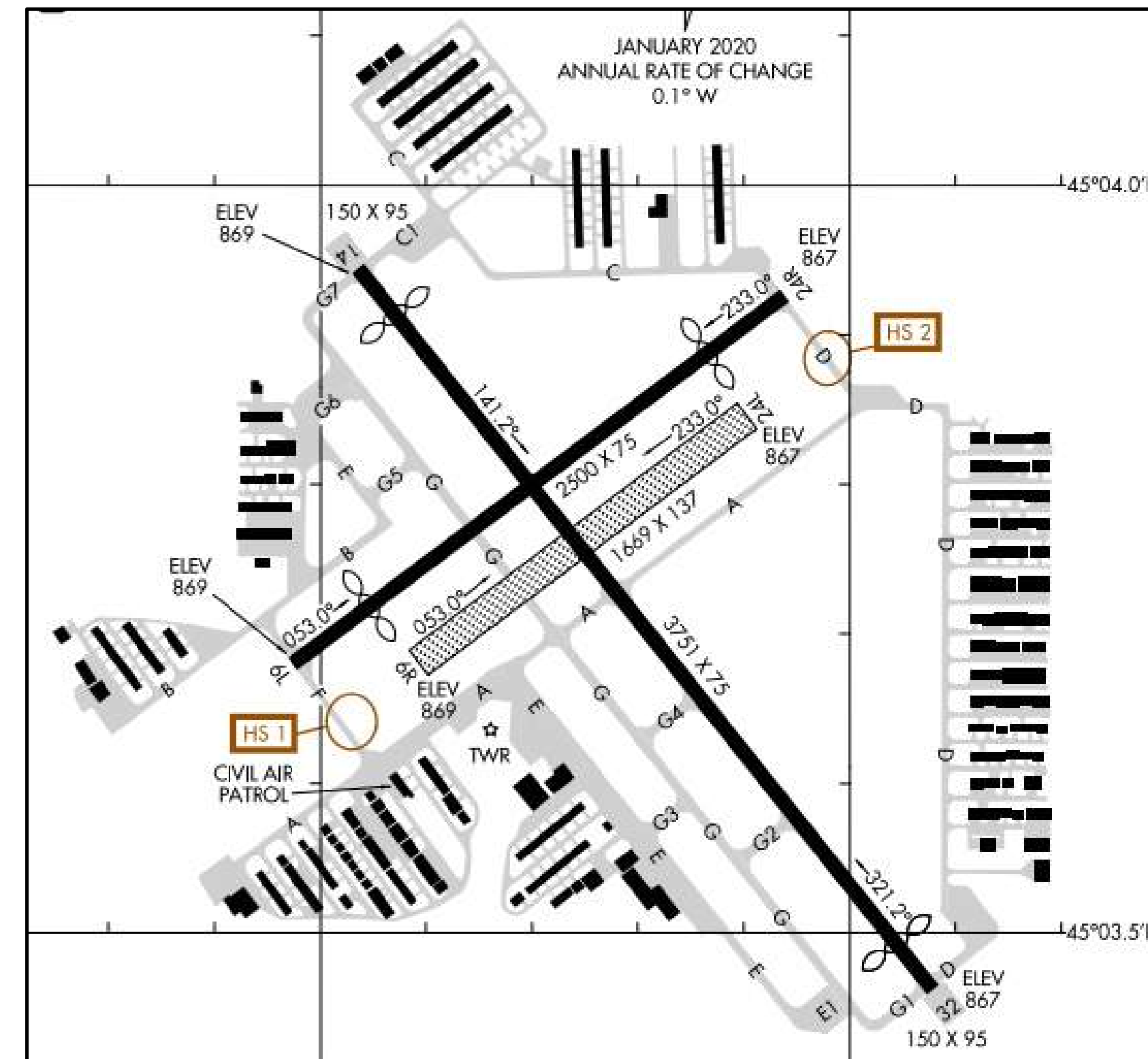
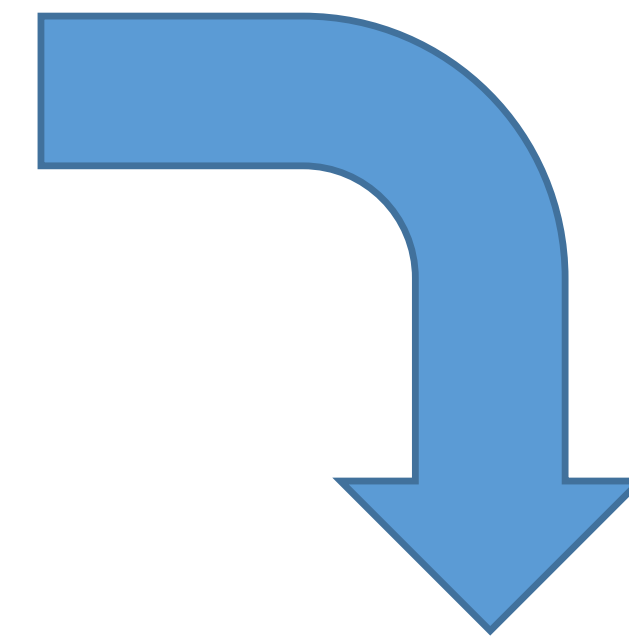
Accident potential distribution

- Accident locations from California Study superimposed on Crystal runway ends
 - Arrivals – blue circles
 - Departures – red squares
- Shows locations where accidents have occurred nationwide
 - NOT actual accidents at Crystal!
- 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 implication of precision



Safety Risk Analysis

Crystal Airport Runway Use %		
Runway	% Arrivals	% Departures
14	41.1%	41.9%
32	38.5%	42.7%
6L/6R	9.8%	7.7%
24L/24R	10.6%	7.7%
Total	100.00%	100.00%



Runway use

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

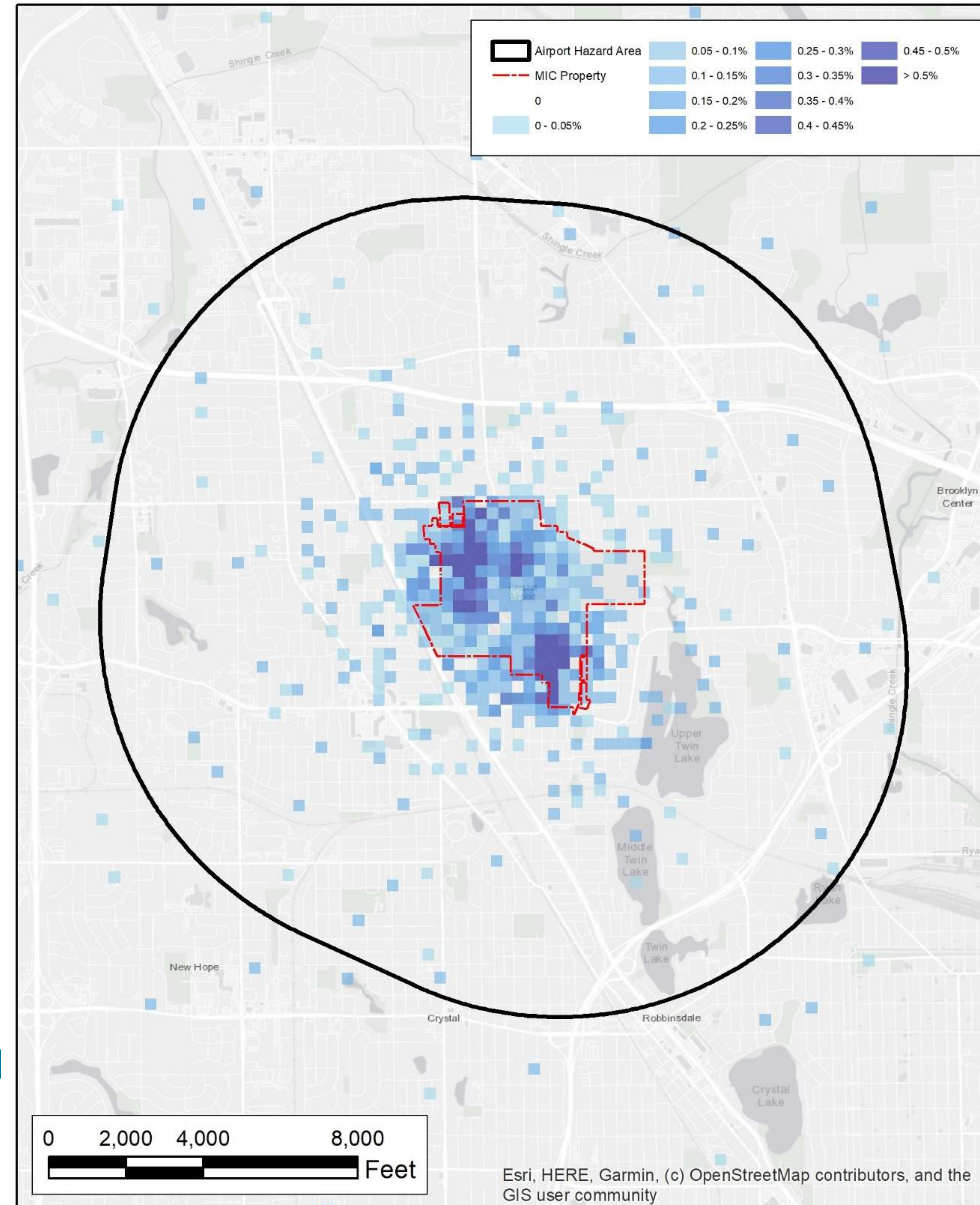
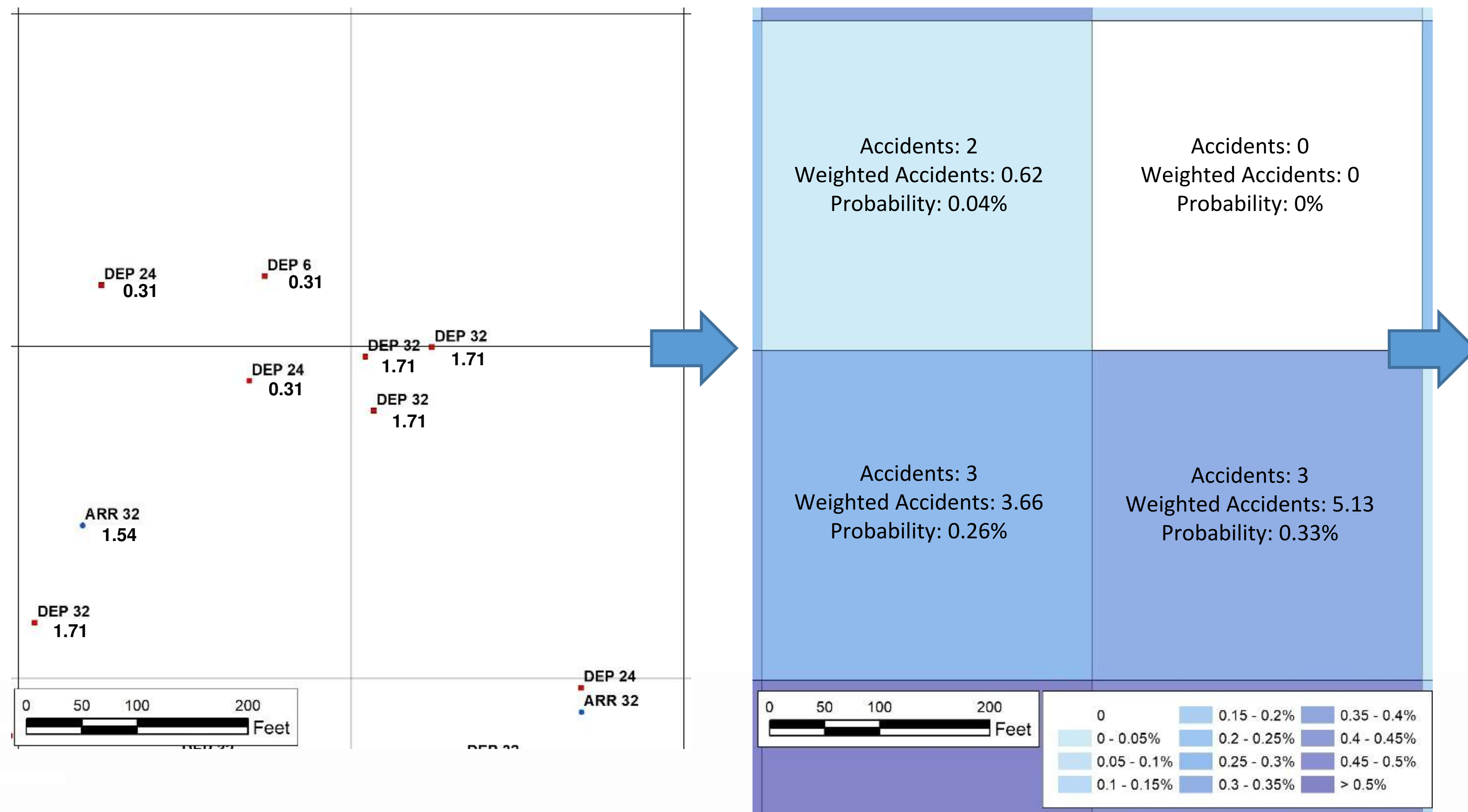
Runway	Aircraft Operations		Accident Data Set		Final Weighting	
	Arrivals	Departures	Arrival Points	Departure Points	Arrivals	Departures
14	35,199	34,793	153	191	1.64	1.68
32	33,051	35,417	153	191	1.54	1.71
6L/6R	8,409	6,367	153	191	0.39	0.31
24L/24R	9,036	6,340	153	191	0.42	0.31
Total	85,695	82,917	612	764	---	---



