Wildlife Hazard Evaluation Report

Williston Airport Alternatives

Williston, North Dakota

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Williston is located in the center of the Bakken Shale Formation, the largest continuous oil reserve ever assessed by the U.S. Geological Survey. Due to the increased oil exploration in the Williston area, regional aviation needs have increased considerably, which has prompted The City of Williston to consider a possible expansion or relocation of Sloulin Field International Airport (ISN). As part of an environmental study being conducted by Kadrmas, Lee & Jackson (KLJ), Tim Pugh of Midwest Wildlife Services (MWS) conducted a year-long wildlife hazard evaluation of 4 proposed airport construction alternatives in the Williston, ND area. Field observations for this evaluation began on April 23rd, 2012 and were completed on May 10, 2013. A total of seven visits were made to the Williston area. This report provides the information collected during the study, identifies the potential hazards associated with each alternative, and provides recommendations to minimize those hazards.

I. INTRODUCTION

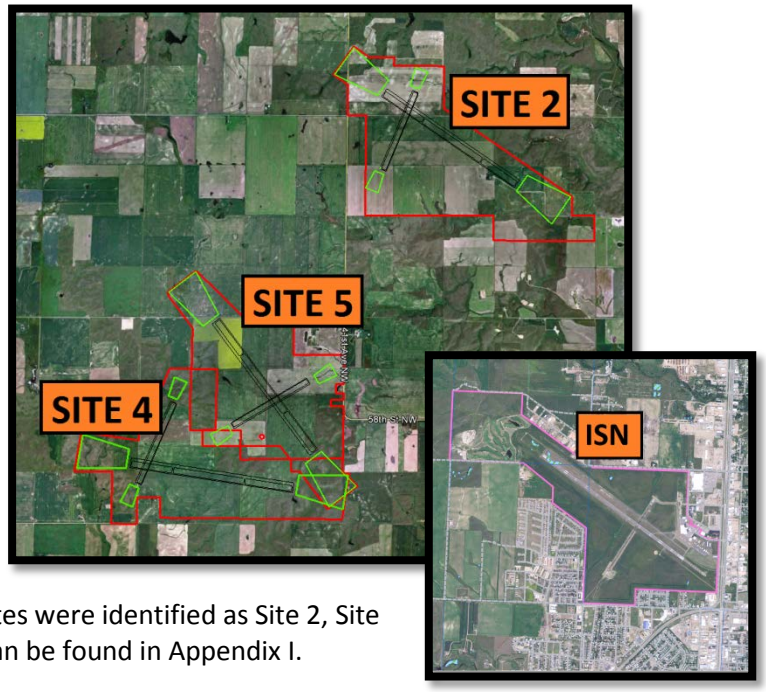
Aircraft strikes with birds and other wildlife are responsible for over $700 million in damage to the aviation industry each year in the United States. Of even greater concern is human safety. Since 1988, over 250 people have lost their lives due to bird strikes with aircraft. In the past, wildlife hazards were rarely considered when locating new airports. Most airports were placed in areas close to towns, wherever space was available. This was often close to municipal landfills, golf courses and wastewater treatment ponds, all of which are known to attract large birds hazardous to aircraft. While wildlife may not have posed a significant hazard to aircraft at these airports initially, it is a different story today. With the increases that have taken place in the aviation industry over the last several decades, along with the increases in wildlife populations, wildlife strikes to aircraft have become common. In the U.S., almost 11,000 strikes to civil aircraft were reported in 2012 alone. Airports are now expending considerable time and resources to mitigate these hazards. Today we have come to understand the importance of identifying the wildlife hazards associated with a site, before it is selected as an airport. This wildlife evaluation, to support the future location of Sloulin Field International Airport, will help to provide safe air travel in the Williston, North Dakota region for decades to come.

Wildlife activity at airports will vary considerably throughout a year. As seasons change, as migrations begin and end, as weather and habitats change, so does wildlife activity. The wildlife species present, their abundance and their habits are changing constantly. Therefore, to best understand all of the potential hazards that might possibly be associated with an airport, it is important to survey the habitats and wildlife activity through all seasons of the year. Since the objective of this study is to aid in the selection of a potential new airport location, the primary focus of this evaluation is to identify the habitats and wildlife species that pose the more significant threats to aviation. Other less critical issues such as suitable grass types for airports or controlling ground squirrels will not be considered in this evaluation, as they will be better addressed in a formal wildlife hazard assessment following the development of a new airport.

Spring and fall seasons usually have the most wildlife and migratory bird activity. Wildlife activity is usually suppressed during the summer due to nesting, an abundance of food, and the summer heat. The winter months in Williston usually involve harsh, cold conditions. Wetlands and rivers freeze over, the ground freezes, and heavy snows cover the land. While medium and large sized mammals will remain in the area, most migratory bird species leave the region completely. Winter birds will consist primarily of pheasants, grouse and a few hawks & owls. Pigeons and house sparrows may be present around residential areas. For purposes of this study, seven trips were made to the Williston area over a one year period. Each trip was timed to effectively and efficiently survey the wildlife at Williston during the different times of the year and in the different stages of the migratory seasons. Three trips were

conducted in the spring, one in the summer, and three in the fall. No surveys were conducted in the winter when wildlife activity was expected to be minimal. The surveys were timed to best identify the wildlife activity at critical times of the seasons. For example, the early spring survey took place on the cusp between winter and spring, when snow was still fairly abundant but beginning to melt, and while the large groups of migrating waterfowl still inhabited the area. The mid spring survey was conducted after the migrating birds had pushed through and focused more on what birds remained in the area to nest. The late spring survey was expected to identify the wetlands that remained after the spring runoff, and determine which wetlands were being used by hazardous birds through the rest of the year. The three fall surveys were conducted in a similar manner.

There were difficulties in data collection due to unexpected and abnormal weather conditions in the Williston area. The winter of 2011-2012, prior to the beginning of this study, was extremely mild and produced little snow. The spring of 2012 came several weeks early. With the lack of winter precipitation and a drought during the summer of 2012, most of the Williston area wetlands were either nonexistent or considerably reduced in size. Many of the remaining wetlands progressively dried up between the spring and the fall of 2012. However, the Williston winter of 2012-2013 was typical and produced considerable moisture. In the spring of 2013, most wetlands were at full capacity. Waterfowl activity was more abundant and widespread in 2013 as compared with 2012. Annual and seasonal variations in habitat conditions can and do influence wildlife activity tremendously. It should be understood that the habitat and related wildlife activity during the duration of this study was not typical for the Williston area. Therefore, the conclusions of this evaluation must take into account, the wildlife and environmental data collected, typical annual temperatures & precipitation, and wildlife life history & behavior as it relates to the various habitat types present.



A total of four proposed alternative airport sites were evaluated in this study. The first consisted of an expansion of the current airport site – Sloulin Field International Airport (ISN). Additionally, three relocation sites, located 7 to 8 miles northwest of Williston are being considered. These three sites were identified as Site 2, Site 4, and Site 5. Detailed maps of all four sites can be found in Appendix I.

II. METHODS

The methods of this study were designed to identify and evaluate the hazardous wildlife activity associated with each of the 4 alternative airport sites. While small birds and various sized mammals can create hazards for aircraft, those species are common on all airports and are best managed through exclusion or habitat manipulation once an airport is established. The primary focus of this study is to identify the features and habitats on and around each alternative airport site that attracts or influences the movement of large birds hazardous to aircraft. While large birds of prey (i.e. hawks & owls) do pose

a hazard to aircraft, they too are fairly common and will be present on any airport site. The primary birds of concern at airports, and for this evaluation, are the large bodied flocking birds, i.e. gulls, ducks, geese, cranes, etc. Since these birds are primarily associated with wetlands, identifying the wetlands on and around each site, and identifying the waterfowl activity associated with each site, is the main emphasis of this study.

As stated previously, seven visits were made to the Williston area during the year. Three were to sample the spring migratory period (early, mid and late). One sampled the summer activity, and three were to sample the fall migratory period (early, mid and late). This project began with the "late spring" visit in late April 2012.

A. Williston Area Visits:

Late Spring 2012 (April 23-27) - Due to the unseasonably mild winter of 2011 -2012, the Williston area received very minimal snow or other precipitation. Temperatures were above normal as well. These conditions continued into the spring. Therefore, many intermittent and semi-permanent wetlands in the area, that would typically hold water in the spring and summer, were dry or greatly reduced. Additionally, with fewer than normal area wetlands and above normal temperatures, the movement of spring migratory birds through the area had passed. Local waterfowl numbers are believed to have been greatly reduced due to the lack of water in the area wetlands. While these conditions were not the best for surveying late spring wildlife activity, it did provide dry roads that were easily accessible, which aided in the identification of area wetlands and setting up this yearlong study. At this early point in the study, KLJ had not yet received permission to access any private lands. Therefore, all observations were limited to what could be observed from roadways and section lines.

Summer 2012 (July 17-21) - The lack of rain and warm temperatures created ongoing drought conditions in the Williston area during the summer of 2012. During this summer visit, most wetland conditions were similar to that of the April 2012 visit. However, KLJ had secured permission to access some of the private lands, which allowed for improved observations and identification of wetlands and other habitats, not available in April.

Fall 2012 (Oct 1-4, Nov 5-8, Dec 5-7) - The lack of summer precipitation in the Williston area continued into fall. October water levels in most of the area wetlands were greatly reduced compared to July. Wetlands continued to diminish throughout the fall. During the December visit, area wetlands had begun to freeze over and most area waterfowl were limited to the open waters of the Missouri and Little Muddy Rivers.

Early & Mid Spring 2013 (Apr 22-25, May 8-11) - Following a long and snow filled winter, the Williston area wetlands began to open up in mid April 2013. During the early spring visit to Williston, most of the area wetlands were open. Many of the larger wetlands were still covered in part with ice and snow, while some of the low lying wetlands were still buried in snow. With the recent and ongoing snowmelt, it appeared that almost all area wetlands were filled to capacity. Access was difficult in some places due to a few snow drifts or roads too muddy to travel. However, migratory waterfowl (geese, ducks & sandhill cranes) were plentiful in the area.

The mid spring visit, which was made two and a half weeks after the early spring visit, was drier and allowed for good road access throughout the area. Most permanent and semi-permanent wetlands were completely free of ice and still full of water. A few of the shallow pothole type wetlands in the crop fields had diminished considerably. The large groups of migratory waterfowl had passed through the area. However, at least one or two pairs of ducks, and an occasional pair of geese, remained on most all of the area wetlands.

B. Survey Route

A survey route with 24 observation points was established (see Appendix II - Route Survey Observation Points). The route was designed to observe as much of the land associated with the 4 alternative sites as possible from the road. The survey was to be conducted in the morning and the evening on two consecutive days during each trip. When run, at least 5 minutes was spent at each survey point. Any notable wildlife activity or habitat information observed was noted. Also, any notable wildlife observed while traveling between points was recorded as well.

After the second visit to Williston (July 2012), subsequent route surveys were reduced to two surveys (one morning and one evening) per visit for the remainder of the study. While the habitat information gained from running the survey was valuable, it remained constant during the visit and additional surveys were not beneficial. Unexpectedly, notable wildlife activity observed during these surveys was very minimal. Wildlife activity on and around each site was better observed and surveyed during the wetland monitoring. Therefore, overall general wildlife observations were also incorporated into the surveys of the 60+ wetlands monitored in this study.

Portions of the 4 alternative sites that could not be observed from the road were surveyed by foot where possible. With the aid of binoculars, most areas could be accessed or viewed this way. However, due to a lack of permission, some areas could not be seen.

C. Wetland Identification/Waterfowl Monitoring

Wetlands are a magnet for wildlife. Virtually all of the large flocking birds that are a hazard for aircraft are associated with wetlands. Therefore it is critical to identify and monitor the wetlands associated with each of the 4 alternative airport sites. All wetlands are important. In some cases, small wetlands can be highly attractive to waterfowl, especially when associated with cropland, while sometimes larger wetlands may not be as attractive to birds. Types of wetlands are important, as they may dictate which types of waterfowl utilize them. Shallow marshy areas may attract large numbers of puddle ducks that feed on vegetation under the water. However, these shallow areas may not afford the protection from predators that geese and gulls seek out.

Wetlands located near an airport can attract waterfowl across a runway or through the runway approach/departure path. Attractive wetlands located a long distance from an airport can still pose a significant hazard. This is often the case when birds fly back and forth between two attractants. If the airport or aircraft flight path lies in the “travel corridor” that birds are using, it can pose a significant hazard. Therefore, all wetlands within at least 1 mile of the airport should

be looked at closely, and all major wetlands and attractants within 5 miles of a site should also be surveyed.

During each visit to the Williston area during the study, wetlands located near each alternative site were identified and monitored for waterfowl activity. In addition, the Little Muddy River was monitored as it has a considerable influence on gulls and waterfowl, especially gulls at the existing airport (ISN). Due to the drought conditions discussed above, many of the area wetlands were dry during the first 5 visits. During the last two spring visits, additional wetlands were present. These were identified, and monitored. While not every wetland near the study sites were identified, they should be a good representation of what was there, and every wetland that might pose a significant hazard concern was identified in this study.

