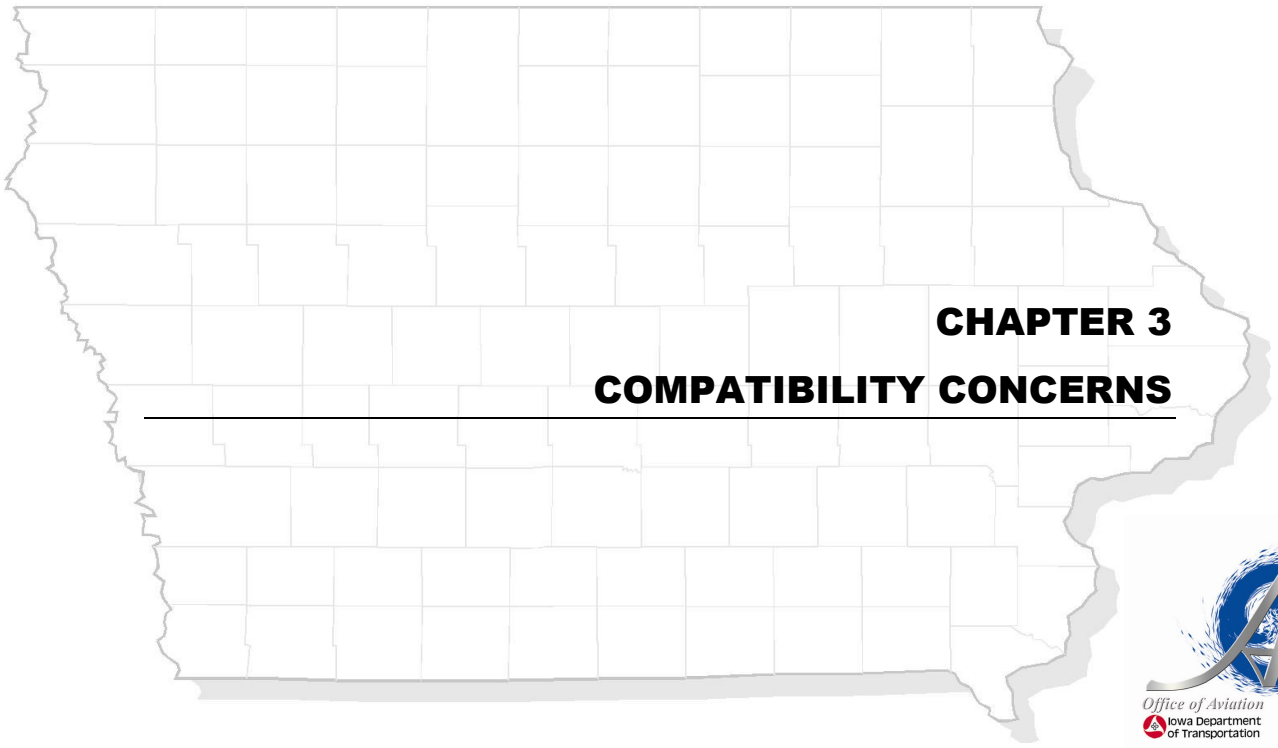
Iowa Airport Land Use Guidebook



CHAPTER 3

COMPATIBILITY CONCERNS

Office of Aviation
Iowa Department of Transportation

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3.0 Overview of Land Use Compatibility Issues

This chapter summarizes some of the most commonly acknowledged land uses that can present compatibility concerns for airports and their host communities. The land uses defined herein have several common impacts on airport operations and may be considered a threat to safe airport and aircraft operations. Each specific land use should be evaluated independently for noise and safety related issues to maintain compatibility with airport environs. Noise and safety issues have potentially adverse impacts on surrounding land uses, creating compatibility issues with the host communities. Land use compatibility issues can be separated into multiple categories with associated land uses and their relationship to airport's environs.

Each specific type of land use should be evaluated independently for noise and safety related issues to ensure compatibility with airport environs.

3.1 Primary Areas of Interest

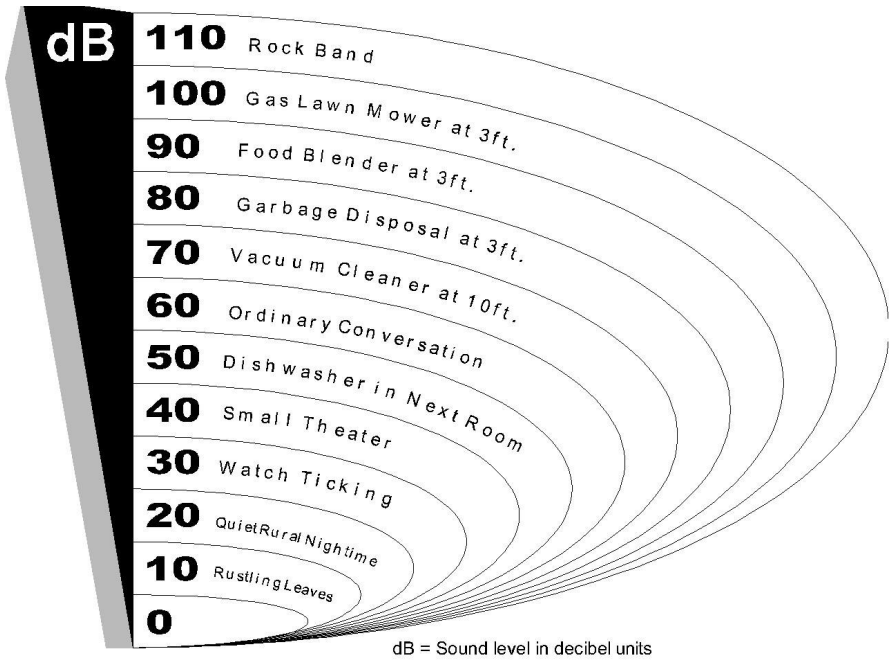
It is important to emphasize the unique characteristics and operations airports bring to a community, while maintaining a land use compatibility plan that addresses the needs of each individual airport, its environs, and the local community. Noise and safety related impacts are common concerns associated with land use compatibility. Safety related issues include areas of high concentrations of people, tall structures, visual obstructions, and wildlife and bird attractants. Each issue is discussed in the following sections to illustrate the associated concerns.

3.1.a. Noise Sensitivity Related Issues

Aircraft noise is evaluated by the degree to which the noise intrudes on a person's quality of life or interrupts or interferes with activities such as conversation or sleep.

Aircraft noise is a primary concern when addressing compatible land uses. Sound is defined as transmitted vibrations that can be detected by the human ear. By comparison, noise is defined as any sound that is undesired or interferes with one's hearing of something. **Figure 3-1** depicts common sources of noises and their associated noise levels. Aircraft noise is evaluated by the degree to which the noise intrudes on a person's quality of life or interrupts or interferes with activities such as conversation and sleep. Noise generated by cars, trucks, and industries within urban areas may cause aircraft noise to seem less intrusive, but within several miles of a large general aviation or commercial service airports, aircraft noise levels can interrupt speech or cause interference with sleep.

Figure 3-1 Common Noise Levels and the Associated Decibel Levels



Source: *Oregon Department of Transportation, Aeronautics Section, Technical Report, Airport Land Use Compatibility Guidelines, November, 1994*

Historically, airports were located on the outskirts of towns and, consequently, aircraft noise may have been a relatively minor concern. However, many communities have grown rapidly, which has allowed potential incompatible land use to encroach upon airports. Coupled with increases in air traffic volume, the potential for noise problems related to land use near airport environs has intensified. Noise impacts generated by an airport are greatly influenced by a variety of factors including:

- Number of aircraft operations
- Type of aircraft using the airport
- Location of the airport relative to surrounding development
- Size of the airport
- Type of air service (commercial versus general aviation)
- Airfield layout
- Type of surrounding land uses (commercial, industrial, institutional, and residential)
- Configuration of surrounding land use
- Time of day

Challenges associated with noise related issues stem from the difference between Federal Aviation Administration (FAA) noise standards and how property owners perceive noise. The FAA and the US Department of Housing and Urban Development (HUD) have defined limits for noise impacts that are based upon specific exposure to noise levels. For example, the FAA and HUD use a unit of measurement called the Day-Night Level (DNL) to measure aircraft noise. A DNL of 65 or greater indicates a level of impact that alters a person's quality of life. Often these exposure levels do not leave the confines of the airport property. Property owners near airports are thus exposed to noise levels below the FAA's identified limits but still have objections to perceived noise levels. The local airport is often challenged with the task of balancing perceived noise impacts with those that meet federal standards.

FAA defines that a DNL of 65dB or greater indicates a level of noise impact that alters a person's quality of life.

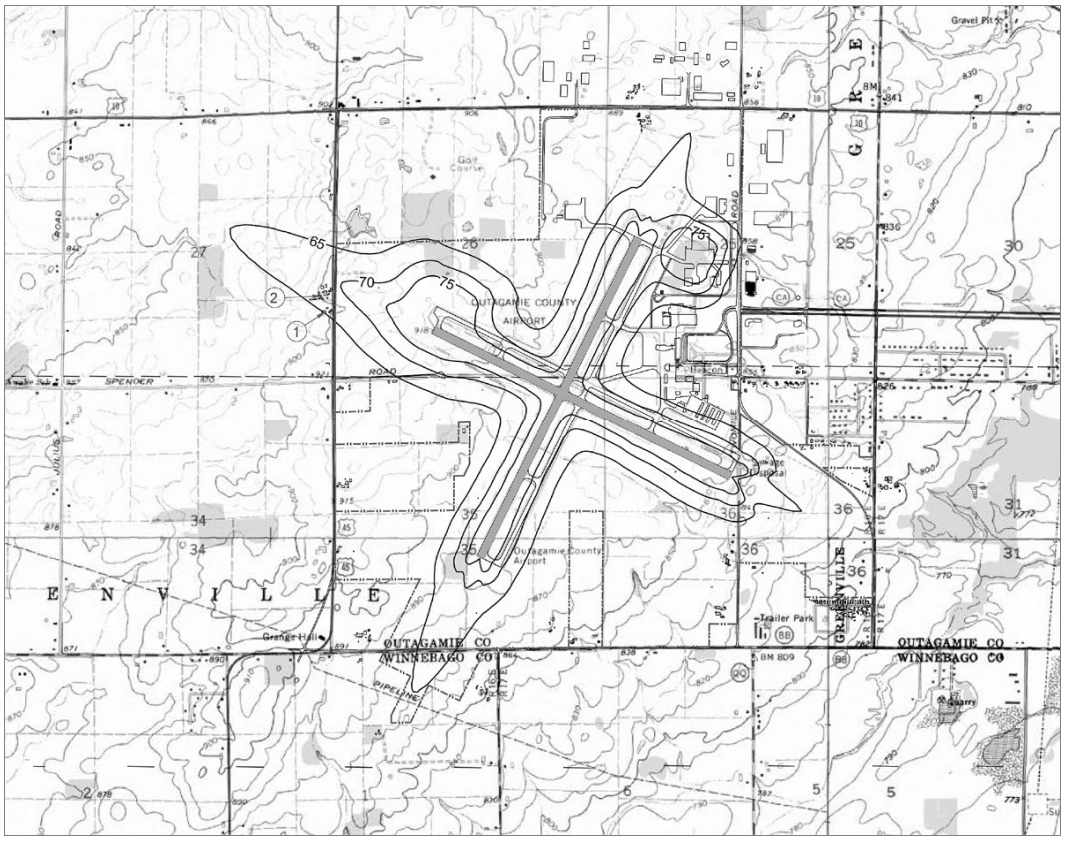
Noise impact areas for an airport are identified by noise contours. Aircraft noise contours are defined using the FAA's Integrated Noise Model (INM). The INM contains a database that relates noise levels to each specific type of aircraft. On a three-dimensional grid around the airport, the INM computes the noise exposure level for the specific aircraft and engine thrust used at a particular point along the aircraft's flight route. Noise levels are then indicated by a series of contour lines superimposed on a map of the airport and its surrounding environs. Although lines on a map tend to be viewed as definitive, it should be emphasized that the INM is only a planning tool. A community or airport planner can use the noise contours to identify areas around an airport that are likely to be impacted by aircraft noise and can then plan accordingly for land use compatibility.

