# GROTON-NEW LONDON AIRPORT MASTER PLAN UPDATE

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# CHAPTER 1 – INTRODUCTION

## OVERVIEW

The purpose of this study was the development of an Airport Master Plan Update (AMPU) for Groton-New London Airport (GON[1]), located in Groton, Connecticut. This update replaces the last AMPU completed in 1999.

An airport master plan is a comprehensive study of an airport which describes the short-, medium-, and long-term development plans to meet future aviation demand. The goal of any master plan is to provide the 20-year framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts.

This planning study will consider the possible environmental and socioeconomic costs associated with alternative development concepts, and the possible means of avoiding, minimizing, or mitigating impacts to sensitive resources at the appropriate level of detail for facilities planning. Additionally, more detailed engineering and environmental analysis and documentation may be required in order to implement some of the recommendations of this update.

This update will focus on changes that have occurred since the last AMPU, and how these changes affect the airport's current and future capacity and demand. The report will be a revision, or "update" to both the 1999 Technical Report (master plan) and the Airport Layout Plan (ALP) drawing set, which is a legal requirement for airports that receive Federal assistance. This update includes the following elements:

- Public Involvement, including a series of meetings and presentation
- Environmental Considerations
- Existing Conditions
- Aviation Forecasts
- Facility Requirements
- Alternatives Development and Evaluation
- Airport Layout Plans
- Facilities Implementation Plan
- Financial Feasibility Analysis

Meeting existing and future demand is the ultimate goal of a master plan. That is, does the airport have now and will it have in the future, adequate capacity to meet this demand? The capacity/demand relationship is important because with the exception of safety

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[1] GON is the Federal Aviation Administration airport identifier for the Groton-New London Airport. The international identifier is KGON.

related changes, all capacity changes are demand based; meaning that infrastructure changes, unless they are safety driven, are generally not made until the demand justifies the change.

## AMPU OBJECTIVES

A successful airport master plan can be easily comprehended, is acceptable to the many airport stakeholders, addresses community concerns and can be implemented in a series of practical stages to meet realistic financial and schedule constraints. To this end, the objective of this master plan update is to provide achievable goals and guidance for future airport development to the community and GON. Ideally, the goals will meet aviation demand; the community will accept them; they will be environmentally compatible; and they will coordinate with other modes of local, state, and national transportation.

The adoption of the Master Plan will be the momentum for making decisions regarding the following:

- The determination of the best feasible alternative for developing airport facilities that serve current and future airport users.
- The justification and time frame for future runway, taxiway, terminal area and landside improvements. These improvements include upgrading the terminal building, hangars, aircraft parking aprons, vehicular parking, and fueling facilities.
- An economic impact analysis that will compile economic, socio-economic and demographic data to accurately depict the value of the airport to the affected communities.
- The development of runway safety areas to meet the required Federal Aviation Administration (FAA) design standards.
- The determination of instrument approach minimum requirements needed to meet current and projected aviation demand and to maximize aviation safety.
- The prioritization of the improvements as they pertain to the financial capability of GON, Connecticut Airport Authority (CAA), Connecticut Department of Transportation (CTDOT), and the FAA.
- Other recommended development that will contribute to safer and efficient airport operations.
- The determination of physical facility developments as they relate to immediate planning (0-5 years), intermediate (5-10 years) and future planning (10-20 years), and financial costs for these improvements.

# CHAPTER 2 - INVENTORY OF EXISTING CONDITIONS

## OVERVIEW

The first step in the airport master planning process involves gathering information about the airport and its environs. An inventory of current conditions is essential to the success of a master plan, since the information also provides a foundation, or starting point, for subsequent evaluations.

The inventory of existing conditions for the GON AMPU includes the following information:

- Information pertaining to airport ownership and management, the general airport setting, transportation access, the airport's relationship to the Federal airport system, and airport history
- Population and socioeconomic information for the geographic area where most of the passengers are coming from
- A review of historic and current airport activity, including commercial service, general aviation, and military activity
- An overview of the area's airspace, air traffic control (ATC) management, and obstructions
- Descriptions of facilities and services now provided at the airport including a general description of airside, terminal, landside, and support facilities, as well as utilities and other infrastructure
- A summary of environmental conditions at the airport
- A financial analysis including historic revenue and expenses

The information gathered for this portion of the Master Plan, to the extent possible, is current as of the end of 2010, the base year for this study. Whenever possible, data was revised right up until the day this report was printed. Updated information was gathered throughout the development of the Master Plan and will be included in subsequent chapters.

Appendix 1 contains terms and abbreviations common to the aviation industry, but possibly nebulous to outsiders not familiar with airports and aircraft. To avoid defining each term throughout this document, readers not familiar with them should refer to this glossary.

## AIRPORT OWNERSHIP AND MANAGEMENT

Groton-New London Airport, one of twenty-three current public use airports in the state, was established as the first State of Connecticut airport in 1929. Originally called Trumbull

Airport after Governor Jonathan Trumbull, airport ownership was transferred to the United States Navy during World War II. After World War II, the Navy returned the airport to the State of Connecticut, and in 1980, the name of the airport changed to Groton-New London Airport.

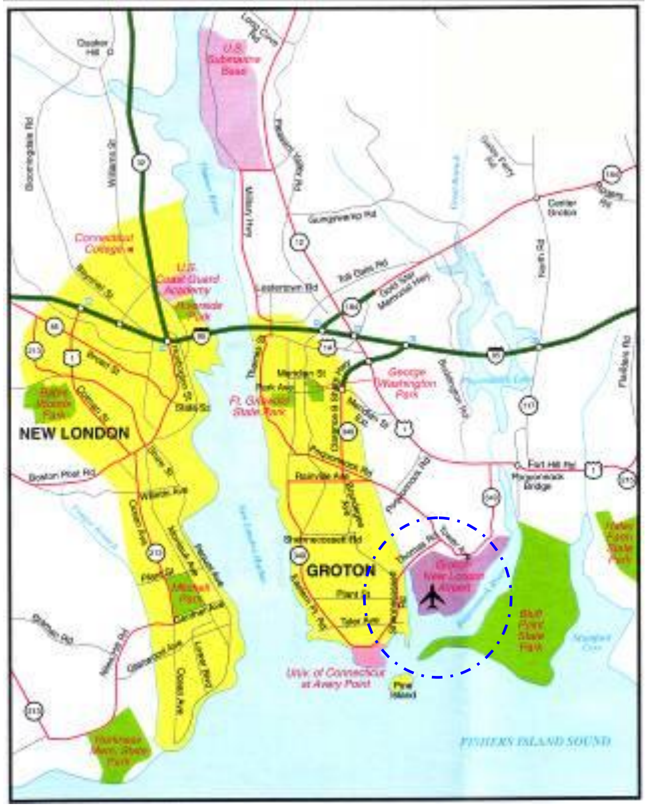



Figure 2.1 - Airport Location Map

The airport is owned and operated by the State of Connecticut, through the Connecticut Airport Authority (CAA) and Connecticut Department of Transportation (CTDOT). The funds necessary to operate Groton-New London Airport come from the Connecticut State Transportation Fund. Likewise, revenue derived from the airport is returned to the Transportation Fund.

The airport is currently budgeted to employ a full time manager with a staff of four full time employees and a part time fire captain, along with seasonal assistances from CTDOT as necessary.

## AIRPORT LOCATION AND ROLE

As shown on Figures 2.1 above and 2.2 on the next page, GON is situated on approximately 489 acres in the town of Groton, Connecticut, along the Poquonnock River, at an average elevation of nine feet above mean sea level (MSL). The airport is located approximately seven miles driving distance southeast of downtown New London and 55 miles southwest of Providence, Rhode Island. The airport is bounded by Interstate 95 to the north and Long Island Sound to the south.

Groton-New London Airport is classified as a general aviation/commercial airport in the Federal Aviation Administration National Plan of Integrated Airports System (NPIAS). Of the 23 public use airports in Connecticut, 14 are in NPIAS. The remaining nine are privately owned and not (generally) eligible for inclusion in NPIAS or eligible for Federal funding. The other airport classifications within NPIAS are commercial service and reliever facilities. Within the state, two airports are commercial facilities (Tweed - New Haven and Bradley International Airports), three airports are relievers (Danbury Municipal, Hartford-Brainard, and Robertson Airports), and the remaining airports are general aviation.

When the last AMPU was developed in 1999, GON was a commercial service – primary airport. Commercial air service required to sustain this classification was withdrawn in 2003 when U.S. Air stopped operations. Since then the airport's classification was officially changed by the FAA. However, CTDOT/CAA will continue to maintain the airport to commercial airport standards, known as Part 139, in part to help keep the airport poised for the possible return of commercial service. Part 139 is discussed in more detail in Appendix 2.


**Figure 2.2 – Aerial View of GON and Surrounding Property**

It is important to note that the general aviation classification does not restrict other types of activity from occuring at the airport. GON does handle considerable military operations, and an occassional commercial flight; but for the most part, the airport almost exclusively handles general aviation aircraft and activities.

## SERVICE AREA

The service area for an airport defines the region that the airport serves. The size of this area can vary depending upon the local population distribution, transportation infrastructure, and geography. An airport may also have several service areas, depending upon the activity that occurs at the facility, such as commercial, air cargo, or general aviation activity.

The 1999 AMPU studied two different methodologies. One method, called the isochrone method, determines the service area based on a specific driving time to the airport. The second method identifies other comparable airports and to define the overlap point of their services areas to Groton's. In the end, the last AMPU relied on the latter technique,

The first technique used in the 1999 study was the isochrone method; which applied a 60-minute drive time in the analysis. This methodology resulted in a fairly large service area that extended northeast along I-95 to Providence, north along I-395 to an area just south of the Massachusetts state line, northwest along Highway 9 to Hartford, and southwest on I-95 to New Haven. The comparable airports method, which was eventually adopted in the previous report, resulted in a much smaller service area; one that represented an approximate 30 minute drive to GON.

While the airport's role has changed since the last study, following the loss of commercial traffic, it was concluded that the service area adopted in 1999 is still applicable today; meaning the majority of people using GON are willing to drive on average, up to 30 minutes. Beyond 30 minutes, other airports, both commercial service and general aviation are readily available. Thus, for the purposes of this report, the primary Service Area for the airport extends north to Norwich and southeast to Old Saybrook in southeastern Connecticut, and northeast to a point midway to Providence. The Airport Service Area includes New London County in Connecticut, and the southwestern corner of Washington County in Rhode Island which includes primarily the town of Westerly.[1]

## Socioeconomic Data and Economic Development

Socioeconomic characteristics such as population and economic conditions provide insights concerning an area's historic and future growth. Moreover, socioeconomic characteristics usually have a positive relationship to aviation activity and are often useful tools in preparing estimates of future airport activity. For an airport master plan, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the geographic area served by the airport. This information is typically used in forecasting aviation demand. Presented in this report are population and Gross Domestic Product (GDP)[2] changes.

U.S. Census data from New London County was combined with the Westerly subset of Washington County in Rhode Island to produce a population set for the Service Area. We compared this data with growth trends in Connecticut and the United States. For consistency, we analyzed data during the period 1990 through 2007. Both 1990 and 2000 were census years; data for 2007 was estimated based on U.S. census growth models for the United States and our own for the Service Area a straight line linear trend was used).

[1] Data is for the town of Westerly as defined by the U.S. Census as a subdivision of Washington County.
[2] Real gross domestic product -- the output of goods and services produced by labor and property located in the United States.

There is little argument that the population in the United States continues to migrate from the northern states into the U.S. Sunbelt. During the 18-year period, the U.S. population grew by 21.8 percent; but Connecticut grew by only 6.3 percent; and the Service Area slightly less at 5.3 percent. The Rhode Island component of this growth was actually higher percentage wise; possibly, because of the more rural character, which is consistent with recent urban sprawl trends. Figure 2.3 provides a comparison of Connecticut's and the Service Area's population change. Figure 2.4 presents the historical GDP for the United States and Connecticut during the period 1997 to 2007.[3] The key to the GDP data is the consistency between the national and state growth rates.

**Figure 2.3**
**Population Change**
**Connecticut & Service Area**

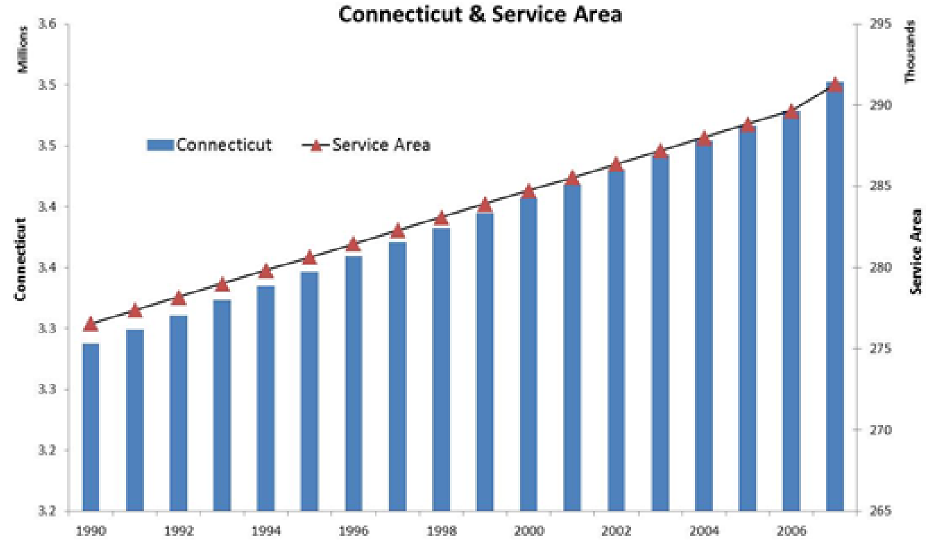
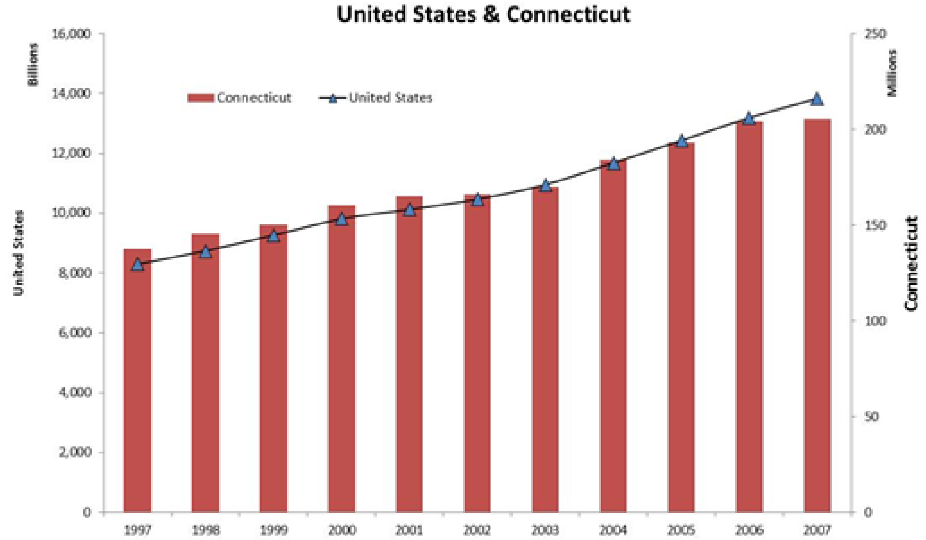



**Figure 2.4**
**Gross Domestic Product Comparison**
**United States & Connecticut**




[3] United States Bureau of Economic Analysis.

## AIRPORT CERTIFICATION

A component of this AMPU is an examination of the nature and purpose of the current and future application of commercial airport certification at Groton-New London Airport. A separate report is contained in Appendix 2 of this paper.

The Appendix 2 report describes the purpose of commercial airport certification requirements, under 14 CFR 139, Certification of Airports (Part 139), and the current and future requirement for certification at GON. It is an essential determination because it defines the classification of GON, which determines a wide-range of administrative, safety, and operational requirements required at commercial service airports. Included in the report is an analysis of the airport's existing Airport Rescue and Fire Fighting (ARFF) index, equipment, and work force requirements.

## EXISTING AIRPORT FACILITIES

Airports are divided into two main areas; airside and landside. The airside area consists of the parts of the airport that accommodate the movement of aircraft (runways, taxiways, parking aprons). The airside also includes the navigational and communication equipment designed to facilitate aircraft operations, navigation aids, lighting systems, antennae, etc. Landside facilities include the terminal/administrative building, hangars, and other support buildings, auto parking, access roads, and supporting infrastructure/utilities. The landside includes support-related facilities for utility delivery, aircraft fire fighting, and airport operations, such as snow removal, maintenance, and airport management facilities.

Figure 2.5 (next page) is an aerial photograph of the airport taken in January 2012; and Figure 2.6 (page 10) is the Existing Airport Layout Plan.


**Figure 2.5 – Airport Aerial Photo (December 2011)**

Insert Figure 2.6 – Existing Airport Layout Plan

### *CRITICAL DESIGN AIRPLANE*

The critical design aircraft is defined as the listing of airplanes (or a single airplane) with the fastest approach speed and longest wingspan, and has at least 500 annual operations for an individual airplane or a family grouping of airplanes.[4] Generally, the existing critical design airplane is carried over from the previous study's preferred or proposed ALP. However, because the critical design aircraft in 1999 was based on air carrier operations by U.S. Air (then U.S. Airways), which no longer operates at GON, selection of a new "existing" design aircraft is required.

In the 1980s, the FAA adopted a new classification system called Airport Reference Code (ARC) to group aircraft based on aircraft size (wingspan) and approach speed for design standards. The ARC has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan or tail height (physical characteristics), whichever is the most restrictive. Generally, runways standards are related to aircraft approach speed, airplane wingspan, and designated or planned approach visibility minimums. Taxiway and taxilane standards are related to airplane design group.

Airport design first requires selecting the ARC(s), then the lowest designated or planned approach visibility minimums for each runway, and then applying the airport design criteria associated with the airport reference code and the designated or planned approach visibility minimums.

The 1999 AMPU did not list a specific critical design aircraft, but rather indicates it was a grouping of airplanes with a wingspan between 79 and 117 feet, and an approach speed between 121 and 141 knots (139 – 162 miles per hour). This aircraft is similar to a Fokker F-27, SAAB SF 340, and McDonnell-Douglas DC-9; U.S. Air used the latter just before they ceased operations at GON.

Determining the current critical design aircraft requires an analysis of current and recent past history operations to determine which aircraft, or grouping of aircraft meet the definition described earlier. However, aircraft operational data about specific aircraft make and models is not realistically possible at U.S. airports because there is no single agency or organization that maintains this type of data. Raw operational numbers are maintained by the air traffic control tower, which does sort by aircraft category (general aviation, air carrier, air taxi, and military), but not by specific make and model (Cessna Skyhawk, Embraer 120, Gulfstream IV, etc.). Therefore, an alternative method of determining which aircraft is the critical aircraft is required.

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[4] AC 150/5325-4B, Runway Length Requirements for Airport Design, paragraph 102.

The FAA Enhanced Traffic Management System Counts (ETMSC) are flight counts designed to provide information on traffic counts by airport (or by city pair) for various data groupings such as aircraft groups, such as general aviation, military, large, medium, and small aircraft categories, etc. In addition, this data does break aircraft out some aircraft operations by type; which is the data needed to determine the critical design aircraft. The data provided by "type aircraft" includes aircraft on a filed flight plan, regardless of size, category, or type of flight (instrument or visual flight rules).

In analyzing the ETMSC data only two aircraft exceeded the minimum 500 annual itinerant operations required to qualify as the critical design aircraft; the Embraer 135 (EMB-13) and the Cessna Citation Model 650. Early in the study the EMB-135 was clearly the most widely used aircraft at GON because of it extensive use by the Pfizer Corporation. However, as the Master Plan unfolded, Pfizer relocated its local operations, and consequently, use of the EMB-135 at GON declined. By 2008 the company ended its EMB-135 operations at GON. This change resulted in the need to reevaluate the current design aircraft.

**Figure 2.7. Cessna 650 Citation VIII**

Discussions with airport management and air traffic control personnel at GON in 2011 indicated that the Cessna 650 was clearly the most widely used aircraft in the size (wingspan) and weight class required to meet the design aircraft requirements. Thus, the design (critical) aircraft for GON and one that establishes the ARC is the Citation 650. Figure 2.7 is a photograph of a typical 650. This aircraft has an average approach speed of 120 knots, placing it in Approach Category "C", and a wingspan of 53.6 feet, putting it in Design Group II. This data makes C-II the current ARC for the airport. However, this C-II classification is not consistent with the current ALP, which cites the ARC as C-III. Conversely, given the fact that airline service was discontinued at GON - operations that played a major role in the higher ARC classification - reducing the ARC from C-III to C-II is reasonable and justified.

In addition to selecting the design aircraft for the airport, selecting an additional aircraft as the critical design aircraft for the shorter crosswind runway and small aircraft parking aprons and hangars is prudent. This option allows planners to fine tune designs for Runway 15-33 and to design smaller, more compact facilities for small recreational aircraft. After analyzing available data, the design aircraft for the crosswind runway (15-33) is the Beech King Air 200, a B-II ARC aircraft. In addition the Cessna Skyhawk (C172), an A-I design aircraft is selected for small apron designs.

In summary, the recommended design aircraft and ARC for existing conditions at GON are:

| Runway/Facility | Aircraft | ARC |
|---|---|---|
| 5-23 | Citation 650 | C-II |
| 15-33 | Beech King Air 200 | B-II |
| Small Aircraft Parking | Cessna 172 | A-I |

## *Design Criteria*

Design criteria identify key characteristics of the airport based on FAA design standards. As discussed in the previous paragraph, the existing airport design aircraft has the characteristics of an ARC C-II aircraft. Planners and designers use this data in establishing required airport sizing of various airport surfaces; both the width of runways and taxiways, and separation around them, and other components of the airport, such as runway safety area size, the distance buildings must be from runways and taxiways, etc.

Table 2.1 lists the principal airport surface and the existing design criteria. Airport surface definitions are contained in Appendix 1.

**Table 2.1 - Airport Design Surfaces**

| Surface | Runway | Required Size | Remarks |
|---|---|---|---|
| Runway Safety Area | 5 | 500' W x 1,000' L | EMAS Installed |
| | 23 | 500' W x 1,000' L | EMAS Installed |
| | 15 | 150' W x 300' L | Displaced threshold required to meet full RSA |
| | 33 | 150' W x 300' L | 298' long with displaced threshold |
| Runway Object Free Area | 5 | 800' W x 1,000' L | |
| | 23 | 800' W x 1,000' L | |
| | 15 | 500' W x 300' L | |
| | 33 | 500' W x 300' L | |
| Runway Protection Zone | 5 | 1,000' Inner-Width<br>1,750' Outer-Width<br>2,500' Length | |
| | 23 | 1,000' Inner-Width<br>1,750' Outer-Width<br>2,500' Length | |
| | 15 | 500' Inner-Width<br>700' Outer-Width<br>1,000' Length | Encompasses a railroad line and vacant land north and south of Thomas Road |
| | 33 | 500' Inner-Width<br>700' Outer-Width<br>1,000' Length | |

## *RUNWAYS*

Groton-New London Airport has two paved runways: Runway 5-23 and Runway 15-33. Table 2.2 lists each runway and there identifying characteristics. Figures 2.5 and 2.6 presented earlier on pages 10 and 11 show the runway layout.

**Table 2.2 - Runway Data**

| Data | Runway 5 | Runway 23 | Runway 15 | Runway 33 |
|---:|---|---|---|---|
| Runway Length | 5,000 feet | | 4,000 feet | |
| Runway Width | 150 feet | | 100 feet | |
| Construction | Bituminious concrete | | Bituminious concrete | |
| Load Bearing Capacity | Single Wheel: 90,000 lbs.<br>Dual-Wheel: 113,000 lbs.<br>Dual-Tandem: 200,000 lbs. | | Single Wheel: 90,000 lbs.<br>Dual-Wheel: 113,000 lbs.<br>Dual-Tandem: 200,000 lbs. | |
| Pavement Condition | Excellent | | Excellent | |
| Runway Edge Lights | High Intensity | | High Intensity | |
| Displaced Threshold | No | No | Yes - 230' | Yes - 205' |
| Visual Approach Guidance Lights | No | PAPI | No | PAPI |
| Runway End Identifier Lights | No | Yes | No | Yes |
| Approach Lights | MALSR | No | No | No |
| Part 77 Approach Slope | 50:1 | 34:1 | 20:1 | 34:1 |
| Approach Procedures | ILS, VOR, GPS | VOR, GPS | Visual | GPS |

## *TAXIWAYS*

The airport has a system of eight taxiways, providing access to/from both runways and the airport's landside. Figure 2.6 (presented earlier on page 10) shows each taxiway and the identifying characteristics.

## *AIR NAVIGATION SYSTEMS*

This paragraph addresses navigation systems; specifically electronic navigation aids (NAVAIDS). Visual navigation aids are addressed on page 15 (see *Aeronautical Lighting*).

Electronic NAVAIDS at GON consist of the Very High Frequency Omni-Directional Range (VOR) and Instrument Landing System (ILS). The Global Positioning System (GPS), because it is not a land-based navigation aid, is not considered for the purposes of the AMPU.

- The **VOR** is located in a triangular unpaved section of the airport bounded by the approach end of Runway 15 and an abandoned runway and an internal access road (refer to Figure 2.6 presented earlier on page 10). The VOR, is owned and maintained by the FAA and operates on frequency 110.25 MHz. The system has no restrictions. The VOR, which includes Distance Measuring Equipment (DME) capability, provides enroute coverage for multiple airways (see Appendix 1), in addition to approach, or terminal coverage to Runways 5 and 23 at GON.

- **ILS**, with Category I minimums (see Appendix 1), is provided to Runway 5. The System consists of two primary components, a glide slope and the azimuth antenna. The glide slope antenna is located on the left side of the runway, 796 feet from the threshold, and is set at 3.0 degrees. The azimuth antenna is located on the departure end of Runway 5, approximately 1,000 feet from the approach end of Runway 23. The System is supported by an approach lighting system addressed in section 1.5.1.6. Figure 2.6 (presented earlier on page 10) shows the location of the ILS glideslope and localizer antennas.

### *Aeronautical Lighting*

This paragraph addresses aeronautical lighting. All aeronautical lights are consistent with FAA guidelines and Part 139 standards. All lights, with the exception of the rotating beacon, are controlled from both the air traffic control tower, and by Pilot Controlled Lighting (PCL) (see Appendix 1). Tower controllers turn lights on and off, and adjust the intensity as required by conditions (nighttime, weather, visibility) during hours of operation; during other times, pilots using a PCL system control lights. The tower controls the rotating beacon, which operates during nighttime and instrument meteorological conditions. The lights are in good condition and working order.

- **Runway Lights**. Elevated high intensity runway edge lights (HIRL) are installed on both runways.
- **Threshold Lights**. Threshold lights are installed on all four-runway ends. Runway 15-33 has flush mounted lights; Runway 5-23 has elevated lights.
- **Runway End Identifier Lights** (REILs) are installed on Runway 23 and 33 only.
- **Approach Lights**. A 1,400 foot medium intensity approach lighting system with runway alignment indicator lights (MALSR) is installed on Runway 5. The system extends into Baker Cove off Fishers Island Sound.
- **Visual Glideslope Indicators (VGSI).** There are two types of VGSI are installed at GON; PAPI and VASI (see Appendix 1).
    - **Runway 5** is equipped with a four-light PAPI on the left side set at the optimum 3.0 degrees, which corresponds to the ILS glide slope.

  - **Runway 33** is equipped with four-light PAPI on the left side set at 3.5 degrees. The higher angle provides obstacle clearance over trees on Pine Bluff State Park, which also accounts for the displaced threshold.
  - **Runway 23** is equipped with a four-box VASI on the left side, set at 3.0 degrees.
  - **Runway 15** has no VGSI.
- **Taxiway Lights.** All taxiways are equipped with medium intensity elevated blue edge lights.
- **Rotating Beacon.** The airport's Beacon is a standard land airport (white-green light) located atop the control tower (Figure 2.8).

Figure 2.8

### AIRPORT SIGNS

Airport signage consists of location, direction, destination, perimeter roadway, and information signs (see Figure 2.9 as an example), which are installed according to FAA standards. All signs are noted on the Airport Sign and Marking Plan.

Figure 2.9

### AIRPORT PAVEMENT MARKINGS

Airport pavement markings consist of runway, taxiway, and apron markings. All markings at GON are consistent with FAA guidelines, including "enhanced" runway and taxiway markings for a Part 139 airport.[5] The markings are all in excellent to good condition. The majority of pavement markings are repainted annually.

Markings for runways and a helicopter landing area are white. Markings for taxiways, areas not intended for use by aircraft (closed and hazardous areas), and holding positions (even if they are on a runway) are yellow.

[5] Per FAA Advisory Circular 150/5340-1J, *Standards for Airport Markings*.

The following lists GON pavement markings.

- **Runway 5-23**. Runway 5-23 is the primary instrument runway with precision markings that consist of white:
  - Runway designation,
  - Runway centerline,
  - Runway threshold,
  - Runway Aiming Point,
  - Runway Touchdown Zone,
  - Runway Side Stripe, and
  - Yellow overrun chevrons on both ends.

- **Runway 15-33**. Runway 15-33 is designed a non-precision runway with equivalent markings, that consist of white:
  - Runway designation,
  - Runway centerline,
  - Runway threshold,
  - Arrows and arrowheads used to identify a displaced threshold on both ends
  - Runway threshold bar.

- **Taxiways**. Taxiway markings are also consistent with FAA guidelines and Part 139 regulations. All taxiways have yellow centerline and edge markings. Runway hold position markings are enhanced with black borders. Taxiway C has Hold Position Markings for ILS operations. Both runways have enhanced hold markings for use when one runway is used as a taxiway.

- **Aprons**. Aprons are marked with both lead-in centerlines and aircraft parking designations.

- **Movement and Non-Movement Areas**. The terminal area non-movement area is clearly separated and marked with a yellow on black background non-movement area boundary markings. The entire terminal apron area, from the northeast apron around the terminal apron and up to the TASMG[6] apron is marked with vehicle roadway markings.

- **Security Markings**. The terminal apron is marked with security identification display area (SIDA)/airport security area (ASA) boundary markings.

[6] 1109th Theatre Aviation Sustainment Maintenance Group.

- **Helipad.** The airport's only helipad, located on Taxiway C directly across from the terminal building and control tower, is marked with a standard white [H]. Other than taxiway lights, the helipad is not lighted.

### *APRONS*

Aircraft aprons/ramps consist of seven specific parking areas joined by continuous pavement that extends throughout the airport's entire northern quadrant, from the approach end of Runway 15 to the end of Runway 23. The seven aprons, some of which are combined, consist of approximately 547,000 square feet of paved space, of which all but 10,000 is available for non-military use. The aprons are generally in excellent shape; well marked with lead-in taxiway and taxilane markings, as well as a designated vehicular designated roadway that extends parallel to Taxiway C along the majority of the outer perimeter of the aprons from the T-Hangar Ramp across the Terminal Ramp.. Refer to Figure 2.6 (page 10). The specific areas include:

- **Military Ramp.** The Military (MIL) ramp is for the exclusive use of the TASMG[7]. The apron measures 200 by 500 feet for a total area of 100,000 square feet.
- **General Aviation Ramps.** There are two general purpose GA ramps used for both based and itinerant aircraft parking. The first ramp is contained along Taxiway B with a single entrance and exit point onto Taxiway H. It accommodates 22 parked aircraft. This area measures 140' by 550' for a total area of 77,000 square feet. The second general aviation ramp accommodates six aircraft and is located off Taxiway C opposite Taxiway E. Both ramps contain in-ground tie-down rings and painted parking lines with spot numbers.

- **Central Ramp.** The central ramp is centrally located between the terminal and ARFF ramps. This apron is used by both transient and based aircraft as well as flight schools operating in the terminal. Total square footage is 280,000 sq feet and leads directly onto Taxiway C. The tie-down parking portion of the ramp measures 150'by 400', or 60,000 square feet. It accommodates 11 single and multi-engine planes with in-ground tie-down rings, painted parking lines and spot numbers.
- **Northeast Ramp.** The northeast ramp extends from the northeast end of the terminal ramp along Taxiway C to the approach end of Runway 23. However, the primary parking area is immediately adjacent to an automobile parking area between the terminal building 155 and ARFF facility, building 165. This apron is used by both transient and based pilots, as well as a flight school operating out of

[7] TASMG is a component of the Connecticut Army National Guard. TASMG's mission is to provide limited depot level maintenance and back-up aviation intermediate maintenance (AVIM) to Army National Guard aviation facilities in 14 northeastern states from Maine to Virginia to Ohio as well as the District of Columbia..

the terminal. The active portion of the ramp measures 150 by 400 feet, or 60,000 square feet.

- **Columbia Air Service Ramp.** The Columbia Air Service ramp is used exclusively by Columbia Air Service for based and itinerant aircraft parking, and often has large corporate aircraft parked or being serviced on the ramp. This ramp measures 160 by 620 feet (99,200 square feet).
- **Lanmar Ramp.** The Lanmar ramp is used exclusively by Lanmar Aviation for based and itinerant aircraft parking, and like Columbia, often has large corporate aircraft parked and being serviced on the apron. This ramp measures approximately 162 by 370 feet, or 61,000 square feet.

### *Terminal Building*

The terminal building is centrally located on the airport and is relatively unchanged since the last AMPU (see Figures 2.10 and 2.11). Constructed in 1963, it remains structurally sound, but underutilized. Renovations in 1997 included a new roof, a new heating and ventilation air-conditioning system, Americans with Disabilities Act compliance, new carpeting, and other improvements.

**Figure 2.10 – Terminal Building (Landside)**

**Figure 2.11 – Terminal Building from Airside**

The building is primarily single story, with a small second story that houses the airport administrative offices only. The building has an area of 10,593 square feet including the small second floor. The first floor contains two restrooms (men's and women's). Approximately 80 percent (9,500 square feet) of the building is available for commercial use, which includes a kitchen and restaurant.

In addition to airport management, current tenants include Avis/Budge Rental Car, Coastal Air Inc. and Action Multi-Ratings flight school. The terminal building is open from 7 am – 6 pm daily to accommodate tenant business hours. There are also two public pedestrian entrances from the roadway curbside and two airline passenger gate entrances to the terminal ramp.

## *Fixed Based Operator (FBO) Facilities*

There are two FBOs located at the airport; Columbia Air Service and Lanmar Aviation. The layout of the two FBOs as well as the other general aviation facilities is depicted on Figure 2.6 (page 10).

Both FBOs sell AVGAS and Jet A fuel and maintain fuel farms and mobile refueler trucks for this purpose. Lanmar also maintains a 24 hour pilot self-service AVGAS fueling system.

### *Columbia Air Services*

Columbia's facilities consist of four separate buildings totaling 66,000 sq. feet. The buildings comprise three conventional hangars used for aircraft storage and maintenance. One hangar also contains a counter and small seating area for air shuttle customers. The fourth building, opened in 2004, is a passenger terminal designed primarily for corporate customers and crew. All of Columbia's facilities are are located on the airport's northeast end. Parking for 76 automobiles is available adjacent to the hangars. Figure 2.11 is a photo of one of Columbia Air Service's hangars.


**Figure 2.11 – Columbia Air Service, Main Hangar & Office**

### *Lanmar Aviation*

Lanmar's facility consists of its original 10,000 square foot hangar now used for aircraft maintenance with an additional 5,000 sq feet of office space and another hangar building accommodating 10 jet-pods on the airport's west side. In 2004, Lanmar completed construction of a 20,000 sq foot hangar primarily for aircraft storage along with 3,750 sq. feet in office,

**Figure 2.12 – Lanmar Aviation, Main Hangar & Office**

crew and passenger terminal space, and also a new aircraft ramp and parking lot, all on the airport's northeast end (see Figure 2.12, previous page). In 2005, the company constructed a new 36 unit t-hangar facility adjacent to its larger hangar building.

### *HANGARS*

There are a total of nine hangars at GON, eight privately owned and one owned and operated by TASMG. Three of the private hangars are T-units; all remaining hangars are conventional units. The private hangars are used by a combination of recreational and corporate aircraft. The TASMG hangar is a maintenance facility.

All hangars are metal construction and in excellent condition. Our assessment in early February 2008 indicates a surplus of space in both the conventional and t-hangar units.

### *MAINTENANCE*

The maintenance focal point is a 1989 vehicle maintenance and workshop facility, located at the western boundary of the airport. The primary building has two large drive-thru bays, three large vehicle bays, a light mechanical room, a supply closet, an office and second floor crew accommodations (kitchen, restrooms, showers and bunkrooms). This building is used to store and repair snow removal equipment (SRE), mowers, trucks and smaller equipment and hand tools. It is powered in an emergency by a back-up generator. Nearby the building is a vehicle fueling station, a covered 4-vehicle truck port and a heated sand shed. Figure 2.13 is a front photograph of the Maintenance/SRE Storage facility

**Figure 2.13 – SRE Storage and Airport Maintenance Building**

## SNOW REMOVAL

Airport employees are responsible for ensuring safe operations during snow and ice conditions. As directed by the broader Airport Certification Manual, airport snow removal is administered by the Snow and Ice Control Plan.

While some of the fleet is aging, overall the snow removal equipment (SRE) is maintained in excellent condition. Table 2.3 lists airport-owned snow and ice control vehicles.

**Table 2.3 – Vehicle / Snow Removal Equipment List**

| Call Sign | Model | Equipment/User |
|---|---|---|
| State 1 | 4-Wheel Drive | Airport Manager |
| State 2 | 4-Wheel Drive | Maintenance Crew Leader |
| State 3 | Pickup Truck with plow | Maintenance |
| State 4 | Mason Dump | 9-foot plow with sander |
| State 9 | Payloader | with snow plow |
| State 10 | Snow broom | 16' broom with snow blower |
| State 11 | International Snow Fighter | 5,000 ton/hour |
| State 12 | International Snow Fighter | 23' plow/jet sander |
| State 15 | International Dump Truck | 11' plow/sander/spreader |

Source: Airport Certification Manual, Attachment A, dated May 5, 2011

## AIRPORT RESCUE AND FIRE FIGHTING

Because GON is classified as a commercial service airport (Part 139), it must, by regulation, support Airport Rescue and Fire Fighting (ARFF) operations during commercial air service operations.

The Fire Station and adjacent ARFF Ramp (see Figure 2.14 next page) are almost centrally located on-airport, north of the Central Ramp, and facing the primary runway. The ramp is within full view of the air traffic control tower cab. Opened in 1970, the building is in fair to poor condition. It was constructed with one drive-thru bay, 3 other truck bays all of which are small in size by today's ARFF apparatus standards. There are also an office, 2 restrooms with 1 shower stall, a kitchen/break room and no sleeping quarters. The station houses all airport firefighting equipment and a hazmat supply storage trailer. The 3,600 s.f. facility is heated, but not cooled except for the administrative office area, and does not have a source of back-up power in case of an electrical outage.

There are two vehicles and each one complies with all FAA requirements for ARFF Index A.[8] The following lists the vehicle descriptions; turret capabilities; type and amount of agents required; numbers and types of portable extinguishers; and their current condition.[9]

**Rescue 1 – 1998 Emergency One Titan 4x4**

- 1,500 gallons of water
- 200 gallons of 3% AFFF
- 550 pounds potassium-based dry chemical power (Purple K)
- 1 portable "ABC" dry chemical extinguisher rated 20 B,C
- Bumper Turret: 300 gallons per minute (GPM)
- Roof Turret: 750 GPM (high flow) and 375 GPM (low flow)
- Condition: Good

**Rescue 2 – 2010 Ford/Crash Rescue Equipment Services Renegade**

- 300 gallons of water
- 50 gallons of 3% AFFF
- 500 pounds potassium-based dry chemical powder (Purple K)
- 1 portable Halotron extinguisher ABC rated 2A, 10 B,C
- 1 portable "BC" dry chemical extinguisher rated 120 B,C
- 1 portable Class D extinguisher
- Bumper Turret: 150 GPM
- Condition: Excellent (new)

## UTILITIES

The airfield is serviced by all essential utilities; water, sanitary, electric, natural gas, and telecommunication lines are connected to the Terminal Building and all other major facilities/businesses on the airport. The conventional hangars, including T-hangars, have electrical power service, and some have water and telecommunications.

Service providers include Groton Utilities (electricity); AT&T (telephone); Town of Groton (water); television/internet service (Comcast).

Electrical service is rated at 9.5 megawatts, with an approximate extra capacity above what is currently used is between 5 and 6 megawatts.[10] Water service is fed from a 20 inch main

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[8] An index is required by 14 CFR Part 139 for each commercial airport certificate holder. The Index is determined by a combination of the length of air carrier aircraft and the average daily departures of air carrier aircraft. There are five indexes, A through E, with A being the minimum index designed to support aircraft less than 90 feet in length.

[9] Groton-New London Airport Certification Manual, Appendix B, dated 7/26/11, FAA approved 8/4/2011.

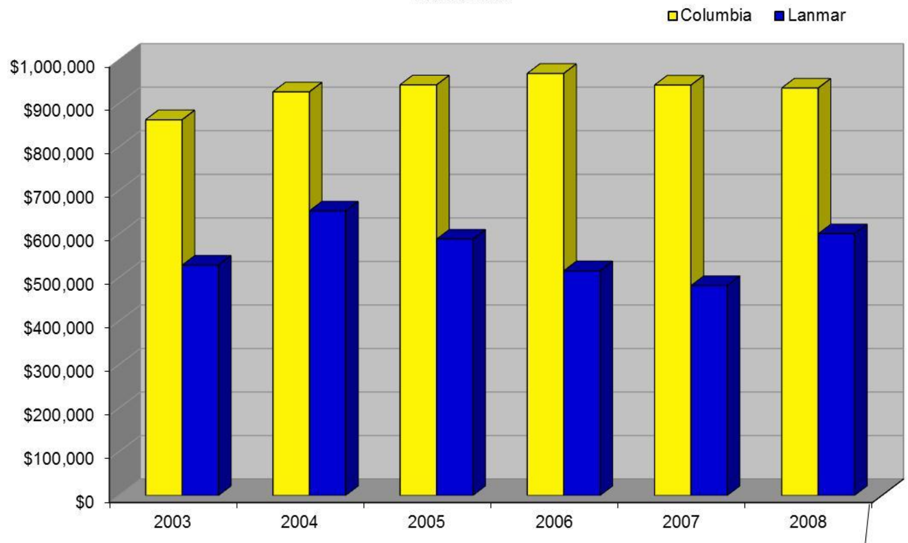
[10] Personal communications, M. Fedors, Groton Utilities, May 14, 2008.

that is reduced to 10 inches just as it enters airport property near the airport maintenance building.

## FUEL SALES

Fuel is currently sold by both fixed base operators, Columbia Aviation and Lanmar Aviation. Columbia sales are by truck, and serviced from a large storage facility located along Tower Avenue at the northwest corner of its leased property. Lanmar sales are by truck and from a self-service terminal located on the airport's General Aviation ramp, between the terminal building and TASMG. Figures 2.5 and 2.6 (pages 9 and 10 respectively) show the location of the two fueling facilities. Figure 2.15 shows the total sales in dollars since 2003 by each of the two fixed base operators.

Figure 2.15
Fuel Sales




Source: ConnDOT, Department of Transportation (March 2008)

## AIRSPACE AND AIR TRAFFIC CONTROL

Groton-New London is located within the jurisdiction of Boston Air Traffic Control Center. Instrument Flight Rules (IFR) arrivals and departures are under the control of Providence Approach/Departure Control. The FAA, which controls air operations, operates the Air Traffic Control Tower (ATCT) with contract personnel. The tower is equipped and staffed to provide Visual Flight Rules (VFR) separation of arriving and departing aircraft and control of taxiing aircraft in movement areas (runways and taxiways). The GON tower hours of operation are 7 a.m. to 10 p.m. daily. During closed periods, the airport reverts to "non-towered operations."

As shown in Figure 2.16 (next page), the Groton-New London Airport is located immediately within Class D airspace for the control of aircraft traffic by the ATCT located at the Airport. This airspace is active when the ATCT is operational. The Class D airspace may be described as generally encompassing a five-nautical mile radius of the Airport with


Figure 2.16 – Airspace Structure

a two-nautical mile cutout to allow visual flight rule operations including the VOR or GPS-A circling approach at the Elizabeth Field Airport to the south.

Class D airspace extends from the surface of the earth up to 2,500' above the airport elevation. This translates to 2,509’ above mean sea level (AMSL), rounded to 2,500' AMSL in practice. Aircraft entering this airspace when it is active are required to establish two-way radio communication with the ATCT prior to entry and when within its boundary. This applies to aircraft operating to or from the Airport or transiting the airspace at an altitude of 2,500' AMSL or less. When at an altitude of 2,500' AMSL or above, radio contact with the ATCT is not required. The assigned ATCT frequencies are 125.6 MHz and 352.8 MHz (military use). By federal regulation, aircraft are required to not exceed an indicated airspeed of 200 knots when operating in the Class D airspace. When the ATCT is closed, aircraft utilize the common traffic advisory frequency (CTAF), 125.6 MHz, the same frequency that is used to activate runway and taxiway lights.

Additionally, a larger airspace designated Class E overlies and surrounds the Airport and extends in all directions without specific dimensions. Class E is another form of controlled airspace that is primarily established to enable aircraft transitions to and from the terminal or en route environment. Radio contact with the ATCT is not required when operating under visual flight rules (VFR) within this classification. When overlying the Class D airspace when it is active, the Class E airspace extends from 2,500' AMSL to 14,500' above ground level (AGL) within its boundary. Otherwise, the floor of the Class E airspace is 700' AGL.

Another form of controlled airspace in the Airport vicinity is Victor airways. These airways are formed by radial headings taken from ground-based navigational aids, the predominant type being the very high frequency omni-directional range (VOR). Victor airways are a form of Class E airspace and extend from 1,200' AGL up to 18,000' AMSL. Their widths are typically eight nautical miles. There are several Victor airways that transit the Airport Class D airspace as also shown in Figure 2.16 (for example V58). It is important to note this because of the location and influence the VOR has at GON; a concept that will be studied in more detail later in this AMPU.

## AIRCRAFT ARRIVAL AND DEPARTURE ROUTES

An analysis of aircraft arrival and departure routes, both in visual and instrument conditions are essential because of their influence on noise in and around the airport; a concept addressed later in this section. The arrival and departure routes that follow are general based on ATC observations[11] and known visual and instrument flight patterns. The accuracy of the routes depicted becomes less precise the further aircraft are from the airport. The purpose of the routes is to help develop noise contours later in this study.

### *AIRCRAFT ARRIVAL ROUTES*

Aircraft operating VFR and seeking to arrive at the Airport may fly any route that affords them entry into the Class D airspace. Once cleared by the ATCT, aircraft are typically instructed to enter the traffic pattern on the downwind leg for the active runway, although straight-in procedures may be authorized depending on the extent and type of air traffic activity at the time. The traffic pattern altitude for the Airport has been established at 1,000' AMSL for light aircraft and 1,500' AMSL for turbojet and all turbine-powered aircraft. The traffic pattern flown is generally rectangular in shape and all turns are standard left-hand.

Aircraft operating under instrument flight rules (IFR) are vectored to the final approach course associated with the instrument procedure by Providence Approach Control (125.75 MHz or 319.2 MHz) and control is then transferred to the Groton ATCT. The aircraft is then cleared for the final approach to land. When the ATCT is closed, Providence Approach Control will clear the aircraft for the instrument approach and the pilot must initiate appropriate radio procedures to report his position and intentions to aircraft that may be in the vicinity of the Airport. Providence Approach Control is operational daily between

[11] Routes verified by C. Moore, ATC Tower Chief.

6:45 a.m. and 1:00 a.m. When closed, Boston Approach and Departure Control provide IFR clearances and may be contacted at 124.85 MHz. Figure 2.17 is a graphic showing arrival routes, developed for noise purposes, which will be addressed in a later working paper.

> Note: On Figure 2.17 (next page) and 2.18 that follows on page 29, the numbers refer to the arrival or departure runway. The letters are used to code the arrival and departure sub routes for the noise modeling that will be developed later in this study.
>
> When the ATCT is active, there is a ground control frequency (121.65 MHz) to direct taxiing aircraft to and from the runway and terminal areas. IFR aircraft arriving after the ATCT is closed can close their flight plan via the remote communications outlet (RCO) linked to the Bridgeport Flight Service Station. This a major convenience and safety factor inasmuch as there is no need to cancel an IFR flight plan in the air prior to the landing and allows the pilot to maintain radio contact with air traffic controllers until the aircraft has stopped at its parking position. This enables the air traffic controller to clear other aircraft for the approach to the Airport because the safe arrival of the preceding aircraft can be confirmed. Otherwise, the landing pilot must exit the aircraft and telephone the air traffic controller, which consumes considerable time and effectively closes the Airport to aircraft arrivals. The RCO frequencies are 122.1 MHz to receive and 110.85 MHz to transmit.

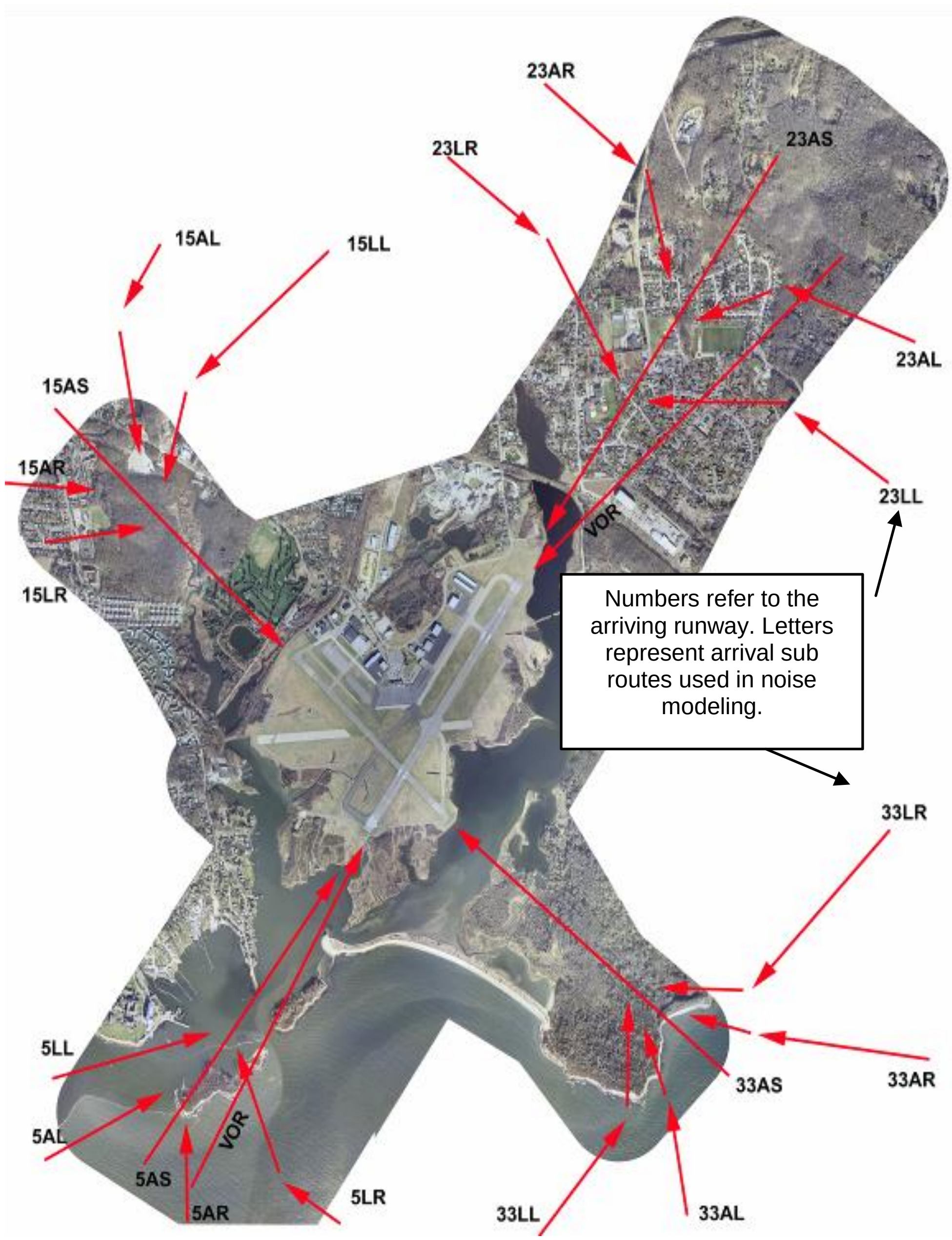
### *AIRCRAFT DEPARTURE PROCEDURES*

There is no standard instrument departure procedures published for IFR aircraft taking off from the Airport. IFR aircraft obtain departure clearances through the ATCT, or when closed, through RCO linked to the Bridgeport Flight Service Station. Once cleared for takeoff by the ATCT or otherwise airborne, IFR aircraft communicate with Providence Approach Control or Boston Approach and Departure Control as specified in its clearance. VFR aircraft departures follow instructions from the ATCT when active or apply standard procedures for an uncontrolled airport. Notwithstanding these practices, there are noise abatement and other operational procedures that aircraft are requested to abide by on a voluntary basis. These are reviewed in the section that follows. A graphic showing departure routes for noise purposes can be found on Figure 2.18 (next page).

### INSTRUMENT APPROACH PROCEDURES

There are six instrument approach procedures (IAP) serving GON, based on the ILS, VOR, and GPS. There are procedures to Runway 5, 23, and 33. These procedures include:

- ILS or Localizer Approach Runway 5. Uses ground based ILS system located along Runway 5-23.
- GPS procedures to Runways 5, 23, and 33. Uses satellite based navigation.
- VOR procedure to Runway 5 and 23. Uses the VOR located on the airport.


23AR
23LR
23AS
15AL
15LL
23AL
15AS
15AR
23LL
VOR
15LR
Numbers refer to the arriving runway. Letters represent arrival sub routes used in noise modeling.
33LR
5LL
33AS
33AR
5AL
VOR
5AS
5LR
5AR
33LL
33AL

It is important to note that the GPS procedures are non-precision and as of this date, have not been evaluated for an upgrade to the newer Localizer Performance with Vertical Guidance (LPV) procedure.

Graphics of each IAP along with a general descriptive page are contained in Appendix 3 of this document.

## AIRCRAFT OPERATING PROCEDURES

Runway 5-23, because of its length, instrument approach capabilities, approach lighting system, and preferable wind patterns, is the preferred runway. The Airport is located in a noise-sensitive area and has adopted voluntary procedures that emphasize 'fly-friendly' policies. These policies include published procedures that pilots are encouraged to follow when operating in visual flight conditions. During instrument flight conditions pilots must follow air traffic control directions. Specific procedures include:

- Runway 5 departures – Turn left heading 020º until reaching 1,000' AMSL, then on course;
- Runway 23 departures – Turn left heading 210º until south of Pine Island, or upon reaching 1,000' AMSL, then on course (see Figure 2.18, next page);
- Runway 33 departures – Fly runway heading until reaching 1,000' AMSL, then on course;
- Touch-and-go operations – Not permitted between the hours of 10:00 pm and 6:00 a.m., daily; and
- Practice approach / full stop / touch-and-go landings prohibited by pure jet aircraft and aircraft weighing 12,500 pounds and over, except by written approval from the Connecticut Bureau of Aviation.

