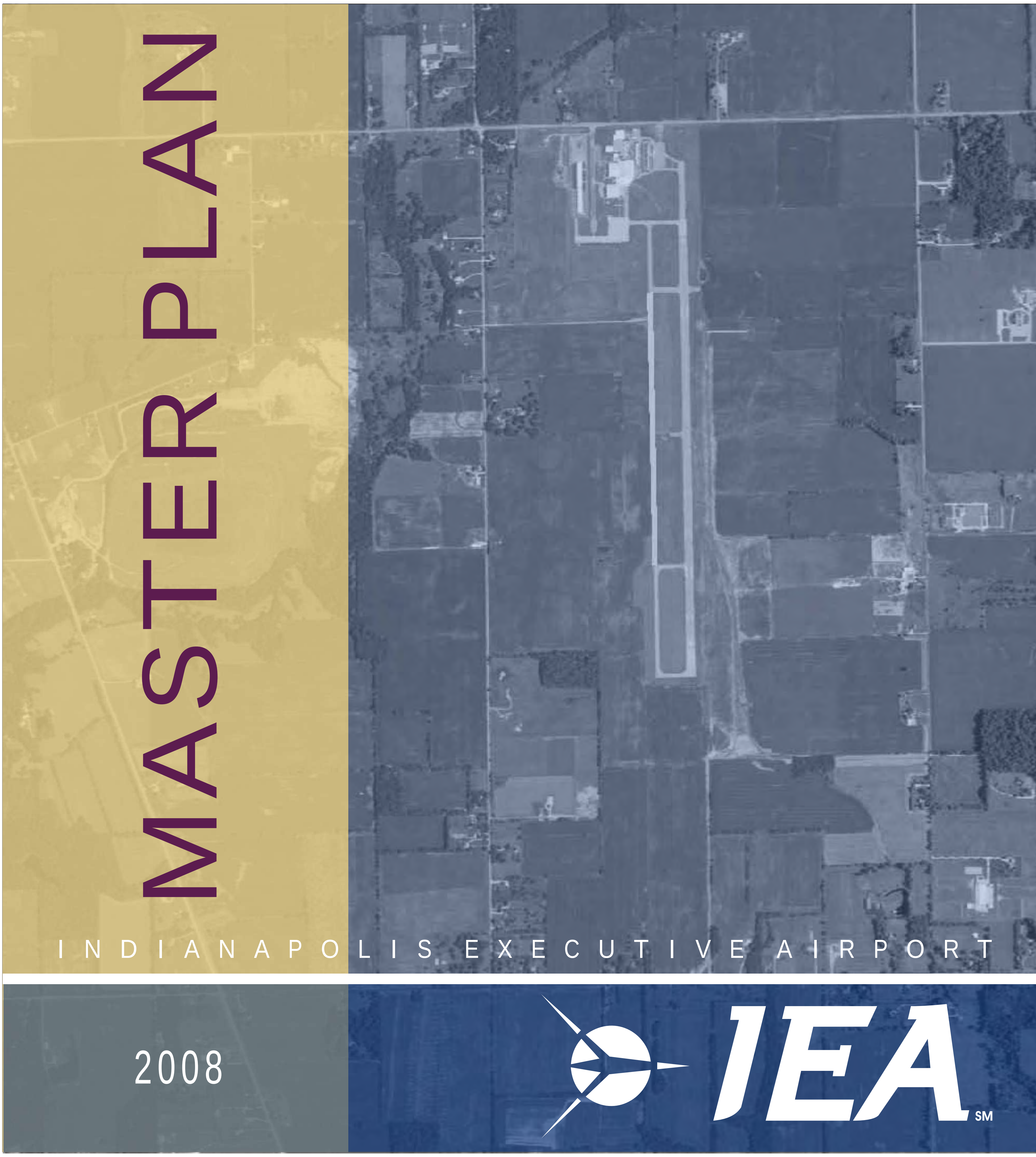

MASTER PLAN

INDIANAPOLIS EXECUTIVE AIRPORT

2008

IEA℠

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CHAPTER 4 FACILITY REQUIREMENTS

INTRODUCTION

Indianapolis Executive Airport (TYQ) began its history as Terry Airport, named after the owner's son, Terry Campbell. It's origin in Boone County, Indiana, as a general aviation airport dates back to 1957 when its construction began. The aerial photo below **(Exhibit 1-1)** shows the airport as it existed in the 1970's.

EXHIBIT 1-1: 1970's Aerial Photo of Indianapolis Executive Airport

Source: Electronic Atlas of Indiana, www.atlas.ulib.iupui.edu (accessed 8/06).

The state and federal governments have invested over $10 million in capital improvement grants in the airport through 2008. Today the facility has a north-south runway 5,500 feet long by 100 feet wide, full parallel taxiway, and an instrument landing system to provide access during inclement weather conditions to a wide range of general aviation aircraft, including business jets. Although located in Boone County, the airport's service area extends into Marion and Hamilton Counties. It is owned by Hamilton County, operated by the Hamilton County Airport Authority, and managed by Montgomery Aviation. TYQ currently accommodates over 100 based aircraft and experiences approximately 49,000 annual operations, including regular operations by business aircraft such as the Gulfstream, multiple Lear Jet models, and a range of Cessna Citations. The airport is used by various entertainers performing at Verizon Wireless Music Center (formerly Deer Creek Music

Center) and racing teams competing at the Indianapolis Motor Speedway. With a runway capable of accommodating business jets and offering a precision instrument landing system (ILS) approach for access in poor weather, Indianapolis Executive Airport provides an important reliever function for Indianapolis International Airport. A precision approach provides both vertical and horizontal guidance to the airport. It is the only reliever on the north side of Indianapolis with these capabilities. The purpose of this master plan is to review the current and future role of the airport and identify the facilities that are needed to allow Indianapolis Executive Airport to meet its vision *to be the premier business and life-style travel facility that mirrors the quality of life in Boone and Hamilton counties, fosters the economic development of the area, and develops its facilities in concert with the surrounding community.*

This inventory chapter identifies the existing facilities at the Indianapolis Executive Airport. The inventory process includes an examination of existing airport facilities, adjacent development, and air traffic control considerations. Additionally, information regarding the airport setting is presented, along with a discussion of the Airport's role in the reliever system. During this inventory narrative and throughout this Master Plan, numerous aviation terms are used. For more complete definitions of these terms, a glossary is included in **Appendix A**. Throughout this document you may see the acronyms of TYQ and IEA. They both mean the Indianapolis Executive Airport. The Federal Aviation Administration (FAA) 3-letter identifier for Indianapolis Executive Airport is TYQ, while the airport adopted a logo that consists of the first letters of its name: IEA.

AIRPORT ROLE

Airports across the country function as an inter-related system. To coordinate and fund this system, the Federal Aviation Administration (FAA) developed the *National Plan of Integrated Airport Systems* (NPIAS), a system of more than 3,400 existing and proposed airports that are significant to the national air transportation network. The goal of the NPIAS is to provide as many people as possible with convenient access to air transportation, typically not more than 20 miles of travel to the nearest NPIAS airport. The aviation facilities included in the NPIAS are significant to the national aviation system and are eligible to receive federal funding. Indianapolis Executive Airport is included in the 2009-2013 NPIAS as a reliever airport. Reliever airports are general aviation airports in metropolitan areas intended to reduce congestion at large primary airports by providing general aviation pilots with alternative landing areas. Reliever airports also provide surrounding metropolitan and suburban areas with access to air transportation. There are 270 reliever airports in the NPIAS with an average of 230 based aircraft, which is 28% of the national general aviation fleet.

Indianapolis Executive Airport is also part of the *2003 Indiana State Aviation System Plan* (ISASP), which consists of 69 aviation facilities of statewide importance that are eligible for state funding. The 2003 ISASP identifies Indianapolis Executive Airport as a Corporate Class Airport, defined as a general aviation or reliever airport with at least a 5,000-foot runway that can accommodate entry and mid-level business jets.

An airport system plan for the Indianapolis metropolitan area was initially developed in 1975, and was updated in 1993. The 1993 update distinguishes TYQ as one of only two Indianapolis reliever airports with a precision instrument landing system.

HISTORY

Purpose of Reliever Airports

By 1970, most airlines had replaced propeller driven aircraft with jets. Accordingly, the U.S. Congress and the FAA became concerned about mixing smaller general aviation (GA) aircraft with the new jet fleet. Wake turbulence from jets caused several GA aircraft accidents, and to avoid this, air traffic controllers increased the separation between aircraft, resulting in reduced runway capacity. An alternative to increased aircraft separation was to set up separate arrival and departure streams, leading to separate runways for general aviation aircraft. Most major airports did not have the real estate or funds to construct another set of runways for general aviation. Thus, at a time when use of jet aircraft caused passenger traffic to grow at record rates, the capacity to accommodate those aircraft was becoming constrained.

The solution selected through national policy was to create a separate airport system for general aviation aircraft in major metropolitan areas, in order to remove or greatly reduce the number of smaller and slower aircraft in the traffic mix with air carrier jets. The *Airport and Airway Development Act of 1970* set the stage for the evolution of reliever airports. Under the Act, federal funds became available for the first time for airport system planning and development. Sponsors of major airports were encouraged to develop reliever airports with facilities to attract general aviation users to relocate. As an incentive, reliever airport facilities and services were to be equal or better than those found at the primary airport, and federal funds were set aside exclusively for the purpose of developing reliever airports.

Indianapolis Reliever Planning

The *1975 Indianapolis Metropolitan Airport System Plan* recommended that the Indianapolis Executive Airport, then known as the Terry Airport, eventually be acquired by a public entity because “the only way of assuring the continued availability of an airport is for the facility to be publicly owned.” The plan also indicated that the airport should be developed to accommodate all types of business aviation including corporate jets.

The *1993 Indianapolis Metropolitan Airport System Plan* depicts Indianapolis Executive Airport as well below its potential operational capacity and lacking in a parallel taxiway and aircraft parking. The plan went on to recommend that a reliever airport like TYQ should have a parallel taxiway, which it now does, and a 2012 capacity to accommodate at least 200 based aircraft.

Development of Indianapolis Executive Airport

Campbell Aviation began developing Indianapolis Executive Airport (TYQ) as Terry Airport in 1957 with a 3,340 feet by 60 feet bituminous runway configured in a north-south direction and a 3,000 feet by 200 feet turf runway configured in a northeast-southwest direction. It was certified by the State of Indiana in 1958. The airport included 10 T-hangars and an administration building. A few years later, twenty-six additional T-hanagrs were added. In 1965, the Campbells sold the airport to the Van Sickles.

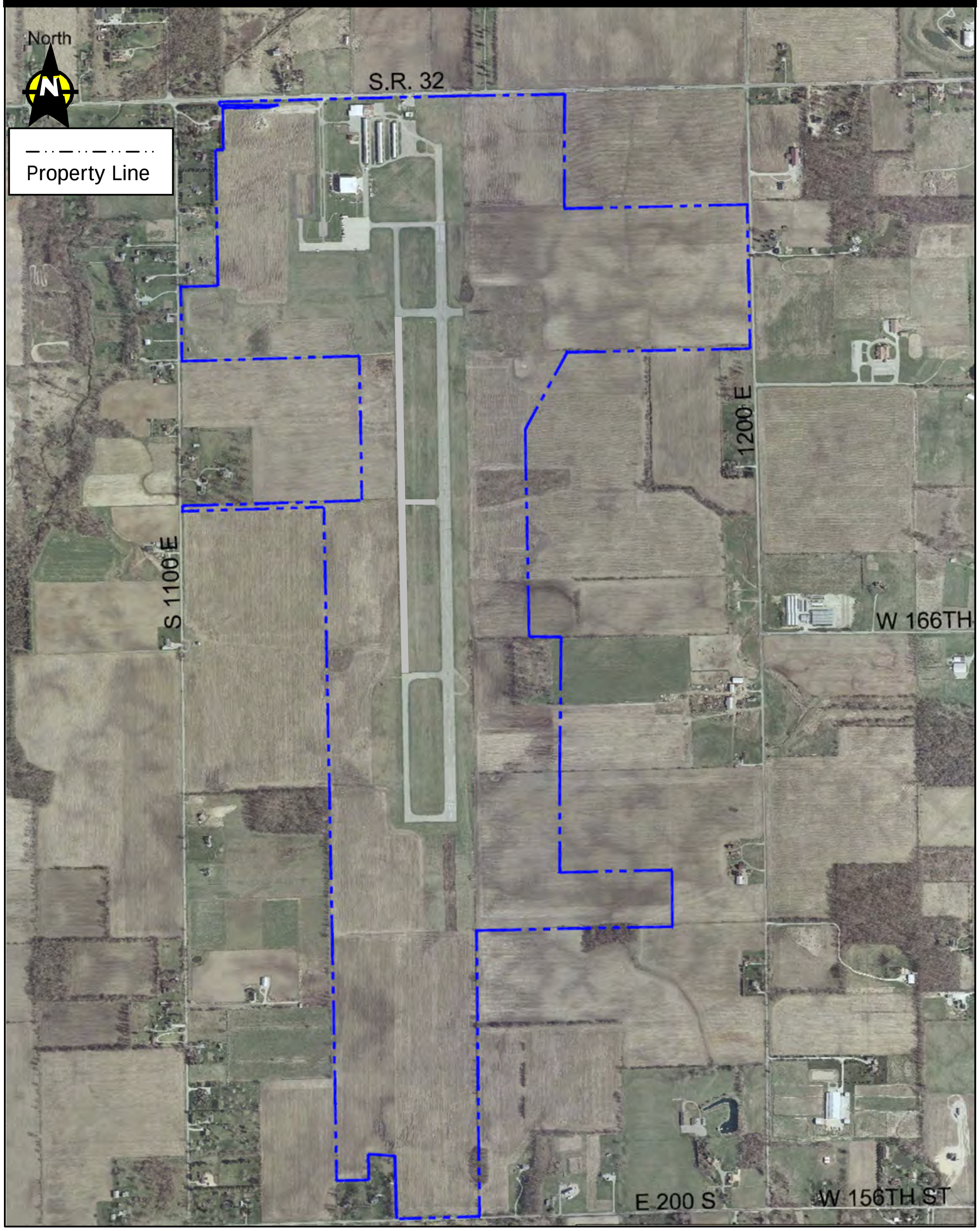
In 1978, the north-south runway (Runway 18-36) was lengthened to 5,160 feet, widened to 75 feet, and three aircraft turnarounds were constructed. Other improvements made by the Van Sickles included installing High Intensity Runway Lights (HIRL), Visual Approach Slope Indicators (VASI-2) for both runways and an Instrument Landing System, including a Non Directional Beacon (NDB). Three additional large hangars were also added.

The airport was classified as a reliever to Indianapolis International Airport in the 1980s, which opened the door for the facility to get government funding from the FAA and the State of Indiana. In 1986, TYQ received it’s first federal grant for construction to install underdrains for Runway 18-36 and acquire 40 acres of land for approach protection. In 1987 and 1988, other grants were received to reconstruct, widen, and groove the primary runway, which resulted in a 60,000 lb. DWL (dual wheel loading) strength for the runway. Under this grant, 33 more acres of land were acquired, an aircraft apron was constructed, and a partial parallel taxiway was added. In the early 1990’s, TYQ received three more grants for extending the runway to its current length of 5,500 feet and acquiring 322 more acres of land.

The airport did not receive further grants until 2001 when they mitigated wetland impacts and graded the runway safety area. In 2003, the airport was purchased by Hamilton County and the Hamilton County Airport Authority began receiving a series of grants for reimbursement for that purchase.

A detailed listing of the grants for TYQ is included in **Appendix B.** The aerial photo in **Exhibit 1-2** shows the current development of the airport with the exception of a new conventional/corporate hangar, canopy, and recently constructed T-hangars.

EXHIBIT 1-2: Indianapolis Executive Airport (TYQ) Aerial Photo

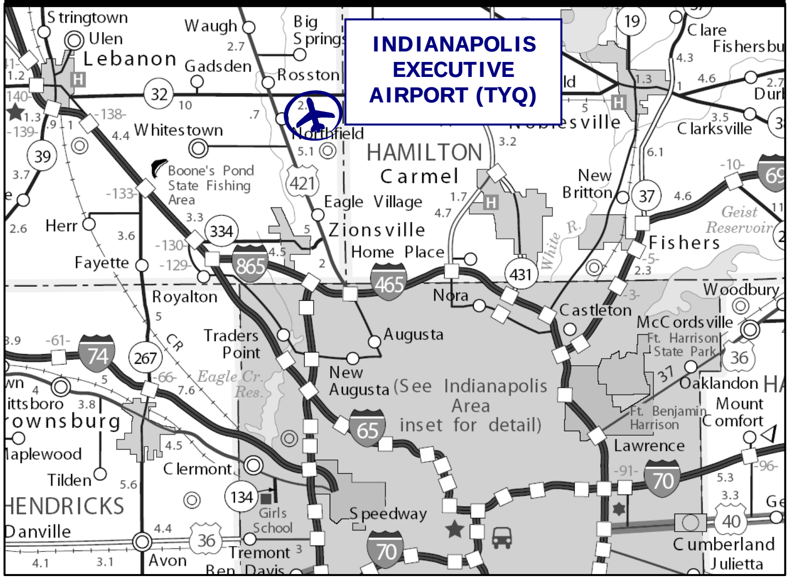


Source: Woolpert Inc., 2006.

AIRPORT LOCATION

As shown on **Exhibit 1-3**, TYQ is located in Boone County on Indiana State Route 32, one mile west of the Hamilton County line. It resides in Union Township, T18N, R2E, on Sections 1 and 12. The airport is twelve miles east of Lebanon, the county seat, and eight miles north of the Town of Zionsville. Interstate Route 65 runs in a northerly-southerly direction approximately twelve miles to the west of the airport while US Route 421 and US Route 31 also run in a northerly-southerly direction approximately two miles to the west and six miles to the east, respectively.

EXHIBIT 1-3: TYQ Airport Location



Source: INDOT, 2005; Aerofinity, 2006.

EXISTING AIRPORT FACILITIES

Airside

Airside facilities accommodate the movement of aircraft. TYQ's airside facilities consist of one north-south runway, a full parallel taxiway system, airfield lighting, navigational aids, and other pilot aids. Characteristics of the runway and taxiway systems, navigational aids, and other pilot aids at the airport are described in the following sections.

Runway 18-36

The primary runway, Runway 18-36, is left hand traffic for both ends and is 5,500 feet long by 100 feet wide. The runway is grooved asphalt designed for 60,000 lbs dual wheel (DW) and lighted with high intensity runway lights (HIRLs).

Runways are often served by some form of visual guidance for the pilot. Precision Approach Slope Indicators (PAPIs) or Vertical Approach Slope Indicators (VASIs) are navigational aids used to visually identify the glide path to the runway. PAPIs are the newer version of the equipment. VASIs are generally being phased out as replacement parts become unavailable. Runway 18 (north end) is served by a two box VASI, while Runway 36 (south end) is served by a two unit PAPI system. Both units are on the left side of the runway as viewed by an approaching pilot.

Runway 18-36 is served by Runway End Identifier Lights (REILs), which are flashing strobes aimed along the glide path to assist the pilot in identifying the end of the runway. The airfield lighting can be activated on the common traffic advisory frequency/Unicom (123.05 MHz). Runway 36 (south end which is served by the ILS) is marked with precision markings, while Runway 18 is marked with nonprecision markings. **Exhibit 1-4** summarizes the runway data and **Exhibit 1-5** shows the runway markings.

EXHIBIT 1-4: TYQ Runway Data Table

	Runway 18	**Runway 36**
Length (feet)	5,500	5,500
Width (feet)	100	100
Material	Asphalt	Asphalt
Condition	Fair	Fair
Strength (pounds)	60,000 DW / 45,000 SW	60,000 DW / 45,000 SW
Lighting	High	High
Traffic Pattern	Left	Left
Markings	Nonprecision	Precision
Visual Slope Indicator	VASI (2L)	PAPI (2L)
Approach Lighting	REILs	REILs
Instrument Approach	NDB; RNAV(GPS); VOR/DME	ILS or LOC; RNAV(GPS); VOR

Source: FAA 5010 Airport Master Records, GCR & Associates, Inc. Form 5010 Website (accessed 8/06).

EXHIBIT 1-5: TYQ Runway Markings

Source: Indiana Geographic Information Council: www.in.gov/igic/index.html (accessed 8/06).

There are specific areas beyond the ends and sides of the runway that the FAA requires to be clear. One such area is called the Runway Safety Area (RSA). It is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. The Object Free Area (OFA) is an area on the ground centered on a runway or taxiway centerline provided to enhance the safety of aircraft operations by having the area free of all objects not necessary for air navigation or aircraft ground maneuvering purposes. At TYQ the RSA and Runway Object Free Area (ROFA) extend 1,000 feet beyond the ends of Runway 18-36. The RSA is 500 feet wide and the ROFA is 800 feet wide centered on the runway centerline. The RSA and ROFA are clear except for runway, taxiway, and approach lighting systems that are fixed by function. The localizer serving Runway 36 is located approximately 1,250 feet north of the end of Runway 18, clear of the RSA and ROFA.

Taxiways

The runway at TYQ is served by a full parallel asphalt taxiway. The T-hangars are also served by a system of taxiways that connect to the terminal area and the runway. (**Exhibit 1-2**).

Pavement Condition

The Indiana Department of Transportation (INDOT) has evaluated the condition of the pavements at TYQ. The INDOT evaluation used a Pavement Condition Index (PCI) that is based on the quantity and type of distress visible at the pavement surface as a measure of the pavement deterioration. New pavement starts at a PCI of 100 and decreases as the pavement ages and incurs distress. The PCI evaluation is a tool for planning maintenance projects. When a pavement falls below an established minimum service level, more extensive rehabilitation or reconstruction is needed.

The most recent evaluation conducted by INDOT was in 2006 and showed the majority of the runway as being in fair condition with an average PCI of between 41-55. Accordingly the runway will need to be rehabilitated or reconstructed in the near future.

Navigational Aids

Navigational aids are essential to the utility of an airport. To serve its reliever function, TYQ must be accessible in poor weather conditions. The Category I (CAT I) ILS on Runway 36 provides minimums of 200-foot ceiling and ¾-mile visibility for all aircraft that can use the airport with the local altimeter setting. The ILS is a precision approach that provides the pilot with horizontal and vertical alignment information and is one of the most precise landing navigational system currently available.

There are also published nonprecision instrument approaches to Runways 18 and 36 utilizing either the Brickyard Very High Frequency Omni Range (VOR) or the Global Positioning System (GPS). Nonprecision approaches only provide horizontal alignment information to the pilot. As a less precise system, the associated minimums are higher than for a precision approach. **Exhibit 1-6** summarizes the instrument approaches serving TYQ. **Appendix C** displays the actual instrument approach charts for each approach.

EXHIBIT 1-6: TYQ Instrument Approaches

	Aircraft Approach Category (ceiling in feet- visibility in miles)[1]			
Approach	A	B	C	D
Runway 36 ILS[1] (ADF Required)	200 – ¾			
Runway 36 RNAV(GPS)	287 – 1			
Runway 36 VOR[1,2]	398 – 1			398 – 1¼
Runway 18 VOR/DME[1,2]	398 – 1			398 – 1¼
Runway 18 RNAV(GPS)[1]	398 - 1			398 – 1¼

[1] With local altimeter setting; minimums higher with Indianapolis International altimeter setting.

[2] Uses the Brickyard VOR located 12.6 nautical miles southwest of the airport.

Source: US Terminal Procedures Publication (d-TPP) Indianapolis Executive Airport Instrument Approach Charts, December 18, 2008.

Weather Reporting

The Automated Weather Observation System-3 (AWOS-3) located on TYQ provides local weather information to pilots 24 hours a day. The AWOS weather information is available via telephone (317.769.3154) or radio frequency (120.725 MHz). The continual availability of weather is important because a local altimeter setting is required to be able to fly the instrument approaches to the lowest published minimums.

Airport Beacon

The location and presence of an airport is universally indicated by an airport beacon. The airport beacon at TYQ is located northwest of the terminal building. As a civilian airport, the beacon is an alternating white and green light.

Remote Communication Outlet (RCO)

TYQ has a Remote Communication Outlet (RCO) on 121.725. According to the FAA *Pilot Controller Glossary,* an RCO is a remote communications facility controlled by air traffic personnel. They provide ground-to-ground communications between air traffic control specialists and pilots located at a satellite airport for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

Landside

Landside facilities are support facilities for operating aircraft at the airport, moving people, and transporting commerce between the air transportation system and the roadway network. **Exhibit 1-7** shows the location of the on-airport businesses and the other general aviation landside facilities in the terminal area at TYQ.

EXHIBIT 1-7: TYQ Airside and Landside Facilities

Source: Indiana Geographic Information Council: www.in.gov/igic/index.html (accessed 8/06); Montgomery Aviation: www.montgomeryaviation.net (accessed 8/06).

On-Airport Businesses

There is one aviation business located on the airport: Montgomery Aviation, the Fixed Base Operator (FBO) for the airport. Montgomery Aviation is also under contract to manage the airport.

Montgomery Aviation

Montgomery Aviation is a full-service FBO providing retail fuel sales, aircraft maintenance, aircraft charter, flight training, aircraft rental and sales, and fractional ownership. It is privately owned and has approximately 40 full and part time employees. Montgomery Aviation began operations at TYQ in 2000 and currently operates from facilities that include approximately 40,000 square feet for a maintenance shop, aircraft storage, lobby, conference rooms, and offices. Their newly constructed conventional/corporate hangar provides passenger loading and unloading under a large canopy, protecting the passengers from inclement weather. The FBO also provides aircraft in and out service, wash and wax, engine pre-heat, rental cars, and catering.

Montgomery Aviation maintains a fleet of six rental aircraft which include four Cessna 172s (180HP); one Cessna 182 (235HP); and one Cirrius SR20 (200HP). Additionally, the flying club, Eagle Flyers, is an organization that allows its members to fly aircraft owned by the club. While most club members pursue flying as a hobby, many commercial pilots also get their start in these organizations.

Aircraft Hangars

With the Midwest's hot summers (mean maximum temperature of approximately 86°F) and cold, snowy winters, most aircraft owners in this area of the country prefer aircraft storage in a hangar. Some of the initial hangars built at Terry Airport are still in use, but the variety and number of hangars at the current airport has grown. The hangars are generally used for based aircraft (aircraft stored at the airport when not in use), but also can be used to accommodate transient aircraft on a temporary basis.

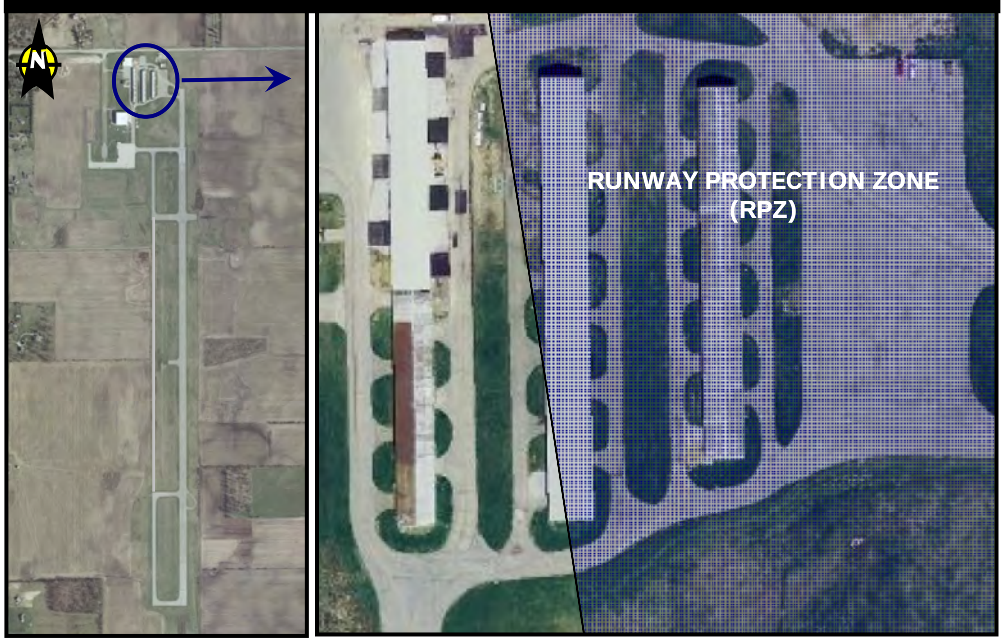
Conventional/Corporate Hangars

There are two, relatively new, large conventional/corporate hangars on the airport, which are owned by Montgomery Aviation, the FBO on the airport. Together, these hangars provide approximately 40,000 square feet of aircraft storage space. Each hangar can house 8 to 10 aircraft, depending on their size, accommodating any aircraft landing at the airport. There are also two smaller, older conventional hangars on the airport.

T-hangars

The airport has six sets of T-hangars containing 61 units available for smaller aircraft ranging in size from 39.6 feet by 30 feet to 55 feet by 40 feet. Two sets are owned by Hamilton County Airport Authority while the remaining four sets are owned by private corporations. The two T-hangar sets owned by Hamilton County fall within the Runway Protection Zone (RPZ) for Runway 18 (see **Exhibit 1-8**). The RPZ is a trapezoidal area established by the FAA to enhance the protection of people and property on the ground. RPZ's should be clear of incompatible objects. Accordingly, these hangars will need to be removed as new T-hangars are built to replace them. These units will house the Cessna 400 series twins, most MU-2's, the Eclipse Jets, Diamond Twin Stars, and most single engine aircraft.

EXHIBIT 1-8: TYQ T-hangars Impacted by RPZ



Source: Indiana Geographic Information Council: www.in.gov/igic/index.htm (accessed 8/06); 1992 TYQ ALP - Mid States; Aerofinity.

Aircraft Parking Aprons

There is one usable aircraft apron at Indianapolis Executive Airport that offers just over 105,000 square feet of aircraft parking (**Exhibit 1-9**). The FBO Service personnel are located in a small trailer on the northern edge of the apron. The apron is used to provide parking for transient aircraft, although some based aircraft may also be kept parked on the apron when not in use. As shown on the previous exhibit, an apron existed east of the T-hangars in the RPZ, and like the hangars, had to be abandoned when the new apron was built.

EXHIBIT 1-9: TYQ Apron Area

Source: Woolpert, 2006; Indiana Geographic Information Council: www.in.gov/igic/index.html (accessed 8/06); Aerofinity, 2006.

Auto Parking

There are approximately 80 designated automobile parking spaces in front of the conventional/corporate hangars owned by the FBO that house the terminal building (see **Exhibit 1-7**). Approximately 300 linear feet of unmarked parking is also available northwest of the apron (see **Exhibit 1-9**).

Administration/Maintenance

There are four maintenance facilities at TYQ used by Montgomery Aviation to support the management and operation of the airport. (See **Exhibit 1-7**.) These buildings are located just south of State Road 32 west of the T-hangars.

Fuel Tanks

The 100LL Avgas fuel is stored in a 10,000 gallon tank under the abandoned apron. A 12,000 gallon tank located underground just north of the new apron stores Jet-A fuel. There are spill containment measures in place for the fuel tanks. Both tanks are owned by the airport. All aircraft are currently fueled via a 1,200 gallon fuel truck for 100LL Avgas and a 3,000 gallon fuel truck for Jet-A. Montgomery Aviation owns the fuel trucks and provides all the fueling services.

Utilities

TYQ is in a rural setting, but utilities have expanded toward the airport. A 24" water line and a 2" gas line run southeast of the runway. There is no public sanitary currently available at the airport. The closest public sanitary is either approximately 2-3 miles to the south or 2-3 miles to the east. Where the airport will ultimately hook into sanitary has not yet been determined and is scheduled to be studied shortly. On site wells and sanitary mound systems will be required for all new development until public water and sewer are extended to the airport. Also, a natural gas line exists on the south side of SR 32 within the terminal development area.

An electrical vault is located just north of the large apron. It houses the regulators that are used to power the airfield lighting. There is not a back-up generator. In 2008 the airport began an airport electrical rehabilitation project for the existing runway and taxiway lights, airfield lighting cable, the VASI/PAPI regulator, VASI replacement with PAPI on Runway 18. The existing and proposed utilities are shown in **Appendix D**.

ADJACENT DEVELOPMENT

Although public airports don't pay property taxes on the property available for public use, they do provide economic benefits and employment to communities through the movement of people and goods. Many times the general public is unaware of the economic development opportunities provided by the airport. The Aviation Association of Indiana (AAI) conducts a biannual study of the economic impact of Indiana airports. In the 2001 study, total economic impact for TYQ was $14 million including direct, indirect, and induced impacts as well as transportation cost savings. Due to increased activity, the economic impact increased to $32 million by 2003 and $43,845,328 in 2005. It is important to note that in 2005, Montgomery Aviation paid approximately $515,000 in federal, state, and local taxes. (Note: The AAI study of the 2007 impact had not been published at time of this writing.)

Since TYQ is owned and operated by Hamilton County and managed by Montgomery Aviation, Boone County is in the enviable position of having a premier reliever airport without the financial or legal responsibility of operating it. The Boone County Comprehensive Plan includes TYQ as a land use in Boone County, as described in the Environmental Overview chapter, and encourages its improvements. Land development around the airport should be geared toward that which protects the flight paths of aircraft using the facility. Additionally, land uses that benefit from airport access should be encouraged to locate near it, while incompatible uses (such as residential subdivisions) should be discouraged.

FINANCIAL OVERVIEW

The purchase of TYQ by Hamilton County was made with cash and a promissory note to the Van Sickles, the former owners of the facility. After the purchase of the facility, a contract was executed with Montgomery aviation to manage the facility. Generally under the contract, Montgomery Aviation is responsible for maintenance, operations, concessions, security, and advertisement of the terminal; parking and rental car provisions; grounds and airfield maintenance; snow removal; ramp operations; airfield signage and navigation; air side security; fueling; public relations; and airport marketing. Hamilton County is responsible for FAA/AIP Regulatory and Grant Assurance Compliance; environmental, economic development, and land acquisition policy; debt issuance; legal and administrative proceedings; and long range planning.

Capital projects are the responsibility of Hamilton County. Projects that are eligible for FAA AIP grant funds are submitted to the FAA for possible funding; however, these grants are limited. Under current federal legislation, the airport is entitled to $150,000 annually as a non-primary entitlement grant (see Chapter 7, Implementation and Financial, for more information). Any funds above this are considered discretionary, and the airport must compete with other airports across the country for these additional funds.

The airport currently receives approximately $382,000 from the County General Fund (aka Fund #101) for operating the facility and providing for some building and structure repairs.

The airport owner receives a fuel flowage fee for all fuel sold at the airport and a fee for farm revenue from the FBO. The maximum amount for these two fees is $40,000 annually, provided in quarterly payments to the airport by the FBO when operating expenses are covered. This fee is deposited into a Revolving Airport Capital Fund (aka Fund #114) that is not available for use by the airport without an appropriation by the Hamilton County Council. Currently there is $115,093 in this fund, but only $20,000 has not been appropriated. **Exhibit 1-10** shows the general operating budget for the airport projected for 2009.

EXHIBIT 1-10: Airport Annual General Income and Expenses			
Expenses Budgeted		**Income Budgeted**	
COUNTY GENERAL FUND - AVIATION	**AMOUNT**	**FBO PAYMENT**	**AMOUNT**
Personnel	$2,100	**Maximum FBO Payment Fee**	**$40,000**
Supplies	$1,000	FUEL FLOWAGE FEE	
Other Services and Charges:		Fuel Sold (Gallons)	
- Building and Structure Repairs	$300,000	0 - 250,000 (Fee per Gallon)	19¢
- Legal Representation	$10,500	250,000 – 300,000	17¢
- Marketing and Advertising	$19,500	300,000 – 350,000	15¢
- Other Contractual Services	$30,000	350,000 – 400,000	13¢
- Other	$19,100	400,000 – 450,000	11¢
		450,000 – 500,000	9¢
		Over 500,000	5¢
		FARM PER ACRE FEE	varies
		RENT	**$0**
Grand Total	**$382,000**	**Grand Total**	**$40,000**

Source: Hamilton County Auditor's Office, 2008.

The airport currently also has access to a Revolving FAA Grant Fund (aka Fund #289) which is designed to pay the airports local share on FAA Grant Projects. As a result of a past County Council appropriation of $100,000, there is a balance of $39,514.46 that is available for use on FAA Grant Projects requiring a local share. (Assuming 2.5% local share, 2.5% INDOT match and 95% federal match this will cover FAA grants up to $1,580,578.40 total project cost.)

Additionally, an Environmental Fund (aka Fund #385) was established at the time the airport was purchased by Hamilton County. This fund currently holds $50,000 for environmental clean-up if it is needed, and the money needs to be appropriated before it can be used and can only be used for environmental clean-up.

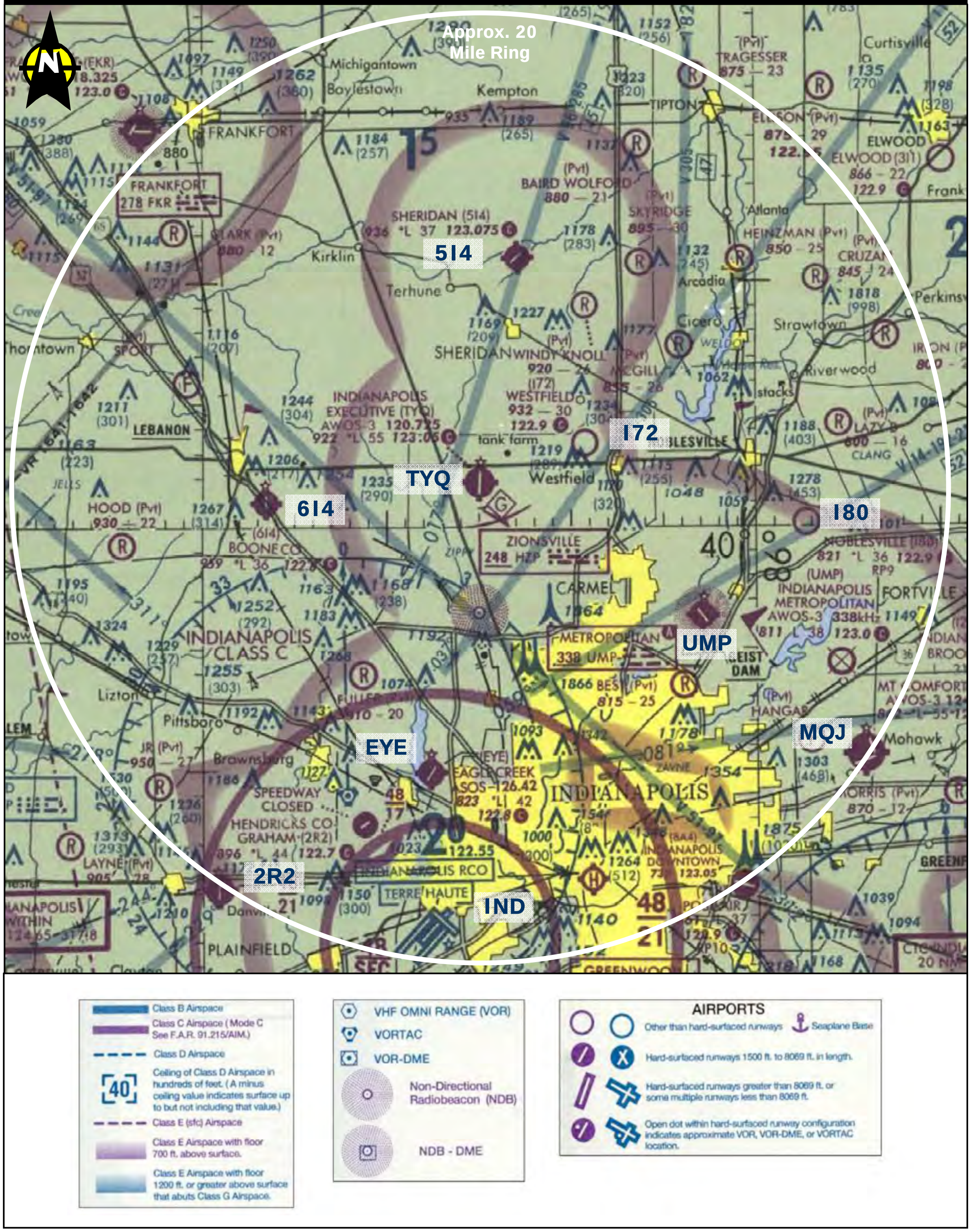
The airport has historically receives some funding from a Tax Increment Finance (TIF) district (Thomson-Meridian TIF) for land acquisition, airport development, runway repairs, and airport planning, but it is currently not budgeted to receive any future funds from this source. A TIF district dedicates all the increased taxes in an area scheduled for redevelopment to a special fund that can only be used for public purposes permitted by law. The Thompson-Meridian TIF was used to fund this Airport Master Plan. Therefore, as reimbursement is received for this project from the FAA, it will be put pack into the Thompson-Meridian TIF and require re-appropriation to TYQ if it is to be used at the airport. (NOTE: All reimbursement grants must go back to their originating fund. For example, reimbursement on land would go back to the Hamilton County Council Cumulative

Capital Development Fund as this was the fund that paid for the land. In order for the airport to access these reimbursed funds, County Council would have to appropriate them.)

SURROUNDING AIRPORTS

Exhibit 1-11 shows the airspace for TYQ as detailed on the Indiana Aeronautical Chart. There are nine public use airports located within a 20 nautical mile radius of Indianapolis Executive Airport, as shown on Exhibit 1-11. Five of those airports are owned by the Indianapolis Airport Authority. These airports are summarized on **Exhibit 1-12** and discussed in more detail in the following text. With the exception of Indianapolis International Airport, the traffic into these airports is primarily general aviation.

EXHIBIT 1-11: Surrounding Airports



Source: INDOT: Indiana Aeronautical Chart © 2005; NOT FOR NAVIGATION.

EXHIBIT 1-12: Airports Surrounding Indianapolis Executive Airport

Airport	Owner	Longest Runway	Best Approach	2007 Based Aircraft	2007 Operations
TYQ - Indianapolis Executive	Hamilton County Airport Auth.	5,500' x 100'	ILS Cat I, no approach lights	105[1]	49,413
MQJ - Mount Comfort	Indianapolis Airport Auth.	5,500' x 100'	ILS Cat I	153	57,681
EYE - Eagle Creek Airpark	Indianapolis Airport Auth.	4,200' x 75'	LOC	123	46,371
2R2- Hendricks County	Indianapolis Airport Auth.	4,400' x 100'	Proposed GPS	49	18,005
IND - Indianapolis International	Indianapolis Airport Auth.	11,200' x 150'	ILS Cat III	96	203,136
UMP - Indianapolis Metropolitan	Indianapolis Airport Auth.	3,850' x 100'	GPS	107	41,623
I80 - Noblesville	Private	3,580' x 100'	Visual	24[2]	7,000[2]
6I4 - Boone County	Private	3,600' x 30'	Visual	24	9,729
5I4 - Sheridan	Private	3,760' x 50'	GPS	30	12,672
I72 - Westfield	Private	3,000' x 100'	Visual	17[2]	8,075[2]

Sources: [1]Montgomery Aviation, 2007; [2]FAA 5010 Airport Master Records, GCR & Associates, Inc. Form 5010 Website (accessed 8/06); INDOT, 2008.

Mount Comfort Airport (MQJ), located approximately 20 nautical miles southeast of TYQ is owned by the Indianapolis Airport Authority and is available for public use. It is classified under the NPIAS as a reliever to Indianapolis International Airport. It has two runways (5,500 feet by 100 feet and 3,901 feet by 75 feet) and is served by an ILS to Runway 25 with minimums of 200 feet above ground level ceiling (AGL) and ½ mile visibility. According to INDOT records, it is home to approximately 153 based aircraft and 58,000 annual operations.

Eagle Creek Airpark (EYE), located approximately 13 nautical miles south of TYQ, is owned by the Indianapolis Airport Authority and is available for public use. It is classified under the NPIAS as a reliever to Indianapolis International Airport. It has one runway 4,200 feet long by 75 feet wide and is served by a localizer instrument approach (LOC) with minimums of 497 feet AGL and ¾ mile visibility. According to INDOT records, it is home to approximately 123 based aircraft and 46,000 annual operations.

Hendricks County Airport-Gordan Graham Field (2R2), located approximately 20 nautical miles southwest of TYQ, was opened by the Indianapolis Airport Authority in December 2000 as a replacement for Speedway Airport. It is classified in the NPIAS as a general aviation airport. It has one runway that is 4,400 feet long by 100 feet wide. According to INDOT records, it is home to 49 based aircraft and approximately 18,000 annual operations.

Indianapolis International Airport (IND), located approximately 19 nautical miles south of TYQ, is a public use airport owned by the Indianapolis Airport Authority and offers commercial air carrier services. Its longest runway is 11,200 feet long by 150 feet wide. It is served by a Category III ILS. It is surrounded by Class C controlled airspace. Class C airspace is generally established from the surface to 4,000 feet above the airport elevation extending five nautical miles from the airport, and from 1,200 feet AGL to 4,000 feet above the airport elevation extending an additional five miles from the airport. It is established around those airports that are serviced by a radar approach control that provides services for aircraft under visual flight rules (VFR) and instrument flight rules (IFR) on a full-time basis. To operate in Class C airspace, pilots must establish and maintain two-way radio communications with air traffic control prior to entering the airspace and have an operating Mode C transponder. According to INDOT records, it is home to approximately 96 based aircraft and has approximately 203,000 annual operations, of which about 28,000 are by general aviation aircraft.

Indianapolis Metropolitan Airport (UMP), located approximately 11 nautical miles southeast of TYQ, is owned by the Indianapolis Airport Authority and is available for public use. It is classified under the NPIAS as a reliever to Indianapolis International Airport. It has one paved runway 3,850 feet long by 100 feet wide, and is served by a GPS approach with minimums of 375 feet AGL and 1 mile visibility. According to INDOT records, it is home to 107 based aircraft and has an approximately 42,000 annual operations.

Noblesville Airport (I80), located approximately 13 nautical miles east of Indianapolis Executive Airport, is privately owned and available for public use. It has one turf runway 3,580 feet long by 100 feet wide. There is no published instrument approach. It is home to 22 based aircraft and approximately 7,000 annual operations.

Boone County Airport (6I4), located approximately 9 nautical miles north of TYQ, is privately owned and available for public use. It has one asphalt runway 3,600 feet long by 30 feet wide. There is no published approach. According to the INDOT records, it is home to 24 based aircraft and approximately 10,000 annual operations.

Sheridan Airport (5I4), located approximately nine nautical miles north of TYQ, is privately owned and available for public use. It has one asphalt runway 3,760 feet long by 50 feet wide and a turf runway 3,590 feet long by 88 feet wide. There is a GPS published approach with minimums of 500 above ground level ceiling and 1 mile visibility. It is home to 36 based aircraft and approximately 13,000 annual operations.

Westfield Airport (I72), located approximately four nautical miles east of TYQ, is privately owned and available for public use. It has one turf runway 3,000 feet long by 100 feet wide. There is no published instrument approach. It has approximately 17 based aircraft and 8,000 annual operations.

Excluding Noblesville and Sheridan airports, all of the facilities discussed above were recommended in the *1993 Indianapolis Metropolitan Airport System Plan* as critical to the system. Of all the facilities within 20 nautical miles of TYQ, five are owned by the Indianapolis Airport Authority while the others are privately owned. This is of particular interest to the Hamilton County Airport Authority because, according to the NPIAS, airports have been closing at a rate of approximately 11 per year from 2001 to 2004, and privately-owned public-use airports are much easier to close than publicly-owned facilities. When an airport is privately owned its future is even less certain, particularly as development encroaches. According to the US General Accounting Office report *General Aviation: Status of the Industry, Related Infrastructure, and Safety Issues* published in August of 2001, there is "greater resistance to airports by the public, including efforts to close airports—particularly privately owned airports—as a way of reducing noise in residential areas and obtaining large parcels of open land for revenue-generating development." Brookside Airport, one of the private airports previously within TYQ's service area, closed in 2003.