Safety Risk Analysis

Calculated Accident Probability per Grid Square

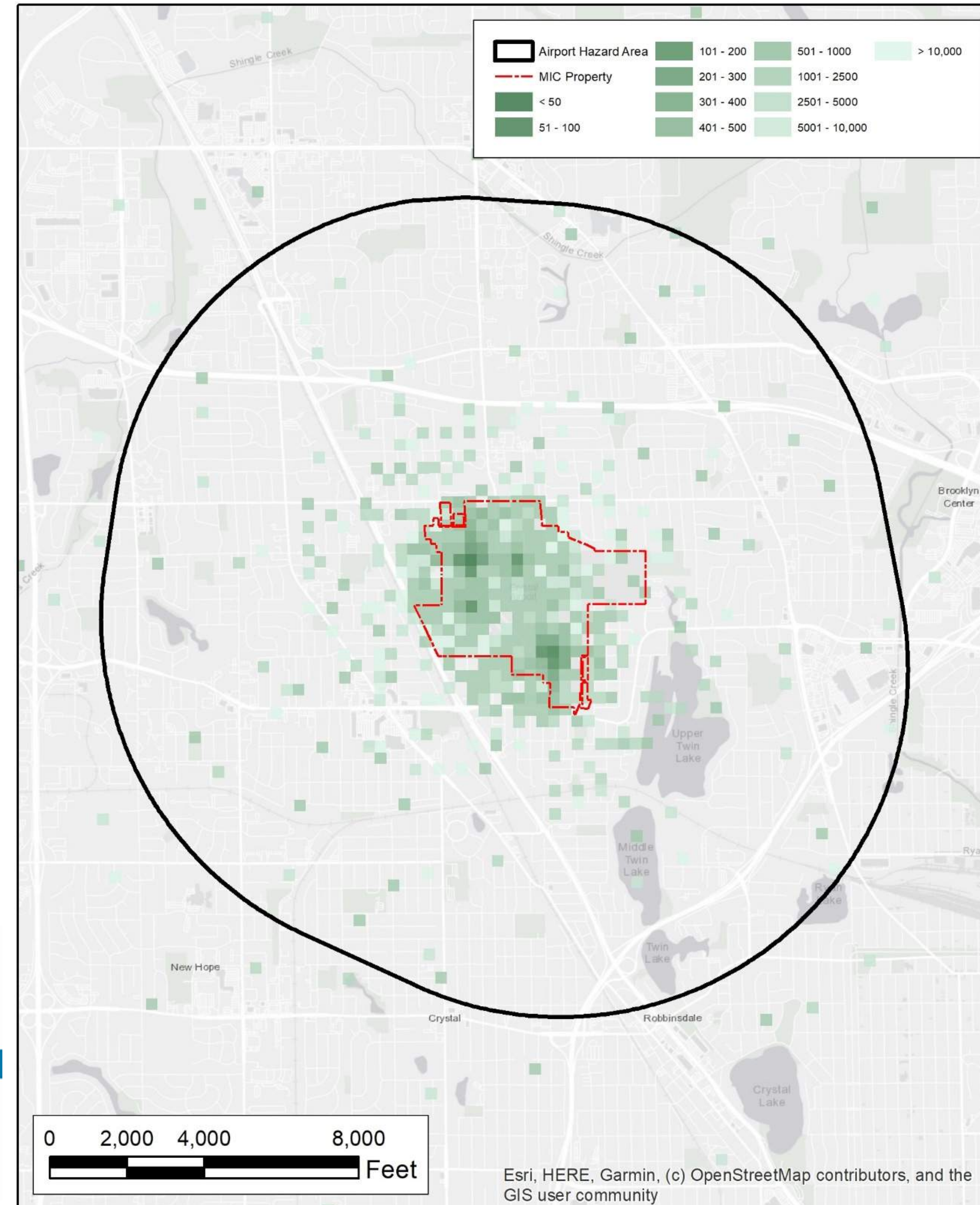
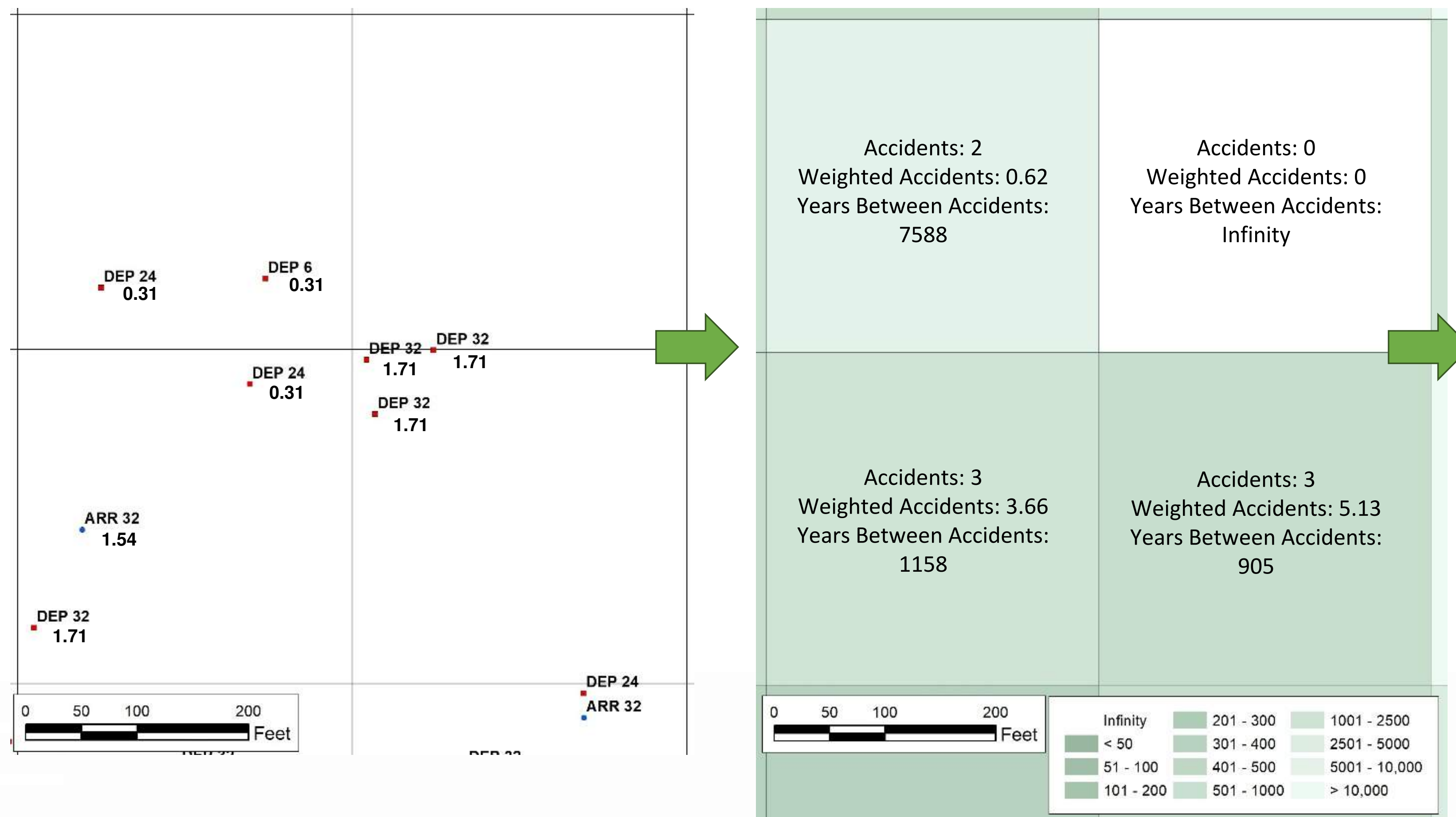
- Sum of all grid probabilities is 100%