Community and/or airport planners can use noise contours to identify areas around an airport that are likely to be impacted by aircraft noise and can then plan accordingly for land use compatibility.

The unit used to measure noise from the INM is the DNL. DNL summarizes the noise exposure comprehensively over a large area; the average sound level, in decibels (dB) is measured over a 24-hour period. A 10 dB penalty is then applied to account for the lower tolerance people generally have for noise events that occur during nighttime hours. With regards to the DNL value, nighttime hours are from 10 PM to 7 AM, local time. **Figure 3-2** shows a sample noise contour map that depicts the geographic areas impacted by specific DNL contours.

Three basic noise impact areas can be identified from DNL noise contours. These impact areas, referred to as noise corridor zones, can be defined as a severe noise impact area, a substantial noise impact area, or a moderate noise impact area. The severe noise impact area includes areas contained within the 70 DNL and above. While the substantial noise impact area is defined by the areas of land impacted by the 65 DNL to the 70 DNL contour. Areas impacted by the 55 DNL up to the 65 DNL contour are within the moderate noise impact category. From a noise perspective, areas exposed to 55 DNL or less are not considered to be significantly impacted.

Figure 3-2 Sample Noise Contour Map



Source: *Mead & Hunt 2006*

The FAA provides guidance for the development of Noise Compatibility Plans for areas affected by aircraft noise in several Federal Aviation Regulations (FAR), each of which can be found on the FAA web sites noted below.

- FAR Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*
  http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=e7de1acb78a1df6e934c2599c57b480c&rgn=div5&view=text&node=14:1.0.1.3.18&idno=14
- FAR Part 91 Subpart I, *Operating Noise Limits*
  http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=e7de1acb78a1df6e934c2599c57b480c&rgn=div5&view=text&node=14:2.0.1.3.10&idno=14#14:2.0.1.3.10.9

- FAR Part 150, *Airport Noise Compatibility Planning*
  http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=e7de1acb78a1df6e934c2599c57b480c&rgn=div5&view=text&node=14:3.0.1.2.7&idno=14
- FAR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*
  http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=e7de1acb78a1df6e934c2599c57b480c&rgn=div5&view=text&node=14:3.0.1.2.14&idno=14

The primary resource for noise related issues is FAR Part 150, *Airport Noise Compatibility Planning.*

FAR Part 150 contains many regulations found in the *Aviation Safety and Noise Abatement Act*, 1979. Under FAR Part 150, local jurisdictions can prepare and submit a Noise Exposure Map (NEM) and a Noise Compatibility Plan (NCP) to the FAA. This voluntary program applies to all publicly-owned, public use airports included in the National Plan of Integrated Airport Systems (NPIAS). The FAR Part 150 regulation does not apply to privately owned airports (unless they are included in the NPIAS), heliports, or military facilities.

Some provisions established by FAR Part 150 include:

- The decibel A-weighted (dBA) scale is the universal noise measurement tool.
- The DNL is the universal noise contour measure.
- Acceptable land use definitions for areas within each DNL noise contour.

FAR Part 150 describes acceptable types of land use for each DNL sound level. Areas impacted by the 70 or greater DNL contour should ultimately be acquired by the airport sponsor. Typically, large, high activity airports have noise level impacts beyond airport property. Noise contours of 70 or greater DNL are usually contained within airport property for airports with low activity. For small airports, the 65 DNL contour will often fall within the airport property line. For larger airports, the 65 DNL contour may extend beyond the airport property line. Residential developments should not be allowed in areas exposed to the 65 or greater DNL. If a noise sensitive facility must be developed within a noise contour area of 65 or greater DNL, the FAA recommends construction that utilizes noise level reduction (NLR) techniques. **Table 3-1** illustrates the compatibility of land uses based upon airport sound levels.

Areas impacted by the 70 or greater DNL contour should ultimately be acquired by the airport.

The basic approach to enhancing noise compatibility is to minimize the extent noise disrupts human activities or otherwise creates an annoyance. In general, the best approach is to allow fewer people to occupy high-noise impacted areas. When this approach is not practical, alternatives include:

- Shielding people from noise
- Increase awareness of noise issues through educational programs
- Allow land uses that have relatively high ambient noise levels or are otherwise not particularly noise sensitive

The best approach to reducing noise related concerns is to keep noise-sensitive developments from the approach areas.

This section has outlined resource and background data important for understanding noise concerns that influence planning for compatible land use within an airport's environs. Information on the general location of areas in need of protection according to noise related planning goals is provided in subsequent sections of this Guidebook.

Table 3-1 Land Use Compatibility with Yearly Day-Night Average Sound Levels (DNL)*

	Yearly Day-Night Average Sound Level (DNL) in Decibels					
Land Use	**Below 65**	**65-70**	**70-75**	**75-80**	**80-85**	**Over 85**
RESIDENTIAL						
Residential Homes	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, & concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale/Retail -bldg matrls/hardware/farm equip.	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING & PRODUCTION						
Manufacturing - general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agricultural (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under FAR Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key: Y (yes) = Land use and related structures compatible without restrictions.
N (no) = Land use and related structures are not compatible and should be prohibited.
25, 30, 35 = Land use and related structures generally compatible; measures to achieve Noise Level Reduction of 25, 30, 35 dB must be incorporated into design and construction of structure.

See following page for notes and source.

Notes: (1) = Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problem.
(2) = Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(3) = Measures to achieve NLR 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(4) = Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(5) = Land use compatibility provided special sound reinforcement systems are installed.
(6) = Residential buildings require an NRL of 25 dB.
(7) = Residential buildings require an NRL of 30 dB.
(8) = Residential building not permitted.

Source: FAR Part 150, *Airport Noise Compatibility Planning,* Appendix A, Table 1

3.1.b. Safety Related Issues

Safety issues are another primary area of concern with compatible land uses. This includes the safety of aircraft and their occupants while in the air and on the ground, as well as the safety of persons on the ground located in proximity to airports. Four primary characteristics of land use that reflect safety related issues are:

- High concentrations of people
- Tall structures
- Visual obstructions
- Wildlife and bird attractants

The common denominator with all incompatible land uses is their effect on the safety of the airport and aircraft, as well as the safety of citizens in proximity to the airport.

Each characteristic is discussed in the following sections to illustrate the associated concerns.

- **High Concentrations of People**

  High concentrations of people can be defined as the number of people within a particular land area and is measured by the number of people per unit of area. Density is often categorized as high, medium, or low depending on the number of people that a development contains. Available accident data suggests that the greatest concentration of aircraft accidents occur near runway ends during approach and departure. The risk of damage and personal injury to both people on the ground and in the aircraft can be reduced significantly by limiting the number of people in areas adjacent to airports, particularly near runway ends. The degree of risk associated with the number of people and the probability of aircraft accidents vary among communities based upon such factors as type of airport, number of operations, and types of surrounding land uses. Choosing an appropriate density within the vicinity of an airport can be a challenge. Acceptable density can vary from airport to airport depending upon the particular needs of the associated communities and the type of aircraft utilizing the airport.

  Available accident data suggest that the greatest concentration of aircraft accidents occur near runway ends. Limiting population density in this area reduces the degree of risk.

  At this time, a national standard is not available for acceptable densities around an airport. The *California Airport Land Use Planning Handbook* provides some measures that a municipality can use as a benchmark when defining densities for various land uses within their community, including:

  - Light Industrial use: 35 to 50 people per acre within the facility
  - Two-Story Motel: 35 to 50 people per acre within the dwelling unit
  - Single-Story Shopping Center: 75 to 125 people per acre within the facility
  - Single-Story Office: 50 to 100 people per acre within the building
  - Sit-Down Restaurant: 100 people per acre within the building
  - Fast Food Restaurant: 150 people per acre within the building

According to the American Planning Association (APA) *Planning and Urban Design Standards*, residential density is most commonly measured by the number of dwelling units per acre (du/ac). Examples of these densities include:

- Low residential density is defined as four units per acre (4du/ac)
- Medium residential density is defined as 16 units per acre (16du/ac)
- High residential density is defined as 48 units per acre (48u/ac)

In dense urban areas, the floor-area ratio may also be used to determine the density. The floor-area ratio is defined as the ratio of the gross building floor area to the net lot area of the building site. Scales of residential development can also be defined. Samples of these scales may include:

- Small scale: five to 50 units per zero to 10 acres
- Medium scale: 50 to 500 units per 10 to 50 acres
- Large scale: 500 or greater units per 50 or greater acres

The higher the concentrations of people that a land use supports or attracts, the less compatible it will be in proximity to an airport.

While there are some definitions for specific densities, local communities may wish to establish their own levels of density. Options they may utilize include:

- Analysis of parking requirements established in local zoning ordinances
- Maximum occupancy level set in accordance with building codes
- Surveys of similar uses

In general, the higher the concentrations of people that a land use supports or attracts, the less compatible it will be in proximity to an airport. The lower the concentration of people, the more compatible land uses are near airports.

