JOINT AIRPORT ZONING BOARD MEETING PARTICIPATION BY TELEPHONE OR OTHER ELECTRONIC MEANS PURSUANT TO MINNESOTA STATUTES SECTION 13D.021

AUGUST 5, 2021
3:30 p.m.

Duluth International Airport
Amatuzio Conference Room

AGENDA

1. Roll Call

2. Approval of Minutes:
   a. July 1, 2021 Meeting Minutes

3. Agenda Approval

4. Community Reports

5. Public Input

6. Reports of Committees

7. Communications

8. Unfinished Business

9. New Business, Motions and Resolutions
   a. Resolution to Approve the Submittal of the Proposed Custom Airport Zoning Ordinance and Maps for the Duluth International Airport to MnDOT.

2a

DRAFT

Joint Airport Zoning Board Minutes
July 1, 2021
Duluth International Airport
Amatuzio Conference Room

Chair Kevin Comnick welcomed everyone and opened the meeting at 3:30 p.m. Participation for this Joint Airport Zoning Board meeting was in person and held by telephone or other electronic means pursuant to Minnesota Statutes Section 13D.021.

1. **Roll Call:**

Participating:

Kevin Comnick	Canosia	*Dan Golen	Canosia
*Don Monaco	Duluth	Suzanne Herstad	Rice Lake
*Patricia Stolee	Duluth	*Brent Malvick	Duluth
Eric Johnson	Hermantown	*John Geissler	Hermantown
*Steve Hanke	Deputy City Attorney	* Gary Eckenberg	Duluth.
* John Hegstrom	Rice Lake		

*Participated via electronic means.

Absent: Frank Jewell, Keith Musolf, SLC,

Visitors: *Mark Papko, *Darren Christopher, *Kyle Deming

2. **Approval of Minutes of Previous Meetings:** Motion by Eric Johnson to approve the minutes for the May 6, 2021 meeting, seconded by Suzanne Herstad . Roll call -- all ayes, motion carried.

3. **Agenda Items:** Motion by John Geissler to approve the agenda. Seconded by Gary Eckenberg. Roll Call -- all ayes, motion carried.

4. **Community Reports**: Bypassed

5. **Opportunity for Citizens to be Heard:** None.

6. **Reports of Committees:** Don Monaco, Steve Hanke and Darren Christopher, Work Scope Committee, summarized on discussions identifying and creating new zones 2.5 for both ends of 3/21. Ordinance language, legal descriptions and supporting analysis documents have been updated. Need to schedule a public hearing and then finalize the ordinance and analysis to resubmit to MnDOT. Chair Comnick thanked all involved for their work to get to this point. He recommended that the Board approve submission of this version for the public hearing and

set a date for the hearing. Discussion followed. Don Monaco made a motion to approve this version of the document for submission. Chair Comnick seconded. Roll Call -- all ayes, motion carried.

Discussion followed on a date, time, and platform for the public hearing. Suzanne Herstad moved to set the public hearing for Wednesday, July 21st, 6 p.m. in the Amatuzio Conference Room with virtual option. Eric Johnson seconded. Roll Call -- all ayes, motion carried. Chair Comnick expressed his appreciation to the Work Scope Committee and all the board members.

7. **Communications:** None

8. **Unfinished Business:** None

The next JAZB meeting date will be August 5th, 2021, 3:30 p.m.

Adjourn: Suzanne Herstad made a motion to adjourn the meeting. Chair Comnick seconded. Roll call -- all ayes, motion carried. Chair Comnick adjourned the July 1st JAZB meeting at 3:51 p.m.

Respectfully Submitted,

Mary Ann Wittkop
Recording Secretary

DULUTH INTERNATIONAL AIRPORT

ZONING ORDINANCE

CREATED BY THE DULUTH INTERNATIONAL AIRPORT

JOINT ZONING BOARD

Formed by and Comprised of:

CITY OF DULUTH

CITY OF HERMANTOWN

TOWNSHIP OF CANOSIA

CITY OF RICE LAKE

ST. LOUIS COUNTY

EFFECTIVE DATE: _____

THIS ORDINANCE AMENDS AND ENTIRELY REPLACES

DULUTH INTERNATIONAL AIRPORT ZONING ORDINANCE dated June 18, 1988,

recorded in the Office of the St. Louis, Minnesota, County Recorder as Document

No._____

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DULUTH INTERNATIONAL AIRPORT
ZONING ORDINANCE

CREATED BY THE

CITY OF DULUTH – CITY OF HERMANTOWN – CANOSIA TOWNSHIP
CITY OF RICE LAKE – ST. LOUIS COUNTY
JOINT AIRPORT ZONING BOARD

AN ORDINANCE REGULATING AND RESTRICTING THE HEIGHT OF STRUCTURES AND OBJECTS OF NATURAL GROWTH, AND OTHERWISE REGULATING THE USE OF PROPERTY, IN THE VICINITY OF THE DULUTH INTERNATIONAL AIRPORT BY CREATING THE APPROPRIATE ZONES AND ESTABLISHING THE BOUNDARIES THEREOF; PROVIDING FOR CHANGES IN THE RESTRICTIONS AND BOUNDARIES OF SUCH ZONES; DEFINING TERMS USED HEREIN; REFERRING TO THE DULUTH INTERNATIONAL AIRPORT ZONING MAPS WHICH ARE INCORPORATED IN AND MADE A PART OF THIS ORDINANCE; PROVIDING FOR ENFORCEMENT; ESTABLISHING A BOARD OF ADJUSTMENT; AND IMPOSING PENALTIES.

IT IS HEREBY ORDAINED BY THE DULUTH INTERNATIONAL AIRPORT JOINT AIRPORT ZONING BOARD COMPRISED OF THE CITY OF DULUTH – CITY OF HERMANTOWN – CANOSIA TOWNSHIP – CITY OF RICE LAKE – ST. LOUIS COUNTY PURSUANT TO THE AUTHORITY CONFERRED BY THE MINNESOTA STATUTES 360.061 – 360.074, AS FOLLOWS:

SECTION 1: PURPOSE AND AUTHORITY

The Duluth International Airport Joint Airport Zoning Board, created and established by joint action of the City Councils of Duluth, Rice Lake, and Hermantown, and the Board of County Commissioners of St. Louis County, and the Town Board of Canosia pursuant to the provisions and authority of Minnesota Statutes 360.063, hereby finds and declares that:

A. The Duluth International Airport is an essential public facility.
B. An Airport Hazard endangers the lives and property of users of the Duluth International Airport, and property or occupants of land in its vicinity, and also if the obstructive type, in effect reduces the size of the area available for the landing, takeoff, and maneuvering of aircraft, thus tending to destroy or impair the utility of the Duluth International Airport and the public investment therein.
C. The creation or establishment of an Airport Hazard is a public nuisance and an injury to the region served by the Duluth International Airport.
D. For the protection of the public health, safety, order, convenience, prosperity and general welfare, and for the promotion of the most appropriate use of land, it is necessary to prevent the creation or establishment of Airport Hazards.
E. The prevention of these Airport Hazards and Aircraft Accidents should be accomplished, to the extent legally possible, by the exercise of the police power without compensation

SECTION 2: SHORT TITLE

This Ordinance shall be known as "Duluth International Airport Zoning Ordinance." Those sections of land affected by this Ordinance are indicated in "Exhibit A" which is attached to this Ordinance.

SECTION 3: DEFINITIONS

For the purposes of this Ordinance, the following words, terms, and phrases shall have the meanings herein given unless otherwise specifically defined by Minnesota Statutes Chapter 360 (Airports and Aeronautics), Section 360.013 (Definitions), and its successors.

Abandoned Structure – a Non-Conforming Structure that has not been legally occupied or used for any commercial or residential purpose for at least one consecutive year as determined by the Local Airport Zoning Administrator.

Abandoned Use – a Non-Confirming Use that has ceased to have been actively conducted for at least one (1) consecutive year as determined by the Local Airport Zoning Administrator.

Agricultural Uses - land used primarily for the production of crops or livestock including irrigated meadows, irrigated and dry pasture, irrigation ditches, stock drive routes, lands used for barns, corrals and storage of crops or agricultural products, but not including lands used primarily for the production of commercial timber; or

Aircraft - any contrivance now known or hereafter invented, used, or designed for navigation of or flight in the air, but excluding parachutes. (Minn. Stat. 360.013)

Aircraft Accident -an occurrence incident to flight in which, because of the operation of an aircraft, a person (occupant or non-occupant) receives fatal or serious injury or an aircraft receives substantial damage. Except as provided below, substantial damage means damage or structural failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered substantial damage.

Airport- the Duluth International Airport lands located in Sections 1, 2, 3, 11, 12, Township 50, Range 15; Section 6, Township 50, Range 14; and Section 31, Township 51, Range 14 that is used, or intended for use, for the landing and take–off of aircraft, and any appurtenant areas that are used, or intended for use, for airport buildings or other airport facilities or rights of way, together with all airport buildings and facilities located thereon.

Airport Boundary - those lands including the property owned by the City of Duluth, by the Government of the United States, and by the State of Minnesota and their respective subdivisions which are used for aeronautical purposes and are contiguous with the runway and building area facilities. The airport boundaries are illustrated in the Airport Property Map of the approved set of Airport Layout Plans on file in the offices of the Duluth Airport Authority.

Airport Elevation -the established elevation of the highest point on the usable landing area which elevation is established to be 1,428 feet above mean sea level.

Airport Hazard -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 restricted landing area or is otherwise hazardous to such landing or taking off. (Minn. Stat. 360.013)

Airport Safety Zone - an area subject to land use zoning controls adopted under Minnesota Statutes sections 360.061 to 360.074 if the zoning controls regulate (1) the size or location of buildings, or (2) the density of population. (Minn. Stat. 394.22, Subd. 1(a))

Airport Zoning Map- the Duluth International Airport Zoning Map prepared by RS&H, and adopted and attached hereto as Exhibit C of the Duluth International Airport Zoning Ordinance.

Airspace Zones – the Primary Zone, Horizontal Zone, Conical Zone, Approach Zone, Precision Instrument Approach Zone, and Transitional Zone, whose locations and dimensions are indicated on the Airport Zoning Map

Airspace Surface or Imaginary Surface - The imaginary areas in space and on the ground that are established by this Ordinance and/or the FAA in relation to the Duluth International Airport and its runways as the basis for regulating obstructions to air travel.

Approach Zone - All that land which lies directly under an imaginary approach surface longitudinally centered on the extended centerline at each end of the runway. The inner edge of the approach surface is at the same width and elevations as, and coincides with, the end of the primary surface; as illustrated in Airport Zoning Map.

Board of Adjustment – Board of Adjustment for the Duluth International Airport Joint Airport Zoning Board.

Building -Any structure designed or built for the support, enclosure, shelter or protection of persons, animals, chattels or property of any kind, and when separated by party or division walls without openings, each portion of such building so separated shall be deemed a separate building.

Commissioner - the commissioner of transportation of the State of Minnesota. (Minn. Stat. 360.013)

Conical Zone - all that land which lies directly under an imaginary conical surface extending upward and outward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of approximately 4,000 feet from the end of Runway 9-27 and Runway 3-21 as measured radially outward from the periphery of the horizontal surface; whose location and dimensions are indicated on the Airport Zoning Map

Department - the Minnesota Department of Transportation. (Minn. Stat. 360.013)

Dwelling - any building or portion thereof designed or used as a residence or sleeping place of one or more persons.

Duluth Airport Authority ("DAA") – A political subdivision of the State of Minnesota established pursuant to Minnesota Laws of 1969, Chapter 577 for the purpose of controlling and managing City of Duluth airport facilities. DAA has the exclusive power to receive, control, and order the expenditure of any and all moneys and funds in the control and management of the City of Duluth airport facilities.

Duluth International Airport Joint Airport Zoning Board ("JAZB") – The joint airport zoning board established pursuant to the authority conferred by Minnesota Statutes Sections 360.061-

360.074 comprised of appointed representatives of the St. Louis County, City of Duluth, City of Hermantown, Canosia Township, and the City of Rice Lake.

Entities or, individually, Entity – mean the Cities of Hermantown, Duluth, Rice Lake, Canosia Township and County of St. Louis, Minnesota.

Federal Aviation Administration (FAA) – A federal agency charged with regulating air commerce to promote its safety and development; encourage and develop civil aviation, air traffic control, and air navigation; and promoting the development of a national system of airports.

Federal Aviation Regulations (FAR) – Regulations established and administered by the FAA that govern civil aviation and aviation-related activities.

FAR Part 36 – Regulation establishing noise standards for the civil aviation fleet.

FAR Part 77 – Objects Affecting Navigable Airspace - Part 77 (a) establishes standards for determining obstructions in navigable airspace; (b) defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; (c) provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; (d) provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and (e) provides for establishing antenna farm areas.

Group A Use – means assembly, churches, restaurants, movie theaters, banquet halls, bars, art galleries, casinos, bowling alleys, dance halls, funeral parlors, gymnasiums, indoor pools/tennis courts, lecture halls, museums, arenas, skating rinks, bleachers, grandstands, stadiums as described in the 2018 International Building Code, as may be revised from time to time.

Group E Use – means education use of a building by six or more at any one time for educational purposes through twelfth grade, daycare facilities for more than five children older than two and one-half years old for fewer than twenty-four hours per day as described in the 2018 International Building Code, as may be revised from time to time.

Group I-2 Use – means buildings used for medical care on a twenty-four hour basis for more than five persons who are incapable of self-preservation. Examples include detoxification, foster care, hospital, nursing homes and other supervised living facilities as described in the 2018 International Building Code, as may be revised from time to time.

Group R-1 Use – means residential occupancies containing sleeping units where occupants are primarily transient. Examples include B&Bs with more than six guest rooms, boarding homes with more than ten occupants, and congregate living with more than ten units, and hotels/motels as described in the 2018 International Building Code, as may be revised from time to time.

Hazard to Air Navigation - any object that has a substantial adverse effect upon the safe and efficient use of navigable airspace. Any obstruction to air navigation is presumed to be a hazard to air navigation unless an FAA aeronautical study has determined otherwise.

Height of Building - the vertical distance measured from the highest ground elevation adjoining the front wall of the building to the highest point of the building

Height of Tower or Structure - the vertical distance measured from the pre-existing grade level to the highest point on the tower or structure, even if said highest point is an antenna or lightening protection device.

Horizontal Surface - all that land which lies directly under an imaginary horizontal surface 150 feet above the established airport elevation; whose location and dimensions are indicated on the Airport Zoning Map.

Hospital - an institution that is built, staffed, and equipped for the diagnosis of disease; for the medical and surgical treatment of in-patients whether they be sick or injured and for their overnight housing during this process. Hospital services include the care and treatment of non-ambulatory patients, intensive care units and acute care services. Outpatient surgery and other treatment centers where overnight stays are provided are not hospitals for the purposes of this definition.

Industrial Use - the use of land or buildings for the production, manufacture, warehousing, storage, or transfer of goods, products, commodities or other wholesale items.

Land - Ground, soil, or earth, including structures on, above, or below the surface.

Landing Area - means the area of the airport used for the landing, taking off or taxiing of aircraft.

Local Airport Zoning Administrator - the person or position designated in the Local Airport Zoning Ordinance to administer and enforce the Local Airport Zoning Ordinance within their political subdivision

Local Airport Zoning Ordinance – means the ordinances as adopted by the City of Hermantown, City of Rice Lake, City of Duluth, Canosia Township, and St. Louis County and codified as a zoning ordinance of that political subdivision.

Material Change in Use – means that there is a change in the purposes for which the circumstances in which a building or property is used.

Material Expansion – means an increase in the floor or building coverage area or volume of an existing building.

Navigable Airspace - airspace at and above the minimum flight altitudes prescribed in the FAR's including airspace needed for safe takeoff and landing (refer to FAR Part 77 and 91).

Non-Conforming Lot - a lot of record created prior to the Effective Date of this Ordinance that does not conform to the requirements of this Ordinance.

Non-Conforming Structure - any structure constructed, converted or adopted for a use prior to the Effective Date of this Ordinance that does not conform to the requirements of this Ordinance.

Non-Conforming Use - any use of a structure or land or arrangement of land and structures existing prior to the Effective Date of this Ordinance that does not conform to the requirements of this Ordinance.

Non-Precision Instrument Runway - a runway having an existing or Planned straight-in instrument approach procedure utilizing air navigation facilities with only horizontal guidance, and for which no precision approach facilities are Planned.

Ordinance- This Duluth International Airport Zoning Ordinance, including all exhibits, appendices, and maps attached hereto.

Obstruction - Any structure, tree, plant or other object of natural growth that penetrates one or more of the applicable Navigable Airspaces, imaginary surfaces, or imaginary zones defined and illustrated in this Ordinance.

Permit- type of written authorization that must be granted by a government or other regulatory body before any activity regulated by the Local Airport Zoning Ordinance can legally occur.

Person - any individual, firm, partnership, corporation, company, association, joint stock association, or body politic; and includes any trustee, receiver, assignee, or other similar representative thereof. (Minn. Stat. 360.013)

Planned - as used in this Ordinance refers only to those proposed future airport developments that are so indicated on a planning document having the approval of the Federal Aviation Administration, the Department of Transportation, Division of Aeronautics, and Duluth Airport Authority.

Precision Instrument Approach Zone - all that land which lies directly under an existing or Planned imaginary precision instrument approach surface longitudinally centered on the extended centerline at each end of Precision Instrument Runways 9-27 and 3-21, The inner edge of the precision instrument approach surface is at the same width and elevation as, and coincides with, the end of the primary surface. The precision instrument approach surface inclines upward and outward at a slope of 50:1 for a horizontal distance of approximately 10,000 feet expanding uniformly to a width of approximately 4,000 feet, then continues upward and outward for an additional horizontal distance of approximately 40,000 feet at a slope of 40:1 expanding uniformly to an ultimate width of approximately 16,000 feet; whose location and dimensions are indicated on the Airport Zoning Map

Precision Instrument Runway - a runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), a Microwave Landing System (MLS), or a Precision Approach Radar (PAR), a Transponder Landing System (TLS), or a satellite-based system capable of operating to the same level of precision guidance provided by the other included systems. Also, a runway for which such a precision instrument approach system is Planned.

Primary Zone -All that land which approximately lies directly under an imaginary primary surface longitudinally centered on a runway and extending 200 feet beyond each end of Runways 9-27 and 3-21. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline; whose location and dimensions are indicated on the Airport Zoning Map

Public Assembly Use – A structure or outdoor facility where concentrations of people gather for purposes such as deliberation, education, shopping, business, entertainment, amusement, sporting events, or similar activities, but excluding air shows. “Public assembly use” does not include places where people congregate for relatively short periods of time, such as parking lots and bus stops, or uses approved by the FAA in an adopted airport master plan.

Public, Civic and Institutional Uses - uses of a public, quasi-public, nonprofit, or charitable nature generally providing a local service to the people of the community. Generally, these uses provide the service on-site or have employees at the site on a regular basis. The service is ongoing, not just for special events. This use category includes the following use types:

a) Community centers or facilities that have membership provisions or are open to the general public to join at any time; and
b) Facilities for the provision of public services, including governmental offices and public safety and emergency response services, such as police, fire and ambulance services. Such facilities often need to be located in or near the area where the service is provided.

Religious Assembly - a facility or area for people to gather for public worship, religious training or other religious activities including a church, temple, mosque, synagogue, convent, monastery or other structure, together with its accessory structures, including a parsonage or rectory. This use does not include home meetings or other religious activities conducted in a privately occupied residence. Accessory uses may include meeting rooms and childcare provided for persons while they are attending assembly functions.

Resource Extraction Use - uses involved in the process of (1) removing or extracting minerals and building stone from naturally occurring veins, deposits, bodies, beds, seams, fields, pools or other concentrations in the earth's crust, including the preliminary treatment of such ore or building stone; and (2) the extraction, exploration or production of oil or natural gas resources, including oil and gas wells and accessory offices, storage buildings, rig camps and gas transmission lines.

Runway - any existing or Planned paved surface or turf-covered area of the airport that is specifically designated and used or Planned to be used for aircraft landing and takeoff.

