

CHAPTER FIVE

Airport Alternatives Analysis

GENERAL

The primary objective of this chapter is to identify an overall development plan for Herlong Airport (HEG) to meet the Airport's long-term aviation needs. In Chapters 3 and 4, landside and airside facilities were determined over the twenty-year planning period based upon forecast demand. Thus, the next step in the master planning process was to evaluate potential alternative concepts to address this demand. Since the combination of possible concepts is limitless, intuitive judgment was applied to identify those concepts that have the greatest potential for implementation. These choices provide the underlying rationale for the preferred recommendation. Implementation of the selected concepts is defined in subsequent chapters.

DEVELOPMENT CONSIDERATIONS

Prior to determining ultimate development, various airside, landside, terminal area and general airport requirements were identified in Chapter 4, *Airfield Demand/Capacity Analysis & Facility Requirements*. The evaluation criteria for each of these requirements varies based upon the particular functional area. In general, similar criteria were used to measure the effectiveness and the feasibility of the various growth options available. Criteria used in the concepts review and evaluation process are grouped into four general categories. These include:

- Operational Performance – Any selected development concept should be capable of meeting the Airport's facility needs (capacity, capability and efficiency) as they have been identified for the planning period. Further, preferred options should resolve any existing or future deficiencies as they relate to Federal Aviation Administration (FAA) design and safety criteria.
- Environmental – Airport growth and expansion has the potential to impact the Airport's environs. The selected plan should seek to minimize impacts in the areas outside the Airport's

boundaries. Concepts should also seek to obtain a reasonable balance between expansion needs and off-site acquisition and relocation needs. The preferred development plan should also recognize sensitive environmental features that may be impacted by the concepts evaluated herein.

- Cost – Some concepts may result in excessive costs as a result of expansive construction, acquisition, or other development requirements. In order for a preferred concept to best serve the Airport and the community, it must satisfy development needs at reasonable costs.
- Feasibility – The selected concepts should be capable of being implemented. Therefore, they must be acceptable to the FAA, Florida Department of Transportation (FDOT), Jacksonville Aviation Authority (JAA), and the community served by the Airport. The preferred development options should proceed along a path that supports the area’s long-term economic development and diversification objectives.

Using the evaluation criteria, each proposed concept was evaluated based upon anticipated long-term planning goals and development needs. Proposed development concepts were presented in separate but interrelated functional areas of the Airport. These are:

- Airfield Development
- Land Use/Land Acquisition
- Landside Facilities – Building Areas
- Landside Facilities – Support Facilities and Surface Access

Functional areas were further subdivided into primary and secondary elements. Primary elements typically consist of large areas of land, and, therefore, the airfield configuration represents the primary element within this study. Secondary elements, such as terminal area, general aviation, and access and support facilities were evaluated both individually and collectively to ensure the orderly evolution of a final master plan concept that is functional, efficient, cost effective, and compatible with the environment.

Based upon each respective concept analysis and comments received from Airport management, JAA Staff, the Technical Advisory Committee, City of Jacksonville Planning and the public, a recommended development concept was developed which forms the basis of the Airport Layout Plan (ALP) Drawing set.

City of Jacksonville Planning and Development

Proposed airfield and landside alternatives at HEG considered the policies and objectives outlined in the City of Jacksonville (COJ) 2010 Comprehensive Plan with regard to land development around civilian airports and to a limited extent transportation concurrency. Florida Growth Management Laws, specifically Chapter 2005-290, defines Capital Improvement requirements in relation to the COJ Plan and Florida Department of Transportation Comprehensive Plan. Land Development around Civilian Airports and Airfields and a portion of the Florida Growth Management Law, Chapter 2005-290, related to aviation facilities are provided in Appendix G of this report.

As required by Chapter 2005-290, members of the Jacksonville Metropolitan Planning Organization, who participated on the Project Technical Advisory Committee (TAC), were involved in the planning and programming of transportation facilities at the airport. Thus, proposed development as outlined within the Airport Master Plan Update was provided to the COJ Planning Department for inclusion into the long-range transportation plan. As a result, the long-range transportation plan should include both long and short-range strategies which comply with state and federal requirements. The purpose of the long-term transportation plan is to preserve the existing transportation structure as well as improve mobility.

The long-range plan also assessed capital investment and other measures necessary to enhance or make more efficient the use of existing transportation corridors. Thus, based upon coordination with the TAC, transportation concurrency to a limited degree was considered with regard to proposed landside development on the airport. Transportation concurrency considers the impact of proposed aviation development on local roads to determine if sufficient capacity is or will be available. Detailed project trip generation and roadway capacity determinations were not part of the scope of this project; therefore, it is recommended that detailed trip generation information be provided as part of future landside design development.

Previous Master Plan

In the process of evaluating potential airfield development, the previous Master Plan Update was reviewed to identify trends and issues, which may impact future development at the Airport. An evaluation of the previous demand capacity analysis revealed that HEG will not reach the 60 percent capacity threshold until beyond the original planning period, approximately 2020. This capacity assessment was verified during the current master plan analysis, and revealed that HEG will not exceed its capacity based upon annual service volume (ASV) until after 2025.

Based upon facility requirements identified in the previous 1992 and 2000 Master Plan Updates, the

following on-airport development was identified:

- T-Hangar Development (1992 and 2000 MPU)
- Bulk Storage Hangar Development (1992 and 2000 MPU)
- Retention/Detention Basin Construction (1992 MPU)
- Vehicular Road Construction and Entrance Road Realignment (1992 and 2000 MPU)
- Apron Expansion (1992 and 2000 MPU)
- Industrial Park Development (1992 MPU)
- ILS Installation (1992 and 2000 MPU)
- Runway 7 extension of 1,400 feet (1992 and 2000 MPU)
- Parallel runway 7R-25L (3,100 x 75 feet) (1992 MPU)
- General Aviation Facility Development (1992 and 2000 MPU)
- Turf Runway Development (2000 MPU)
- Install Fencing (2000 MPU)
- Residential Fly-In Community Development (2000 MPU)
- Renovate Terminal Building (2000 MPU)
- Upgrade Airfield Lighting (1992 and 2000 MPU)
- Construct Taxiways E, F, G and K (2000 MPU)

A number of the previous short and mid-term goals as outlined in the previous two master plans have been implemented including T-hangar development, bulk hangar construction, construction of a central/detention basin, terminal rehabilitation, fencing, and upgrades to airport lighting. Consideration was given to these concepts as part of this master plan analysis in order to limit the number of potential options as well as address existing and future demand requirements.

Since its transfer to JAA, HEG has remained a general aviation reliever and recreation airport even after the conversion of Cecil Field from a military to public use facility within the Jacksonville Aviation Authority System. As a result of the dynamics between the airports (Jacksonville International, Craig, Herlong and Cecil Field Airports) within the JAA System, an airport improvement strategy was developed to include an evaluation of several preliminary concepts. This development strategy was used to identify ultimate runway lengths, future airfield development and revenue generation options.

PREFERRED CONCEPT SUMMARY

The preferred aviation development concept for HEG was created through discussions with the Airport Sponsor, the Airport Technical Advisory Committee, including the COJ Planning Department, and the

general public through a qualitative and quantitative assessment process. For each development area, several alternatives were conceptualized and further analyzed using an evaluation scoring matrix. The evaluation scores afford the most measurable assessment of each concept and highlight deficits/surpluses in providing for future demand.

The preferred development concept combines options identified in Airfield Concept III, North GA Concepts II and III, Mid-Field Concept II, the East and West Commerce Park and South Development Concept I. Based upon existing and forecast market demand, this combination of concepts is anticipated to ensure that on-airport land use will be served by development likely to augment forecast demand. The preferred concept proposes a 2,000 foot turf runway and an extension to Runway 7. Alternative III provides JAA the flexibility to provide a 500-foot or 600-foot extension due to potential costs associated with runway lighting relocation. Either option will increase the total usable runway length as well as provide overrun pavement beyond each threshold. The runway stopways provide an additional measure of safety, and are recommended as a direct result of both TAC and Public input. The recommended development concept also proposes several taxiway improvements to provide access to underutilized portions of the airfield as well as incorporates a new precision LPV instrument approach to both Runways 7 and 25, thus increasing approach and visibility minimums.

The preferred North GA Concept addresses the need for variable hangar space to accommodate both large and small aircraft through the construction of T-hangar, conventional and corporate hangar space as well as provides areas adjacent to Normandy Boulevard for non-aviation development. Further, both the South Development Industrial Park and East Commerce Park propose a combination of compatible non-aviation and aviation related development in order to buffer the airport from encroaching residential neighborhoods while providing additional sources of revenue diversification and generation for the airport. Finally, the Midfield Concept II provides JAA the flexibility to address hangar storage needs related to anticipated corporate and GA traffic. The Mid-Field Concept also envisions the development of a new FBO/Maintenance facility supported by a new aircraft parking apron.

DEVELOPMENT CONCEPTS

Runway Length Analysis

The runway is the principal facility of an airfield as it serves as the primary method for aircraft to access airfield facilities. It is vital to ensure that the runway has the proper length, width and strength to safely accommodate aircraft expected to operate on it. In this section, the existing runway length was

evaluated to determine if the runway could safely accommodate both existing and future critical aircraft requirements.

The existing runway lengths at HEG are: 7-25 (4,000 feet) and 11-29 (3,900 feet). Runway length and width requirements are presented in **FAA AC 150/5300-13, Change 10, Airport Design**. These design standards are based upon a critical aircraft's approach speed, wingspan and the approach minimum for that runway. Based upon discussions with management, an ARC B-II group aircraft (i.e. King Air 90, Citation Jet I and Dassault Falcon 20) represents the most demanding aircraft (e.g. "critical aircraft") currently using the airport. However, HEG is used on a limited basis by ARC Group C-II aircraft, including Learjet 60 and Citation X aircraft, which, at the time of this writing account for approximately 260 annual operations. Based upon forecast data, operations by C-I and II ARC Group aircraft are projected to increase to more than 610 by 2010 and over 3,000 by the year 2025. However, if the use of VLJs is higher than expected, it is anticipated that the number of C-I and C-II aircraft could increase exponentially. For this reason, the critical aircraft used for this analysis was a C-II.1 The forecast demand of over 500 total annual operations supports the master plan's recommendation for a longer runway at HEG. Therefore, the master plan recommends the critical aircraft be changed to a C-II.

The runway length analysis was conducted in accordance with the guidelines provided in FAA AC 150/5325-4A, FAA Airport Design Software (Version 4.2D), and the manufacturer's airplane characteristics manuals. These calculations take into account variable conditions including airport elevation, mean temperature, stage length and runway gradient. The runway length determination also accounts for critical aircraft data such as payload, landing and takeoff weight.

Runway length requirements were initially calculated for the critical class aircraft using FAA AC 150/5325-4A and the FAA's Airport Design Software. Use of this analysis provides a general picture of runway length for various groups of aircraft and provides a starting point for the review. This initial analysis was based on the following assumptions specific to HEG which are shown in **Table 5-1**.

¹ Existing demand is based upon discussion with the local FBO and letters received from interested users requesting a longer runway. Currently, some C-I and C-II aircraft (primarily the Citation X, Falcon 900 and some Learjets which account for approximately 260 annual operations) fly to and from HEG using take-off weight restrictions. Letters from interested parties are included in Appendix F of this report.

TABLE 5-1
AIRPORT DATA

Airport Elevation	87 Feet
Mean Daily Maximum Temperature of the Hottest Month	97.1° F
Maximum Difference in Runway Centerline Elevation	6 feet
Average Length of Haul	1,000 Miles
Runway Conditions	Wet & Slippery
<i>Source: The LPA Group, Incorporated, 2006</i>	

For this analysis, it assumed that the existing fleet changes from B-II (i.e. King Air 90) to C-II (i.e. Citation X) and that the average stage length is 1,000 miles. This data was used to calculate the recommended runway lengths using the FAA Software. These results are displayed in **Table 5-2**.

Aircraft Description	Required Takeoff Length
Small airplanes with approach speeds of less than 30 knots	300 feet
Small airplanes with approach speeds of less than 50 knots	810 feet
Small airplanes with less than 10 seats:	
75 percent of these small aircraft	2,600 feet
95 percent of these small aircraft	3,180 feet
100 percent of these small aircraft	3,760 feet
Small airplanes with more than 10 seats	4,440 feet
Large airplanes of 60,000 pounds or less:	
75 percent of these large airplanes at 60 percent useful load	5,470 feet
75 percent of these large airplanes at 90 percent useful load	7,350 feet
100 percent of these large airplanes at 60 percent useful load	5,830 feet
100 percent of these large airplanes at 90 percent useful load	9,460 feet
Airplanes of more than 60,000 pounds	Approximately 5,990 feet
<i>Source: FAA Airport Design Software, Version 4.2D, 2005</i>	

The runway lengths were calculated using the FAA Airport Design Software, Version 4.2D; however, this only provides a rough estimate commonly used for long-term planning purposes. Based upon the data provided in **Table 5-2**, a runway length of at least 4,440 feet should be provided. However, it should be noted that these calculated runway lengths are often shorter than designated manufacturer and insurance company requirements. In order to obtain a more accurate runway length requirement, the FAA recommends in **AC 150/5325-4A** that individual length analyses be conducted for critical aircraft operating at the airport.

As a result, the critical runway length was obtained from manufacturer specifications. Using a number of variables, such as temperature, airfield elevation, and aircraft load characteristics, the aircraft specification manuals provide more realistic and accurate runway length requirements based upon aircraft demand.

Table 5-3 lists the group of critical aircraft that operate or is expected to operate at HEG and the manufacturer's recommended runway length requirements. The recommended runway length requirements data is for aircraft at Maximum Takeoff Weight (MTW), at sea level and with standard ISA temperature (59° F). The runway lengths given by the manufacturer are then adjusted to the airport elevation and temperature at HEG.

Airport Elevation Adjustment

The runway length was adjusted to consider the effect of airport elevation on aircraft performance - the higher the airport elevation, the less dense the air. This lack of density requires additional runway length to obtain more speed. As a result, the runway length was adjusted by a rate of 1 percent per 984 feet above sea level. The airport elevation at HEG is 87 feet MSL; therefore the runway length was increased by 0.08 percent.

Temperature Adjustment

The runway length requirement was also adjusted to consider the impact of temperature on the aircraft performance. Higher temperatures have an adverse effect on aircraft performance, especially jet turbine aircraft. Jet engines rely on the difference in temperature inside and outside the engine to produce thrust. Therefore, as the temperature outside increases, the engine becomes less efficient and requires additional runway length to build the necessary thrust to become airborne. The required runway length was adjusted for temperature by a rate of 1 percent for every 1 degree Celsius. The mean temperature during the hottest month at HEG is 91.7° F or 36.16° Celsius, while ISA temperature at sea level is 59° F or 15°C. This is a difference of 32.7° F or 21.16° C. This difference resulted in a runway length increase of 21.16 percent.

Pavement Conditions

Finally, the runway length was calculated assuming that the runway is wet. Wet runway conditions also require more runway length. The required runway length is derived by applying a 15 percent increase to the previously calculated runway length requirements. The results of these calculations are depicted in **Table 5-3**.

**TABLE 5-3
RUNWAY LENGTH CALCULATION FOR EXISTING AND POTENTIAL AIRCRAFT AT HEG**

Aircraft	MTW (lbs.) ¹	Manufacturer's Runway Length Recommendation ²	Calculated Runway Length Requirement ³	Wet Runway Length Requirement ⁴
*Beech Jet 400	16,100	4,169	5,054	5,813
*King Air 90	10,100	2,625	3,435	3,950
Falcon 10	18,740	4,450	5,395	6,204
Learjet 28/29	18,740	4,075	4,941	5,682
Learjet 24	13,500	4,300	5,213	5,995
Learjet 25	15,000	5,118	6,205	7,136
*Learjet 31A	16,500	3,280	3,977	4,573
Premier Jet	12,500	3,792	4,597	5,287
*Citation Jet (CJ1/CJ2)	10,400	3,080	3,734	4,294
Citation Excel	18,700	3,414	4,139	4,760
*Citation II	13,500	2,990	3,625	4,169
Citation Ultra	16,300	3,180	3,855	4,434
Jetstream 31	16,204	4,350	5,274	6,065
TBM 850	7,394	2,840	3,443	3,960
SJ30-2	13,500	3,515	4,262	4,901

*Denotes aircraft currently using HEG

Data of Aircraft Manufacturer Runway Length Recommendation comes from the aircraft manufacturer's website and published manuals.

¹ Maximum Allowable Takeoff Weight (MTW) comes from the manufacturer's website or published manuals.

² The recommended runway length is for aircraft at MTW at standard ISA, at sea level.

³ Runway length was determined by adjusting the manufacturer's recommended runway length for the elevation (increased by 0.08%) and temperature (21.16%) at HEG.

⁴ Wet runway length was calculated by applying a 15% increase to the calculated runway length

Source: Aircraft Manufacturer runway length requirements and The LPA Group, Incorporated, 2006

Currently the longest available runway at HEG has a length of 4,000 feet (Runway 7-25). At this length, only 35.7 percent of the listed aircraft can takeoff at maximum takeoff weight (MTW) under dry runway conditions, while only the TBM 850 can takeoff at MTW during wet runway conditions. Extending the runway an additional 500 to 600 feet, providing a length of 4,500 to 4,600 feet, would increase the percentage of aircraft that can takeoff at MTW under dry runway conditions to 50 percent and increase the percentage to 28.5 percent under wet runway conditions. Extending the runway to 5,000 feet would increase the percentage to 64.2 percent under dry runway conditions and 50 percent under wet runway conditions. Both extensions would constitute an increase in the operational capacity for the aircraft operating at the airfield. It is important to note that an environmental assessment (EA) may or may not be triggered by the extension since an EA is typically triggered by potential environmental impacts such

as wetland, noise, air quality, etc. It is the consultant's opinion that a short form EA should allow FAA to issue a FONSI for this project. The Master Plan Update recommends an extension to 4,500 feet. However, JAA should continue to analyze the increased operational capacity and additional safety margin provided by a 1,000 foot extension to serve the increasing demands of C-I and C-II aircraft as part of the design development prior to construction. JAA should also analyze the cost of upgrading the runway lighting systems as a part of the extension project.

Instrument Approach Analysis

The Airport is located in a one-mile "cut-out" of Cecil Field Class D airspace and is surrounded by the Class D airspace associated with NAS Jacksonville to the east and Naval Outlying Field (NOLF) Whitehouse to the northwest as well as the Class C airspace of Jacksonville International Airport to the North. In addition, a significant amount of military training occurs within the special use airspace (SUA) surrounding HEG. Special use airspace areas include: Alert Areas, Military Operating Areas (MOAs), and Restricted Areas (RAs), which are located east, north and west of HEG. The special use airspace areas typically have a high volume of rotary and high-speed fixed wing activities and can have ceilings as high as 17,500 feet.

As part of the concepts analysis, the installation of a precision approach to either Runway 7 or 25 was considered. Currently, Runway 25 is designated as a non-precision instrument approach, and Runways 7, 11 and 29 are designated as visual only.

Air Traffic Control

HEG is surrounded by a combination of military and civilian airspace. There is no Air Traffic Control Tower (ATCT) at HEG; therefore, the airspace is categorized as Class E (uncontrolled) with floor of 700 feet MSL and extending upwards to 18,000 feet MSL. However, HEG is surrounded by Class D and C airspace due to its proximity to the Whitehouse NOLF, Jacksonville NAS and Mayport NAS, as well as Jacksonville International Airport and Cecil Field. As a result, contact with Jacksonville Air Traffic Control is required to transit through Class C airspace associated with JIA and recommended during approach and departure procedures to HEG. In addition, aircraft transitioning through Class D airspace associated with Cecil Field, NAS Jacksonville and NOLF Whitehouse must also contact ATC prior to entering the terminal airspace.

It is anticipated that providing an ATCT facility at HEG would improve the hourly capacity of the airport while increasing safety due to the variety of aircraft operations that occur at the Airport. However, the cost of an ATCT is significant and recreational users do not desire an ATCT. An analysis of Air Traffic Control requirements is discussed in further detail within the Airport Support Facilities

section of this report.

GA Security Requirements

In the aftermath of the September 11, 2001 attacks, airport security came under intense scrutiny. Historically, GA airports have not been high-security facilities, and federal and state governments have not, to date, regulated GA airport security as it has done with commercial service airports. However, the main terrorist threat against GA and GA airports is considered the possible theft or hijacking of aircraft for use as potential terrorist weapons.

In May 2004, a report entitled, "Recommended Security Guidelines related to General Aviation Airports" was developed by State Aviation Officials from the continental United States, Puerto Rico and Guam. The report provides advice, recommendations and guidance to federal authorities for developing a national policy as well as appropriate standards of airport security for public-use general aviation airports. As a result, the FDOT in conjunction with the FAA is recommending the following best practices at general aviation airports throughout the State. These include:

- Prepare a comprehensive airport security plan which would be subject to periodic review and approval by the TSA and FDOT.
- Install adequate outdoor area lighting to help improve the security of (a) aircraft parking and hangar areas, (b) fuel storage areas, and (c) access points to the aircraft operations area.
- Institute criminal record background checks for all airport, fixed base operator (FBO) and airport tenant employees with access to the aircraft operations area (AOA). Criteria similar to that used in FAR Part 107 should be developed to determine what offenses would disqualify individuals from being granted access.
- Install security fencing to help prevent unauthorized access to the aircraft operations area, fuel facilities, and other sensitive areas.
- Install signage around the AOA, fuel facilities, and other sensitive areas to deter unauthorized entry.