- **Tall Structures**

  Another pertinent aspect of airport safety is height restrictions for buildings and structures on or near airports. Low-level flight occurs during approach, departure, crop dusting, and search and rescue operations. Inadvertent collisions with tall structures during any of these stages of flight are detrimental to the safety and welfare of those in the aircraft and those on the ground. Tall structures may include building and objects, as well as natural features such as trees and terrain. It is critical to avoid tall structures within the airport approach and departure surfaces, as described in FAR Part 77 Surfaces. Tall objects adversely affect approach corridors and instrument approach altitudes. Therefore, the siting of tall objects such as multi-story structures, power lines, wind farms, and telecommunication towers near airport traffic patterns and flight paths should be discouraged. The risk to aircraft safety associated with tall structures can be minimized if structures are clearly marked with lighting and if a Notice to Airmen (NOTAM) is issued to pilots by the airport.

  The impact of tall structures to aircraft safety may be minimized if structures are clearly marked with lighting and if a Notice to Airmen (NOTAM) is issued to pilots by the airport.

  When local jurisdictions receive an application to erect a tall structure within the airport's environs, local decision-makers must submit the application to the FAA. The FAA uses FAR Part 77 Surfaces to evaluate the application. FAR Part 77 Surfaces provisions require that an aeronautical study be evaluated to determine whether a proposed construction project would pose a hazard to navigable airspace. Local municipalities can establish and enforce height restrictions that go beyond the basic FAA standards. However, local level approval should be withheld until comments from the FAA and any state level agency are received. The FAA determination and opinion do not override the local governing authority, should the local ordinance be more restrictive.

- **Visual Obstructions**

  Land uses that obscure pilot visibility should be limited to ensure safe navigation. Visibility can be obscured by a number of items including: dust, glare, light emissions, smoke, steam, and smog.

- ***Dust*** and dust storms carry sand particles through the air, which create hazardous conditions due to severe reduction in visibility. When construction or farming activities occur within the vicinity of an airport, there is a risk for exposed earth materials to be carried by high winds across airport operational areas. Areas where low-level flight altitudes occur are susceptible to such dust storms during approach and departure.

- ***Glare*** produced from reflective surfaces can blind or distract pilots during low-level flight altitudes. Water surfaces such as storm water detention ponds and light-colored or mirrored building materials can produce glare as well. It is important to evaluate these items during site plan review and to consider whether or not they may impact a pilot's vision.

- ***Light emissions*** are often caused by lights that shine upward in the flight path. A pilot's ability to identify an airport during low-level flight altitudes can be hindered by emissions during evening hours, storm events, or times of reduced visibility such as fog. Also, lights arranged in a linear pattern can be mistaken for airport lights depicting operational areas. Bright lights are a concern because they are distracting and can cause a blurred or momentary loss of vision for pilots as they pass from darkness into well-lit areas.

- ***Smoke, steam, and smog*** can create a hazardous haze that contributes to reduced visibility for a pilot while operating an aircraft. Generation of these conditions by land uses such as manufacturing and ethanol plants or utilities such as electrical generation and nuclear power plants can pose a problem for pilots. The location of these types of land uses relative to the airports operational areas should be carefully considered.

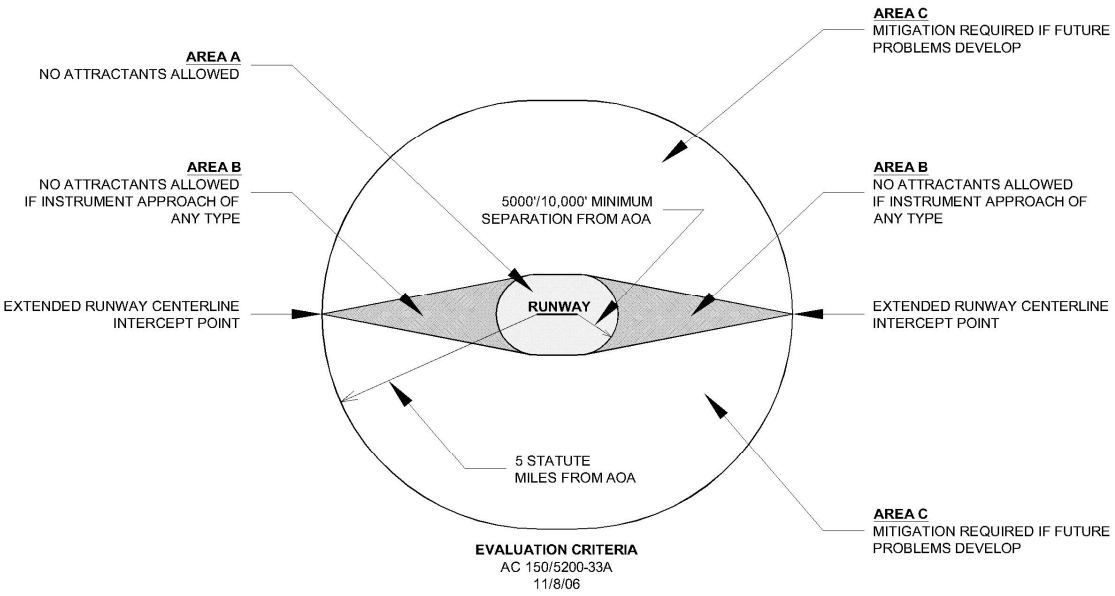
- **Wildlife and Bird Attractants**

  Aircraft collisions with wildlife are a threat to human health and safety and are steadily increasing. Wildlife strikes killed more than 194 people and destroyed over 163 aircraft according to the *FAA Wildlife Strikes to Civil Aircraft in the United States 1990-2005*. Monitoring wildlife activity and habitats on or near airports is an important first step in determining how to protect airports from wildlife hazards. Development and implementation of a wildlife management plan also plays a critical role in airport planning and zoning by giving an airport the tools and techniques to properly maintain habitat management controls. FAA Advisory Circular (AC) 150/5200-33A, *Hazardous Wildlife Attractants on or Near Airports* discusses various incompatible land uses and bird attractants and can be found at the following web address:
  www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/media/150-5200-33A/150_5200_33A.pdf

  Monitoring wildlife activity and habitats to establish a baseline of activity on or near airports is an important first step in determining how to protect airports from wildlife hazards.

  Figure 3-3 illustrates the areas where wildlife attractants are not allowed on or near airport property; area A is between 5,000 feet and 10,000 feet minimum separation from the Airport Operations Area (AOA). Guidelines urge airport sponsors to discourage the creation of pools, ponds, sewage lagoons, and fountains on or near an airport. Permanent water sources should be managed by removal, physical exclusion, or alteration of appearance. Underground facilities such as French drains or buried rock fields are examples of successful retention/detention designs, while temporary holding basins that drain within 24-hours are also an option. If drains and ditches cannot be removed, the banks should be mowed regularly to control bird nesting and perching.

Figure 3-3 Evaluation Criteria Where Wildlife Attractants are Not Allowed



Source: Graphic Developed by FAA Central Region Airports Division based upon guidance in FAA *AC 150/5200-33A, Hazardous Wildlife Attractants on or Near Airports*

Control techniques to manage wildlife hazards or bird attractants include physical removal of wildlife, fence installation, and maintenance of airport grounds in such a manner that deters wildlife habitation. Habitat management controls include:

- Select and space tree species to minimize habitats
- Maintain appropriate grass lengths to minimize wildlife attractants
- Prohibit certain agricultural crops near airports
- Eliminate standing water
- Use repellents to disperse wildlife in a humane manner

The United States Department of Agriculture (USDA) provides a listing of plants that are attractive to wildlife and should be avoided on or near airports. Woody plants such as oaks, firs, pines, maples, and cedars should be avoided, as they provide roosting habitats. Additionally, upland weeds and shrubs should be discouraged near an airport as they provide a food source and habitats for wildlife. Marsh plants such as water lily, wild celery, and wild rice can also provide a food source for a variety of wildlife. Cultivated or ornamental plants such as alfalfa, corn, birch trees, and dogwoods provide food sources and some habitat options as well.

It is important for airports to assess potential wildlife attractants and monitor and record all wildlife strikes.

Managing potentially hazardous wildlife on or near an airport proves to be a challenge because it typically combines active control measures, such as repellents, along with passive control measures, such as preventing and eliminating refuges and controlling attractants. Another key component to implementing these short-term and long-term control measures is to accurately monitor and record wildlife obstructions and control wildlife activity on and near an airport. Reporting all bird and other wildlife strikes to the FAA is important for the study of this issue. In addition to the AC 150/5200-33A, the FAA has published a manual titled *Wildlife Hazard Management at Airports*. The manual serves as a reference for wildlife issues within proximity to airports and can be accessed at the following web site:
http://wildlife.pr.erau.edu/EnglishManual/2005_FAA_Manual_complete.pdf

The FAA and the USDA, Animal and Plant Inspection Services (APHIS) Wildlife Services (WS) have signed a Memorandum of Understanding (MOU) to resolve wildlife hazards to aviation, thus enhancing public safety. The MOU establishes that WS has the expertise to provide technical and operational assistance to alleviate wildlife hazards at airports. A copy of the MOU is included in **Appendix C**. The *Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988* authorizes and directs the Secretary of Agriculture to cooperate with states, individuals, public and private agencies, organizations, and institutions in the control of nuisance mammals and birds deemed harmful to the public. Airports can enter into a cooperative agreement with the USDA APHIS WS for the completion of a wildlife hazard assessment or mitigation efforts.

In 2006, the Iowa DOT Office of Aviation entered into a cooperative agreement with the USDA WS to conduct wildlife consultations at general aviation airports in Iowa. WS biologists visit airports, review wildlife habitat at the airport, discuss problems experienced at airports, and recommend potential prevention and mitigation actions that an airport can take to reduce potential wildlife impacts. The Iowa DOT Office of Aviation is committed to assisting airports with wildlife issues through technical assistance and funding for assessments and mitigation.

The Iowa DOT Office of Aviation is committed to assisting airports with wildlife issues.

When initial consultations indicate concern, a more complete assessment may be necessary. A wildlife hazard assessment is conducted by a wildlife damage management biologist to provide the scientific basis for the development, implementation, and refinement of a Wildlife Hazard Management Plan, if needed. The Plan is prepared by both the wildlife biologist and airport staff. The airport staff provides historical information regarding wildlife activity at the airport. Typically, the wildlife biologist conducts a 12-month assessment of the current activity from which to make recommendations for reduction of wildlife activity. US Code of Federal Regulations title 14 Aeronautics and Space Part 139 Certification of Airports, Subpart D 139.337 *Wildlife Hazard Management* requires airport sponsors take action to eliminate wildlife hazards on or near airport environs and can be found at the following web address.