## NEIGHBORING AIRPORTS

The nearest airport to Groton-New London Airport is the Elizabeth Field Airport, located about five nautical miles to the south-southeast on Fishers Island. This is a general aviation airport with two relatively short runways, neither greater than 2,400 feet, in a northwest-southeast and a northeast-southwest alignment. A circling approach based on the Groton VOR/DME with GPS overlay is published. Aircraft over fly the VOR/DME at an altitude of 2,000' AMSL and therefore are transiting the Class D airspace assigned to the Airport when the ATCT is in operation. The Elizabeth Field Airport is a base for two aircraft and total aircraft operations are estimated at 2,125 annually; about half of which are conducted by air taxi operators that serve the community. The Airport is attended during the months of May through October, generally between the hours of 8:00 a.m. and 8:00 p.m. There is sufficient airspace between the airports to afford minimal, if any, interaction between arriving and departing aircraft.

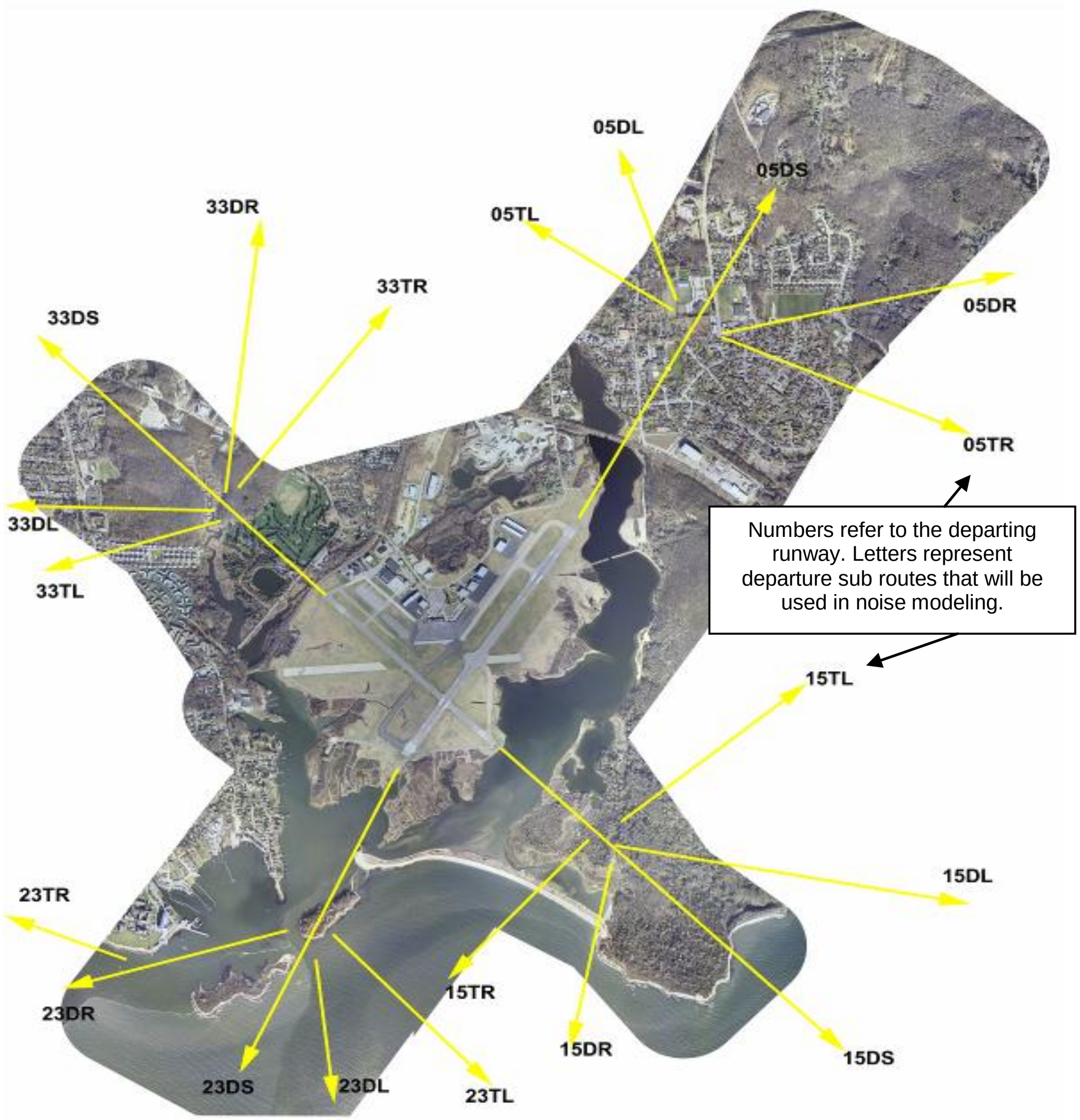



**Figure 2.18 – Departure Route Tracks**

Four other area public-use airports[12] are located between 11 nautical miles and 23 nautical miles from the Groton-New London Airport. These are general aviation airports served with instrument approach procedures, but none over fly the Groton-New London Airport Class D airspace. The airspace allocated to these airports is sufficiently large to preclude interaction among aircraft activity conducted at these facilities and the Groton-New London Airport.

### AIRPORT ACCESS AND VEHICULAR PARKING

The access route to and from GON and Interstate 95 has changed little since the last AMPU in 1999. The route uses Exit 87 from I-95 to U.S. Route 1, then via Poquonnock Road to High Rock Road, then Tower Avenue, which serves as the main feeder road to all airport facilities and services. This route is very congested because of Route 1 and its extensive commercial development that has only increased since the last update.

At-grade public parking is provided on-airport at no charge for passengers, visitors, and employees. On-airport parking consists of 245 parking spaces with eight handicap spaces. The parking lot is in fair condition and of adequate size to meet current demand. However, some spaces in the lot flood during high tide and heavy rainstorms. In the fall of 2001, new lighting, which included new poles, bases, conduit, and wire, was installed in the lot.

Parking at the two opposite ends of the airport is not as plentiful. TASMG, with its high employee concentration has expanded parking since the last AMPU. The organization is currently developing its own master plan and will look at potential expansion in the future.[13] On the opposite end, Columbia Air Services with 76 spaces, and Lanmar Aviation with space for 60 automobiles, both need extra parking. However, with the surplus of space at the terminal, split between the two FBOs and TASMG, the airport overall has plenty of space, and is a short walk to either end of the terminal area.

### RECENT DEVELOPMENT

The most significant recent development at GON since this report was started is the construction of full Runway Safety Areas (RSA) on Runway ends 5 and 23 using Engineered Material Arresting System (EMAS) technology, a crushable concrete installed as a bed at each end of the runway. EMAS was installed in lieu of a standard turf safety area because of space limitation. Refer to Figures 2.5 and 2.6 presented earlier on pages 9 and 10.

- The Runway 5 departure end (Runway 23 approach) EMAS is set back 245 feet from the threshold. The pad is 130 feet long and 162 feet wide.

[12] Westerly State Airport; Block Island State Airport; Montauk Airport; Chester Airport
[13] Telephone conversation with LCOL Scott Panagrosso, September 15, 2008.

- The Runway 23 departure end (Runway 5 approach) EMAS is set back 35 feet from the threshold and is 340 feet long and 162 feet wide.

## HISTORIC AND CURRENT AVIATION ACTIVITY

This part addresses aircraft activity (operations and based aircraft). Operations refer to the actual takeoff and landing of aircraft (one operation for each separate event). A based aircraft is an aircraft that is "operational and air worthy", which is typically based at the airport for a majority of the year. For this AMPU three categories of aircraft operations (commercial, general aviation, and military) as well as the based aircraft that use GON as the home field, comprises aviation activity analyzed. All four (commercial, general aviation, and military operations, as well as based aircraft) are strong indicators of trends, which are used in developing forecasts in Chapter 3 of this report.

Operations are further divided into itinerant and local. Local operations begin and end at the airport and by definition remain within 20 miles of the airport during this period. Local operations are usually those aircraft that remain in the local air traffic pattern for the purpose of practice and/or flight training. Itinerant operations are those that do not remain in the local pattern. Lastly, operations are also divided into instrument flight rules (IFR) and visual flight rules (VFR). For air traffic reporting purposes, itinerant operations are classified as either IFR or VFR, while local operations are only VFR. For traffic count purposes an air carrier aircraft is considered to be an aircraft capable of carrying more than 60 passengers. Air taxi is those commercial operations not classified as an air carrier aircraft.[14] As Table 2.4 on the next page illustrates, the majority of commercial operations at GON are air taxi for traffic reporting purposes.

Table 2.4 (page 34) shows operations during the 18-year period from 1990 through 2007 as reported by air traffic control tower personnel for the period the tower is open (7 am to 10 pm daily).[15] This table breaks the operations data out into itinerant and local, and is further divided into air carrier, air taxi, military, and general aviation. Note that local operations only include general aviation and military[16]. For illustration purposes, Figure 2.19 (next page) presents itinerant versus local operations, which is currently 61 percent itinerant and 39 percent local.

Table 2.5 (page 34) is the breakout of IFR and VFR operations (where IFR only includes itinerant operations, and VFR includes both itinerant and local).

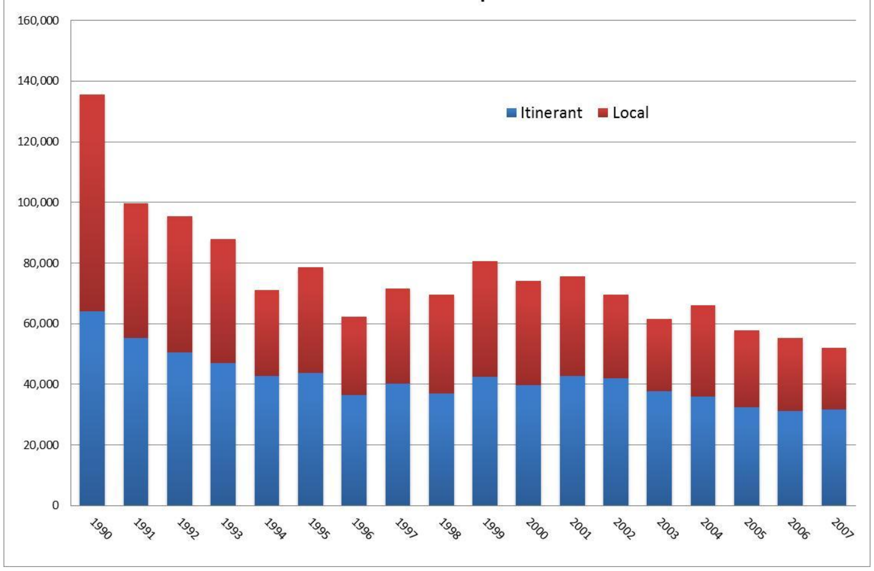
[14] As reported by the air traffic control tower, which reports aircraft operations data according to FAA Order JO 7210.3V, Facility Operation and Administration, February 14, 2008.
[15] A night differential will be added later in this report for noise reporting purposes.

## *COMMERCIAL OPERATIONS*

Commercial operations mean any operation involving the carriage of people and/or cargo for hire. This includes air carrier (schedule and non-scheduled), air taxi and charter operations (see Appendix 1). A more detailed explanation can be found in Appendix 2.

While airline service ended in September 2003, other commercial service (air taxi and charter) continue at GON. Prior to the loss of airline service the airport averaged 5,000 annual commercial operations. Since the loss of air carrier service in 2003, the airport has averaged slightly less than 2,800 commercial operations. Presumably, the difference is because of the termination of air carrier service.

**Figure 2.19**
**Itinerant v. Local Operations**




A review of commercial operations shows a steady decline since 1990 when the airport reported over 14,000 operations. During the period from 1990 to 1994, commercial operations declined by 58 percent, from 14,431 to 6,048 operations. Flights slightly increased for the next three years, then started a slow steady decline through 2007. Figure 2.20 (page 35) shows commercial operations (air carrier, air taxi and charter operations) during the period 1990 through 2007. Commercial operations during the base year (2007) total 2,446.

## *GENERAL AVIATION OPERATIONS*

The primary activity at GON is general aviation, and like commercial operations, this segment has shown a steady decline in numbers. However, this is a nation-wide trend and does not necessarily reflect abnormal movement or conditions at GON. Steady rising fuel prices and insurance costs are the primary reason. Inflationary issues have also impacted the cost of aircraft, aircraft parts, maintenance, and flight training.

**Table 2.4 - Historic Aircraft Operations**

| Year | Itinerant Operations | | | | | Local Operations | | | Total Operations |
|---|---|---|---|---|---|---|---|---|---|
| | Air Carrier | Air Taxi | General Aviation | Military | Total | General Aviation | Military | Total | |
| 1990 | 0 | 14,431 | 46,561 | 3,122 | 64,114 | 68,218 | 3,333 | 71,551 | 135,665 |
| 1991 | 0 | 10,428 | 41,445 | 3,364 | 55,237 | 41,357 | 3,132 | 44,489 | 99,726 |
| 1992 | 0 | 9,285 | 37,069 | 4,237 | 50,591 | 39,754 | 5,058 | 44,812 | 95,403 |
| 1993 | 0 | 7,692 | 36,180 | 3,185 | 47,057 | 38,505 | 2,420 | 40,925 | 87,982 |
| 1994 | 2 | 6,027 | 34,596 | 2,236 | 42,861 | 26,687 | 1,582 | 28,269 | 71,130 |
| 1995 | 1 | 6,459 | 34,404 | 2,792 | 43,656 | 32,876 | 2,048 | 34,924 | 78,580 |
| 1996 | 1 | 6,604 | 27,325 | 2,610 | 36,540 | 23,627 | 2,186 | 25,813 | 62,353 |
| 1997 | 0 | 6,982 | 30,763 | 2,377 | 40,122 | 29,441 | 1,972 | 31,413 | 71,535 |
| 1998 | 0 | 5,862 | 29,309 | 1,877 | 37,048 | 30,712 | 1,778 | 32,490 | 69,538 |
| 1999 | 0 | 4,751 | 35,739 | 2,108 | 42,598 | 35,796 | 2,194 | 37,990 | 80,588 |
| 2000 | 0 | 4,342 | 33,199 | 2,123 | 39,664 | 32,693 | 1,876 | 34,569 | 74,233 |
| 2001 | 6 | 4,312 | 36,258 | 2,131 | 42,707 | 31,018 | 1,852 | 32,870 | 75,577 |
| 2002 | 3 | 3,574 | 35,534 | 2,763 | 41,874 | 24,804 | 2,850 | 27,654 | 69,528 |
| 2003 | 4 | 3,869 | 32,000 | 1,875 | 37,748 | 22,395 | 1,318 | 23,713 | 61,461 |
| 2004 | 0 | 3,079 | 30,695 | 2,292 | 36,066 | 28,254 | 1,692 | 29,946 | 66,012 |
| 2005 | 4 | 2,711 | 26,999 | 2,711 | 32,425 | 23,517 | 1,950 | 25,467 | 57,892 |
| 2006 | 2 | 2,437 | 25,869 | 2,906 | 31,214 | 22,200 | 2,003 | 24,203 | 55,417 |
| 2007 | 0 | 2,446 | 26,217 | 3,021 | 31,684 | 18,662 | 1,614 | 20,276 | 51,960 |

Source: FAA Air Traffic Activity System (ATADS) (September 26, 2008)

**Table 2.5 - IFR v. VFR Operations**

| Year | IFR | VFR | Total |
|---|---|---|---|
| 1998 | 9,367 | 60,173 | 69,540 |
| 1999 | 10,047 | 70,544 | 80,591 |
| 2000 | 10,037 | 64,198 | 74,235 |
| 2001 | 11,409 | 64,170 | 75,579 |
| 2002 | 10,789 | 58,739 | 69,528 |
| 2003 | 11,860 | 49,601 | 61,461 |
| 2004 | 10,676 | 55,337 | 66,013 |
| 2005 | 9,762 | 48,159 | 57,921 |
| 2006 | 8,990 | 46,247 | 55,237 |
| 2007 | 9,610 | 42,350 | 51,960 |

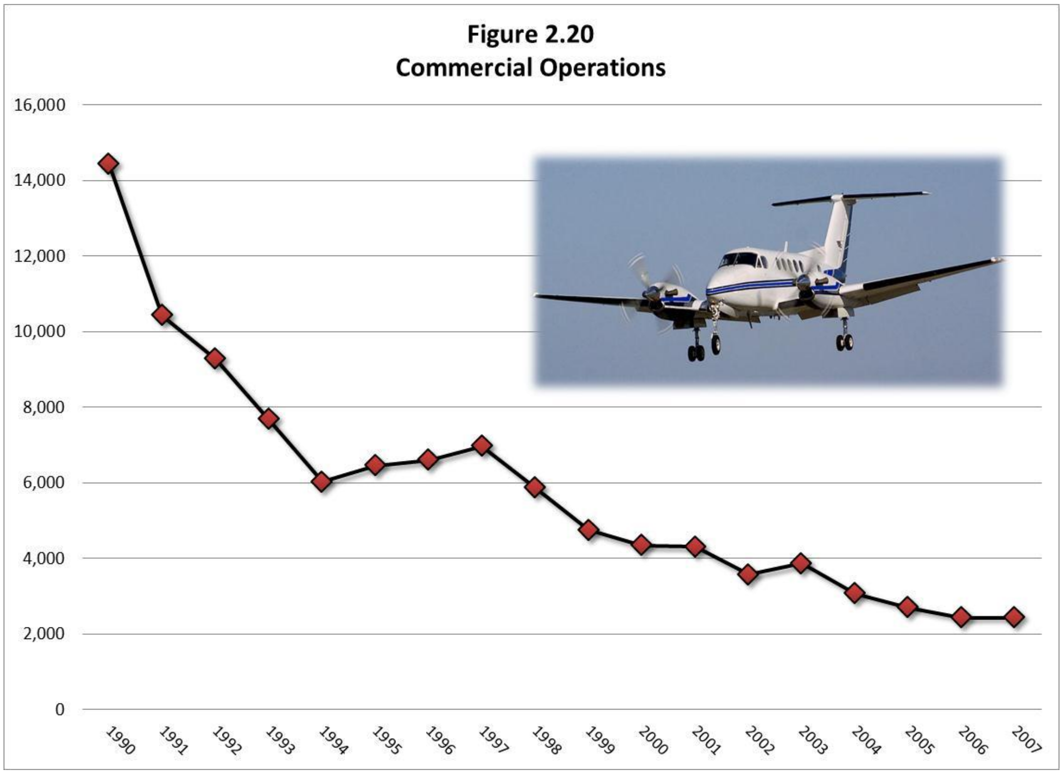


Figure 2.20
Commercial Operations
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007

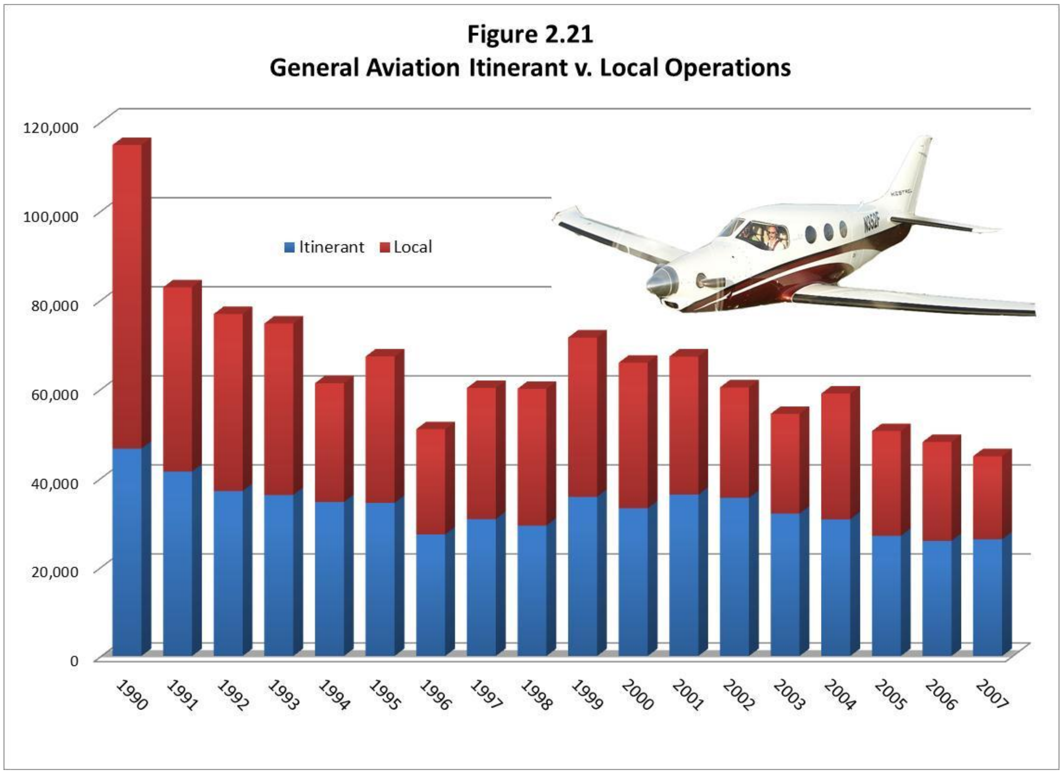


Figure 2.21
General Aviation Itinerant v. Local Operations
120,000
100,000
80,000
60,000
40,000
20,000
0
Itinerant
Local
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007

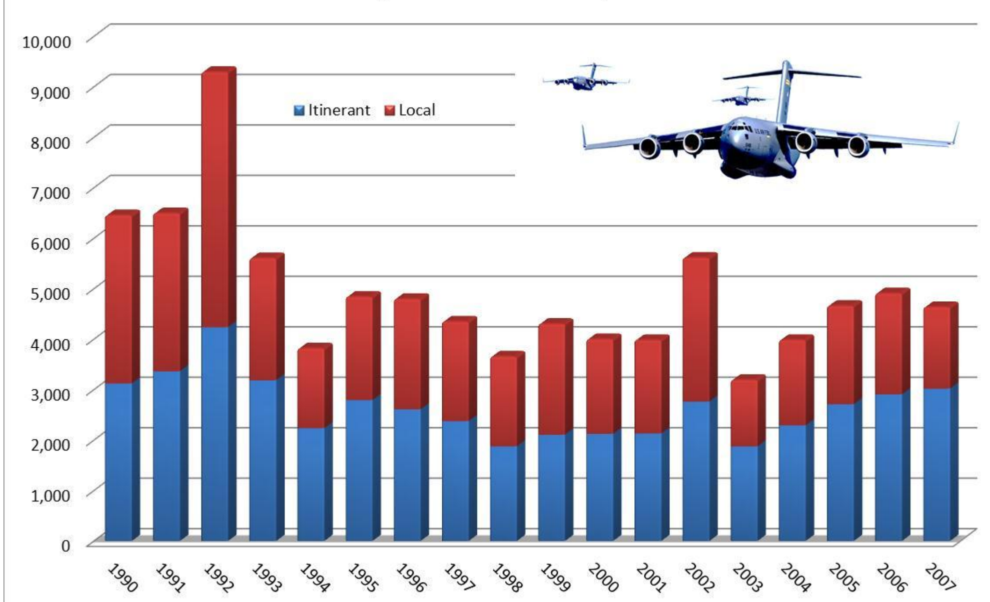
General aviation operations are divided into two categories; local and itinerant (see Appendix 1). And like commercial operations, general aviation activity in the past 14 years was at its peak in 1990 when the airport reported almost 115,000 local and itinerant operations. This number declined rapidly until 1994, where it increased slightly for the next three years, then slowly declined through 2007 to just under 45,000; a 69 percent decline since 1990.

Figure 2.21 (on the previous page) shows a comparison of itinerant and local general aviation activity at GON. This data shows that the 2007 base year numbers reflect 58 percent of general aviation operations in 2007 were itinerant (26,217) and the remaining 42 percent (18,662) are local operations.

### *MILITARY OPERATIONS*

Military activity at GON is from a variety of sources including: Local operations conducted primarily by Army National Guard 1109th TASMG and also the U.S. Air Force Auxiliary Civil Air Patrol which has squadron offices on-airport; and Itinerant operations either in support of the National Guard or aircraft using GON for practice approaches (from military airfields in New England and along the eastern seaboard); VIP flights associated with the nearby U.S. Naval Submarine Base – New London and the U.S. Coast Guard Academy in New London; and the U.S. Coast Guard International Ice Patrol whose operations center is located in New London and whose flights involve C-130 aircraft operations February through July using U.S. Customs services.Figure 2.22 shows military operations for the period 1990 through 2007.

**Figure 2.22**
**Military Itinerant v. Local Operations**



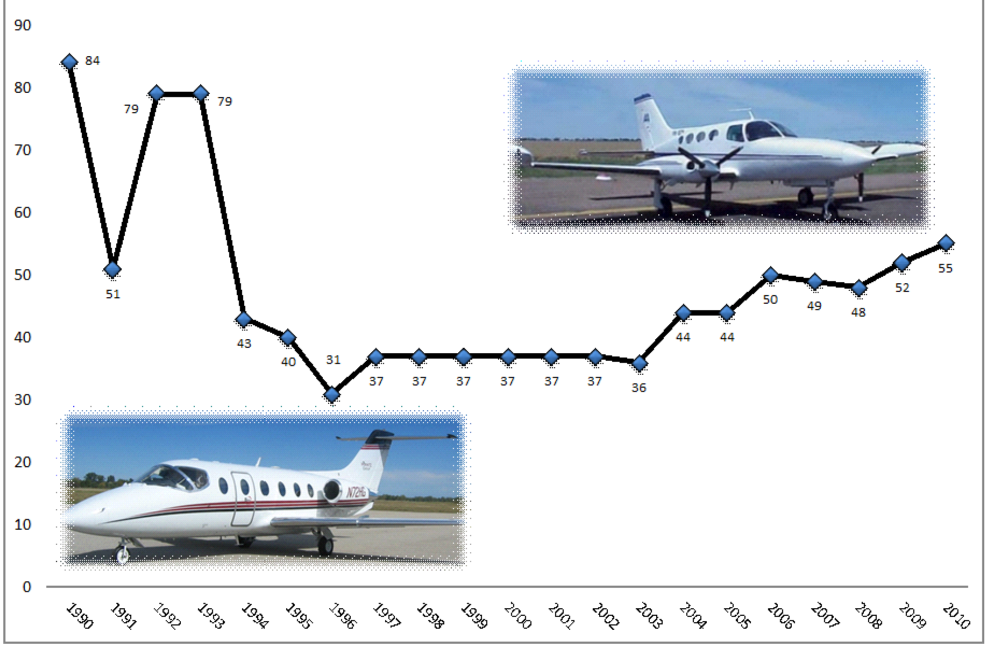
### *Based Aircraft*

Based aircraft are measured as a future forecasting tool to assess airport services and infrastructure needs. Based aircraft at GON have averaged 54 aircraft during the 27 year period from 1980 through 2006 (last reported year). However, this number has decreased significantly since 1993. For the period from 1980 through 1993, based aircraft averaged 69 aircraft; since then, the average fell to as low as 39, but has been steadily increasing to its base year number of 55. Construction in 2004 and 2005 of the new jet pods and T-hangars has undoubtedly contributed to some of the increase in based aircraft.

One issue that is difficult to determine is the number of TASMG aircraft that are based at GON on a temporary basis. In reality, military airplanes have no bearing on the based aircraft forecasts because they are really not "true" based aircraft. The number of military fixed-wing and helicopter aircraft parked at GON changes almost on a daily basis. As the master plan develops and alternatives are developed, where and how civil aircraft are parked (apron or hangar) will be one of the issues this master plan studies. TASMG is currently developing their own master plan and will determine how much space the guard unit will need in the planning years. For the purposes of this master plan it is virtually impossible for to determine what TASMG future needs are until they finish their study, primarily because their needs will not be impacted by the forecasts develop in this master plan.

Figure 2.23 presents the reported totals for base year in 2010, data provided by the airport manager in 2011. As illustrated in Figure 2.24 (next page), the base year fleet-mix consists of 67% single-engine reciprocating, 14% multiengine reciprocating, 4% helicopter and 15% jet/turbofan.

Figure 2.23
Historic Based Aircraft



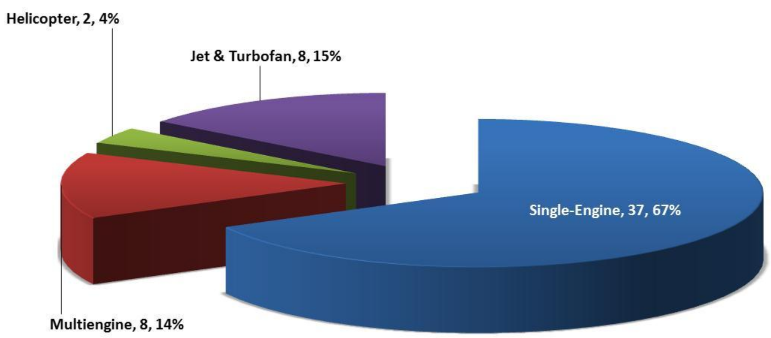



**Figure 2.24**
**Based Aircraft Fleet Mix**

## *AIRCRAFT AND OPERATIONS INVENTORY SUMMARY*

Table 2.6 summarizes the aircraft and operations summary for the base year 2010. This is the baseline data for the master plan update, which will be used in forecasting future airfield requirements.

**Table 2.6 - Aircraft and Operations Inventory Summary**

| Operations | Commercial | General Aviation | Military | Total |
|---|---|---|---|---|
| Itinerant | 2,300 | 28,000 | 3,100 | 33,400 |
| Local | 0 | 18,600 | 1,500 | 20,100 |
| Total | 2,300 | 46,600 | 4,600 | 53,500 |

**Based Aircraft**

| Single-Engine | Multiengine | Helicopter | Jet & Turbofan | Total |
|---|---|---|---|---|
| 37 | 8 | 2 | 8 | 55 |

| Design Aircraft | | Airport Reference Code |
|---|---|---|
| Runway 5-23 | Citation 650 | C-II |
| Runway 15-33 | Beech King Air 200 | B-II |

## ENVIRONMENTAL OVERVIEW

This master plan update will perform an environmental overview that will identify projects that will need further analysis if the project were to move forward. It does not include an Environmental Assessment or Environmental Impact Statement.

### *CONSULTATION WITH ENVIRONMENTAL AGENCIES*

Coordination letters were sent to the United States Fish & Wildlife Service and the Connecticut Department of Energy and Environmental Protection (CTDEEP) to identify the potential presence of endangered and/or threatened species or species of special concern in the area of the airport. In addition, preliminary coordination with the Connecticut State Historic Preservation Office (SHPO) regarding the potential for cultural resources was implemented and a preliminary response received (see next paragraph). Figure 2.25 shows the airport location, with cross-hatching that indicates that threatened or endangered species or species of special concern are present in the area based on the CTDEEP NDDB GIS database.

We do know that prehistoric archaeological sites 59-5 and 59-18 are located on airport property and as such, indicate a moderate to high archaeological sensitivity that would warrant additional archaeological studies prior to future ground disturbance.

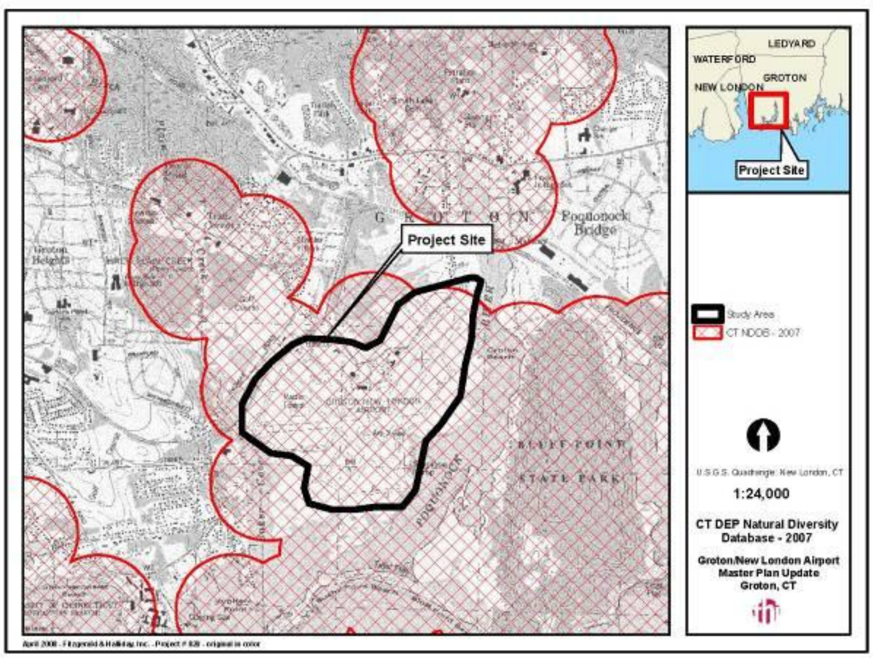



**Figure 2.25 – Threatened and Endangered Species Locations**

In addition to the above, separate reports were prepared independent of this update and are noted as additional sources of information. These include the following:

- *Ornithological Surveys and Habitat Assessments*, Prepared July 2007 by Mark S. Szantyr under contract with Parsons Corporation.

- *Rare Plant Survey and Plant Community Classification,* Prepared September 2007 by William H. Moorhead III under contract with Parsons Corporation.
- *Groton-New London Airport Safety Improvements to Runway 5-23 Endangered Specie Mitigation Plan*, DOT Project 58-303 Mitigation Plan, Prepared by CTDOT Office of Environmental Planning, April 2009.
- *Soil/Wetland Delineation Report*, Prepared July 2007 by Parsons Corporation.

### *LAND USE – ON AIRPORT*

The Groton-New London Airport is located in the Town of Groton and abutting the boundary with the City of Groton. The airport is on a peninsula and all of the land on the airport property is occupied for aircraft related uses with the exception a pocket of undeveloped shrub lands northwest of Tower Avenue/South Road. Runways and taxiways occupy the southern tip and eastern half of the airport property with one generally northeast/southwest runway and one southeast/northwest runway. These runways and adjacent taxiways abut waterways including Baker Cove and the Poquonnock River. The northwest corner of the airport includes hangars, aircraft parking and related buildings, including maintenance buildings, charter facilities, aircraft sales, safety and rescue training facilities, and a Connecticut National Guard complex. Figure 2.5, presented earlier on page 9, is a current aerial photo of the airport, followed by the airport layout plan, Figure 2.6 on page 10. The airport includes:

- One NNE-SSW runway 5,000 feet long and 150 feet wide
- One NNW-SSE runway 4,000 feet long and 100 feet wide
- ATCT and approach lighting
- 2.5 miles of taxiways
- 16 acres of paved aircraft parking area
- 14 buildings for various uses

### *LAND USE – OFF AIRPORT*

The existing Groton-New London Airport is situated on the eastern end of the Connecticut coast at Long Island Sound and is surrounded on the southwest, south and east by Baker Cove, the Sound and the Poquonnock River respectively. Land just to the northwest of airport property is the 40 acre privately owned Airport Business Park that encompasses over 800 acres and provides public–access to Bushy Point Beach. The park is designated a coastal reserve and is only accessible via non-motorized vehicles or on foot. The City of Groton lies immediately to the west and land uses adjacent to the airport in the City are predominantly single-family residents, including the Jupiter Point neighborhood. Other land uses to the west are, the University of Connecticut at Avery Point on the Avery Point peninsula, the Shennecossett Beach Club and Golf Course. Land to the north of the airport

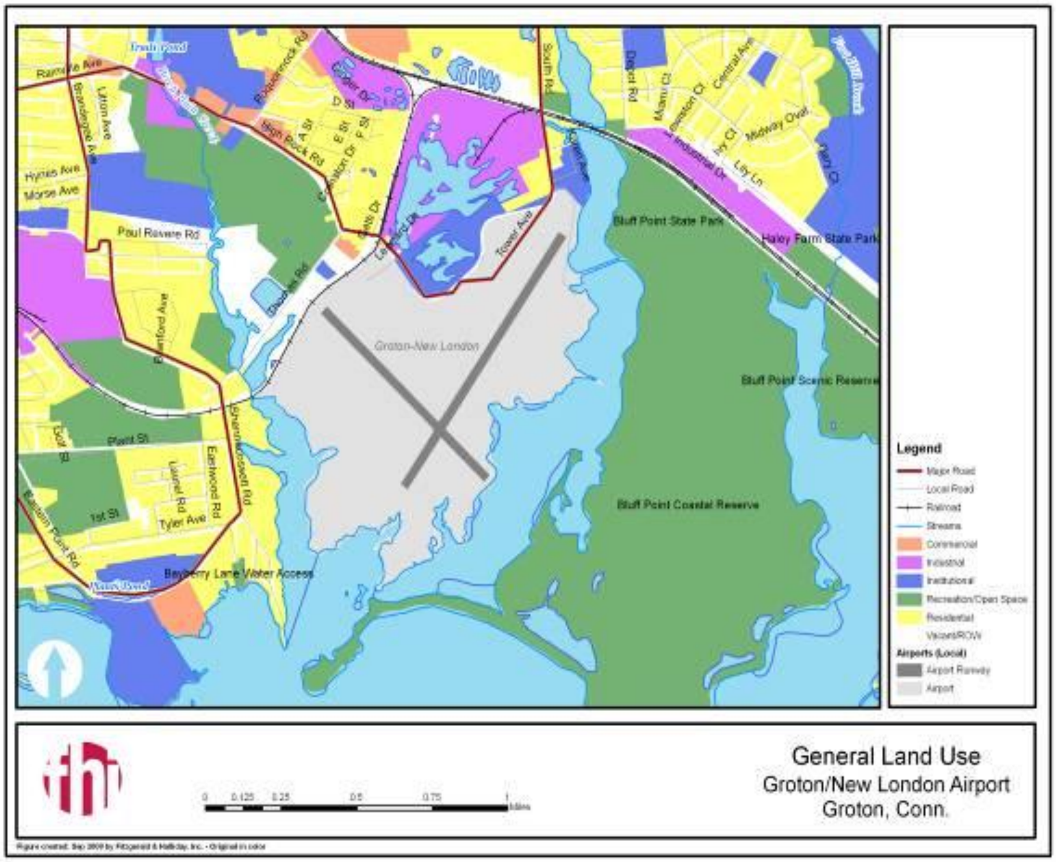



**Figure 2.26 – General Land Use Map**

is a mix of activities typical of long-established urban and suburban communities including Pleasant Valley Mobile Home Park with approximately 240 homes. Development abutting the airport to the north and northwest is predominantly industrial, including a rail line, but with residential subdivisions further north. Other uses of note in the vicinity include a town ball field and boat launch to the northeast of the airport, several schools, a daycare, a cemetery and several places of worship. Figure 2.26 shows generalized land uses in the airport vicinity.

### *DEVELOPMENT POLICIES*

The airport falls within the planning regions addressed by

- the State Conservation and Development Policies Plan for Connecticut (2005-2010) (the C&D Plan);
- the Regional Plan of Conservation and Development 2007 for the Southeastern Connecticut Council of Governments (SCCOG); and

- Groton 2002 Plan of Conservation and Development (Groton Planning Commission). These plans each articulate a vision, goals, and objectives for future land use and overall development within their respective planning regions. Relevant key elements of these reports are summarized below.

The C&D Plan contains growth management, economic, environmental quality, and public service infrastructure guidelines and goals for the State of Connecticut. It contains six "growth management principles" intended to better integrate a variety of state planning functions. The overall strategy of the C&D Plan is to reinforce and conserve existing urban areas, to promote appropriate, sustainable development, and to preserve areas of significant environmental value. The Location Guide Map which accompanies the C&D Plan provides a geographical interpretation of the State's conservation and development policies.

According to the C&D Plan's Development Location Guide Map, the Groton-New London Airport peninsula falls within a Conservation Area with Neighborhood Conservation areas to the north and west and Preservation Areas to the south and east. Typically, the Conservation Areas are "planned for the long-term management of lands that contribute to the state's need for food, water and other resources and environmental quality by ensuring that any changes in use are compatible with the identified conservation value." The Neighborhood Conservation areas are significantly built-up and well populated areas but without the infrastructure, density, and diverse income characteristics of an urban based regional center. The state strategy for a Neighborhood Conservation Area is to maintain these stable communities and support intensification of development when "supportive of community stability and consistent with the capacity of available urban services". Finally, Preservation Areas are intended to protect significant resource, heritage, recreation, and hazard-prone areas by avoiding structural development, except as directly consistent with the preservation value.

The Regional Plan of Conservation and Development 2007 for southeastern Connecticut includes a map of proposed future land use based on policies defined in the plan text. The Groton-New London Airport peninsula is identified as an area of "Existing Institutional Uses" and is proposed to remain in that use. It is surrounded by "Existing and Proposed Urban Uses" except for the state park which is categorized as "Existing Recreation and Open Space Uses". The areas of institutional use in the plan include public and private institutional uses that are expected to remain such as "governmental, military, correctional, educational and medical facilities". The plan's urban areas are recommended for "the most intensive residential and/or industrial and commercial development". These areas include the region's urban centers as well as concentrations of intensive development in village and town centers. The plan states that "where feasible, these areas should be looked to for the location of compact, transit accessible, and pedestrian-orientated mixed use". Recreation and open space areas in the plan include existing preserved open space such as Bluff Point State Park which should remain as such in the future.

The SCCOG Regional Plan of Conservation and Development 2007 conclude with a set of goals, objectives, and recommended actions. Transportation-related goals, objectives, and recommendations include:

- **Goal** - Create a balanced regional transportation system that strives to meet the needs of all segments of the population, including tourists, regardless of age, income or disability, and which promotes responsible development within the region's core.
- **Objective 3** - Regional transportation systems, which are planned and budgeted for within the context of fiscal constraint
- **Recommended Action 10** - Support actions to improve service levels and the use of Groton-New London Airport.

The most recent plan of conservation and development for the Town of Groton is the Groton 2002 Plan of Conservation and Development. It is organized around a series of themes including conservation, development, and infrastructure. The transportation system is addressed as part of the infrastructure theme. The overarching goal is to enhance the transportation system. The plan notes that, as of 2002, "the airport is recognized as an underutilized asset and the airline operations there have not been well developed." It also notes that "While the airport continues to provide a valuable service to area residents and businesses, activities at the airport tend to be controversial since about half of its operations involve flight paths over residential areas. Due to the potential impacts (both positive and negative) on local residents and businesses, activities at the airport should be closely monitored." Recommendations relative to the airport include:

- Continue to closely monitor activities at the airport due to the potential impacts (both positive and negative) on local residents and businesses.
- Undertake partnerships with the airport and CTDOT to enhance the economic potential of the airport facilities.

### *ZONING*

According to the Town of Groton zoning map (October, 2003), the Groton-New London Airport falls entirely within the industrial IA-40 Zone. The IA-40 zone has a minimum lot size requirement of one acre (or 40,000 square feet) with a maximum building coverage of 40 percent. The principle intended uses in this zone include a full range of industrial, warehousing, and manufacturing activities. Airports are a permitted use in this district. Zoning districts in the airport environs are shown in Figure 2.27 (next page).

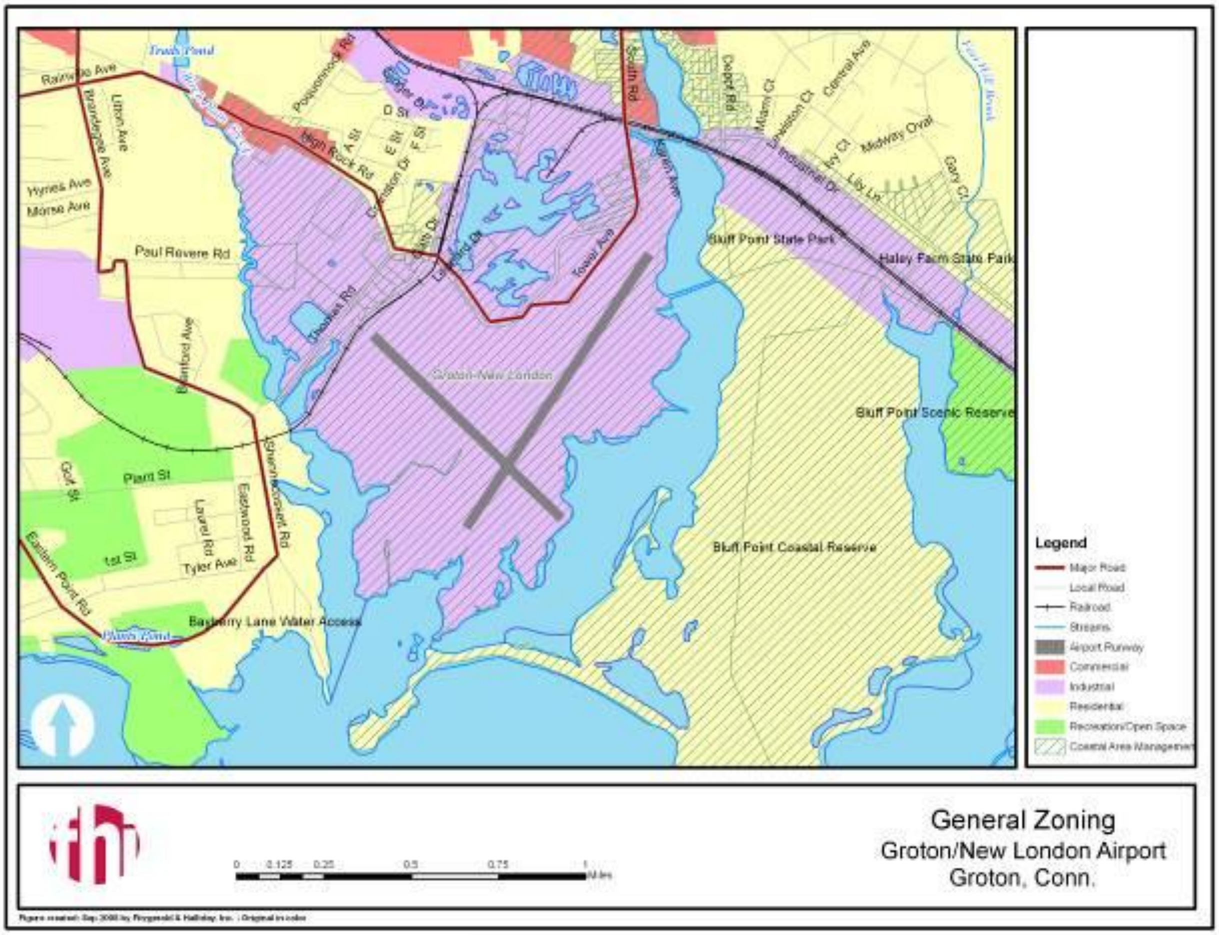



**Figure 2.7 – General Land Use Map**

## Financial Data

An examination of the airport's financial resources, including its basic business model, operating revenue and expenses, and sources and use of capital funds is included in this section.

The Groton-New London Airport's business model is based on a general aviation facility; which by definition generates revenue from a wide-range of recreational and business aircraft operations. Instead of receiving income from airline ticket counters and ramp/apron leasing, the airport generates revenue from sources such as land leases for businesses and hangars, fuel flow fees, tie-down fees, landing fees from corporate aircraft, and rental car agency fees. Like most general aviation airports, GON must offset expenses through sponsor derived funding, in this case the CTDOT. As the data that follows shows, airport revenues have increased and the costs have decreased in the prior five years The primary reason for this increase comes from rent on land and buildings, where the change equals a 378 percent increase over five years. In addition, the airport is financially supported by the State's Transportation Fund and in the case of approved AIP projects, the FAA, with a 95 percent federal and five percent sponsor cost sharing.

Table 2.7 shows revenue and expense summaries for the period fiscal year 2002 through 2007.

**Table 2.7 - Airport Revenue and Expense Summary**

| | FY 02-03 | FY 03-04 | FY 04-05 | FY 05-06 | FY 06-07 |
|---|---|---|---|---|---|
| Revenue | $276,932 | $389,748 | $443,018 | $408,801 | $668,543 |
| Expenses | $966,721 | $805,920 | $682,305 | $770,376 | $758,790 |
| Operating Surplus/Deficit | ($689,789) | ($416,172) | ($239,287) | ($361,575) | ($90,247) |

Source: CT Department of Transportation, Bureau of Finance and Administration, May 26, 2008

# CHAPTER 3 - FORECASTS OF AVIATION ACTIVITY

## INTRODUCTION

Forecasts of future levels of aviation activity are the basis for effective decisions in airport planning. These projections are used to determine the need for new or improved facilities. In general, forecasts should be realistic, based upon the latest available data, be supported by information in the study, and provide an adequate justification for airport planning and development. This planning process will eventually result in various facility development recommendations tied to the demand projected within respective forecast periods.

However, in all likelihood, activity growth will not exactly occur as projected. There undoubtedly will be peaks and valleys over the next 20 years that our process depicts in a linear fashion. Therefore, the facility development recommendations may have to be adjusted accordingly. Slower than projected growth may delay or even negate the need for recommendations, especially for those in outlying years. Naturally, the opposite may hold true for faster than projected growth.

We start through the preparation of reliable activity baseline, which was accomplished in Chapter 2 (starting on page 3). The next step will be a review of factors affecting aviation activity, followed by discussion of other local, regional, and national aviation and related forecasts, and a review of various forecast methodologies. We then develop a forecast range, compare it to other forecasts for reasonableness, and submit the forecasts to CTDOT and FAA for approval.

## FORECAST ELEMENTS

To establish the demands likely to be placed on GON, forecasts will include all relevant aviation demand elements, including both the type and level of aviation activity expected at the airport over the planning horizon. The specific activity elements to be forecasted include:

- Number and Type of Based Aircraft
- Aircraft Operations: General Aviation, Military, and Commercial (Schedule Service)
- Passenger Enplanements (GA/Air Taxi/Charter and Scheduled Service)
- Peak Hour Activity
- Identification of the Forecasted Critical Aircraft
- Airport Role (General Aviation, Reliever, and/or Commercial Service)

## GON Forecast Assumptions

There are several existing operations at GON that need to be understood as they relate to our forecasts of future activity at GON. This includes military and the air taxi/charter operations that will have some impact on the total operations projections developed in this section. Each is briefly discussed below in following paragraphs.

### Military Operations and Aircraft

For purposes of this analysis, military operations will be shown as a constant throughout the planning period. The FAA and other industry analysts have no reliable method of determining military growth trends and typically this information is classified. Further, military operations are a relatively small component of the overall operational use of GON. While TASMG predicts and is planning on future expansion, this growth is under the purview of the Connecticut National Guard and Department of Defense, not the FAA or CTDOT. Regardless, even with strong growth, military operations will remain a small percentage of the total, and will remain almost exclusively helicopters because of the nature of TASMG's mission. Nevertheless, military operations will be included in respective noise analysis.

As stated earlier, TASMG is developing its own internal master plan. Until this study is complete, TASMG will not fully understand its future infrastructure needs. To help ensure a seamless integration with TASMG facility needs and future civilian growth, open communication channels between all affected parties will be maintained throughout this study.

### General Aviation, Air Taxi and Charter Operations

The broad definition of general aviation includes all civil aviation except that classified as air carrier or air taxi. The types of aircraft typically used in GA activities can vary from large multiengine jet aircraft to single engine piston aircraft and other sport and recreational aircraft including gliders and balloons. At GON, there are several on-going operations that are not technically defined as GA including charter flights to and from Long Island, accessing Mohegan Sun and other for hire charter flights offered by respective FBOs. For purposes of this analysis, these operations are included in the forecasts below. A discussion regarding the possible reintroduction of regularly scheduled commercial service at GON is presented later on page 64.

### Terms of Aviation Forecasts

Forecasts are prepared for short-, medium- and long-term periods and will specify the existing and future critical aircraft. Short-term forecasts, for up to five years, are used to justify near-term development and support operational planning and environmental improvement programs. Medium-term forecasts (a 6- to 10-year time frame) are typically used in planning capital improvements and long-term forecasts (beyond 10 years) are helpful in general planning.

Given the above, the forecast horizons for this update are:

- **Short-Term**. Five-year period from 2010 through 2015. During this period, the airport and its sponsor will focus on correcting safety related issues, such as improving the runway safety areas. In addition, operational and environmental improvements should be undertaken.
- **Intermediate-Term**. Second five-year period from 2016 through 2020. During this period, the sponsor should focus on capital improvements, including major construction projects.
- **Long-term**. Last 10 year period, from 2021 through 2030. This is the general planning period. Assuming all short and intermediate term projects are successfully completed, the sponsor should undertake another master plan update while concentrating on how to best position the airport for the third and forth decades.

## FACTORS AFFECTING AVIATION ACTIVITY

In preparing forecasts of demand and updating existing forecasts factors considered include socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation. To the extent data is available; we will address each of these elements.

### *ECONOMIC CHARACTERISTICS*

The economic characteristics of a community will affect the demand for air traffic. In regions experiencing strong economic growth, business travel typically increases and greater disposable income translates into higher volumes of personal and vacation air travelers. In addition to national and regional economic trends, local activities that distinguish the geographic area served by the airport must also be considered. If an airport serves a major recreational area, peak seasonal demands should be assessed. Further, an airport serving a large governmental/military facility may also experience sudden surges and cutbacks in airport use depending on federal funding. The type of industry in an airport's service area also will affect aviation demand, with manufacturing and service industries tending to generate more aviation activity than resource industries such as mining.

### *DEMOGRAPHIC CHARACTERISTICS*

The demographic characteristics of an area's population also affect the demand for aviation services. Demographic characteristics influence the level, composition, and growth of both local traffic and traffic from other areas. Factors such as leisure time and recreational activity are important in estimating activity, but can be difficult to measure. Another important demographic characteristic is the level of disposable income, usually measured on a per capita basis, which is a good indicator of the propensity to travel and general aviation aircraft purchases and use.

### *Geographic Attributes*

The geographic distances between populations and centers of commerce within the airport's service area may have a direct bearing on the type and level of transportation demand. The existence of populations and centers of commerce beyond an airport's service area may indicate the need for additional airports that serve transportation demand. The physical characteristics of the area and the local climate may also be important, since they may stimulate holiday traffic and tourism. The role of the airport within the airport system and its relationship to other airports may also have an effect on the services that are demanded at the airport.

### *Aviation Related Factors*

Business activity, changes in the aviation industry, and local aviation actions[1] can markedly affect the demand for airport services. Business developments in the airline industry, such as consolidations, mergers, and new marketing agreements, can affect airline operations at a particular airport, while fractional ownership of aircraft can affect others. Wider industry trends, such as the introduction of new low-fare service, the introduction of new classes of aircraft, and the growth or curtailment of airline hub and spoke systems[2], may also alter the level and pattern of demand. To the extent that such actions affect all aviation activity in a region or the country, their effects will be captured in the FAA's forecasts. If, however, only the demand at a particular airport is affected, appropriate adjustments should be made in that airport's forecast. Actions taken by local airport authorities, such as changes in user charges, ground access policies or their support services can also stimulate or hinder the demand for airport services. Investment decisions made as a result of the planning process itself can also produce change by removing physical constraints to airport growth, which should be reflected in the forecasts.