D. General Observations

During all visits, while conducting survey routes, monitoring wetlands or traveling in the area, any hazardous wildlife activity observed was noted. This provided key information, including the identification of the wetlands and the patterns used by migrating waterfowl while in the area.

E. General Zone Attractants

With the use of aerial maps, and searching the area by vehicle, an attempt was made to identify all major attractants in the Williston area that could affect hazards at the 4 alternative sites. Main attractants of the area that were monitored were the landfill, Little Muddy River, Missouri River, Golf course, and the City of Williston.

III. RESULTS/DISCUSSION/RECOMMENDATIONS

A. Habitat. The main habitats associated with the proposed relocation sites are: cropland, grassland/pasture, wetlands, and to some extent, trees. Other habitats include structures such as roads, houses and oil related facilities. These structures did not appear to contribute to any wildlife hazard issues associated with the proposed new sites.

a) Cropland – Wheat appeared to be the predominate crop grown in the Williams County area. All three of the proposed relocation sites had crop land to varying degrees. Crops in the Williston area attracted ducks and geese for feeding during both the spring and the fall migratory seasons. While waterfowl were not observed feeding in cropland on any of the study sites, they were observed feeding in similar cropland adjacent to each site. The crop areas that attracted waterfowl were always associated with potholes or temporary standing water within the field. Since airport vegetation recommendations do not advise that crops be grown on airfields, vegetation on any new airport site should be converted to grass, and maintained at a height that

does not attract gulls and waterfowl. This should eliminate any issue with cropland being an attractant, regardless of which site is selected as a new airport site.

However, cropland adjacent to an airfield can pose hazards when large birds utilize them for feeding or loafing. In most situations, as long as wetlands are not associated with the cropland, issues in the Williston area should be relatively minor.

b) Grasslands/Pasture – Except for an occasional hawk, grassland areas in the Williston area did not appear to attract any hazardous bird species. Ducks did use the creeks and wetlands that were present in, or flowed through these prairie habitats, but they were mainly attracted by the wetlands present, or a combination thereof. Most of the grasslands associated with the study sites were being grazed. Eliminating grazing and maintaining recommended grass heights on an airport site, will help to keep grass habitats free of hazardous birds.

c) Trees – In general, trees were relatively sparse on the relocation sites. Most trees were associated with wetlands, adjacent buildings or the occasional tree belt. Trees on airports provide attractive perches for birds of prey, or provide nesting, loafing and roosting areas for various other birds. Removal of all trees from any airport site is recommended and will help to keep wildlife hazards to a minimum.

d) Wetlands – In the somewhat arid, short to mid-grass environment of the Williston area, wetlands are the single most influential attractant for hazardous bird species. Except for numerous, low pothole type areas that hold standing water temporarily, the Williston area had relatively few natural wetlands. Most wetlands on and around the four study sites consisted of lakes or ponds created by dams on the various drainages. Over sixty different wetland impoundments were identified and monitored on and around the 4 alternative airport sites during the course of this study. Appendix III contains the maps and corresponding data collected from the wetlands, or groups of wetlands, that were identified on or near the 4 sites. The table in Appendix III gives a description of each wetland, including the waterfowl activity observed on the wetland, discussion or comments about the wetland, and the expected hazard influence it has on each alternative airport site. The table also indicates which seasons the wetland contained water during the study. The weakest part of this study is the unforeseen drought conditions and lack of water that took place during the study year. When

wetlands are dry, they do not attract waterfowl. This was considered in the discussion part of Appendix III when describing the hazard influence each wetland may have in a typical year.

In addition to the wetland impoundments, there were several creeks and drainages that contained water during most of the study. Along most of these drainages, there were several pockets or pools of standing water that were attractive to ducks. During the summer and fall of 2012, when the drought caused the flow of water in these drainages to cease, these creeks still maintained pools of open water that was utilized by ducks. However, during the spring of 2013, these creeks had good water flow, which in many cases caused small flooding in fields, and further attracted ducks.

There is one potential wetland hazard issue, while not located on any of the three proposed relocation sites that appears to cause a hazardous situation for all three of them. This involves **Wetlands Nos. 17 & 18** (Appendix III). Located about 2 miles north of Site 5 and 3 miles west of Site 2, **Wetland No. 17** is a 14 acre weedy marsh area that contained water in the spring of 2013, when migratory waterfowl were abundant in the area. The melting snow caused much of the adjacent crop land to flood as well, greatly expanding this wetland area. Additional crop lands to the south were flooded too (**Wetland No. 18**), creating a large abundant wetland flat. This area was the primary congregating area for waterfowl during the early spring. It contained about 200 sandhill cranes, 200 ducks, and 600 to 800 Canada geese at any one time. Geese, in groups of 10 to 300 could be seen flying in various directions, to or from this location on a regular basis, creating what could be a potentially hazardous situation for planes approaching or departing any one of the three relocation sites. During the mid-spring visit two weeks later, the migratory geese and cranes had moved on, and the ducks had either migrated on or dispersed to smaller wetlands around the vicinity. These wetlands were also diminished, consisting of an area less than a quarter of what they originally were. While this could be a highly hazardous issue for each of the sites, it is also one that should be fairly short lived each year. It is something to be aware of so that precautions can be taken.

Canada geese will avoid areas where they have movement above their heads. Flagging, mylar ribbon, and helium balloons are a few of the many tools that have been used effectively to keep geese out of crop and wetland areas. If a new airport is located at

one of the three proposed relocation sites, these methods would be an effective way to make these wetlands less attractive to geese, and cause them to concentrate in another area.

Further information on how wetlands may influence hazards at the alternative airport sites is discussed in Section C - Site Specific Evaluations below.

B. WILDLIFE

The main wildlife interest in this evaluation is with flocking birds and large bodied birds that pose the greatest hazards to aircraft. Gulls, ducks, geese and pelicans are all large bodied flocking birds common to the Williston area that are a particular hazard concern for airports. These birds are typically influenced by wetland habitats on or adjacent to an airport. Hawks and other birds of prey, while more solitary pose threats as well. They are typically influenced by the specific habitat on the airfield and the prey species present. Their threat to aircraft can be more easily influenced by how the airport manages their existing habitat. Similarly, small flocking birds can be a hazard as well. Flocks of starlings and blackbirds have caused catastrophic damage to aircraft. These species will mostly be influenced by the trees and other vegetation on or adjacent to the airfield. Therefore while trees and vegetation on a proposed site will influence wildlife activity, most of it can be best managed after the airport is in place. However, the concerns of wetlands on and off an airport, that influence the movements of the large hazardous flocking birds, is the primary focus of evaluating potential airport sites.

Deer, rodents, rabbits, coyotes, etc. are all common mammals of the Williston area that will be present on any airport site. All mammals, regardless of size, can pose a threat to aircraft. However, mammal activity on the airfield is largely influenced by how an established airport manages its habitat. Therefore, current mammal activity should not influence the selection of a future airport site.

a) <u>Ducks</u> - Ducks remain in the Williston area throughout the year, as long as there is open water for them to utilize. With the 2013 spring melt, and as the snow line receded, some of the larger migratory groups of ducks moved into the Williston area. While some ducks continued migrating north as the weather allowed, many ducks remained in the area. While many of these remaining ducks were still congregated in small groups in mid-spring, most were paired up and seeking out small wetlands to nest. In the spring months of both 2012 & 2013, virtually every small wetland, pothole, road ditch, etc. that held water, contained at least one or two pairs of ducks. While many of these areas dried up and forced those ducks to move on, ducks attempted to utilize all suitable wetlands available.

In 2012, as the drought continued into the fall, few ducks were seen in October, before the fall migration was underway. However, as the migratory birds passed through in November, there was a small influx of ducks. It is likely that more ducks would have

been present in the Williston area, if more wetlands still contained water. The bottom line is: if the water is present, so will the ducks. In normal years, it should be expected that almost all of the identified wetlands are likely to hold ducks.

As expected, duck numbers in the Williston area appear to be proportional to the wetland habitat available. However, the wetland habitat available for ducks, aside from the major rivers of the area, is relatively small compared to the more eastern prairie pothole areas of North Dakota. In rare cases does any section of land, contain more than two or three significant wetlands. Most wetlands in the Williston area are small and generally do not contain more than one or two pairs of ducks. The larger, permanent wetlands and the flooded lands in the spring are the exception. Additionally, ducks spend most of their time feeding, nesting, and loafing, with relatively little time spent in the air. Therefore overall, duck hazards to aircraft on all of these sites, is relatively low. However, ducks pose the greatest threat to aircraft on all of the relocation study sites through most months of the year (spring goose activity is the exception). Significant hazards associated with ducks on the three relocation sites will be in situations where wetlands are located near runways or aircraft flight paths. Appendix III and Section C. Site Specific Evaluations below, address the duck hazards associated with each site more specifically.

b) Geese – Because of their large size and flocking characteristics, Canada geese are one of the most hazardous birds to aircraft. Several thousand Canada geese use the Williston area during the spring and fall migratory seasons. Very few remain in the area to nest. In the spring of 2013 several hundred geese, possibly more than 1000 were using the croplands and wetlands in the vicinity of the 3 relocation sites. While none were ever seen feeding on any of the sites, flocks were commonly seen flying over and around the sites, and geese were feeding in croplands adjacent to the sites. Geese remained in the area for a brief period of a few weeks until weather conditions allowed them to continue their northern migration. This is expected to be their annual routine.

In the fall, geese appear to pass through the Williston area fairly quickly. With little to slow them down, groups may not remain in the area for very long. They may spend a few days in the area to feed on area crop land and rest with the protection of the Missouri River, but will quickly continue their southward migration. However, different groups of geese will pass through the Williston area at different times, so migrating geese may be seen continually in the area over a several week period. They will likely be feeding in croplands throughout the area. For fall migrating geese, there will be little an airport can do to avoid these hazards.

c) Cranes – Sandhill cranes were observed in the Williston area in both the spring and the fall. They were not observed on any of the proposed

airport sites. Their migration through the area is likely to be very brief each year and is unlikely to be a significant hazard for any of the proposed airport sites.

d) Gulls – Gulls are another large flocking bird that is responsible for a large number of damaging aircraft strikes. Gulls are attracted to airport runways as a favored spot to loaf, warm themselves on a cool morning, or feed on worms after a rain. Gulls were observed on occasion using wetlands near the relocation sites. However, their numbers were minimal, rarely involving more than one or two individuals.

At ISN, the current airport site, gulls continue to create a highly hazardous situation for aircraft. Gulls migrate into the Williston area in very early spring and remain until late fall. They were present during all of the study visits to Williston except for the December 2012 visit, when the area wetlands were frozen over. When present, gulls feed at the Williston landfill throughout the day. Their typical routine is to move back and forth from the landfill to the Little Muddy River, passing through aircraft flight paths continually. Some gulls will venture into town and feed in dumpsters and parking lots, or loaf on the airport runways. In the evening, they typically move southwest to the Missouri River area.

It is unknown if the creation of a new airport at one of the proposed relocation sites would cause gulls to venture 10-12 miles from the landfill to utilize the new site. It is probably not likely, but gulls have been known to routinely travel much greater distances to feed.

e) Hawks – On several occasions northern harriers were seen on or near the 4 alternative sites, especially in the spring. Harriers are typically ground nesters and a common species of the grasslands. They feed mainly on small rodents and will likely be present wherever an airport is located. Keeping rodent numbers to a minimum will be the best method of reducing hazards caused by harriers. The presence of harriers during the study should not influence the selection of a future airport site.

It is also expected that other birds of prey likely use these sites. Swainson's hawks, rough-legged hawks, ferruginous hawks and golden eagles are but a few of the other large birds of prey that will potentially use these airport sites. Since these species often hunt for rabbits and small rodents while perched on a high structure, it is advisable to remove all trees from any airfield.

f) Other Birds - Small flocking birds can be a hazard as well. Large flocks of starlings, blackbirds or shorebirds can cause catastrophic damage to aircraft. While some very small groups of starlings were seen during the study, they are unlikely to be present in the Williston area in the size & numbers, to present a concern at airports.