Safety Zone – The land use safety zones (Zones 1, 2 and 3) established by this Ordinance further illustrated in the Airport Zoning Map. *See also* Airport Safety Zone.

Site - a parcel or several adjoining parcels of land under common ownership.

Slope - an incline from the horizontal expressed in an arithmetic ratio of horizontal magnitude to vertical magnitude. (e.g., slope = 3:1 = 3 feet horizontal to 1 feet vertical).

Structure **-** Structure. Anything constructed or erected, the use of which requires a location on the ground, or attached to something having a location on the ground.

Structural Alteration - Any change in the supporting members of a building, such as bearing walls, columns, beams or girders, or any substantial changes in the roofs or exterior walls but not including openings in bearing walls as permitted by existing ordinances

Substantial Damage -Damage of any origin sustained by a Non-Conforming Structure where the cost of restoring the structure to its before damaged condition would equal or exceed 60 percent of the assessed market value of the structure as determined by the St. Louis County Assessor before the damage occurred. For flood plain management and flood hazard purposes, substantial damage shall occur when damage of any origin sustained by a structure, where the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent

of the assessed market value of the structure as determined by the St Louis County Assessor before the damage occurred.

Substantially Damaged Structure – means a Non-Conforming Structure that has sustained Substantial Damage.

Transitional Zone - All that land which lies directly under an imaginary transitional surface extending upward and outward at right angles to the runway centerline and the runway centerline extended at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surface. Transitional surfaces for those portions of the instrument approach surface which project through and beyond the limits of the conical surface, extend a distance of approximately 5,000 feet measured horizontally from the edge of the instrument approach surface and at right angles to the extended instrument runway centerline; whose location and dimensions are indicated on the Airport Zoning Map.

Traverse Ways - roads, railroads, trails, waterways, or any other avenue of surface transportation.

Utility Runway - a runway that is constructed for and intended to be used by propeller-driven aircraft of 12,500 pounds maximum gross weight and less and which runway is less than 4,900 feet in length.

Variance – Any modification or variation of application of this Ordinance to a real property structure or use approved in writing by the BOA.

Visual Runway - a runway intended solely for the operation of aircraft using visual approach procedures, with no existing or Planned instrument approach procedures.

Zoning – the partitioning of land parcels in a community by ordinance into zones and the establishment of regulations in the ordinance to govern the land use and the location, height, use and land coverage of buildings within each zone.

SECTION 4: AIRSPACE OBSTRUCTION ZONING

A. **BOUNDARY LIMITATION:** The airspace obstruction height zoning restrictions set forth in this section shall apply for a distance not to exceed one-and-one-half (1.5) miles beyond the perimeter of the Airport boundary; said boundary location and dimensions are indicated on the Airport Zoning Map.

B. **AIRSPACE ZONES**: Airspace Zones are established to regulate and protect aircraft from navigational hazards during landings and departures. In order to carry out the purposes of this Ordinance, the following Imaginary Airspace Zones are hereby established: Primary Zone, Horizontal Zone, Conical Zone, Approach Zone, Precision Instrument Approach Zone, and Transitional Zone, all whose locations and dimensions are indicated on the Airport Zoning Map.

C. **HEIGHT RESTRICTIONS:** Except as otherwise provided in the Ordinance, or except as necessary and incidental to airport operations, no structure or tree shall be constructed, altered, maintained, or allowed to grow so as to project above any of the Imaginary Airspace surfaces described in this Section 4(B) . Where an area is covered by more than one height limitation, the more restrictive limitations shall prevail.

SECTION 5: LAND USE SAFETY ZONING

SAFETY ZONE BOUNDARIES INTENT AND SCOPE: In order to carry out the purpose of this Ordinance, as set forth above, to restrict those uses which may be hazardous to the operational safety of aircraft operating to and from the Airport, and, furthermore, to limit population and building density in the runway approach areas, thereby creating sufficient open space to protect life and property in case of an accident, there are hereby created and established the following Safety Zones, which restrict land use:

A. **SAFETY ZONE 1:** All land designated as Safety Zone 1 on the Airport Zoning Map and as legally described in Exhibit B.

B. **SAFETY ZONE 2:** All land designated as Safety Zone 2 on the Airport Zoning Map and legally described in Exhibit B.

C. **SAFETY ZONE 2.5**: All land designated as Safety Zone 2.5 on the Airport Zoning Map and legally described in Exhibit B.

D. **SAFETY ZONE 3:** All land designated as Safety Zone 3 on the Airport Zoning Map and legally described in Exhibit B.

E. **BOUNDARY LIMITATIONS:** The land use zoning restrictions set forth in this Section 5 shall apply for a distance not to exceed one mile beyond the perimeter of the airport boundary and in the portion of an Airport Hazard Area under the approach zone for a distance not exceeding one and one-half (1½) miles from the airport boundary; said land use zoning boundary location and dimensions are indicated on the Airport Zoning Map.

F. **USE RESTRICTIONS**

In order to restrict those uses which may be hazardous to the operational safety of aircraft operating to and from the Duluth International Airport, and furthermore to limit population and building density in the runway approach areas, thereby creating sufficient open space so as to protect life and property in case of accident, the following use restrictions are applied to the land use Safety Zones:

1. **ALL SAFETY ZONES:** No use shall be made of any land in any of the Safety Zones which creates or causes interference with the operation of radio or electronic facilities on the airport or with radio or electronic communications between the airport and aircraft, makes it difficult for pilots to distinguish between airport lights and other lights, results in glare in the eyes of pilots using the airport, impairs visibility in the vicinity of the airport, or otherwise endangers the landing, taking off, or maneuvering of aircraft.

2. **SAFETY ZONE 1:** Areas designated as Safety Zone 1 shall contain no buildings, temporary structures, exposed transmission lines, or other similar above-ground land use structural hazards, and shall be restricted to those

uses which will not create, attract, or bring together an assembly of persons thereon. Permitted uses may include Agricultural Use, Resource Extraction Use, horticulture, animal husbandry, raising of livestock, wildlife habitat, light outdoor recreation (non-spectator), cemeteries, and automobile parking.

3. **SAFETY ZONE 2:**

3.1 Specific Prohibited Uses. The following classifications of building and structures as to use and occupancy are prohibited in Safety Zone 2:

3.1.1 Group A Uses;

3.1.2 Group E Uses;

3.1.3 Group I-2 Uses; and

3.1.4 Group R-1 Uses.

3.2 Density Limitation. Other uses not specifically prohibited by Section 3.1 must be on a site whose area is at least two and one-half (2.5) acres. Each use shall not create, attract, or bring together a site population in excess of 20 persons per acre during the same time period; density as calculated pursuant to the 2020 Minnesota State Building Code, or its successor.

4. **SAFETY ZONE 2.5:**

4.1 Specific Prohibited Uses. The following classifications of building and structures as to use and occupancy are prohibited in Safety Zone 2.5;

4.1.1 Childcare or daycare centers;

4.1.2 State licensed residential care facilities and housing with service establishments serving 7 or more persons;

4.1.3 State licensed adult daycare facility serving 13 or more persons;

4.1.4 State licensed group family daycare facility serving 13 or more children;

4.1.5 Public or private school.

4.1.6 Public or private Hospital.

~~4.~~5. **SAFETY ZONE 3:** Areas designated as Safety Zone 3 are only subject to the restrictions set forth in this Section 5(E)(1).

SECTION 6: AIRPORT ZONING MAP

The Zones established in this Ordinance are shown on the Airport Zoning Map attached hereto as Exhibit C and made a part hereof. The Airport Zoning Map, together with map and all notations, references, elevation, data, zone boundaries, and other information thereon, shall be referred to in this Ordinance is hereby adopted in its entirety as part of this Ordinance.

SECTION 7: EXISTING USES AND STRUCTURES AS OF ENACTMENT

A. **THIS ORDINANCE AND ANY LOCAL AIRPORT ZONING ORDINANCE NOT RETROACTIVE:** The regulations prescribed by this Ordinance and any Local Airport Zoning Ordinance shall not be construed to require the removal, lowering, or other changes or alteration of any existing use, lot, structure, or tree or otherwise interfere with the continuance of any such use or Structure, or tree after the Effective Date (Section 21 – EFFECTIVE DATE) of this Ordinance.

B. **ACQUISITION IN SAFETY ZONES:** The Airport is an essential public facility. The DAA or City of Duluth may acquire land at their own expense for the purposes of preventing and/or reducing Airport Hazards and Aircraft Accidents.

SECTION 8: PERMITS; AND ORDERS TO REMOVE USE OR STRUCTURE, OR TREE

A. **PERMIT STANDARDS.** Permit applications shall be made in the manner and on the form established by the Local Airport Zoning Administrator pursuant to their applicable Local Airport Zoning Ordinance. Each Permit application shall indicate the purpose for which the Permit is desired, with sufficient information with respect to the proposed project to allow a determination as to whether it conforms to the applicable Local Airport Zoning Ordinance. If such determination is in the affirmative, the Permit shall be granted. Copies of applications for permits shall be provided to the DAA.

B. **PERMIT REQUIRED.** The following structures or uses shall not be allowed in a Safety Zone 2 unless a Permit has first been submitted to and granted by the Local Airport Zoning Administrator for that jurisdiction:

1. Material expansion of an Existing Structure or Use. Permit required.
2. New structures or uses. Permit required.
3. Abandoned Non-Conforming Structure. Permit required for structure to be re-used, rebuilt or replaced.
4. Substantially Damaged Non-Conforming Structure. Permit required to rebuild, repair, or replace.
5. Material Change in Non-Conforming Use. Permit required before material change in use may occur.

C. **ORDER TO REMOVE USE, STRUCTURE, OR TREE.** Whether application is made for a Permit under this subdivision or not, the Local Airport Zoning Administrator may by appropriate action compel the owner of any Structure, use, or tree, at the owner's expense, to lower, remove, reconstruct, or equip the object as may be necessary to conform to the regulations of the applicable Local Airport Zoning Ordinance. If the owner of the Structure, use, or tree neglects or refuses to comply with the order for ten days after notice of the order, the Local Airport Zoning Administrator may take whatever lawful actions they deem necessary and appropriate to obtain compliance with the provisions of the applicable Local Airport Zoning Ordinance.

SECTION 9: VARIANCES

A. **APPLICATION.** Any person desiring to erect or increase the height of any Structure, permit the growth of any tree, or use property in a way prohibited by the applicable

Local Airport Zoning Ordinance may apply to both the Local Airport Zoning Administrator and the BOA for a Variance from such regulations. Variance applications shall be made in the manner and on the form established by the Local Airport Zoning Administrator. The Local Zoning Administrator may also establish, collect, and retain a Variance application fee. Variance applications shall be delivered to the Local Airport Zoning Administrator, who shall then deliver the Variance application to the BOA and DAA. The Variance applications may only be made after the Local Airport Zoning Administrator determines that a Variance is required. Copies of Variance applications shall be provided to the DAA.

B. **FAILURE OF BOARD TO ACT ON VARIANCE.** This Section 9B is intended to implement the provisions of Minnesota Statutes § 360.063, Subd. 6a and § 360.067, Subd. 2. If a person submits a complete application for a Variance by certified mail to both the Local Airport Zoning Administrator and the BOA, and they both fail to grant or deny the Variance within four (4) months after receipt of the application, the Variance shall be deemed to be granted by the BOA, unless the BOA has made its decision within a longer time period authorized in writing by applicant. When the Variance is granted by reason of the failure of the BOA to act on the Variance, the person receiving the Variance shall notify the BOA and the Commissioner, in writing by certified mail, that the Variance has been granted. The applicant shall include a copy of the original Permit and Variance applications with the notice. The Variance shall be effective sixty (60) days after this notice is received by the Commissioner subject to any action taken by the Commissioner pursuant to Minnesota Statutes Section 360.063, Subdivision 6(a).

C. **VARIANCE STANDARDS.** The provisions of Minnesota Statutes § 360.067, Subd. 2 shall be applicable to an application for a Variance. Variances shall only be granted where it is duly found by the BOA that a literal application or enforcement of the regulations would result in practical difficulty, or undue hardship, and the relief granted would not be contrary to the public interest but do substantial justice and be in accordance with the spirit of the applicable Local Airport Zoning Ordinance provided any Variance so allowed may be subject to any reasonable conditions that the JAZB or Commissioner may deem necessary to effectuate the purpose of the applicable Local Airport Zoning Ordinance.

SECTION 10: HAZARD MARKING AND LIGHTING

The Local Airport Zoning Administrator or the BOA may condition any Permit or Variance granted so as to require the owner of the Structure or tree or use in question at their own expense, to install, operate, and maintain thereon such markers and lights as may be necessary to indicate to pilots the presence of an Airport Hazards.

SECTION 11: LOCAL AIRPORT ZONING ADMINISTRATOR

It shall be the duty of the Local Airport Zoning Administrator to enforce the regulations prescribed by the applicable Local Airport Zoning Ordinance. Regulations prescribed by the applicable Local Airport Zoning Ordinance for which a Permit is not required to be obtained under the Local Airport Zoning Ordinance shall be enforced and administered as determined by the Local Airport Zoning Administrator. Permit applications shall be made to the Local Airport Zoning Administrator for that jurisdiction. Copies of Permit applications shall be provided to the DAA. Permit applications shall be promptly considered and granted or denied pursuant to the regulations by the applicable Local Airport Zoning Ordinance. Variance applications shall

be made to both the Local Airport Zoning Administrator for that Jurisdiction and the BOA. Copies of Variance applications shall be provided to the DAA.

SECTION 12: BOARD OF ADJUSTMENT FOR THE DULUTH INTERNATIONAL AIRPORT JOINT ZONING BOARD

A. Establishment: The Board of Adjustment ("BOA") shall consist of five members, one member each appointed by:

1. Canosia Township
2. City of Duluth;
3. City of Hermantown;
4. City of Rice Lake; and
5. Duluth Airport Authority.

Each member shall serve for a term of three years and until their successor is duly appointed and qualified. In the event of a vacancy, the vacancy for the unexpired term shall be filled in the same manner as the appointment was originally made. BOA members may be removed by the Entity which appointed such member at any time, with or without cause. JAZB members may also serve on the BOA.

B. Powers: The BOA shall have and exercise the following powers:

(1) to hear and decide appeals from any order, requirement, decision, or determination made by the Local Airport Zoning Administrator in the enforcement of the Local Airport Zoning Ordinance;

(2) to hear and decide any special exceptions to the terms of the Local Airport Zoning Ordinance upon which the BOA may be required to pass under such Local Airport Zoning Ordinance; and

(3) to hear and decide Variances.

C. Majority Vote: The concurring vote of a majority of the members of the BOA shall be sufficient for any action or any order, requirement, decision, or determination of the Local Airport Zoning Administrator, or to make a decision on any matter upon which it is required to pass under the Local Airport Zoning Ordinance or to make a decision on a Variance.

D. Rules and Procedures: The BOA shall adopt rules in accordance with the provisions of this Ordinance. Upon their appointment the BOA members shall select a chair to act at the pleasure of the BOA. Meetings of the BOA shall be held at the call of the chair and at such other times as the BOA may determine. The chair, or if absent, the acting chair, may administer oaths and compel the attendance of witnesses. All hearings of the BOA shall be public. The BOA shall keep minutes of its proceedings, showing the vote of each member upon each question, or, if absent or failing to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the BOA and shall be a public record.

SECTION 13: APPEALS

A. Who May Appeal:

Any Person directly affected by any decision of the Local Airport Zoning Administrator in connection with the administration of a Local Airport Zoning Ordinance may appeal that decision to the BOA. Such appeals may also be made by any governing body of the Entities.

B. Procedure:

All appeals hereunder must be commenced in writing within 10 business days of the issuance in writing of the decision by the Local Airport Zoning Administrator, by filing with the Local Airport Zoning Administrator and the BOA a notice of appeal specifying the grounds thereof and the applicable appeal filing and hearing fee set by the BOA. The Local Airport Zoning Administrator shall forthwith transmit to the BOA all data constituting the record upon which the action appealed from was taken. Copies of the data shall also be provided to the DAA.

C. Stay of Proceedings:

An appeal shall stay all proceedings in furtherance of the action appealed from, unless the Local Airport Zoning Administrator certifies to the BOA, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate finds that a stay would, in their opinion, cause imminent peril to life or property. In such case, proceedings shall not be stayed except by order of the BOA on written notice to the Local Airport Zoning Administrator and on due cause shown.

D. Hearing:

The BOA shall fix a time for hearing appeals, and then give public notice to the Entities and the DAA, and written notice by mail to the appellant. At the hearing, any party may appear in person or by agent or by attorney.

E. Decisions:

The BOA may, in conformity with the provisions of this ordinance, reverse or affirm, in whole or in part, or modify the order, requirement, decision or determination appealed from and may make such order, requirement, decision or determination, in writing with detailed findings, as may be appropriate under the circumstances, and to that end shall have all the powers of an Local Airport Zoning Administrator.

SECTION 14: JUDICIAL REVIEW

All decisions of the BOA are final. Any party aggrieved by a decision of the BOA may appeal as authorized by Minnesota law provided that such appeal is made within thirty (30) days of the date of the decision of the BOA.

SECTION 15: PENALTIES

A. CRIMINAL. Every person who shall construct, establish, substantially change, alter or repair any existing structure or use, or permit the growth of any tree without having complied with the provision of this Ordinance or who, having been granted a Permit or Variance under the provisions of this Ordinance, shall construct, establish, substantially change or substantially alter or repair any existing growth or

structure or permit the growth of any tree, except as permitted by such Permit or Variance, shall be guilty of a misdemeanor and shall be punished by a fine of not more than $1,000 or imprisonment for not more than 90 days or by both. Each day a violation continues to exist shall constitute a separate offense.

B. CIVIL. In addition, a Local Airport Zoning Administrator or the DAA may institute in any court of competent jurisdiction an action to prevent, restrain, correct, or abate any violation of the Local Airport Zoning Ordinance, or of any order or ruling made in connection with their administration or enforcement of this Ordinance, and the court shall adjudge to the plaintiff such relief, by way of injunction (which may be mandatory) or otherwise, as may be proper under all the facts and circumstances of the case.

SECTION 16: EXEMPTIONS – LAND USED FOR AERONAUTICAL PURPOSES

The restrictions of this Ordinance or any Local Airport Zoning Ordinance shall not control the use of land or the height of structures on land owned by the City of Duluth, the State of Minnesota, the Duluth Airport Authority, or the United States of America and used by the Duluth Airport Authority exclusively for aeronautical purposes.

SECTION 17: CONFLICTS

Where there exists a conflict between any of the regulations or limitations prescribed in this Ordinance and any other regulations applicable to the same area including but not limited to the Local Airport Zoning Ordinance, whether the conflict be with respect to the height of Structures or trees, the use of land, or any other matter, the more stringent limitation or regulation shall govern and prevail.

SECTION 18: SEVERABILITY

In any case in which the provisions of this Ordinance, although generally reasonable, are held by a court to interfere with the use or enjoyment of a particular Structure or parcel of land to such an extent, or to be so onerous in their application to such a Structure or parcel of land, as to constitute a taking or deprivation of that property in violation of the United States or State of Minnesota Constitutions, such holding shall not affect the application of this Ordinance as to other structures and parcels of land, and to this end the provisions of this Ordinance are declared to be severable.

SECTION 19: ADMINISTRATION

A. Meetings and hearings of the JAZB and BOA shall be held at the Duluth International Airport.
B. JAZB and BOA shall be supported administratively by the staff of the Duluth Airport Authority and Duluth City Attorney's Office.
C. The BOA shall be supported by the staff and legal counsel provided by the Entity in whose jurisdiction the property affected by the Variance is located with respect to the requested Variance.
D. The BOA shall be supported administratively by the staff of the Duluth Airport Authority and legal counsel provided by the Duluth Airport Authority in connection with any judicial review of any actions of the BOA pursuant to Section 14 hereof.

E. The DAA shall provide reasonable technical advice and assistance to Local Zoning Administrators with respect to the administration and enforcement of a Local Zoning Ordinance upon request by a Local Zoning Administrator.