When an airport closes, the aircraft based there need to find accommodations elsewhere, thus impacting surrounding airports. Accordingly, the influence that the surrounding airports could have on TYQ should also be considered. Together, the four private airports provide a home base for over 100 aircraft. If these facilities were to close, those aircraft would have to be accommodated at existing airports.

Market areas can also be considered from a perspective of facilities available to accommodate transient traffic. Besides Indianapolis International Airport, currently only one of the Indianapolis metropolitan airports has a runway capable of serving most business jets: Mount Comfort Airport (5,500 feet by 100 feet). The airport a business uses is influenced both by final destination and by services available.

AIRPORT USERS

The based aircraft at TYQ have been steadily growing over the last few years. As shown in **Exhibit 1-13,** based aircraft have increased from 46 in 2000 to 105 in 2007 due to increased activity. The 2006 fleet mix for TYQ based aircraft is shown in **Exhibit 1-14** below. The majority of based aircraft are piston driven, while sixteen are jets.

EXHIBIT 1-13: Based Aircraft	
Year	**Aircraft**
2000	46
2001	51
2002	57
2003	58
2004	59
2005	79
2006	91
2007	105

Source: 2000-2004: INDOT; 2005-2007: Montgomery Aviation.

According to the NPIAS, the airport system should provide as many people as possible with convenient access to air transportation, typically not more than 20 miles of travel to the nearest airport. In addition to the recommended service area established by the NPIAS 20 mile ring, the market area of an airport should also consider the addresses of the owners of the based aircraft. The current market area of TYQ's based aircraft owners is outlined in **Exhibit 1-15 and 1-16.**

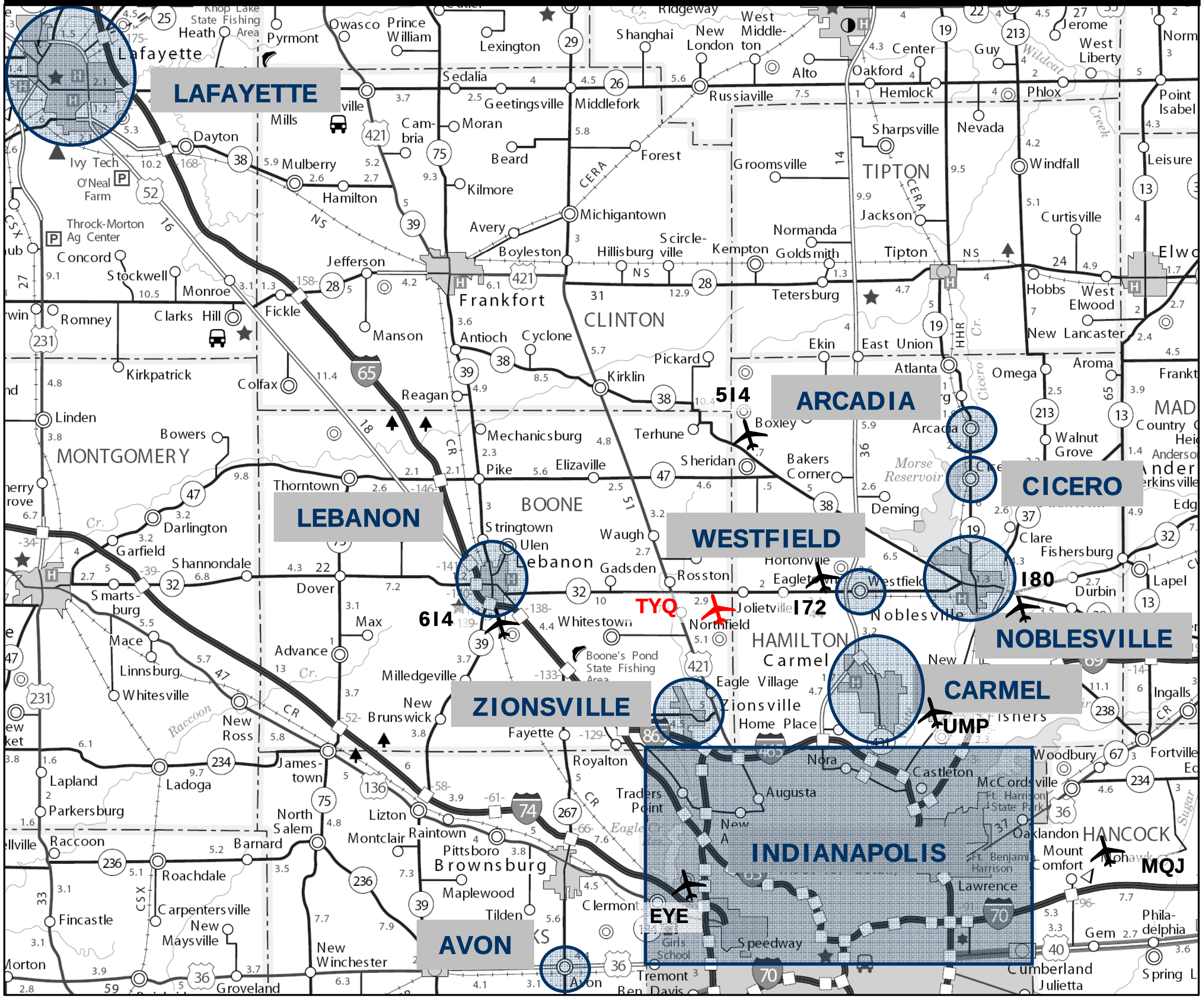
EXHIBIT 1-14: 2006 Fleet Mix				
Aircraft Type	**Type**	**Percent**	**Percent Piston**	**Percent Jet**
Single Engine Piston	71	78.0%	82.4%	
Multi Engine Piston	4	1.1%		
Single Engine Jet-Turbo Prop	1	4.4%		17.6%
Multi Engine Jet-Turbo Prop	6	6.6%		
Multi Engine Jet-Turbo Fan	2	2.2%		
Multi Engine Jet-Turbo Jet	7	7.7%		
Total	91	100.00%		

Source: Montgomery Aviation, 2007; Aerofinity, 2007.

EXHIBIT 1-15: 2006 Based Aircraft - Market Area			
City	**Percentage**	**County**	**Percentage**
Arcadia	1.10%	Boone County	23.08%
Avon	1.10%	Hamilton County	37.36%
Carmel	24.18%	Marion County	31.87%
Cicero	3.30%	Other	7.69%
Indianapolis*	23.08%		
Lafayette	2.20%		
Lebanon	3.30%		
Noblesville	5.49%		
Westfield	3.30%		
Zionsville	28.57%		
Other	4.40%		
Total	**100.00%**		

Source: Montgomery Aviation, 2007; Aerofinity, 2007.

EXHIBIT 1-16: 2006 Based Aircraft Market Area



Source: INDOT, 2007; Aerofinity. 2007.

Pilots fly under visual flight rules (VFR) or instrument flight rules (IFR). Under VFR, pilots fly by visual reference to the ground, are not allowed to enter clouds, and are not normally under air traffic control. Under IFR, pilots fly by reference to their cockpit instruments, are permitted to fly into clouds, and are under air traffic control. Most business aircraft operate on IFR (instrument flight rules) flight plans. Flight plans are plans filed by pilots with the FAA prior to flying, and they include such information as the aircraft's registration number, departure and arrival airports, estimated time, alternate airports in the event of bad weather at the destination airport, the pilot's name, and number of passengers. In the United States, flight plans are required for flights under IFR. A review of all the IFR flight plans filed to and from the airport is shown in **Exhibit 1-17**:

EXHIBIT 1-17: TYQ IFR Flight Plans			
	2005	**2006**	**2007**
Total number of IFR flight plans filed in and out of TYQ.	5,114	5,792	6,084
Total number of IFR flight plans filed by business jets.	2,337	2,498	3,084

Source: FAA, 2008.

IFR flight plans have risen from 2005 to 2007. Aircraft departures play a role in the runway length of an airport. The size of the aircraft, the distance it travels, and the load it carriers determines the runway length required for it to takeoff. **Exhibit 1-18** details the distance traveled by aircraft on an IFR flight plan departing from TYQ.

EXHIBIT 1-18: 2007 IFR Departure Destination Distances	
Distance from TYQ to destination	**Total Flights**
1,000 NM or more	143
750 – 999 NM	287
500 – 749 NM	486

Source: FAA, 2008

AIRSPACE/AIR TRAFFIC CONTROL CONSIDERATIONS

As shown on **Exhibit 1-11**, TYQ is surrounded by Class E controlled airspace. Class E airspace is generally established at an airport with an instrument approach. At TYQ, it is established from 700 feet AGL to the overlaying adjacent controlled airspace, and configured to contain all instrument approach procedures (IAP). Although outside the Class C airspace for Indianapolis International Airport, aircraft operating at TYQ are provided with radar service by Indianapolis Approach Control. Eagle Creek, Sheridan, and Indianapolis Metropolitan are the closest airports to TYQ with instrument approach procedures. Due to their close proximity, there are some overlapping instrument procedures that Indianapolis Approach Control must coordinate to maintain proper separation between the aircraft.

When an aircraft is flying the ILS to Runway 36 at TYQ, approach control must keep the airspace north of the airport clear to accommodate a potential missed approach until the pilot reports landing or cancels his/her Instrument Flight Rules (IFR) flight plan on final. Also, an aircraft departing TYQ may be held if an aircraft is flying an IAP into Metropolitan Airport or to Runway 21 at Eagle Creek. It may also be held if an aircraft is departing to the northwest at Metropolitan or to the northeast at Eagle Creek in IFR conditions.

TYQ, Metropolitan, and Eagle Creek airports are heavily used general aviation airports for IFR operations. When aircraft are in radar control, the required separation is 3 miles and 1,000 feet. When an aircraft has been cleared for an IFR operation, but is not in radar control because they are communicating on the local airport frequency, the airport is closed to any other IFR traffic and increased separation is required until they make radar contact or cancel IFR. With the current operational volumes at the airports, approach control can typically vector the aircraft with minimal delay. However, it is important that pilots use the RCO at TYQ to open an IFR flight plan only when ready to depart, and cancel as soon as possible upon landing to minimize the periods of no radar contact.

INVENTORY SUMMARY

TYQ is a busy general aviation airport providing reliever services for Indianapolis International Airport. Since its transfer to public ownership in 2003, based aircraft and operations have grown and this growth is anticipated to continue. The airport provides aviation access to Boone County, Hamilton County, and the Indianapolis metropolitan area. With the continued success of TYQ, the remainder of this Airport Master Plan will project future airport usage, compare it to the existing facilities, and identify what improvements may be desirable to increase the value of this important asset for the users and surrounding community. This chapter provides the background for the master plan. The next chapter, *Aviation Forecasts*, will examine the past, current, and projected activity at the airport in more detail.

INTRODUCTION

The aviation forecasts contained within this chapter were completed and approved by the FAA (see **Appendix L**) early in the master planning process to allow for the facilities requirements and alternatives sections of the plan to be completed, as these sections build upon the results of the forecasts.

Aviation activity forecasts play an important role in airport planning. An airport's full potential resides in the phrase "unconstrained demand," describing the optimal environment in which the airport's resources can be maximized. Defining the reasonable level of unconstrained demand for an airport, or activity level that can be expected to occur over a long-term planning period, is the foundation of facility planning.

Forecasting is both an art and a science. Data collected for the airport and surrounding area is used to define the forecast levels of aviation activity during the planning period. Year-to-year variation, however, is difficult to predict with any level of certainty over a 20-year planning period. Many factors affect aviation activity at the local, regional, and national levels. While actual development investment is made based upon realized demand, the planning that precedes it should be made in an optimal environment that looks at full potential.

The first step to update the aviation forecasts at Indianapolis Executive Airport is to define the standard indicators of aviation activity and identify what data are available to represent these indicators. The next step is to review past studies for the airport to identify any previously used forecasting processes. The findings of these studies are compared to the actual historic activity to help identify what forecasting methodologies appear to be the most applicable to the airport.

As a part of updating the airport's forecasts, local socioeconomic indicators are reviewed to determine the applicability of national trends to the activity at Indianapolis Executive Airport. Various forecasting resources are then used as the basis for preparing updated forecasts of based aircraft, aircraft operations, peak operations, and critical aircraft expected to operate at the airport.

EXISTING AVIATION ACTIVITY INDICATORS

There are two primary measures of aviation activity at general aviation airports: based aircraft and annual operations. Based aircraft are those aircraft that are kept at the airport either in hangars or tied-down when not in use. Annual operations are the total of all types of operations (takeoffs and landings) that occur at the airport in a year. Data have been collected for existing and historic levels of based aircraft and annual operations at Indianapolis Executive Airport and are used as the starting point for preparing updated aviation activity forecasts.

BASED AIRCRAFT

Per the based aircraft list supplied by Montgomery Aviation, the airport management company, as of August 2006 there were 91 based aircraft at Indianapolis Executive Airport (TYQ). The majority of the aircraft are single engine as shown in **Exhibit 2-1**. As shown in **Exhibit 2-2**, 23% of the current based aircraft are owned by individuals or businesses located in Boone County; 37% by individuals or businesses located in Hamilton County; and 32% by individuals or businesses in Marion County. The remaining 8% of based aircraft are owned by individuals or business located in other areas of Indiana or outside of the state. The largest aircraft based at TYQ Airport is the Gulfstream II.

EXHIBIT 2-1: Fleet Mix Aircraft Type	**Type**
Single Engine Piston	71
Multi Engine Piston	4
Turbo Prop	7
Jet	9
Total	91

Source: Montgomery Aviation; Aerofinity, Inc. 2006.

A number of factors affect an aircraft owner's decision of where to base his/her aircraft. Location relative to the owner's home or business is usually a strong consideration. Other factors include availability of hangar and/or tie-down space, rental rates for such space, facilities available at the airport,

EXHIBIT 2-2: Based Aircraft – Market Area

City	**Percentage**	**County**	**Percentage**
Arcadia	1.10%	Boone County	23.08%
Avon	1.10%	Hamilton County	37.36%
Carmel	24.18%	Marion County*	31.87%
Cicero	3.30%	Other	7.69%
Indianapolis*	23.08%		
Lafayette	2.20%		
Lebanon	3.30%		
Noblesville	5.49%		
Westfield	3.30%		
Zionsville	28.57%		
Other	4.40%		
Total	**100.00%**		

Surrounding Counties:

**All Marion County based aircraft owners are located North of US 36 and Washington St. as shown by the dotted line.*

Source: Montgomery Aviation, Aerofinity, Inc., INDOT, 2006.

and services provided by the fixed base operator (FBO).

The Indiana Department of Transportation (INDOT), Office of Aviation, maintains a database of based aircraft at Indiana airports. **Exhibit 2-3** contains the historical based aircraft data for Indianapolis Executive Airport until 2006. The 2005 figure from INDOT for Indianapolis Executive Airport was not as current as that provided by the FBO. Also, INDOT's records stopped at 2005. Accordingly, 2005 and 2006 figures are provided by the FBO, Montgomery Aviation. From 1978 to 2005 total based aircraft at Indianapolis Executive Airport has fluctuated from a low of 37 in 1984 to a high of 91 in 2006. A significant increase in the number of based aircraft occurred between 2004 and 2006. A portion of that increase is attributed to the construction of new hangars at the airport.

EXHIBIT 2-3: Historic Based Aircraft Records for Indianapolis Executive Airport

Year	Based Aircraft	Percent Change
1978	46	
1979	57	23.9%
1980	56	-1.8%
1981	55	-1.8%
1982	51	-7.3%
1983	40	-21.6%
1984	37	-7.5%
1985	41	10.8%
1986	43	4.9%
1987	49	14.0%
1988	45	-8.2%
1989	53	17.8%
1990	48	-9.4%
1991	49	2.1%
1992	43	-12.2%
1993	44	2.3%
1994	44	0.0%
1995	58	31.8%
1996	49	-15.5%
1997	49	0.0%
1998	75	53.1%
1999	50	-33.3%
2000	46	-8.0%
2001	51	10.9%
2002	57	11.8%
2003	58	1.8%
2004	59	1.7%
2005	79	33.9%
2006	91	15.3%

Source: 2005 and 2006 data from Montgomery Aviation, August 2006; 1978 – 2004 data from Indiana Department of Transportation.

ANNUAL OPERATIONS

Operations data for Indianapolis Executive Airport were obtained from INDOT. Since 1989, INDOT has conducted a traffic counting program by sampling aircraft operations for multiple weeks at each of the 69 facilities in the Indiana State Aviation System (ISASP) every three to five years on a rotating basis. (The ISASP includes landing facilities that are considered to be of statewide importance to provide adequate aviation access for the state's population.) The multi-week sample is then extrapolated into an annual operations estimate via monthly factors that are established from operations records at towered airports in Indiana. The annual operations estimate is used to establish an operations per based aircraft (OPBA) level by dividing the annual operations by the total based aircraft. For the years between actual samples, annual operations are estimated by multiplying the OPBA by the current based aircraft level. The last operations count at Indianapolis Executive Airport was completed in 2002. The annual operations records and resulting OPBA are shown in **Exhibit 2-4**.

EXHIBIT 2-4: Annual Operations at Indianapolis Executive Airport

Year	Based Aircraft	OPBA	Total Operations	Operations Percent Change
1990	48	436.0	20,928	
1991	49	436.0	21,364	2.1%
1992	43	645.9	***27,775***	30.0%
1993	44	646.0	28,424	2.3%
1994	44	840.9	***36,998***	30.2%
1995	58	841.0	48,778	31.8%
1996	49	840.8	41,200	-15.5%
1997	49	840.8	41,200	0.0%
1998	50	499.8	***37,485***	-9.0%
1999	50	499.8	24,990	-33.3%
2000	46	499.8	22,991	-8.0%
2001	51	499.8	25,490	10.9%
2002	57	490.5	***27,956***	9.7%
2003	58	490.5	28,447	1.8%
2004	59	490.5	28,937	1.7%
2005	79	490.5	38,710	33.8%
2006	91	490.5	44,632	15.3%

Bold italic indicates sample count taken during that year, resulting in new OPBA.
Source: Indiana Department of Transportation, 1990-2004; Montgomery Aviation 2005 - 2006.; 1998 Based Aircraft interpolated by Aerofinity.

PRIOR FORECAST METHODOLOGY/FINDINGS

Other resources were also referenced to identify the aviation activity at Indianapolis Executive Airport. Additional sources of information include the *1988 Environmental Assessment, 1993 Metropolitan Airport System Plan, 2003 Indiana State Aviation System Plan (ISASP), Federal Aviation Administration (FAA) Aerospace Forecasts,* and the *FAA Terminal Area Forecasts (TAF).*

Prior Local Forecasts

1988 ENVIRONMENTAL ASSESSMENT

An environmental assessment (EA) was prepared for Terry Airport, now known as Indianapolis Executive Airport, in 1988 for expansion and multiple improvements of the facility. This EA included a forecast of future traffic. **Exhibit 2-5** displays the operations and based aircraft for the airport for the years 1989–2009 from the EA.

EXHIBIT 2-5: Indianapolis Executive Airport Forecasts – 1988 EA

INDIANAPOLIS TERRY AIRPORT
FORECAST OF FUTURE TRAFFIC

ITEM	1989	1994	1999	2004	2009
Total Based Aircraft	49	76	102	126	150
Single Engine Piston	29	48	64	78	92
Multi Engine Piston	5	6	10	14	18
Turboprop	1	2	3	4	4
Turbojet	0	1	1	1	2
Glider	14	19	24	29	34
Total Operations	19,600	33,750	50,500	69,300	90,000
Local	15,200	24,150	35,500	47,800	61,500
Itinerant	4,400	7,600	12,000	17,000	23,000
Turbine Operations	300	2,000	3,000	4,500	5,500
Turboprop	180	1,400	2,000	2,900	3,400
Turbojet	120	700	1,000	1,600	2,100
Peak Hour Traffic	16	28	42	58	75
Enplaned Passengers	15,500	28,560	42,200	57,900	74,100
Peak Hour Pilots & Passengers	48	85	126	173	223

Source: Improvement and Expansion of Indianapolis Terry Airport, Environmental Assessment, December, 1988, Mid States Engineering.

In comparing these forecasts to current conditions, the 2004 based aircraft and operations levels were below the forecast 2004 levels because traffic did not increase as anticipated. This may have been due to limited service or facilities offered at the airport.

1993 METROPOLITAN AIRPORT SYSTEM PLAN

A Metropolitan Airport System Plan (MASP) was initially developed for the Indianapolis Metropolitan Area in 1975 and was updated in 1993. Terry Airport (now Indianapolis Executive Airport) was one of the reliever facilities of the Indianapolis MASP. The forecast process for this plan reviewed the national and regional trends and forecasts, allocated the regional aircraft totals to county and sub-county planning units, and forecast the based aircraft, by type, for each of the airports in the metropolitan system.

The MASP examined the historic based aircraft and annual operations for Indianapolis Executive Airport. The plan predicted growth in based aircraft and annual operations from 1992-2012. Based aircraft were forecast to increase from 43 in 1992 to 82 in 2012. Annual operations were forecast to increase from 27,775 in 1992 to 44,700 in 2012, with a 45%-55% split between local and itinerant operations respectively. In comparing these forecasts to current conditions, the 2006 based aircraft level has already exceeded the forecasted 2012 level. Additionally, the 2006 operations level has essentially met the 2010 forecast.

2003 INDIANA STATE AVIATION SYSTEM PLAN

The most recent forecasts prepared for Indianapolis Executive Airport are in the Indiana State Aviation System Plan (ISASP), completed in December 2003. The ISASP reviewed the aviation activity in Indiana as a whole. As a part of the ISASP, individual facility forecasts were prepared based on analysis of factors affecting aviation activity at the national, state and local levels. The ISASP consists of 69 aviation facilities of statewide importance.

The ISASP used a uniform forecasting methodology that could be applied to many airports, which is reasonable given the statewide focus of the system plan, but may be less than ideal when examining airports on an individual basis. To produce a preferred final based aircraft forecast, the ISASP used an average of the market share, trend, and mean of the regression (population, employment, and total income) forecasts. The operations forecasts were prepared by using the mean of the most recent OPBA (current conditions) and the average of the actual OPBAs within the last five years (reducing the effect of random variation). If an airport had only one or no samples of traffic taken within the last five years, the most recent OPBA was used to forecast operations. The resulting ISASP forecasts for Indianapolis Executive Airport are shown in **Exhibit 2-6**. In comparing the ISASP forecasts to current conditions, the 2006 actual based aircraft and operations levels have already exceeded the forecasted 2023 levels. For the ISASP, the uniform forecasting methodology resulted in forecasts that were overly conservative for Indianapolis Executive Airport. This arises from the localized growth in based aircraft at the airport in recent years.

EXHIBIT 2-6: Indianapolis Executive Airport Forecasts from ISASP

	Based Aircraft	Operations
2003	55	30,436
2004	56	30,605
2005	56	30,796
2006	56	30,980
2007	57	31,174
2008	57	31,372
2009	57	31,567
2010	58	31,758
2011	58	31,947
2012	59	32,135
2013	59	32,328
2014	59	32,518
2015	60	32,716
2016	60	32,912
2017	60	33,110
2018	61	33,308
2019	61	33,508
2020	61	33,707
2021	62	33,910
2022	62	34,112
2023	63	34,319

Source: Source: Indiana State Aviation System Plan, December 2003.

The change in airport ownership from private to public and the appearance of Montgomery Aviation, the FBO, on the airport has resulted in greater growth than predicted in the ISASP. The airport's origins began in 1957 as a privately-owned public-use airport. The facility was not acquired by a public entity until 2003 when Hamilton County purchased it; thus it's growth was restricted by the limited availability of private funds.

FEDERAL AVIATION ADMINISTRATION FORECASTS

FAA Aerospace Forecasts

One resource commonly reviewed for aviation forecasting purposes is the *FAA Aerospace Forecasts*. The FAA uses the economic performance of the United States as an indicator of future aviation industry growth. The latest edition released in March 2006, which forecasts aviation activity for fiscal years 2006-2017, was used in this forecasting process.

The *FAA Aerospace Forecasts 2006-2017* identified that "despite a slowdown in the demand for business jets over the past several years, the current forecast assumes that business use of general aviation aircraft will expand at a more rapid pace than that for personal/sport use. The business/corporate side of general aviation should continue to benefit from a growing market for new very light jets (VLJ). In addition, safety/security concerns for corporate staff, combined with increased processing times at some U.S. airports have made fractional ownership (shared ownership in aircraft operated by an aircraft management company), corporate and on-demand charter flights practical alternatives to travel to commercial flights."

VLJ's are relatively inexpensive twin-engine jets (priced between $1 and $2 million). Industry experts suggested that the market for new VLJ's could add 500 aircraft a year to the active fleet by 2010. The VLJ's may have the potential to redefine the business jet segment by expanding business jet flying and offering performance that could support a true on-demand air-taxi business. The *FAA Aerospace Forecasts 2006-2017* assumes that VLJ's will begin to enter the active fleet in 2006 (100 aircraft) and grow by 400 to 500 aircraft per year after that, reaching 4,950 aircraft by 2017.

In 2005, the FAA created a new category of aircraft (light-sport aircraft) that were not included in the FAA's aircraft registry counts. Light sport aircraft are simple, very basic, lightweight, low-performance aircraft other than helicopter or powered lift. Many of these aircraft have existed as ultralight aircraft and, with the change in regulations, must now be certified as light-sport aircraft. The forecast assumes registration of 10,000 aircraft over a six-year period beginning in 2005. The *FAA Aerospace Forecasts 2006-2017* projected light-sport aircraft to total roughly 14,000 in 2017.

Overall, the *FAA Aerospace Forecasts 2006-2017* project the active general aviation fleet to increase at an average annual rate of 1.4 percent over the 12-year forecast period, from an estimated 214,591 aircraft in 2005 to 252,775 aircraft in 2017. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at an average of 4 percent a year over the 12-year forecast period, with the turbine jet fleet doubling in size.

The number of piston-powered aircraft (including rotorcraft) is projected to increase an average of 1 percent yearly from 193,098 in 2005 to 218,415. Within the piston-powered forecast, single-engine and multi-engine piston aircraft are anticipated to grow slowly at 0.3 and 0.1 percent respectively. The higher overall piston-powered growth is due to a projected 6.7 percent average annual growth in piston rotorcraft. The piston-powered aircraft growth is low because this forecast assumes the relatively inexpensive VLJ's and new light-sport aircraft could dilute or weaken the replacement market for piston aircraft.

The number of general aviation hours flown is projected to increase by 3.2 percent yearly over the 12-year forecast period, due to increasing utilization rates. The increased utilization rates come from increased flying by business and corporate aircraft and increased utilization of piston aircraft. The hours flown by turbine aircraft are forecast to increase 6.4 percent yearly for the forecast period, compared to 1.8 percent for piston aircraft. Jet aircraft account for most of the increase, expanding at an average annual rate of 10.2 percent over the 12 years. This forecast increase in jet hours is due to the introduction of VLJ's as well as increases in the fractional ownership fleet and its activity levels. Also, the *FAA Aerospace Forecasts 2006-2017* estimate that fractional ownership aircraft fly about 1,200 hours annually, compared to 350 hours for business jets in all applications. The use of VLJ's is unknown, and the FAA forecast estimates it to be close to the utilization rates achieved by fractional operators.

The FAA Aerospace Forecasts also project general aviation activity at FAA and contract towers. While Indianapolis Executive Airport does not have a tower, it is another indicator of general aviation activity. General aviation activity at towers was down 2.5 percent in 2005 and is projected to be down slightly at 0.1 percent in 2006 before increasing 2.8 percent in 2007. The large increase in 2007 is from the extra activity at seven new FAA/contract towers that were not previously in the database. For the balance of the forecast period through 2017, general aviation activity at towered airports is forecast to increase at an average annual rate of 2.0 percent. The forecast growth in general aviation activity at towered airports is somewhat lower than the forecast growth rate for general aviation hours flown. The higher growth of general aviation hours flown reflects the longer trip lengths associated with the growth in business and corporate aircraft utilization.

FAA Long-Range Aerospace Forecasts

The most recent *FAA Long-Range Aerospace Forecasts Fiscal Year 2020, 2025, and 2030* were published in August 2006 and are based on the *FAA Aerospace Forecasts 2006-2017* discussed previously. The FAA's long-range forecast was developed to meet the FAA's periodic need for forecasts that extend beyond 2016. In the long-range forecasts, the general aviation fleet is forecast to grow at an average annual rate of 1.4 percent during the intermediate forecast period and 1.2 percent over the extended forecast period.

EXHIBIT 2-7: FAA Terminal Area Forecasts (TAF) Indianapolis Executive Airport

Year	Based Aircraft	Operations
2000	58	45,282
2001	58	45,282
2002	57	27,920
2003	57	27,920
2004	59	28,937
2005*	59	28,937
2006*	59	28,937
2007*	61	28,937
2008*	61	28,937
2009*	61	28,937
2010*	61	28,937
2011*	62	28,937
2012*	63	28,937
2013*	63	28,937
2014*	65	28,937
2015*	66	28,937
2016*	66	28,937
2017*	67	28,937
2018*	67	28,937
2019*	68	28,937
2020*	68	28,937
2021*	69	28,937
2022*	70	28,937
2023*	70	28,937
2024*	70	28,937
2025*	70	28,937

*Forecast Years
Source: FAA Terminal Area Forecasts, 2006.

Terminal Area Forecasts (TAF)

To address anticipated local levels of aviation activity, the FAA prepares and publishes Terminal Area Forecasts (TAF) for each airport in the National Plan of Integrated Airport Systems (NPIAS). The TAF is used by the FAA in budgeting and facility planning. The TAF provides information that is commonly used as reference in the aviation industry for other planning purposes. **Exhibit 2-7** summarizes the FAA TAF historic based aircraft and operations records, along with its forecast based aircraft and operations forecasts for Indianapolis Executive Airport.

For general aviation and reliever airports, the FAA's TAF tends to be flat with periodic revisions. For Indianapolis Executive Airport this appears to be true, with most recent based aircraft levels being revised in 2002 and then again in 2004. The year 2004 is the baseline from which the FAA forecasted future based aircraft levels. While the TAF shows based aircraft levels increasing, albeit at a slower rate than has actually occurred, the projected level of operations is flat. In comparing the TAF to current conditions, the **actual** 2006 based aircraft is 54% higher than the TAF's 2006 forecasts and 30% higher than the TAF's 2025 forecast. This is partly due to the airport's transfer in ownership from private to public hands in 2003 and the establishment of Montgomery Aviation as a full service FBO at the facility in 2000. The other factors influencing the airports growth include the socioeconomic conditions for the airport's market area. All of these factors (ownership, FBO services, and socioeconomic indicators) are discussed in greater detail in the following sections.

SOCIOECONOMIC INDICATORS

Socioeconomic indicators are reviewed to determine whether state and/or national trends in aviation are applicable to the local airport service area. In summary, the socioeconomic indicators representative of the majority of the Indianapolis Executive Airport service area are generally similar to or above the national growth trends, as discussed in detail below. Thus, the socioeconomics of the area should be favorable for growth at the airport. Also, national trends in aviation are anticipated to be applicable to the Indianapolis Executive Airport Service Area.

Indianapolis Executive Airport is located in Boone County, north of the Marion County line and directly adjacent to the Hamilton County line (see Exhibit 1-2 in previous chapter). According to the *2007-2011 National Plan of Integrated Airport Systems (NPIAS)*, Indianapolis Executive Airport serves as an FAA designated reliever airport for Indianapolis International Airport. The majority of the aircraft based at Indianapolis Executive Airport have owners located in Boone, Hamilton, and Marion counties. Two statistical areas encompass the Indianapolis metropolitan area: The Indianapolis, Indiana Metropolitan Statistical Area (MSA) is comprised of Boone, Brown, Hamilton, Hancock, Hendricks, Johnson, Marion, Morgan, Putnam, and Shelby counties in Indiana; and the Indianapolis-Anderson-Columbus, Indiana Consolidated Statistical Area (CSA) adds Bartholomew, Henry, Jennings, Madison, and Montgomery counties to the MSA. The CSA was not considered representative of the socioeconomic factors influencing Indianapolis Executive Airport because the airport does not have any based aircraft owners from these five added counties. Over 92% of the based aircraft at Indianapolis Executive Airport are from Boone, Hamilton, and Marion counties and 93% of the based aircraft are in the MSA (which adds Hendricks County [see Exhibit 2-2]). Since the Boone, Hamilton, and Hendricks counties can also be influenced by the overall MSA, both the MSA and the combination of Boone, Hamilton, and Marion counties were considered separately in the forecasting analysis.

Three socioeconomic indicators traditionally have the potential to influence aviation activity in a region:

- Population – the higher the population, the more potential aircraft owners and operations
- Employment – the higher the employment level, the more potential aircraft owners

- Total Income (per capita income multiplied by population) – the higher the total income, the more potential discretionary income that may be used for aviation related activities

Data have been obtained from Woods & Poole Economics for this study process. The Woods & Poole data are commonly used for forecasting since they are a consistent summary of historical and forecast data through 2030 for various socioeconomic indicators. The Indiana and United States socioeconomic factors have been used for reference purposes for comparisons to national trends.

As part of a larger metropolitan area, activity at Indianapolis Executive Airport is influenced not only by the socioeconomics in Boone County, but also by the socioeconomics in the larger metropolitan area, including Marion County, and one of the fastest growing counties in the state, Hamilton County. As described earlier, the majority of the owners of based aircraft are from Boone, Hamilton, and Marion counties. **Exhibits 2-9, 2-10,** and **2-11** summarize the key socioeconomic indicators for Boone, Hamilton, and Marion counties; the Indianapolis MSA; along with comparisons to the State of Indiana and the United States. The populations of Boone and Hamilton counties have increased somewhat in recent years with a forecasted increase above the national average for the future (Exhibit 2-9). Marion

EXHIBIT 2-9: Population

	1970	1980	1990	2000	2010	2020	2030
Boone County	30,950	36,620	38,300	46,400	57,010	66,940	77,470
% Avg. Annual		*1.70*	*0.45*	*1.94*	*2.08*	*1.62*	*1.47*
Hamilton County	54,760	82,520	110,350	185,400	272,650	336,320	402,890
% Avg. Annual	-	*4.19*	*2.95*	*5.33*	*3.93*	*2.12*	*1.82*
Marion County	794,130	765,560	800,140	860,450	874,580	900,330	935,740
% Avg. Annual	-	*-0.37*	*0.44*	*0.73*	*0.16*	*0.29*	*0.39*
Indianapolis MSA	1,148,620	1,210,050	1,300,390	1,530,950	1,742,330	1,948,340	2,173,260
% Avg. Annual	-	*0.52*	*0.72*	*1.65*	*1.30*	*1.12*	*1.10*
Indiana	5,205,540	5,492,730	5,557,800	6,091,960	6,491,200	6,944,620	7,468,270
% Avg. Annual	-	*0.54*	*0.12*	*0.92*	*0.64*	*0.68*	*0.73*
United States	203,982,310	227,225,620	249,622,810	282,193,480	311,843,980	343,338,610	378,302,740
% Avg. Annual	-	*1.08*	*0.94*	*1.23*	*1.00*	*0.97*	*0.97*

Source: 2006 State Profile, Indiana, Woods & Poole Economics.

County is maintaining a somewhat steady, but lower than national average increase over past and forecasted years. According to the Woods and Poole data, in terms of overall state population growth, Hamilton and Boone counties are the second and fifth fastest growing counties in the state, respectively.

The employment rates in Boone and Hamilton counties are forecast to grow faster than national average, while Marion County is forecast to grow slower than the national average (Exhibit 2-10). The employment rate for the entire Indianapolis MSA is forecast to grow faster than the national average, but slower than an average of Boone, Hamilton, and Marion Counties combined. According to the Woods and Poole data, in terms of overall state employment growth, Hamilton and Boone counties are the fourth and seventh fastest growing counties in the state, respectively.

EXHIBIT 2-10: Employment

	1970	1980	1990	2000	2010	2020	2030
Boone County	10,350	13,720	17,110	24,020	31,990	38,650	44,910
% Avg. Annual		*2.86*	*2.23*	*3.45*	*2.91*	*1.91*	*1.51*
Hamilton County	15,040	30,100	57,730	110,170	155,100	195,210	243,280
% Avg. Annual	-	*7.18*	*6.73*	*6.68*	*3.48*	*2.33*	*2.23*
Marion County	443,230	503,120	612,790	716,500	727,130	812,460	899,540
% Avg. Annual	-	*1.28*	*1.99*	*1.58*	*0.15*	*1.12*	*1.02*
Indianapolis MSA	541,170	649,820	926,890	1,047,900	1,174,020	1,364,740	1,563,030
% Avg. Annual	-	*1.85*	*3.62*	*1.23*	*1.14*	*1.52*	*1.37*
Indiana	2,290,880	2,632,240	3,089,820	3,673,250	3,955,160	4,471,030	4,987,320
% Avg. Annual	-	*1.40*	*1.62*	*1.74*	*0.74*	*1.23*	*1.10*
United States	91,281,600	114,231,190	139,380,890	166,758,780	186,079,920	213,164,410	240,248,990
% Avg. Annual	-	*2.27*	*2.01*	*1.81*	*1.10*	*1.37*	*1.20*

Source: 2006 State Profile, Indiana, Woods & Poole Economics.

The per capita income in Marion County is forecast to grow faster then the national average, while Boone County, Hamilton County, and the MSA fluctuate above and below the national average for the duration of the forecast (Exhibit 2-11). According to the Woods and Poole data, in terms of overall state per capita income forecasted for 2030, Hamilton, Boone, and Marion counties are the first, second, and third highest counties in the state, respectively.

EXHIBIT 2-11: Per Capita Income (1996 dollars)

	1970	1980	1990	2000	2010	2020	2030
Boone County	$13,620	$19,734	$24,310	$34,356	$35,309	$39,629	$44,092
% Avg. Annual		*3.78*	*2.11*	*3.52*	*0.27*	*1.16*	*1.07*
Hamilton County	$15,245	$22,229	$30,787	$40,464	$38,603	$42,442	$48,016
% Avg. Annual		*3.84*	*3.31*	*2.77*	*(0.47)*	*0.95*	*1.24*
Marion County	$15,363	$18,925	$23,723	$28,705	$32,216	$36,304	$41,004
% Avg. Annual		*2.11*	*2.29*	*1.92*	*1.16*	*1.20*	*1.22*
Indianapolis MSA	$14,675	$18,676	$23,493	$28,572	$32,156	$35,789	$40,049
% Avg. Annual		*2.44*	*2.32*	*1.98*	*1.19*	*1.08*	*1.13*
Indiana	$13,371	$16,832	$20,327	$25,381	$27,606	$30,943	$34,633
% Avg. Annual		*2.33*	*1.90*	*2.25*	*0.84*	*1.15*	*1.13*
United States	$14,434	$18,168	$22,634	$27,919	$30,133	$33,736	$37,837
% Avg. Annual		*2.33*	*2.22*	*2.12*	*0.77*	*1.14*	*1.15*

Source: 2006 State Profile, Indiana, Woods & Poole Economics.

TRENDS AT INDIANAPOLIS EXECUTIVE AIRPORT

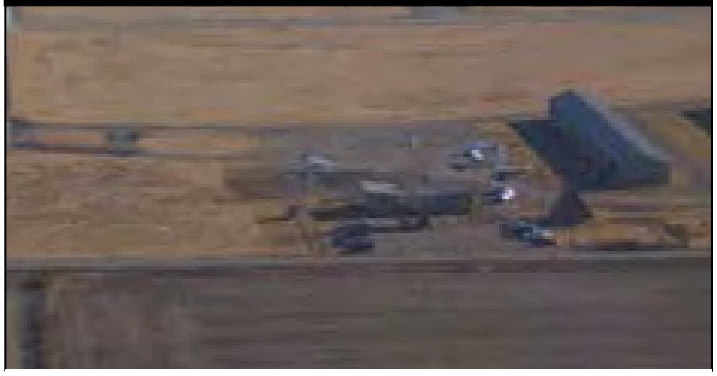
Activity at Indianapolis Executive Airport is influenced by national trends in aviation, regional trends in the Indianapolis area, and local trends in the airport service area. On a national level, general aviation has been experiencing slow growth, with the strongest growth in the business jet segment. The introduction of VLJ's is anticipated to further the growth in that segment of the industry.

Regionally, Indianapolis Executive Airport is influenced by the Indianapolis metropolitan area. While the State of Indiana has seen a significant loss in manufacturing jobs, the Indianapolis area tends to be more diversified. Also, the primary counties that Indianapolis Executive Airport serves are Boone, Hamilton, and Marion; Boone and Hamilton counties are two of the fastest growing counties in the state.

The change in airport ownership from private to public and the emergence of Montgomery Aviation, the FBO, on the airport has resulted in greater growth than predicted in the ISASP or the TAF. The Airport origins began in 1957 as a privately-owned public-use airport. The facility was not acquired by a public entity until 2003 when Hamilton County purchased it; thus it's growth was restricted by the limited availability of private funds. The transfer of ownership into public hands made funding for improvements more readily available. Additionally, Montgomery Aviation has introduced new service to the airport and facilitated the construction of a new terminal, new hangars, and added jet fuel. They are a full service FBO providing retail fuel sales, aircraft maintenance, aircraft charter, flight training, aircraft rental and sales, and fractional ownership. Montgomery Aviation's charter aircraft include either an IAI Westwind or Astra. All customers can arrive and depart the terminal out of the weather under canopy, the only such structure in the state. (See **Exhibit 2-13**.)

The fractional ownership offered by Montgomery Aviation is through Skyshares. The program is designed exclusively for the Midwest traveler and is built around the safe, versatile, and affordable Pilatus PC-12 and the EADS/Socata TBM 850. Skyway Shares provides businesses and individuals all the privileges of private air travel at a fraction of the cost.

EXHIBIT 2-12: Terminal Area Under Private Ownership



Source: www.indianapolisterryairport.com, accessed 2006.

All variety and quality of service now available at the airport under the new FBO and public ownership has resulted in increased airport activity in recent years (see **Exhibits 2-12** and **2-13**). Although this trend cannot continue indefinitely, continued growth is still planned. This growth includes the construction of 48 new T-hangars and one multi-tenant corporate hangar in the next few years. Eighteen of the T-hangars will be replacement hangars, resulting in a net increase of 30 T-hangars and 5-10 spaces for corporate aircraft.

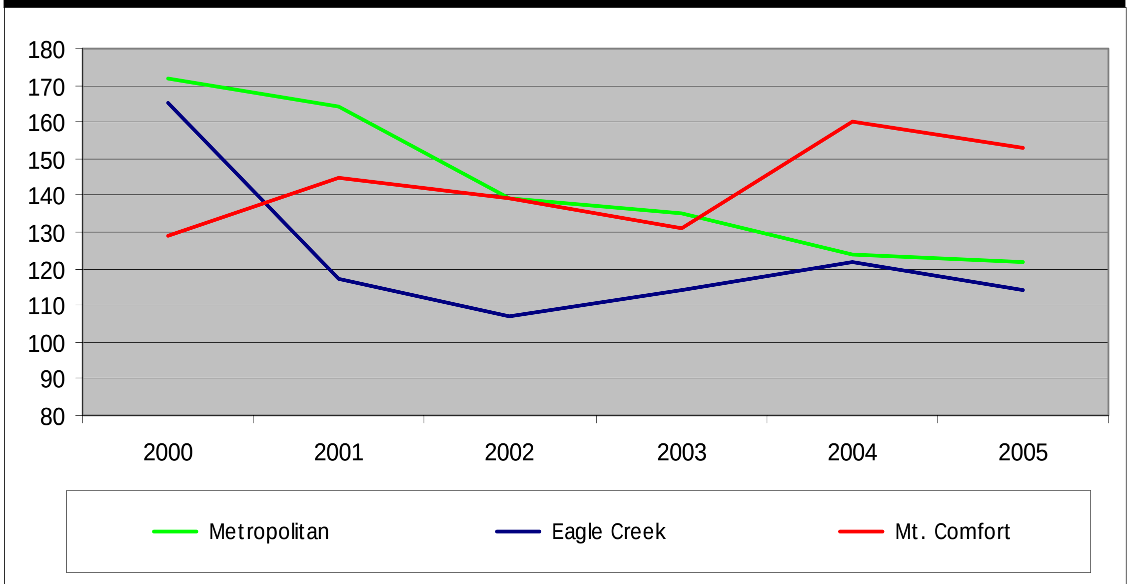
EXHIBIT 2-13: Terminal Area Under Public Ownership and with Montgomery Aviation as FBO

Source: www.indianapolisterryairport.com, accessed 2006.

TRENDS AT OTHER INDIANAPOLIS AREA AIRPORTS IN THE TYQ MARKET AREA

As indicated in the previous chapter on inventory, there are eight public-use general aviation airports within twenty nautical miles of Indianapolis Executive Airport. Four are publicly-owned and four are privately-owned. The publicly-owned airports include Mt. Comfort (MQJ), Eagle Creek (EYE), Metropolitan (UMP), and Hendricks County (2R2). Trends and market shares for these airports, excluding Hendricks County, were reviewed as shown in **Exhibit 2-14**. Hendricks County was excluded because it is a young airport without a Fixed Base Operator (FBO), jet fuel, or based jet aircraft; thus it is not considered representative of based aircraft levels or market share that could potentially occur at TYQ.

EXHIBIT 2-14: Trends at Other Indianapolis Area Airports



Source: Aerofinity, Inc., 2006.

The trends at these three facilities vary significantly. Metropolitan airport has lost based aircraft consistently over the last five years, while Eagle Creek has had a net loss over this same period. Mt. Comfort, on the other hand, has had a net increase over this same time period. The last known market shares for these airports are shown in **Exhibit 2-15** below.

EXHIBIT 2-15: Based Aircraft at Publicly-Owned General Aviation Airports

Airport Name	2000	2001	2002	2003	2004	2005	2006	Market Share
Eagle Creek Airpark	165	117	107	114	122	114		0.053%
Indianapolis Metropolitan	172	164	139	135	124	122		0.057%
Indianapolis Mt. Comfort	129	145	139	131	160	153	150	0.069%
Indianapolis Executive	46	51	57	58	59	79	91	0.042%

Source: INDOT, Montgomery Aviation, Mt. Comfort Airport, 2006.

Mt. Comfort Airport is the largest general aviation airport in the area with a primary and crosswind runway and an Instrument Landing System (ILS). Therefore, it is logical that it would have the greatest market share.

The four privately owned airports within twenty nautical miles of TYQ accommodate 101 based aircraft. (See **Exhibit 2-16**.) Additionally, thirteen privately-owned, private-use airports are also located within twenty nautical miles of TYQ. These thirteen airports accommodate twelve based aircraft. (See Exhibit 2-16.) As indicated in the chapter on inventory, the NPIAS airports have been closing at a rate of approximately 11 per year from 2001 to 2004, and privately-owned public-use airports are much easier to close than publicly-owned facilities. When an airport is privately owned its future is even less certain, particularly as development encroaches. According to the US General Accounting Office report *General Aviation: Status of the Industry, Related Infrastructure, and Safety Issues* published in August of 2001, there is “greater resistance to airports by the public, including efforts to close airports—particularly privately owned airports—as a way of reducing noise in residential areas and obtaining large parcels of open land for revenue-generating development.” Brookside Airport, one of the private airports previously within Indianapolis Executive Airport’s service area, closed in 2003.

EXHIBIT 2-16: Based Aircraft at Privately Owned Airports

Airport Name	Based Aircraft
Boone County	25
Noblesville	22
Sheridan	30
Westfield	24
Private-Use Airports	12
Total	113

Source: INDOT, 2006; FAA 5010 Airport Master Records, GCR & Associates, Inc. Form 5010 Website (accessed 8/06); Aerofinity, Inc., 2006.

