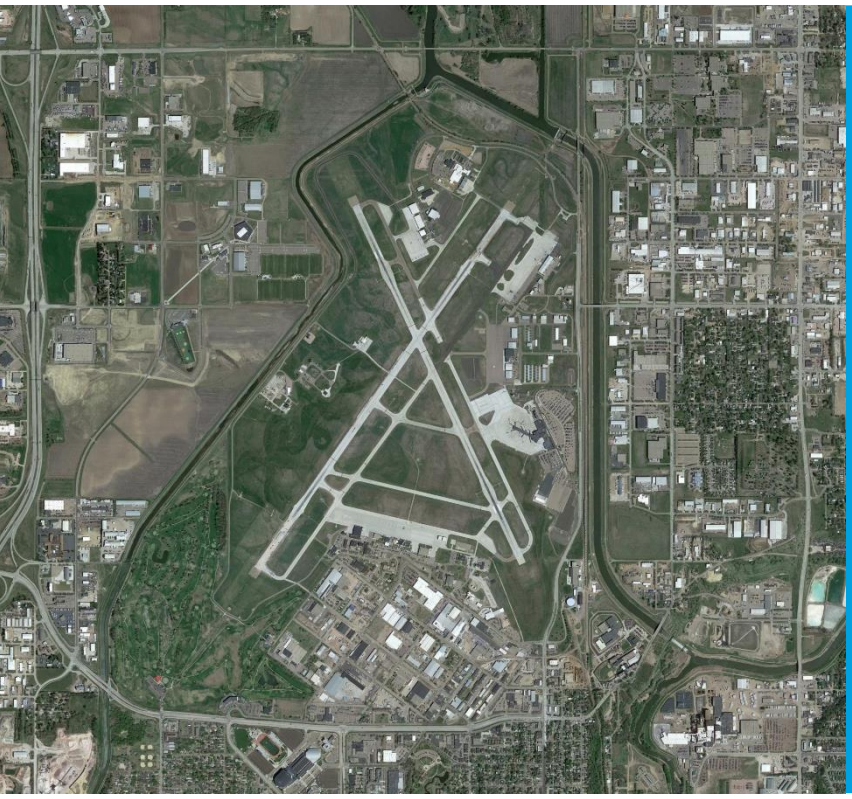
APPENDIX I

Compatible Land Use Plan

PREPARED BY

Mead & Hunt



FSD Airport Compatible Land Use Plan

February 21, 2024

Introduction

This document examines the need for airspace and land use protection around Sioux Falls Regional Airport (FSD) and the existing regulations governing the Airport Influence Overlay District of FSD. It highlights some of the issues with the current zoning regulation and proposes revisions to the Airport Influence Overlay District regulation to address a number of the issues currently experienced. The proposed revisions will better protect FSD and its neighbors.

Compatible Land Use Overview

Protecting airports from encroachment to the airspace and land use around the airport and incompatible land uses in proximity to airports is important. As demand for development space increases, both on the ground and into the airspace, land uses that are incompatible with airport operations can threaten the safety and viability of airports and of citizens on the ground near airports. Compatible land uses near airports protect the public investment in the infrastructure and ensure that airports can meet the needs of local businesses and citizens.

Compatible land uses are those that can coexist with a nearby airport without constraining the safe and efficient operation of the airport or exposing people living or working nearby to unacceptable hazards. When evaluating compatibility, several main areas of concern are considered:

- Tall Structures/Vegetation (buildings, vegetation, towers, wind turbines, etc.)
- Density/Concentrations of People (theaters, hospitals, schools, churches, etc.)
- Noise Sensitivity (residential, schools, churches, etc.)
- Visual Obstructions (steam, light, glare, etc.)
- Wildlife Attractants (sources of food, water, and shelter)

Each of these areas of concern are discussed in more detail to highlight some of the potential impacts and the relationship to airport and aircraft operations.

Tall Structures/Vegetation

Tall structures can include built infrastructure such as cell towers, power lines, wind turbines, and tall buildings, as well as natural growth such as trees and even local terrain and topography depending upon the proximity to the airport environment. Land uses that protrude into the air are often the easiest for people to recognize as land use concerns, since they understand that aircraft fly in the air. The primary concern with this category is that tall structures or height issues can reduce the utility of an airport. When aircraft are approaching or departing an airport, they are operating at reduced speed close to the ground; consequently, the airspace needs to be clear of obstructions that could impede their ability to reach the runway environment. If tall structures are built or if vegetation grows into these operational areas, they can force the aircraft to operate at higher altitudes. Operation at higher altitudes reduces or eliminates their ability to effectively use the runway, and in turn, reduces the utility of the airport.

The Federal Aviation Administration (FAA) has a notification process that initiates reviews of proposed construction that may pose a hazard to air navigation. This is accomplished through the submission of a *Notice of Proposed Construction or Alteration* (FAA Form 7460-1). This process does not necessarily protect an airport from impacts due to tall structures, because the FAA does not have police power to prohibit uses. They can only determine if an object is a non-hazard, a hazard, or a hazard that can be mitigated. In some instances, the mitigation measure is to raise the approach minimums to the airport. This measure reduces the airport's utility, which reduces the viability of the airport. Additionally, the categorization as a non-hazard can also be the result of a mitigation measure changing the approach minimum to achieve the finding of non-hazard. The mitigation may have an adverse impact on the airport and impact the ability of aircraft to utilize the airport. Therefore, the Airport should closely review the FAA response to its submitted form to assess the full impact of a potential development. Consequently, it is important for local municipalities to police the construction of tall structures at the local level to ensure the airspace in proximity to the airport can be kept clear of obstructions.

Density/Concentrations of People

Aircraft accidents are limited compared to other modes of transportation such as automobiles. Yet, accidents do happen, and when they do, often they take place during takeoff or landing when an aircraft is flying at reduced speeds and at lower elevations. Therefore, providing areas near an airport that are free of obstructions is important. This includes limiting the number people in proximity to an airport. Reducing the density or concentration of people in areas such as the runway approach areas is one way to reduce potential injury should an aircraft accident take place during landing or takeoff.

Addressing this issue can take two forms. First, the overall number of persons allowed to congregate in the approach areas, or the aircraft traffic pattern, should be limited. This means high density residential uses or large sporting venues, hospitals, churches, and schools should be discouraged from these areas. Additionally, from a physical perspective, areas of open space should be designed into site plans to provide pockets of undeveloped or at least less populated areas for emergency use, if necessary. This does not mean that site damage may not occur in these areas in the event of an accident. It simply means injury or death may be reduced if development is less dense and a smaller concentration of people are in the area.

Noise Sensitivity

Aircraft operations can create sound levels that annoy people in communities near airports and cause additional effects such as speech interference, sleep disturbance, and disruption to classroom learning. For residents near airports, these effects can often impact quality of life, and therefore, are often considered when assessing compatible land use.

This list provides a sample of factors that can impact noise concerns:

- Number of aircraft operations
- Type of aircraft using the airport
- Time of day for operations
- Airfield layout
- Percentage of time each runway or runway direction is used
- Location and frequency of use of flight tracks/patterns

Additionally, this list includes a sample of factors that can determine how a local community responds to noise:

- Type of surrounding land uses and the noise levels that these land uses themselves generate
- Type of surrounding environment and its ambient noise level
- Topography of surrounding land
- Noise sensitivity of surrounding land uses
- Past experiences with noise exposure

A noise analysis can determine if any schools, hospitals, churches, or commercial use buildings are within the FAA approved 65 Day/Night Level (DNL) contour for FSD. This does not mean that land uses outside of this contour may not experience some degree of annoyance due to overflights, but this result is below the maximum acceptable threshold for noise exposure set by the FAA and the US Department of Housing and Urban Development (HUD).

To maintain this limited number of noise sensitive uses, it is important for a zoning strategy to guide growth and development toward those uses that are less impacted by noise. Where that is infeasible, owners or users in these areas must be made aware of the potential impacts. This can be accomplished through educational programs, deed restrictions, and even requiring the use of enhanced building materials to shield the uses from potential noise impacts.