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[1] "Local actions" may include the reputation and service practices of the FBO, on-field pricing structure, and/or operational restrictions, such as noise abatement policies, that may impact both private and commercial operations.
[2] An airline hub is an airport that an airline uses as a transfer point to get passengers to their intended destination. It is part of a hub and spoke model, where travelers moving between airports not served by direct flights change planes en route to their destinations.

### *OTHER FACTORS*

External factors may also influence the demand for airport services. These include economic actions such as fuel price changes, availability of aviation fuels, currency restrictions, and changes in the level and type of aviation taxes. Political developments, including rising international tensions, changes in the regulatory environment, and shifting attitudes toward the environmental impacts of aviation, may also impact future demand and should be considered in developing or updating airport forecasts.

## PREVIOUS AIRPORT FORECASTS

Applicable forecasts prepared specifically for GON are reviewed in this section. This includes three different forecasts sources prepared by the FAA, as well as forecasts from the last master plan. In addition, forecasts from the Connecticut Statewide Aviation System Plan (CSASP) and economic and demographic trends prepared by the Southeastern Connecticut Council of Governments (SCCOG) are presented. The primary focus of forecast review will be on general aviation activity (this includes private, corporate, air taxi and charter aircraft and operations). Include in this study is a brief exploration of the possible reintroduction of scheduled service to GON. For purposes of this analysis, military based aircraft and operations will be assumed to remain constant through the planning period.

### *FAA FORECASTS*

Three different forecast sources prepared by the FAA are reviewed in this section. The first is from the annual update of the *National Integrated Plan of Airport Systems (NPIAS) 2007*. This particular document is primarily used as a tool as for capital budgeting for required funding through Airport Improvement Program. The second document, *FAA Aviation/Aerospace Forecasts 2007-2020* is also updated annually by the FAA and represents a national overview of projected activity levels. It is especially helpful in projecting the changes in fleet mix at both commercial service and general aviation airports. The third forecast source prepared by the FAA is the *Terminal Area Forecast (TAF).* This effort is more site-specific than the other two documents in terms of based aircraft and operations for an individual airport. Each is briefly discussed below.

### *NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS)*

The National Plan of Integrated Airport Systems (NPIAS) is used by FAA management in administering the AIP. It supports FAA's goals for safety and capacity by identifying the specific airport improvements that will contribute to achievement of those goals.

NPIAS includes a section on the condition and performance of the airport system, highlighting six topics: safety, capacity, pavement condition, financial performance, surface accessibility, and environment. The findings in the 2007 update are generally favorable, indicating that the system is safe, convenient, well maintained, and largely supported by rents, fees, and taxes paid by users. At GON specifically, NPIAS projects the role[3] of the airport to remain General Aviation with 46 based aircraft over the next five years[4] and $8.5 million needed for AIP eligible project funding over this five year period.

## *FAA AVIATION/AEROSPACE FORECASTS 2007-2025*

As noted in the above referenced document, developing forecasts of aviation demand and activity levels continues to be challenging as the uncertainties confronting the aviation industry have remained complex and difficult to quantify. Nevertheless, the FAA has developed a set of assumptions and FAA aerospace forecast are consistent with the emerging trends and structural changes currently taking place within the aviation industry.

The general aviation forecasts rely heavily on the discussions with industry experts that occurred at the October 2006 FAA/Transportation Research Board (TRB) Workshop on General Aviation.

Table 3.1 briefly summarizes FAA national aerospace forecasts for projected GA aircraft. Particular focus is given to the changing fleet mix with the expected highest growth in fixed wing turbine equipment.

**Table 3.1 - FAA Forecasted Rate of Growth (Avg. Annual %) Active General Aviation and Air Taxi Aircraft**

| Period | Fixed Wing | | | | | | Rotorcraft | | | Other[1] | Total GA Fleet | Total Pistons | Total Turbines |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Piston | | | Turbine | | | | | | | | | |
| | Single | Multi | Total | Prop | Jet | Total | Piston | Turbine | Total | | | | |
| 2010 2024 | 0.3% | -0.2% | 0.3% | 0.6% | 6.0% | 4.1% | 5.7% | 2.1% | 3.6% | 0.1% | 1.4% | 0.4% | 3.6% |

1. Includes experimental and sport aircraft
Source: FAA Aviation/Aerospace Forecasts Year 2010-2024

The following key points are gleaned from the FAA Aviation Forecasts for aviation nationally:

- The active general aviation fleet[5] is projected to increase at an average annual rate of 1.4 percent over the 14-year forecast period, growing from an estimated 226,422 in 2006 to 274,914 aircraft in 2020.

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[3] One of four basic airport service levels which describe the type of service that the airport currently provides to the community and is anticipated to provide the community at the end of the five-year planning period.
[4] The existing number of based aircraft (which for this document would have been 2006) is not shown. It is likely that the NPIAS forecast was derived from an assumed 39 aircraft which would equate to annual average growth rate of 3.5%.
[5] General aviation is the operation of civilian aircraft for purposes other than commercial passenger transport. The active general aviation fleet refers to aircraft that are operational and air worthy. It is

- The more expensive and sophisticated turbine-powered fleet[6] (including rotorcraft[7]) is projected to grow at an average of 3.6 percent a year over the 14-year forecast period with the turbine jet fleet increasing at 6.0 percent per year. At the October 2006 TRB/FAA workshop, industry experts suggested the market for new VLJs could add 500 aircraft a year to the active fleet by 2010.
- The relatively inexpensive twin-engine turbine powered aircraft (priced between $1 and $2 million) are believed by many to have the potential to redefine the business jet segment by expanding business jet flying and offering performance that could support a true on demand air-taxi business service. This year's forecast assumes that VLJs will begin to enter the active fleet in 2007 (350 aircraft) and grow by 400 to 500 aircraft a year after that, reaching 6,300 aircraft by 2020.
- The number of piston-powered aircraft (including rotorcraft) is projected to increase from 170,967 in 2006 to 181,750 in 2020, an average increase of 0.4 percent yearly.
- Although piston rotorcraft production are projected to increase rapidly (5.7 percent per year) they are a relatively small component of this segment of general aviation aircraft.
- Single-engine and multi-engine fixed-wing piston aircraft, such as a Cessna Skyhawk or Piper Seneca, which are much more numerous, are projected to grow at much slower rates (0.3 and -0.2 percent respectively) leading to the low growth of the piston-powered fleet. In addition, it is assumed that relatively inexpensive VLJs and new light sport aircraft, like the Cheetah XLS and Atec Zephyr would erode the replacement market for traditional piston aircraft at the high and low ends of the market respectively.

## *TERMINAL AREA FORECASTS (TAF)*

The primary TAF forecast of interest to GON is for operations, which include air taxi, general aviation and military operations. It is important to note that FAA forecasts are not continuously updated, and therefore do not necessarily start with current baseline data. When analyzing Table 3.2 (next page), which represents FAA forecasts for the period from 2008 through 2025, known data from 2007 (as reported in Chapter 1) does not correlate accurately with 2008. As an example, total operations reported at the end of 2007 were 51,960[8]. This number is within 845 operations, or less than one percent difference.

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important to note that general aviation aircraft can include any type aircraft from a small home-built experimental airplane to a large multiengine jet transport.

[6] For example the Cessna Citation and Gulfstream III business jets.

[7] Rotorcraft is an FAA category of aircraft (for helicopter).

[8] Exclusive of night operations between the hours of 10 p.m. and 7 a.m. Much

**Table 3.2 - FAA Terminal Area Forecasts for GON**

| Year | Itinerant Operations | | | | | Local Operations | | | Total Operations | Instrument Operations | Based Aircraft |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Air Carrier | Air Taxi | General Aviation | Military | Total | General Aviation | Military | Total | | | |
| 2008 | 0 | 2,132 | 27,461 | 2,971 | 32,564 | 19,956 | 1,742 | 21,698 | 54,262 | 9,560 | 69 |
| 2013 | 0 | 2,172 | 30,250 | 2,971 | 35,393 | 20,959 | 1,742 | 22,701 | 58,094 | 10,326 | 74 |
| 2019 | 0 | 2,222 | 32,693 | 2,971 | 37,886 | 22,228 | 1,742 | 23,970 | 61,856 | 11,009 | 80 |
| 2025 | 0 | 2,274 | 35,061 | 2,971 | 40,306 | 23,570 | 1,742 | 25,312 | 65,618 | 11,674 | 85 |
| Net Change | 0 | 142 | 7,600 | 0 | 7,742 | 3,614 | 0 | 3,614 | 11,356 | 2,114 | 16 |
| Annual Growth | | 0.37% | 1.54% | 0.00% | 1.32% | 1.01% | 0.00% | 0.93% | 1.16% | 1.23% | 1.29% |

The TAF operations forecasts prepared specifically for GON are compared to similar projections done on a national basis for all towered airports. As shown in the TAF (Table 3.2 *Total Combined Aircraft Operations at Airports with FAA and Contract Traffic Control)* GA itinerant is expected to grow by an average annual rate of 1.7 percent nationally compared to 1.6 percent at GON. Local GA is at 0.8 percent nationally and 1.1 percent at GON. Air taxi is 2.7 percent nationally and 0.4 percent at GON with the GA totals over the national forecast period at 1.3 percent compared to 1.2 percent at GON.

The following national key points are gleaned from the FAA TAF Operations Forecasts:[9]

- The number of general aviation hours flown is projected to increase by 3.4 percent yearly over the 14- year forecast period. of the increase reflects increased flying by business and corporate aircraft as well as steady increases in utilization rates for piston aircraft.
- Hours flown by turbine aircraft (including rotorcraft) are forecast to increase 6.1 percent yearly over the forecast period, compared with 1.3 percent for piston-powered aircraft.
- Jet aircraft are forecast to account for most of the increase, with hours flown expanding at an average annual rate of 9.4 percent over the 14 years. The large increases in jet hours result from the introduction of VLJs as well as increases in the fractional ownership fleet and its activity levels.
- Utilization rates for VLJs will vary by mission. VLJ air taxis are expected to average approximately 1,500 hours per year, fractional 1,200 and private use 350. This results in an expected utilization rate for all VLJs in 2020 of 3,050 hours. [10]

[9] The information presented in this list is directly from the FAA's Aerospace Forecasts.

- Traditional (non-VLJ) turbojets are expected to average approximately 407 hours per year by 2020, since VLJs are expected to have a greater share of their use in on-demand air taxi than the traditional turbojets.

### *PREVIOUS MASTER PLAN FORECASTS*

The 1999 AMPU developed forecasts that spanned the conventional twenty-year period, starting with baseline data from 1995. The previous master plan also focused on passenger and commuter forecasts, and how service levels experienced by the airport had and would change given the economic conditions of the mid-1990s. Previous master plan forecasts were prepared for commercial, general aviation, and military activity. Military forecasts were held constant and not discussed in this paragraph. As noted above, the primary focus herein is general aviation forecasts as discussed in the following paragraphs.

Table 3.3 presents the summary of recommended forecasts from the 1999 AMPU.

**Table 3.3 - Summary of 1999 AMPU Forecasts**

| Forecast | 2005 | 2010 | 2015 |
|---|---|---|---|
| Passenger Enplanements | 32,963 | 47,219 | 54,026 |
| Annual Operations | 111,096 | 116,321 | 120,397 |
| Commuter | 4,433 | 4,908 | 5,519 |
| Air Taxi | 4,822 | 5,403 | 6,053 |
| General Aviation | 97,127 | 101,206 | 104,111 |
| Local | 45,650 | 47,567 | 48,932 |
| Itinerant | 51,478 | 53,639 | 55,179 |
| Military | 4,714 | 4,714 | 4,714 |
| Based Aircraft | 78 | 81 | 82 |

Source: Groton-New London Airport Master Plan Update, March 1999, Table 6.24

### *PREVIOUS AMPU GENERAL AVIATION FORECASTS*

The general aviation industry during the previous decade was going through major changes, which made forecasting difficult. While the industry was active and growing steadily in the 1980's, the 1990's were a more difficult time. Many small aircraft manufactures curtailed and, in some instances, stopped production altogether, primarily because of rising, and often prohibitive liability costs. On top of this, and for the same primary reason – high insurance costs – operations dropped significantly, as well as new pilot training and pilot certification renewals. In 1994 Congress passed reform legislation, but its impact on the industry would take another six to eight years to show any favorable gains because of the time it took for manufacturers to retool, start production, and the time it took for the aircraft to eventually reach the end user.

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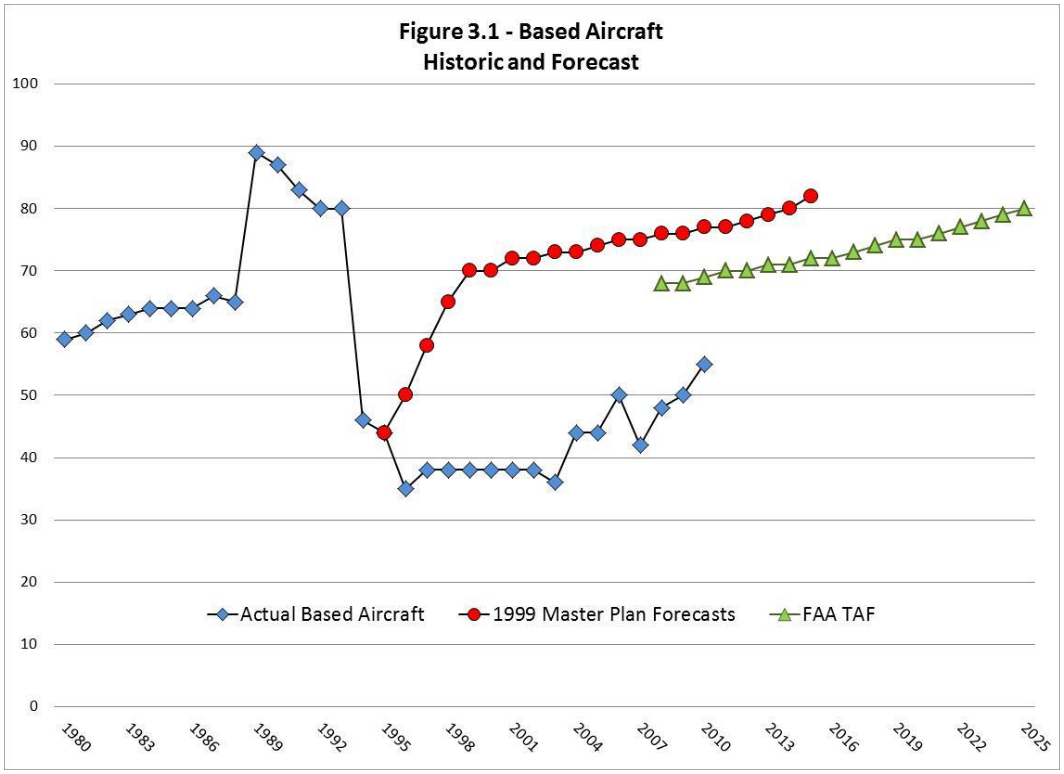
[10] Actual results were not verified because accurate VLJ operations are not specifically tracked. Eclipse Aviation has, as of January 1, 2008, produced 100 of its Eclipse 500 VLJ aircraft (http://www.eclipseaviation.com/company/news/press-releases.php)

The based aircraft forecast in the previous master plan used a "market share" analysis, which was based on the market share of based aircraft at GON relative to the registered aircraft in the general aviation service area. This analysis, which was based on historic trend analysis, was promising for GON. Historically, GON saw a steady increase in market share, from 15.6 percent in 1980 to 19.7 percent in 1993, with some fluctuation during the period. Based on this trend, the 1999 master plan projected a moderate growth scenario that indicated 78 aircraft would be based at GON in 2005 and 80-85 based aircraft by 2015. As indicated in Chapter 1, based aircraft on June 30, 2008 was 42 civil airplanes, (plus military aircraft), which is significantly under the previous AMPU forecasts. An average annual rate of growth of approximately 5% is realized when using the midpoint of this forecast range.

Again, forecasts from 1999 and the FAA are no longer reasonable. As Figure 3.1 (next page) shows, based aircraft forecasts were overestimated; a common event at most airports during this period.

### *CONNECTICUT STATEWIDE AVIATION SYSTEM PLAN FORECAST*

CTDOT prepared a Connecticut Statewide Airport System Plan (CSASP). The CSASP provides a comprehensive review of the current state aviation system in support of continued operation and maintenance of state airports, and recommends modifications to the airport system to meet existing and projected aviation needs. The CSASP forecasts out to the year 2025, and includes statewide population changes.




### *CSASP - BASED AIRCRAFT*

For the based aircraft at GON, a correlation was made between the population in Connecticut and the number of based aircraft at the airport. In 1990, there were 94 based aircraft at the airport. This number fell to 37 based aircraft in 2000, but rebounded to 51 in 2003. This is an average of 0.02 based aircraft per 1000 persons in Connecticut. Due to the services available at the airport, a slightly higher ratio of 0.025 based aircraft per 1000 persons in Connecticut was used for the forecasts. It is assumed that this ratio will remain similar for the study time frame, which corresponds to 94 based aircraft in 2025. This equates to an annual average growth rate of 3.3%; significantly higher than national trends forecasted by the FAA

### *CSASP - OPERATIONS*

The forecast for the number of general aviation operations at GON is expected to grow from 66,200 operations in 2004 to 114,600 operations in 2025. This represents an average increase for the itinerant and local general aviation operations at the airport of 2.8 percent per year between 2004 and 2025. The itinerant and local general aviation split is approximately 54/46; this split is expected to remain similar through the study period.[11] An increasing portion of the general aviation activity at the airport is corporate operations using the airport because of the facilities available. There is also a large amount of pilot flight training activity at GON represented in the local operations.

### *SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS FORECASTS*

The Southeastern Connecticut Council of Governments (SCCOG), a public agency, created the Regional Plan of Conservation and Development in 2007. The Plan is an advisory document intended to present general recommendations based on a review of regional trends and the identification of issues of regional concern. The Plan identifies five issue areas with associated goals, objectives and recommendations that are based on independent research and analysis as well as responses to a survey, input from a public hearing, public meetings and workshops, and ongoing collaboration with other regional organizations on a number of regional issues and concerns. Of importance to this Master Plan Update are regional population characteristics and forecasts that may be a prime indicator of future airport demand.

### *SCCOG - POPULATION CHARACTERISTICS*

According to SCCOG, the region's population growth has slowed; the characteristics of the regional population have changed significantly over the last fifteen years.[12] The urban municipalities have experienced an overall net loss in population while the population of suburban towns increased substantially. The region's population is significantly older overall and, consistent with the past 30-year regional trend, more diverse. The region has seen a sharp increase in the number of one-person households as well as a notable decrease in median income. Despite the regions slow growth in population, it is projected that the region will grow to more than 272,000 persons by the year 2020, an increase of 12 percent over the 2000 recorded Census population. This equates to an average annual growth rate of 0.6 percent.

## FORECAST METHODOLOGY

There are several appropriate methodologies and techniques for forecasting aviation activity at a specific airport. The selection and application of appropriate methodologies and techniques requires professional judgment from experienced planners and aviation officials familiar with industry trends and unique airport environments.

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[11] The actual Itinerant/Local split for the five-year period is 58 percent itinerant to 42 percent local (see Figure 2.21, page 35).
[12] *Regional Plan of Conservation and Development 2007*, Southeastern Connecticut Council of Governments, October 17, 2007.

A forecast effort may involve a number of different techniques. The most common techniques include the following:

- **Regression Analysis –** A statistical technique that ties aviation demand (dependent variables), such as enplanements, to economic measures (independent variables), such as population and income. Regression analysis should be restricted to relatively simple models with independent variables for which reliable forecasts are available.
- **Trend Analysis and Extrapolation –** Typically uses the historical pattern of an activity and projects this trend into the future. This approach is useful where unusual local conditions differentiate the study airport from other airports in the region.
- **Market Share Analysis or Ratio Analysis –** This technique assumes a top-down relationship between national, regional, and local forecasts. Local forecasts are a market share (percentage) of regional forecasts, which are a market share (percentage) of national forecasts. Historical market shares are calculated and used as a basis for projecting future market shares. This type of forecast is useful when the activity to be forecast has a constant share of a larger aggregate forecast.
- **Smoothing –** A statistical technique applied to historical data, giving greater weight to the latest trend and conditions at the airport; it can be effective in generating short-term forecasts. The forecasts in this study are prepared using a combination of trend analysis and professional judgment based on the knowledge gleamed from our study of the airport, its history, and trends in aviation, primarily the general aviation component. In addition, we will look at market share for based aircraft only and compare it to data from a trend analysis and professional judgment. Historical aviation trends over time can be used to project future aviation activity levels. In using it, we have evaluated the history of operations at the airport and will project a future trend based on that history.

## GROTON-NEW LONDON AIRPORT GENERAL AVIATION FORECASTS

To assess the future of general aviation activity at GON, we must take a second look at its historic performance, particularly during the past 10 to 20 years. As discussed earlier, GON has seen a steady decline in both based aircraft and operations, however, the net jobs gained during the past 10 years in the region is positive. Defense jobs have declined but tourism jobs have increased. Couple this with a projected 12 percent increase in population, primarily in older, more diverse people (see SCCOG, page 57). The demographic forecasts[13] prepared by SCCOG point to the group of people with disposable income, and the types of jobs and industry that rely heavily on transportation.

Over the past decade, rising fuel and aircraft costs, that have exceeded corresponding increases in income levels, have driven many recreational pilots away from flying. One only has to look at the declining operations at GON and elsewhere to realize the direction general aviation is going. Changes in the fleet mix with the introduction of sport aircraft will result in an increase in smaller, less expensive aircraft populating the flight line and hangars. Unlike their predecessor, sport aircraft are relatively inexpensive to own and operate. However, these new smaller less expensive aircraft will likely only replace existing standard single engine piston, and some light twin piston aircraft. It is unlikely that a net gain will be realized. As stated earlier in this chapter, it is assumed that relatively inexpensive VLJs and new light sport aircraft could erode the replacement market for traditional piston aircraft in the mid-range market. These aircraft are typically higher cost single and light twin engine aircraft in the $200,000 to $800,000 range.

On the positive side, the CSASP forecasts a substantial increase in both based aircraft and operations. The forecast for the CSASP for based aircraft was based on a market share analysis to provide continuity for all the airports in the system. This type of analysis assumes a top down relationship between population and aircraft ownership, and does not take the relationship of rising aircraft ownership costs versus changes in income into consideration. For example, the 2004 CSASP based aircraft correlation is 0.025 based aircraft per 1000 persons in Connecticut. Using this method, the based aircraft today should be approximately 88 aircraft, when in fact, there are 42. This shows why using a market share analysis is not as reliable because it cannot predict changes in market forces; which in this case is the rising cost of aircraft and fuel, and declining pilot population as a percentage of the overall population.

Figure 3.2 (page 61) shows the relationship of based aircraft to local operations. Two important issues to note: first, in 1994, Congress passed legislation that, among other things, opened up production of recreational aircraft, which resulted in increased production and lower overall aircraft prices. Second, the FAA, with pressure from general aviation organizations such as the Aircraft Owners and Pilots Association, developed regulatory changes that sped up experimental aircraft design and production, and sport pilot certification, shortly after the turn of the century, which helped establish the sport aircraft market. This also increased aircraft availability. Finally, as fuel prices started to climb several years ago, the market saw a dramatic decline in recreational flight hours.

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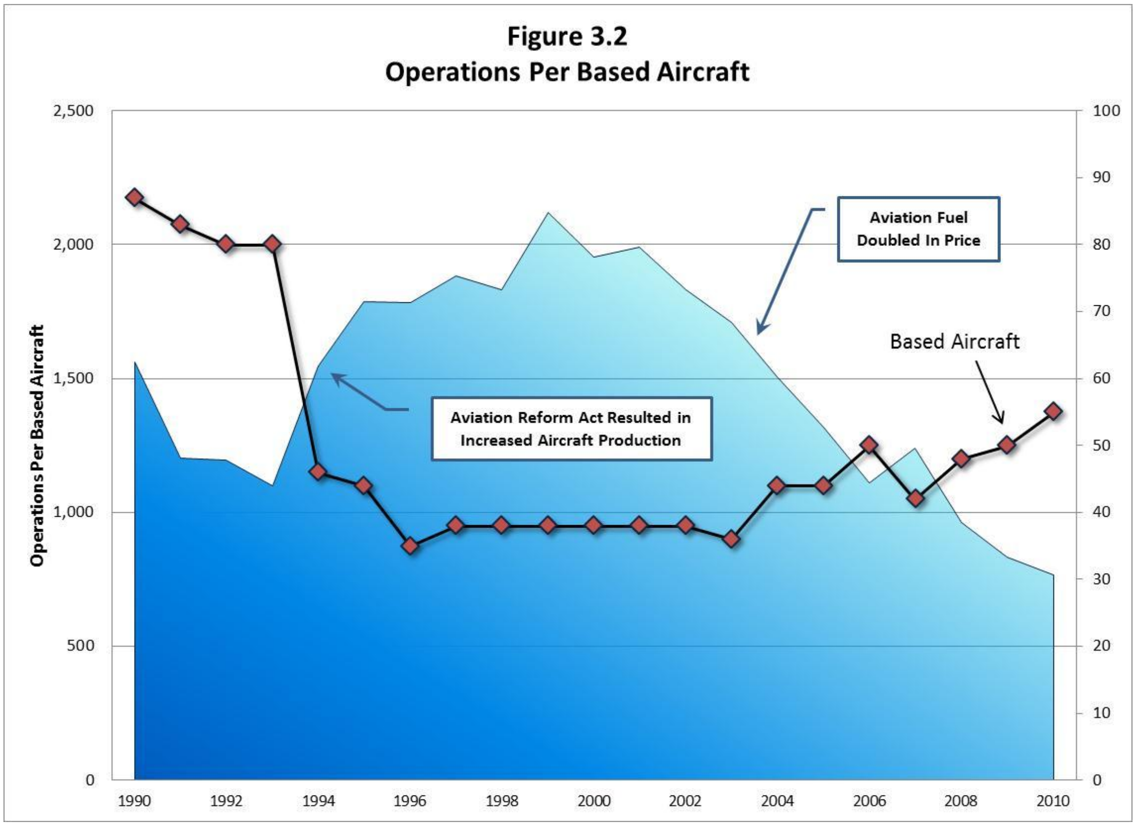
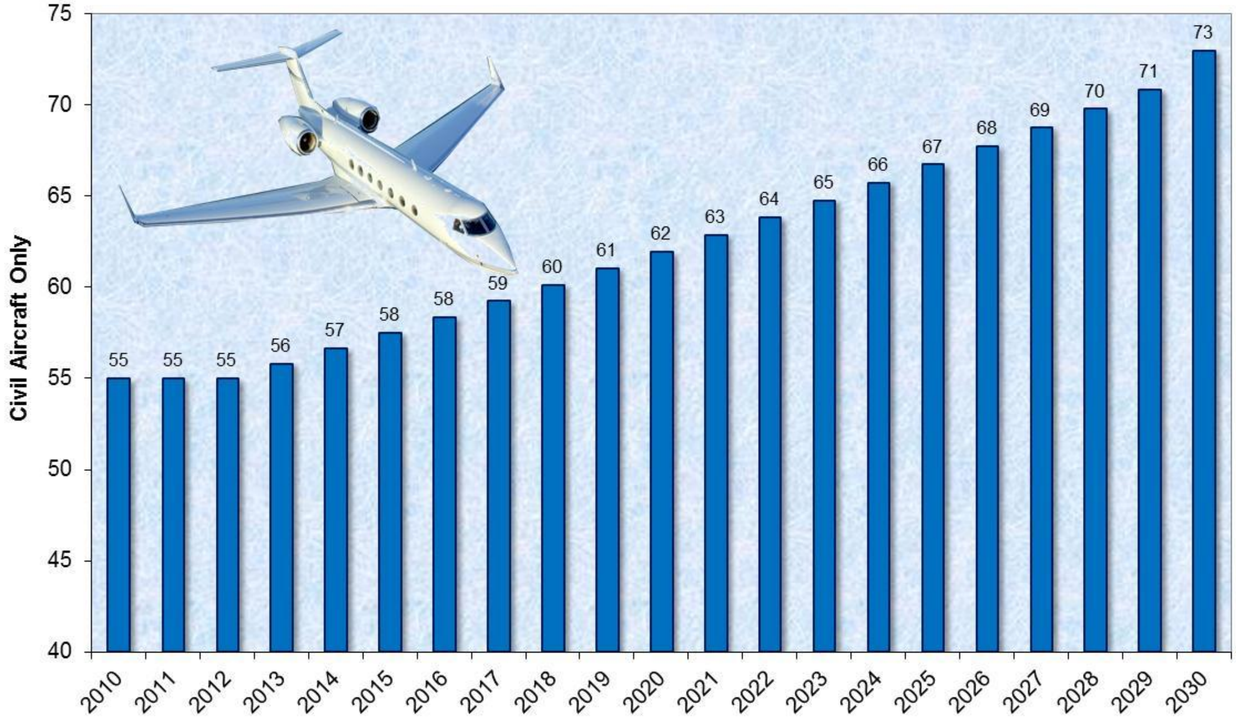
[13] *Demographic trends*, or forecasts, describes the changes in demographics in a population over time. For example, the average age of a population may increase. It may decrease as well as certain restrictions may be in place, for instance like in China if the population is high.




### *BASED AIRCRAFT FORECASTS*

Based aircraft, of which 50 percent are recreational in size and use, will see little growth during this planning cycle. As the cost of owning and operating aircraft continues to escalate, the number of potential owners and operators will continue to decrease as an overall percentage of the general Groton-New London population. In review of the historical forecasts presented earlier, the average annual rate of growth will likely fall within the ranges presented. As noted, the lowest rate of growth is direct correlation to population projections (0.6 percent/year) with the high end based on previous AMPU projections with an average annual rate of growth at five percent. In conclusion, we project the based fleet to remain flat through 2015, and will then increase at the rate of two percent per year through the planning period. This will result in 73 based aircraft in 2030 as shown in Figure 3.3 (page 61).

**Figure 3.3 - Based Aircraft Forecasts**




## *FLEET-MIX*

The current fleet-mix consists of 37 single engine, 8 multiengine, 2 helicopters and 8 turbofan/jet aircraft. This mix will change during the planning years in favor of a larger percentage of turbojet aircraft over recreational single engine and light twin engine aircraft. This will occur for two reasons. First, the cost of owning and operating general aviation aircraft will continue to drive more people out of the market, primarily because of initial aircraft acquisition, ongoing maintenance and repairs, and operating costs, including fuel, insurance, and parking (apron and hangar). The second reason may be locally driven because of the limited land resources at GON that may have an impact on providing adequate support facilities at a reasonable cost. The profit margin of servicing and maintaining corporate business aircraft is much higher than recreational aircraft. As land becomes limited, the remaining space becomes more valuable thus further exacerbating the cost of flying for the private/recreational aircraft owner at GON.

Another reason for the fleet-mix change is the introduction of the VLJ. This relatively low-cost aircraft may, according to some industry experts, dramatically change the air transportation market by providing affordable air taxi service to currently excluded market segments. Thus, consideration of the VLJ in the fleet-mix ratio is essential for future planning. Table 3.4 shows the current, short-term (2015), intermediate-term (2020), and long-term (2030) projected changes in based aircraft.

**Table 3.4 - Groton-New London Airport Based Aircraft Forecasts (2010-2030)**

| Category of Aircraft | Current (2010) | | Short-Term (2015) | | Intermediate-Term (2020) | | Long-Term (2030) | |
|---|---|---|---|---|---|---|---|---|
| | Aicraft | Percent | Aicraft | Percent | Aircraft | Percent | Aircraft | Percent |
| Single Engine Reciprocating | 37 | 67% | 37 | 67% | 37 | 61% | 40 | 55% |
| Multiengine Reciprocating | 8 | 15% | 8 | 15% | 8 | 13% | 7 | 10% |
| Helicopter | 2 | 4% | 2 | 4% | 3 | 5% | 8 | 11% |
| Turbofan (Jet) | 8 | 15% | 8 | 15% | 13 | 21% | 18 | 25% |
| **Total** | **55** | **100%** | **55** | **100%** | **61** | **100%** | **73** | **100%** |

## *OPERATIONS*

We anticipate that operations growth will be mixed during the planning period. While local operations, primarily a function of recreational based aircraft will decline because of rising fuel, insurance, and other ownership costs, itinerant operations, primarily from business aircraft will increase because of increased congestion, increased ticket prices, and fewer available flights.

The forecasts that follow also address night operations, or those that take place between the hours of 10 p.m. and 7 a.m. daily. This is the period when the control tower is closed and no accurate traffic count is taken. The ATCT sampled flight data for instrument operations recorded by Providence Approach Control. This data indicates that on average, 3.5 instrument flights occur during the hours the control tower is closed. For planning purposes we assumed that an addition one visual flight also occurs on average every night, for a total of 4.5 operations. The data that follows reflects this increase. In addition, this data will be used when developing the noise contours that follow later in the study.

Table 3.5 (next page) shows the projected change based on a similar rate of growth (average annual two percent) as developed for based aircraft. Note that the decline in local based aircraft flying will be offset by the projected increases in itinerant/business operations. This assumption is reflective of national trends presented earlier in FAA forecasts and further supported by the decline in local/training flying at GON.

### *OPERATIONS BY FLEET MIX*

In addition to understanding projections of total operations at GON, the next critical step is to assign these operation totals to the aircraft that currently are based and/or use the airport on a regular basis. This information is essential to assess future noise impacts and capacity needs for key components of the airfield infrastructure.

**Table 3.5 - Forecasted Operations**

| Type | Year | | | |
|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2030 |
| Itinerant | 21,500 | 20,800 | 20,500 | 22,000 |
| Local | 32,100 | 34,000 | 36,500 | 40,800 |
| **Total** | **53,500** | **54,800** | **57,000** | **63,000** |

- **Local Operations**. Local operations will decline as a percentage of based aircraft. This trend is inevitable as the cost of fuel continues to rise at a rate far higher than inflation. In 2007 the local operations to based aircraft ratio is 373:1; in 1990 it was 812:1. For purposes of this analysis, it is projected that 90 percent of total local civilian operations will be conducted by single engine piston and the remaining 10 percent by multi-engine piston. Most of the local military operations are conducted by rotorcraft

- **Itinerant Operations**. Itinerant operations will increase primarily because of the growing business market. As commercial operations reach maximum capacity as a factor of airport capacity in the region, U.S., business aircraft use will fill the void. GON is adequately sized and in a competitive location to take advantage of this demand for air service. Although the greatest number of operations at GON will continue to be small piston powered aircraft, the higher performance aircraft will show the greatest growth. For purposes of this analysis, our projections of specific itinerant aircraft operations will closely track with the same rates of growth anticipated for based aircraft. As shown above for local operations, 100 percent of itinerant military operations are shown as rotorcraft. Table 3.6 (next page) summarizes the results.

- **Peak Operations.** Peak operations are calculated to assist in the proper sizing of apron space for itinerant aircraft operations and terminal building and other facility sizes to ensure adequate space for pilots, crew, passengers, and visitors. Two categories are analyzed; peak month/average day (PMAD) and peak hour (PH). For planning purposes, PMAD is assumed to be 20% of annual operations (busiest month of the year) and PH is assumed to be 15% of the PMAD (busiest hour of the busiest month).

**Table 3.6 - Operations Fleet Mix Forecast**

| Aircraft Category | 2010 | | | 2015 | | |
|---|---|---|---|---|---|---|
| | Local | Itinerant | Total | Local | Itinerant | Total |
| Single Engine Reciprocating | 7,855 | 17,868 | 25,723 | 7,871 | 17,827 | 25,698 |
| Multiengine Reciprocating | 1,698 | 3,863 | 5,562 | 1,702 | 3,855 | 5,556 |
| Helicopter | 425 | 966 | 1,390 | 425 | 964 | 1,389 |
| Turbofan (Jet) | 1,698 | 3,863 | 5,562 | 1,702 | 3,855 | 5,556 |
| **Total** | **11,676** | **26,561** | **38,237** | **11,700** | **26,500** | **38,200** |

| Aircraft Category | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|
| | Local | Itinerant | Total | Local | Itinerant | Total |
| Single Engine Reciprocating | 7,806 | 17,681 | 25,488 | 8,462 | 19,167 | 27,630 |
| Multiengine Reciprocating | 1,688 | 3,823 | 5,511 | 1,481 | 3,354 | 4,835 |
| Helicopter | 633 | 1,434 | 2,067 | 1,692 | 3,833 | 5,526 |
| Turbofan (Jet) | 2,743 | 6,212 | 8,955 | 3,808 | 8,625 | 12,433 |
| **Total** | **12,870** | **29,150** | **42,020** | **15,444** | **34,980** | **50,424** |

## COMMERCIAL SERVICE ANALYSIS

This section assesses the potential for reintroduction of scheduled commercial service at GON. This analysis will not delve into other commercial activities at the airport including commercial unscheduled or scheduled charter activity such as the Mohegan Sun flights to and from GON and Republic Airport in Farmingdale, NY since these operations were included in operations forecast presented above.

A number of factors must be considered to determine the viability of any new scheduled commercial carrier at GON. This includes a historical overview of past service at GON, assessment of competing services at nearby airports, local market demand, destination market(s) served, ticket costs, reliability and frequency of service to be offered, aircraft type and size, and finally passenger amenities. Many less quantifiable but important national and global issues that may have an indirect bearing on any new service at the airport should also be discussed. These include economics such as operating costs, security issues, and FAA operating regulations. All of these issues are presented below followed by conclusions and recommendations.

Commercial service was discontinued in 2003 with no indication that it may return. However, commercial service is a precarious segment of aviation. We do know that airport capacity in the United States is shrinking, with many major airports at or close to saturation, particularly during peak periods. In addition, small start up and low cost carriers rarely provide airport sponsors with much advanced notice before setting up operations. As an example, both Pease International Tradeport in Portsmouth, NH, and Westover Air Reserve Base/Metropolitan Airport in Springfield/Chicopee, MA provided commercial service on very short notice to Skybus Airlines. However, Skybus left as quickly as it arrived because of rising fuel costs earlier in 2008. Worcester Regional Airport, Worcester, MA, has seen airlines come and go frequently over the past 10 years, but remains positioned to accept the next offer, if and when it comes, as with Pease and Westover.

### *HISTORICAL OVERVIEW*

Commercial service enplanements at GON was in a steady decline from the peak in 1980 of 96,857 to only 5,952 in 2003, the final year of service. Table 3.7 shows historical levels of enplanements at GON. Records indicate that up to 1993, there were direct daily flights to both New York City and Philadelphia. After 1993, service was limited to only Philadelphia. Based on a report prepared for Connecticut DOT, Bureau of Aviation and Ports, in 1998 titled *Air Service Development Study for Groton-New London Airport;* the main reason for the decline was the expansion of commercial services at both Bradley/Hartford (BDL) and T.F. Green/Providence (PVD).

**Table 3.7**
**Historic Enplanements**

| Year | Enplanements |
|---|---|
| 1980 | 96,900 |
| 1985 | 36,500 |
| 1990 | 32,000 |
| 2000 | 12,100 |
| 2003 | 5,000 |

Along with competing service at the two nearby major air carrier facilities, GON was also impacted by several other contributing factors. The first has been cutbacks in the local defense industry, a major source of employment in the Groton and New London economy. An additional factor that benefited the larger competing airports was the introduction of low-fare carriers such as Southwest, Delta Express and Metrojet over the past several decades. Although some marginal low-fare carriers can be rather volatile in terms of longevity at these and other air carrier facilities, such service has never been available at GON.

Based on historical records maintained by the FAA, it also appears that 1998 was the last year of the federally sponsored airline subsidy provided through the Essential Air Service (EAS) program at GON. It was noted in the Air Service Study that GON, along with Bridgeport and New Haven, were receiving these subsidies, but due to proximity to Bradley/Hartford (BDL), T.F. Green/Providence (PVD), or New York City airports, these subsidies were suspended.

In the final year of commercial service operation at GON (2003), US Airways Express was flying four daily round-trips to Philadelphia using 19 seat turboprop Beech 1900 aircraft. Enplanements at this point had fallen to historical lows thus negating eligibility of FAA entitlement funding[14]. Perhaps the single greatest event explaining the demise of GON scheduled service was the aftermath of the September 11, 2001 terrorist attacks. Airports across the nation experienced declines in passenger volume and did not begin to recover for several years thereafter (for further related discussion see Section 5.0 of the PART 139 Assessment contained in Appendix 2).

### *COMPETING SERVICES*

There are three airports within a 90 minute (or less) of GON offering scheduled commercial airline service. These include Tweed-New Haven Regional Airport to the west, Bradley International Airport to the northwest and T.F. Green to the northeast of GON. A brief synopsis of service and facilities available at each is presented below:

- **Tweed-New Haven Regional Airport (HVN)**
  - Annual Enplanements: 2006 – 37,900, 2005 – 65,100, 2004 – 39,700[15]
  - Average Daily Scheduled Service Departures: 6
  - Scheduled Service Airlines: 1
  - Non-Stop Destinations: 1
  - Direct International: No
  - Longest Runway: 5,600 ft.
- **Bradley International Airport (BDL)**
  - Annual Enplanements (mil.): 2006 – 3.4, 2005 – 3.6, 2004 – 3.3
  - Average Daily Scheduled Service Departures: 165
  - Scheduled Service Airlines: 14
  - Non-Stop Destinations: 38
  - Direct International: No
  - Longest Runway: 9,510 ft.
- **T.F. Green Airport (PVD)**
  - Annual Enplanements (mil.): 2006 – 2.6, 2005 – 2.8, 2004 – 2.7
  - Average Daily Scheduled Service Departures: 147
  - Scheduled Service Airlines: 11

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[14] FAA, through the enabling legislation Airport Improvement Program (AIP), provides entitlement funding for all commercial service airports with a minimum of 10,000 annual enplanements. The existing minimum is $1 million for eligible project development.
[15] Latest available data.

- Non-Stop Destinations: 27
- Direct International: Yes
- Longest Runway: 7,166 ft.

### *Local Market Demand*

Based on the results presented in the 1998 Air Service Study, the GON market area was defined as an area encompassing an approximate 20-mile radius around the airport. The Study noted that in 1998 within this area there were over a half-million airline tickets sold. With four daily non-stops to Philadelphia, an average of 3 percent of market area enplanements utilized GON. The other enplanements from the GON market area were 55 percent using PVD, 25 percent from BDL and the remaining 17 percent split between HVN, the NYC airports and Boston. With no commercial service at GON, it is still reasonable to assume the majority of local enplanements are still using PVD.

### *Destination Market*

Using a sample of ticket-lifts and travel agency surveys, the 1998 Air Service Study noted that the number one destination market from GON was Philadelphia[16]. The other top destination markets were Norfolk, VA and Washington D.C., which were assumed Department of Defense business travel. Utilizing data from the Ticket Lift Survey, it was determined in the Air Service Report that the actual preferred destinations for the GON market area travelers were Washington D.C (DCA) and Orlando, FL (MCO). These cities are also the top two destination markets for PVD and BDL.

### *Ticket Costs*

Airline fares are a major driver of passenger traffic and have a significant influence on airport preference where multiple opportunities exist, as is the case at GON. Review of various pricing comparisons between business (typically unrestricted ticket sales) and leisure (restricted ticket sales) indicate that GON was historically more expensive. On average, leisure fares were 18 percent cheaper at BDL and business fares were 19 percent less at PVD as noted in the Air Service Study.

### *Service Reliability and Frequency*

At most small commercial service airports, the lack of reliability and inadequate frequency of flights are often viewed as the most important factors for choosing an alternate airport. The Air Service Study did a survey over a three-week period in 1998 of 130 air travelers. Approximately 85 percent of those surveyed were business passengers who reported that

[16] Passengers connecting on other outbound flights were not included.

the most important criteria were non-stop service at convenient times. Most surveyed stated that the convenience of departing GON outweighed the higher ticket prices.

At the time of the survey, there were only four daily non-stop flights to Philadelphia. However, the survey indicated that the early morning departure and evening return were adequate for connecting through to other flights at PHL. Although there is no statistical or anecdotal data concerning reliability, it must be assumed that this would have been a concern. Given the airport's seaside location, early morning fog and inclement weather would have had some bearing on cancelled or relocated operations. With so few flights, this would have undoubtedly caused concerns with GON air travelers for timing and scheduling[17].

### *AIRCRAFT TYPE AND SIZE*

The results of the above referenced survey did not find any appreciable hesitation to fly on the smaller turboprop aircraft that were in use by US Airways Express (Beech 1900). Many respondents noted that jet service would be preferred along with greater selection in destinations. The Air Service Study indicated that during a brief period when Pilgrim Airlines was serving GON, Dash 8 aircraft were briefly used. This is a 37-seat aircraft, which is currently serving HVN.

### *PASSENGER AMENITIES*

As part of the Passenger Survey conducted in 1998, respondents were asked to rate basic terminal facilities including accessibility, parking, and the terminal functions along with other aspects of the airline operation. Even though the terminal facilities received ratings better than average, most participants felt there was a need for a café, vending machines and a comfortable lounge area. Free parking was noted as strong consideration to use GON.

### *OTHER CONSIDERATIONS*

In addition to the local considerations discussed above, the possible return of scheduled airline service to GON must also assess other national and global issues. Unquestionably, the most important of these are airline-operating costs. Historically, the rule of thumb used to determine a breakeven point for smaller markets was an average 50 percent load factor. Today, airline costs are constantly moving higher driven by the exponential rise in fuel costs. With the price of oil around $100/barrel, airlines are adopting a plethora of cost saving techniques while at the same time trying to keep pricing competitive. This includes

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[17] At a similar airport, Knox County Regional in Maine, serving the Rockland/Thomaston/Owl's Head region of Maine's mid-coast, Stantec conducted a separate study to evaluate the times the airport was below minimums due to inclement weather. Our calculations indicated that this occurrence was 12.6 percent of the time on an annual basis.

reduction in force and wage freezing, mergers and consolidations, elimination of unprofitable routes, downsizing aircraft, off-peak pricing, and a la carte pricing of amenities. Based on current information, it would appear that an average load factor of approximately 75 percent would be a reasonable assumption to use as the breakeven point.

### *SUMMARY AND RECOMMENDATIONS*

The analysis conducted to determine the possibility of reintroduction of scheduled airline service to GON does not indicate many favorable considerations. The following points provide a summary overview:

- Available airline service, markets served, and pricing structures at BDL and PVD will be a major consideration for any new airline at GON. In addition, HVN offers four daily non-stops to PHL.
- Available runway length at GON (5,000') will only allow full operation for small to mid-sized turboprop aircraft. Small regional jets can operate from GON, but may face limitations on hot days or wet/icy runway conditions.
- Airline operating costs are stretching operations close to the breaking point even at well-established markets. Capital expenditures for a start-up operation at GON may be prohibitive.
- A large percentage of historical airline travel at GON was DOD related. Federal cutbacks and resulting reductions in work force have reduced this potential market.
- Any new scheduled service at GON will require an upgrade to the AOC, establishment of a TSA presence with required infrastructure, and upgrade in terminal amenities if GON is to be competitive. Current funding limitations may prevent some, or all, of these requirements from occurring.

In conclusion, it does not appear likely that new scheduled service is a realistic possibility at GON through the short-term. Competition is too keen and costs are too high for a low volume start-up operation. However, it is only prudent to keep this option open to the extent practicable. As noted in the Air Service Study, GON does have the potential to fill some unexpected niche in the scheduled service airline market. Though somewhat unlikely under current conditions, several outlying facilities in the New England region have experienced just that, a case in point being Westover Air Reserve Base/Metropolitan Airport in Massachusetts. There, a low cost carrier, Skybus, introduced service to Ohio with A-319 aircraft. By all accounts, service was good and enplanements were increasing until the airline declared bankruptcy primarily due to fuel costs.

In order to ensure a strong operating base at GON, it is recommended that primary attention be given to accommodating and enhancing facility infrastructure for the upper end of the general aviation fleet. Nonetheless, sound planning should be implemented to accommodate new scheduled service should the demand ever be realized including maintaining existing Part 139 certification.

## GA/AIR TAXI PASSENGER ENPLANEMENTS

Passenger enplanement data is needed to ensure adequate facilities are available; such as terminal space, restrooms, lobby areas, auto parking etc.

Passenger enplanements at GON, since the air carrier market ended in 2003 consist of those passengers enplaning general aviation aircraft. These include both recreational, business aircraft, and air taxi operations. Unlike air carrier operations, which track every enplanement, records of general aviation aircraft operations are not maintained to the same degree.

Columbia and Lanmar, the two fixed base operators do maintain records of some flight activity, however, for the most part, accurate enplanement data is not required and not maintained. To gain some idea of the number of passengers using aircraft at GON, FAA assumes for planning purposes that for every itinerant departure, there are on average, 2.5 people, including the flight crew.

Forecasted itinerant operations in 2015, exclusive of military operations, will total 54,800. For planning purposes we assume one-half of total operations are counted for passenger enplanement purposes, or approximately 26,400. If we assume there were 2.5 people onboard each flight, then the total enplanements in 2015 equals 68,500.

In forecasting future enplanements, the selected growth scenario of 2 percent per year will be used. This increase will result in total estimated enplanements by the end of the planning period of approximately 78,750 (passengers and crew). Table 3.8 shows the growth as spread out over the 20 year planning period.

**Table 3.8 - Passenger Enplanements**

| Year | Total Operations | 50% | Passengers |
|---|---|---|---|
| 2010 | 38,237 | 19,119 | 47,796 |
| 2015 | 38,200 | 19,100 | 47,750 |
| 2020 | 42,020 | 21,010 | 52,525 |
| 2030 | 50,424 | 25,212 | 63,030 |

### *PEAK HOUR PASSENGERS*

Peak hour passengers are forecasted for the purpose of sizing terminal and other support building requirements, and will be used later in the study in developing alternatives for terminal and other passenger facilities.

Large commercial airports routinely analyze peaking characteristics because of the need to ensure terminal buildings and automobile parking are adequate. Smaller general aviation airports rely on more simplistic planning assumptions. Typical theories breakdown annual enplanements into peak month, peak month/average day, and then peak hour using standard and accepted planning practices. Absent more reliable data, the peak month is typically July or August and accounts for 15 percent of the total annual enplanements. Peak month/average day is PM divided by 30 and then peak hour is 20 percent of this figure. Hence, the peak hour passenger forecast at GON is as presented in Table 3.9.

**Table 3.9 - Peak Passenger Assessment**

| Year | Enplanements | Peak Month | PMAD | PH |
|---|---|---|---|---|
| 2010 | 38,237 | 5,736 | 191 | 38 |
| 2015 | 38,200 | 5,730 | 191 | 38 |
| 2020 | 42,020 | 6,303 | 210 | 42 |
| 2030 | 50,424 | 7,564 | 252 | 50 |

## *CRITICAL FORECASTED AIRCRAFT*

The current design aircraft is the Citation VIII. Given the reintroduction of scheduled airline service at GON is unlikely in the short-term; the future design aircraft will probably not change significantly. While the Gulfstream III and similar size aircraft may not be around in 20 years, aircraft of similar size and characteristics will. As an example, the larger and considerably more expensive Gulfstream V and its successor will use GON, however the operational numbers significant enough to warrant increasing the ARC into the "D" category, with larger wingspan sizes will most likely not be realized. Thus, the design aircraft for GON will not change during the term of this study. It will remain C-II for the primary runway and B-II for the crosswind.

## AIRPORT ROLE

Without the reintroduction of scheduled airline service the role of GON to remain general aviation. In addition, the likelihood of commercial airline service returning to GON is remote. Competition is too keen and costs are too high for a low volume start-up operation. However, it is only prudent to keep this option open to the extent practicable. In the mean time the airport will continue to serve a valuable service to the public as a general aviation airport. The fairly consistent use of the facility by air taxi and other commercial and non-commercial shuttle operations is noteworthy. The use of GON will mirror the economy. In good times operations will flourish and during downturns, such as the airport experiencing in 2008, operations will naturally decline.

## FORECAST SUMMARY

Table 3.10 on the next page summarizes the forecast data addressed in this chapter of the report.

**Table 3.10 - Forecast Summary for Groton-New London Airport**

| Forecast Data | Year | | | |
|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2030 |
| **Based Aircraft** | | | | |
| Single Engine | 37 | 37 | 37 | 40 |
| Multiengine | 8 | 8 | 8 | 7 |
| Helicopter | 2 | 2 | 3 | 8 |
| Turbojet | 8 | 8 | 13 | 18 |
| **Total** | **55** | **55** | **61** | **73** |
| **Operations** | | | | |
| Itinerant | 26,561 | 26,500 | 29,150 | 34,980 |
| Local | 11,676 | 11,700 | 12,870 | 15,444 |
| Total | 38,237 | 38,200 | 42,020 | 50,424 |
| **Peak Operations** | | | | |
| Peak-Month/Average Day (PMAD) [1] | 191 | 191 | 210 | 252 |
| Peak-Hour (PH) [2] | 38 | 38 | 42 | 50 |
| **Passenger Enplanement** | 47,796 | 47,750 | 52,525 | 63,030 |
| **Peak Hour Passengers** | 38 | 38 | 42 | 50 |
| **Critical Design Aircraft** | Citation 650 | Citation 650 | Citation 650 | Citation 650 |
| **Airport Reference Code** | C-II | C-II | C-II | C-II |
| Runway 5-23 | C-II | C-II | C-II | C-II |
| Runway 15-33 | B-II | B-II | B-II | B-II |

Notes
1. PMAD is 20% of annual operations
2. PH is 15% of PMAD

# CHAPTER 4 - DEMAND CAPACITY & FACILITY REQUIREMENTS

## INTRODUCTION

This section compares the capacity of all airport infrastructure and facilities to accommodate existing and forecasted demand. The future requirements serve to determine which airport facilities will become inadequate to meet demand and at what projected time through the course of the 20 year planning period. This information will be the basis of the next step in the planning process: the definition and evaluation of development alternatives, which are presented later in Chapter 5 (starting on page 108).

Any calculated shortfall in facilities provides a "glimpse" of the degree of facility expansion needed in 20 years, as well as the improvements needed before then. While certain facilities may be needed, at what demand level they actually are implemented is often a matter of airport policy and funding availability. This policy is often based on prioritization of need, development costs, and engineering and environmental feasibility. In the case of an apron expansion for example, the calculated need increases over time with growth, but that does not mean very small expansions are needed every year. Providing a facility before it is needed is not financially prudent and may not receive environmental approvals (if required) due to inadequate justification based on purpose and need. Providing a facility late, however, causes unnecessary congestion and delay, inconveniencing airport management and users. Late development of facilities is also more expensive and time consuming, tying up airport funds that could be used for other capital projects.

Facility requirements were calculated for existing conditions (year 2010) and the forecast years of 2015, 2020, and 2030 (end of the short, intermediate, and long-terms respectively) by applying the forecasts presented in Chapter 3. The forecasts are summarized in Table 4.1 (next page). The timing of the need for the identified improvements is driven by the projections of future aviation activity or trigger points.[1] For example, the need for a larger aircraft apron is triggered by a growth in based and/or itinerant aircraft, now or at a future date.

The facility requirements analysis is presented for the major elements of land use at Groton-New London:



[1] Change in a condition or value that represents crossing a threshold and actuates or initiates a need for a change in the airport's infrastructure.