HISTORICAL TIME PERIODS REVIEWED

Four historical time frames were reviewed in the process of forecasting future operations:

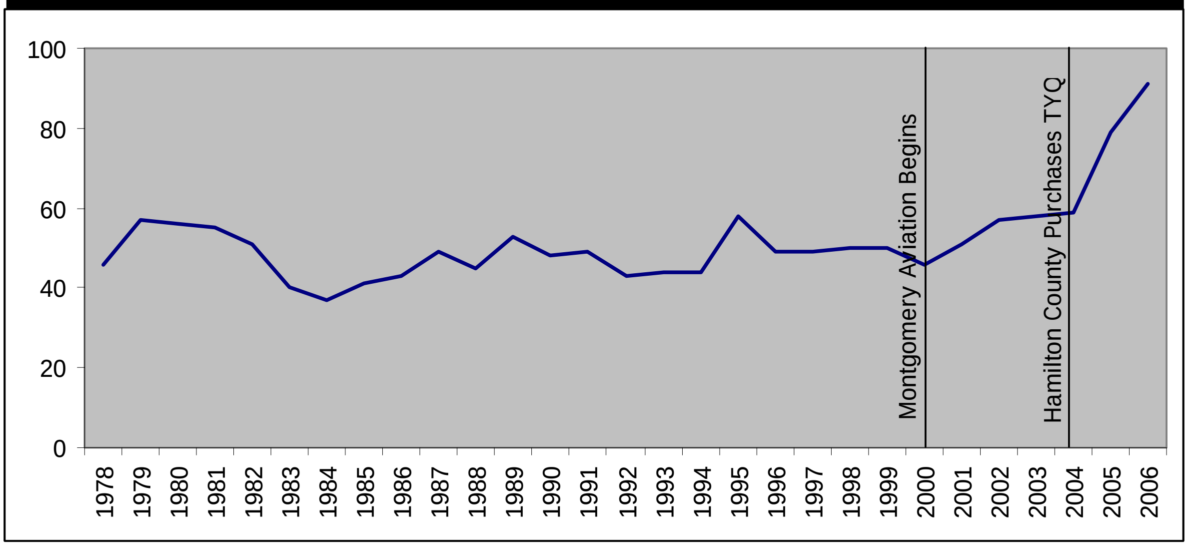
1. The last 29 years (1978 to 2006 [the entire history of the airport])
2. The last 20 years (1987-2006)
3. The last 10 years (1997-2006)
4. The last 7 years (2000-2006 [time since the new FBO])
5. The last year

The forecasts produced using the two longest historical periods (20 and 29 years) produced results that were not statistically significant or correlated or they were unrealistic. As discussed previously, the airport was privately owned for the majority of its history and capital for development was very limited. In order to provide an unconstrained forecast envelope representing a range of probable based aircraft levels, the early low-growth years need to be omitted to produce more reasonable forecasts of the established conditions because they represent a time frame when the airport was privately owned with very little FBO services. Accordingly, for each of the forecasting methods described below, time frames between the last year to the last ten years were used.

BASED AIRCRAFT FORECASTS

At general aviation airports, the number of based aircraft is related to the level of activity at the airport. Therefore, the future based aircraft will be forecast first for Indianapolis Executive Airport. In this forecasting effort, the historical based aircraft levels were graphed to help identify trends that may influence future aircraft levels (see **Exhibit 2-17**). The based aircraft levels have ranged from a low of 37 in 1984 to a high of 91 in 2005, exhibiting an overall growth of approximately 245% over a 21 year period.

EXHIBIT 2-17: Indianapolis Executive Airport Historical Based Aircraft



Note: 1998 was linearly interpolated to remove anomaly in INDOT's data that was identified in the 2003 ISASP. Source: INDOT Records, 1978-2004; Montgomery Aviation, 2005-2006; ISASP.

Three types of forecasts are examined: **market share, trend,** and **regression**. For each type of forecast, the results need to be realistic, correlated, and statistically significant, where appropriate, to be considered as a viable forecast for future activity. Although some of the forecasts resulted in correlated and statistically significant results, they were not considered viable because the projected growth was unrealistic. Indianapolis Executive Airport's current market share is approximately .042% of the total U.S. general aviation (GA) non-sport aircraft fleet. Any forecast that approached the magnitude of doubling their market share in the 20-year forecast period was considered unrealistic since the total GA market is only anticipated to grow at 1.4% to 2017 and 1.2% to 2027. **Exhibit 2-18** summarizes all the statistically significant and correlated, where appropriate, and viable forecasts that were produced using the market share, trend, and regression forecasts. Each of these three methods is discussed in more detail in the following sections.

EXHIBIT 2-18: Based Aircraft Forecasts for Indianapolis Executive Airport									
	Market Share			**Trend**	**Regression MSA**			**Regression 3-County**	
Year	TYQ Current	MQJ Current	Avg. of MQJ, EYE, UMP Current	TYQ 10 years	Population 10 years	Employment 10 years	Income 10 years	Population since FBO	Population 10 years
2012	96	118	110	102	98	106	92	113	93
2017	101	141	127	122	116	131	111	141	109
2022	107	163	143	142	135	157	131	169	124
2027	113	186	159	162	155	184	154	199	141

Note: Based aircraft forecasts shown above reflect mathematical rounding.
Source: Aerofinity, Inc., 2006.

Market Share Forecasts

To forecast for TYQ using market share, the national market was identified as shown in **Exhibit 2-19**. Slow growth in overall general aviation aircraft is forecast nationally, as discussed in the FAA forecasts sections. For the market share forecasts, only those aircraft that have traditionally been counted as general aviation aircraft are included, as they are the only aircraft that have been included in the historical national general aviation fleet. The FAA promulgated the new Light-Sport Aircraft Rule in 2004 that starts counting many existing ultra-light aircraft as part of the general aviation fleet. Since many of these are existing aircraft, they already have an existing base of operation. A significant increase in based aircraft at Indianapolis Executive Airport is not anticipated due to this change in registration requirements. Also, as an airport with business jet use, Indianapolis Executive Airport may be less conducive for the operation of light-sport aircraft.

The FAA Aerospace Forecasts 2006-2017 distinguishes between the existing aviation aircraft and new light-sport aircraft in the general aviation forecast. The FAA's Long-Range forecasts do not, thus they are assumed to remain at the same percentage from 2017 to 2027 (see Exhibit 2-19).

EXHIBIT 2-19
National General Aviation Non Light-Sport Aircraft Forecast to 2027

Year	National General Aviation Aircraft*
FAA Forecast	
2006	216,535
2007	218,550
2008	220,645
2009	222,760
2010	224,900
2011	227,050
2012	229,140
2013	231,205
2014	233,250
2015	235,230
2016	237,175
2017	239,150
2018	242,151
2019	245,152
2020	248,152
2021	251,153
2022	254,153
2023	257,154
2024	260,155
2025	263,155
2026	266,156
2027	269,156

* excludes light-sport aircraft, light-sport aircraft percentage of US fleet is assumed to remain constant from 2017 forward.

Source: FAA Aerospace Forecasts 2006-2017, FAA Long-Range Aerospace Forecasts Fiscal Years 2020, 2025, and 2030.

The market share forecast incorporates the national forecast for general aviation aircraft, reflecting national trends. The market share forecasting methodologies considered for this forecasting effort included the TYQ current market share, the TYQ average market share over the last five years, the Mount Comfort Airport (MQJ) current market share, and the current average market share of three publicly owned general aviation airports within twenty nautical miles of TYQ, as described in the section on trends at other Indianapolis area airports and Exhibit 2-15 (Eagle Creek, Metropolitan, and Mt. Comfort).

The forecast using TYQ's average market share over the last 5 years was omitted because it resulted in a reduction in based aircraft. The forecast using the TYQ current market share resulted in growth of 18 aircraft over the forecast period, which is low since TYQ has plans to construct 31 additional hangars in the next few years. This is the lowest of all forecasts considered in this forecasting effort.

A forecast for TYQ was made using the current market share for MQJ, a reliever airport with similar facilities in the Indianapolis metropolitan area. As described in the previous section on inventory, of the Indianapolis reliever airports, only TYQ and MQJ have the ability to accommodate most business jets because they have 5,500 feet runways with an instrument landing system (ILS). TYQ's current market share is undoubtedly lower than would have realistically occurred at the facility if funds had been available to appropriately develop the infrastructure. Under new management and ownership, funding has been available to allow the airport to grow rapidly in an effort to meet demand. TYQ's market share has increased significantly since Montgomery Aviation established an FBO at the facility and Hamilton County purchased it, bringing it into public ownership. Accordingly, it is logical to assume that TYQ's market share would grow to meet the same market share as MQJ (.069%), which has grown over the years as demand has required because of public ownership and capital funding. Therefore, a forecast was made for TYQ depicting it reaching MQJ's current market over the 20 year forecast period, which is shown in Exhibit 2-18. This forecast results in a net increase of 95 aircraft over the forecast period.

Since TYQ's growth has historically been constrained due to ownership, available capital, and FBO services, TYQ was also compared to other Indianapolis metropolitan area airports: Eagle Creek, Metropolitan, and Mt. Comfort. As shown in Exhibit 2-15, these airport's market shares ranged from .053% to .069% of the US general aviation non light-sport aircraft fleet. The forecasts made with the average market share for these three airports produced reasonable results, growing TYQ's market share by .017% (68 aircraft) over the 20-year forecast period (see Exhibit 2-18).

Trend

Since a trend over the historical period may not be present or may even reverse, a process was used to assure that trend forecasts are prepared only if significant, consistent, meaningful trends are present in recent years. For trend forecasts to be viable, they had to be in the same direction (both positive or both negative [R^2 at least 0.5]) and the trends had to be statistically significant at the 0.05 or less level (less than a 1 in 20 chance the observed trend is the result of random variation). The trend forecasts made from data from the last 10 years were the only trend forecasts that were statistically significant, correlated, and viable. They are shown previously in Exhibit 2-18. This forecast results in a growth of 71 aircraft over the 20-year forecast period.

Regression Analysis

Regression forecasts predict the number of based aircraft at an airport using characteristics of the area in which the airport is located. Regression analysis is used to establish the relationship between the quantity being forecast (based aircraft) and other measures potentially associated with and possibly affecting that quantity (socioeconomic indicators of population, employment, and total income). Then the estimated regression equation is used to forecast future values of based aircraft from separately forecast values of socioeconomic indicators. For the regression forecasts, both the socioeconomic indicators of the Indianapolis Metropolitan Statistical Area (MSA) and those for Boone, Hamilton, and Marion counties (3-county) were used because 92% of the based aircraft owners are from the three counties of Boone, Hamilton, and Marion counties and 93% from the Indianapolis MSA.

Simple regression (one predictor variable per equation) was found to be appropriate for forecasting the future numbers of based aircraft; multiple regression (more than one predictor variable per equation) was not, due to the very high intercorrelations between the data (employment is related to population, per capita income is related to population, etc.) and multicollinearity (lack of independence among the predictors). With the existence of intercorrelations and multicollinearity, the resulting multiple regression relationships are likely to be randomly weighted rather than based on relationships in the data.

In addition, for a regression analysis to be viable, it has to represent a positive relationship with the predictor variable (R^2 at least 0.5) and be statistically significant at the 0.05 or less threshold. A positive relationship results in an increase in the number of based aircraft as population, employment, or income increases; or a decrease in the number of based aircraft with decreasing population, employment or income. When a negative relationship occurs, i.e., based aircraft growing with declining socioeconomic indicators, the growth or decline of based aircraft is occurring for reasons other than socioeconomic factors. Therefore, any regression equations with a negative relationship between based aircraft and the socioeconomic indictors are considered illogical and discarded from consideration.

POPULATION

Both regression equations using the 3-county and the MSA population data for the last 10 years produced statistically correlated, significant, and viable forecasts. Additionally, the regression equations using the 3-county population for the last 7 years (since the FBO) produced a statistically correlated, significant, and viable forecast. This forecast is actually the highest of all the forecasts and results in growth by 108 aircraft over the forecast period.

The number of based aircraft at TYQ has generally grown as the population of the Indianapolis MSA and the 3-county area have grown. Development and growth are moving closer to TYQ. Thus the opportunity is present for growth in population to result in an increase in based aircraft. According to the Woods and Poole data described in the socioeconomic section, the populations of Hamilton and Boone counties are forecasted to increase above the national average, and their populations are the second and fifth fastest growing in the state, respectively. The viable forecasts produced using population as the predictor are shown in Exhibit 2-18.

EMPLOYMENT

The only statistically correlated, significant, and viable forecast made from employment data came from using the MAS 10-year employment data as the predictor variable. This is shown in Exhibit 2-18. This forecast results in a growth of 93 aircraft over the forecast period.

According to the Woods and Poole data described in the socioeconomic section, in terms of employment growth, Hamilton and Boone counties are the fourth and seventh fastest growing counties in the state, respectively.

INCOME

The only statistically correlated, significant, and viable forecast made from income data came from the using the MAS 10-year income data as the predictor variable. This is shown in Exhibit 2-18. This forecast results in a growth of 63 aircraft over the forecast period. According to the Woods and Poole data described in the socioeconomic section, in terms of overall state per capita income forecasted for 2030, Hamilton, Boone, and Marion counties are the first, second, and third fastest growing counties in the state, respectively.

SUMMARY OF BASED AIRCRAFT FORECASTS

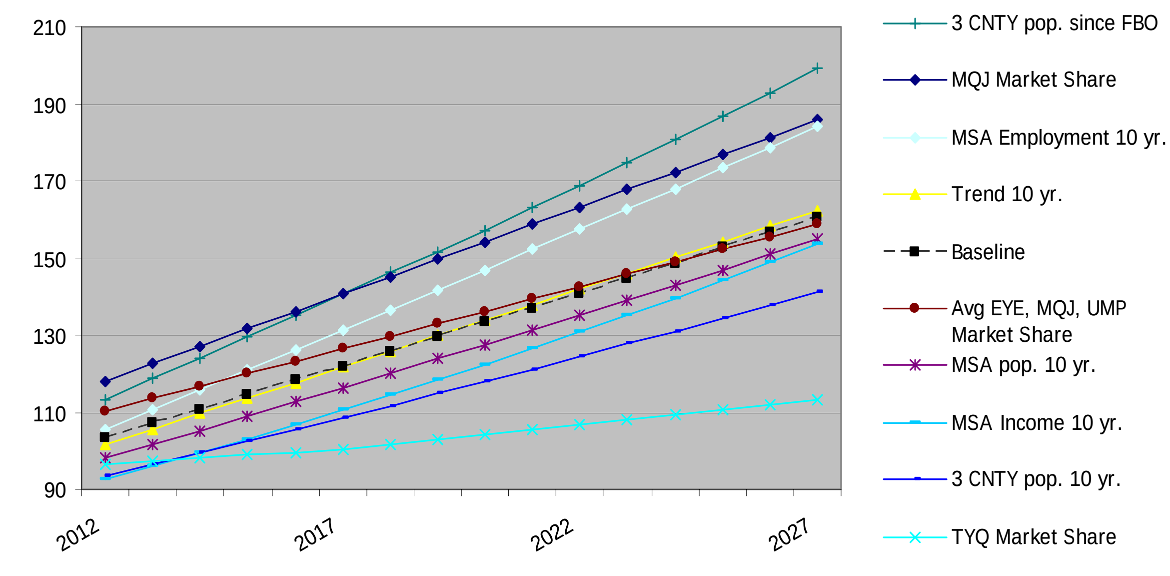
Each of the three forecasting methodologies represents different forces influencing the based aircraft at the airport. The market share forecasts represent the influence of factors at the local, state, and national level. The regression forecasts represent the influence of factors in the service area, while the trend forecasts represent the actual experience at a local facility in the area.

The following forecasts produced statistically correlated, significant, and viable results. They are summarized in Exhibit 2-18 and graphed in **Exhibit 2-20**:

1. Indianapolis Executive Airport current market share
2. Average current market share of Eagle Creek, Metropolitan, and Mt. Comfort airports
3. Mt. Comfort Airport current market share
4. Indianapolis Executive Airport trend over the last ten years
5. Regression using the Indianapolis MSA's last 10 years of population as the predictor
6. Regression using the Indianapolis MSA's last 10 years of employment as the predictor
7. Regression using the Indianapolis MSA's last 10 years of income as the predictor
8. Regression using the 3-county's last 10 years of population as the predictor
9. Regression using the 3-county's last 7 years of population as the predictor

To prepare a baseline forecast that gives equal weight to all three factors, the average of the mean of the market share, trend, and regression forecasts was calculated. This is also graphed in Exhibit 2-20.

EXHIBIT 2-20: Potentially Viable Forecasts



Source: Aerofinity, Inc., 2006.

These forecasts produce an envelope ranging from 113 to 199 based aircraft over the 20-year period, reflecting low, baseline, and high forecasts. The baseline forecast is produced by averaging the means of the forecasts. The low forecast is the lowest of the nine forecasts and the high is the highest of the nine. The low, baseline, and high forecasts are shown on **Exhibit 2-21** and graphed on **Exhibit 2-22**.

EXHIBIT 2-21: TYQ Based Aircraft Forecast Envelope

Year	Low	Baseline	High
2012	96	103	113
2017	101	122	141
2022	107	141	169
2027	113	160	199

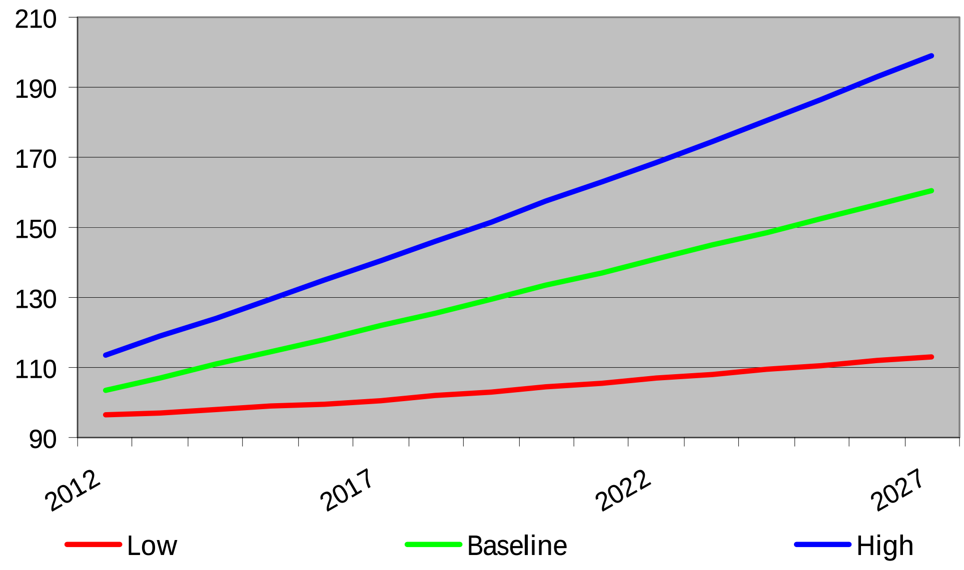
Note: Based aircraft forecast shown above reflects mathematical rounding.
Source: Aerofinity, Inc. 2006.

The low forecast represents a mature airport with slow growth. However, this is not representative of the characteristics that exist at TYQ since plans currently exist for the addition of several hangars in the next few years.

The baseline forecast is midrange in the envelope and takes into account national, regional, and local trends as it was prepared by averaging the mean of the market share, trend, and regression forecasts. It represents a proactive airport owner and operator attempting to maximize the utility of the facility for its community of users. The baseline forecast is higher than the FAA TAF and ISASP based aircraft forecasts, but lower than the local forecasts made in the 1988 Environmental Assessment for the airport.

The high forecasts represent a change in the airport system. There are two types of potential changes that could occur at airports within TYQ's market area: closure or stagnation. If either of these happens at the 21 privately or publicly-owned general aviation airports within twenty miles of TYQ, major growth could occur at this facility.

EXHIBIT 2-22: TYQ Based Aircraft Forecast Envelope Graph



Source: Aerofinity, Inc., 2006.

Year-to year fluctuations of activity are difficult to predict with any level of certainty when the planning horizon is the 20-year future. The forecast envelope recognizes that the aviation activity can be affected by a vast array of influences at the local, regional, and national levels, and provides an expected range of future activity including consideration of changes in the regional airport system. This allows future planning to be more flexible to respond to unforeseen facility needs. However, if significant changes occur at Indianapolis Executive Airport due to new growth opportunities beyond what was envisioned in this forecast process, a review and potential update may still be necessary.

FLEET MIX FORECAST

The next step in forecasting based aircraft for Indianapolis Executive Airport (TYQ) is identifying the forecast fleet mix. The existing based aircraft are comprised as shown on **Exhibit 2-23.**

EXHIBIT 2-23: Fleet Mix Aircraft Type	Type	Percentage	Percent Piston	Percent Turbo Prop	Percent Jet
Single Engine Piston	71	78.0%	82.4%		
Multi Engine Piston	4	4.4%			
Turbo Prop	7	7.7%		7.7%	
Jet	9	9.9%			9.9%
Total	91	100.00%			

Source: Montgomery Aviation; Aerofinity, Inc. 2006.

Based on data supplied by Montgomery Aviation and fboweb.com, the largest aircraft regularly using the airport are the based and transient business jets. These include, but are not limited to, operations by the following:

- Canadair Challenger
- Cessna Citation (multiple models)
- Gulfstream II, III, IV, and V
- Falcon (multiple models)
- Hawker Siddley HS 125-700/800
- Israel Aircraft Industries ASTRA SPX
- LearJet (multiple models)

Each segment of the existing fleet mix has growth potential. Thirty additional t-hangars and one multi-tenant corporate hangar is planned for the facility. Since all the segments have the potential for growth, the existing fleet mix has been applied to all forecast levels, as shown in **Exhibit 2-24**.

EXHIBIT 2-24: Forecast Fleet Mix

	Single Engine Piston	Multi Engine Piston	Turbo Prop	Jet
Current Fleet Mix				
Aircraft	71	4	7	9
Percentage	78.0%	4.4%	7.7%	9.9%
Forecast Fleet Mix %				
Low	78.0%	4.4%	7.7%	9.9%
Base	78.0%	4.4%	7.7%	9.9%
High	78.0%	4.4%	7.7%	9.9%
Forecast Fleet Mix				
2012				
Low	75	4	7	10
Base	81	5	8	10
High	88	5	9	11
2017				
Low	78	4	8	10
Base	95	5	9	12
High	110	6	11	14
2022				
Low	83	5	8	11
Base	110	6	11	14
High	132	7	13	17
2027				
Low	88	5	9	11
Base	125	7	12	16
High	155	9	15	20

Note: Forecast fleet mix shown above reflects mathematical rounding.
Source: Aerofinity, Inc., 2006.

OPERATIONS FORECAST

With the traffic counting program occurring at Indiana State Aviation System Plan (ISASP) airports on a rotating basis since 1989, there are a limited number of actual counts and operations per based aircraft (OPBA) figures for Indianapolis Executive Airport. This is the case for all non-towered airports in the state. These limited data are insufficient to identify trends in operations. Therefore, OPBA measures have been used to translate the forecast based aircraft into forecast operations in a manner similar to that used with market share forecasts for based aircraft. OPBA for Indianapolis Executive Airport (TYQ), Mt. Comfort (MQJ), Metropolitan (UMP), and Eagle Creek (EYE) were used to calculate low, baseline, and high operations forecasts.

As shown on **Exhibit 2-25**, the last OPBA for TYQ established by INDOT was 490. The OPBA for the other publicly-owned general aviation airports in TYQ's market area range from a low of 251 at MQJ to a high of 426 at UMP. The TYQ OPBA corresponds with FAA AC 150/5300-13, *Airport Design*, which advises using 492 OPBA for design on reliever airports. It is common for OPBA to decrease as the total number of based aircraft increase; therefore it is logical that MQJ would have the lowest OPBA of all four airports since they have the most based aircraft. However, they are significantly lower than that recommended by FAA AC 150/5300-13 for airport design.

EXHIBIT 2-25: Operations Per Based Aircraft (OPBA)

Airport	OPBA
TYQ	490
EYE	379
MQJ	251
UMP	426
FAA AC 150/5300-13 recommendation	492
Average	408

Source: INDOT, 2006; FAA AC 150/5300-13, Airport Design.

The 2003 ISASP used an OPBA of 549 for their forecast, while the 1993 Indianapolis Metropolitan Airport System Plan (MASP) used 545 OPBA. The FAA TAF used an OPBA of 490 and gradually decreased to 413.

For this forecasting effort an average of OPBA levels for TYQ, UMP, MQJ, EYE, and the FAA AC 150/5300-13, *Airport Design*, recommended OPBA were applied to the low, baseline, and high based aircraft forecasts to develop low, baseline, and high operations forecast for TYQ. These are shown in **Exhibit 2-26**.

EXHIBIT 2-26: Forecast Total Operations at Indianapolis Executive Airport

	Based Aircraft Forecast			Operations Forecast		
Year	Low	Base	High	Low	Base	High
				OPBA=408	OPBA=408	OPBA=408
2012	96	103	113	39,289	42,199	46,249
2017	101	122	141	41,006	49,744	57,362
2022	107	141	169	43,578	57,503	68,832
2027	113	160	199	46,151	65,478	81,268

Note: Based aircraft forecast shown above reflects mathematical rounding. Operations forecast based on aircraft forecast prior to mathematical rounding.
Source: Aerofinity, Inc. 2006.

Local and Itinerant Operations

Operations at Indianapolis Executive Airport (TYQ) can be divided into two types: local and itinerant. Local operations remain within the airport vicinity. Itinerant operations are flights between airports, usually at least 20 miles from the originating airport. Three sources of itinerant data were available: the 1988 Environmental Assessment (EA), the 1993 Indianapolis Metropolitan Airport System Plan, and the FAA TAF.

The 1988 Environmental Assessment estimated a local/itinerant split for TYQ shown in **Exhibit 2-27**.

EXHIBIT 2-27: TYQ 1988 Environmental Assessment Local/Itinerant Split

Year	Itinerant %	Local %
1989	22%	78%
1994	28%	72%
1999	30%	70%
2004	31%	69%
2009	32%	68%

Source: 1988 Indianapolis Executive Airport Environmental Assessment.

The FAA TAF estimated the local/itinerant split as shown in **Exhibit 2-28** and the 1993 Indianapolis Metropolitan Airport System Plan Update split is shown in **Exhibit 2-29**.

EXHIBIT 2-28
FAA TAF Local/Itinerant Split

Year	Itinerant %	Local %
2000	22%	78%
2001	22%	78%
2002	56%	44%
2003	56%	44%
2004	58%	42%
2005 – 2025*	58%	42%

**Forecast*
Source: FAA TAF.

EXHIBIT 2-29
1993 Indianapolis MASP Local/Itinerant Split

Year	Itinerant %	Local %
2012	55%	45%

Source: 1993 Indianapolis Metropolitan Airport System Plan Update.

There may have been more local than itinerant traffic in 1988 when the Environmental Assessment was completed, however, with the added services available from the FBO and the ILS system, there is a significant itinerant traffic element. The 1993 Indianapolis Metropolitan Airport System Plan and the TAF present a more representative picture of what exists at the airport today. Therefore, an average of these two (56.5% itinerant and 43.5% local) have been applied. **Exhibit 2-30** summarizes the local and itinerant operations forecast.

EXHIBIT 2-30: Local/Itinerant Split

Local: 43.5%
Itinerant: 56.5%

	Low	Baseline	High
2012	39,289	42,199	46,249
Local	17,091	18,357	20,119
Itinerant	22,198	23,843	26,131
2017	41,006	49,744	57,362
Local	17,837	21,638	24,952
Itinerant	23,168	28,105	32,409
2022	43,578	57,503	68,832
Local	18,957	25,014	29,942
Itinerant	24,622	32,489	38,890
2027	46,151	65,478	81,268
Local	20,076	28,483	35,352
Itinerant	26,075	36,995	45,917

Souce: Aerofinity, Inc., 2006.

PEAK OPERATIONS

Purpose

Airports are similar to other facilities with fixed capacities, such as highways or parking facilities. An airport may be able to accommodate the overall annual operations demand, but may not be able to handle the peak hour traffic. The periods that will be used in developing facility requirements for this master plan include peak month, average day of the peak month (design day), busy day, and design hour operations.

Peak Month – the calendar month when peak aircraft operations occur.

Design Day – the average day within the peak month. Dividing the peak month operations by the number of days in the month calculates this indicator.

Busy Day – the busy day in a typical week within the peak month. This indicator is used primarily for planning general aviation apron space.

Peak Hour – the peak hour within the busy day. This indicator is used in airfield demand/capacity analysis and terminal building and access road requirements.

Findings

Without an air traffic control tower, no detailed operational records are available. Thus, for this analysis, the planning guidelines provided in *FAA Advisory Circular 150/5300-13, Airport Design* and professional judgment have been applied.

Peak Month – If the operations were spread equally over a year, each month would have 8.3 percent. However, at general aviation airports the peak month typically occurs during the good flying weather season (spring to fall), most commonly in the summer. Based on experience at other reliever airports with air traffic control towers, the peak month averaged about 11 to 13 percent of the annual operations. Thus, the peak month has been assumed to be 12 percent of the annual operations. This represents a typical peak month and does not take into consideration extraordinary traffic that may be generated for a short period of time from an event like an open house.

Average Day – The average day is the peak month operations divided by 30 days, for the average length of a month.

Busy Day – Per FAA Advisory Circular 150/5300-13, Airport Design, Appendix 5, a recommended assumption is to assume the busy day is 10 percent more active than the most active day.

Peak Hour – Based on experience at other reliever airports, excluding days with extraordinarily high peak hours due to significant local operations, typically touch and goes, the peak hour ranged from 9 to 12 percent of the daily traffic. These forecasts assume the peak hour to be 10 percent of the busy day.

Exhibit 2-31 summarizes the forecast peak general aviation activity levels. This information will be used later in the master planning process as part of the facility needs determination.

EXHIBIT 2-31
TYQ Forecast Peak General Aviation Activity Levels

	Low	Baseline	High
2012			
Annual Operations	39,289	42,199	46,249
Peak Month	4,715	5,064	5,550
Average Day	157	169	185
Busy Day	173	186	203
Peak Hour	17	19	20
2017			
Annual Operations	41,006	49,744	57,362
Peak Month	4,921	5,969	6,883
Average Day	164	199	229
Busy Day	180	219	252
Peak Hour	18	22	25
2022			
Annual Operations	43,578	57,503	68,832
Peak Month	5,229	6,900	8,260
Average Day	174	230	275
Busy Day	192	253	303
Peak Hour	19	25	30
2027			
Annual Operations	46,151	65,478	81,268
Peak Month	5,538	7,857	9,752
Average Day	185	262	325
Busy Day	203	288	358
Peak Hour	20	29	36

Note: Forecast shown above reflects mathematical rounding.
Source: Aerofinity, Inc., 2006.

AIRPORT REFERENCE CODE

When considering future facility needs at Indianapolis Executive Airport (TYQ), in addition to identifying aircraft activity forecasts, it is important to identify what size of aircraft will use the facility. The FAA has developed a system to relate airport planning and design criteria to the operational and physical characteristics of the aircraft intended to use the airport. This system is known as the Airport Reference Code (ARC), and is detailed in *FAA Advisory Circular 150/5300-13, Airport Design.*

A combination of two codes is used to develop the ARC. The first code, Aircraft Approach Category, relates to the approach speed (landing speed) of an aircraft. The second code, Airplane Design Group, pertains to the design group determined by the wingspan of an aircraft. The ARC is based upon the aircraft or combination of aircraft with the highest approach speed code and greatest wingspan that use, or are expected to make substantial use, of the airport. Per *FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems*, substantial use means 500 or more annual itinerant operations. An operation is a takeoff or landing by an aircraft. **Exhibit 2-32** summarizes the various approach categories and airplane design groups.

EXHIBIT 2-32: ARC Characteristics

Aircraft Approach Category	Speed (knots)	Airplane Design Group	Wingspan (feet) or Tail Height (feet)
A	Less than 91	I	Wingspan less than 49 **or** Tail Height up to but not including 20
B	91 to less than 121	II	Wingspan 49 up to but not including 79 **or** Tail Height from 20 up to but not including 30
C	121 to less than 141	III	Wingspan 79 up to but not including 118 **or** Tail Height from 30 up to but not including 45
D	141 to less than 166	IV	Wingspan 118 up to but not including 171 **or** Tail Height from 45 up to but not including 60
E	166 or more	V	Wingspan 171 up to but not including 214 **or** Tail Height from 60 up to but not including 66
		VI	Wingspan 214 up to but not including 262 **or** Tail Height from 66 up to but not including 80

Source: FAA Advisory Circular 150/5300-13, Airport Design.

The largest aircraft using the airport are business jets and turboprops. Without a local data source, the instrument flight plan records (IFR) from *fboweb.com* for calendar year 2005 were used to identify the large aircraft currently using TYQ on a regular basis. While occasionally an operation by a large aircraft will not file an IFR flight plan, most large aircraft are operated as transportation for business purposes and therefore typically operate IFR. Thus, while the IFR records may not capture every larger aircraft operation at TYQ, most are included. Thus, this provides the most reliable data source to identify the critical aircraft operating at TYQ. **Exhibit 2-33** summarizes the 2005 large aircraft operations at TYQ by ARC criteria.

EXHIBIT 2-33 TYQ IFR Jet Traffic - 2005	Aircraft Approach Category				Aircraft Design Group		
Type	**A**	**B**	**C**	**D**	**I**	**II**	**III**
Aerospatiale TBM TB-700	4				4		
Beech Super King Air B350		34				34	
Boeing Business Jet				2			2
Beech Jet 400A		163				163	
Beech King Air 90/A90 to E90 & F90		52				52	
Cessna 414A		13				13	
Cessna Citation 1 500		2				2	
Cessna Citation 1-SP 501		14				14	
Cessna Citation Jet 525 CJ1		142				142	
Cessna Citation Jet C526		48				48	
Cessna Citation 2/ Bravo 550		337				337	
Cessna Citation 5/Ultra		86				86	
Cessna Citation Excel		104				104	
Cessna Citation 3/6/7 650			79			79	
Cessna Citation Sovereign 680			16			16	
Cessna Citation 10 750			84			84	
Canadair CL600/601/604 Challenger			41			41	
Canadair CRJ-100 Regional Jet			2			2	
Diamond DA10		2				2	
Diamond DA42		2				2	
Falcon 2000-F2TH		29				29	
Falcon 900		17				17	
Falcon 10		35				35	
Falcon 200		12				12	
Falcon 50		14				14	
Israel Aircraft Industries 1124A			193		193		
Israel Aircraft Industries ASTRA SPX			127			127	
Israel Aircraft Industries Galaxy				6		6	
Gulfstream Aerospace G-II				98		98	
Gulfstream Aerospace G-III			4			4	
Gulfstream Aerospace G-IV				14		14	
Gulfstream Aerospace G-V				2		2	
Hawker HS 12-1/2/3/400/600				3		3	
Hawker HS 125-700/800			279			279	
Hawker 1000/800XP/HS70				6		6	
Lear Jet 24F			10		10		
Lear Jet 25			104		104		
Lear Jet 31A			17		17		
Lear Jet 35			60		60		
Lear Jet 36			1		1		
Lear Jet 45			30		30		
Lear Jet 55			6		6		
Lear Jet 60				40	40		
Mitsubishi MU2		42			42		
Mitsubishi Diamond		2			2		
Piper Meridian	118				118		
Piper Cheyenne 1/2/3		14			14		
Rockwell International Saberliner			2			2	
Swearingen Merlin II/III/IV		12			12		
Sub Totals	**122**	**1176**	**1055**	**171**	**653**	**1869**	**2**

TOTAL: 2524

Source: webfbo.com, 2006;
Category and Code identified by Aerofinity.

The ARC for an airport is based on the most demanding aircraft or combination of aircraft that make 500 annual operations. At TYQ, it is a combination of aircraft that represent the most demanding operational characteristics. There were 1,226 annual operations by Approach Category C and D aircraft in 2005. Since the FAA design standards for Approach Category C and D are almost identical, use of Approach Category C/D is recommended. There were 1,869 annual operations by Design Group II aircraft in 2005. Therefore, the recommended existing and future ARC for TYQ is C/D-II and should be used for future facility planning.

The family of ARC C/D-II business jet aircraft identified in Exhibit 2-33, including such aircraft as Israel Aircraft Industries ASTRA SPX, Hawker 800 125-700/800, Gulfstreams, and some of the larger Cessna Citations, will represent the critical aircraft anticipated to use TYQ during the forecast period. In addition, other aircraft types, such as the various models of Learjets (ARC C/D-I) will also be considered during facility needs assessment when their operating characteristics are equivalent or more demanding than the representative ARC C/D-II aircraft. Runway length and aircraft load factors determine the maximum length an aircraft can fly without stopping for fuel.

COMPARISON TO TERMINAL AREA FORECAST

The FAA's Terminal Area Forecast (TAF), Exhibit 2-7, is the basis for FAA planning. As such, forecasts prepared by an airport need to be compared to the TAF. The FAA's most recent *Revision to Guidance on Review and Approval of Aviation Forecasts* was issued December 23, 2004. According to this guidance, locally developed forecasts for operations and based aircraft at reliever airports are considered consistent with FAA's TAF if they meet the following criteria:

Where the five- or ten-year forecast exceeds 100,000 total annual operations or 100 based aircraft,

1. Forecast differs by less than 10 percent in the five-year period and 15 percent in the 10-year period, or
2. Forecast activity levels do not affect the timing or scale of an airport project, or
3. Forecast activity levels do not affect the role of the airport as defined in *FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems*.

Indianapolis Executive Airport is a reliever airport with 91 current based aircraft. The master Plan is anticipated to be completed in 2007, making 2012 the five-year mark and 2017 the ten-year mark. The master plan based aircraft forecasts for 2012 range from 96 to 113 (**Exhibit 2-34**). The TAF forecast for 2012 is 63 (Exhibit 2-34); thus, all of the master plan based aircraft forecasts are higher than the TAF by 53% to 80% for 2012 (**Exhibit 2-35**). This may seem excessive, but when compared to the TAF forecast for the current year, 2006, the actual current aircraft at the airport exceed the TAF by 54%. So the TAF was exceedingly low because it did not take into account the impact of Montgomery Aviation, the new FBO, or the purchase of the airport by a public entity, Hamilton County. In fact, the TAF does not forecast TYQ to reach their current based aircraft level until sometime far beyond the year 2025. Accordingly, to be 53% to 80% higher than the TAF is reasonable since the TAF was off by 54% in the year 2006 alone. The TAF does not show current conditions, so comparing the TQY forecasts to the TAF is not reasonable. A more appropriate comparison would be the FAA Aerospace Forecast, which results in a growth of general aviation aircraft by 1.4% up to 2017. When comparing the TYQ forecasts to the FAA's forecast of 1.4% growth over the next ten years, the differences are much smaller. The TYQ baseline forecast fall within the FAA's ten and fifteen percent limits of the FAA Aerospace Forecast (**Exhibit 2-36**). However, it is important to note that even though the high forecasts exceed the FAA Aerospace Forecasts by the FAA's normal limits, these are viable forecasts considering the dramatic changes that have occurred at Indianapolis Executive Airport. The change in ownership and management, the added FBO services, and the strong socioeconomic indicators for the market area make these based aircraft forecasts possible.

EXHIBIT 2-34: TYQ Master Plan and TAF Based Aircraft Forecast

Current Based Aircraft = 91				
Year	Low	Baseline	High	TAF
2012	96	103	113	63
2017	101	122	141	67

Source: Aerofinity, Inc., 2006; FAA Terminal Area Forecast, 2006.

EXHIBIT 2-35: Percent Above TAF

Year	Low	Baseline	High
2012	53%	64%	80%
2017	50%	82%	110%

Source: Aerofinity, Inc., 2006.

EXHIBIT 2-36: Percent Above FAA Aerospace Forecast of 1.4%

Year	Low	Baseline	High
2012	-3%	5%	15%
2017	-5%	15%	33%

Source: Aerofinity, Inc., 2006; FAA Aerospace Forecast, 2006.

The TAF annual operations forecast is flat at 28,937. In comparison to the TAF, the TYQ operations forecasts exceed it by 36% to 98% (**Exhibit 2-37**).

EXHIBIT 2-37 Operations Forecast

Year	TAF	Resulting TAF OPBA	Low Forecast	Percent Difference	Baseline Forecast	Percent Difference	High Forecast	Percent Difference
2012	28,937	459	39,289	36%	42,199	46%	46,249	60%
2017	28,937	432	41,006	42%	49,744	72%	57,362	98%

Source: Aerofinity, Inc., 2006.

Using the last operations per based aircraft estimate made by INDOT, TYQ is estimated to have 44,636 annual operations. Accordingly, the TAF is lower than the current estimated annual operations for TYQ by 54% for the same reasons as those outlined for the based aircraft forecasts. Typically at general aviation airports, when the based aircraft levels increase the operations levels also increase. In addition, the FAA Aerospace Forecasts predicts that the general aviation activity at towered airports and hours flown will increase, resulting in more operations. Therefore, it appears that flat lining of the operations levels for TYQ for the next 20 years is somewhat unrealistic.

The TYQ forecast apply an OPBA of 408 to the based aircraft forecasts to produce low, baseline, and high operations forecasts. An OPBA of 408 is actually lower than TYQ's last calculated OPBA by INDOT and lower than the OPBA recommended by the FAA Advisory Circular 150/5300-13*, Airport Design*. Accordingly, the operations forecasts are reasonable even though they exceed the TAF.

AVIATION FORECAST SUMMARY

The aviation forecasts are developed to provide a reasonable prediction of future unconstrained activity levels at Indianapolis Executive Airport (TYQ), ranging from the status quo to a change in the Indianapolis metropolitan airport system. The forecasts allow the airport to assess its ability to meet future demands and reserve space to plan future development. The forecasts provide indicators of approximate timing for developing additional airport facilities due to demand. A development made either too early or too late may lead to premature capital expenditures or lost revenues, so it is important to examine the actual demand at the time a new or expanded facility is being considered. If activity significantly surpasses this forecast due to new growth opportunities, an earlier than anticipated update of the forecast and resulting facility requirements may be needed.

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INTRODUCTION

Minimizing potential environmental impacts is an important part of the planning process. Accordingly, when selecting preferred development alternatives, it is important to identify the nature and extent of any potential impacts associated with the planned development at the Indianapolis Executive Airport (TYQ) and to determine what level of detailed environmental analysis will be required for future proposed development prior to construction.

Many federal, state, and local laws, policies, and procedures have been enacted to address the concerns of preserving the human environment and the overall ecosystem of the nation. When using Federal Aviation Administration (FAA) funding for airport development, all projects require environmental approval. The federal legislation enacted to provide overall coordination for airport and other development is the National Environmental Policy Act of 1969 (NEPA). While this Environmental Overview is not intended to satisfy NEPA requirements, it may be used as a preliminary review of the environmental consideration that would be analyzed in detail within the NEPA process.

ENVIRONMENTAL ANALYSIS PROCESS

To implement the requirements of NEPA, the FAA has developed specific guidance for the environmental documentation of airport development, referred to as a proposed action or project. This guidance is found in FAA Order 1050.1E, *Policies and Procedures for Considering Environmental Impacts*, and FAA Order 5050.4B, *Airport Environmental Handbook*. This guidance outlines three major levels of environmental review: categorical exclusion (CATEX), environmental assessment (EA), and environmental impact statement (EIS). Each level of environmental review considers the 18 potential impact categories shown in **Exhibit 3-1** and the potential for cumulative impacts.

EXHIBIT 3-1: Impact Categories
Air Quality
Coastal Resources (Barriers and Zones)
Compatible Land Use
Construction Impacts
Department of Transportation Section 4(f)
Farmlands
Fish, Wildlife, and Plants
Floodplains
Hazardous Materials, Pollution Prevention, and Solid Waste
Historical, Architectural, Archaeological, and Cultural Resources
Light Emissions and Visual Effects
Natural Resources and Energy Supply
Noise
Socioeconomic, Environmental Justice, Children's Health and Safety Risks
Solid Waste
Water Quality
Wetlands
Wild and Scenic Rivers

Source: FAA Order 1050.1E Change 1.

When considering the impact categories, the depth of analysis and documentation of impact is in direct proportion to the potential significance of the impacts.

The following section describes each level of review.

Categorical Exclusion (CAT-EX)

Categorical exclusions are a minimum level of environmental analysis to document that a project (proposed action) will not have any significant environmental impacts and to receive the FAA's concurrence. The airport sponsor is responsible for the preparation of categorical exclusions. Actions identified by the FAA as normally eligible for a categorical exclusion have been found by the FAA, based on past experience with similar actions, to not normally require an EA or EIS. Typically these actions do not individually or cumulatively have a significant effect on the human environment, unless there are extraordinary circumstances. Extraordinary circumstances exist when a project has the potential to create a significant environmental impact. **Exhibit 3-2** summarizes the most common airport development projects typically eligible for categorical exclusion.

EXHIBIT 3-2: Actions Typically Eligible for a Categorical Exclusion
Subject to Extraordinary Circumstances
Runway, taxiway, apron, or loading ramp construction or repair work including extension, strengthening, reconstruction, resurfacing, marking, grooving, fillets, and jet blast facilities, and a new heliport on existing airports except where such action will create environmental impacts off airport property.
Installation or upgrading of airfield lighting systems, including runway end identifier lights, visual approach aids, beacons, and electrical distribution systems.
Installation of miscellaneous items including segmented circles, wind or landing direction indicators or measuring devices, or fencing.
Construction or expansion of passenger handling facilities.
Construction, relocation, or repair of entrance and service roadways.
Grading or removal of obstructions on airport property and erosion control actions with no off airport impacts.
Landscaping generally, and landscaping or construction of physical barriers to diminish impacts of airport blast and noise.
Projects to carry out noise compatibility programs.
Land acquisition and relocation associated with any of the above.
Federal release of airport land.
Removal of a displaced threshold.
Not Subject to Extraordinary Circumstances
Acquisition of an existing privately owned airport, as long as acquisition only involves change of ownership.
Acquisition of security equipment required by rule or regulation for the certification of airport or snow removal equipment.
Issuance of planning grants.
Airport Improvement Program actions which are tentative and conditional as a preliminary action to establish a sponsor's eligibility under the Program.
Retirement of the principal of a bond or other indebtedness for terminal development.
Issuance of airport policy and planning documents, which are not intended for direct implementation or which are issued by the FAA as administrative and technical guidance to the public.
Issuance of certificates and related actions under the Airport Certification Program.
Issuance of grants for preparation of noise exposure maps and noise compatibility programs.
Airspace determinations.

Source: FAA Order 1050.1E Change 1, FAA Order 5050.4B.

Environmental Assessment (EA)

An EA is prepared when a project is not categorically excluded or is typically categorically excluded, but involves extraordinary circumstances, and is not known to normally require an EIS. It is a concise document used to describe a proposed action's anticipated environmental impacts. The airport sponsor is responsible for the preparation of an EA. If no significant impacts are identified in the EA or if significant impacts can be mitigated, the outcome of an EA is a Finding of No Significant Impact (FONSI), or mitigated FONSI. If there are significant impacts that can not be fully mitigated, the EA evolves into an EIS. The FAA can also issue a Record of Decision (ROD) or FONSI/ROD for an EA. **Exhibit 3-3** summarizes the most common airport development projects normally requiring an environmental assessment.

EXHIBIT 3-3: Proposed Actions Normally Requiring an Environmental Assessment
Airport location.
New runway.
Major runway extension.
Runway strengthening resulting in a 1.5 DNL or greater increase in noise over any noise sensitive area location within the 65 DNL contour.
Construction or relocation of an entrance or service road connection to public roads that adversely affect the capacity of such public roads.
Land acquisition associated with any of the above plus land acquisition that results in the relocation of residential units when there is evidence of insufficient replacement dwellings, major disruption of business activities, or acquisition which involves land covered under Section 4(f) of the Department of Transportation (DOT) Act, or land acquisition that is greater than three acres.
Establishment or relocation of an instrument landing system.
Establishment or relocation of an approach lighting system that is not on airport property.
New instrument approach procedures, departure procedures, en route procedures, and modifications to currently approved instrument procedures that routinely route aircraft over noise sensitive areas at less than 3,000 feet above ground level (AGL).
New or revised air traffic control procedures which routinely route air traffic over noise sensitive areas at less than 3,000 feet AGL.
Airport development with extraordinary circumstances, such as being highly controversial from an environmental perspective.
FAA requests for conveyance of government land for airport purposes.
Conversion of land protected under the Farmland Protection Act when the USDA's Farmland Conversion Impact Rating exceeds 200.
Dredging or filling any waterway or wetland when the project is not normally categorically excluded.

Source: FAA Order 1050.1E Change 1, FAA Order 5050.4B.