Safety Risk Analysis

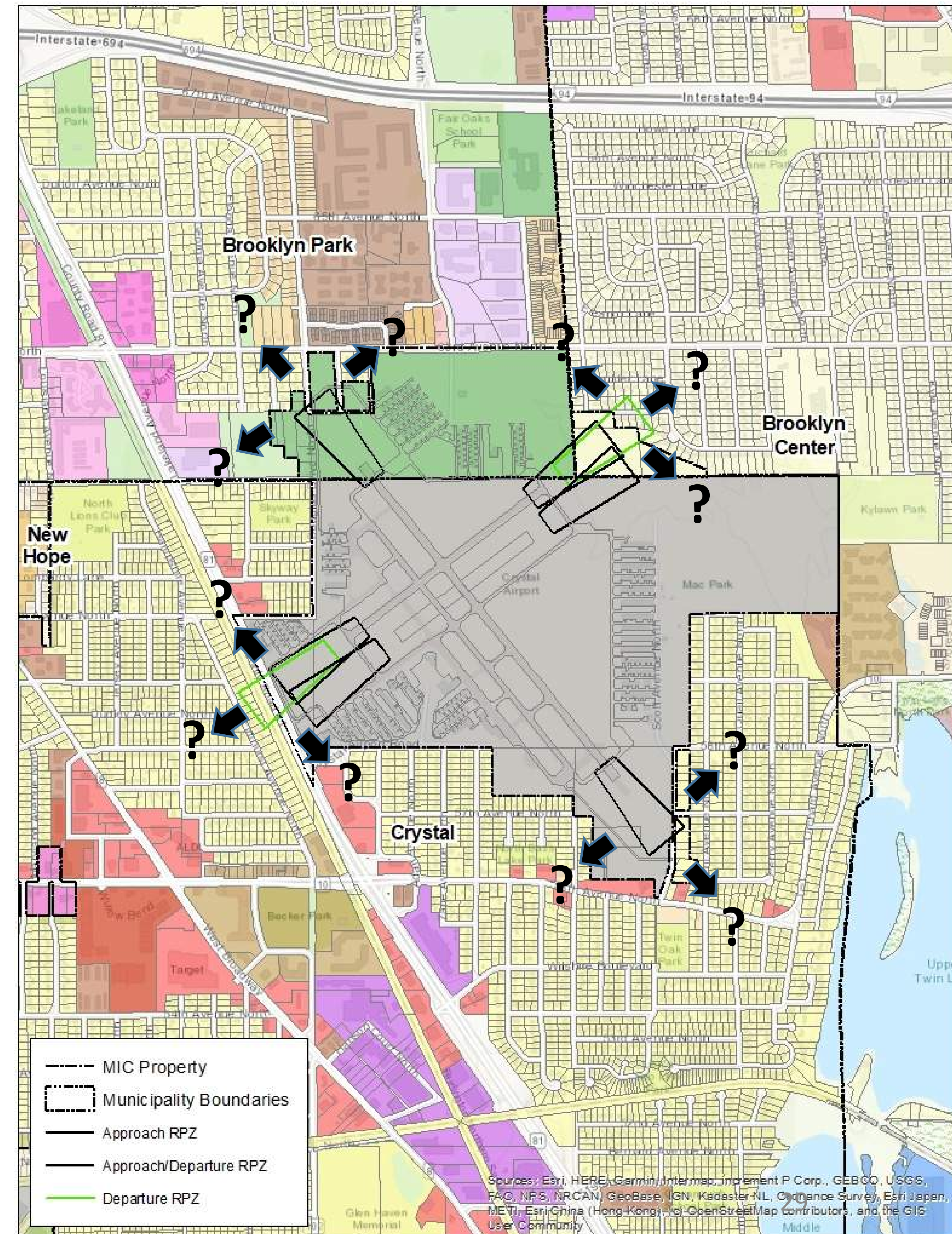
Calculated Accident Frequency per Grid Square

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



Custom Zoning Factors

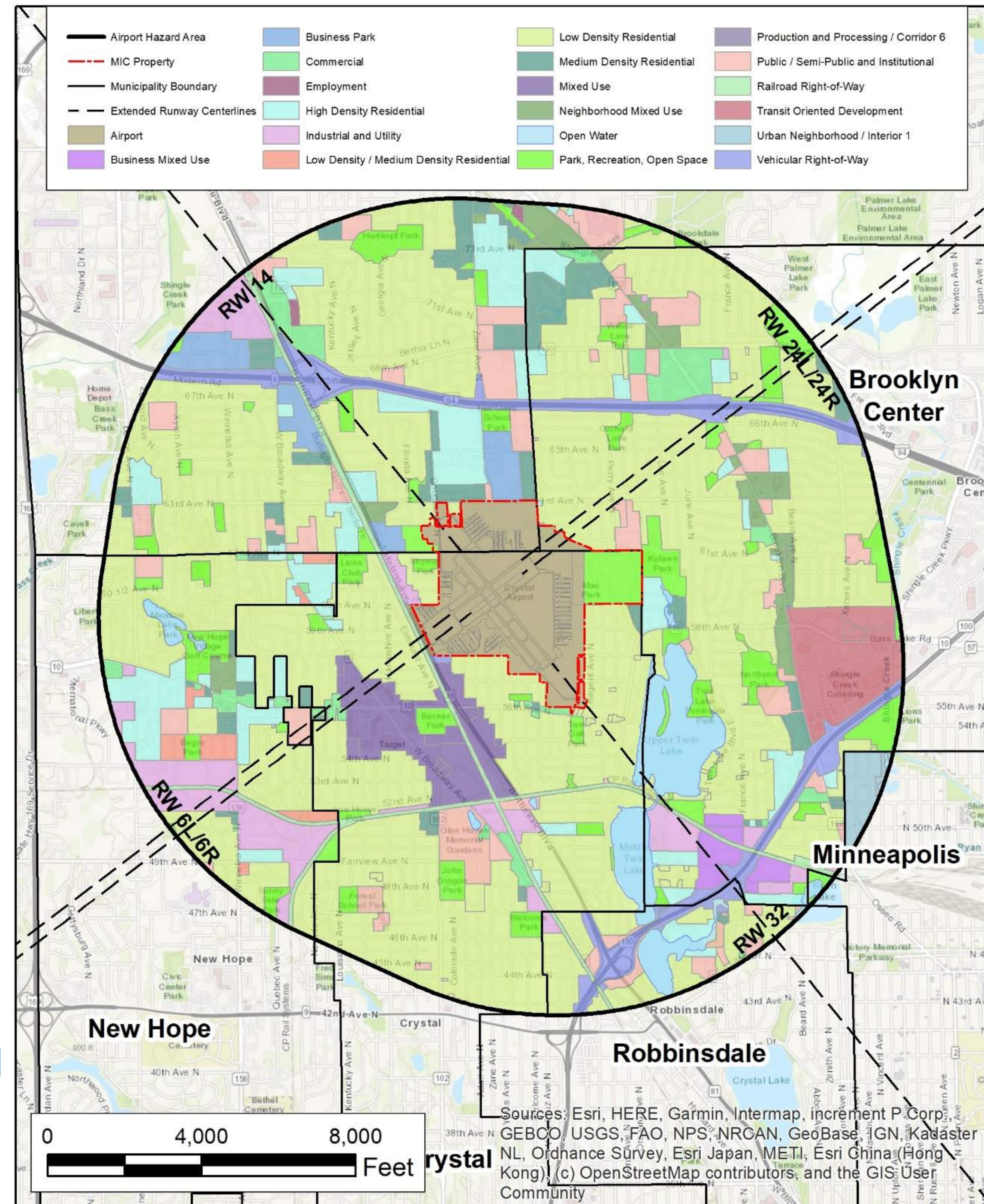
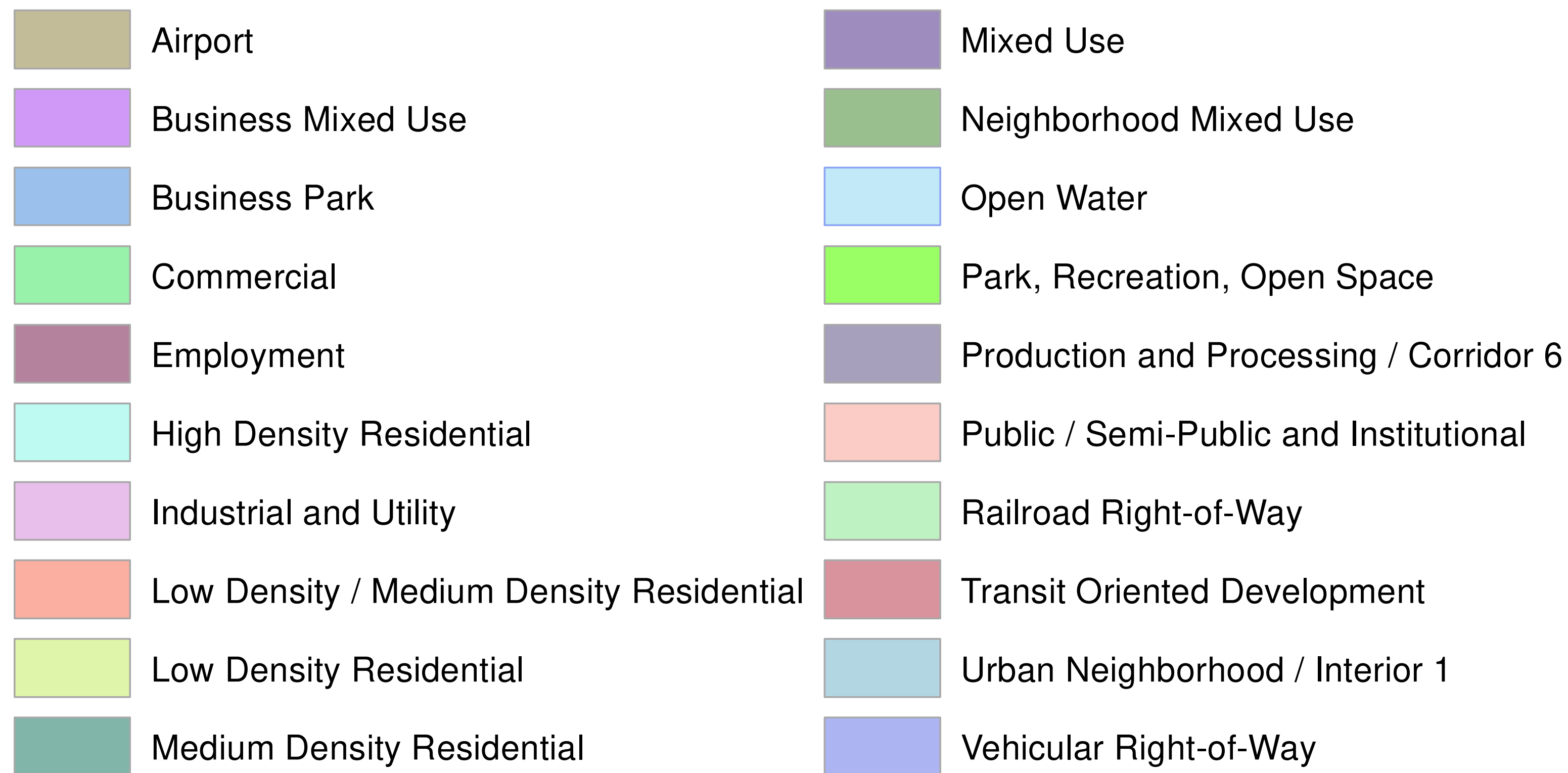
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Planned Land Uses