Visual Obstructions

Although not a physical obstruction in airspace, visual obstructions can also pose hazards to flight. Since many aircraft operations occur without navigational aids, clear visibility is important. Land uses that can obscure a pilot's vision can be a concern and should be limited. Visibility can be reduced multiple ways, including dust, smoke, glare, light emissions, steam, and smog.

Often these issues are ancillary to the primary type of land use. For example, smoke or steam may be generated by a manufacturing operation. Glare may be created by a reflective building material on a building near the airport. Light emission issues could be created by large LED billboards in proximity to the approach area or lighting that may not be down-shielded in the approach areas. Protecting a pilot's ability to see clearly to navigate is critical to the safe operation of aircraft in the vicinity of the airport.

Wildlife Attractants

Wildlife hazards to aircraft were brought to the national stage with the Miracle on the Hudson, when a commercial airliner struck a flock of birds over New York City and was forced to make an emergency landing on the Hudson River. What could have ended tragically instead serves as a perfect example of why it is important to limit land uses that create wildlife attractants near airports. Wildlife attractants as are defined by the FAA in Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports* as any human-made structure, land use, practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departing surface or the airport operations area. An airport should look to limit land uses that generate options that provide food, water, or shelter for wildlife. Per the FAA in AC 150/5200-33B, the study area should encompass 5 to 7 miles from the airport operations area when assessing wildlife hazards.

A brief list of land uses that are discouraged would include ponds, pools, sewage lagoons, water detention and retention basins, sources of food, such as fruit bearing trees, and various agricultural uses as well as solid waste landfills.

Federal Requirements

The FAA is the federal agency responsible for the management and preservation of the national air space system. As such the FAA has established requirements that address issues related to height of structures that penetrate the airspace and established requirements for airports to address land use compatibility in their local community. As an airport that has received federal funding, FSD is required to address these issues.

Airport Design Standards

In the airport environment, it is necessary to maintain an area in which safe and efficient landing and takeoff operations can occur. According to FAA AC 150/5300-13B, *Airport Design*, this requires certain areas on and near the airport to be clear of objects or restricted to objects with a certain function, composition, and/or height. These surfaces are referred to as airport design surfaces.

Code of Federal Regulations (CFR) 14 Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (Part 77), exists to protect the navigable airspace around and in the vicinity of an airport. Part 77 contains the various *imaginary surfaces* that exist to maintain a safe and efficient operating environment. According to AC 150/5300-13B, “any existing or proposed object, whether man-made or of natural growth that penetrates these surfaces is classified as an ‘obstruction’ and is presumed to be a hazard to air navigation.” It is important the airport operator is aware of and actively reviews existing and proposed objects that could affect existing and future airspace at and around an airport. This study has evaluated the Part 77 surfaces, both existing and the anticipated future surfaces, in addition to applicable airport design surfaces according to AC 150/5300-13B.

In administering Part 77, the FAA requires that any construction that takes place in proximity to the airport or development that is more than 200 feet above the ground be evaluated for impacts to the national airspace system. This is handled through a process called the Obstruction Evaluation and Airspace Analysis with the use of the FAA Form 7460-1. The specific requirements for submitting include:

- The height of a structure is more than 200 feet above ground level, or
- The use/structure is within 20,000 feet of a runway and penetrates a 100:1-foot slope extending from any point on a runway.

The required notification can be accomplished by using the online portal at: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

As noted previously, if incompatible land uses are allowed to be constructed or erected in critical areas, they may limit the utility of the airport. In turn, they may reduce the efficiency or ability of the airport and aircraft to conduct operations, and this impacts the long-term viability of the airport.

Federal Grant Assurances

Airports that have accepted federal funding must also take on the responsibility to address grant assurances included within the federal contracting process. Two of these grant assurances are particularly focused on issues related to land use compatibility and approach protection. If airports are found to be in non-compliance with these federal grant assurances, the FAA may withhold federal funding until the situation is remedied.

Grant Assurance # 21 – Compatible Land Use

This assurance states that an airport will "take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

Grant Assurance #20 – Hazard Removal & Mitigation

This assurance states that an airport will "take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting, or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards."

The Airport, as a federally obligated airport, is required to maintain the surrounding airspace free of obstructions or land uses, which may impact the safe and efficient movement of aircraft when using the airport. As such, the FAA recommends that a local airport sponsor work with local municipal agencies to establish, implement, and enforce zoning and land use strategies that protect not only the safe use of the airport but also the health and safety of persons on the ground in proximity to the airport. Updating the current zoning ordinance to better address the issues outlined would contribute to these federal obligations as well as protect the infrastructure that the federal, state, and local governments have invested considerable funds to develop. To accomplish this, South Dakota grants airport authorities, as well as municipal governments, zoning authority to protect airports.

South Dakota Land Use Legislation

Zoning authority on airport property rests with the Sioux Falls Regional Airport Authority. Outside of airport property, the City of Sioux Falls and Minnehaha County have primary zoning control over property in the immediate vicinity of FSD. Further out, should zoning authority be exercised to the extent possible for FSD, Lincoln County may also be involved. These powers are established through the South Dakota Codified Laws.

State of South Dakota

According to South Dakota Codified Laws, counties and cities of the state may enter into joint planning and zoning agreements. The Revised Joint Zoning Ordinance for Minnehaha County and the City of Sioux Falls applies a three-mile limit: "…the regulations are intended to preserve and protect existing property uses and values against adverse or unharmonious adjacent uses by zoning land outside the corporate boundaries of the city but not to exceed three miles from the city limits."[1]

Section 11-6-10 of South Dakota Codified Laws permits zoning powers up to six miles from municipality corporate limits and provides further guidance on jurisdiction when multiple municipalities are involved: "The joint jurisdictional area, not to exceed six miles, shall be delineated in a comprehensive plan but in no instance may the area extend beyond a line equidistant from the corporate limits of any other municipality unless otherwise agreed to by a majority vote of the governing body of each municipality having a planning commission." [2] The state of South Dakota has no minimum land use development and airspace standards around airports.

Under South Dakota Codified Laws, Title 50, Chapter 06A, Regional Airport Authorities have the power to establish comprehensive airport zoning regulations and shall have the same powers as all other political subdivisions to adopt and enforce comprehensive airport zoning regulations.

Additional State laws and regulations in effect under Chapter 50-9 concern structures affecting aviation in South Dakota. This Chapter requires an FAA determination of no hazard be provided to the South Dakota Aeronautics Commission prior to the start of construction or alteration of any structure within the FAA's jurisdiction.

City Zoning

Sioux Falls has airport-specific zoning, including an airport influence overlay zoning ordinance that regulates the height of buildings, structures, and trees, as well as any other potential hazards to safe aerial navigation in the area around the airport. Additionally, the City's code of ordinances provides the option for the Airport to negotiate conveyance of an avigation easement with a property owner if land within the airport influence overlay district is proposed to be subdivided, substantial construction of a habitable structure is proposed, or a zoning change proposed.

[1] https://minnweb.minnehahacounty.gov/home/revised-joint-zoning-ordinance-for-minnehaha-county-and-the-city-of-sioux-falls/

[2] https://sdlegislature.gov/Statutes/11-6

County Zoning

Per South Dakota code, counties and cities can enter into joint planning and zoning agreements. There is joint jurisdiction between City of Sioux Falls and both counties (**Figure 1**). Minnehaha County and Lincoln County both have zoning ordinances with airspace controls limiting heights of objects consistent with City of Sioux Falls zoning.