**Table 4.1 - Groton-New London Demand Forecast Summary**

| Activity | 2010 | 2015 | 2020 | 2030 |
|---|---|---|---|---|
| Local Operations | 11,676 | 11,700 | 12,870 | 15,444 |
| Itinerant Operations | 26,561 | 26,500 | 29,150 | 34,980 |
| Total Annual Operations | 38,237 | 38,200 | 42,020 | 50,424 |
| PMAD Operations [Note 1] | 191.2 | 191.0 | 210.1 | 252.1 |
| PH Operations [Note 2] | 38 | 38 | 42 | 50 |
| Based Aircraft [Note 3] | 50 | 54 | 59 | 71 |
| Passenger Enplanements | 35,800 | 38,800 | 42,800 | 52,200 |
| Peak Hour Passengers | 36 | 39 | 43 | 52 |

[1] For planning purposes, Peak-Month/Average Day (PMAD) is calculated as 15% of annual operations divided by 30.

[2] Peak-Hour (PH) is 20% of PMAD

[3] The based aircraft numbers reflect an increase over those presented in Chapter 2, Inventory and Chapter 3, Forecasts

## AIRPORT DESIGN STANDARDS

As addressed in Chapter 2, *Inventory of Existing Conditions*, airport design standards are based on the airport's critical design aircraft, where the size and speed of this aircraft is translated to the airport reference code, or ARC, which in turn established the airport's design standards. As a review, the current and forecasted critical design aircraft is the Cessna 650 Citation VIII and the ARC is C-II.[2] This ARC is not applicable to the airport as a whole, but primarily the airport's main runway, Runway 5-23. The crosswind runway, 15-33, has a different ARC (B-II) because of its shorter length and use by smaller and less demanding aircraft in terms of size and landing/takeoff distances requirements. In addition, small aircraft parking areas used exclusively by single and light twin piston aircraft have an even less demanding A-1 ARC. The reason for the different designations is to ensure airport facilities are properly sized and positioned based on their most demanding planned uses. This equates to savings in terms of maintenance and construction costs and does not "oversize" airfield design requirements and related set-back distances thus potentially preserving additional land for compatible development.

## AIRSIDE FACILITIES

This section contains the demand/capacity analysis for the existing airfield facilities as well as future airfield requirements. For reference, the existing airfield is shown earlier in Chapter 2 on Figure 2.6 (page 10).

[2] See Critical Design Airplane, Page 11.

### *AIRFIELD CAPACITY*

The purpose of this analysis is to determine the level of aircraft activity, as defined by hourly or annual aircraft operations that can be accommodated by the existing airfield system at an acceptable level of delay. The methodology used is derived from AC 150/5060-5, *Airport Capacity and Delay*.

### *ASSUMPTIONS*

The inputs required for the analysis, include existing and forecast demand, runway configuration, and the taxiway system.

The demand levels used to test the airfield system were derived from the forecasts of aviation demand. Calculations were made for the airfield at the existing 2010 level of demand, as well as for the 2012, 2017, and 2027 activity levels. Table 4.1 presented on the previous page shows the projected annual airport demand for each planning year.

### *RUNWAY CONFIGURATION*

As shown in the previous chapter, there are two runways at Groton-New London, configured in a crossing design. Runway 5-23 is 5,000 feet long by 150 feet wide and is the preferred runway for most operations, particularly when wind conditions require. Runway 15-33 is 4,000 feet long by 100 feet wide and is used primarily by small category aircraft[3] when crosswind conditions prevent the use of the longer, primary runway. However, most aircraft currently using Groton-New London can operate from the shorter strip depending on wind, temperature, and operating weight and speed.

Based on findings contained in AC 150/5060-5, it is important to note that the crosswind runway (15-33) does not provide much additional airfield capacity. This is because the crosswind runway cannot be operated independently of the main runway (5-23) due to the intersection of the two runways. Arrivals and departures on Runway 5-23 must take place in coordination with operations on Runway 15-33. For example, when an aircraft is landing or departing on Runway 5 or 23, arriving or departing aircraft on Runway 15 or 33 must wait until the Runway 5-23 aircraft has passed the intersection of the runways. In addition, if a large aircraft is operating on one runway, aircraft using the crossing runway may have to wait even longer to protect against wake turbulence. As a result of this coordination and inherent delay factor, the capacity of the two runways together is not significantly higher than a single runway.

It is important, however, to understand the purpose of a crosswind runway, which is not to increase capacity, but rather to compensate primary runways that provide less than the

[3] Gross takeoff weight of 12,500 pounds or less.

FAA recommended 95 percent wind coverage. A review of the 1999 master plan indicates wind favors the primary runway (5-23) 94.6% of the time at 15 miles per hour, or mph (equal to 13 knots) and 88.2% of the time at 12 mph (10.5 knots). The slower speed at 12 miles per hour (10.5 knots) is applicable to smaller aircraft, while the higher speed (15 mph/13 knots) applies to larger aircraft. Combined, both runways provide 97.2% coverage at 12 mph/10.5 knots and 99.36% at 15 mph/13 knots. Because the coverage for the predominant smaller aircraft on the primary runway is well below the 95% threshold, a crosswind runway is essential for both safety and operational viability of the airport; that is, it makes the airport available during most wind conditions for all aircraft, at a higher level of safety.

### *Taxiway Configuration*

For the purposes of airport capacity calculations at Groton-New London, the current taxiway configuration does not create an inherent delay situation. The full parallel taxiways along both runways, combined with the connecting taxiways provides for optimum flow of traffic in all runway operating configurations.

### *Annual Service Volume*

Annual service volume is used by the FAA as a quantifiable measure of an airport's operating capacity. The annual service volume is defined as the maximum level of annual aircraft operations that can take place at an airport (i.e. it does not consider levels of delay). Annual service volume can be used as a reference point for the general planning of capacity-related improvements. As actual annual operations approach the annual service volume of an airport, annual aircraft delays increase rapidly, with relatively small increases in the number of operations served. As a general rule, when demand at an airport reaches 60 percent of its capacity, delays become noticeable during portions of the day and new airfield facilities (i.e. runways) should be planned. When airport activity reaches 80 percent of operational capacity, new airfield facilities should be constructed.

The annual service volume at Groton-New London was calculated to be 230,000 operations. The 60 and 80 percent ratio were applied to Groton-New London's annual service volume to determine if new airfield facilities would be required. The annual service volume methodology indicates that the airport is currently operating well below its operational capacity levels (17 percent or 38,237[4]). This methodology also indicates that delays of any significance will not occur until the annual service volume reaches 138,000. New runway facilities will not be required until the airport is operating at 80 percent of its annual service volume, or 184,000 operations. Demand is projected to reach 27 percent of the airfield's annual service volume by 2030, when annual operations are projected to reach 63,000.

[4] Total operations in the base year (2010).

## *SUMMARY*

The results of the airfield demand/capacity analysis indicate that Groton-New London will not reach critical capacity levels during the master planning horizon. There are improvements that could be made regardless of this capacity analysis, including new technology and improvements to the taxiway lighting system that would provide a small measure of increased safety and possible operating cost reductions such as LED lights, and these improvements are addressed in subsequent sections in this chapter. Nonetheless, additional airfield infrastructure (either runways or taxiways) will not be required through the planning period to address any capacity concerns.

## RUNWAY LENGTH ANALYSIS

The purpose of a runway length analysis is to determine if the lengths of the existing runways are adequate, and to determine the needed length for the existing and any future requirements. This analysis does not include the geometric design standards provided by the FAA including the Runways Safety Area (RSA) and Runway Protection Zone (RPZ). These two key standards are discussed later in this chapter (see *Airport Design Standards*, page 83).

Runway length requirements were identified for two aircraft groups (large and small category aircraft)[5], in addition to landing and takeoff runway length requirements for the airport's critical design airplanes. In the analysis, various runway length requirements were identified in order to provide as much information as possible for future planning.

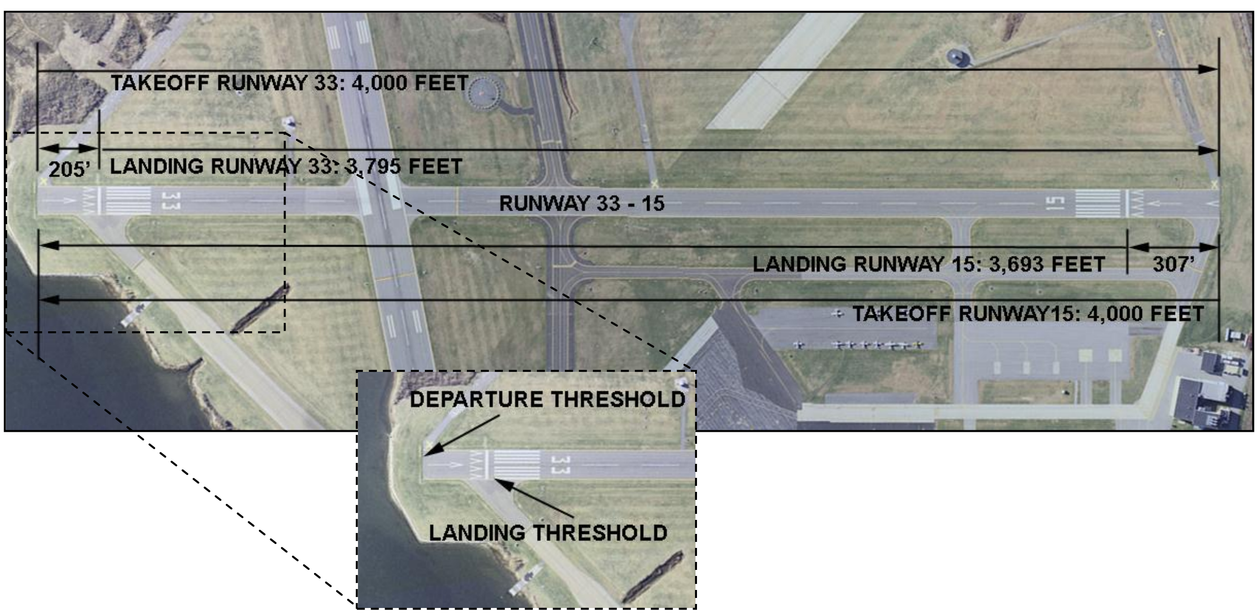
The runway length requirements were calculated using AC 150/5325-4B, *Runway Length Requirements for Airport Design*, and charts published in the aircraft manufacturers' aircraft performance manuals. Requirements were calculated by taking into consideration the airport elevation and average temperature, runway conditions, and the performance characteristics and operating weight of each aircraft. The operating weight of an aircraft is dependent on the amount of fuel needed to reach the destination and the amount of payload (passengers, baggage, and cargo). Although this analysis utilized the individual aircraft manufacturers' manuals, individual aircraft operators, will typically have their own runway length requirements. These requirements are sometimes more stringent than those presented in the aircraft design manuals and are based upon additional safety and insurance requirements.

[5] Small category aircraft are those weighing 12,500 pounds or less, and large aircraft weight more than 12,500 pounds up to and including 60,000 pounds. Aircraft weighing more than 60,000 fall into the transport category.

### *EXISTING RUNWAY LENGTH*

Runway 5-23 is 5,000 feet long and is the primary arrival and departure runway for most commercial operations. Runway 15-33 is 4,000 feet long and is used primarily by small general aviation aircraft in good weather conditions. Two of the runway ends operate with a displaced threshold. A displaced threshold represents a point on the runway other than the physical beginning of the runway and is marked for arriving aircraft to touch down. This limits the landing length available to arriving aircraft. The physical beginning of the runway is used by departing aircraft, which typically require more runway length than arriving aircraft. Displaced thresholds are used when there are obstructions that an arriving aircraft cannot clear when using the physical beginning of the runway. Runway 15-33 operates with a displaced threshold of 307 feet for Runway 15 and 205 feet for Runway 33. The displaced threshold only reduces the available runway length during landings. As a result, Runway 15 arrivals have 3,693 feet of runway available, and Runway 33 arrivals have 3,795 feet of landing length available. Figure 4.1 illustrates the displaced threshold effect on Runway 15-33 operations; it shows the available runway for departures and arrivals from both runway ends. The inset in this figure shows where an aircraft can begin takeoff roll and the earliest point an aircraft can touchdown on landing approach.

**Figure 4.1 – Displaced Threshold Effect on Runway 15-33**
**Effect of Displaced Threshold**



## *TAKEOFF RUNWAY LENGTH REQUIREMENTS*

This section discusses the takeoff runway length requirements for the aircraft currently using or projected to be in operation at Groton-New London over the planning horizon.

### *Large Aircraft Requirements*

The design procedure for this airplane weight category requires the following information: airport elevation above mean sea level, mean daily maximum temperature of the hottest month at the airport, the critical design airplanes under evaluation with their respective useful loads. Another factor considered is the percentage of the existing fleet considered. One calculation considers 75 percent of the fleet, and the second calculation considers 100 percent of the fleet in this weight class; both calculations also factor useful load at both 60 and 90 percent.[6]

As shown on Figure 4.2 (next page), 100 percent of the fleet at 60 and 90 percent useful load require the most runway length (5,000 to 7,400 feet). (Although it should be noted that pilots and operators may insist on longer lengths as the required length for regular use.) Calculations for 75 percent of the fleet require 4,700 to 6,000 feet of runway length at 60 and 90 percent useful load respectively. All aircraft in this weight class can be accommodated with a 7,400-foot runway.

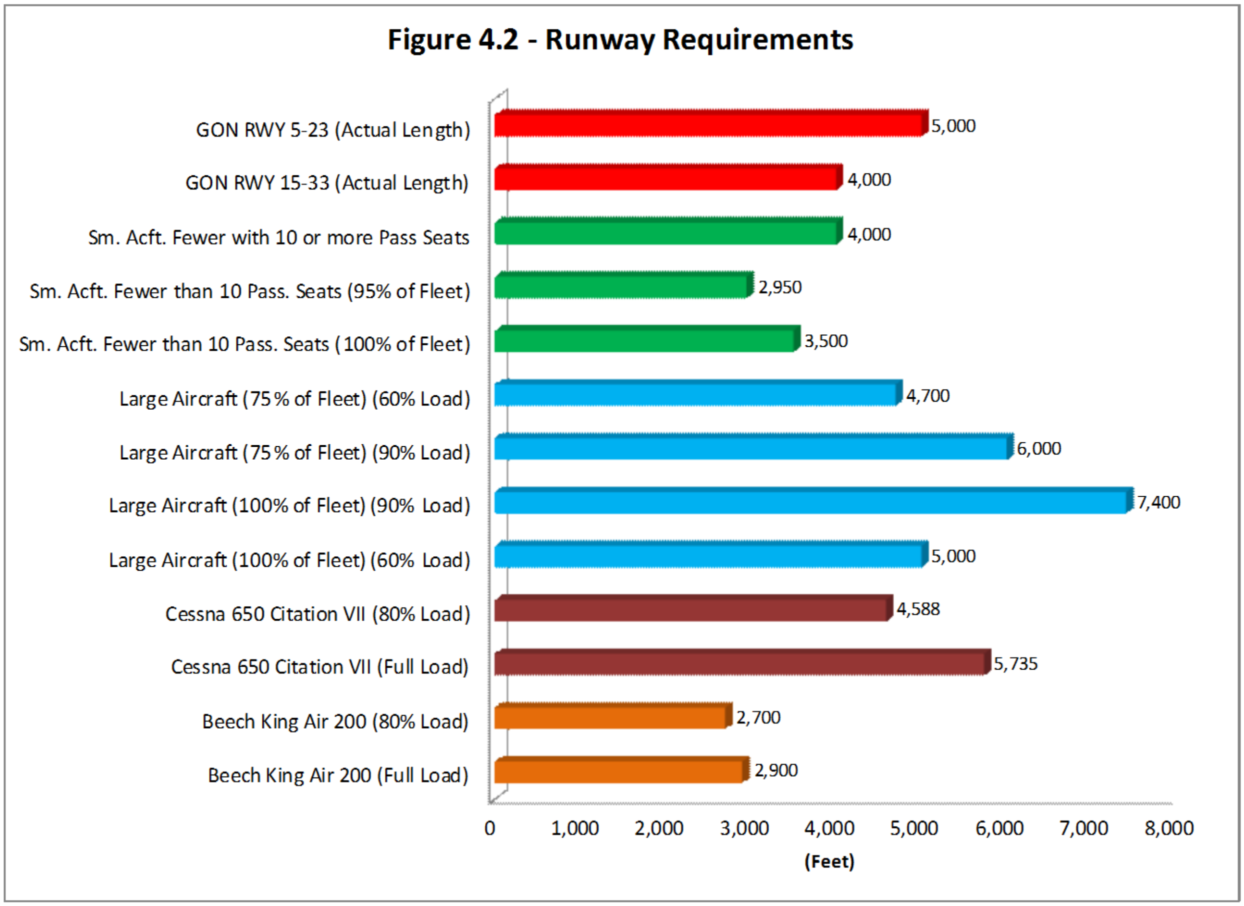
### *Small Aircraft Requirements*

Runway lengths for small airplanes with a maximum certificated takeoff weight of 12,500 pounds or less were calculated using the same analysis as large aircraft.  The design procedure requires the following information: the critical design airplanes under evaluation, approach speed in knots, number of passenger seats, airport elevation above mean sea level, and the mean daily maximum temperature of the hottest month at the airport.

Three separate calculations were made: small airplanes with fewer than 10 passenger seats, with calculations for 95 and 100 percent of the fleet, and for small airplanes with 10 or more passenger seats (no breakout for fleet percent).

[6] AC 5325-4B, Chapter 3.

Small aircraft with 10 or more passenger seats require the most runway length at 4,000 feet (Figure 4.2). Calculations for small aircraft with less than 10 passenger seats require between 2,950 and 3,500 feet for 95 and 100 percent of the fleet respectively.




### *Critical Design Aircraft*

A separate calculation was performed for the airport's two design aircraft, the Embraer 135 and Beech King Air 200. The Cessna 650 Citation VII requires 5,150 feet of runway at sea level under standard atmospheric conditions.[7] At Groton-New London this distance increases to 5,735 feet with a full load, and 4590 at 80 percent load. The King Air 200

[7] International Standard Atmosphere (ISA) is an atmospheric model of how the pressure, temperature, density, and viscosity of the Earth's atmosphere change over a wide range of altitudes. The ISA at sea level is 59°F (15°C) and with a pressure of 29.92 inches (1013.25 millibars). As the pressure and temperature changes, the operating performance of aircraft change as well. In general, the higher the temperature and the lower the pressure from ISA, the more runway pavement aircraft require for both takeoff and landings.

requires 2,600 feet at sea level under standard conditions. The runway length increases to 2,900 at Groton-New London with a full load, and 1,800 to 2,700 at 60 and 90 percent load factors respectively.

### *CROSSWIND RUNWAYS*

Crosswind runways are generally designed at approximately 80 percent of the identified primary departure runway length requirement.[8] A crosswind runway length that is shorter that the primary runway is usually acceptable at most airports for two reasons. First, the added lift from increased head-on wind speeds under conditions where the crosswind runway is in use, somewhat reduces takeoff length requirements. In addition, at many airports, the occurrences of winds that require the use of the crosswind do not occur frequently enough to make runway length-caused operational restrictions an issue.

Since a 5,000 to 7,400-foot runway is recommended for the primary departure runway at Groton-New London, 4,000 to 5,900 feet would be the recommended crosswind runway length (based on the 80 percent guideline) for planning purposes. At 5,900 feet, the crosswind runway would be capable of providing operational flexibility as a backup runway during maintenance, snow removal, or favorable wind conditions.

### *SUMMARY*

The preceding analysis identified runway length scenarios for two aircraft weight classes under various conditions (fleet percent and load factors), and for the two critical design aircraft at Groton-New London. It is important to note that these requirements do not imply that several different runways are needed to serve different aircraft groups, or that a longer runway is required. For certain aircraft under certain conditions, a longer runway is always desirable or required. Meeting that demand is not an obligation, but rather a balance between purpose and need.

While preserving all options must be considered, and theoretically there may be a need for longer runways at Groton-New London, the need does not exist today at a level of use that justifies the cost. Certainly some aircraft must operate with a reduced fuel/cargo load, or use another airport; however the majority of aircraft do not. Given there is no commercial airline service at Groton-New London, no reasonable justification can be made to expand the existing runway surfaces for the following reasons.

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[8] When possible, crosswind runways are generally designed at approximately 80 percent of the identified primary departure runway length requirements; however, 80 percent is a general planning and design guideline recommended by the FAA, not a regulation or rule. If it is determined that lengthening the crosswind runway to 80 percent of the primary runway length requirement is not feasible or practical due to environmental impacts (i.e. wetlands/hydrological issues) and/or exorbitant costs (i.e. costs more than the benefit gained), etc., then a lesser length will be considered adequate. Again, this is a FAA "rule-of-thumb" planning/design guideline.

- No need for most operations
- No available land for expansion
- Major environmental issues. A runway extension automatically triggers the needs for an Environmental Assessment, if not an Environmental Impact Statement. Given the airport's location along Poquonnock River and Baker Cove, any runway extension to Runway 33 would require relocating an active railroad line, and an extension to Runways 5, 23, or 15 would require filling portions of one or both bodies of water; an environmental obstacle that would take years to navigate, with a high probability of a finding of significant impacts in one or more categories (wetlands, wildlife, etc.).
- The cost of design and construction alone may not outweigh any benefits achieved.

Given the above, it is recommended that no further study of a runway extension be pursued in this document.

### RUNWAY WIDTH ANALYSIS

Runway 05-23 is 150 feet wide and Runway 15-33 is 100 feet wide. Under current design standard, Runway 05-23 should be at least 100 feet wide and Runway 15-33 needs to be at least 75 feet wide. It is recommended, however, that the runway widths remain at 150 and 100 feet, respectively at least until each strip is scheduled for reconstruction; at which time the required width should be readdressed and adjusted accordingly.

Although the likelihood of the ARC increasing to Group IV in this planning period is remote, it is possible, which would dictate a wider runway infrastructure. Regardless, the runway width can be reevaluated when the next major reconstruction project of the runway(s) is due. Reducing the width for the sake of meeting current design standards is expensive and would serve no operational purpose.

In fact, the wider runway adds an immeasurable safety element to flight operations: it offers pilots of all experience levels a greater margin of error, particularly during strong wind conditions. In addition, a wider runway provides an increased margin of safety during low visibility operations by offering pilots a wider target or aim point in the final phase of approach. It also provides a greater safety margin when runways are subjected to snow removal and ice control operations (November to April).

It is therefore recommended, that the runway widths remain at 150 and 100 feet, respectively during the study period.

## AIRPORT DESIGN STANDARDS

As determined in Chapter 2 (see *Critical Design Airplane*, page 11), the airport is currently an ARC C-II facility. The C-II ARC is applicable to the airport as a whole, but principally to the primary runway, which means that all airport geometric standards, except Runway 15-33 and small aircraft parking areas will be based on an aircraft with a wingspan up to 79 feet and an aircraft approach speed of 141 knots or less. Runway 15-33 is designed to ARC B-II standards because it is used primarily by small category aircraft with a slower approach speed and shorter wingspan, however, large category aircraft do use this runway.

### *RUNWAY SAFETY AREA*

The definition and purpose of RSAs is defined in Appendix 1. GON runway design prescribes separate standards of ARC C-II for Runway 05-23 and ARC B-II for Runway 15-33. Table 2.1, *Airport Design Surfaces* (presented earlier on page 13) lists the required and actual RSA dimensions along with the nonconforming issues. The airport undertook a safety-area study that identified issues, and in 2011, EMAS was installed on both ends of Runway 5-23.

### *OBJECT-FREE AREA*

Like RSA, the OFA extends around the runway, creating an area that must meet FAA clearing standards. Objects nonessential for air navigation or aircraft ground maneuvering must not be placed in the OFA, including parked aircraft. The size of the OFAs at Groton-New London meets design criteria. Table 2.1 (page 13) also lists the required and actual OFA dimensions along with the nonconforming issues.

### *RUNWAY PROTECTION ZONES*

The RPZ is an area off the end of a runway provided to enhance the protection of people and property on the ground. Control of this trapezoid shaped area is achieved through airport owner control over RPZs. Such control includes clearing (and maintaining them clear) of incompatible objects and activities. Land uses prohibited from the RPZ are residences and places of public assembly. Figure 2.6 (page 10) shows the location of the four runway zones and Table 2.1 (page 13) lists the RPZ dimensions (see Inventory Section, page 10 and 14 respectively).

All four RPZs rest at least partially off airport property with no controlling interests in the portions that overlie private property. Property interests should be in the form of airport ownership, an easement, or zoning controls. Methods of obtaining this control are addressed in Chapter 4, *Alternatives*.

### *Taxiway Requirements*

For the purpose of airport capacity calculations Groton-New London has sufficient full-length parallel taxiways and runway entrance/exit taxiways and no taxiway/runway crossing problems. The two runways are currently served with a full parallel taxiway and there are sufficient runway exits along both Runways 5-23 and 15-33.

The minimum pavement widths, curve radii, and separations associated with airplane movement areas and airplane physical characteristics of the airports critical design aircraft are consistent with FAA design standards. The role of the taxiway system is to function as the transitional facility between the two runways and the aircraft parking areas. The taxiway system requires no adjustments given the airports current role.

## Lighting, Markings and Signs

All aeronautical lights, markings, and signs are consistent with FAA guidelines and Part 139 standards.

### *Runway Lights*

The existing runway-edge light system consists of high intensity runway edge lights (HIRL). Other than routine maintenance and replacement of damaged or worn components, no change in lighting is recommended at this time other than switching to LED lights when and if the technology becomes available.

### *Approach Lights*

A 2,400 foot medium intensity approach lighting system with runway alignment indicator lights (MALSR) is installed on Runway 5. This configuration and length is appropriate for the Airport and runway end (with an ILS). No additional approach lighting systems are recommended at this time.

### *Runway End Identifier Lights*

Runway End Identifier Lights (REILs) are currently installed on Runway 23 and 33 only. Adding a REILs system to Runway 15, combined with the existing ALS on Runway 5, would provide total airport coverage. The addition of REILs would provide pilots with added safety and security during night operations.

### *VERTICAL GUIDANCE LIGHTS*

A Vertical Glideslope Indicator (VGLI) consists primarily of VASI and PAPI systems and is designed to provide pilots with visual descent guidance information during the approach to a runway during both day and night conditions (see section 1.5.1.6, page 13). The existing VGLI consists of a four-light PAPI on the left side of Runway 5 and 33. There is a four-box VASI on the left side of Runway 23, and Runway 15 has no VGSL. It is recommended that a four-light PAPI be installed on Runway 15 and the Runway 23 VASI be replaced with a four-light PAPI.

### *TAXIWAY LIGHTS*

All taxiway lights are currently equipped with Medium-Intensity Taxiway Lights (MITLs). No changes are recommended other than to transition to LED lights when the existing systems are due for replacement. Any change to LED lighting should include individual heaters for each fixture. The heating system keeps the globe clear of ice and snow and is required in northern climates because unlike incandescent lights, the LED does not give off heat.

### *MARKINGS AND SIGNS*

Current runway markings are satisfactory and meet current design requirements. The markings are in good condition. In the fall of 2005 the majority of the markings were repainted due to construction projects and FAA mandates for new runway holding position markings. Airport signage, during an airfield inspection in February 2009 for this AMPU were in good condition, function according to design and also meet FAA standards.

## LANDSIDE FACILITIES

This section addresses issues related to landside facility capacity and recommended changes.

### *AIRCRAFT STORAGE AND PARKING*

The first assumption that must be made is how the mix of aircraft that park on the various aprons and those in hangars will change during the planning period. Currently, the mix is not divided equally between hangars and ramp tie down spaces. There are 50-based civil aircraft (2010 inventory). Of these, approximately 19 percent, or 8 aircraft are parked in the open on aprons; the remaining 44 (88 percent) are parked in one of several hangars. It is anticipated that this ratio will remain fairly constant throughout the planning years (for planning purposes we use 20 percent apron and 80 percent hangar). Given this, the need for open apron space will grow from the current 8 aircraft to 14 and hangar demand will increase from the current 44 to 57 by year 2030.

Conventional-hangar capacity is difficult to judge because aircraft size is difficult to determine. The larger the aircraft the fewer aircraft a conventional hangar can hold. Also, most conventional hangars are not strictly used for long-term storage purposes but rather are maintenance facilities. There are a total of nine hangars at Groton-New London, three are t-hangar buildings, and all remaining hangars are conventional units. The TASMG hangar is a maintenance facility. All hangars are metal construction and in excellent condition. Our assessment in early February 2008 indicates a surplus of space both in the conventional and t-hangars.

Like any other project, hangars and (new apron space) should be developed only in concert with demand. The key is timing the market to ensure that adequate space is available, which is generally left to private developers to assess market conditions and the need for more hangar space. The airport must work closely with developers, usually the FBO, to ensure adequate space is available and lease agreements are in place in a timely manner.

### *BASED AIRCRAFT APRON REQUIREMENTS*

Aircraft aprons/ ramps consist of seven specific parking areas joined by continuous pavement that extends throughout the airport's entire northern quadrant, from the approach end of Runway 15 to the end of Runway 23. The seven aprons, some of which are combined, consist of approximately 547,000 square feet of paved space, of which all but 10,000 is available for non-military use. The aprons are generally in excellent shape; well-marked with lead in taxiway and taxilane markings, as well as designated vehicular roadway that extends along the entire outer perimeter of the apron, from Runway 23 to Runway 15.

Based aircraft pavement requirements are generally calculated using approximately 2,700 square feet per aircraft. This number can be adjusted on the average size of aircraft. For example, the Cessna 650 Citation VII, with an overall length of 56 feet and a wingspan of 53 feet has a 3,000 square foot footprint, and clearly requires more space than a Cessna Skyhawk with a 945 square foot footprint (length 27 feet and 35 foot wingspan). However, the majority of aircraft requiring parking space at Groton-New London have an average size closer to the Skyhawk than the Citation VII. Neither number accounts for maneuvering space. However, for planning purposes the 2,700 square foot per aircraft rule will apply, with the understanding that ample room will be available for the larger aircraft on both FBO aprons and the terminal apron.

Based aircraft apron requirements are calculated based on the percentage of aircraft on apron space versus the percentage in hangars. The existing ratio is 80% hangar / 20% apron (for based aircraft), a proportion that will be used throughout the 20-year planning cycle. Given this, the estimated area required for based aircraft is 27,000 square feet today, expanding to slight over 38,000 in 2020. Table 4.2 (next page) shows the existing and

**Table 4.2 - Based Aircraft Apron Demand**

| Calculations | Year | | | |
|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2030 |
| Based Aircraft | 50 | 54 | 59 | 71 |
| Percent Aircraft in Hangars | 80% | 80% | 80% | 80% |
| Percent Aircraft on Aprons | 20% | 20% | 20% | 20% |
| Aircraft Apron Demand | 10.0 | 10.8 | 11.8 | 14.2 |
| Allowance per Aircraft (s.f.) | 2,700 | 2,700 | 2,700 | 2,700 |
| **Apron Area Required (s.f.)** | **27,000** | **29,160** | **31,860** | **38,340** |

future calculations.

### *ITINERANT AIRCRAFT APRON REQUIREMENTS*

Itinerant-aircraft apron space is determined by using itinerant aircraft peak activity levels (Peak-Month/Average Day, or PMAD)[9] and applying them to the standard planning space of 3,240 square feet per aircraft.[10] Based on FAA guidelines, parking requirements are determined from itinerant PMAD calculations. PMAD is the average number of operations that occur on the average day during the busiest month of the year. PMAD was presented earlier in Table 3.10 (page 73). PMAD is adjusted to determine apron size based on an industry accepted formula. Table 4.3 presents the formula along with calculations for existing and well as planning demand for the next 20 years. As shown, the existing

**Table 4.3 - Itinerant Aircraft Apron Demand**

| Calculations | Year | | | |
|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2030 |
| PMAD | 191.2 | 191.0 | 210.1 | 252.1 |
| Operational Demand = 110% of PMAD | 210.3 | 210.1 | 231.1 | 277.3 |
| Aircraft Arrivals = 50% of Operational Demand | 105.2 | 105.1 | 115.6 | 138.7 |
| Parking Demand = 75% of Aircraft Arrivals | 78.9 | 78.8 | 86.7 | 104.0 |
| Allowance per Aircraft (s.f.) | 3,240 | 3,240 | 3,240 | 3,240 |
| **Apron Area Required (s.f.)** | **255,519** | **255,272** | **280,799** | **336,958** |

[9] See Chapter 3, Peak Operations, on page 64.

[10] Generally, itinerant aircraft require slightly more space than based aircraft because of they tend to be slightly larger than based aircraft, which are easier to account for. Consequently, transient (itinerant) aircraft are afforded slightly more space (360 s.y. versus 300 s.y. for based aircraft.

itinerant apron demand is 255,500 s.y., decreasing slightly to 255,000 in 2015, than increasing to nearly 281,000 in 2020, and 337,000 in 2030 (all numbers rounded).[11]

### *TOTAL APRON REQUIREMENTS*

Total apron requirements are a combination of based and itinerant-aircraft parking needs space for servicing and maintenance, and other aircraft infrastructure needs, such as maintenance vehicles (aircraft tugs, deicers, etc.) and other essential movement and parking needs. Table 4.4 shows the total apron requirements for parking aircraft throughout the planning period, as well as the current and future demand/capacity. As noted, while the growth in based and itinerant aircraft will be reserved, available apron space will approach a deficit by the end of the planning cycle. Plans to expand apron space should start when existing demand reaches 90 percent of available capacity, which will not be reached during this 20-year planning cycle.

**Table 4.4 - Itinerant Aircraft Apron Demand**

| Requirements | Year | | | |
|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2030 |
| Based Aircraft Apron (from Table 4.2) | 27,000 | 29,160 | 31,860 | 38,340 |
| Itinerant Aircraft Apron (from Table 4.3) | 255,519 | 255,272 | 280,799 | 336,958 |
| Total Demand (s.f). | 282,519 | 284,432 | 312,659 | 375,298 |
| Current Apron (Capacity) | 547,000 | 547,000 | 547,000 | 547,000 |
| Surplus (Deficit) | 264,481 | 262,569 | 234,341 | 171,702 |
| Demand/Capacity Ratio | 52% | 52% | 57% | 69% |

### *HANGAR REQUIREMENTS*

There are nine hangars at the airport, of which eight are privately owned; the ninth is owned and operated by TASMG. The eight private hangars include a single jet pod on the airport's southwest side between TASMG and the terminal, two t-units located on the airport's north side close to Runway 23, and five conventional units, which serve as both maintenance and storage facilities for the two FBOs. The total storage capacity of the eight private hangars is between 60 and 70 aircraft depending on size. This includes eight spaces in the jet pod, 36 combined in the two t-units, and the remaining 16-26 in the five conventional hangars.

Current hangar demand accounts for 80 percent of based aircraft (44 of 55 total civil aircraft). For planning purposes hangar demand will remain at 80 percent of total based

[11] Apron demand decreases over the next five years as projected operations decrease a corresponding amount.

aircraft. Thus, the demand for hangar parking will increase to 64 aircraft by the end of the planning period. The current and projected demand by hangar type is shown in Table 4.4 (next page), along with the demand/capacity ratio.

It is important to remember when reviewing this table that the number of aircraft capable of parking inside conventional hangars is totally dependent on the size of aircraft, which is an unknown variable that changes on a regular basis; therefore, the numbers projected are based solely on the forecast increase in total based aircraft. In addition, the numbers do not reflect the need for short-term itinerant aircraft parking. Given these projections with a long-term surplus of only seven aircraft spaces, it is reasonable to plan for added hangar space, particularly individual jet-pods and t-hangar units, and planning should be well underway when the demand/capacity ratio reaches 90% (bottom row of Table 4.5). In addition, hangars are a valuable source of revenue for airports. They produce land lease income, plus occupied hangars produced additional revenue in the form of fuel sales and other operating costs often spent at the home based airport.

**Table 4.5 - Hangar Requirements**

| Hangar Unit (Number) Owner | Current Capacity | Existing Capacity | | Short-Term | | Intermediate-Term | | Long-Term | |
|---|---|---|---|---|---|---|---|---|---|
| | | Demand | Surplus/ (Deficit) | Demand | Surplus/ (Deficit) | Demand | Surplus/ (Deficit) | Demand | Surplus/ (Deficit) |
| Conventional Hangar (151) Lanmar | 7 | 4 | 3 | 4 | 3 | 4 | 3 | 5 | 2 |
| Conventional Hangar (175) Columbia | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 |
| Conventional Hangar (185) Columbia | 5 | 2 | 3 | 2 | 3 | 2 | 3 | 4 | 1 |
| Conventional Hangar (201) Columbia | 5 | 2 | 3 | 2 | 3 | 2 | 3 | 4 | 1 |
| Conventional Hangar (255) Lanmar | 8 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 3 |
| Jet Pod (147) Lanmar | 8 | 5 | 3 | 5 | 3 | 6 | 2 | 8 | 0 |
| T-Hangars (275 & 285) Lanmar | 36 | 26 | 10 | 30 | 6 | 33 | 3 | 36 | 0 |
| **Total** | **71** | **44** | **27** | **48** | **23** | **52** | **19** | **64** | **7** |
| **Demand/Capacity Ratio** | | **62%** | | **68%** | | **73%** | | **90%** | |

## TERMINAL BUILDING REQUIREMENTS

The terminal building, located in the central part of the airport, is 45 years old. It is located in the central portion of the airport and is relatively unchanged since the last AMPU in 1999. As addressed in Chapter 2 (page 19), approximately 90 percent of the building is available for commercial use, and about 50 percent of the lower floor is not being used. This number changes periodically because of the restaurant, which has undergone several changes in ownership during the past few years, but as of today is vacant.

With no commercial air carrier service, and the remote chance of it returning, the need for the terminal in its current service and size is questionable. However, today's market changes with little warning. For this reason it is recommended that the airport keep its options open. Until there is a quantifiable demand for terminal space, the terminal should be maintained in a high state of availability, in sound working order and cleanliness. Should commercial air carrier service return to Groton-New London, the airport should undertake a terminal study to assess existing and future needs.

Groton-New London may want to explore other alternatives, such as expanding commercial leasing of empty space. As discussed in Chapter 2 (page 19), 90 percent of the building's 10,593 s.f. is available for commercial use, and only 50 percent is being used. It is estimated that a small airline operation would need all of the available unused space (approximately 4,500 s.f.). However, a short-term lease of this space would produce added revenue and give the building an "occupied" appearance. Long-term leasing may not be viable because it would "lock out" potential airline use.

## SUPPORT FACILITIES

Support or ancillary facilities play a vital role in the operations and maintenance of Groton-New London Airport. The sizing, location, and phasing of any proposed improvements to these facilities must provide flexibility to accommodate the dynamic aviation industry. Short-term actions and recommendations should not preclude long-term planning options. The requirements contained herein provide general planning parameters and are based on the forecasts of aviation demand and the existing or anticipated conditions at Groton-New London.

### *AIRFIELD MAINTENANCE/SNOW REMOVAL EQUIPMENT (SRE) FACILITIES*

Assessing the need for SRE and storage buildings requires an understanding of the airport's role, number of operations, average annual snowfall, and the size of primary clearing areas.

- Airport's role.............................................General aviation[12]
- Number of operations ............................53,500, increasing to 63,000 in 2020
- Average Annual Snowfall ......................33 inches[13]

[12] For snow clearing purposes, Groton-New London is classified as a general aviation airport because there is no air carrier service (see AC 150/5220-20, paragraph 38-39.
[13] Average of Bridgeport, CT and Providence, RI (source: Northeast Regional Climate Center - http://met-www.cit.cornell.edu/ccd/avgsnf98.html).

- Size of primary clearing areas.............1,300,000 square feet[14]

Based on this data, Groton-New London requires the equipment shown in Table 4.6. It should be noted that acquisition of this equipment is eligible under the Airport Improvement Program.

**Table 4.6 - Snow Removal Equipment Inventory and Requirements**

| Equipment | Existing | Required |
|---|---|---|
| **Class II Rotary Blower** | 1 | 1 |
| Minimum Capacity = 805 tons/hour | | |
| Minimum Casting Distance = 75 feet | | |
| **Carrier Vehicle for Rotary Snow Plow** | 1 | 1 |
| GVW (including blower and accessories) of 20,000 pounds or 10 tons and a general HP rating for carrier vehicle of 200 | | |
| **Displacement Plows with 23' Actual Blade Length** | 2 | 0 |
| **Displacement Plows with 15' Actual Blade Length** | 3 | 2 |
| **Carrier Vehicle for Displacement Plow** | 4 | 2 |
| 250 bhp to accommodate 15' plow blades | | |
| **Truck Mounted Hopper/Spreader** | 2 | 1 |
| **Self-Propelled High Speed Sweeper (7-12' swath)** | 1 | 1 |
| **Front-End Loader** | 0 | 1 |
| **8-12 CY Bucket** | 0 | 1 |
| **1-2 CY Bucket** | 0 | 1 |

Source: Stantec Analysis using AC 150/5220-20, *Airport Snow and Ice Control Equipment*

The existing maintenance/snow removal equipment building, as discussed in Chapter 2 is a 7,000 square foot facility. The vehicle side, which is a large open bay with 16 foot eave height, occupies three-quarters of the building, with five storage bays. The vehicle side also contains a maintenance shop, wash and steam clean bay, and storage areas. The personnel side is a two story facility that contains a lounge, bunk room, kitchen, bathrooms (with showers) and miscellaneous storage areas. An analysis of the size building required at Groton-New London was performed using current FAA criteria. This analysis considers airport size, a factor of paved runway. Unlike the equipment analysis, paved runway includes both runways, not just the primary runway. The total paved runway at Groton-

[14] Primary runway (5-23) primary taxiways (serving primary runway) primary ramp, ARFF and NAVAID access.

New London equals 1,150,000 square feet.[15] This area equates to a 'large airport' classification for the purposes of sizing SRE buildings.

Total space allocation is based on three separate areas within the building. These are areas for storage of equipment, which includes clearance for equipment safety zones (room for maneuvering, support, etc.), support areas (people), and special equipment areas (HVAC, generators, etc.). As Table 4.7 shows, the airport has a 4,000 square foot space deficit based on current and forecasted needs. Expansion capabilities will be addressed in Chapter 5, Alternatives.

**Table 4.7 - Snow Removal Equipment/Maintenance Building Requirements**

| Area | Square Feet Required |
|---|---|
| Equipment Bay | 2,500 |
| Snow Desk | 200 |
| Supervisor's Office | 140 |
| Mechanic's Office | 150 |
| Administrative Area | 400 |
| Training Room | 400 |
| Lunch Room | 400 |
| Kitchen | 200 |
| Rest Room/Lavatory | 700 |
| Lockers | 700 |
| Sleeping Quarters | 200 |
| Parts Area | 1,000 |
| Lubrication, Oil, Grease Storage | 150 |
| Welding Area | 400 |
| Recycled Oil and Used Antifreeze Storage | 200 |
| Mechanics Bench Area | 400 |
| Repair Bay | 1,000 |
| Cleaning Bay | 1,000 |
| Emergency First Aid Room | 75 |
| HVAC Area | 300 |
| Emergency Power Generator | 200 |
| Hydraulic Lift, Vacuum Pumps, Air Compresor | 150 |
| Major/Large Power Tools | 150 |
| Total Area Requirements | 11,015 |
| Existing Area | 7,000 |
| Surplus (Deficit) | -4,015 |

### *AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF)*

The primary responsibility of the ARFF equipment at Groton-New London is to provide emergency response services to aircraft incidents. The airport ARFF personnel assist the local fire department on all airport structural fires. .

The current ARFF station is located northeast of the intersection of Runway 5 and 15. It houses all airport firefighting equipment, emergency vehicles, as well as personnel and support facilities. The 3,600 square foot facility was built circa 1980 to accommodate four vehicles and a small staff. The current equipment inventory exceeds this service level, however one vehicle (Rescue 2) is now 40 years old and at the end of its service life and is being replaced with a Rapid Intervention Vehicle as a backup to Rescue 1. The airport's primary vehicle (Rescue 1) is a 1998 P-101 Titan meets and exceeds Index A requirements.

[15] Runway 5-23 at 5,000 by 150 feet, or 750,000 square feet, and Runway 15-33 at 4,000 by 100 feet, or 400,000 square feet.

Airport firefighting and rescue equipment requirements depend on aircraft rescue and firefighting (ARFF) index, which is based on the length of the most demanding aircraft with at least five daily departures. The ARFF index specifies the quantity of water and foam required to be carried and the number and type of ARFF vehicles required. Groton-New London is Index A, which is based on an aircraft length less than 90 feet. If the airport's design aircraft changes appreciably to one larger than 90 feet in length, then an increase in the ARFF index and supporting equipment may be justified. However, there is no current requirement or plans to increase the ARFF Index.

### *FUEL STORAGE AND DISPENSING*

The airport's fuel storage and dispensing system consists of two separate systems; a self-service terminal used primarily by small general aviation aircraft, and a truck fueler system.

The self-service terminal (Figure 4.3), owned and operated by Lanmar Aviation, provides only aviation gas (100LL). The 8,000 gallon tank is supported by a credit-card reader and as the name implies, is operated by pilots who service their own aircraft. This system is centrally located on the general aviation ramp northwest of the terminal building.

Truck fueling is provided by FBOs, Columbia Air Services and Lanmar Aviation. Each operator provides full-service jet fuel and aviation gas via truck. Each operates a fuel storage facility.

All facilities comply with National Fire Protection Association (NFPA) for the design, operation, maintenance, location of fuel storage areas, and aircraft fueling devices. The facilities are properly located away from occupied buildings, are grounded, have properly inspected fire extinguishers, and in general appear to be well maintained. Each facility is inspected annually during FAA Part 139 Safety Inspection.


**Figure 4.3 – Self-Service Fuel System**

As required by 14 CFR Part 139.321(e)(1), the airport has written regulations covering fuel handling procedures, including the need to complete company training for fuel handling, with documentation on file with airport management. In addition, airport regulations specify the use of fuel servicing vehicles, restrictions on where aircraft can and cannot be fueled, and procedures for lightning and spills. In summary, the airport is in compliance with all federal regulations.

Because fuel service is privately owned and operated, the two FBOs are also saliently responsible for maintaining adequate fuel supplies. Since this is a private matter, the businesses responsible are compelled to ensure their customers are satisfied. This includes not only maintaining their equipment in a high state of maintenance, but also providing customer support as a profit motive. In addition, each FBO is responsible for ensuring an adequate supply of fuel is maintained. While the current storage capacity appears satisfactory, the FBOs are the first line in determining if and when increased capacity is needed. The Airport must ensure the FBOs have ample space for expansion when needed. Both existing storage facilities have room for expansion.

## NAVIGATION FACILITIES

This section describes the Groton-New London navigation facilities and procedures, including a discussion of the Airport's navigation facilities and instrument approach procedures, VOR, and TERPS.

### *INSTRUMENT APPROACH PROCEDURES*

The Groton-New London Airport is served with a variety of ground-based electronic and visual landing. Key data associated with each facility as it relates to its navigation use is presented in Table 4.8 (next page).

Table 4.8 highlights several features worth noting and that may have implications for the future improvement of the Airport. These include:

- The Category I ILS[16] offers the lowest approach minimums that can be authorized for this type of instrument procedure (200 foot ceiling and ½ mile visibility). The satellite-based RNAV[17] (GPS) LPV[18] procedure to Runway 5 offers a viable alternative in those instances when the ILS is out of service for maintenance or other reasons. However, the approach minimums increase to 284-½. It would be useful to identify the cause for the higher ceiling minimum, as mitigation may be applicable and appropriate.

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[16] There are three categories of instrument landing system (ILS) approaches, each with a different minimum decision height. Category I (200 feet), Category II (100 feet), and Category III (0 feet).
[17] Area Navigation (RNAV) is a method of air navigation that allows an aircraft to choose any course within a network of navigation aids, such as a VOR, rather than navigating directly to and from the aids.
[18] Localizer Performance with Vertical guidance (LPV) are the highest precision GPS aviation instrument approach procedures currently available without specialized aircrew training requirements. Landing minima are similar to the Instrument Landing System (ILS), that is, 200 feet decision altitude and 1/2 mile visibility. The aircraft avionics must support LPV.

- The approach minimums associated with the Localizer procedure to Runway 5 and the VOR/DME approaches to that runway end and Runway 23 are significantly higher than the lowest that could be authorized (250-½ in the case of Runway 5 and 250-1 for Runway 23).[19]

**Table 4.8 - Electronic and Visual Landing Aids - Technical Factors**

| Landing Aid | Runway End | Glide Path Angle | Threshold Crossing Height | Runway Alignment | Lowest Authorized Approach Minimums (1) | Comments |
|---|---|---|---|---|---|---|
| **Electronic** | | | | | | |
| ILS Glide Slope | 5 | 3.00° | 42' | NA | 200-1 / 200-1 | Unrestricted |
| Localizer | 5 | NA | NA | Straight-in | 493-½ / 493-¾ | Unrestricted |
| ILS DME | 5 | NA | NA | NA | NA | Unrestricted |
| VOR / DME | 5 | 3.09° | 42' | Offset 21°W | 493-½ / 493-¾ | VOR unusable 241-019° below 5,000' MSL |
| | 23 | 3.48° | 50' | Offset 14°E | 572-1 / 572-1½ | DME unusable 355-019° below 3,000' MSL |
| **Visual** | | | | | | |
| MALSR | 5 | NA | NA | NA | NA | Pilot controlled lighting (PCL) |
| PAPI-4 | 5 | 3.00° | 40.1' | NA | NA | Operational / PCL |
| | 23 | 3.00° | 49.1' | NA | NA | Operational / PCL |
| | 33 | 3.75° | 33.5' | NA | NA | Unusable beyond 7° right of approach due to trees / PCL |
| Runway Edge Lighting | 5-23 | NA | NA | NA | NA | High intensity / PCL |
| | 15-33 | NA | NA | NA | NA | High intensity / PCL |
| Taxiway Edge Lighting | All | NA | NA | NA | NA | Medium intensity / PCL |

Note (1) - Height Above Touchdown (HAT) in feet AGL and visibility in statute miles for Approach Category B & C aircraft.
Source: QED Associates with data provide by FAA

[19] The reason for the higher than permitted minimums are because of obstructions. At the time of this writing the data for the obstruction analysis was not available, but should be before this study is complete. At such time this section will be updated to reflect the actual reason and source.

- The VOR/DME is not usable within certain quadrants and below certain altitudes. Although these limitations do not affect the use of the existing instrument approach procedures or en route navigation, they diminish the ultimate potential use of the facility and may serve as one reason for its relocation or possible removal. In those instances, instrument approach procedures to the Airport or other area airports that rely on the use of the VOR/DME can be replaced with satellite-based navigation. En route navigation can be redirected using other area ground-based aids and/or satellite-based waypoints.

- RNAV (GPS) procedures are low-cost means to improve the utilization of runways and possibly reduce approach minimums that are dependent on the use of conventional ground-based navigational aids. These options are evaluated in a subsequent section of this report and include RNAV (GPS) LPV to Runways 15, 23 and 33; and an RNAV (GPS) LNAV to Runway 15. However, this is a preliminary assessment and does not imply that Runway 15-33 will qualify. Airport geometric implications and potential obstructions must be analyzed and corrected before instrument procedures can be developed to this runway.

- The glidepath angles and threshold crossing heights that are specified for the instrument approach procedures and the PAPI's differ but are appropriate for the design of each specific procedure. Although it is desirable that they be the same by runway end, this is not a requirement. The trees that restrict the use of the PAPI-4 serving Runway 33 should be analyzed to determine if this restriction could be eliminated.[20] PAPI systems are regarded as effective safety features that aid pilots in the approach to a landing. The potential installation of a PAPI-4 on Runway 15 should be explored.

- The high intensity edge lighting for Runway 5-23 is appropriate for the type of instrument approach procedures to this runway end. Runway 15-33 requires the use of medium-intensity edge lighting; however, the provision of high intensity lights is permissible.

- All the taxiways at the Airport are lighted with medium-intensity edge lights, which are appropriate for the use of these aircraft movement areas.

- Pilot-controlled lighting of the MALSR and the edge lights for both runways is a useful service feature when the air traffic control tower is closed. Extension of this capability to the PAPI's would be an attractive capability.

[20] Data for this analysis was not available at the time this draft report was prepared. This section will be modified when this data is made available.

## *VOR ANALYSIS*

The GON VOR/DME is used as a navigational aid to define instrument approach and missed approach procedures at the Airport as well as other airports in the vicinity. As discussed in Chapter 2, the GON VOR provides terminal coverage providing instrument approach guidance to GON, as well as Westerly State Airport, Montauk Airport, and Elizabeth Field.


The GON VOR/DME is also used for low and high en route flight navigation. Radials from the GON VOR/DME define Victor and Jet Routes that link other terminal navigational aids or define intersection fixes. Victor airways are Class E airspace that extends from 1,200 feet above ground level up to but not including 18,000 feet above mean sea level. These are a system of established routes that link VOR facilities with one another and create a means of defining an aircraft routing. The width of the Victor airway is 4 nautical miles on either side of the centerline when the distance between navigational aids is less than 102 nautical miles and increases at larger distances. Victor airways are prefixed with the letter "V". Jet routes are similar in use and function but are designated for flight at altitudes from 18,000' MSL to and including 45,000' MSL and carry a "J" prefix.

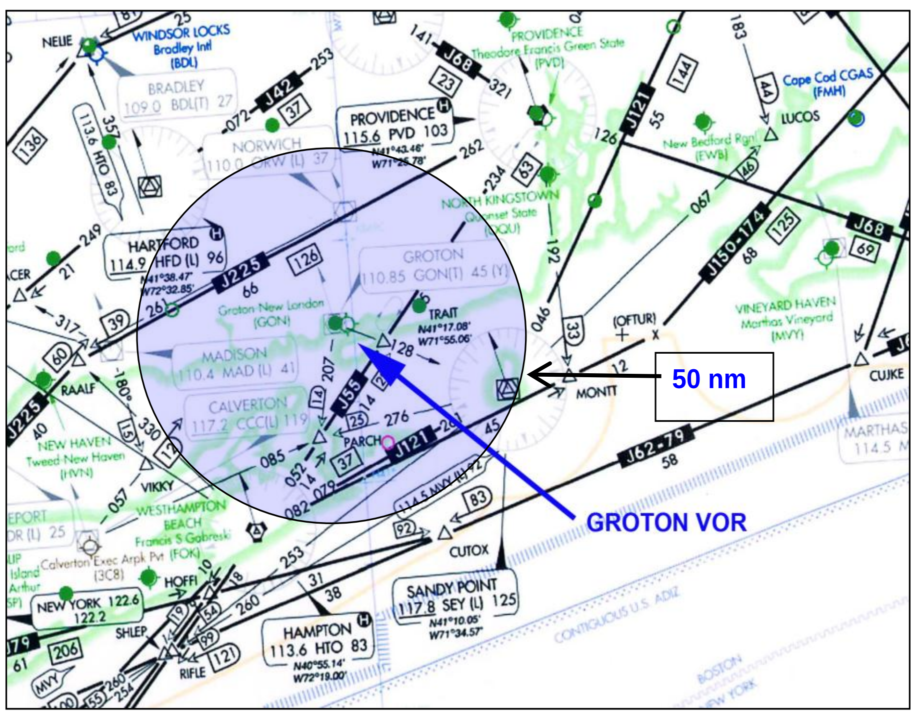


Figure 4.4 – GON VOR Jet Route Structure

Figure 4.4 (previous page) shows the high altitude Jet Route structure around the GON VOR. Jet Routes (labeled "J") serve aircraft operations between 18,000 and 45,000 feet.