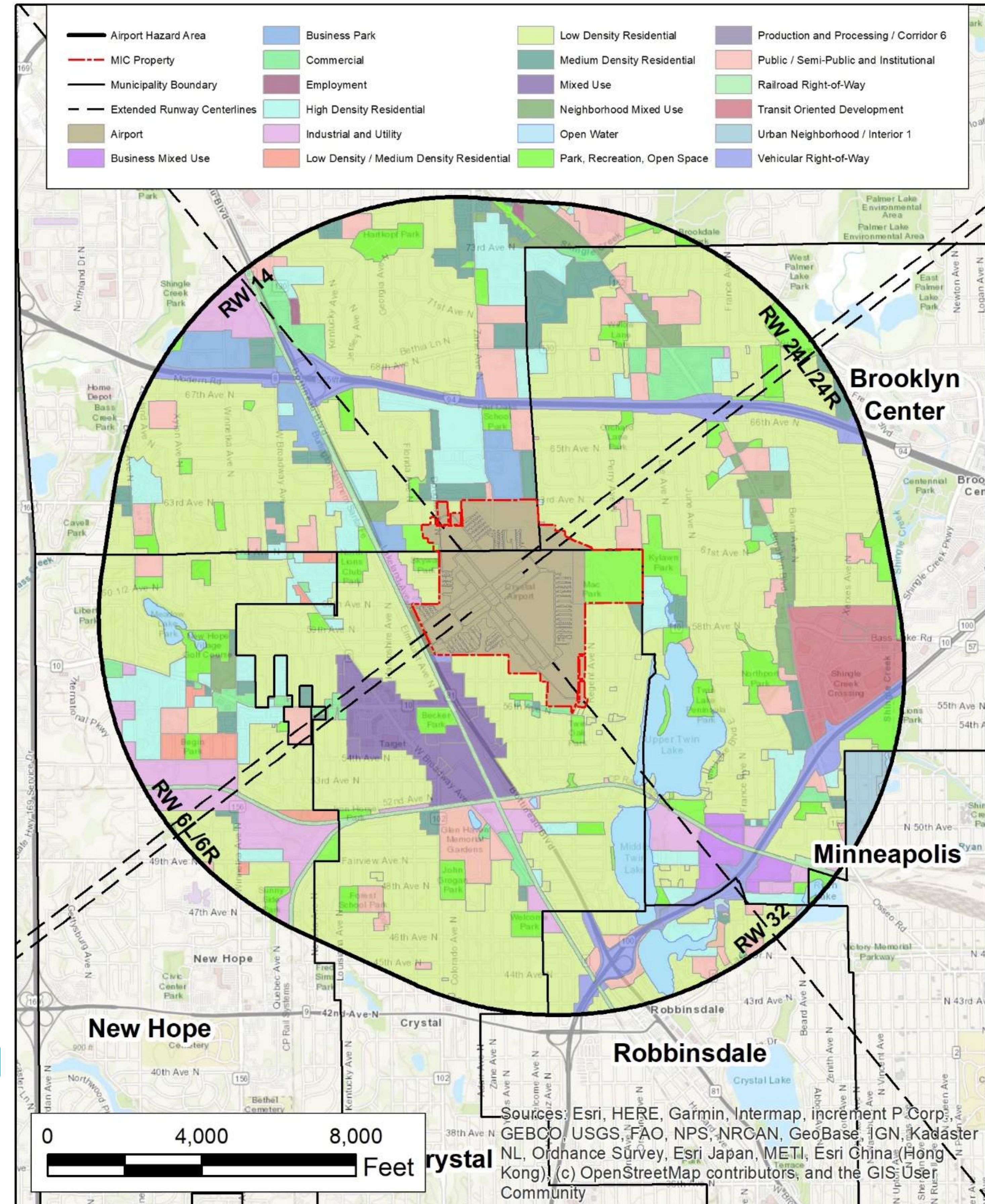
Metropolitan Council Future Land Use Data

- As of April 8, 2022
- Some categories have been combined for simplicity



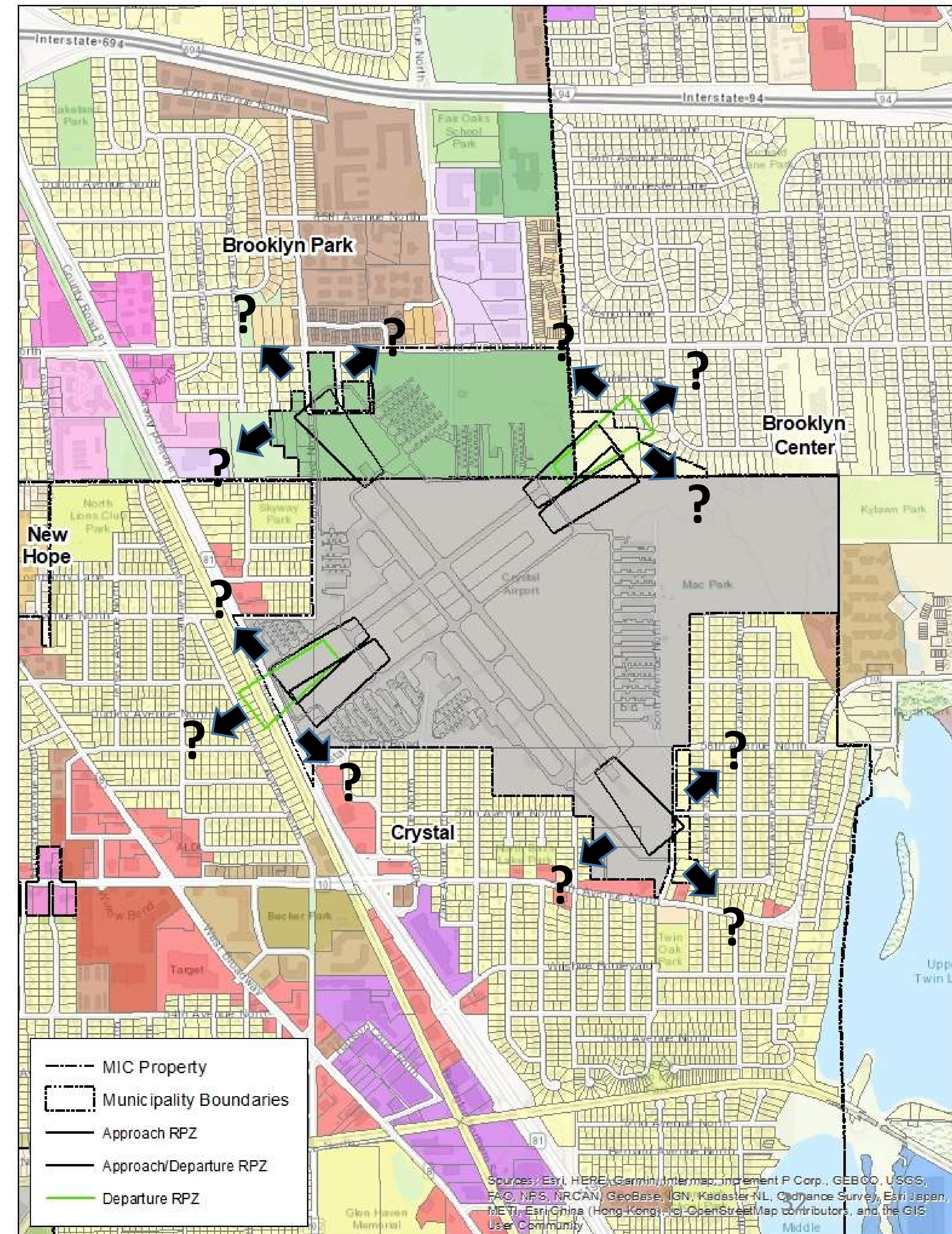
Location, Character of Surrounding Land Uses

- Fixed land use patterns, unlikely to change based on future land use guidance
 - Exceptions include Bottineau Blvd and Brooklyn Blvd transportation corridors



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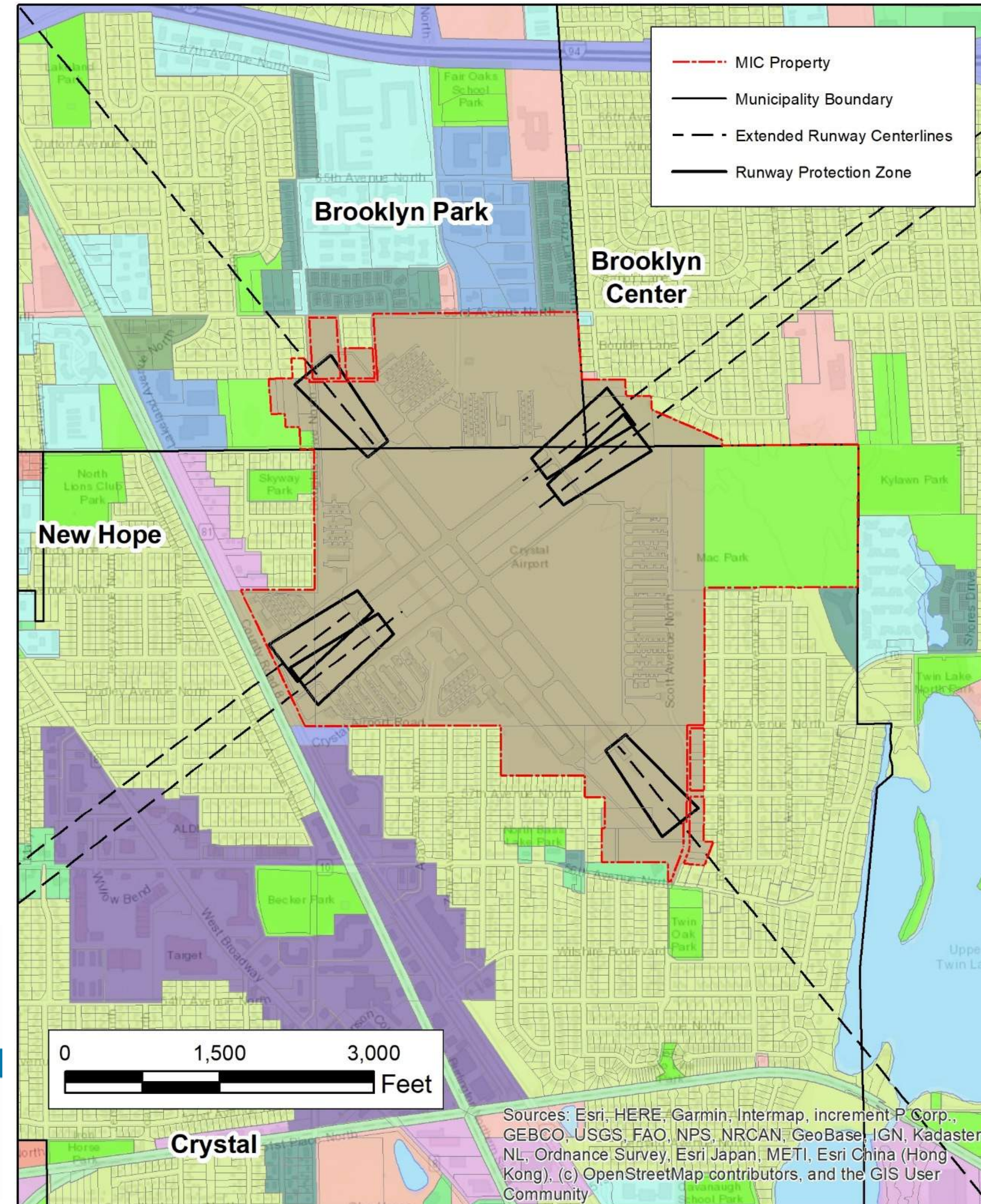
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Example Custom Zone

Example Custom Zone Criteria

- Federal Runway Protection Zones (RPZs)
- Undeveloped airport property adjacent to the RPZs
 - Outside perimeter fence, including MAC wetland area
 - Under approach surfaces
 - Not planned for non-aeronautical development
- Off-airport property not planned for future development in close proximity to the RPZs
 - Public parks