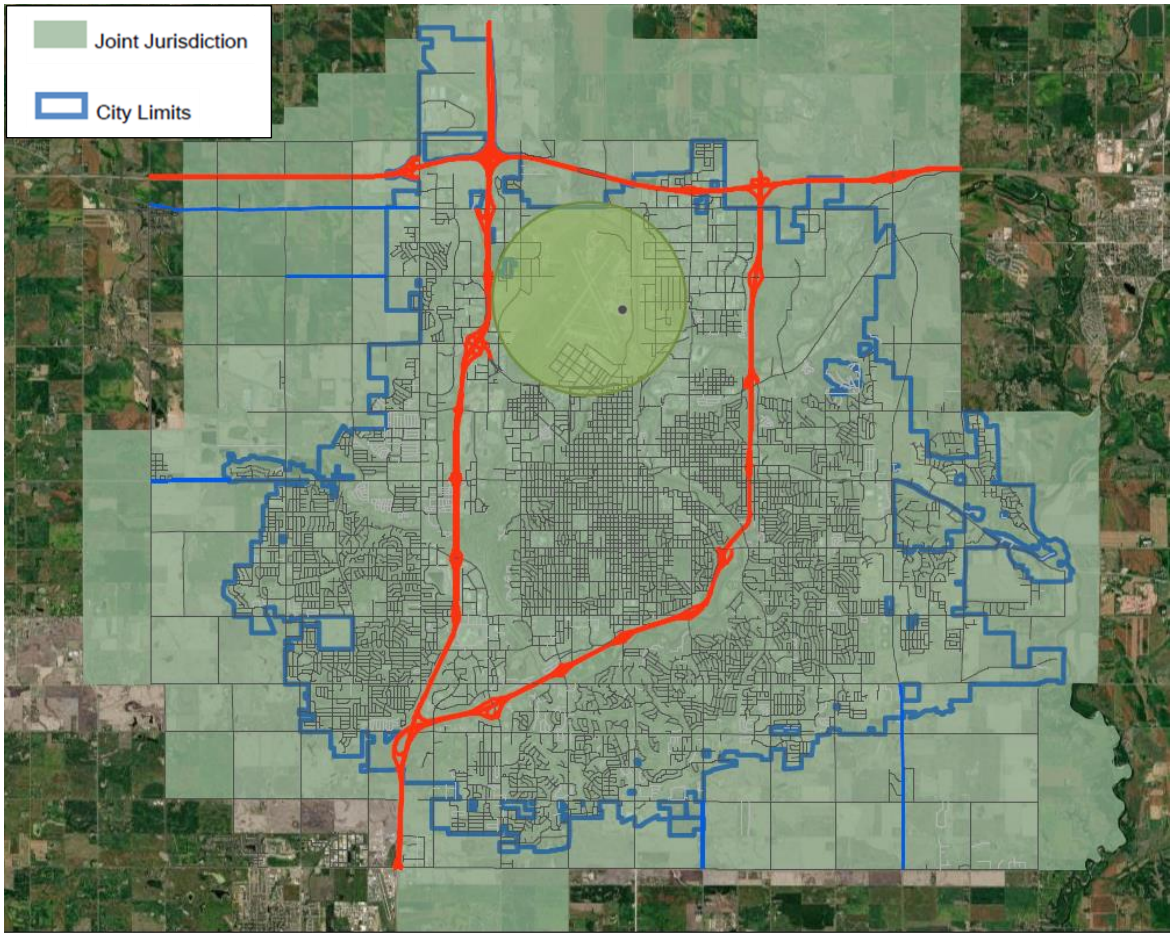


Figure 1: Joint jurisdiction zoning around Sioux Falls. Source: Mead & Hunt.

FSD Airport Zoning

Airport zoning regulations governing the land around FSD are regulated by Chapter 160.418 *Airport Influence Overlay District* of the Code of Ordinances of Sioux Falls, South Dakota.

During research, three amendments were discovered that have been made to the airport influence overlay district since it was first enacted. They are summarized below.

2007 – Ordinance No. 76-07 (adopted June 4, 2007)

This ordinance solely addressed airport issues. It revised the Approach Zone, Transition Zones, and Conical Zone of the airport influence overlay district. We have not been able to locate the zoning ordinance that Ordinance No. 76-07 revised, so we cannot specify what changed.

Other parts of the zoning ordinance that were amended include:

- Airport Influence Overlay District: The airport influence district is composed of lands located within an area affected by noise or safety hazards associated with aircraft operations at general aviation airports. The airport influence district includes the approach zone, transition zone, conical zone, and airport noise exposure zone. The airport influence overlay district is identified as an overlay. The official map shall be on file at the city clerk's office and the city planning and building services office.
- Easement: subdividing any land, or initiating construction on subdivided land, which is within the airport influence overlay district, conveys an easement to the city and airport
- Notice: prospective purchasers of land within the airport influence overlay district must be notified of avigation and hazard easements and impacts from the airport.

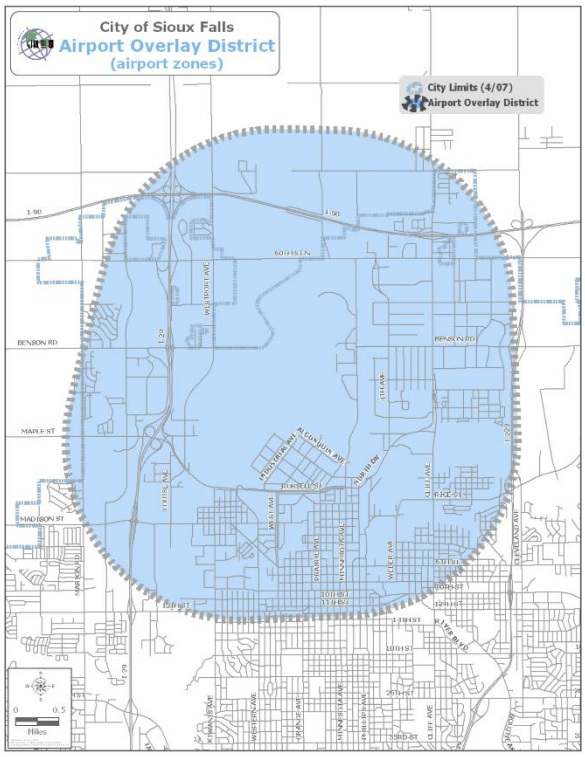


Figure 2: Airport Overlay District in 2007. Source: City of Sioux Falls.

Finally, Ordinance No. 76-07 included a graphic depicting the Airport Overlay District, as shown in **Figure 2**. Ordinance No. 76-07 is the only amendment to feature a map depicting the Airport Overlay District.

2009 – Ordinance No. 71-09 (adopted August 3, 2009)

This ordinance also only addressed airport issues. It altered the airport influence overlay district verbiage as indicated by the underlined text below.

> Airport influence overlay district: The airport influence overlay district is composed of lands located within an area affected by noise or safety hazards associated with aircraft operations at the Sioux Falls Regional Airport. The land use compatibility evaluation of the 2007 airport master plan was completed to determine the highest risks to properties and protect the community. The airport influence overlay district includes all or portions of the approach zone, transition zone, conical zone, and airport noise exposure zone. The airport influence overlay district is identified as an overlay district.
>
> (See map on file with the city clerk of records office.)

It also changed the description of the approach zone for non-instrument runways from numerical references to a reference determined by the Sioux Falls Regional Airport Authority.

2013 – Ordinance No. 9-13 (adopted March 19, 2013)

This ordinance addressed a large number of elements in the zoning ordinance, most of which do not deal with the airport influence overlay district. The changes that did impact the overlay district consisted of renumbering the municipal code, and the following language revisions:

§ 160.418(c)(1)
~~Change of uses~~ Zoning permits shall be consistent with the growth management plan and the zoning ordinances.

§ 160.418(c)(3)
With ~~change of use~~ zoning permit for ~~institutional uses whose internal use for employees and customers [schools, hospitals, churches, auditoriums, noise-sensitive areas] are impacted by noise levels within the 65 dbl to 55 dbl range; property owners shall provide NLR~~ any school, hospital, or places of worship, property owners shall provide Noise Level Reduction (NLR) of at least 10 dbl over standard construction practices [reducing to 55 dbl to 45 dbl].