Figure 4.5 shows the low altitude airway structure (labeled "V"), which serves flight operations below 18,000 feet.

There are seven low altitude Victor airways that are based on radials from the GON VOR/DME. When aircraft are operating along Jet routes, the GON VOR/DME is used to define the TRAIT and PARCH fixes that are associated with J55.[21]

As noted above, the GON VOR portion of the VOR/DME is unusable between 241º and 265º below 5,000' MSL. This can potentially impact on the use of V451 that links the GON VOR/DME with the CREAM intersection some 24 nautical miles to the southwest. The DME is unusable between the 355º and 019º radials below 3,000' MSL. However, there are no designated Victor airways within those headings.

Aircraft are not required to fly along the designated airways. Pilots operating under VFR have flexibility in their flight planning and might seek to avoid Victor airways simply to minimize their potential interaction with other en route aircraft. Therefore, the unusable features of the GON VOR/DME can impact the use of the facility for navigation by VFR pilots, who frequently operate at altitudes below 5,000' MSL. Pilots that file IFR flight plans will be assigned to Victor airways or Jet routes depending on

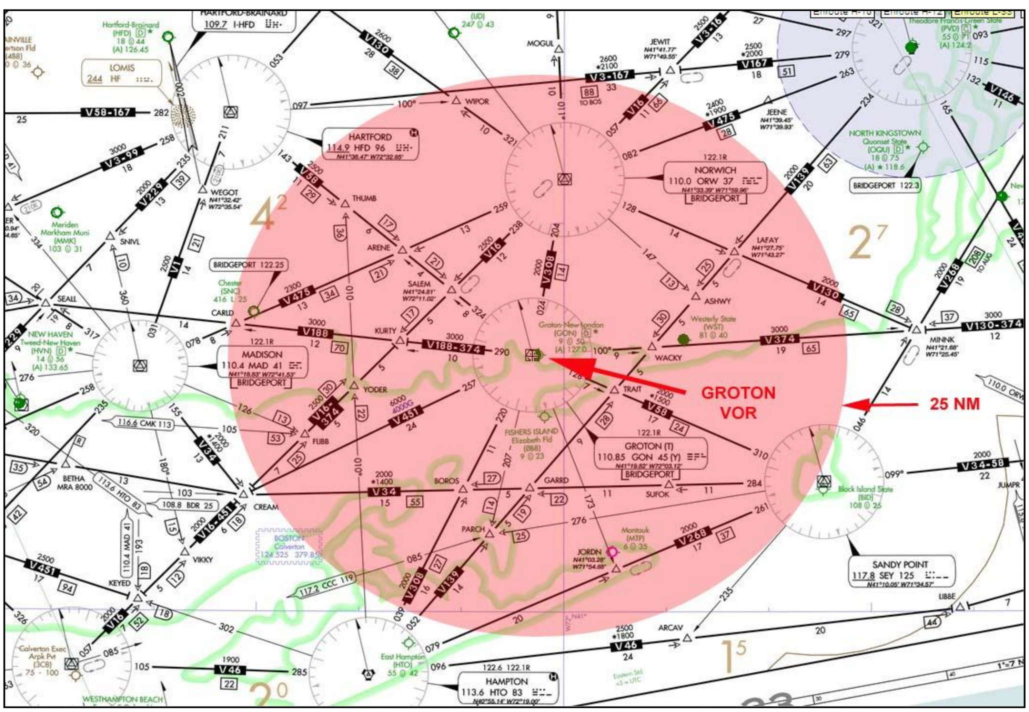


**Figure 4.5 – GON VOR Low Altitude Airway Structure**

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[21] TRAIT and PARCH are names assigned by the FAA to identify two enroute air traffic fixes in the vicinity of the Airport. This type of fix is a geographical position determined by one or more radio navigation aids. The names TRAIT and PARCH are not abbreviations, but rather computer generated names that identify the fix to pilots and air traffic control personnel. Both are shown in Exhibit 3.6.A.

their planned altitudes, or they may be assigned radar vectors to a specific navigational aid or fix/waypoint by air traffic controllers.

There are seven VOR/DME and one VORTAC facilities within a 40-nautical mile radius of the Groton-New London Airport. These facilities, with the exception of the New Haven VOR/DME, are currently used to define low altitude (Victor airways) and high altitude (Jet routes) routings. The New Haven VOR is a "terminal" facility meaning it is not used to define an airway or jet route. All of the facilities are also incorporated into instrument approach and missed approach procedures and standard terminal arrival routes to one or more airports in the region. All but one facility (Norwich VOR/DME) have use restrictions on the VOR and/or DME component of their signals, and all are owned, operated and maintained by the Federal Aviation Administration. Due to their relative close spacing, it is possible that the loss of one or possibly more of these ground-based navigational aids could be compensated by creating new or utilizing existing Victor airways and Jet routes to define requisite area routings and instrument approach procedures. Victor airways and Jet routes can be re-routed through the application of area navigation (RNAV) waypoints that have been developed by the FAA for several years. Instrument approach and missed approach procedures and standard terminal arrival routes based on VOR/DME and VORTAC facilities can be replaced through the use of satellite-based RNAV (GPS) procedures that are being developed for airport runways across the country.

The GON VOR/DME is an active waypoint and also serves as a convenient means of locating the Groton-New London Airport, which speaks for its retention in the air navigation system. Discussions with the Air Traffic Organization Systems Support Center in New Haven, which has responsibility for maintaining and operating the GON VOR/DME, indicate there are no current plans to decommission the facility. Additionally, the equipment shelter for the GON VOR/DME also houses radio equipment and external antennas that service the Providence TRACON. The GON VOR/DME and the equipment servicing the Providence TRACON may be relocated if found to be mutually beneficial to the Airport and airspace use and management. The possible relocation is subject to an extensive airspace analysis that can be initiated through the filing of FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, with the FAA Air Traffic Organization.

Notwithstanding the above, as the FAA continues to move forward with a satellite-based navigation system over the next 20 years, there is the possibility that the GON VOR/DME will be decommissioned. The use restrictions on the GON VOR/DME and the proximity of similar ground-based navigational aids that can be included as part of a skeletal backup system to satellite-based navigation are other factors that can lead to the decommissioning of the GON VOR/DME. The closure of the facility may also be impacted sooner dependent on the availability of maintenance resources both in terms of supplies and manpower. This Chapter has not identified a need for additional land for either airside or landside use. However, should a higher use of the land that is controlled by the GON VOR/DME critical area be determined at some point in the future, it would be prudent to involve the FAA early on in the process. This will offer resolution as to the potential relocation of the GON VOR/DME or perhaps its decommissioning.

### *Terminal Instrument Procedures (TERPS) Analysis*

The potential of establishing new instrument approach procedures, including Localizer with Vertical Performance (LPV) GPS procedures is addressed in Appendix 4. Summary of recommendations are addressed at the end of this chapter starting on Page 105.

## Airport Security

This section provides a brief overview of existing security measures at Groton-New London and recommendations.

### *Regulations and Guidance*

While Groton-New London is officially listed as an FAA commercial service airport, its primary role is in support of general aviation operations. While general aviation airports are not subject to federal security rules, consistent with the airport's commercial status under 14 CFR Part 139, the Groton-New London Airport maintains a higher level of security then required at a general aviation facility. This elevated security requires compliance with rules established by the Transportation Security Administration (TSA) for civil aviation security under Title 49 CFR, Chapter XII, Subchapter C. A more narrow focus under this statute at Groton-New London includes compliance with several parts, either directly, or indirectly. These include:

- Part 1540—Civil Aviation Security: General Rules;
- Part 1542—Airport Security;
- Part 1550—Aircraft Security Under General Operating and Flight Rules; and
- Part 1552—Flight Schools.

In addition, Lanmar Marine and Aviation, Inc. operate charter service under the TSA security 12-5 Rule.

Of primary concern to Groton-New London is Part 1542, which requires airport operators to adopt and carry out a security program approved by TSA. It describes requirements for security programs, including establishing secured areas, air operations areas (AOA), security identification display areas (SIDA), and access control systems. This part also contains requirements for fingerprint-based criminal history record checks of specified individuals. The Airport complies with this Part, as well as Parts 1540, and 1550 as outlined in two documents: the Airport Certification Manual and the Airport's Ramp Rules & Regulations Handbook. Of a lesser, but important extent are Parts 1540, 1550, and 1552.

Part 1540 contains rules that cover all segments of civil aviation security. It contains definitions that apply to Subchapter C, and it contains rules that apply to passengers, aviation employees, and other individuals and persons related to civil aviation security, including airport operators, aircraft operators, and foreign air carriers. The airport operator component, §1540.105, *Security Responsibilities of Employees and other persons*, is directly applicable to airport management's role at Groton-New London. Specifically, this subpart protects management through the adoption of rules that prohibit tampering or interfere with, compromise, modify, attempt to circumvent, or cause a person to tamper or interfere with, compromise, modify, or attempt to circumvent any security system, measure, or procedures. In addition, this subpart provides regulatory control over various airport security areas, such as secured areas, AOA, SIDA or sterile areas.

Part 1550 applies to the operation of aircraft for which there are no security requirements in other parts of this statute, which for Groton-New applies to certain aircraft operations conducted in an aircraft with a maximum certificated takeoff weight of 12,500 pounds or more. Compliance oversight is not a direct responsibility of airport management, but rather aircraft operators, and to a lesser extent the two FBO's that supports the majority of these operations. Airport management does maintain awareness of the requirements and works with operators to ensure compliance.

Finally, §1552, *Flight Schools*, prohibits a flight school from providing flight training to aliens and other individuals designated by TSA (candidates) unless the flight school or the candidate submits certain information to TSA, the candidate remits the specified fee to TSA, and TSA determines that the candidate is not a threat to aviation or national security. This rule also requires flight schools to provide security awareness training to personnel. Again, like §1552, airport management does not have a direct role in enforcing this rule, but does monitor compliance.

The Airport maintains a well-defined security program, which is fully addressed in written directives. Inclusive in the Groton-New London Ramp Rules & Regulations Handbook are procedures covering all Part 139 and TSA regulations, including:

- General Rules and Regulations,
- Vehicle Operator Procedures,
- Vehicle Condition and Markings,
- Required Security Identification,
- Fuel Handling,
- Escorting Procedures, and
- Enforcement Procedures.

It is important to note that the airport's current security system is sound and well maintained. The airport has an established CCTV and electronic identification system for airfield access, and one that includes testing and the issuance of an identification card, which contains a full-face image, the individual's full name, the airport's name, the individual's employer, the scope of the individual's access and movement privileges, and identification number, and a 2 year expiration date meeting TSA regulations, and a one year expiration date for vehicle drivers per FAA regulations. Use of a card is electronically tracked during all card usage until it expires or is revoked, whichever comes first, after which access to the airfield is not possible.

In summary, the airport has a well-defined security system in place. Personnel are well trained, procedures are well documented, and personnel who must operate on the airport airside are trained, badged, and operate within prescribed areas without exception.

### *Security Fencing*

Security fencing at Groton-New London provides coverage along the airport's landside, but does not cover the areas bounded by the Poquonnock River and Baker Cove. Access gates, both manual and electric, for both pedestrians and vehicles are strategically located along the entire fence line. The fence and gates are in excellent condition and serve the purpose of providing a barrier between non-secure and aircraft operating areas.

The primary deterrence relies on employees of both the airport and its tenants. The two FBOs as well as TASMG have strict measures in place that control access onto aircraft operating areas. This is the systems strong point and weakness. Strength in terms of human intervention and control, particularly at the two ends of the airport's landside; the FBOs and TASMG. All three organizations monitor and control access. This strength is also the weak link in the system because once on the ramp, there is not direct monitoring of activity. In addition, the airport does not have a state-of-art access or surveillance system. In essence, to a certain extent, like most airports, the honor system prevails.

## Recommendations

Four specific recommendations are offered; however, before numbers 2, 3 and 4 are considered, the airport should implement action Recommendation #1 first. This proposed working group should then study the remaining issues, as well as others as adopted by the committee, and make specific recommendations to airport management.

### *Recommendation #1: Develop a local Aviation Security Advisory Committee (ASAC)*

The Groton-New London ASAC's mission would be to examine areas of civil aviation security at Groton-New London Airport with the aim of developing recommendations for the improvement of civil aviation security methods, equipment, and procedures. This working group, which can be part of an existing airport committee, or stand alone group, must include airport management, and all airport tenants, including ATC, and local pilot and aircraft owner organizations. However, it is important that airport management not lead this group, but rather participates and uses it as a tool to develop a broad view of all issues and sides of the security equation. The reason for this is to ensure airport management does not sway or otherwise influence the decision making process of the ASAC.

It is further recommended that this committee obtain and use the TSA Security Guidelines for General Aviation Airports[22], as well as TSA regulations as a means of formulating a broad airport security program. These Guidelines are in use now. In addition, the Airport Security Plan of 2004 is in process of being revised to meet TSA's Supporting Airport Security Program for Cat IV Airports in time for the charter service start-up June 2009.

### *Recommendation #2: Develop Enhanced Identification and Surveillance System.*

The current identification system, while adequate, does not offer state-of-the-art enhancements available in today's security conscious market. Advanced smart card systems would permit or prevent access of individuals to aircraft operating areas. This system reduces, if not totally eliminates direct human interface at key access points, such as the terminal building, or each FBO, as well as access gates between buildings.

### *Recommendation #3: Security Fence*

The third major recommendation is the installation of a complete security fence around the entire airport boundary, with appropriate gates as necessary to provide water access in the event of an emergency.

### *Recommendation #4: Subscribe to TSA RSS*

Subscribe to TSA news through a Really Simple Syndication (RSS) feed to the airport's website. This will provide the airport and visitors to its website with the latest security news transmitted by TSA.

## Summary of Airport Facility Requirements

This section summarizes the facilities that are adequate and those that require improvements in the 20-year planning period.

[22] TSA Information Publication A-001, dated May 2004.

### *ADEQUATE FACILITIES*

- Additional runway or taxiway capacity will not be needed unless commercial airline service returns to Groton-New London, and only if the yet unknown design aircraft and leg length require a longer runway.
- For the same reasons, the passenger terminal will not require expansion.
- Although not discussed in this Chapter, major roadway improvements are not envisioned within the planning horizon.
- Auto parking requirements are not projected to increase significantly, thus the existing surplus of space will remain available, with perhaps minor adjustments to accommodate surges in growth in the FBOs or TASMG.
- No increase in ARFF or the ARFF building will be required.

### *FACILITIES REQUIRING IMPROVEMENTS OR UPGRADES*

- Airfield Lighting will require upgrades, particularly the REILS and PAPI/VASI. Runway lights and taxiway lights should be converted to LED during the next system replacement cycle.
- The general aviation facilities and other support facilities will all require improvements over the planning horizon, but not to the extent that more land is required. Thus the airport has little need to acquire more property for capacity purposes.
- At some point in the 10-20 year period ARFF equipment will require replacement due to age.
- The SRE fleet is one of the few areas where increased capacity is required. The fleet should be brought into line with current FAA standards in terms of the number and size of equipment. In concert, the SRE/Maintenance building should be expanded from its current 7,000 square feet to 11,000 square feet.
- An upgrade to modern GPS instrument approach procedures would improve the airport's operational capability. Specifically, the analysis presented in Appendix 4 suggests that an RNAV (GPS) procedure with LNAV minimums to Runway 15 has merit. In addition, the establishment of an RNAV (GPS) LPV procedure to Runway 23 offers an improved operational capability when the achievable approach minimums of 280-1 are compared to the existing 522-1 levels.
- Security changes should be considered. Advanced technology should be employed in the areas of identification cards (Smart Cards) and video surveillance systems.

The activity levels that may trigger changes are more important than the actual years that are identified in this chapter. In order to provide maximum flexibility for CTDOT, Table 4.8

summarizes the trigger points that will lead to the need to expand the airport's facilities. It is important to note that as demand patterns, fleet mix, etc. change over time, the activity triggers may also change. However, this table provides order of magnitude planning criteria for CTDOT to monitor actual conditions and activity levels at Groton-New London.

**Table 4.9 - Summary of Trigger Points**

| Facility | Trigger | Trigger Point (When Major Expansion is Set in Motion) |
|---|---|---|
| Runway/Taxiway System | Peak hour operations, annual operations | Operation levels in the range of 138,000 - 184,000 (currently 53,500 and forecasted to increase to 63,000 by 2027) |
| Runway Length (Primary) | Aircraft Type and Stage Length | Not anticipated in this planning period. However, the introduction of commercial airline service where forecast aircraft and leg length exceeds 5,000 foot runway. |
| Runway Length (Crosswind) | Design Standard is 80% of the Primary Runway | When primary runway length exceeds 5,000 feet. |
| Technology & Taxiway Improvements | Airport Role | Needs as soon as possible to improve safety, meet FAA standards, and help offset the need for additional runway capacity |
| Runway Safety Areas (RSA) | FAA Standards | Provide standard length RSA or EMAS as soon as possible to enhance safety |
| Overnight Aircraft Parking | Airport Role | Aircraft apron size reaches 80-90% of capacity |
| Hangars | Airport Role | When demand reaches 80-90% of capacity; or when private development interest exists (helps increase airport revenue) |
| Terminal Building | Return of Air Carrier Service | Conduct terminal study to analyze demand/capacity |
| ARFF | Frequency and Size of Design Aircraft | ARFF Index approaches Index B |
| Instrument Approach Procedures | Existing | Now. Prepare request for new IAP and implement aeronautical survey in accordance with AC 5300-16, 5300-17, and 5300-18 (current editions). |

# CHAPTER 5 - ALTERNATIVES

## INTRODUCTION

This section uses conclusions and findings of previous sections of the Master Planning process for GON to identify and evaluate various alternatives for both the airside and landside components of the airport. The underlying objective is to meet the identified needs for both capacity and safety requirements for the entire airfield operation and infrastructure. The key elements of this process are the identification of alternative ways to address previously identified facility requirements; an evaluation of the alternatives such that stakeholders gain a thorough understanding of the strengths, weaknesses, and other implication of each; and selection of the preferred alternative.

## DEMAND/CAPACITY & FACILITY REQUIREMENT REVIEW

Chapter Three compared the capacity of all airport infrastructure and facilities to accommodate existing and forecasted demand. Facility requirements were calculated for existing conditions (2010) and the forecast years of 2015, 2020, and 2030 (end of the short, intermediate, and long-terms respectively). Notable changes in the 20-year planning period include:

- 45% increase in based aircraft, including a 77% increase in turbojet aircraft
- 18% increase in operations
- 46% increase in passenger enplanements (primarily due to charter/on-demand activity)
- No change in the critical design aircraft or airport reference code (C-II)

To ensure a strong operating base, primary attention must be given to accommodating and enhancing the facility to meet the upper end of the general aviation fleet; that is, larger corporate class turbofan and turboprop aircraft. By doing so, the airport will support both forecasted demand while positioning the facility to handle limited air carrier operations, should the need arise.

### *FACILITY REQUIREMENTS*

Only those facilities identified as requiring capacity and/or safety improvements are evaluated in this section. The evaluation includes development of alternatives as well as an operational performance assessment, and best planning tenets based on FAA airport planning and design guidelines[1]. In addition, environmental factors that may influence these proposed changes, and a financial assessment are included. The proposed

[1] FAA AC 150/5060-6B, *Airport Master Plans*

requirements were addressed earlier in this report (see *Summary of Airport Facility Requirements*, page 105) and are summarized below.

**Airside**

a. Reduce Runway Width
b. Upgrade airfield lighting
c. Upgrade instrument approach procedures

**Landside**

a. Upgrade general aviation facilities
b. Replace ARFF equipment
c. Increase SRE capacity
d. Expand SRE Building

## ALTERNATIVES ANALYSIS

Included in this section is the identification of opportunities for development as well as possible development constraints within the airport area.

### *REDUCE RUNWAY WIDTH*

Runway 05-23 is 150 feet wide and Runway 15-33 is 100 feet wide. Under current design standards, Runway 05-23 should be at least 100 feet wide and Runway 15-33 needs to be at least 75 feet wide.

Maintaining existing pavement provides a safer operating environment especially for crosswind landings. Removing pavement decreases impenetrable surfaces, which enhances environmental credits. Also reduced pavement width does provide a slight decrease in operations and maintenance costs. However, removing usable pavement is not recommended at this time, but should be reevaluated when the next major runway reconstruction project planning phase.

### *UPGRADE AIRFIELD LIGHTING*

Airfield lighting will require upgrading; particularly the REILS and PAPI/VASI because the airport has older systems nearing the end of their usefulness and newer systems are available. In addition, changes in an airport's operating conditions may warrant installation of systems not previously required, such as the addition of VGSI where none previously existed.

For increased energy and maintenance efficiency, runway and taxiway lights should be converted to light emitting diode (LED) fixtures (when technically available), but not before they are due for replacement, which is usually during major pavement reconstruction. While LED taxiway lights are currently available and FAA approved, the existing fixtures are adequate and should not be replaced before they've reached their service life.

### *UPGRADE LANDSIDE FACILITIES*

The most notable change proposed at GON is the possible upgrade to existing landside facilities, primarily the reallocation of land to build revenue producing buildings, including hangars and general aviation related structures. In assessing the correct approach, the sponsor proposed an assessment of one of three options: do nothing, minimal development, and maximum development potential. However, before any decision can be made, the land available for possible construction must be assessed for development potential and viable alternatives studied. It is important to note that the alternatives that follow are not license for wholesale speculative development, but rather options that the sponsor can consider if and when demand is actually realized. In addition, each of the options addressed in subsequent sections will be reviewed for environmental and other planning tenets.

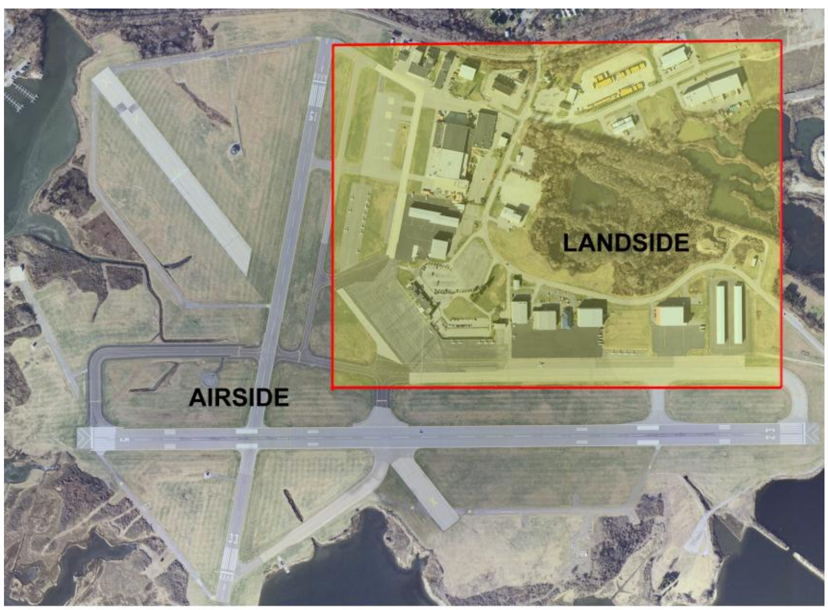

Figure 5.1 - Airside / Landside

Figure 5.1 shows the entire airport; airside and landside. Figure 5.2 (next page) shows the landside only and highlights areas that are either vacant or underutilized areas, such as automobile parking. For example, the area around the existing terminal/administration building (central terminal area) is largely underutilized, with large areas dedicated to automobile parking (beyond the current and forecasted demand), and open unused areas on the landside and excess pavement on the airside. In both cases, underdeveloped land on an airport reduces potential revenue and makes the facility less viable. In addition, there are costs associated with mowing and pavement maintenance, even when not used. Other undeveloped areas exist in the terminal landside area (both sides of Tower Avenue).


**Figure 5.2 - Developable Land - Central Terminal Area**

The areas shown on Figure 5.2 include:

| Area | Description |
|---|---|
| A | Existing SRE building lot has available space for development of a larger SRE facility. |
| B | 60,000[2] s.f. lot currently used as overflow parking for TASMG and is leased by the military. |
| C | 145,000 s.f. irregular shaped parcel that is currently vacant. |
| D | 100,000 s.f. lot currently underutilized by CAP (and earns no revenue from CAP). |
| E | 110,000 s.f. undeveloped lot. Approximately 10,000 s.f. of Area E rests outside the existing BRL, but is available for parking apron. |
| F | 90,000 s.f. undeveloped lot. 5,000 s.f. of Area F sits outside the BRL, but is available as additional aircraft parking apron or hangar(s). |
| G | 300,000 s.f. of partially developed space used for public automobile parking. Approximately 50,000 s.f. of Area G is currently undeveloped. |
| H | Area H is 150,000 s.f. of low use aircraft parking apron. This area is seldom used and rests inside the BRL making it prime land for development of revenue producing facilities. A portion of this area is leased by the local flight school for aircraft tiedowns. |
| I | Vacant, undesignated area. |

[2] Area size approximate square footage

### *ALTERNATIVE 1: DO-NOTHING/NO-BUILD OPTION*

The "do-nothing" approach assumes market demand will not require any, or very little development beyond the areas already developed, or under lease agreement pending future construction as demand dictates. This approach will result in little to no cost to the sponsor and in return, little increase in revenue.

### *ALTERNATIVE 2: MINIMAL DEVELOPMENT*

This approach assumes demand for additional hangar and other related aviation business development will exceed areas currently in use or under lease, but not to the point where a full airport growth is required. It allows for bare minimum development of the existing central terminal area identified in Figure 5.2 (page 111). Figure 5.3 (next page) is one possible scenario. This plan converts approximately one-third of the central landside area into viable revenue producing space in the form of hangars and additional aircraft parking apron. It also reconfigures and reduces existing automobile parking and sets aside land on the opposite side of Tower Avenue for compatible aviation activity. It is important to note again that the option shown in Figure 5.3 (page 113) is only a planning concept as one possible alternative. The location, size, and orientation of the three new buildings, automobile parking, entrance roads, etc., shown can, and most likely will be developed to some other concept based on actual demand, developer wishes, and lease negotiations at some future time.

The Minimum Development concept shown in Alternative 2 includes the following:

- Existing Terminal/Administration Building and Control Tower remain unchanged. Other than remodeling and infrastructure upgrades, the two buildings will remain the same basic size in the same location. This includes space for business such as flight training operations, rental car agencies, and a restaurant.
- Hangar numbers 147, 151, 175, and 185 remain unchanged.
- ARFF building (# 165) remains unchanged; however, there is room to enlarge and modernize this facility, or replacement.
- The automobile parking area for both visitors and employees is reconfigured into one or two smaller lots.


Figure 5.3 - Alternative 2

- The entrance road to the terminal and control tower is redesigned providing one ingress and egress route, with a circular pattern around the main parking lot.
- Three (or more) hangars, depending on size, can be developed in the area (listed as 1, 2, and 3). Hangars 1 and 2 are large corporate structures in the 10,000± s.f. range, while Hangar 3 is a small 2000 - 3000 s.f. building. The footprint, orientation, and general location are easily modified within the available area.
- Ample aircraft apron is possible with a single access taxilane to the main apron.
- The existing access road that currently serves the ARFF Building (165) remains essentially unchanged except for ingress and egress to the hangars.
- Room for compatible aviation related development on the west side of Tower Avenue (3-4 possible parcels identified as Areas B, C, and D on Figure 5.2 on page 111).

### *ALTERNATIVE 3: FULL BUILD OUT*

This approach assumes demand for additional hangar and other related aviation business development will exceed areas currently in use or under lease, to the point where a full-airport build-out is required. It allows for maximum development of the existing central terminal area identified in Figure 5.2 (page 111). Figure 5.4 (page 115) presents a second scenario; one that converts the entire central landside and airside areas into revenue producing space in the form of hangars and additional aircraft parking apron. One important concept is revenue producing growth of the landside into existing airside assets. This is acceptable provided building heights do not exceed the current BRL height limit.[3]

This concept includes replacing the existing terminal/administration building, control tower, and ARFF facility. Like Alternative 2, it also reconfigures and reduces existing automobile parking and sets aside land on the opposite side of Tower Avenue for compatible aviation activity. It is important to note again that the option shown in Figure 5.4 is <u>only a planning concept</u> as one possible alternative. The location, size, and orientation of the three new buildings, automobile parking, entrance roads, etc., shown can, and most likely will be developed to some other concept based on actual demand, developer wishes, and lease negotiations at some future time. The concept is Figure 5.4 includes the following:

- Existing Terminal/Administration Building, Control Tower, and ARFF building are replaced by a large building that combines all three facilities along with space for additional aviation related business development (FBO, restaurant, etc.), and a medium size hangar).
  - 5A – ARFF Facility
  - 5B – Terminal/Administration
  - 5C – Aviation Business
  - 5D – Hangar or additional Aviation Business
- Two large (10,000± s.f.) hangars (1 and 2)
- Two medium (5,000± s.f.) hangars (3 and 4)
- Three small (2,000± s.f.) hangars (8, 9 and 10)
- Two medium size T-hangars (8-12 aircraft units) (6 and 7)
- Ample automobile parking for passengers, visitors, and employees).
- Single two-way terminal area entrance road off Tower Avenue
- Room for ample compatible aviation development on the opposite side of Tower Avenue.

[3] The BRL shown on Figure 5.2 (page 111) and Figure 5.4 (page 115) represents a 20-foot height limit; that is, at the BRL line, no object should exceed 20 feet in height above the surface. This height decreases at the rate of 1 foot for every 7 feet horizontally the closer the object is to the runway; and increases at the same rate as the object moves further away from the runway.

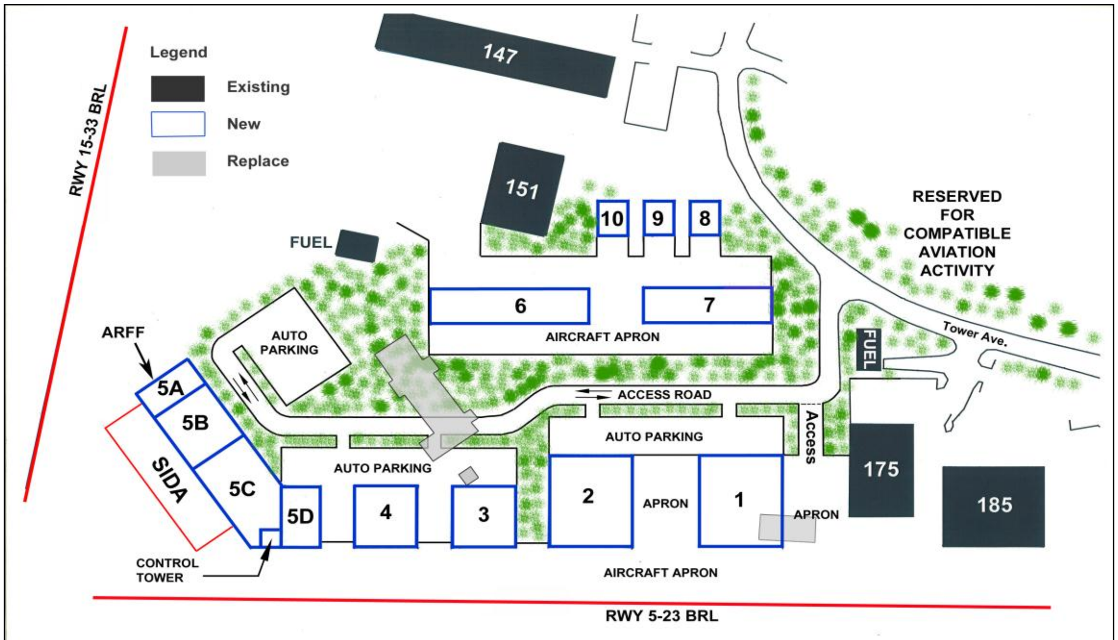

Figure 5.4 - Alternative 3

## *REPLACE ARFF EQUIPMENT*

The airport has two principal pieces of ARFF equipment for aircraft support; a 1998 P-101 Titan truck and a 2010 Ford/Crash Rescue Equipment Services Renegade (see *Airport Rescue and Fire Fighting*, page 21). Both vehicles meet FAA requirements. As noted on page 21, the P-101 is in good condition and the Renegade is new and in excellent condition. Assuming no changes occur in FAA requirements; no additional equipment will be required. However, at some point during this 20-year planning period, the 1998 Titan will probably require replacement.

## *INCREASE SRE CAPACITY*

The existing fleet consists of four plows, with blades ranging from 8 to 23 feet; a 16 foot broom; and a 5,000 ton/hour blower. Two of the plows and are new and include large body sand storage capacity. See *Airfield Maintenance/Snow Removal Equipment (SRE) Facilities* (page 92) for details. As indicated on page 92, the airport requires fewer plows and connecting carrier vehicles, but does require a front-end loader with at least two bucket attachments. It is recommended that the airport acquire as soon as possible, a large capacity front-end loader and two buckets in the 8-12 and 1-2 cubic yard capacity. In addition, like ARFF equipment, the fleet should be replaced as the age and condition of the equipment dictates, and is eligible for federal funding.

### *INCREASE SRE FACILITY STORAGE*

The existing maintenance/snow removal equipment building, as discussed in Chapter 2 (see *Maintenance*, page 20) is a 7,000 square foot facility. The vehicle side, which is a large open bay with 16 foot eave height, occupies three-quarters of the building, with five storage bays. The vehicle side also contains a maintenance shop, wash and steam clean bay, and storage areas. The personnel side is a two story facility that contains bunk rooms, kitchen, bathrooms (with showers) and miscellaneous storage areas. The analysis of the size building required was performed using current FAA criteria. This analysis considers airport size, a factor of paved runway surfaces. Unlike the equipment analysis, paved runway refers to both runways, not just the primary runway. The total paved runway at Groton-New London equals 1,150,000 square feet. This area equates to a 'large airport' classification for the purposes of sizing SRE buildings.

Total space allocation is based on three separate areas within the building. These are areas for storage of equipment, which includes clearance for equipment safety zones (room for maneuvering, support, etc.), support areas (people), and special equipment areas (HVAC, generators, etc.). As previously indicated (see in *Airfield Maintenance/Snow Removal Equipment (SRE) Facilities* (page 92), the airport has a 4,000 square foot space deficit based on current and forecasted needs. Given the excellent condition of the existing SRE building, it should be expanded if possible, with an addition that will support storing the additional equipment. The problem with expanding it is a lack of usable space. Tower Avenue and the airport boundary border the SRE lot on two sides, an access road to the ramp is in the front, and an existing leased area (TASMG) completes the perimeter of the SRE building area. Any extension should be on the buildings storage bay side; however, this side has limited room for growth.

Expanding to the left side (as shown in the photo) would be on the personnel side, away from easy access to the working side of the building. As an alternative, though expensive, would be to construct a new cold storage building on an available parcel, and then lease out the existing facility. The new facility could serve as both an SRE and ARFF building, but should be in an area not ideally suitable for direct aviation activity because it would reduce potential revenue. The parcels "C" and "D" identified on Figure 5.2 (page 111) are suitable in size, but not ideally located because Tower Avenue divides them from the airside. In addition, a portion of parcel "D" is used by the CAP. A third possible location would be in the Central Terminal Area discussed earlier (see Figure 5.2, page 111). Both plans can be modified to accommodate a new SRE building or an SRE auxiliary building. Whichever approach is taken, future revenue production should be considered and not compromised if at all possible.

## EVALUATION OF ALTERNATIVES

The following is an evaluation of the alternatives based on criteria selected in the initial scoping process. This includes an assessment of the airport's operational performance, best planning tenets, including the ability of the airport to operate safely and securely today and throughout the planning period. This assessment includes the proposed changes addressed earlier, and whether they allow for forecasted growth.

### *OPERATIONAL PERFORMANCE*

This AMPU includes an airport operational review and assessment, including capacity, capability, and efficiency. Specifically, this cursory evaluation was:

- An assessment of the Airport's operational policies and practices (e.g.: airport pavement, field and building maintenance; snow clearing; emergency response, etc.)
- Compliance with all applicable standards and recommended practices
- Adequacy of air traffic services, navigational aids and landing aids, and efficiency and effectiveness in use of available human and other resources

Capacity refers to the airport's processing capability of service over a given period. That is, how many aircraft can the airport handle over a period of one-hour, one-day, a year, etc? The evaluation completed as part of the airport's long-range forecast indicate the facility currently has approximately 54,000 annual operations, which is forecast to increase to 63,000 operations. The current annual operational demand equates to approximately nine peak-hour aircraft operations per hour during visual conditions and three in instrument conditions, increasing to 11 and five respectively in 20-years. Conversely, for an airport in the configuration of GON (two runways in a crossing configuration), the annual service volume is 230,000 operations. This equates to between 72 visual operations per hour and a maximum of 20 instrument operations per hour. In all three cases, the airport's demand is well below its capacity. In summary:

- Total demand is 23% of capacity, growing to 27% of capacity in 2028
- VFR PH demand is 13% of capacity, growing to 21% of capacity
- IFR PH demand is 15% of capacity, increasing to 25% in 20-years

Capability refers to the airport's technological system to perform as intended. An assessment of the airport's potential indicates there are no drawbacks or reasons why GON cannot provide services to its users in a manner and fashion expected. While there are some aging systems, such as runway lights, ATC equipment, etc., all systems work as designed and do not impact overall safety or efficiency.

Operational efficiency has a direct impact on safety, user satisfaction and the financial performance of the airport, as well as aircraft owners and operators, and service providers. As part of this assessment, the following operation and procedural areas were analyzed:

- Minimum Standards for Groton-New London Airport (dated 2/10/2010);
- Airspace, including ATC services;
- aircraft characteristics and fleet-mix;
- operations procedures;
- airfield layout, including runway configurations and availability;
- taxiway layout;
- pavement, including surface contamination and irregularities;
- vehicle usage, including delays on taxiways and runway crossings;
- Emergency services preparedness, including the emergency plan;
- Removal of disabled aircraft; Snow clearance and water removal from pavement surfaces;
- Bird control and hazard reduction; and
- Preventive maintenance program.

In each case, the assessment of the airport's operational efficiency indicates the facility is well prepared and fully capable of providing the level of service required today and envisioned throughout this planning period. In part, this level of commitment is because of the facility's Part 139 certification, which because of FAA regulations requires a higher level of control and oversight. In addition, the airport's Rules and Regulations provide an added measure of safety and security.

### *BEST PLANNING TENETS AND OTHER FACTORS*

This section is an assessment of the relative strengths and weaknesses of the proposed alternatives. Table 5.1 (page 119) is a matrix that denotes how each project (columns) compares with the tenets (rows) established at the beginning of this project. The following summarizes the best planning tenets of each project.

a. **Replace Terminal/Administration Building**. The existing terminal/administration building is now over forty-six years old. While structurally sound and in good condition[4], its location and layout does not lend itself to maximizing airport resources and revenue. Its location leaves a large unused portion of pavement on the airside that could be used for other purposes, opening up potential future landside space for other purposes, such as hangar development. While this area is not required today, or in the next 10- 20 years, planning ahead on how and where this building can be used should be part of the sponsor's long-term plans for the airport. It would allow for growth beyond the planning horizon; it is technically feasible from an FAA design standpoint.

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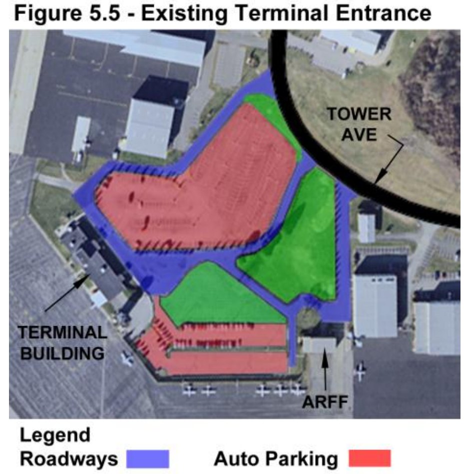
[4] Based on a walk-through inspection.

b. **New Hangars.** The single largest stream of revenue for any general aviation airport is through hangar development. While current and forecast demand does not indicate a need for new hangars, providing for growth beyond the planning horizon is essential. No other single project addressed in this report provides for the highest and best on airport land use then adding new hangars to the airport's inventory.

**Figure 5.5 - Existing Terminal Entrance**




c. **Relocate Terminal Service Road.** The current entrance road (blue area on Figure 5.5) is a pavement medley built over a period of time as needed to connect new sections of the terminal area to older parts. Today the pavement is a meandering network that ties up valuable landside resources. In both options addressed earlier, this pavement is consolidated into a more uniform roadway that provides access to all major infrastructure (terminal, hangars, parking). Regardless of which approach is taken, this service road should be a top priority. Both versions provide balance between demand and capacity, provide for the best and highest use of this area, and allows for growth beyond the planning period.

d. **Modify Auto Parking.** No single area on the airport is more in need of immediate attention then the existing terminal automobile parking area. The existing parking lot is a combination of two primary areas (show in red on Figure 5.5) is approximately 142,000 square feet, with room for about 500 vehicles. Current demand requires about 50 spaces, growing to approximately 60 to 70 in the next 20 years. Clearly, this unused space does not provide for the best and highest use of the airport. The two options shown earlier in Figure 5.3 and 5.4 (pages 113 and 115 respectively) conform to best planning tenets and provide a much clearer balance between demand and capacity.

e. **Develop New Hangars.** In reality, the sponsor should develop opportunities for new hangars and related infrastructure. As stated several times already, hangars are the "fundamental" generator of revenue for general aviation airports. While current and projected demand does not require additional hangar space, airport sponsors must always plan for growth while maximizing revenue potential. The cost of operating the airport will never decrease, and often these costs will outpace consumer price indexing built into existing lease agreements. The airport must plan to offer land for development of hangars by private industry, or be prepared to develop and lease units on an as needed basis.

INSERT TABLE 5.1 – Project Assessment

f. **Expand Aircraft Aprons**. The same argument offered for developing new hangars applies to additional aircraft apron space; the two go hand in hand. Aprons in this case are related to the pavement surrounding and necessary for any new hangar development. While the airport does not require under existing and forecasted demand, additional apron space, increasing apron size is a function of hangar development. Aprons should be part of the airport's long-range development plan, as either a private or public venture.

g. **ARFF and Snow Removal Equipment.** This report recommends replacing ARFF vehicles and SRE as needed based not on age, but rather on functionality and technological improvements. As equipment ages, maintenance costs increase to the point where replacement make better fiscal sense. Likewise, equipment becomes obsolete, particulary ARFF, where industry will eventually provide better equipment, such as a fire fighting truck that can be operated by one person instead of two, or one that provides improved vehicle safety. The sponsor must ensure that the airport's ARFF and SRE fleet meet or exceed industry and government standards, and provide a balance between efficiency, safety, and cost.

h. **Expand SRE Building.** The existing SRE building size does not meet current demand. As discussed in *Airfield Maintenance/Snow Removal Equipment (SRE) Facilities* (page 92), the existing building is approximatley 7,000 square feet; however, calculations show that the building should be closer to 11,000 square feet. This deficit is mostly in the maintenance and storage side of the building. However, as discussed earlier (see *Increase SRE Capacity*, page 116) the current SRE building site will not allow for the necessary 4,000 square foot extension. Several possible sites were addressed earlier, and no single site is preferred other any other. In terms of best planning tenets, the sponsor should select a site that will have minimal impact on future revenue production, but first and foremost should select a site that meets safety and efficiency requirements,and satisfies its needs (as the user).

### *ENVIRONMENTAL FACTORS*

Each conceptual landside alternative was screened to determine its potential effect on existing environmental and community resources. The environmental and community resource categories that were considered for this screening include those identified in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*. These resources are listed in the left-hand column of Table 5.2 (next page) and defined in Appendix 1. The following rating scale and associated criteria were used to screen each conceptual alternative:

1. Benefits/protects environmental and community resources
2. No effects
3. Some negative effects that can be easily mitigated

4. Negative effects that could potentially delay or compromise alternative implementation
5. Significant impacts that cannot be mitigated

In addition to aerial images, the most up-to-date Geographic Information Systems (GIS) data from the Connecticut Department of Environmental Protection (CTDEP), Natural Resources Conservation Service (NRCS), and National Oceanic and Atmospheric Administration (NOAA) were used to facilitate this planning level screening process. Where adverse impacts to resources were identified using the maps and footprints of the conceptual alternatives, the degree or severity of the impact was estimated and incorporated into the overall rating. This environmental screening process is the first step in understanding the potential environmental implications of an alternative. Once an alternative is selected and advanced beyond the concept stage, a more detailed assessment of environmental impacts will be undertaken.

It should be noted that the proposed airside alternatives; which include reducing runway width, upgrading airfield lighting, and upgrading instrument approach procedures, are not anticipated to have any notable environmental impacts.

**Table 5.2 – Environmental Screening of Master Plan Alternative Concepts**

| Environmental Factors[1] | Alternative 1 No Action | Alternative 2 Minimum Build | Alternative 3 Full Build Out |
|---|---|---|---|
| Air Quality | 2 | 3 | 3 |
| Coastal Barriers | 2 | 2 | 2 |
| Coastal Zone Management Program | 2 | 3 | 4 |
| Compatible Land Use | 2 | 2 | 2 |
| Construction Impacts | 2 | 3 | 3 |
| Aircraft Noise | 2 | 2 | 3 |
| Social Impacts | 2 | 2 | 2 |
| Water Quality | 2 | 3 | 4 |
| USDOT § 4(f) | 2 | 2 | 2 |
| Cultural Resources | 2 | 2 | 2 |
| Biotic Communities | 2 | 2 | 3 |
| Threatened and Endangered Species | 2 | 3 | 3 |
| Secondary and Cumulative Impacts | 2 | 2 | 3 |
| Light Emissions | 2 | 2 | 3 |
| Natural Resources and Energy Supply | 2 | 2 | 3 |
| Farmland | 2 | 3 | 3 |
| Induced Socioeconomic Impacts | 2 | 2 | 3 |
| Wetlands | 2 | 3 | 3 |
| Floodplains | 2 | 3 | 3 |
| Solid Waste | 2 | 3 | 3 |
| Wild & Scenic Rivers | 2 | 2 | 2 |

Note

1. Per FAA Order 1050E, Environmental Impacts: Policies and Procedures and Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects. Defined in Appendix 1.

## *FISCAL FACTORS*

A rating matrix was developed to assist in the evaluation of each of the two alternatives (partial build and full-build). In addition, preliminary costs for airfield lighting upgrades (see *Upgrade Airfield Lighting*, page 109) are provided. Once the preferred alternatives are selected, detailed cost estimates will be provided in the financial analysis chapter (pending). Table 5.3 (next page) is a data array that lists each of the infrastructure design considerations, impacts, and costs.

## SUMMARY

This chapter assessed the conclusions and findings of Chapters 2 through 4, and identified and evaluated alternative for the airside and landside components, as well as general needs of the airport. The underlying objective was to meet the identified needs for both capacity and safety requirements for the entire airfield operation and infrastructure. This process identified options to address previously identified facility requirements, and provided an evaluation of those alternatives such that stakeholders could gain an understanding of the strengths, weaknesses, and other implication of each, which will lead to selection of the preferred alternative.

This assessment included those facilities that lacked both the capacity and safety shortcomings, as well as a long-term look at the airport to determine how the facility can best addressed revenue production by maximizing available land, in both a fiscally responsible and environmentally sound manner. The evaluation looked at both airside and landside facilities.

With one noted exception, the airside is in excellent condition, requiring very little change other then routine maintenance and upgrades as systems wear out or are replaced by improved systems. Other airside systems that will require attention at some point in the future include the width of both runways (see *Reduce Runway Width*, page 109).

**Table 5.3 – Fiscal Considerations**

| Criteria | Airside | Landside Alternative 1 | Landside Alternative 2 |
|---|---|---|---|
| Upgrade Airfield Lighting | | | |
| PAPI Upgrades[1] | $200,000 | | |
| Taxiway Light LED Upgrades[2] | $550,000 | | |
| Terminal Remodeling | | $500,000 | |
| Terminal Replacement | | | |
| Unit 5A (ARFF) | | | $500,000 |
| Unit 5B | | | $1,000,000 |
| Unit 5C | | | $1,000,000 |
| Unit 5D | | | $2,000,000 |
| Control Tower | | | $1,000,000 |
| ARFF Remodeling | | $100,000 | |
| Auto Parking Expansion | | $300,000 | $1,000,000 |
| Entrance Road Redesign | | $100,000 | $500,000 |
| Hangar 1 | | $2,500,000 | $2,500,000 |
| Hangar 2 | | $2,500,000 | $2,500,000 |
| Hangar 3 | | $350,000 | $1,000,000 |
| Hangar 4 | | | $1,000,000 |
| Hangar 6 | | | $550,000 |
| Hangar 7 | | | $550,000 |
| Hangar 8 | | | $300,000 |
| Hangar 9 | | | $300,000 |
| Hangar 10 | | | $300,000 |
| Aircraft Apron | | $400,000 | $1,500,000 |
| Demolition | | | $500,000 |
| **Total** | **$750,000** | **$6,750,000** | **$18,000,000** |

Notes

1. $50,000 per runway end for equipment and installation.

2. Approximately 220 lights for Runway 5-23; 180 for Runway 15-33; plus 100 additional lights for other taxiway segments.

Runway 5-23 is 150 feet wide, but only requires 100 feet, and Runway 15-33 is 100 feet and by standards could be 75 feet. However, in both cases, runways are not arbitrarily reduced in width, but rather evaluated when due for a major reconstruction project. In both cases, the runways are in excellent condition and should not require this type of work for many years. The last airside components addressed in this section is lighting, which includes VGLS and taxiway lights.

VGLS provides the pilot with a safe and accurate glide slope on final approach to the runway. A row of PAPI or a VASI configuration placed perpendicular to the approach path are seen by the pilot in combinations of red and white to indicate a path that is too high, too low or correctly on slope. GON has a PAPI on runway ends 23 and 33, and VASI on Runway 23 (see page 15), but could use systems on the other two runway ends, 5 and 15.

Finally, it is recommended that the airport upgrade its taxiway lighting system and eventually runway lighting systems to LED fixtures.

A major element of this chapter was devoted to the airport's landside. Three key components were addressed: the terminal building, aircraft apron space, and aircraft hangars to meet both future demand and increased revenue potential. As discussed in Chapter 3, the airport has a surplus of aircraft parking apron and hangar space. Forecasts show a surplus of hangar space; however apron space will reach capacity in the next 15-20 years. In addition, the terminal building, while in fair condition, is outdated and in need of repairs and a general facelift. Notwithstanding this assessment, this report does recommend taking a long-term look at the airport and how to maximize revenue production while making the facility more attractive to both its users and investors.

Besides taking the "do nothing" approach, this report recommended two alternative design concepts for what was referred to as the central terminal area (see areas C, G, and H on Figure 5.2, page 111). The two Alternatives suggest either a minimum development approach where the majority of the existing landside remains essentially unchanged, but with a revamped auto parking area and additional hangars. The second, more comprehensive (and expensive) approach suggests a total redesign of the central terminal area, with not only numerous new hangars of various sizes, but a completely new terminal facility, including a new ARFF building and control tower. This model takes advantage of unused space between the existing terminal and the runways, moving facilities and structures closer to the existing BRL; thus opening up unused but available space for development and potential revenue.

## CONSULTANTS RECOMMENDED ALTERNATIVE

The recommended alternative for GON is to maintain the facility to its current high standards, which includes full compliance with the airport operating certificate under Part 139. This process includes upgrading lighting facilities, snow removal and firefighting equipment and buildings, and other ancillary facilities and equipment as necessary to commercial airport standards.

As with any airport, the need to generate sufficient revenue to cover operating and maintenance costs is essential. The airport's historic and current financial resources were examined. This assessment looked at fiscal years 2002 through 2007 (which was the most recent at the time). While the airport has shown considerable revenue growth, while cutting costs, it was still reporting a $90,000 deficit; a shortfall that comes from state revenue. To overcome this shortage, plus position itself for future infrastructure changes that may require at least matching funds to apply against federal grants, the airport should plan on changes now that will raise revenue. This primary means for a general aviation airport to raise revenue is through land leases, hangar sales, or rentals, and apron fees. Other charges such as landing fees, fuel sales, and short term hangar storage are also employed. This is the primary reason why Alternatives 2 and 3 were developed. As discussed, Alternative 3 is the most aggressive plan, but will take years of planning, promotion, and development to see through to fruition. And again, the concepts shown in the two alternatives are planning visions; options that show what is possible in the land area available.

Given the purpose and future of GON, and the need for long term planning, Alternative 3, in its current or some variation is recommended. In short, the Sponsor should plan to maximize development and revenue production. While there are some environmental issues to address as noted, these negative effects can be mitigated. The next working paper will address each preferred alternative in detail.

Table 5.4 (next page) lists the consultants recommended alternatives along with a cross-reference to the section and page where each concept is discussed.

**Table 5.4 – Consultant's Recommended Alternatives**

| Facility | Recommendation | Timeline (Trigger) | Reference Pages |
|---|---|---|---|
| **Runways** | Reevaluate width requirements and adjust | Next major reconstruction | 74, 98 |
| | Upgrade Edge Lighting | Next major reconstruction or as needed | 15, 76, 98 |
| | Install PAPI/Replace VASI | As soon as practical | 15, 77, 98 |
| **Taxiways** | Replace edge lighting with LED Technology | Next major reconstruction or as needed | 17, 98 |
| **Terminal Building** | Replace | As public and private funding allows, and demand dictates, but before major remodeling is required | 19, 81, 98, 108 |
| **SRE Building** | Expand storage capacity | As funding becomes available | 82 |
| **ARFF Building** | Replace | Replace when new terminal building is constructed | 83 |
| **Equipment – ARFF & SRE** | Replace and Upgrade | As required for aging fleet and new technology and regulatory changes | 21, 82, 109 |
| **Hangars** | Develop long-term concept; establish lease areas and conditions. | Develop as needed | 80, 109 |
| **Aprons** | Monitor based aircraft demand against current capacity | Develop as needed | 78, 109 |

## PREFERRED ALTERNATIVE

After review by the sponsor[5], the consultants preferred alternative (see page 126) was presented to the public on June 9, 2011[6]. Following a examination of comments from this meeting as well as the FAA and discussions internally with the sponsor and consultant, a preferred alternative concept emerged.

The sponsor decided that while the full-build out, Alternative 3 (see page 114) represented its long-term vision of the airport, the probability of it happening for both financial and community barriers was low. This alternative essentially redeveloped the entire terminal area, including the replacement of the terminal building and adjacent auto parking lot, as well as the air traffic control tower. In addition, this option indicated the development of approximately 8-10 new hangar facilities along with associated aircraft and vehicle parking

[5] State of Connecticut
[6] Minutes from this meeting and other public presentations are contained in Appendix 5.

areas. While this concept was developed to show the potential in this area, all parties agreed that a scaled back version, with a less aggressive development plan was more realistic at this time; one that could be feasibly built in the next 10-20 years.

The stakeholders also agreed that the no-build concept (Alternative 1 on page 110) was equally not realistic given the 20 year timeframe of this master plan. While the current demand for a new terminal building and terminal space and hangars is low, some growth is inevitable and the airport must be positioned for change when it comes.