Environmental Impact Statement (EIS)

An EIS is a clear, concise and appropriately detailed document that provides agency decision makers and the public with full and fair discussion of significant environmental impacts of a project and reasonable alternatives. When an EIS is prepared for projects with environmental impacts that cannot be fully mitigated, the EIS will outline the impacts, document why they cannot be completely mitigated, and identify the steps that can be taken for those impacts that can be mitigated. The FAA is responsible for the preparation of an EIS; however, Federal agencies are allowed to select contractors to help the agencies prepare the EIS. When contracting with an outside firm, the consulting firm prepares the report under the direction of the FAA. In some cases, an EIS is undertaken immediately at the start of the environmental documentation process and in other cases it is the outgrowth from an environmental assessment. The outcome of an EIS is a ROD. **Exhibit 3-4** summarizes the most common airport development project requiring the preparation of an EIS.

EXHIBIT 3-4: Proposed Actions Normally Requiring an Environmental Impact Statement
Unconditionally approving or Federally funding the first Airport Layout Plan or airport location for a new commercial service in an metropolitan statistical area (MSA).
Unconditionally approving or Federally funding a new runway to accommodate air carrier aircraft at a commercial service airport located in an MSA.
Projects with environmental impacts where proposed mitigation would not reduce the action's impacts below significant impact thresholds.

Source: FAA Order 1050.1E Change 1, FAA Order 5050.4B.

ESTABLISHING APPROPRIATE LEVEL OF ENVIRONMENTAL REVIEW

The appropriate level of environmental review for an airport development project is established through a two step process. The first step is determining if the project is listed among the types of development requiring a specific level of environmental review, and the second step is determining if any extraordinary circumstances exist that would require a more detailed review. FAA Orders 1050.1E and 5050.4B contain detailed listings of the level of environmental review applicable for certain types of proposed development. Exhibits 3-2, 3-3, and 3-4 summarize the most common types of projects typically in the CAT-EX, EA, and EIS categories, respectively.

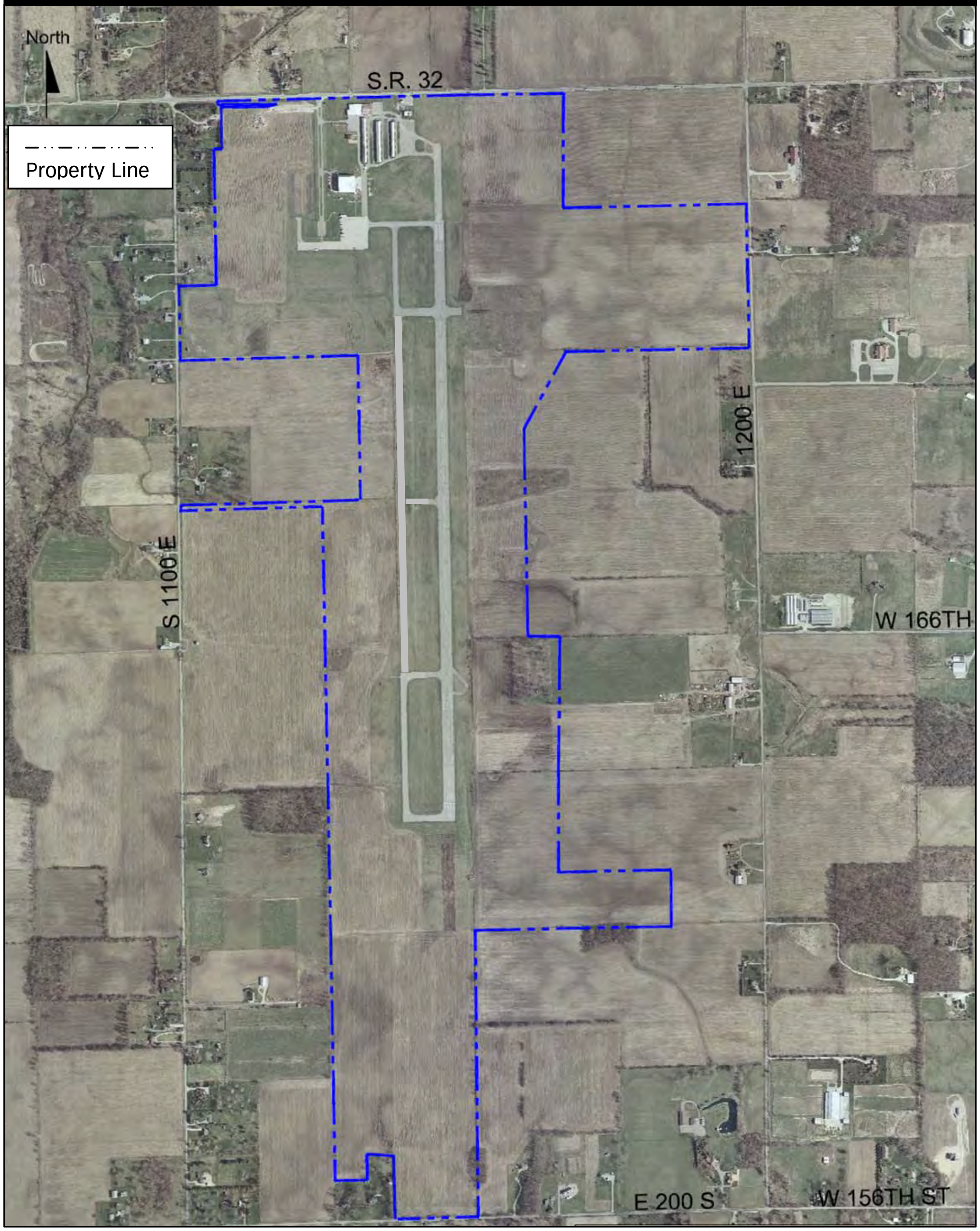
AIRPORT MASTER PLANS AND THE ENVIRONMENTAL REVIEW PROCESS

Federal Aviation Administration (FAA) Advisory Circular AC 150/5070-6B, *Airport Master Plans*, advises that an airport master plan should document environmental conditions that need consideration when identifying and evaluating development alternatives at an airport. When selecting preferred development alternatives for the Indianapolis Executive Airport (FAA airport identifier TYQ), identifying the nature and extent of any potential impacts associated is vital to minimizing stress on the environment. This environmental overview looks ahead, where possible, to select alternatives outlined in Chapter 6, *Alternatives Analysis*, to determine potential environmental impacts, while Chapter 6 looks back to this environmental overview when analyzing the alternatives for the airport.

ENVIRONMENTAL REVIEW CATEGORIES

Exhibit 3-5 below provides an aerial overview of Indianapolis Executive Airport (TYQ). When development is being considered for this facility, the eighteen environmental categories outlined in Exhibit 3-1 are analyzed for potential impact. The remainder of this section addresses the environmental categories detailed in Exhibit 3-1 in more detail.

EXHIBIT 3-5: TYQ Aerial Photo



Source: Woolpert Inc., 2006.

Air Quality

The airport is located within Boone County, Indiana, an area of relatively good air quality. The U.S. Environmental Protection Agency (USEPA) has determined the area to be compliant with all the Federally-regulated air quality standards in effect at the time of the preparation off this environmental overview. The standards are referred to as the National Ambient Air Quality Standards (NAAQS) and were established under the Clean Air Act (including the 1990 Amendments, [CAA]) to define the maximum healthful concentrations of the criteria pollutants in the ambient air, namely, carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), coarse particulate matter (PM_{10}),fine particulate matter ($PM_{2.5}$), and lead.

Potential impacts to air quality caused by selected alternatives outlined in Chapter 6, *Alternatives Analysis*, were assessed in accordance with the *National Environmental Policy Act (NEPA)* and pursuant to the guidelines provided in FAA, *Air Quality Procedures for Civilian Airports & Air Force Bases*, and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, which together with the guidelines of FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, constitute compliance with all the relevant provisions of NEPA and the CAA. The full air quality analysis (*Air Quality Technical Report*, prepared by L&B, October 23, 2008) can be found in **Appendix J**. The alternatives studied (detailed in Chapter 6) for the air quality analysis included the following:

- 1,500 ft. primary runway and associated taxiway extension
- 4,000 ft. crosswind runway and associated taxiway construction
- additional 700 ft. primary runway and associated taxiway extension

According to the *Air Quality Technical Report,* neither construction nor operation of the studied alternatives would result in annual net emissions that would exceed the emission thresholds established under the CAA. Additionally, the studied alternatives do not have the potential to cause significant adverse air quality impacts, and the alternatives are therefore presumed to conform to the Indiana State Implementation Plan (SIP).

Further, there is no requirement to conduct dispersion analysis to compare project-related emissions to the NAAQS for a project estimated to cause *de minimis* emissions. Therefore, the alternatives are assumed to comply under the guidelines found in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* Appendix A, Section 2 *Air Quality*.

As such, the alternatives comply with the provisions of the *Clean Air Act Title 1, Section 176(c)(1*). Consequently, no further analysis or reporting would be required under the provisions of the CAA or under NEPA guidelines.

Coastal Resources (Barriers and Zones)

No coastal barriers or coastal zones are located near the airport.

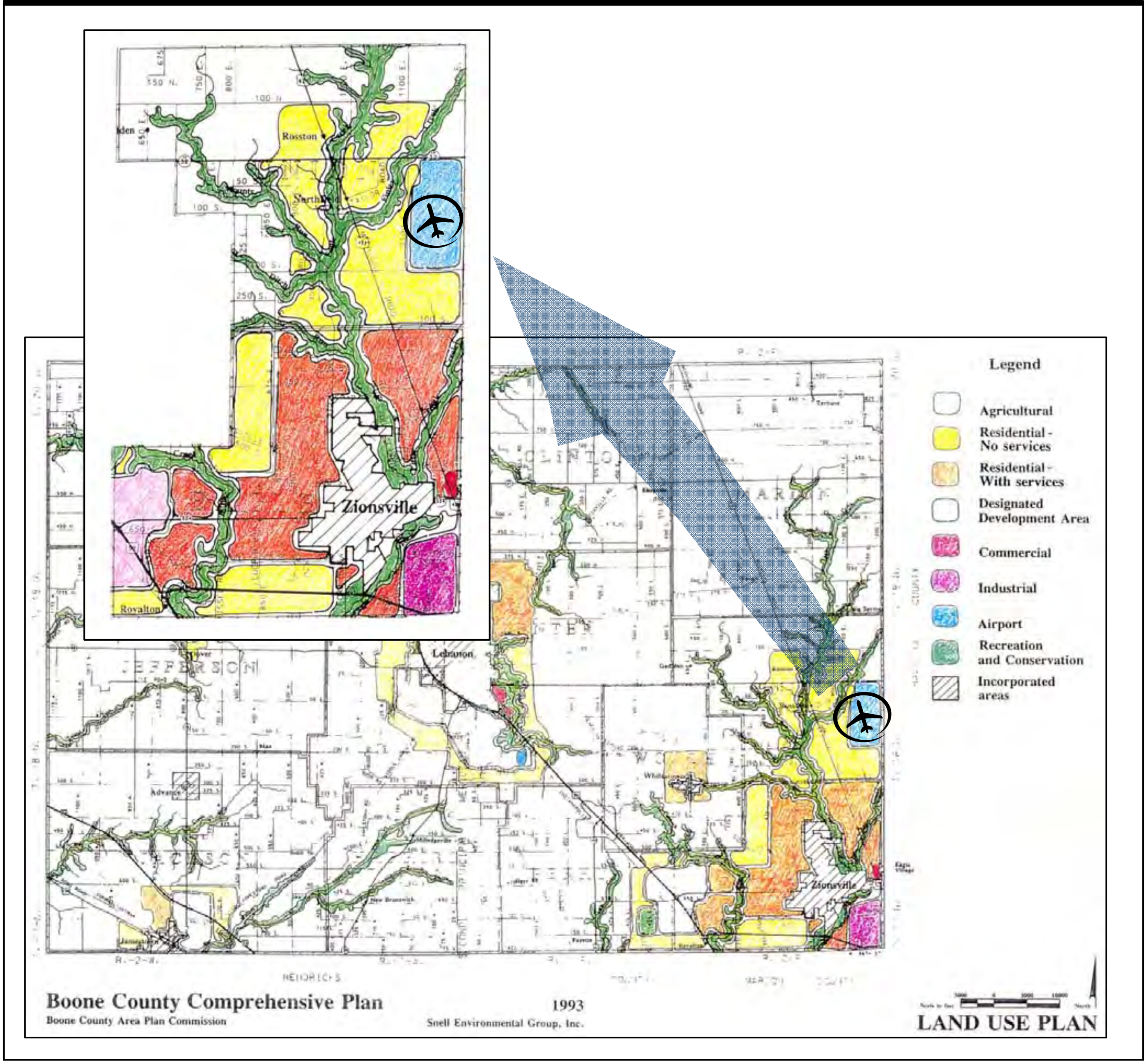
Compatible Land Use

Any federal project at an airport must be compatible with the plans of public agencies for development of the area. The current land use plans for the area identify TYQ as a recognized use. However, residential is identified as the use surrounding the airport. Development at the airport needs to be cognizant of the existing residential use around the facility, and the governing agencies should work with the community to encourage compatible development near the airport.

The compatibility of existing and future land uses near an airport is commonly associated with the degree of the airports noise impacts. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites; parks; recreational areas; wildlife refuges; and cultural and historical sites. To determine if a proposed action at the airport will create a significant impact, the potential changes in off airport noise are assessed. A separate section later in this chapter specifically address noise, and a noise analysis can be found in **Appendix I.** In summary, the noise analysis found that the 65 DNL airport noise contours for the airport alternative development options studied remain mostly on current airport property or on property proposed for purchase if the alternative were to be developed. It is important to note that Union Elementary School is approximately 8,300 ft. south of Runway 18-36, and the noise study indicates that the 65 DNL airport noise contour does not reach this school in 2027 with either the 7,000 ft. runway or the 7,700 ft. runway alternatives discussed in Chapter 6, *Alternatives Analysis*.

The Boone County Comprehensive Plan–Land Use Plan (**Exhibit 3-6**) includes the Indianapolis Executive Airport as a land use in Boone County. Therefore, the airport is consistent with the plans in the area.

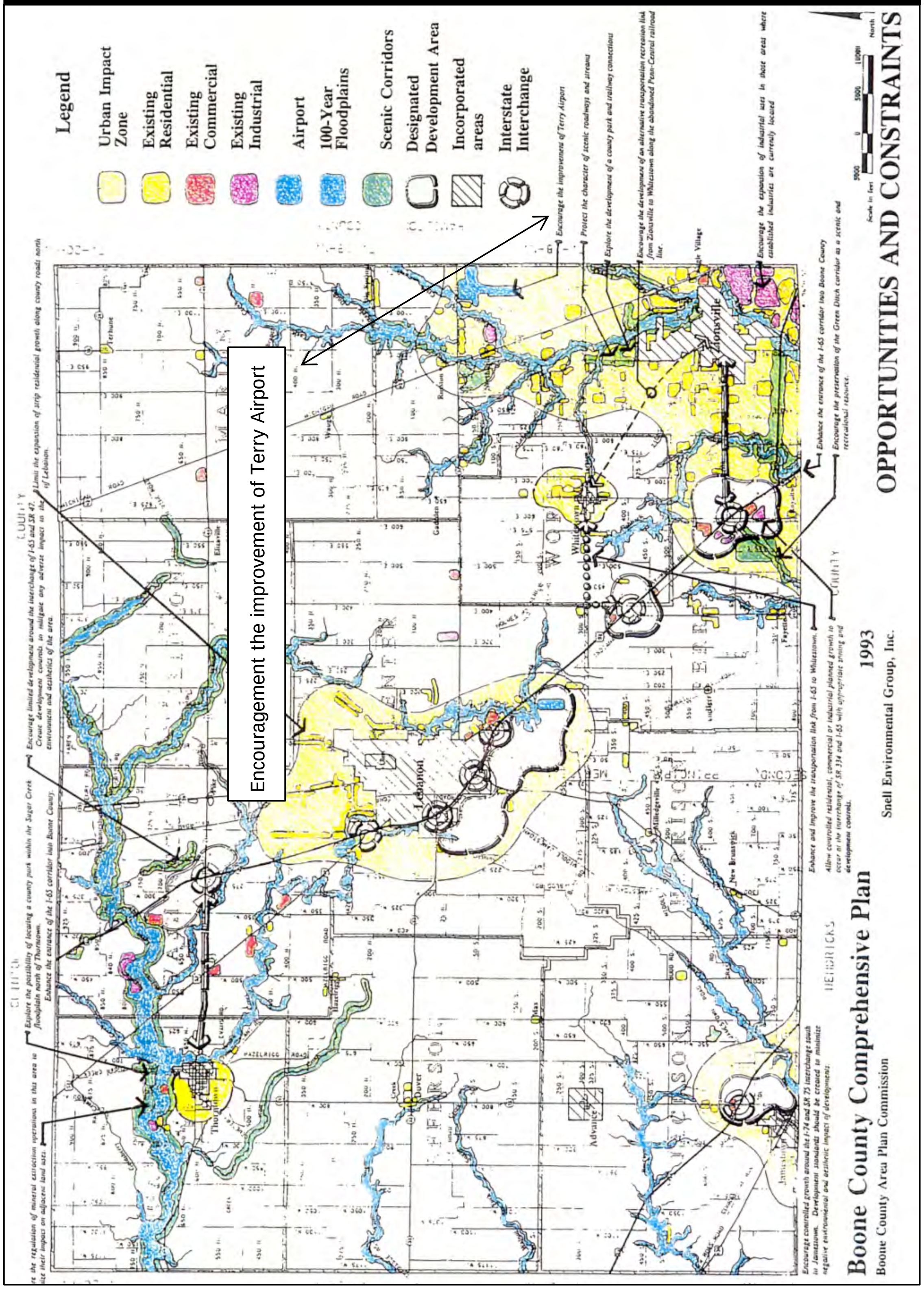
EXHIBIT 3-6: Boone County Comprehensive Plan—Land Use Plan



Source: http://boonecounty.in.gov/Default.aspx?tabid=69, accessed 10-08.

The Boone County Comprehensive Plan–Opportunities and Constrains (**Exhibit 3-7**) includes encouragement of improvements at the Indianapolis Executive Airport (formerly Terry).

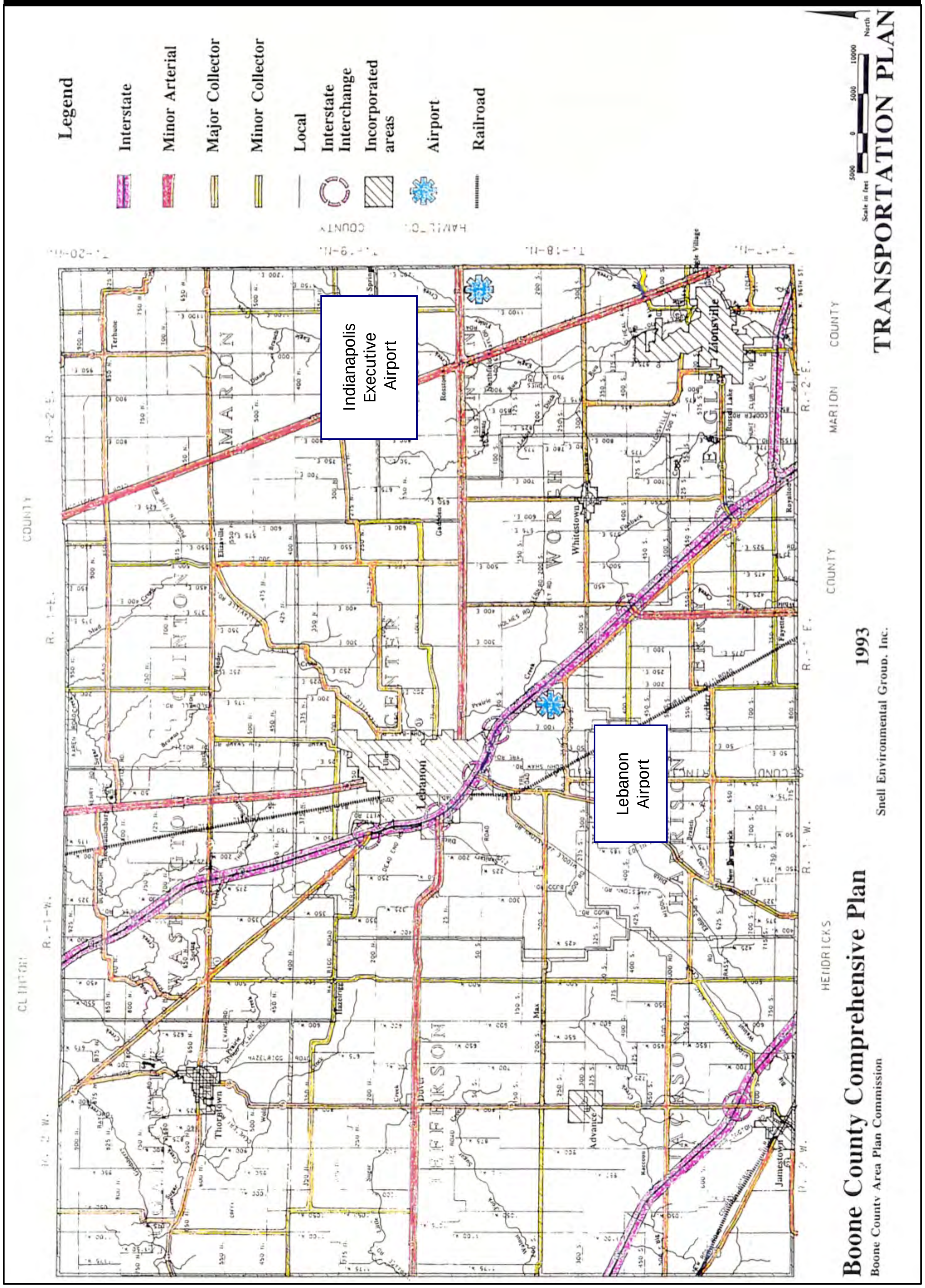
EXHIBIT 3-7: Boone County Comprehensive Plan—Opportunities and Constraints



Source: http://boonecounty.in.gov/LinkClick.aspx?fileticket=Mbsh%2fYhYkwE%3d&tabid=69&mid=403, accessed 10-08.

The Boone County Comprehensive Plan–Transportation Plan (**Exhibit 3-8**) recognizes TYQ as part of the county's transportation assets.

EXHIBIT 3-8: Boone County Comprehensive Plan—Transportation Plan



Source: http://boonecounty.in.gov/LinkClick.aspx?fileticket=EJUiuiSEaBE%3d&tabid=69&mid=403, accessed 10-08.

Construction Impacts

Local, state, and federal ordinances and regulations address construction impacts at airports and any associated permits required. The construction program should be considered when identifying major development alternatives in regard to potential impacts for such things as soil erosion controls, water quality, wetlands, air quality, noise, solid and hazardous waste, source and quality of materials, socioeconomic impacts, and operation of existing airport construction. Since Boone and Hamilton Counties are classified as nonattainment counties for 8-hour ozone (03) standards and Hamilton County is classified as a nonattainment county for the particulate matter (PM2.5) standards, consideration of impacts to air quality should be into account.

Construction impacts are temporary in nature. All construction on the airport should follow the provisions of FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports*. In addition, all appropriate permitting and erosion control measures will need to be addressed as part of the development program.

Department of Transportation Act, Section 303(c) Lands (Formerly Section 4(f))

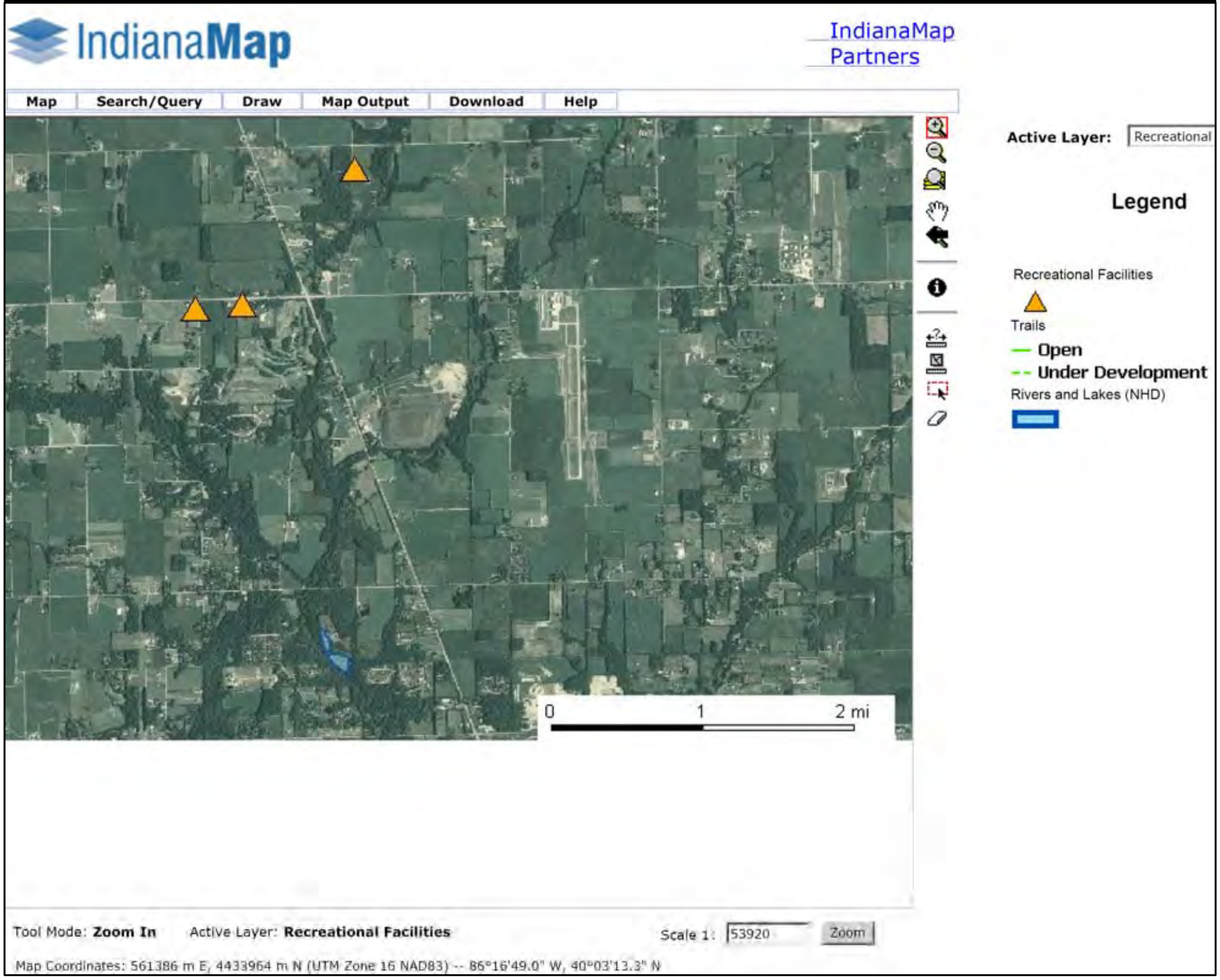
This act governs the approval of any federal project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significant. It also covers land considered a historic site of national, state, or local significance.

According to the US Department of Interior, National Park Service, there are no parklands within the potential airport development area.

According to the Indiana Department of Natural Resources, there are no state parks within the potential airport development area.

According to the Indiana Geological Survey, there are no recreational facilities within the potential airport development area (**Exhibit 3-9**).

EXHIBIT 3-9: Recreational Facilities

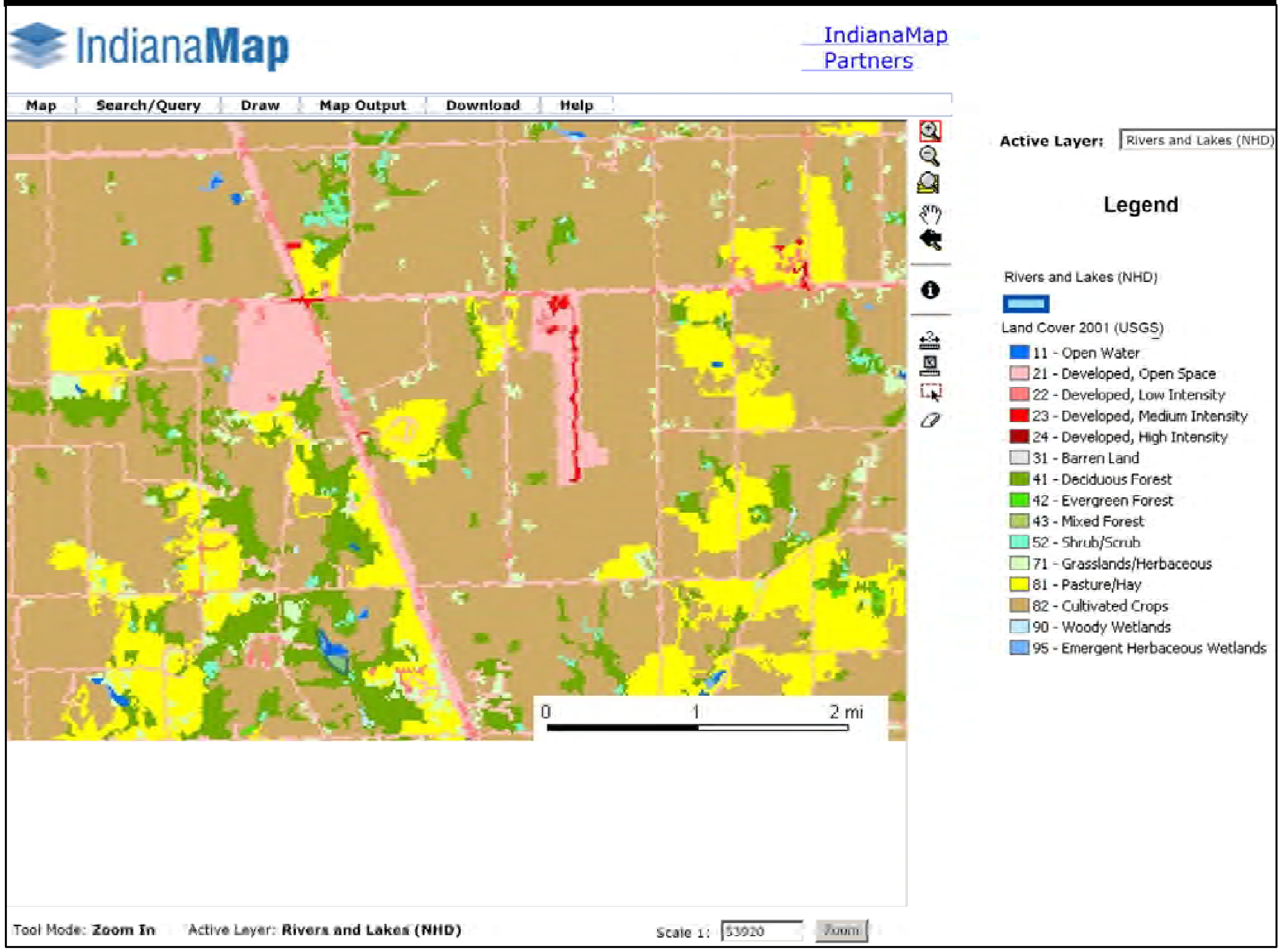


Source: http://129.79.145.7/arcims/statewide_mxd/viewer.htm?562620,4431118,53920,1,52,57,91,109,111,148,224,207,209, accessed 10-08.

Farmlands

The Farmland Protection Policy Act governs all federal projects that have the potential to convert farmland to non-agricultural uses. TYQ is surrounded by farmland (**Exhibit 3-10**); therefore, any projects that will disrupt previous or current farmland will need to be evaluated for their potential to impact prime farmland.

EXHIBIT 3-10: Land Cover



Source: http://129.79.145.7/arcims/statewide_mxd/viewer.htm?562620,4431118,53920,1,52,57,91,109,111,148,224,207,209, accessed 10-08.

Fish, Wildlife, and Plants

The Endangered Species Act (ESA) governs federal projects that may impact an endangered or threatened species (fish, wildlife, and plants). Coordination is anticipated with the Indiana Department of Natural Resources (IDNR) or the Indiana Department of Environmental Management (IDEM), as appropriate, to determine the potential for impacts. The 1988 Environmental Assessment completed for Indianapolis Executive Airport (formerly Terry Airport) for multiple projects including a runway extension, parallel taxiway, and crosswind runway, found that the Indiana Department of Natural Resources Natural Heritage Program's data had been reviewed and that "to date no vulnerable plant or animal species of either state or federal significance had been reported" near the airport.

The current Endangered, Threatened, and Rare Species List from the Indiana Department of Natural Resources (11/22/05) is shown on **Exhibit 3-11**. The Indianapolis Executive Airport is within the range of the Indiana bat (Myotis sodalis), a federally endangered species. Any

EXHIBIT 3-11: Boone County Endangered, Threatened, and Rare Species List

Page 1 of 1

11/22/2005

Indiana County Endangered, Threatened and Rare Species List

County: Boone

Species Name	Common Name	FED	STATE	GRANK	SRANK
Mollusk: Bivalvia (Mussels)					
Alasmidonta viridis	Slippershell Mussel			G4G5	S2
Fusconaia subrotunda	Longsolid		SE	G3	S1
Lampsilis fasciola	Wavyrayed Lampmussel		SSC	G4	S2
Ptychobranchus fasciolaris	Kidneyshell		SSC	G4G5	S2
Toxolasma lividus	Purple Lilliput		SSC	G2	S2
Toxolasma parvum	Lilliput			G5	S2
Villosa lienosa	Little Spectaclecase		SSC	G5	S2
Bird					
Ardea herodias	Great Blue Heron			G5	S4B
Bartramia longicauda	Upland Sandpiper		SE	G5	S3B
Buteo lineatus	Red-shouldered Hawk		SSC	G5	S3
Cistothorus palustris	Marsh Wren		SE	G5	S3B
Cistothorus platensis	Sedge Wren		SE	G5	S3B
Dendroica cerulea	Cerulean Warbler		SSC	G4	S3B
Helmitheros vermivorus	Worm-eating Warbler		SSC	G5	S3B
Ixobrychus exilis	Least Bittern		SE	G5	S3B
Mniotilta varia	Black-and-white Warbler		SSC	G5	S1S2B
Nycticorax nycticorax	Black-crowned Night-heron		SE	G5	S1B
Rallus elegans	King Rail		SE	G4	S1B
Rallus limicola	Virginia Rail		SE	G5	S3B
Tyto alba	Barn Owl		SE	G5	S2
Wilsonia citrina	Hooded Warbler		SSC	G5	S3B
Mammal					
Myotis sodalis	Indiana Bat or Social Myotis	LE	SE	G2	S1
Taxidea taxus	American Badger			G5	S2
Vascular Plant					
Crataegus grandis	Grand Hawthorn		SE	G3G5Q	S1
Juglans cinerea	Butternut		WL	G3G4	S3
Plantago cordata	Heart-leaved Plantain		SE	G4	S1
High Quality Natural Community					
Forest - flatwoods central till plain	Central Till Plain Flatwoods		SG	G3	S2

Indiana Natural Heritage Data Center
Division of Nature Preserves
Indiana Department of Natural Resources
This data is not the result of comprehensive county surveys.

Fed: LE = Endangered; LT = Threatened; C = candidate; PDL = proposed for delisting

State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

GRANK: Global Heritage Rank: G1 = critically imperiled globally; G2 = imperiled globally; G3 = rare or uncommon globally; G4 = widespread and abundant globally but with long term concerns; G5 = widespread and abundant globally; G? = unranked; GX = extinct; Q = uncertain rank; T = taxonomic subunit rank

SRANK: State Heritage Rank: S1 = critically imperiled in state; S2 = imperiled in state; S3 = rare or uncommon in state; G4 = widespread and abundant in state but with long term concern; SG = state significant; SH = historical in state; SX = state extirpated; B = breeding status; S? = unranked; SNR = unranked; SNA = nonbreeding status unranked

Source: www.in.gov/dnr/files/np_boone.pdf, accessed 10-08.

project requiring the removal of trees that are considered habitat for the Indiana bat, must be coordinated consistent with the U.S. Fish and Wildlife policy. Common guidelines include not cutting lose bark trees between April and September. (Source: www.in.gov/dnr/

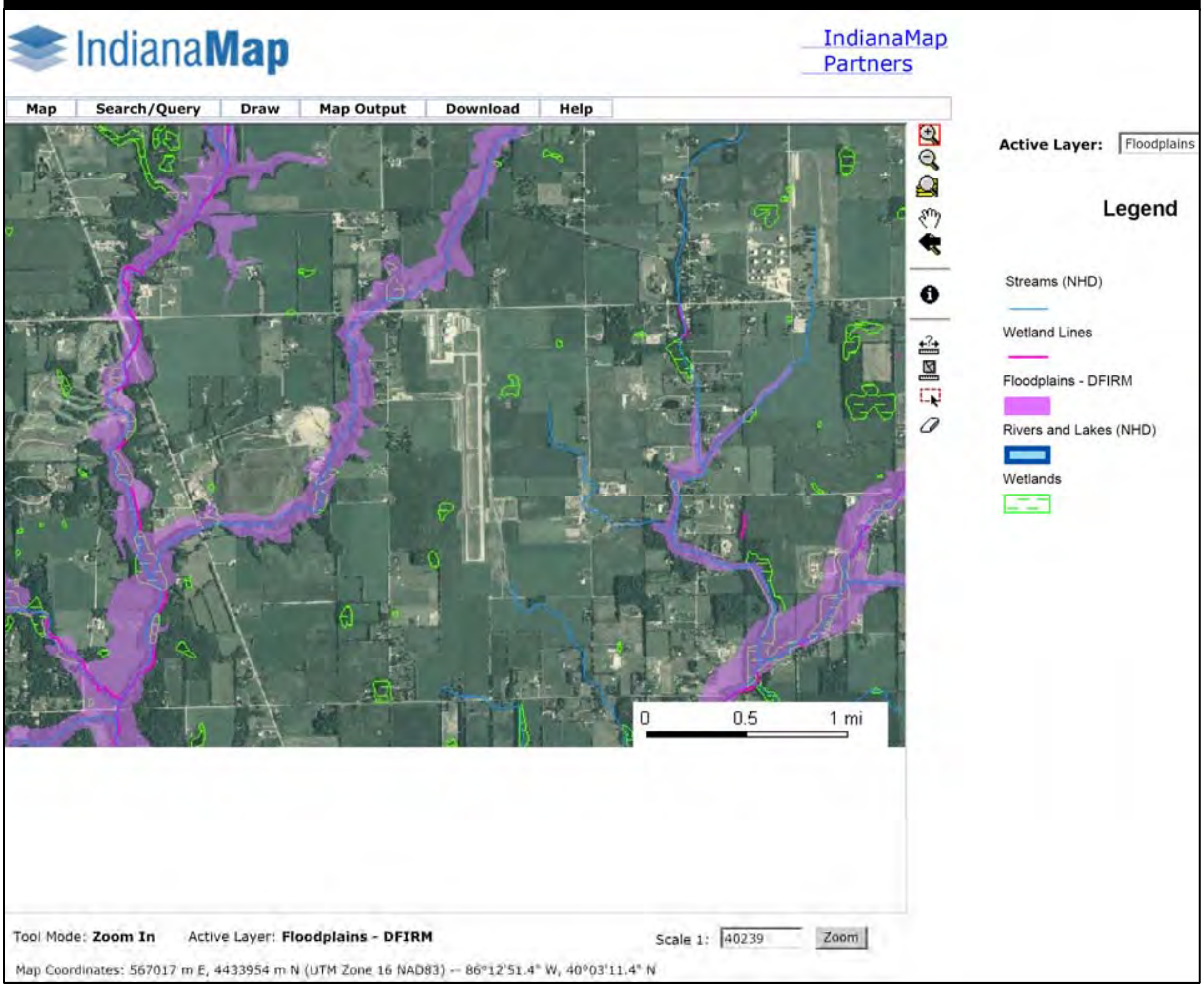
files/I-H-1_Strategy_for_Indiana_Bat.pdf.) If trees need to be removed outside of these seasonal cutting guidelines, an emergence survey may be recommended.

Additionally, the *Regulated Waters Determination Report* for Indianapolis Executive Airport, completed by JFNew on July 1, 2008, indicates that no threatened or endangered species or Indiana Bat habitat was observed in potential development areas of the airport during their site investigation (see **Appendix H**).

Floodplains

Executive Order 11988 directs federal agencies to take action to reduce the risk of loss (structural and human) from flooding and preserve the natural values of floodplains. According to the Indiana Geological Survey (**Exhibit 3-12**), there are no floodplains on the

EXHIBIT 3-12: Floodplains



Source: http://129.79.145.7/arcims/statewide_mxd/viewer.htm?562620,4431118,53920,111,148,211,224, accessed 10-08.

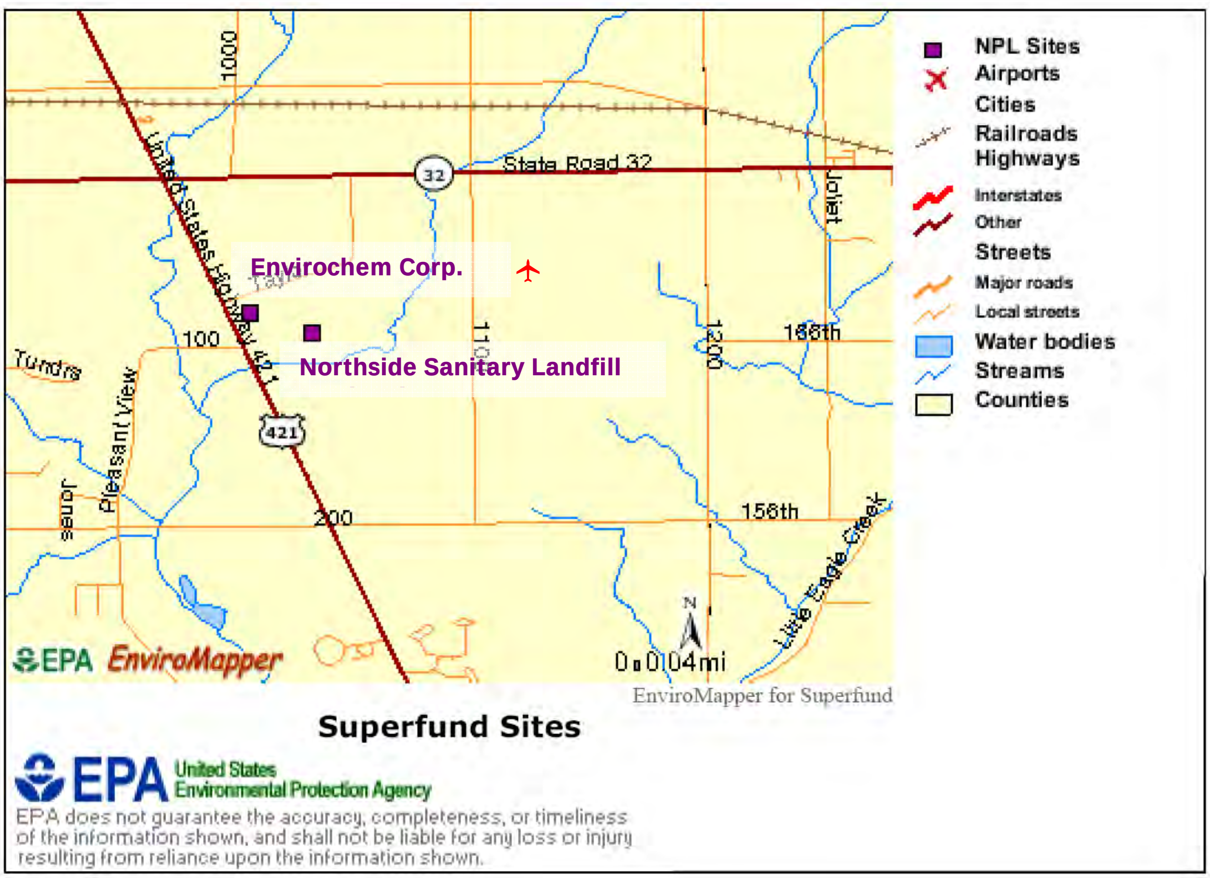
contiguous land surrounding the airport. The closest floodplains are associated with Finley Creek north of S.R. 32 and west of S. 1100 E.

Hazardous Materials, Pollution Prevention, and Solid Waste

The two most important statutes related to hazardous materials and waste affecting FAA projects are the Resource Conservation and Recovery Act (RCRA) (as amended by the Federal Facilities Compliance Act of 1992) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA or Superfund) and the Community Environmental Response Facilitation Act of 1992. RCRA governs the production, treatment, storage, and disposal of hazardous wastes. CERCLA covers the cleanup of any release of a hazardous substance (excluding petroleum) into the environment. A federal project at an airport that uses, generates, or disturbs a hazardous substance must analyze the impact and provide for control measures.

Superfund Sites – In 1980, Congress established the Superfund Program (administered by the EPA) to locate and clean up the nation's worst uncontrolled or abandoned hazardous waste sites. As shown in **Exhibit 3-13** below, two superfund sites are located

EXHIBIT 3-13: Superfund Sites



Source: http://134.67.99.113/sf/emsuperfund.asp?xl=-86.285949&yt=39.96902&xr=-86.237702&yb=39.932835, accessed 10-08.

approximately one mile directly west of the airport. According to FAA AC 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports*, landfills that attract wildlife should not be located within 5,000 feet of an airport serving piston-powered aircraft; 10,000 feet of an airport serving turbine-powered aircraft; and within 5 statute miles of a runway end that could cause hazardous bird species to fly across the airport's approach or departure airspace.

ENVIROCHEM CORP.

865 South State Road 42; Zionsville IN 46077

EPA ID: IND084259951

The EPA website indicates that, under current conditions at this site, potential or actual human exposures are under control. 15,523 cubic yards of soil or other solid-based media have been treated, stabilized, or removed (roughly equivalent to three football fields, covered one yard deep). Additionally, 1,955,451 gallons of water or other liquid-based media have been treated, stabilized, or removed (roughly equivalent to 2 and a half Olympic size swimming pools). (Source: http://cfpub.epa.gov/supercpad/cursites/csitinfo.cfm?id=0501540, accessed 10-08.)

NORTHSIDE SANITARY LANDFILL, INC.