Security related projects are eligible for GA Entitlement funding and limited state funding. However, GA security projects are ranked low and, therefore, have no priority for discretionary funding at this time. Therefore, the ability of the large majority of GA airports to implement the various recommendations will be contingent upon the provision of extensive financial assistance from federal, state, and local governments.

AIRFIELD CONCEPTS

Airfield facilities are, by their very nature, a focal point of an airport complex. Because of their role and the fact that they physically dominate a large portion of Airport's property, airfield facility needs are often the most critical factor in the determination of viable airport development concepts. In particular, the runway system requires the greatest commitment of land area and is often the greatest influence on the identification and development of other airport facilities

Furthermore, the runway and taxiway system directly affects the efficiency of aircraft movements, both on the ground and in the surrounding airspace. The runway and taxiway system also limits the ability of an airport to handle certain aircraft, which directly affects the types of air service an airport can offer or accommodate. Finally, the efficiency of aircraft movement is affected by local approach and departure procedures, which are influenced by local restrictions associated with noise, airspace congestion, and other considerations.

The objective of the airfield concepts section of this chapter is to derive concepts to address airfield deficiencies identified in the previous chapters and to provide the necessary facilities to meet the forecast demand over the 20-year planning period.

One of the key issues identified is the runway length deficiency. The longest runway length available at the airfield is 4,000 feet. However, an analysis of existing aircraft use indicates that several larger and heavier aircraft operate with a weight restriction (i.e. Citation Jet and Learjet), which limits their use at the Airport. The forecast indicates that operations by these aircraft will increase from 260 annual operations to over 900 during the twenty-year planning period. From the list of aircraft provided in **Table 5-2**, it was determined of these types of aircraft that only 35.7 percent can takeoff at maximum takeoff weight under dry runway conditions and only one aircraft under wet runway conditions at the current runway length of 4,000 feet. However, if the runway length is increased to at least 4,500 feet, then these percentages increase to 57.1 percent and 35.7 percent during dry and wet conditions, respectively. Therefore, the airfield concepts analysis considered development to increase runway length.

Runway 7-25 is the primary runway at HEG. Not only is this runway the longest on the airfield, it also has wind coverage over the 85 percent required by the FAA. Because of this, it is the primary candidate for the runway extension. In addition to variations of an extension to an existing runway, construction of a new runway based upon varying orientations was also considered. However, the construction of a new runway concept was abandoned due to cost, environmental issues and wind coverage.

Airfield Concept 1 (No Build/Limited Development)

Concept 1 was developed to show the most cost-conscious and efficient usage of existing airfield facilities. Only minor improvements to safety and capacity were chosen. Projects that were costly, created major changes to existing airfield configurations, had potential environmental impacts, or required land acquisition were eliminated from further consideration.

Projects associated with the “Limited Development” Concept included:

- Closed Runways pavement removal
- Taxiways (Closed runways) pavement overlay and repair
- Taxiways (Closed runways) marking and lighting
- Runway 7-25 Pavement Maintenance and Overlay
- Runway 7-25 Marking Removal and Remarketing
- Runway 11-29 Pavement Maintenance and Overlay
- Runway 11-29 Marking Removal and Remarketing
- Overlay Taxiways C and D
- Pavement Condition Report
- Signage Plan and Airfield Signage System Improvements, and
- Non-Directional Beacon, AWOS and Electrical Vault Relocation

Both Runways 7-25 and 11-29 would remain unchanged and would require pavement maintenance, overlay and remarketing. However, this also means that the runway length deficiencies and required facilities to meet the future demand will not be addressed.

However, a number of projects including the rehabilitation of Runway 11-29 and the closed runways, the electrical vault relocation, and the pavement condition report costs will remain consistent throughout all three airfield concepts. Therefore, **Table 5-4** identifies projects which will remain consistent throughout the alternatives analysis, and **Table 5-5** identifies preliminary project costs associated with Airfield Concept 1 only. As a result, the estimated total magnitude costs for Airfield Concept 1 were estimated at \$9,697,452, which includes a 20 percent allowance for engineering, design and contingency fees.

In developing cost estimates, no land acquisition was included since no on or off-site development is planned. The following is an order of magnitude cost estimate in 2006 dollars:

TABLE 5-4 AIRFIELD COSTS ASSOCIATED WITH ALL THREE CONCEPTS PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Runway 11-29 Pavement Overlay and Rehabilitation	\$2,215,388
Runway 11-29 Marking Removal and Remarking	\$297,317
Closed Runways Pavement Removal	\$275,974
Taxiway Overlay and Repair (closed runways)	\$1,151,009
Install Marking and Lighting on South Taxiways (Closed Runways)	\$368,522
Pavement Condition Report	\$30,000
Electrical Vault Relocation	\$330,240
Design and Construct New Fuel Farm (2 Tanks)	\$500,000
Replace AWOS	\$200,000
Overlay Taxiways C & D	\$1,700,000
Estimated Development Cost¹	\$7,068,450
¹ Project Costs include 20% engineering, design and contingency fee	
Source: The LPA Group, Incorporated	

TABLE 5-5 AIRFIELD CONCEPT 1 ONLY PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Runway 7-25 Pavement Overlay and Rehabilitation	\$2,110,394
Runway 7-25 Marking Removal and Remarking	\$304,525
Signage Plan	\$19,400
Airfield Signage System Upgrades	\$194,683
Estimated Development Cost - Airfield Concept 1¹	\$2,629,002
¹ Project Costs include 20% engineering, design and contingency fee	
Source: The LPA Group, Incorporated	

A listing of key strengths and weaknesses associated with Airfield Concept 1 is shown below:

AIRFIELD CONCEPT 1	
“LIMITED DEVELOPMENT” SCENARIO	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Most cost efficient concept. 2. Limited impacts to existing facilities. 3. No environmental impacts or land acquisition required. 4. Provides improved airfield access to south airfield 	<ol style="list-style-type: none"> 1. Configuration accommodates only B-II aircraft. 2. Does not provide runway length to accommodate long-term demand 3. Does not eliminate the use of the grassy strip between Taxiway A and Runway 7-25 by Ultra light aircraft. 4. Does not provide facilities for larger aircraft 5. Does not meet forecast demand

Thus, a “Limited Action” concept in any of the functional areas identified would effectively limit future development at HEG to the existing airside configuration and thus would not accommodate forecast demand. Additional development, with the exception of tenant-funded projects, would be made over the 20-year planning period only when absolutely necessary.

Airfield Concept 2 (Constrained Development)

As recommended in **Table 5-3, Runway Length Calculation for Existing and Potential Aircraft at HEG**, extending Runway 7 by 500 feet to the south will provide the 4,500 foot length requirement. An extension to Runway 7-25 is the most feasible due to wind coverage and overall alignment. An extension to the Runway 7 threshold was chosen since it would have minimal impact to existing airfield facilities, would remain on existing airport property, and is anticipated to have minimal environmental impacts. Further, the associated Runway 7 protection zone and noise contours would also remain on airport property. Major projects associated with Concept 2 are outlined below and in **Figure 5-2, Airfield Concept 2**.

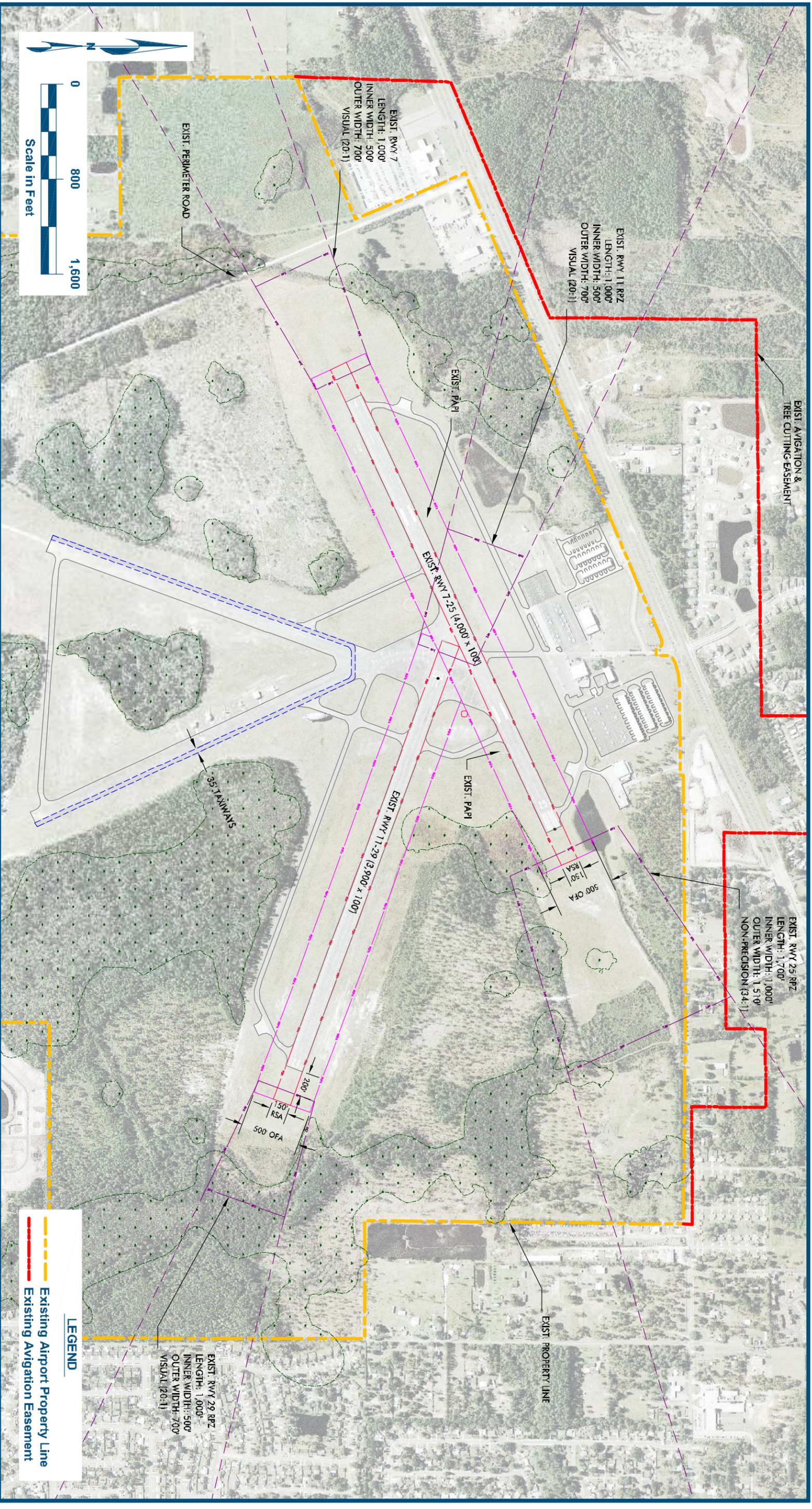


Figure 5-1

In addition to projects outlined in **Tables 5-6** and **5-7**, major projects associated with Airfield Concept 2 only include:

- Relocate Runway 7 threshold 500 feet west
- Extend Taxiway A 500 feet to the west
- Install ILS Approach to Runway 25 including airport lighting system
- Relocate PAPI on Runway 7
- Construct connector taxiway between Runway 7 and Taxiway A
- Perimeter road relocation
- Convert closed runways to 35 foot taxiways
- Pavement maintenance and overlay
- Remark Runway 7-25 for precision instrument approach
- Mark and install MITL on converted runways, and
- Upgrade lighting on Runway 7-25

According to the FAA AIP Project Eligibility documentation, **FAA Order 5090.3** and **Order 7031.2**, a GA airport is eligible for an ILS with appropriate airport lighting system if it is included in the NPIAS system and the runway meets or is forecast to have sustained turbojet operations within five (5) years or meets annual instrument approach criteria (i.e. wind coverage, obstructions, NAVAID siting requirements, etc.). However, according to **FAA Order 5090.3C**, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, **Table 3-1, Fundamental Airport Development**, the introduction of satellite navigation will be able to support instrument approaches to virtually all runway ends, dependent upon satellite signal availability. Thus, with the advent of the global positioning system, installation of ILSs is decreasing and must be strongly justified. Consequently, in order to provide the option for a precision instrument approach, a Lateral Performance with Vertical Guidance (LPV) approach could also be used for Runway 25 due to wind and existing traffic patterns. An LPV approach requires high intensity runway lighting and a MALSR to allow the approach visibility to decrease to less than 3/4 statute mile.

With the installation of a precision approach to Runway 7-25, the runway markings should be upgraded in conformance with **AC 150/5340-1J**, *Standards for Airport Markings*. Runway marking improvements include the installation of aircraft hold markings, touchdown zones and aiming points. As part of the precision approach system, a glide slope antenna would be installed to the south of Runway 25 and a localizer would be installed approximately 1,000 feet beyond the Runway 7 threshold. The Glide Slope Antenna (GS) is used to establish and maintain the aircraft's descent rate until visual contact confirms the runway alignment and location. As such, the GS antenna may be located on either

side of the runway but is recommended to be located on the side of the runway offering the least possibility of signal reflections from buildings, power lines, vehicles, aircraft, etc. The glide slope critical area, depending upon the system used, can range from 800 feet to 3,200 feet long by 100 feet to 200 feet wide. The critical areas associated with the existing and future precision instrument approach to Runway 25 are identified in **Figure 5-2, Airfield Concept 2**. In addition, the installation of a precision approach to Runway 25 will require the relocation and realignment of the airport perimeter road to minimize the impact to the localizer critical area. Further, the cost of an environmental assessment associated with the extension of Runway 7 was also considered as part of the development cost. Although environmental impacts likely to trigger an EA are not believed to be significant, this decision is beyond the scope of the consultant and, therefore, should be considered.

TABLE 5-6 AIRFIELD COSTS ASSOCIATED WITH ALL THREE CONCEPTS PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Runway 11-29 Pavement Overlay and Rehabilitation	\$2,215,388
Runway 11-29 Marking Removal and Remarketing	\$297,317
Closed Runways Pavement Removal	\$275,974
Taxiway Overlay and Repair (closed runways)	\$1,151,009
Install Marking and Lighting on South Taxiways (Closed Runways)	\$368,522
Pavement Condition Report	\$30,000
Electrical Vault Relocation	\$330,240
Design and Construct New Fuel Farm (2 Tanks)	\$500,000
Replace AWOS	\$200,000
Overlay Taxiways C & D	\$1,700,000
Estimated Development Cost¹	\$7,068,450
¹ Project Costs include 20% engineering, design and contingency fee	
Source: The LPA Group, Incorporated	

Land acquisition is limited to an aviation easement prior to the approach to Runway 25 to accommodate the precision approach. The existing use of this property is primarily commercial with a small amount of residential development (approximately three homeowners) according to the COJ Property Appraisers' Office. The estimated cost of **Table 5-7, Airfield Concept 2, Preliminary Order of Magnitude Cost Estimates** provide costs in 2006 dollars for the proposed development.

**TABLE 5-7
AIRFIELD CONCEPT 2 ONLY
PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES
IN 2006 DOLLARS**

Project Description	Estimated Cost
EA Runway 7-25 Extension	\$200,000
Signage Plan	\$29,000
Airfield Sign System Upgrades including additional signage	\$299,812
Runway 7 Extension*	\$719,528
Runway 7-25 Pavement Rehabilitation and Overlay	\$2,606,252
Taxiway A Extension including lighting	\$535,395
Taxiway A Pavement Rehabilitation and Overlay	\$1,305,000
Taxiway A Marking Removal and Remarking	\$219,124
Runway 7 PAPI Relocation	\$32,211
Install REILs on Runway 7	\$50,000
Runway 7-25 Marking Removal and Remarking	\$342,591
Replace and Relocate MIRL with HIRL on Runway 7-25	\$288,482
Taxiway J - Design and Construct	\$325,000
Acquire Runway 25 Avigation Easement (~1.7 acres)	\$60,000
Installation of ILS System (Glideslope, Localizer and MALSR)	\$1,950,000
Relocated Perimeter Road	\$896,412
Clear obstructions on Runway 25	\$82,000
Drainage Improvements*	\$225,000
Total Development Costs¹	\$10,165,807

* Runway 7-25 extension includes 500 ft extension to Runway 7 only
¹ Project Costs include 20% engineering and contingency fee
Source: The LPA Group, Incorporated, 2006

Thus, based upon proposed development, the total estimated cost associated with Airfield Concept 2 is **\$17,234,257**. It is important to note that the implementation of an LPV approach rather than an ILS approach on Runway 25 would likely cost approximately \$500,000 rather than the estimated \$1.9 million.

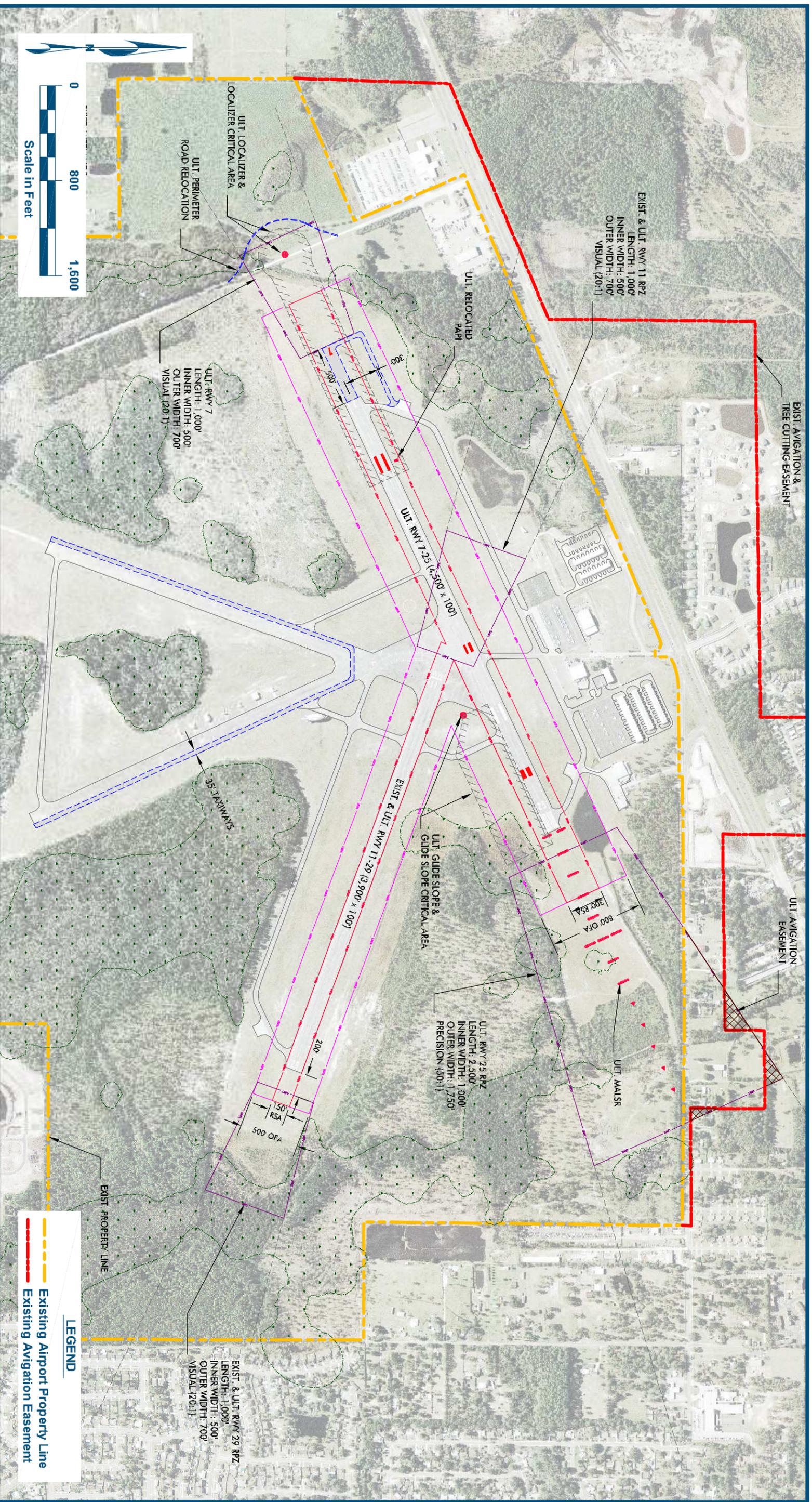


Figure 5-2

A listing of key strengths and weaknesses associated with Airfield Concept 2 is listed below:

AIRFIELD CONCEPT 2 "RUNWAY EXTENSION" SCENARIO	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Provides required runway length of 4,500 feet 2. Accommodates aircraft design group C-II 3. Provides precision instrument approach capabilities on Runway 25, and non-precision approach to Runway 7 4. Provides full runway access thereby avoiding back taxiing issues 5. Anticipate increased airfield and runway capacity due to additional connector taxiway and precision approach capability. 6. Taxiway development provides for improved access to western quadrant of the airfield 7. All runways equipped with required NAVAIDs and markings 8. No anticipated environmental impacts 	<ol style="list-style-type: none"> 1. Requires the realignment of the airport perimeter road 2. Requires relocation of Runway 7 PAPIs & REILs 3. Does not eliminate use of grassy area for landings and takeoffs of ultra-lights and gliders. 4. Significant cost (~\$17.2 million) 5. Requires the replacement of MIRL with HIRL on Runway 7-25 6. May require Environmental Assessment 7. Requires acquisition of avigation easement (1.7 acres)

Airfield Concept 3 (Unconstrained Development)

The third concept consists of extending Runway 7 by 500 feet and adding 250-foot stopways to both runway ends. According to **FAA Advisory Circular 150/5300-13, Change 10**, "a stopway is an area beyond the takeoff runway centered on the runway centerline, and designated by the airport owner for use in decelerating an airplane during an aborted takeoff. The stopway must be at least as wide as the runway and able to support an aircraft during an aborted takeoff without causing structural damage to the airplane". The length of the overrun/stopway must be able to accommodate the critical aircraft at maximum takeoff weight. Based upon requests by existing and potential users as well as the general public in addition to expected aircraft demand, runway stopways are warranted. Thus, as a result of changes to the forecast transient fleet at HEG, the proposed stopways will provide an additional margin of safety in case an aircraft 'overshoots' or 'undershoots' the runway as well as provide JAA greater

flexibility for future development. The use of stopways on both Runway 7 and 25 provides the following declared distance lengths as outlined in Appendix 14 of FAA Advisory Circular 150/5300-13.