The table under § 160.418(c)(4) was changed. This was the original table:

Change of Zone	Regulations for Approval
Residential	An avigation easement for noise and vibrations will be required; NLR* are recommended for future residents.
Office, Institutional	With three conditions: (1) The parcel contains three acres of land or less; and (2) The building contains 50,000 square feet of area or less. (3) Signed Acknowledgment of the airport influence overlay district.
Commercial, Industrial	Written documentation from the Sioux Falls Regional Airport Authority that occupancy standards meet FAA regulations. Local jurisdictions cannot waive federal regulations.
Agricultural, Recreation/ Conservation	A mitigation plan approved by the Sioux Falls Regional Airport Authority which addresses wildlife attractant(s) [Advisory Circular 150/5200-33B provides specific guidance].

*NLR—Noise Level Reduction—Outdoor to indoor reduction to be achieved through incorporation of noise attenuation into the design and construction of the structure(s).

The table was changed to this:

Change of Zone	Regulations for Approval
Ag, REC, CN	A mitigation plan approved by the Sioux Falls Regional Airport Authority which addresses wildlife attractant(s) [Advisory Circular 150/5200-33B, Hazardous Wildlife Attractant, provides specific guidance].
C-1, C-2, C-3, C-4, I-1, I-2	Written documentation from the Sioux Falls Regional Airport Authority that occupancy standards meet FAA regulations. Local jurisdictions cannot waive federal regulations.
O, S-1, S-2, LW	With three (3) conditions: (1) The parcel contains three acres of land or less; (2) The building contains 50,000 square feet of area or less; and (3) Signed acknowledgment of the airport influence overlay district.
RS, RD-1, RD-2, RA-1, RA-2, RA-3	An avigation easement for noise and vibrations will be required; NLR* are recommended for future residents.

*NLR—Noise Level Reduction—Outdoor to indoor reduction to be achieved through incorporation of noise attenuation into the design and construction of the structure(s).

Issues with Existing Airport Influence Overlay District

A number of issues identified could be addressed by revising the existing airport influence overlay district regulations. The issues with the existing zoning ordinance consisted of:

1. Land uses that may be incompatible with airport operations are not addressed. While the ordinance does address land uses that may be hazardous to flight operations, land use that unnecessarily concentrates people in areas near the airport are not adequately addressed, based on our experience with similar airport zoning regulations.
2. There is a lack of documentation showing the boundaries of the existing airport influence overlay district. Our research found the last ordinance revision that documented the airport influence overlay district boundary was from 2007, as shown in **Figure 2**. However, the current airport influence overlay district, as enforced by the City of Sioux Falls Planning Department is significantly smaller, as shown in **Figure 3**. There are approximately 8,580 fewer acres (more than 13 square miles) in the airport overlay district depicted in 2023 as compared to the one depicted in 2007. **Figure 4** illustrates the difference in size between these two overlay areas.
3. There does not appear to be a mechanism in place to ensure that easements are conveyed when directed, nor that notifications of airport impacts are occurring when land is purchased within the airport influence overlay district.

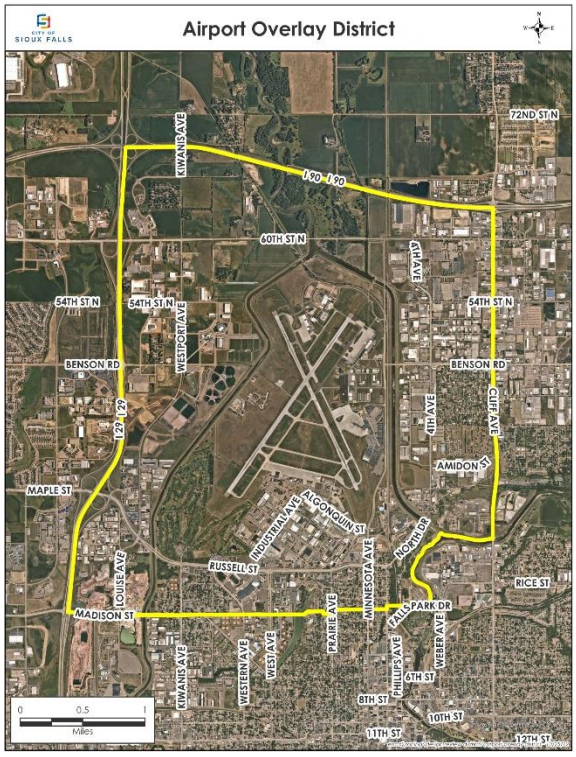


Figure 3: Airport Overlay District in 2023. Source: City of Sioux Falls Zoning Office.

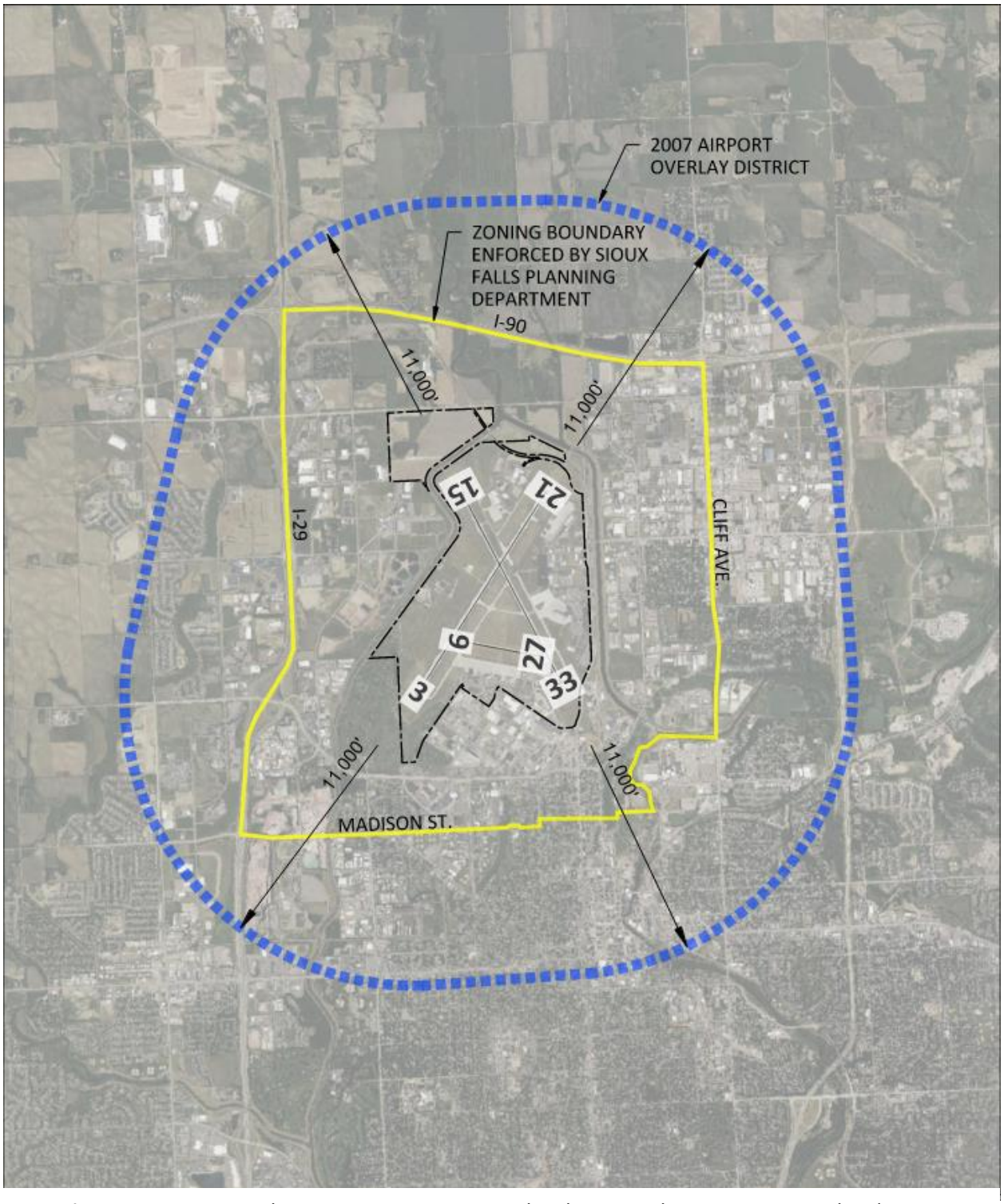


Figure 4: Comparison between 2007 airport overlay district and 2023 airport overlay district. Source: City of Sioux Falls and Mead & Hunt.

