1.0 INTRODUCTION

Frederick Municipal Airport (FDK) is one of the busiest airports in Maryland in terms of annual operations (takeoffs and landings). According to the analysis prepared for the Master Plan Update, FDK experienced approximately 129,000 operations in 2004 with operations projected to increase to approximately 165,000 in 2025. FDK maintains two paved runways: the primary runway, Runway 5-23, which is 5,220 feet in length and 100 feet in width, and Runway 12-30, which is 3,600 feet in length and 75 feet in width.

To the immediate north of and parallel to Runway 12-30 is a grassed area that has been used for glider operations since 1992 when Runway 12-30 was constructed. Note: this area has also been used for single engine powered aircraft not related to glider operations. The grassed area encroaches upon a portion of the Runway Object Free Area (ROFA) for Runway 12-30. On June 3, 2003, the Federal Aviation Administration (FAA) notified the City of Frederick (City) that this grassed area was not a recognized turf runway. In this correspondence, the FAA outlined several measures necessary for FDK, as a federally obligated airport, to perform their current operations on a turf runway. These measures include (1) file a Form 7480-1 – Notice of Landing Area Proposal; (2) identify the proposed runway and associated design surfaces on the Airport Layout Plan (ALP); and (3) identify the existence of the runway on all other airport related documents. Also, the establishment of a runway requires environmental documentation. In addition to the regulatory requirements identified, the FAA also stated that they cannot protect navigable airspace for landing areas not properly coordinated with the agency. Navigable airspace surrounding recognized Runway 12-30 includes applicable imaginary surfaces as defined in Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. It is likely that an airborne aircraft operating in the turf runway environment would be a penetration to one of the imaginary surfaces.

As a result of this coordination and to adhere to federal grant obligations, the City issued an advisory notice on December 30, 2004 stating that the grass area located on the north side of Runway 12-30 is not approved for aircraft takeoff and landing operations. In addition, the FAA requested a Study to determine the potential for and feasibility of a turf runway/glider operations area on existing or ultimate Airport property as part of the Master Plan Update. This Feasibility Study will involve the following:

- Compile specific user data for a turf runway and develop a comparison analysis to national trends and project aviation activity;
- Develop alternatives that are based on projected level of growth, phasing, and development plans;
- Evaluate and detail a new runway's affect on existing and future traffic patterns; and
- Recommend a plan of action based upon the 20 year phasing of the Master Plan.

1.0.1 Questionnaire Results

In order to accurately identify the characteristics of the aircraft owners community at FDK, a survey was distributed to approximately 450 individuals in 2004. Of the 450 surveys distributed, 171 responses were received. Results of this survey, which were used in the preparation of this Study, are summarized in **Table 1.0-1**:

TABLE 1.0-1 TURF RUNWAY FEASIBILITY STUDY SURVEY RESULTS

AIRCRAFT OWNERSHIP		
	Respondents who own an aircraft	43
	Respondents who do not own an aircraft	128
PURCHASE AIRCRAFT		
	Respondents who plan to purchase aircraft	50
	Respondents who do not plan to purchase aircraft	102
	Respondents who might purchase aircraft	1
	Respondents who did not answer this question	18
LOCATIONS OF BASED AIRCRAFT (AIRCRAFT OWNERS) OTHER THAN AT FDK		
	Fairfield, PA	14
	Longmont, CO	1
	Hagerstown, MD	2
	Martin State, MD	1
	Leesburg, VA	1
TYPE OF OPERATIONS		
	Respondents capable of both hard and soft operations	159
	Respondents not capable of both hard and soft operations	12
RESPONSE TO IF NO TURF RUNWAY WAS AT FDK		
	Respondents who would relocate or rent elsewhere	60
	Respondents who would not relocate or rent elsewhere	94
	Respondents who might relocate or rent elsewhere	7
	Respondents who did not answer this question	9
AIRCRAFT RENTAL SOURCES		
	FFC / FAI	29
	Advanced Helicopter Concepts	1
	M-ASA	49
AFFILIATIONS		
	AOPA	120
	EAA	44
	M-ASA	84
	FAA	16
	SSA	20
	MCAA	2
	CPA	3
	MAPA	2
	NAA	3
	HAI	1

Source: Turf Runway Feasibility Survey (2004).