AIRFIELD CONCEPT 3 DECLARED DISTANCE CALCULATIONS		
<i>Source: FAA AC 150/5300-13, Appendix 14 and The LPA Group, Inc. 2007</i>		
	Runway 25	Runway 7
Takeoff Run Available (TORA)	4,500	4,500
Takeoff Distance Available (TODA)	4,500	4,500
Accelerate Stop Distance Available (ASDA)	4,750	4,750
Landing Distance Available	4,500	4,500

In addition to the proposed runway extension, this concept also adds a parallel turf runway for light sport and glider aircraft.

Turf Runway

Currently, light sport aircraft and gliders land on turf situated between Taxiway A and Runway 7-25. This area, although not designated or marked for landing, may potentially cause unsafe conditions for aircraft on the runway or taxiway due to the limited separation distances between them. Hence, several sites were evaluated and considered for the ultimate layout of the turf runway as shown in **Figure 5-3, Turf Runway Alternatives**, but due to impacts on hangar facilities and existing wetlands as well as wind direction and flight patterns, the placement of the turf runway south of Runway 7-25 appeared to be the most legitimate and safest course of action without compromising approach areas. Additionally, impacts to airspace were also considered. Based upon discussions with Cecil Field and JAA airspace personnel, concerns regarding crossing an active runway during approach and departure were resolved with modified flight operations procedures. One suggestion noted was a left hand turn off of Runway 7 and a right hand turn off of 25. This would allow aircraft to operate well within Herlong's airspace and not impact operations on Runway 7-25. The proposed location for the turf runway will ultimately allow future expansion of facilities by providing parking and shade hangars while also limiting encroachment by larger aircraft.

Five potential alternatives, as shown in **Figure 5-3**, were developed for the new turf runway. Placing the turf runway parallel to the north side of Runway 7-25 was not considered an option due to its significant impact on both existing facilities and operations.

Alternative 1: Parallel to Runway 7-25 – This option, although convenient in terms of access from the

north side of the airfield, poses a potential problem for separation with aircraft operating on Runway 7-25. The proximity and density of aircraft activity in this area causes a problem for larger aircraft due to the concentrated light sport aircraft that will use the turf runway.

Alternative 2: Runway 7-25 South of Closed Runways - Alternative two does provide 95 percent wind coverage for a 10 knot crosswind. However, the location would impact residential development south and west of the airfield, impact recommended industrial development as well as impact the local Gun and Rifle Club. In addition, Alternative 2 is located within a wetland area. Therefore, significant mitigation and cost would be required to effectively accommodate these operations.

Alternative 3: Staggered and Parallel to Runway 7-25 – Similar to Alternative 1, this option suggests that the turf runway be situated parallel to 7-25 but shifted south and then to the southwest several hundred feet. This configuration establishes more separation with 7-25, allowing a better safety margin for both larger and smaller aircraft. However, a shifting of the turf runway to the southwest will encumber the location of the perimeter and ultimate south side access road.

Alternative 4: Parallel to west closed runway – This option enables flight activity by light sport aircraft to be completely segregated from larger aircraft activity on Runway 7-25. This configuration does not overlap the approach surfaces to Runway 7-25 and facilitates the operational pattern and activity of light aircraft. Another advantage of this alternative is the benefit of adjacency of the runway to a dedicated area exclusive to sport and light aircraft.

Alternative 5: Runway 9-22 - Alternative five would also separate powered aircraft traffic from the lighter glider and sport aircraft traffic, thus improving overall airport capacity. In addition, wind coverage for Runway 9-22 is almost 92% with a 10 knot crosswind. However, like Alternative Two, Alternative Five will require significant mitigation and, therefore, will incur a significant cost. Further, operations would require glider and other small aircraft to operate near the Gun and Rifle Club which may be considered a safety hazard.

Preferred Turf Runway Alternative - It is recommended that a 2,000 by 60-foot Turf Runway be constructed 400 feet parallel to and staggered adjacent to Runway 7-25 to segregate ultra light and glider traffic from the piston and turbine aircraft that use Runway 7-25. Due to environmental and terrain constraints anticipated to occur at the 700 foot runway to runway separation, JAA requests a modification to design standards. Further, HEG management and JAA will implement operating procedures designating that the paved Runway 7-25 and Turf Runway (7U-25U) are considered one runway. Thus, simultaneous operations are not allowed. An area adjacent to the turf runway will be graded for glider and sport aircraft storage.

In conjunction with the runway extension, a 500 foot extension is recommended for Taxiway A to provide access to the new runway threshold. The runway-to-taxiway separation between Runway 7-25 and Taxiway A will remain at 300 feet and its width will be 35 feet in accordance with AC 150/5300-13. In addition, it is recommended that the closed runways be converted to 35 foot wide taxiways, in accordance with Aircraft Group II requirements, thereby providing access to the southern quadrant of the airfield. Further, the removal of excess pavement will minimize the airport's ongoing pavement maintenance costs. Again, the cost of an environmental assessment related to the extension of Runway 7-25 was included in the preliminary cost estimates. Although based upon a preliminary environmental evaluation that potential impacts will be minimal, and, therefore unlikely to trigger an EA, it was considered in the best interest of JAA to include this cost since the decision to require an EA or Categorical Exclusion is determined by the FAA.

As discussed in Airfield Concept 2, a precision instrument approach to Runway 25 is recommended as is a precision instrument approach to Runway 7 either using an ILS or LPV approach. This will allow an approach visibility of less than 3/4 statute mile to either runway threshold. Both the ILS and LPV will require approach lighting systems and upgrades to Runway 7-25's runway markings and lighting. Further an airspace study would need to be conducted by the FAA prior to implementing a Category I precision instrument approach to Runway 7 in order to determine if such operations will impact approaches to Runways 18L-36R and 18R-36L at Cecil Field Airport. As shown in Alternative 2, the PAPIs and REILs on Runway 7 will be relocated to the new threshold, and a realignment of the airport perimeter road is required. **Figure 5-4** is a graphical representation of Airfield Concept 3.

Costs associated with Concept 3 include the acquisition of avigation easements beyond the Runway 7 and Runway 25 thresholds. Property acquisition is estimated at 10.7 acres (1.7 acres Runway 25 and 9.0 acres Runway 7). Property prior to the Runway 7 threshold is designated as commercial/industrial. Land acquisition, based upon the COJ Property Appraiser information, is anticipated to impact only two at a maximum three businesses. Property prior to the Runway 25 threshold consists of a mix of residential and commercial land use. It is anticipated that the acquisition of additional land associated with the proposed avigation easement will impact approximately three (3) home owners and one or two businesses. However, since JAA already has a partial avigation easement over the residential property located across Normandy Blvd, it is anticipated that the impact to both homeowners and businesses will be negligible. Still an environmental assessment may be required to determine the impact of proposed development.

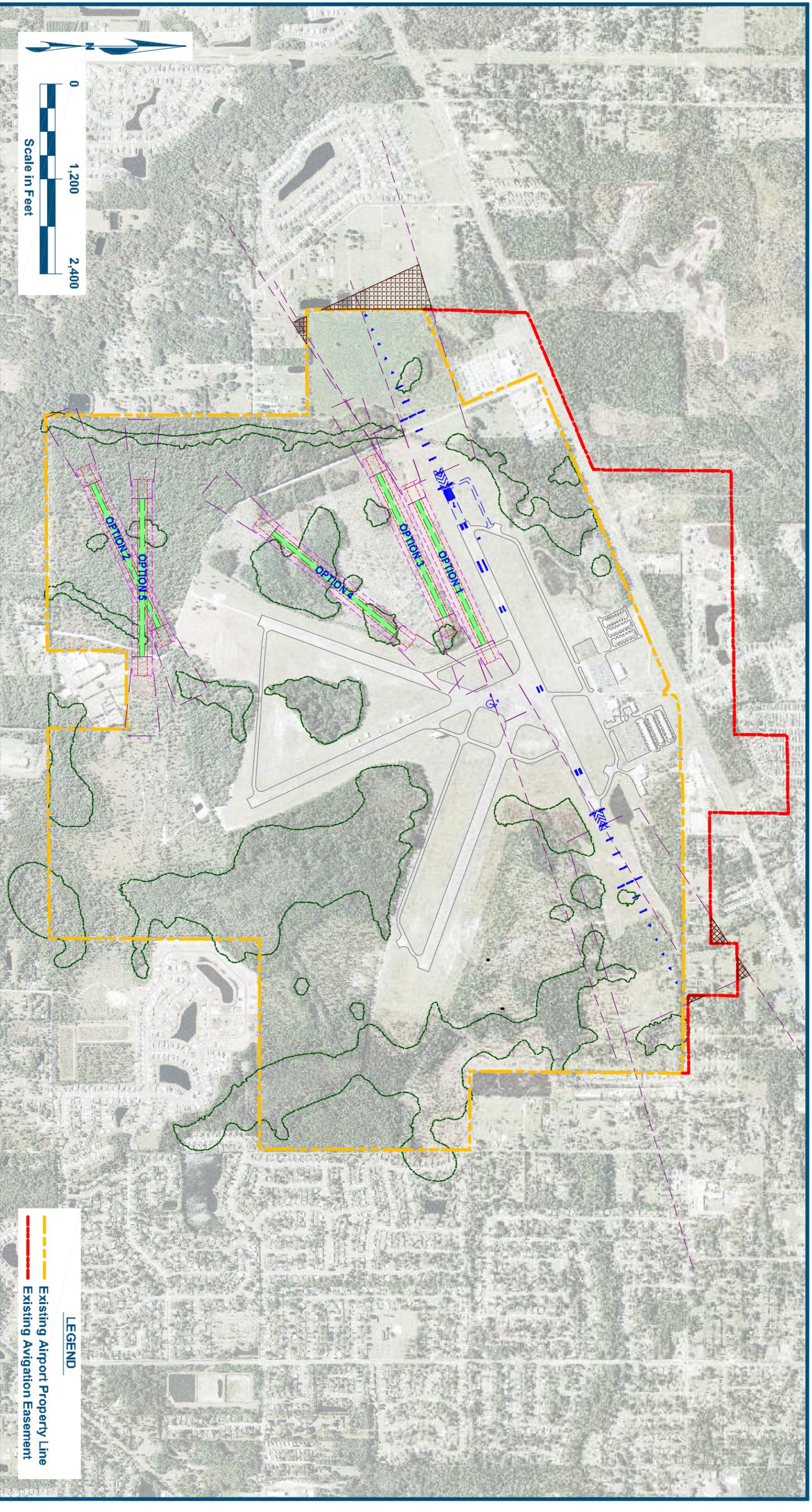


Figure 5-3

A listing of key strengths and weaknesses associated with Airfield Concept 3 are listed below:

CONCEPT 3	
“RUNWAY EXTENSION WITH STOPWAYS” SCENARIO	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Provides required runway length of 4,500 feet and an additional 500 feet for aircraft overruns 2. Provides option for 600 ft runway extension to avoid lighting relocation as well as 400 feet for aircraft overruns. 3. Accommodates user and public demand for longer runway and stopways in case of aircraft aborted takeoff. 4. Provides JAA flexibility for development based upon runway lighting needs 5. Accommodates aircraft design group C-II 6. Provides precision instrument approach capabilities on both Runways 25 and 7 7. Provides full runway access thereby avoiding back taxiing issues 8. Anticipate increased airfield and runway capacity due to additional connector taxiway and precision approach capability. 9. Taxiway development provides for improved access to western quadrant of the airfield 10. All runways equipped with required NAVAIDs and markings 11. Segregates powered and non-powered traffic 	<ol style="list-style-type: none"> 1. Requires the realignment of the airport perimeter road 2. May require an Environmental Assessment 3. Requires relocation of Runway 7 PAPIs and REILs 4. Significant cost (~\$21.1 million) 5. Requires the replacement of MIRL with HIRL on Runway 7-25 6. Requires the installation of utilities on the south side of airfield to accommodate taxiway lighting 7. Requires acquisition of aviation easements

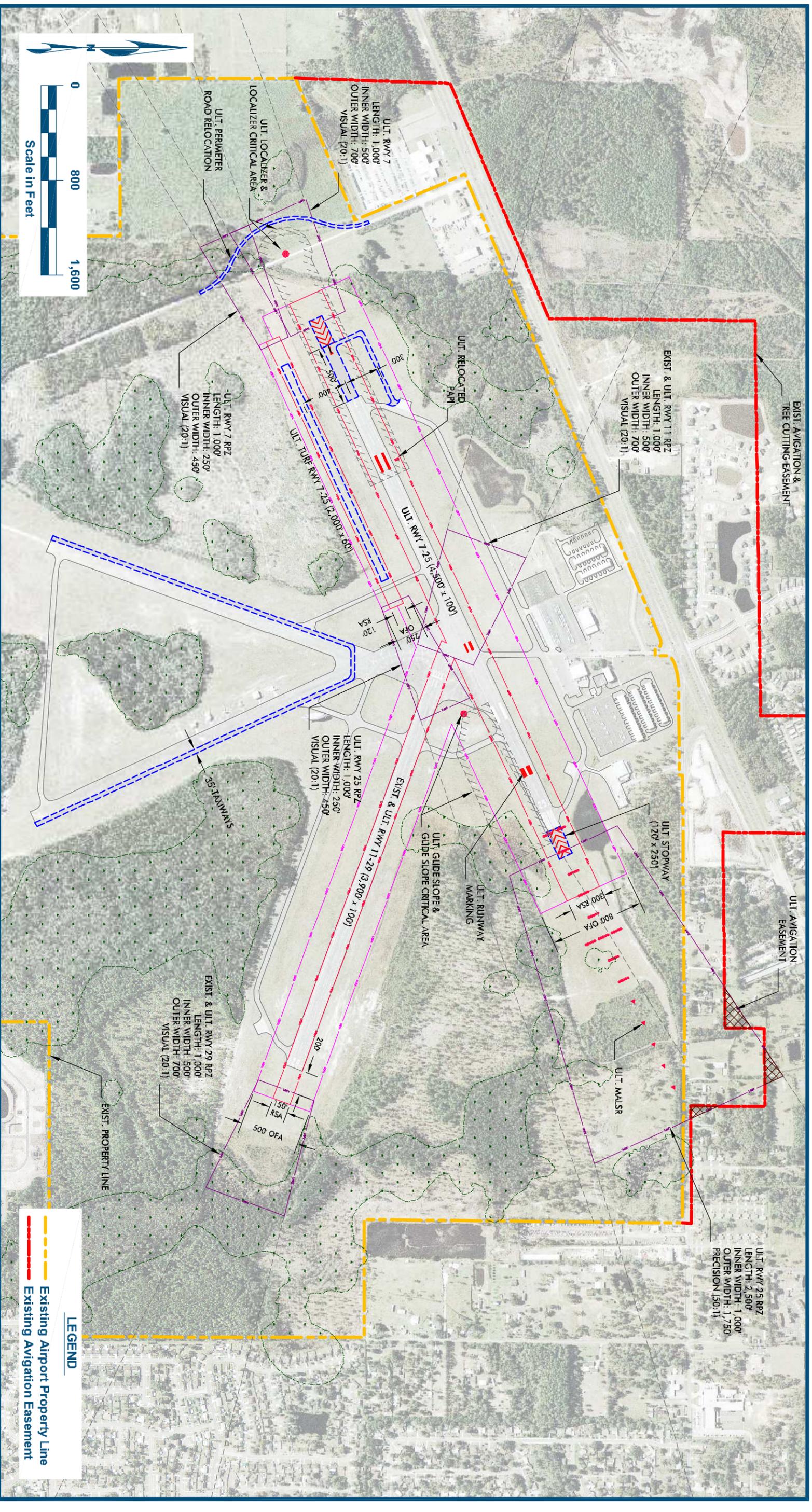


Figure 5-4

Tables 5-8 and 5-9 outline the preliminary order of magnitude costs associated with Airfield Concept 3 in 2006 dollars. The total estimated cost of Airfield Concept 3 including routine maintenance and associated projects was determined to be approximately **\$21,123,382**.

TABLE 5-8 AIRFIELD COSTS ASSOCIATED WITH ALL THREE CONCEPTS PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Runway 11-29 Pavement Overlay and Rehabilitation	\$2,215,388
Runway 11-29 Marking Removal and Remarking	\$297,317
Closed Runways Pavement Removal	\$275,974
Taxiway Overlay and Repair (closed runways)	\$1,151,009
Install Marking and Lighting on South Taxiways (Closed Runways)	\$368,522
Pavement Condition Report	\$30,000
Electrical Vault Relocation	\$330,240
Design and Construct New Fuel Farm (2 Tanks)	\$500,000
Replace AWOS	\$200,000
Overlay Taxiways C & D	\$1,700,000
Estimated Development Cost¹	\$7,068,450
¹ Project Costs include 20% engineering, design and contingency fee	
Source: The LPA Group, Incorporated	

**TABLE 5-9
AIRFIELD CONCEPT 3 “RUNWAY EXTENSION WITH STOPWAYS”
PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES
IN 2006 DOLLARS**

Project Description	Estimated Cost
Environmental Assessment -Turf Runway	\$50,800
Environmental Assessment - Runway 7 Extension	\$200,000
Signage Plan	\$29,000
Airfield Sign System Upgrades including new signage	\$219,812
Rehabilitate Runway 7-25 - Phase I	\$141,641
Rehabilitate and overlay Runway 7-25 - Phase II	\$2,464,611
Runway 7 Extension	\$719,528
Runway 7-25 Stopways and Markings	\$618,352
Taxiway A Extension with Lights	\$535,395
Taxiway A Rehabilitation and Overlay	\$1,305,000
Taxiway A remove markings and remark	\$219,124
Construct 2000 x 60 Turf Runway	\$422,973
Relocate PAPI's on Runway 7	\$32,211
Install REILs on Runway 7	\$50,000
Runway 7-25 Marking Removal and Remarking	\$342,591
Replace and relocate MIRL with HIRL on Runway 7-25	\$288,482
Construct Taxiway J	\$325,000
Construct Taxiway E	\$350,000
Acquire Runway 25 Avigation Easement (1.7 Acres)	\$60,000
Acquire Runway 7 Avigation Easement (9 Acres)	\$270,000
Installation of ILS System on Runway 25 (Glideslope, Localizer and MALSR)	\$1,950,000
Installation of ILS System on Runway 7	\$1,950,000
Clear Runway 25 obstructions	\$82,000
Clear Runway 7 obstructions	\$82,000
Drainage Improvements *	\$450,000
Realignment of perimeter road	\$896,412
Estimated Development Cost¹	\$14,054,932

¹ Project Costs include 20% engineering and contingency fee
Source: The LPA Group, Incorporated, 2006

Environmental Assessment

Typically an environmental assessment (EA) is warranted, according to **FAA Order 5050.4B**, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, and **Order 1050.1E**, Environmental Impacts: Policies and Procedures, for the following projects:

- Helicopter Facilities and operations
- Land Acquisition
- New Airport
- Airport Relocation
- New Runway
- Major runway strengthening or extension
- Conversion of Prime and Unique Farmland,
- Conversion or impacts to Coastal Waters or Wetlands, and
- Other actions anticipated to negatively alter existing airport environs.

Although the cost of an environmental assessment is included within the proposed airfield development concepts, based upon preliminary environmental impacts and limited discussions with FAA Environmental Scientists, the extension of Runway 7-25 and the construction of the turf runway are not anticipated to trigger an EA. However, the decision to apply a Categorical Exclusion or an Environmental Assessment is at the discretion of the FAA Airport District Office.

Evaluation of Concepts

The airfield concepts were evaluated within this section to weigh the inherent strengths and weaknesses of each in comparison to the other development concepts discussed. Concepts were evaluated within the following categories: best planning tenets, phasing/construction, operational performance, environmental impacts, fiscal factors and community recommendations and acceptance.