FAA Part 77 Airspace

One of the FAA's primary concerns regarding land use around airports is preventing the creation of hazards to air navigation. This is primarily from objects tall enough to interfere with aircraft in flight. Generally, the height at which an object becomes a hazard to air navigation decreases the closer it is to the airport, but this can be affected by the height of the ground upon which the object is situated. The FAA delineates specific height criteria to protect airspace surrounding airports. CFR 14 Part 77 defines five surfaces that surround each runway at an airport designed to preserve airspace and protect traversing aircraft from obstructions. Any object that penetrates a FAR Part 77 surface is considered an obstruction to navigation. The dimensions of each surface are based on the category of a runway as defined by FAR Part 77 and the instrument approach (existing or planned) for each runway end.

Figure 5 graphically depicts some of the runway design surfaces.

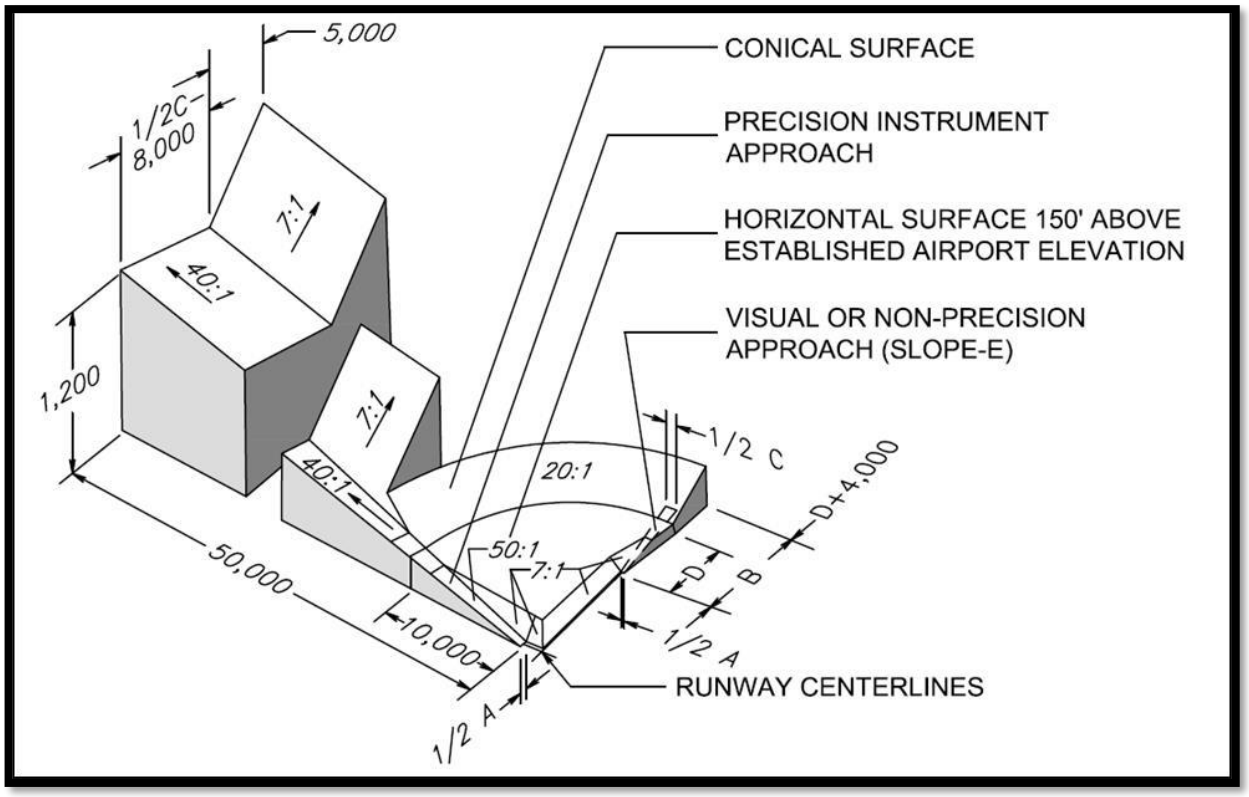


Figure 5: Runway design surfaces. Source: FAA.

The surfaces as applied to FSD airspace are discussed in detail in the **Recommended Airport Overlay District Boundaries**, section which addresses the proposed airport overall district.

- Primary Surface – The primary surface is centered longitudinally on each runway and extends 200 feet beyond the end of the paved runway. The elevation of the primary surface is the same elevation as the runway centerline.
- Approach Surface – The approach surface is centered longitudinally on a runway and extends outward and upward from each end of the primary surface.
- Transitional Surface – The transitional surface extends outward and upward at right angles to the runway at a slope of 7:1 from the sides of the primary and approach surfaces.
- Horizontal Surface – The horizontal surface is a plane 150 feet above the elevation of the airport whose perimeter is constructed by swinging arcs of 10,000 feet from the center of each end of the primary surface for each runway and connecting the adjacent arcs by tangent lines.
- Conical Surface – The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

Objects penetrating FAR Part 77 surfaces are hazards to air navigation unless determined otherwise by an aeronautical study conducted by the FAA. Aeronautical studies only determine if an object is a hazard to air navigation and do not give FAA specific authorization to limit the height of objects that may be identified as hazards. That responsibility falls to state and local jurisdictions.

Figure 6 illustrates the Part 77 surfaces for FSD and compares them to the airport overlay district established in 2007, shown by a blue, dashed line. Since it was demonstrated previously that the airport overlay district as it currently exists is even smaller, that leaves a significant portion of FSD airspace that is unprotected.