985 S St Rd 421; Zionsville IN 46077

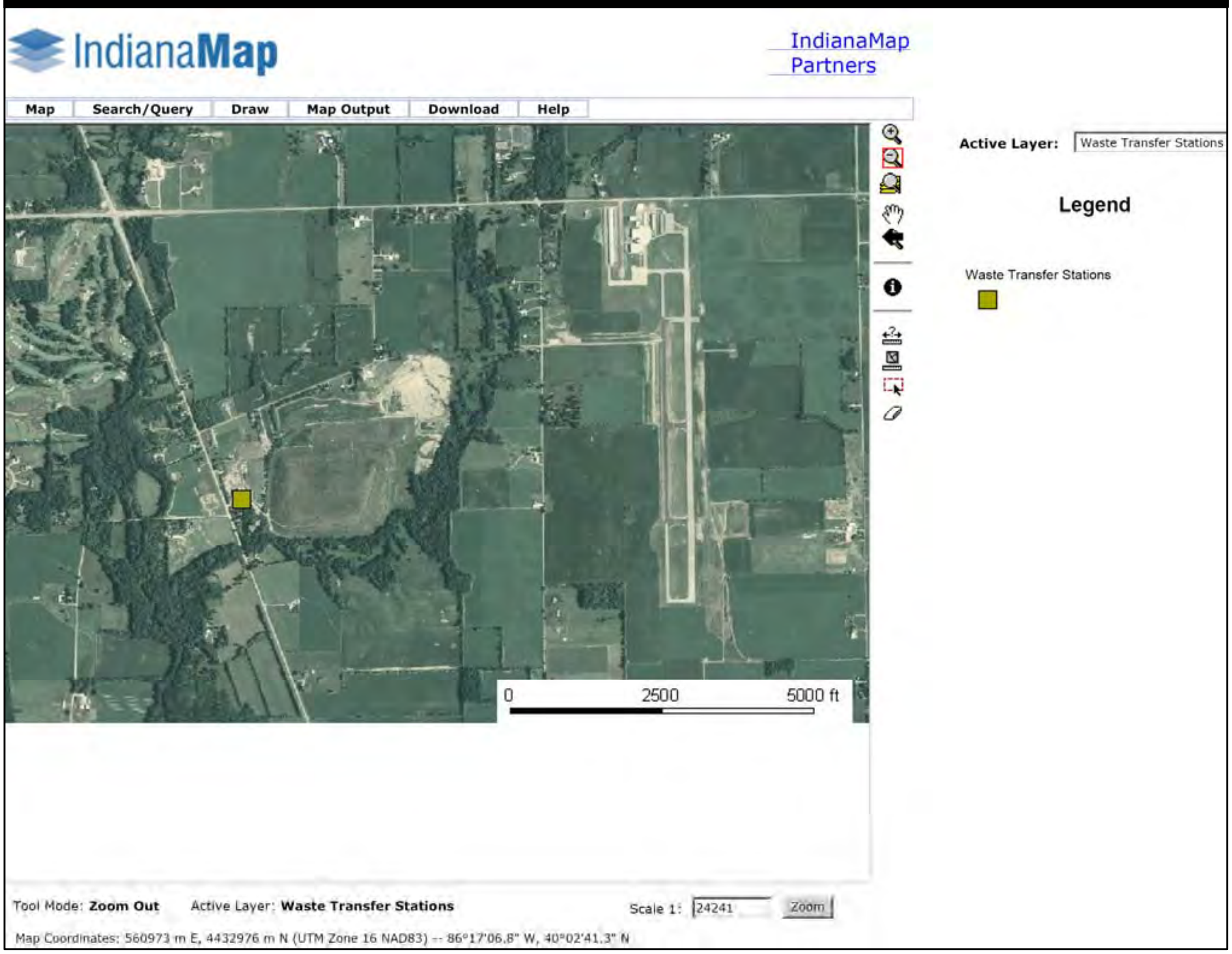
EPA ID: IND050530872

The EPA website indicates that, under current conditions at this site, potential or actual human exposures are under control. (Source: http://cfpub.epa.gov/supercpad/cursites/csitinfo.cfm?id=0501442, accessed 10-08.) The landfill closed in 1991 and has been covered and seeded, and as such, there is no exposed municipal waste on the site. Therefore, it should not be considered a hazardous wildlife attractant per FAA AC 150/5200-33B. Also, according to the 1998 EA completed for the airport, since the "landfill is constantly graded to cover the waste material, there is no evidence of the flocking of birds, and the jet aircraft and the soaring gliders have not reported any incidents which could be construed as a potential dangerous situation due to the existence of the landfill." Although not considered an impact at this point, the airport owner should remain informed of any new developments at the facility.

SOLID WASTE

The Boone County Resource Recovery Systems (located at 985 S US Hwy 421, Zionsville, IN 46077-8829) is located approximately one mile from the Indianapolis Executive Airport. (See **Exhibit 3-14**.) The current waste processing activities involve the sorting and recycling of construction/demolition waste and the disposal of clean fill material (tree and yard waste, concrete, dirt, etc.) (See **Exhibit 3-15**.) Therefore, it should not be considered a hazardous wildlife attractant per FAA AC 150/5200-33B. Additionally, TYQ is a general aviation airport serving general aviation piston and jet aircraft. The airport experienced approximately 29,000 operations (takeoffs and landings) in 2005. At this service level, the airport is not a significant waste generator, and available capacity to handle any likely increase from typical growth at this type of facility is anticipated. Additionally, any waste generated from construction will be short term and temporary.

EXHIBIT 3-14: Waste Transfer Stations



Source: http://129.79.145.7/arcims/statewide_mxd/viewer.htm?563690,4431596,40239,89,110,111,143,148,187,224, accessed 10-08.

EXHIBIT 3-15: Boone County Resources Recovery Systems

BOONE COUNTY RESOURCE
RECOVERY SYSTEMS INC.
985 US 421, Zionsville, IN 46077

October 25, 2007

Dan Montgomery
Montgomery Aviation
11329 East SR 32
Zionsville, IN 46077

Dear Dan,

In response to your inquiry concerning the potential for a large population of birds congregating on the old Northside Sanitary Landfill site, please be aware that the site closed in 1991 and has since been covered and seeded. There is no exposed municipal waste to attract the birds.

Our current waste processing activities involve the sorting and recycling of construction / demolition waste and the disposal of clean fill material (tree and yard waste, concrete, dirt, etc.). These materials do not attract birds.

If you have any further questions please do not hesitate to contact me.

Sincerely

John Bankert

John Bankert

Source: John Bankert, 2007.

Historical, Architectural, Archeological, and Cultural Resources

The National Register of Historic Places (administered by the National Park Service) is the official list of cultural resources considered worthy of preservation. This list is authorized under the National Historic Preservation Act of 1966. Properties identified in the Register include districts, sites, buildings, and structures that are significant in American history, architecture, archeology, engineering, and culture.

According to the National Register of Historic Places, there are no historically significant places or structures near the airport. Those sites that are considered of historical significance in Boone County are listed in **Exhibit 3-16** below:

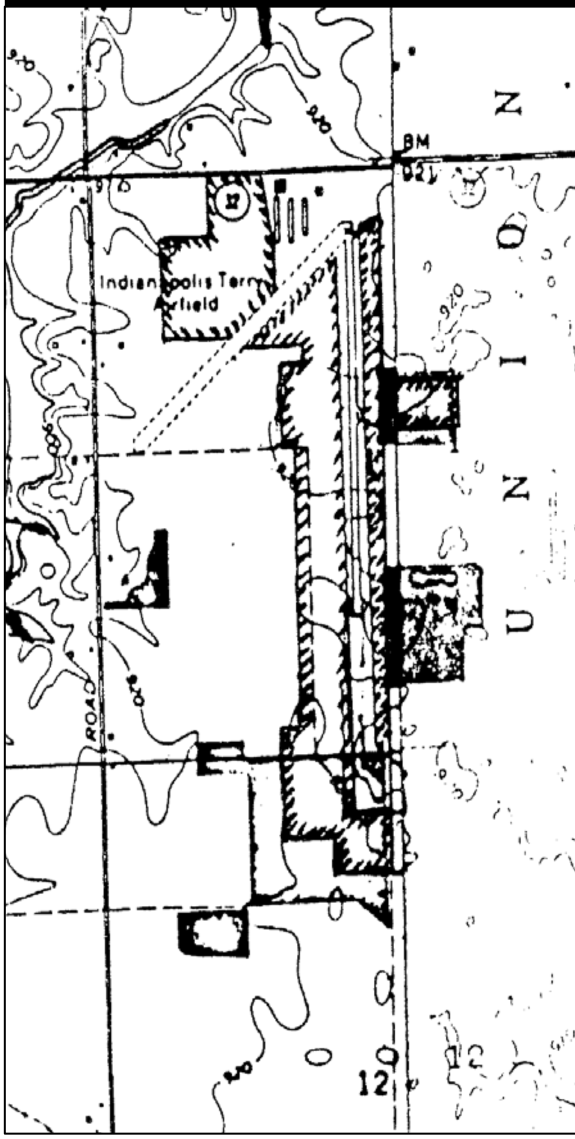
EXHIBIT 3-16: Boone County Historic Places

County	Resource Name	Address	City	Listed	Multiple
Boone	Boone County Courthouse	Courthouse Sq.	Lebanon	1986-09-22	
Boone	Scotland Bridge	Lost Rd. (Co. Rd. 200 E) over Sugar Cr.	Mechanicsburg	1994-03-17	
Boone	Thorntown Public Library	124 N. Market St.	Thorntown	1986-09-22	
Boone	Town Hall (Castle Hall)	65 E. Cedar St.	Zionsville	1983-06-09	
Boone	VanHuys, Andrew B., Round Barn	Address Restricted	Lebanon	1993-04-02	Round and Polygonal Barns of Indiana MPS

Source: http://www.nr.nps.gov/nrloc1.htm, accessed 10-08.

According to Archaeological Field Reconnaissance completed for Indianapolis Executive Airport in 1980 (**Exhibit 3-17**), areas along and around the runway were inspected and no significant archeological resources were believed to have survived farm plowing in the area.

EXHIBIT 3-17: Archaeological Field Reconnaissance



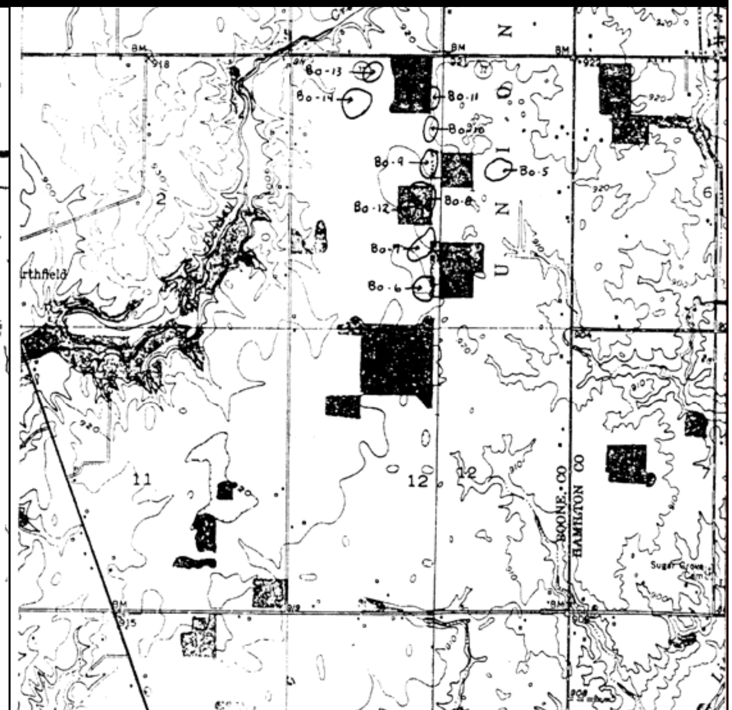


Figure 5. A portion of the USGS 7.5-minute Rosston and Westfield Quadrangles showing site locations.

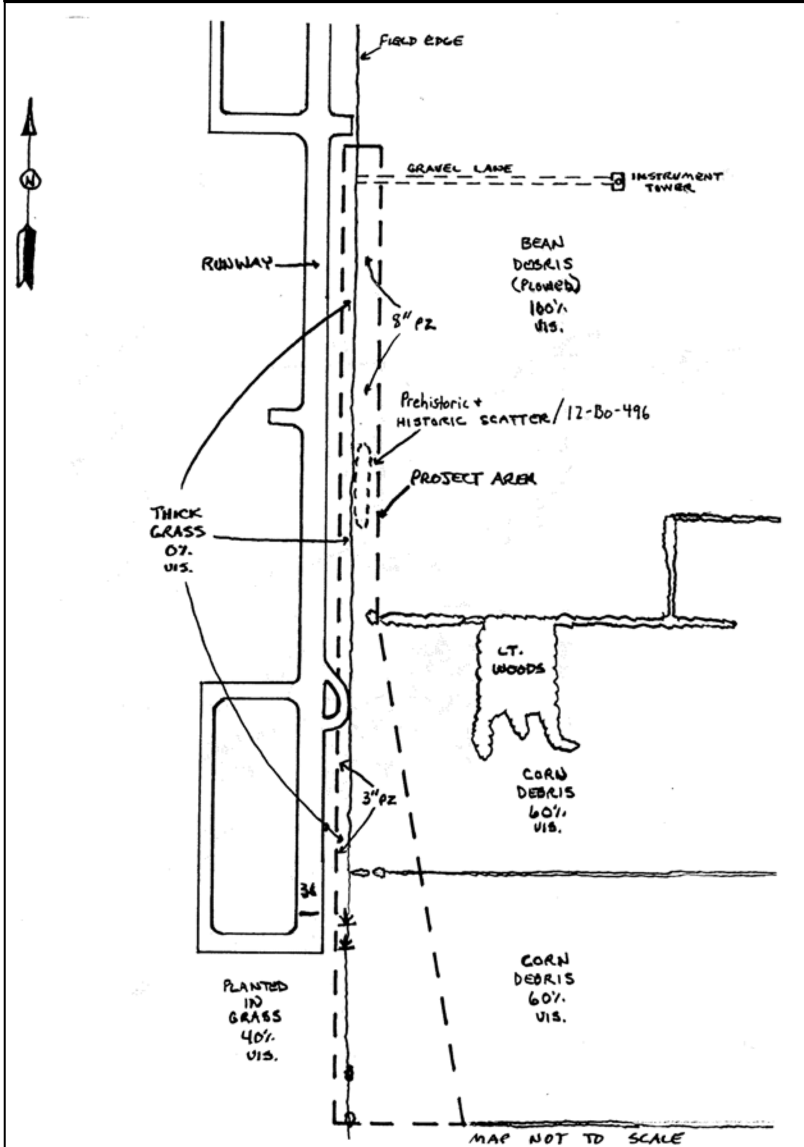
Comments and Recommendations

Since all of the sites located during the field reconnaissance were disturbed by plowing and since all but the Archaic site, 12-Bo-12, contained only diffusely scattered flakes and cores, it is felt that significant archaeological resources are unlikely to have survived, therefore it is recommended that no further testing be required and that the project be allowed to proceed as planned.

Source: Archaeological Field Reconnaissance – Indianapolis Terry Airport, Boone County, Indiana; 10 July 1980.

Additionally, Archaeological Field Reconnaissance was completed for a glide slope relocation and runway safety area (RSA) grading at the airport in 2005. This inspection determined that no significant archaeological sites were found. (See **Exhibit 3-18** below.)

EXHIBIT 3-18: Archaeological Field Reconnaissance



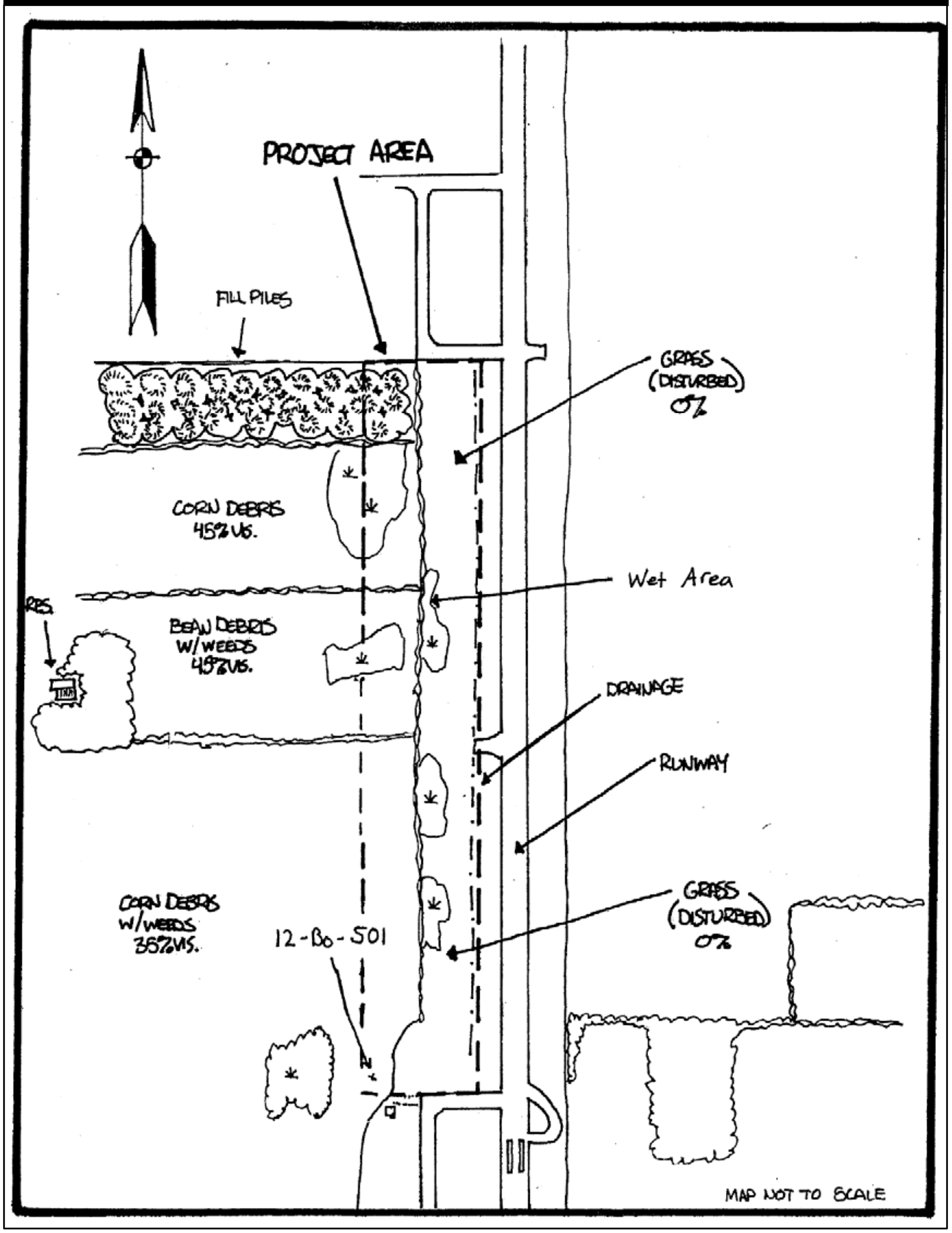
Conclusions and Recommendations

An archaeological field reconnaissance of the proposed glide slope relocation and RSA grading improvement at the Indianapolis Executive Airport in Boone County, Indiana located one archaeological site. The site, 12-Bo-496, consisted of an insignificant historic/prehistoric field scatter. The field reconnaissance determined that limited portions of the survey area had been previously disturbed by non-agricultural activity. Known cultural resources in the region range in size and significance from large artifact concentrations and habitation sites to smaller ephemeral lithic scatters of unknown prehistoric age as evidenced by McCord and Cochran (1994), and Stillwell (2003d, 2004a, 2004b). Because no significant archaeological sites recorded during the field survey, it is the opinion of the archaeologist that the proposed undertaking will not affect any properties eligible for listing on the National Register of Historic Places, and no further archaeological work is warranted. Project clearance is recommended. However, if any unanticipated artifact concentrations, burials, or features become apparent during construction of the project, work should be halted until the archaeologist in the Department of Natural Resources-Division of Historic Preservation and Archaeology is contacted.

Source: An Archaeological Field Reconnaissance of the Proposed Glideslope Relocation and RSA Grading at the Indianapolis Executive Airport, Boone County, Indiana, May 2, 2005.

Archaeological reconnaissance was also performed for a partial parallel taxiway in the area depicted on **Exhibit 3-19**. No historically or archaeologically significant sites were found during this reconnaissance either. Standard archeological reconnaissance should be performed for any project that impacts land that has not been previously disturbed or surveyed.

EXHIBIT 3-19: Archaeological Field Reconnaissance for Proposed Parallel Taxiway



Source: An Archaeological Field Reconnaissance of the Proposed Parallel Taxiway at the Indianapolis Executive Airport, Boone County, Indiana, February 3, 2006.

Light Emissions and Visual Effects

The location of lighting systems for navigation and parking and the overall appearance of certain structures have the potential to impact areas around the airport. Any impacts due to light emissions or any visual impacts associated with a federal project may require analysis and/or mitigation if the impact is significant or adverse. The extent to which lighting associated with a project will have off airport impacts must be considered.

Natural Resources and Energy Supply

Executive Order 13123, Greening the Government through Efficient Energy Management, encourages the expanded use of renewable energy on Federal projects. Although any future runway extension or crosswind runway addition may create a minimal increase in the demand for power, taxi distance, and fuel consumption, adequate supply is available. Any proposed projects should be reviewed for use of any natural resources in short supply.

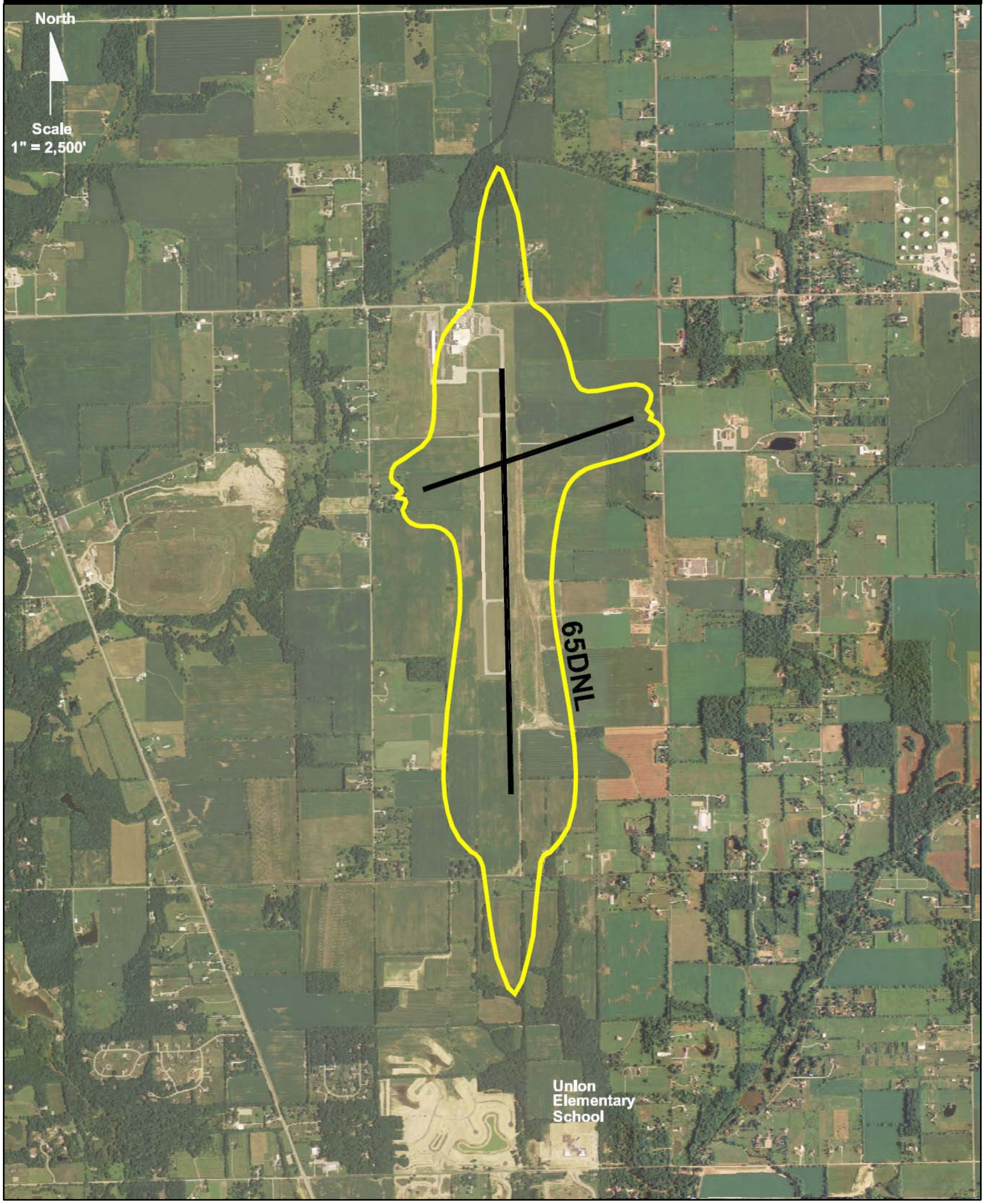
Noise

The noise generated by aircraft is often the most noticeable environmental effect associated with aviation projects. If this noise is sufficiently loud or frequent in occurrence, it may interfere with various human activities or be considered objectionable. The Aviation Safety and Noise Abatement Act of 1979 is the primary regulation covering airport noise. Day-Night Average Sound Level (DNL) is the metric of choice in the airport world. It is used to define noise contours of equal exposure. All federal agencies have adopted DNL as the metric for airport noise analysis. DNL is a 24-hour time-averaged sound exposure level with a 10 dB nighttime (10p-7a) weighting.

The FAA's Integrated Noise Model (INM) version 7.0a was used to prepare and run noise contours for Indianapolis Executive Airport for current conditions and forecasted conditions for selected alternatives outlined in Chapter 6, *Alternatives Analysis*. (The full noise report can be found in **Appendix I**.) The noise contours for existing conditions were based on the current fleet mix and operations level at the airport. The future contours were based on existing airport layout conditions and for a 1,500 ft. extension to the south end of Runway 18-36 by 2013, an additional 700 ft. extension to the south end of Runway 18-36 by 2020, and the addition of a 4,400 ft. crosswind runway in 2020. The existing conditions airport noise contour 65 DNL (see maps in Appendix I) is approximately 355 acres. The future 2013 conditions airport noise contour 65 DNL is approximately 414 acres, the future 2020 noise contour 65 DNL is approximately 511 acres, and the future 2027 noise contour 65 DNL is approximately 631 acres.

The 65 DNL airport noise contours for the alternatives studied remain mostly on current airport property or on property proposed for purchase if the alternative were to be developed. It is important to note that Union Elementary School is approximately 8,300 ft. south of Runway 18-36, and that the 65 DNL airport noise contour does not reach this school in 2027 with either the 7,000 ft. runway or the 7,700 ft. runway alternatives discussed in Chapter 5, *Alternatives Analysis*. (See **Exhibit 3-20**.)

EXHIBIT 3-20: TYQ 65 DNL Airport Noise Contour for 7700 ft. Primary Runway and 4,400 ft. Crosswind Runway



Source: L&B, 2008; Aerofinity, 2008.

Secondary (Induced) Impacts

Secondary or induced impacts are generally due to noise, land use, or socioeconomic impacts. Examples of these impacts include shifts in population movement or growth, changes in the demands for public service, and changes in business and economic activity. Induced impacts will normally not be significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts. Noise, compatible land use, and socioeconomic impacts of selected alternatives found in Chapter 6, *Alternatives Analysis*, are detailed in their respective sections of this chapter and do not appear to be significant. Therefore, secondary impacts of the selected alternatives appear unlikely.

Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health & Safety Risks

When Federal projects have the potential to cause extensive relocation, fragmentation of neighborhoods and communities, disproportionately high adverse impacts on minority or low income communities, disproportionate health and safety risks to children, or significant community disruption, the degree of the impact and mitigation or alternative measures must be identified.

Any project proposed at the airport should be reviewed for major shifts in population, movement or growth of public service demands, risks to children, community disruption, impacts of minority or low income populations, or changes in business/economic activity that is anticipated by development of the airport. Schools would be included in this category.

The airport's address is Zionsville, Indiana. The population in the area of the airport is low. Accordingly, the alternatives discussed in Chapter 6, *Alternatives Analysis*, are unlikely to cause major population shifts. According to the 2000 Census, approximately 98% of the Zionsville population is white while the median household income is $81,770. As such, impacts from the alternatives to minority or low income populations are also unlikely.

Union Elementary School is located approximately 8,300 ft. south of Runway 18-36 in the noise sensitive area as defined by Indiana Code 8-21-10-3. The Zionsville Community Schools received Noise Sensitive Permit #06-IN-01-NS on January 5, 2006 to construct the school in a noise sensitive zone. The permit states the following:

> The permittee acknowledges for itself, its heirs, its successors, and its assigns, that the real estates described in this permit experiences or may experience significant levels of aircraft operations, and that the permittee is erecting a building designed for noise sensitive use upon the real estate, with the full knowledge and acceptance of the aircraft operations as well any any effects resulting from the aircraft operations.

Sound attenuation was built into Union Elementary School at the time of its construction based on its noise sensitive use in a noise sensitive area of an airport. According to the noise study referenced in the noise section of this chapter, extension of Runway 18-36 up to an overall length of 7,700 ft., as detailed in the Chapter-*Alternatives Analysis*, would not put the school in the projected 2027 65 DNL noise contour for the airport.

As part of the master planning process, a public information workshop was held on July 31, 2008 to receive public input on the alternatives discussed in Chapter 6, *Alternatives Analysis*. Written comments were taken until August 14, 2008. Forty-nine comments were received via the workshop comment forms or through email. All comments are included in **Appendix K** in their entirety, but are summarized in **Exhibit 3-21**:

EXHIBIT 3-21: Summary of Public Comments

Name	Summary of Comment
1. Friederick E. Leickley	Questioned if the crosswind runway was being built for recreation.
2. Steve Oden	Support of runway extension.
3. Brandon & Christian Sorgen	Concerned about increased noise, road traffic, pollution, and home value.
4. Frank Hoffman	Opposed to any expansion.
5. Mike Zeller	Master plan should reflect desired future state of the airport by the public and not a maximum build-out based on unconstrained demand.
6. Charles Maranto	Concerned about how and when his property will be purchased and the market value it will be given.
7. Marjie Breisch	Opposed to runway extension.
8. Shelagh & Thomas F. Chope	Opposed to expansion of airport.
9. Richard A. Lyndon	Opposed to crosswind runway.
10. John Ulmer	Should stress that master plan is a 20-year plan that is dependent on funding. Growth is coming and it is good that it is being planned for.
11. Michael Bacon	Supports the master plan.
12. Joseph Newkirk	Supports the master plan.
13. Carl Winkler	Supports the master plan.
14. Elly Delong	Supports the master plan.
15. Jeffrey C. Chapman	Supports the master plan.
16. Bradley T. Ryan	Supports the master plan.
17. Pat Gaston	Supports the master plan.
18. Sonny Beck	Supports the master plan.
19. Andrew Facer	Supports the master plan.
20. Don Peyton	Supports the master plan.
21. Deborah Sawyer	Supports the master plan.
22. Douglas Ladika	Supports the master plan.
23. Walter Winkler	Supports the master plan.
24. Timothy A. Higgins	Supports the master plan.
25. Jerry L. White Jr.	Supports the master plan.
26. John Moore	Supports the master plan.
27. Meredith Stines	Supports the master plan.
28. J.W. Vandeventer	Supports the master plan.
29. John J. Gallo	Supports the master plan.
30. John Morrical	Supports the master plan.
31. Michelle Barrett	Appreciates IEA and undertaking of a comprehensive plan, but also concerned about how IEA will negatively impact home values and quality of life.
32. Laura Cain	Supports the master plan.
33. Louis F. Janeira	Supports the master plan.
34. Mitchell Allen	Supports the master plan.
35. Rebecca Miller	Supports the master plan.
36. Thomas K. Nasser	Supports the master plan.
37. Jason Ray	Supports the master plan.
38. Rob West	Opposed to IEA accommodating planes larger than what currently operate there.

39. Craig Sherman	Supports the master plan.
40. J.C. Buehler	Supports the master plan.
41. Rick Kocerha	Supports the master plan.
42. Bill Sherman	Supports the master plan.
43. Kevin P. Griffith	Supports the master plan.
44. Scott Robinson	Opposed to expansion of runway beyond 7,000 ft.
45. John Mueller	Supports continued development of community, proud of airport and image being created by it and the first class nature of improvements there.
46. Kelly Bailey	Concerned about increased noise and air pollution, plane crashes, property values, and infringement of homeowners rights.
47. Daniel Shreve	Opposed to any additional traffic or larger planes at IEA.
48. Tracy Horn	Supports the master plan.
49. Brian Myers	Concerned about cost of master plan, who's paying for it, who's profiting from it.

Water Quality

The Federal Water Pollution Control Act (more commonly known as the Clean Water Act) establishes water quality standards and controls discharges into water sources. The Fish and Wildlife Coordination Act may also apply to certain federal projects that impact streams or other bodies of water. If a project will impact an aquifer designated by the EPA as a sole or principal drinking water resource for an area, the Safe Drinking Water Act will govern the project.

According to the EA completed for TYQ in 1988, surface water drains from the airport west into Finley Creek and east into Little Eagle Creek. According to *Watershed Connections: Water Resources of Boone County (https://engineering.purdue.edu/SafeWater/watershed/boone.pdf, accessed 10-08)*, the Indianapolis Executive Airport is located in the Upper White River watershed. Any modification to the existing drainage patterns should be reviewed as a part of the environmental documentation. Also, all permits required for the proposed development should be identified in the environmental documentation for the project and obtained prior to construction. One such permit is the National Pollution Discharge Elimination System (NPDES) General Construction Permit for land disturbing activity over one acre. This permit will need to be obtained for the proposed land disturbing development and the appropriate erosion control plans developed and implemented.

Wetlands

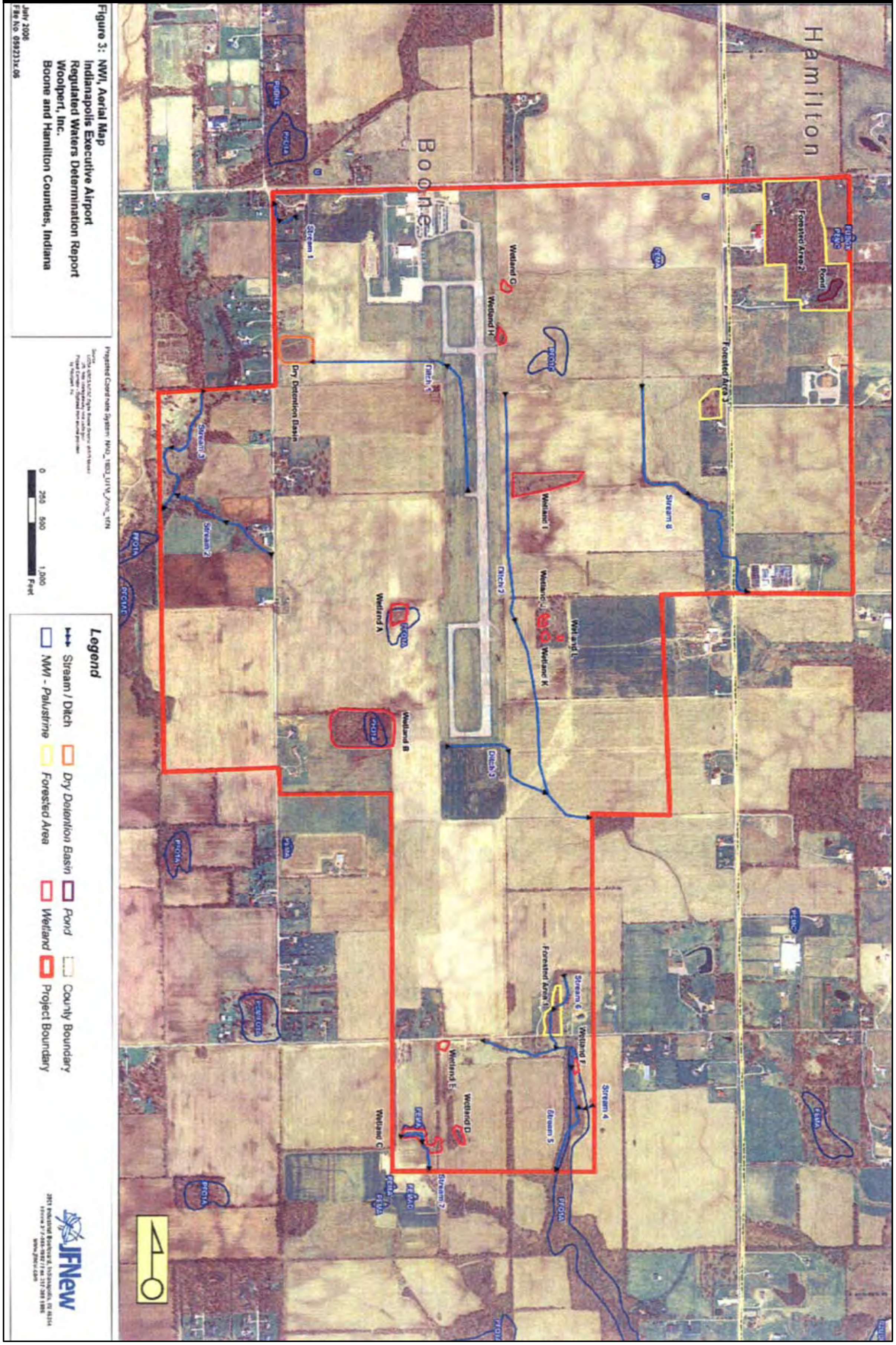
There are four primary regulations governing federal projects that impact wetlands: Executive Order 11990, Order DOT 5660.1A, the Rivers and Harbors Act of 1899, and the Clean Water Act. In Indiana, the Indiana Department of Environmental Management plays a role in wetland regulation.

According to the *Regulated Waters Determination Report* for Indianapolis Executive Airport completed by JFNew on July 1, 2008, wetland areas exist on and around the airport.

Specifically, twelve wetlands, one pond, eight streams, and three ditches were identified within the boundary of potential airport projects. (See **Exhibit 3-22** and **Appendix H.**) According to the report, all of the streams and wetlands C and F should be considered jurisdictional “waters of the U.S.” Wetlands A, B, D, E, G, H, I J, K, and L should be considered isolated. These waters are taken into consideration in Chapter 6, *Alternatives Analysis*. No threatened or endangered species or Indiana Bat habitat was observed during the site investigation.

The report notes that the Louisville District of the U.S. Army Corps of Engineers has the final discretionary authority over all jurisdictional determination of “waters of the U.S.” and that if any work is proposed within the boundaries of any wetlands or streams, a permit will need to be obtained from the U.S. Army Corps of Engineers and the Indiana Department of Environmental Management.

EXHIBIT 3-22: TYQ Wetlands



Source: Regulated Waters Determination Report, July 1, 2008,JF New.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act governs federal projects that may impact river segments that posses "outstandingly remarkable" natural or cultural values believed to be of more than local or regional significance. These rivers are included in the Nationwide Rivers Inventory maintained by the National Park Service. There are no rivers in Boone County that are contained in the Nationwide Rivers Inventory. Additionally, there are no rivers in Boone County that are contained in the Outstanding Rivers List for Indiana maintained by the Indiana Department of Environmental Management.

SUMMARY

In this chapter, a general overview of the 18 environmental impact categories has been provided. Selected development alternatives from Chapter 6, *Alternatives Analysis*, were reviewed with the preliminary findings of the environmental overview in mind. Although every proposed development project will have some impact on the natural environment, the use of prudent planning criteria, along with sound environmental data and analysis as developed here, helps minimize unavoidable environmental impacts and delays in project design and construction.

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INTRODUCTION

Since the inception of TYQ in 1957, the role of the facility has evolved as the national fleet of general aviation aircraft has become more sophisticated. Navigational systems have shifted from ground based to satellite based, and new opportunities to use corporate aircraft have developed with fractional ownership companies (shared ownership in aircraft operated by an aircraft management company). With a constantly evolving air transportation system, the Federal Aviation Administration (FAA) continually evaluates and updates their design standards, which may result in revised standards that need to be taken into consideration when making changes at an airport. To identify the anticipated future facility requirements at TYQ, aviation forecasts developed in the previous chapter along with user input are compared to the existing facilities and current FAA standards. Identified future facility requirements are compared to the airport vision, developed by the Airport Authority with input from community leaders, to ensure development plans match the objectives for TYQ. It is important to recognize that TYQ already has good facilities in place; the purpose of this chapter is to identify improvements that will enhance the overall utility of the airport and its role in the aviation system.

Using quantitative and qualitative factors in conjunction, the airfield, airside, and landside facilities have been reviewed to identify the anticipated future facility needs. The airfield facilities are reviewed first because they allow aircraft to arrive and depart from the airport. Airfield facilities include the runway (capacity and infrastructure), navigational aids, taxiways, marking, and lighting. Airside facilities are then developed around the airfield system to accommodate aircraft on the ground. Airside facilities have access to the airfield and include the aircraft hangars, aircraft apron areas, fueling facilities, administrative facilities, auto parking, and ground access. The landside facilities are other amenities located on the airport property that do not require direct airfield access. Examples of such facilities on the airport include office space. Some of these facilities may be located in an airside area and have airfield access now, but that location would not be necessary to fulfill their function. While this chapter identifies the potential facility needs, the alternatives analysis in the next chapter will consider alternatives for development taking into account items such as priority for development, benefits and costs, and ease of implementation.

The following sections provide detailed analysis of the airfield, airside, and landside facility needs. In summary, the most important airfield development is extension of the primary runway to serve the larger business jets traffic and construction of a crosswind runway to serve smaller aircraft and provide improved wind coverage. The primary airside facility needs include T-hangar, conventional/corporate, and executive hangar development. Attention will also need to be given to continuing to provide user-friendly access and the implication of surrounding off-airport development. Aviation related landside facilities could be developed as needed after meeting the needs for airfield and airside development.

AIRPORT REFERENCE CODE/PAVEMENT STRENGTH

Facilities at an airport are planned and developed to serve specific aircraft operators. The aircraft are defined by the approach (landing) speed, wing span and weight. As identified in the Airport Reference Code (ARC) section of the Aviation Forecasts chapter, the business jets using TYQ are the largest regular users, or critical aircraft, and are represented by ARC C/D-II (approach speed 121 knots to less than 166 knots, and wingspan 49 feet up to but not including 79 feet or tai height from 20 up to but not including 30).

There are five areas of the airport that should be considered independently when assigning the ARC. These are the primary runway, crosswind runway, aircraft apron, and hangars. The portions of the airport intended to accommodate all users should be planned to ARC C/D-II standards. However, there are some portions of the airport that are not anticipated to be used by all aircraft, such as a future crosswind runway and the T-hangar area that will house single- and multi-engine piston aircraft. To avoid overbuilding areas that will not be used by the larger aircraft, a separate ARC should be established for those areas that will serve these types of aircraft.

In addition to grouping aircraft by their approach speed and wingspan, the FAA also categorizes aircraft by their maximum takeoff weight. Small aircraft have a maximum takeoff weight of 12,500 pounds or less. Any general aviation aircraft with a maximum takeoff weight of more than 12,500 pounds is a large aircraft. The FAA also has a “heavy” classification, but this only applies to larger air carrier jets. Pavement strength is associated with the aircraft weight, so areas developed with the appropriate size and separation to serve the critical aircraft also need to be planned with the appropriate pavement strength to support these users.

Runways

Runway 18-36 serves all airport users and should be planned to accommodate the most demanding aircraft, represented by ARC C/D-II. The primary runway is currently designed to accommodate aircraft weighing up to 60,000 pounds dual wheel maximum allowable takeoff and landing weight for continuous and daily operations. **Exhibit 4-1** lists the critical aircraft identified in the Aviation Forecasts chapter with the addition of their maximum takeoff weight and classification by weight. Examining the critical aircraft that used TYQ in 2005, the Gulfstream series GII-GIV were the heaviest aircraft that consistently used the airport, weighing from 65,300 to 73,200 pounds maximum takeoff weight (MTOW) on dual wheels. If the airport is to consistently accommodate these types of aircraft, the pavement strength should be increased as these aircraft operations warrant and for their occasional or emergency use.

EXHIBIT 4-1: TYQ Critical Aircraft for Primary Runway

Aircraft Type	Aircraft Approach Category A	B	C	D	Aircraft Design Group I	II	III	Weight	Small	Large
Aerospatiale TBM TB-700	4				4			6,579	4	
Beech Super King Air B350		34				34		15,000		34
Boeing Business Jet				2			2	171,000		2
Beech Jet 400A		163				163		16,100		163
Beech King Air 90/A90 to E90 & F90		52				52		12,500	52	
Cessna 414A		13				13		3,078	13	
Cessna Citation 1 500		2				2		11,850	2	
Cessna Citation 1-SP 501		14				14		11,850	14	
Cessna Citation Jet 525 CJ1		142				142		10,600	142	
Cessna Citation Jet C526		48				48		10,600	48	
Cessna Citation 2/ Bravo 550		337				337		14,800		337
Cessna Citation 5/Ultra		86				86		16,300		86
Cessna Citation Excel		104				104		20,000		104
Cessna Citation 3/6/7 650			79			79		22,450		79
Cessna Citation Sovereign 680			16			16		30,000		16
Cessna Citation 10 750			84			84		36,100		84
Canadair CL600/601/604 Challenger			41			41		48,200		41
Canadair CRJ-100 Regional Jet			2			2		47,600		2
Diamond DA42		2			2			3,673	2	
Falcon 2000-F2TH		29				29		35,800		29
Falcon 900		17				17		45,500		17
Falcon 10		37				37		18,700		37
Falcon 200		12				12		30,650		12
Falcon 50		14				14		45,500		14
Israel Aircraft Industries 1124A			193		193			23,500		193
Israel Aircraft Industries ASTRA SPX			127			127		24,650		127
Israel Aircraft Industries Galaxy				6		6		34,850		6
Gulfstream Aerospace G-II				98		98		65,300		98
Gulfstream Aerospace G-III			4			4		68,700		4
Gulfstream Aerospace G-IV				14		14		73,200		14
Gulfstream Aerospace G-V				2		2		90,500		2
Hawker HS 12-1/2/3/400/600				3		3		23,300		3
Hawker HS 125-700/800			279			279		25,000		279
Hawker 1000/800XP/HS70				6		6		28,000		6
Lear Jet 24F			10		10			13,000		10
Lear Jet 25			104		104			16,300		104
Lear Jet 31A			17		17			17,000		17
Lear Jet 35			60		60			18,300		60
Lear Jet 36			1		1			18,300		1
Lear Jet 45			30		30			20,500		30
Lear Jet 55			6		6			21,500		6
Lear Jet 60				40	40			23,500		40
Mitsubishi MU2		42			42			10,800	42	
Mitsubishi Diamond MU300		2			2			15,730		2
Piper Meridian	118				118			4,850	118	
Piper Cheyenne 1/2/3		14			14			12,050	14	
Rockwell International Saberliner			2			2		23,000		2
Swearingen Merlin II/III/IV		12			12			14,500		12
Sub Totals	**122**	**1,176**	**1,055**	**171**	**655**	**1,867**	**2**		**451**	**2,073**
TOTAL:		**2,524**				**2,524**			**2,524**	

Sources: webfbo.com, 2006; Category and Code identified by Aerofinity; Weights from the following: FAA Aircraft Database, www.faa.gov/arp/airchardb/; citation.cessna.com/comparison_p.chtml; www.virtuallanw.net?Hubs/KLAX/performance.html; Business and Commercial Aviation, May 2002; www.airliners.net.

A crosswind runway is recommended later in this chapter to meet the FAA recommended wind coverage for an airport. In addition to the aircraft that were used to analyze the ARC for the primary runway (Exhibit 4-1), other aircraft greater than 12,500 lbs. use the airport on a regular basis that would become the critical aircraft for the crosswind runway because they are affected more by winds than the larger jets. According to the IFR flight plans filed to and from TYQ, the following additional aircraft used the airport in 2005:

- 160 Beechcraft Super King Air 200s (BE20) that weigh 12,590 lbs.
- 34 Beechcraft Super King Air 350s (BE35) that weigh 15,000 lbs.
- 99 Beechcraft Super King Air 300s (BE30) that weigh 14,100 lbs.

These are all B-II aircraft that weigh more than 12,500 lbs. and total to 295 annual operations. With an average annual growth rate in operations of 3.83% forecasted for TYQ, there would be over 500 annual operations by these aircraft in the next 20 years. This is a conservative projection because it only takes into account aircraft that filed IFR flight plans, and in all likelihood there is additional aircraft traffic of similar weight that would utilize the crosswind runway that have not filed IFR flight plans and therefore were not counted in this analysis. Additionally, there are other similar weighted aircraft shown in Exhibit 4-1 that were not counted in this analysis that could use this runway if the primary runway was closed or if operational needs warranted. Please note that aircraft weighing more than 30,000 lbs. are not anticipated to use the crosswind runway. Accordingly, the crosswind runway should have an ARC of B-II with a pavement strength of 12,500 lbs. single wheel (SW) and 30,000 lbs. dual wheel (DW).

Transient Apron/Large Hangars

The aircraft parking apron and large hangars (conventional/corporate, and executive) serve all users of the airport and should meet ARC C/D-II standards. Also, the pavements should be strong enough to accommodate all of the users on a regular basis.

T-Hangars

The T-hangars are designed to serve smaller aircraft up to multi-engine piston aircraft. The largest aircraft in this group are represented by ARC B-I (approach speed 91 knots to less than 121 knots and wingspan less than 49 feet). All of these aircraft have a maximum takeoff weight of 12,500 pounds or less.