- Best Planning Tenets – pertains to the total growth potential that each concept affords and the process inherent to achieving that growth. The evaluation criteria associated with this category includes: the ability to provide airfield facilities that will satisfy the needs of unconstrained levels of demand, provides the best practices for safety and security, conforms to applicable FAA design and other appropriate standards, provides the highest and best on and off-airport land use, provides balance between elements, provides flexibility to adjust to unforeseen changes, conforms to appropriate local, regional and state transportation plans, is technically feasible, socially and politically feasible and satisfies users needs throughout the twenty-year planning

period.

- Phasing/Construction – pertains to existing on-airport land uses and associated impacts to existing facilities as well as the level of difficulty and the cost involved in implementing the proposed airfield concepts. The evaluation criteria associated with this category include the ability to phase construction and expand incrementally, the costs associated with construction, the impact on existing facilities, and any engineering difficulties associated with airfield build-out requirements.
- Operational Performance – compares the overall operational efficiency of the proposed airfield layouts. The evaluation criteria associated with this category include the compatibility with the long-range airfield in terms of length requirements and the efficiency of the supporting taxiway system.
- Environmental Effects – performs a general assessment to determine the degree to which proposed airfield improvements would potentially affect various components of the surrounding environment as outlined in FAA Order 1050.1, Environmental Impacts: Policies and Procedures and FAA Order 5050.4, FAA guidance for complying with NEPA.
- Fiscal Factors – performs an order of magnitude cost analysis to determine if concepts are responsive to the fiscal constraints of the Airport. This includes an evaluation of the respective cost advantages and disadvantages of the concepts as well as identification of likely funding sources to determine if the proposed concepts are realistically within the fiscal capability of the Airport.
- Community Recommendations/Acceptance – performs a general assessment of the likelihood that the proposed improvements will obtain acceptance from the community at large.

An evaluation matrix, which addresses the aforementioned criteria, is presented in **Table 5-10**, *Airfield Concept Evaluation*.

Recommended Airfield Concept

Upon evaluation of the criteria presented in **Table 5-10** as well as consultation and input from the TAC and general public, the recommended airfield concept for HEG is Airfield Concept III, “Runway Extension with Stopways Scenario”. The evaluation scores presented in **Table 5-10** afford a measurable assessment of the three airfield alternative concepts with respect to the outlined criteria. Although

Alternative I is most favorable in terms of phasing and construction, it fails to address the needs and accommodate forecast increases in operational activity at HEG. Although a 500-foot extension is required to accommodate forecast activity, a 600-foot extension with 400 feet of stopways may be more cost effective. The anticipated cost of relocating the lights on Runway 7-25 to accommodate the 500-foot extension may outweigh the cost of doing a 600-foot extension which will require additional lighting only. As a result, Airfield Concept III provides the opportunity to implement either extension, reinforces the needs of all airport constituencies, and provides the most reasonable development scenario for the airport's immediate and long-term requirements and its greater role within the Jacksonville Airport System. As a result, based upon the previous analysis, it is recommended that Airfield Concept III be considered for future implementation. **Figure 5-5** is a graphical representation of the preferred airfield development.

TABLE 5-10
AIRFIELD CONCEPT EVALUATION

Evaluation Criterion	Airfield Concept 1		Airfield Concept 2		Airfield Concept 3	
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
Best Planning Tenets:						
Accommodates unconstrained demand	1	Will not accommodate larger aircraft	4	Will accommodate larger aircraft	5	Will accommodate larger aircraft and provide additional safety margin. Provides JAA greater level of flexibility for future development
Conforms to best practices for safety and security	2	Does not provide runway length required to meet demand	4	Provides runway length required to meet majority of aircraft	4	Provides runway length required to meet majority of aircraft
Provides highest and best land use	1	Maintains status quo	5	Allows for additional on-airport development	5	Allows for additional on-airport development
Meets forecast growth	1	Does not meet forecast growth	5	Meets forecast growth	5	Meets forecast growth
Provides growth beyond planning horizon	1	Doesn't meet anticipated critical aircraft requirement	4	May accommodate demand, but does not offer as much flexibility	5	Allows airport greater flexibility in accommodating demand
Improves airfield capacity	1	Capacity limited	4	ILS improves capacity	5	Turf runway and ILS/Precision approach

						improve capacity
Provides flexibility	1	Limited flexibility	4	Runway and Taxiway extensions combined with ILS	5	Most flexible due to Turf runway
Conforms to Sponsor's vision	1	Does not meet sponsors desire for growth	4	Accommodates sponsor desire for ILS and runway extension	5	Meets sponsors needs beyond planning period
Conforms to applicable transportation plans	3	Does not conform with vision of HEG within the JAA System	5	Conforms with JAA Management Vision	5	Same as Two

TABLE 5-10 AIRFIELD CONCEPT EVALUATION (CON'T)						
Evaluation Criterion		Airfield Concept 1		Airfield Concept 2		Airfield Concept 3
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
Technically feasible	5		5		5	
Socially and politically feasible	5	No Change, thus considered feasible	4	Will require support to implement	4	Will require support to implement
Satisfies users needs	1	Does not satisfy user needs	4	Satisfies traditional users (i.e. Piston and turbine operations)	5	Satisfies all user needs
Phasing/Construction:						
Ability to phase construction/expansion	5	No Development	5	Construction phasing based upon demand	5	Phasing based upon demand as well interest beyond forecast
Impact on existing facilities	5	No Impact on existing facilities other than refurbish closed runways	4	Limited impact associated with construction	4	Same as Two
Engineering/Land Build-out or acquisition requirements	5	No land acquisition required.	4	Requires acquisition of 1.7 acres for avigation easement	4	Requires 10.7 acres for avigation easement
Operational Performance:						
Capacity	1	Limited improvements impact overall capacity	4	Improves overall capacity and accommodates planned demand	5	Improves overall capacity and accommodates beyond planned demand
Capability	3	Capability limited due to runway length	4	Accommodates design aircraft and precision approach	4	Accommodates design aircraft & precision approach on both Runways 7 and 25. Precision approach to Runway 7 must be coordinated with FAA to determine impacts on

						surrounding airfields
Efficiency	3	Development limited	4	Improves airfield capacity	5	Improves airfield capacity

TABLE 5-10 AIRFIELD CONCEPT EVALUATION (CON'T)						
Evaluation Criterion		Airfield Concept 1		Airfield Concept 2		Airfield Concept 3
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
Environmental Effects:						
Noise	5	No Change	5	Contours remain on airport	5	60, 65 and 70 DNL Contours remain on airport
Land Use	5	No Change	5	Avigation Easement Acquisition prior to Runway 25	5	Acquisition of two avigation easements associated with Runway 7 and 25
Social Impacts	5	No Change	5	May impact three residences and possibly two businesses within easement	5	May impact residences and businesses located within easements
Induced Socio-Economic Impacts	5	No Change	5	No Impact	5	No Impact
Air Quality	5	No Change	5	No Impact	5	No Impact
Water Quality	5	No Change	5	No Impact	5	No Impact
DOT Act, Section 303 (c)	5	No Change	5	No Impact	5	No Impact
Historical, Architectural, Archaeological, and Cultural Resources	5	No Change	5	No Impact	5	No Impact
Biotic Communities	5	No Change	5	No Impact	5	No Impact
Air Quality	5	No Change	5	No Impact	5	No Impact
Water Quality	5	No Change	5	No Impact	5	No Impact

TABLE 5-10 AIRFIELD CONCEPT EVALUATION (CON'T)						
Evaluation Criterion		Airfield Concept 1		Airfield Concept 2		Airfield Concept 3
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
DOT Act, Section 303 (c)	5	No Impact	5	No Impact	5	No Impact
Endangered and Threatened Species	5	No Impact	5	No Impact	5	No Impact
Wetlands	5	No Impact	5	No Impact	5	No Impact
Floodplains	5	No Impact	5	No Impact	5	No Impact
Coastal Zone Management	5	No Impact	5	No Impact	5	No Impact
Coastal Barriers	5	No Impact	5	No Impact	5	No Impact
Wild and Scenic Rivers	5	No Impact	5	No Impact	5	No Impact
Farmland	5	No Impact	5	No Impact	5	No Impact
Energy Supply and Natural Resources	5	No Impact	5	No Impact	5	No Impact
Light Emissions	5	No Impact	5	No Impact	5	No Impact
Solid Waste Impact	5	No Impact	5	No Impact	5	No Impact
Construction Impacts	4	Limited impact associated with maintenance and closed runway conversion	3	Impacts associated with Runway and Taxiway development	3	Same as Two

TABLE 5-10 AIRFIELD CONCEPT EVALUATION (CON'T)						
Evaluation Criterion		Airfield Concept 1		Airfield Concept 2		Airfield Concept 3
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
Fiscal Factors:						
Cost Estimates	5	\$9.2 million	3	\$16.5 million	2	\$20.2 million
Key Elements		<ul style="list-style-type: none"> * Rehabilitation of Rwy 7-25 & 11-29 * Conversion of Closed Runways to Taxiways * Relocation of electrical vault, NDB and wind cone * Airfield Signage Upgrade * New Fuel Farm * Drainage Improvements * Overlay of Twys C & D 		<ul style="list-style-type: none"> * All Projects in Airfield Concept 1, and * Runway 7-25 extension * NPI Approach to Runway 25 * Upgrade MIRL to HIRL on Runway 7-25 * Construct Taxiway J * Extension and Overlay of Taxiway A * EA * Acquisition of Avigation Easement - Rwy 25 Installation of REILs and Relocation of PAPIs - Runway 7 * Realign perimeter road 		<ul style="list-style-type: none"> *In addition to items outlined in Airfield Concept 2: * Runway extension with 500 feet stopways * Turf Runway Construction * Taxiway E extension * NPI on Runway 7 * Avigation Easement acquisition - Rwy 7

TABLE 5-10 AIRFIELD CONCEPT EVALUATION (CON'T)						
Evaluation Criterion		Airfield Concept 1		Airfield Concept 2		Airfield Concept 3
	Score	Comment	Score	Comment	Score	Comment
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent						
Fiscal Capability of Airport	2	Costs limited to reuse/redevelopment of closed runways		Cost significant due to installation of precision approach and runway extension		Will need cost benefit analysis to justify stopways and turf runway
Community Recommendations/Acceptance						
Public Acceptance	5	Limited development, thus, expect public acceptance	5	Based upon meetings with users and public, runway extension requested	5	Public & Users requested extension and stopways for increased safety due to changes in fleet mix as well as weather.
Total Evaluation Score	150		192		198	
Average Evaluation Score	4.5		5.8		6.0	

Source: The LPA Group Incorporated, 2006

Land Use

The objective of the Land Use Analysis is to evaluate the impacts that airfield and landside improvements would have on the use of land within the Airport's boundary, on contiguous parcels and on the community as a whole. As described in **Chapter 2, Airport Inventory**, HEG is located on approximately 1,434 acres of land which is designated as Fee Simple ownership.

While considering the inter-relationship between various airport functions, the recommended concept identifies and delineates the areas on the Airport reserved for future development. Land use concepts were developed based upon Airfield Concepts 2 and 3, which primarily involve the extension of Runway 7, the rehabilitation of the closed runways as well as the installation of an ILS approach to Runway 25. However, Airfield Concept 3 in addition to the development outlined in Airfield Concept 2 also includes development of a Turf Runway and 250 foot safety stopways beyond the thresholds of both Runways 7 and 25. Both concepts will accommodate anticipated demand over the course of the twenty year planning period.

It is important to note that discussions are on-going as to the use of the property on the south portion of the airfield for potential residential development. Due to FAA concerns related to on-airport residential development, JAA is considering the implications would consider divesting itself of the property with the assistance of the FAA. However, in a letter received on May 11, 2006, included in **Appendix B, FAA/FDOT Correspondence and Related Data**, of this report, "the FAA strongly discourages "through the fence" operations' especially those including residential land use." The FAA further stated: "If an airport sponsor chooses to grant "through the fence" access, the sponsor must ensure that its decision will not result in a violation of its Federal obligations, at present or in the future."

However, according to the Land Use Compatibility and Airport documentation developed by the FAA in 1998, HEG can support a wide variety of discretionary uses including: airport or aviation related businesses, non-aviation commercial/industrial development, general aviation and corporate aviation development, mixed use, which includes aviation and non-aviation development, as well as low population density, such as golf courses, limited agricultural, etc. within the approach/transition zones. **Figure 5-6** is a graphical representation of the Recommended Land Use Map for HEG. These areas serve as the foundation for future airport development and are described in the paragraphs that follow.

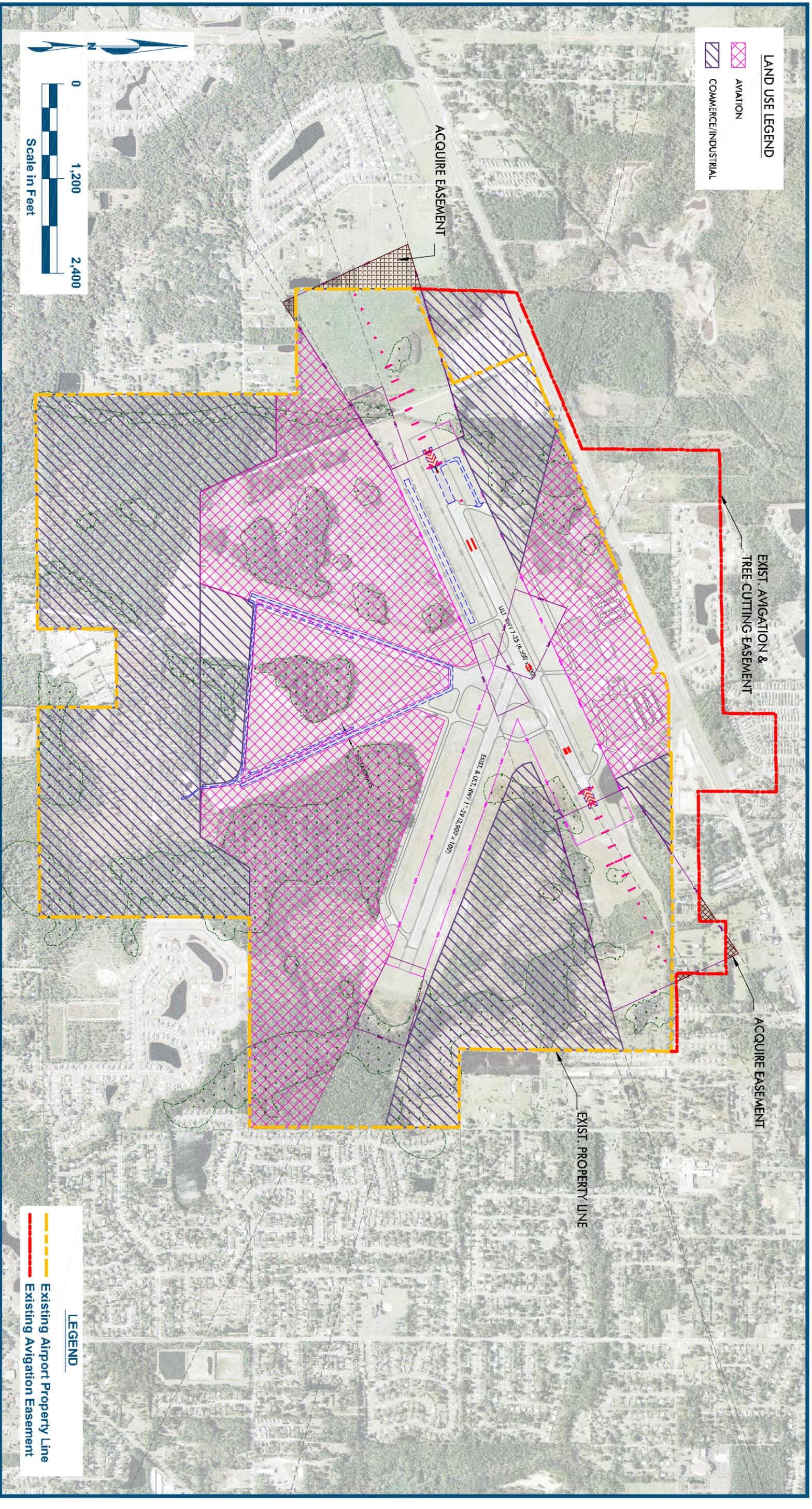


Figure 5-6



Airport Operations

The airport operations area is centered on the runways, taxiways, and various safety zones (i.e. Runway Safety Area (RSA), Runway Object Free Area (OFA), Runway Protection Zone (RPZ), etc.) that impact the operation of aircraft. Based upon the airfield concepts discussed, an extension to Runway 7-25 as well as the installation of a precision approach to both Runways 25 and 7 will require the acquisition of approximately 15.7 acres north of the threshold of Runway 25 and 9.9 acres north and west of the threshold to Runway 7 to accommodate the expanded RPZ areas.

It is anticipated that a runway extension would result in increased in turbine GA activity and would no longer limit aircraft performance requirements due to inadequate facilities, thus making the Airport more attractive to a variety of users. Although a slight increase in noise is possible due to increases in turbine operations, based upon the noise contours, the noise increase was negligible since newer turbine engine aircraft are quieter than several older piston aircraft currently using the field. Existing and future noise contours associated with the existing and forecast fleet mix is provided in **Appendix D, Noise Analysis**, of this report.

The establishment of future airport development along the northwest, southwest and southeast portions of the airfield will maximize the utilization of available land areas while also providing a buffer between airport operations and contiguous residential and commercial parcels while increasing the airport's overall revenue stream. Further, proposed taxiway development through the conversion of the closed runways to taxiways will provide airside access to currently underutilized areas of the airport, thus improving airfield capacity and utilization.

Corporate and Light General Aviation

As mentioned, the areas south of Runway 7-25 adjacent to the closed runways is underutilized due to limited surface access, poor pavement conditions, and lack of utilities. To date, the majority of general aviation and corporate facilities are located along the north side of the Airport property line adjacent to Runway 7-25 and Normandy Boulevard. As part of proposed airfield development, it is recommended that facilities dedicated to larger corporate aircraft be located adjacent to the closed runways along the south and west side of the airport property. Development of this area would include corporate and conventional hangars as well as associated apron and parking facilities.

Areas dedicated to ultra lights and gliders could be located adjacent to the proposed turf runway, 7U-25U, thereby providing ease of access while limiting potential conflicts with traditional piston and turbine aircraft on the field. Lastly an area dedicated to lighter GA development such as T-hangars,

small conventional hangars and FBO facilities would be constructed to the north of Runway 7-25. The General Aviation areas can be easily accessed via Normandy Boulevard and the Airport Entrance road, while access to the west and south side of the airfield could be obtained via the airport perimeter road and access gate south of the Airport Entrance Road. It is important to note that for development to occur, utilities will need to be provided before construction can begin.

Airport Commerce and Industrial Park

In an effort to increase the generation and diversification of revenues at HEG, several areas of the airport were evaluated for airport commerce or industrial park development. Possible locations include the western side of the airport along Normandy Boulevard contiguous to the road and near the Advanced Disposal site, along the eastern side of the airport located between Runways 25 and 29, and the land area south of the closed runways adjacent to the Airport Perimeter Road as shown in **Figure 5-6, Land Use**. Commerce and industrial park development will play a key role in providing a location for aviation and non-aviation oriented businesses, including non-aviation storage facilities, offices and even a restaurant.

A Commerce Park/Industrial Park may also provide a location for firms such as parts suppliers and avionics repair shops that often operate from locations not directly accessible to the airfield to be accommodated. There are a number of organizations and businesses that prefer to be located on or adjacent to an airport due to the orientation of their products, market and/or operations. These may include a number of firms that operate their own aircraft.

JAA should also consider marketing HEG's facilities to corporate aircraft and experimental aircraft manufacturers. Typically these companies locate in areas with a strong aviation-oriented labor force. In developing the site, an area must be chosen which provides ample apron frontage and easy surface access. Manufacturers of specialized parts or components do not require direct access to the airfield but many, due to the aviation orientation of their business, would make the airport a preferred location.

Both a Commerce Park and Industrial Park are compatible with the airport environment, and not only provide airport management an additional source of revenue but supply a buffer between the airport operating area and the surrounding community.

Residential Development

Several interested parties have approached JAA to develop a residential fly-in community either on or adjacent to airport property south of the closed runways. A potential layout of the fly-in community include lots with houses and attached hangars as well as taxi lanes providing access to the airfield through the conversion of the closed runways to taxi lanes as shown in **Figure 5-7, Residential Air Park**. It is the current FAA policy not to support residential fly-in community development around public use airports even if the airport secures covenants and restrictions on the property that ensure the airport will be protected from noise and height control issues. The FAA is also concerned about the potential for through the fence operations that might occur as shown in the letter dated May 11, 2006 in **Appendix B** of this document. If JAA wants to pursue this alternative, they most probably have to seek legislative support to address FAA concerns.

JAA could also declare the property not required for aviation purposes and seek FAA approval to sell the property at fair market value. The money obtained from the sale of property could be used for future airport development. Based upon local appraisals, it is estimated that the sale would generate (at \$20,000 per acre) approximately \$2.4 million to offset airport costs listed in **Table 5-11** needed to support residential development. Anticipated airport development needed to accommodate a residential fly-in community is related primarily to fence line, roadway and taxiway improvements. However, the airport may gain significant revenues associated with aircraft maintenance and fuel sales.