SECTION 20: LOCAL AIRPORT ZONING ORDINANCE

Each of the Entities shall consider the adoption of amendments to its comprehensive plan and thereafter amendments to the zoning for its jurisdiction that incorporate the applicable provisions of this Ordinance. Any such amendments to Entities' zoning shall become effective only after this Ordinance has been approved by the Commissioner.

SECTION 21: EFFECTIVE DATE

This Ordinance shall take effect upon recordation in the St. Louis County Recorder's Office, which shall occur after approval of the Ordinance by the Commissioner. Copies thereof shall be filed with the State of Minnesota Commissioner of Transportation, Division of Aeronautics, and the Entities.

Passed and adopted by the Duluth International Joint Airport Zoning Board ("JAZB") on _____after public hearing by the JAZB, and after approval by the Commissioner.

_____
Chairperson

ATTEST:

_____
Its _____

EXHIBIT A–SAFETY ZONE LEGAL DESCRIPTIONS

Safety Zone 1 of East End of Runway 9-27

That part of Section 6, Township 50, Range 14, St Louis County, Minnesota, described as follows:

Commencing at the northwest corner of the Southwest Quarter of said Section 6; thence on an assumed bearing of South 00 degrees 49 minutes 13 seconds East, along the west line of said Southwest Quarter, a distance of 935.43 feet to the intersection with the easterly extension of the centerline of Runway 9-27; thence South 88 degrees 23 minutes 44 seconds East, along last described easterly extension, a distance of 204.53 feet to the east end of the proposed runway 9-27; thence continuing South 88 degrees 23 minutes 44 seconds East, along last described easterly extension, a distance of 200.00 feet; thence South 01 degree 36 minutes 16 seconds West a distance of 500.00 feet to the actual point of beginning of Zone 1; thence North 01 degree 36 minutes 16 seconds East a distance of 1000.00 feet; thence North 83 degrees 04 minutes 25 seconds East a distance of 4180.09 feet to the intersection with the north line of the Northeast Quarter of the Southeast Quarter of said Section 6; thence North 89 degrees 17 minutes 03 seconds East, along last described north line, a distance of 705.98 feet to the westerly right of way line of Rice Lake Road; thence southerly, along last described right of way line, a distance of 2280.58 feet to the east line of the North Half of the South Half of the Southeast Quarter of the Southeast Quarter of said Section 6; thence South 01 degree 03 minutes 54 seconds East, along last described east line, a distance of 39.99 feet to the south line of said North Half of the South Half of the Southeast Quarter of the Southeast Quarter; thence South 89 degrees 00 minutes 30 seconds West, along last described south line, a distance of 457.54 feet to the intersection with a line bearing South 79 degrees 51 minutes 54 seconds East from said point of beginning; thence North 79 degrees 51 minutes 54 seconds West a distance of 4590.59 feet to said point of beginning.

Safety Zone 2 of East End of Runway 9-27

That part of Sections 5, 6, and 8, Township 50, Range 14, St Louis County, Minnesota, described as follows:

Commencing at the northwest corner of the Southwest Quarter of said Section 6; thence on an assumed bearing of South 00 degrees 49 minutes 13 seconds East, along the west line of said Southwest Quarter, a distance of 935.43 feet to the intersection with the easterly extension of the centerline of Runway 9-27; thence South 88 degrees 23 minutes 44 seconds East, along last described easterly extension, a distance of 204.53 feet to the east end of the proposed runway 9-27; thence continuing South 88 degrees 23 minutes 44 seconds East, along last described easterly extension, a distance of 200.00 feet; thence South 01 degree 36 minutes 16 seconds West a distance of 500.00 feet to a point hereinafter referred to as Point "A"; thence North 01 degree 36 minutes 16 seconds East a distance of 1000.00 feet; thence North 83 degrees 04 minutes 25 seconds East a distance of 4180.09 feet to a point on the north line of the Northeast Quarter of the Southeast Quarter of said Section 6 said point being the actual

point of beginning of Zone 2; thence North 89 degrees 17 minutes 03 seconds East, along last described north line, a distance of 705.98 feet to the westerly right of way line of Rice Lake Road; thence southerly, along last described right of way line, a distance of 2280.58 feet to the east line of the North Half of the South Half of the Southeast Quarter of the Southeast Quarter of said Section 6; thence South 01 degree 03 minutes 54 seconds East, along last described east line, a distance of 39.99 feet to the south line of said North Half of the South Half of the Southeast Quarter of the Southeast Quarter; thence South 89 degrees 00 minutes 30 seconds West, along last described south line, a distance of 457.54 feet to the intersection with a line bearing South 79 degrees 51 minutes 54 seconds East from said Point "A"; thence South 79 degrees 51 minutes 54 seconds East a distance of 4368.29 feet; thence North 00 degrees 07 minutes 11 seconds West a distance of 3643.14 feet to the intersection with a line bearing North 83 degrees 04 minutes 25 seconds East from said point of beginning; thence South 83 degrees 04 minutes 25 seconds West a distance of 4667.96 feet to said point of beginning.

Safety Zone 1 of North End of Runway 3-21

That part of Section 31, Township 51, Range 14, St Louis County, Minnesota, described as follows:

Commencing at the southwest corner of the Southwest Quarter of said Section 31; thence on an assumed bearing of North 89 degrees 22 minutes 07 seconds East, along the south line of said Southwest Quarter, a distance of 56.31 feet to the intersection with the northeasterly extension of the centerline of Runway 3-21; thence North 30 degrees 52 minutes 18 seconds East, along last described northeasterly extension, a distance of 1458.40 feet to the end of the proposed extension of Runway 3-21; thence continuing North 30 degrees 52 minutes 18 seconds East, along last described northeasterly extension, a distance of 200.00 feet; thence South 59 degree 07 minutes 42 seconds East a distance of 500.00 feet to the actual point of beginning of Zone 1; thence North 59 degrees 07 minutes 42 seconds West a distance of 1000.00 feet; thence North 22 degrees 20 minutes 27 seconds East a distance of 3933.06 feet to the intersection with the north line of the Northeast Quarter of the Northwest Quarter of said Section 31; thence North 89 degrees 06 minutes 56 seconds East, along last described north line, a distance of 470.64 feet to the west line of the East 200.00 feet of said Northeast Quarter of the Northwest Quarter; thence South 00 degrees 40 minutes 03 seconds East, along last described west line, a distance of 1323.05 feet to the south line of said Northeast Quarter of the Northwest Quarter; thence North 89 degrees 08 minutes 06 seconds East, along last described south line, a distance of 200.00 feet to the southeast corner of said Northeast Quarter of the Northwest Quarter; thence North 89 degrees 08 minutes 19 seconds East, along the south line of the Northwest Quarter of the Northeast Quarter of said Section 31, a distance of 990.90 feet to the west line of the East Half of the East Half of said Northwest Quarter of the Northeast Quarter; thence North 00 degrees 40 minutes 13 seconds West, along last described west line, a distance of 1323.39 feet to the north line of said Northeast Quarter of Section 31; thence North 89 degrees 07 minutes 22 seconds East, along last described north line, a distance of 990.84 feet to the east line of the West Half of the Northeast Quarter of the Northeast Quarter of said Section 31; thence South 00 degrees 40 minutes 22 seconds East, along last described east line, a distance of 185.61 feet to the intersection with a line bearing North 39 degrees 24 minutes 09 seconds East from said point

of beginning; thence South 39 degrees 24 minutes 09 seconds West a distance of 5184.44 feet to said point of beginning.

Safety Zone 2.5 of North End of Runway 3-21

The Southeast Quarter of the Southwest Quarter and the Southwest Quarter of the Southeast Quarter, Section 30 and the West Three Quarters of the Northwest Quarter of the Northeast Quarter and the East 200.00 feet of the Northeast Quarter of the Northwest Quarter, Section 31, all located in Township 51, Range 14, St. Louis County, Minnesota.

Safety Zone 1 of West End of Runway 9-27

That part of Sections 3 and 4, Township 50, Range 15, St Louis County, Minnesota, described as follows:

Commencing at the northeast corner of the Southeast Quarter of said Section 3; thence on an assumed bearing of South 00 degrees 17 minutes 07 seconds East, along the east line of said Southeast Quarter, a distance of 523.82 feet to the intersection with the westerly extension of the centerline of Runway 9-27; thence North 88 degrees 23 minutes 44 seconds West, along last described westerly extension, a distance of 817.84 feet to the end of the proposed extension of Runway 9-27; thence continuing North 88 degrees 23 minutes 44 seconds West, along last described westerly extension, a distance of 200.00 feet; thence South 01 degree 36 minutes 16 seconds West a distance of 500.00 feet to the actual point of beginning of Zone 1; thence North 01 degree 36 minutes 16 seconds East a distance of 1000.00 feet; thence North 79 degrees 51 minutes 54 seconds West a distance of 5093.17 feet to the intersection with the south line of the North Half of the North Half of the Southeast Quarter of the Northeast Quarter of said Section 4; thence South 89 degrees 17 minutes 28 seconds West, along last described south line, a distance of 612.03 feet to the west line of said Southeast Quarter of the Northeast Quarter; thence South 00 degrees 29 minutes 37 seconds East, along last described west line, a distance of 986.08 feet to the southwest corner of said Southeast Quarter of the Northeast Quarter; thence North 89 degrees 19 minutes 12 seconds East, along the south line of said Southeast Quarter of the Northeast Quarter, a distance of 1314.17 feet to the southeast corner of said Southeast Quarter of the Northeast Quarter; thence South 00 degrees 11 minutes 17 seconds West, along the east line of the Southeast Quarter of said Section 4, a distance of 1437.77 feet to the intersection with a line bearing South 83 degrees 04 minutes 25 seconds West from said point of beginning; thence North 83 degrees 04 minutes 25 seconds East a distance of 4311.30 feet to said point of beginning.

Safety Zone 2 of West End of Runway 9-27

That part of Section 4, Township 50, Range 15, St Louis County, Minnesota, described as follows:

Commencing at the northeast corner of the Southeast Quarter of Section 3 of said Township 50; thence on an assumed bearing of South 00 degrees 17 minutes 07 seconds East, along the east line of said Southeast Quarter, a distance of 523.82 feet to the intersection with the westerly extension of the centerline of Runway 9-27; thence North 88 degrees 23 minutes 44 seconds West, along last described westerly extension, a distance of 817.84 feet to the end

of the proposed extension of Runway 9-27; thence continuing North 88 degrees 23 minutes 44 seconds West, along last described westerly extension, a distance of 200.00 feet; thence South 01 degree 36 minutes 16 seconds West a distance of 500.00 feet to a point hereinafter referred to as Point "A"; thence North 01 degree 36 minutes 16 seconds East a distance of 1000.00 feet; thence North 79 degrees 51 minutes 54 seconds West a distance of 5093.17 feet to a point on the south line of the North Half of the North Half of the Southeast Quarter of the Northeast Quarter of said Section 4 said point being the actual point of beginning of Zone 2; thence South 89 degrees 17 minutes 28 seconds West, along last described south line, a distance of 612.03 feet to the west line of said Southeast Quarter of the Northeast Quarter; thence South 00 degrees 29 minutes 37 seconds East, along last described west line, a distance of 986.08 feet to the southwest corner of said Southeast Quarter of the Northeast Quarter; thence North 89 degrees 19 minutes 12 seconds East, along the south line of said Southeast Quarter of the Northeast Quarter, a distance of 1314.17 feet to the southeast corner of said Southeast Quarter of the Northeast Quarter; thence South 00 degrees 11 minutes 17 seconds West, along the east line of the Southeast Quarter of said Section 4, a distance of 1325.00 feet to the north line of the Southeast Quarter of the
Southeast Quarter of said Section 4; thence South 89 degrees 14 minutes 37 seconds West, along last said north line, a distance of 1304.68 feet to the northwest corner of said Southeast Quarter of the Southeast Quarter; thence South 00 degrees 13 minutes 11 seconds East, along the west line of said Southeast Quarter of the Southeast Quarter, a distance of 253.87 feet to the intersection with a line bearing South 83 degrees 04 minutes 25 seconds West from said Point "A"; thence South 83 degrees 04 minutes 25 seconds West a distance of 3932.53 feet; thence North 00 degrees 07 minutes 11 seconds West a distance of 3854.41 feet to the intersection with a line bearing North 79 degrees 51 minutes 54 seconds West from said point of beginning; thence South 79 degrees 51 minutes 54 seconds East a distance of 4576.98 feet to said point of beginning.

Safety Zone 1 of South End of Runway 3-21

That part of Sections 11 and 12, Township 50, Range 15, St Louis County, Minnesota, described as follows:

Commencing at the northeast corner of the Northwest Quarter of said Section 12; thence on an assumed bearing of South 89 degrees 22 minutes 46 seconds West, along the north line of said Northwest Quarter, a distance of 548.52 feet to the intersection with the southwesterly extension of the centerline of Runway 3-21; thence South 30 degrees 52 minutes 18 seconds West, along last described southwesterly extension, a distance of 349.89 feet to the end of proposed runway 3-21; thence continuing South 30 degrees 52 minutes 18 seconds West, along last described southwesterly extension, a distance of 200.00; thence South 59 degree 07 minutes 42 seconds East a distance of 500.00 feet to the actual point of beginning of Zone 1; thence North 59 degrees 07 minutes 42 seconds West a distance of 1000.00 feet; thence South 37 degrees 59 minutes 48 seconds West a distance of 3104.55 feet to the intersection with the northeasterly right of way line of Miller Trunk Highway; thence South 53 degrees 03 minutes 51 seconds East, along last said northeasterly right of way line, a distance of 739.20 feet to the east line of the Southeast Quarter of said Section 11; thence North 00 degrees 34 minutes 00 seconds West, along last described east line, a distance of

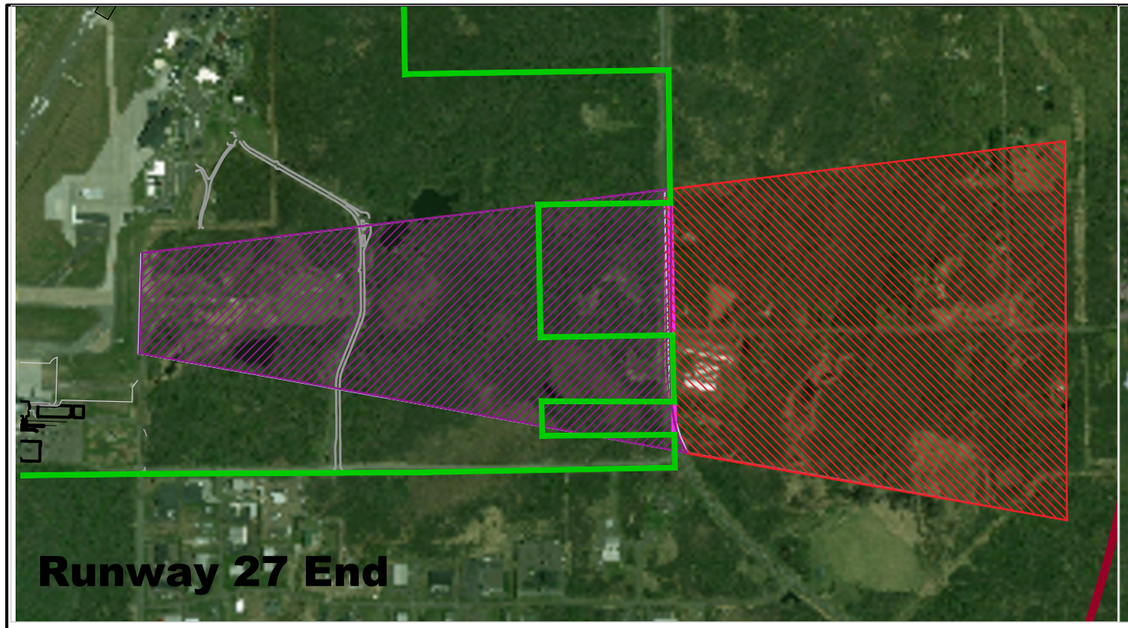
347.40 feet to the intersection with the northwesterly extension of the southwesterly line of Lot 4 of the recorded plat of "ANDERSON'S ACRE TRACTS" on file and of record in the office of the St Louis County Recorder; thence South 54 degrees 08 minutes 29 seconds East, along last described northwesterly extension and said southwesterly line of Lot 4 and the southeasterly extension of said southwesterly line of Lot 4, a distance of 1201.00 feet to the intersection with a line bearing South 23 degrees 51 minutes 10 seconds West from said point of beginning; thence North 23 degrees 51 minutes 10 seconds East a distance of 2989.06 feet to said point of beginning.

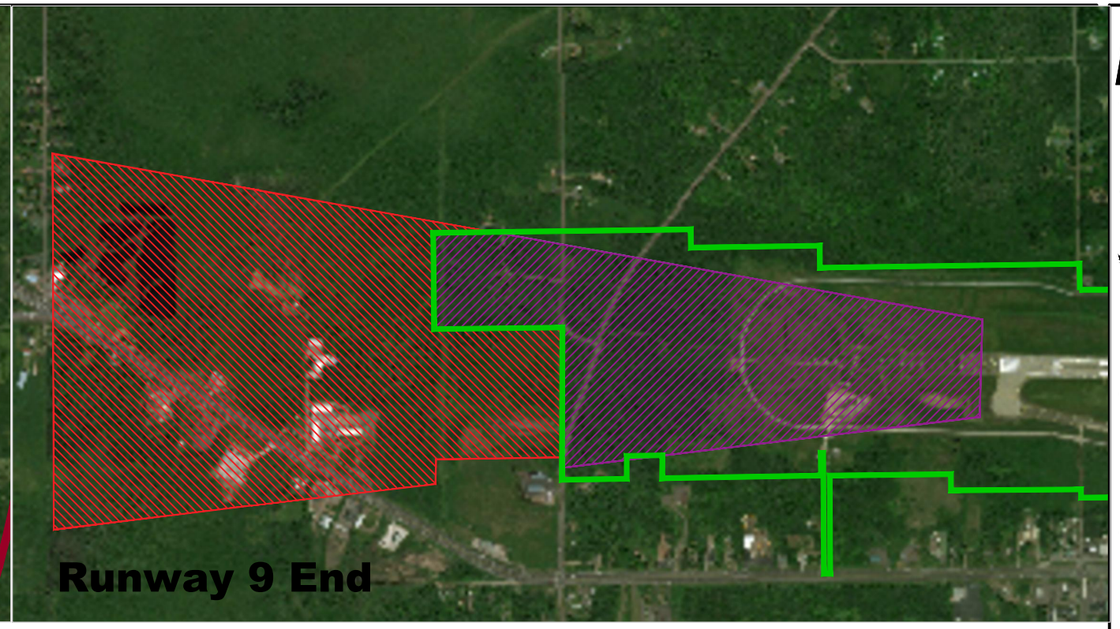
Safety Zone 2.5 of South End of Runway 3-21

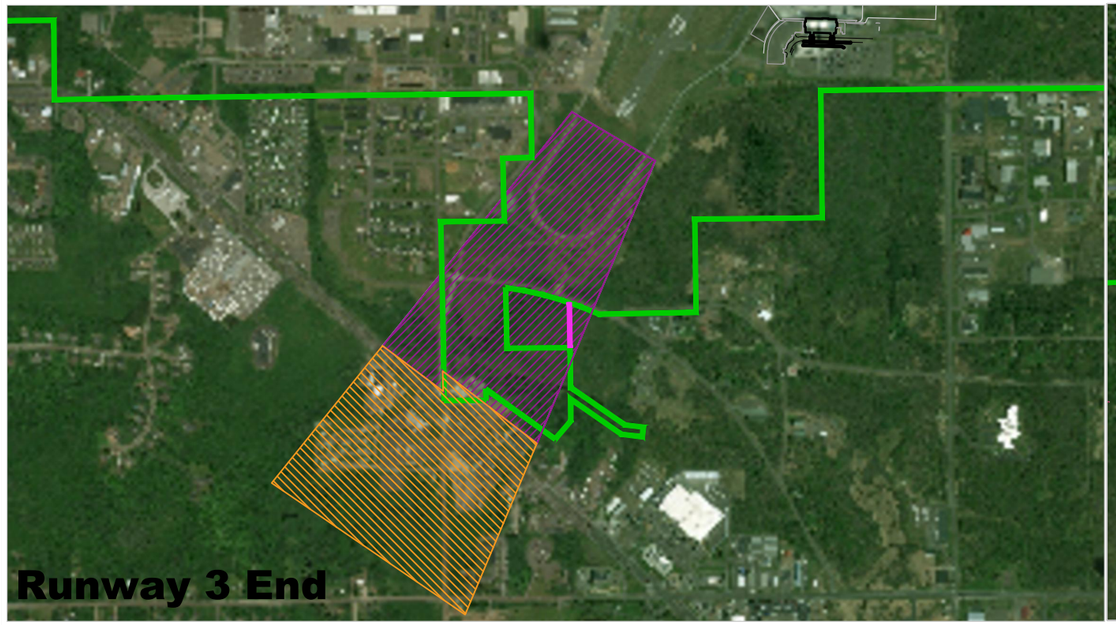
That part of Sections 11, 12 and 13, Township 50, Range 15, St Louis County, Minnesota, described as follows:

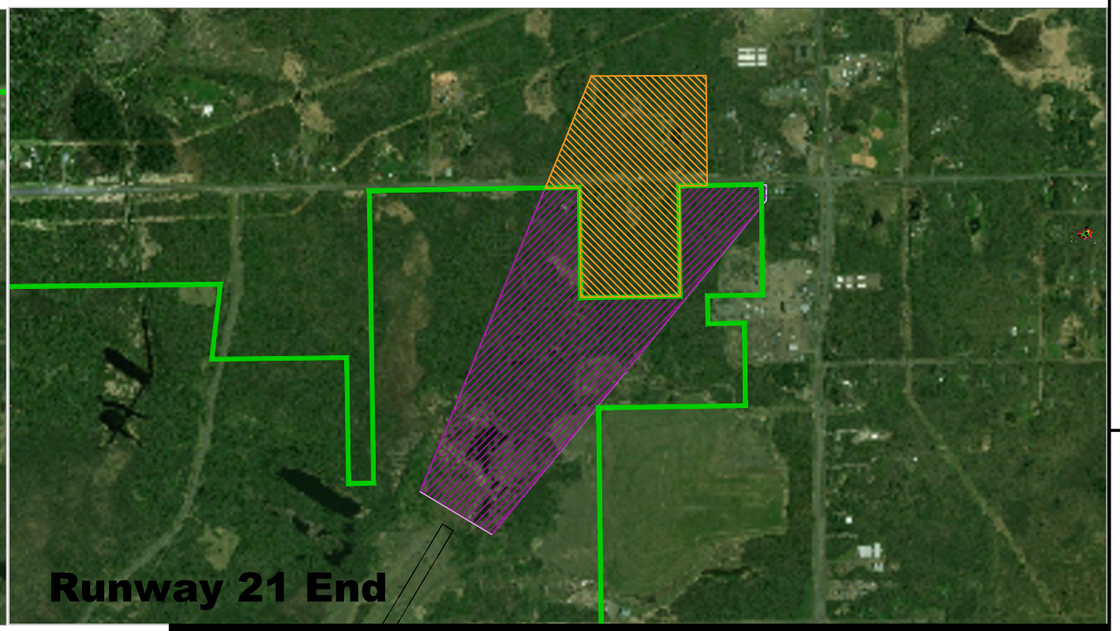
Commencing at the northeast corner of the Northwest Quarter of said Section 12; thence on an assumed bearing of South 89 degrees 22 minutes 46 seconds West, along the north line of said Northwest Quarter, a distance of 548.52 feet to the intersection with the southwesterly extension of the centerline of Runway 3-21; thence South 30 degrees 52 minutes 18 seconds West, along last described southwesterly extension, a distance of 349.89 feet to the end of proposed runway 3-21; thence continuing South 30 degrees 52 minutes 18 seconds West, along last described southwesterly extension, a distance of 200.00; thence South 59 degree 07 minutes 42 seconds East a distance of 500.00 feet to a point hereinafter referred to as Point "A"; thence North 59 degrees 07 minutes 42 seconds West a distance of 1000.00 feet; thence South 37 degrees 59 minutes 48 seconds West a distance of 3104.55 feet to a point on the northeasterly right of way line of Miller Trunk Highway said point being the actual point of beginning of Zone 2.5; thence South 53 degrees 03 minutes 51 seconds East, along last said northeasterly right of way line, a distance of 739.20 feet to the east line of the Southeast Quarter of said Section 11; thence North 00 degrees 34 minutes 00 seconds West, along last described east line, a distance of 347.40 feet to the intersection with the northwesterly extension of the southwesterly line of Lot 4 of the recorded plat of "ANDERSON'S ACRE TRACTS" on file and of record in the office of the St Louis County Recorder; thence South 54 degrees 08 minutes 29 seconds East, along last described northwesterly extension and said southwesterly line of Lot 4 and the southeasterly extension of said southwesterly line of Lot 4, a distance of 1201.00 feet to the intersection with a line bearing South 23 degrees 51 minutes 10 seconds West from said Point "A"; thence South 23 degrees 51 minutes 10 seconds West a distance of 2068.80 feet; thence North 55 degrees 45 minutes 40 seconds West a distance of 2232.99 feet to the intersection with a line bearing South 37 degrees 59 minutes 48 seconds West from said point of beginning; thence North 37 degrees 59 minutes 48 seconds East a distance of 1822.30 feet to said point of beginning.

EXHIBIT B – AIRPORT ZONING MAPS









N

0 1500 3000 Feet

ZONING LEGEND

AIRPORT PROPERTY BOUNDARY	
FUTURE AIRPORT PROPERTY	
ZONE 1	
ZONE 2	
ZONE 2.5	
ZONE 3	

RS&H

RS&H, Inc.
4525 Airport Approach Road, Suite A
Duluth, Minnesota 55811
218-722-1227 FAX 218-722-1052
www.rsandh.com

DULUTH AIRPORT AUTHORITY

DULUTH CUSTOM ZONING ORDINANCE

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED:
REVIEWED BY:
DRAWN BY:
DESIGNED BY:

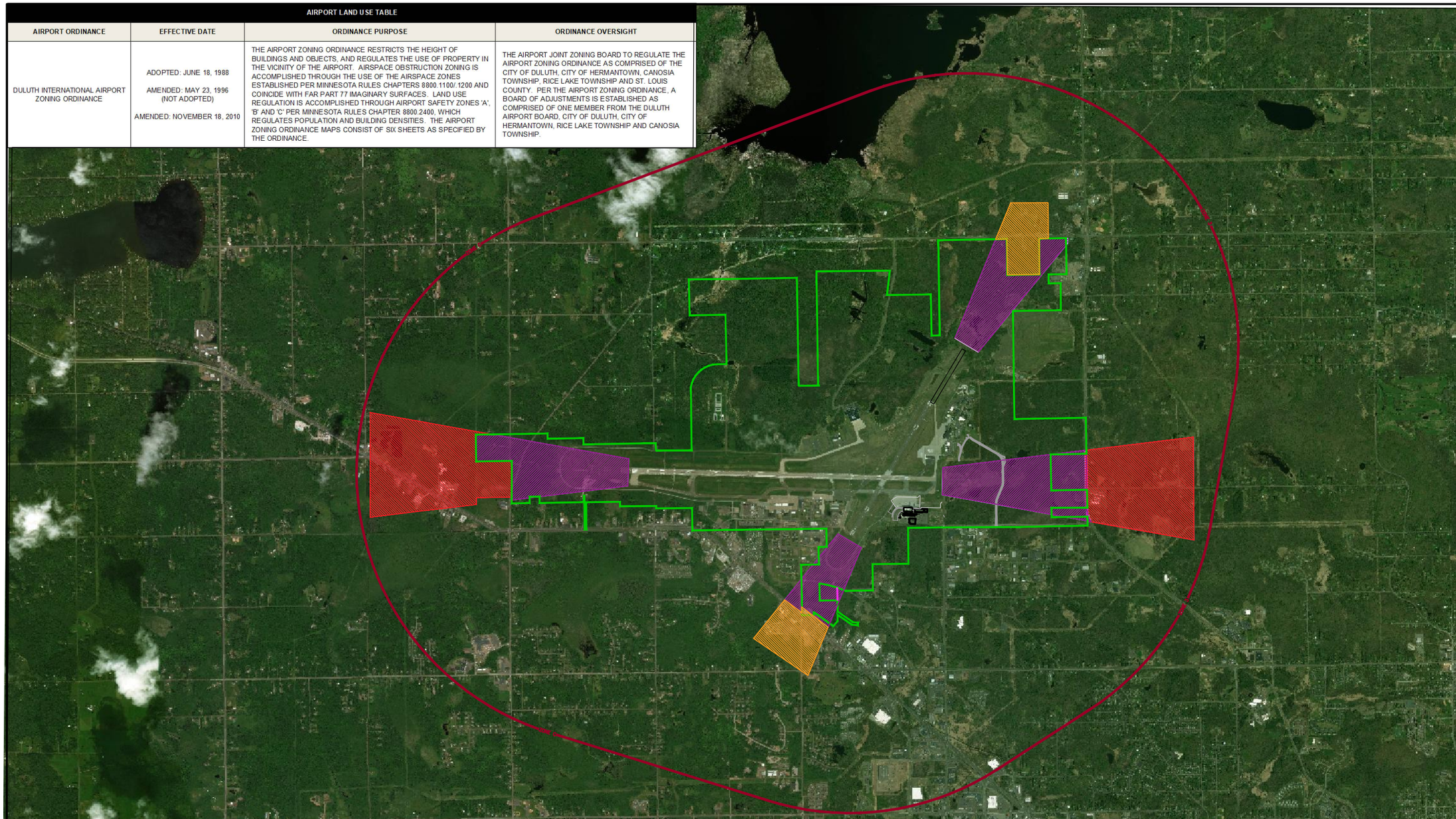
PROJECT NUMBER

SHEET TITLE

SHEET NUMBER

AIRPORT LAND USE TABLE

AIRPORT ORDINANCE	EFFECTIVE DATE	ORDINANCE PURPOSE	ORDINANCE OVERSIGHT
DULUTH INTERNATIONAL AIRPORT ZONING ORDINANCE	ADOPTED: JUNE 18, 1988 AMENDED: MAY 23, 1996 (NOT ADOPTED) AMENDED: NOVEMBER 18, 2010	THE AIRPORT ZONING ORDINANCE RESTRICTS THE HEIGHT OF BUILDINGS AND OBJECTS, AND REGULATES THE USE OF PROPERTY IN THE VICINITY OF THE AIRPORT. AIRSPACE OBSTRUCTION ZONING IS ACCOMPLISHED THROUGH THE USE OF THE AIRSPACE ZONES ESTABLISHED PER MINNESOTA RULES CHAPTERS 8800.1100/.1200 AND COINCIDE WITH FAR PART 77 IMAGINARY SURFACES. LAND USE REGULATION IS ACCOMPLISHED THROUGH AIRPORT SAFETY ZONES 'A', 'B' AND 'C' PER MINNESOTA RULES CHAPTER 8800.2400, WHICH REGULATES POPULATION AND BUILDING DENSITIES. THE AIRPORT ZONING ORDINANCE MAPS CONSIST OF SIX SHEETS AS SPECIFIED BY THE ORDINANCE.	THE AIRPORT JOINT ZONING BOARD TO REGULATE THE AIRPORT ZONING ORDINANCE AS COMPRISED OF THE CITY OF DULUTH, CITY OF HERMANTOWN, CANOSIA TOWNSHIP, RICE LAKE TOWNSHIP AND ST. LOUIS COUNTY. PER THE AIRPORT ZONING ORDINANCE, A BOARD OF ADJUSTMENTS IS ESTABLISHED AS COMPRISED OF ONE MEMBER FROM THE DULUTH AIRPORT BOARD, CITY OF DULUTH, CITY OF HERMANTOWN, RICE LAKE TOWNSHIP AND CANOSIA TOWNSHIP.



N

0 3700 7400 Feet

ZONING LEGEND

AIRPORT PROPERTY BOUNDARY	
FUTURE AIRPORT PROPERTY	
ZONE 1	
ZONE 2	
ZONE 2.5	
ZONE 3	

RS&H

RS&H, Inc.
4525 Airport Approach Road, Suite A
Duluth, Minnesota 55811
218-722-1227 FAX 218-722-1052
www.rsandh.com

DULUTH AIRPORT AUTHORITY

DULUTH CUSTOM ZONING ORDINANCE

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED:
REVIEWED BY:
DRAWN BY:
DESIGNED BY:
PROJECT NUMBER

SHEET TITLE

SHEET NUMBER

Duluth International Airport Zone 2.5 Analysis

This document is a supplement to the Airport Zoning Ordinance Analysis previously submitted to illustrate how the proposed Duluth International Airport Zone 2.5 balances safety and economic development. The JAZB and Airport staff work together with the local jurisdictions to implement land use policies that conform to Minnesota Statute Chapter 360.063 Airport Zoning, protect vulnerable populations, and enable compatible development near the Airport. The Minnesota Airport Zoning statute outlines four zones restricting development adjacent to airports:

- Clear Zone: Airport must control property in the Runway Protection Zone (RPZ) associated with the approach to the runway
- Zone A: There shall be no buildings in the approach zone adjacent to the RPZ
- Zone B: No land use of less than 3 acres should be found in an approach zone that extends outward from Zone A to a distance equal to one-third of the runway length
- Zone C: All land within the horizonal zone, subject to uses that do not interfere with airport electronic facilities

The purpose of the State's Airport Zoning statute is to ensure that the following elements are considered when allowing or denying land uses in the vicinity of the Airport:

- Location of vulnerable populations
- Availability of contiguous open spaces
- Land uses that surround the airport, create or cause interference, attract large assemblies of people, attract wildlife, cause interference with airport operations
- Airspace protection
- Social and economic costs of restricting land uses
- Accident rate compared to statistically significant sample
- Planned uses within the airport hazard area
- Any other information relevant to safety or the Airport

The JAZB sets zoning requirements for the properties surrounding the Airport and the communities have also established individual zoning or land use measures to help protect from incompatible uses. Zoning for the Canosia Township is administered through St. Louis County. Note that respecting the character of the surrounding community was emphasized in all stages of Custom Zone development. All nonconforming existing land uses would be permitted to remain. Land use regulations were assessed by working closely with the surrounding communities and an Ordinance was drafted that we believe appropriately balances the interests of all parties.

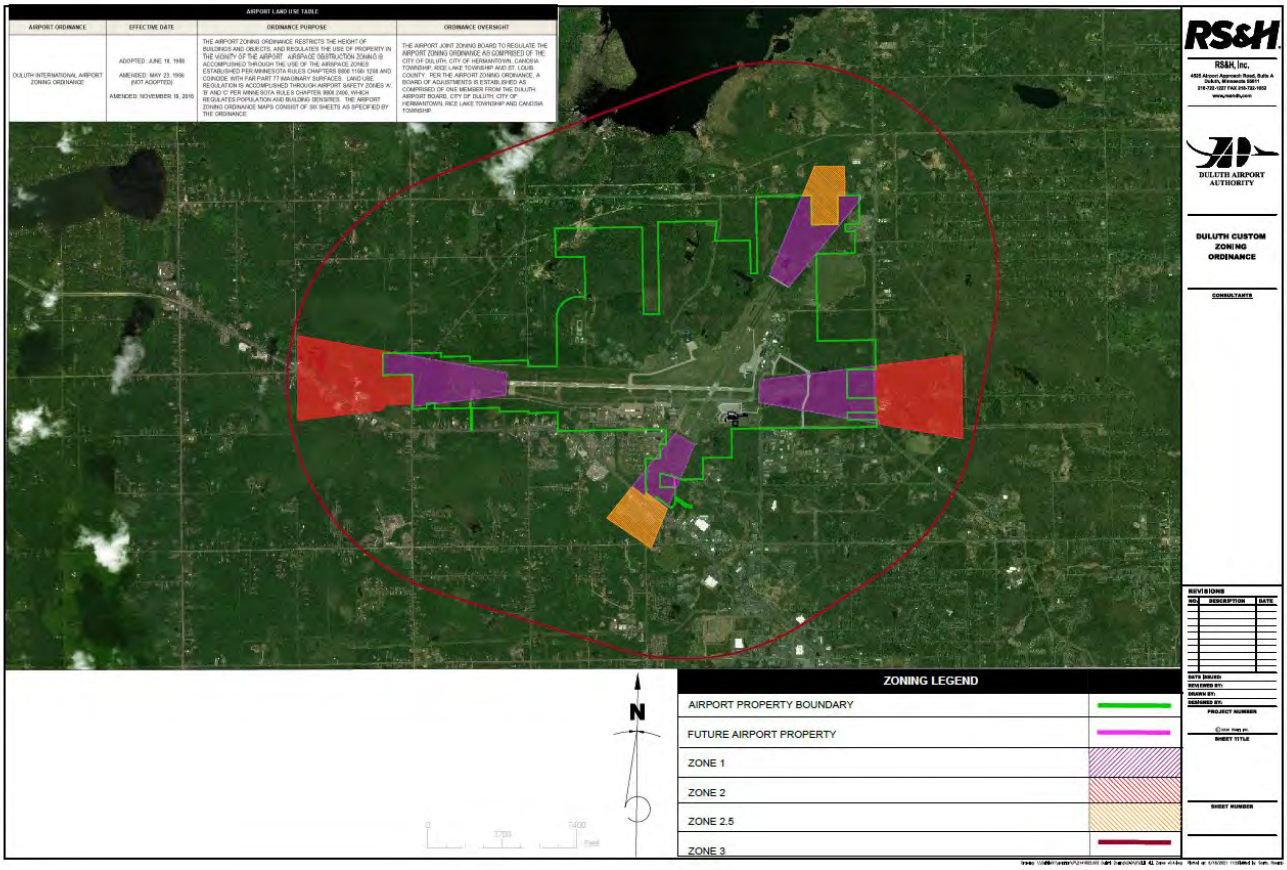
The analytical targets outlined in the Statute and summarized in the previous section were then translated to key metrics for integration into the revised Custom Airport Zones. In order to avoid confusion between the standard zones defined by the Statute in Figure 1 and the Custom Airport Zones

proposed by the JAZB, the proposed Custom Airport Zones are referred to as Zone 1, Zone 2, and Zone 3. Custom Zone 1 is roughly analogous to standard Zone A; Custom Zone 2 is roughly analogous to standard Zone B; and Custom Zone 3 is roughly analogous to standard Zone C. The JAZB is also proposing Custom Zone 2.5 which has less restrictions than Zone 2 and more restrictions than Zone 3. The following are key goals associated with the development of the new Custom Airport Zones:

- Existing land uses are not affected
- For future development:
  - Zone 1: In approach zones of a runway, shall not contain buildings
    - Approach surface = Imaginary surface longitudinally centered on extended centerline at each end of a runway
  - Zone 2: Extends outward from Zone 1, each use shall not be less than 2.5 acres and prohibits uses that attract/house crowds
    - Places of public assembly
    - Schools
    - Hospitals
  - Zone 2.5: Extends outward from Zone 1 on Runway 3-21 and prohibits
    - Childcare or daycare centers
    - State licensed residential care facilities and housing with service establishments serving 7 or more persons
    - State licensed adult daycare facility serving 13 or more persons
    - State licensed group family daycare facility serving 13 or more children
    - Public or private schools
    - Public or private hospitals
  - Zone 3: Subject to uses that do not create or cause interference with airport operations
    - Electronic facilities
    - Make it difficult for pilots to distinguish airport lights
    - Glare

Based on the analysis, a Custom Airport Zone map was created, as shown in Figure 1.

Figure 1
Proposed Custom Zones



Source: RS&H, 2020

Zoning Standards in Duluth International Airport Zones

This section illustrates for each of the requirements in Minnesota Statute 360.0656 how the proposed Duluth International Airport Zones meet that requirement. Note that respecting the character of the surrounding community was emphasized in all stages of Custom Zone development. The Ordinance was written such that existing land uses would be permitted to remain.