Summary

Exhibit 4-2 summarizes the recommended ARCs for the various areas of the airport. As a premier reliever airport, those areas that are to be used by all aircraft should be developed to support all corporate aircraft using the airport without restriction. However, the needs of all general aviation users can be met without overbuilding by using multiple ARCs based on the infrastructure use.

EXHIBIT 4-2: Applicable ARC for TYQ

Facility	ARC	Recommended Pavement Strength
Runway 18-36	C/D-II	60,000 - 75,000 lbs. SW/DW as large aircraft operations warrant and for their occasional or emergency use
Crosswind Runway	B-II	12,500 lbs. SW/30,000 lbs. DW
Apron, Corporate/Conventional and Executive Hangars	C/D-II	60,000 - 75,000 lbs. SW/DW as large aircraft operations warrant and for their occasional or emergency use
T-Hangars	B-I	12,500 lbs. SW

Note: The crosswind runway is analyzed in detail later in this chapter.
Source: Woolpert, 2008.

CAPACITY

Airfield

There are two types of capital development needs related to the airfield: capacity of the facility to accommodate the total operations (described in this section) and facilities to support the critical aircraft (described in the following sections). Airfield capacity is the measure of the runway system's ability to accommodate the existing and future demand for airfield operations. Capacity is expressed both as an hourly capacity figure and as an annual figure. Hourly capacity is a measure of the maximum number of aircraft operations that can be accommodated in one hour. Annual capacity is expressed as the Annual Service Volume (ASV) and is a reasonable estimate of an airport's annual capacity. ASV is dependent on several factors: the hourly capacity, the differences in runway use, aircraft mix, and weather conditions, all of which are considered in the ASV calculation.

Per *FAA Advisory Circular 150/5060-5, Airport Capacity and Delay*, the long-range planning ASV at TYQ is estimated at 230,000 operations. The hourly capacity under visual flight rules (VFR) conditions is estimated at 98 operations per hour and under instrument flight rules (IFR) at 59 operations per hour. Detailed capacity calculations are provided in **Appendix F**.

To avoid high levels of delay, the FAA recommends planning for increased capacity when annual operations reach 60 percent of the ASV, and implementing the improvements before annual operations reach 80 percent of the ASV. The high forecast at TYQ is for 81,268 annual operations and 36 peak hour operations in 2027. This is 35 percent of the annual service volume. (See **Exhibit 4-3**.) Comparing the hourly capacity, which can be more representative since the operations at TYQ are generally greater during the day, 7 a.m. to 10 p.m., in VFR conditions the airport is at approximately 37 percent of its capacity. If peak hour operations were the same in IFR as VFR conditions, then TYQ would be at approximately 61 percent of its peak hour capacity. However, the demand during IFR conditions is considered to be much less than the peak hour VFR level, so TYQ's forecast IFR hourly demand is considered to be less than 60 percent of the airport's capacity. All of these measures are below the FAA's criteria for planning capacity improvements.

EXHIBIT 4-3: TYQ Current and Future Airport Capacity Usage	
Current Annual Service Volume (ASV) Capacity	230,000
Current Peak VFR Peak Hour Capacity	98
2007 High Annual Operations Forecast	35,971
2007 % of ASV Capacity Used	15.6%
2007 % of Peak VFR Hour Capacity Used	16.3%
% of Long Term ASV Forecasted to be Used in 2027 (High Forecast)	35.3%
% of Long Term Peak VFR Hour Capacity Forecasted to be Used in 2027 (High Forecast)	36.7%

Source: Aerofinity, 2007.

Airspace

TYQ does not currently have an airport traffic control tower (ATCT). The following criteria along with general facility establishment standards must be met before an airport can qualify for an ATCT:

(1) The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the Airport and Airway Improvement Act of 1982;

(2) The airport must be recognized by and contained within the National Plan of Integrated Airport Systems;

(3) The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the ATCT investment;

(4) The FAA must be furnished appropriate land without cost for construction of the ATCT; and

(5) The airport must meet the benefit-cost ratio criteria specified herein utilizing three consecutive FAA annual counts and projections of future traffic during the

expected life of the tower facility. This criteria compares the present value of tower benefits at a specific airport with the present value of tower costs over a specific time frame.

Although required to be eligible for a tower, the satisfaction of all the criteria listed above does not guarantee that the airport will receive an ATCT.

The addition of an ATCT at TYQ would not increase the ASV; however, with the addition of a crosswind runway that crosses the primary runway, a local ATCT would provide an enhanced margin of safety. (A crosswind runway has historically been shown on the ALP and a new crosswind analysis is provided later in this chapter.) The alternatives analysis should identify a location to be preserved for the development of an ATCT so that the airport can provide the highest level of service to its users when demand justifies. Preserving a location for a future ATCT will ensure that hangars or other future development does not interfere with the line-of-sight requirements for the tower.

AIRFIELD REQUIREMENTS

In addition to providing capacity to accommodate the total level of operations, consideration needs to be given to individual facilities to accommodate all of the users. This is done by planning for the critical aircraft, the largest aircraft anticipated to use the facility on a regular basis. Planning for the critical aircraft is accomplished through the use of the airport reference code (ARC), as described in the Forecast Chapter and overviewed above with aircraft size classification and maximum takeoff weight. As previously identified, different ARCs are recommended for different facilities at TYQ. Using the recommended ARCs and associated pavement strength based on maximum takeoff weight, this portion of the facility requirements analysis uses that quantitative information along with qualitative information compared to FAA design standards to review the airfield facilities: runways, navigational aids, taxiways, marking, and lighting. It identifies areas where further analysis of improving the airfield facilities at TYQ should be undertaken during the alternatives analysis portion of this planning process.

Runways

WIND COVERAGE

The present runway system at TYQ includes Runway 18-36 at a length 5,500 feet and a width of 100 feet. FAA Advisory Circular *AC 150/5300-13, Airport Design*, states that the most desirable runway orientation based on wind is the one which has the largest wind coverage and minimum crosswind components. Smaller, lighter aircraft are the most sensitive to crosswinds. The desirable wind coverage for an airport is 95 percent, or to attain 95-percent runway usability. According to *AC 150/5300-13*, when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I; 13 knots for Airport Reference Codes A-II and B-II; 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III; and 20 knots for Airport Reference Codes A-IV through D-VI.

As shown in **Appendix G**, Runway 18-36 does not provide 95 percent wind coverage for the smaller aircraft ARC A-I, B-I, A-II and B-II (10.5 knots and 13 knots). The wind analysis information indicates that for Runway 18-36 at the 10.5 knot crosswind threshold, wind coverage is 85.85 percent. For 13-knot crosswinds, the coverage is 91.92 percent. Thus, a crosswind runway has historically been included on the Airport Layout Plan to serve these smaller aircraft. This future crosswind has historically been oriented as Runway 9-27 and shown at 3,800 ft. x 75 ft. Together, Runway 18-36 and a future Runway 9-27 would provide a crosswind coverage of over 97% for all aircraft.

Since a crosswind runway has not been constructed yet at TYQ, in addition to Runway 9-27, three other runway orientations, 5-23, 7-25, and 10-28, were analyzed to determine the best wind coverage for a crosswind runway at this facility. Exhibit 4-4 shows the combined wind coverage for Runway 18-36 and these three other runway configurations. (Detailed windrose analysis is included in Appendix G.)

EXHIBIT 4-4: Runway Wind Analysis

Runway Combinations				
All Weather	**10.5 Kts.**	**13 Kts.**	**16 Kts.**	**20 Kts.**
18-36 & 9-27	**97.91%**	**99.45%**	**99.90%**	**99.99%**
18-36 & 5-23	94.61	97.78	99.33	99.90
18-36 & 7-25	97.19	99.27	99.84	99.98
18-36 & 10-28	97.22	99.20	99.83	99.98
IFR				
18-36 & 9-27	**97.82%**	**99.50%**	**99.925**	**99.99%**
18-36 & 5-23	93.60	97.45	99.26	99.88
18-36 & 7-25	96.73	99.24	99.85	99.97
18-36 & 10-28	97.00	99.40	99.89	99.99

Source: Aerofinity, 2008.

The best combined crosswind coverage for TYQ is provided by a combination of the primary Runway 18-36 and crosswind Runway 9-27. However, certain physical constraints and environmental issues may make this orientation more difficult to achieve. Accordingly, a crosswind configured in the 7-25 and 10-28 orientations should be reviewed in the alternatives analysis in the following chapter because they would meet the 95 percent wind coverage goal also. A crosswind runway configured in the 5-23 orientation, when combined with primary Runway 18-36, will not provide the goal of 95 percent combined wind coverage during 10.5 knot winds and, therefore, should not be considered.

A future crosswind runway should serve at least ARC B-II small aircraft. As noted earlier, the best combined wind coverage would be provided with a crosswind runway in the 9-27 orientation. However, if environmental issues or building constraints make this a less desirable orientation, then a 7-25 or 10-28 orientation would meet the 95 percent goal.

GLIDER RUNWAY

That last FAA approved ALP for TYQ showed a 2,200 ft. x 100 ft. parallel runway west of the existing primary runway. This runway was used by gliders. The Central Indiana Soaring Society was based at TYQ for many years, but has now relocated to Alexandria. Accordingly, the need for the glider runway no longer exists and is not anticipated to return in the future.

RUNWAY LENGTH AND WIDTH

When considering runway length needs, adequate runway length should be provided to meet safety requirements and customer needs, while being sensitive to the environment and surrounding communities. Runway length requirements are based on five primary factors.

- Airport elevation
- Mean daily maximum temperature of the hottest month
- Maximum elevation change in the runway centerline
- Wet or dry pavement
- Stage length of the longest non-stop trip (considered for aircraft more than 60,000 pounds only)

These factors are critical because aircraft performance declines as elevation, temperature, and runway gradient factors increase. For the facility requirements analysis, each runway is evaluated separately, depending upon its primary use.

To identify the appropriate runway length for the aircraft operating at TYQ, the FAA general planning guidance is used as a starting point. This FAA guidance is then enhanced by using aircraft-specific operating information for TYQ.

FAA Advisory Circular 150/5325-4B, Runway Length Requirements for Airport Design provides planning guidance for runway length and is the basis of runway length analysis in *Airports Design Program, Version 4.3B*. **Exhibit 4-5** is a partial printout of the *Airports*

Design Program, *Version 4.2D* for TYQ. Since the FAA program uses a combination of aircraft rather than detailed operating specifications, it provides general planning guidance rather than specific runway length requirements. The FAA uses this program as a guideline to determine what they will fund for the development of runway length at general aviation airports. The FAA will generally consider approval of runway lengths beyond those identified in the *Airport Design Program* if a specific need can be documented based upon user data.

EXHIBIT 4-5: Runway Length Requirements for TYQ

Airport and Runway Data		
Airport Elevation		822 feet MSL
Mean daily maximum temperature of the hottest month		86.0 F
Maximum difference in runway centerline elevation		0 feet
Runway Length Recommended for Airport Design		
	Dry Runway	**Wet Runway**
Small Airplanes with less than 10 passenger seats		
75% of these small airplanes	2,780	2,780
95% of these small airplanes	3,310	3,310
100% of these small airplanes	3,920	3,920
Small airplanes with 10 or more passenger seats	4,370	4,370
Large airplanes of 60,000 pounds or less		
75% of these large airplanes at 60% useful load	4,770	5,480
75% of these large airplanes at 90% useful load	6,500	7,000
100% of these large airplanes at 60% useful load	5,520	5,520
100% of these large airplanes at 90% useful load	8,350	8,350

Note: Stage length does not apply for 60,000 lbs. or less.
Source: Airport Design Program, Version 4.2D with Indianapolis Executive Airport data, October 2006.

For large aircraft weighing less than 60,000 pounds, useful load is the measure sensitive to stage length. The farther an aircraft is flying nonstop, the more fuel it needs onboard at takeoff, thus increasing its percent of total useful load at takeoff. Per *FAA Advisory Circular 150/5325-4B, Runway Length Requirements for Airport Design*, the critical aircraft using TYQ were compared to the FAA classification of 75 percent of large aircraft and 100 percent of large aircraft as shown in Exhibit 4-5. At TYQ, approximately 1,476 IFR operations were by aircraft in the 75 percent of large aircraft category, 637 IFR were by aircraft in the 100 percent category. Thus, a length of 7,000 feet to 8,400 feet should be provided on the primary runway to accommodate existing critical aircraft in the 75% and 100% large airplane group in all weather conditions. The largest existing critical jet users (including 120 IFR operations by aircraft weighing over 60,000 lbs.) operating from the airport have to depart with reduced payload because they cannot carry enough fuel due to runway length/takeoff performance. This creates the need for a fuel stop en route and reduces fuel sales for the local fixed base operator and income to Hamilton County. Additional length on the primary runway would also increase the utility of the airport for the largest users and increase the margin of safety available at the facility.

ARC analysis for the future crosswind runway recommended that this runway serve ARC B-II aircraft. The length of the crosswind runway should accommodate aircraft that are not able to operate on the primary runway when crosswind conditions are present. Based on the activity forecasts for TYQ, the crosswind runway should be long enough to accommodate 100 percent of small aircraft with less than 10 passengers in all weather conditions as shown in Exhibit 4-5. If HCAA desires to accommodate aircraft with less than passengers on the crosswind runway, consideration should be given to providing a 4,000 ft. runway. However, if HCAA desires to accommodate aircraft with 10 or more passengers on the crosswind runway, consideration should be given to providing a 4,400 ft. runway. The width of the crosswind runway should be 75 feet to accommodate B-II aircraft. However, a width of 100 feet is a design requirement for precision approaches, and this is the recommended design for LPV approaches with the best minimums. (LPV approaches for the crosswind runway are discussed later in this chapter under navigational aids).

Taxiways

Taxiways are planned and constructed primarily to allow aircraft movement to and from the runway system. Taxiways and taxilanes are provided in the terminal area to facilitate safe movement of aircraft in or near the hangar complexes. The FAA defines a taxiway as "a defined path established for the taxiing of aircraft from one part of an airport to another." A taxilane is defined as "the portion of aircraft parking area used for access between taxiways and aircraft parking positions."

The most demanding aircraft using the taxiway system are the C/D-II corporate aircraft. The FAA taxiway design standards for C/D-II aircraft are shown in **Exhibit 4-6**. This should be used for all taxiways and lanes expect those dedicated to T-hangars which should be B-I standards.

EXHIBIT 4-6: FAA Taxiway Design Standards For C/D-II Aircraft

Standard	Group II Design Standards (feet)
Runway centerline to taxiway centerline	400
Taxiway centerline to taxiway centerline	105
Taxiway centerline to fixed or moveable object	65.5
Taxilane centerline to fixed or moveable object	57.5
Taxiway Width	35
Taxiway Edge Safety Margin	7.5
Taxiway Shoulder Width	10
Taxiway Safety Area Width	79
Taxiway Object Free Area Width	131
Taxilane Object Free Area Width	115

Source: FAA Advisory Circular 150/5300-13.

Runway 18-36 at TYQ is served by a full-length parallel taxiway, designated as Taxiway A. There are also five connector taxiways (Taxiways A-1, A-2, A-3, A-4, and A-5) between the runway and parallel taxiway, providing more than ample exit opportunities for landing aircraft.

PRIMARY RUNWAY TO TAXIWAY CENTERLINE SEPARATION AND TAXIWAY WIDTH

The existing runway-centerline to taxiway-centerline separation for Runway 18-36 is 400 feet. The FAA standard for Group C/D-II aircraft is 400 feet. Per *FAA Advisory Circular 150/5300-13*, the runway centerline to parallel taxiway centerline separation distance is such to satisfy the requirement that no part of an aircraft (tail tip, wing tip) on the taxiway centerline is within the Runway Safety Area (RSA) or penetrates the obstacle free zone (OFZ). (The OFZ is defined as the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual navigational aids that need to be located in the OFZ to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches.)

Taxiway A is 50 feet wide and Taxiways A-1, A-2, A-3 and A-4 are 50 feet wide. All of the taxiways at TYQ exceed the required Group II standards. The additional width allows the airport to better accommodate the business/corporate jets that use the airport and it also allows for the parallel taxiway to be utilized as a runway during primary runway closures.

To provide full utility for any proposed runway extension, the associated parallel taxiway should also be extended. This will avoid the need for any back taxiing (aircraft taxiing on the runway to reach the end or an exit). Also per Appendix 16 of *FAA Advisory Circular 150/5300-13, Airport Design*, for any runway served by a precision approach, a parallel taxiway is required, and for any runway served by a non-precision approach the parallel taxiway is either required or recommended depending on the approach minimums. Careful consideration needs to be given to any taxiway extension in the vicinity of an intersecting runway to be sure it is user-friendly and remains clear of protected runway surfaces.

CROSSWIND RUNWAY TO TAXIWAY CENTERLINE SEPARATION AND TAXIWAY WIDTH

To provide full utility for the crosswind runway, a full parallel taxiway should also be provided. This will avoid the need for any back taxiing. The taxiway should be located 300 feet from the runway centerline if instrument approach minimums of lower than ¾ statue mile visibility are desired. A separation of only 240 feet would be needed for instrument approach minimums not lower then ¾ statue mile visibility. The FAA recommends the greatest distance economically possible between taxiway and runway to accommodate changes in future design standards that may, and often do, arise and to accommodate future changes in aircraft fleet mix. Accordingly, a 300 foot separation will provide for long term cost savings and increased safety margins. Additionally, the width for the crosswind taxiway should be 35 feet for B-II aircraft.

Navigational Aids

Instrument approaches are critical to airport operations in adverse weather. The more advanced an airport's navigational aids (navaids), the more accessible it is in all weather conditions. Adverse weather is a regular occurrence at TYQ's Midwest location. Navaids vary in sophistication with the most precise system currently available being an Instrument Landing System (ILS), a type of precision approach. An ILS supplies both horizontal and vertical alignment information to the pilot. Non-precision approaches offer only horizontal alignment with the runway. An ILS has lower minimum decent altitudes because of its precision.

The best approach for TYQ is a Category I (CAT I) ILS on Runway 36. Without the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), minimums for this approach are 200-feet ceiling and ¾ mile visibility (with local altimeter setting). Accordingly, the addition a MALSR will increase the utility of the primary runway by lowering the visibility conditions to ½ mile.

The FAA is in the process of developing LPV (Localizer Performance with Vertical Guidance) approaches. LPV offers an ILS-like capability without requiring any additional equipment on the airfield. LPV uses the GPS signal, enhanced by the WAAS (Wide Area Augmentation System), which in turn provides a capability to fly an LPV approach with ceilings as low as 200 feet with the appropriate airport infrastructure (i.e. glideslope and localizer), increasing the number of times pilots are able to land in bad weather conditions. At present, Runway 36 has a LPV approach with minimums of 300 feet and 1 mile. These minimums could be reduced with the addition of the MALSR.

The LPV approach would be the most economical approach to serve Runway 18 and a future crosswind runway because a minimal amount of infrastructure investment will achieve the appropriate approach minimums for those runway ends. It is important to note that a runway needs to be at least 4,200 feet long to establish an LPV approach with approach minimums of less than ¾ mile visibility. Otherwise, a 3,200 feet runway will provide approach minimums of equal to ¾ mile visibility or greater. The potential minimums for Runway 18 and the crosswind runway ends should be considered in the alternatives analysis.

Additionally, all existing VASIs need to replaced with PAPIs and PAPIs and REILs should be installed on all new runway ends. Supplemental windcones should be installed at each end of the primary runway. The airport has and should continue to maintain an AWOS-III at a minimum and the Non-Directional Beacon (NDB).

Marking and Lighting

Lighting provides guidance to pilots during nighttime or low-visibility conditions. Runway 18-36 is equipped with High Intensity Runway Lights (HIRLs). The parallel taxiway is marked with reflectors. Due to the large business jets using this facility during all weather conditions and performing nighttime operations, Medium Intensity Taxiway Lights (MITLs) should be considered for this taxiway. Any extension of runway or taxiway pavement will also require the extension of the associated runway or taxiway lighting system.

Precision runway markings are painted on Runway 36 and non-precision markings are painted on Runway 18. These are the appropriate markings for the existing instrument approaches. If any approaches are upgraded the pavement markings should also be upgraded as necessary per the guidance in *FAA Advisory Circular 150/5340-1J, Standards for Airport Markings*.

The crosswind runway should initially include non-precision marking medium intensity runway lighting. The markings and lighting should be upgraded as needed to support any future improved approaches.

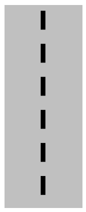
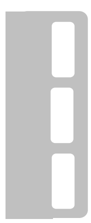
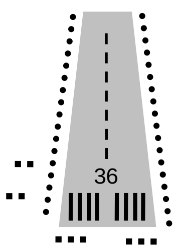
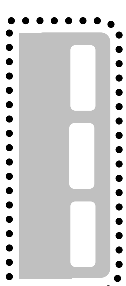
Airfield Pavement Condition

The Indiana Department of Transportation (INDOT) has evaluated the condition of the pavements at TYQ using the Pavement Condition Index (PCI) system. The PCI rating is based on the quantity of distress visible at the pavement surface as a measure of pavement deterioration. According to the February 2007 PCI report for TYQ, the condition of vast majority of Runway 18-36 is considered below the minimum service level 60 established by INDOT for a runway at a general aviation airport. Accordingly, this pavement should be rehabilitated. This rehabilitation will likely require the runway to be closed for an extended period of time. Alternatives to allow access to the airport during this time, through the use of a taxiway as a runway, will need to be considered. Additionally, the taxiway extending from the north end of runway into the terminal area is listed as failed in INDOT's PCI report. Accordingly, it will need to be rehabilitated or reconstructed in the near future also. Any remaining taxiways that were not built in the past few years will require preventative maintenance and/or rehabilitation in the next 20 years.

Airfield Requirements Summary

The airfield facilities at TYQ provide adequate capacity and infrastructure to support operations at the airport over the planning period. One of the higher priority needs for airfield facilities at TYQ is for the extension of Runway 18-36 to at least 7,000 feet with the addition of a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). Long term plans for the primary runway should include a future length of 8,400 feet if 100% of large aircraft 60,000 pounds or less at 90% useful load are to accommodated. This length would allow existing business jets currently operating from TYQ to fly to the west coast without stopping for fuel. Additionally, constructing a crosswind Runway 4,000 feet in length to ARC B-II standards is also warranted to meet the FAA recommendation of 95% wind coverage for small aircraft with less than 10 passenger seats. In conjunction with the runway extension and crosswind runway construction, associated full parallel taxiway systems should also be developed for both runways along with LPV approaches. All runway marking and lighting should be improved to accommodate improved approaches as they are developed. Additionally, pavement for the primary runway and select taxiways will require rehabilitation in the short term. The recommended airfield facilities are summarized in **Exhibit 4-7**.

EXHIBIT 4-7: TYQ Airfield Facilities Requirements Summary

REQUIREMENTS	EXISTING	FUTURE
Runways 	<u>Runway 18-36</u> 5,500' x 100' ARC C/D-II 60,000 lbs DW	<u>Runway 18-36</u> 7,000' x 100' (for 75% of Large Airplanes 60,000 lbs. or Less at 90% Useful Load) ARC C/D-II 75,000 lbs SW/DW **-OR-** 8,400' x 100' (for 100% of Large Airplanes 60,000 lbs. or Less at 90% Useful Load) ARC C/D-II 75,000 lbs SW/DW <u>Crosswind Runway</u> 4,000' x 75' Phase 1 4,000' x 100' Phase 2 ARC B-II 12,500 lbs SW / 30,000 lbs. DW
Taxiways 	<u>Runway 18-36</u> Full Length Parallel	<u>Runway 18-36</u> Full Length Parallel <u>Crosswind Runway</u> Full Length Parallel
Navaids 	<u>Runway 18</u> GPS, VASI-2L, REILS <u>Runway 36</u> ILS (CAT I), LPV, PAPI-2L, REILS Windcone AWOS-III, NDB for Airport	<u>Runway 18</u> LPV, PAPI-2L, REILS, Windone <u>Runway 36</u> ILS (CAT I), LPV, MALSR, PAPI-2L, REILS, Windcone <u>Crosswind Runway</u> LPV, REILS, PAPI-2L AWOS-III, NDB for Airport
Marking and Lighting 	<u>Runway 18</u> Precision, HIRL <u>Runway 36</u> Precision, HIRL	<u>Runway 18</u> Precision, HIRL <u>Runway 36</u> Precision, HIRL <u>Crosswind Runway</u> Non-precision; MIRL Upgrade markings as needed to support improved approaches

Source: Aerofinity, 2007.

AIRSIDE/LANDSIDE REQUIREMENTS

The airside facilities, including storage and service facilities, are used to accommodate the aircraft operators while the aircraft is on the ground. Landside facilities are other aviation related development on the airport without airfield access. The space requirements to be considered for airside facilities associated with corporate/business and general aviation include:

- Aircraft hangars
- Aircraft parking aprons
- Fueling facilities
- Terminal building
- Auto parking
- Maintenance functions
- Roadway access

The facility requirements process is one of comparing long-term facility needs to existing facilities to identify the deficiencies where additional infrastructure will be needed. The airside facilities should focus on the needs of the corporate/business users and general aviation. They need to be planned to preserve investment in the existing facilities, while allowing the airside development to be staged in an efficient, flexible and cost-effective manner. This chapter will identify the airside facilities needs. The alternatives analysis in the next chapter will evaluate alternatives to meet the airside needs.

Airside facility requirements have been identified based on the high forecast at the end of the 20-year planning period, as shown in **Exhibit 4-8** and described below. Where existing facilities exceed anticipated facility needs, it is not proposed that existing facilities be removed, but additional development in those areas is not anticipated. The airside facility requirements are prepared for the purpose of reserving sufficient area to support corporate/business and general aviation over the planning period.

EXHIBIT 4-8: TYQ Airside Facility Requirements							
Based Aircraft			**Existing 2007**	**Forecast 2012**	**Forecast 2017**	**Forecast 2022**	**Forecast 2027**
Single Engine			77	88	110	132	155
Multi Engine			11	5	6	7	9
Turbo Prop			8	9	11	13	15
Jet			9	11	14	17	20
		TOTAL:	105	113	141	169	199
Operations*			**Forecast 2007**	**Forecast 2012**	**Forecast 2017**	**Forecast 2022**	**Forecast 2027**
Operations Peak Day in Peak Month			158	203	252	303	358
Operations in Design Hour in Peak Month			16	20	25	30	36
Peak Itinerant Operations		Day	89	115	142	171	202
		Hour	9	11	14	17	20
Peak Itinerant Passengers		Day	112	144	178	214	253
		Hour	11	14	18	21	25
Facility Requirements˜			**Existing 2007**	**Forecast 2012**	**Forecast 2017**	**Forecast 2022**	**Forecast 2027**
T-Hangars		Units	61	66	82	98	115
Conventional/Corporate/Executive Hangars		Aircraft	34+	32	39	46	54
		(SF)	52,300	85,200	104,800	124,500	145,200
Apron Tie Downs	Based	Units	18	20	25	30	36
		(SY)	5,400 (e)	6,000	7,500	9,000	10,700
	Transient	Units	10	14	18	21	25
		(SY)	8,000 (e)	11,200	14,400	16,800	20,000
	Total Apron	(SY)	13,400 (e)	17,200	21,900	25,800	30,800
Terminal & Hangar Auto Parking		Spaces	47	68	81	91	105
Employee Auto Parking		Spaces	18	23	28	33	38

*43.5% local operations, 56.5% itinerant operations; 50% of itinerant operations are transient.

˜Average based tie down area estimated at 300 SY for single engine nested; transient tie downs estimated at 50% peak day itinerant at 800 SY for mix of single and multi pull through; currently have 47 non-employee parking spaces but need approximately 20 more; today there are 6 more multi engine aircraft than forecast, so equation adds 6 multi for each forecast year; T-hangar equation assumes 71% of single and 36% of multi-engine; there are currently 2 open T-hangars and 6 open conventional hangar positions. (e) = estimated based on 18 small * 300 SY + 6 transient * 800 SY + 4 transient small AC * 300 SY

+ Includes 6 open spaces.

Source: Aerofinity, Inc., 2007; Montgomery Aviation, 2007; Woolpert, 2008.

Aircraft Hangars

There are four typical types of hangars that exist at an airport: T-hangars, executive hangars, corporate hangars, and conventional hangars.

- T-hangars: A grouping of hangars in a rectangular shaped building. The name is derived from the shape that the hangar within the rectangular building takes in the form of T. Typical T-hangars have door widths of 45-feet.

- Executive Hangars: A square or rectangular-shaped hangar that usually stands alone which is designed primarily to accommodate the business aircraft operations of a single company or individual who may or may not service (and stage) their own aircraft. Executive hangars are typically larger than stand T-hangars but smaller than most corporate hangars. In many cases, office, shop, and/or storage space is located within the structure.

- Conventional Hangar: A square or rectangular-shaped hangar with large open-bay hangars capable of accommodating multiple aircraft in a community setting. Conventional hangars typically range in size from 75 feet by 75 feet to upwards of 100,000 square feet per building. Such hangars are typically owned and operated by an FBO. Conventional hangars are also described as community hangars.

- Corporate Hangars: A square or rectangular-shaped hangar similar to a conventional hangar but used to accommodate the business aircraft operations of a single company who typically services (and stages) its own aircraft. Corporate hangars, which typically stand alone, are usually larger than executive hangars.

In the case of TYQ, there are currently 61 T-hangars and four conventional/corporate hangars (55,000 SF accommodating approximately 26-34 aircraft depending on size). The corporate and conventional have been grouped together for the purpose of this report because although at TYQ they are owned by a corporation, the FBO, they house more one company's aircraft. They accommodate everything from single-engine aircraft to business jets and house multiple aircraft per hangar. The T-hangars are used by single- and multi-engine aircraft (see Exhibit 1-7 for location) and house one aircraft per hangar. **Exhibit 4-9** shows the current mix of storage. For future planning purposes, the current mix of storage has been carried forward.

EXHIBIT 4-9: Existing Storage Facility Use at TYQ (2007)

	T-hangar		Conventional Hangar		Tie-Downs	
	Aircraft	Percent	Aircraft	Percent	Aircraft	Percent
Single-engine	55	71%	6	8%	16	21%
Multi-engine	4	36%	5	45%	2	18%
Turboprops			8	100%		
Business Jets			9	100%		

Source: Montgomery Aviation, 2007.

T-HANGARS

The T-Hangars at TYQ are used solely by single engine and multi-engine aircraft. Assuming that the current rate of 71 percent of the single engine and 36 percent of the multi-engine aircraft will be stored in T-hangars over the planning period, there will be a need for at least 115 T-hangars by 2027 if the forecast is met, as shown on Exhibit 4-8. The airport has six sets of T-hangars containing 61 units, two of which are vacant. These hangars range in size from 39.6 feet by 30 feet to 55 feet by 40 feet. However, two of these sets fall within the Runway Protection Zone (RPZ) for Runway 18 (see Exhibit 1-8). Accordingly, these hangars will need to be removed as new T-hangars are built to replace them.

CONVENTIONAL HANGARS

The four conventional hangars at TYQ range both in the size and the number of aircraft they can accommodate, as shown in **Exhibit 4-10**. The conventional hangar (Conventional Hangar #1) that houses the terminal (18,750 SF) is the newest and was completed in 2006. It accommodates 8-10 aircraft depending on their size and includes a 120-foot wide canopy (big enough to park two corporate jets) that covers the adjacent ramp area allowing passengers to board their planes out of the rain or snow. This hangar also includes pilot rest areas and a conference room. The next newest conventional hangar (Conventional Hangar #2) was constructed in 2003. It is 18,750 SF and also accommodates 8-10 aircraft depending on their size. It includes several offices and a conference room. The east conventional hangar (Conventional Hangar #3) and the west conventional hangar (Conventional Hangar #4) are older and smaller, accommodating 4-8 aircraft each.

EXHIBIT 4-10: Corporate Hangar Facilities at TYQ

Hangar	Size	Door Opening	Aircraft
Conventional Hangar #1	18,750 SF Hangar 3,000 SF Terminal & FBO	100' x 30' 120-foot wide canopy	8-10
Conventional Hangar #2	18,750 SF Hangar 6,000 SF Offices	100' x 30'	8-10
Conventional Hangar #3	10,000 SF	80' x 16'	6-8
Conventional Hangar #4	4,800 SF	60' x 20'	4-6
Total	**52,300 SF**		**34 aircraft**

Source: Montgomery Aviation, 2007.

When hangars are used primarily to store larger business aircraft, at least 3,000 square feet (based on the Cessna Citation III as a midsize representative aircraft) is usually allocated per aircraft. It is recommended that no stand-alone hangars be constructed that are less than 3,000 square feet, to allow flexibility in future use.

Using the FAA approved forecasts as shown on Exhibit 4-8, up to approximately 92,915 square feet (145,215 less existing 52,300) of non T-hanger storage space may be needed in the future, an increase from the existing 52,300 square feet of storage hangars. The alternatives analysis should consider various alternatives to provide a mix of hangar sizes. The actual hangar development will be dependent on tenant needs.

Aircraft Parking Aprons

The two existing aircraft parking aprons primarily serve transient aircraft, although some based aircraft are also kept parked on the apron. Currently, 18 locally based aircraft are kept tied-down on the apron and in front of the Eagle Hangar. The apron area below the canopy adjacent to the terminal hangar can accommodate two corporate jets, but this area is not normally used for overnight storage. There are 12 existing tie downs on the south jet ramp and east/west taxi lane. There are four tie downs near the canopy that need to be removed based on their location. The south jet ramp can accommodate approximately another 12 small or six larger aircraft.

For planning purposes, it is assumed that 50 percent of the aircraft on the apron are corporate aircraft and the remaining 50 percent are piston aircraft. A common parking configuration for corporate aircraft on a transient apron is to face all the aircraft in a row in the same direction with space between the wing tips. This allows service vehicles, such as fuel trucks to approach the aircraft and also allows the aircraft to pull in and out under power.

For planning purposes, the transient apron needs have been sized without any nesting (facing aircraft alternating directions to fit more aircraft in a given area) by identifying the space used by each aircraft, based on its length multiplied by its wingspan. In addition, each aircraft is allocated its wingspan and an additional 115-foot Design Group II (wingspan 49 feet up to but not including 79 feet) taxilane object free area to provide maneuvering space on the apron. **Exhibit 4-11** shows the apron area needed to accommodate representative general aviation aircraft.

EXHIBIT 4-11: TYQ Aircraft Parking Apron Needs

Aircraft	Wingspan (feet)	Length (feet)	Apron Area* (sq. yards)
Corporate Aircraft			
Gulfstream II	68.8	79.9	1,490
Challenger 600	61.1	68.5	1,246
IAI 1124	44.8	52.3	833
Hawker 800/850	51.4	51.2	949
Lear 55/60	43.8	55.1	828
Citation Bravo	52.2	47.2	941
King Air 90	50.2	35.5	839
Piston Aircraft			
Beech Baron	37.8	28.8	604
Cessna 182	35.8	28.1	569

*Includes Group II taxilane object free area.

Source: *FAA Advisory Circular 150/5300-13*, *FAA Aircraft Characteristics Database, www.faa.gov/arp/airchardb*, Aerofinity, Inc., 2006.

Averaging the areas needed to serve each type of aircraft results in approximately 1,000 square yards per corporate aircraft, 600 square yards per piston aircraft. This results in 800 square yards per transient aircraft, assuming 50 percent corporate and 50 percent piston. To accommodate the transient aircraft forecast by the end of the planning period, approximately 20,000 square yards of apron will be needed. The FAA recommends 300 square yards per aircraft for locally based aircraft. Thus, to accommodate 36 tied-down based aircraft in the future, a total of approximately 11,000 square yards is needed. Combining the transient and based aircraft needs results in a total of approximately 31,000 square yards of apron by the end of the planning period.

Fueling Facilities

For fueling purposes, 100LL Avgas is stored in a 10,000 gallon tank under the abandoned apron. A 12,000 gallon tank located underground just north of the new apron stores Jet-A fuel. There are spill containment measures in place for the fuel tanks. Both tanks are owned by the airport. All aircraft are currently fueled via a 1,200 gallon fuel truck for 100LL Avgas and a 3,000 gallon or 2,000 gallon fuel truck for Jet-A. Montgomery Aviation owns the three fuel trucks and provides all the fueling services; sales have increased from 660,000 gallons in 2003 to 800,000 gallons in 2005.

According to Montgomery Aviation, the capacity and size of the current tanks and truck storage are sufficient through the planning period. However, the 100LL Avgas fuel tank is in the RPZ and, therefore, needs to be relocated.

Terminal Building

The FBO, Montgomery Aviation, provides terminal building functions at TYQ. Montgomery Aviation operates from the first floor of the terminal that includes approximately 3,000 square feet dedicated to office, lobby and lounge area. This area serves the following functions:

- Waiting lounge
- Restrooms
- Public phone
- Flight planning
- Pilots lounge/quite space
- Conference room
- FBO counter and offices
- Concessions
- Storage rooms

The second floor of the terminal building includes an additional 1,500 square feet of conference rooms and offices.

These terminal facilities serve both transient users and other FBO customers, such as flight training students. As a private entity, any expansion of this space will be driven by their business plan. However, the alternative analysis should reserve space to allow for future FBO operator growth in close proximity to the existing operation and with good visibility from the airfield.

Auto Parking

Auto parking needs at TYQ have outpaced capacity. According to Montgomery Aviation, approximately 20 more parking spaces are needed to accommodate existing demand. There are currently a total of 65 parking spaces, the vast majority in front of the terminal building. There are only 3 spaces associated with the T-Hangar units. Future parking needs have been estimated by using twice peak hour passengers (since most flying lasts more than one hour plus an additional 70 percent for longer-term traffic) plus the additional 20 spaces they are short today. This also assumes that airport employees will grow by one person per year. Using this methodology, approximately 143 total spaces will be needed to serve the users and employees by the end of the planning period.

Presently there are only 3 parking spaces associated with the T-hangars. T-hangar lessees are required to park inside their T-hangars now, so if new T-hangar construction is not going to follow this approach, it should be planned to accommodate automobile parking.

An advantage to providing auto parking for T-hangar tenants outside the immediate hangar area allows the airport operator to control airfield and airside access.

Maintenance Functions

TYQ has one maintenance facility (2,400 square feet) managed and operated by Montgomery Aviation. It is located just south of State Road 32 and just east of the airport access road. Because there presently is not enough space for airport maintenance equipment, some of the old open T-hangars are used for equipment storage. According to Montgomery Aviation, an additional 2,400 square feet would accommodate existing and future maintenance function storage needs.

Utilities

There is no public sanitary sewer currently available at the airport. The closest public sanitary is either approximately 2-3 miles to the south or 2-3 miles to the east. Where the airport will ultimately hook into sanitary sewer has not yet been determined and is currently under study. On site wells and sanitary mound systems will be required for all new development until public water and sewer are extended to the airport.

An electrical vault is located just south of the conventional hangars. It houses the regulators that are used to power the airfield lighting. There is not a back-up generator. In 2008 the airport began an airport electrical rehabilitation project for the existing runway and taxiway lights, airfield lighting cable, the VASI/PAPI regulator, VASI replacement with PAPI on Runway 18. The existing and proposed utilities are shown in **Appendix D**.

Other Facility Requirements

Improved fencing is identified as a potential facility need. Fencing allows access to the airfield to be controlled. It protects the general public from inadvertent entry into areas where aircraft may be operating and also increases the safety for the aircraft operators. Controlling the entry of wildlife onto the active operating areas should also be taken into consideration. This may become a greater concern in the future as development around the airport displaces wildlife. It is important to note that commercial air service is not being pursued at the airport, so Part 139 standards have not been applied in this planning process.

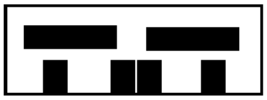
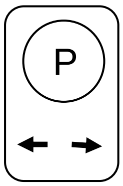
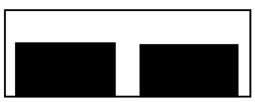
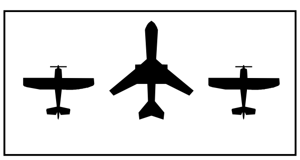
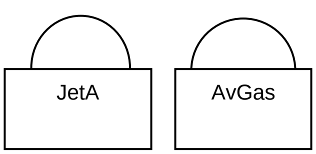
Road Access

The airport access road is located off State Road 32. All airport users must access the airport from this two-lane road. It is considered a minor arterial in the Boone County Comprehensive Plan; however, the *2007 Hamilton County Thoroughfare Plan* considers this same road just east of the county line as a major arterial with a 150 feet right of way. All airport planning should be clear of any current or future right-of-way. As airport activity increases, dedicated turn lanes may be justified to allow for traffic flow. The airport operator should continue to stay informed regarding planned transportation improvements in both counties and their potential impact on TYQ.

Airside/Landside Requirements Summary

TYQ has good general aviation terminal facilities in place. This analysis has identified the need to preserve space on the airport for additional large hangars, T-hangars, and vehicle parking development. The alternatives considered for the airside facility growth should take into account the need for flexibility, as the timing of the development of the airside facilities will be heavily dependent on the users. It should also consider optimizing the space on the airport, while making best use of the existing utilities to support development. **Exhibit 4-12** summarized the airside facility requirements.

EXHIBIT 4-12: TYQ Airside Facilities Requirements Summary

REQUIREMENTS	EXISTING	FUTURE
TERMINAL BUILDING 	4,500 SF (Provided by FBO)	At least 4,500 SF (Provided by FBO)
AUTO PARKING 	Passenger: 47 Employee: 18	Passenger: 105 Employee: 38
HANGARS 	T-Hangars: 61 Conventional Hangars: 52,300 SF	T-Hangars: 115 Conventional/Corporate/Executive Hangars: 145,200 SF
APRON 	Transient and Based: 13,400 SY	Transient and Based: 31,000 SY
FUEL FACILITIES 	Jet A: 17,000 GAL. 100LL: 11,200 GAL.	Jet A: at least 17,000 GAL. 100LL: at least 11,200 GAL.
UTILITIES	Site Wells, Sanitary Mound Systems, Electricity, Telephone, Cable	Extend Public Sewer and Water to Airport

Source: Aerofinity, 2007.

SUMMARY

This analysis identified what facilities are needed at TYQ to accommodate current and future activity at the facility. These facility requirements now need to be put into the context of the local environs to direct the alternatives analysis in the next chapter. The alternatives analysis will seek to identify the improvements that should be made to provide the greatest margin of safety for the operators and neighbors while providing the maximum economic return in a community-sensitive manner.

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INTRODUCTION

Guiding principles were outlined for the Alternatives Analysis to assist in ensuring that decisions made in the immediate future provide long-term flexibility to meet the needs of the evolving aviation industry. Based on the aviation forecasts for the 20-year planning period, following Federal Aviation Administration (FAA) guidelines, the Facility Requirements chapter identified the short- and long-term infrastructure needed to support the forecast demand at Indianapolis Executive Airport (TYQ). This chapter reviews the options available to meet those short- and long-term needs while keeping in mind their potential impact on the environment as reviewed in the Environmental Overview chapter.

The following guiding principles were developed to help guide the suggested improvements for TYQ:

1. Safety and security is the first priority, followed by meeting customer needs and promoting regional economic development.
2. Focus on the needs of corporate/business users and general aviation.
3. Preserve investments in existing facilities.
4. Preserve properties contiguous with taxiways and aircraft aprons for aviation purposes with airside needs.
5. Plan landside development in an efficient, flexible and cost-effective manner.
6. Co-locate like users/services.
7. Protect utility corridors and future utility capacity needs.
8. Utilize emerging technology to increase all-weather utility of the airport.
9. Comply with all FAA regulations and design standards.
10. Embrace environmental stewardship in all development.
11. Promote compatible land use surrounding the airport.

As a premier reliever airport, the most demanding guiding principle for TYQ is serving the corporate/business aircraft. Meeting the needs of these aircraft starts with the ability to accommodate their landing and takeoff requirements in all weather conditions for all trip lengths without constraints. The alternatives to meet the future airfield needs for the runways, taxiways, and navigation aids were assessed first. Development was recommended in the facility requirements chapter that would result in a 7,000 ft. by 100 ft. primary runway to accommodate large airplanes of 60,000 pounds or less in the 75% category at 90% useful load and 8,400 accommodates large airplanes of 60,000 pounds or less in the 100% category at 90% useful load. Alternatives for these recommendations are analyzed in this chapter. Additionally, development was recommended in the facility requirements chapter that would result in a 4,000 ft. by 100 ft. crosswind runway to accommodate 100% of small airplanes with less than 10 passengers and 4,400 ft. by 100 ft. to accommodate 100% of small airplanes with 10 or more passenger seats. Alternatives for these recommendations are also analyzed in this chapter.

After defining the area needed to accommodate the airfield needs, airside and landside development opportunities were analyzed to meet the recommendations identified in the facility requirements chapter. For the airside (storage and service facilities with airside access), primary consideration was given to grouping like uses around existing development and taking advantage of the available utilities. After the airside requirements were addressed, areas available for landside (aviation related without airside access) development was identified.

AIRFIELD ALTERNATIVES

Primary Runway

Recommendations
Extend Runway 18-36 to the south by 1,500 feet for a 7,000-foot by 100-foot primary runway to accommodate large airplanes of 60,000 pounds or less in the 75% category at 90% useful load. (Phase 1) Extend Runway 18-36 to the south by and additional 700 feet for a 7,700 ft. by 100 ft. primary runway in the long-term to accommodate large airplanes of 60,000 pounds or less in the 100% category at a capacity that exceeds 60% useful load. (Phase 2)

Runway 18-36, the primary runway at TYQ, is 5,500 ft. long by 100 ft. wide. This runway meets Airport Reference Code (ARC) C/D-II standards. The ARC for future development to serve all users at TYQ is also ARC C/D-II; however, the need for additional runway length was identified to serve the corporate/business users with higher useful loads or when the runway is wet or contaminated by snow or ice. The facility requirements identified the need for the 7,000 feet primary runway to accommodate large airplanes of 60,000 pounds or less in the 75% category at 90% useful load or 8,400 feet to accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load. (See Exhibit 4-5: Runway Length Requirements for TYQ, in Chapter 4, Facility Requirements.) Since Runway 18-36 meets ARC C/D-II standards, the runway width, clear areas, and taxiway separation are sufficient. The Runway Protection Zones (RPZ) for each runway end should also be controlled and kept clear of incompatible development.

Five alternatives (see **Exhibit 5-1**) were reviewed for the extension of Runway 18-36 to 7,000 ft., 8,400 ft., and 7,700 ft.

7,000 ft**.**

- Option A: 1,500 ft. extension to the south
- Option B: 1,500 ft. extension to the north

8,400 ft.

- Option C: 2,900 ft. extension to the south
- Option D: 1,400 ft. extension to the north and 1,500 ft. extension to the south.

7,700 ft.

- Option E: 2,200 ft. extension to the south

These alternatives are shown as options A, B, C, D, and E on **Exhibits 5-1.** (Please note that an alternative showing phased development to the north was not considered as a better combination of options A and C because the environmental impacts would be higher.)

In review of the primary runway alternatives discussed below, a 1,500 ft. extension to the south end (Options A) of Runway 18-36 is recommended for a 7,000 ft. primary runway to accommodate large airplanes of 60,000 pounds or less in the 75% category at 90% useful load. Options C and D for an 8,400 ft. runway to accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load were ruled out because the environmental impacts associated with CR 200 and SR 32 and the financial cost were considered too great. Therefore, Option E for a 7,700 ft. runway was considered to determine the longest amount of runway that could be constructed without impacting CR 200 or SR 32. This alternative would maximize the use of airport owned property. Option E is recommended for a long-term goal to accommodate additional large airplanes of 60,000 pounds or less in the 100% category at a capacity that exceeds 60% useful load. (See Exhibit 4-5: Runway Length Requirements for TYQ, in Chapter 4, Facility Requirements.) (Please note, to minimize the impact on the runway length and instrument approach during construction, the glideslope could be relocated prior to constructing the runway extension.)

OPTION A – 1,500 FT. EXTENSION TO THE SOUTH FOR 7,000 FT.