TABLE 5-11 RESIDENTIAL FLY-IN COMMUNITY PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Preliminary Development	\$300,000
Taxilane extension	\$1,200,000
Fence line Relocation including security improvements	\$2,000,000
Perimeter Roadway Relocation	\$500,000
Total Development Costs¹	\$4,000,000
¹ Project Costs include 20% engineering and contingency fee	
Source: The LPA Group, Incorporated	

RESIDENTIAL DEVELOPMENT SOUTH SIDE CONCEPT 2	
<i>Source: The LPA Group, Incorporated 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Sale of land will provide airport with influx of cash for on-airport improvements 2. Residents will support on-airport facilities, including aircraft maintenance and fuel sales 	<ol style="list-style-type: none"> 1. Requires the sale of property thus decreasing HEG's available property 2. Will require relocation of Airport fence line 3. Will require relocation of Airport Perimeter Road 4. Requires through the fence operation, therefore airport will be required to install additional gates 5. FAA does not approve of "through the fence" operations

Another issue that will need to be addressed in order to move forward with possible residential development is the issue of the gun club located to the south of HEG property adjacent this proposed development.

Mixed Use

While HEG should give priority consideration in its real estate policy to firms and organizations that are aviation oriented, it should not preclude using available property to attract other industrial/commercial activities. Creating strong business activities near the Airport will create beneficial effects and a favorable climate for the potential attraction of aviation-related organizations.

Thus, in order to maintain flexibility and take advantage of market opportunities, areas adjacent to Normandy Boulevard and Herlong Road on the north and east sides of the airfield can and should be reserved for mixed use development. As a result, this combination of aviation and non-aviation development including commercial, industrial, or retail opportunities depending upon market demand, would allow HEG to maximize land use within its current property line while providing an additional source of viable revenue.

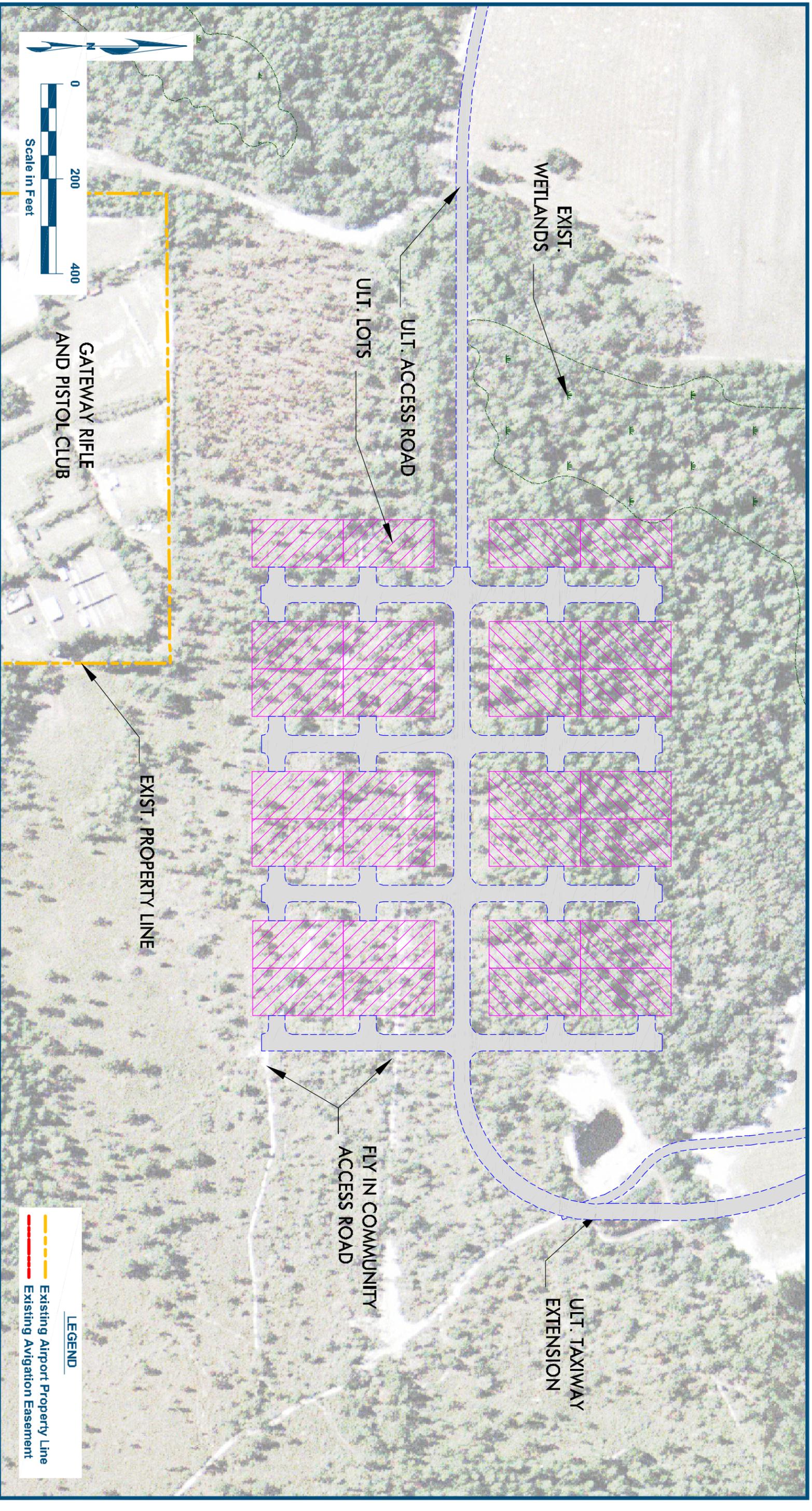


Figure 5-7

Low Density Uses for Approach/Transition Zones

The approach/transition zones for Runway 7, 25 and 29 are unsuitable for most commercial and industrial development due to height limitations and/or obstacle free zone criterion. This area is often designated for low density population use. Many airports have been successful in developing low-density recreational facilities in approach and departure zones. Golf courses are frequently regarded as a good use in this area, although clubhouses and other areas where large groups of people congregate should not be located within the RPZ. Ball fields may be developed outside the RPZ, but caution must be exercised when planning. Caution should also be exercised before planning recreational facilities, even on an interim basis, in areas reserved for future aeronautical development. The required relocation of such facilities may require special environmental approvals.

When considering potential land uses within high noise zones, consideration must also be given to the land use guidelines included within the Airport's approved Noise Compatibility Program, which specifies the level of noise reduction which should be included in structures, local zoning and general compatibility of various types of land uses.

LANDSIDE FACILITIES – BUILDING AREAS

All landside facilities, particularly building areas, are ideally developed to be in balance with the airfield/airspace facilities. At HEG, existing and proposed development areas include:

- GA and related aeronautical development areas
- Commerce Park
- Industrial Park
- Residential Aviation Development

The focus of this section is to evaluate those building areas directly related to support aviation activity. Non-aviation development on-Airport was evaluated in a cursory manner considering location, function and future utility and compatibility with aviation operations.

Building area concepts were conceptualized with the goal of creating a facilities plan that exhibits the following characteristics:

- Flexibility: A plan that is demand-responsive and can adjust over time to changes in quantifiable demands as well as changes in the nature of demand.
- Vision: A plan that addresses probable future aviation trends and technologies, as well as trends in other transportation arenas.
- Definition: A plan that sets a sure course of action for the short-range, and is clearly supported and realistic.
- Order: A plan that views each part of the landside system as a interrelated part of the whole Airport and regional transportation system
- Balance: A plan that can extend the landside to its required fullest extent while maintaining balance with the capacity of the fully expanded airside.
- Convenience: A plan that enables HEG and its tenants to achieve a high level of public service.
- Stability: A plan that properly guides small increments of growth and modification that HEG and its tenants may need over time.
- Economic Soundness: A plan that enables HEG and its tenants to prosper over the years.
- Suitability: A plan that meets the needs of the Airport's tenants and its users.

Table 5-12 presents a cursory summary of estimated building area facility requirements derived from the previous chapter. Although specific years were used to identify forecast levels of development, these years merely represent “triggers” which may or may not coincide with the year that will require the expansion or upgrade of major facilities at the Airport. These requirements were used as the basis for the formulation and evaluation of concept building area concepts. These requirements are based upon an analysis of facilities at HEG and comparisons with other similarly sized airports based upon future levels of projected demand.

**TABLE 5-12
SUMMARY OF BUILDING AREA FACILITY REQUIREMENTS BASED UPON EXISTING OPERATIONAL
CAPACITY/DEMAND**

	Existing 2005	2010	2015	2025
Activity:				
Peak Hour Passengers	17	19	20	22
Aircraft operations				
General Aviation	63,101	66,958	70,828	79,251
Military Rotorcraft	2,240	2,000	2,000	2,000
Total operations	65,341	68,958	72,828	81,251
Based Aircraft	170	179	190	224
Requirements:				
GA Terminal Facilities				
Terminal building (sq ft)	2,000	1,455	1,544	1,723
Parking spaces adjacent to Terminal	5	32	33	37
Public Parking (SY) adjacent to Terminal	220	1,388	1,470	1,634
General Aviation Hangars Required:				
T-hangars	86*	102**	105	114
Conventional Hangars	2	3	3	4
Corporate Hangars	0	6	6	6
Shade Hangars or Other Facilities	0	6	8	15
Apron Space:				
Conventional Hangar Apron (SY)	29,000	37,888	37,888	40,110
Corporate Hangar Apron (SY)	0	3,333	3,333	6,666
Transient Aircraft Apron Requirements (SY)	3,100	1,800	2,160	2,520
Based Aircraft Apron Requirements (SY)	29,000	15,300	16,800	21,300

*Note: Existing T-Hangars includes recently constructed 14-Unit T-Hangar (T-6)

**Note: Based upon existing work program, anticipate 100 existing T-Hangars by 2010.

Source: The LPA Group Incorporated, 2006 and Airport Management

Although it appears that no additional apron space is required to accommodate based and transient aircraft parking demand, it is recommended that new apron areas dedicated to light aircraft activity as well as transient aircraft operations be developed near the north of Taxiway A, adjacent to the proposed turf runway and possibly near the closed runways due to the location, condition and access limitations of existing facilities.

Considering the seemingly endless range of possibilities for facility development, broad concepts were first developed in their long-range configuration to a limited extent of detail in order to understand their potential and reasonableness in relation to anticipated demand. These concepts were then narrowed according to their ability to meet the characteristics described above. As a result, the following landside development area concepts were considered.

GA and Related Aeronautical Development Areas

The existing GA facilities are primarily located on the west side of the airfield adjacent to Normandy Boulevard. Yet, due to limited developable land within the western quadrant of the airfield, additional general aviation development is recommended within the midfield area east of Runway 7 and adjacent to the closed runway facilities. Expansion of facilities located west of Taxiway A and adjacent to the existing Terminal Facilities will be designated as the North GA complex whereas proposed midfield development will be designated as the Midfield GA complex. Favored locations for GA development considered topography, environmental impacts, airfield and roadway access and utilities. These criteria were used to evaluate the preferred facility development for each of the GA areas outlined above.

Establishing areas for specific GA functions allows the airport to maximize on-airport development while separating larger aircraft operations from glider, skydiving and ultra-light activity. Further the development of the midfield area and the redevelopment of the closed runways as taxiways will provide HEG the opportunity to provide not only T-hangar facilities but also the opportunity to develop conventional and corporate storage facilities and expanded apron tie-down facilities.

Aircraft storage facilities at HEG consist of a combination of conventional and T-hangars in addition to aircraft tie-down facilities. Aircraft hangar facilities are provided and managed by the Fixed Based Operator, JAA/Herlong Aviation, which also provides airport management. At the time of this writing, the airport's current T-hangars were operating at 100 percent capacity and 14 T-hangar facilities were in the process of being constructed. Still, based upon the airport's existing waiting list as well as forecast demand, hangar storage demand over the long-term planning period is significant. The proposed development options accommodate the capacity requirements outlined in **Chapter 4, Demand Capacity and Facility Requirements**, while also providing for various leasehold options and diversification of

revenue. The demand for T-hangars in Florida exceeds the ability of the FDOT to meet anticipated demand for storage facilities. Therefore, if HEG were to build T-hangar facilities beyond those required to meet demand, the Airport may likely attract based aircraft tenants beyond those forecast for the twenty-year planning period.

Proposed GA development concepts build upon the airfield concepts evaluated earlier in the report. The following subsections provide a detailed analysis of GA development in conjunction to proposed airfield development. Following an evaluation of the GA concepts, a preferred concept for each (North and Midfield) may be recommended to provide a framework to support and guide future development at the Airport, including support facilities and landside access.

Each GA development considered storm water retention/drainage improvements, airfield capacity and landside and airside access. Each considers the nine fundamental areas for GA facilities, including:

- Airport Operations Area (AOA) – includes all runways, taxiways, Runway Protection Zones (RPZ), obstacle-free areas, and Federal Aviation Regulations (FAR) Part 77 areas that are object free so as not to affect navigable airspace.
- T-Hangars – as required for the planning period based on the anticipated preference for this type of aircraft storage.
- Conventional Hangars – encompassing conventional hangar storage and maintenance hangars provided by the FBOs.
- Based Aircraft Apron – includes the required based aircraft tie-down apron as well as the areas required for aircraft maneuvering.
- Transient Aircraft Apron – consists of the required transient aircraft parking apron, tie-down and the areas required for aircraft fueling.
- Other Apron Areas – includes the apron areas associated with maneuvering aircraft for storage as well as aircraft maintenance.
- Terminal – includes the terminal and office areas for intermodal and FBO operations.
- Automobile Parking – consists of the required vehicular parking for general aviation facilities.

- Corporate Facilities – represent all hangar storage, aircraft apron, and automobile parking areas for aviation-related businesses and private corporations.

All proposed development was evaluated based upon the assessment criteria of best planning tenets: phasing/construction, operational performance, environmental impacts, fiscal factors and community recommendations and acceptance to determine the preferred development concept for each of the proposed GA development areas. Proposed layouts for GA facilities within the North and Midfield quadrants of the airport are shown in **Figures 5-8 through 5-12**, respectively.

North Landside Development

Included in the North Landside development are options for aircraft storage and associated facilities adjacent to the Airport Entrance Road, Bulk Storage hangar, and Taxiway A. As stated, the North Landside Development is located within the west quadrant of the airfield adjacent to Taxiway A and Normandy Boulevard. This sector contains the majority of development on the airport including aircraft storage, terminal facilities, fuel facilities, aircraft tie-down and automobile parking. Three GA development layouts for this zone were identified and include hangar development, apron expansion and construction, access road improvements, fence line adjustment, surface parking, and airfield access improvements. Order of magnitude cost estimates for each concept is provided in 2006 dollars, and development is shown through the long-term planning period.

Several concepts were considered for the development of the North district including the various undeveloped areas north of the existing FBO and west of T-hangar 10. Due to the anticipated cost of wetland mitigation, development in specific areas was limited. Proposed development consists of aviation development, including hangar storage facilities, apron, automobile parking and access roads. All three concepts considered surface and airfield access, potential environmental impacts, operational considerations, including Part 77 height requirements, facility demand and revenue diversification.

North Landside Concept 1

Concept 1 proposes that aviation and non-aviation tenants continue to use the bulk hangar office facilities, while available lease hold areas would be primarily developed for aircraft storage facilities. Access to on-airport storage, including T-hangar and conventional hangar facilities is provided via the Airport Entrance Road as well as Normandy Boulevard. North Landside Concept 1, shown in **Figure 5-8**, proposes a variety of hangar storage facilities to accommodate small and medium sized aircraft via T-hangars and conventional hangars. T-hangar facilities are to be constructed west of the existing T-Hangars north of the West Apron, and three 100 x 220-foot conventional hangars are to be constructed



between the existing FBO/Bulk Hangar facility and Normandy Boulevard. Access to both the T-hangars and conventional hangars will require a realignment of the T-Hangar access road via the Airport Entrance Road. All the proposed facilities have airside access to Taxiway A via taxiway connectors, and surface parking is provided adjacent to the facilities.

Projects associated with North Landside Concept 1 include construction of:

- One 12-unit T-hangar
- Three (3) 100 x 220-foot Conventional Hangar
- Approximately 3500 SY of Apron Space
- Relocation of T-Hangar Access Road
- Construction of four (4) 35-foot wide Taxilanes
- Approximately 75 parking spaces,
- Access Road Relocation and Extension
- Drainage Improvements, and
- Fencing Relocation

Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-13**.

TABLE 5-13 NORTH LANDSIDE CONCEPT 1 PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
12 T-hangar Units	\$1,045,840
3 100' x 220' Conventional Hangars	\$10,318,348
Construction of Conventional Hangar Apron	\$442,123
Construction of Additional Surface Parking	\$337,798
Access Road Relocation and Extension	\$103,875
Fencing Relocation	\$7,470
Drainage Improvements	\$23,000
Total Phase I Development Costs¹	\$12,478,503
¹ Project Costs include 20% engineering and contingency fee	
Source: The LPA Group, Incorporated, 2006	

A comparison of the anticipated impacts associated with the proposed development is outlined below:

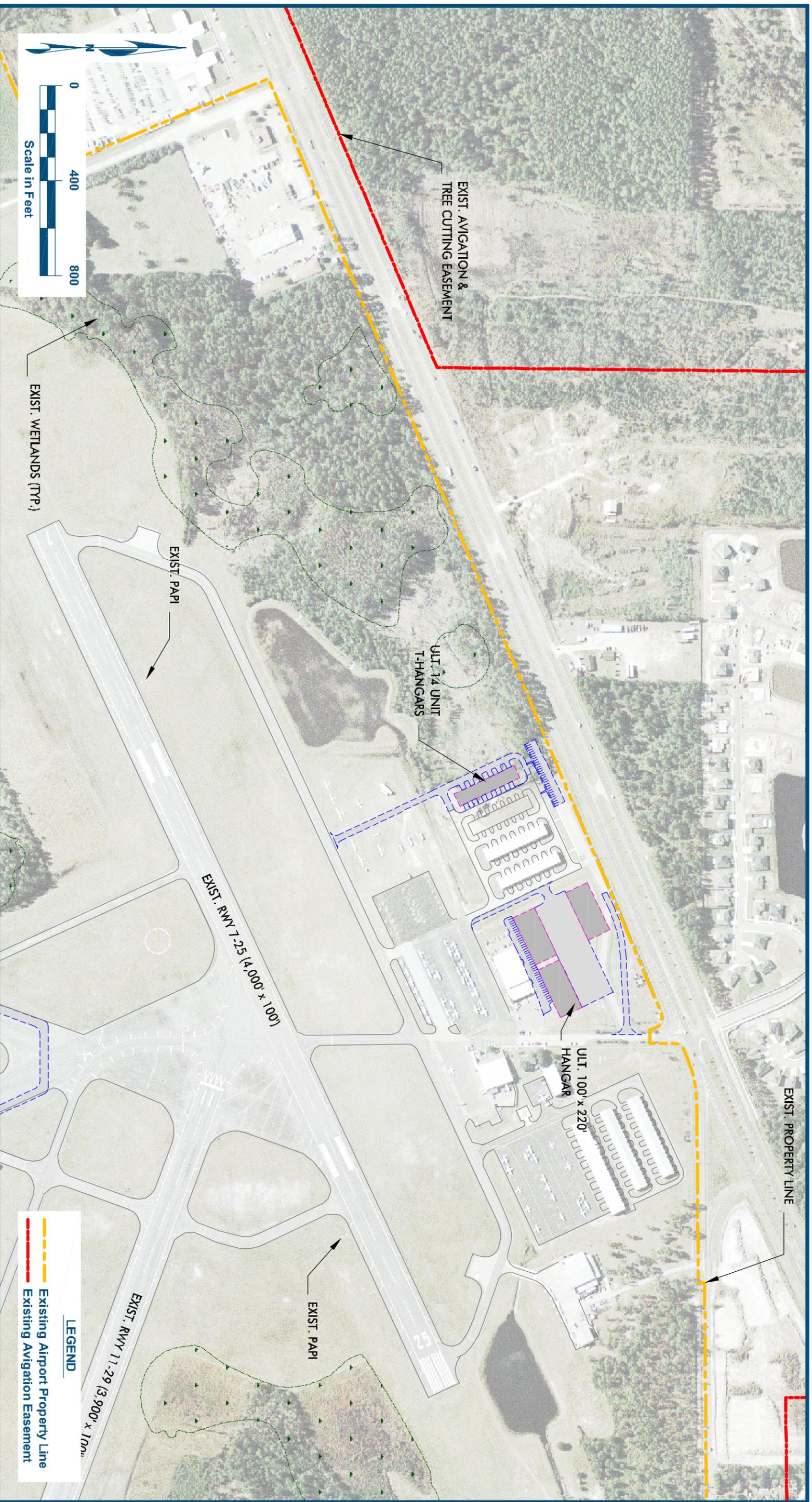


Figure 5-8

NORTH LANDSIDE DEVELOPMENT CONCEPT 1	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Utilizes existing airport property and requires no land acquisition 2. Provides a mix of aircraft storage facilities 3. Provides adequate automobile parking 	<ol style="list-style-type: none"> 1. Requires fence line adjustment to accommodate development 2. Will require drainage improvements of approximately \$23,000 3. Does not meet T-hangar demand over the long-term planning period. 4. Cost = \$12.5 million 5. Requires the relocation of the T-Hangar Access Road

North Landside Concept 2

North Landside Concept 2, shown in **Figure 5-9**, also proposes a mix of hangar storage facilities to accommodate small and medium sized aircraft via T-hangars and conventional hangars. T-Hangar facilities are provided throughout the north side, including west of the existing T-hangars adjacent to the retention pond, north of the bulk hangar facility, and south of T-hangars 1, 2 and 3. Conventional hangars will be constructed north of the Mercair Facilities adjacent to T-hangars 1, 2 and 3. Landside access is primarily provided via the Airport Entrance Road. Automobile parking is provided adjacent to both the T-hangar and Conventional aircraft storage facilities. Airside access for all development is provided via taxi lanes to Taxiway A and the East and West Aprons.