The sponsor decided to move forward with a modified version of Alternative 2 (presented on page 112). This option keeps the existing terminal building (and control tower) in place, but modifies the vehicle parking area by reducing its overall size and capacity and eliminates one of two access points off of Airport Avenue by creating a single access. This change allows for ample vehicle parking, while setting aside ample space for future aviation development. This concept, shown in Figure 5.6 (next page), provides an area that serves the airport more efficiently, while providing sufficient space for future hangar and related aviation business development.

## AIRPORT LAND USE ALTERNATIVES

With selection of the airport's preferred alternatives, general options for airport property not needed for aviation purposes can be identified. During the development of this update an examination of all airport property was completed. This property includes land on the circumference of the airside as well as property in the landside, including land around the terminal area on both sides of Tower Avenue. In addition, we examined land around the Groton VOR (see *Air Navigation Systems*, page 14).

Our examination of airport property indicates that once land not already used or reserved for aviation purposes is excluded; there is little property left for non-aviation use. Property already used for or required for aviation or other purposes includes the areas listed below.

- Runways and associate safety areas and other required setbacks
- Taxiways and associated safety areas and other required setbacks
- Aprons and other aircraft parking areas
- Hangars and employee/visitor parking areas
- Airport and private maintenance facilities and storage areas
- Terminal building and vehicle parking lot
- Air traffic control tower
- VOR and protected land around it
- Protected shore land and tidal zones along Poquonnock River and Baker Cove
- Wetlands (other than above) on the northeast side of Tower Avenue

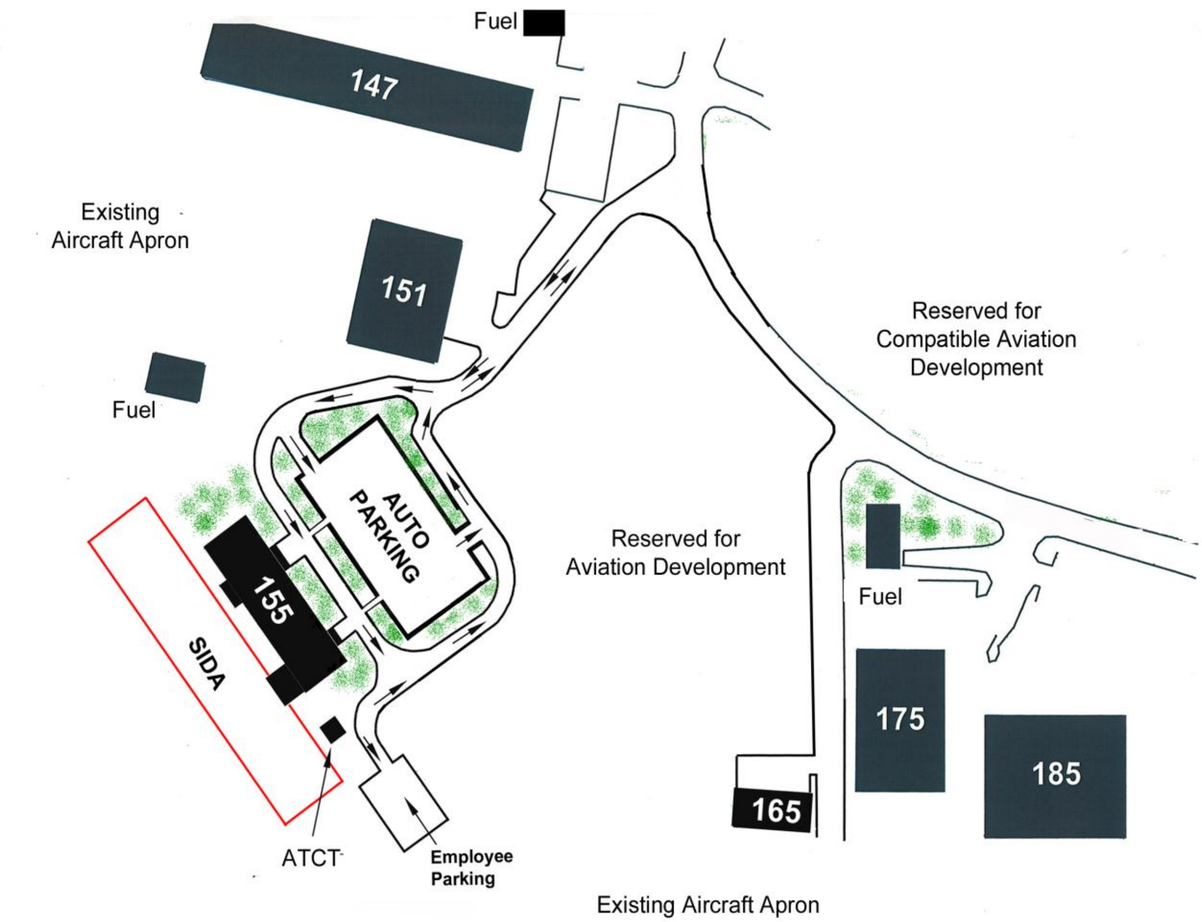



**Figure 5.6 – Preferred Alternative (Terminal Area)**

Figure 5.7 (next page) shows the current terminal area. This figure shows nine areas identified for possible development. The five areas labeled as A, E, F, G, and H are inside the airport's landside area (between Tower Avenue and the airport's airside) and should only be used for direct aviation development (hangars, airport related businesses, such as FBOs, etc). The four areas on the opposite side of Tower Avenue (identified as B, C, D, and I), that do not have direct access to the airside, should be reserved for development "compatible with aviation", meaning the activities that take place will not interfere with aircraft operations.

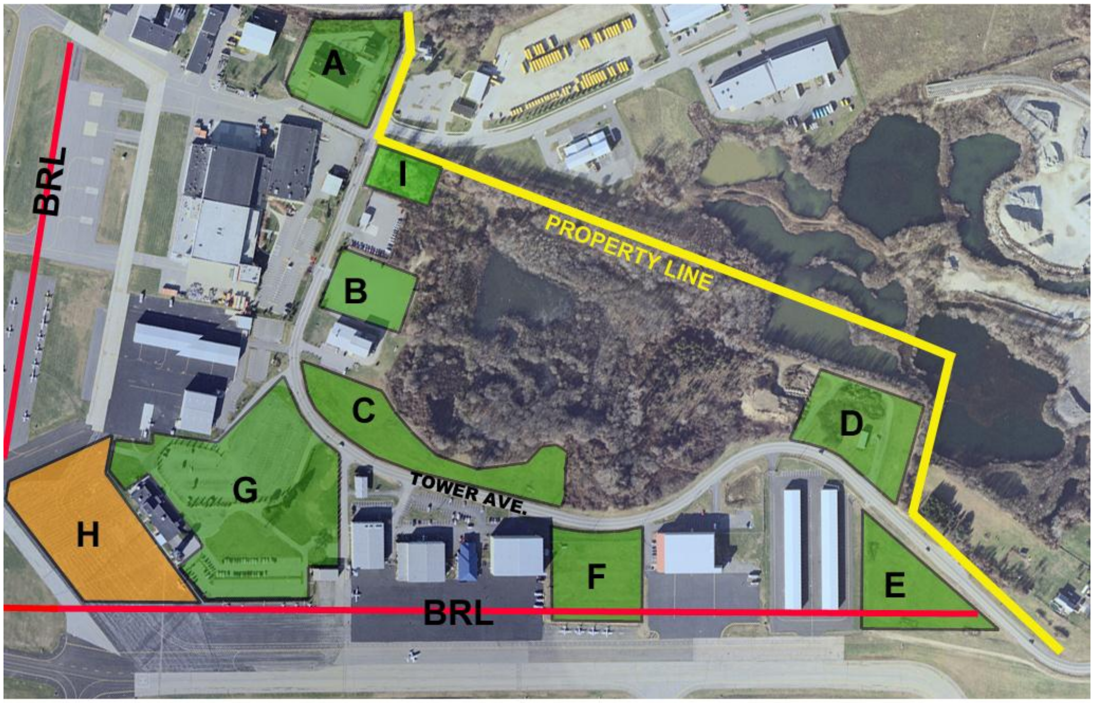



Figure 5.7 - Airport Landside Development Areas

The airport sponsor has elected to take a conservative approach to the future of GON. This policy is both fiscally and socially responsible because it does not commit the airport to spending funds other than to ensure the airport is maintained to both federal and state standards, including those necessary to retain its airport certification under Part 139 (see Appendix 2). In addition, it provides ample space for private development, as well as possible development and expansion of TASMG.

Most, if not all of the sponsors future financial resources should be for ongoing maintenance of the airport as well as facility upgrades as needed, such as lighting improvements, expansion of the SRE building, and modernizing/upgrading the terminal and ARFF building, etc. Table 5.5 (next page) lists the sponsor's preferred alternatives and is the basis of the rest of this report, which includes an Environmental Review, the Airport Layout Plan set, a Facility Implementation Plan, and Capital Improvement Plan.

**Table 5.5 – Preferred Alternatives**

| Facility | Recommendation | Timeline (Trigger) | Reference Pages |
|---|---|---|---|
| **Runways** | Reevaluate width requirements and adjust | Next major reconstruction | 74, 98 |
| | Upgrade Edge Lighting | Next major reconstruction or as needed | 15, 76, 98 |
| | Install PAPI/Replace VASI | As soon as practical | 15, 77, 98 |
| **Taxiways** | Replace edge lighting with LED Technology | Next major reconstruction or as needed | 17, 98 |
| **Terminal Building** | Modernize | As public and private funding allows | 19, 81, 98, 108 |
| **SRE Building** | Expand storage capacity | As funding becomes available | 82 |
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| **Equipment – ARFF & SRE** | Replace and Upgrade | As required for aging fleet and new technology and regulatory changes | 21, 82, 109 |
| **Hangars** | Develop long-term concept; establish lease areas and conditions. | Develop as needed | 80, 109 |
| **Aprons** | Monitor based aircraft demand against current capacity | Develop as needed | 78, 109 |

# CHAPTER 6 – AIRPORT PLANS

## OVERVIEW

This chapter presents a detailed graphic and narrative description of the selected development concept for Groton-New London Airport (GON). The plans set presented in this chapter will serve as the Airport Sponsor's primary planning tool for the long-range development of GON's airfield and terminal facilities.

The Ultimate Airport Layout Plan (ALP) shows a conceptual layout of the airfield, landside, and ground access areas necessary to support the design year 2030 aviation activity projections. The ALP package includes the following 8 drawings:

1 of 8 ................ Title Sheet

2 of 8 ................ Existing Airport Layout Plan

3 of 8 ................ Ultimate Airport Layout Plan

4 of 8 ................ Terminal Area Plan

5 of 8 ................ Runway 5-23 Approach Plan and Profile

6 of 8 ................ Runway 15-33 Approach Plan and Profile

7 of 8 ................ FAR Part 77 Imaginary Surfaces Plan

8 of 8 ................ Land Use Plan

## AIRPORT DESIGN STANDARDS

The GON airport plan set was prepared using Federal Aviation Administration (FAA) standards and guidelines for use in the design of civil airports. The design standards are set forth in FAA Advisory Circular 150-5300-13 Airport Design (Change 19). In addition the airport layout plans were prepared in accordance with guidance from the FAA New England Region Airports Division.

One of the key factors of the airport design advisory circular was to organize the airport design standards by Airport Reference Codes (ARC). The ARC incorporates the operational and physical characteristics of the critical aircraft approach category and an airplane design group. The aircraft approach category, based on the aircraft approach speed, relates to the operational requirements of the aircraft while the airplane design group, based on aircraft wingspan, relates to the physical requirements of the aircraft.

The ARC is based on the most demanding aircraft that is anticipated to serve the Airport during the twenty-year planning period. For GON the critical aircraft was determined to be the Cessna 650 Citation VIII that should remain in service through the twenty-year planning period. The Citation VIII is classified under Approach Category C and Airplane

Design Group II. The applicable recommended airfield design standards for ARC C-II are shown in Table 6.1. All aeronautical and airfield design standards applicable to ARC C-II have been incorporated into the proposed airfield geometry.

**Table 6.1 - Recommended FAA Airfield Design Standards**

| Design Element | Design Standard (feet) |
|---|---|
| **Runway 5-23** | |
| Runway Width | 100 |
| Runway Centerline to Parallel Taxiway Centerline | 300 |
| Runway Safety Area Width | 500 |
| Runway Object Free Area Width | 800 |
| Runway Object Free Area Length Beyond Runway En | 1000 |
| Runway Obstacle Free Zone Width | 400 |
| Runway Obstacle Free Zone Length Beyond Runway | 200 |
| **Runway 15-33** | |
| Runway Width | 75 |
| Runway Centerline to Parallel Taxiway Centerline | 240 |
| Runway Safety Area Width | 150 |
| Runway Object Free Area Width | 500 |
| Runway Object Free Area Length Beyond Runway En | 300 |
| Runway Obstacle Free Zone Width | 250 |
| Runway Obstacle Free Zone Length Beyond Runway | 200 |
| **Taxiways** | |
| Taxiway Width | 35 |
| Taxiway Safety Area Width | 79 |
| Taxiway Object Free Area Width | 131 |

## AIRPORT LAYOUT PLAN

The Airport Master Planning process culminates with the FAA's approval of the ALP. For CTDOT the ALP serves as a "blueprint" for the future renovation and development of GON.

The ALP drawings that describe the 20-year development program for GON are discussed below.

### *TITLE SHEET*

The Title Sheet (1 of 8) of the ALP Plans Package contains the following information:

- Project Title: Airport Layout Plans
- Facility Name: Groton-New London Airport (GON)
- Location Map: Shows location of GON in northeast Connecticut
- Airport Photo: Photo current as of 2012
- Index of Drawings: Eight Drawings

### *EXISTING AIRPORT LAYOUT PLAN*

Sheet 2 of 8 is the existing ALP and is included as a reference plan to complement the Future ALP since the level of proposed development obscures pertinent existing detail in some locations on the Airport.

### *AIRPORT LAYOUT PLAN*

Sheet 3 of 8 is the focal point of the Plans Package. The Future Airport Layout Plan delineates all future aeronautical requirements of the Airport. The improvements presented on the Future ALP (and Future Terminal Area Plan, Sheet 4) are based on the Master Plan Update analysis. These improvements are consistent with this Airport Master Plan Update. These recommendations are described in the following paragraphs. The design year 2030 Airport Development Program indicated on the Future ALP (and Terminal Plan) is, unless otherwise noted in the report, intended to be implemented in phases as required by demand.

The assignment of projects to any particular phase or timeline is flexible, as a number of factors influence whether a project will take place at a specific time. For example, some items in the short-term (first five years) may actually occur in the intermediate time frame (years 6-10). This could be due to project approval delays, Federal and local funding issues, shifts in market demand, aircraft operational activity levels that differ from forecasts, policy issues, and other operational considerations that are unique to the development of a public airport.

The first two phases, which encompass ten years, are proposed to support projects that have been identified to meet a proven need, or those with a high probability of occurrence. The remaining, long-range aviation development projects depict airfield and landside development projects that are related to projected 20-year aviation activity demands as described elsewhere in this report.

The three development phases included in the Future ALP are:

- Short-Term 2010-2015
- Intermediate-Term 2015-2020
- Long-Term 2020-2030

The three development phases are carried into and discussed in the financial feasibility plan in Chapter 8 of this report.

### *Terminal Area Plan*

Drawing 4 of 8 focuses on the airport's landside, or terminal area. It's a smaller scale of the Airport Layout Plan presented on Sheet 4.

### *Runway Approach Plans*

These drawings (sheets 5 and 6 of 8) depict both plan and profile views of the approaches to the four existing runway ends. These drawings document existing and proposed man-made structures, objects of natural growth and terrain which represent obstructions to navigable airspace. The plans depict existing and ultimate approach slopes along with roads and railroads shown on the profile to highest elevation plus the added elevation specified by FAA guidelines. Obstructions to runway approaches are based on the criteria outlined in Federal Aviation Regulations (FAR) Part 77 Objects Affecting Navigable Airspace, and FAA Order 8250.3B United States Standards for Terminal Instrument Procedures (TERPS).

### *FAR Part 77 Imaginary Surfaces Plan*

This 1 inch =1,500 feet FAR Part 77 airspace plan shows the five airspace control surfaces depicted over a USGS base map. The Part 77 obstruction control services include: Primary, Approach, Transitional, Horizontal, and Conical services for the existing four runways.

### *Land Use Plan*

Sheet 8 of 8 shows the projected noise contours overlaid on a high-resolution photograph of the airport. The Airport Land Use Plan provides CTDOT with data to assist in establishing a vision for the aeronautical and non-aeronautical land uses that are located on airport property based on project noise contours.

The recommended on-airport land use categories for GON include:

**Airfield:**

- Airfield Operating Areas
- Runway Protection Zones & Object Free Areas
- Navaid Critical Areas
- Terminal Area
- Terminal Facilities
- Public Parking & Terminal Access

**Airfield & Terminal Support Areas**

- Rental Car Storage Areas
- Fuel Farm
- Airport Grounds Maintenance
- ARFF
- Air Traffic Control Tower
- Airport Security
- Aircraft Engine Run-Up Areas
- Employee Parking

**Airport Reserve Areas**

- Airport Noise Buffer
- Surface Drainage
- 4-F Lands
- Green Space
- Community Compatible Development Areas
- Community Recreational Areas
- Aviation Related Commercial Development Areas
- Revenue Generating Uses
- Restaurants
- Aviation Warehousing
- Agriculture
- Airline Aircraft Maintenance Hangars

**Military Operations Areas**

- Military Aircraft Aprons

- Military Hangars
- Military Support Facilities
- Military Fuel Storage

**General Aviation Areas**

- Corporate Hangars
- Fixed Base Operator (FBO) Terminals
- FBO Based & Transient Aircraft Aprons
- T-Hangars

## AIRPORT PLANS INDEX

# GROTON-NEW LONDON AIRPORT
# GROTON, CONNECTICUT

# AIRPORT MASTER PLAN UPDATE

MAY 2013
A.I.P. NO. 3-09-0009-24-2007


VICINITY MAP
NOT TO SCALE

INDEX OF SHEETS



ORIGINAL SHEET – ARCH D

| RUNWAY DATA | | EXISTING | | | |
|---|---|---|---|---|---|
| | | RUNWAY 5 | RUNWAY 23 | RUNWAY 15 | RUNWAY 33 |
| EFFECTIVE GRADIENT | | 0.04% | | 0.08% | |
| WIND COVERAGE (15 MPH) | | 94.6% | | 95.6% | |
| MAX. ELEVATION (MSL) | | 8.3' | | 9.9' | |
| DISPLACED THRESHOLD | | N/A | | 307' / 205' | |
| RUNWAY LENGTH | | 5000' | | 4000' | |
| RUNWAY WIDTH | | 150' | | 100' | |
| RUNWAY SURFACE | | ASPHALT–GROOVED | | ASPHALT–GROOVED | |
| PAVEMENT STRENGTH | | S-90K / D-113K / DT-200K | | S-90K / D-113K | |
| RUNWAY LIGHTING | | HIRL | | HIRL | |
| RUNWAY MARKING | | PRECISION / NPI | | VISUAL / NPI | |
| TAXIWAY LIGHTING | | MITL | | MITL | |
| APPROACH SLOPE | | 40:1/50:1 / 34:1 | | 20:1/34:1 | |
| VISIBILITY MINIMUMS | | .5 MI. / 1 MI. | | VISUAL / 1 MI. | |
| APPROACH PROCEDURE | | ILS/VOR | | NONE/GPS | |
| VISUAL AIDS | | PAPI, MALSR/VASI, REIL | | NONE/PAPI, REIL | |
| FAR PART 77 CATEGORY | | PIR / NPI | | VISUAL / NPI | |
| RSA | LENGTH BEYOND THRESHOLD | 475' / 555' | | 183' / 100' | |
| | WIDTH | 500' / 500' | | 150' / 150' | |
| OFA | LENGTH BEYOND THRESHOLD | 800' | | 300' | |
| | WIDTH | 800' | | 500' | |
| CRITICAL AIRCRAFT | APP. CAT. | C | | B | |
| | WINGSPAN | II | | II | |
| | AIRCRAFT | CITATION 680 | | BEECH KING AIR 200 | |
| RUNWAY END COORDINATES | LATITUDE | 41° 19' 29.8" N /41° 20' 10.7" N | | 41° 19' 58.9" N /41° 20' 30.9" N | |
| | LONGITUDE | 72° 02' 54.7" W / 72° 02' 18.0" W | | 72° 02' 12.6" W / 72° 02' 35.6" W | |
| DISPLACED THRESHOLD COORDINATES | LATITUDE | 41° 19' 29.8" N /41° 20' 10.7" N | | 41° 19' 58.9" N /41° 20' 30.9" N | |
| | LONGITUDE | 72° 02' 54.7" W / 72° 02' 18.0" W | | 72° 02' 12.6" W / 72° 02' 35.6" W | |

| AIRPORT DATA | EXISTING |
|---|---|
| AIRPORT ELEVATION (MSL) | 10' MSL |
| AIRPORT REFERENCE POINT (ARP) | LAT. 41° 19' 47.9" N<br>LONG. 72° 2' 44.2" W |
| MEAN MAX. TEMP. (HOTTEST MO.) | 81.7° F |
| DESIGN AIRCRAFT | CITATION 680 |
| AIRPORT REFERENCE CODE (ARC) | C–II |
| ACREAGE OWNED IN FEE SIMPLE | 489 ACRES |
| USE/OWNERSHIP | PUBLIC/PUBLIC |

| | EXISTING |
|---|---|
| AIRPORT PROPERTY LINE | |
| ABUTTERS' PROPERTY LINE | |
| PAVEMENT | |
| CONTOURS | 560 |
| TREE LINE | |
| FENCELINE | X X |
| WETLANDS | |
| OBJECT–FREE AREA | OFA |
| RUNWAY SAFETY AREA | RSA |
| RUNWAY VISIBILITY ZONE | RVZ |
| BUILDING RESTRICTION LINE | BRL |

NOTE:

1. BUILDING RESTRICTION LINE (BRL) WAS ESTABLISHED IN ACCORDANCE WITH FAA DESIGN AND FAR PART 77 CRITERIA. ITS LOCATION UTILIZES A 20–FT. VERTICAL OBJECT HEIGHT. THE BRL LOCATION MAY CHANGE DUE TO GROUND CONTOURS OR DIFFERENT OBJECT HEIGHTS BUT ALWAYS IN ACCORDANCE WITH FAR PART 77 AND FAA DESIGN CRITERIA.

| EXISTING* | BUILDINGS |
|---|---|
| 73 | SAND STORAGE (HEATED) |
| 75 | MAINTENANCE / SRE BUILDING |
| 139 | TASMG HANGAR / ADMIN (ARNG) |
| 139A | TASMG MAINTENANCE (ARNG) |
| 139B | TASMG MAINTENANCE (ARNG) |
| 139C | TASMG ENG. TEST CELL (ARNG) |
| 144 | SURVIVAL SYSTEMS INC. (NON–AERO USE) |
| 147 | LANMAR HANGAR (JET PODS) |
| 201 | LANMAR MAINTENANCE HANGAR / OFFICE |
| 155 | TERMINAL BLDG / RESTAURANT / RENTAL CTR |
| 157 | CONTROL TOWER / AIRPORT BEACON |
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| 185 | COLUMBIA AIR SERVICE HANGAR |
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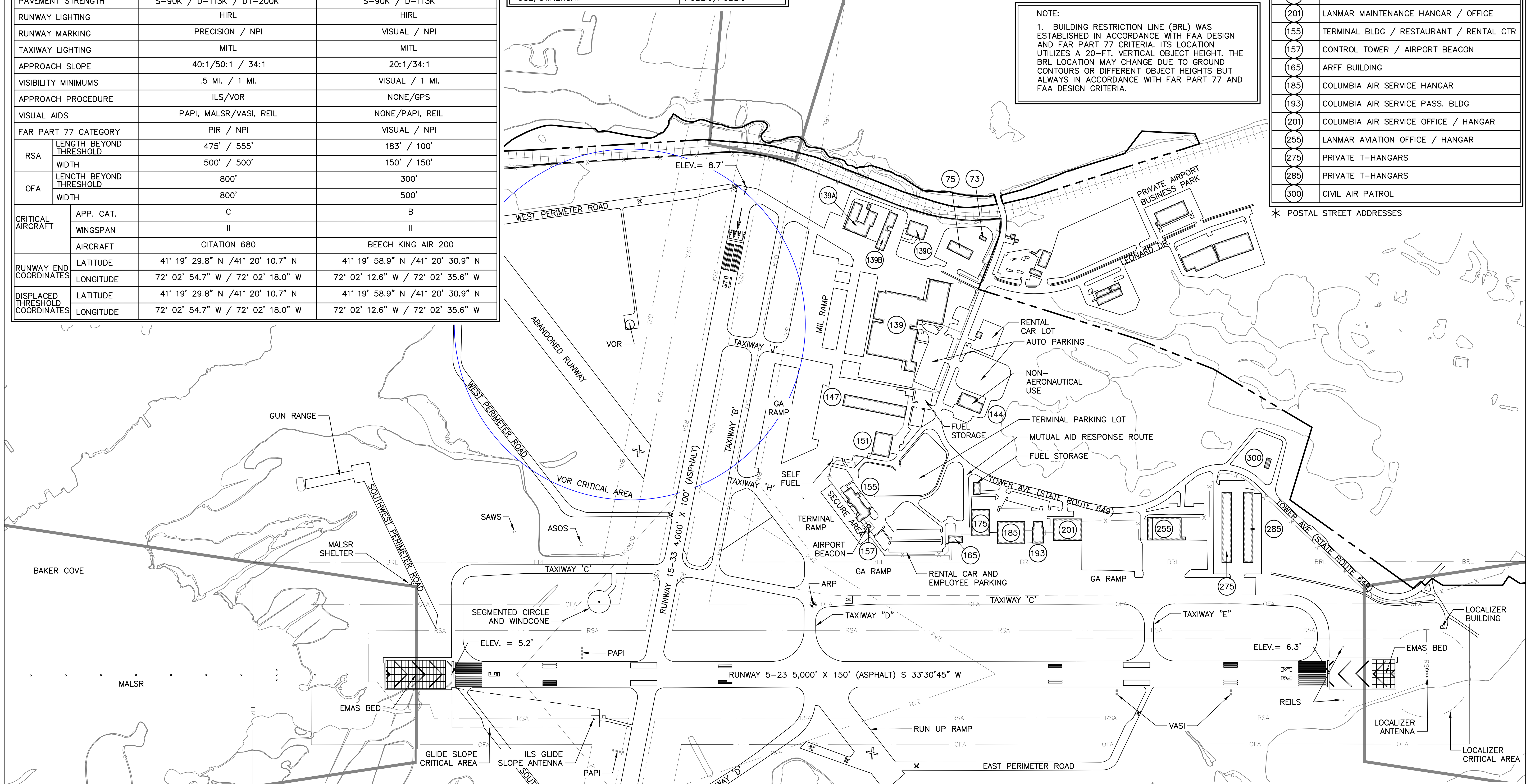
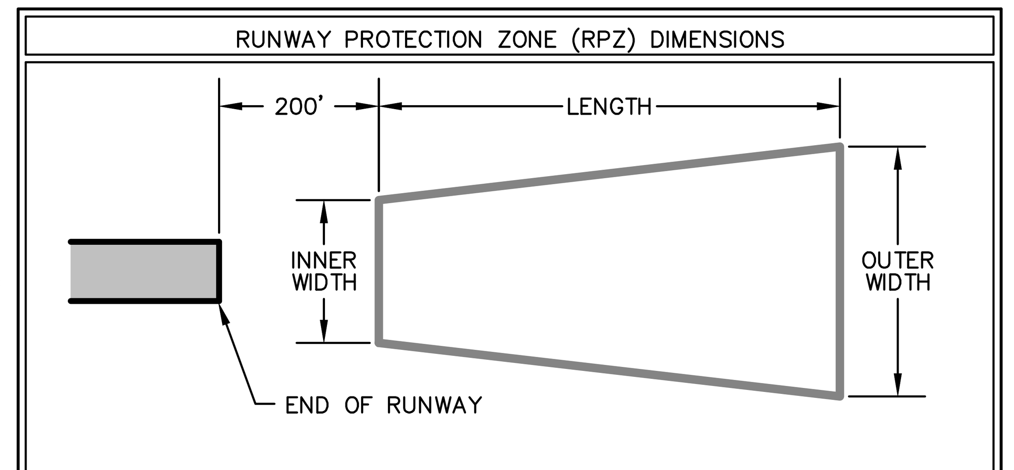
| 255 | LANMAR AVIATION OFFICE / HANGAR |
| 275 | PRIVATE T–HANGARS |
| 285 | PRIVATE T–HANGARS |
| 300 | CIVIL AIR PATROL |

* POSTAL STREET ADDRESSES




RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS




| RUNWAY | INNER WIDTH | OUTER WIDTH | LENGTH | ACRES |
|---|---|---|---|---|
| 05 | 1000 | 1750 | 2500 | 78.914 |
| 23 | 1000 | 1510 | 1700 | 48.978 |
| 15 | 500 | 700 | 1000 | 13.77 |
| 33 | 500 | 700 | 1000 | 13.77 |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Legend

Notes
DECLINATION = 14°16'W CHANGING BY 0°2' EACH YEAR NOV. 2011

14°16'W N

0 300' 600'

| Revision | By | Appd. | YY.MM.DD |
|---|---|---|---|

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|

| File Name: | LRK | DCD | ECD | 2012.02.24 |
|---|---|---|---|---|
| | Dwn. | Chkd. | Dsgn. | YY.MM.DD |

Permit-Seal

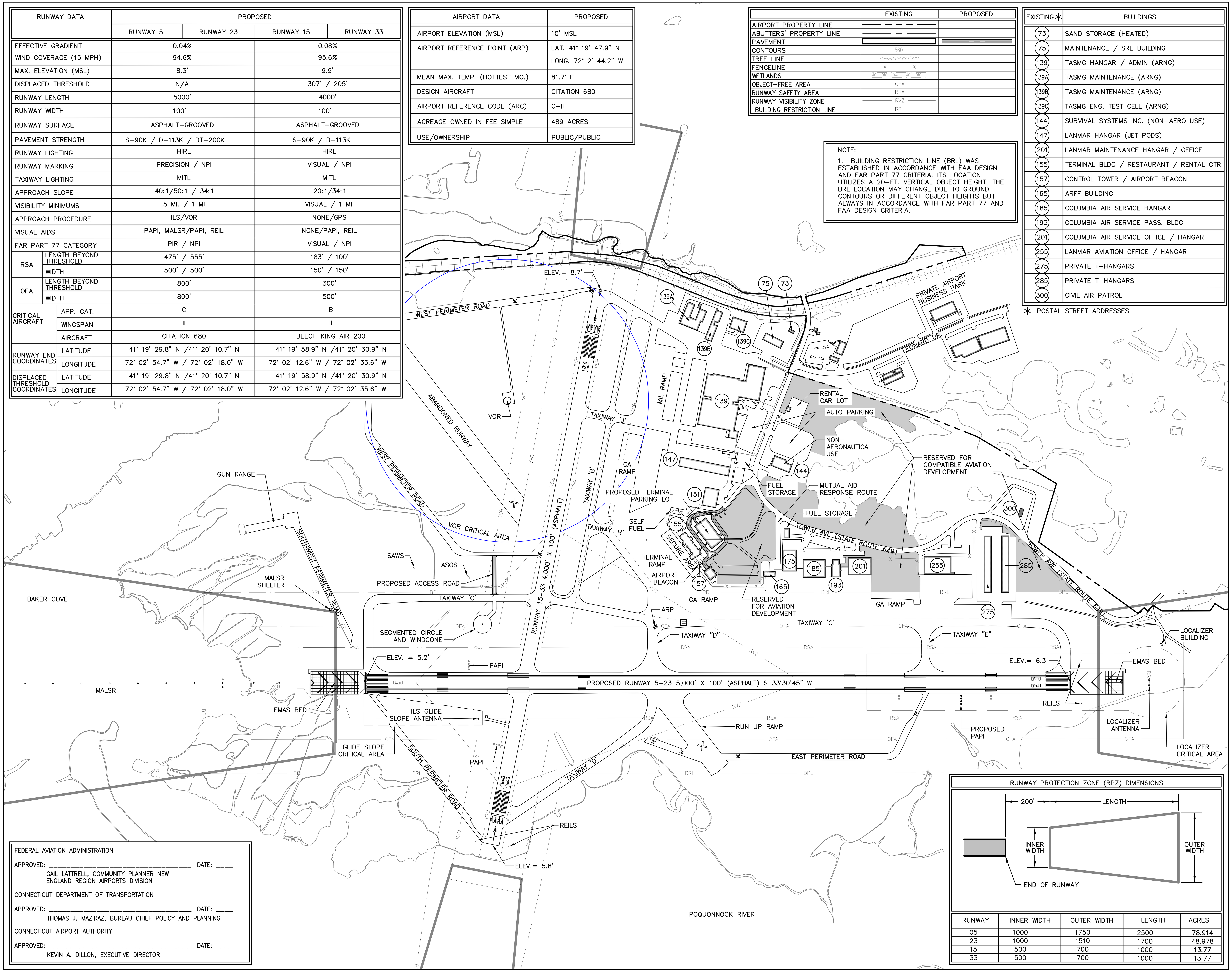
Client/Project
GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007

AIRPORT MASTER PLAN UPDATE

GROTON, CONNECTICUT

Title
EXISTING AIRPORT LAYOUT PLAN

| Project No. | Scale | |
|---|---|---|
| 195210216 | 1"=300' | |
| Drawing No. | Sheet | Revision |
| 2 | 2 of 8 | 0 |




| RUNWAY DATA | PROPOSED | | | |
|---|---|---|---|---|
| | RUNWAY 5 | RUNWAY 23 | RUNWAY 15 | RUNWAY 33 |
| EFFECTIVE GRADIENT | 0.04% | | 0.08% | |
| WIND COVERAGE (15 MPH) | 94.6% | | 95.6% | |
| MAX. ELEVATION (MSL) | 8.3' | | 9.9' | |
| DISPLACED THRESHOLD | N/A | | 307' / 205' | |
| RUNWAY LENGTH | 5000' | | 4000' | |
| RUNWAY WIDTH | 100' | | 100' | |
| RUNWAY SURFACE | ASPHALT–GROOVED | | ASPHALT–GROOVED | |
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| RUNWAY MARKING | PRECISION / NPI | | VISUAL / NPI | |
| TAXIWAY LIGHTING | MITL | | MITL | |
| APPROACH SLOPE | 40:1/50:1 / 34:1 | | 20:1/34:1 | |
| VISIBILITY MINIMUMS | .5 MI. / 1 MI. | | VISUAL / 1 MI. | |
| APPROACH PROCEDURE | ILS/VOR | | NONE/GPS | |
| VISUAL AIDS | PAPI, MALSR/PAPI, REIL | | NONE/PAPI, REIL | |
| FAR PART 77 CATEGORY | PIR / NPI | | VISUAL / NPI | |
| RSA – LENGTH BEYOND THRESHOLD | 475' / 555' | | 183' / 100' | |
| RSA – WIDTH | 500' / 500' | | 150' / 150' | |
| OFA – LENGTH BEYOND THRESHOLD | 800' | | 300' | |
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| DESIGN AIRCRAFT | CITATION 680 |
| AIRPORT REFERENCE CODE (ARC) | C–II |
| ACREAGE OWNED IN FEE SIMPLE | 489 ACRES |
| USE/OWNERSHIP | PUBLIC/PUBLIC |

| | EXISTING | PROPOSED |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| ABUTTERS' PROPERTY LINE | | |
| PAVEMENT | | |
| CONTOURS | 560 | |
| TREE LINE | | |
| FENCELINE | X X | |
| WETLANDS | | |
| OBJECT–FREE AREA | OFA | |
| RUNWAY SAFETY AREA | RSA | |
| RUNWAY VISIBILITY ZONE | RVZ | |
| BUILDING RESTRICTION LINE | BRL | |

| EXISTING * | BUILDINGS |
|---|---|
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* POSTAL STREET ADDRESSES

NOTE:

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RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS

200' — LENGTH — INNER WIDTH — OUTER WIDTH — END OF RUNWAY

| RUNWAY | INNER WIDTH | OUTER WIDTH | LENGTH | ACRES |
|---|---|---|---|---|
| 05 | 1000 | 1750 | 2500 | 78.914 |
| 23 | 1000 | 1510 | 1700 | 48.978 |
| 15 | 500 | 700 | 1000 | 13.77 |
| 33 | 500 | 700 | 1000 | 13.77 |

FEDERAL AVIATION ADMINISTRATION

APPROVED: ______________________________ DATE: _____
GAIL LATTRELL, COMMUNITY PLANNER NEW ENGLAND REGION AIRPORTS DIVISION

CONNECTICUT DEPARTMENT OF TRANSPORTATION

APPROVED: ______________________________ DATE: _____
THOMAS J. MAZIRAZ, BUREAU CHIEF POLICY AND PLANNING

CONNECTICUT AIRPORT AUTHORITY

APPROVED: ______________________________ DATE: _____
KEVIN A. DILLON, EXECUTIVE DIRECTOR


Stantec

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Notes
DECLINATION = 14°16'W CHANGING BY 0°2' EACH YEAR NOV. 2011

| Revision | By | Appd. | YY.MM.DD |
|---|---|---|---|

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|

| File Name: | LRK | DCD | ECD | 13.05.30 |
|---|---|---|---|---|
| | Dwn. | Chkd. | Dsgn. | YY.MM.DD |

Permit-Seal

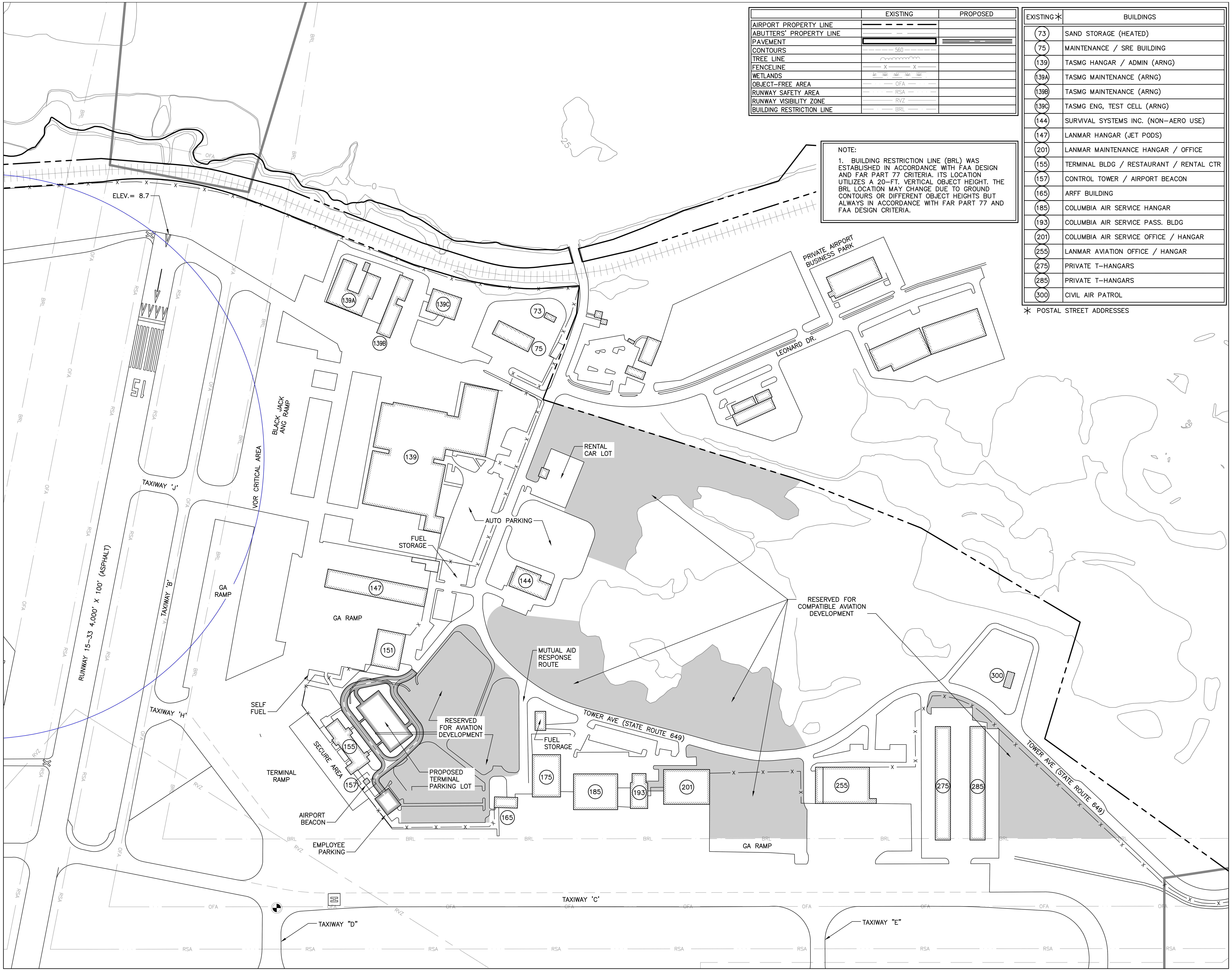
Client/Project
GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007

AIRPORT MASTER PLAN UPDATE

GROTON, CONNECTICUT

Title
ULTIMATE AIRPORT LAYOUT PLAN

| Project No. | Scale | |
|---|---|---|
| 195210216 | 1"=300' | |
| Drawing No. | Sheet | Revision |
| 3 | 3 of 8 | 0 |




| | EXISTING | PROPOSED |
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| ABUTTERS' PROPERTY LINE | | |
| PAVEMENT | | |
| CONTOURS | 560 | |
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| FENCELINE | x x | |
| WETLANDS | | |
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| 139A | TASMG MAINTENANCE (ARNG) |
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Notes
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Revision — By — Appd. — YY.MM.DD

Issued — By — Appd. — YY.MM.DD

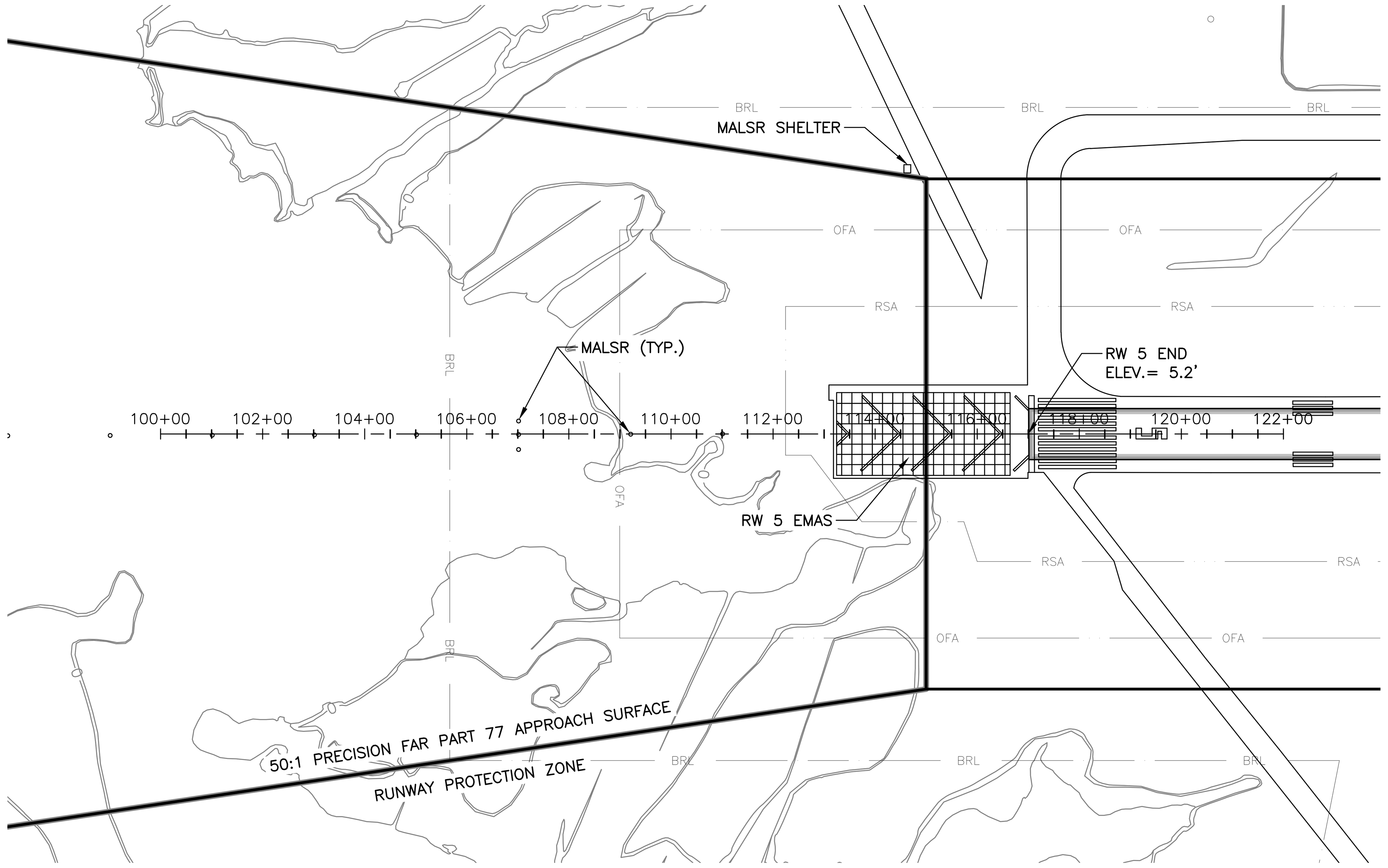
File Name: — LRK Dwn. — DCD Chkd. — ECD Dsgn. — 13.05.30 YY.MM.DD

Permit-Seal

Client/Project
GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007
AIRPORT MASTER PLAN UPDATE
GROTON, CONNECTICUT

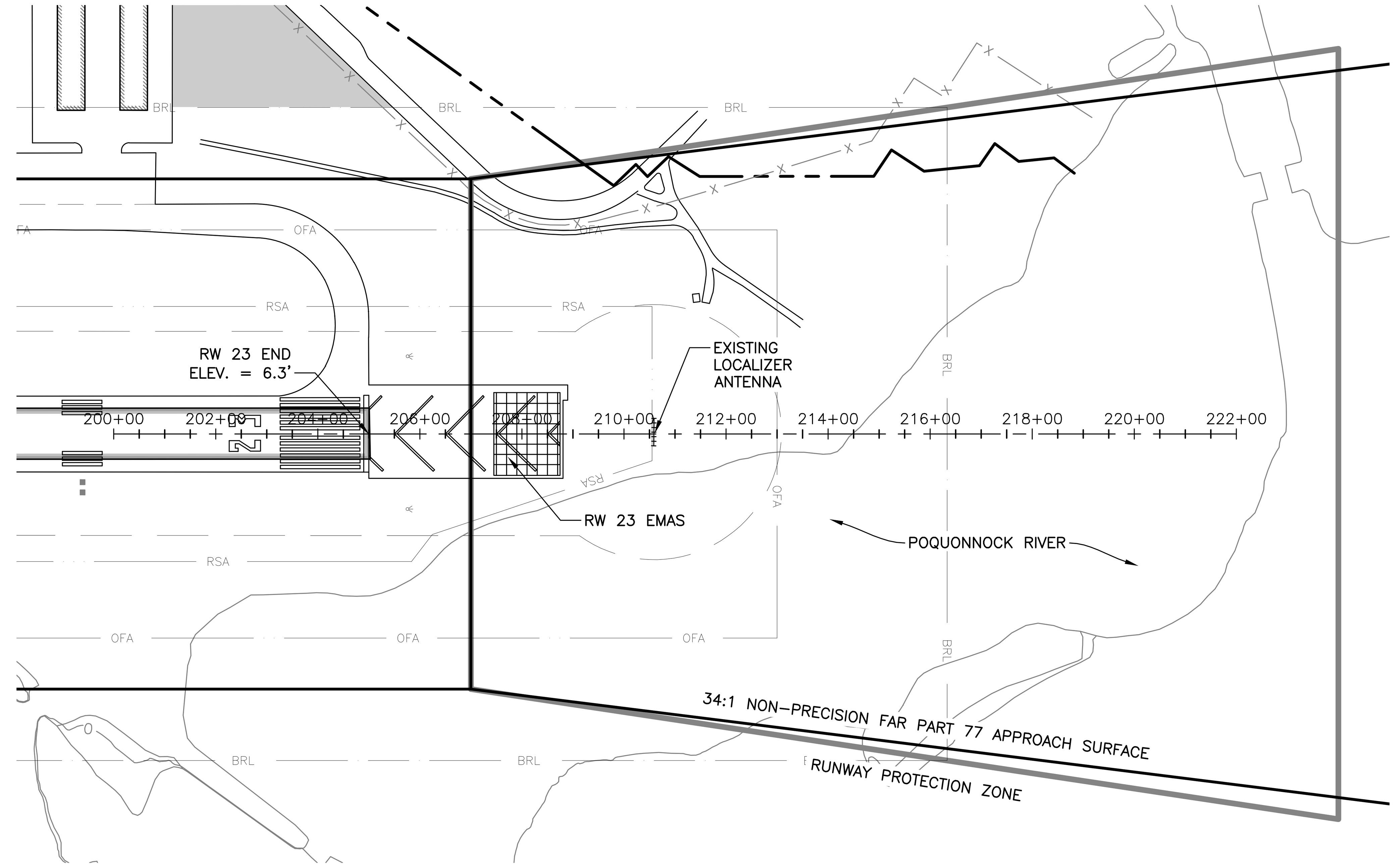
Title
TERMINAL LAYOUT PLAN

| Project No. | Scale | |
|---|---|---|
| 195210216 | 1"=150' | |
| Drawing No. | Sheet | Revision |
| 4 | 4 of 8 | 0 |



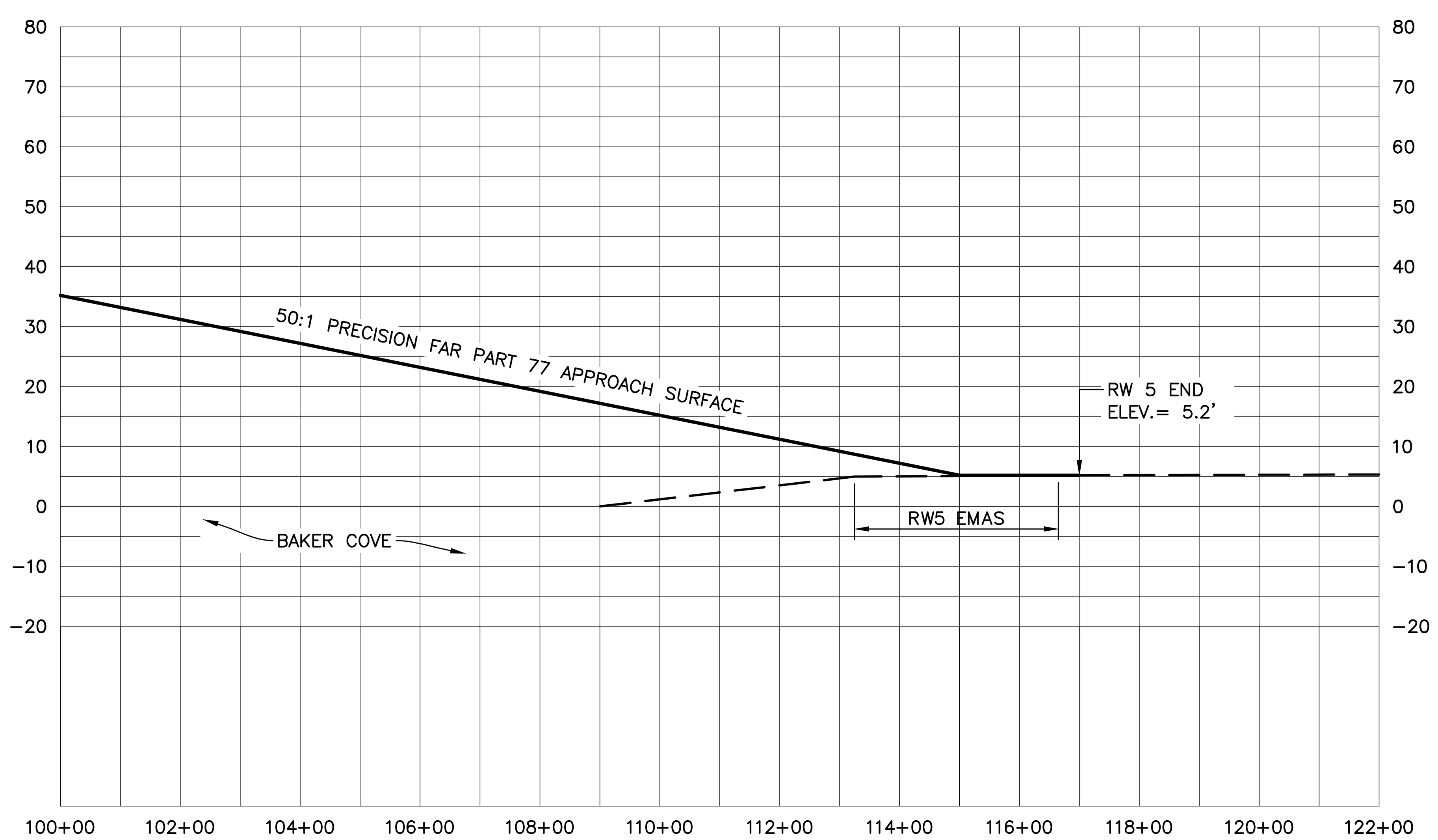

## RUNWAY 5 END PLAN

0 200' 400'