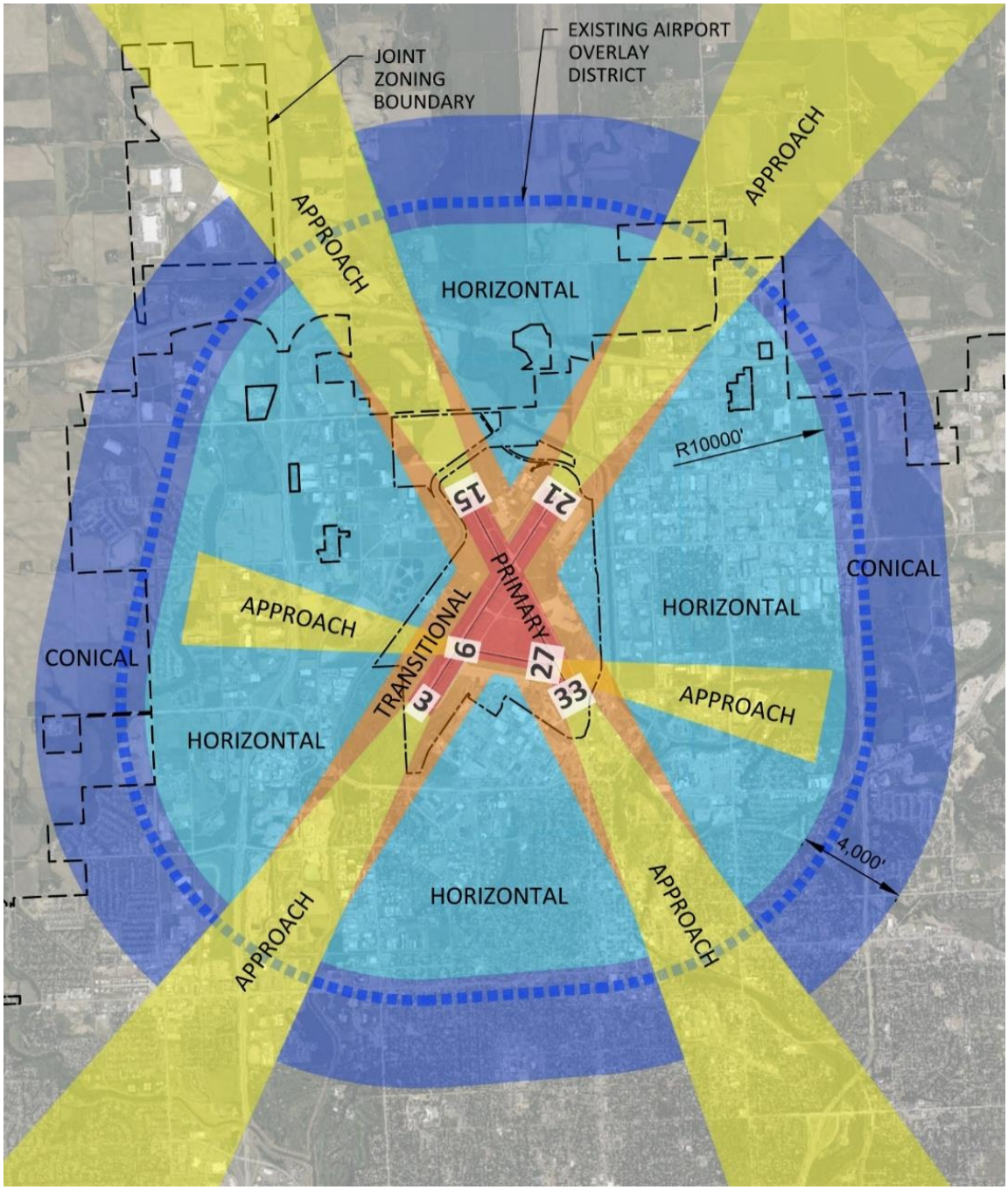


Figure 6: FSD's Part 77 surfaces compared to its 2007 airport overlay district.
Source: City of Sioux Falls and Mead & Hunt.

Figure 7 presents a zoomed-out view of FSD's Part 77 surfaces to show the extent that the approach surfaces reach.

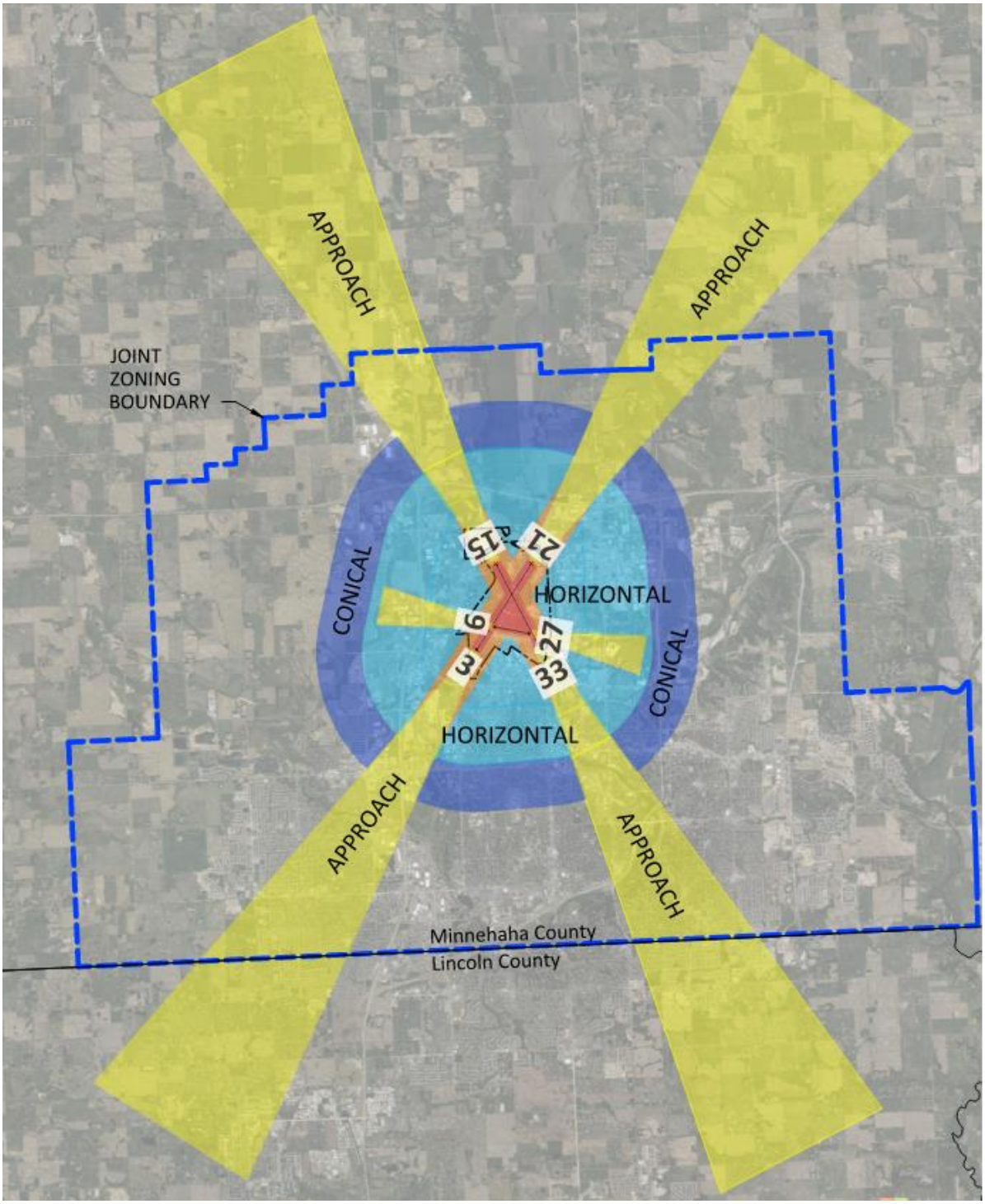


Figure 7: FSD's Part 77 Surfaces extend significantly beyond the joint zoning boundary.
Source: City of Sioux Falls and Mead & Hunt.

Recommended Airport Overlay District Boundaries

Based on discussions with FSD, Sioux Falls, and Minnehaha County planning staff and the importance of protecting airport airspace in accordance with FAA grant assurances, Mead & Hunt recommends an approach aimed at balancing the interests of FSD and the city planners. This involves FSD imposing and enforcing an airport overlay district that protects the airspace of the primary runway and the best approach into Runway 15/33, which is the approach from the southeast (Runway 33). Mead & Hunt recommends using six overlay zones, defined below, and illustrated in **Figure 10**. Multiple zones allow FSD to structure land use regulations that are tailored to the airspace protection needed.

Zone 1 – Primary Surfaces and Runway Protection Zones

Zone 1 consists of the intersection of each runway's primary surface, the transitional surface that connects the primary surface to the horizontal surface, and the runway protection zones (RPZ) at each end.

The primary surface is a rectangle centered on each runway. It is 1,000 feet wide for Runway 3/21 and 15/33 and 500 feet wide for Runway 9/27. The primary surface extends 200 feet beyond each runway end. Zone 1 includes the area within the triangle formed by the three intersecting runways.

The RPZs for each runway end are trapezoids that start where the primary surface ends. **Figure 8** shows a typical RPZ with L denoting its length, U its inner width, and V its outer width. These dimensions are a function of the runway design code and the visibility limit of the best instrument approach for the runway.

Figure 9 shows the dimensions of the approach RPZ for each runway end.