Projects associated with North Landside Concept 2 include construction of:

One 12-Unit T-Hangars

- Two 22-Unit T-Hangars
- Three 14-Unit T-Hangars
- Two 100' x 170' Conventional Hangars
- Expansion of West Apron
- Construction of Approximately 3,800 SY Conventional Hangar Apron
- Expansion of East Apron north of Taxiway A,
- Relocation of T-Hangar Access Road

- Construction of 25 parking spaces
- Drainage Improvements, and
- Taxilane Construction

Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-14**.

TABLE 5-14 NORTH LANDSIDE CONCEPT 2 PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
One 12-Unit T-Hangars	\$1,045,840
Two 22-Unit T-Hangars	\$3,834,747
Three 14-Unit T-Hangars	\$3,660,440
Two 100 x 170-foot Conventional Hangars	\$5,119,470
Expansion of West Apron	\$471,050
Conventional Hangar Apron (3,800 SY)	\$478,800
Expansion of East Apron	\$1,570,582
Relocation of T-Hangar Access Road	\$103,875
Construction of Surface Parking	\$186,204
Drainage Improvements	\$200,000
Taxilane Construction	\$165,800
Fenceline Relocation	\$9,780
Total Phase I Development Costs¹	\$16,846,588

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated, 2006

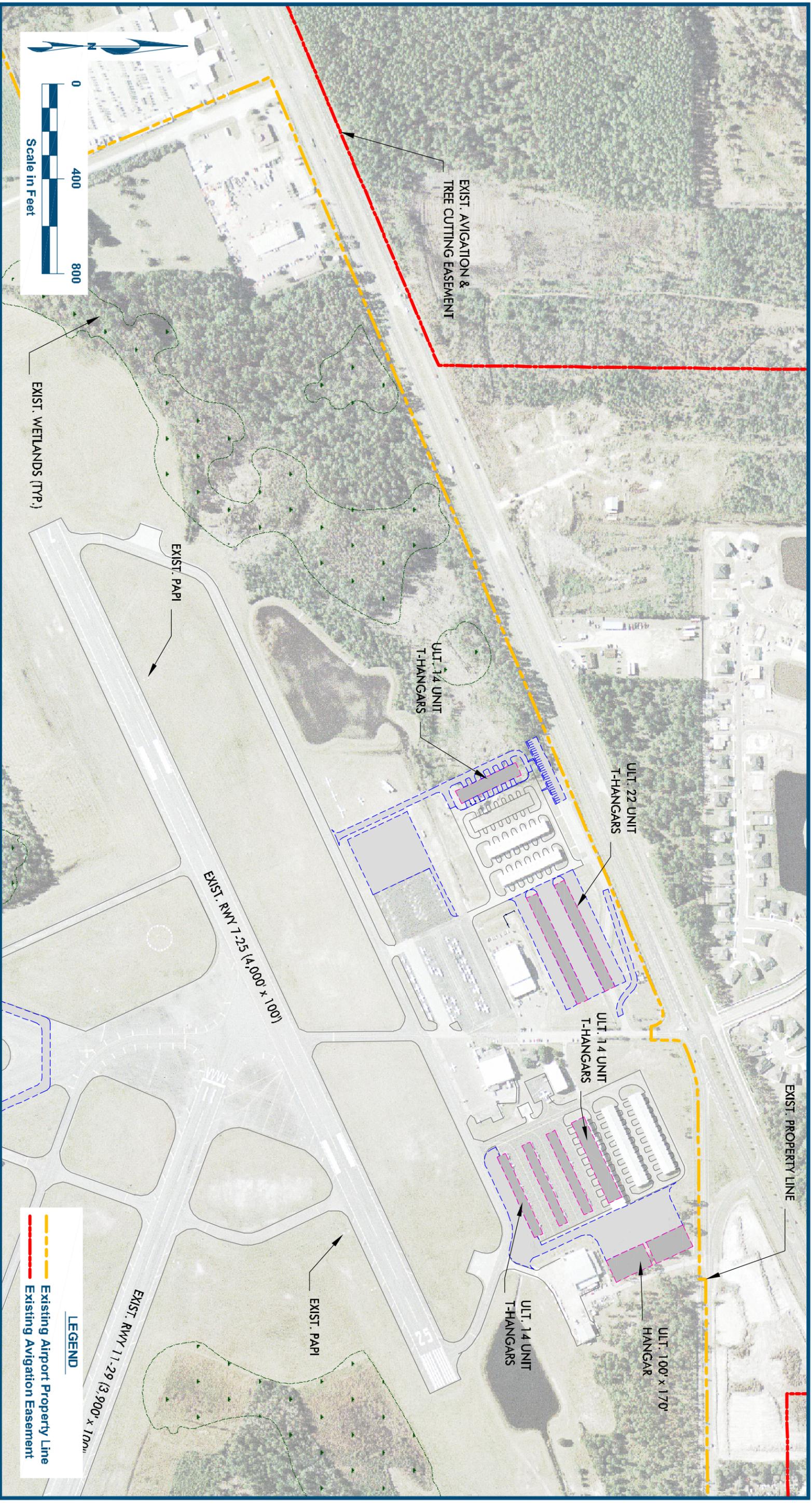


Figure 5-9

A comparison of the anticipated impacts associated with the proposed development is outlined below:

NORTH LANDSIDE DEVELOPMENT CONCEPT 2	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Utilizes existing airport property, therefore, no land acquisition required 2. Provides mix of aircraft storage facilities 3. Accommodates long-term automobile parking and aircraft apron space 4. Accommodates short and mid-term T-Hangar demand 	<ol style="list-style-type: none"> 1. Will require additional drainage improvements 2. Will require realignment of internal T-Hangar Access Road 3. Will require relocation of Fence line 4. Cost is approximately \$16.8 5. Does not accommodate forecast corporate demand

North Landside Concept 3

North Landside Concept 3, shown in **Figure 5-10**, provides a variety of aviation storage facilities including: T-hangar, corporate, conventional and shade hangars. This concept accommodates mid to long-term aviation storage demand and improves landside and airfield access with the realignment of the Airport Entrance Road. As part of aircraft storage development, additional taxi lanes will be constructed as well as auto parking facilities. T-hangars will be constructed along the East and West Apron areas and conventional and corporate hangar facilities will be constructed north of Taxiway A and behind the FBO/Bulk Hangar.

Projects associated with North Landside Concept 3 include construction of:

- Three 14-Unit T-Hangars
- Three 100 x 100-foot Corporate Hangars
- One 100 x 120-foot Corporate Hangar
- One 70 x 70-foot Corporate Hangar
- Two 60 x 60-foot Corporate Hangars
- Two 100 x 170-foot Conventional Hangars
- One 14-Unit T-Hangar
- Two 14-Unit Shadeports
- West Apron Expansion

- Conventional and Corporate Hangar Apron Construction
- Airport Entrance Road Realignment
- Realignment and construction of additional surface parking
- Improvements to Drainage Facilities
- Construction of Taxilanes, and
- Fence line Relocation

Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-15**.

TABLE 5-15 NORTH LANDSIDE CONCEPT 3 PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Three 12-Unit nested T-Hangars	\$3,137,520
Three 100' x 100' Corporate Hangars	\$4,690,158
One 100' x 120' Corporate Hangar	\$1,848,057
One 70' x 70' Corporate Hangar	\$805,952
Two 60' x 60' Corporate Hangars	\$1,133,324
One 8-Unit T-Hangar	\$697,227
Two 100' x 170' Conventional Hangars	\$5,119,470
One 14-Unit nested T-Hangar	\$1,220,147
Two 14-Unit nested Shadeports	\$168,000
West Apron Expansion	\$771,050
East Apron Expansion (13,424 SY)	\$1,570,582
Conventional and Corporate Hangar Apron Construction	\$273,214
Airport Entrance Road Realignment	\$103,875
Construction and Realignment of Surface Parking	\$112,800
Drainage Improvements	\$200,000
Relocate Access Road to T-Hangars 1, 2 and 3	\$103,875
Taxilane Construction	\$283,530
Perimeter Fence line Realignment	\$25,600
Automobile Parking	\$134,704
North Landside Concept 3 Preliminary Costs¹	\$22,399,085

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated, 2006



Figure 5-10

A comparison of the anticipated impacts associated with the proposed development is outlined below:

NORTH LANDSIDE DEVELOPMENT CONCEPT 3	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Utilizes existing Airport property and doesn't require land acquisition 2. Provides a mix of facilities for aircraft hangar storage 3. Accommodates long-term Aircraft Storage Demand 4. Provides long-term automobile parking facilities and aircraft ramp space 5. Relocation of Entrance Road allows for existing parking realignment, and improved access. 6. Allows for expansion of Terminal and existing airport tenant facilities 	<ol style="list-style-type: none"> 1. Requires fence line adjustment to accommodate development 2. Will require additional drainage facilities 3. Significant cost: \$22.3 million

Evaluation Criteria

A single concept or a combination of elements from two or more concepts presented will serve as the framework for future development. Concepts were evaluated within this section to weigh the inherent strengths and weaknesses of each in comparison to each other and based upon the following evaluation criteria.

- Ease of implementation
- Efficiency in meeting facility requirements
- Engineering factors
- Phasing
- Airside and landside accessibility
- Environmental impacts
- Integration with the airfield
- Ease of ground access to existing and future roadways
- Impact to other aviation related uses on the Airport,
- Overall cost of development, and
- Availability of requisite infrastructure

Table 5-16 presents an evaluation matrix that addresses the aforementioned criteria. This matrix summarizes the consultant's analyses of the development concepts presented in the following paragraphs

	Concept 1	Concept 2	Concept 3
	Rating	Rating	Rating
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent			
Best Planning Tenets			
Meets Facility Requirements	2	4	5
Availability of requisite Infrastructure	2	3	4
Ease of implementation	4	4	4
Conforms to Sponsor's vision	1	4	5
Phasing/Construction			
Ability to Phase Construction/Expansion	5	5	5
Impact on existing facilities	4	4	5
Engineering or Land Build-out Requirements	4	4	4
Operational Performance			
Airside and landside accessibility	4	4	4
Integration with the airfield	4	3	4
Ease of ground access to existing and future roadways	4	4	5
Impact to other aviation related uses	3	4	5
Environmental Impacts	4	4	4
Fiscal Factors			
Cost Estimates	4	3	3
Subtotal	45	50	57
Average	3.46	3.85	4.38

Source: The LPA Group Incorporated, 2006

Recommended North Landside Development

Recommended North Landside development consists primarily upon development outlined in Concept III. However, proposed shade hangars along the east apron would be replaced by T-hangars as shown in Concept II. Concept III provides a mix of conventional, corporate and T-Hangar as well as automobile parking and aircraft ramp space necessary to accommodate mid to long-term demand. The preferred concept identifies hangar space likely to accommodate projected changes in operational fleet mix and conforms to both the Sponsor's and airport users strategic vision.

Potential Environmental Impacts

The project location for the proposed North Landside Development is located within a developed area, which does not contain wetlands or suitable protected species habitat. Therefore, no wetland or protected species impacts are anticipated as a result of the project.

Regulatory Requirements

FAA National Policy Order 1050.1E Change 1 contains policies and procedures for compliance with the National Environment Policy Act (NEPA). Environmental survey and documentation will be required to determine if the proposed project(s) have a significant impact on the human environment. Based upon the literature review and a preliminary environmental survey, proposed projects would likely be processed as a Categorical Exclusion (**FAA Order 1050.1E Change 1 Chapter 310**). However, the runway and parallel taxiway projects proposed may or may not require an environmental assessment. A further evaluation of potential impacts will be required prior to design and construction.

State Permit

According to **Florida Administrative Code (F.A.C.) Chapter 40C-4**, *Environmental Resource Permits for Surface Water Management Systems*, the proposed development will require a St. John's River Water Management District (SJRWMD) Environmental Resource Permit (ERP) in order to meet stormwater runoff treatment and water quality regulatory requirements.

City of Jacksonville Concurrency Compliance

The City of Jacksonville has implemented a Concurrency Management System Ordinance, Chapter 655, of the Ordinance Code to provide a local structure for administering state law. The concurrency requirement mandates that before any proposed development can obtain a final development order, it must be demonstrated that its impact can be adequately absorbed by the existing public facilities scheduled to serve it (Section 655.105(r) Ordinance Code). If it is determined that a public facility cannot absorb a proposed development's impact, the project cannot go forward until the situation is corrected. However, according to state law, projects may be grandfathered if the proposed development is included in an approved development plan prior to a date covered in the law.

Improvements subject to concurrency requirements include: final engineering drawings for any new subdivision; building permits for any new buildings, non-residential additions or accessory building, new mobile home move on, trailer parks or camps; building permits for any non-residential alterations

or repairs, residential and non-residential foundations only, converting uses or "other" types of development not found to be de minimis development.

However, Florida Statutes Chapter 163.3180, Concurrency, states that "A local government may grant an exception from the concurrency requirement for transportation facilities if the proposed development is otherwise consistent with the adopted local government comprehensive plan and is a project that promotes public transportation or is located within an area designated in the comprehensive plan for: urban infill development, urban redevelopment or downtown revitalization. ... Further, "Each local government may adopt as part of its long-term development transportation concurrency management system with a planning period of up to 10 years for specially designated districts where a backlog exists."²

In addition, under Chapter 655.108, Exemptions; completed structures; de minimis development, "not all development or development activity impacts area significant enough to cause a deterioration in the levels of service as adopted in the City of Jacksonville 2010 Comprehensive Plan." A de minimis impact is defined as an impact that would not exceed one (1) percent of maximum volume of the adopted level of service as determined by the local government.

According to COJ, the following development shall be exempt from concurrency management system (CMS) review:

- "A change in the use of a structure completed as of April 25, 1991, without addition of square footage, from a lawful use within a presently applicable zoning district to a similar permitted use within the same zoning district.
- A development with a vehicular trip generation rate of ten or less average daily trips (ADT) according to the latest ITE Trip Generation Manual, and
- All public facilities necessary to ensure the protection of the health, safety and general welfare of the citizens of the City of Jacksonville, including all public facility construction projects included in the Capital Improvement Program and Capital Improvement Element of the 2010 Comprehensive plan which are required to ensure compliance with all adopted levels of service, shall be exempt from concurrency review."³

² 2006 Florida Statutes, Part II, Growth Policy; County and Municipal Planning; Land Development Regulation, Chapter 163.3180, Concurrency, 5(b) and (e)

³ 2007 City of Jacksonville Concurrency Management System Ordinance, Chapter 655, Sections 108, Exemptions; Completed Structures; de minimis development.

Since it is anticipated that proposed on-airport development will impact to some degree existing public use facilities, coordination with the COJ's Concurrency Management Office is recommended. In an effort to facilitate this process, members of the COJ Planning Department participated on the Technical Advisory Committee. It was recommended that for all future development that JAA obtain a Concurrency Reservation Certificate in order to obtain long-term commitments from the City. Although detailed roadway concurrency issues are not part of this scope of work, it was important to note that portions of Normandy Boulevard and Herlong Road have already exceeded their capacity according to the City of Jacksonville Road Links Status Report, dated February 2007. As a result, further on-airport development and actions should be coordinated with the City prior to design as part of the City's efforts to improve access in and around HEG.

Midfield Concept Development

Several general aviation concepts were considered for the grassy area adjacent and between the closed runways. A few box hangar facilities are currently located adjacent to the closed runways, but no utilities are located on the Southside of the airfield. As part of any proposed development, utilities, roadway access and possibly wetland mitigation will need to be considered. As outlined in Airfield Concepts 1 through 3, the closed runways will be redeveloped as taxiways to provide access to existing and proposed development.

Proposed development consists of hangar storage facilities, maintenance hangars, apron, automobile parking and access roads that support aviation growth. Considering surface and airfield access, environmental impacts, operational considerations, including Part 77 height requirements, facility demand and revenue diversification, two concepts for the Midfield GA Aviation Complex were developed.

Midfield Concept 1

Midfield Concept 1, shown in **Figure 5-11**, proposes a variety of hangar storage facilities to accommodate small and medium sized aircraft via T-hangars, box hangars and corporate hangars. In addition to hangar storage facilities, tie-down storage is also proposed for this area. A 100 foot x 150 foot hangar is constructed in the northern section of the midfield. This hangar serves as a secondary FBO or an aircraft maintenance facility, while the associated apron is used for aircraft parking. Directly to the south of the FBO/maintenance hangar, three rows of T-hangars are constructed, while four rows

of corporate hangars are constructed to the south of the FBO/maintenance apron.

Further to the south of the proposed T-hangars, a corporate hangar complex is constructed. Landside access to the all the new development is provided via the existing airport perimeter road to the south of the airfield. The perimeter road runs north-south along the side of each taxiway. The taxiway to the south is converted into an east-west access road. Automobile parking for the proposed corporate hangars and the FBO/maintenance hangar is constructed to the rear of these facilities, while automobile parking for the box hangars is located to the south of the hangars. All the proposed facilities have airside access to converted taxi lanes via taxiway connectors.

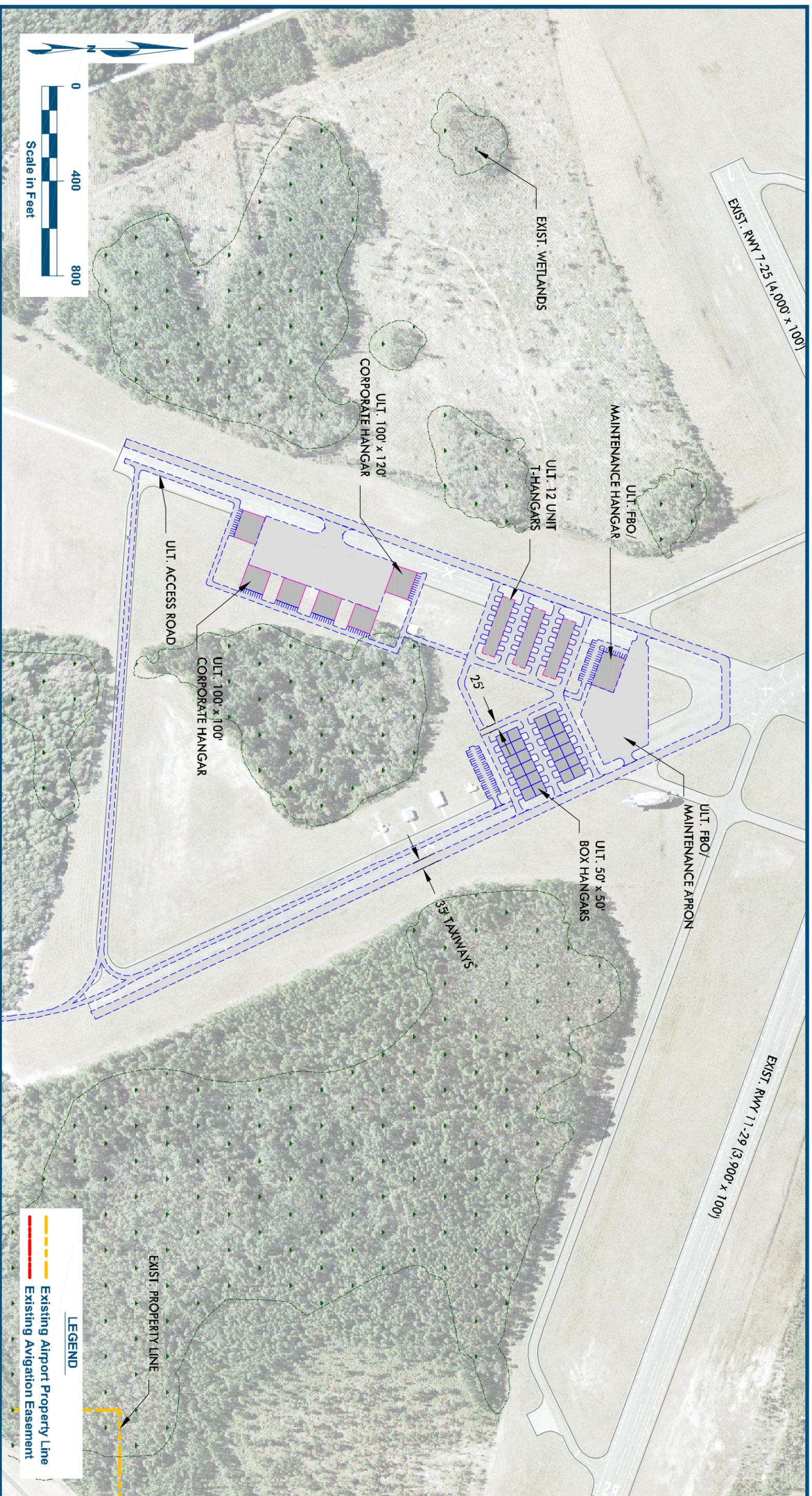


Figure 5-11

Projects associated with Midfield GA Concept 1 include construction of:

- Three (3) 12-unit T-Hangars
- One (1) 100 x 150-foot FBO/Maintenance office and hangar
- Twenty-four (24) 50 x 50-foot Corporate Hangars
- Four (4) 100 x 100-foot Corporate Hangars
- Two (2) 100 x 120-foot Corporate Hangars
- FBO/Maintenance Apron
- Corporate Hangar Apron
- Access Road Construction
- Automobile Parking
- Fenceline Realignment
- Taxilane Construction,
- Utility Installation, and
- Drainage Improvements

Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-17**.