Option A shows a 1,500 ft. extension to the south, which would accommodate the first phase of development bringing the runway to 7,000 ft. (See Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements and Exhibit 5-1.)

Advantages:
This option requires the least amount of land acquisition and, as a result, appears to be the least costly. It accommodates large airplanes of 60,000 pounds or less in the 75% category at 90% useful load and has the least community disruption.

Disadvantages:
This option would require relocation of the glideslope and a few feet of ground fill due to elevation differences. It does not accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load. Although a complete NEPA analysis would be required prior to construction, this option appears to have some potential impact to farmland and would require some land acquisition, including two homes.

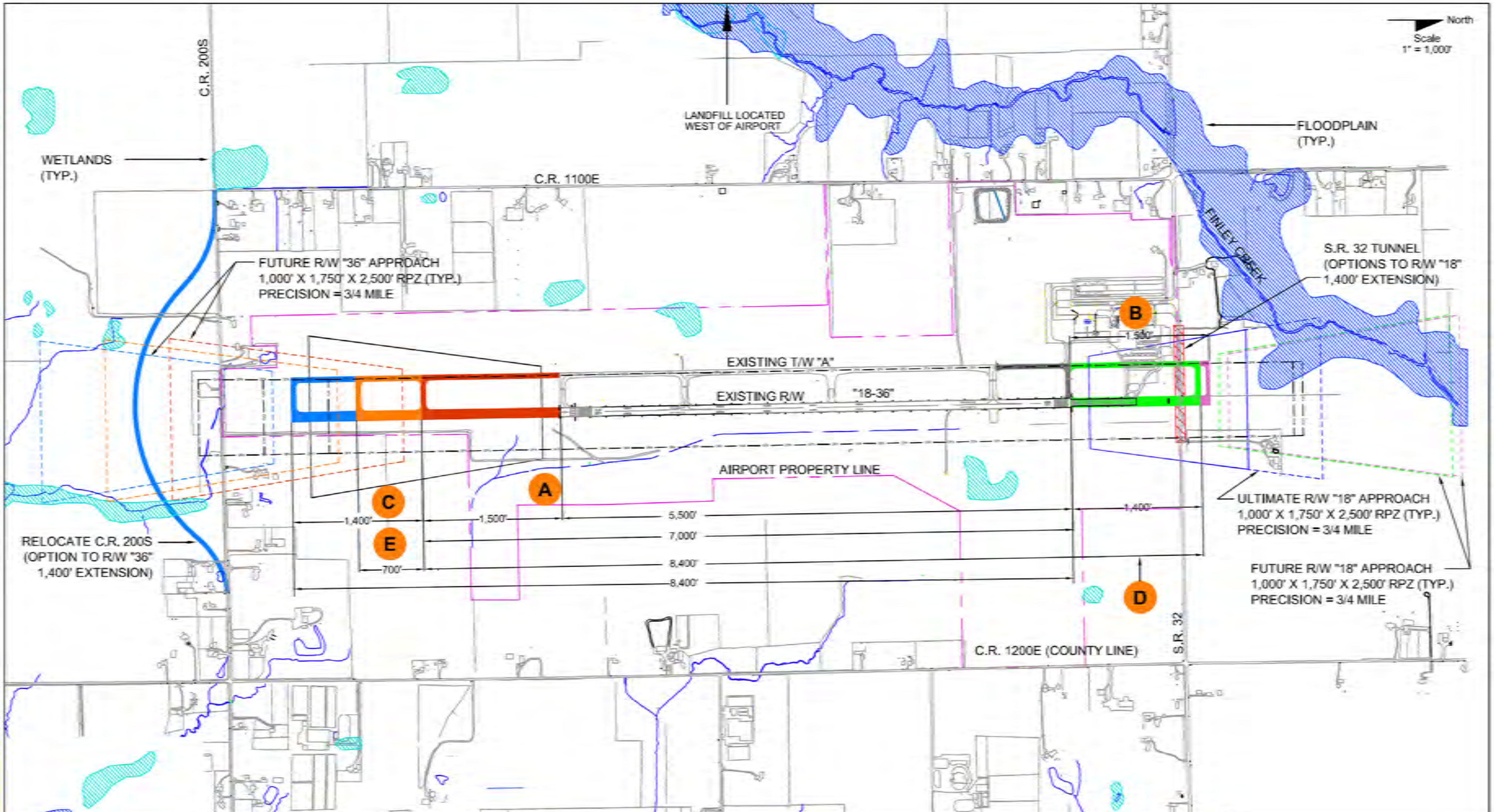

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EXHIBIT 5-1
RUNWAY 18-36
ALTERNATIVES

Indianapolis Executive Airport Zionsville, Indiana

OPTION B: 1,500 FT. EXTENSION TO THE NORTH FOR 7,000 FT.

Option B shows a 1,500 ft. extension to the north, which would accommodate large airplanes of 60,000 pounds or less in the 75% category at 90% useful load. (See Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements and Exhibit 5-1.)

Advantages:
This option accommodates large airplanes of 60,000 pounds or less in the 75% category at 90% useful load and removes some height and build restrictions from the current terminal area because it moves the north RPZ further away from the terminal to the north. It would also allow for more efficient airport operations than extending to the south because it offers a shorter distance from the terminal to both the runway ends.

Disadvantages:
This option is the most costly option to get to 7,000 ft. because it would require the relocation of the localizer, extensive land acquisition, and the construction of a tunnel for S.R. 32. Closure and/or relocation of this road is not considered an option because it is a major east/west thoroughfare in this part of the county accommodating approximately 7,000 vehicles daily [http://www.in.gov/indot/files/boone(1).pdf, accessed 6-4-08]. This tunnel is considered impractical because the depth and height design requirements for a tunnel are extensive and would result in large elevation differences between the road and the adjacent land owners. Additional infrastructure would be required to resolve these conflicts to make the existing homes and businesses along this road accessible. To achieve the slope necessary for the decent into the tunnel, the segment of road affected would be substantially larger than that physically required for the tunnel itself. This would likely result in a new airport access road and frontages road for the existing homes. Additionally, the Indiana Department of Transportation (INDOT) is planning US 31 corridor improvements from I-65 to I-69 that would include road widening and possible strengthening while also reducing the number of intersections and stop lights. As a result, the tunnel width requirements would also likely increase. This option does not accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load.

Although a complete NEPA analysis would be required prior to construction, this option appears to have likely impacts to farmland, wetlands, floodplains, trees, a state road, airport access, and multi-building residences.

OPTION C: 2,900 FT. EXTENSION TO THE SOUTH FOR 8,400 FT.

Option C shows a Phase 1 extension to the south of 1,500 ft with and an additional Phase 2 extension of 1,400 ft. extension to the south to accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load. (See Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements and Exhibit 5-1.)

Advantages:
This option maximizes use of airport owned land without impacting SR 32. It appears to be the least costly of the options to meet 8,400 ft., accommodates large airplanes of 60,000 pounds or less in the 100% category at 90% useful load, and has the least community disruption.

Disadvantages:
This option would require relocation of the glideslope, land acquisition, and relocation of a segment of C.R. 200S. Although a complete NEPA analysis would be required prior to construction, this option appears to have likely impacts to farmland, wetlands and waterways, a roadway, trees, and approximately two homes. Additionally, Union Elementary School is located approximately 8,600 ft. to the south of the existing runway and an extension 2,900 ft. to the south would likely impact this facility.

OPTION D: 1,500 FT. EXTENSION TO THE SOUTH AND 1,400 FT. EXTENSION TO THE NORTH FOR 8,400 FT.

Option D shows a 1,500 ft. extension to the south for Phase 1 and an additional 1,400 ft. extension to the north, which would accommodate large airplanes of 60,000 pounds or less in the 100% category at 90% useful load (see Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements Exhibit 5-1).

Advantages:
This option has basically the same advantages as Options A and B, but accommodates large airplanes of 60,000 pounds or less in the 100% category at 90% useful load.

Disadvantages:
This option has basically the same disadvantages as Options A and B.

OPTION E: 2,200 FT. EXTENSION TO THE SOUTH

Option E shows a 2,200 ft. extension to the south.

Advantages:

This option has basically the same advantages as Option A, but will also accommodate some additional large airplanes of 60,000 pounds or less in the 100% category at a capacity that exceeds 60% useful load (see Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements and Exhibit 5-1).

Disadvantages:

This option has basically the same advantages as Option A, but falls short of accommodating all large airplanes of 60,000 pounds or less in the 100% category at 90% useful load.

Crosswind Runway

Recommendation
To accommodate 100% of small aircraft with less than 10 passengers, construct a crosswind Phase 1 Runway 4,000 ft. X 75 ft. in approximately a 7-25 configuration located far enough south of the terminal area not to impact terminal development (440 ft. south of Option G). Phase 2 increase width to 100 ft. to coincide with recommended precision design criteria and provide enhanced safety margins.

Four orientations for the crosswind runway were analyzed in the Facilities Requirements chapter: 9-27, 5-23, 7-25, and 10-28. Since the 5-23 configuration would not provide the wind coverage goals as set by the FAA, this orientation was not considered as an alternative. Although a 100' width may be desirable should the crosswind runway ever have a precision approach and the ability to accommodate a critical aircraft larger than B-II, it is not warranted by current aircraft operating at the airport that would actually use this runway. Therefore, a 100 ft. wide runway is not show as an option.

In review of the primary crosswind runway alternatives discussed below, a 4,000 ft. X 75 ft. crosswind runway is recommended in approximately a 7-25 configuration located far enough south of the terminal area not to impact terminal development (location of first phase of Option G shifted 440 ft to the south).

Options A through D were ruled out because the first phase (3,800 ft.) does not accommodate 100% of small planes with less than 10 passengers (see Exhibit 4-5: Runway Length Requirements for TYQ, in Chapter 4, Facility Requirements) while the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

Options E and F were eliminated because they require more land purchase than other viable options and locate the runway a significant distance from the terminal area, increasing taxi times as compared to options to locate farther north. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

Option H was eliminated because it requires more land purchase than other viable options and is likely to limit the ultimate potential for the terminal to grow in the existing northwest quadrant of the airport beyond this planning period and would impact the airport's dry detention basin. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

The locations of the options considered for the crosswind runway are summarized below:

Runway 9-27 Orientation (See **Exhibit 5-2**)

- Option A: Runway 9-27 crossing south of current Runway 18-36
- Option B: Runway 9-27 crossing current south end of Runway 18-36
- Option C: Runway 9-27 crossing midsection of Runway 18-36
- Option D: Runway 9-27 crossing northern portion of Runway 18-36

Runway 7-25 Orientation (See **Exhibit 5-3**)

- Option E: Runway 7-25 crossing southern portion of Runway 18-36
- Option F: Runway 7-25 crossing midsection of Runway 18-36
- Option G: Runway 7-25 crossing northern portion of Runway 18-36

Runway 10-28 Orientation (See **Exhibit 5-4**)

- Option H: Runway 10-28 crossing midsection of Runway 18-36

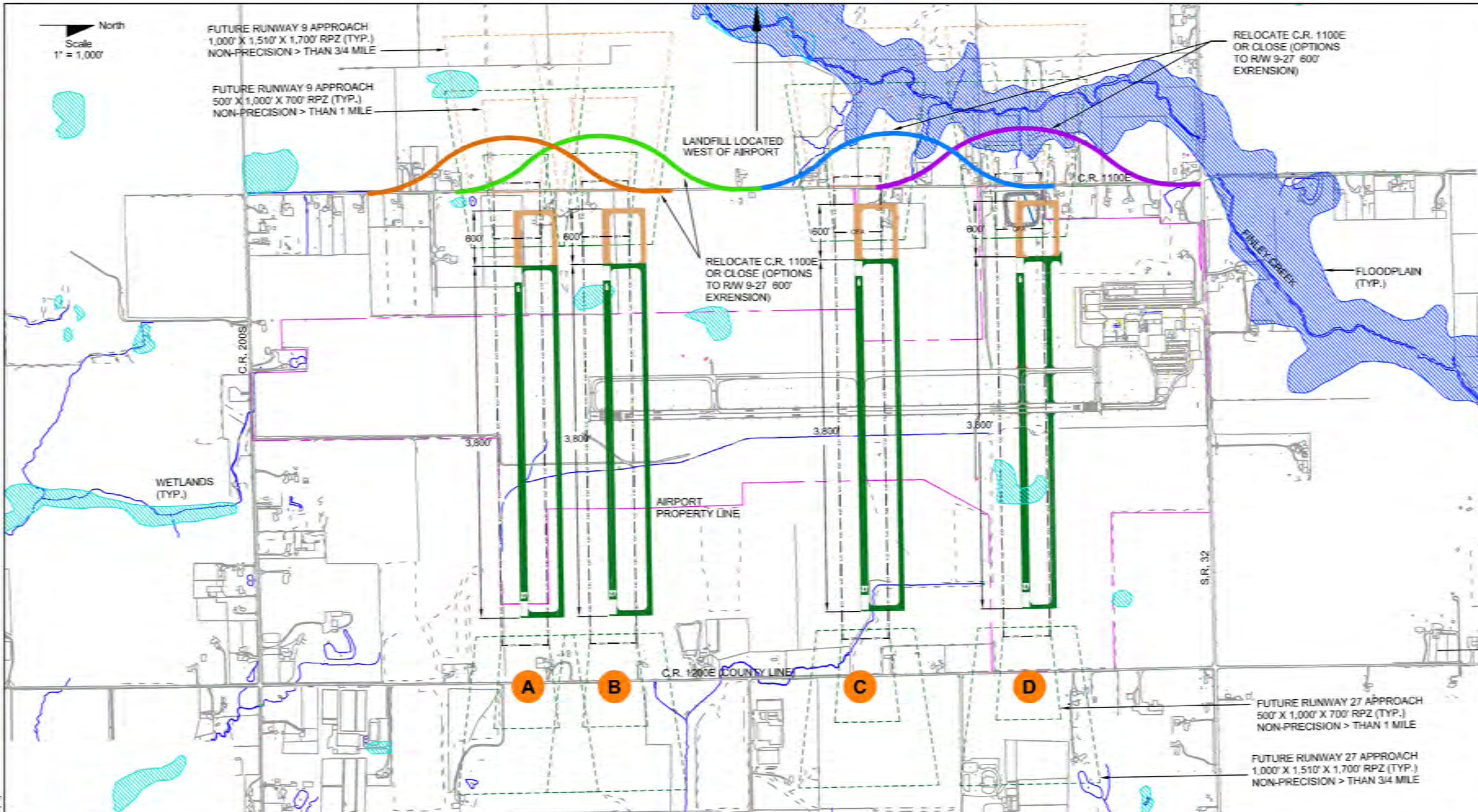

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EXHIBIT 5-2
FUTURE CROSSWIND "9-27"
ALTERNATIVES

Indianapolis Executive Airport — Zionsville, Indiana

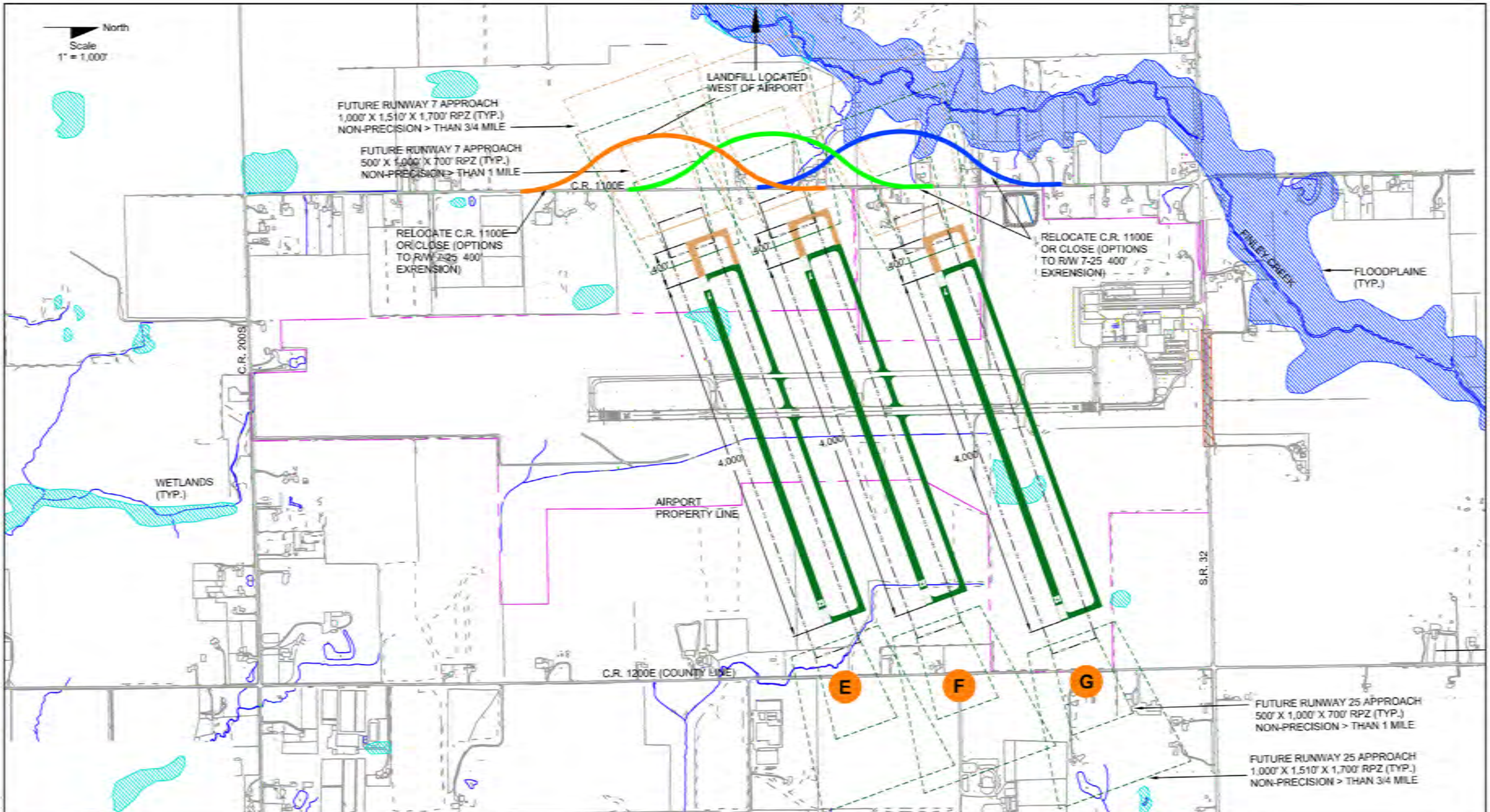

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EXHIBIT 5-3
FUTURE CROSSWIND "7-25"
ALTERNATIVES

Indianapolis Executive Airport   Zionsville, Indiana

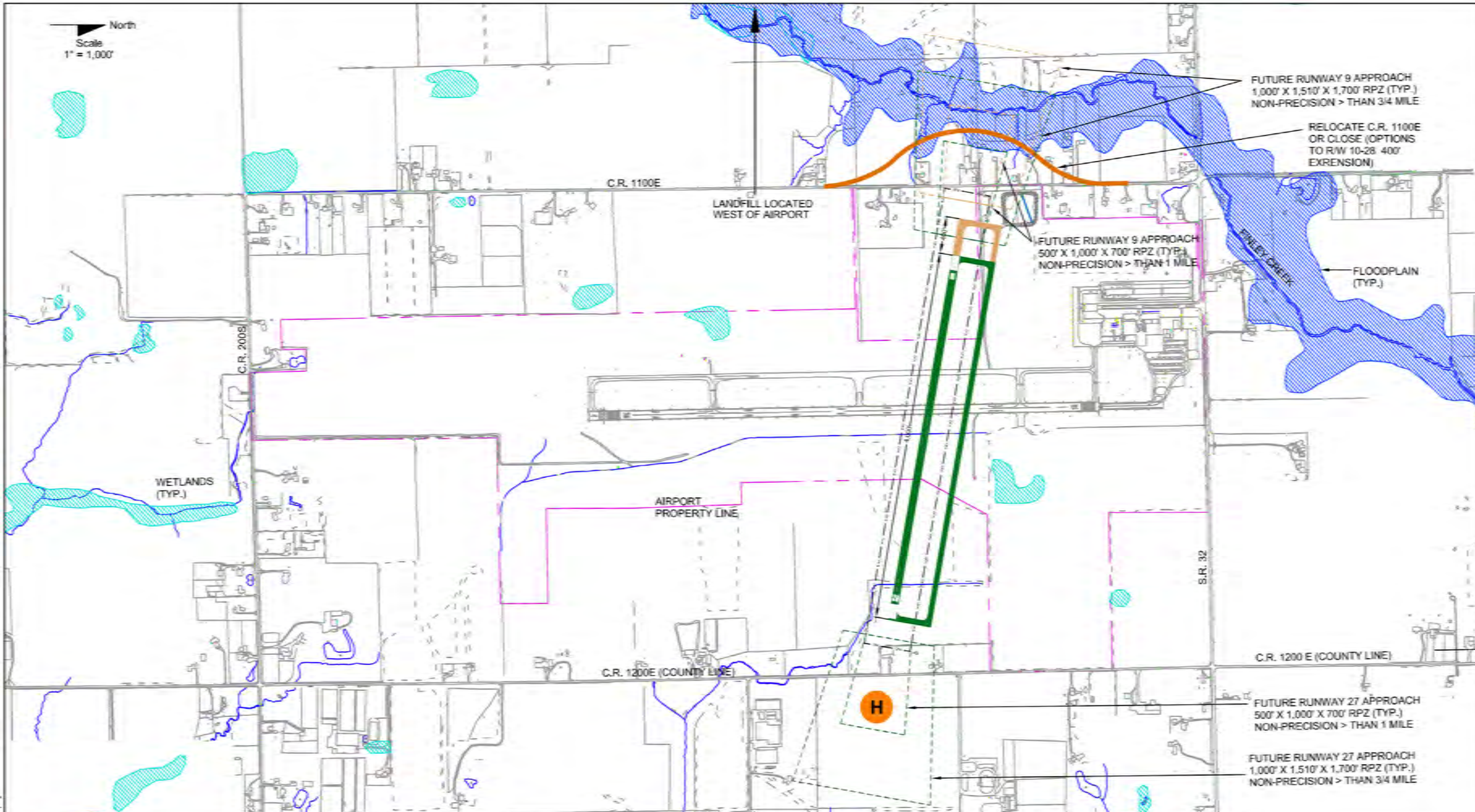

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EXHIBIT 5-4
FUTURE CROSSWIND "10-28" ALTERNATIVE

Indianapolis Executive Airport Zionsville, Indiana

OPTION A: RUNWAY 9-27 CROSSING SOUTH OF CURRENT RUNWAY 18-36

This option locates a phased crosswind runway (initially at 3,800 ft. X 75 ft. with a long-term extension to 4,400 ft.) south of the current primary runway. (See Exhibit 5-2.)

Advantages:
This option avoids the need for aircraft to fly directly over the landfill described in the Environmental Overview chapter.

Disadvantages:
This option could not be constructed until the primary runway was extended because of the FAA requirement for the runways to intersect. It does not meet the facility requirements in the short-term and it requires land acquisition. This option locates the runway a significant distance from the terminal area, increasing taxi times as compared to other options to locate farther north. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to farmland, trees, wetlands and waterways, and require approximately four homes to be purchased while also requiring the relocation or closure of a segment of C.R. 1100 E when constructed to its full length. There may be obstructions to the line-of-sight between the primary and crosswind runway ends. At the first phase (3,800 ft.) it does not accommodate 100% of small planes with less than 10 passengers (see Exhibit 4-5: Runway Length Requirements for TYQ, in Chapter 4, Facility Requirements). Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION B: RUNWAY 9-27 CROSSING CURRENT SOUTH END OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 3,800 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the current south end of the primary runway. (See Exhibit 5-2.)

Advantages:
This option avoids the need for aircraft to fly directly over the landfill described in the Environmental Overview section.

Disadvantages:
The disadvantages of this option are basically the same as option A less the intersecting runways requirement. It would require the purchase of approximately three homes. At the first phase (3,800 ft.) it does not accommodate 100% of small planes with less than 10 passengers (see Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility

Requirements). It will likely impact wetlands, trees, and farmland. The second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION C: RUNWAY 9-27 CROSSING MIDSECTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 3,800 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the midsection of the primary runway. (See Exhibit 5-2.)

Advantages:
This option moves the runway closer to the terminal area, reducing taxi times as compared to options to locate farther south.

Disadvantages:
This option brings aircraft very close to the landfill. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to farmland, trees (less than A and B), and homes, require approximately three-to-five homes to be purchased, while also forcing the relocation or closure of a segment of C.R. 1100 E when constructed to its full length. There may be obstructions to the line-of-sight between the primary and crosswind runway ends. At the first phase (3,800 ft.) it does not accommodate 100% of small planes with less than 10 passengers (see Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements). Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION D: RUNWAY 9-27 CROSSING NORTHERN PORTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 3,800 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the northern portion of the primary runway. (See Exhibit 5-2.)

Advantages:
This option keeps the runway in close proximity to the terminal area, reducing taxi times as compared to options to locate farther south, and matches the current FAA approved ALP. It also takes advantage of using currently owned land.

Disadvantages:

This option brings aircraft close to the landfill. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to wetlands, farmland, trees (less than A and B), and requires the purchase of approximately eleven homes and one business, while also forcing the relocation or closure of a segment of C.R. 1100 E when constructed to its full length. Although this option maximizes the use of currently owned property, it impacts the most number of homes, most likely resulting in one of the higher overall costing alternatives. It also limits the ultimate potential for the terminal to grow in the existing northwest quadrant of the airport beyond this planning period. At the first phase (3,800 ft.) it does not accommodate 100% of small planes with less than 10 passengers (see Exhibit 4-5: Runway Length Requirements for TYQ in Chapter 4, Facility Requirements). Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION E: RUNWAY 7-25 CROSSING SOUTHERN PORTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 4,000 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the southern portion of the primary runway. (See Exhibit 5-3.)

Advantages:

This option avoids the need for aircraft to fly directly over the landfill. It accommodates 100% of small airplanes with less than 10 passengers in the first phase and small airplanes with 10 or more passengers in the second phase.

Disadvantages:

This option requires additional land purchase and locates the runway a significant distance from the terminal area, increasing taxi times as compared to options to locate farther north. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to wetlands, farmland, and at full length, would impact at least one home while also requiring the relocation or closure of a segment of C.R. 1100 E. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION F: RUNWAY 7-25 CROSSING MIDSECTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 4,000 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the midsection of the primary runway. (See Exhibit 5-3.)

Advantages:
This option locates the crosswind closer to the terminal as compared to options to locate farther south. It also accommodates 100% of small airplanes with less than 10 passengers in the first phase and small airplanes with 10 or more passengers in the second phase.

Disadvantages:
This option brings aircraft close to the landfill and locates the runway a significant distance from the terminal area (less than E), increasing taxi times (less than E) as compared to other options except E. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to waterways, farmland, some trees, and at full length, would require the purchase of approximately three homes, while also forcing the relocation or closure of a segment of C.R. 1100 E. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION G: RUNWAY 7-25 CROSSING NORTHERN PORTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 4,000 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the northern portion of the primary runway. (See Exhibit 5-3.)

Advantages:
This option locates the runway in a proximity to the terminal area, minimizing taxi times as compared to options that locate it further to the south. It also requires the second least amount of land acquisition because it maximizes the use of currently owned property. It also accommodates 100% of small airplanes with less than 10 passengers in the first phase and small airplanes with 10 or more passengers in the second phase.

Disadvantages:
This option brings aircraft directly over the landfill. Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to wetlands and waterways, farmland, trees, and at full length, would require the purchase of approximately nine homes, while also forcing the relocation or closure of a segment of C.R. 1100 E. It, like Option D, is likely to be one of the most expensive of all the crosswind runway alternatives

because of the high volume of homes required to be purchased. It also limits the ultimate potential for the terminal to grow in the existing northwest quadrant of the airport beyond this planning period. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

OPTION H: RUNWAY 10-28 CROSSING MIDSECTION OF RUNWAY 18-36

This option locates a phased crosswind runway (initially at 4,000 ft. X 75 ft. with a long-term extension to 4,400 ft.) that crosses the mid section of the primary runway. (See Exhibit 5-4.)

Advantages:

This option does not put aircraft directly over the landfill. It also accommodates 100% of small airplanes with less than 10 passengers in the first phase and small airplanes with 10 or more passengers in the second phase. It's approach surface to the east has a minimal residential impact as compared to other options.

Disadvantages:

Although a complete NEPA analysis would be required prior to construction, this option is likely to have impacts to drainage, waterways, farmland, and at full length, would impact approximately six homes purchased while also requiring the relocation or closure of a segment of C.R. 1100 E. At full length, this option would impact the storm water detention basin. It also limits the ultimate potential for the terminal to grow in the existing northwest quadrant of the airport beyond this planning period. Additionally, the second phase (4,400 ft.) is not justified because the majority of the aircraft with more than 10 passenger seats operating at the airport are jets and will likely use the longer primary runway.

Glider Runway

Recommendation
Remove Glider Runway.

That last FAA approved ALP for TYQ showed a 2,200 ft. x 100 ft. parallel runway west of the existing primary runway. This runway was used by gliders. The Central Indiana Soaring Society was based at TYQ for many years, but has now relocated to Alexandria. Accordingly, the need to the glider runway no longer exists and is not anticipated to return in the future. Accordingly, removal of the glider runway from the ALP is recommended.

Navigational Aids (Navaids)

Recommendations
Maintain ILS or equivalent approach to Runway 36
Pursue MALSR for Runway 36
Pursue GPS enabled LPV approaches to Runways 36 & 18 and the future Crosswind Runway.

TYQ has published two straight-in instrument approaches. Runway 36 is served by an Instrument Landing System (ILS) with minimums of a 200-foot ceiling and ¾ mile visibility. It is also served by a Very High Omni Range or Global Positioning System (VOR/GPS) approach with minimums of a 398-foot ceiling and 1 mile visibility. If a medium intensity approach lighting system with runway alignment indicator lights were added, the minimums to this approach could be lowered to 200-foot ceiling and ½-mile visibility. With the upcoming availability of global positioning system (GPS) enabled Localizer Performance with Vertical Guidance (LPV) approaches, space should be preserved to accommodate these low-cost precision equivalent approaches for Runways 18 and the future crosswind runway with minimums no lower than ¾-mile visibility (no approach lights).

A 1,500 ft. extension to the south end of Runway 18-36 was reviewed for its ability to support a precision approach equivalent. Examining the existing known obstructions, there are no known major obstructions to attaining a precision approach.

A 1,400 ft. additional extension to the south end of Runway 18-36 was also reviewed for its ability to support a precision approach equivalent. Examining the existing known obstructions, C.R. 200 S. would be required to be relocated to attain a precision approach.

A 700 ft. additional extension to the south end of Runway 18-36 instead of the 1,400 ft. additional extension was also reviewed for its ability to support a precision approach equivalent. Examining the existing known obstructions, there are no known major obstructions to attaining a precision approach.

Utilities

Recommendations
Extend public water and sewer to the airport.

Westfield and Union Township are currently interested in extending public sewer and water to the airport. HCAA should review both options for service and choose the one that best fits the preferred alternatives shown on the airport layout plan while providing the maximum amount of flexibility for long-term improvements.

Marking and Lighting

Recommendation
Upgrade markings as needed for improved approaches.

Runway 18-36 is served by high intensity runway lights (HIRL). This system is appropriate for all recommended future approaches. The future crosswind runway should be planned with MIRLs since instrument approaches are anticipated for both ends.

Runway 18-36 is marked with precision markings. This system is appropriate for all recommended future approaches.

Pavement Strength/Condition

Recommendations
Continue ongoing pavement maintenance. Increase primary pavement strength of primary runway as warranted by critical aircraft or occasional and emergency use of larger aircraft. Pavement strength for crosswind is currently justified at 12,500 lbs.

In addition to improvements designed to meet future demand, preserving the airport's existing facilities is a high priority, as identified in the guiding principals detailed earlier in this chapter. The current pavement strength was designed for all aircraft 60,000 pounds or less. The pavement strength should be maintained to support the original design of 60,000 pounds or less and increased as larger critical aircraft operations warrant or for occasional or emergency use of larger aircraft.

TERMINAL AREA ALTERNATIVES

Hangars

Hangars provide aircraft with protection from the weather and security against vandalism or theft. In general, aircraft owners prefer hangars. The demand for hangars is understandably higher in northern climates with severe winter weather conditions.

T-HANGARS

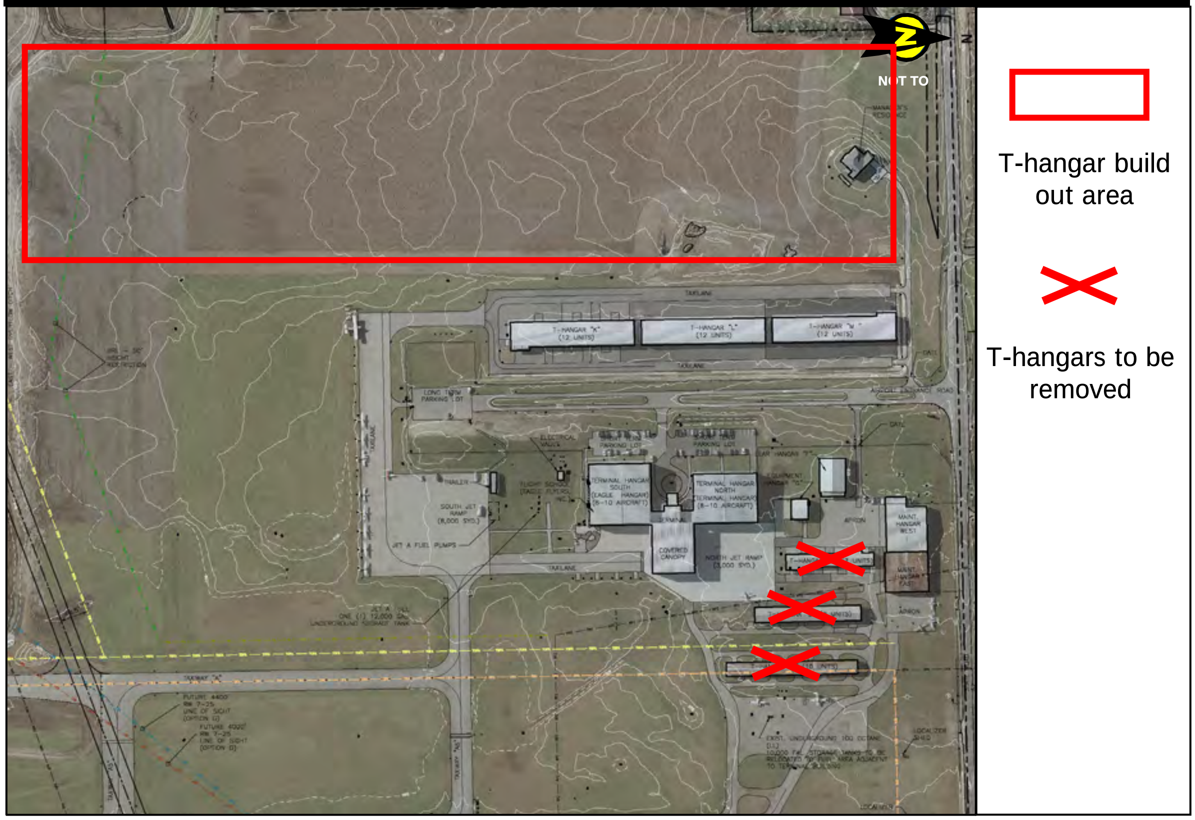
Recommendations
Build out T-hangar area to the east of the terminal area as demand warrants maximizing full terminal area development potential (Option 3B).

According to Chapter 4, Facility Requirements, a total of 115 T-hangar units are needed over the planning period. This total includes the following:

- 36 existing T-hangar units
- 25 new units to replace existing hangars that must be removed due to RPZ restrictions and nonconformance with guiding principles of co-locating like uses
- 54 new units to accommodate increased demand.

Exhibit 5-5 depicts the general area where the T-hangars will be planned in addition to where they are to be removed. The T-hangar build out area shown in Exhibit 5-5 co-locates like uses as identified in guiding principle #6.

EXHIBIT 5-5: T-hangar Build Out Area and T-hangars to be Replaced



Source: Woolpert, 2008.

In review of the T-hangar development alternatives discussed below, T-hangar development is recommended to the west of the terminal area as demand warrants maximizing full terminal area development potential. The locations of the options considered for the T-hangar configurations are summarized below:

Four alternatives were reviewed for the build out of the T-hangar area:

- Option 1: North/South Facing T-hangars (See **Exhibit 5-6**)
- Option 2: North/South and East/West Facing T-hangars (See **Exhibit 5-7**)
- Option 3a: East/West Facing T-hangars with North and West Vehicle Parking (Phased with North Units First) (See **Exhibit 5-8**)
- Option 3b: East/West Facing T-hangars with North and West Vehicle Parking (Phased with East Units First) (See **Exhibit 5-9**)

Option 1: North/South Facing T-hangars with North and Middle Vehicle Parking (Exhibit 5-6)

Advantages:
There are no obvious advantages to Option 1.

Disadvantages:
This option has half the units with north facing doors. Snow and ice are a frequent problem during Midwest winters. The pavement serving north-facing doors is the last to melt and the first to refreeze, which could result in access problems. This option requires more land per unit as compared to other options, and does not offer the best access drive alignment or vehicle parking space.

EXHIBIT 5-6: T-Hangars Option 1

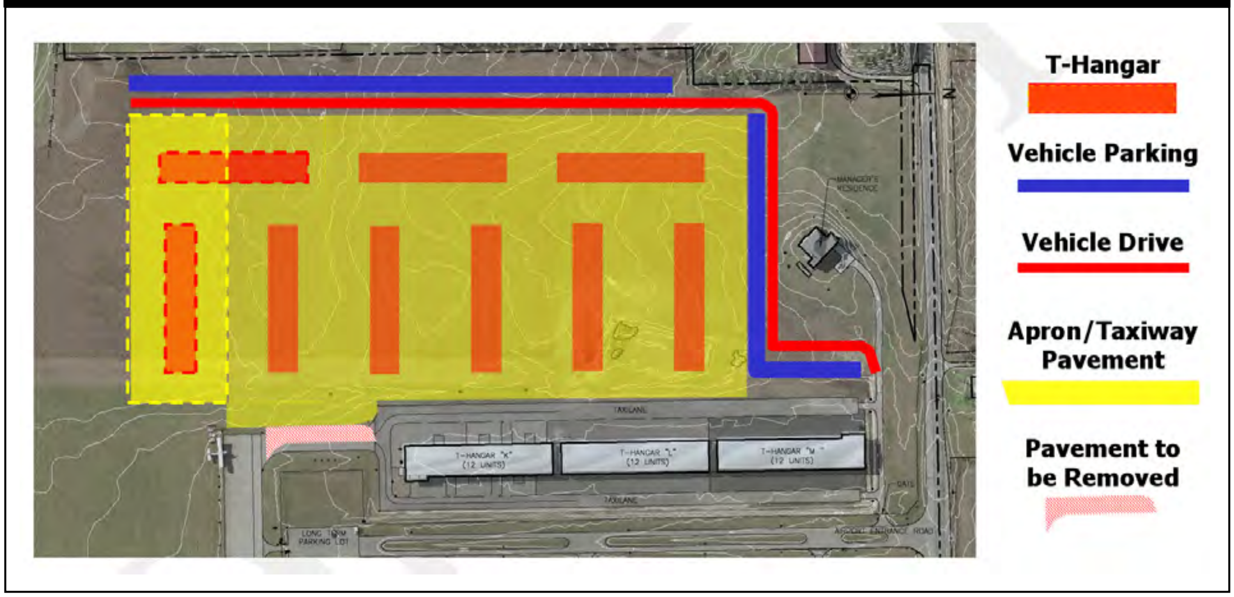
Source: Woolpert, 2008.

Option 2: North/South and East/West Facing T-hangars (Exhibit 5-7)

Advantages:
This option offers some east/west facing hangars.

Disadvantages:
This option requires more land per unit as compared to other options and includes some north facing hangars. It results in an odd configuration and taxiway designation around the hangars that could result in traffic conflicts. This option also results in a long distance from vehicular parking to the eastern hangars

EXHIBIT 5-7: T-Hangars Option 2



Source: Woolpert, 2008.

Option 3a: East/West Facing T-hangars [Phased with North Units First] (Exhibit 5-8)

Advantages:
This option maximizes the potential number of T-hangars in this area, matches the existing layout, and provides for some parking near the hangars.

Disadvantages:
This option results in some of the eastern hangars being a long distance from vehicular parking.

EXHIBIT 5-8: T-Hangars Option 3a

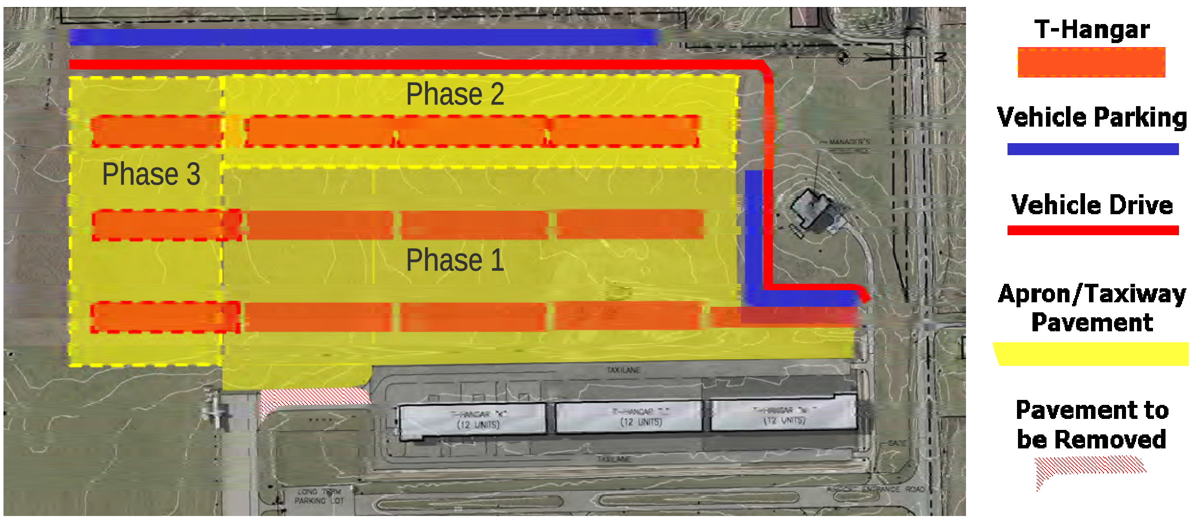
Source: Woolpert, 2008.

Option 3b: East/West Facing T-hangars [Phased with East Units First] (Exhibit 5-9)

Advantages:
This option provides for the maximum potential development around the T-hangar complex by maximizing units built per acre. Additionally, it matches the existing layout and minimizes the amount of taxiway needed to accommodate new buildings potentially to the south. It also offers the most flexibility for future planning changes. The way the development of this option is phased better meets the needs of the airport as opposed to Option 3a.

Disadvantages:
This option results in some of the eastern hangars being a long distance from vehicular parking.

EXHIBIT 5-9: T-Hangars Option 3b



Source: Woolpert, 2008.

OTHER HANGARS

According to Chapter 4, Facility Requirements, a total of 54 hangar spaces (approximately 145,200 SF) will be needed through the forecast period in the form of conventional, corporate, or executive hangar buildings. This includes 34 existing spaces (approximately 53,000 SF). Executive hangars are typically single unit stand-alone buildings while conventional and corporate hangars are typically larger multi-unit hangars that are owned by an FBO (conventional) or by a corporation operating a corporate aircraft (corporate).

Conventional/Corporate

Recommendations
Build out the existing terminal area with conventional hangars to maximize its capacity (Option A).

OPTION A:

Advantages:
This option provides for the maximum potential of units to be built in an area already confined by existing buildings and infrastructure. It maximizes the use of existing infrastructure and provides for the least amount of additional taxiway and ramp area needed for additional hangar space. Additionally, it matches the existing layout. (See **Exhibit 5-10**.)

Disadvantages:
Because there is limited green space and limits on height and build in the existing terminal area, this option offers a limited increase in the number of additional aircraft that can be hangared, but maximizes use of the existing terminal area rather than opening up new development in the northeast quadrant of the airport.

EXHIBIT 5-10: Conventional/Corporate Hangars Option A

Source: Woolpert, 2008.

<u>Executive (Stand-Alone)</u>

Recommendations
Build stand-alone executive hangars as demand warrants using existing infrastructure first and minimizing additional future infrastructure required to access buildings while reserving flexibility for future development of T-hangar and terminal area (Option E).

OPTION B:

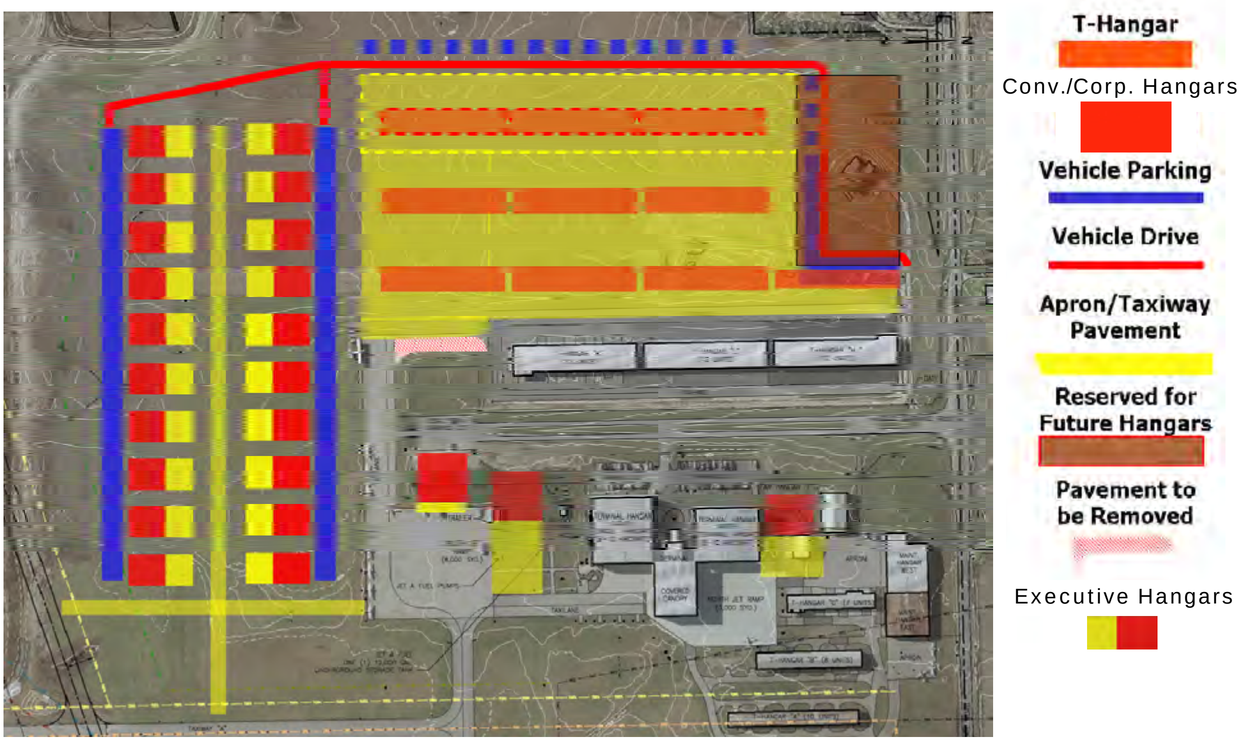
Advantages:

This option provides for a symmetrical layout of taxiways to corporate hangars and locates the hangars clear of the recommended crosswind runway. (See **Exhibit 5-11**.)

Disadvantages:

This option requires more additional taxiway infrastructure than compared to option C for the first row of units. It also requires two separate rows of vehicular parking and limits all future apron area in the existing terminal area.

EXHIBIT 5-11: Executive Hangars Option B



Source: Woolpert, 2008.