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

> **-the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including: - the location of vulnerable populations, including schools, hospitals, and nursing homes, in the airport hazard area**

The locations of vulnerable populations and places of public assembly within vicinity of the Airport are shown Figure 2. There are no locations of vulnerable populations including nursing homes, schools, or hospitals within Zones 1, 2, or 2.5. There is one place of public assembly on the boundary of Zone 2 (Grace Lutheran Church) west of Runway 9 and is allowed to remain. Zone 2.5 is located on the southern end of Runway 3 and north of Runway 21. The following uses are prohibited in Zone 2.5:

- Childcare or daycare centers;
- State licensed residential care facilities and housing with service establishments serving 7 or more persons;
- State licensed adult daycare facility serving 13 or more persons;
- State licensed group family daycare facility serving 13 or more children;
- Public or private schools;
- Public or private hospitals

Runway 3-21 currently serves as a crosswind runway that provides another option for pilots to land when winds do not favor Runway 9-27. Current zoning underlying Zone 2.5 at the south end is identified as Public, High Density Commercial, and Low Density Residential within the Hermantown Zoning District (see Figure 3). Zone 2.5 land at the north end is currently zoned as Rural Residential 1 District and Industrial Future Land Use within the Rice Lake Zoning District and Future Land Use. Future development in the Zone 2.5 area will prohibit development of uses that include places vulnerable populations such as daycares, hospitals, schools, and nursing homes.

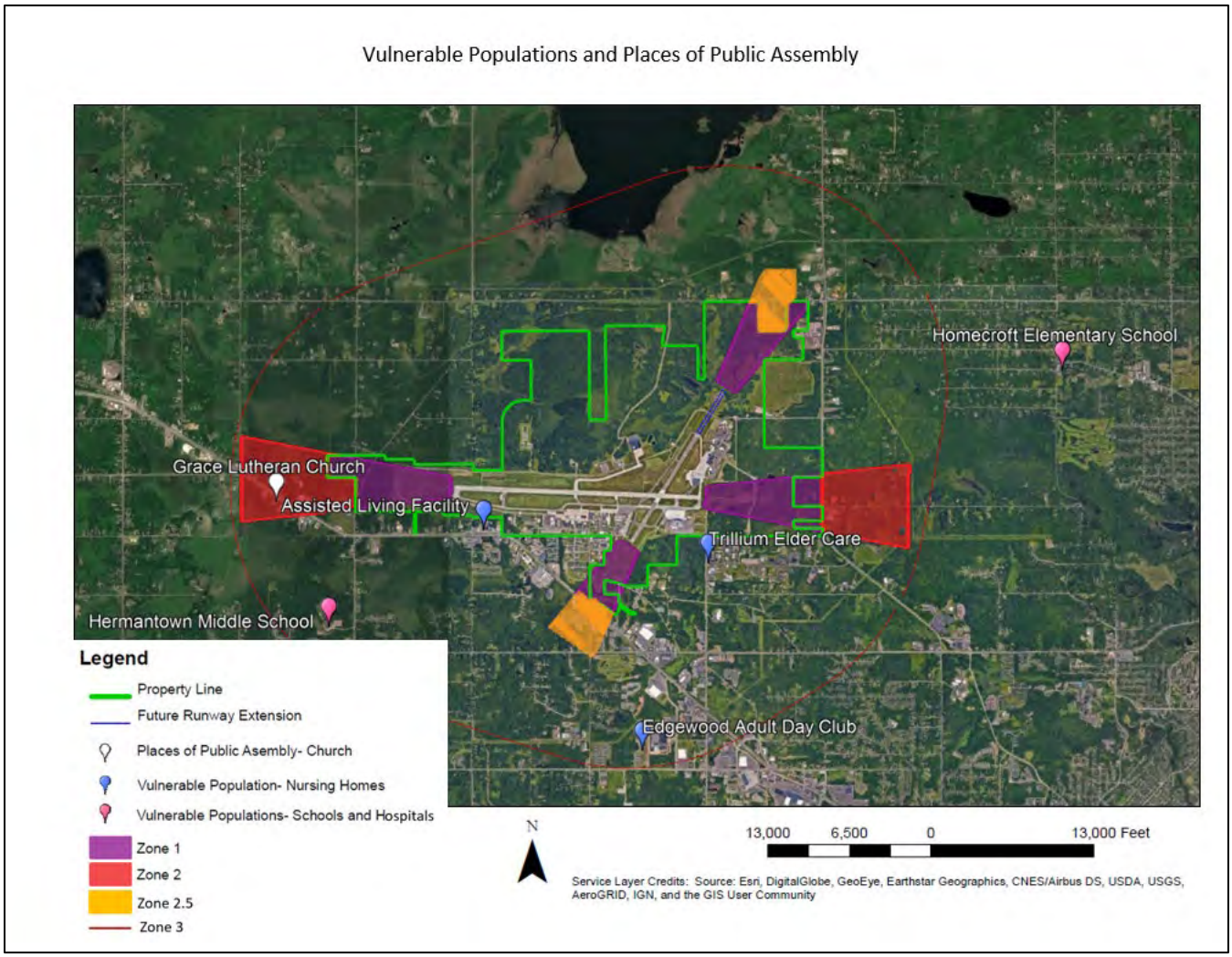
As previously discussed, Zone 2 is within the City of Hermantown Zoning District Industrial, C-1A Commercial, R-1 Residential, and Open Space districts. Per Section 520.01 Land Use Regulations for Hermantown, the Commercial Zoning District is intended to provide suitable areas within the community for the grouping and establishment of general retail sales, offices, professional buildings, and service businesses. It is intended to provide convenient retail facilities for the residents of Hermantown and the surrounding area. The City of Hermantown Residential R-1 Zoning District allows for one- and two-family residential dwellings (Section 505.01). The minimum lot area requirement for R-1 is 2.5 acres.

New facilities containing vulnerable populations will not be developed in Zone 1, 2, or 2.5. Future development of properties containing vulnerable populations are acceptable in Zone 3. The existing community development patterns indicate that vulnerable populations are likely to cluster closer to the more developed areas of Duluth and in areas of higher density development. There are no existing development patterns that indicate higher density growth in the vicinity of the Airport is likely. This is due to the various Zoning Districts immediately surrounding the airport which include Open Space, Residential (R-1 and Rural Residential), Industrial, and Commercial uses.

The location of future or potential land uses containing vulnerable populations or the identification of areas where the development of land uses containing vulnerable populations would be most harmful to airport safety along Runway 3-21 will not be able to exist due to the creation of Zone 2.5. Land use restrictions in Zone 2 prevent the creation of land uses which contain vulnerable populations. Now, with the creation of Zone 2.5, there is a reasonable level of safety regarding vulnerable populations off the ends of Runways 3 and 21, much like Zone 2 provides for Zone 2.5, by adding land use restrictions that

improve public safety, especially when combined with existing mechanisms preventing the creation of other airport hazards for Runways 9 and 27.

Figure 2
Vulnerable Populations and Places of Public Assembly



Source: RS&H, 2020

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the location of land uses that attract large assemblies of people in the airport hazard area

Chapter 360 of the Minnesota Statutes does not define what constitutes a "large assembly of people," and, for the purposes of this analysis, this was defined to mean a location or facility that may attract a number and density of people in excess of what would typically be found in a retail establishment or residential area. "Large assembly" was interpreted to mean several hundred people collected in a dense

environment, such as what may be found during peak times at a church, concert venue, or indoor recreational facility.

The uses found within Zone 2.5 are within the Hermantown Commercial Zoning District which is intended to provide suitable areas within the community for the grouping and establishment of general retail sales, offices, professional buildings, and service businesses. This district is intended to provide convenient retail facilities for the residents of Hermantown and the surrounding area.

It is important to note that Chapter 360 of the Minnesota Statutes does not impact existing development. There are two existing land uses that may create a number or density of people. Marcus Lakes Cinema (movie theater) and Skyline Social and Games are located 0.77 miles southwest of Runway 3. Section 520.02 of the Hermantown Zoning Code outlines the uses allowed. The properties found within the proposed Zone 3 are described in Table 1.

Table 1
Land Uses That May Attract Large Numbers of People

Churches		
Name	Location	Zone
Gethsemane Covenant Church	0.94 miles southwest of Runway 9	Within Zone 3 and 2019 MnDOT Zoning Statute Zone B
Grace Lutheran Church	1.46 miles west of Runway 9	Within Zone 2 and 2019 MnDOT Zoning Statute Zone B
New Life Lutheran Church	1.16 miles southeast of Runway 3	Within Zone 3 and 2019 MnDOT Zoning Statute Zone C

Movie Theater		
Name	Location	Zone
Marcus Lakes Cinema	0.77 miles southwest of Runway 3	Within Zone 2.5 and 2019 MnDOT Zoning Statute Zone A

Bowling/Games Center		
Name	Location	Zone
Skyline Social & Games	0.73 miles southwest of Runway 3	Within Zone 2.5 and 2019 MnDOT Zoning Statute Zone A

Meeting/Event Centers		
Name	Location	Zone
AAD Shrine Meeting and Event Center	0.42 miles of south of Runway 9	Within Zone 3 and 2019 MnDOT Zoning Statute Zone C

Source: RS&H, 2020

The JAZB collaborates with the surrounding communities as part of the municipal review process to provide comments and feedback about the compatibility of any proposed conditional use development

in this area.

Future development of properties containing land uses that may attract large assemblies of people will not be developed in Zone 1. Future development of properties containing land uses that may attract large assemblies of people are unlikely to be developed in Zone 2.

Runway 9 end: Highway 53 crosses the Runway 9-27 extended centerline approximately 9,000 feet (1.7 miles) west of the threshold. This road is the only commercial corridor that intersects the extended centerline within the Airport Hazard Area and is therefore the only road on which a future facility that may attract large assemblies of people is likely to be proposed for development. Existing development in the area primarily consists of low-density commercial facilities such as small-scale industrial, consumer storage facilities, and automobile sales/repair facilities.

As distance from the Airport increases, the area takes on rural characteristics of low-density and large property sizes. Given the characteristics of the area and the increasingly rural environment as distance from the City of Duluth increases, it is reasonable to assume that future land uses will resemble existing land uses.

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the social and economic costs of restricting land uses

Based on this discussion of balancing safety and economic development, the boundaries of Zone 2.5 were revised from the initial proposal. The JAZB set the final proposed boundaries of Zone 2.5 after consideration of all the all the custom zoning factors and with the goal of ensuring a reasonable level of safety, including consideration of the balance between safety and costs.

The purpose of custom zoning is to provide airports with flexibility to best balance the social and economic costs of zoning while providing a reasonable level of safety in a manner which considers the unique qualities of the airport. This takes into thought the economic costs of impeding new development, which has three primary impacts: the loss of potential tax revenue, the loss of employment opportunities, and the cost to the governmental agency to acquire property or development rights from the property owners.

Zone 2.5 balances these costs with airport safety by maintaining restrictions that would not encourage incompatible development due to the current objectives in the various plans that surround the Airport but still allow development that maintains safety without adding restrictions that socially and economically impact the residents of the communities near the airport. Land adjacent to Zone 2, off Runway 9, is within the Western Miller Trunk Highway Small Area Plan conducted by the City of Hermantown. The purpose of the study was to provide guidance for future planning development, redevelopment, transportation, infrastructure, and commerce within this corridor. State Trunk Highway 53, otherwise known as the Miller Trunk Highway, is a key transportation connection between downtown Duluth, Hermantown, and outlying northern residential communities. Zone 2.5 does not impact this area (see Figure 5) that contains 40 percent of the city's commercial and industrial zoned land. Commercial uses are mixed in function though most are locally or regionally owned retail and

service businesses. The study identified this area to be central to several development opportunities including corridor, office, industrial, and small business growth. In 2017, there were over 130 businesses located in the study area. Although Zone 2.5 does not impact this area, this reaffirms that acquiring commercial properties and forcing those businesses could disrupt long-established development patterns in the area that would ripple throughout the community.

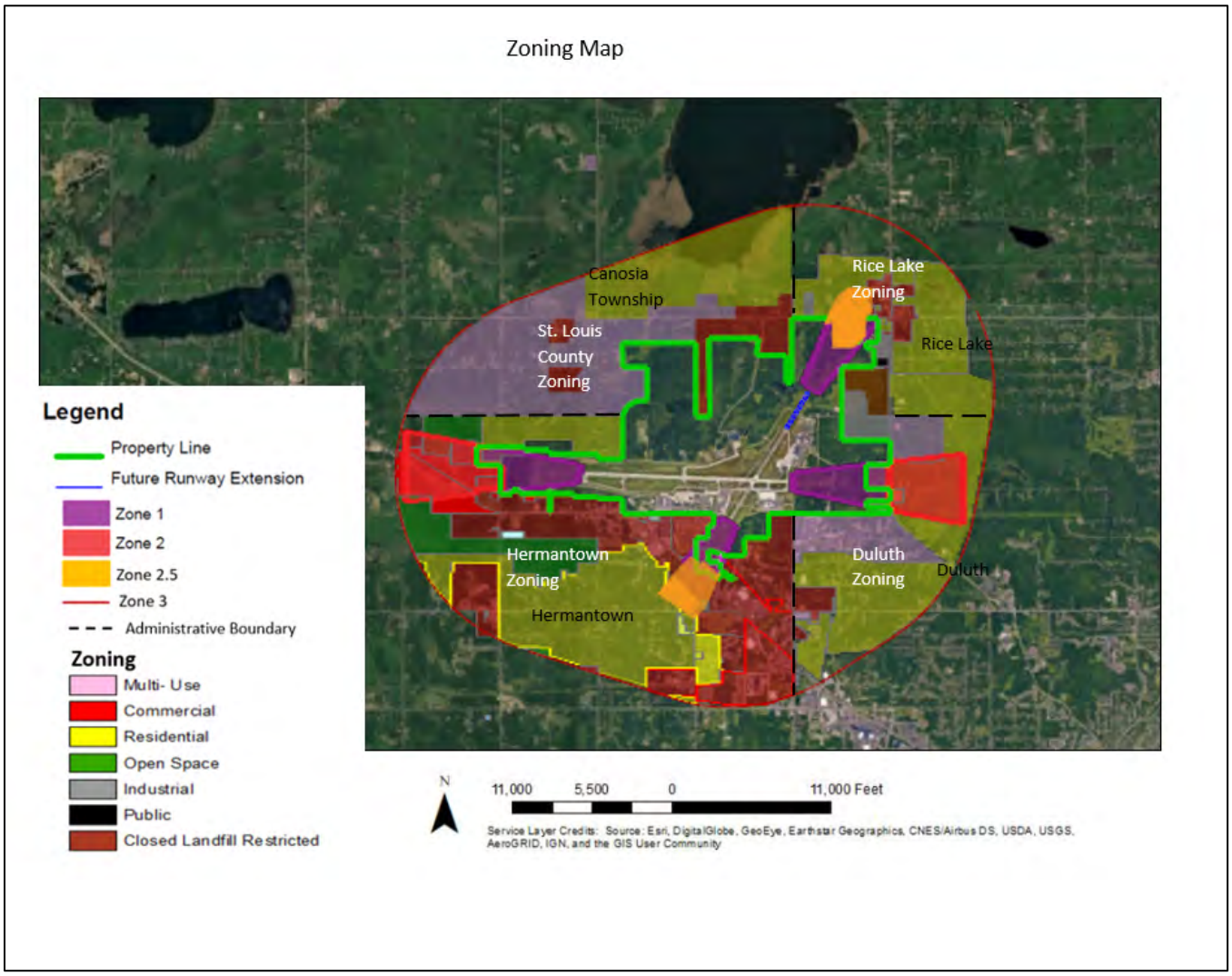
The custom zones balance these costs with airport safety by maintaining restrictions that would not encourage incompatible development due to the current objectives in the various Comprehensive Plans and Zoning Districts surround the Airport including the Western Miller Trunk Highway Small Area Plan.

Zone 2.5 does not place new burdens on property owners in the form of variance requirements including commercial uses and development. Social repercussions of relocation and displacement of existing homes and businesses to the community were also considered when creating Zone 2.5. The existing land uses found within Zone 2.5 are allowed to remain.

The social and economic costs of restricting land uses were determined when creating the appropriate boundaries for Zone 2.5. Based on its analysis of all the custom zoning factors (including those related to safety, and social and economic costs of restricting land uses), it was determined that no additional land use restrictions, including less-burdensome land use restrictions, were necessary outside the proposed zones to ensure a reasonable level of safety.

Zone 2.5 does not restrict future commercial development in an area that has existing commercial development (southwest of Runway 3). Doing so would have legal implications that could result in challenges to the zoning ordinance by property owners because it could be considered a public taking without just compensation. Acquiring commercial properties and forcing those businesses could disrupt long-established development patterns in the area that would ripple throughout the community. The JAZB worked very closely with the surrounding communities to arrive at the proposed configuration of the safety zones and drafted an Ordinance that the JAZB believes provides a reasonable level of safety while respecting the economic interests of each community. Other alternatives were considered during that process before arriving at the proposed configuration.

Figure 3
Zoning Map



Source: RS&H, 2020

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the accident rate of the airport compared to a statistically significant sample, including an analysis of accident distribution based on the rate with a higher accident incidence

The Airport's low historical accident rate and the existing land use protections in place through the existing RPZs provide an acceptable level of safety for the community in the vicinity of the airport. Statistically, an aircraft could be expected to crash within the airport hazard area off one of the runway ends, but outside the RPZ, approximately once every 800 years. See the previously submitted Appendix.

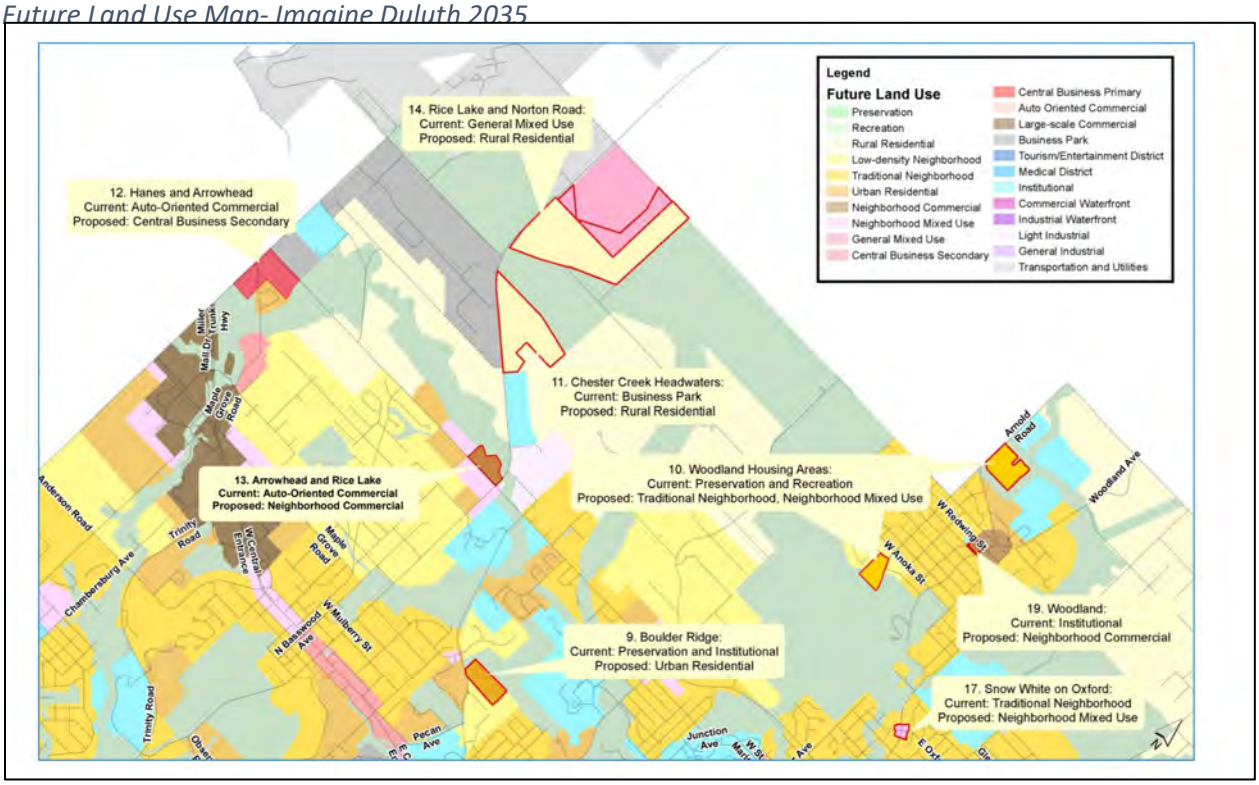
Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the planned land uses within an airport hazard area, including any applicable platting, zoning, comprehensive plan, or transportation plan

The custom zones do not impact the existing municipal plans and reinforce the policies found within each plan. The analysis states that the custom zones are compatible with current comprehensive, zoning and/or transportation plans in the surrounding jurisdictions. Land use regulations created outside of airport zoning are subject to change at the discretion of the community. However, the custom zones and the addition of Zone 2.5 decrease incompatible uses that would negatively impact airport safety. Zone 2.5 provides the community a regulatory tool to prevent the creation of airport hazards.