Smaller birds such as meadow larks and mourning doves are common in the area and sometimes will be grouped up and pose a hazard to aircraft. Their hazards are best managed by habitat manipulation on an airfield.

g) Small and Medium Sized Mammals – Small mammals such as rabbits and rodents may not pose a direct hazard to aircraft, however, they can attract larger predator species such as hawks, coyotes, fox, etc. that do pose a threat. Medium sized mammals, such as coyotes and fox were observed during the surveys and will be present on any airport site that is selected. Keeping these species to a minimum will be best addressed through vegetation management, exclusion, and/or direct control, once an airport is in place or under construction.

h) Deer – Deer are considered the most hazardous species to aircraft. The Williston area did not appear to have a strong deer population, although deer or deer sign was observed on all of the relocation sites. Regardless, deer are widespread and will utilize any airport site that is selected. All airports should have a deer proof perimeter fence installed to eliminate the hazard they pose.

i) Eagles – While bald and golden eagles were not observed during the study, just prior to the last study visit to the Williston area, KLJ indicated that the US Fish and Wildlife Service had requested that an eagle survey be conducted on the relocation sites prior to May 15th, before leaf-out so that nests are visible. On May 9th & 10th 2013, MWS conducted a ground survey for eagle nests in the vicinity of the three relocation sites, including the areas on, and within one mile of each site.

Surveys were conducted from the road, or where necessary, on foot. Most of the survey area was fairly open, allowing for very good visibility of up to two or three miles or more. In general, there were relatively few trees, which were usually associated with small stock dams. With the aid of 10X binoculars, it is believed that all areas within a 1 mile perimeter of the sites were surveyed. No eagles or eagle nests were found. While better habitat may lie several miles away on larger wetlands or along the Missouri and

Little Muddy Rivers, the area around the study sites did not appear to be attractive eagle habitat. The area contained very few trees of the type and height that bald eagles are typically known to nest in, and it is doubtful that any of the area stock dams held fish. Additionally, there were no steep cliffs or forested areas that were suitable for golden eagle nesting. MWS is confident that eagles were not nesting in the study areas during the time of the survey and does not believe that eagle nesting should an issue for the City of Williston when locating an airport.

Table 1. Notable Species In The Williston Area Observed During The Evaluation.

Ducks:	Other Birds:		Mammals:
Blue-winged teal	*American crow*	*Ring-necked pheasant*	*Badger*
Canvasback	*American White Pelican*	*Rough-legged hawk*	*Coyote*
Lesser scaup	*Canada Goose*	*Sandhill Crane*	*Deer*
Mallard	European starling	*Swainson's hawk*	*Red fox*
Northern Shoveler	*Herring gull*	*Turkey Vulture*	*White-tailed Jackrabbit*
Northern Pintail	*Mourning dove*		
Redhead	*Northern harrier*		
Wood Duck	*Ring-billed gull*		

C. Site Specific Evaluations

The potential issues and hazards that were identified with each of the four alternative study sites are discussed in detail below. The hazards and recommendations made in this section are further reviewed in a table in the following section. As a foreword to this section, it should be noted that in general, all three of the relocation sites had relatively few hazard issues. As with most airports, the main hazard issues were related to wetlands. Ducks proved to be the primary species of concern in the area. For a short duration in the spring, geese posed hazards as well. While these hazards are very real, they are also relative. When compared to the hazards associated with airports located in other areas, these hazards, in many cases, may appear relatively minor. Williston is at an advantage in having airport choices that do not involve EXTREME hazards.

Site 2

Site 2 is located 8 miles north of Williston, about 5 miles west of the Little Muddy River and 2 miles south of Cow Creek. It currently consists almost completely of cropland, with some small parcels of grassland or pasture. The site itself has relatively few features that might pose a wildlife threat. See detailed Map of Site 2 in Appendix I - Site Maps.

Onsite Issues

a) A home site with trees is located along the south side of the proposed main runway. A few trees are also located in a north-south row 200+ yards west of the crosswind runway. All onsite trees and buildings should be removed so that they do not become a wildlife attractant.

b) A small drainage passes through the west RPZ of the main runway, which contain several small potholes (Identified as **Wetland No. 5** in Appendix III). While the drainage does not appear to maintain an open water flow, these small potholes hold water, are aligned with the runway and could attract an incidental pair of ducks on occasion. However, they are about 500 yards from the end of the runaway, and present a very low hazard concern. If the City of Williston does have control of this land, it would be best to eliminate the potholes by allowing the drainage to flow freely.

c) Approximately 300 feet west of the runway intersections, some small drainages converge along 61st street. This drainage then continues to flow east along the road, through the runway intersection for about a half mile before it drains to the north. Two wetlands (**Nos. 10 & 11**), are little more than water filled road ditches for part of the year. While they attract a few ducks in spring and early summer, their close proximity to the runways warrant their elimination.

d) Some small potholes (**Wetland No. 24**) are aligned with, and to the southeast of the main runway. These potholes are small and hold water briefly in the spring. They no longer contained standing water by the mid spring visit in 2013. Located more than a half mile from the main runway, they should not present any significant hazard for aircraft.

Offsite Issues

a) The north-south tree belt located just off of airport property west of the crosswind runway has a very small potential for attracting hawks or smaller birds (i.e. doves, blackbirds) for nesting or roosting. Since large groups of flocking birds were not seen in the area during the study, and the trees are approximately 400 yards from the runway at its closest point. This hazard concern is very small. Removal of the trees would eliminate any hazard potential they might pose.

b) At least 4 home sites, several oil wells and the UB Services facility all lay between a half mile and a mile of this site. None of these features appeared to influence hazardous wildlife that would impact Site 2.

c) Wetland **No. 4** is a permanent 4 acre lake located approximately 500 yards from both runways on Site 2. This wetland routinely had a moderate to high number of ducks on it, except in October. Two pair of geese appeared to be attempting to nest on this wetland in the spring of 2013. Four gulls were also noted on this lake during the summer. Due to the consistent waterfowl activity on this lake, and its proximity to the Site 2 runways, this lake could pose a moderate level of hazard for aircraft. Its removal would be required to eliminate the potential hazard it poses.

d) Three wetlands (**No. 2**, **No. 19** & **No. 20**), and possibly **No. 3**, could also pose hazards for aircraft at Site 2. All of these wetlands are larger bodies of water that attract waterfowl. They all are relatively close to the flight paths of planes using these runways. However, they are all at least 3200 feet from any runway surface. Considering the relatively low waterfowl numbers in the area and the fact that these wetlands are a substantial distance from the proposed runways, they not likely to pose more than a small hazard to aircraft. Their removal would be the only way to eliminate the potential hazard they would pose.

e) The group of wetlands identified as **Wetland Nos. 17 & 18** and discussed in the Habitat section above are located about 1 ½ miles southwest of the crosswind runway end and 2 miles southwest of the main runway. While spring migrating waterfowl create a hazard throughout the area, their numbers and movements will be more concentrated in this area, which will create a higher level of hazards for aircraft using these runways, at least for a brief period each spring. Flagging, mylar tape and other tools could be utilized to effectively stop geese from concentrating in this area.

f) Several other wetlands were identified in the Site 2 vicinity. While all of them attract waterfowl and have the potential to influence hazards at this site, they are either small and do not attract waterfowl in large numbers or they are located at such a distance that their hazard influence on Site 2 is fairly negligible. Additional information on these wetlands is noted in the table in Appendix III.

Site 4

Location - Site 4 is located about 7 miles northwest of Williston and about 7 miles west of the Little Muddy River. It appears to consist of about 60% crop land and 40% pasture/grassland. Other than wetland issues, the site itself does not have any structures or other features that might pose a wildlife threat. See detailed Map of Site 4 in Appendix I - Site Maps.

Onsite Issues

a) One stock pond, **Wetland No. 45** is located right on the east end of the main runway taxiway. This was a small, .15 acre pond that did not contain water during the summer and fall of 2012. In the spring of 2013 it was full of water and attracted a dozen ducks of various species (mallard, canvasback, scaup & teal). In a typical year, it is unknown how long water will remain in this reservoir. However, considering its extreme close proximity to the runway, it will likely pose a high hazard to aircraft for at least part of the year. If Site 4 is selected as a new airport site, this stock pond should be eliminated.

b) Eastside drainage – Along the east end of the Site 4 airport layout, flowing out of **Wetland No. 46** and through the RPZ is a drainage that meanders through the low grassland valley. This drainage lies within a few hundred feet of the main runway end. In the spring of 2013, when this drainage contained a substantial flow, it supported several small ponds and potholes along its way. A few pairs of ducks utilized these

wetlands. While this drainage was dry during the summer and fall of 2012 due to the drought conditions, it is uncertain if this drainage attracts ducks in just spring, or throughout the summer. Regardless, as long as ducks use this drainage for part of the year, just a few hundred feet from the end of the runway, they will pose at least a small hazard. Modifying this drainage to eliminate small ponds and potholes along its course would aid in reducing the attractiveness of this drainage.

c) Westside Drainage – Starting from the north, and flowing through **Wetland Nos. 29**, **38**, **43**, & **48** is a substantial drainage along the west side of Site 4. Additionally, a fork of this drainage flows from **Wetland No. 36** and merges just above **Wetland No. 43**. This drainage flows through part of the airfield, clipping the north corner of the crosswind runway and flowing through the RPZ on the west end. This drainage was flowing at a trickle during the spring and summer of 2012. In the fall, water flow had ceased completely. However, throughout the year, the creek contained pools of water which did hold a few ducks. This drainage was flowing at high speed in early spring 2013, with a fairly good flow still during the mid-spring. With the heavy flow, some areas of the creek spread out into the adjacent cropland creating small pools. Due to the numerous pools and potholes along its course, several ducks were attracted to this drainage. This drainage near the north end of the crosswind runway may create a small hazard, for at least the spring months. This drainage again passes less than 500 yards from the end of the main runway, as it flows through the RPZ on the west end. It will probably create a low hazard throughout most months of the year. Eliminating potholes or re-routing this drainage to outside of both RPZ's would minimize its hazard influence. However, that is likely not logistically or economically possible.

<u>Offsite Issues</u>

a) Some farm buildings and trees are located about 400 yards southeast of the south end of the crosswind runway. The trees are a minor attractant to perching birds and could have a very small influence on attracting birds into the path of aircraft. If possible, the removal of the trees would eliminate this minor issue. Additionally, a farm house is located approximately 3000 feet southwest of the south end of the crosswind runway. Considering its distance from the runway, it likely does not pose a threat to aircraft safety.

b) **Wetland No. 40** is a stock pond located about 1000 yards northeast of the north end of the crosswind runway. It is a small, .2 acre pond that held water year round and

attracted 6 to 8 ducks through all seasons. While it does not attract a high level of waterfowl, and is more than a half mile from the runway, it is somewhat close to the aircraft approach path for the crosswind runway. The overall hazard that it would pose to aircraft using this site is very low. Its removal would eliminate it as a hazard concern.

c) Wetland **No. 44** consists of two large low areas in a crop field just 300 yards south of the crosswind runway. These were totally dry during 2012 but were filled during the visit in early spring 2013. Several ducks were using these wetlands at that time. However, two weeks later, they were almost completely dry. These wetlands will likely pose a moderate hazard at Site 4 for a very brief period (2-3 weeks) each spring. Removal of these wetlands would eliminate the hazard they pose. Issuing NOTAMs during the brief period when they are full of water would be advisable.

d) **Wetland No. 37** is a permanent wetland that held water throughout the study. It contained from 4 – 12 ducks during every visit during the study. Located 550 yards from the crosswind runway, it poses a very small hazard concern. Removing this stock dam and allowing the area to drain naturally would eliminate any hazard it poses.

e) The Westside Drainage, including **Wetland Nos. 38 &** 43, as discussed above, flows from the north of Site 4, along its west side, and continues in a southeast direction. Aircraft using either end of the crosswind runway or the west end of the main runway will cross this drainage. **Wetland Nos. 38**, **43** & **48** are all located along this drainage. However, this drainage is often an open waterway, and has many small impoundments along its entire course. Ducks were commonly seen flying into and out of this drainage during the study. Overall, considering the number of ducks using the area, and the distance that most of the drainage lies from the site, the drainage does pose a small hazard. Little can probably be done to eliminate this hazard. Removal of pools and potholes along the course of this drainage will make it less attractive to waterfowl.

f) The group of wetlands identified as **Wetland Nos. 17 & 18** and discussed in the Habitat section above are located about 1 ½ to 2 miles directly north of the crosswind runway end. While spring migrating waterfowl create a hazard throughout the area, their numbers and movements will be more concentrated in this area, which will create a higher level of hazards for aircraft using the crosswind runway, for this brief period each spring. Flagging, mylar tape and other tools could be utilized to effectively stop geese from concentrating in this area.

g) Several other wetlands were identified in the Site 4 vicinity. While all of them attract waterfowl and have the potential to influence hazards at this site, they are either small and do not attract waterfowl in large numbers or they are located at such a distance that their hazard influence on Site 4 is fairly negligible. Additional information on these wetlands is noted in the table in Appendix III.

Site 5

Location - Site 4 is located about 7 miles northwest of Williston and about 7 miles west of the Little Muddy River. It appears to consist of about 70% crop land and 30% pasture/grassland. Other than wetland issues, the site itself does not have any structures or other features that might pose a wildlife threat. See detailed Map of Site 5 in Appendix I - Site Maps.