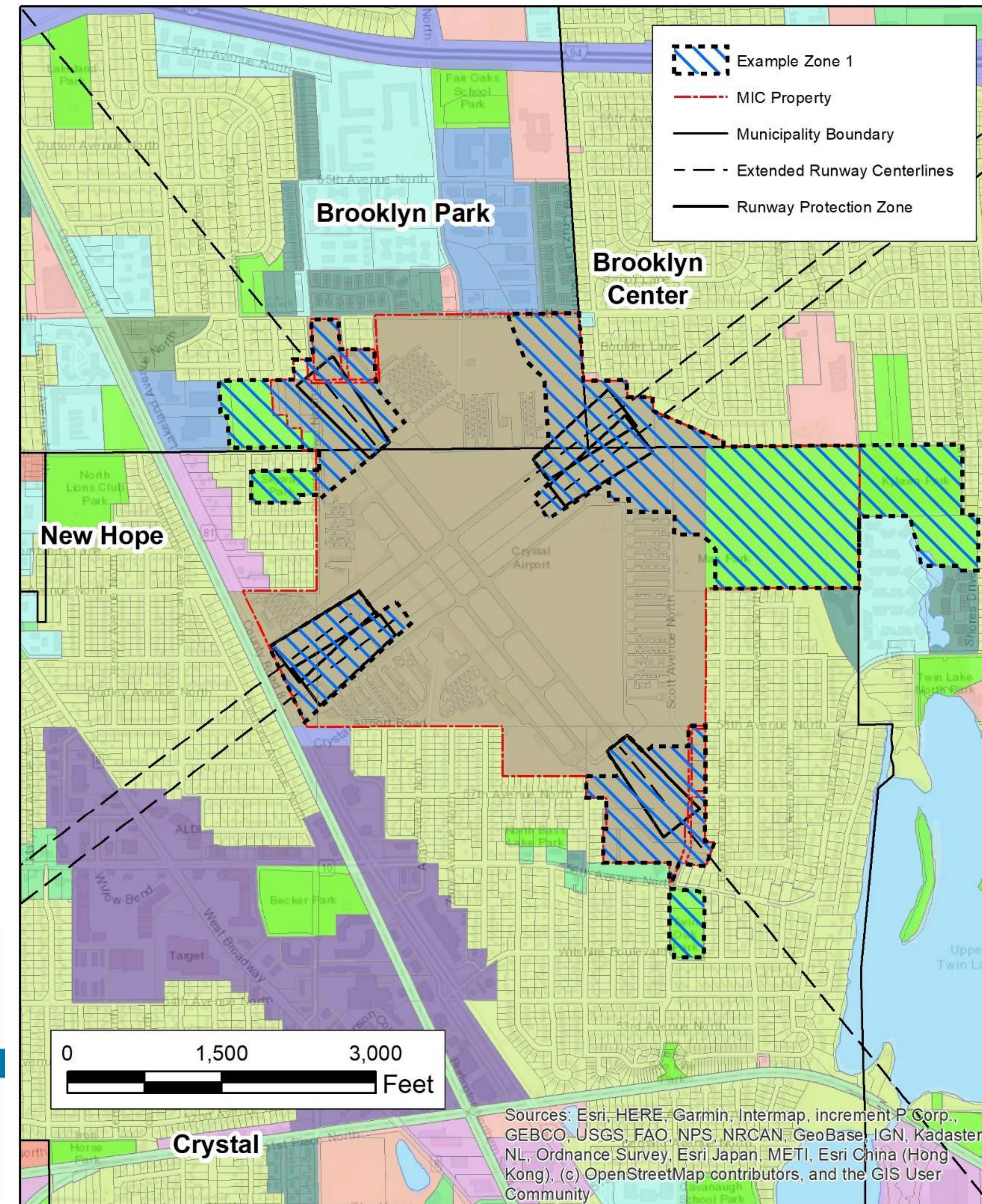
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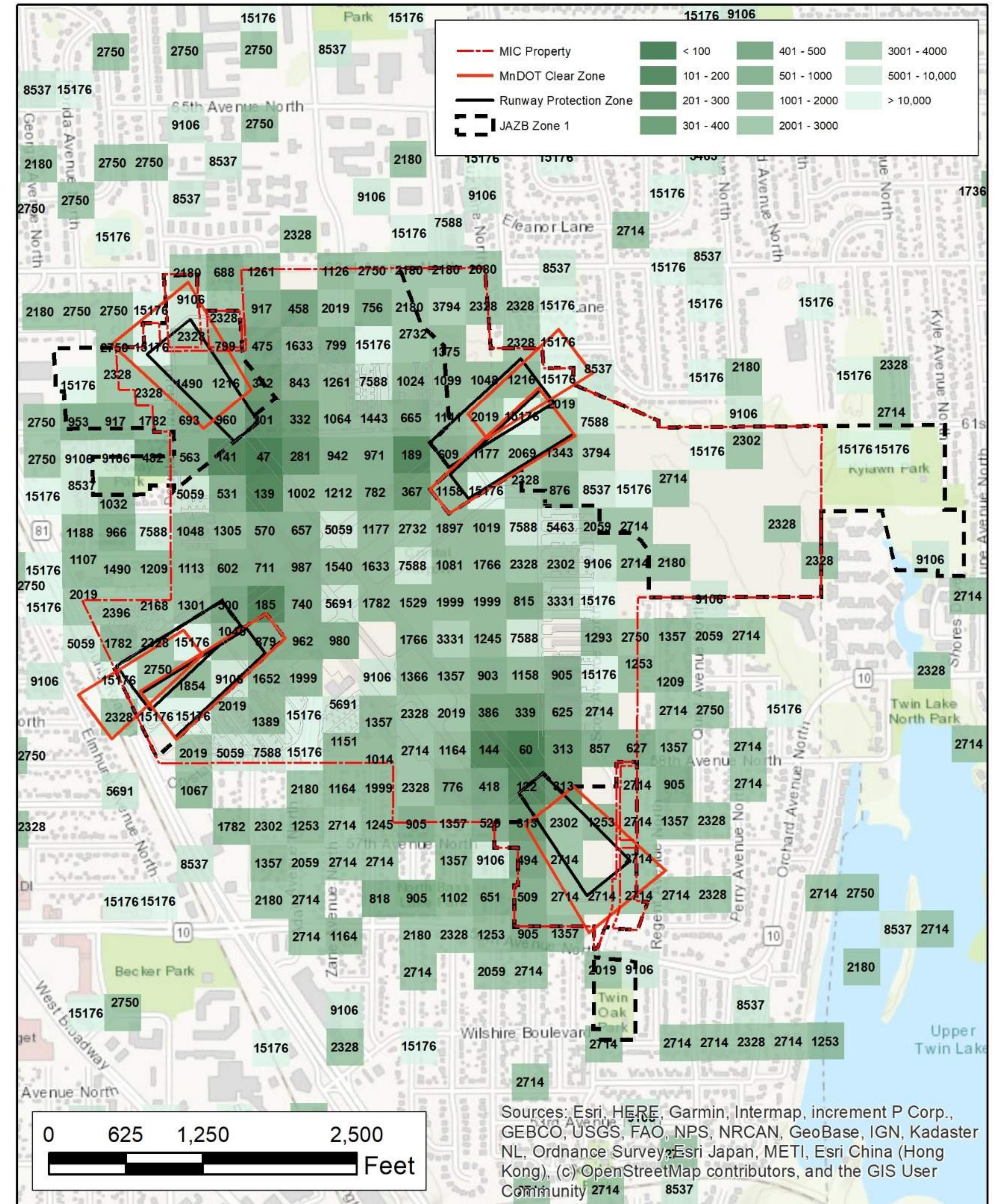
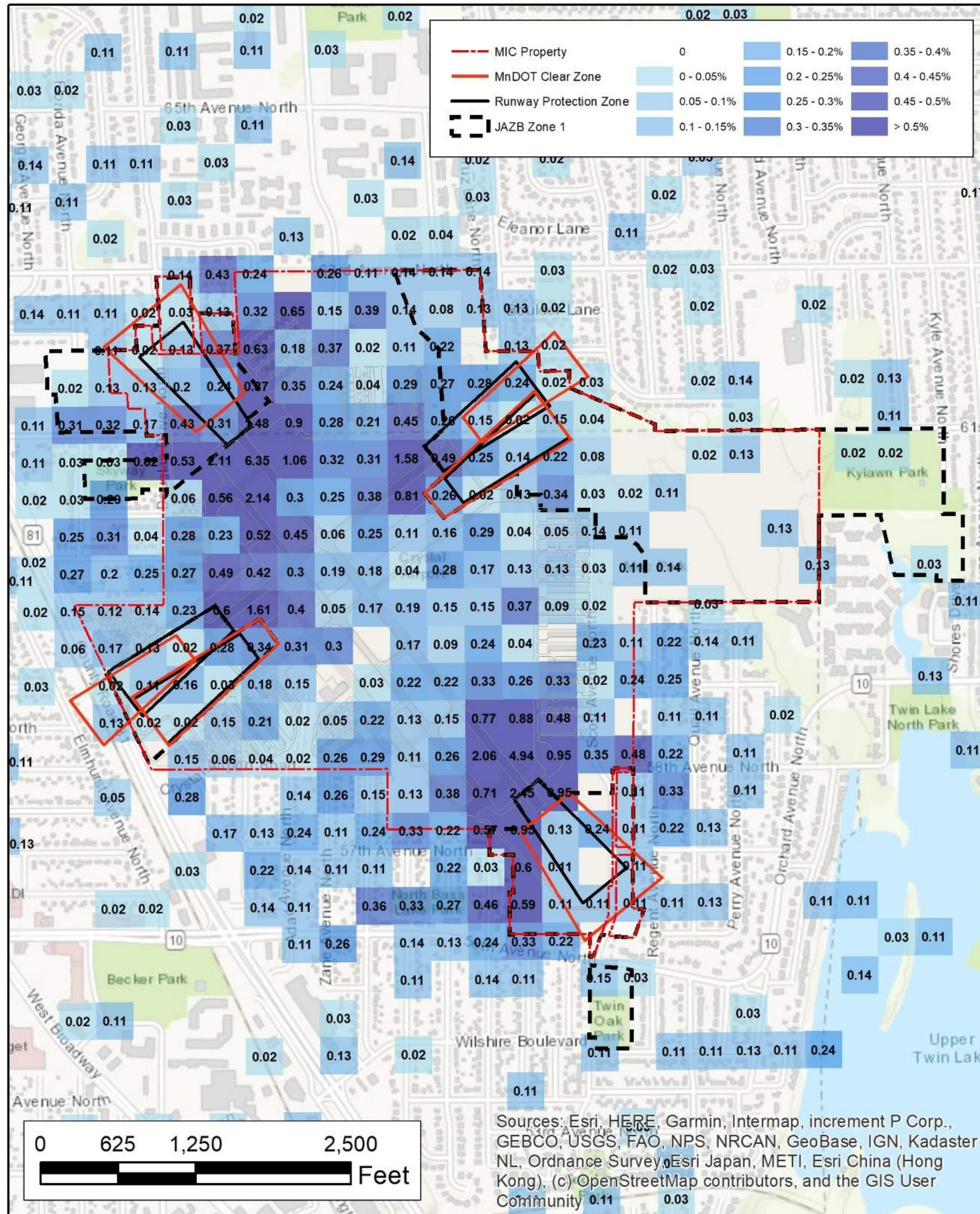
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Example Custom Zone Regulations

- Prohibited uses
 - Buildings
 - Other structural hazards
 - Land uses that bring together assemblies of people
- Permitted uses
 - Aircraft parking aprons
 - Taxiways
 - On-airport and off-airport roads