1.1 EXISTING RUNWAY CONDITIONS

Currently, FDK has two licensed runways. These runways are paved Runway 5-23 and paved Runway 12-30 (see **Table 1.1-1**). There is no turf runway depicted on the approved Airport Layout Plan (2003).

TABLE 1.1-1 EXISTING RUNWAY CHARACTERISTICS

Runway	Length x Width (feet)	Strength	RSA (feet)	OFA (feet)	RPZ (feet)
5-23	5,220 x 100	68,800DW	1,000 x 500	1,000 x 800	RW5 – 500 x 1,700 x 1,010 RW23 –1,000 x 1,700 x 1,510
12-30	3,730 x 75	12,500 SW	300 x 150	300 x 500	500 x 1,000 x 700

1.2 GLIDER SPECIFIC DATA

1.2.1 Current Users, Facilities, and Ground Access

The Mid-Atlantic Soaring Association (M-ASA), who began operating at FDK in 1966, is a group comprised of approximately 165 individuals that offer primary and advanced flight instruction, local and cross-country soaring, and the use of club single and two place gliders. M-ASA operates at both FDK and a field that they own in Fairfield, Pennsylvania. M-ASA maintains both voluntary and elected officers and is headed by a Board of Directors.

The M-ASA glider hangar is located 323 feet north of the Runway 12-30 centerline on the north side of the Airport (**Exhibit 1.2-1**). The 333-foot by 49-foot glider group hangar houses 19 assembled gliders and 2 tow planes. A two-story heated clubhouse, which is approximately 31 feet by 49 feet, is located on the northwest end of the hangar. This clubhouse has a balcony and consists of a bathroom with shower, a television, internet, and a 100-gallon propane tank for heat. The gliders use a predominantly grassed unmarked tie-down area to the southwest of the hangar, which is approximately 2,000 square feet. These facilities are leased by the M-ASA, the sole tenant.

There are no marked automobile parking areas at the facility. However, the area surrounding the hangar is paved, measuring approximately 1,600 square feet on the northwest side, adjacent to the clubhouse, and 4,000 along the back of the hangar. These areas can adequately park approximately 28 automobiles (standard 9 feet x 15 feet stalls) while still allowing two lanes of traffic flow.

These facilities can be accessed via a public road off Gas House Pike to the City of Frederick Waste Water Treatment Facility. The road extends southeast from the treatment facility entrance as a private drive shared between M-ASA and a private residence, known as the Fout Farm. This route is the sole

ingress and egress of M-ASA facilities. Since it is a private drive, the City is not responsible for maintenance of the M-ASA access roadway.

1.2.2 Operational Activity

From the time Runway 12-30 was constructed in 1992 until December 2004, gliders at FDK have used the Runway 12-30 north side ROFA as a runway. This strip is locally known as the "turf runway" or "glider operations area." The most common traffic pattern was departing in the direction of Runway 30 and landing in the direction of Runway 12. Most power aircraft operated on Runway 5-23; however, single engine piston powered aircraft not related to the glider activity did operate in this unofficial turf runway area. When winds favor Runway 12-30, gliders landed in the direction of Runway 30 and communicated via radio to inform powered aircraft to do the same. If powered traffic continued to use Runway 5-23 in crosswind conditions that forced a glider to land on Runway 30, caution and a long landing were used. The least common traffic pattern occurred in a strong east wind. This wind dictated a takeoff and landing in the direction of Runway 12. Caution was advised to aircraft in the traffic pattern to be aware of the tow pilot who attempted to turn out inside of Runway 5-23. This use of this area caused the co-mingling of powered aircraft, including corporate jets, student pilots, and helicopters with glider traffic.