Rice Lake and Canosia are rural residential communities consisting of mostly agricultural, conservation, large lot, and low-density land uses that require at least 2.5 acres per dwelling unit. Hermantown is a city experiencing growth in single-family and multi-family residential and commercial uses on varied lot sizes. The Imagine Duluth 2035 Comprehensive Plan evaluated the area of Rice Lake and Norton Area and identified this area as Site 14. This area is recognized as potentially dealing with development pressure. However, the Imagine Duluth 2035 Comprehensive Plan identified this area as pivotal for the preservation of the low intensity character and within the headwaters of Chester Creek resulting in Preservation and Low-Density Neighborhood Future Land Use categories (see Figure 4).

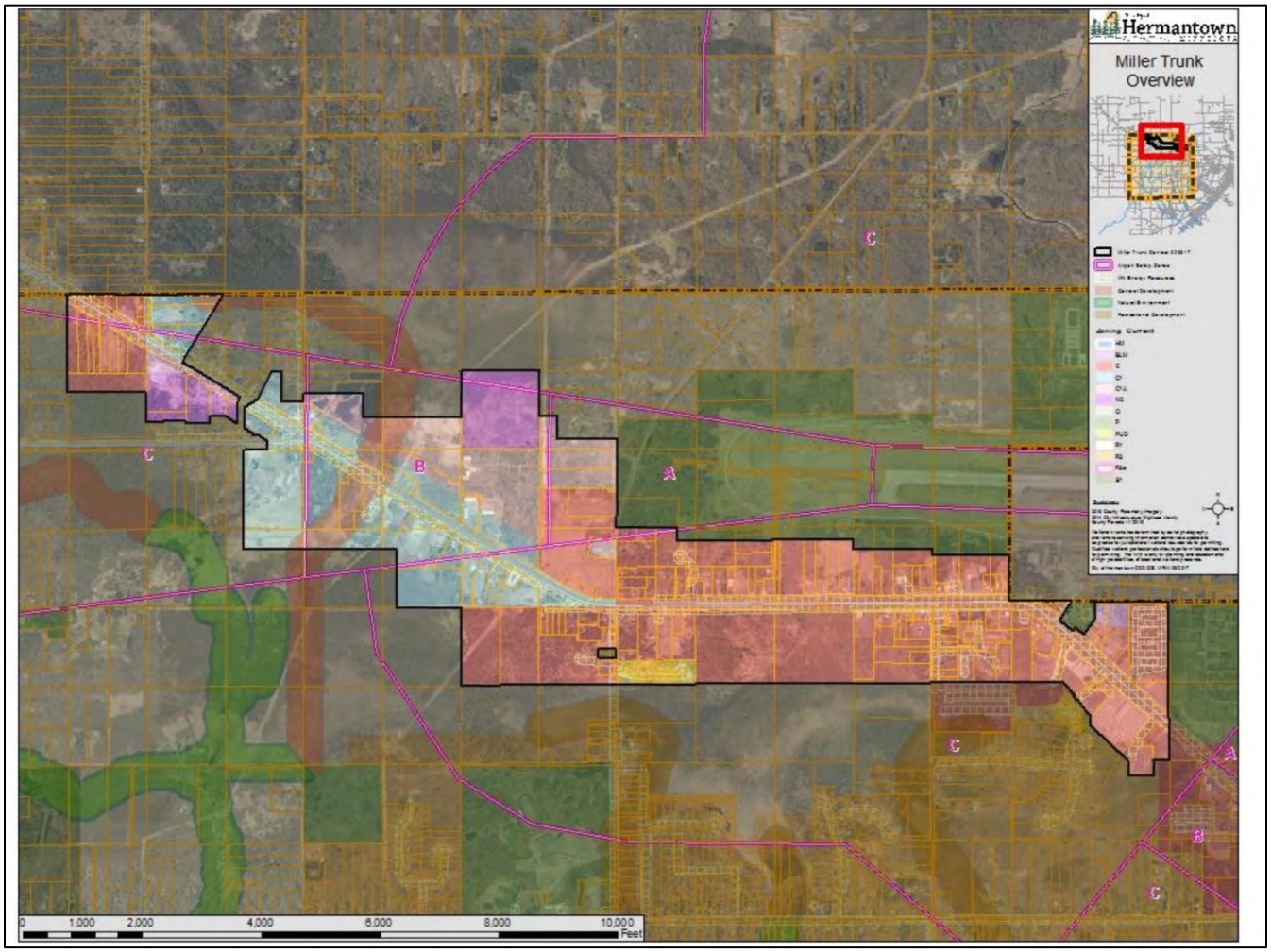
Figure 4
Future Land Use Map- Imagine Duluth 2035



Source: Imagine Duluth 2035 Land Use, 2018

As previously discussed, a portion of land adjacent to Zone 2, off Runway 9, is within the Western Miller Trunk Highway Small Area Plan (see Western Miller Trunk Highway Study Area figure) conducted by the City of Hermantown. The study area included commercial and industrial parcels along Miller Trunk Highway between R.J. Sport and Cycle and Seville Road on the west end of Hermantown. The stretch of area adjacent to Zone 2 along Miller Trunk Highway is zoned Commercial and Open Space to represent the low-density area of the highway and transition to rural areas. The study also recognized that much of the land within this study area that is zoned Commercial and subject to additional development regulations from the overlay zoning district. This area is also classified as Airport Safety Zone A and Zone B (now Custom Zone 1 and 2) within the Western Miller Trunk Highway Study Area. The plan specifically indicates that uses in the area require approval of the Airport Zoning administrator and JAZB. The Commercial Zoning District allows for more intense uses and is consistent with Airport standards.

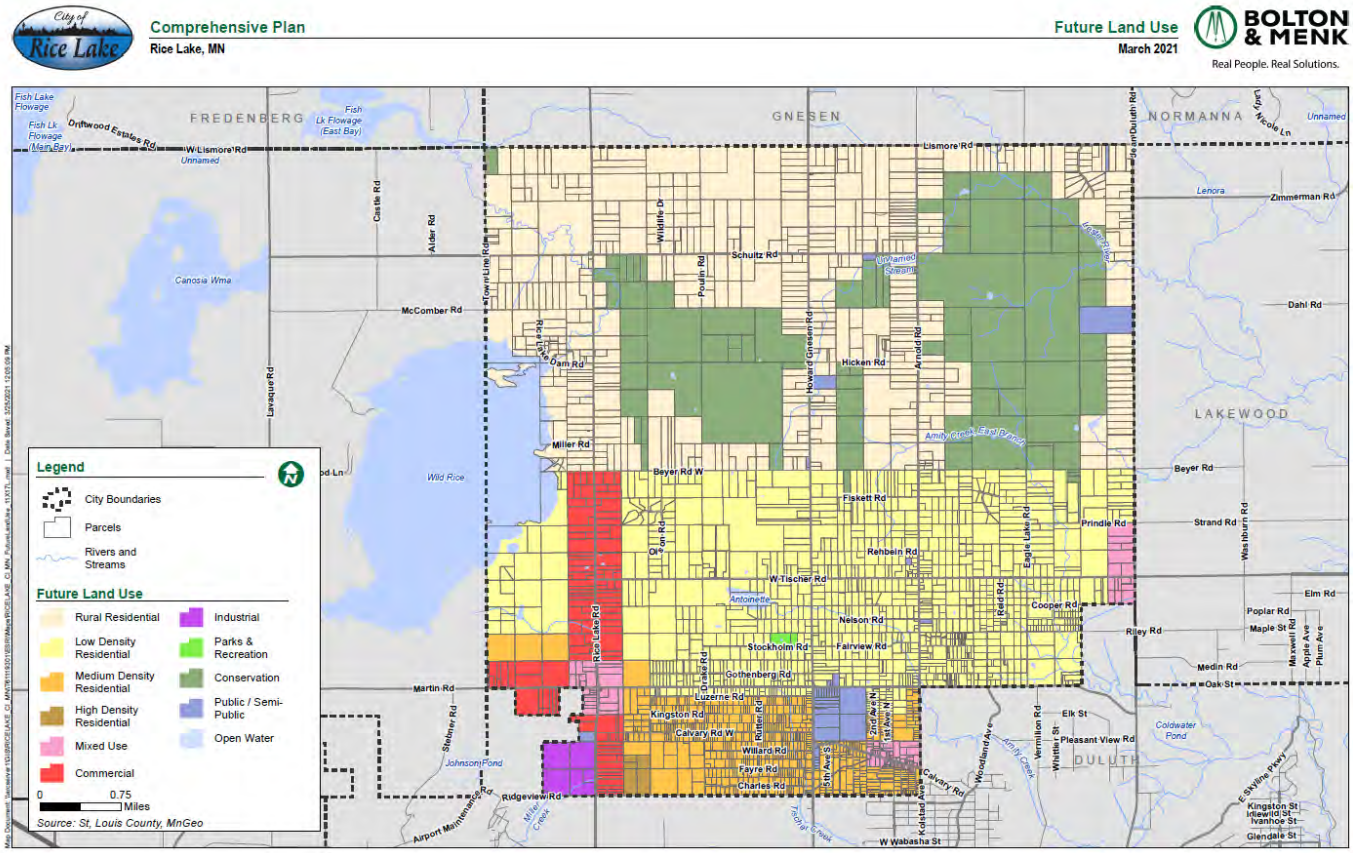
Figure 5
Western Miller Trunk Highway Study Area



Source: City of Hermantown, Western Miller Trunk Highway Small Area Plan, 2017

The City of Rice Lake Comprehensive Plan also recognizes the importance of preserving the safety of regional air carrier service and identifies this as goal with objectives specifically focusing on the coordination with the Airport Authority to protect the Airport from encroachment of incompatible uses. The Future Land Use Map (see Rice Lake Future Land Use Map figure) created in March 2021, identifies the area west of Runway 21 as Commercial Future Land Use category. The goal of identifying this area is to support the development of regional and local transportation options but to also preserve the safety of the Airport including addressing federal and state standards when planning the design of any object related to or affecting navigable space as specified in the Rice Lake Comprehensive Plan. Therefore, the plans mentioned above recognize the existence of the Airport and coordination required to develop in the area in order to protect the Airport from incompatible land uses.

Figure 6
Rice Lake Future Land Use Map



Source: City of Rice Lake Comprehensive Plan, 2021.

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the location of wildlife attractants in the airport hazard area

Land uses that attract wildlife in the vicinity of the Airport include open water and wetland areas. No other traditional wildlife attractants, such as wastewater treatment facilities and waste transfer stations are located in the vicinity of the area or in Zones 1 and 2. The former Rice Lake Landfill east of the extended runway centerline was closed and capped in 2003 and should not serve as a wildlife attractant. A small portion of Wild Lake Reservoir is located within Zone 3 approximately 2 miles away from Runway 21.

- Runway 3 end: No properties of interest were found in this area. Based on existing development patterns, no additional development of wildlife attractants is likely in this area.

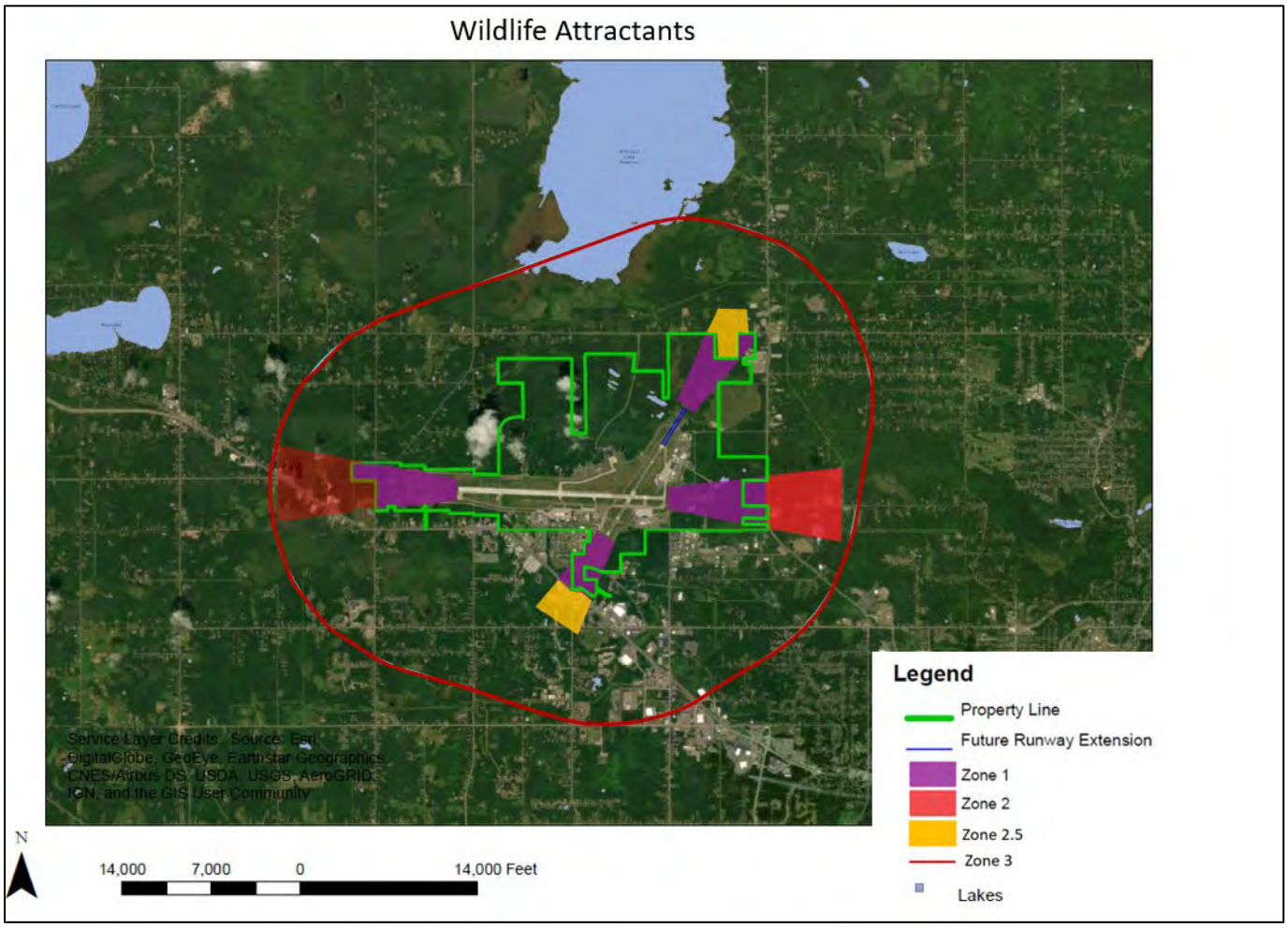
- Runway 9 end: No properties of interest were found in this area with the exception of a borrow pit that sometimes retains water located approximately 8,500 feet (1.6 miles) west of the runway threshold. Based on existing development patterns, no additional development of wildlife attractants is likely in this area.

- Runway 21 end: The former Rice Lake Landfill east of the extended runway centerline was closed and capped in 2003 and should not serve as a wildlife attractant. Based on existing development patterns, no additional development of wildlife attractants is likely in this area.

- Runway 27 end: Three small ponds of approximately 2 acres each currently exist within a half mile of the runway threshold and on either side of the extended runway centerline. Based on existing development patterns, no additional development of wildlife attractants is likely in this area.

Based on existing development patterns (see Figure 7), no additional development of wildlife attractants is likely to develop in this area. Wildlife attractant areas are shown below. Zone 2.5 provides a reasonable level of safety regarding the prevention of the creation of wildlife attractants by precluding the establishment of new wildlife attractants in the foreseeable future.

Figure 7
Wildlife Attractants



Source: RS&H, 2020

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-the availability of contiguous open spaces in the airport hazard area

Contiguous open spaces are valuable in the vicinity of an airport as they give the pilot of a disabled aircraft options to land in a place that have the greatest potential to minimize damage and contain the accident site. Contiguous open spaces adjacent to runway ends in the vicinity of the Airport are provided by the following land uses in the zoning districts below:

- Land guided Open Space in the City of Hermantown and St. Louis County
- Land guided as Open Space and Residential (required to be a minimum of 2.5 acres) in the City of Hermantown
- Open water

Per Section 545.01 Land Use Regulations for Hermantown, the Open Space district is intended to preserve those areas of the community which have limited development potential due to their location, accessibility, natural features, or unique characteristics. They are normally areas of unsuitable soils, low marsh/wetlands, bedrock, or steep topography. Uses within these areas, due to specific unsuitable conditions, will include agriculture, forestry, and recreation. The minimum lot area requirement is 5 acres. Research shows that in more than 95 percent of aircraft accidents the pilot has some measure of control of the aircraft well into the ground impact sequence. For that reason, open contiguous parcels adjacent to the airport are desirable – particularly along the extended runway centerline. A pilot experiencing fuel exhaustion or mechanical failure can then steer toward the open parcels to complete an off-airport landing.

The proposed custom zoning ordinance requires a minimum parcel size of 2.5 acres in Zone 2, as well as the presence of at least one undeveloped open space of at least 2.5 acres. The intent of this requirement is to ensure very low-density development so as to give pilots options in the case of a forced landing, thereby increasing the safety of people on the ground. This strategy provides ample area for a pilot of a stricken airplane to guide it away from population on the ground.

For example, a Cessna 172 – the most popular general aviation aircraft ever manufactured – requires approximately 600 feet for a controlled landing to a full stop on grass.

- Runway 3 end: Except for a stretch of commercial properties along Highway 53 south of the Airport, the primary development in this area is low-density residential with lot sizes in excess of 1 acre, as well as several undeveloped parcels of greater than 15 acres (though ownership may vary). Most of the undeveloped land and much of the residential property is wooded.

- Runway 9 end: Except for the low-density rural commercial land uses along Highway 53, Zone 2 off the end of Runway 9-27 west of the Airport is primarily agricultural and complies with the intent to maintain contiguous open areas. Some of the undeveloped land is wooded, but most is either small scrub vegetation or open fields.