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=e7de1acb78a1df6e934c2599c57b480c&rgn=div5&view=text&node=14:2.0.1.4.26&idno=14#14:2.0.1.4.26.4.11.19

While aviation safety is a key issue, it is recognized that the elimination of all wildlife hazards to aviation is not possible and that not all wildlife are equally hazardous to aviation. Guidelines and assistance provided by the USDA WS can be followed in order to effectively analyze the comparative threats by wildlife. The following web address provides access to the USDA APHIS WS home page for assistance with wildlife matters on or near airport environs.

www.aphis.usda.gov/wildlife_damage/

3.2 Land-Use Classifications

As part of the local planning effort, definitions of various land uses are developed to address specific needs. Since the specific classifications can vary by community, the definitions in this section have been kept broad to allow flexibility in interpretation and implementation by local planners and elected officials. Land use classifications are separated into the following categories:

Types of uses to consider in land use plans include, but are not limited to:
- Residential
- Commercial
- Industrial
- Water collection areas
- Wetlands
- Landfills
- Wildlife attractants

- Residential activities
- Commercial activities (shopping, business, or trade activities)
- Industrial/Manufacturing activities (industrial, manufacturing, and waste activities)
- Institutional activities (social and institutional activities)
- Infrastructure activities (special uses and infrastructure activities)
- Agricultural and open space activities (natural resource activities)
- Parks and Recreation activities (leisure activities)

Tables within this section contain examples of development associated with each land use classification and suggest areas of potential noise or safety concerns.

The intent of this section is to provide a brief summary of the various types of land uses that can be found near airports and of the various concerns associated with the five primary areas of interest. The information contained herein is not meant to be a definitive list of specific land use classifications that are considered compatible or incompatible with airport environs. Instead, it is designed to provide a general assessment tool to be used by elected officials, planning commissions, developers, and planners when evaluating the compatibility between a potential development and airport property.

3.2.a. Residential Activities

As urban population continues to increase, residential land use development often encroaches upon what was once open space that surrounded airport property. Encroachment jeopardizes public safety and airport viability. An increase in the number of housing developments, bright street lights, water detention ponds, and concentrations of people can be a detriment to aircraft and public safety.

Encroachment on an airport jeopardizes public safety and airport viability and economic vitality.

Residential developments near airports should be planned and designed carefully. Safety issues related to concentrations of people and potential noise impacts need to be evaluated when considering development of single- or multi-family housing and manufactured housing parks. Residential housing should be prohibited in proximity to airport environs.

A brief discussion of the general concerns associated with the Residential classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-2** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**
  Aircraft noise is often perceived as a nuisance by residents within the vicinity of airports. There are measures residents can implement to minimize the effects of aircraft noise on their quality of life. These measures are generally limited to changes in the interior of the home and can include adding additional insulation to roofs and walls, installing efficient windows and doors, or investing in a cooling system to limit the need to open windows in warmer weather. Unfortunately, the outdoor impacts of noise are often disregarded and make activities such as backyard barbeques and time spent outdoors an issue for homeowners.

- **High Concentrations of People**
  Residential developments can concentrate a large number of people in a small area. If such developments are near an airport, the potential for injury or casualty increases should an aircraft accident occur. Multi-family units, such as apartment complexes, condominiums, and manufactured housing parks, contain a high density of people, while duplexes and small condominiums contain a moderate density of people. Aircraft fly at low altitudes as they approach and depart an airport and have less opportunity to correct or recover from an unexpected event, such as engine failure or equipment malfunction. During such an event, the impact and wide spread debris from an aircraft accident can cause significant harm to surrounding residents. Careful consideration must be given to any request involving residential development within the vicinity of an airport.

Tall residential apartment or condo buildings near an airport have the potential to impede safe aircraft movement during approach and departure and limit possible flight paths.

- **Tall Structures**
  Tall structures near an airport have the potential to impede safe aircraft movement during approach and departure and limit flight paths. Tall structures include, but are not limited to, multi-story buildings, light poles, natural vegetation, houses, and television or radio towers. The use of tall structures should be discouraged near airports or height limitations should be imposed so that structures do not breach the FAR Part 77 Surfaces.

- **Visual Obstructions**
  Residential developments have the potential to create visual obstructions that can affect safe aircraft navigation. If street lighting is installed incorrectly, it may focus light upward and create night blindness for pilots during approach and departure from an airport. Flood lights on private property may create a similar risk. Additionally, if street lights are installed in a linear pattern near runway ends, a pilot may mistake the residential development as an extension of the runway or the pilot may assume the runway is in an incorrect location. These examples, while generally a minor issue, should be considered when evaluating or regulating residential development in the vicinity of an airport.

- **Wildlife and Bird Attractants**
  Aircraft wildlife strikes are devastating and debilitating to aircraft, and potentially impact the safety of pilots and persons on the ground. High-density and medium-density residential developments, such as condominium and apartment complexes, often require detention ponds to control storm water runoff. Detention ponds can attract wildlife that may increase the risk of aircraft wildlife strikes. Additionally, open spaces within residential developments often attract wildlife by the presence of maintained grass areas and desirable vegetation. If properly managed, water bodies and open space can be located within proximity to an airport with minimal risk.

Storm water retention ponds may attract wildlife and increase the risk of aircraft wildlife strikes.

Table 3-2 Land-Use Compatibility Chart for Residential Activities

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Residential Activities					
Single-Family Uses (1 dwelling per lot)					
Detached Single Family Dwelling (i.e. farm dwelling, detached single family house, manufactured/modular/mobile homes if converted to real property and taxed)	**I**	**P**	**N**	**P**	**P**
Detached Zero Lot Line Dwelling (i.e. condominium)	**I**	**P**	**N**	**P**	**P**
Attached Single Family Dwelling (i.e. townhouses)	**I**	**P**	**P**	**P**	**P**
Two Family Uses (i.e. two principal dwelling units within one building on the same parcel)	**I**	**P**	**P**	**P**	**P**
Multi-Family Uses (i.e. three or more principal dwelling units within a single building on the same parcel, apartments such as condominium, elder, assisted living, townhouse-style)					
Low-Rise (1-3 Levels)	**I**	**P**	**N**	**P**	**P**
Mid-Rise (4-12 Levels)	**I**	**I**	**P**	**I**	**P**
High-Rise (13+ Levels)	**I**	**I**	**I**	**I**	**I**
Group Living Uses (i.e. assisted living, group care facilities, nursing and convalescent homes, independent group living)	**I**	**I**	**P**	**I**	**P**
Manufactured Housing Parks	**I**	**I**	**N**	**P**	**I**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.b. Commercial Activities

Commercial activities often require specific review and evaluation by local planners to determine compatibility with airport operational areas. Smaller commercial developments are typically more desirable than larger commercial developments as compatible land uses. For example, a restaurant attracts a higher concentration of people than a convenience store. Additionally, patrons using outdoor seating at a restaurant may be exposed to perceived noise impacts from aircraft approaching and departing from the airport, thus making the area a less viable or attractive land use. Strip malls typically offer smaller store fronts and specialized retail options and bring comparatively lower concentrations of people, thus reducing density concerns. However, strip commercial developments often have parking lot light emissions, which can affect a pilot's vision and water detention areas that can attract wildlife. As illustrated above, diverse compatibility issues arise between airport's environs and commercial land uses, which make it difficult to generalize the benefits or detriment created by certain land use types. Nevertheless, local planners should carefully review the development of commercial activities near airports so that concerns such as water detention, road alignments, wildlife attractants, lighting impacts, and building location do not create a hazard within the areas closest to an airport.

Smaller developments are more desirable than larger ones around airport environs.

Mixed-development use is an emerging trend in planning because it offers commercial, leisure, and residential uses in a single area. Such developments can include mixed-use buildings that incorporate retail or office space at the street level and living space in the upper levels, all within a central area. The mix of uses can create higher concentrations of people per area and may combine the safety and noise risks of both commercial and residential developments that have been identified above.

A brief discussion of the general concerns associated with the Commercial classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-3** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**
  As previously noted, commercial activities can create noise sensitivity concerns due to the nature of the activities taking place within them. Shopping centers and malls, such as open-air malls, often combine activities such as walking, dining, and shopping. Also, many restaurants offer outdoor seating options to enhance the dining experience. Aircraft noise, in an open-air setting, can make the experience uncomfortable or undesirable for patrons. Other types of commercial development, such as movie theaters, may also experience noise related impacts if developed too close to airport operational areas.

- **High Concentrations of People**
  Commercial retail uses, ranging from corner convenience stores to multi-acre mega malls, present various concerns related to compatible land use issues near airport property. Large malls attract a dense population of customers, contain large parking lots equipped with numerous lights, generate parking lot debris, and include sizeable trash containment areas and water detention basins. As discussed in prior sections, it is not desirable for a land use on or near airports to concentrate a population of people, affect a pilot's visual acuity, or attract wildlife and birds on or near airport property.

Commercial uses that create high concentrations of people or tall structures near an airport are not compatible land uses.

- **Tall Structures**
  Business and office parks represent another land use that can raise airport compatibility issues. The types of buildings associated with such development can be defined as:

  - Low-rise: one to three stories in height
  - Mid-rise: four to 12 stories in height
  - High-rise: 13 stories or more in height

Single-story office buildings with relatively low number of people are often considered a compatible land uses. Concerns typically arise when taller, multi-story buildings are proposed because they attract a greater concentration of people and pose potential height obstructions. Moreover, these developments often require large water detention areas and open green spaces that act as wildlife attractants. Local planners should consider the height of all proposed structures near airports to preserve safe navigable airspace.

Local planners should consider the height of all proposed structures near airports to preserve a safe navigable airspace.

- **Visual Obstructions**
  Building and landscaping materials for a development should be evaluated for potential impact regarding compatibility with an airport. The use of reflective materials may create a glare and pose a visual concern to pilots. Additionally, lighting for parking lots and structures should be evaluated to minimize or avoid visual obstructions, which may create concerns for a pilot. Linear alignments for streetlights should be avoided, as well as indirect lighting, which may create ambient light issues.

- **Wildlife and Bird Attractants**
  Aircraft accidents caused by wildlife and birds strikes can endanger the flying public, as well as those persons in the surrounding area. In order to maintain a safe operating environment, wildlife and bird attractants must be limited on and in proximity of airport property. Commercial and business land uses often have ancillary functions associated with them that are prime wildlife attractants. As previously mentioned, larger commercial developments require sufficient parking lot space to accommodate customers and sizeable facilities to house merchandise. Litter left in parking lots may supply birds and rodents with a food source. The facilities generally have flat roofs that encourage protected roosting habitats for birds. Large impermeable surface areas associated with commercial developments often necessitate the development of water detention and green space areas, which can serve as attractants to wildlife such as geese and gulls, both of which pose a significant hazard to aircraft. Thorough review by local planners should be completed to identify potential areas of concern related to wildlife and bird attractants on and near airport property.