Since the Advisory was posted on December 30, 2004, no operations have occurred on the grassed area within the Runway 12-30 OFA, but rather on the existing paved runways. This now also causes the co-mingling of powered aircraft with glider traffic on the same runway, especially when northwest winds push both powered and glider traffic to use Runway 30.

1.2.3 Glider Fleet Mix and Trends

The inventory effort conducted as part of the Master Plan Update identified that 38 glider/sport aircraft are currently based at FDK. The FAA-approved forecast for the 20-year study period projects an increase of this aircraft type to a total of 42.

According to a survey conducted in 2002 of general aviation for the *FAA Aerospace Forecasts, Fiscal Years 2004-2015* (2004), gliders increased from 1,904 to 1,951, up 2.4 percent from the 2001 survey. In addition, this report summarized general aviation aircraft by aircraft type. Glider aircraft are included in this Report in the "other" category, which does not include experimental aircraft. In 1997, there were 4,100 "other" aircraft, increasing to 6,400 in 2002.

1.3 TURF RUNWAY SPECIFICATIONS

Although the FAA does not publish standards specifically for a turf runway, FAA Advisory Circular 150/5300-13, *Airport Design*, will be used to establish the minimum runway requirements for all runways, including turf. FAA Advisory Circular 90-66A, *Recommended Standard Traffic Patterns and Practices for Aeronautical Operations at Airports Without Operating Control Towers*, provides recommendations regarding the operation of gliders and powered aircraft. Additional reference material entitled *Basic Minimum Runway Criteria for Turf Runways*, January 2003, was obtained from the FAA Central Region, together with recommendations from the M-ASA.

The tow aircraft used in glider operations include a Piper Pawnee and a PA-18 Super Cub; both are small aircraft in Approach Category A (i.e. an approach speed of less than 91 knots). The glider aircraft at FDK have a typical wingspan in the range of 48 to 60 feet, which is a greater wingspan than the tow aircraft, and would be in Airplane Design Group II (i.e., wingspan of 49 to 78 feet). Accordingly, the turf runway will be categorized as an A-II, visual runway, serving small aircraft exclusively. The applicable width of the primary surface would be 250 feet and the Runway Protection Zone (RPZ) dimensions would be 1,000 feet long by 250 feet wide at the inner end by 450 feet wide at the outer end.

In general terms, the required runway length for glider operations is not different than that needed for standard 4-place general aviation powered aircraft. A turf runway length analysis was completed using the Piper Pawnee as the critical aircraft. The Piper Pawnee has a take off runway length requirement of 625 feet, versus 420 feet for the Super Cub. Turf runway planning guidelines recommend adding 20 percent to the runway length requirements of a given aircraft for operations on grass. A minimum turf runway length was calculated by using (a) 120 percent of the runway length requirements for a Piper Pawnee, and (b) a multiplier of two to account for the drag effects of a glider attached to the powered aircraft, for a total length of 1,500 feet.

Once the required turf runway length was calculated established, additional consideration was given to the length of a glider operations area. Because of the lack of an engine, gliders cannot taxi for takeoff or after landing, which then necessitates manual ground handling. Manual ground handling requires a staging area at the end of the runway where gliders can be parked while they await their launch position. According to M-ASA, under most nominal wind conditions a glider being launched can safely perform a 180 degree turn and return to the runway once it reaches a critical altitude of 200 feet AGL. However, prior to reaching the critical altitude a straight ahead landing is required. Accordingly, the calculated turf runway length of 1,500 feet was adjusted to a recommended length of 2,400 feet to be used for planning purposes.

FAA Advisory Circular 150/5300-13 provides for a determination of runway width based on the airplane design group. For a visual turf runway serving aircraft in Design Group II, the minimum runway width is

75 feet, together with a RSA width of 150 feet and a ROFA width of 500 feet. The FAA Central Region recommends a turf runway width of 120 feet. A 100 feet wide glider runway, with 100 feet wide pull-off areas to each side, is recommended by M-ASA. For a glider operations area, the additional 100 feet at each side of the runway allows a glider to turn off and roll clear of the landing area so it can be safely carried to staging or parking areas.