Onsite Issues.

a) One stock pond, **Wetland No. 40** is located about 350 yards west of the main runway and 700 yards north of the crosswind runway. This is a small, .2 acre pond that held water year round and attracted 6 to 8 ducks through all seasons. Since ducks will likely cross the runway as they fly to and from this wetland, it will pose an increased hazard potential for Site 5. Considering that wetland is an attractant on the airfield, and relatively close to the main runway, it should be removed.

b) From aerial maps, on land owned by Harriet Jensen that KLJ did not have permission to trespass on, appears to be a small pothole wetland approximately 400 yards north of the intersection of the two runways on Site 5 (not labeled on the maps in this report). This wetland likely attracts occasional waterfowl and would create moderate hazard on the airfield. It is recommended that it be eliminated.

c) **Wetland No. 34** is a small dugout pond very close to **Wetland No. 35**, which is a low marshy area at the corner in a roadway. Both wetlands are, at least in part, within the airport boundaries. While they both are attractive to small numbers of ducks, they are located almost a half mile from any runway surface and not near a runway approach. Therefore, it is doubtful that either wetland will be a significant hazard threat.

d) Eastside Drainage – On Site 5, this drainage is located on the southeast side, flowing out of **Wetland No. 46** and meandering southwest through the RPZ of the main runway. This drainage lies within 300 yards of the runway end. As discussed above for Site 4, in the spring of 2013, when this drainage contained a substantial flow, it supported several small ponds and potholes along its way. A few pairs of ducks utilized these wetlands. While overall, duck numbers in the area were relatively low, any duck activity in the RPZ is a potential hazard. Modifying this drainage to eliminate small ponds and potholes along its course would aid in reducing the attractiveness of this drainage.

e) Westside Drainage – This drainage, the same as discussed above for Site 4, passes through part of the northern RPZ for the main runway on Site 5. **Wetland No. 29** is one of several pools and potholes along this drainage that exist through most of the year. Small numbers of ducks use the open water and potholes along this drainage. Since this drainage comes within 350 yards of the runway and lies in the RPZ, it creates a small hazard. **Wetland No. 29** lies right on the RPZ perimeter border. While this wetland likely attracts ducks to the area, it is not any more likely to attract ducks as compared with all of the many other ponds and potholes along this drainage. The elimination of any of the pools or potholes along this drainage will help to reduce potential hazards to aircraft.

Offsite Issues

a) Two houses with trees are located just outside of the airfield. One home is 500 yards east of the crosswind runway while the other is 800 yards north. Tree belts associated with these homes have a small potential for attracting hawks or smaller birds (i.e. doves, blackbirds) for nesting or roosting. While the trees to the north are farther from the airfield and unlikely to pose a hazard, the trees to the east are closer and only 200 yards from the RPZ. This closer distance to the aircraft flight paths could cause a small hazard potential. Removal of these trees would eliminate any possible hazard threat.

b) Wetland **Nos. 45 & 46** are located .5 and .4 miles respectively, from the end of the main runway. While they have the potential to pose a hazard at this site, especially if waterfowl move back and forth through the flight paths of planes, their small size, relatively low use by waterfowl, and distance from the runway make them a fairly small hazard risk. Removal will eliminate any hazard these wetlands may pose.

c) The group of wetlands identified as **Wetland Nos. 17 & 18** and discussed in the Habitat section above are located about one mile north of the main runway end. While spring migrating waterfowl create a hazard throughout the area, their numbers and movements will be more concentrated in this area, which will create a higher level of hazards for aircraft using the main runway, for a brief period each spring. Flagging, mylar tape and other tools could be utilized to effectively stop geese from concentrating in this area.

d) Several other wetlands were identified in the Site 4 vicinity. While all of them attract waterfowl and have the potential to influence hazards at this site, they are either small and do not attract waterfowl in large numbers or they are located at such a distance that their hazard influence on Site 4 is fairly negligible. Additional information on these wetlands is noted in the table in Appendix III.

Site ISN

The current ISN airfield is located on the north side of the city of Williston. It is about 4 miles north of the main channel of the Missouri River and 1 ½ miles west of the Little Muddy River. A yearlong wildlife hazard assessment was completed at ISN in 2007; therefore, one of the main objectives in evaluating the ISN alternative was to further look at those attractants that were identified in 2007, i.e. primarily the Little Muddy River and the landfill. Additionally, since one of the proposed alternatives is to expand the current airfield and RPZ to the west, which would include the golf course and grasslands in that direction, those habitats were surveyed as well. See detailed Map of Site ISN in Appendix I - Site Maps.

Offsite Issues

a) The Landfill and the Little Muddy River continue to influence gull activity on and near the current ISN airfield. Discussed in more detail above in the Wildlife Section, gulls fly

back and forth from the landfill and the Little Muddy throughout the day, spring to fall, flying directly through the flight path of aircraft approaching or departing from the east end of the main runway. Gulls are, at least occasionally, attracted to the ISN airfield where they loaf on runways or short grass. Gull activity at the landfill continues to create a very high hazard for aircraft using ISN. An effective gull control program implemented at the landfill to prevent gulls from feeding will help to eliminate this hazard.

b) Land to the west of the golf course and the current airfield is primarily grassland with no noticeable wetlands. It did not appear to present any hazard issues or concerns for the Site ISN expansion alternative.

c) The golf course wetlands (**Wetland Nos. 56 & 57**) are located about 500 yards off the west end of the main runway. They are not necessarily filled with water year round. In the early spring of 2013, during the time when the migratory push of waterfowl were in the area, **Wetland No. 56** was empty and **Wetland No. 57** was covered with snow. In mid-spring, **Wetland No. 57** had a pair of ducks using it while **Wetland No. 56** was beginning to be filled. Both wetlands attract one or two pairs of ducks through the summer, and sometimes an occasional goose, according to golf course personnel. Although waterfowl activity on these ponds is not high, they are located close to the main ISN runway end and pose a small hazard risk.

d) The group of wetlands identified as **Wetland No. 58**, along with **Wetland No. 59** is located to the southwest of the golf course property. These wetlands consist of a few small potholes and a small stock dam that attract one or two pairs of ducks. Located 300+ yards from the main runway end, they do not appear to pose any significant hazard risk to aircraft.

e) The Little Muddy River (**Wetland No. 60**) attracts ducks and geese in variable numbers throughout most of the year. Typically, waterfowl on the little muddy are in small groups or pairs. Located more than a mile from ISN, waterfowl activity on the Little Muddy does not appear to be a significant hazard concern for ISN.

D. Review of the Site Specific Evaluations

For comparison purposes, the hazards associated with each of the four alternative sites discussed above, are presented in the table below. Hazard levels are categorized as High, Moderate and Low. A hazard level of “High” indicates that the hazard has a relatively high likelihood of contributing to a damaging strike with aircraft. These types of hazards should be considered unacceptable and the hazard should be removed if the site is to be used for an airport. A hazard level of “Moderate” in the chart below indicates that hazard may have either a high likelihood of causing a damaging strike, but for a very short duration, or may contribute to the possibility of a damaging strike at a level much lower than that of a high hazard. An airport should make all reasonable efforts to remove a moderate hazard. While funding, logistics and environmental regulations may make this difficult or impossible to accomplish, an airport should be aware of all moderate hazards, and continually work towards their eventual elimination. A moderate hazard should not necessarily prevent an airport from being constructed. A hazard

that has been given a "Low" hazard designation is a hazard that while small, does influence hazardous wildlife on or near the site. Airports should be aware of all hazards associated with their airport, regardless of magnitude or ability to correct it. Low hazards should be addressed whenever they can be. Any hazard that exists, that cannot be corrected, may require that a Notice to Airmen (NOTAM) be issued.

Table 2. Review of Site Hazards & Recommendations.

Hazard	Hazard Level			Recommended Action to Address Hazard
	High	Mod.	Low	
Site 2				
House/Trees Along Runway - Onsite	X			Remove Buildings and Trees
N-S Tree Belt - Onsite		X		Remove Trees
Wetland #5 in RPZ - Onsite			X	Remove / Restore Drainage
Wetlands #10 & #11- Onsite			X	Remove Wetlands
N-S Tree Belt – Offsite			X	Remove Trees
Wetland #4 - Offsite		X		Remove / Restore Drainage
Wetlands #2, #19, #20, #3 - Offsite			X	Remove / Restore Drainage
Site 4				
Wetland #45 – Onsite	X			Remove / Restore Drainage
Eastside Drainage – Onsite			X	Modify/ Eliminate Pools & Potholes
Westside Drainage – Onsite			X	Modify/Reroute
Trees SE of CW Runway – Offsite			X	Remove Trees
Wetland #40 – Offsite			X	Remove / Restore Drainage
Wetland #44 – Offsite			X	Remove/Issue NOTAM's
Wetland #37 – Offsite			X	Remove / Restore Drainage
Westside Drainage – Offsite			X	Modify/ Eliminate Pools & Potholes
Site 5				
Wetland 40 – Onsite	X			Remove / Restore Drainage
Harriet Jensen Pothole - Onsite		X		Remove
Eastside Drainage – Onsite			X	Modify/ Eliminate Pools & Potholes
Wetland #29 & Westside Drainage – Onsite			X	Modify/ Eliminate Pools & Potholes
Trees E of CW Runway -Offsite			X	Remove Trees
Wetlands #45 & #46 - Offsite			X	Remove / Restore Drainage
Site ISN				
Landfill - Offsite	X			Eliminate Gull Activity
Wetlands #56 & #57 - Offsite			X	Remove
All Sites				
Wetlands #17 & #18 - Offsite		X		Employ Frightening Devices

IV. CONCLUSION

While unforeseen weather issues and problems with site access were some of the difficulties experienced during this evaluation, MWS believes that this study adequately and effectively identified the hazards associated with the four alternative airport sites.

Clearly, wetlands and waterfowl proved to be the main wildlife hazard issues associated with the relocation sites. While drainages and low areas contained water naturally, almost all wetland impoundments associated with the study sites were man made. With the lack of local wetlands, birds and wildlife are drawn to the relatively few available sources of water. Virtually all wetlands that held water attracted waterfowl. Therefore, any wetlands on an airport site will likewise, attract waterfowl. Keeping airport environments free of wetlands will be the key to minimizing hazards at these sites.

Offsite wetlands, those wetlands located adjacent to the airport relocation sites, which the City of Williston does not have control of, may prove to be the greatest hazard threat for these sites over the long term. The No. 17 & 18 wetlands that were identified as a congregating area for spring migrating waterfowl, may be a significant, annual, short term hazard that the city is unable to address.

Sloulin Field International Airport (Site ISN) continues to have hazard issues related to gull feeding at the landfill. This issue is by far, the single most hazardous issue observed during the evaluation study. The gull attraction to the landfill needs to be controlled. While the golf course ponds still provide a small threat to the current ISN site, an expansion of ISN to the west is not expected to have any new wildlife hazard issues to contend with.