Table 3-3 Land-Use Compatibility Chart for Commercial Activities

Iowa Land Use Compatibility Chart					
I *= Impact*	***P*** *= Possible Impact*		***N*** *= No Impact*		
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Commercial Activities					
Eating and Drinking Establishments (i.e. restaurants, cafes, coffee shops, fast food restaurants, bars, nightclubs, taverns, cocktail lounges)	**I**	**I**	**P**	**P**	**I**
Quick Vehicle Servicing Uses (i.e. full-serve and mini-serve gas station, unattended card key service stations, car washes)	**N**	**P**	**N**	**P**	**N**
Office Uses (i.e. business, government, professional, medical, or financial)					
General Office (i.e. professional offices, financial businesses, government offices)	**I**	**P**	**P**	**P**	**P**
Low-Rise (2-3 Levels)	**I**	**P**	**N**	**P**	**P**
Mid-Rise (3-12 Levels)	**I**	**I**	**P**	**P**	**P**
High-Rise (12+ Levels)	**I**	**I**	**I**	**P**	**I**
Medical/Dental Office (i.e. medical and dental clinics, chiropractic clinics, physical therapy clinics)	**I**	**P**	**P**	**P**	**P**
Low-Rise (2-3 Levels)	**I**	**P**	**N**	**P**	**P**
Mid-Rise (3-12 Levels)	**I**	**I**	**P**	**P**	**P**
High-Rise (12+ Levels)	**I**	**I**	**I**	**P**	**I**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

Table 3-3 Land-Use Compatibility Chart for Commercial Activities *(Continued)*

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Commercial Activities *(Continued)*					
Retail Uses (i.e. sale, lease, or rent of new or used products)					
Sales-Oriented (i.e. appliances, convenience stores, bakeries, electronics, furniture, garden supplies, gas stations, groceries, hardware, malls, strip malls, videos)[3]	**P**	**P**	**P**	**P**	**P**
Personal Service-Oriented (i.e. retail service-banking establishments, laundromats/dry cleaning, quick printing services, beauty/tanning salons, funeral homes)	**P**	**P**	**P**	**P**	**P**
Repair-Oriented (i.e. consumer goods-electronics, office equipment, appliances)	**P**	**P**	**P**	**P**	**P**
Hospitality-Oriented (hotels, motels, convention centers, meeting halls, event facilities)	**I**	**P**	**P**	**P**	**I**
Low-Rise (2-3 Levels)	**I**	**P**	**N**	**P**	**P**
Mid-Rise (3-12 Levels)	**I**	**I**	**P**	**P**	**P**
High-Rise (12+ Levels)	**I**	**I**	**I**	**I**	**I**
Outdoor Storage and Display-Oriented (i.e. outdoor storage-lumber yards, vehicles sales, landscape material and nursery product sales, farm supply and equipment sales)	**P**	**P**	**N**	**P**	**P**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.
[3] Sales oriented land uses should be evaluated based upon the size of the facility for potential land use impacts. Smaller establishments such as bakeries are less of a concern as they contain a reduced concentration of people due to the size of the facility, as well as a high turn-over of patrons; while larger establishments such as mall or big box stores contain a higher concentration of people based upon a greater building area and often for a greater period of time.

Table 3-3 Land-Use Compatibility Chart for Commercial Activities *(Continued)*

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Commercial Activities *(Continued)*					
Surface Passenger Services (i.e. passenger terminals for buses, rail services, local taxi, and limousine services)	**P**	**I**	**P**	**P**	**P**
Vehicle Repair Uses (i.e. vehicle repair or service shops, alignment shops, tire sales)	**N**	**P**	**N**	**P**	**P**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.c. Industrial/Manufacturing Activities

Industrial parks or areas designated to house industrial activities were historically composed solely of industrial uses. Today, however, industrial parks are often a mix of industrial businesses, manufacturing facilities, office parks, and research and development complexes within the same geographic area. Occasionally even hotels, restaurants, and retail activities have developed along the fringes of industrial parks to provide necessary support facilities and stimulate economic development within these areas. Industry and manufacturing land uses can include activities such as materials processing and assembly, lumber and wood product manufacturing, paper and allied product manufacturing, petroleum refining and related processing, primary metal manufacturing, product manufacturing, and storage of finished products. Each use has unique compatibility concerns such as the size of the facility, secondary uses, height of the proposed development, which should be reviewed by local planners and the FAA.

Industrial and manufacturing activities have unique compatibility concerns such as the size of the facility, secondary uses, and height of proposed developments.

Industrial and manufacturing areas are typically encouraged within a community as a means to attract business, increase business tax base and employment levels, and enhance economic benefits to the community. To complement the development of these land uses, industrial and manufacturing areas are often located in proximity to major transportation arteries such as highways, interstates, railroads, and airports in order to provide inter-modal connectivity. Transportation arteries are critical for companies to increase productivity and allow for just-in-time delivery options that are becoming more prevalent in the current economy.

Waste disposal facilities require careful consideration within this land use classification. Waste disposal facilities consist of landfill and compost sites, garbage dumps, and waste transfer and storage facilities. Waste disposal facilities share similar zoning requirements with airports; both should be located away from residential areas but need to be accessible to the population. Although airports and waste disposal facilities have similarities, they are not compatible land uses and therefore should not be located near each other. The FAA has issued specific guidance related to the development and management of landfills in AC 150/5200-34A, *Construction or Establishment of Landfills near Public Airports.* In addition, 40 CFR 258, Subpart B, *Criteria for Municipal Solid Waste Landfills*, contains specific information referring to landfills in proximity to airports. Both documents should be consulted when addressing these types of land uses within a community near an airport. Detailed information regarding these documents can be found at the following web site:

AC 150/5200-34 and FAR Part 258, Subpart B should be consulted when addressing waste disposal and landfill uses within a community near an airport.

www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/index.cfm?template=Document_Listing

Industrial and manufacturing uses raise concerns in four of the five impact areas. Aircraft or airport noise is usually a minor or non-existent issue because industrial and manufacturing land uses also generate a significant amount of noise. The level of concern for the other four impacts depends upon the size and type of development and the location of the facility relative to an airport.

A brief discussion of the general concerns associated with the Industrial/Manufacturing classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-4** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**
  Industrial and manufacturing activities generally create ambient sounds and therefore typically do not raise a concern with regards to airport noise compatibility issues. Aircraft noise tends to blend into background sounds and does not create a nuisance for people within the facility. However, when considering the outdoor environment (i.e., outdoor break or lunch areas) aircraft noise can be a concern and should be considered if these types of uses present themselves. Manufacturing land uses that utilize equipment sensitive to noise or vibration may be discouraged within the vicinity of an airport.

- **High Concentrations of People**
  The high concentration of people associated with a facility can vary depending on the types of industrial or manufacturing uses. Some industries can be very labor intensive, requiring a large number of employees to be within a facility at a given time. Other businesses, like warehousing, may require a minimal number of employees to remain operational. However, it is recommended that consideration be given when siting industrial development within the vicinity of an airport, that the number of employees be minimized if applicable.

- **Tall Structures**
  Industrial and manufacturing land uses may raise concerns regarding the height of structures. Ethanol and manufacturing plants often have tall ventilation or smoke stacks that extend to a height that can create an obstruction to navigable airspace. Height limits should be imposed to avoid impact issues within the vicinity of an airport.

Industrial and manufacturing plants often generate smoke or steam, which can cause potential visual obstructions for a pilot.

- **Visual Obstructions**
  Industrial and manufacturing plants often generate smoke or steam from facility operations, which can cause visual obstructions for a pilot. When released into the air, smoke and steam can create visual impacts to the surrounding area by obscuring visibility and precluding a pilot from having an accurate view during approach, departure, and low-level flight altitudes. It is important to evaluate issues such as the location of the building and the prevailing wind direction, which will carry the smoke or steam away from the facility when siting the development.

Industrial and manufacturing land use areas can emit significant high intensity light in loading dock and cargo transfer areas and from fixtures in parking lots. Light emissions may cause visibility concerns for pilots when aircraft pass through areas of intense light and then back in to areas of darkness. Zoning regulations can require installation of light fixtures with directional aiming options to reduce ambient lighting concerns, as well as control placement of these types of lights to minimize potential impacts.

Light emissions may cause visibility concerns for pilots when aircraft pass through areas of intense light and then back in to areas of darkness.

Reflective surfaces are also a significant concern for a pilot because they can potentially produce a disruptive glare. Some types of industrial developments, such as ethanol plants or petroleum refineries, have large storage tanks that are often constructed of metal or have reflective surfaces. If a pilot's vision is compromised by a visual obstruction the safe operation of the aircraft is at risk, which in turn jeopardizes the safety of the pilot, aircraft passengers, and people on the ground. Local planners and elected officials should consider these factors during the site plan review process to minimize potential impacts prior to development.

- **Wildlife and Bird Attractants**

  Industrial and manufacturing land uses can generate habitats and opportunities that are inviting to wildlife and birds. Such land uses often have buildings that offer roosting opportunities for birds, as well as habitats for small rodents and mammals. Trash storage facilities and parking lots can generate debris from users, such as discarded food containers, which offer a potential food source for animals. Also, water detention areas can provide food, water, and habitat opportunities for wildlife. As birds fly between these areas to other roosting or food sources, they create a flight path that may interfere with the approach or departure of aircraft. All of the above are undesirable situations that can be limited with proper placement and management of areas that serve as wildlife attractants.

  Landfills and similar facilities, such as composting areas, recycling centers, sanitary and water treatment facilities, and waste sorting, can act as wildlife attractants and require proper maintenance to avoid undesirable impacts.

FAA's AC 150/5200-34A, *Construction or Establishment of Landfills near Public Airports*, addresses the development and management of landfills. This AC provides guidance to comply with 49 U.S.C. 44718(d) as amended by Section 503 of the *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* (AIR-21) Public Law No. 106-181 (April 5, 2000.) This code section restricts the construction or establishment of a Municipal Solid Waste Landfill (MSWLF) within six miles of a public airport that receives federal grants and primarily serves general aviation aircraft and scheduled air carrier operations using aircraft with fewer than 60 passenger seats.

www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/media/150-5200-34A/150_5200_34a.pdf

In addition, 40 CFR 258, Subpart B, *Criteria for Municipal Solid Waste Landfills*, requires that owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the FAA and must demonstrate that the units are designed and operated in such a way that the MSWLF unit does not pose a bird hazard to aircraft.

http://frwebgate5.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=574356361808+43+0+0&WAISaction=retrieve

Consequently, the area between five and six miles of an airport should be limited for consideration for solid waste landfills. Sanitary and water treatment facilities generally attract a large number of birds due to the combination of water bodies and lush open green space that surround the facilities. Large concentrations of birds can pose a threat to aircraft safety during low-level flight near treatment facility areas. Some communities have considered the co-use of airport property with wastewater treatment facilities, an arrangement that would appear to be a beneficial use of property. However, spraying or disposal of wastewater improves the soil quality that can attract insects, small mammals, and birds looking for a food source, which can in turn increase the potential for wildlife strikes as the number of wildlife in the area around the airport increases. Consequently, it is recommended that sanitary, wastewater treatment, recycling, composting, and solid waste transfer facilities be located away from airport property.