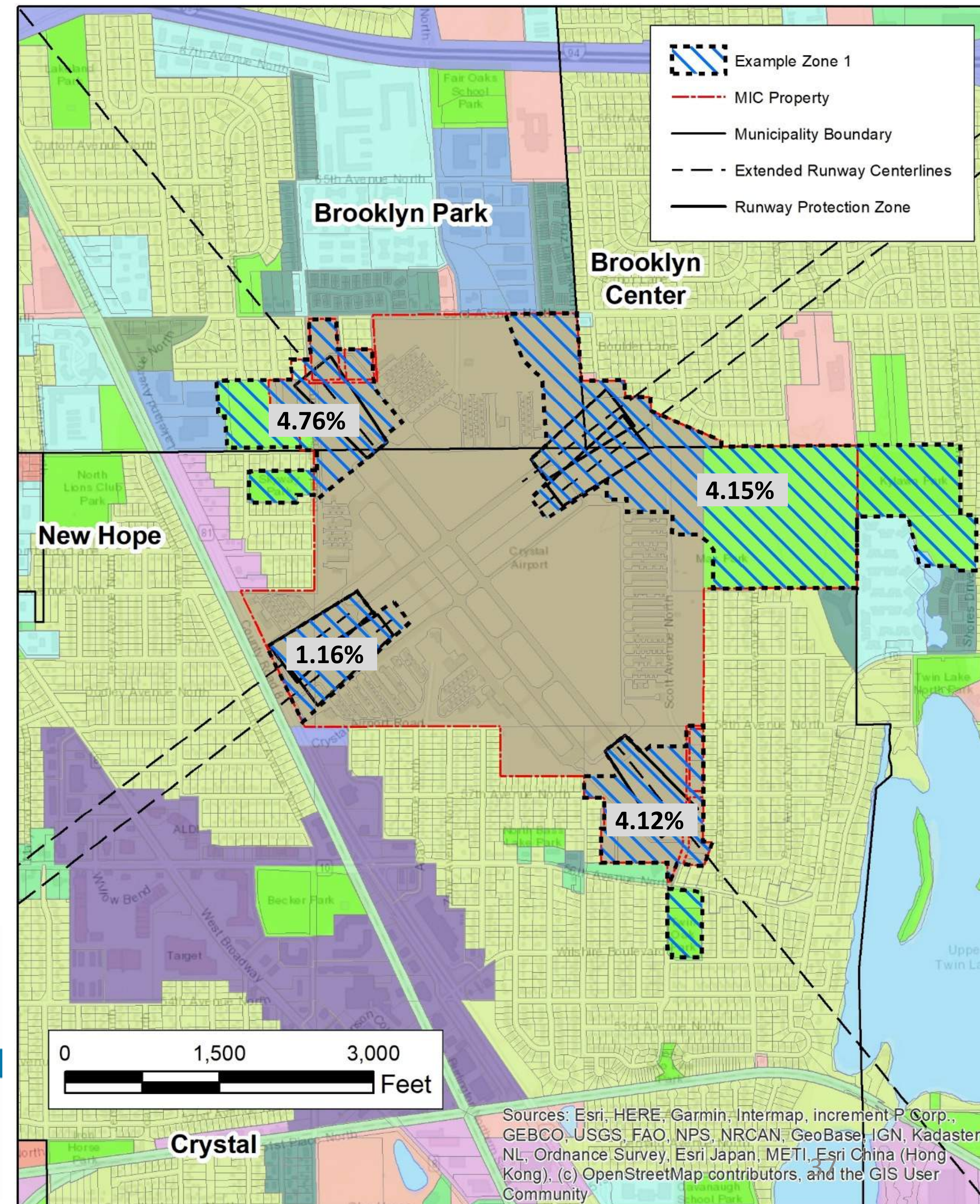




Example Custom Zone

Example Custom Zone Only Accident Probability

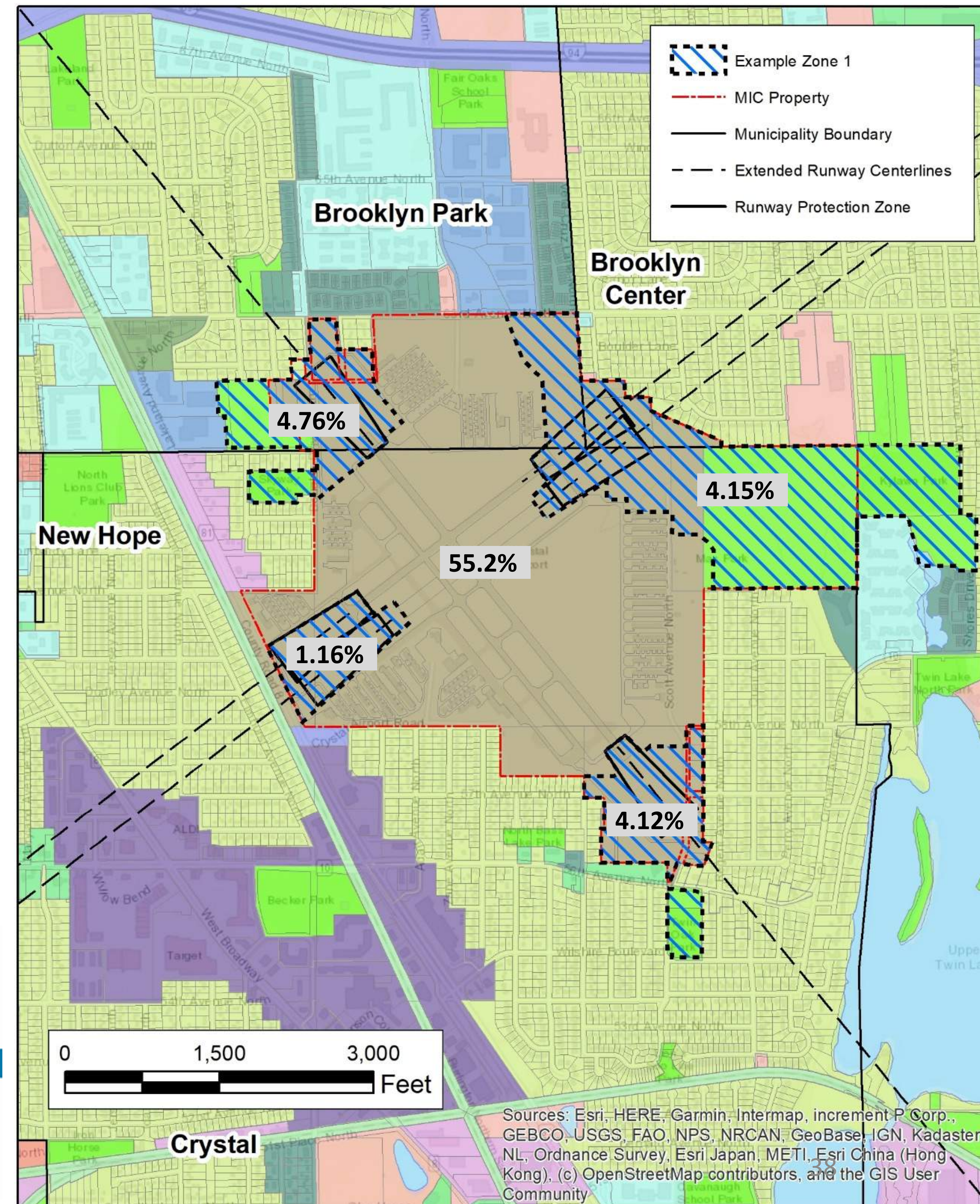
- ~14.4% accident probability captured within example custom zone
 - If an accident occurs at Crystal Airport, there is a 14.4% chance it will occur within Example Custom Zone
- ~21 years between accidents within Example Custom Zone

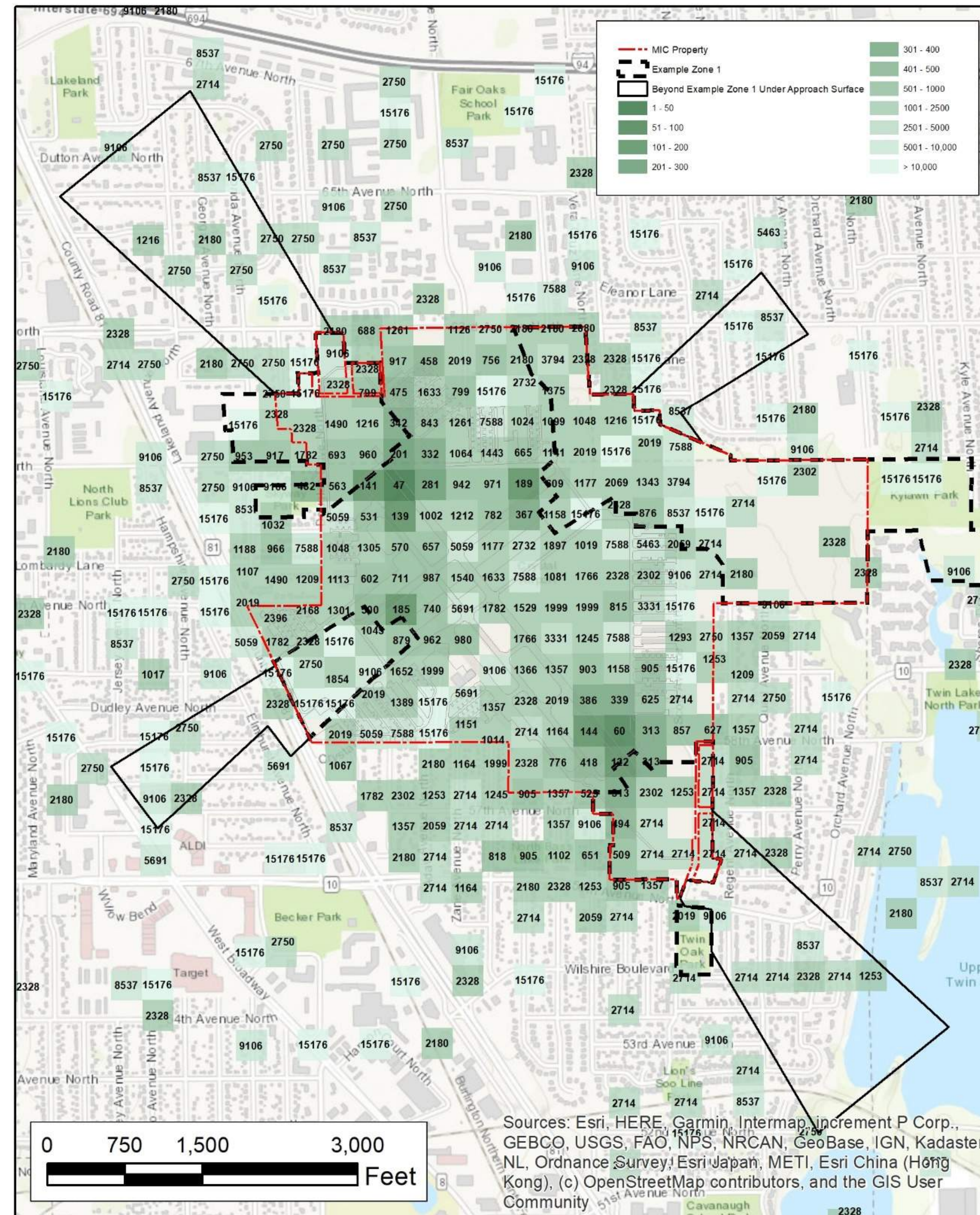
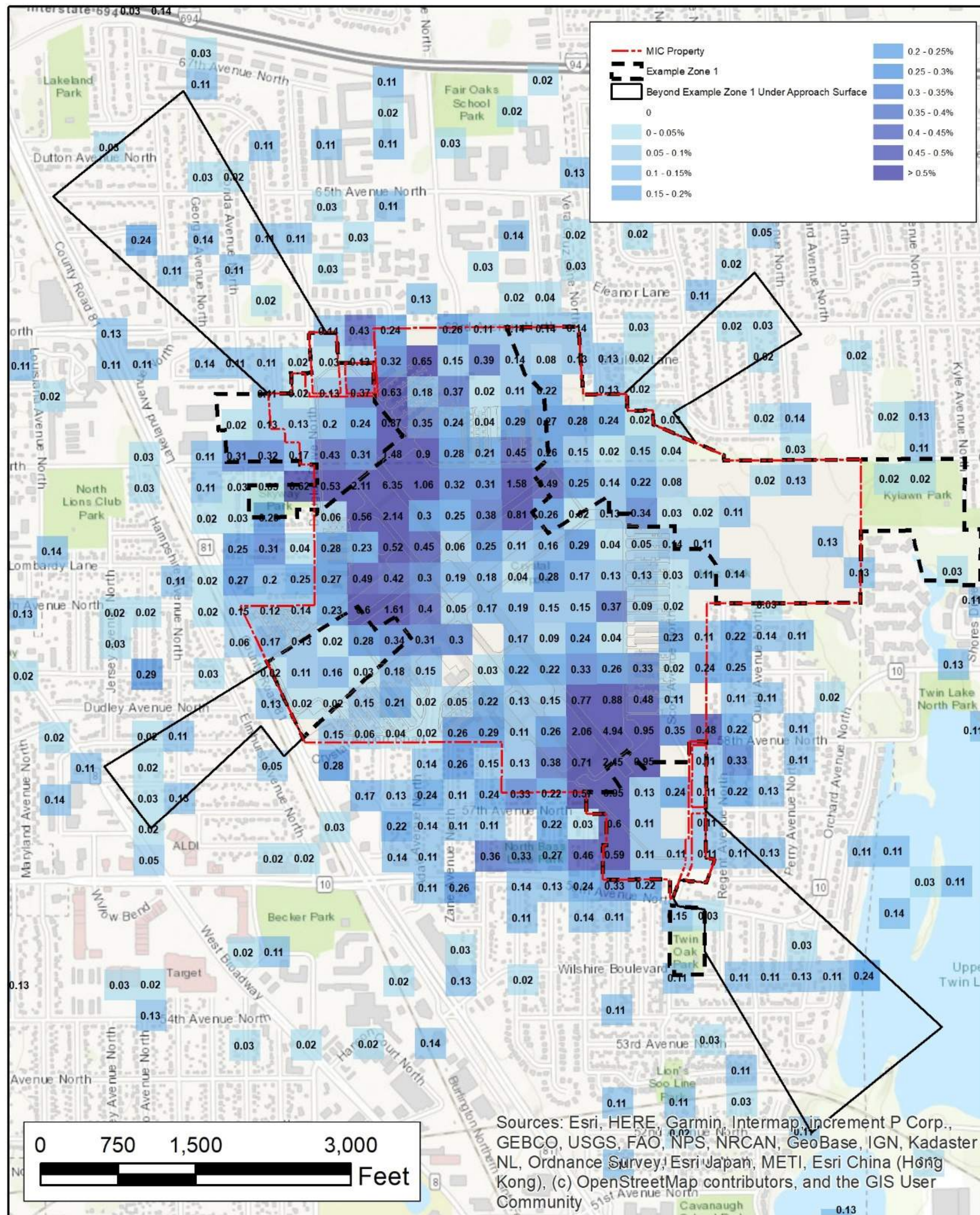