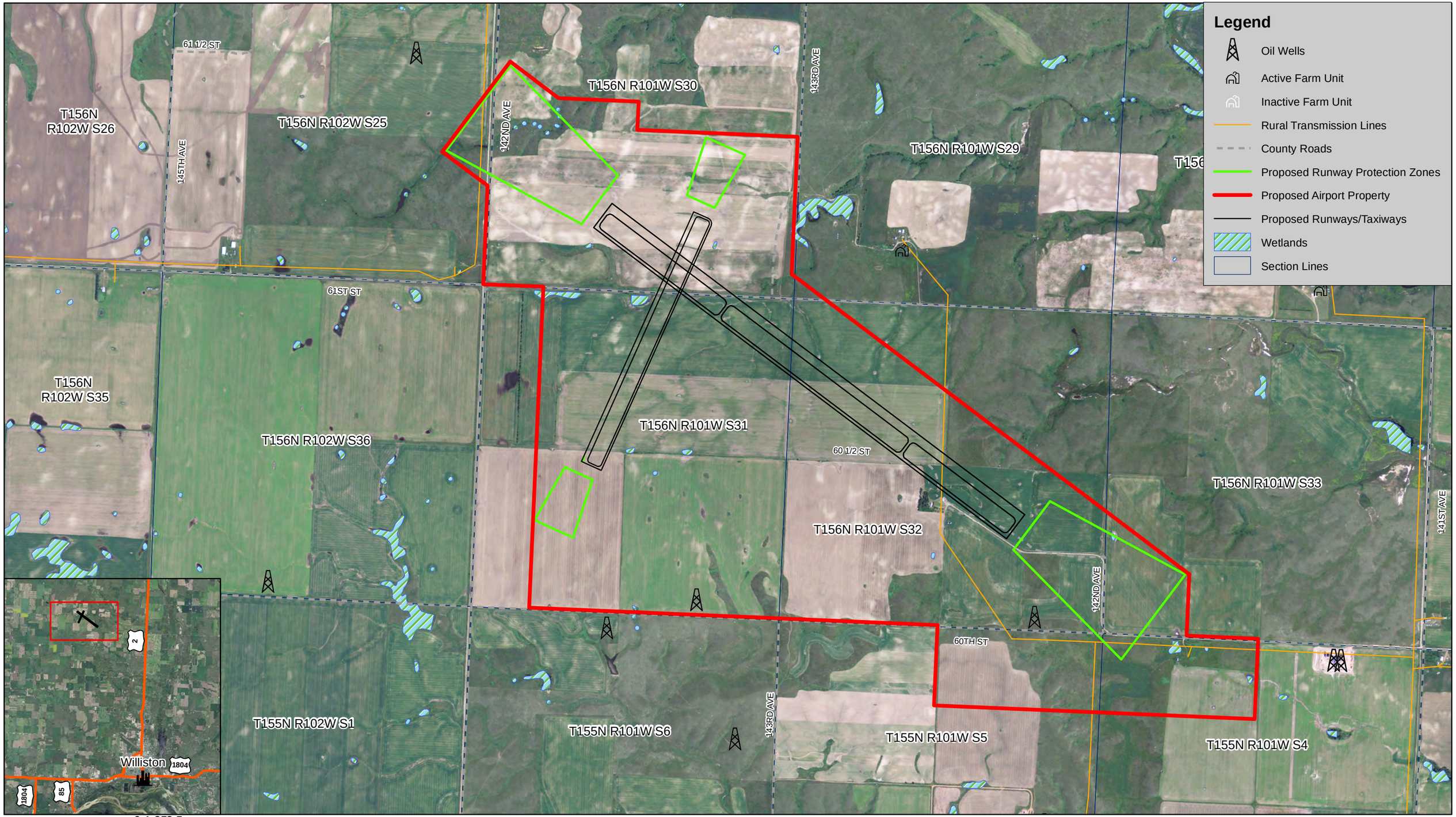
MWS does not foresee any wildlife related reason why any of these four alternatives could not be constructed, as long as the recommendations provided in this report are followed. Regardless of which airport alternative is ultimately implemented, one thing keep in mind is that wildlife are dynamic. They will constantly react and adjust to changes in their environment. While MWS does not foresee any critical new issues developing with the implementing of any one of the alternatives, there is always the possibility, and likelihood, that wildlife will attempt to utilize the new habitat created with a new airport. A permanent and proactive wildlife hazard management program will be the key to keeping wildlife hazards to a minimum, at any airport location.

Should the City of Williston need further information or assistance in mitigating wildlife hazards related to the airport, or wants additional information on how to implement an effective bird control program at the landfill, or the No. 17 & 18 wetlands, please contact MWS.

MWS appreciates the opportunity to work with the City of Williston on this project. If there are questions about this report or if further information is needed about this evaluation, please contact Timothy Pugh, Qualified Airport Wildlife Biologist, Midwest Wildlife Services, at P.O. Box 1102, Pierre, SD 57501, 605-280-0704.

Appendix I

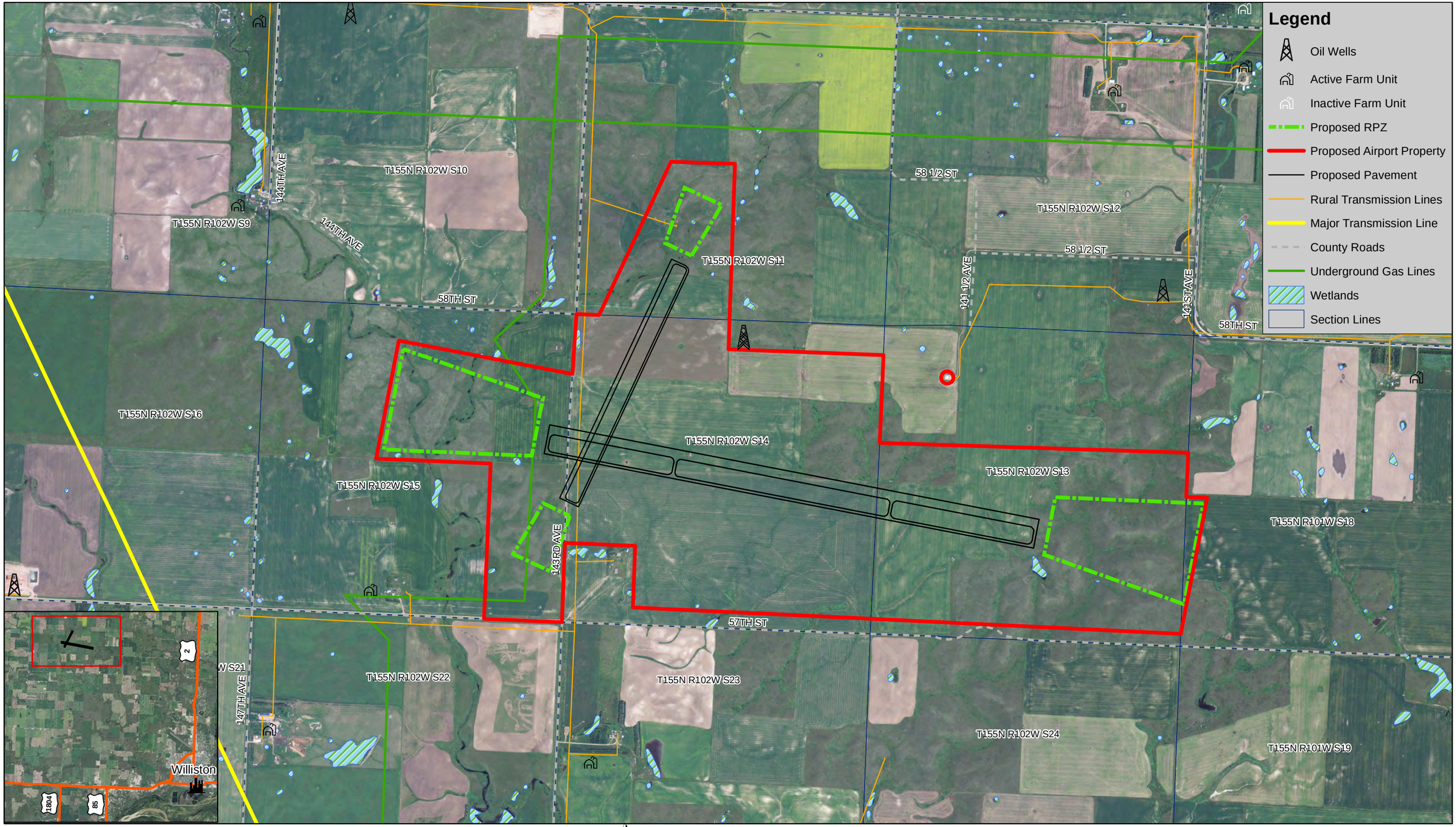
Site Maps



PRELIMINARY

*Intended for Planning Purposes Only

Sloulin Field International Airport Site Selection
8 Miles N & 3 Miles W of Williston
Site 2 - Alternative C



0 1.5 3 Miles

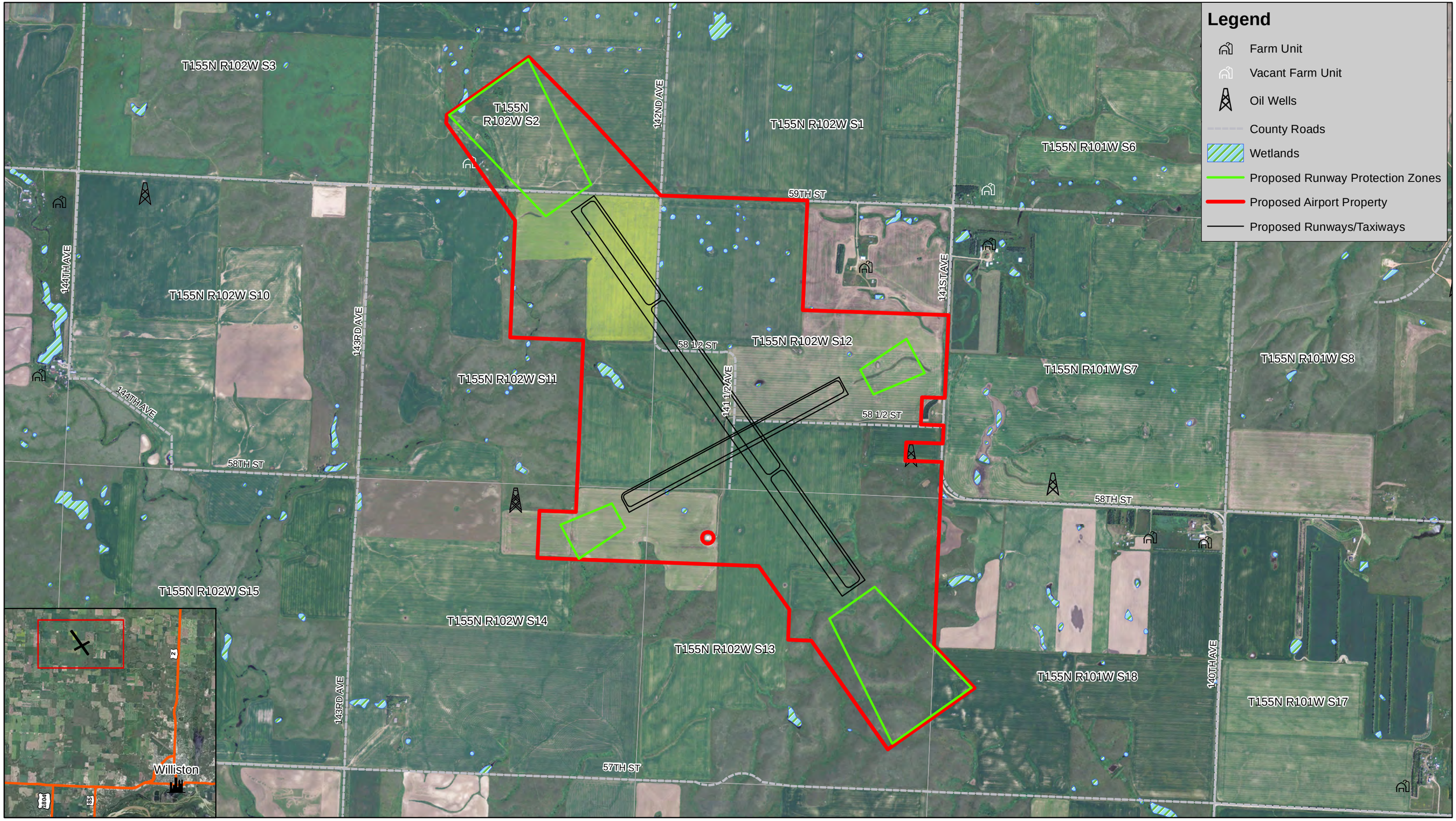
PRELIMINARY

*Intended for Planning Purposes Only

N

0 0.25 0.5 1 Miles

Sloulin Field International Airport Site Selection
5 Miles N & 6 Miles W of Williston
Site 4 - Alternative D