Table 3-4 Land-Use Compatibility Chart for Industrial/Manufacturing Activities

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Industrial/Manufacturing Activities					
Industrial Service Uses (i.e. machine shops, tool repair, towing and vehicle storage, building supply yards, heating/plumbing/electrical contractors, exterminators, janitorial services, fuel oil distributors, solid fuel yards)	**N**	**I**	**P**	**P**	**P**
Manufacturing and Production Uses (i.e. manufacturing, processing, fabrication, packaging or assembly of goods)					
Technical/Light Manufacturing (i.e. electrical components, engineering, scientific and research, office, computer hardware/software, optical, pharmaceuticals, printing/photo facilities, publishing)	**P**	**I**	**P**	**I**	**P**
General Manufacturing (i.e. manufacturing, compounding, assembling or treatment of most articles, materials, or merchandise)	**N**	**I**	**P**	**I**	**P**
**Heavy Manufacturing* (i.e. concrete and asphalt plants, meat packing plants, wet corn milling, manufacturing of animal feed, paper/paperboard mills, ethanol plants)	**N**	**P**	**I**	**I**	**I**
Mining and Extraction Uses	**N**	**P**	**N**	**I**	**I**

* Heavy Manufacturing typically has excessive smoke, dust, or hazardous waste

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

Table 3-4 Land-Use Compatibility Chart for Industrial/Manufacturing Activities *(Continued)*

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Industrial/Manufacturing Activities *(Continued)*					
Salvage Operations (i.e. firms that collect, store, and dismantle damaged or discarded vehicles, machinery, appliances, and building material)	**N**	**N**	**P**	**P**	**P**
Self-Service Storage Uses (i.e. mini-warehouses/storage facilities)	**N**	**N**	**N**	**P**	**P**
Warehouse and Freight Uses (i.e. major wholesale distribution centers, general freight storage, railroad switching yards, bus/rail car storage lots, parcel service, grain terminals)	**N**	**P**	**P**	**P**	**P**
Waste-Related Uses (i.e. recycling centers, sanitary landfills, waste transfer stations, composting, energy recovery plants, sanitary and water treatment facilities, sanitary collection/pumping facilities, hazardous waste collection sites)	**N**	**N**	**P**	**I**	**I**
Wholesale Sales Uses (i.e. sale, lease, or rental of products to retailers for industrial, institutional, or commercial business users)	**N**	**N**	**N**	**P**	**P**

* Heavy Manufacturing typically has excessive smoke, dust, or hazardous waste

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.d. Institutional Activities

Institutional uses should not be located near airports due to the large population densities and noise sensitivity concerns.

Institutional land uses should not typically be located on or near airports due to noise sensitivity and the risk associated with concentrations of people. Such land uses include, but are not limited to, places of worship, day care and elder care centers, hospitals, health care facilities, and educational facilities. These types of facilities may contain people who are unable to care for themselves making evacuation difficult in the event of an aircraft accident. These uses can also contain large parking lots and water detention areas that can contribute to light emission and wildlife attractant concerns.

A brief discussion of the general concerns associated with the Institutional classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-5** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**
  Aircraft noise can often create a nuisance for social land uses and institutions in the vicinity of airports. Noise impacts have been determined to affect the quality of life of persons and also affect quality of service within these areas. Noise can be considered a detriment to the learning process at schools and universities because of the distraction aircraft noise creates while students are trying to learn. Institutional land uses such as hospitals or health care facilities are affected by vibrations related to aircraft noise. Ideally, institutional land uses should be precluded from development near an airport. If this is not feasible, various measures can be taken to minimize aircraft noise impacts. Specific noise reducing building materials and construction techniques can be used as a mitigation measure such as:

  - Installation of additional insulation to the roof and walls of existing structures
  - Installation of energy efficient windows that limit the amount of audible aircraft noise impacts

  As with residential land uses, the outdoor impacts are left unaddressed and the best practice is to prohibit noise sensitive facilities within the vicinity of an airport.

Aircraft noise can create a nuisance and impact quality of life, as well as create vibrations affecting sensitive equipment.

- **High Concentrations of People**
  Hospitals, places of worship, educational, and institutional facilities typically contain large congregations of people and are considered incompatible land use. Time spent within each of the above facilities varies depending on the function of that establishment. The duration of time people congregate in a place of worship is typically limited compared to the amount of time people spend in hospitals, educational, or institutional facilities. Limited time duration may suggest that such land uses could be compatible since the exposure time for a potential aircraft incident is lower. However, this might not be the case as the facility use may increase the future. Consequently, these land uses should be precluded in the vicinity of an airport.

Additionally, some facilities also have mobility or access concerns for the occupants. Hospitals are typically multi-story structures and accommodate patients with limited mobility or those who are dependent on others, such as infants or small children, which can create a challenge if an evacuation is necessary due to an aircraft accident. Also, schools are occupied by a large numbers of students and a limited number of adults, which can place the occupants in danger if the building must be evacuated. Facilities that promote large congregations of people should not be developed within the vicinity of an airport due to the safety issues that may arise if an aircraft incident occurs.

Institutional facilities often contain a large number of windows that can reflect light, creating potential glare affecting a pilot's vision.

- **Tall Structures**
  Consideration should be given to the height of structures associated with institutional uses such as hospitals, places of worship, and educational facilities, to limit potential FAR Part 77 Surface penetrations. Church bell towers, multi-story hospitals, schools and universities, as well as associated parking lot light structures should not be located near airport property due to their height concerns.

- **Visual Obstructions**
  Institutional facilities raise many safety concerns regarding visual obstructions affecting safe airport operations such as glare, light emission, steam, and smoke. Large parking lots are usually associated with these types of land uses. Lights used to illuminate parking lots can create potential emission issues if they are not properly installed and down-shielded to reduce ambient lighting into aircraft operational areas. Additionally, institutional facilities often contain a large number of windows that can reflect light, creating potential glare that can affect a pilot's vision during approach, departure, and low-level flight altitudes.

- **Wildlife and Bird Attractants**
  Institutional land uses often include detention ponds to control storm water runoff. Ponds have a tendency to attract wildlife, which can pose a significant risk to airport operations. Additionally, parking lot and waste storage areas should be maintained and kept clear of litter to avoid creating a food source for small mammals. Mammals can attract large-bodied birds, such as raptors (i.e. hawks, owls, and falcons), which pose a serious hazard to flying aircraft. If managed properly, detention ponds, parking lots, and waste storage areas can be located within the vicinity of an airport. However, given the concerns in the other four areas, institutional development is not encouraged near airports.

Table 3-5 Land-Use Compatibility Chart for Institutional Activities

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Institutional Activities					
Basic Utility Uses (i.e. utility substation facilities, electrical substations, water and sewer lift stations, water towers)	**N**	**N**	**P**	**I**	**I**
College and Universities (i.e. public or private colleges and universities, technical colleges, seminaries)	**I**	**I**	**I**	**I**	**I**
Community Service Uses (i.e. public, nonprofit, or charitable nature providing a local service to the people)					
General Community Service (i.e. libraries, museums, transit centers, park and ride facilities, senior/community/neighborhood centers, police and fire stations)	**I**	**I**	**P**	**I**	**I**
Community Service-Shelter (i.e. transient housing)	**I**	**P**	**N**	**P**	**P**
Daycare Uses (i.e. childcare centers, adult daycare, preschools after school programs)	**I**	**I**	**N**	**I**	**I**
Detention Facilities (i.e. prisons, jails, probation centers, juvenile detention homes, halfway houses)	**I**	**I**	**P**	**I**	**I**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

Table 3-5 Land-Use Compatibility Chart for Institutional Activities *(Continued)*

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Institutional Activities *(Continued)*					
Educational Facilities (i.e. public and private schools)					
General Educational Facilities (i.e. public and private elementary, middle, junior, and senior high schools including religious, boarding, military schools)	**I**	**I**	**I**	**I**	**I**
Specialized Education Facilities (i.e. specialized trade, business, or commercial courses, nondegree-granting schools)	**I**	**I**	**P**	**P**	**P**
Hospitals (i.e. hospitals, medical centers)	**I**	**I**	**I**	**I**	**I**
Religious Assembly Uses (i.e. churches, temples, synagogues, mosques, Masonic, eagles, moose, or elk lodges)	**I**	**I**	**I**	**I**	**P**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.e. Infrastructure Activities

Cellular towers create a height concern and should not be permitted within the vicinity of an airport.

Infrastructure activities include a variety of land uses such as cellular communication towers, water towers, and wind farms. As noted in the following paragraphs, each land use has compatibility concerns should be assessed prior to construction within the vicinity of an airport.

The growing popularity of cellular communication has prompted the construction of an abundance of cellular communication towers around the nation. Cellular communication towers have appeared and continue to multiply in business parks, industrial and shopping mall areas, and along the national highway infrastructure. As a result, cellular communication towers are a significant concern when evaluating height issues near airport environs. These towers can pose a concern to aircraft during low-level flight, approach, and departure.

Wind farms can create visual obstructions due to the light emissions emitted from the marker lights, while glare from the turbine blades can impair a pilot's vision, and the height of the structure can penetrate FAR Part 77 Surfaces.

Wind farms are becoming increasingly prevalent, as oil prices continue to rise and renewable energy gains momentum in the United States. California, Texas, and Iowa are ranked as the leading states in wind energy production, as noted by Iowa's Energy Center. While this increased use is beneficial to the national energy system, these types of land uses pose a potential concern when located near an airport. The height of these structures can be a compatibility concern. Wind farms generally contain numerous wind turbines that are typically very tall and cover a sizeable area. Wind farms can also cause potentially hazardous conditions for air traffic controllers if they create clutter on radar screens, which increases the difficulty to recognize aircraft. A study conducted in June 2003 by the British Department of Trade and Industry (DTI), *American Wind Energy Association, Wind Turbines and Radar An Informal Resource* determined that efforts can be implemented to reduce or eliminate wind turbine clutter effects on air traffic control radar systems. Additionally, wind turbine blades can generate glare, which can create potential visual problems for a pilot. Many of the impacts associated with wind farms can be mitigated during the design phase of the facility, as long as the local community and developer are mindful of potential concerns and work to address them early.