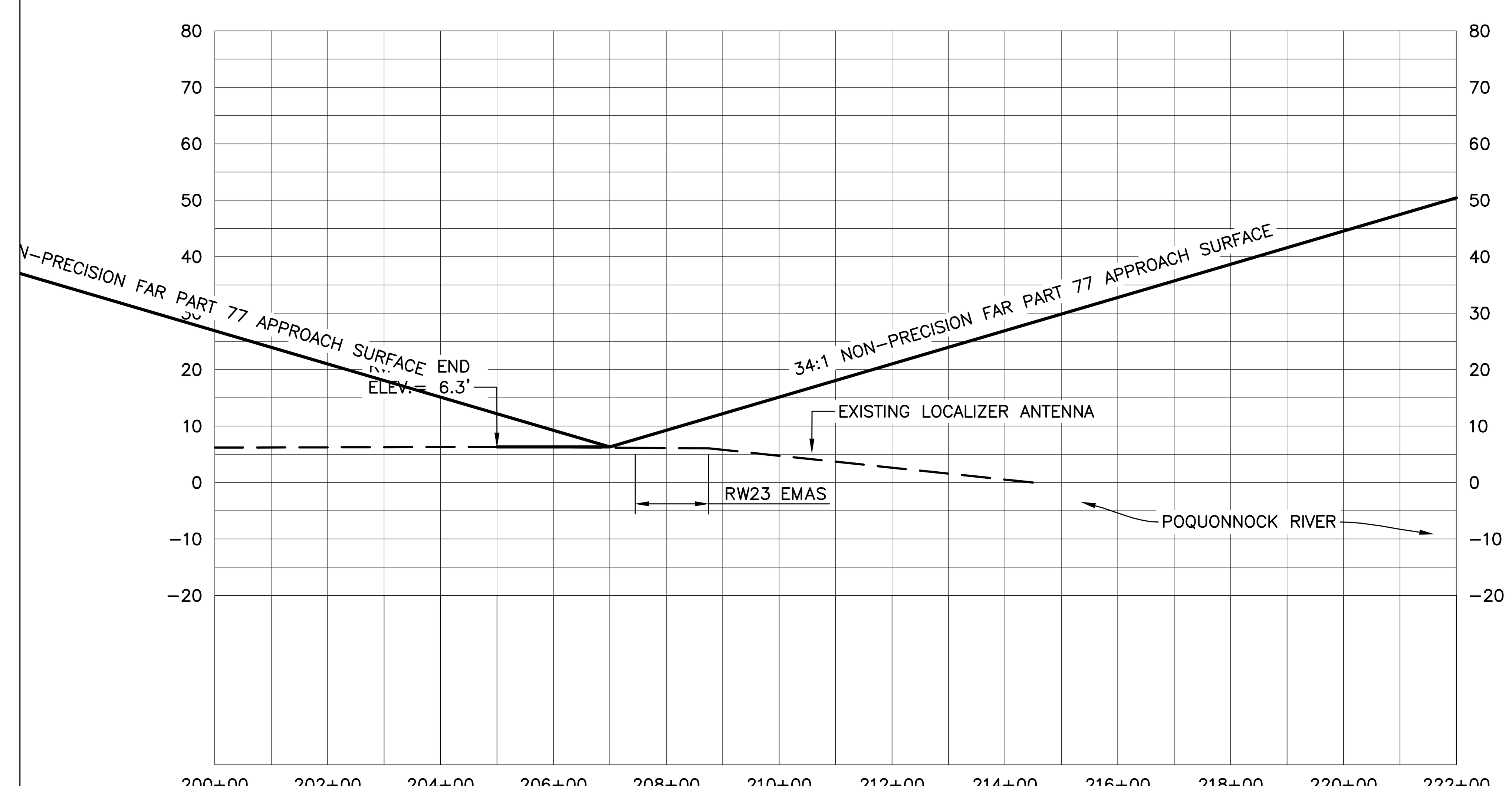

## RUNWAY 23 END PLAN

0 200' 400'




## RUNWAY 5 END PROFILE

0 200' 400'




## RUNWAY 23 END PROFILE

0 200' 400'

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Consultants

Legend

Notes
DECLINATION =
14°16'W CHANGING
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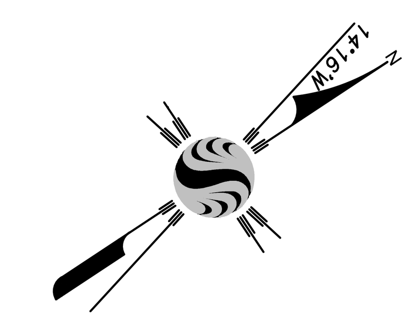
NOV. 2011

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Permit-Seal

Client/Project

GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007

AIRPORT MASTER PLAN UPDATE

GROTON, CONNECTICUT

Title

RUNWAY 5-23 APPROACH
PLAN AND PROFILE

| Project No. | Scale | |
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| 195210216 | AS SHOWN | |
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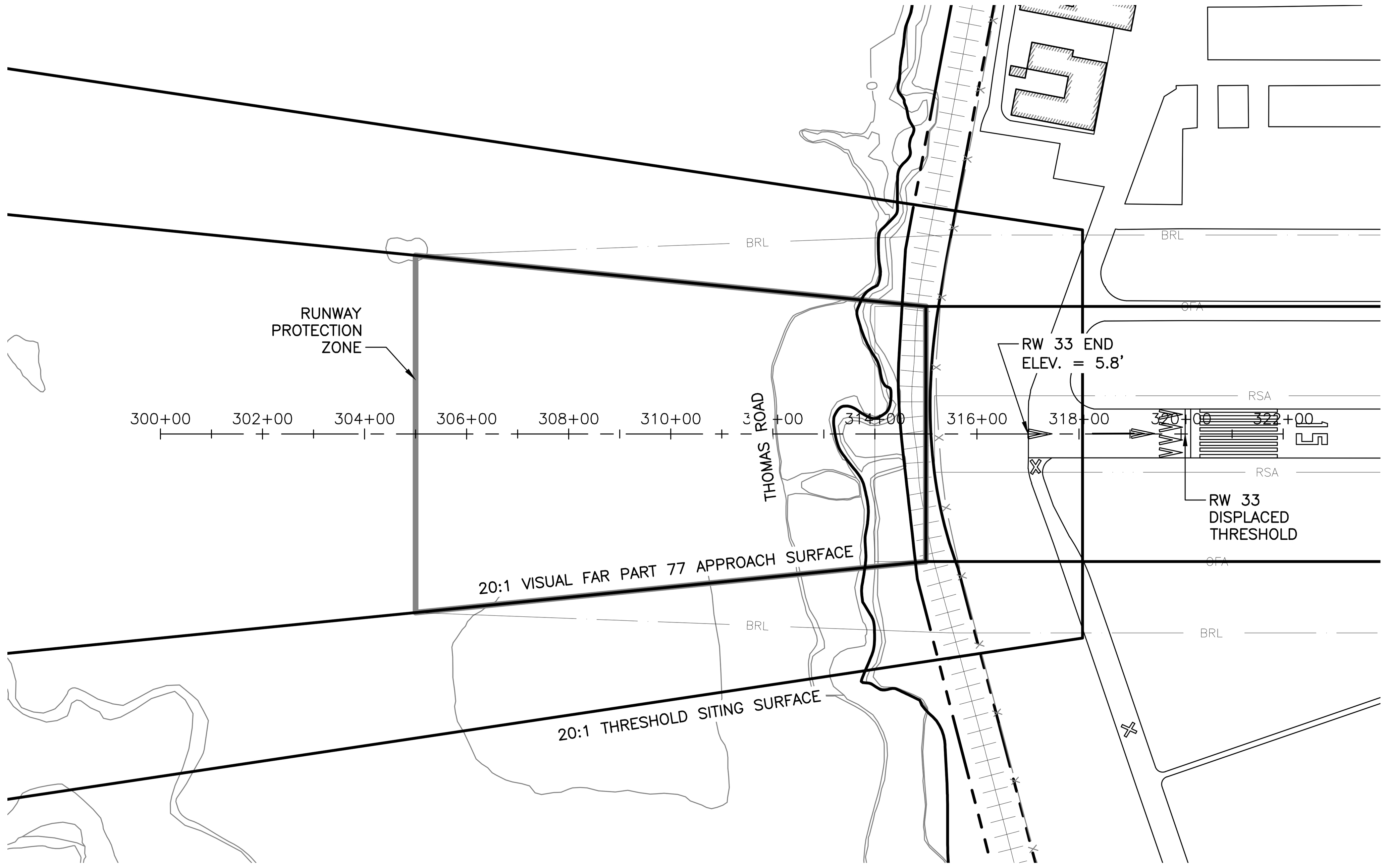
| 5 | 5 of 8 | 0 |

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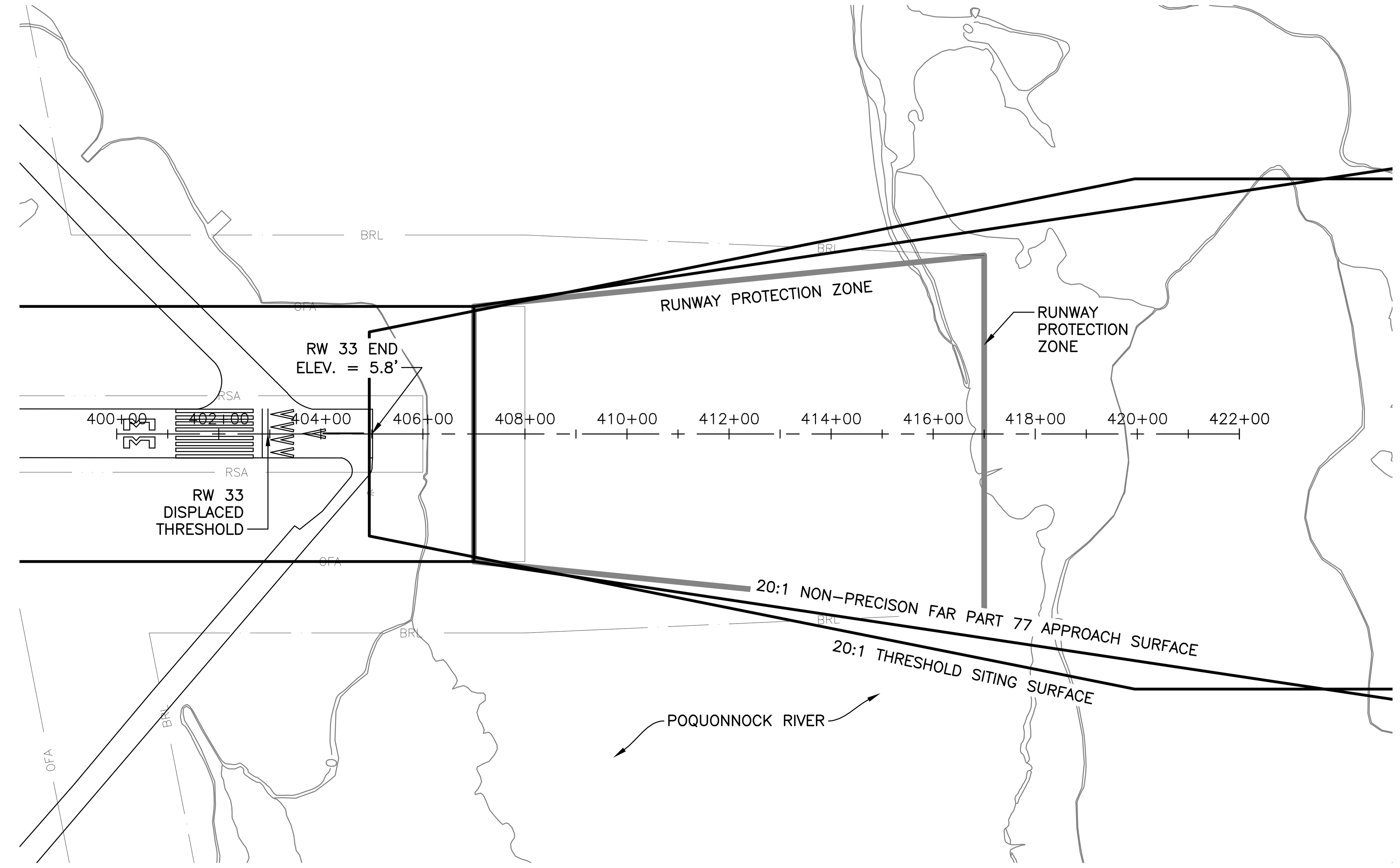


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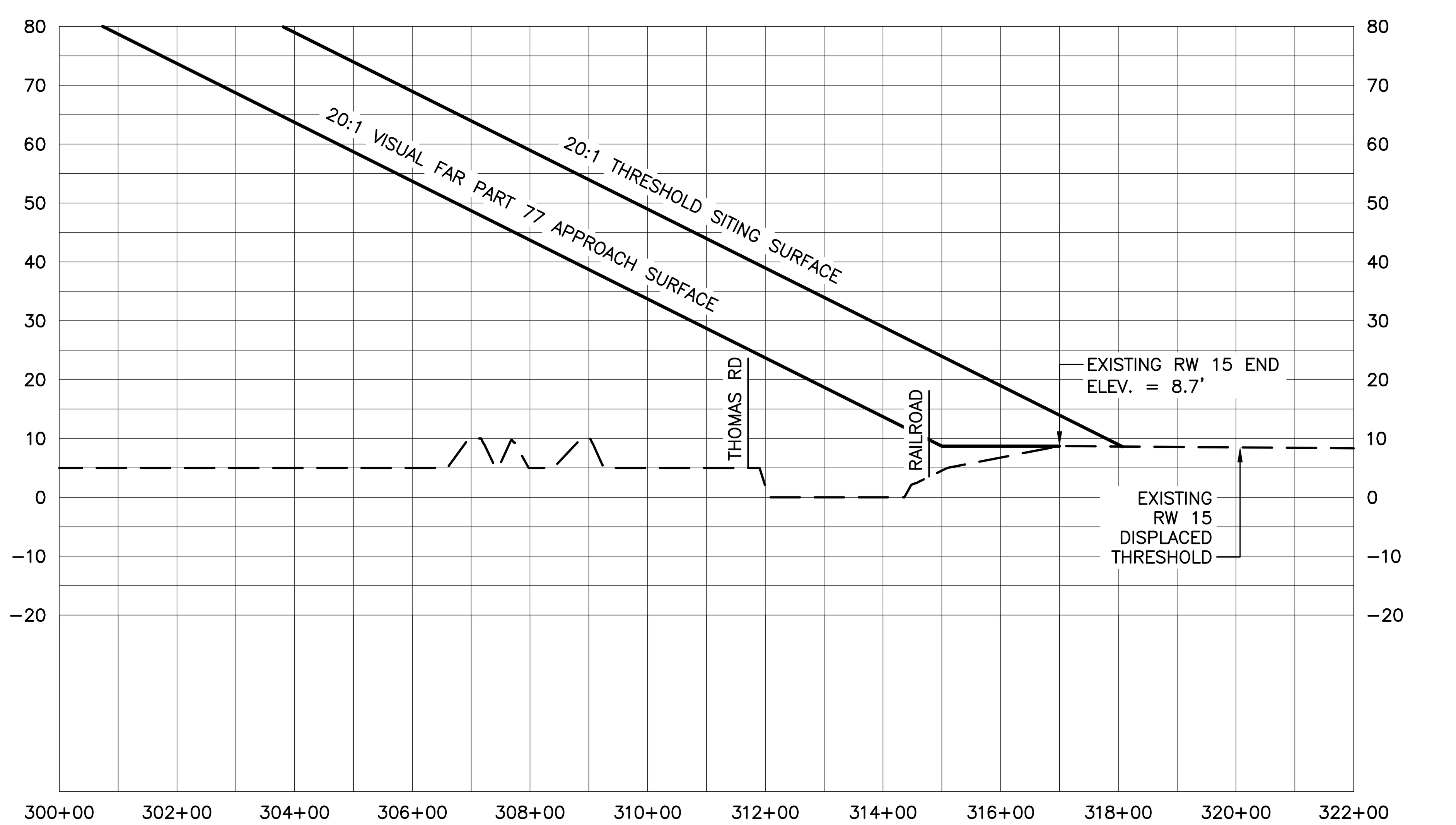
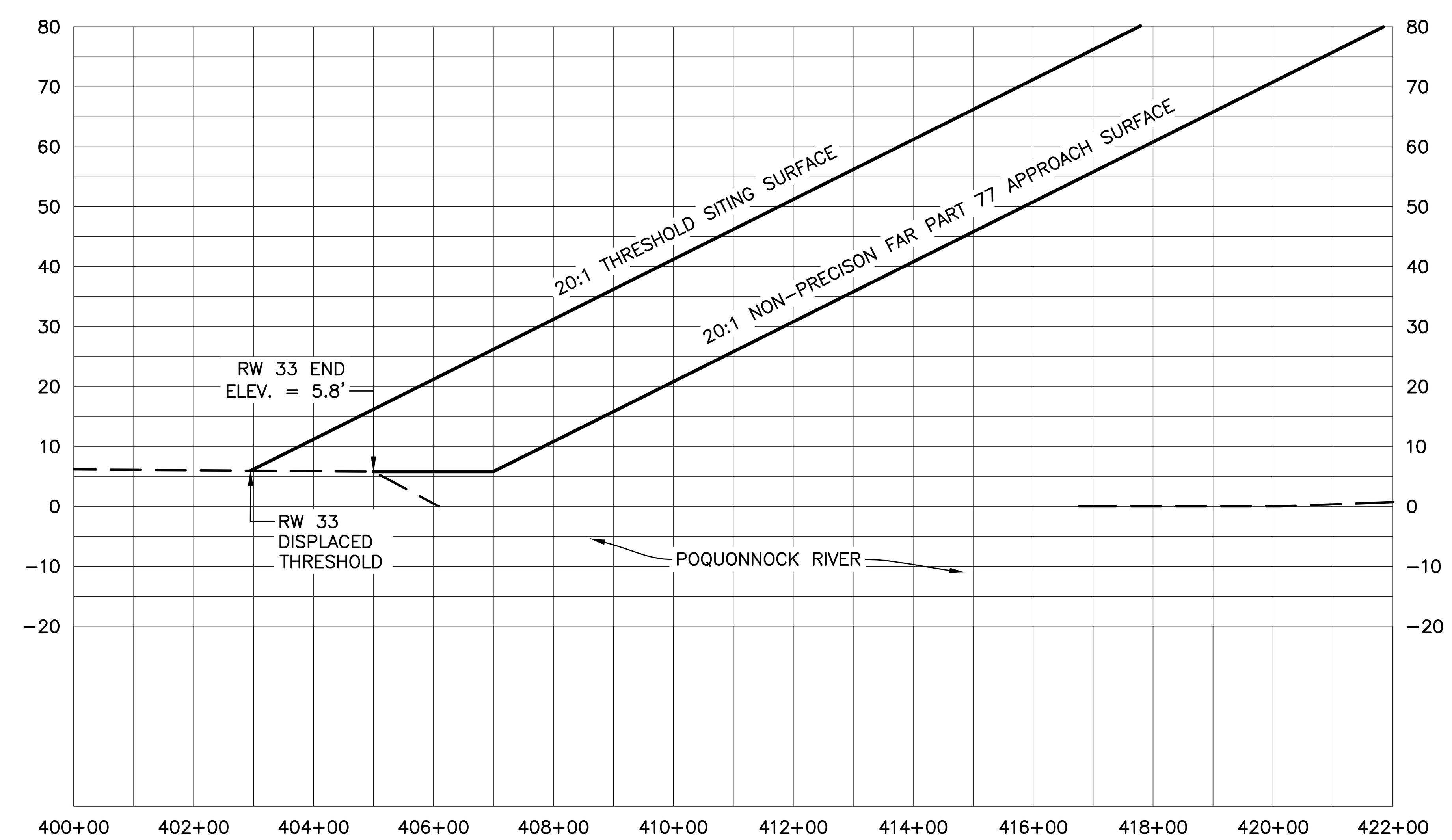



VERTICAL

## RUNWAY 15 END PROFILE




VERTICAL

## RUNWAY 33 END PROFILE

Stantec
Stantec Consulting Services Inc.
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Consultants

Legend

Notes
DECLINATION = 14°16'W CHANGING BY 0°2' EACH YEAR NOV. 2011

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GROTON-NEW LONDON AIRPORT
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AIRPORT MASTER PLAN UPDATE
GROTON, CONNECTICUT

Title
RUNWAY 15-33 APPROACH PLAN AND PROFILE

Project No. 195210216
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Sheet 6 of 8
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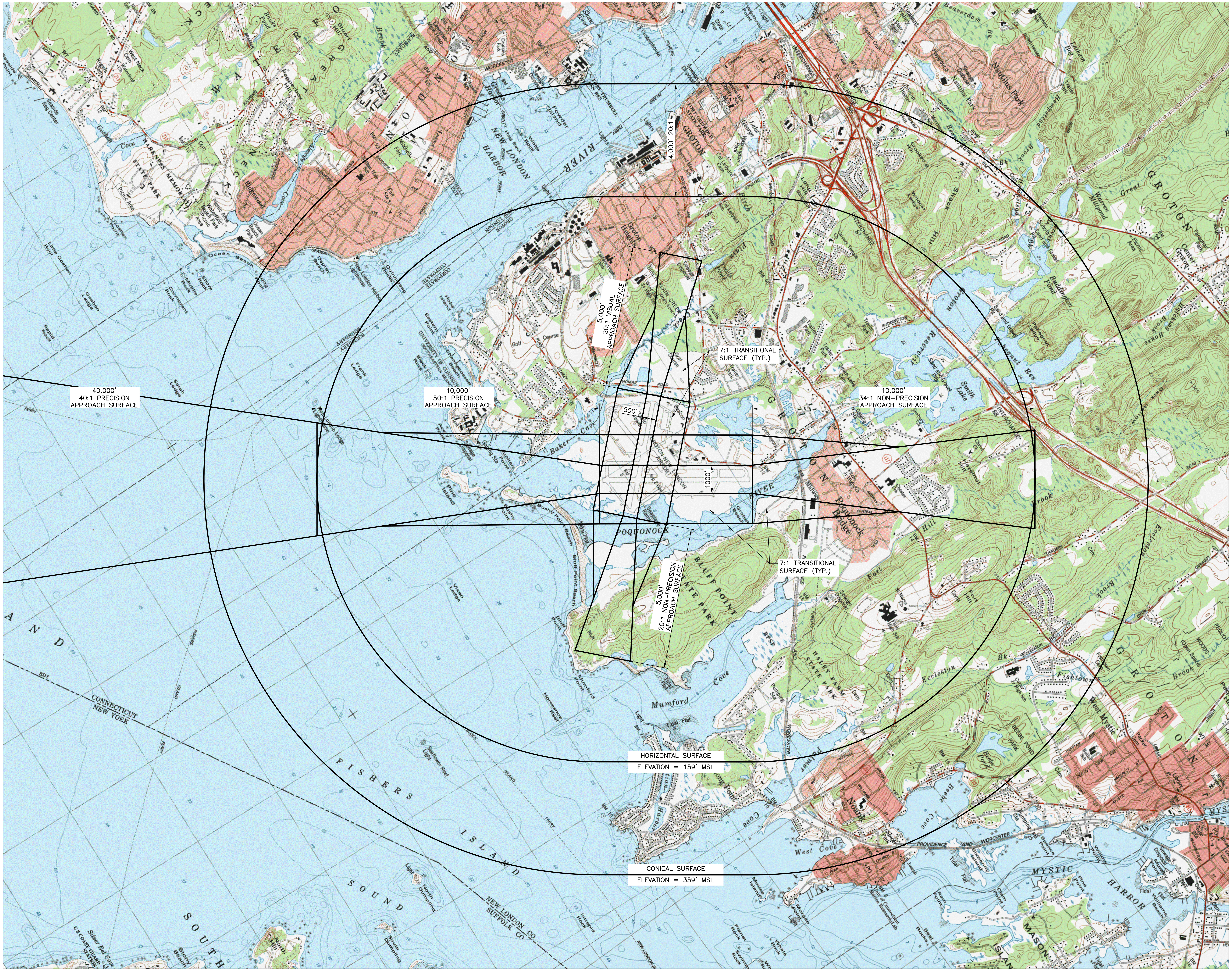


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GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007

AIRPORT MASTER PLAN UPDATE

GROTON, CONNECTICUT

Title

FAR PART 77 IMAGINARY SURFACES PLAN

| Project No. | Scale |
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| 195210216 | 1"=1500' |

| Drawing No. | Sheet | Revision |
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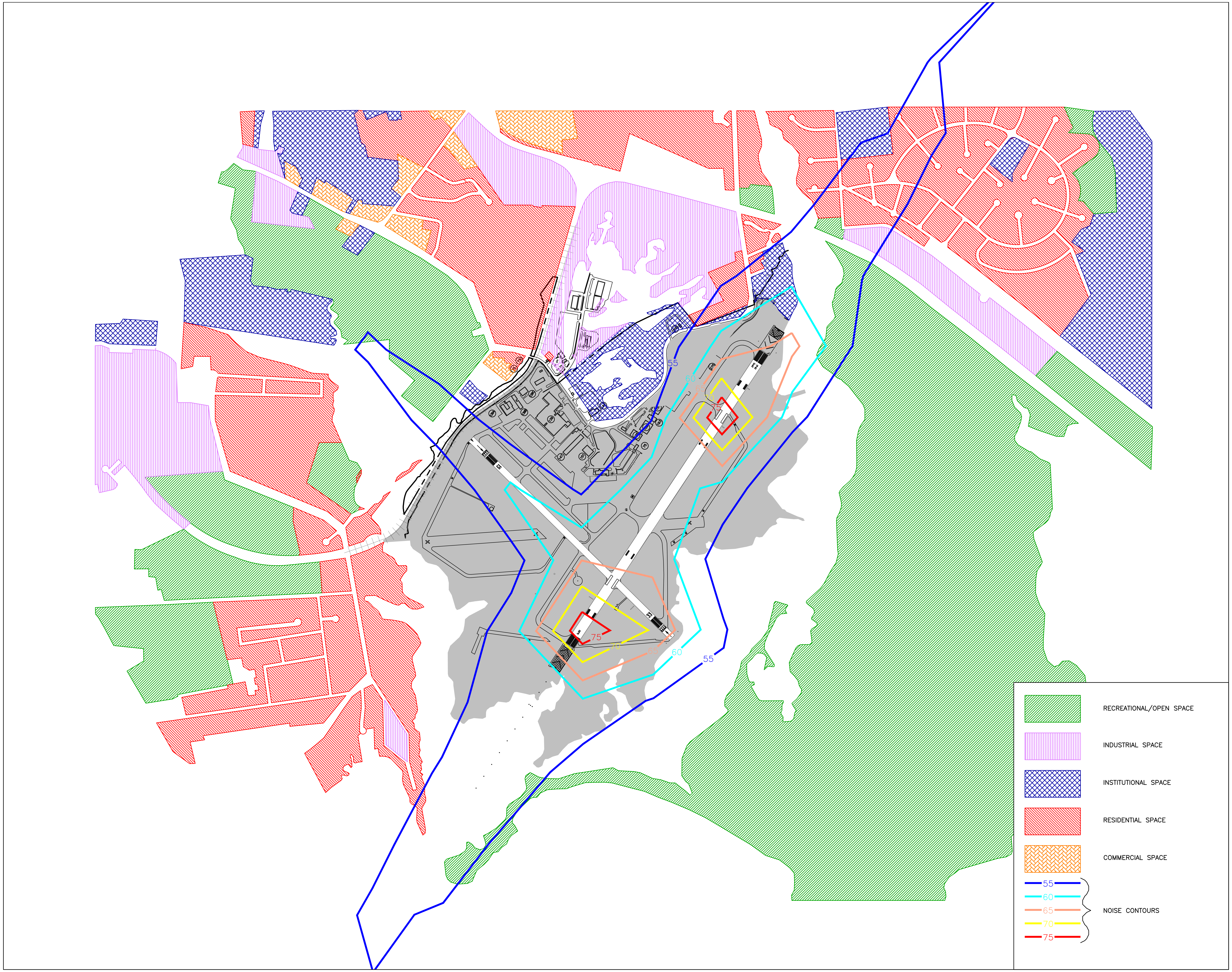


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Legend

Notes
DECLINATION = 14°16'W CHANGING BY 0°2' EACH YEAR NOV. 2011

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GROTON-NEW LONDON AIRPORT
A.I.P. NO. 3-09-0009-24-2007
AIRPORT MASTER PLAN UPDATE
GROTON, CONNECTICUT

Title
LAND USE PLAN

Project No. 195210216
Scale 1"=600'

Drawing No. 8
Sheet 8 of 8
Revision 0

# CHAPTER 7 - ENVIRONMENTAL OVERVIEW

## OVERVIEW

This chapter presents an overview of the environmental conditions on and immediately surrounding the Groton-New London Airport (GON) and highlights the potential impacts associated with the recommended airport development plan which is the Minimum Build Alternative, as described below and depicted in Figure 7.1 entitled "Preferred Terminal Area Alternative". This was previously discussed in the Alternatives Chapter (see Table 5.5, Preferred Alternatives, page 133). The environmental information presented herein is adequate to satisfy the requirements of the Federal Aviation Administration's (FAA) Airport Master Plan Update (AMPU) process. However, it does not meet the level of detail and coordination that is required under the provisions of the National Environmental Policy Act of 1969 (NEPA). At the time of project implementation, an appropriate level of environmental analysis to satisfy NEPA will be completed. That documentation effort would update and build upon the information presented herein, and would involve detailed coordination with federal, state, and local environmental agencies. By addressing agency concerns, necessary approvals and permits can be effectively secured for the proposed development, thereby allowing project construction to proceed.

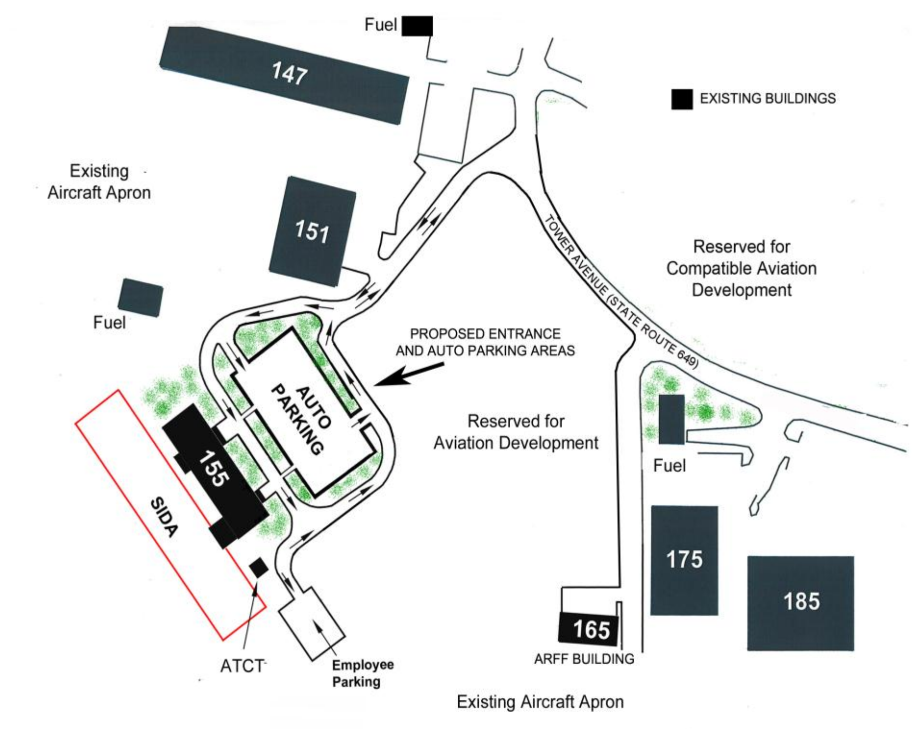



**Figure 7.1 - Preferred Terminal Area Layout**

### RECOMMENDED ALTERNATIVE

The Minimum Build Alternative is the recommended alternative in the AMPU. This alternative involves reserving an area to the northeast of the existing surface parking lot and terminal building for "as yet to be defined" aviation development and reserving a second area north-northwest of Tower Avenue for "as yet to be defined" compatible aviation development. The alternative assumes that there may be future demand for additional hangar and/or other related aviation business development that will exceed areas currently in use or under lease, but not to the point where a full airport build out is required. It allows for minimum development in the existing central terminal area. The location, size, and orientation of potential new buildings, automobile parking, entrance roads and other infrastructure most likely will be developed and based on actual demand, developer wishes, and lease negotiations in the future. Therefore, the focus of the Minimum Build Alternative impact assessment contained herein is on the two land areas reserved for development. It is important to note that an assessment of potential permits that may be required for development in these areas is speculative at best at this planning stage. As development concepts emerge, the nature and extent of permit requirements will become increasingly more evident.

#### RESOURCE OVERVIEW AND IMPACT ASSESSMENT

This overview and impact assessment of the recommended alternative was prepared following the guidelines of FAA Order 5050.4B, "*National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects,*" which requires, with one exception, a review of each of the following categories:

- Air Quality
- Coastal Barriers
- Coastal Zone
- Compatible Land Use
- Construction Impacts
- Aircraft Noise
- Social and Induced Socioeconomic Impacts
- Water Quality
- USDOT Section 4(f)
- Cultural Resources
- Biotic Communities
- Threatened and Endangered Species
- Secondary and Cumulative Impacts
- Light Emissions
- Natural Resources & Energy Supply
- Farmland
- Wetlands
- Floodplains
- Solid Waste
- Wild and Scenic Rivers
- Climate Change/Sea Level Rise[1]

[1] Climate Change/Sea Level Rise was added to the list of topics considered per a request made at a public meeting held during the airport planning process. Covering this topic is important now as it will also be a required component of future NEPA documentation.

Environmental categories of greatest concern at the airport are described in greater detail herein. Information was obtained through a combination of field investigations, agency coordination, and review of existing studies that have been conducted either at GON over the past decade (2000-2010) or that have relevance to the Minimum Build Alternative project study area. Studies and documents that were reviewed include:

- *Groton-New London Airport Runway 5-23 Safety Area Improvements: Final Environmental Impact Statement (2004)* – CTDOT State Project 58-280
- *2006 Ornithological Surveys and Habitat Assessments: Groton-New London Airport* by Mark Szantyr (July, 2007)
- *2006 Rare Plant Survey and Plant Community Classification: Groton-New London Airport* by William H. Moorhead III (September, 2007)
- *2006 Soil/Wetland Delineation Report: Groton-New London Airport* (Parsons, July, 2007)
- *Facing Our Future: Infrastructure Adapting to Connecticut's Climate Change* (CTDEEP, March 2009)
- Meeting minutes/session summaries and MS PowerPoint presentations given by various speakers at the Groton Climate Change Adaptation Workshops held during three sessions from December 2009 through June 2010.
- *Coastal Adaptation Plan for the Town of Groton, Connecticut* (2010)
- *Preparing for Climate Change in Groton, Connecticut: A Model Process for Communities in the Northeast (April 2011)*[2]

Digital Geographic Information System (GIS) data maintained by the Connecticut Department of Energy and Environmental Protection (CTDEEP) as well as aerial imagery and assorted hard copy and digital maps were also consulted as part of this environmental review.

The sections that follow provide a summary of future required analyses, potential impacts, and anticipated permits regarding the recommended alternative.

## *AIR QUALITY*

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six air pollutants (i.e., ozone, carbon monoxide, particulates, sulfur dioxide, nitrogen dioxide, and lead). States must identify geographic areas, termed

[2] Available at http://www.groton-ct.gov/depts/plandev/docs/Final%20Report_Groton%20Coastal%20Climate%20Change%20ProjectJP.pdf

"nonattainment" areas, which do not meet the NAAQS. Areas that meet the NAAQS are termed "attainment" areas.

Federal regulations specify that an air quality analysis is not required if the project is located within an attainment area, and at a general aviation airport with less than 180,000 forecast operations. If these criteria are met, it is concluded that the proposed project would not cause significant air quality impacts.

The EPA classifies all of Connecticut as a Moderate Nonattainment Area for 8-hour ozone. New London County is in attainment for all other pollutants monitored by the EPA. Therefore, an air quality analysis would potentially be required during NEPA documentation for the development that occurs within the reserved land areas identified in the Minimum Build Alternative, as increases in emissions due to automobile traffic and/or building exhaust may result.

### *COASTAL BARRIERS*

Bluff Point State Park, located to the east of GON, includes a barrier beach and bluffs and is considered an important undeveloped coastal barrier. Future development at GON in the reserved land areas identified in the Minimum Build Alternative, however, will have no adverse impact to this important coastal barrier resource. Therefore, no further coordination or assessment of impacts to coastal barriers will be required during NEPA or subsequent permitting stages for the Minimum Build Alternative.

### *COASTAL ZONE MANAGEMENT PROGRAM*

The Coastal Zone Management Act (CZMA) and the National Oceanic and Atmospheric Administration (NOAA) provide procedures for ensuring that a proposed action is consistent with approved coastal zone management (CZM) programs. If the coastal zone is located in a state with an approved CZM program, the proposal requires a determination from the State as to the consistency with said program.

The GON airport is located entirely within Connecticut's designated coastal boundary, as defined by section 22a-94 of the Connecticut General Statues (CGS). Therefore, any projects undertaken at the airport are subject to the provisions of the Connecticut Coastal Management Act (CCMA), CGS sections 22a-90 through 22a-112. All activities at or waterward of the high tide line and/or in tidal wetlands would require permits from the CTDEEP Office of Long Island Sound Programs (OLISP) in accordance with CGS sections 22a-361 and 22a-32, respectively.

Coastal resources in the vicinity of GON include:

- Estuarine embayments - south and east
- Tidal wetlands - along the periphery of the airport property

- Freshwater wetlands - north and west
- Beaches – east and southeast
- Shorelands – north and west
- Coastal flood hazard areas – essentially the entire airport
- Nearshore waters – south

GON lies on a coastal peninsula bordered to the east and southeast by the Poquonnock River and Baker Cove to the south and southwest. Both of these bodies of water are estuarine embayments, which are protected coastal bodies of water with an open connection to the sea. These estuarine embayments connect to the Fisher's Island Sound estuary. Baker Cove and the Poquonnock River are both designated as hard clam (*Mercenaria mercenaria*) shellfish concentration areas. These geographic areas support and produce significant concentrations of shellfish that are of recreational and commercial value. The Poquonnock River is designated by the CTDEEP as an "Approved" recreational shellfishing area. Baker Cove, however, is closed to recreational shellfishing. The shellfish beds within Baker Cover are designated by the CTDEEP as "Conditionally Restricted Relay" beds. These beds are leased by commercial shellfisherman, who must first remove or relay their harvest to approved waters for natural cleansing before their harvest can be made available for market consumption.

Coastal tidal marshes line the edges of the airport property, with the southerly Baker Cove/ Poquonnock River area having the largest concentration of tidal wetlands. North of Runway 23, there is an 8-15 foot wide strip of low salt marsh along the Poquonnock River, with an elevation change of 8 to 10 feet from the shoreline to the upland. Large rip-rap is located along much of the Poquonnock River shoreline along the airport property's eastern edge. Located south of Runway 5 is an extensive area where low salt marsh transitions to high salt marsh.

A freshwater wetland comprised of forested and scrub shrub vegetation interspersed with smaller areas of open water is located to the north-northwest of Tower Avenue. This inland wetland, which is described in more detail below, is located in close proximity to the land area reserved under the Minimum Development Alternative for compatible aviation development.

The Minimum Development Alternative could potentially affect coastal resources. In particular, areas of impervious surface can generate freshwater runoff. If not properly managed and treated, this runoff could impact the quality of an adjacent freshwater wetland (described in a subsequent section of this memorandum) or could even impact nearby tidal wetlands depending on the location of the discharge outfall. The alternative will be subject to CAM review by the CTDEEP OLISP.

## *COMPATIBLE LAND USE*

### *On Airport*

The Groton-New London Airport is located in the Town of Groton and abutting the boundary with the City of Groton. The airport is on a peninsula and all of the land on the airport property is occupied for aircraft related uses with the exception of a pocket of undeveloped freshwater wetlands located north-northwest of Tower Avenue. Runways and taxiways occupy the southern tip and eastern half of the airport property with one north/south runway and one east/west runway. These runways and adjacent taxiways abut waterways including Baker Cove and the Poquonnock River. The northwest corner of the airport includes hangars, aircraft parking and related buildings, including maintenance buildings, charter facilities, aircraft sales, safety and rescue training facilities, and a Connecticut National Guard Aviation Maintenance complex.

### *Off-Airport*

The existing Groton-New London Airport is situated on the Connecticut coast at Long Island Sound and is surrounded on the southwest, south, and east by Baker Cove, the Sound, and the Poquonnock River respectively. Land to the east across the river from the airport is the 760 acre Bluff Point Coastal Reserve State Park including the public–access Bushy Point Beach. The park is only accessible on foot. The City of Groton lies immediately to the west and land uses adjacent to the airport in the City are predominantly single-family residential. Other land uses of note in this area include the University of Connecticut at Avery Point on the Avery Point peninsula, the Shennecossett Beach Club and Golf Course, and a mobile home park with approximately 240 homes. Land to the north of the airport is a mix of activities typical of long-established urban and suburban communities. Development abutting the airport to the north and northwest is a business/office park, a rail line, and residential subdivisions further north. Within two miles of the airport are Pfizer Pharmaceuticals and General Dynamics/Electric Boat Defense manufacturing plants. Other uses of note in the vicinity include a town ball field and boat launch to the northeast of the airport, several schools, a daycare, a cemetery and several places of worship.

### *Development Policies*

The airport falls within the planning regions addressed by a) the State *Conservation and Development Policies Plan for Connecticut (2005-2010)* (the C&D Plan) b) the *Regional Plan of Conservation and Development 2007* for the southeastern Connecticut region (SECCOG, October 17, 2007) and c) *Groton 2002 Plan of Conservation and Development* (Groton Planning Commission, February 2002). These plans each articulate a vision, goals, and objectives for future land use and overall development within their respective planning regions. Relevant key elements of these reports are summarized below.[3]

---

[3] There is also a SECCOG Long Range Regional Transportation Plan FY 2011-2040. That is not a development policies plan per se and are therefore not referenced it in this report. The SECCOG LRTP plan does not call

The C&D Plan contains growth management, economic, environmental quality, and public service infrastructure guidelines and goals for the State of Connecticut. It contains six "growth management principles" intended to better integrate a variety of state planning functions. The overall strategy of the C&D Plan is to reinforce and conserve existing urban areas, to promote appropriate, sustainable development, and to preserve areas of significant environmental value. The Locational Guide Map which accompanies the CD Plan provides a geographical interpretation of the State's conservation and development policies.

According to the C&D Plan's Locational Guide Map, the Groton-New London Airport peninsula falls within a Conservation Area with Neighborhood Conservation areas to the north and west and Preservation Areas to the south and east. Typically, the Conservation Areas are "planned for the long-term management of lands that contribute to the state's need for food, water and other resources and environmental quality by ensuring that any changes in use are compatible with the identified conservation value." The Neighborhood Conservation areas are significantly built-up and well populated areas but without the infrastructure, density, and diverse income characteristics of an urban based regional center. The state strategy for a Neighborhood Conservation Area is to maintain these stable communities and support intensification of development when "supportive of community stability and consistent with the capacity of available urban services". Finally, Preservation Areas are intended to protect significant resource, heritage, recreation, and hazard-prone areas by avoiding structural development, except as directly consistent with the preservation value.

The *Regional Plan of Conservation and Development 2007* for southeastern Connecticut includes a map of proposed future land use based on policies defined in the plan text. The Groton-New London Airport peninsula is identified as an area of "Existing Institutional Uses" and is proposed to remain in that use. It is surrounded by "Existing and Proposed Urban Uses" except for the state park which is categorized as "Existing Recreation and Open Space Uses". The areas of institutional use in the plan include public and private institutional uses that are expected to remain such as "governmental, military, correctional, educational and medical facilities". The plan's urban areas are recommended for "the most intensive residential and/or industrial and commercial development". These areas include the region's urban centers as well as concentrations of intensive development in village and town centers. The plan states that "where feasible, these areas should be looked to for the location of compact, transit accessible, and pedestrian-orientated mixed use". Recreation and open space areas in the plan include existing preserved open space such as Bluff Point Coastal Reserve State Park which should remain as such in the future.

out anything specific to the airport – other than summarizing the work being done for the AMPU, the Wildlife Hazard Mitigation and the EMAS.

The SCCOG *Regional Plan of Conservation and Development 2007* concludes with a set of goals, objectives, and recommended actions. Transportation-related goals, objectives, and recommendations include:

- Goal - Create a balanced regional transportation system that strives to meet the needs of all segments of the population, including tourists, regardless of age, income or disability, and which promotes responsible development within the region's core.

- Objective 3- Regional transportation systems, which are planned and budgeted for within the context of fiscal constraint Recommended Action 10 - Support actions to improve service levels and the use of Groton-New London Airport.

The most recent plan of conservation and development for the Town of Groton is the *Groton 2002 Plan of Conservation and Development*. It is organized around a series of themes including conservation, development, and infrastructure. The transportation system is addressed as part of the infrastructure theme. The overarching goal is to enhance the transportation system. The plan notes that, as of 2002 "the airport is recognized as an underutilized asset and the airline operations there have not been well developed." It also notes that "While the airport continues to provide a valuable service to area residents and businesses, activities at the airport tend to be controversial since about half of its operations involve flight paths over residential areas. Due to the potential impacts (both positive and negative) on local residents and businesses, activities at the airport should be closely monitored." Recommendations relative to the airport include:

- Continue to closely monitor activities at the airport due to the potential impacts (both positive and negative) on local residents and businesses.

- Undertake partnerships with the airport and CTDOT to enhance the economic potential of the airport facilities.

The Minimum Build Alternative was developed as part of a comprehensive planning process coordinated closely with an advisory committee, the town, and the public. The alternative is compatible with all of the development plans and policies identified and described above. The alternative is not expected to directly contribute to fleet mix changes, nor will it affect the number of aircraft operations at the airport. It will not precipitate air traffic changes, or new approaches made possible by new navigational aids, or anything that could potentially affect or exceed existing aircraft noise thresholds experienced in surrounding areas. As described above, the development that could potentially occur under the Minimum Build Alternative in the designated reserved land areas may be driven by future demand for aviation-related business that would exceed areas currently in use or under lease at the airport. The alternative allows for the minimum need-based development of the existing central terminal area. As such, the Minimum Build Alternative is not anticipated to result in any community disruption, relocations, or induced socioeconomic impacts.

### *Construction Impacts*

Construction projects can produce temporary environmental disturbances such as increased noise from construction vehicles and equipment, air quality impacts from dust and excessive idling of equipment and vehicles, and water quality impacts from increased sedimentation due to erosion of disturbed surfaces. Local traffic patterns and vehicle mix in the vicinity of a construction site can also be affected by detours and designated truck haul routes. Temporary utility impacts can occur as a consequence of service disruptions due to construction. These impacts can all be mitigated through careful planning and consideration, as well as through quality-focused construction supervision.

Limiting construction activities to normal daytime work hours will eliminate nighttime noise. Enforcing three-minute idling rules and using dust covers on haul trucks will help to reduce air emissions at the construction site and along haul routes.

Construction specifications for any development at GON would include Best Management Practices (BMPs) for control of erosion, sedimentation, and stormwater runoff. The airport currently operates under an existing CTDEEP Stormwater Discharge Permit and Stormwater Pollution Prevention Plan (SWPPP). However, any future development(s) at the airport would require application to the CTDEEP for a General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities associated with that development, including preparation of a SWPPP for the construction activity. The SWPPP would identify measures to avoid or minimize impacts to surface waters and groundwater at the site both during and after construction activities. The specific measures included in the plan would be determined during the design phase, and could consist of the implementation of infiltration swales, vegetated buffer strips, vegetated open channels, and/or a piped stormwater collection and conveyance system. Also, if any stormwater discharges are to be located within 500 feet of a tidal wetland, the developer is required to retain the first one inch of stormwater runoff prior to discharge. The overall goal of the plan is to minimize runoff, especially to the nearby freshwater and tidal wetlands, and to replicate pre-construction hydrology. Temporarily disturbed areas would be re-seeded with a seed mix deemed appropriate for the airport, and stabilized following construction. Post construction controls would be inspected and maintained on a regular basis.

With the standard safeguards identified above, construction impacts associated with the Minimum Build Alternative could be effectively managed and minimized.

### *AIRCRAFT NOISE*

A noise analysis was performed for this project using Integrated Noise Model (INM) version 7.0c. The software was developed for the FAA and is approved for use to estimate noise exposure around airports.

INM is a computer model that evaluates aircraft noise impacts in the vicinity of airports. It is developed based on the algorithm and framework from SAE AIR 1845 standard, which used Noise-Power-Distance (NPD) data to estimate noise accounting for specific operation mode, thrust setting, and source-receiver geometry, acoustic directivity and other environmental factors. The INM can output either noise contours for an area or noise level at pre-selected locations. The noise output can be exposure-based, maximum-level-based, or time-based. In the United States, INM is preferred model typically used for FAR Part 150 noise compatibility planning and for FAA Order 1050 environmental assessments and environmental impact statements. The INM has many analytical uses, however for this study only assessing changes in noise impact resulting from new traffic demand and fleet mix were analyzed.

Input for this study included the following:

- Layout of the airport (runway length, runway ends and runway end elevations)
- Type of aircraft using the facility (fleet-mix)
- Number of operations, both day time and night time[4]
- Flight corridors used by the aircraft for take-offs and landings, including touch-and-go operations.

The output results in noise contours, which define areas of similar noise exposure. These contours are then overlaid on a color orthorectified photo of the airport and immediate surrounding community, which depicts areas impacted by aircraft noise.

There are several different measurements used to define noise exposure. The FAA has approved the use of the day-night average sound level (abbreviated Ldn) for noise compatibility modeling around airports. Ldn represents the average sound level in A-weighted decibels (sound exposure adjusted for the response of human hearing) for a 24-hour period. The Ldn metric also approximates the response to nighttime noises by adding 10 decibels to all noise events (aircraft operations) between 10 pm and 5:59 am.

The FAA also provides guidance for recommended land uses within specific noise exposure areas (areas within defined Ldn contours). Below 65 Ldn, all land uses are considered compatible. Above 65 Ldn, the compatibility of land uses depends on a variety of factors, including the Ldn at a specific location, type of land use, construction standards such as

[4] For INM, nighttime is between 10 pm and 7 am.

sound insulation, manmade or nature noise barriers, land use controls such as zoning or easements, and ambient noise levels.

While local communities generally do not have authority to regulate the type or time of aircraft operations at the airport without complex studies and analysis, the FAA guidelines[5] provide tools for local municipalities to develop compatible land uses surrounding airports. Because the guidelines are fairly extensive they are not included in this document, but are available over the Internet through the Government Printing Office's website.[6]

The distribution of the noise pattern calculated by INM is a function of the number of aircraft operations during the evaluation period, the types of aircraft flown, the time of day of the operation, aircraft flight tracks, how frequently each runway is used for operations, and aircraft operational procedures. Variations of any of these over an extended period of time could result in discernible changes to the annual noise pattern.

In order to calculate noise contours for the future 2030 conditions, the average numbers of daily arrivals and departures by specific aircraft types were prepared for input into the INM. The fleet mix and number of annual operations for future conditions were taken from the forecast of future conditions analysis completed earlier in this study.

The noise analysis included 50,424 aircraft operations in the 2030 calendar year. Of these approximately 2%, or 1024 were allocated to night time operations. When divided by 365 days, the average annual daytime operations equal 138 arrivals and departures. Of these 2.8 operations occur, on average between the hours of 10 pm and 5:59 am. Table 7.1 summarizes the future aircraft operations by aircraft category.

**Table 7.1. Forecasted Day/Night Operations by Fleet-Mix in Year 2030**

| Aircraft Category | Day Time | Nighttime | Total | Percent |
|---|---|---|---|---|
| General Aviation Single Engine Prop | 25,000 | 114 | 25,114 | 50% |
| General Aviation Multi Engine Prop | 5,200 | 50 | 5,250 | 10% |
| General Aviation Jet | 17,200 | 800 | 18,000 | 36% |
| Military | 500 | 20 | 520 | 1% |
| Helicopter | 1,500 | 40 | 1,540 | 3% |
| **Total** | **49,400** | **1,024** | **50,424** | **100%** |

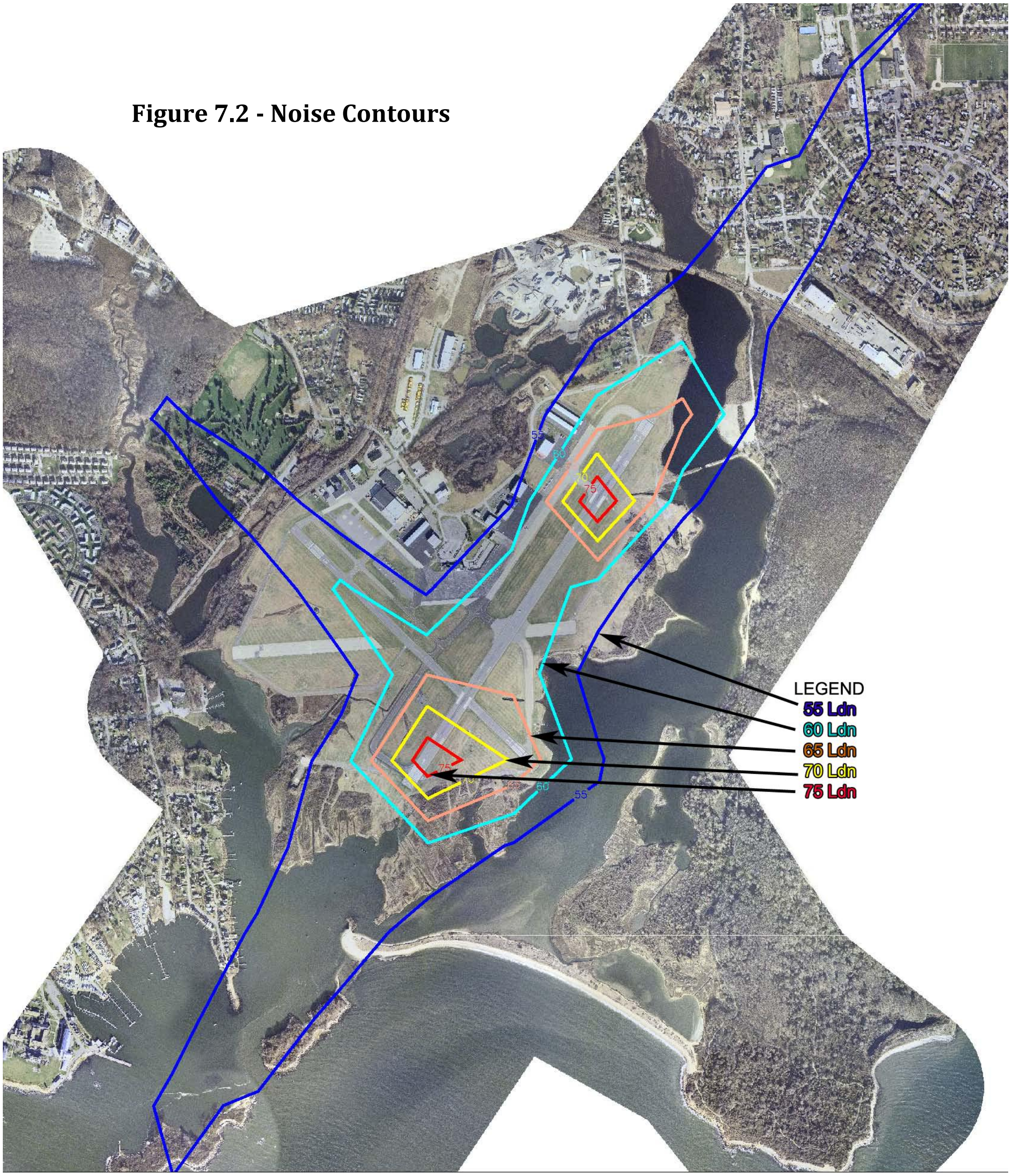
[5] 14 CFR Part 150, Airport Noise Compatibility Planning

[6] http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl

The number of forecasted operations was taken from Chapter 3, Forecasts of Aviation Activity (see Table 3.10, page 73). Flight corridors developed earlier in the master plan process (see *Aircraft Arrival and Departure Routes*, page 26).

The Land-Use Plan shown in Figure 7.2 (next page) presents the 55 through 75 Ldn contours overlaid on an orthorectified aerial photograph of the airport and immediate surrounding community. An analysis of incompatible uses was performed by identifying land areas within the various noise exposure areas. The 65 Ldn and higher contours all rest well within the airport boundary. As noted in Figure 7.2, only the 55 and 60 Ldn contours extend off airport.