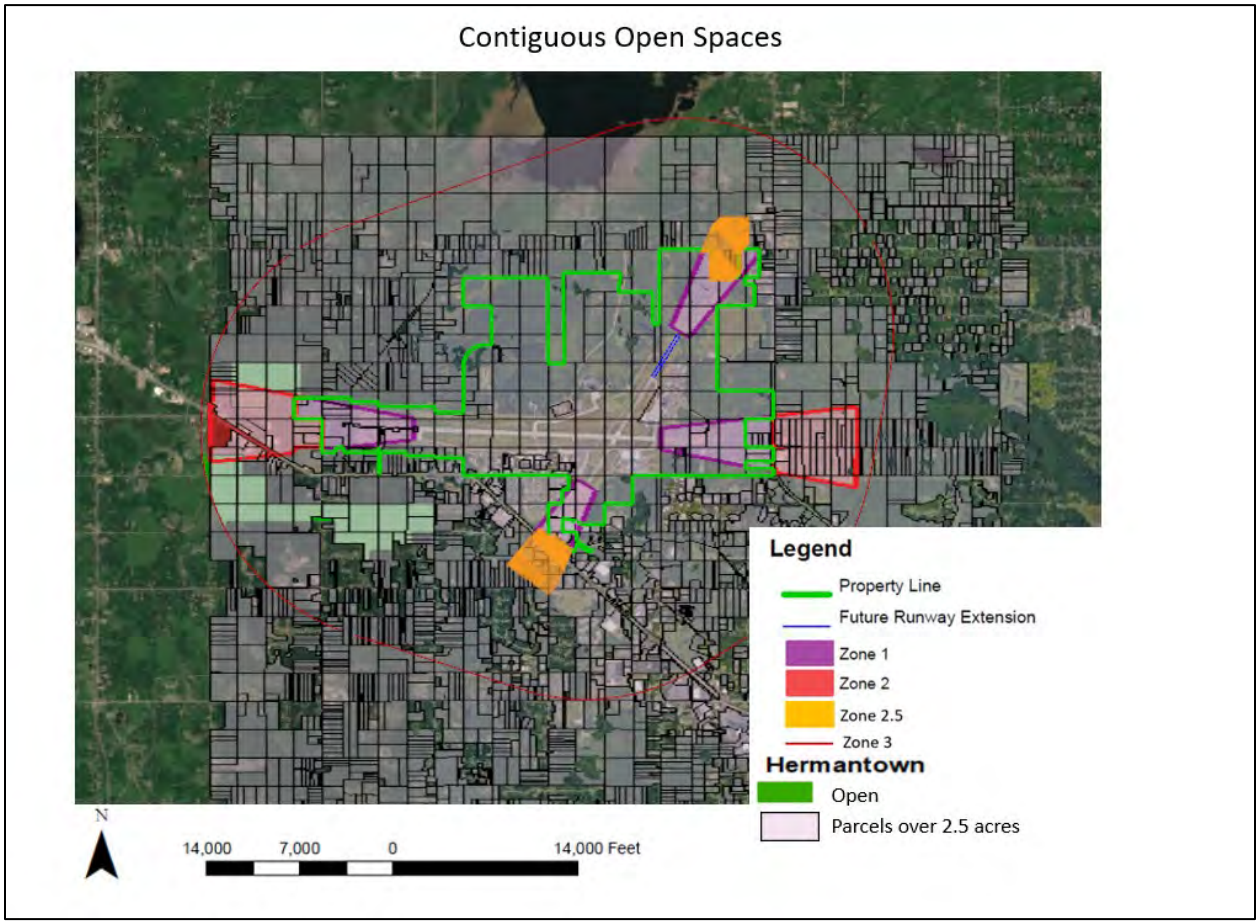
- Runway 21 end: Two roadways, Martin Road and Rice Lake Road serve properties off the north end of Runway 3-21. Development along both of these roads is limited to low-density rural commercial and residential properties. The majority of the land in this area is undeveloped and forested, although some areas of open field and scrub vegetation exist on either side of the approach corridor.

- Runway 27 end: Rice Lake Road intersects the extended runway centerline approximately 5,500 feet (1 mile) east of the threshold. Development along this road and throughout the area is limited to low-density rural commercial and residential properties. The majority of the land in this area is undeveloped and forested, although some areas of open field and scrub vegetation exist on either side of the approach corridor.

The rural atmosphere surrounding the Airport will maintain sufficient buffer for the pilot of a malfunctioning airport to steer clear of structures.

In addition to these open space areas, there are large bands of low-density residential development surrounding the airport that is zoned to require at least 2.5 acres per dwelling unit. This type of low-density development provides additional swaths of open space not available in more densely developed areas. This meets the requirement of contiguous open spaces within the Airport Hazard Area. In addition, the map below depicts the Residential and Open Space Zoning Districts and parcels that are a minimum of 2.5 acres. The Airport is surrounded by properties over 2.5 acres as seen in Figure 8 and includes those parcels within Zone 2.5.

Figure 8
Contiguous Open Spaces



Source: RS&H, 2020

Requirement : *Analyze the location of the airport, the surrounding land uses, and the character of neighborhoods in the vicinity of the airport, including:*

-analyze 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

In the 20 years from January 2000-December 2019, there have been two civil aviation accidents within DLH's Airport environment that rose to the level of accident as defined by the National Transportation

Safety Board. Both were general aviation accidents. One (January 2008) involved a poor landing of a general aviation aircraft that resulted in a broken nose gear. The accident was contained within the runway safety area of Runway 9-27.

The other (July 2000) involved a spatial disorientation loss of control after an instrument departure in fog from Runway 9 and a resulting crash in a wooded area approximately 1.8 miles north-northeast of the departure end of the runway. The NTSB report does not specify the exact location, but analysis from aerial imagery suggests ground impact was within the standard Zone C and proposed custom Zone 3.

These two events represent an accident rate of 0.158 per 100,000 operations over the 20-year period. By comparison, the accident rate for all US air carriers during the same interval was 0.187 per 100,000 operations. The 28th Joseph T Nall Report, published in October 2019, found that over a 10-year period from January 2007 through December 2016, there were a total of 4,749 non-commercial general aviation airplane accidents in the US that occurred either on landing or on takeoff/initial climb. FAA's Traffic Flow Management System Counts found that over the same period there were approximately 70.7 million general aviation operations. Together, these data put the accident rate in the airport environment for all US general aviation at approximately 6.717 per 100,000 operations – far higher than the rate exhibited at the Airport.

The small sample size of local aviation accidents requires examination of a broader universe of airports to determine potential accident site distribution. One key study was the 2008 ACRP Report 3, Analysis of Aircraft Overruns and Undershoots for Runway Safety Areas, which examined landing undershoots, landing overruns and takeoff overruns to identify the location and extent of hazardous areas near the runway ends. ARCP Report 3 looked at 459 air carrier accidents and incidents in the vicinity of the airport to determine the value of Runway Safety Areas. Data for the study was compiled from the National Transportation Safety Board, FAA, NASA's Aviation Safety Reporting System, Canada's Transportation Safety Board, the United Kingdom's Air Accident Investigation Branch and France's Bureau d'Enquêtes et d'Analyses.

In the course of the analysis, the research team developed a series of risk models that created a probability distribution for the point of first impact for landing undershoots and the final stopping location for landing and takeoff overruns. Although the purpose of ACRP Report 3 was to analyze Runway Safety Areas, an intermediary step involved creating probability formulas for each of the three accident/incident scenarios that reflected the real-world probability of an accident aircraft's position relative to the threshold and the extended runway centerline. This analysis included only landing undershoots, landing overruns, and takeoff overruns. Runway loss-of-control accidents were not considered, as they occur independently of the location of the runway ends and typically remain on airport property.

The study created probability formulas that show the distribution of landing undershoots, landing overruns, and departure overruns based on longitudinal distance from the threshold and lateral distance from the extended centerline. Those probability formulas gave the following distances in which the probability of containing the accident would be 80 percent, 90 percent, and 95 percent.

Table 2
Accident Containment Probability

	80% Probability	90% Probability	95% Probability
Landing Undershoot			
Distance from Threshold (ft)	671	1,170	1,764
Distance from Centerline (ft)	49	136	286
Landing Overrun			
Distance from Threshold (ft)	552	803	1,057
Distance from Centerline (ft)	70	145	249
Departure Overrun			
Distance from Threshold (ft)	994	1,392	1,782
Distance from Centerline (ft)	129	287	500

Source: ACRP 3, Table 10 and Table 11 Raw Data

As evident from Table 2, there is a greater than 95 percent probability that a runway-area accident would be contained within an area between the runway threshold and a point 1,782 from the threshold, and within 500 feet of the runway extended centerlines. This area fits wholly within the Runway Protection Zone of each runway, and all RPZs are contained wholly within Airport property.

The Airport's low historical accident rate and the existing land use protections in place through the existing RPZs provide an acceptable level of safety for the community in the vicinity of the airport. Statistically, an aircraft could be expected to crash within the airport hazard area off one of the runway ends but outside the RPZ approximately once every 800 years.

APPENDIX-

Airport Area Safety Analysis

1 BACKGROUND

This study examined the rationale for establishing airport land use classifications based on the geolocation of aviation accidents. A primary consideration of airport development is ensuring that the community surrounding the airport contains land uses that are compatible with aviation activity.

This analysis examined current and historical studies of aircraft accident locations that were designed to identify the risk to uninvolved public in the airport area due to an aircraft accident. The purpose of the analysis was to identify ways to determine acceptable land uses near the airport in an effort to assess state and local zoning ordinances with respect to predicted risk.

A variety of studies and datasets were examined to determine the likely spread of accidents near an airport. It was the intention of this study to identify areas surrounding the Duluth International Airport and identify areas where the risk to the uninvolved public may be elevated due to the potential for accidents involving fixed-wing aircraft.

There are several key limitations involved in a study of general aviation aircraft accidents, which are described throughout this Appendix. Those limitations include the lack of authoritative flight activity data that would allow accident rates to be calculated and the inconsistent documentation created as a result of the accident investigations. In addition, a relatively low number of accidents occur near the airport, but outside of the runway environment. Combined, these factors mean that statistical analysis of aviation accident locations should be approached with caution, particularly as the accident sample size shrinks even further during the segmentation of near-airport areas.

2 STUDY APPROACH

This study assesses the relative risk to the public of aviation operations, particularly in respect to the location of areas of higher risk that may be associated with extended runway centerlines or airport traffic patterns to and from Duluth International Airport (DLH).

By focusing on the risk to the uninvolved public, this study will not consider risk associated with accidents that can reasonably be expected to be contained within the confines of the runway safety area (such as hard landings or runway loss of control), or those associated with en-route operations (such as controlled flight into terrain or fuel mismanagement). This limitation leaves takeoff/initial climb and descent/approach as the phases of flight of interest when assessing near-airport risk exposure and removes most accidents from consideration. For example, National Transportation Safety Board (NTSB) recorded 10,673 accidents involving non-commercial fixed-wing general aviation aircraft from 2009 through 2018, of which only 16.2% occurred during the takeoff/initial climb and descent/approach phases of flight, according to the Air Safety Institute's Nall Report[1].

The Nall Report cites NTSB statistics show that in the most recent decade studied, non-commercial fixed-wing general aviation aircraft suffer an average of 178.2 accidents per year nationwide in the takeoff/initial climb and descent/approach phases of flight. The data includes operations from more than 13,000 airports, and so the likelihood of such an accident at any one airport is small.

[1] 30th Joseph T. Nall Report, Air Safety Institute, 2020, retrieved from https://www.aopa.org/training-and-safety/air-safety-institute/accident-analysis/joseph-t-nall-report

Table 1
Non-Commercial Fixed Wing Aircraft Accidents

Year	Total Accidents	Takeoff/ Climb	Approach/ Descent	Combined	% of Total Accidents
2009	1,180	151	44	195	16.5%
2010	1,160	135	46	181	15.6%
2011	1,185	146	57	203	17.1%
2012	1,155	145	52	197	17.1%
2013	964	119	32	151	15.7%
2014	969	115	46	161	16.6%
2015	975	108	44	152	15.6%
2016	1,050	123	39	162	15.4%
2017	1,002	113	44	157	15.7%
2018	1,033	111	58	169	16.4%
Total	**10,673**	**1,266**	**462**	**1,728**	**16.2%**

Source: 30th Joseph T. Nall Report, Air Safety Institute, 2020

While the potential for injury to the uninvolved public located in near-airport areas appears to be small, historically it has been a key component in determining compatible land uses and therefore should be given due consideration.

The factors to be analyzed are 1) the risk associated with each specific runway end and 2) identifying a distribution of likely locations on the ground, as may be determined by the geolocations of historical accidents.

There have been multiple attempts to develop statistical analyses of the locations of aircraft accidents in relation to airport infrastructure. Although all are limited by small data sets, a common theme appears throughout: risk is concentrated along the runway centerlines, and generally decreases as distance increases from the centerline at the threshold.

The most comprehensive to date has been the Airport Cooperative Research Program (ACRP) Report 3, Analysis of Aircraft Overruns and Undershoots for Runway Safety Areas, a 2008 study that examined landing undershoots, landing overruns, and takeoff overruns to identify the location and extent of hazardous areas near the runway ends.

ARCP Report 3 looked at 459 air carrier accidents and incidents in the vicinity of the airport to determine the value of Runway Safety Areas. Data for the study was compiled from the National Transportation Safety Board, FAA, NASA's Aviation Safety Reporting System, Canada's Transportation Safety Board, the United Kingdom's Air Accident Investigation Branch and France's Bureau d'Enquêtes et d'Analyses.

In the course of the analysis, the research team developed a series of risk models that created a probability distribution for the point of first impact for landing undershoots and the final stopping location for landing and takeoff overruns. Although the purpose of ACRP Report 3 was to analyze Runway Safety Areas, an intermediary step involved creating mathematical formulas for each of the three accident/incident scenarios that reflected the real-world probability of an accident aircraft's position relative to the threshold and the extended runway centerline.

The analysis included only landing undershoots, landing overruns, and takeoff overruns. Runway loss-of-control accidents were not considered, as they occur independently of the location of the runway ends and typically remain on airport property.

Three sets of complementary cumulative probability distribution (CCPD) models were developed. When multiplied by the frequency of events, a complementary cumulative frequency distribution (CCFD) is obtained, which can quantify the likelihood of an incident exceeding a given distance from the runway end or centerline.

2.1 LANDING OVERRUNS

Researchers used 257 accidents/incidents that involved landing overruns. The locations of the final stopping points of the aircraft can be described by two formulas, one for longitudinal distance from the runway end and one for lateral distance from the extended runway centerline.

The longitudinal distribution model is:

$P\{Location > x\} = e^{-ax^n}$ where:

- $P\{Location > x\}$ is the probability that distance of the overrun past the runway end will be greater than x.
- x is the given distance beyond the runway end.
- a and n are regression coefficients. For landing overruns, a = 0.003871 and n = 0.955175. The resulting R^2 value is 99.8%.

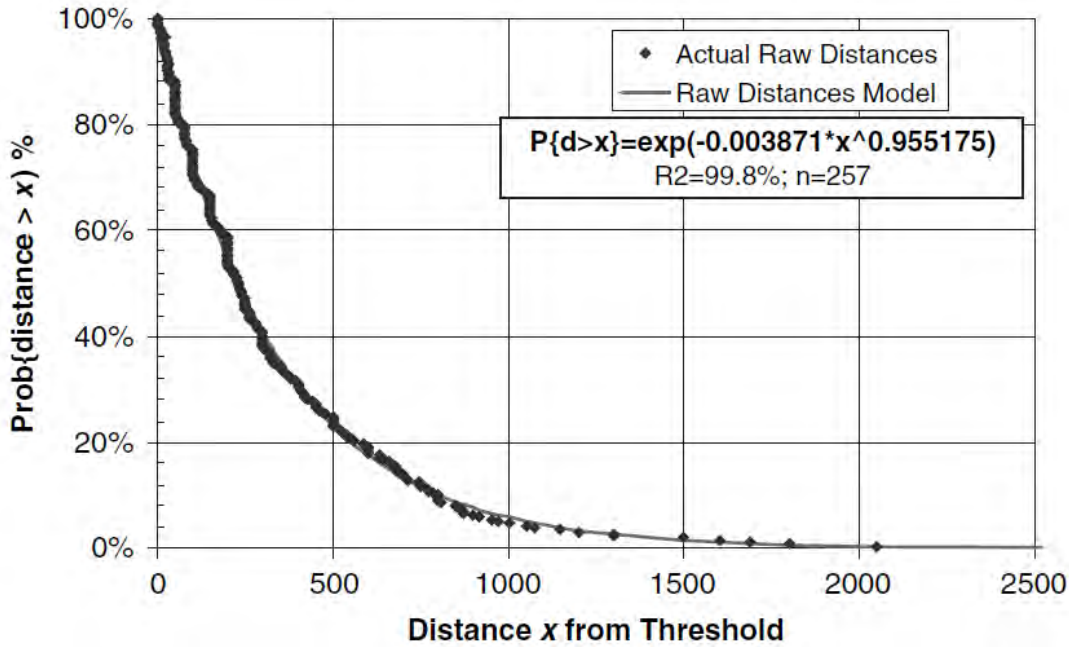
The lateral distribution model is:

$P\{Location > y\} = e^{-by^m}$ where:

- $P\{Location > y\}$ is the probability that distance of the lateral deviation from the runway centerline will be greater than y.
- y is the given distance from the extended runway centerline. Note that lateral R^2 factors will tend to be lower because distance from threshold is often not reported if the location is within the extended lateral limits of the runway.
- b and m are regression coefficients. For landing overruns, b = 0.20174 and m = 0.489009. The resulting R^2 value is 94.7%.

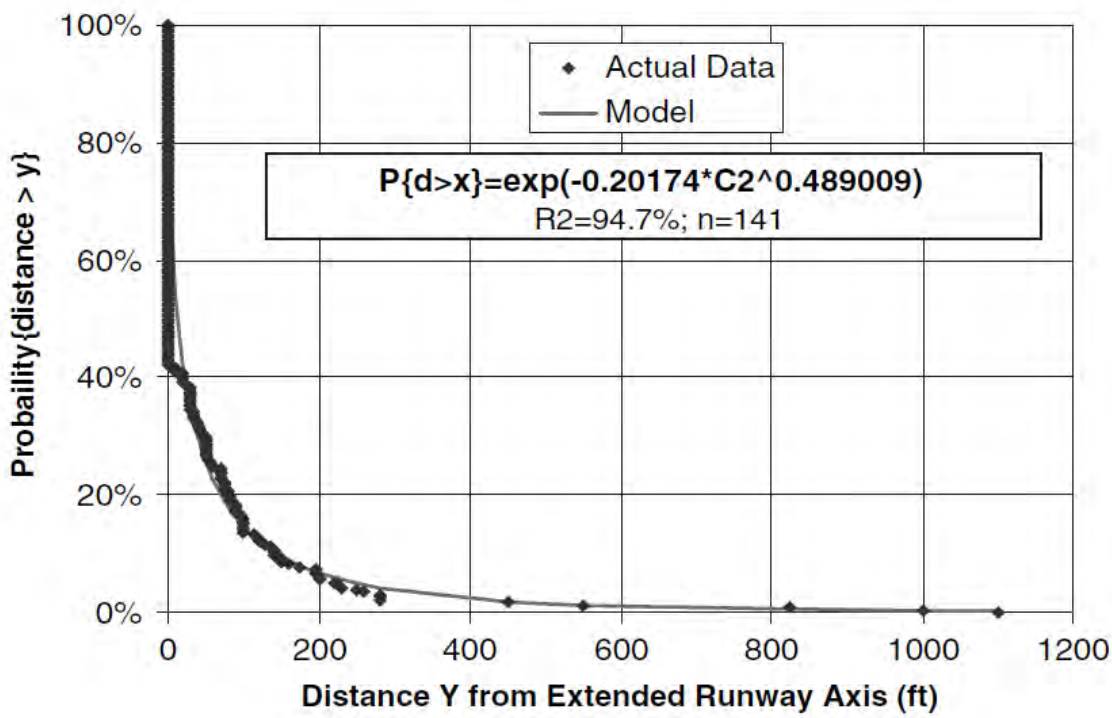
Figure 1 shows the distance distribution from the runway end for the 257 accidents/incidents studied that involved landing overruns and **Figure 2** shows the distance distribution from the extended runway center line for the 141 accidents/incidents for which data was available.

Figure 1
Raw Distances Model for Landing Overruns



Source: ACRP Report 3, page 30

Figure 2
Raw Lateral Distances Model for Runway Overruns



Source: ACRP Report 3, page 31

2.2 LANDING UNDERSHOOTS

Researchers used 82 accidents/incidents that involved landing undershoots. The locations of the initial impact points of the aircraft can be described by two formulas, one for longitudinal distance from the runway threshold and one for lateral distance from the extended runway centerline.