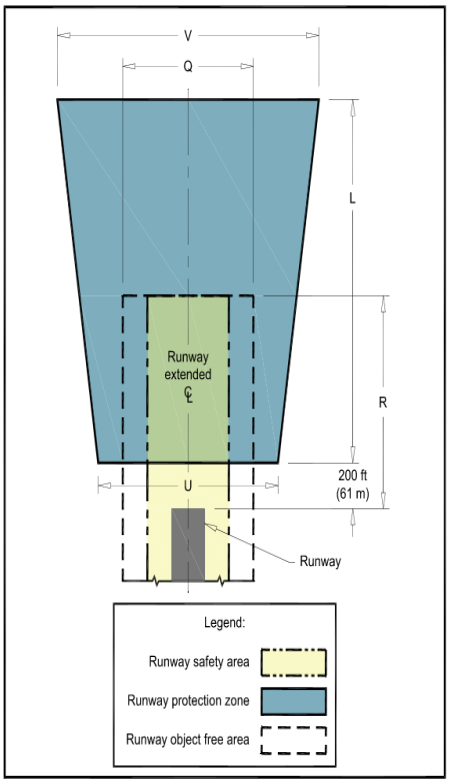


Figure 8: Dimensions of an RPZ.
Source: FAA.

Runway	Length (L)	Inner Width (U)	Outer Width (V)
RWY 3	2,500	1,000	1,750
RWY 15	1,700	1,000	1,510
RWY 21	2,500	1,000	1,750
RWY 33	1,700	1,000	1,510
RWY 9	1,000	250	450
RWY 27	1,000	250	450

Figure 9: Approach RPZ dimensions for each FSD runway.
Source: FAA and Mead & Hunt.

Figure 10 presents recommended airport overlay zoning districts for FSD. The dimensions of each zone and associated height and land use controls are described on the following pages.

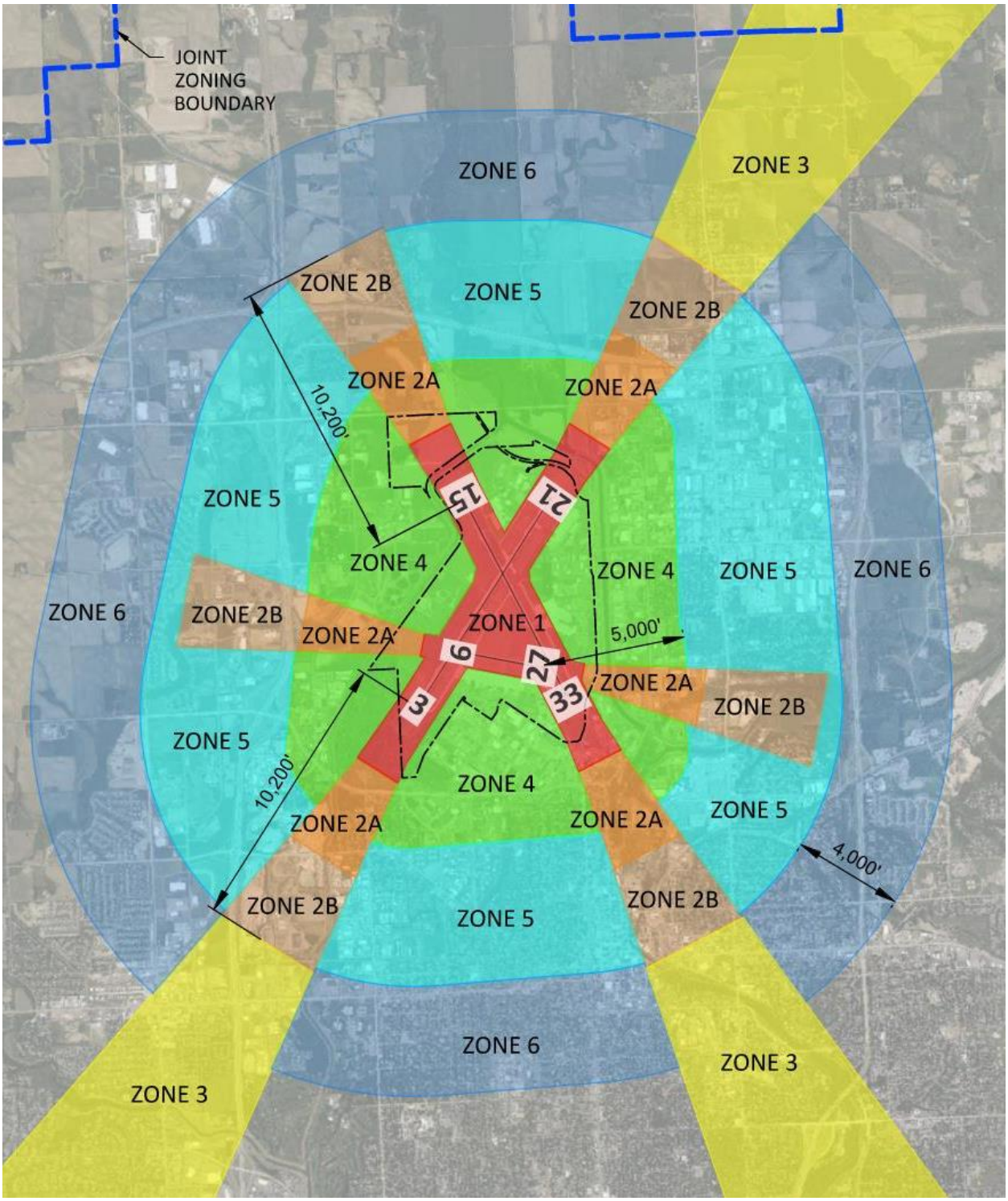


Figure 10: Recommended airport overlay districts.
Source: City of Sioux Falls and Mead & Hunt.

Zone 2 – Inner Approach

Zone 2 is the inner approach area and extends outward from each runway end forming a trapezoidal area, starting where Zone 1 ends. Zone 2 is split into two subzones – a Zone 2A and a Zone 2B. Zone 2A starts from the end of Zone 1 and expands outward, widening until reaching the beginning edge of Zone 2B. Zone 2B extends and expands out to a distance of 10,200 feet from its respective runway end.

- For Runway 3/21, Zone 2A is 1,750 feet wide at its beginning (where it meets Zone 1) and extends 3,750 feet where it is 2,875 feet wide. Zone 2B is 2,875 feet wide at its beginning (where it meets Zone 2A) and extends 3,750 feet where it is 4,000 feet wide.
- For Runway 15/33, Zone 2A is 1,510 feet wide at its beginning (where it meets Zone 1) and extends 3,750 feet where it is 2,875 feet wide. Zone 2B is 2,875 feet wide at its beginning (where it meets Zone 2A) and extends 3,750 feet where it is 4,000 feet wide.
- For Runway 9/27, Zone 2A is 500 feet wide at its beginning (where it meets Zone 1) and extends 4,405 feet where it is 2,178 feet wide. Zone 2B is 2,178 feet wide at its beginning (where it meets Zone 2A) and extends 4,405 feet where it is 3,500 feet wide.

Zone 3 – Outer Approach

Zone 3 is the outer approach area and only applies to Runway 3/21 and Runway 33. It starts at the end of Zone 2B. It extends out to a distance of 50,200 feet from its respective runway end, widening to a distance of 16,000 feet.

Zone 4 – Traffic Pattern

Zone 4 consists of the general aviation traffic pattern area. It is the area encompassed by 5,000-foot arcs off of each runway end that are connected by tangent lines, excluding the Zone 1 and 2 areas within that boundary. Elevation restrictions exist from the primary surface out to a maximum of 150 feet.

Zone 5 – Horizontal Surface Area

Zone 5 is the horizontal surface area. It is the area beyond Zone 4 encompassed by 10,000-foot arcs off of each runway end that are connected by tangent lines, excluding the Zone 2 areas. There are height limits of 150 feet within this zone.

Zone 6 – Conical Surface Area

Zone 6 is the conical surface area. It is a band 4,000 feet wide beyond Zone 5, excluding the parts of Zones 2 and 3 that intersect it. Height limits within the conical surface start at 150 feet where it meets the horizontal surface and increase at a slope of 20 to 1 out to the limit of the conical surface.