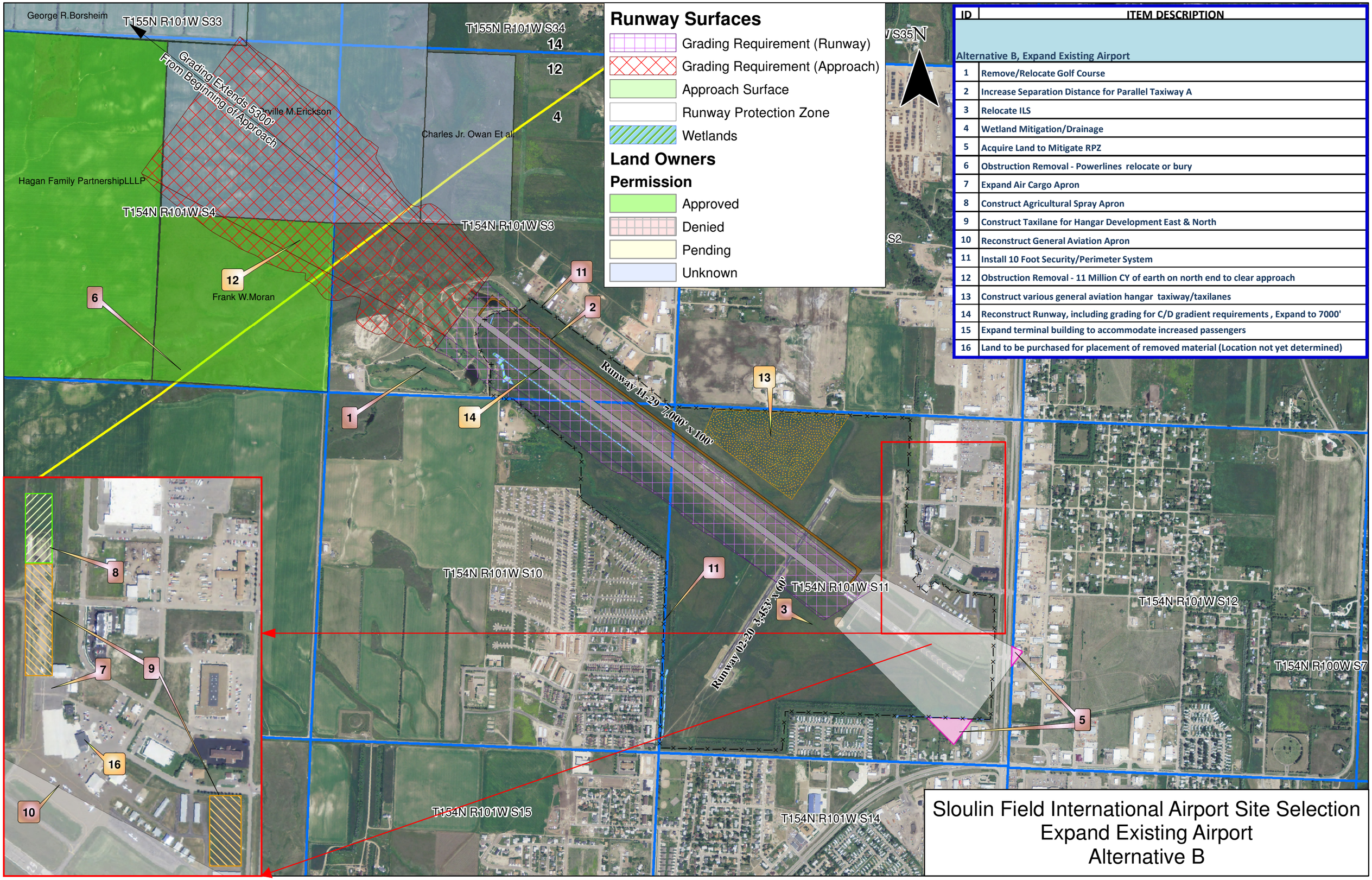
PRELIMINARY

*Intended for Planning Purposes Only

N

0 0.25 0.5 1 Miles

Sloulin Field International Airport Site Selection
6 Miles N & 5 Miles W of Williston
Site 5 - Alternative E

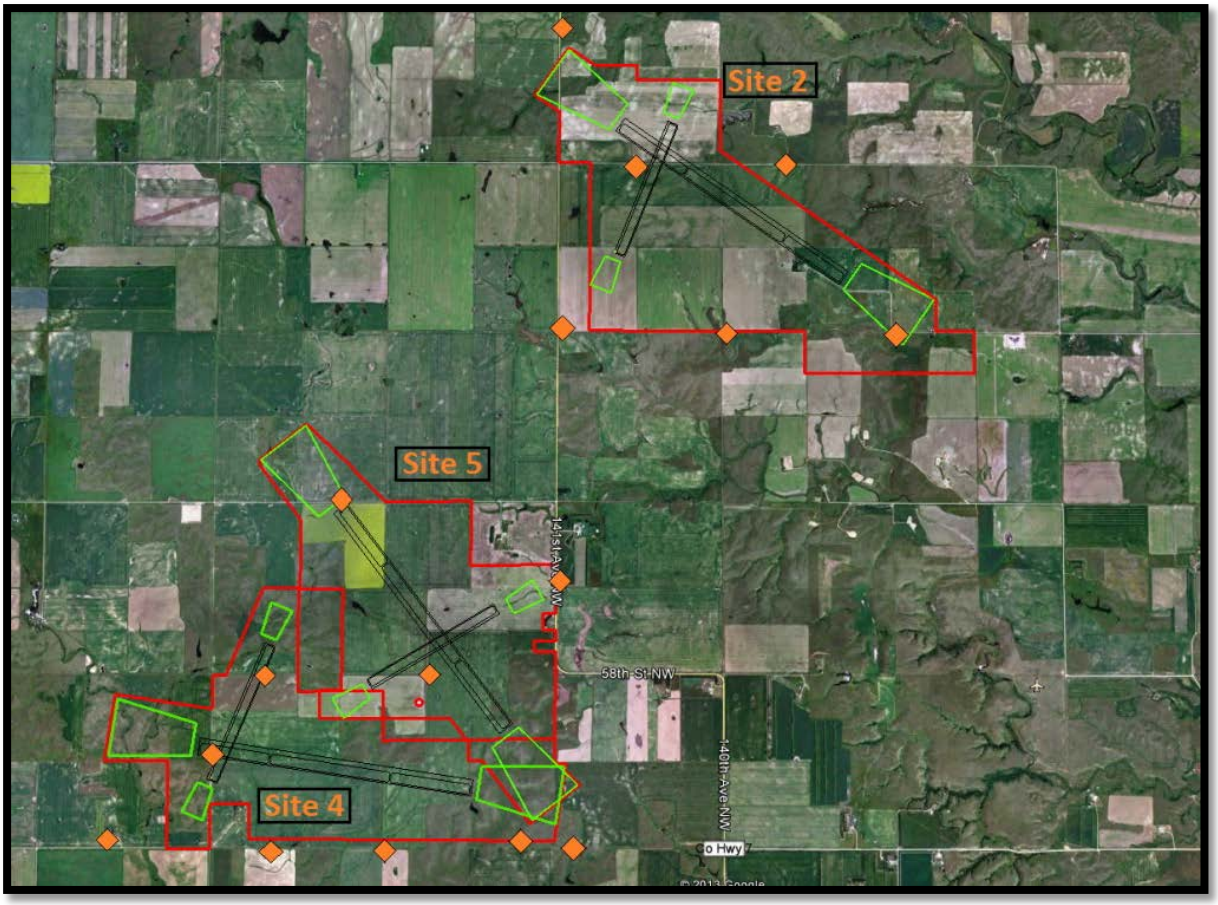


ID	ITEM DESCRIPTION
	Alternative B, Expand Existing Airport
1	Remove/Relocate Golf Course
2	Increase Separation Distance for Parallel Taxiway A
3	Relocate ILS
4	Wetland Mitigation/Drainage
5	Acquire Land to Mitigate RPZ
6	Obstruction Removal - Powerlines relocate or bury
7	Expand Air Cargo Apron
8	Construct Agricultural Spray Apron
9	Construct Taxilane for Hangar Development East & North
10	Reconstruct General Aviation Apron
11	Install 10 Foot Security/Perimeter System
12	Obstruction Removal - 11 Million CY of earth on north end to clear approach
13	Construct various general aviation hangar taxiway/taxilanes
14	Reconstruct Runway, including grading for C/D gradient requirements , Expand to 7000'
15	Expand terminal building to accommodate increased passengers
16	Land to be purchased for placement of removed material (Location not yet determined)

Sloulin Field International Airport Site Selection
Expand Existing Airport
Alternative B

Appendix II

Route Survey
Observation
Points



Route Survey Observation Points

Appendix II

Appendix III

Wetland Maps

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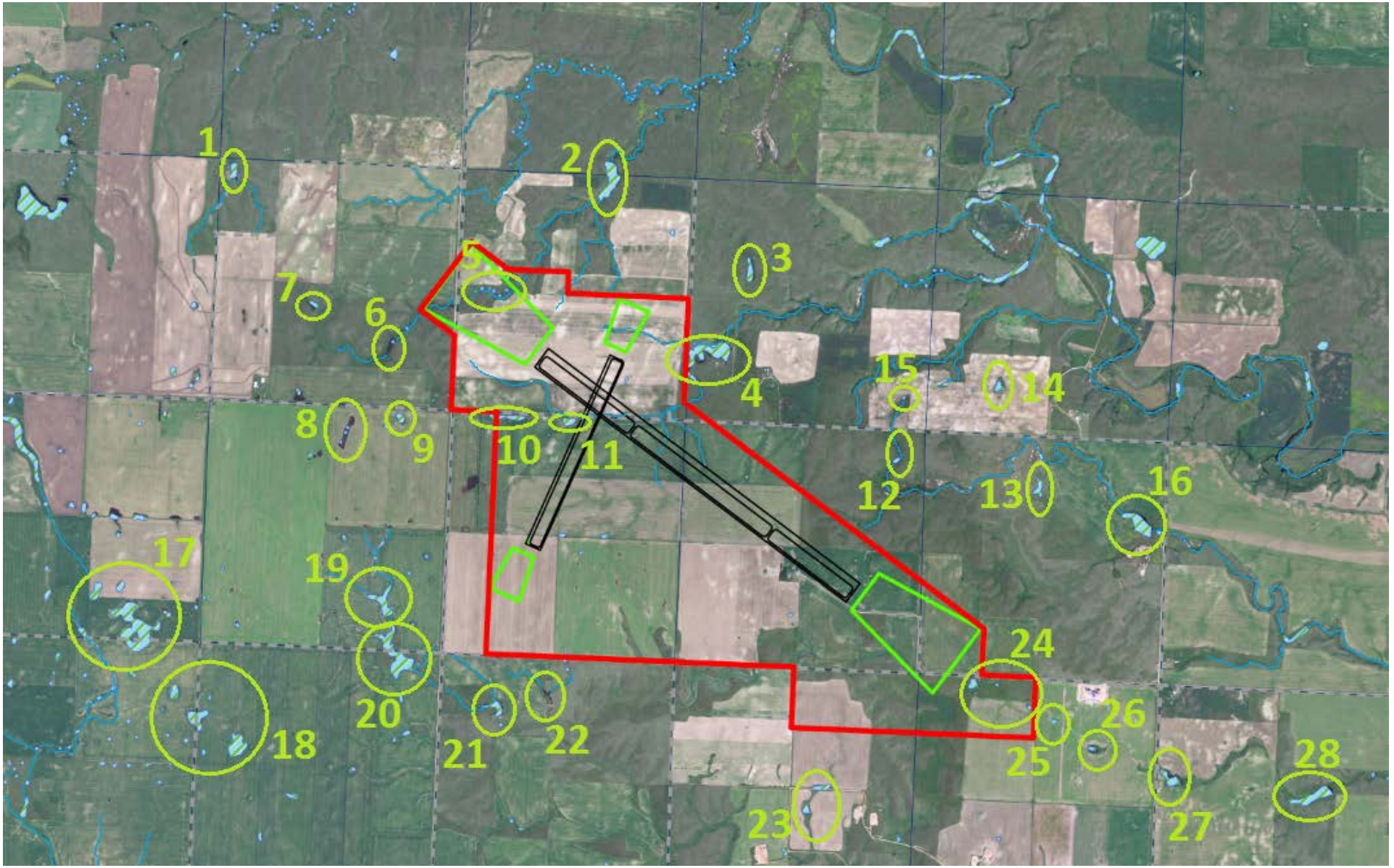
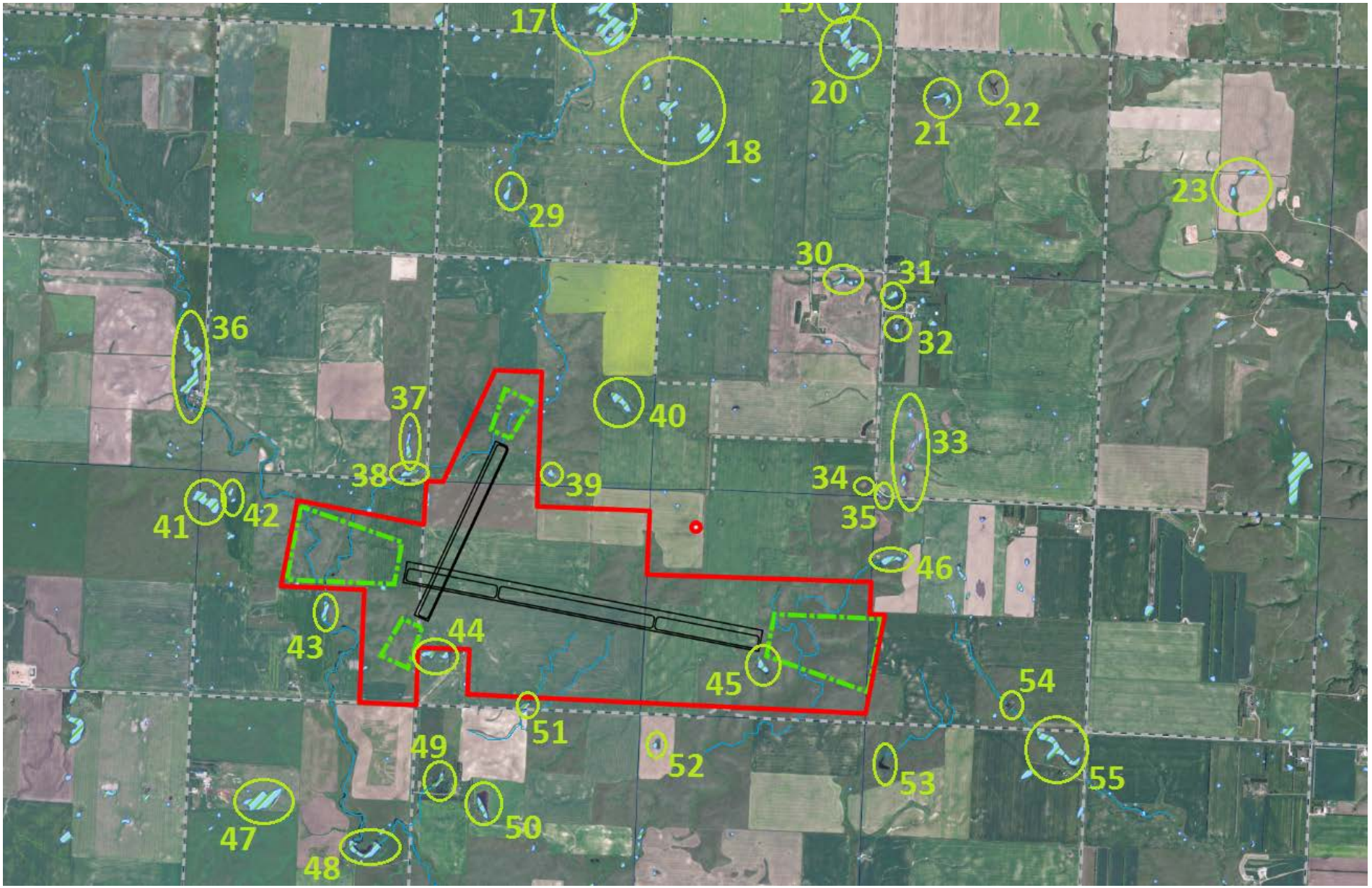
Wetlands & Waterfowl
Activity Chart