TABLE 5-17 MIDFIELD CONCEPT 1 PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Three 12-unit T-hangars	\$3,137,520
One (1) 100 x 150-foot FBO Offices & Hangar	\$2,275,064
24 50 x 50-foot Corporate Hangars	\$9,380,304
Four 100 x 100-foot Corporate Hangars	\$8,708,667
Two 100 x 120-foot Corporate Hangars	\$3,697,000
FBO/Maintenance Apron	\$3,430,855
Corporate Area Aprons	\$1,736,000
Access Road Construction	\$2,261,659
Surface Parking	\$331,042
Taxi lane Construction	\$977,480
Electrical Utility Installation*	\$800,000
Drainage Improvements*	\$450,000
Total Development Costs¹	\$37,185,591

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated, 2006

A comparison of the anticipated impacts associated with the proposed development is outlined below:

MIDFIELD GA DEVELOPMENT CONCEPT 1	
<i>Source: The LPA Group Incorporated, 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Utilizes existing airport property and doesn't require land acquisition 2. Provides a mix of aircraft storage facilities 3. Provides parking, hangar and apron for growth beyond the forecast years. 4. Exceeds corporate and conventional hangar demand 5. Provides for an additional FBO facility or maintenance facility 	<ol style="list-style-type: none"> 1. Will require storm water/drainage retention facilities 2. No utilities (i.e. electricity, water, sewer, etc.) 3. Initial Costs ~\$37.1 million for structural development only 4. Limits tie-down facilities

Midfield Concept 2

Midfield GA Concept 2, shown in **Figure 5-12**, also proposes a variety of hangar storage facilities including T-hangars, corporate hangars, and conventional hangars. In addition to hangar storage facilities, tie down storage was also provided. The tie-downs are located to the north section of the Midfield. Two rows of corporate hangars are constructed to the south of the tie downs. Four rows of T-hangars are constructed south of the corporate hangars. The conventional hangar complex is constructed to the south of the T-hangars. A 100 foot x 150 foot hangar is constructed in the south west side of the conventional hangar complex. This hangar serves as a secondary FBO or an aircraft maintenance facility, while the associated apron is used for aircraft parking. Landside access to new development is provided via the existing perimeter road to the south of the airfield. As a result, the taxiway to the south is converted into an east-west access road. Automobile parking for the proposed conventional hangars and the FBO/maintenance hangar is constructed to the rear of these facilities, while tenants of the corporate hangars and T-hangars typically park their automobile in their hangars. All the proposed facilities have airside access to converted taxi lanes via taxiway connectors. This alternative provides JAA with additional flexibility for future development, and accommodates anticipated demand beyond the twenty-year planning period.

Projects associated with Midfield GA Concept 2 include construction of:

- Sixteen (16) 50 x 50-foot Corporate Hangars
- Four (4) 12-unit T-Hangars
- Four (4) 120 x 100-foot Hangars
- 150 x 100-foot Conventional Hangar
- Hangar Apron
- FBO/Maintenance Facility
- FBO/Maintenance Apron
- Tie-Down Apron
- Surface Parking
- Access Road Extension
- Taxilane Construction
- Drainage Improvements, and
- Installation of Utilities

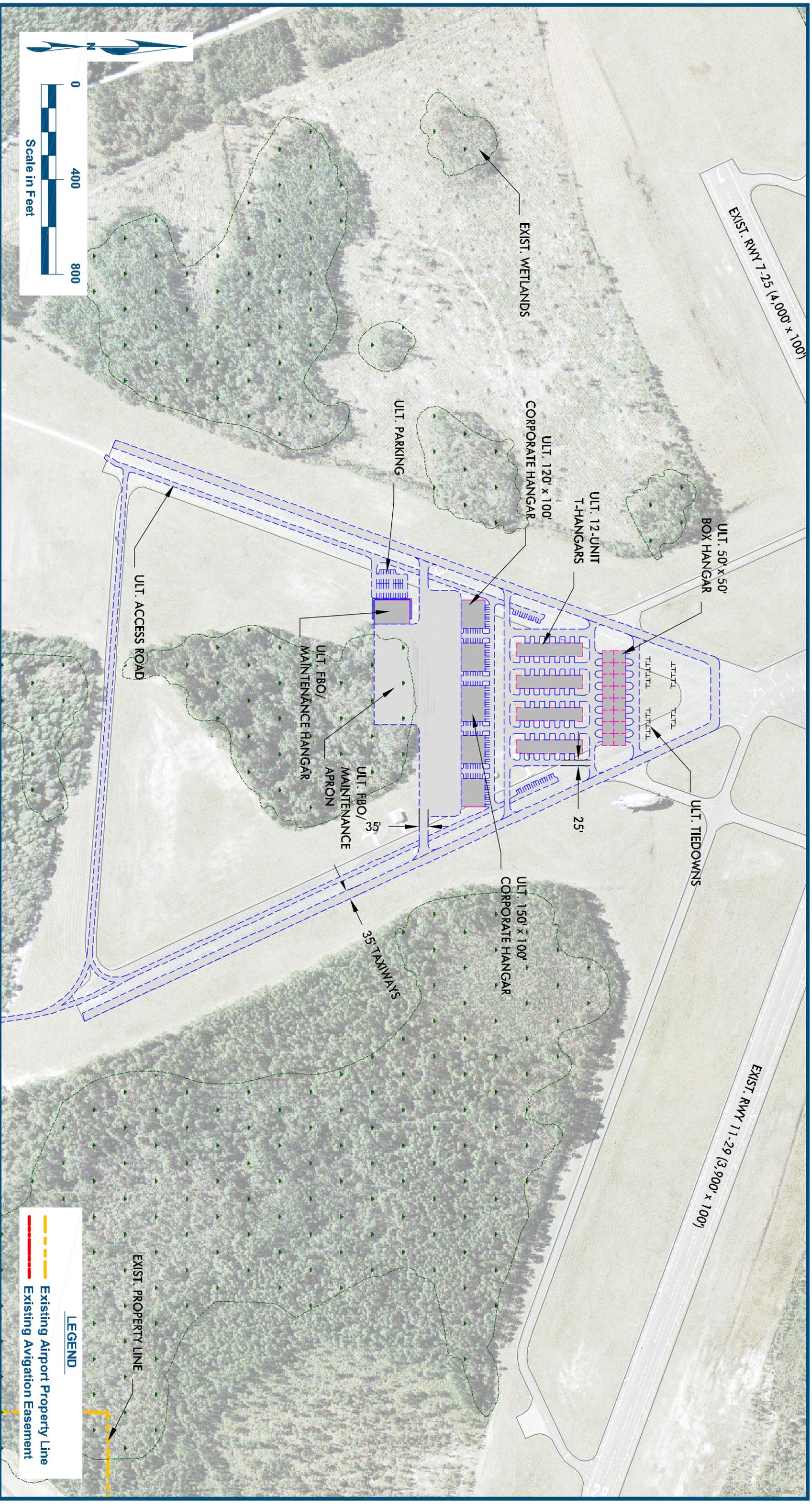
Additional construction associated with the hangar development includes fence line adjustments, construction of two taxiway connectors and the widening of one taxiway connector. Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-18**.

TABLE 5-18 MIDFIELD CONCEPT 2 PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
16 50 x 50-foot Corporate Hangars	\$6,253,536
Four 12-unit T-Hangars	\$4,183,360
Four 120 x 100-foot Corporate Hangars	\$7,392,228
150 x 100-foot Conventional Hangar	\$2,345,079
Hangar Apron	\$882,000
FBO/Maintenance Facility	\$2,275,064
FBO/Maintenance Apron	\$3,430,855
Tie-Down Apron	\$168,000
Surface Parking	\$331,042
Access Road Construction	\$2,261,659
Taxilane Construction	\$977,480
Drainage Improvements*	\$450,000
Electrical Utilities*	\$800,000
Preliminary Development Costs¹	\$31,750,303

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated, 2006.

MIDFIELD GA DEVELOPMENT CONCEPT 2	
<i>Source: The LPA Group, Incorporated 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Utilizes existing airport property and doesn't require land acquisitions 2. Provides a mix of aircraft storage facilities 3. Exceeds automobile parking, hangar and apron space requirements 4. Exceeds corporate and conventional hangar demand 5. Provides for an additional FBO facility or maintenance facility 	<ol style="list-style-type: none"> 1. Will require drainage improvements 2. Will require utility installation 3. Will require access road extension and realignment 4. Significant cost for development (~\$31.7 million)



LEGEND

- Existing Airport Property Line
- Existing Avigation Easement



Figure 5-12

Evaluation Criteria

The Airport development plans described previously for Midfield GA development outline the necessary facility improvements to meet forecast demand while creating an environment for future diversification and development as well as fiscal viability. In evaluating landside and airside elements associated with the Midfield GA Development, each concept was weighed as to its inherent strengths and weaknesses in comparison to other concepts as well as against the evaluation criteria outlined in **Table 5-19**.

TABLE 5-19		
MIDFIELD GA DEVELOPMENT EVALUATION MATRIX		
	Concept 1	Concept 2
	Rating	Rating
Legend: 1. Poor 2. Fair 3. Satisfactory 4. Very Good 5. Excellent		
Best Planning Tenets		
Meets Facility Requirements	4	5
Availability of requisite Infrastructure	1	1
Ease of implementation	3	3
Conforms to Sponsor's vision	4	3
Phasing/Construction		
Ability to Phase Construction/Expansion	4	4
Impact on existing facilities	4	4
Engineering or Land Build-out Requirements	4	4
Operational Performance		
Airside and landside accessibility	4	4
Integration with the airfield	4	4
Ease of ground access to existing and future roadways	3	3
Impact to other aviation related uses	3	4
Environmental Impacts	2	2
Fiscal Factors		
Cost Estimates	2	2
Subtotal	42	43
Average	3.23	3.31

Source: The LPA Group Incorporated, 2006

Recommended Midfield Development

The recommended development option for the Midfield at HEG considered all input and recommendations provided by JAA Staff, Airport Management, the TAC, and the general public.

Although both concepts are similar in terms of hangar and apron space, the orientation and layout of Concept II is more favorable with respect to its integration with the rest of the airfield and its impact to other aviation related uses. Both concepts provide a mix of hangar facilities, including large corporate hangars and a maintenance hangar, each varying in size and quantity. In addition, the recommended concept also provides space for aircraft tie-downs. Concept II centralizes these facilities and developments, allowing better integration and adjacency with parking, aircraft storage areas and roadway access. Therefore, it is recommended that Concept II for the Midfield GA Development Area be implemented.

Potential Environmental Impact

The Mid-Field Development is proposed within a developed area that contains a wetland and unsuitable upland habitat for protected species. Minimal impacts to the wetland or wetland-dependent protected species are anticipated as a result of the proposed development. No impact to upland-dependent protected species is anticipated as a result of the proposed development.

Regulatory Requirements

An environmental survey and documentation will be necessary to determine if the proposed development would have a significant effect on the human environment. According to the results of the literature review and preliminary environmental survey, the proposed development has the potential for minimal wetland impacts and would likely be classified as a Categorical Exclusion or a Categorical Exclusion with Environmental Conditions.

State Permit

The proposed development will also require an ERP from SJRWMD, in order to meet wetlands, stormwater runoff treatment, and water quality regulatory requirements. The ERP application also serves as an application for a United States Army Corps of Engineers (COE) Dredge and Fill (Section 404) permit.

City of Jacksonville Concurrency Issues

Since it is anticipated that proposed development will impact Normandy Boulevard as well as future wastewater treatment, power substations, potable water etc., JAA in coordination with the City of Jacksonville, must coordinate development over the twenty year planning period. Prior to design and

construction, JAA should apply for a Concurrency Reservation in order to limit possible development within the vicinity of the airport that negatively impacts future development. Prior to development, the FAA will require a Cost-Benefit Analysis in order to provide funding. Concurrency issues related to utilities and access should be addressed at this time.

Industrial/Commerce Park Development

As discussed earlier, three sectors of the airport were identified for potential commerce and industrial park development. These sectors include: the West Zone adjacent to Normandy Boulevard and the Advanced Disposal Site, the East Zone located between Runways 29 and 25, and the South Zone on the property south of the closed runways. All three areas provide potential for future development and additional revenue generation. Order of magnitude costs and impacts for each region are outlined in the following paragraphs.

West Industrial Development

Proposed west industrial development is located north of Taxiway A and adjacent to various on-airport lease holds including Advanced Disposal and National Guard. A preliminary layout of potential commercial development is shown in **Figure 5-13, West Industrial Zone**. The west industrial zone consists of approximately 84.4 acres of land providing direct access to Normandy Blvd. Due to the location of existing businesses along Normandy, an access road off of Normandy will be constructed to provide access to storage facilities, offices and possibly a restaurant to be located south of existing businesses. The location is ideal for short-term industrial and business development because of surface access, availability of utilities, and limited pre-development costs compared to the South and West development zones.

Potential projects associated with the West Industrial Park development include:

- Preliminary Site Development
- Airport Fence line relocation
- Access Road Construction, including lighting, drainage, and markings
- Extension and expansion of utilities
- Construction of x facilities, including parking
- Construction of Restaurant, including parking, and

- Drainage Improvements

Preliminary order of magnitude costs associated with development are included in **Table 5-20**. It is important to note that JAA may only be required to cover the cost of preliminary site development, fence line relocation and the installation or expansion of utilities. Thus, allowing potential tenants to incur the cost of development. It is recommended that revenue streams associated with industrial and commercial development include land rather than building leases.

TABLE 5-20 WEST INDUSTRIAL PARK DEVELOPMENT PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Preliminary Site Development	\$200,000
Fence line Relocation	\$15,000
Roadway Improvements and access	\$546,000
Restaurant Construction, including Parking	\$5,000,000
Drainage Improvements	\$123,500
Total Development Costs¹	\$5,844,500

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated 2006

WEST INDUSTRIAL PARK DEVELOPMENT	
<i>Source: The LPA Group, Incorporated 2006</i>	
Strengths	Weaknesses

<ol style="list-style-type: none"> 1. Provides an additional source of on-going revenue 2. Utilizes existing airport property 3. Provides a buffer between airport development and off-airport residential development 4. May attract both aviation and non-aviation businesses 5. Provides facilities for the benefit of the community as a whole 6. Access to Normandy Blvd, and proximity to existing utilities 7. Compatible land use 	<ol style="list-style-type: none"> 1. Approximately \$ for pre-development 2. Expansion of utilities required 3. Fence line will need to be realigned 4. Access road and pre-development costs 5. Likely to increase demand on Normandy Blvd
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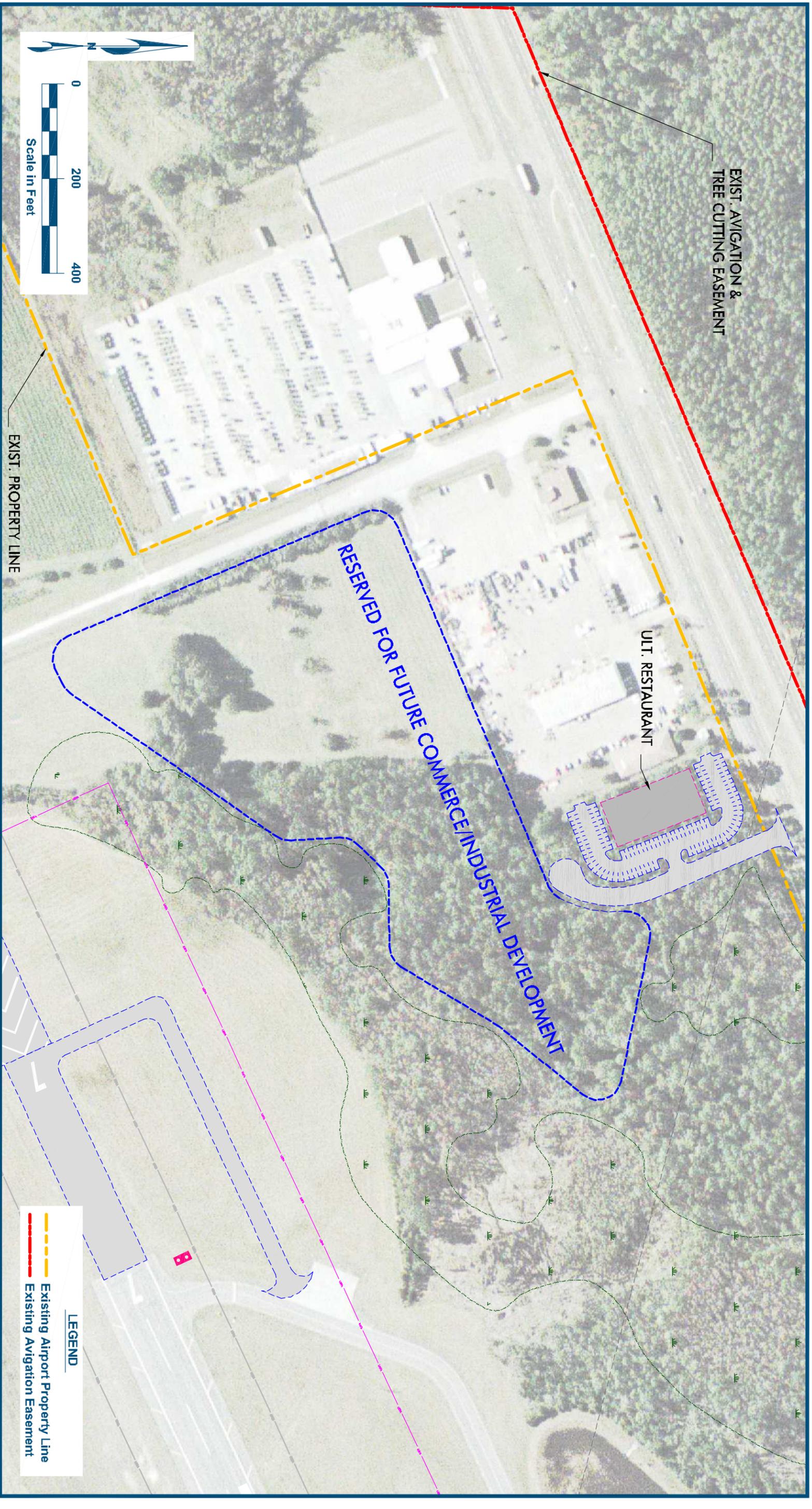


Figure 5-13

East Commerce Park Development

The proposed East Commerce Park is recommended to be located within the currently undeveloped portion of the airfield between Runways 25 and 29. The Commerce Park would primarily consist of office buildings as well as some storage facilities. Access to the proposed Commerce Park would likely be provided via Herlong Boulevard in order to limit potential impact to existing wetlands. Proposed development would be located on upland areas adjacent to Runway 29. A preliminary drawing of potential development is provided in **Figure 5-14**. Projects associated with preliminary development include:

- Site Pre-development
- East Commerce Park Access Road and Auto Parking
- Construct 30 10,000 SF Office Buildings, including parking
- Construct five (5) 20,000 SF Office Buildings, including parking
- Utilities (Water, Sewer, Electrical, etc)
- Drainage improvements, and
- Airport Fence Line Relocation

Preliminary costs associated with proposed commerce park development are outlined in **Table 5-21**. However, if JAA provides a land lease only for proposed development, then the anticipated cost will be significantly lower (~6.4 million).