Example Custom Zone

Example Custom Zone + Airport Property Accident Probability

- ~69.4% accident probability captured within example custom zone and airport property line
 - If an accident occurs at Crystal Airport, there is a 69.4% chance it will occur within Example Custom Zone or airport property line
 - Leaves a 30.6% chance that an accident will occur outside Example Custom Zone or airport property line





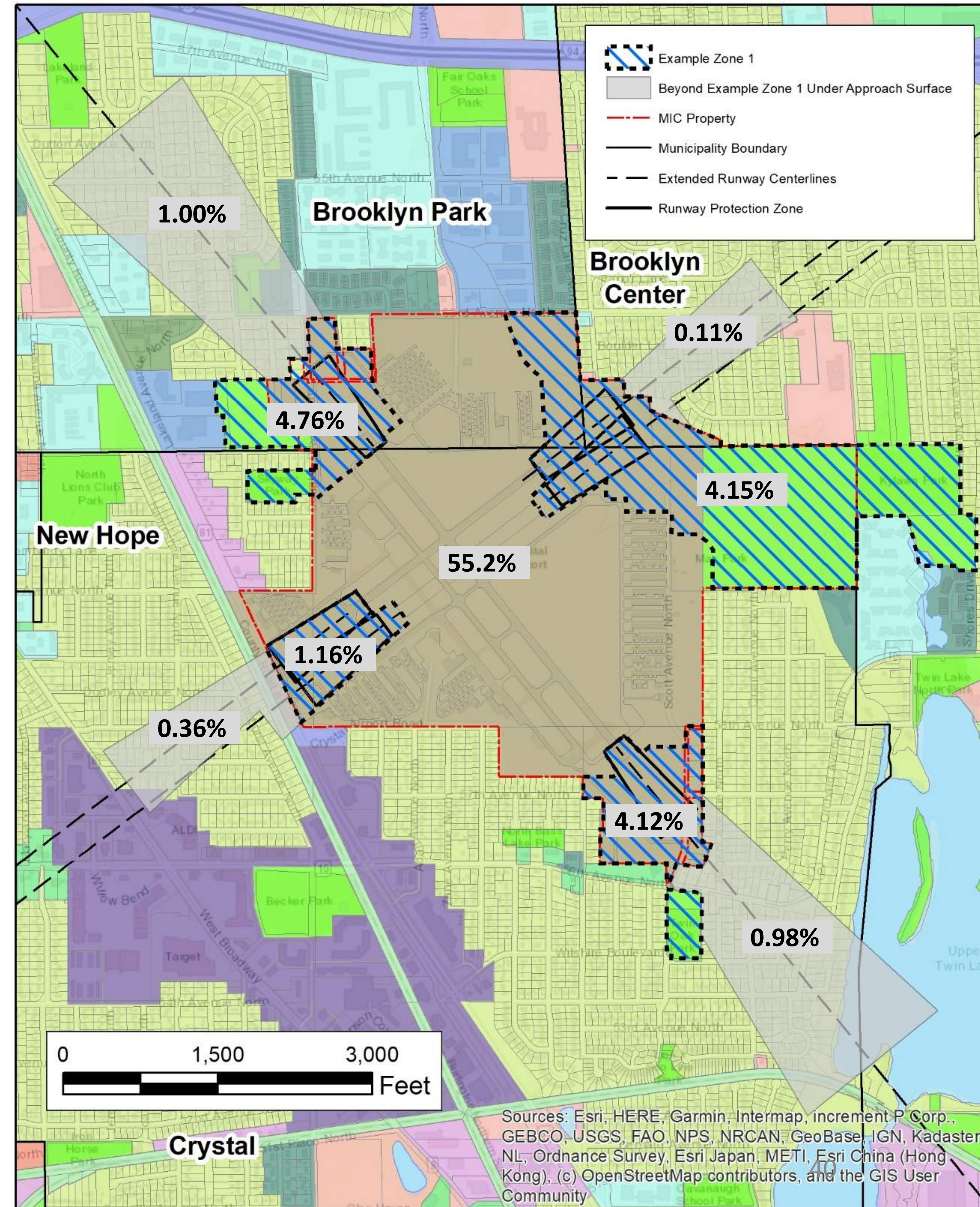
Example Custom Zone

Accident Probability Outside of Example Custom Zone Area

- Under the approach surface for the length of the runway

Runway	Accident Probability	Years Between Accidents
14	1.00%	298
32	0.98%	304
6L/6R	0.36%	827
24L/24R	0.11%	2707

A reasonable level of safety?

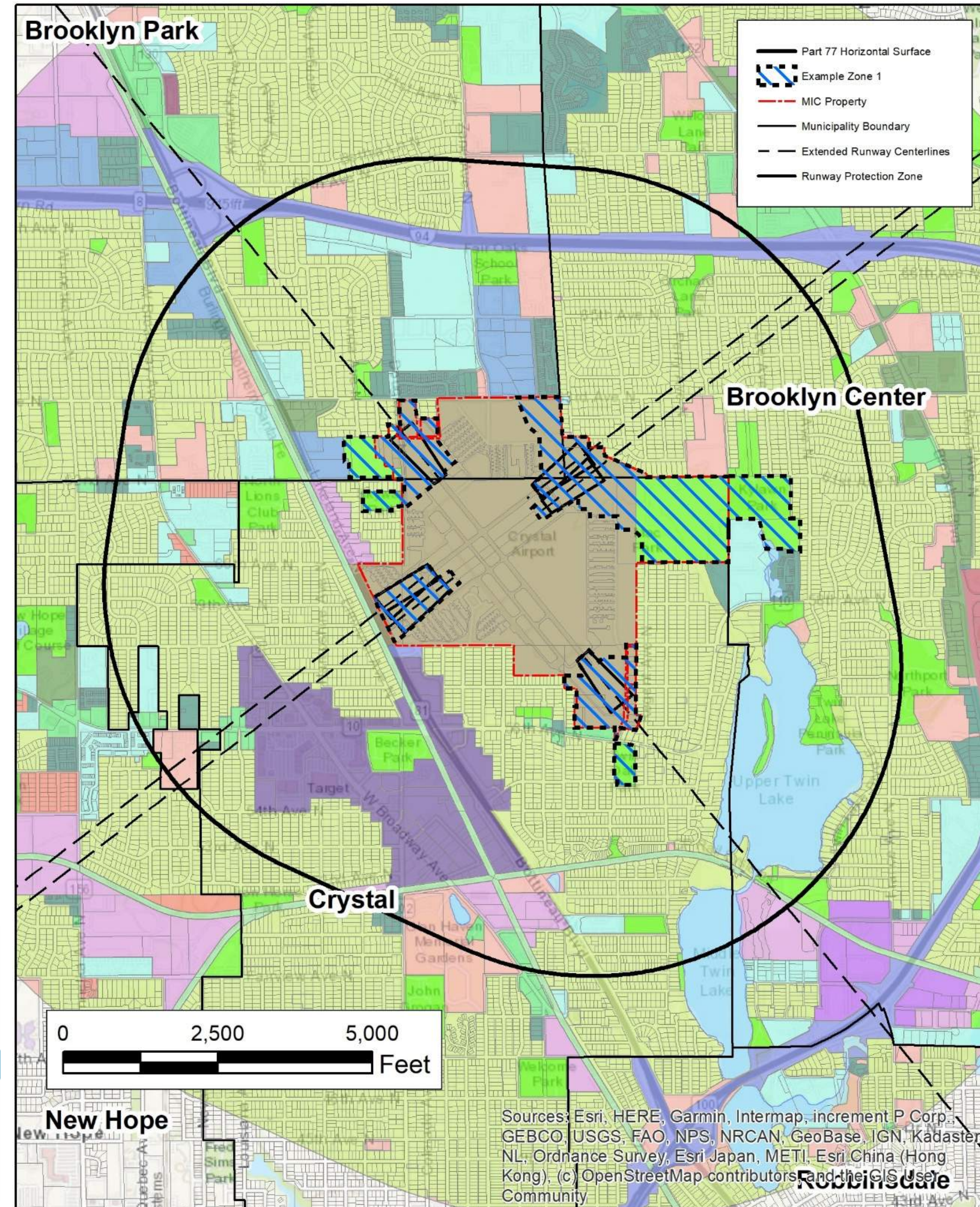


Example Custom Zone

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 cause 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
 - Is deemed a hazard to air navigation by the FAA or MnDOT as part of an FAA 7460 obstruction evaluation
 - Otherwise endanger the landing, taking off, or maneuvering of aircraft in the runway approach areas