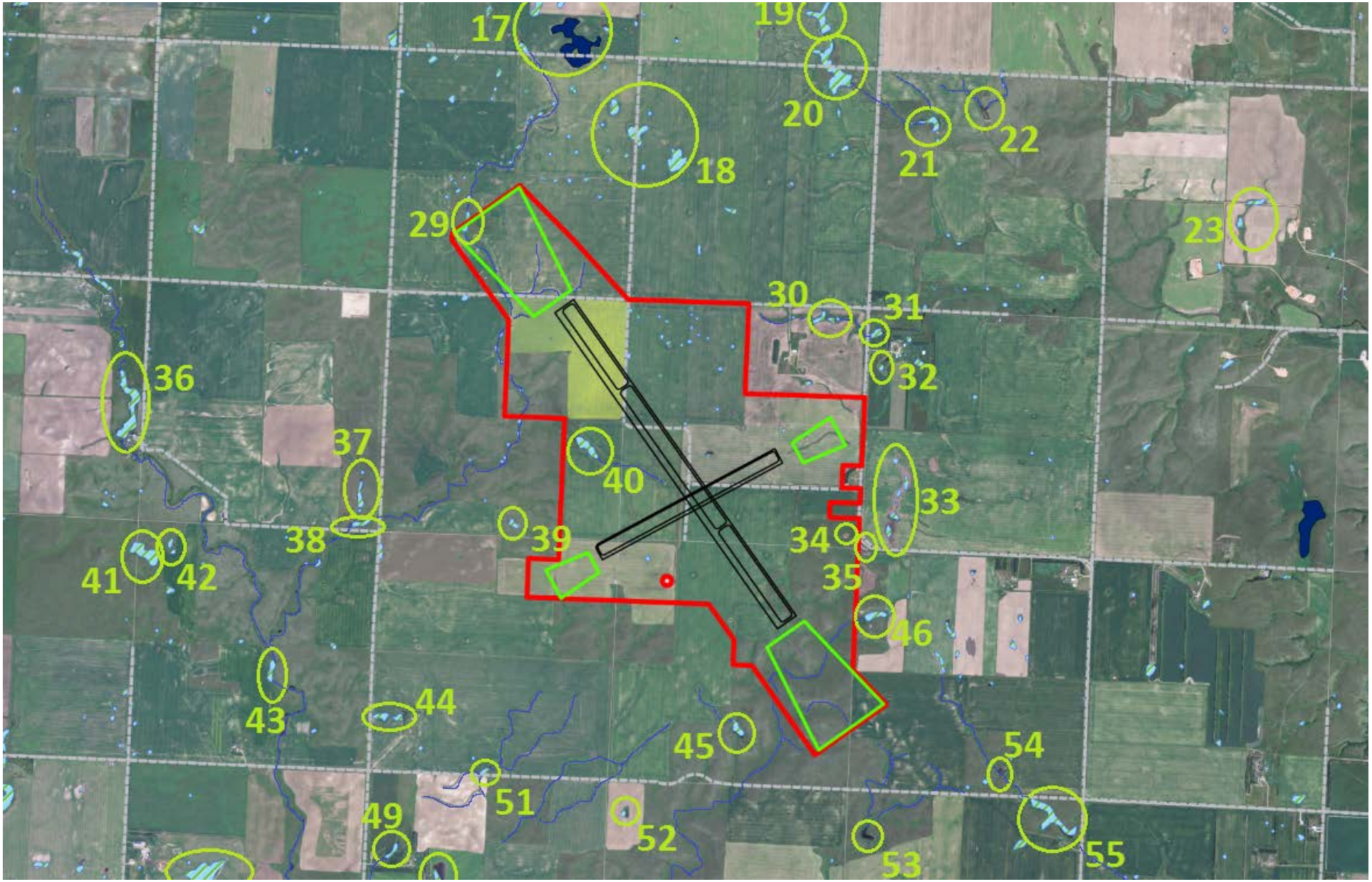
Wetlands Map – Site 2

Appendix III



Wetlands Map – Site 4

Appendix III



Wetlands Map – Site 5

Appendix III

Wetlands Map – Site ISN

Appendix III

Wetlands and Waterfowl Activity Chart

Wetland Types	Waterfowl Activity	Expected Hazard Influence
P- Permanent (Typically contains water year round) **S**- Semi-Permanent (May dry up or be greatly reduced in the fall, or during periods of below normal precipitation) **I** – Intermittent (Regularly fill & dry with seasonal changes or variations in precipitation)	**H** - High(>20) **M** – Moderate (5-20) **L** – Low (<5) **0** – Zero **U** – Unknown **Shaded Cells** - Indicate that the wetland did not, or likely did not hold water due to the lack of winter precipitation and the drought conditions of 2012.	**L** – Low (A hazard influence does exist but expected to be very minimal) **M** – Moderate (Hazard influence is expected to be significant) **H** – High (Hazard influence is expected to be high)

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments	
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN		
1	**S**	Stock Dam, Approximately .8 acre & 300 feet long.	**L/0**	**0/0**	**0/0**					1.5 miles from runway on Site 2, and in direct alignment with runway. Almost completely dry in fall, full in Spring. Minimal use by waterfowl observed. Not likely to be a hazard concern.	
2	**P**	Stock dam on drainage. Approximately 3.5 acres & 750 feet long.	**M/0**	**0/0**	**0/0**	**L**				Larger, more permanent reservoir in the area. Sits in low area, less than 1 mile from both runways at Site 2. It will likely pose a low hazard from minimal duck activity.	

Appendix III

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments	
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN		
3	**S**	Low depression in pasture. Approximately 2.0 acres & 850 feet long.	**M/0**	**0/0**	**0/0**	**L**				Likely dries up in late summer or fall. Could attract & hold large numbers of waterfowl when full in spring. Less than 1 mile from the runways on Site 2. ~ ¼ mile from crosswind runway flight path.	
4	**P**	4 acre permanent lake on drainage in pasture. 900 feet long.	**M/L**	**H/0**	**H/0**	**M**				Large permanent lake that attracts waterfowl throughout the year. Located < ½ mile from the intersection of both runways on site 2, it causes a moderate hazard concern.	
5	**S**	Series of small potholes along drainage.	**L/0**	**0/0**	**0/0**	**L**				Located < ½ mile from runway end on Site 2, and closely aligned with the main runway. These potholes could attract occasional ducks into and across the path of aircraft, but hazard concern is very low.	
6	**S**	Stock dam along drainage. Approximately .8 acres & 420 feet long.	**L/0**	**0/0**	**0/0**	**L**				Small stock dam ~ ½ mile from runway end on Site 2. Could attract ducks across path of aircraft. Hazard influence is expected to be low.	

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments	
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN		
7	**I**	Stock dam along drainage. Approximately .4 acres & 300 feet long.	**U/U**	**U/U**	**U/U**					Small Stock dam ~ 1 mile from runway on Site 2. Unlikely to attract more than occasional waterfowl.	
8	**I**	Series of small potholes in low area.	**L/H**	**0/0**	**0/0**	**L**				Small potholes in crop field. Likely to attract waterfowl only in early spring when large migratory groups are in the area & seek out these areas. Hazard influence to Site 2 is expected to be very low.	
9	**I**	Small potholes in low spot.	**L/H**	**0/0**	**0/0**	**L**				Small pothole in crop field. Likely to attract waterfowl only in early spring when large migratory groups are in the area & seek out these areas. Hazard influence to Site 2 is expected to be very low.	
10	**I**	Low area along road ditch and drainage.	**L/0**	**0/0**	**0/0**	**L**				May attract 1-2 pairs of ducks in spring when water accumulates. Close proximity to the Site 2 runway creates a small hazard.	

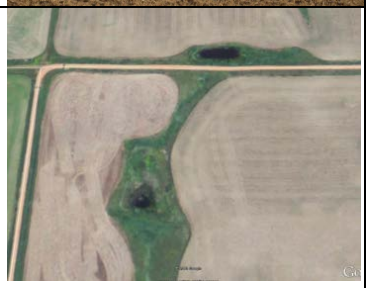
Appendix III

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments	
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN		
11	**S**	Low area along road ditch and drainage.	**L/0**	**0/0**	**0/0**	**L**				May attract 1-2 pairs of ducks in spring when water accumulates. Close proximity to the Site 2 runway creates a small hazard.	
12	**S**	Small .3 acre marsh wetland in low area along drainage. Approx. 400 feet long.	**L/0**	**0/0**	**0/0**	**L**				Small marsh ½ mile north of main runway on Site 2. It will likely attract spring nesting ducks. Hazard influence to Site 2 is expected to be very low.	
13	**S**	Low flat area along drainage.	**0/0**	**0/0**	**0/0**					Appears to be a flat wet area along a drainage ¾ miles from main runway on Site 2. It did not appear to hold water during the year, but is likely to be wet in spring.	
14	**I**	Small .7 acre pothole in crop field.	**0/0**	**0/0**	**0/0**					This small pothole may attract a few ducks in spring, but is likely to dry up in summer and fall. Located ~ 1 mile from Site 2 runway, it does not appear to present a hazard concern.	

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
15	**I**	Small .2 acre pothole in crop field.	**0/0**	**0/0**	**0/0**					This small depression may attract a few ducks in spring, but is likely to dry up in summer and fall. Located > ½ mile from Site 2 runway, it does not appear to present a hazard concern. 
16	**P**	Narrow, long dam along drainage. Approximately .7 acres & 700 feet long.	**L/0**	**0/0**	**L/0**					Permanent impoundment/lake lined with a few large trees and very attractive to waterfowl. Its 1 mile distance and position from Site 2 makes it a very low hazard issue. 
17	**S**	14 acre marsh that can expand to over 20 acres when it includes standing water in adjacent cropland	**H/H**	**0/0**	**0/0**	**M**	**M**	**M**		In spring as snow melts, this low weedy area fills with water, expanding into and flooding the adjacent cropland creating an attractive congregating area for migrating waterfowl. Along with the flooded adjacent cropland of **No. 18**, this marsh attracts and holds large numbers of waterfowl for a few weeks each spring. Ducks and cranes using this area numbered in the hundreds. Geese are likely to be in the thousands. While this hazard is likely to be short lived, only a few weeks each spring, it will affect all three relocation sites (Sites 2, 4 & 5) substantially during that time, especially Site 5 which has a runway located less than 1 mile from this area. 

Appendix III

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
18	**I**	20 acres of low flat areas that temporarily fill in spring.	**H/H**	**0/0**	**0/0**	**M**	**M**	**M**		These flat croplands adjacent to the marsh of wetland **No. 17** help to expand the already attractive congregating area for migrating waterfowl in spring. They are greatly diminished in late spring when the large migrating groups have moved north. 
19	**P**	Larger reservoir on drainage, Approximately 1.3 acres & 600 feet long	**M/L**	**0/0**	**0/0**	**L**				Large open water reservoir within ¾ mile of Site 2 runway, and relatively close to the aircraft flight path. Duck and goose activity will influence hazards for Site 2. 
20	**P**	Larger reservoir on drainage, Approximately 2.5 acres & 850 feet long	**M/L**	**0/0**	**0/0**	**L**				Large open water reservoir within ¾ mile of Site 2 runway, and relatively close to the aircraft flight path. Duck and goose activity will influence hazards for Site 2. 
21	**S**	Small stock dam, approximately .4 acres & 160 feet long	**L/0**	**0/0**	**0/0**					Small dam in low area will have a very low attraction to anything more than 1 pair of ducks. Its distance from the Site 2 runways Makes it a minor hazard concern. 