TABLE 5-21 EAST COMMERCE PARK DEVELOPMENT PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
Site Pre-Development	\$300,000
Access Road and Auto Parking	\$3,945,216
Construct 30 10,000 SF Office Buildings	\$37,055,000
Construct five 20,000 SF Office Buildings	\$12,351,110
Utilities*	\$1,105,050
Drainage Improvements	\$900,000
Fence line adjustment	\$223,000
Total Development Costs¹	\$55,879,376

* Estimate

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated 2006



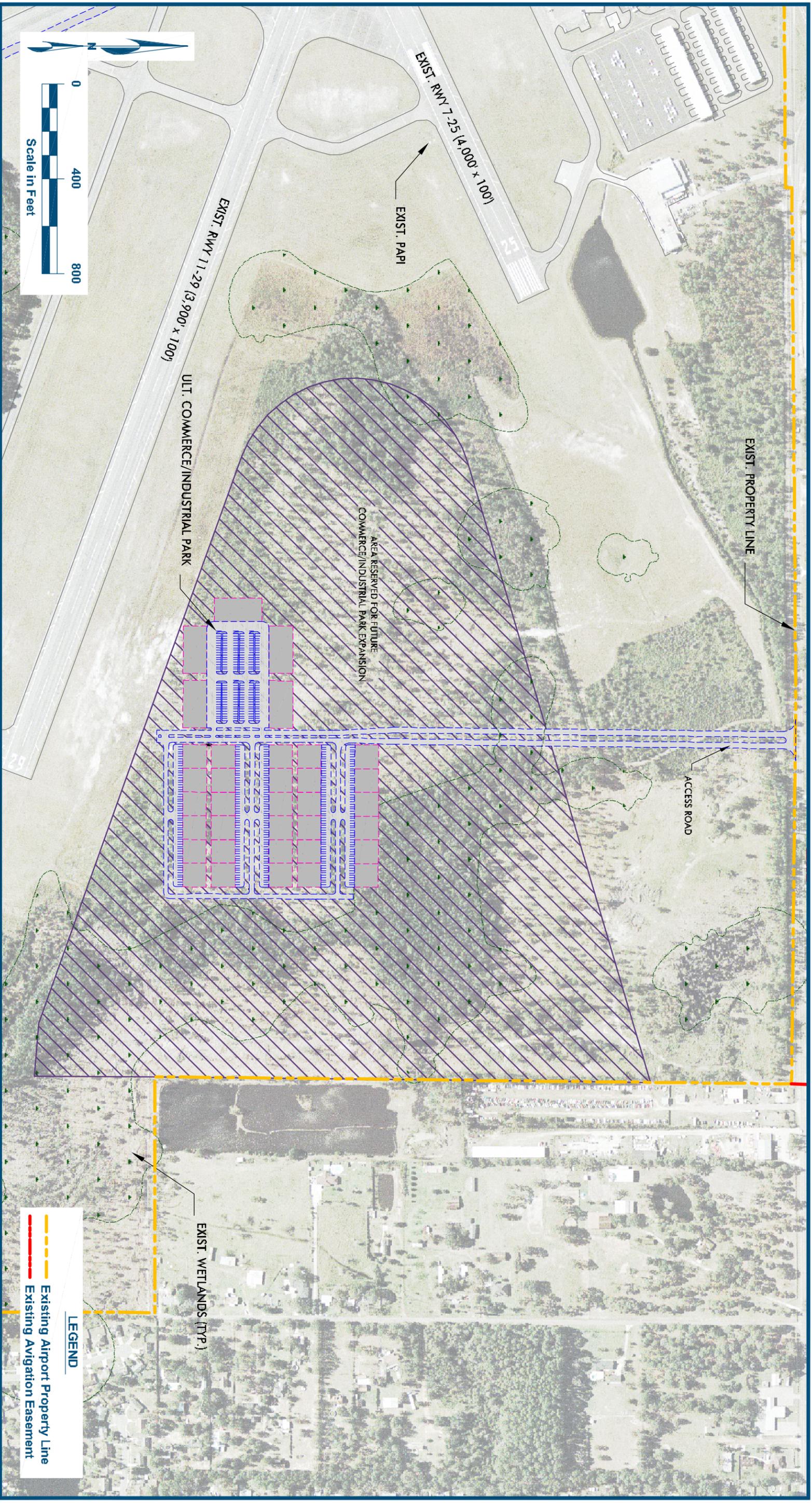


Figure 5-14

EAST COMMERCE PARK DEVELOPMENT	
<i>Source: The LPA Group, Incorporated 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Provides an additional source of on-going revenue 2. Utilizes existing airport property 3. Provides a buffer between airport development and off-airport residential development 4. May attract both aviation and non-aviation businesses 5. Compatible Land Use with Airport Operations 	<ol style="list-style-type: none"> 1. Significant cost 2. Utilities will need to be provided 3. Will require additional fencing 4. May require wetland mitigation or Drainage Improvements 5. Will require construction of access road and site development 6. Will increase surface demand on Herlong Road.

It is recommended that JAA provide twenty-year or longer ground leases to perspective tenants in order to recoup the cost of preliminary development. Further, based upon an initial cost-benefit ratio, it is recommended that JAA not build any office or storage facilities. It is rather recommended that the owner or contractor develop the property within the criteria set by JAA and the City of Jacksonville, which requires less financial input by the Jacksonville Aviation Authority since FAA or FDOT will not pay for non-aviation related development.

South Commerce/Industrial Development

Industrial Park development as shown in **Figure 5-15** on the south side of the airfield adjacent to the Airport Perimeter Road will provide HEG another source of revenue while providing a buffer between the Airport and off-airport residential and commercial development. Proposed development consists of both aviation and non-aviation businesses.

The complex consists of an eastern, western and a southern section. The western section consists of three industrial buildings to the north and two rows of commercial use buildings to the south of these industrial buildings. The eastern section consists of two industrial buildings to the north and two rows of industrial buildings are constructed south of the north eastern industrial buildings. The southern section of the commercial/industrial complex consists of four warehousing or large commercial type buildings. Direct vehicular access to the industrial/commercial complex from the west is provided via the west access road and vehicular access from the east is provided via the east-west road to the north of

the complex. A dedicated truck route provides tractor trailers access to the loading docks to the rear of the four large buildings in the southern development. Parking for the tenants and employees of the commercial and industrial buildings are located to the front and sides of these buildings. A large parking lot provides parking for tenants and employees of the southern portion of the complex.

Proposed Development associated with the Industrial/Commerce Park includes the following:

- Four (4) 100 foot by 200 foot industrial building
- Eight (8) 100 foot by 150 foot industrial/commercial building
- Twelve (12) 100 foot by 100 foot commercial buildings
- One (1) 100 foot by 120 foot industrial building
- Four (4) 200 foot by 240 foot commercial/warehousing buildings
- Twenty eight (28) 0.4 Acres lots
- Associated taxi lanes and automobile parking

Construction associated with proposed industrial development will include installation of a new fence line, existing fence line realignment and the installation of utilities and storm water retention facilities. Order of magnitude cost estimates in 2006 dollars are shown in **Table 5-22**.

TABLE 5-22 SOUTH INDUSTRIAL PARK DEVELOPMENT PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATES	
Project Description	Estimated Cost
4, 100 x 200-ft industrial buildings	\$ 1,500,000
8, 100 x 150-ft industrial/commercial buildings	\$ 2,000,000
12, 100 x 100-ft commercial buildings	\$ 2,000,000
1, 100 x 120-ft industrial building	\$ 1,000,000
4, 200 x 240-ft commercial/warehouse buildings	\$ 1,200,000
Fence line adjustment	\$ 15,000
Roadway improvements and associated parking, includes lighting, drainage and markings	\$ 2,000,000
Total Development Costs¹	\$ 12,629,500

¹ Project Costs include 20% engineering and contingency fee

Source: The LPA Group, Incorporated 2006

Although airport industrial development along the south side of the airfield will require financial input from both JAA and FDOT to accomplish, the anticipated revenue generation associated with such development is considerable. Similarly sized airports around the U.S. have financially benefited in both the short and long-term from industrial or commerce park development. Although residential development along the south side of the airfield is a viable option, it will require JAA to seek legislative assistance since the FAA discourages “through the fence” operations. Further, JAA will need to address the issue of the Gun Club with the City of Jacksonville in order to allow residential development along the south airfield.

SOUTH INDUSTRIAL PARK DEVELOPMENT	
<i>Source: The LPA Group, Incorporated 2006</i>	
Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Provides an additional source of on-going revenue 2. Utilizes existing airport property 3. Provides a buffer between airport development and off-airport residential development 4. May attract both aviation and non-aviation businesses 5. Will not require relocation of Gun Club 6. Compatible Land Development 	<ol style="list-style-type: none"> 1. Significant cost (~12.6 million) 2. Utilities will need to be provided 3. Will require additional fencing 4. Drainage Improvements required 5. Will require airport perimeter road expansion and potential realignment 6. Will increase demand on Normandy Boulevard.

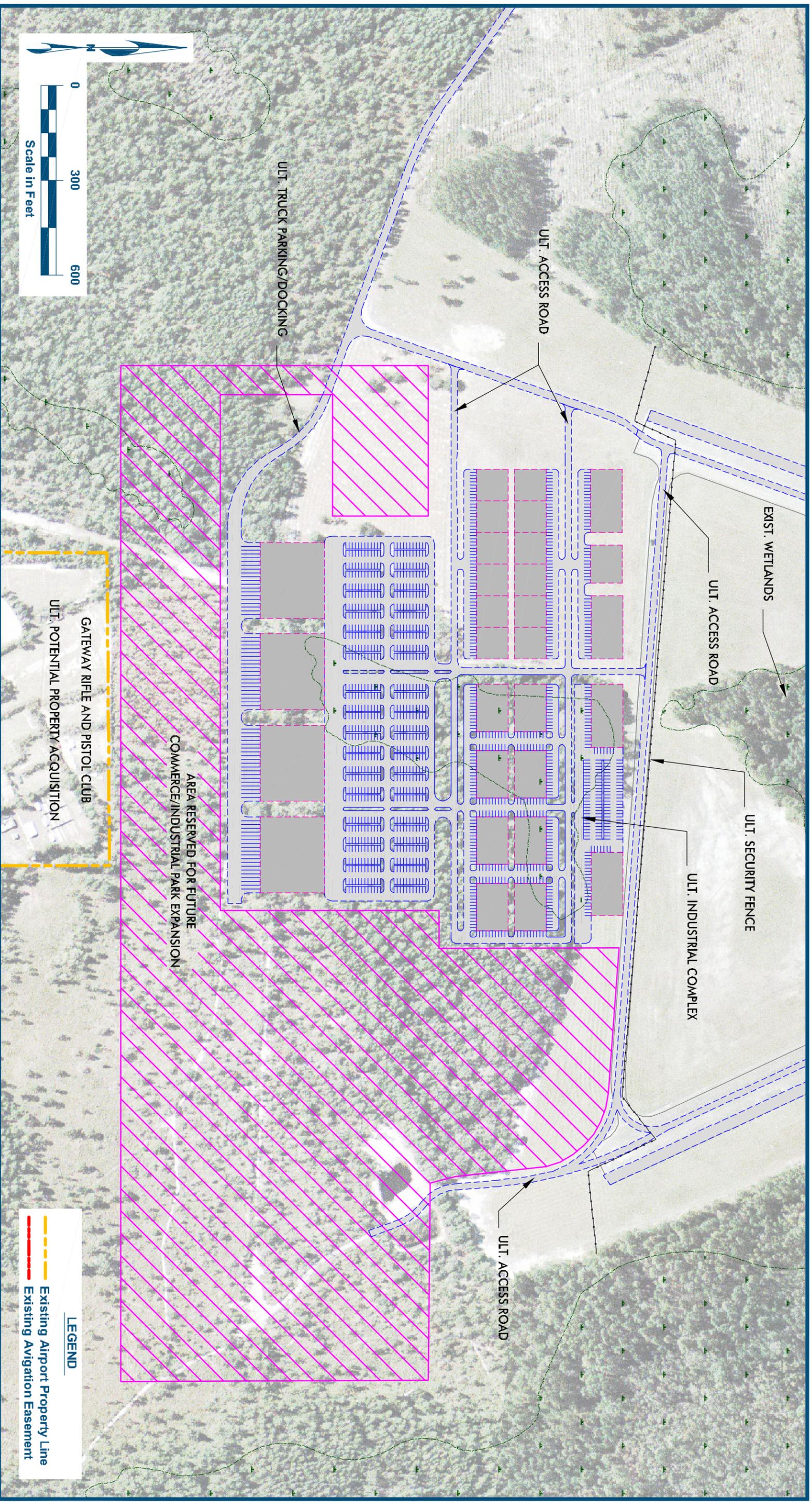


Figure 5-15

Upon review and consultation with JAA Staff, Airport Management, the TAC, FAA and FDOT as well as Public input, industrial park development was recommended. Development of an industrial park negates several of the issues associated with future development including "through the fence operations" and the location of the Gun Club. Further, industrial park development according to FAA is a compatible land use, and is anticipated to create on-going revenue streams, attract both aviation and non-aviation businesses, and provide a buffer between on- and off-airport development.

Despite interest in the development of a residential fly-in community, such a concept would decrease the property footprint and potential future developable areas at the Airport. Moreover, this concept limits revenue generation primarily to aircraft maintenance, storage and fuel sales in addition to require JAA to take legislative action to relocate the Gun Club as well as overcome FAA objections. Therefore, it is recommended that the southern development zone be reserved for future industrial and commerce park development over the twenty-year planning period.

Potential Environmental Impacts

The South Development, proposed in the southern section of the Airport contains a forested wetland and suitable gopher tortoise habitat. The proposed development will likely have impact to the forested wetland, forested upland, shrub and brushland, and associated wildlife that utilize these habitats. The proposed development has the potential to impact wading birds and other wetland dependent species. It also has the potential to impact the gopher tortoise and its habitat and trees. Based upon the results of the literature review and preliminary environmental survey, gopher tortoise and their burrows were observed at the proposed project site.

The East Commerce/Industrial Park is proposed in an undeveloped area of the Airport that contains forested wetlands and uplands. Like the South Development, proposed east side development based upon the literature review identified that plant communities in this area have a low potential to provide suitable habitat for protected species.

The West Industrial Development area is located in a disturbed area near existing wetlands and uplands. Since development has already occurred contiguous to the proposed West Industrial Park parcel, based upon the literature review, limited wildlife habitats exist and existing plant species were unlikely to accommodate protected species.

Regulatory Requirements

It is anticipated that an environmental assessment will be required in conjunction with the East Commerce Park and South Industrial Park development options according to preliminary survey and literature review. Provided that suitable mitigation for the environmental impacts associated with both the south and east development is proposed then it would likely result in a Finding of No Significant Impacts (FONSI).

However, it is anticipated that the West Industrial Park development will require a Categorical Exclusion rather than an EA since proposed development is already located on disturbed soil which is not conducive habitat for protected species.

State and Federal Permits

An ERP is required to meet stormwater runoff treatment, water quality, and wetland protection regulations. The ERP application also serves as an application for a COE Section 404 permit.

Should the results of the environmental assessment determine the presence of gopher tortoise and their habitat or the presence of other protected species, species-specific surveys maybe required to meet federal and state protected species regulatory requirements. Mitigation and permits maybe required to compensate for impact to protected species by the United States Fish and Wildlife Service (FWS) for federally protected species. Similarly, permits and mitigation maybe be required by the Florida Fish and Wildlife Conservation Commission (FWC) for state protected species.

An ERP permit would be required to meet stormwater runoff treatment, water quality, and wetland protection regulations. The ERP application also serves as an application for a COE Section 404 permit.

Should the results of the environmental assessment determine the presence of protected species within the proposed development area then species-specific surveys maybe be required to meet federal and state protected species regulatory requirement. An FWC permit and mitigation maybe required in order to compensate for impacts to state protected species and an FWS permit and mitigation maybe required to compensate for impacts to federally protected species.

City of Jacksonville Concurrency

Based upon information obtained from the City of Jacksonville's Planning Department, portions of Herlong Road and Normandy Boulevard exceed their current capacity based upon existing and planned

development. Therefore, action is being taken by the City to improve overall capacity in an effort to alleviate congestion and accommodate growth within the west region of Jacksonville. Since members of the City of Jacksonville participated in the development of the preferred alternative, it was recommended that JAA work with COJ to reserve capacity on both Normandy and Herlong to accommodate mid and long-term demand. In an effort to accommodate future demand, it is recommended that prior to development of the commerce and industrial parks that a roadway study be performed prior to design. This will allow both the City of Jacksonville and JAA to address future demand in and around the airport facilities.

SUPPORT FACILITIES

Support facilities are based upon the recommended Airfield Alternative development in relation to airside and landside requirements. Components of the support facilities identified for development at HEG are described in the following.

Roadways, Ground Access and Signage

With the development of the Midfield and South Side complexes, ground access to these areas from major highways and arterial roadways will be critical for their expansion. Proposed roadway connectors to the Midfield hangar/FBO area include connecting existing roadway infrastructure with Normandy Boulevard via the South Development area, which can be accessed directly from a dedicated roadway. Associated roadway signage complementary to these developments will be provided.

Airport Maintenance Hangar

The aircraft maintenance facility for the storage of airport support vehicles, including mowers and other equipment, is to be located adjacent to the terminal facilities between the washrack and self-fueling facility within fenced area adjacent to terminal building. It is estimated that this facility will be approximately 60 x 100 feet.

Security and Fencing

Existing portions of the airfield periphery are currently unsecured in terms fencing. Adequate airfield perimeter fencing ensures that only airport employees and other authorized personnel have access. Those areas of airport property that currently lie within dense forest areas on the southeast side of the airfield may not be able to be fully fenced due to topographical constraints. Consequently, circuitous

fencing around these areas should be considered.

Fuel Storage

Existing fuel storage facilities are underground tanks located adjacent to the terminal facilities near the terminal automobile parking. It is the intent of the airport management to relocate fuel facilities east of the terminal facility adjacent to the northeast ramp to facilitate operations.

Electrical Vault

The electrical vault provides an access point into which airfield lighting, signage, navigational aids and other essential equipment are connected. The existing electrical vault, located on the north side of the airfield adjacent to the west apron, is insufficient to support development in the midfield and southern portions on the airfield. In addition as part of proposed development, the location of the electrical vault is located with the taxilane object free area. Therefore as part of airfield development, the electrical vault, non-directional beacon and AWOS are recommended for relocation.

Air Traffic Control Tower

As stated earlier, HEG is an uncontrolled airfield since it does not have an FAA or contract control tower. Typically, a contract ATCT is warranted when there are significant operations and mix of operations and is based upon a cost-benefit ratio. The Federal Contract Tower (FCT) program provides air traffic control services to FAA Level I VFR towers. A Level I tower has an approximate traffic density of 0 to 34.99 operations an hour. Services provided by an FCT are identical to those provided by an FAA-staffed tower. However, unlike Federal ATCTs, the Airport Sponsor is responsible for the funding and construction of the ATCT facility. Proposed locations for an ATCT at HEG include:

- Adjacent to the Midfield Development Area – this site provides a centralized location for monitoring all runway operations, including ramp movements, as well as activity on the more distant Runway 11-29.
- On or Near the Existing Terminal Building – this location provides adjacency benefits to most of the airport's larger aircraft operations, but is distant from operations occurring on Runway 11-29.
- Adjacent to the North Landside Development Area – similar to the adjacency benefits previously mentioned, a control tower situated near the North Landside Development Area may cause line-of-site issues resulting from the new hangar development.

Herlong Airport's candidacy for a control tower would require a series of further analyses including a separate Cost/Benefit Analysis and if warranted, a tower sighting study. However, the need for a tower will ultimately justify the means for constructing one, either contract or FAA. As such, further investigation apart from this master plan update will need to be conducted into the feasibility of a control tower at HEG.

CONCLUSIONS

The Airport development plans described above outline the necessary development and facility improvements to not only meet the forecast demand presented in **Chapter 4**, but to ultimately ensure competitiveness and financial viability of the Airport, and provide the Airport and surrounding community with the greatest overall benefit considering the goals of the HEG.

The process utilized in assessing airside and landside development concepts involved an analysis of long-term requirements and growth potential. Current Airport design standards were reflected in the analysis of runway and taxiway needs, with consideration given to the safety areas required by the FAA in runway approaches. As design standards are further modified in the future, revisions may need to be made in the plan, which could affect future development options.

Although an ILS system was recommended as part of the airfield development, discussions with FAA revealed that support of ILS systems is waning as a result of new technology. Thus, in order to provide the option for a precision instrument approach, a Lateral Performance with Vertical Guidance (LPV) approach is recommended for Runway 25 due to wind and existing traffic patterns. LPV approaches are designed to fully exploit the tighter satellite signal protection limits from the Wide Area Augmentation Systems (WAAS). This approach combines the LNAV/VNAV vertical accuracy with lateral guidance similar to the typical Instrument Landing System. The use of LPV approaches capitalizes on the inherent accuracy of the WAAS signal and will result in lower approach minimums. There are currently seven LPV approach locations in the U.S., and production will continue until all qualified (based upon visibility minimums and operational requirements) airports have an LPV approach at each runway end. An LPV approach requires high intensity runway lighting and a MALSR to allow the approach visibility to decrease to less than 3/4 statute mile.

In addition, the use of an LPV system rather than the traditional ILS system provides the airport with greater flexibility and does not require the relocation of the airport perimeter road since no ground equipment other than the MALSRs are required.

Also at the time of this writing, airport management has received interest from private parties regarding development of a Blimp Hangar at HEG. As a result, the recommended development shows a 20,000 SF (80 x 250 foot) and 25 foot high storage hangar and 2,569 SY (23,119 sf) apron between Taxiway D and ultimate Taxiway G. Access to the airfield would be provided via Taxiway C. Since this location was determined to be dry with no evident environmental impacts, the airport or user has the option of expanding the facilities southeast to run parallel to Taxiway D. **Figure 5-16** provides a graphical presentation of the recommended development over the twenty year planning period.

However, as any good long-range planning tool, the final master-planning concept should remain flexible to unique opportunities that may be presented to the Airport. It should also be kept in mind that changes in market conditions such as changes in operations or fleet mix may dictate the acceleration or delay of projects.

The remaining portions of the Master Plan will be directed towards the preparation and phasing of a detailed implementation program, and an evaluation of funding options currently available to the HEG. A detailed review of the projects, including construction costs and phasing, is provided in **Chapter 7**, Implementation Plan.