A brief discussion of the general concerns associated with the Infrastructure classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-6** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**
  Infrastructure land uses are not sensitive to noise associated with aircraft operations and are therefore not a concern within this topic.

- **High Concentrations of People**
  Infrastructure land uses do not contribute to an increase in density and are therefore not a concern within this topic.

- **Tall Structures**
  The uses identified within this category can be built to heights that may be hazardous to aircraft. Cellular towers may reach heights in-excess of 250 feet and encroach upon navigable airspace, which creates a hazard to aircraft safety and the welfare of residents on the ground. Wind turbines associated with wind farms can reach 300 to 400 feet in height and also pose a hazard to aircraft navigation. Water towers may exceed allowable height requirements within the jurisdictional boundary of an airport as established by the planning process and should be evaluated by both the FAA and the local municipality.

Wind turbines can reach heights of 300 to 400 feet and pose a hazard to aircraft navigation.

- **Visual Obstructions**
  Wind farms, cellular communication towers, and water towers generate height and visual obstruction concerns. The FAA requires that any structure over 200 feet in height be illuminated with warning lights for aircraft. Illumination of these structures can create a significant amount of light emission and present a potential hazard to aircraft navigation, as well as cause potential night blindness for pilots during low-level flights, approaches, and departures. Pilots could mistake the lights for a city or possibly an airport depending on the configuration of the lights. For example, wind farms that sprawl over a large area of land may appear from the air to be a city or even be mistaken by pilots as airports or airport runways. Additionally, turbine blades can produce a glare if constructed from reflective materials.

FAA requires that any structure over 200 feet in height be illuminated with warning lights for aircraft.

- **Wildlife and Bird Attractants**
  Communication towers, water towers, and wind farms are not identified as significant wildlife attractants. Such uses do not commonly have areas of standing water or open vegetation that serve as nesting or feeding areas for wildlife or birds.

Table 3-6 Land-Use Compatibility Chart for Infrastructure Activities

Iowa Land Use Compatibility Chart					
***I** = Impact*	***P** = Possible Impact*	***N** = No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Infrastructure Activities					
Communication Transmission Facility Uses (i.e. broadcast, wireless, point to point, emergency towers and antennae)	**N**	**N**	**I**	**I**	**P**
Parking Uses (i.e. ground lots, parking structures)	**N**	**P**	**I**	**P**	**P**
Transportation Uses (i.e. highways, interstates, local and county roads)	**N**	**P**	**N**	**P**	**N**
Utility Uses (i.e. solar power generation equipment, wind generators, wind farms)	**N**	**N**	**I**	**I**	**N**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.f. Agriculture and Open Space Activities

When evaluating the potential impacts of agriculture and open space based land uses, it is important to recognize that these land uses are often the least serious of the primary areas of interest. Agriculture and open space activities may cover an array of land uses such as:

If properly managed to limit wildlife attractant impacts, some agricultural land uses are considered compatible to airport operations,

- Agricultural
  - Row crops
  - Orchards
  - Vineyards
  - Farms
- Tree farms
- Undeveloped natural areas
- Wetland areas
- Water bodies

Most of these land uses would be considered compatible to airport operations, as they have relatively low concentrations of people, limited concerns associated with visual obstructions or penetrations to navigable airspace, and limited impacts related to noise sensitivity.

The primary area of interest with agriculture and open space land uses is the impacts associated with wildlife and bird attractants. The proximity of farmland to airports, especially row crops and orchards, may cause detrimental interactions between wildlife and aircraft. If crops are highly attractive to birds or wildlife for their nutritive or nesting value, the risk increases.

The proximity of farmland to airports, especially row crops and orchards, may cause detrimental interactions between wildlife and aircraft.

The USDA bulletin, *Plants Attractive to Wildlife*, provides a list of cultivated plants that can attract wildlife. Wildlife can be attracted to specific cultivated plants as a food source and may also be attracted to plants for shelter. According to the bulletin, crops and vegetation that should be discouraged within the vicinity of the airport's environs include, but are not limited to:

- Alfalfa
- Barley
- Corn
- Oats
- Sorghum
- Wheat
- Vineyards
- Apple trees
- Cherry trees

The presence of these types of crops and vegetation can provide wildlife with not only a food source but also shelter, which can serve as an attractant to various types of wildlife. For example, small mammals can be attracted to planted fields of row crops that provide cover. Large predatory birds are often attracted to these same areas because of the presence of the small mammals, birds, and rodents that hide in the crops and neighboring tall grasses. This can create a detrimental cycle of wildlife attractants that may lead to wildlife and bird strikes with approaching and departing aircraft. Coordination of land use concerns between airports, local communities, and local neighbors, such as farmers and horticulturists, is crucial to reduce the potential of wildlife strikes.

Iowa Code Section 328.1 and Rule 720 state that specific areas of an airport should be free of all agricultural activities.

- **Iowa Code Section 328.1 and 761 Iowa Administrative Code 720 *Iowa Airport Registration, as amended***
  This section establishes site approval, registration and registration renewal requirements, and minimum safety standards for airports used by the public. It also establishes site approval requirements for airports maintained for private use.

Specifically, 761 Iowa Administrative Code 720.10(1) c *Obstruction-free area*, states the following areas of an airport shall be free of all agricultural activities (i.e. crops or farm equipment) in excess of eight inches in height:

- Within 50 feet of paved runway surfaces and 200 feet from paved runway ends.
- Within 60 feet of a nonpaved runway centerline.
- Within a 100-foot radius of automated weather observation system equipment.

Iowa Code Section 328.1 can be found at web site:
www.legis.state.ia.us/IACODE/2003/328/1.html
761 Iowa Administrative Code 720 can be found at web site:
www.legis.state.ia.us/Rules/Current/iac/761iac/761720/761720.pdf

Federal regulations that note the areas of an airport that shall be free from all agricultural activities are illustrated below in **Table 3-7** and are found in AC 150/5300-13 Change 11, *Airport Design,* Appendix 17, *Minimum Distances Between Certain Airport Features and any On-Airport Agriculture Crops*.

Table 3-7 Minimum Distances Between Certain Airport Features and Any On-Airport Agriculture Crops

Aircraft Approach Category and Design Group [1]	Distance in Feet From Runway Centerline to Crop		Distance in Feet From Runway End to Crop		Distance in Feet from Centerline of Taxiway to Crop	Distance in Feet from Edge of Apron to Crop
	Visual & ≥ ¾ Mile	< ¾ Mile	Visual & ≥ ¾ Mile	< ¾ Mile		
Category A & B Aircraft						
Group I	200 [2]	400	300 [3]	600	45	40
Group II	250	400	400 [3]	600	66	58
Group III	400	400	600	800	93	81
Group IV	400	400	1,000	1,000	130	113
Category C, D, & E Aircraft						
Group I	530 [3]	575 [3]	1,000	1,000	45	40
Group II	530 [3]	575 [3]	1,000	1,000	66	58
Group III	530 [3]	575 [3]	1,000	1,000	93	81
Group IV	530 [3]	575 [3]	1,000	1,000	130	113
Group V	530 [3]	575 [3]	1,000	1,000	160	138
Group VI	530 [3]	575 [3]	1,000	1,000	193	167

1. Design Groups are based on wing span or tail height, and Category depends on approach speed of the aircraft, as shown below:

Design Group	Category
Group I: Wing span up to 49 ft.	Category A: Speed less than 91 knots
Group II Wing span 49 ft. up to 79 ft.	Category B: Speed 91 knots up to 121 knots
Group III: Wing span 79 ft. up to 118 ft.	Category C: Speed 121 knots up to 141 knots
Group IV: Wing span 118 ft. up to 171 ft.	Category D: Speed 141 knots up to 166 knots
Group V: Wing span 171 ft. up to 214 ft.	Category E: Speed 166 knots or more
Group VI: Wing span 214 ft. up to 262 ft.	

2. If the runway will only serve small airplanes (12,500 lb. and under) in Design Group I, this dimension may be reduced to 125 feet; however, this dimension should be increased where necessary to accommodate visual navigational aids that may be installed. For example, farming operations should not be allowed within 25 feet of a Precision Approach Path Indicator (PAPI) light box.

3. These dimensions reflect the Threshold Siting Surface (TSS) as defined in AC 150/5300-13, Appendix 2. The TSS cannot be penetrated by any object. Under these conditions, the TSS is more restrictive than the OFA. The dimensions shown here are to prevent penetration of the TSS by crops and farm machinery.

Source: *FAA AC 150/5300-13 Change 11 Airport Design*, Appendix 17

Open water bodies provide wildlife and birds with opportunities for drinking, bathing, feeding, loafing, roosting, and protection. Open water can include a wide range of water bodies such as but not limited to:

- Storm water detention areas
- Ponds
- Water quality treatment areas
- Wetlands
- Borrow pits
- Sumps
- Swamps
- Rivers
- Creeks
- Lakes

Coordination between an airport and local natural resource agencies can identify specific species of wildlife, birds, and waterfowl that are hazardous to airport operations and aircraft movement.

A significant concern with open water rests with its attractiveness to waterfowl, such as geese. Coordination between an airport and local natural resource agencies can work to identify specific species of wildlife, birds, and waterfowl that are a hazard to an airport, as well as develop a management plan for specific species indigenous to local airport conditions. Distinguishing characteristics of each airport and the associated wildlife in the area should be identified to address compatibility in a comprehensive manner.

A brief discussion of the general concerns associated with the Agriculture and Open Space classification of land use and the five primary areas of interest are provided on the following pages. **Table 3-8** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**

  Noise sensitivity is generally not a compatibility concern with agriculture and open space activities due to the limited number of people who are exposed to potential noise impacts.

- **High Concentrations of People**
  Agriculture and open space land uses are not generally foreseen as an airport compatibility concern in relation to density as these areas of development usually have a small number of people associated with them.

- **Tall Structures**
  In conjunction with the growth of natural vegetation, tree height can be a concern around airport property, especially within the approach and departure ends of the runway. FAR Part 77 Surfaces should be considered when evaluating the height of development and the placement of landscaping vegetation within proximity to an airport's environs.

- **Visual Obstructions**
  Agriculture and open space activities generally do not create visual obstruction concerns in the vicinity of airport property. However, consideration should be given to the location of open water as it can reflect sunlight upward, sometimes blinding pilots during the approach or departure phase of flight.

- **Wildlife and Bird Attractants**
  Agriculture and open space land uses have a significant potential to generate wildlife and bird attractants if the areas are not managed properly. These areas can provide shelter and/or feeding areas for a variety of wildlife and birds within the vicinity of airports. These impacts are not focused solely on potential aircraft strikes while in the air, but also include aircraft strikes while on the ground. Mammals such as white-tailed deer, woodchucks, and coyotes can create potential aircraft accidents. Accepted industry and best management practices should be utilized to minimize both habitat and food source attractants in agricultural and open water areas in order to further protect airport operational areas.