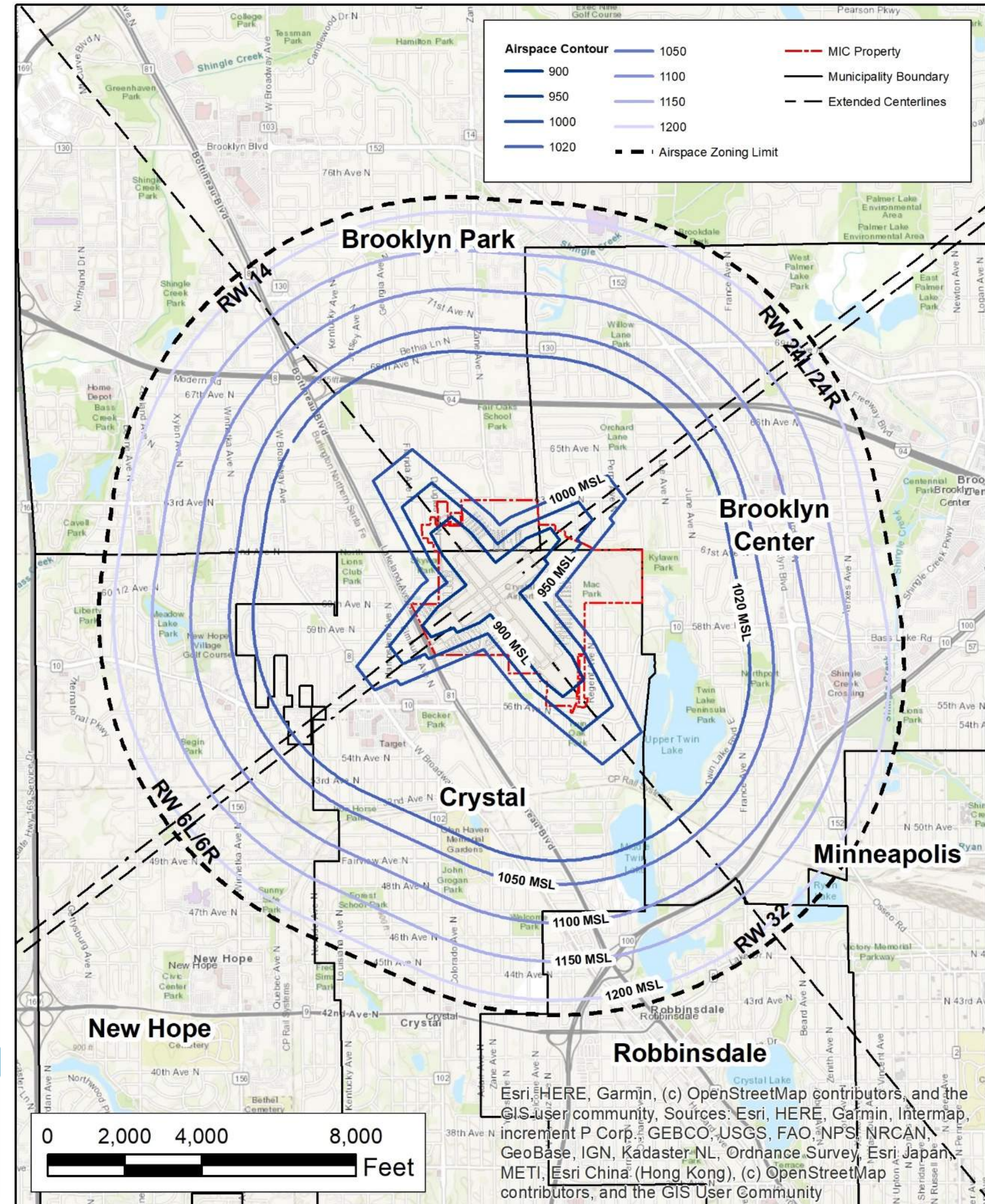


Airspace Zoning

Height Limitations

Based on FAA airspace criteria

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



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- Example Custom Zone for Discussion
- **Public Comments**
- Board Discussion on Custom Zoning Factors and Example Custom Zone
- Establish Next Meeting Date
- Adjourn



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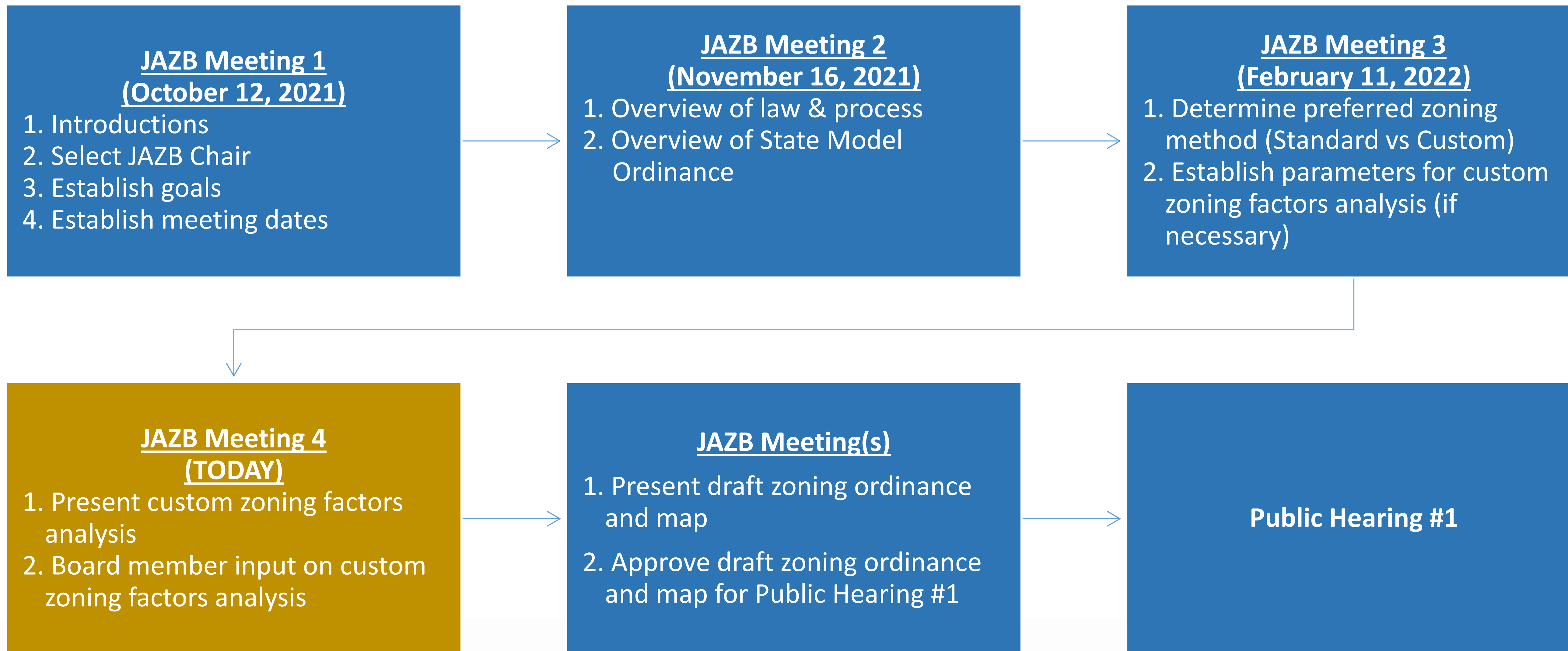


Agenda

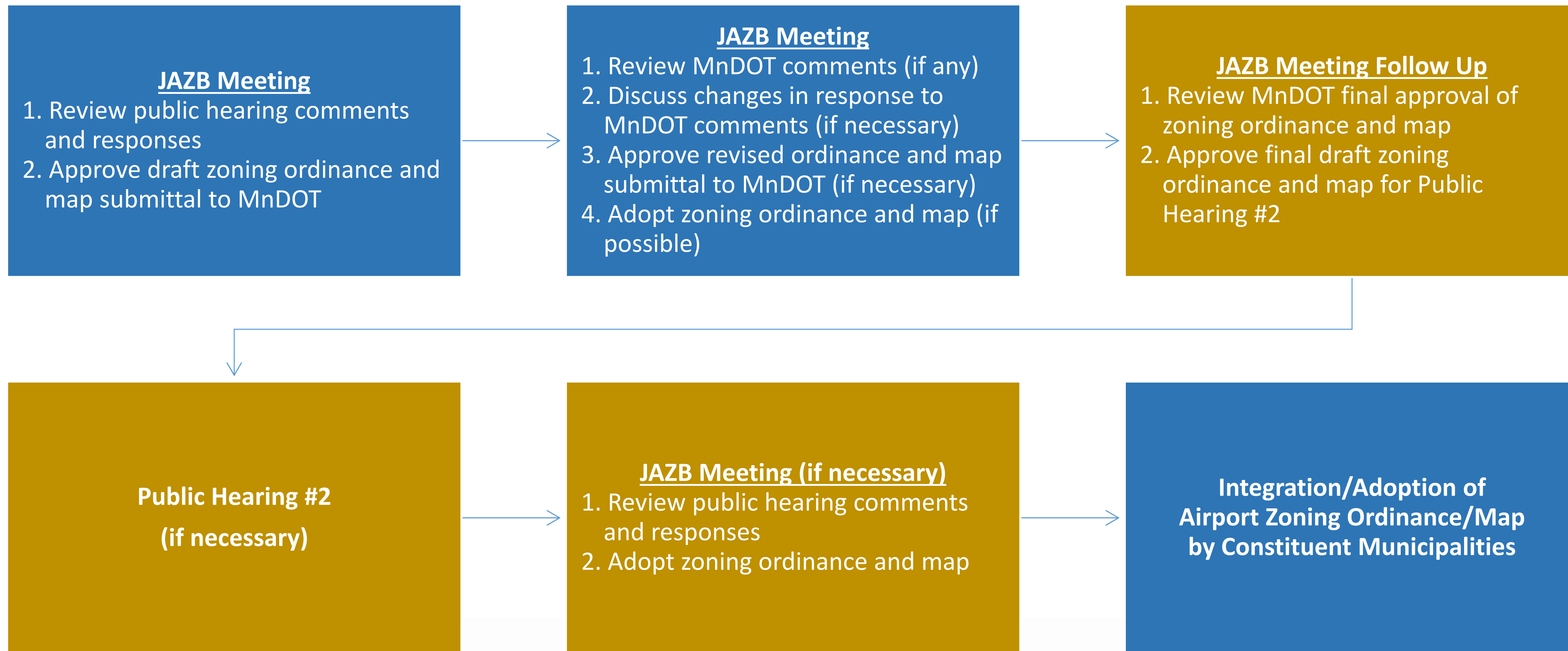
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Airport Zoning Procedural Steps



Airport Zoning Procedural Steps (continued)



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