The longitudinal distribution model is:

$P\{Location > x\} = e^{-ax^n}$ where:

- $P\{Location > x\}$ is the probability that distance of the initial impact point prior to the runway threshold will be greater than x
- x is the given distance prior to the runway threshold
- a and n are regression coefficients. For landing undershoots, a = 0.024445 and n = 0.643232. The resulting R^2 value is 98.5%

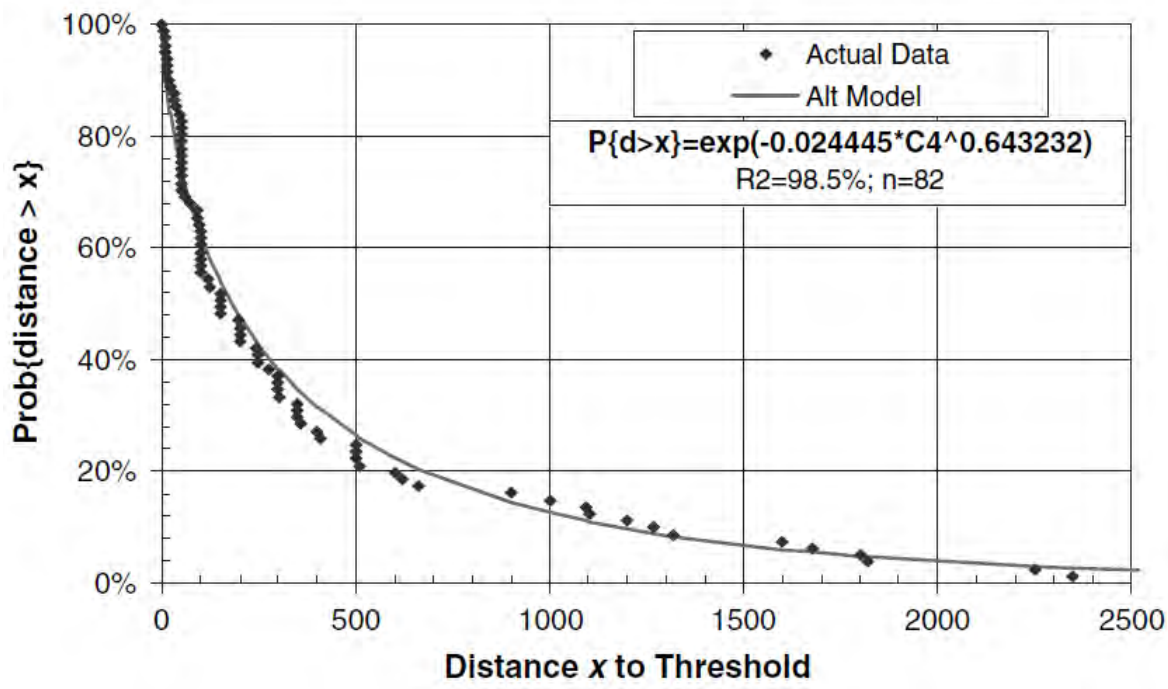
The lateral distribution model is:

$P\{Location > y\} = e^{-by^m}$ where:

- $P\{Location > y\}$ is the probability that distance of the lateral deviation from the runway centerline will be greater than y
- y is the given distance from the extended runway centerline. Note that lateral R^2 factors will tend to be lower because distance from threshold is often not reported if the location is within the extended lateral limits of the runway.
- b and m are regression coefficients. For landing undershoots, b = 0.409268 and m = 0.643232. The resulting R^2 value is 92.0%.

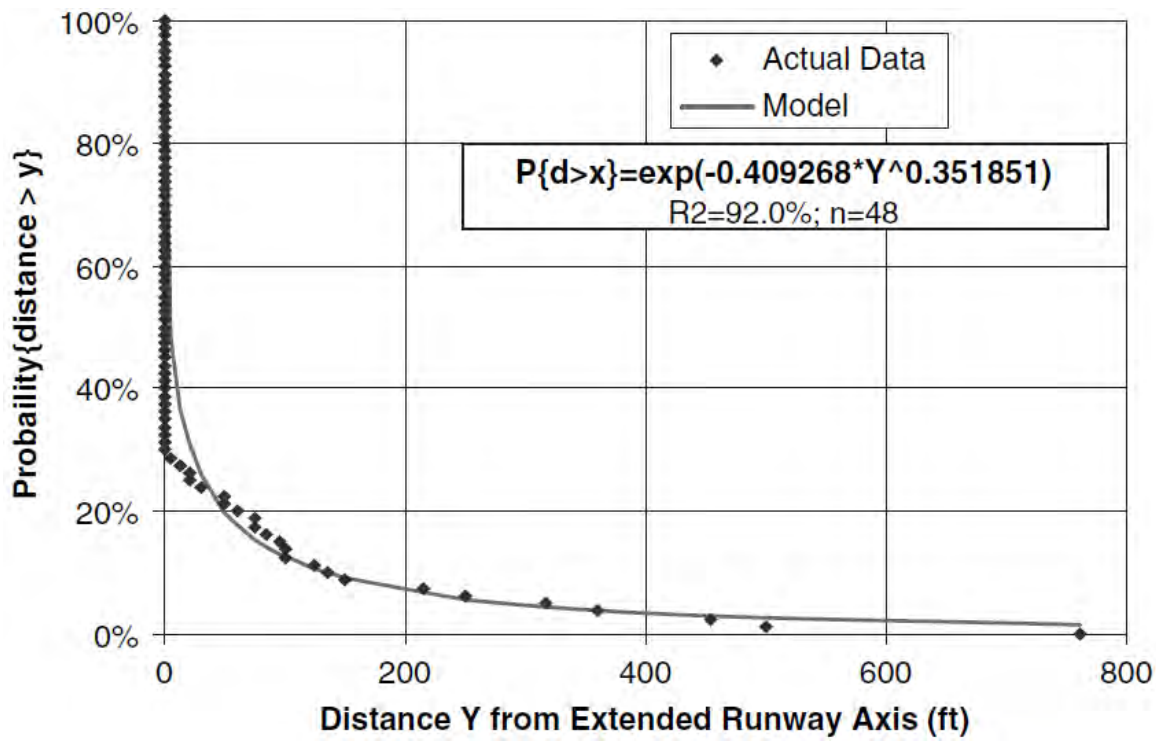
Figure 3 shows the distance distribution from the runway threshold for the 82 accidents/incidents studied that involved landing undershoots and **Figure 4** shows the distance distribution from the extended runway center line for the 48 accidents/incidents for which data was available.

Figure 3
Raw Distances Model for Landing Undershoots



Source: ACRP Report 3, page 32

Figure 4
Raw Lateral Distances Model for Landing Undershoots



Source: ACRP Report 3, page 32

2.3 TAKEOFF OVERRUNS

Researchers used 76 accidents/incidents that involved takeoff overruns. The locations of the final stopping points of the aircraft can be described by two formulas, one for longitudinal distance from the runway threshold and one for lateral distance from the extended runway centerline.

The longitudinal distribution model is:

$P\{Location > x\} = e^{-ax^n}$ where:

- $P\{Location > x\}$ is the probability that distance of the overrun past the runway end will be greater than x
- x is the given distance beyond the runway end
- a and n are regression coefficients. For takeoff overruns, a = 0.001033 and n = 1.065025. The resulting R^2 value is 99.0%

The lateral distribution model is:

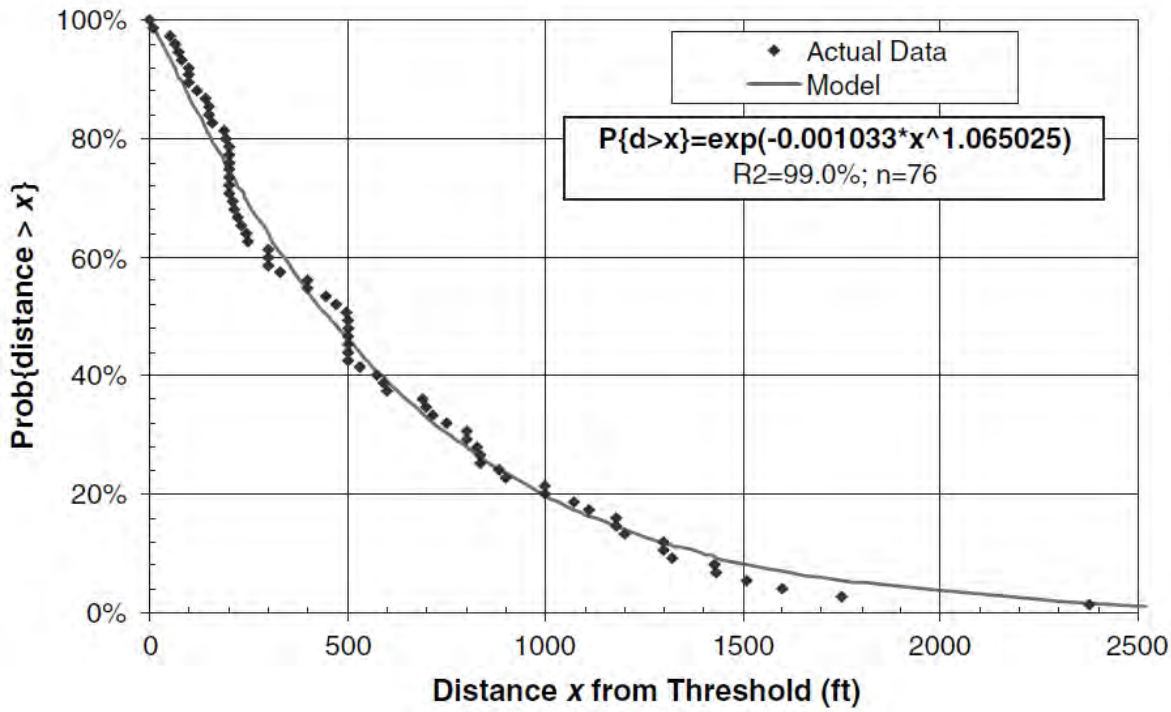
$P\{Location > y\} = e^{-by^m}$ where:

- $P\{Location > y\}$ is the probability that distance of the lateral deviation from the runway centerline will be greater than y
- y is the given distance from the extended runway centerline. Note that lateral R^2 factors will tend to be lower because distance from threshold is often not reported if the location is within the extended lateral limits of the runway.
- b and m are regression coefficients. For landing undershoots, b = 0.182098 and m = 0.448346. The resulting R^2 value is 95.6%.

Figure 5 shows the distance distribution from the runway end for the 76 accidents/incidents studied that involved takeoff overruns and Figure 6 shows the distance distribution from the extended runway center line for the 44 accidents/incidents for which data was available.

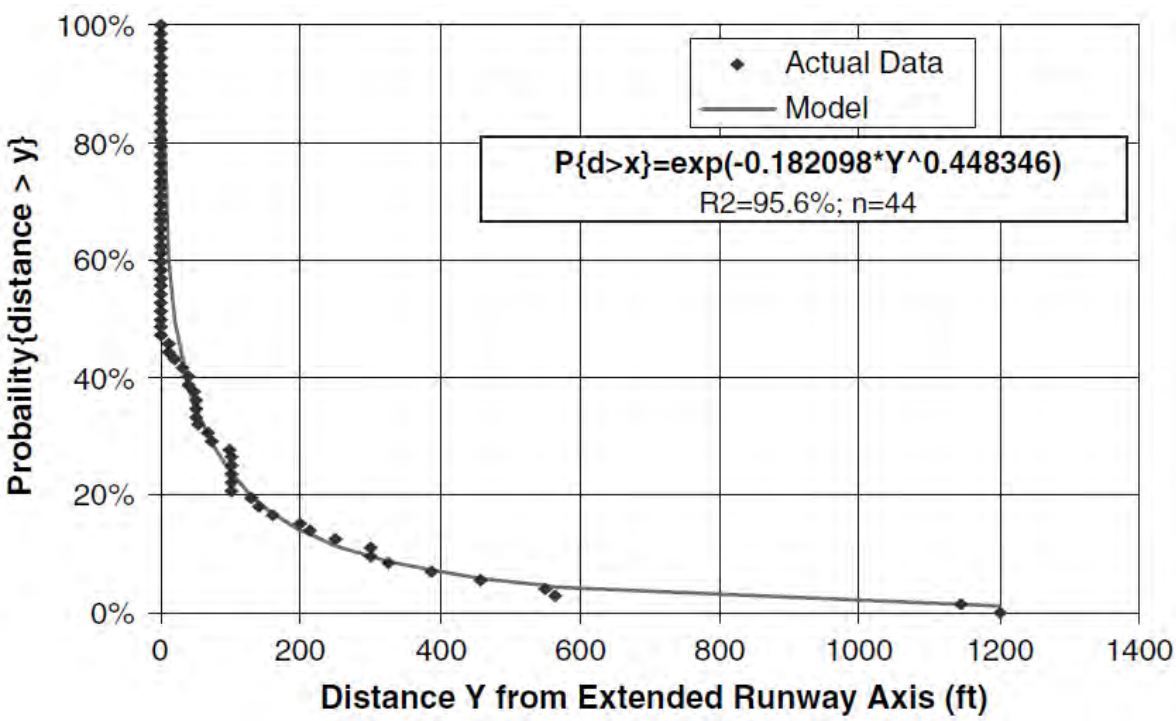
Table 2 shows a summary of all of the models presented in this section.

Figure 5
Raw Distances Model for Takeoff Overruns



Source: ACRP Report 3, page 34

Figure 6
Raw Lateral Distances Model for Takeoff Overruns



Source: ACRP Report 3, page 34

Table 2
Summary of Location Models

Type of Accident	Model	R^2	# of Points
Landing Overrun Longitudinal	$P\{d>x\} = e^{-0.003871\ x^{0.955175}}$	99.8%	257
Landing Overrun Lateral	$P\{d>x\} = e^{-0.20174\ y^{0.489009}}$	94.7%	141
Landing Undershoot Longitudinal	$P\{d>x\} = e^{-0.024445\ x^{0.643232}}$	98.5%	82
Landing Undershoot Lateral	$P\{d>x\} = e^{-0.409268\ y^{0.351851}}$	92.0%	48
Takeoff Overrun Longitudinal	$P\{d>x\} = e^{-0.001033\ x^{1.065025}}$	99.0%	76
Takeoff Overrun Lateral	$P\{d>x\} = e^{-0.182098\ y^{0.406544}}$	95.6%	44

Source: ACRP Report 3, page 35-36

Determining the risk to the public that may be associated with Zones 1, 2, and 3 required applying the probability models shown in **Table 2** to the statistical historical accident distribution and existing and forecast operations at DLH to get a probability that an accident would occur at any given runway end that would extend into each of the custom zones. This accident probability was then applied to FAA's Safety Risk Matrices to determine the acceptability of the calculated probability.

3 ANALYTICAL RESULTS

The formulas in **Table 2** were used to create a distance from the runway end/threshold that would have a, 80%, 90% and 95% chance of containing the wreckage should an accident or incident occur. The results of the calculations are shown in **Table 3**.

Table 3
Distances Required to Contain Accident/Incident

	80% Probability	90% Probability	95% Probability
Landing Undershoot			
Distance from threshold	671 feet	1,170 feet	1,764 feet
Distance from centerline	49 feet	136 feet	286 feet
Landing Overrun			
Distance from runway end	552 feet	803 feet	1,057 feet
Distance from centerline	70 feet	145 feet	249 feet
Departure Overrun			
Distance from runway end	994 feet	1,392 feet	1,782 feet
Distance from centerline	129 feet	287 feet	500 feet

Source: ACRP Report 3, RS&H 2020

Recall, however, that the probabilities discussed above are the probabilities of an accident that has happened at the runway end will occur outside the stated distance. The ACRP analysis determined that, during a 24-year period that included more than 200 million commercial flights, only 459 accidents and incidents occurred in the runway environment that left the Runway Safety Area, which means that in the unlikely event of an aircraft incident, the probability of an aircraft leaving the runway safety area equals 459 ÷ 200,000,000 = 2.3×10^{-6}.

Duluth International Airport hosts approximately 62,000 operations annually, excluding traffic impacts associated with the Covid-19 pandemic. Statistically speaking, that would mean that the

number of accidents/incidents at DLH leaving the runway safety area would be 62,000 x (2.3×10^{-6}) = 0.14 per year.

A recent study of traffic at DLH by the consulting firm Landrum & Brown concluded that approximately 69% of traffic uses Runway 9-27 and 31% uses Runway 3-12. Therefore, the number of accidents/incidents anticipated to leave the runway safety area would be:

- 0.098 per year on Runway 9-27
- 0.044 per year on Runway 3-21.

As the curves in **Figures 1-6** showed, the probability of accident/incident occurrence drops dramatically as distance from the runway increases. Therefore, the risk that an accident/incident would leave the proposed Zone 1 area was calculated using the probabilities and distances shown in **Table 3**.

For Runway 9-27, the distances shown in the 95% column are contained within airport property and are within Zone 1. For Runway 3-21, the distances contained within the 80% column are contained within airport property and are within Zone 1. That is, 5% of the accidents/incidents that left the Runway Safety Area could be expected to be outside of Zone 1 for Runway 9-27 operations and 20% of the accidents/incidents that left the Runway Safety Area could be expected to be outside of Zone 1 for Runway 3-21.

Applying these percentages to the numbers of flights per year shown in the bullets above:

- 0.098 x 0.05 = 0.0049 per year, or **1 every 203.7 years for Runway 9-27**
- 0.044 x 0.20 = 0.0088 per year, or **1 every 113.4 years for Runway 3-21**

4 RISK ASSESSMENT

Some assessment of the realistic effect of the land use model must be made, to ensure the public is adequately protected without unnecessarily restricting private property rights or having the airport or other government entity investing excessively in acquiring land or easements.

Determining the acceptability of different levels of risk as consistently and objectively as possible is the basis for Safety Risk Management (SRM) processes put into place by FAA in its various safety management systems (SMS) programs. SRM is used internally by FAA's Air Traffic Organization (ATO) to assess the impacts of changes to the National Airspace System due to revisions of operational procedures as well as introduction of new equipment. FAA's Airports line of business uses SRM to identify and manage potential hazards associated with changes to airport design standards, airfield construction projects, and modification of standards applications. FAA has required airlines, maintenance shops, flight schools, and many airports to adopt SRM methodologies.

The FAA's SMS initiatives all have common goals: identifying potential hazards, developing ways to control those hazards, predicting the worst credible outcome if the hazard results in an accident, and determining the likelihood of that worst credible outcome occurring. FAA Order 8040.4B aligns the requirements of the various FAA programs.

FAA's SMS protocols require risk assessments to measure both worst credible outcome (severity) and probability (likelihood). The measure of severity is that death or injury will occur or significant property damage. The potential for fatalities generally leads to a severity ranking of either Hazardous or Catastrophic. Order 8040.4B defines the two terms as follows:

- Hazardous: Multiple serious injuries; fatal injury to a relatively small number of persons (one or two); or hull loss without fatalities
- Catastrophic: Multiple fatalities (or fatality to all on board) usually with the loss of aircraft/vehicle

For assessing likelihood, the methodology includes using quantitative data when possible, and using qualitative assessments when data is not available. Determining likelihood can be made through either subjective or statistical means. The following definitions apply:

- Unlikely to occur, but not impossible
- Expected to occur less than once every 10 years

With probabilities of an accident/incident occurring outside of Zone 1 determined to be 1 in every 203.7 years for Runway 9-27 and 1 in every 113.4 years for Runway 3-21, the standard for Extremely improbable is met. The results are then plotted on a risk matrix (see **Figure 7**) and the risk is identified as low (acceptable), medium (possibly acceptable), and high (not acceptable).

Figure 7
FAA Risk Matrix

Severity / Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A					
Probable B				[Red]	
Remote C			[Yellow]		
Extremely Remote D		[Green]			
Extremely Improbable E					*

Unacceptable Risk
Acceptable Risk with Mitigation
Acceptable Risk

* Unacceptable with Single Point and/or Common Cause Failures

Source: FAA Order 8040.4B

Based on the risk matrix, a severity of Hazardous or Catastrophic and a likelihood of Extremely Remote lead to an acceptable outcome.

From the standpoint of SRM, then, the risk of multiple serious injuries or fatalities due to an aircraft accident/incident occurring outside of Zone 1 appears to be acceptable under the existing definitions of Zone 1 for all four runway ends at DLH.