Recommended Height and Land Use Controls

Once these airport overlay districts are adequately defined, the next step is for FSD and the City/Counties to decide what restrictions should be imposed for each zone. Under the existing zoning regulation, height restrictions are in place for Zone 1 and Zone 2. Therefore, the study team recommends that FSD impose height restrictions for at least Zone 3 since it lies beyond the region that has a current airport overlay district in force. Once that is established, FSD should consider limiting the height of objects in Zones 4, 5, and 6 where necessary.

Land use restrictions should also be a consideration. Five types of land use restrictions are listed in **Figure 11**, along with a recommendation of how to implement them in each of the zoning districts, color coded by priority.

Priority 1 Priority 2 Priority 3 **Overlay Zoning District**	**Light Emissions/ Visibility Impairments**	**Wildlife Attractants**	**Structure Height**	**Dense Populations**	**Sensitive to Aircraft Noise**
Zone 1 - Primary surface, and RPZs	Prohibit	Prohibit	Prohibit	Prohibit	Prohibit
Zone 2A - Inner approach	Evaluate	Prohibit	Evaluate	Prohibit	Prohibit
Zone 2B - Inner approach	Evaluate	Prohibit	Evaluate	Evaluate	Evaluate
Zone 3 - Outer approach	Mitigate	Mitigate	FAA Evaluate		Mitigate
Zone 4 - Traffic pattern	Mitigate	Prohibit	FAA Evaluate	Mitigate	Evaluate
Zone 5 - Horizontal surface	Mitigate	Mitigate	FAA Evaluate		
Zone 6 - Conical surface	Mitigate	Mitigate	FAA Evaluate		

Figure 11: Recommended land use restrictions by zone.
Source: Mead & Hunt.

The meanings of each recommended land use restriction and implementation method are explained below.

- Prohibit – This land use should not be allowed to occur within the designated zone.
- Evaluate – The indicated land use may be denied, approved, or approved with conditions, depending upon the findings of the evaluation.
- FAA Evaluate – An airspace determination by the FAA will be used to determine if a height obstruction occurs. Note that an FAA evaluation does not prohibit an obstruction, it merely identifies when one exists and may offer mitigations that negatively impact the operation of the airport.
- Mitigate – The indicated land use will be approved as long as stipulated conditions are met.

These recommendations are based on the principle that any existing uses that meet current zoning requirements are grandfathered, but any expansion of existing uses or change in use requires an evaluation. For example, replacing a single-family home after it burns down is acceptable if it is not any worse (no taller than before), but replacing several single-family homes with a multi-family home increases density and is not acceptable. It should also be noted that land uses that introduce electronic or other interference (including lighting) with aviation may be found to be in violation of federal law.

Possible Zoning Ordinance Language

To facilitate the adoption of the airport overlay district regulation, Mead & Hunt has developed zoning language that may be useful for FSD. This text is presented in two sections.

Land Uses Prohibited for Safety

There are a number of land uses that can present hazards to aviation either because they can impede the view of aircraft pilots, interfere with necessary aviation signals, attract wildlife that endangers aircraft, or present an unnecessary danger to aircraft crashing off airport. Language to prohibit such uses within airport overlay districts is offered below.

> *No land use within this FSD airport influence overlay zoning district shall interfere with avigation. This includes land uses that:*
>
> - *Release into the atmosphere any substance that could impair visibility or otherwise interfere with the operation of aircraft;*
> - *Produce light emissions, whether direct or indirect (reflective), that could interfere with the operation of aircraft;*
> - *Produce electrical, magnetic, or other emissions that could interfere with the operation of aircraft, aircraft communication, or aircraft guidance systems;*
> - *Create standing water areas or detention/retention ponds that may attract wildlife; or*
> - *Create an avigation hazard of any other type.*

The following language is recommended for Zones 1 and 2, with the need greater in Zone 2A than in Zone 2B due to aircraft being closer to the ground in their approach profile in Zone 2A.

> *No land use that may otherwise be permitted herein shall manufacture flammable and/or combustible materials. The handling and storage of flammable and/or combustible materials and materials that produce flammable or combustible vapors or gases shall be in accordance with applicable state laws, rules and regulations, and administrative orders.*
>
> *None of the existing land uses within the airport overlay district shall be prohibited by this ordinance.*

Existing Land Uses and Expansion of Existing Uses

The zoning regulations should address existing land uses that may conflict with the proposed zoning ordinance. Keeping in mind that the goal of the proposed zoning ordinance is to prevent existing land uses from making the situation worse, not to correct or prohibit land uses in existence, the following language aims to strike that balance.

> *Existing Land Uses. All existing property uses allowed by the current zoning classifications, within the zones defined by this chapter can remain, subject to applicable federal, state, and local requirements including height limitations set forth in this ordinance. This includes the construction of ancillary uses, such as garages, subject to existing local requirements. Nothing contained in this ordinance shall require the removal of or any change in the construction, alteration, location, or use of any existing facility; this includes the construction, alteration, or use of property or structural improvements lawfully in existence at the time of the effective date of this ordinance, or which commenced prior to the effective date of this ordinance and has been completed or is being diligently pursued. This includes vacant platted lots that were established to accommodate proposed development prior to the effective date of this ordinance. It is further provided that the height limits of this ordinance shall in no event be exceeded.*
>
> *Partial/Complete Destruction or Reconstruction. The owner of any existing use, building, or structure which, as a result of fire, flood, explosion, or other casualty is destroyed or is demolished by the owner, shall be allowed to rebuild, reconstruct, or rehabilitate the same existing use on the same parcel, provided the following requirements are met:*
>
> - *The existing use is reviewed and complies with the Joe Foss Field Airport Height Limitation Map – Sioux Falls, South Dakota, and is not otherwise prohibited by the underlying zoning ordinance of the municipality with jurisdictional authority.*
> - *A site plan is reviewed and approved by the planning commission with concurrence by the FSD Airport Manager.*
>
> *Expansion of Existing Land Use. Any existing use may be expanded, altered, or otherwise enlarged if the following requirements are met:*
>
> - *The expansion, alteration, or enlargement meets the requirements of the Joe Foss Field Airport Height Limitation Map – Sioux Falls, South Dakota, meets the criteria for the existing land use with no change in zoning classification, and is not otherwise prohibited by the airport influence overlay zoning district or underlying zoning ordinance of the municipality with jurisdictional authority.*
> - *Before any nonconforming structure may be replaced, altered, or rebuilt, approval shall be obtained and secured from the FSD Airport Manager, authorizing such change, replacement, or repair. No such approval shall be denied if the structure will not become a greater hazard to air navigation than it was on the effective date of this chapter, or than it was when the approval was requested.*

Conditional Use Determination

Certain land uses fall into a grey area where they may be allowed if certain conditions are met. Examples include steps taken to mitigate their negative impact, such as covering water surfaces to reduce their attraction to waterfowl. The language below provides some flexibility to permit certain land uses if the evaluation of the land use finds that it does not significantly raise risks or identifies steps that can be taken to mitigate those risks.

> *All conditional uses are subject to review by the planning commission. Coordination with the FSD Airport Manager is required to review the applicability of the criteria. Places of assembly and other conditional land uses as designated in each zone are permitted so long as underlying zoning district permits the use and the use is reasonable, does not have impact on airport operations, and mitigation measures are taken to alleviate, incompatible uses. The following are considerations as to whether the proposed land use is significantly incompatible:*
>
> - *The place of assembly attracts significant numbers of people.*
> - *The place of assembly holds a significant density of customers.*
> - *The place of assembly is occupied by customers a significant amount of time.*
> - *The place of assembly has a low turnover of customers.*
> - *The place of assembly is sensitive to noise.*
> - *The facility is a height concern.*
> - *The land use is a wildlife attractant.*
> - *The land use presents visual obstructions or hindrances.*
> - *The land use presents electronic interference.*
>
> *Uses considered as significantly incompatible could be considered on a conditional use basis requiring review by the planning commission in coordination with the FSD Airport Manager, taking into account the effectiveness of any proposed mitigation measures.*

This recommendation language and other recommendations are aimed at providing FSD the necessary airspace protections to allow for future operations and growth, while continuing to collaborate with nearby land users.