Table 3-8 Land-Use Compatibility Chart for Agriculture and Open Space Activities

Iowa Land Use Compatibility Chart					
I *= Impact*	***P*** *= Possible Impact*	***N*** *= No Impact*			
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Agriculture and Open Space Activities					
Agricultural Uses (i.e. commercial cultivation of plants, livestock production)					
Plant-related (i.e. crop farming, vegetable, fruit, and tree, wholesale plant nurseries)	**N**	**N**	**P**	**N**	**I**
Animal-related (i.e. livestock operations, dairy farms, horse farms)	**N**	**N**	**P**	**N**	**I**
Resident-related (i.e. single-family home, mobile home if converted to real property and taxed)	**I**	**N**	**P**	**P**	**I**
Facility-related (i.e. fuel bulk storage/pumping facility, grain elevator, livestock/seed/grain sales)	**P**	**P**	**I**	**P**	**I**
Floodplains	**N**	**N**	**N**	**N**	**I**
Water Bodies (i.e. open bodies containing water)					
Man-made resources (i.e. mining and extraction, water detention ponds, wetlands)	**N**	**N**	**N**	**I**	**I**
Naturally occurring (i.e. lakes, ponds, prairie pot holes, rivers, streams, wetlands)	**N**	**N**	**N**	**I**	**I**
Wildlife Preservation Areas (i.e. petting zoos, wildlife rehabilitation centers, zoos)	**I**	**P**	**N**	**I**	**I**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.

3.2.g. Parks and Recreational Activities

Parks and recreational land uses typically take place outdoors and can generate a number of concerns with airport compatibility. Recreational activities can include passive activities, such as resting on a park bench, or physical activities, such as fishing, swimming, hunting, and participating in sporting events.

Parks and recreational land uses may have potential noise impacts, concentrations of people, and wildlife attractants and may not be compatible near airports.

In general, potential noise impacts, congregations of people, and wildlife attractants are the primary areas of concerns for land uses in the Parks and Recreational category. Land uses such as race tracks, sports arenas, golf courses, casinos, and the more traditional park and recreational activities, such as campgrounds and playgrounds, are a concern. For example, professional auto racing has become one of the premier sporting events in the country and proposals for new tracks are beginning to appear around the country. Racing facilities include large tracks for professional racing circuits, as well as small local race tracks. Sports arenas are typically spectator facilities for sporting events such as baseball, football, hockey, and soccer, while sports parks are generally outdoor facilities that contain multi-use areas for participant events such as baseball, football, and soccer. These facilities often include large parking lots and extensive lighting, and generate congregations of people and wildlife attractants, not all of which are compatible with airport property.

Casinos represent another growing recreational land use. Casinos have large facilities that may generate a significant congregation of people. They also have large parking lots and extensive lighting not only from the lights to illuminate the parking lot but also from the large flashing billboards to announce events to attract patrons. Casinos often have restaurants that can attract wildlife due to food in trash receptacles and litter in the parking lots, as well as roosting areas such as roof tops and light poles.

Golf courses are a recreational land use that generates compatibility concerns. Golf courses may not have a large concentration of people or have large illuminated parking areas. However, they do have manicured lawns, trees, grasses, and water bodies that can attract birds, rodents, and wildlife to the area for feeding, resting, and roosting. Noise is another critical issue from not only the golfer's perception but also from surrounding neighborhoods. Golf is often used as a relaxing and meditative event and when located on or near an airport, aircraft noise can lessen the enjoyment of the activity. In addition, due to the cleared open areas on a golf course, noise from aircraft operations has a tendency to carry for long distances causing a quality of life issue for residents surrounding both the airport and the golf course.

Traditional parks and recreational activities, such as camping and playgrounds have quality of life concerns due to aircraft noise and hazards associated with aircraft accidents, therefore should not be located within the vicinity of an airport.

More traditional parks and recreational activities, such as camping and playgrounds, also have quality of life impacts due to aircraft noise and hazards associated with aircraft accidents. These areas generally contain groups of people and attract wildlife due to the litter found on the ground. All of these land uses are discouraged within the vicinity of an airport.

A brief discussion of the general concerns associated with the Parks and Recreational classification of land use and the five primary areas of interest is provided on the following pages. **Table 3-9** contains additional details of specific types of development associated with this classification of land use and the areas of potential concern. This information is not intended to be an all-inclusive summary, however is meant to provide a general understanding of the topic from which to begin an evaluation of compatible land use on a case-by-case basis for each individual community.

- **Noise Sensitivity**

  Many parks and recreational activities can be exposed to aircraft noise. In many instances, the impacts associated with exposure to aircraft noise are not significant enough to warrant corrective action, yet the perception of the impact still exists. The 65 DNL noise contours that govern the limits of noise mitigation from the FAA and HUD perspective often do not leave the confines of the airport property and are deemed to be a tolerable level of noise. Consequently, people participating in recreational activities near an airport may perceive aircraft noise as a nuisance to their enjoyment or participation in an activity. Unfortunately, insulation is not available for outdoor activities to soften or lessen the noises created by aircraft. These types of land uses should be discouraged in proximity to an airport or within approach and departure areas because mitigation strategies for noise impacts are limited.

Many parks and recreational land uses are located outdoors and are impacted by aircraft noise thus creating a nuisance to a participant's enjoyment or participation in an activity.

- **High Concentrations of People**

  The number of people participating in a specific recreational activity or at a specific geographic area can vary. A large community park may have several playground, picnic, and activity areas. On a weekend or during warm weather months, parks can be very busy and have a significant congregation of people. Consequently, park activities or recreational uses that create a significant concentration of people should be discouraged in proximity to an airport. Land uses such as race tracks, casinos, and sports parks also promote large congregations of people. The frequency of use can vary depending on the size of the venue. Many times other programs or events will take place at these facilities throughout the year and consequently their compatibility becomes a concern. Local review of potential concerns related to density should be conducted for park and recreational activities within the vicinity of an airport.

Parks and recreational activities that create moderate or high population densities should be discouraged in proximity to an airport.

- **Tall Structures**
  Parks and recreational land uses may include extensive lighting and can incorporate tall structures such as press boxes, light poles, and scoreboards. These land uses often have marketing activities, such as tethered balloons and over-flights, during events that can affect navigable airspace. In such instances, the height of objects and associated buildings should be evaluated according to FAR Part 77 Surface requirements for potential impacts to navigable airspace in airport environs.

Water bodies incorporated within a recreational area may create glare that can produce a visibility concern for pilots or create a wildlife attractant.

- **Visual Obstructions**
  Land uses within this classification often have a number of high intensity lights that illuminate large areas, such as playing fields or parking lots, which create emissions that can result in night blindness for aircraft pilots. Water bodies incorporated within a recreational area may create glare that can produce a visibility concern for pilots. If numerous bright lights are located in proximity to an airport or aircraft traffic pattern, they may affect a pilot's ability to see the airport or operate the aircraft. Specific review of emission and glare related concerns should be conducted when assessing possible impacts with park and recreational uses.

- **Wildlife and Bird Attractants**
  Parks and recreational activities attract wildlife and birds because they combine food and shelter in one geographic area. A typical city park has a variety of trees and shrubs that provide excellent shelter for birds and small mammals. Additionally, food sources are usually prevalent from people feeding animals and birds or from open trash receptacles that contain discarded food material.

Golf courses provide areas of open space and limited number of people, which creates an acceptable environment for wildlife. As a general rule, golf courses are considered incompatible land uses due to their concerns related to wildlife attractants. However, golf courses may be a compatible land use within the vicinity of an airport if they are managed correctly to avoid significant wildlife attractants. Coordination with the FAA is essential prior to approval of these types of land uses. Water hazards attract waterfowl, such as geese and gulls, while manicured turf provides a food source for birds and rodents. Raptors (i.e. hawks, owls, and falcons) can also be attracted to the golf course environment as they prey on small rodents feeding in the area. All of these forms of wildlife can be detrimental to aircraft operations during approach and departure. Recreational areas that provide shelter and/or food sources for wildlife and birds should be discouraged from the environs near airports to reduce the potential for wildlife strikes.

Wildlife typically look for areas that provide nesting, roosting, or feeding opportunities. Race tracks and sports arenas usually offer all of these elements, making them attractive to wildlife and birds. If not managed properly, food remains that are dropped or discarded by spectators and vendors lure birds and rodents to the area to feed. These land uses typically have water detention ponds that support storm water runoff from the facility. Open water bodies provide nesting and roosting habitats for the wildlife and birds. Light poles and structures also provide roosting habitats for larger bodied birds, such as raptors, which prey on smaller birds and mammals attracted to food debris. Larger birds can pose a safety concern when they fly at higher altitudes, which can interfere with aircraft flight paths, and cause significant damage to aircraft. Local government should attach management conditions to development approvals so that the potential to attract wildlife and birds is minimized.

Local governments should require management plans for approved development plans so that long term maintenance is required to limit wildlife attractants.

Table 3-9 Land-Use Compatibility Chart for Parks and Recreation Activities

Iowa Land Use Compatibility Chart					
I *= Impact*	***P*** *= Possible Impact*		***N*** *= No Impact*		
Land Uses[1]	Noise Sensitivity	High Concentration of People	Tall Structures	Visual Obstructions[2]	Wildlife & Bird Attractants
Parks and Recreation Activities					
Commercial Recreational Uses (i.e. facilities used for physical exercise, recreation, or culture)					
Outdoor (i.e. campgrounds, tennis/swimming facilities, drive-in theaters, skating rinks, pavilions, amphitheaters)	**I**	**P**	**P**	**I**	**P**
Indoor (i.e. physical fitness centers, health clubs, bowling alleys, skating rinks, billiard halls, arcades, indoor theaters)	**P**	**I**	**P**	**I**	**P**
Golf (i.e. golf driving ranges, outdoor miniature golf, 9+ hole courses)	**I**	**N**	**N**	**P**	**I**
Utility Uses (i.e. amusement/theme parks, fairgrounds, racetracks, sports arenas)	**I**	**I**	**I**	**I**	**I**
Parks (i.e. aquatic, mini, private, sports, neighborhood, school, community)	**I**	**P**	**I**	**P**	**P**
Casino	**N**	**I**	**P**	**I**	**I**

[1] The following information is not an all inclusive list; however it is meant to be a sample of land uses under each individual land use classification to provide guidance.
[2] It should be noted that any land use containing a parking lot should be classified as a possible impact (P) due to the lighting issues associated with visual obstructions.