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
22	**S**	Small Stock dam in pasture on drainage, approximately .6 acres & 320 feet long	**0/0**	**0/0**	**0/0**					Small dam in low area will have a very low attraction to anything more than 1 pair of ducks. Its distance from the Site 2 runways Makes it a minor hazard concern. 
23	**I**	Two small low areas in drainage. Appears to create small wetland marshes during times of higher precipitation, and possibly small open water ponds 80 to 150 feet in length.	**U/U**	**U/U**	**U/U**					Located ~ ¾ mile south of the main runway end on Site 2, the size, location & type of these low areas do not appear to be attractive to larger waterfowl groups, and are not expected to pose any significant hazard threat. 
24	**I**	Series of small pothole wetlands.	**L/0**	**0/0**	**0/0**					Aligned with the main runway on Site 2 but more than ½ mile away, these potholes are likely to contain a small amount of standing water briefly in spring or following heavy precipitation. They are not expected to pose a hazard to aircraft. 

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments	
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN		
25	**I**	Small pothole wetland, approx .2 acres 100 feet in diameter	**0/0**	**0/0**	**0/0**					Considering the size and distance of this wetland from Site 2, it is unlikely to pose a significant hazard.	
26	**S**	Small .8 acre pothole lake, approx. 190 feet in diameter	**0/0**	**0/0**	**0/0**					This small lake is bordered by a few trees, but considering the size and distance of this wetland from Site 2, it is unlikely to pose a significant hazard.	
27	**S**	Lake or small depression along drainge, approx .75 acres & 360 feet long	**L/0**	**0/0**	**0/0**					This small lake is densely bordered by trees, but considering the size and distance of this wetland from Site 2, it is unlikely to pose a significant hazard.	
28	**S**	Stock dam on drainage, approx 1.4 acres & 600 feet long.	**U/U**	**U/U**	**U/U**					Unable to see this wetland during study. It will likely attract ducks during spring, but at 2 miles from Site 2, it does not appear to be a hazard threat.	

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
29	**S**	Small stock dams on drainage, approx .5 acres & 450 feet long.	**L/0**	**0/0**	**0/0**			**L**		Small stock dam may attract a few ducks in spring & early summer. Aligned ~ ½ mile from the main runway end on Site 5. Hazard influence is expected to be very low. 
30	**S**	2 small stock dams on drainage, approx .3 acres & 300 feet long.	**L/0**	**0/0**	**0/0**			**L**		Small stock dam could hold 1 – 2 pairs of ducks during spring & summer. Located ~ ½ miles from the crosswind runway end on Site 5. Hazard influence is expected to be very low. 
31	**S**	Small stock dam on drainage, approx .5 acres & 150 feet long.	**M/0**	**M/0**	**M/0**			**L**		This pond is surrounded by tall grass & trees, with adjacent cropland. It is very attractive to ducks throughout the year. It has an increased attractiveness to ducks than most of the other area wetlands. Located > ½ mile from the Site 5 crosswind runway, it could pose a small hazard for Site 5. 
32	**I**	Two low areas along drainage, approx .300 feet long.	**L/0**	**L/0**	**L/0**					These low areas could hold 1 – 2 pairs of ducks during spring & summer on occasion. Located ~ ½ miles from crosswind runway end on Site 5, they should not influence hazards for aircraft. 

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
33	**I**	Series of small potholes in a long narrow depression, 1800 feet long.	**0/0**	**0/0**	**0/0**			**L**		This low area ~ ½ mile from Site 5, contains water intermittently. Only one pothole held water in the spring. Likely to attract waterfowl only when it contains substantial water, which may be a rare occasion. 
34	**S**	Small rectangle dugout area, .25 acres	**L/0**	**0/0**	**0/0**			**L**		Small pond with some bordering vegetation. May hold small # of ducks on occasion. Located ½ mile from runways on Site 5, its hazard influence is expected to be very low. 
35	**S**	Low area in road corner, .5 acres in size	**H/0**	**L/0**	**L/0**			**L**		Weedy wet area that usually contains a few pairs of ducks. Located ½ mile from runways on Site 5, it is expected to be very low. 
36	**P**	Long reservoir approx 2.7 acres & 1400 feet long.	**M/M**	**M/0**	**M/0**		**L**			Next to a farmhouse, this long lake is very attractive to ducks and geese in larger numbers. Likely to have nesting geese in addition to larger numbers & varieties of ducks. Will help to hold waterfowl in the area that could move into flight paths on Site 4. Due to its distance from Site 4, its hazard influence is expected to be very low. 

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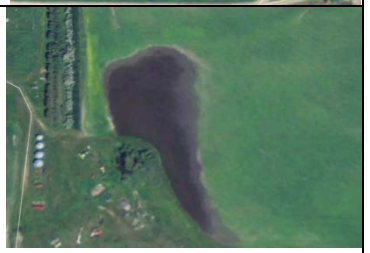
Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
37	**P**	Small stock dam approx 1.5 acres & 600 feet long.	**M/0**	**M/0**	**M/0**		**L**			Permanent Pond that typically holds a moderate number of ducks through the year. Located ~ ½ mile from the crosswind runway on Site 4, could pose a minimal hazard. 
38	**S**	Small pond along drainage, approx .5 acres & 430 feet long.	**M/0**	**0/0**	**0/0**		**L**			This pond on a drainage, typically has water except during the very dry periods when the creek does not flow. Thick trees surround it and it typically contains some ducks. Located ~ ½ mile from the crosswind runway on Site 4, could pose a minimal hazard. 
39	**I**	Small dugout stock pond, approx .2 acres & 170 feet long.	**0/0**	**0/0**	**0/0**					Small pond in open pasture. Not very attractive to waterfowl. But may contain a few ducks, especially in spring. Approximately ½ miles from crosswind runways on Sites 4 & 5. 
40	**P**	Stock dam on drainage, approx .2 acres & 630 feet long.	**M/0**	**M/0**	**M/0**		**L**	**H**		Permanent reservoir that held water and attracted several ducks through all seasons of the year. Approximately ½ mile from the crosswind runway on Site 4 and ¼ mile from the main runway on Site 5. 

Appendix III

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
41	**S**	Small lake, approx. 2.25 acres & 580 feet long.	**M/0**	**U/U**	**U/U**		**L**			Weedy wetland that is very attractive to ducks in spring. Appears fairly shallow and may typically be dry in the fall. Located < 1 mile, and closely aligned with the flight path for the main runway, it could have a small seasonal hazard influence. 
42	**I**	Low depression that fills with water in spring. Approximately .4 acres.	**M/0**	**U/U**	**U/U**		**L**			Low depression that contained water in spring. Very attractive to ducks, but is likely to be dry by summer. Located close to No. 38, it too is < 1 mile, and closely aligned with the flight path for the main runway on Site 4, it could pose a small seasonal hazard influence. 
43	**S**	Larger pothole along creek, approx .25 acres & 190 feet long.	**0/0**	**L/0**	**0/0**		**L**			One of many pooled or open water areas along this major creek west of Sites 4 & 5. This creek was used by several ducks throughout the year, but open water and duck use was minimal by fall. Located ~ ½ miles from the runway ends on Site 4, this drainage creates a small hazard concern. 

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
44	**I**	Two small .5 acres low spots in crop field	**L/0**	**0/0**	**0/0**		**L**			 These cropland ponds were full in early spring but were almost dry two weeks later. They attracted a few ducks when they held water. For the very brief period each spring, when these wetlands exist near the crosswind runway end on Site 4, they may pose a small hazard.
45	**S**	Small stock dam on drainage, approx .15 acres & 380 feet long.	**M/0**	**0/0**	**0/0**		**H**	**L**		 This wetland was not apparent during the dry year, but held substantial water in the following spring, and attracted several varieties of ducks. This wetland is likely to hold water during most seasons in most years. Located ½ mile from the main runway on Site 5, its hazard influence will likely be minimal. This wetland lies only a few feet from the main runway & taxiway on Site 4, where it will be a high hazard concern.
46	**P**	Stock dam on drainage, approx 1.75 acres & 460 feet long.	**L/0**	**0/0**	**L/0**			**L**		 This is a larger that did hold ducks on occasion. Located more than ½ mile from the main runway on Site 4, it poses a very minimal hazard. Located ¼ mile from main runway on Site 5, it could pose a small hazard on occasion.

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
47	**S**	Large low area, approx. 7.5 acres & 900 feet wide	**M/0**	**U/U**	**U/U**		**L**			Very large flooded area that can fluctuate considerably, depending upon precipitation. Very attractive to ducks and is likely to be used by geese in the spring. Aligned 1 mile from the end of the crosswind runway on Site 4, it could have a small seasonal hazard influence on Site 4. 
48	**S**	Stock dam along drainage, approx .15 acres & 700 feet long.	**L/0**	**U/U**	**U/U**					One of several wetland impoundments along this major creek. May hold a few ducks year round. Approximately 1 mile and aligned with the crosswind runway on Site 4. Not likely to pose any significant hazard concern. 
49	**S**	Long narrow dam on drainage, approx. .2 acres &400 feet long	**0/0**	**U/U**	**U/U**					Small narrow wetland that may hold a few ducks at times during the year. Due to its size and 1 mile distance from Site 4, it is unlikely to pose a hazard. 
50	**I**	Low area in cropland that can contain up to 1.8 acres of standing water.	**U/U**	**U/U**	**U/U**					Low area in crop field that expands or shrinks with recent precipitation levels. Could be very attractive to ducks, especially in spring. Due to its typically small size and 1 mile distance from Site 4, it is unlikely to pose a hazard. 

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Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
51	**S**	Small stock dam on drainage, approx .25 Acres & 235 feet long.	**L/0**	**0/0**	**0/0**					Will typically hold water in spring and summer. It is attractive to ducks. Because of its small size, location, and ½ mile distance from the Site 4 runway, it is unlikely to be a concern. 
52	**I**	Low wet area in cropfield, approx. .75 acres	**0/0**	**0/0**	**0/0**					Small pothole area that may contain water during parts of the year. Located ½ mile from Site 4 main runway. Not expected to be a significant waterfowl attractant. 
53	**P**	Lake along drainage, approx. 1.4 acres & 300 feet long.	**M/L**	**M/0**	**M/0**		**L**	**L**		Highly attractive to several ducks & other water birds throughout the year. Located ½ mile south of the main runway on Site 4, and < 1 mile & closely aligned with the main runway on Site 5, it creates a small hazard influence. 
54	**I**	Small Dugout stock pond, approx. .25 acres	**0/0**	**0/0**	**0/0**					Small stock pond that will attract a few ducks when it contains water. Located 1 mile or more from runways on Sites 4 & 5, it does not appear to pose a concern. 

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Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
55	**S**	Two connecting stock dams on drainage, approx. 1.3 acres & 960 feet long.	**M/0**	**0/0**	**0/0**					This attractive marshy area will typically attract a few ducks. Located 1 mile or more from runways on Sites 4 & 5, it does not appear to pose a concern. 
56	**I**	Golf course pond approx. .8 acres & 500 feet long.	**0/0**	**L/0**	**L/0**				**L**	Filled in summer and located in direct alignment, < ¼ mile from the end of the main runway on ISN, this golf course pond attracts an occasional pair of ducks. Its hazard influence is small. 
57	**P**	Golf course pond approx. .5 acres & 190 feet long.	**L/0**	**L/0**	**L/0**				**L**	Possibly kept filled year and located < ¼ mile from the end of the main runway on ISN, this golf course pond attracts a few ducks throughout the year. Its overall hazard influence on ISN is small. 
58	**S**	Group of small variable sized ponds along drainage	**0/0**	**0/0**	**0/0**					These small potholes will attract occasional ducks to within ½ mile of the ISN runway. Due to its distance from ISN and relatively low waterfowl usage, it is not expected to be a hazard concern. 

Wetland		Wetland Description	Waterfowl Activity Ducks/Geese			Expected Hazard Influence Low Mod High				Discussion/Comments
No.	Type		Spring	Sum	Fall	Site 2	Site 4	Site 5	Site ISN	
59	**S**	Small stock dam on drainage	**L/0**	**0/0**	**0/0**					This small pond will attract occasional ducks to within ½ mile of the ISN runway. Due to its distance from ISN and relatively low waterfowl usage, it is not expected to be a hazard concern. 
60	**P**	Little Muddy River – Large tributary of the Missouri River	**H/H**	**L/H**	**H/H**				**H**	This is a major river of the area that feeds into the Missouri River. It lies just over 1 mile from ISN and is located between ISN and the landfill. It attracts migrating and nesting waterfowl throughout the year. Its main influence on hazards at ISN is that it serves as a loafing and overnighting area for gulls, which utilize the landfill. Throughout the day gulls move back and forth from loafing areas on the Little Muddy to feeding in the landfill. This activity causes considerable gull activity in the direct flight path of planes utilizing the main runway at ISN.