OPTION C:

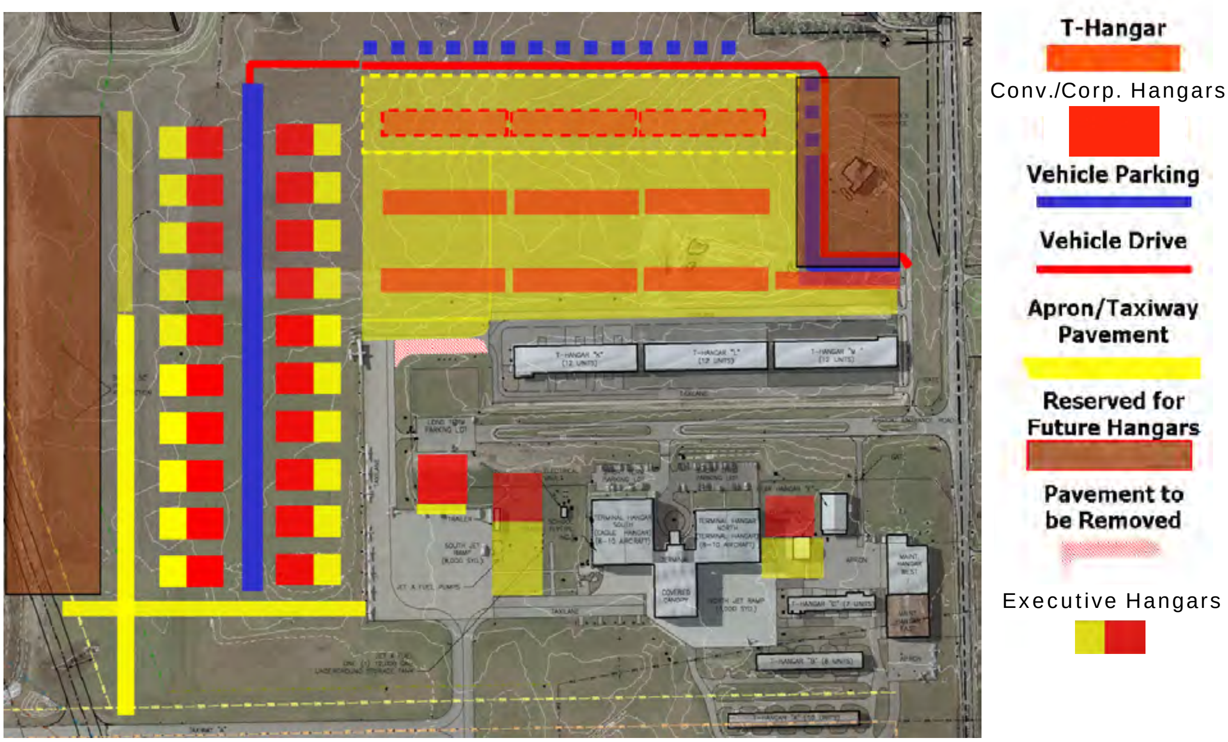
Advantages:

This option provides for maximum use of the existing taxiways and infrastructure and requires the least amount of infrastructure per building constructed in the first row of hangars. This option utilizes one row of parking for two hangar rows. It also locates the hangars in an area clear of the recommended crosswind runway. (See **Exhibit 5-12**.)

Disadvantages:

After the first row is built, more infrastructure is required for the next row. This limits all future apron area in the existing terminal.

EXHIBIT 5-12: Executive Hangars Option C



Source: Woolpert, 2008.

OPTION D:

Advantages:

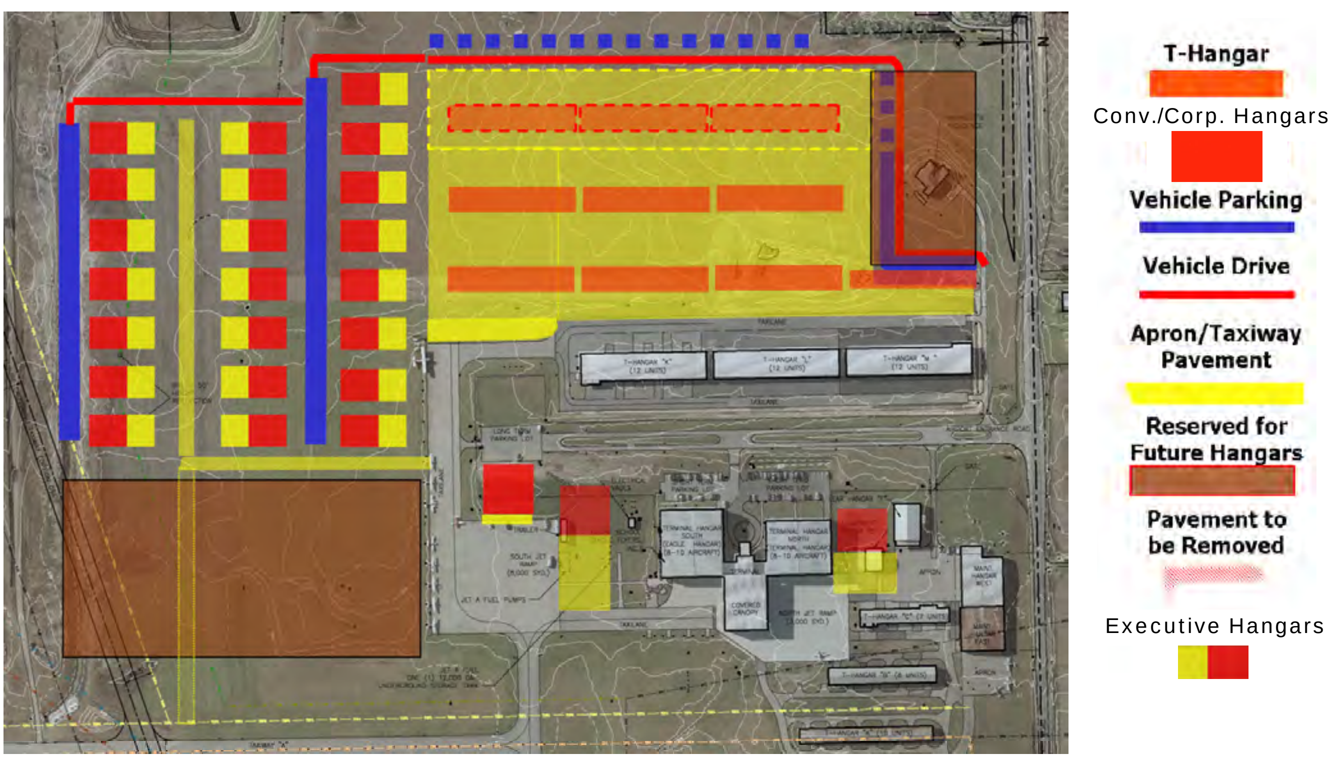
This option permits additional apron expansion in the existing terminal area. It also allows for immediate development of the existing pavement infrastructure and locates the hangars in an area clear of the recommended crosswind runway alternative. (See **Exhibit 5-13**.)

Disadvantages:

This option requires the development of a longer taxiway to reach the hangars. It also encroaches upon the area recommended for T-hangar development.

This option is likely to have impacts on current drainage infrastructure. In addition, it is likely to mix corporate users with T-hangar users, which conflicts with Guiding Principle #6.

EXHIBIT 5-13: Executive Hangars Option D



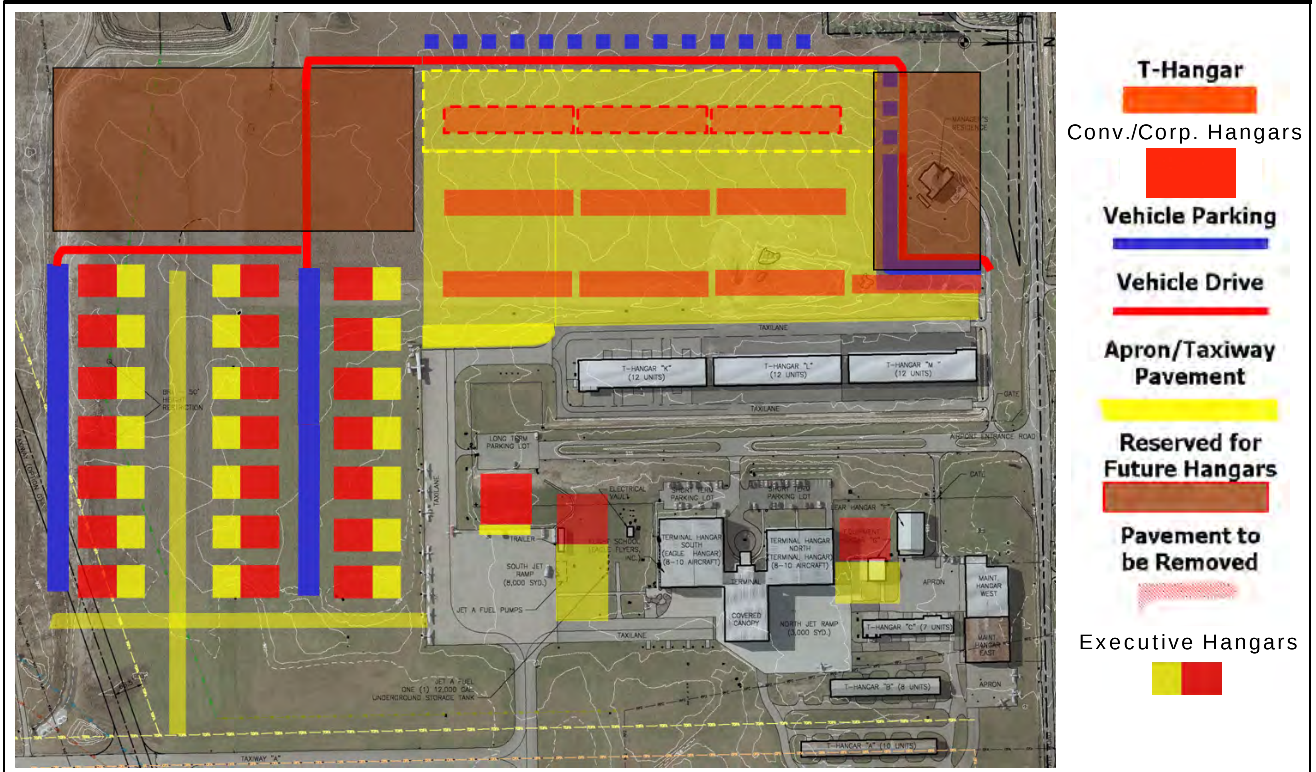
Source: Woolpert, 2008.

OPTION E:

Advantages:
This option requires less pavement infrastructure for taxiways as compared to option D, while also increasing the flexibility of the final layout of both the corporate and T-hangar expansion to the west and south respectively. (See **Exhibit 5-14**.)

Disadvantages:
This option may impact Option G for the crosswind runway depending on actual ground elevations and final runway siting. It limits apron expansion in the existing terminal area and requires additional vehicular roadway infrastructure to reach the hangars. Additionally, this option is likely to have impacts on current drainage infrastructure.

EXHIBIT 5-14: Executive Hangars Option E



Source: Woolpert, 2008.

Apron / Tie-Downs

Recommendations
Increase apron area/tie-downs as demand warrants in a way that maximizes flexibility of parking configurations at different locations by aircraft size for optimal terminal access (Option 3).

According to the Facilities Requirements chapter, 36 tie-down spaces are needed for based aircraft and 25 are needed for transient aircraft over the forecast period. There are currently 21 tie-down spaces that will need to be replaced due to future development as shown in the previous recommended corporate and T-hangar sections. Accordingly, a total of 61 new spaces will be needed, (approximately 30,800 SY of apron space).

Three alternatives were reviewed for the apron/tie-down space requirements:

Option 1: Expansion of all existing aprons

Option 2: Expansion of south apron

Option 3: Expansion of all existing aprons with new taxiways

OPTION 1: EXPANSION OF ALL EXISTING APRONS

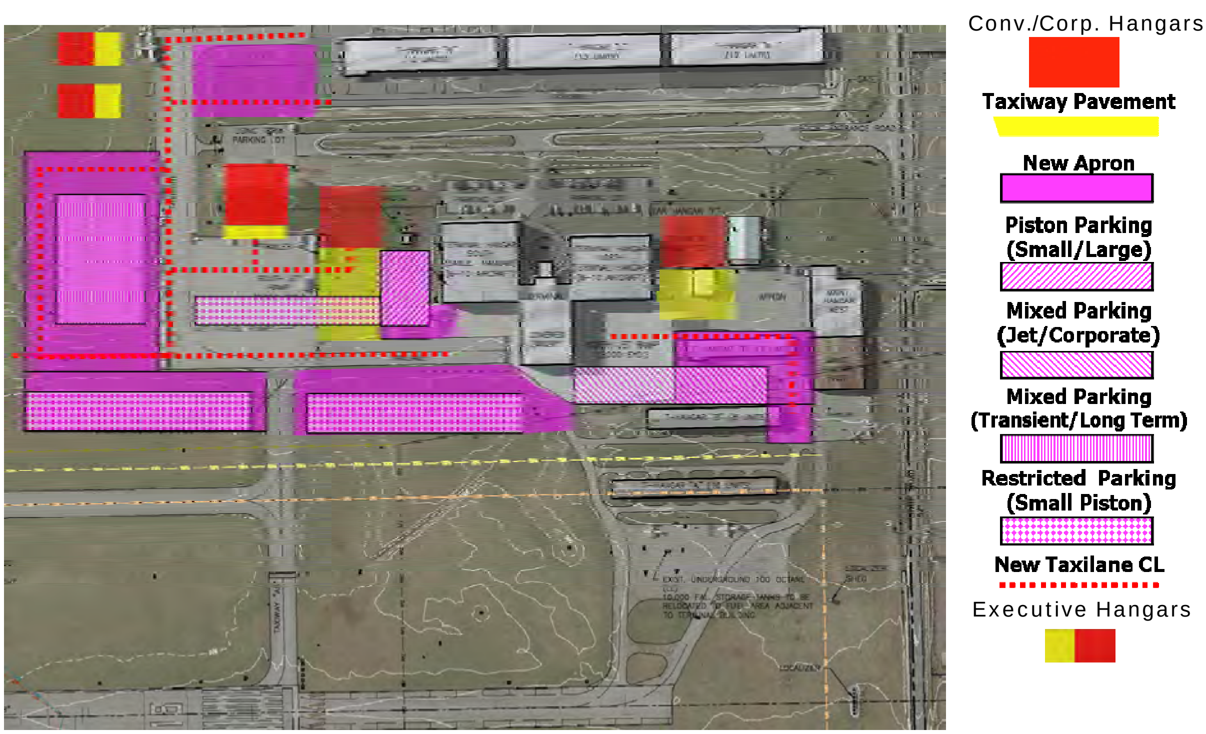
Advantages:

This option allows for maximum use of existing infrastructure with minimal removal of same. (See **Exhibit 5-15**.)

Disadvantages:

This option, due to its location in respect to the RPZ, restricts the height of the aircraft that can be parked in multiple locations.

EXHIBIT 5-15: Apron/Tie-Downs Option 1



Source: Woolpert, 2008.

OPTION 2: EXPANSION OF SOUTH APRON

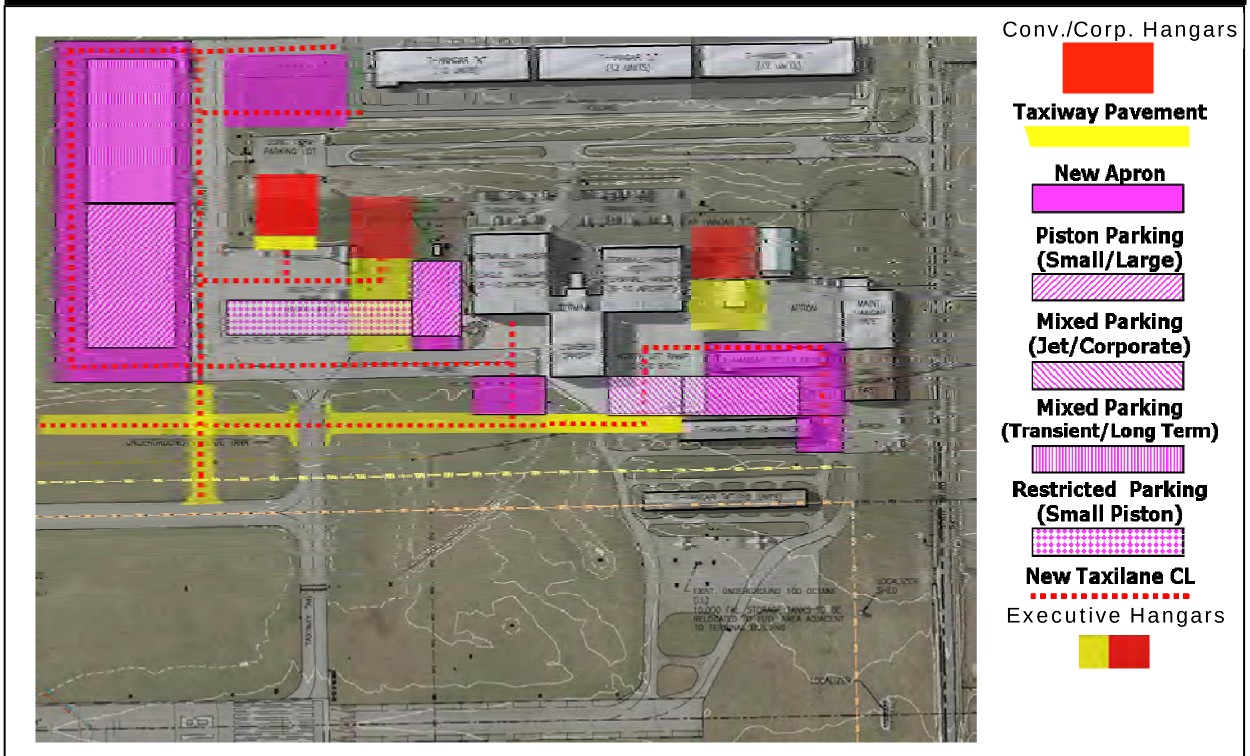
Advantages:

This option allows maximum use of existing infrastructure with minimal removal of same. This option offers the most aircraft parking in a central location. (See **Exhibit 5-16**.)

Disadvantages:

More pavement infrastructure is required to accommodate aircraft movements and parking. This option requires the greatest walking distance to the terminal.

EXHIBIT 5-16: Apron/Tie-Downs Option 2



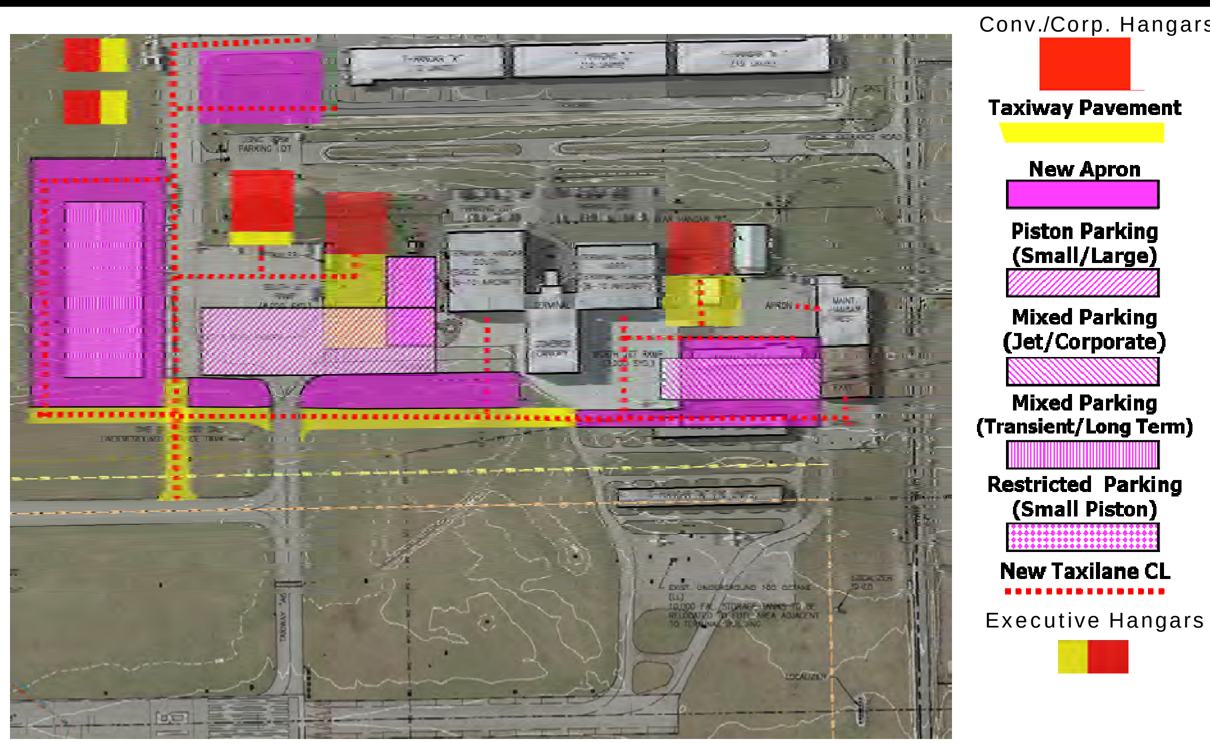
Source: Woolpert, 2008.

OPTION 3: EXPANSION OF ALL EXISTING APRONS WITH NEW TAXIWAYS

Advantages:
This option offers the greatest flexibility for terminal access and accommodates different configurations of aircraft at different locations. It is also the most compatible with the guiding principles and offers more parking closer to the terminal than the other options. (See **Exhibit 5-17**.)

Disadvantages:
Some head-to-head traffic conflict could occur between taxing aircraft on the south and north ramps.

EXHIBIT 5-17: Apron/Tie-Downs Option 3



Source: Woolpert, 2008.

Fencing

Recommendation
Plan for at least six foot perimeter fence, increase height to 10 feet for wildlife control.

TYQ has minor fencing for safety and security near the terminal that separates airside from landside. Although perimeter fencing is not a Federal requirement, fencing the airport would help control entry by the general public and by wildlife. Wildlife fencing is recommended at 10 feet high so it is less likely to be jumped by deer, while an additional portion should be buried to minimize animals burrowing under if warranted by the FAA.

Public Road Access

Recommendations
Monitor other transportation planning to ensure compatibility with the airport.

As a corporate class reliever airport, TYQ is capable of attracting users from across the market area. As urban sprawl continues to move north of I-465, congestion will build around the interchange along SR 421 and SR 32 as development occurs, both of which carry significant north-south and east-west traffic through Boone and Hamilton Counties. As improvements are made to SR 32 from I-65 to I-69, it will increase the accessibility of the airport to users from the east, including portions of Hamilton County. As this happens, the airport should monitor other transportation planning to ensure its compatibility with the airport.

Auto Parking and Fueling

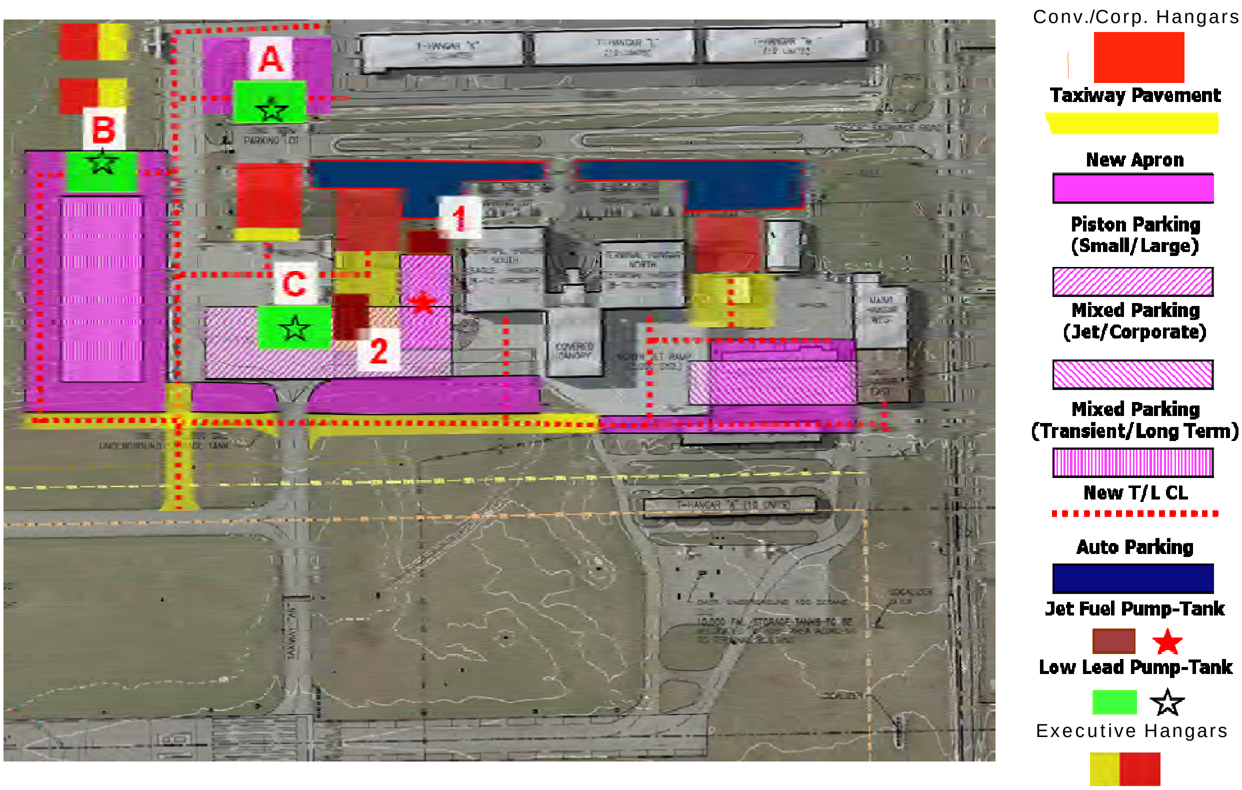
Recommendations
Add additional auto parking now to meet current demand, with future increases as demand warrants. Relocate 100LL AvGas fuel pumps out of RPZ and relocate 100LL AvGas fuel tanks if warranted. Relocate jet fuel pumps to allow for additional aircraft movement area. Allow for fill of Jet Fuel tanks from outside of airport operations area if financially feasible.

According to Chapter 4, Facilities Requirements, 105 vehicle parking spaces are needed for terminal and hangar customers and 38 are needed for employees, for a total of 143 spaces over the planning period. There is a current need for approximately 20 additional parking spaces to accommodate existing demand.

The fueling capacity currently at the airport will meet the forecasted requirements; however, the 100LL AvGas fuel tank is in the RPZ and needs to be relocated. The desired access fill point for the tanks would be somewhere outside the airport operations area.

The parking options studied are shown in blue on **Exhibit 5-18**. The fuel location options for the AvGas are shown as A, B, and C, while the jet fuel location options are shown as 1 and 2.

EXHIBIT 5-18: Auto Parking/Fueling Options



Source: Woolpert, 2008.

AVGAS

<u>Option A:</u>

Advantages:

This option generally follows the guiding principles and is closer to the hangar facilities of the majority of the aircraft users than the other options. (See Exhibit 5-18.)

Disadvantages:
This option is further away from the current terminal and less visible to transient aircraft users.

Option B:
Advantages:
This option is closer to the existing apron and more visible by transient users than other options. (See Exhibit 5-18.)

Disadvantages:
This option restricts the use of new apron parking as it takes up more of the proposed apron space.

Option C:
Advantages:
This option is the closest to the existing apron and terminal facilities making it easily identifiable by transients. (See Exhibit 5-18.)

Disadvantages:
This option places the facility in the middle of an apron expansion area.

JET FUEL

Option 1:

Advantages:
This option puts the pumps close to the existing tanks and outside of the area of existing apron parking. (See Exhibit 5-18.)

Disadvantages:
This option may require the relocation of an electrical vault facility.

Option 2:

Advantages:
This option puts the pumps close to the existing tanks. (See Exhibit 5-18.)

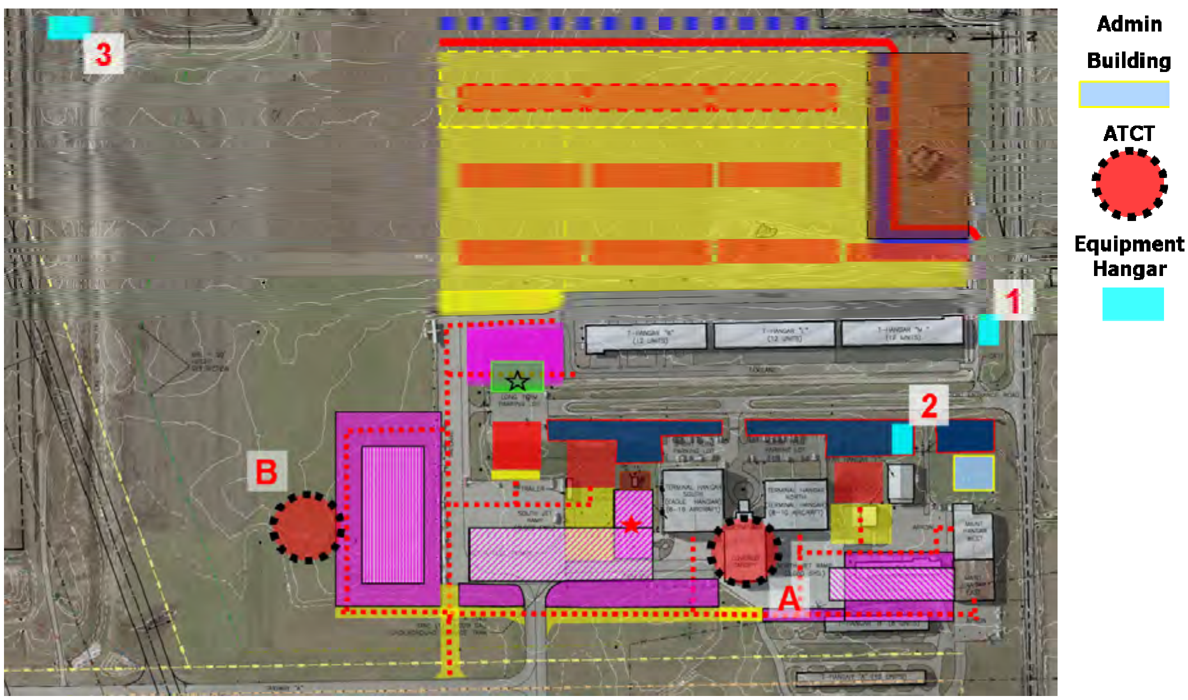
Advantages:
This option puts the pumps in the middle of the apron parking and aircraft movement areas and locates it farthest away from the T-hangars.

Other Terminal Area Structures

Recommendation
Reserve space for an administrative building.
Reserve space for an equipment hangar.
Reserve space for long-term ATCT development, if warranted.

An airport administration building, equipment hangar, and air traffic control tower (ATCT) are also desirable additions to the terminal area of a corporate class airport. **Exhibit 5-19** shows three options (1, 2, 3) for the location of the equipment hangar, two options (A, B) for the ATCT, and one location for the administration building.

EXHIBIT 5-19: Other Terminal Area Structures Options



Source: Woolpert, 2008.

ADMINISTRATIVE BUILDING AND EQUIPMENT HANGAR

The airport provides a wide variety of services to ensure that airport tenants and users have a safe, efficient, and reliable environment. The facilities needed to support these services include administrative offices; buildings for storage and maintenance of equipment; snow removal equipment storage; shop space; and buildings for supply storage. Space should be reserved for an administrative building and an equipment hangar that provides the most efficient operations without conflicting with traffic in the terminal area.

ATCT

An ATCT is desired for TYQ if future demand warrants it. The FAA has criteria for establishing an ATCT. From 1951 to 1974, the minimum qualifying level was 50,000 annual itinerant operations at a general aviation airport. However, in 1975 the criteria were revised to incorporate benefit-cost analysis that considers collision and accident risk, reduction in flying time, mix of aircraft types, percentage of passengers injured and percent of aircraft damaged.

The general qualifications to become a candidate site for an ATCT are published in *FAR Part 170 Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigational Facilities* and include:

- the airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the *Airport and Airway Improvement Act of 1982*;
- the airport must be part of the National Plan of Integrated Airport Systems;
- the airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the control tower investment;
- the FAA must be furnished appropriate land without cost for construction of the control tower; and
- the airport must meet the benefit-cost ratio criteria utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility.

The computation methodology is outlined in the FAA report *Establishment and Discontinuance Criteria for Air Traffic Control Towers (Report No. FAA-APO-90-7)*. Site specific forecasts are used to assign dollar values to three types of estimated ATCT benefits from:

- prevented collisions between aircraft
- other prevented accidents
- reduced flying time

The results of the benefit calculations are compared to the tower establishment costs of:

- annual operating costs -- staffing, equipment, supplies and lease service, and
- investment costs -- facilities, equipment and operational start-up.

An airport is not guaranteed to receive a control tower even if the airport meets all of the criteria listed above. The FAA can also elect to establish a contract tower, which is in effect a cost sharing program with the sponsor. Contract towers generally have a lower operating cost due to increased flexibility in scheduling and other factors that are not feasible with FAA staff.

To allow the airport operator the flexibility to establish one when warranted, a potential site to be reserved for a future ATCT has been identified. The controllers need to be able to see all of the movement areas on the airfield – the runways and taxiways. To provide the best line-of-sight to these facilities, ideally the ATCT should be located close to the intersection of the runways. A potential site was identified based on the recommended primary runways extensions and future crosswind runway. This site has not been evaluated for full FAA design criteria to determine the required tower height, but is shown to reserve a location and guide future ALP development and decrease potential conflicts in that area. FAA will perform the ultimate future site study and final determination if warranted.

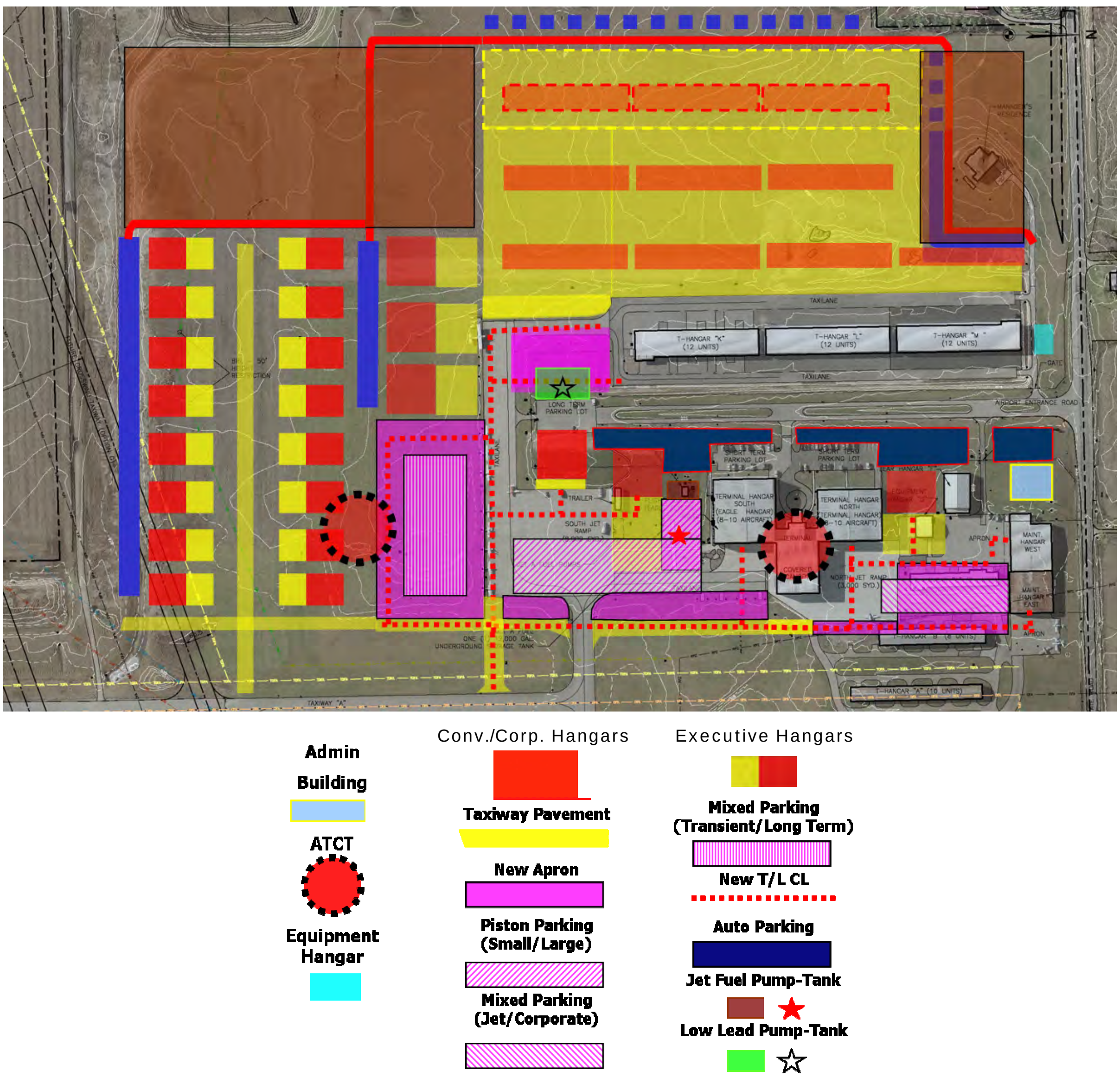
Terminal Area Alternatives Summary

Exhibit 5-20 and the list below represent a compilation of all the previous recommendations in the terminal area.

- Build out T-hangar area to the west of the terminal area as demand warrants maximizing full terminal area development potential.
- Build corporate hangars to the south of the terminal area as demand warrants.
- Build out the existing terminal area with conventional hangars to maximize its capacity.
- Build stand alone corporate hangars as demand warrants using existing infrastructure first and minimizing additional future infrastructure required to access buildings while reserving flexibility for future development of T-hangar and terminal area.
- Increase apron area/tie-downs as demand warrants in a way that maximizes flexibility of parking configurations at different locations by aircraft size for optimal terminal access.
- Add additional auto parking now to meet current demand, with future increases as demand warrants.
- Relocate 100LL AvGas fuel pumps out of RPZ and relocate 100LL AvGas fuel tanks if warranted.

- Relocate jet fuel pumps to allow for additional aircraft movement area.
- Allow for fill of Jet Fuel tanks from outside of airport operations area if financially feasible.
- Reserve space for an administrative building.
- Reserve space for an equipment hangar.
- Reserve space for long-term ATCT development, if warranted.

EXHIBIT 5-20: Complete Airside/Landside Recommendation



Source: Woolpert, 2008.

ALTERNATIVES SUMMARY

Because TYQ is a premier corporate class airport, it should provide facilities to attract users from across the market area and spectrum. Construction of a 1,500 extension to Runway 18-36 (Phase 1) with and additional 700 ft. extension (Phase 2) is the preferred alternative to accommodate 100% of aircraft less than 60,000 lbs. at a capacity that exceeds 60% useful load. A 4,000 ft. X 75 ft. crosswind runway (Phase 1) in a 7-25 orientation with an additional 25 ft width (Phase 2) is the preferred alternative to accommodate 100% of small airplanes with less than 10 passengers. This runway should be located far enough south of the terminal area not to impact the long term potential for terminal development. (See **Exhibit 5-21** for the preferred primary and crosswind runway alternatives.)

It also recommended that improved instrument approaches be sought for all runways to take advantage of the increasing capabilities of GPS/WAAS enabled LPV approaches. Additionally, removal of the glider runway is recommended.

To accommodate airport users, additional hangar development is anticipated over the planning period as demand warrants. Additional T-hangars are recommended to the west of the current terminal area while individual stand-alone corporate hangars are recommended to the south of the terminal area. Building out the existing terminal area with conventional corporate hangars is also recommended as is additional apron and tie-down area as demand warrants. (See **Exhibit 5-22** for the preferred terminal area alternative.)

With proposed intersecting runways, two potential sites have been identified to accommodate an ATCT when warranted, which is anticipated to be beyond the planning period. In addition to identifying new development, projects to preserve the existing facilities should also be undertaken. There is a current shortage of auto parking, so additional parking is recommended immediately to meet existing demand with further expansion as increased demand warrants. Relocation of the AvGas fuel pumps out of the RPZ is recommended. Additionally, relocation of the jet fuel pumps would provide for additional aircraft movement area. Perimeter fencing for safety, security, and wildlife control is also a desirable addition for TYQ.

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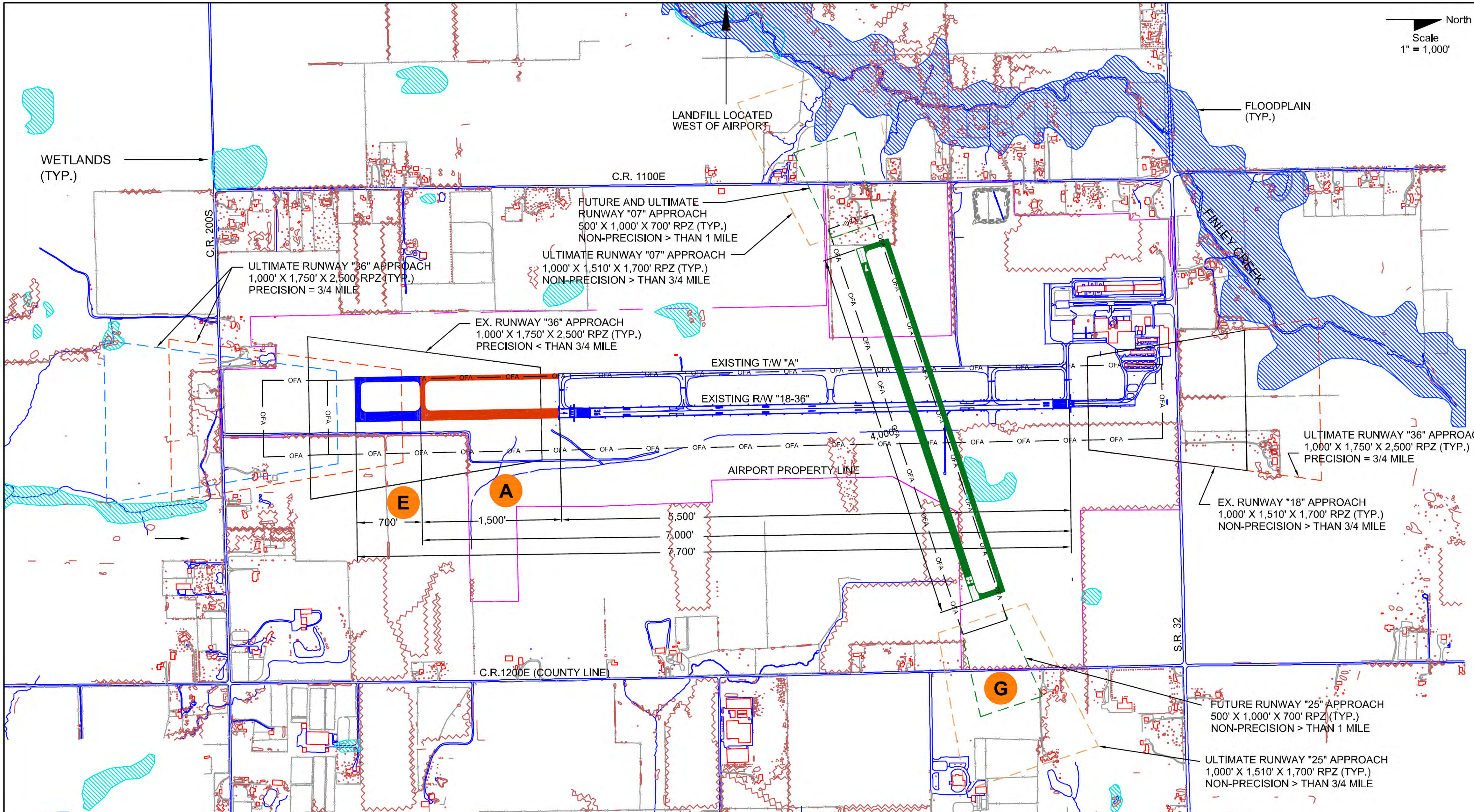

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EXHIBIT 5-21
PREFERRED ALTERNATIVES

Indianapolis Executive Airport
Zionsville, Indiana

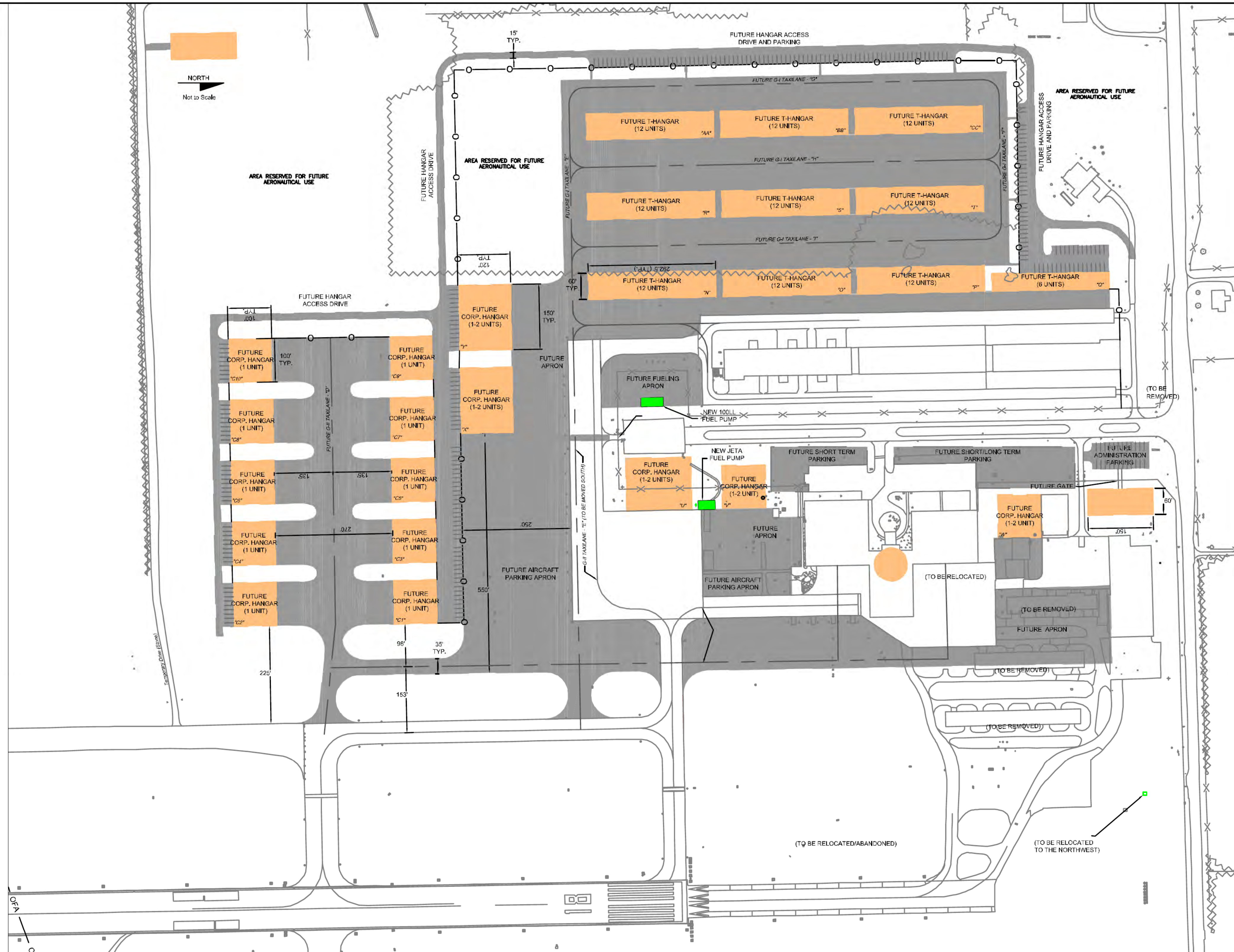

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EXHIBIT 5-22
PREFERRED ALTERNATIVES

Indianapolis Executive Airport
Zionsville, Indiana