Given the need for a turf runway to safely accommodate both powered aircraft and gliders, the recommended layout for planning purposes is a combination of FAA criteria for powered aircraft and M-ASA recommendations for glider operations. The recommended turf runway should be 100 feet wide with a RSA that is 150 feet wide and extends 300 feet beyond the runway end. The OFA for runways serving Group II aircraft is 500 feet. The runway should have glider pull-off areas along each side, to effectively serve as taxiways for gliders, since they do not have engines. However, the glider pull-off areas where aircraft will be parked should be outside of the RSA and ROFA. (i.e., pull-off area begins 250 feet from the runway centerline).

1.4 ALTERNATIVE ANALYSIS

As a result of the current and projected demand for an officially designated turf runway at FDK, it was determined that a turf runway should be planned at FDK. While developing alternatives, the unique spatial requirements associated with tow aircraft and gliders were taken into consideration and the objective was to locate a turf runway/glider operations area using a template that meets all applicable FAA runway design standards (e.g., RSAs, RPZs, etc).

1.4.1 Evaluation of Previous Turf Runway Area

It should be noted that the turf area adjacent to Runway 12-30 previously used as a runway would not accommodate the specified glider operations area for several reasons (see **Exhibit 1.4-1**).

- A 2,400 foot long by 100 feet wide turf runway in this location would encroach upon the ROFA of Runway 12-30. The ROFA must be clear of above ground objects.

- According to FAA Advisory Circular 150/5300-13, the minimum separation distance between parallel runways under visual flight rules is 700 feet. Assuming that a turf runway is located so that its primary surface (250 feet wide) is located just outside of the existing glider hangar, the runway separation distance would be 198 feet from this area to Runway 12-30. This distance is well below FAA standards.

- The Runway 12-30 – turf runway centerline to centerline separation is 198 feet. The existing glider hangar would penetrate the turf runway primary surface and would be an obstruction to the

Federal Aviation Regulation (FAR) Part 77 transitional surface of Runway 12-30, which extends upward at a 7:1 slope from the primary surface.

- The glider hangar is located within the 500-foot wide OFA of the turf runway.

- By maintaining the recommended length of 2,400 feet, portions of the RPZ would be located off Airport property. According to FAA Advisory Circular 150/5300-13, the FAA recommends that the Airport have control of all property with this RPZ; therefore additional property acquisition would be recommended.

- By locating a turf runway parallel to Runway 12-30, slow glider traffic is mixed with faster jet aircraft utilizing Runway 5-23, creating hazardous traffic patterns. This conflict would impact the Runway 23 approach.

1.4.2 Alternative Locations

Given the limited space available on the airfield at FDK for such a facility, only one location for a turf runway was evaluated. The three alternatives developed for the landside and airside development at FDK included in this Master Plan all include a turf runway located 805 feet southeast and parallel of Runway 5-23 (see **Exhibit 1.4-2**). The turf runway will be categorized as an A-II, visual runway, serving small aircraft exclusively. The turf runway would be 2,400 feet in length and 100 feet in width and all FAA criteria would be met. The facility would be sited to avoid penetrations to all imaginary surfaces for all runways at FDK.

1.5 RECOMMENDED PLAN OF ACTION

It is estimated that the cost to create this turf runway would be approximately $1,108,000. As discussed throughout the Master Plan process, as a proposed third runway does not meet justification contained in the National Plan of Integrated Airport Systems and Airport Improvement Program Handbook, the project is not eligible for Federal funding; therefore, the funding of this turf runway would be the responsibility of the City.

TABLE 1.5-1 ESTIMATED TURF RUNWAY COSTS

PROJECT COMPONENT	COST
Drainage	$38,880
Earthwork	$560,000
Paving	$139,825
Erosion and Sediment Control, Design, Inspection	$369,295
TOTAL COST	**$1,108,000**

Source: URS Corporation (2006).

Because of the relative demands, and given the lack of FAA funding, this runway would most likely be constructed in phases. If it were to be constructed in one phase, it is recommended that the turf runway be constructed within Phase II of this Master Plan.