**Figure 7.2 - Noise Contours**



The 60 Ldn exposure area extends off the approach end of Runway 23 a short distance, near Karen Avenue, but exclusively over undeveloped land. The 55 Ldn extends:

- Beyond the approach end of Runway 23 across the Poquonnock River, the railroad tracks and into a residential area referred to as Midway Oval Park.
- Off the approach end of Runway 15, across Thomas Road and over the Birch Plain Golf Course.
- Beyond the approach end of Runway 5 over the tip of Jupiter Point Road, and parts of uninhabited Bushy Point, and Pine Island.

There is an aircraft Noise Compatibility Program in effect at the airport. This Program was developed by the Connecticut Department of Transportation and the Groton-New London Airport Advisory Committee in accordance with the provisions and procedures of Federal Aviation Regulation - Part 150. The procedures listed are mandatory, consistent with the safe operation of aircraft, and part of the Noise Compatibility Program for the Airport. The mandatory flight procedures include the following:

- Departing Runway 5 - Turn left heading 020º until clear of the Groton reservoir or until leaving 1000' MSL, before proceeding on course.
- Departing Runway 23 - turn left heading 210° until clear of Pine Island or until leaving 1000' MSL, before proceeding on course.
- Departing Runway 33 - Maintain runway heading until clear of the Westside School or leaving 1000' MSL. Landing Runway 5 - Left traffic, extend downwind to avoid Avery Point.
- Touch-and-Go Operations – Restrictions
    - Aircraft operators are encouraged to refrain from touch-and-go operations between the hours of sunset and 8:00 a.m.
    - No touch-and-go operations are permitted by any aircraft operator between the hours of 10:00 p.m. and 6:00 a.m.
- Preferential Runway Use Program - Runway 23 is designated Calm Wind runway and is to be used under as many calm and light wind conditions as possible to minimize flight over noise sensitive areas north of the Airport.

### *Social and Induced Socioeconomic Impacts*

Social and induced socioeconomic impacts are typically defined by disruptions to surrounding communities, such as shifts in patterns of population movement and growth, changes in public service demands, loss of tax revenue, and changes in employment and economic activity stemming from airport development. These impacts may result from the closure of roads, increased traffic congestion, acquisition of business districts or neighborhoods, and/or by disproportionately affecting low income or minority populations.

Development anticipated under the Minimum Build Alternative at GON does not have the potential for these types of broad impacts. There will be no impacts to housing that would result in the relocation of residents; no impacts or relocation of businesses that would create severe economic hardship on the community; no substantial loss to the community tax base; and only minor disruption of local traffic along Tower Avenue is anticipated during project construction. Past FAA studies have identified that social and induced socioeconomic impacts are not normally significant unless substantial impacts are anticipated in other categories (e.g., noise, land use, property acquisition), and this would not be the case with the Minimum Build Alternative at GON.

## *WATER QUALITY*

### *Surface Water Resources*

The airport property is located within the Southeast Coastal Drainage Basin. According to CTDEEP Surface Water Quality Standards (February 25, 2011), the Poquonnock River, which forms the northeast boundary of GON is classified as a Class SA surface water resource. Class SA surface waters are saline and are known or presumed to meet specific defined water quality criteria for Class SA waters that support several designated uses, including: Habitat for marine fish, other aquatic life and wildlife; shellfish harvesting for direct human consumption; recreation; industrial water supply, and navigation. Discharges to Class SA waters may be permitted by the Commissioner of CTDEEP from public and private drinking water treatment systems; and from dredging activities and dredge material dewatering operations, including the discharge of dredged or fill materials and clean water discharges.[7] Other discharges to Class SA waters may be authorized by the Commissioner of CTDEEP provided the Commissioner finds such discharge to be of short duration and is necessary to remediate potential surface or groundwater pollution. Any such discharge shall be treated or controlled to a level which in the judgment of the Commissioner; protects aquatic life and public health. These other discharges may include the discharge of treated domestic sewage so long as the domestic sewage discharge meets or qualifies for one of five specific criteria defined for Class A and SA surface waters discharges defined in CTDEEP surface water standards.

The southerly adjoining Baker Cove has a state water quality classification of Class SB. Designated used for Class SB surface waters are similar to Class SA designated uses with the exception that shellfish cannot be harvested for direct human consumption from waters designated as Class SB. Commercial shellfish harvesting; however, can occur in

[7] This information was taken verbatim from the CTDEEP water quality standards

Class SB waters. The designated uses are defined for water quality criteria that are slightly less stringent than the criteria defined for Class A and SA waters. Discharges to Class SB surface waters include all discharges allowed for Class SA waters described above as well as cooling water discharges and discharges from municipal and industrial wastewater treatment systems. Other discharges subject to the provisions of CGS Section 22a-430 may also be allowed to Class SB surface waters.

Nearby freshwaters, including the wetland located northwest of Tower Avenue, are designated as Class A surface water resources. Designated uses for Class A waters are based on established criteria defined in the February 2011 CTDEEP Surface Water Quality manual and include the following: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture. Discharges to Class A waters are identical to those defined above for Class SA waters.

There are several known active or recently active wastewater discharges into Baker Cove. These discharges include: cooling water from Electric Boat Corporation's Research and Development Annex on Poquonnock Road (into Birch Plain Creek); cooling water from Arwood Corporation; and Groton-Trumbull sewage treatment plant. The sole discharge into the Poquonnock River is backwash from the Groton Water Department's filtration facilities located upstream from the airport.

### *Groundwater Resources*

The entire airport property is underlain by groundwater that is designated as Class GB according to the CTDEEP Groundwater Quality Standards (2011). Class GB groundwater is found in areas that have a long history of urban or industrial activity. These areas are serviced by public water supply systems. The CTDEEP assumes the underlying groundwater to be degraded due to a variety of pollution sources; as such, no specific groundwater quality criteria apply. Designated uses of Class GB groundwater include: Industrial waters and cooling waters; and baseflow for hydraulically connected surface water bodies. Groundwater with a Class B designation is presumed not suitable for human consumption without treatment.

### *Potential Water Quality Impacts*

Because proposed development activities associated with the Minimum Build Alternative are in close proximity to a Class A surface water resource (the wetland area located northwest of Tower Avenue), any construction activity to implement the Minimum Build Alternative has a moderate potential to impact the water quality of that wetland system. Therefore, project designs will be developed according to the guidelines contained in the CTDEEP *Stormwater Quality Manual* (2004) as well as with the *2002 Connecticut Guidelines for Sediment and Erosion Control*. BMPs for control of erosion, sedimentation, and stormwater runoff would be incorporated into project construction specifications. Additionally, because construction of the Minimum Build Alternative is likely to disturb more than one acre of land area, a *General Permit for Stormwater and Dewatering Wastewaters from Construction Activities* will be required by the CTDEEP and an associated Stormwater Pollution Prevention Plan (SWPPP) would be required. The SWPPP would include a description of the erosion and sedimentation controls to be used on the site, the management of dewatering wastewaters, and will also describe all measures that would be installed to ensure post construction stormwater management as new impervious surfaces are likely to be created with the Minimum Build Alternative which could potentially be a source of contaminants. The plan would also address the disposal of waste at the site, and described practices to be followed to minimize off-site vehicle tracking of sediments and the generation of dust.

## *USDOT SECTION 4(F)*

The US Department of Transportation Act of 1966 prevents transportation projects from developing or taking publicly owned land from public parks, recreational areas, designated wildlife or waterfowl refuges, or historic sites of national, State, or local significance unless there are no feasible alternatives, and planning to minimize harm and mitigation measures have been incorporated.

Although there are several 4(f) properties in the vicinity of the airport, such as Bluff Point State Park located east of the Poquonnock River, the Minimum Build Alternative will have no direct impacts to these protected resources. Additionally, the development associated with the Minimum Build Alternative is also not anticipated to result in any constructive use of Section 4(f) resources.

## *CULTURAL RESOURCES*

A review of the 2010 National Register of Historic Places (NRHP) revealed that there are no listed historic properties or districts located along either side of Tower Avenue near the main entrance to GON. These areas are identified in the Minimum Build Alternative for future aviation or compatible aviation development. The area east of Tower Avenue is partially developed as a surface parking lot for the airport terminal and therefore is disturbed. The remaining land area adjacent to the surface parking lot is mowed/maintained lawn. The area northwest of Tower Avenue is comprised of a mowed/maintained field and freshwater wetland.

Although previous archaeological studies conducted for the Groton-New London Airport Runway Safety Area EIS determined that there are prehistoric archaeological sites on the airside portion of the airport property near the ends of Runway 5-23, no archaeological sites have been identified in the two “reserved” development areas located along Tower Avenue. Despite no listed or eligible cultural resources in these areas, further consultation with the Connecticut State Historic Preservation Office (SHPO) and an on-site archaeological survey of the Minimum Build Alternative land areas may be required once a development concept for these locations is established. The survey would aide in the determination of whether sensitive cultural resources are present and whether or not there is a potential for impacts. However, at this stage of airport planning, there appears to be no impact to cultural resources from the Minimum Build Alternative.

### *BIOTIC COMMUNITIES*

As mentioned at the outset of this memorandum, the airport has been the subject of extensive environmental investigations during the past decade. These investigations were performed to 1) support the Runway Safety Area EIS, which culminated with the recommendation to install an Engineered Materials Arresting System (EMAS) at each end of Runway 5-23, and 2) to support permit documentation required to implement EMAS. EMAS was installed on the Runway 5 and 23 ends. These studies helped characterize the variety of biotic communities found on the airport property.

The perimeter of the airport property is comprised of tidal marshes, grasslands and scrub-shrub areas. The interior of the airport property consists of paved taxiways and runways, with maintained grass throughout. The two areas on either side of Tower Avenue that have been identified for possible future aviation or compatible aviation development under the Minimum Build Alternative include the following biotic communities:

- **Maintained Lawn** – regularly mowed and maintained grass
- **Maintained Field** – open, successional field that is periodically mowed and maintained
- **Forested Wetland** – treed inland wetland area dominated by red maples
- **Non-forested Inland Wetland** – shrub and emergent inland wetland area dominated by dogwood and herbaceous species
- **Inland Open Water** – non-tidal fresh water

Development of the land areas identified in the Minimum Build Alternative would primarily impact mowed and maintained lawns and fields. Wetlands are regulated resources and are not likely to be directly impacted by development.

### *THREATENED AND ENDANGERED SPECIES*

Coordination with the United States Fish and Wildlife Service (USFWS) and the CTDEEP Natural Diversity Database (NDDB) to identify federal and state listed threatened and endangered species, state species of special concern, and critical habitats on GON property occurred on a fairly regular basis over the past decade. Coordination was conducted as part of NEPA planning and documentation efforts and permitting activities associated with

Runway Safety Area (RSA) improvements at the airport. Agency responses to this ongoing coordination effort identified the need for detailed plant and bird surveys at the airport.

From May 9, 2006 through November 7, 2006, a detailed survey of state and federally listed plant species was orchestrated by Parsons Corporation. The survey culminated in a September 2007 report by Parsons entitled, "2006 Rare Plant Survey and Plant Community Classification" A total of 54 plant species were targeted by the survey. A total of seven State-listed endangered plant species and three Special Concern plants were found to exist on the airport property. No federally listed threatened or endangered plant species were identified on GON property.

With respect to the Minimum Build Alternative, no state endangered or special concern plant species were identified in the land area to the east of Tower Avenue that is reserved for future aviation development. However, two state listed plants were found to occur on land northwest of Tower Avenue that is reserved for compatible aviation development. The plants, which include the state endangered Nuttall's milkwort (*Polygala nuttallii*), and Needlegrass (*Aristida longespica*), a state special concern plant, were found along the periphery of the large freshwater wetland system. Any development planned at this location has the potential to impact these species. Therefore, coordination will be required with the CTDEEP NDDB during subsequent NEPA and project permitting stages.

Parsons Corporation also managed a comprehensive bird survey that was performed during 2006 to establish a baseline avifaunal profile at the airport. The results of the survey are documented in a report, entitled, "*2006 Ornithological Surveys and Habitat Assessments*" for the GON property, which was completed in July 2007. The survey involved an inventory of nesting bird species and species listed by the state as endangered, threatened and special concern. The survey recorded a total of 98 species of birds and 27 species were determined to be nesting on the airport property. Of the 98 bird species identified, 19 are listed by the CTDEEP; including six endangered, three threatened, and 10 species of special concern. Of these listed birds, four are suspected of breeding at the airport. The report does not identify any nesting areas of state endangered, rare, or special concern bird species in the vicinity of Tower Avenue on the two land areas reserved for future aviation development under the Minimum Build Alternative. The report concludes that if any construction work were to occur at GON, it should be conducted during the non-breeding season.

Due to the abundance of state listed bird species found on GON property, any development planned at the airport may have the potential to impact these species. Therefore, coordination will be required with the CTDEEP NDDB during subsequent NEPA and project permitting stages. Any areas proposed to be developed will be thoroughly investigated prior to construction to ensure that no breeding is occurring in the area. Time of year restrictions on construction activities will be established as necessary to ensure no adverse impact.

### *SECONDARY AND CUMULATIVE IMPACTS*

Secondary impacts occur when one project fosters, encourages, and/or enables another project with environmental impacts. Cumulative impacts consider past, present, and reasonably foreseeable actions, based on the fact that environmental impacts can accumulate over time. Therefore, the assessment of secondary and cumulative impacts requires consideration of both spatial and temporary factors and the overall sensitivity of natural and community resources.

Major development proposals often involve the potential for induced or secondary impacts on the surrounding environment and community. Examples include: increased public service demands; shifts in population patterns, movement, and growth; and changes in business and economic activity. These changes can often result in induced impacts to natural and community resources. The recommended Minimum Build Alternative at GON is not considered to be a major development proposal. It will not change the general character of the existing airport nor will it change the character of the community within which it is located. Its overall potential to directly impact natural and community resources is considered to be minimal and manageable. Nevertheless, once a development proposal is advanced at the airport that is in keeping with the recommended Minimum Build Alternative, there will be a need to assess, in more detail as part of NEPA compliance process, the potential likelihood for the action to generate secondary and cumulative impacts. However, these impacts are anticipated to be minimal.

### *LIGHT EMISSIONS*

The Minimum Build Alternative involves setting aside land areas for potential future development should economic conditions at the airport become ripe for development. The areas are set aside for “as yet to be defined” landside aviation development and compatible aviation development that is not associated with the airfield or runway improvements. Such development is likely to include hangars, storage space, parking, and other landside amenities that are accessible to the general public. As such, the Minimum Build Alternative will not include airside lighting such as runway lighting or any other elaborate lighting systems that would include blinking or flashing lights or high intensity lights that would be considered intrusive or offensive to area residents. Instead, energy efficient fixtures would be used for parking area and facility illumination at the proposed development sites. The lights would be properly shielded to prevent light scatter, and would be directed and/or focused only on the area to be illuminated. All lighting will be “Dark Sky Compliant”.

Compared to background levels associated existing air navigation infrastructure (NAVAIDS) at GON, light emission impacts from the Minimum Build Alternative are unlikely to have an adverse impact on human activity or the use or characteristics of adjacent properties.

### *NATURAL RESOURCES AND ENERGY SUPPLY*

The Minimum Build Alternative does not include specific development concepts or plans but instead involves setting aside land areas for potential future development should economic conditions improve and airport use/activities increase. The areas set aside for "as yet to be defined" aviation development and compatible aviation development are located on either side of Tower Avenue. Development at these locations would potentially include hangars, other equipment and materials storage facilities, parking, and amenities that are accessible to the general public. The intensity of development is expected to be low and will proceed gradually over the 20-year planning period covered by this update to the GON Master Plan. Additionally, principals of environmental design, sustainability, and energy conservation are now being required on federally funded projects, in keeping with Executive Order 13123, *Greening the Government through Efficient Energy Management*. Thus, innovative measures that reduce greenhouse gas emissions and air pollution; minimize the generation of wastes; conserve water resources; and promote the use of renewable energy products are being incorporated into project and facility designs.

Although the specific types of landside development at these reserved sites remains to be defined, the developments, when incorporating the measures described above, are anticipated to have low to moderate energy requirements and therefore would not have a measurable effect on local supplies of energy or natural resources.

### *FARMLANDS*

The Natural Resources Conservation Service (NRCS) within the United States Department of Agriculture (USDA) has established guidelines under the Farmland Protection Policy Act (FPPA) for federal activities the involve directly undertaking, financing, or approving a project that would convert farmland soils. The guidelines recognize that the quality of farmland varies based on soil conditions, and places higher value on soils with high productivity potential. To preserve these highly productive soils, the NRCS classifies soil types as prime and statewide important. The NRCS requires that soils in these categories be given proper consideration before they are converted to non-farming uses by federal programs.

Although there are no active farms located on, or adjacent to the land areas set aside for future aviation development and compatible aviation development as proposed in the Minimum Build Alternative, a portion of these land areas (those areas that are not currently paved surface parking lots) do include soils identified on NRCS mapping as prime farmland soils. Proposed future development associated with the Minimum Build Alternative would therefore affect these soils. Due to their location within the airport property boundary; however, it is highly unlikely that these soils would ever be developed as active farmland.

## *WETLANDS*

Wetlands on the airport property were delineated and described in a report entitled "*2006 Soil/Wetland Delineation Report*" prepared by Parsons Corporation in July 2007. The report identified both inland wetlands and tidal wetlands on the airport property. There is one inland wetland that is located northwest of Tower Avenue and proximate to the land area identified in the Minimum Build Alternative as "reserved" for future aviation compatible development. This wetland is the only wetland on or adjacent to the airport property that could potentially be impacted by development occurring under the Minimum Build Alternative. The wetland is described by Parsons as a "Palustrine Forested/Shrub-Scrub/Emergent/Aquatic/Open Water Wetland that consists of an excavated pond/wetland separated into three areas by an access road and associated berms. The northernmost open water pond connects to offsite ponds associated with an active quarry. The other areas are isolated except for subsurface hydrologic connection." The wetland, which has a high degree of interspersion of different wetland vegetative types, has several principal functions; including wildlife habitat, production export, fish habitat, and potential threatened/endangered species habitat.[8]

The exact type of compatible aviation development that could occur next to this wetland has not yet been defined under the Minimum Build Alternative. Any improvements planned for this area would be designed to avoid direct wetland impacts to the greatest extent possible. Potential indirect impacts to this wetland could occur from sediment inputs during construction or if stormwater runoff from any new impervious areas is discharged into the wetland. Secondary impacts could also occur at this wetland from as yet to be defined adjacent development(s). Overall, potential impacts to this wetland will need to be assessed further in NEPA once a conceptual design plan for the site is developed.

## *FLOODPLAINS*

Floodplain resources are governed and regulated by Executive Order 11988. Federal agencies must take steps to avoid, to the greatest extent possible, both long term and short term impacts to floodplains. In addition, they should avoid supporting actions that directly or indirectly promote development within FEMA designated floodplains or floodways whenever there is another practicable alternative available.

The Federal Emergency Management Agency (FEMA) publishes Flood Insurance Rate Maps (FIRMs) that depict 100-year and 500-year floodplains in many areas throughout the country. A 100-year floodplain is an area that has a 1% chance of being flooded in any given year whereas a 500-year floodplain is an area that has a 0.2% chance of being flooded in a given year. A review of the most recent FIRM data (July 18, 2011) for the study area indicates that most of the airport lies within the 100-year coastal floodplain associated

[8] The information included here was taken directly from a report by Parsons Corp (referenced in the paragraph). Since an F&V assessment of this wetland was part of the scope for the AMPU, we cannot provide any more information as to other functions or values that are occurring at this wetland.

with Long Island Sound. The areas reserved for development under the Minimum Build Alternative fall mostly within the FEMA 100-year floodplain with 100-year base flood elevations determined to be 9 or 10 feet. Interviews with airport personnel conducted as part of the Runway Safety Area EIS determined that the airport is subjected to occasional flooding events during hurricanes and major nor'easters. During these events, floodwaters have extended up onto the safety areas surrounding runway end and taxiway edges. It was also revealed that during heavy rainfall events, particularly at high tide, some localized flooding occurs on some airplane parking ramps. This localized flooding also occurs along roadways leading to the airport access road (Tower Avenue) and at the roadway entrance to the terminal building. This is in the general location of the areas reserved for future development under the Minimum Build Alternative. Therefore, any development in these areas would have the potential to impact floodplain resources and could potentially effect localized flooding conditions and flood elevations. The development would need to comply with Section 25-68h-2 through 25-68h-3 of the Regulations of Connecticut State Agencies. [9]

### *SOLID WASTE*

The proposed land areas on either side of Tower Avenue that are "reserved" for potential future development under the Minimum Build Alternative are currently being used either as surface parking for the GON terminal building or are regularly mowed and maintained grassy areas or fields. An inland wetland also occupies a portion of the land area northwest of Tower Avenue as described elsewhere in this memorandum. There are no obvious signs of, or known hazardous waste areas, underground storage tanks, or other potential sources of contamination at these locations. However, an investigation of files maintained by the USEPA and CTDEEP, including Resource Conservation and Recovery Act (RCRA) files, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) files, leaking underground storage tank (LUST) files, and spill files among others should be conducted as an important confirmation step during the NEPA environmental process and subsequent permitting phases associated with any development of these sites.

Because a specific development proposal has not been identified for these two "reserved" land areas, the potential for solid waste generation, including amounts generated and methods of collection and disposal cannot be determined at this stage of the airport planning process. These issues will need to be considered and addressed once conceptual design plans are established. Regardless, any development will result in an increased output of solid waste over the existing condition. Additionally, any solid waste generated during construction will be handled and disposed of properly.

[9] Any future development recommends by or independent of this AMPU would need to comply to the referenced CT State Agency Regulations.

### *Wild and Scenic Rivers*

There are no state or federally designated wild and scenic rivers within the airport vicinity. As such, the Minimum Build Alternative will have no impacts to this resource.

### *Climate Change/Sea Level Rise*

The issue of climate change and its potential effect on sea level rise and storm frequency has been of increasing concern over the past few decades. The continued release of greenhouse gases to the atmosphere at unprecedented rates has contributed to a very gradual upward trend in global temperatures. Scientists have predicted that this global warming trend will continue indefinitely into the future unless we significantly curb our dependency on fossil fuels and reduce greenhouse gas emissions.

The effects of global warming are predicted to include a reduction of the polar ice caps leading to an increase in sea level rise, as well as a potential increase in the frequency and intensity of coastal storm events. A wide range of predictions have been put forth as to the rates and timeframe for sea level rise but there is overall agreement that sea level rise is inevitable. As such, coastal communities and entities with significant investments in, or oversight and administration of, coastal infrastructure have begun to initiate various levels of adaptation planning. The City and Town of Groton and GON are no exception, as they recently took part in a series of three climate change adaptation workshops held from December 2009 through June 2010. Due to the coastal location of GON, sea level rise could potentially affect operations at the airport in the future. The present AMPU only covers a 20-year planning horizon. Its recommended alternative, the Minimum Build Alternative, suggests “reserving” specific land areas for future aviation development should economic conditions improve and airport use/operations increase, thereby creating a need for such development. It does not recommend a full build-out of the airport property or significant outlay of expenditures at this point in time. As time passes and the need for another update to the airport master plan arrives, the issue of adaptation planning to address climate change and sea level rise will take greater precedence so that informed decisions regarding airport needs and expenditures can be made. Hopefully, in the interim, updated climate change data will be gathered and additional climate change studies will occur which will further direct the planning process not only at GON, but by coastal communities and coastal infrastructure managers worldwide. The Airport sponsor will take an active role in future planning efforts and climate change studies with local and state entities.

With respect to the Minimum Build Alternative’s potential to contribute to greenhouse gas emissions, development concepts have yet to be advanced for these “reserved” land areas. As development concepts arise, GON will advocate for the inclusion of measures to reduce greenhouse gas emissions as well as other innovative and environmentally friendly design features as applicable.

# CHAPTER 8 - IMPLEMENTATION AND FINANCIAL PLAN

## INTRODUCTION

The improvements necessary to efficiently accommodate the forecasted aviation demands for Groton-New London Airport have been placed into three phases: Phase I (Short-Term, 2010-2015), Phase II (Intermediate-Term, 2015-2020), and Phase III (Long-Term, 2020-2030).

## IMPLEMENTATION SCHEDULE AND PROJECT LIST

A list of proactive capital improvement projects has been assembled from the facility requirements documentation and recommended development plan previously presented. The project list has been coordinated with the Airport Layout Plan drawing set and the Capital Improvement Program, which is continuously updated by airport management and the Federal Aviation Administration. The projects for the first five years are listed in a general priority order. In the second and third phases (years 6-20), the projects are listed primarily as placeholders. The Groton-New London Airport's phased capital improvement program (CIP) and associated costs, entitled Development Plan Project Costs, are presented as Tables 8.1, 8.2, and 8.3 of this chapter (pages 172, 173 and 174 respectively). CTDOT/CAA will develop a CIP and airport work plan that adheres to goals and objectives specified in this Master Plan Update. Furthermore, it is anticipated that the project phasing will invariably alter as state and federal priorities evolve over the coming years.

This development plan is conservative, demand driven, and focused on the maintenance and improvement of existing facilities. It is also a solid plan that represents the Airport's best opportunity to meet the needs of Groton-New London's general aviation community. In addition, the decision to implement or construct a project will be based on such factors as need and funding availability. The ultimate success of Groton-New London Airport does not rely upon the completion of each and every capital item programmed in the development plan. To meet realistic funding expectations, it will be necessary to weigh the items of the development plan in a thoughtful and global manner.

In other words, the State may be required to selectively implement the capital items. Knowing the full scope of development possibilities enables the community to capitalize on opportunities, respond to financial realities, and select projects that are consistent with the overall planning recommendations of the Master Plan.

**Table 8.1 - Phase I (2010-2015) Airport Plan Project Costs**

| | Project Description | Total Cost (a) | State (b) | Federal (c) | Private (d) |
|---|---|---|---|---|---|
| **In general priority order** | | | | | |
| 1 | Survey and Develop LPV Approach Runway 5-23 (e) | $150,000 | | $150,000 | |
| 2 | Replace VASI with PAPI Runway 23 | $50,000 | $5,000 | $45,000 | |
| 3 | SRE Building – Expand Facility & Remodel (f) | $500,000 | $150,000 | $350,000 | |
| 4 | ARFF Building – Modernize | $50,000 | $50,000 | | |
| 5 | ARFF Equipment – Replace/Upgrade (g) | $200,000 | $200,000 | | |
| 6 | Hangars | $1,000,000 | | | $1,000,000 |
| 7 | General Permit for Stormwater and Dewatering Wastewaters from Construction Activities (h) | $10,000 | $1,000 | $9,000 | |
| 8 | Storm Water Pollution Prevention Plan for construction (h) | $100,000 | $10,000 | $90,000 | |
| | **Subtotal (Phase I)** | **$2,060,000** | **$416,000** | **$644,000** | **$1,000,000** |

**Notes**

a. Cost estimates, based upon 2011 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.
b. CTDOT; includes current airport revenues, cash reserves, state appropriateions, bonds, etc.
c. FAA AIP (Airport Improvement Program) - Unless Otherwise Noted
d. Third party funding
e. Generally funded at 100% AIP
f. Remodeling portion is not AIP eligible.
g. Not eligible for Federal funding under current airport NPIAS classification (general aviation)
h. Required prior to redevelopment of teminal area (see Chapter 7, *Environmental Overview, Potential Water Quality Impacts* )

**Table 8.2 - Phase II (2015-2020) Airport Plan Project Costs**

| Project Description | Total Cost (a) | State (b) | Federal (c) | Private (d) |
|---|---|---|---|---|
| **Not priortized** | | | | |
| ✈ Terminal Building Remodeling (e) | $600,000 | $250,000 | $250,000 | $100,000 |
| ✈ Terminal Auto Parking Redesign | $300,000 | $30,000 | $270,000 | |
| ✈ Entrance Road Redesign | $100,000 | $100,000 | | |
| ✈ Snow Removal Equipment – Replace/Upgrade | $250,000 | $25,000 | $225,000 | |
| ✈ Hangars | $1,000,000 | | | $1,000,000 |
| ✈ Apron Reconstruction - Phase I | $500,000 | $50,000 | $450,000 | |
| ✈ Taxiway Reconstruction - Phase I | $750,000 | $75,000 | $675,000 | |
| ✈ Taxiway Light LED Upgrades – Phase I | $250,000 | $25,000 | $225,000 | |
| ✈ Reconstruct Runway 5-23 (f) | $1,800,000 | $180,000 | $1,620,000 | |
| ✈ Replace Runway 5-23 Lights (g) | $250,000 | $25,000 | $225,000 | |
| **Subtotal (Phase II)** | **$5,800,000** | **$735,000** | **$3,715,000** | **$1,100,000** |

Notes

a. Cost estimates, based upon 2011 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.

b. CTDOT; includes current airport revenues, cash reserves, state appropriateions, bonds, etc.

c. FAA AIP (Airport Improvement Program) - Unless Otherwise Noted

d. Third party funding

e. Estimate 50% of project will not be AIP eligible and some portion could be funded privately.

f. Estimated end of pavement servicability is 2016 (20 years after the last runway rehabilitation project).

g. Project combined with runway reconstruction. Lights replaced with LED or current industry standard.

**Table 8-3 - Phase III (2020-2030) Airport Plan Project Costs**

| Project Description | Total Cost (a) | State (b) | Federal (c) | Private (d) |
|---|---|---|---|---|
| **Not prioritized** | | | | |
| ✈ Reconstruct Runway 15-33 (e) | $1,900,000 | $190,000 | $1,710,000 | |
| ✈ Replace Runway 15-33 Lights (f) | $250,000 | $25,000 | $225,000 | |
| ✈ Apron Reconstruction - Phase II | $500,000 | $50,000 | $450,000 | |
| ✈ Taxiway Reconstruction - Phase II | $750,000 | $75,000 | $675,000 | |
| ✈ Taxiway Light LED Upgrades – Phase II | $300,000 | $30,000 | $270,000 | |
| ✈ Airport Master Plan Update | $300,000 | $30,000 | $270,000 | |
| ✈ Hangars | $1,000,000 | | | $1,000,000 |
| ✈ Replace EMAS Blocks | $3,000,000 | $300,000 | $2,700,000 | |
| **Subtotal (Phase III)** | **$8,000,000** | **$700,000** | **$6,300,000** | **$1,000,000** |

**Notes**

a. Cost estimates, based upon 2011 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.

b. CTDOT; includes current airport revenues, cash reserves, state appropriateions, bonds, etc.

c. FAA AIP (Airport Improvement Program) - Unless Otherwise Noted

d. Third party funding

e. Estimated end of pavement servicability is 2025 (20 years after the last runway rehabiliation project)

f. Project combined with runway reconstruction. Lights replaced with LED or current industry standard.

## COST ESTIMATES

Cost estimates for individual projects, based on current dollars (2011), have been prepared for improvements that have been identified as necessary during the 20-year planning period. Facility costs have been formulated using unit prices extended by the size of the particular facility and tempered with specific considerations related to the region, the Airport, and the development site. That being said, these estimates are intended to be used for planning purposes only and should not be construed as construction cost estimates, which can only be compiled following the preparation of detailed engineering design and documents.

## CAPITAL IMPROVEMENT PROGRAM (CIP)

To assist in the preparation of the Capital Improvement Program, which CTDOT keeps on file and up to date with the FAA, the first phase of the project/cost list, *Phase I (Short-Term) Airport Plan Project Costs*, appearing on page 172, has been organized by priorities. The projects, phasing, and costs presented in this Master Plan are the best projections that can be made at the time of formulation. The purpose of the project list, phasing, and costs listed here is to provide a progressive projection of capital needs, which can then be utilized in state and federal financial programming. It is realized that, as soon as this long range planning document is published, the project list is dated and; therefore, it will always differ to some degree with the Airport's 5-year CIP on file with the FAA.

## PHASING PLAN

The schedules presented in the preceding tables are suggested schedules and variance from them may be necessary, especially during the latter time periods. Attention has been given to the first five years because the projects outlined in this time frame include some critical improvements. The demand for certain facilities, especially in the latter time frame, and the economic feasibility of their development are to be the prime factors influencing the timing of individual project construction. Care must be taken to provide for adequate lead-time for detailed planning and construction of facilities in order to meet aviation demands. It's also important to minimize the disruptive scheduling where a portion of the facility may become inoperative due to construction and to prevent extra costs resulting from improper project scheduling. These scheduling issues can be particularly critical in conjunction with the construction of new hangars, based upon the availability of existing development sites vs. the development of new areas that may require significant upfront infrastructure construction costs.

## FINANCIAL PLAN

Funding sources for the capital improvement program depend on many factors, including Airport Improvement Program (AIP) project eligibility, the ultimate type and use of facilities to be developed, debt capacity of the state, the availability of other financing sources, and the priorities for scheduling project completion. For planning purposes, assumptions were made related to the funding source of each capital improvement. The projects costs provided in the Development Plan Project tables are identified with likely funding sources.

## SOURCES OF CAPITAL FUNDING AIP

### *ENTITLEMENT GRANTS*

The passage of the Wendall H. Ford Aviation Investment and Reform Act for 21st Century (AIR-21) introduced a new funding source for general aviation airports. The subsequent AIP re-authorizations, Vision 100 and the FAA Modernization and Reform Act of 2012 retained Non-Primary entitlement funding with some changes.

Non-primary entitlement funds[1] are specifically for general aviation airports listed in the latest published National Plan of Integrated Airports (NPIAS), that show needed airfield development. General aviation airports with an identified need are eligible to receive annually the lesser value of the following:

- 20% of the 5-year cost of their current NPIAS value or,
- $150,000
- A funding condition of Non-Primary Entitlement is that Congress must appropriate $3.2 billion or more for non-primary entitlement funds to exist in that fiscal year

For the convenience of the airport sponsor, if a project is anticipated to cost in excess of $150,000, the participating airport can roll over (i.e., save) the Non Primary Entitlement funds up to four years ($600,000), at which time the accumulated total of rolled-over funds can be used for larger projects. The Non Primary entitlement funds are generally earmarked for routine work to preserve and extend the useful life of runway, taxiway, and apron pavements at smaller general aviation airports. However, project eligibility was expanded under Vision 100 to include support facilities, fuel farms and hangars, in addition to the previously approved list of pavement maintenance projects (e.g., pavement seal coating, joint/crack sealing, pavement overlays, patching, marking, clearing/maintaining airfield drainage and perimeter fencing).

### *AIP DISCRETIONARY GRANTS*

The FAA also provides discretionary grants (on a 90%/10% ratio)[2], over and above entitlement funding, to airports for projects that have a high federal priority for enhancing safety, security, and capacity of the airport and would be difficult to fund otherwise. The amount that individual grants vary can be significant in comparison to entitlements and are awarded at the FAA's total discretion. Discretionary grant applications are evaluated based

[1] Groton-New London Airport is a non-primary airport and is currently eligible for entitlement funding dependent on the three conditions listed in this section.
[2] Under Vision 100 the cost sharing ratio of 95% / 5%. This changed in February 2012 to a 90/10% split between the FAA and airport sponsor.

on need, the FAA's project priority ranking system, and the FAA's assessment of a project's significance within the national airport and airway system.

### *FACILITIES & EQUIPMENT (F&E)*

F&E finances major capital investments related to modernizing and improving air traffic control and airway facilities, equipment, and systems. The F&E appropriation provides funds to establish, replace, relocate, or improve air navigation facilities and equipment and aviation safety systems based on their operational uses.

### PRIVATE THIRD-PARTY FINANCING

Many airports use private third-party financing when the planned improvements will be primarily used by a private business or other organization. Such projects are not ordinarily eligible for federal funding. Projects of this kind typically include hangars, FBO facilities, fuel storage, and air cargo facilities, exclusive aircraft parking aprons, industrial development areas, non-aviation commercial areas, and various other projects. An example at Groton-New London would be for hangar development, as well as some improvements to the terminal building area, such as rental car space, private offices, and a restaurant.

### *AIRPORT REVENUES*

As with many general aviation facilities, generating the necessary cash flow to balance the operations and maintenance costs of an airport is typically a constant challenge. The capital costs associated with an airport's development program, whether for local matching funds for a state[3] or federal grant, or for 100 percent funding of non-grant capital projects, can be a further daunting challenge for any small airport. As discussed previously, Groton-New London has made significant progress towards fiscal solvency (see *Financial Data*, page 44).

### SUMMARY - MASTER PLAN CAPITAL IMPROVEMENT PROGRAM FINANCIAL IMPLICATIONS

The previously presented Airport Plan Project Costs tables (pages 172-174) provide a reasonable estimate of the funding that will be needed to cover the costs of this progressive capital improvement program at the Airport. With the best information available today, the tables provide information related to what projects will be needed, when those projects are likely to be constructed, and how the improvements are likely to be funded (i.e., state, federal, etc.). It is realized that the timing for project implementation will change as

[3] For GON, state and local matching funds are one of the same.

sponsor and FAA priorities evolve; however, the projections of funding needs are reasonable estimates for long-term capital improvement planning purposes.

The financial implications for financing of Airport improvements is probably best summarized in a presentation of the total expected expenditures, broken down by phase and recommended financing method. This information is presented in Table 8.4.

**Table 8.4 - Capital Improvement Costs by Phase**

| Phase | Total Cost (a) | State (b) | Federal (c) | Private (d) |
|---|---|---|---|---|
| Phase I (2010-2015) | $2,060,000 | $416,000 | $644,000 | $1,000,000 |
| Phase II (2015-2020) | $5,800,000 | $735,000 | $3,715,000 | $1,100,000 |
| Phase III (2020-2030) | $8,000,000 | $700,000 | $6,300,000 | $1,000,000 |
| **Totals** | **$15,860,000** | **$1,851,000** | **$10,659,000** | **$3,100,000** |

a. Cost estimates, based upon 2011 data, are intended for preliminary planning purposes and do not reflect a
b. CTDOT; includes current airport revenues, cash reserves, state appropriateions, bonds, etc.
c. FAA AIP (Airport Improvement Program) - Unless Otherwise Noted
d. Third party funding

As presented in the accompanying tables, the Groton-New London Airport Development Plan cost estimates for an approximate twenty-year planning period, not including maintenance and operational expenses, amount to approximately $15.9 million. The anticipated FAA share is approximately $10.6 million. In addition, approximately $3.1 million are projected to be spent on private projects (e.g., non FAA-eligible hangars, apron development, etc.) that will generate revenue and could be financed through some form of private financing.

Of the state's share, approximately $416,000 are required during the phase one period (Short-Term), $735,000 during the phase two period (Intermediate-Term), and $700,00 during the phase three period (Long-Term).

In addition, state maintenance and operation expenses may increase as the Airport develops and more airport facilities are completed. Revenues generated by these facilities should increase. It is a worthy and feasible goal that operational expenses should not outweigh airport generated revenue. This relationship should, however, be monitored closely so those future imbalances can be anticipated and provided for in the budgeting and capital improvement process.

It should also be noted that projects represented as potentially needed in this Master Plan are based on forecast demand; only those projects that are required to meet actual demand will be proposed for construction. If demands do not increase as rapidly as anticipated, a number of the proposed projects should be revised, delayed, or potentially eliminated.

Because demand and improvement needs can best be defined in the short-term, the Phase I project list is the most comprehensive and is generally the most challenging to finance. As indicated in Table 8.4 (previous page), federal funding needs could total as much as $644,000 dollars during the five years comprising Phase I; and, state funding needs to match these federal dollars, including projects ineligible for federal participation, could be approximately $416,000. Even with the increases in AIP funding over the past few years, Groton-New London's needs may exceed the capabilities of the FAA to participate.

Also, it may be a significant task for the Airport to fund the state's share of the proposed capital improvement costs, should federal funds become available. Financial implications are significant for both the Airport Sponsor and FAA; yet, an attainable balance can and should be structured.

# APPENDIX 1 – GLOSSARY OF TERMS

| Term – Abbreviation | Definition |
|---|---|
| *Above Mean Sea Level (AMSL)* | Refers to the elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level datum. |
| *Advisory Circular (AC)* | Guidelines published by the FAA that provide information for the public and industry. In some cases they outline acceptable means of compliance with Federal Aviation Regulations (FARs). In other cases, they provide general information. Advisory Circulars are not enforceable as are rules. However, since users sometimes face the choice of complying with an AC or spending months to get approval of a different means of complying, an AC frequently becomes mandatory for all practical purposes. |
| *AGL* | Above Ground Level |
| *AIP* | Airport Improvement Program |
| *Air Cargo Air Service* | The carriage by aircraft of only (1) property as a common carrier for compensation or hire, or (2) mail, or both. |
| *Air Carrier* | Air carrier means a person who undertakes directly by lease, or other arrangement, to engage in air transportation. |
| *Air Carrier Operation* | Operations by aircraft capable of carrying more than 60 passengers, as identified in Appendix 3 of FAA Order JO 7210.3, Facility Operation and Administration. |
| *Air Navigation Aid* | See Navigation Aid. |
| *Air Quality** | In 1998, FAA revised its policy on air quality modeling procedures and identified the Emissions and Dispersion Modeling System (EDMS) as the required model to perform air quality analyses for aviation sources. This revised policy ensures the consistency and quality of aviation analyses performed for the FAA. |
| *Air Route Traffic Control Center (ARTCC)* | Provides ATC service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. |
| *Air Taxi* | An air taxi is a for-hire passenger or cargo aircraft which operates on an on-demand basis. In the United States, air taxi and air charter operations are governed by Part 135 of the Federal Aviation Regulations (FAR), unlike the larger scheduled air carriers which are governed by more stringent standards of FAR Part 121. |

| **Term – Abbreviation** | **Definition** |
| --- | --- |
| *Air Taxi Operation* | Aircraft operations by aircraft other than those classified as an air carrier operation which use three-letter company designators or the prefix "TANGO" or "Lifeguard." |
| *Air Traffic* | Air traffic means aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas. |
| *Air Traffic Control (ATC)* | Air traffic control (ATC) is a service provided by ground-based controllers who direct aircraft on the ground and in the air. The primary purpose of ATC systems worldwide is to separate aircraft to prevent collisions, to organize and expedite the flow of traffic, and to provide information and other support for pilots when able. |
| *Air Traffic Control Tower* | A control tower, or more specifically an air traffic control tower, is the name of the airport building from which the air traffic control unit controls the movement of aircraft on and around the airport. Most of the world's airports are non-towered - only a small percentage of airports have enough traffic to justify a control tower. |
| *Air Transportation* | Air transportation means interstate, overseas, or foreign air transportation or the transportation of mail by aircraft. |
| *Aircraft* | Aircraft means a device that is used or intended to be used for flight in the air. |
| *Aircraft Approach Category* | A grouping of aircraft based on 1.3 times their stall speed in their landing configuration at the certificated maximum flap setting and maximum landing weight at standard atmospheric conditions. The categories are:<br>· Category A: Speed less than 91 knots<br>· Category B: Speed 91 knots or more but less than 121 knots.<br>· Category C: Speed 121 knots or more but less than 141 knots.<br>· Category D: Speed 141 knots or more but less than 166 knots.<br>· Category E: Speed 166 knots or more. |
| *Airplane* | Airplane means an engine-driven fixed-wing aircraft heavier than air that is supported in flight by the dynamic reaction of the air against its wings. |

| Term – Abbreviation | Definition |
|---|---|
| *Airplane Design Group (ADG)* | A grouping of airplanes based on wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used. The groups are as follows:<br>· Group I: Up to but not including 49 feet wingspan or tail height up to but not including 20 feet<br>· Group II: 49 feet up to but not including 79 feet wingspan<br>· Group III: 79 feet up to but not including 118 feet wingspan or tail height from 30 up to but not including 45 feet<br>· Group IV: 118 feet up to but not including 171 feet wingspan or tail height from 45 up to but not including 60 feet<br>· Group V: 171 feet up to but not including 214 feet wingspan or tail height from 60 up to but not including 66 feet<br>· Group VI: 214 feet up to but not including 262 feet wingspan |
| *Airport Elevation* | The highest point on an airport's usable runway expressed in feet above mean sea level (MSL). |
| *Airport Improvement Program (AIP)* | The Airport Improvement Program is a United States federal grant program that provides funds to airports to help improve safety and efficiency. Improvement projects relate to runways, taxiways, ramps, lighting, signage, weather stations, NAVAIDs, land acquisition, and some areas of planning. The program was established under the Airport and Airway Improvement Act of 1982. |
| *Airport Layout Plan* | An airport layout plan is a scaled drawing of existing and proposed land and facilities necessary for the operation and development of an airport. All airport carried out at a Federally obligated airport must be done in accordance with an FAA-approved ALP. The FAA-approved ALP, to the extent practicable, should conform to the FAA airport design standards existing at the time of its approval. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Airport Noise** | When evaluating proposed airport projects, airport noise is often the most controversial environmental impact FAA examines. Airport development actions that change airport runway configurations, aircraft operations and/or movements, aircraft types using the airport, or aircraft flight characteristics may affect existing and future noise levels. FAA's noise analysis primarily focuses on how proposed airport actions would change the cumulative noise exposure of individuals to aircraft noise in areas surrounding the airport. |
| *Airport Operations Count* | The statistic maintained by the control tower. Basically, it is the number of arrivals and departures from the airport. Specifically, one airport operation count is taken for each land and takeoff, while two airport operation counts; i.e., one landing and one takeoff, are taken for each low approach below traffic pattern altitude, stop and go, or touch and go operation. Note: Airport operations are only recorded during the period the control tower is open. This is between the hours of 7 am and 10 pm daily at GON. See also Local Operation, Itinerant Operation, Air Carrier Operation, Air Taxi Operation, Military Operation, and Night Operation. |
| *Airport Reference Code (ARC)* | The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. The airport reference code has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The second component depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan or tail height (physical characteristics), whichever is the most restrictive. Generally, runways standards are related to aircraft approach speed, airplane wingspan, and designated or planned approach visibility minimums. Taxiway and taxilane standards are related to airplane design group. |
| *Airport Reference Point (ARP)* | The latitude and longitude of the approximate center of the airport. |
| *Airside* | The aircraft operational side of an airport, including runways, taxiways, aircraft aprons, and their supporting infrastructure. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Airspace* | The world's navigable airspace is divided into three-dimensional segments, each of which is assigned to a specific class. Most nations adhere to the classification specified by the International Civil Aviation Organization (ICAO). |
| *ALS* | Approach Lighting System |
| *AMPU* | Airport Master Plan Update |
| *AMSL* | Above Mean Sea Level |
| *Approach Control* | A Terminal Radar Approach Control (or FAA TRACON in the United States) is an air traffic control facility usually located within the vicinity of a large airport. Typically, the TRACON controls aircraft within a 30-50 nautical mile radius of the airport between the surface of the earth and 18,000 feet. A TRACON is sometimes called Approach Control or Departure Control in radio transmissions. In The U.S. Air Force it is known as RAPCON (Radar Approach Control), and in the U.S. Navy as a "RATCF" (Radar Air Traffic Control Facility). |
| *Approach Lighting System (ALS)* | An approach lighting system, or ALS, is a lighting system installed on the approach end of an airport runway and consists of a series of light bars, strobe lights, or a combination of the two that extends outward from the runway end. ALS usually serves a runway that has an instrument approach procedure (IAP) associated with it and allows the pilot to visually identify the runway environment once he or she has arrived at a prescribed point on an approach. |
| *Approach Lights* | See Approach Lighting System |

| Term – Abbreviation | Definition |
|---|---|
| *Approach Minimum* | Pilots may not operate an aircraft at any airport below the authorized MDA or continue an approach below the authorized DA/DH unless:<br>1. The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal descent rate using normal maneuvers;<br>2. The flight visibility is not less than that prescribed for the approach procedure being used; and<br>3. At least one of the following visual references for the intended runway is visible and identifiable to the pilot:<br>▪ Approach light system<br>▪ Threshold<br>▪ Threshold markings<br>▪ Threshold lights<br>▪ Runway end identifier lights (REIL)<br>▪ Visual approach slope indicator (VASI)<br>▪ Touchdown zone or touchdown zone markings<br>▪ Touchdown zone lights<br>▪ Runway or runway markings<br>▪ Runway lights |
| *Approach Procedure* | See Instrument Approach Procedure |
| *Apron* | The airport or apron or ramp is part of an airport. It is usually the area where aircraft are parked, unloaded or loaded, refueled or boarded. Although the use of the apron is covered by regulations, such as lighting on vehicles, it is typically more accessible to users than the runway or taxiway. However, the apron is not usually open to the general public and a license may be required to gain access. |
| *Area Navigation (RNAV)* | Area navigation (RNAV) is a method of navigation that permits aircraft operations on any desired flight path. |
| *ARFF* | Airport Rescue and Fire Fighting |
| *ARP* | Airport Reference Point |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *ARTCC* | Air Route Traffic Control Center |
| *ASOS* | Automatic Surface Observation System |
| *ATC* | Air Traffic Control |
| *ATCT* | Air Traffic Control Tower |
| *Automatic Surface Observation System (ASOS)* | Automated weather reporting systems consisting of various sensors, a processor, a computer-generated voice subsystem, and a transmitter to broadcast weather data. Note: ASOS and AWOS are the same basic systems, just developed for different Federal agencies. |
| *AWOS* | Automatic Weather Observation System |
| *Based Aircraft* | An aircraft that is "operational & air worthy"; one that is typically based at a given facility for a majority of the year. |
| *Biotic Communities** | For purposes of this Appendix, the term "biotic communities" means various types of flora (plants) and fauna (fish, birds, reptiles, amphibians, marine mammals, coral reefs, etc.) in a particular area. The term also means rivers, lakes, wetlands, forests, upland communities, and other habitat types supporting flora and aquatic and avian fauna. |
| *Building Restriction Line (BRL)* | A line that identifies suitable building area locations on airports. The line represents an arbitrary elevation, selected by the planner. Thus, objects may be inside the line (closer to the runway) and still permitted, if they do not exceed. |
| *C&D Plans* | State Conservation and Development Policy Plans |
| *CAA* | Connecticut Airport Authority |
| *Category* | As used with respect to the certification of aircraft, means a grouping of aircraft based upon intended use or operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional. |
| *Category I Minimums* | A precision instrument approach and landing with a decision height not lower than 200 feet above touchdown zone elevation and with a visibility not less than 1/2 mile. Other Categories include II, III, IIIA, IIIB, and IIIC, with progressively lower decision height and visibility minimums, ranging from less than 200 feet and ¼ mile to zero feet and visibility for a Category IIIC approach. |

| Term – Abbreviation | Definition |
|---|---|
| *CFR* | Code of Federal Regulations |
| *Charter Air Carrier* | An air carrier holding a certificate of public convenience and necessity authorizing it to engage in charter air transportation. |
| *Charter Air Transportation* | Charter trips, including inclusive for charter trips, in air transportation, rendered pursuant to authority conferred under the Federal Aviation Act of 1958. |
| *Circling Approach* | A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight in landing from an instrument approach is not possible or is not desirable. |
| *Civil Aircraft* | Civil aircraft means aircraft other than public aircraft. |
| *Class* | As used with respect to the certification of aircraft, means a broad grouping of aircraft having similar characteristics of propulsion, flight, or landing. Examples include: airplane, rotorcraft, glider, balloon, landplane, and seaplane. |
| *Class A Airspace* | Airspace from 18,000 feet MSL up to and including flight level 600, including the airspace overlying the waters within 12 NM of the coast of the 48 contiguous states and Alaska; and designated international airspace beyond 12 NM of the coast of the 48 contiguous states and Alaska within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic procedures are applied. |
| *Class B Airspace* | Airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger numbers. The configuration of each Class B airspace is individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures once an aircraft enters the airspace. For all aircraft, an ATC clearance is required to operate in the area, and aircraft so cleared receive separation services within the airspace. |

| Term – Abbreviation | Definition |
|---|---|
| *Class C Airspace* | Airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports having an operational control tower, serviced by radar approach control, and having a certain number of IFR operations or passenger numbers. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a 5 NM radius core surface area that extends from the surface up to 4,000 feet above the airport elevation, and a 10 NM radius shelf area that extends from 1,200 feet to 4,000 feet above the airport elevation. |
| *Class D Airspace* | Airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored, and when instrument procedures are published, the airspace is normally designed to contain the procedures. |
| *Class E Airspace* | Airspace that is not Class A, Class B, Class C, or Class D, and is controlled airspace. |
| *Class G Airspace* | Airspace that is uncontrolled, except when associated with a temporary control tower, and has not been designated as Class A, Class B, Class C, Class D, or Class E airspace. |
| *Coastal Barriers** | Barrier islands are geologically unstable formations and cannot support development. Yet, they protect the mainland by buffering storm or hurricane-driven winds or waves. As a result, these islands protect fish, wildlife, human life, and property along coasts and shorelines. |
| *Coastal Zone Management Program** | In accordance with Coastal Zone Management Act regulations, a letter of concurrence with federal consistency requirements (15 CFR Part 930) or a waiver is required for activities using federal funds in a municipality located within the coastal zone. |
| *Code of Federal Regulations (CFR)* | The Code of Federal Regulations (CFR) is the codification of the general and permanent rules and regulations (sometimes called administrative law) published in the Federal Register by the executive departments and agencies of the Federal Government of the United States. The CFR is published by the Office of the Federal Register, an agency of the National Archives and Records Administration. |

| Term – Abbreviation | Definition |
|---|---|
| *Commercial Operator (or operation)* | Commercial operator means a person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier or foreign air carrier or under the authority of Part 375 of this title. Where it is doubtful that an operation is for ‘‘compensation or hire’’, the test applied is whether the carriage by air is merely incidental to the person’s other business or is, in itself, a major enterprise for profit. |
| *Commercial Service Airport* | Commercial service airports are defined as public airports receiving scheduled passenger service and having 2,500 or more enplaned passengers per year. There are 517 commercial service airports. Of these, 382 have more than 10,000 annual passenger enplanements (also referred to as boardings) and are classified as primary airports. Primary airports are grouped into four categories: large, medium, and small hubs, and non-hub airports. The FAA uses the term “hub” to identify very busy commercial service airports. |
| *Common Traffic Advisory Frequency (CTAF)* | Common Traffic Advisory Frequency (CTAF) is the name given to the VHF radio frequency used for air-to-air communication at U.S., non-towered airports. Many towered airports close their towers overnight, but keeping the airport open during periods when activity is very low. Pilots use the common frequency to coordinate their arrivals and departures safely, giving position reports and acknowledging other aircraft in the airfield traffic pattern. In many locations, smaller airports use pilot-controlled lighting systems when it is uneconomical or inconvenient to have automated systems or staff to turn on the taxiway and runway lights. Two common CTAF allocations are UNICOM, a licensed non-government base station that provides air-to-ground communications (and vice versa) and may also serve as a CTAF when in operation, and MULTICOM, a frequency allocation (without a physical base station) that is reserved as a CTAF for airports without other facilities. |
| *Commuter Aircraft* | A small aircraft designed to fly between 35 and 100 passengers from point to point on short-haul flights. These classes of airliners are typically flown by the regional airline divisions of the larger international airlines. The regional jet (RJ) aircraft of the same class that has become the aircraft of choice for most domestic operations. |

| Term – Abbreviation | Definition |
|---|---|
| *Compatible Land Use** | The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of potential aircraft-noise impacts from the airport, as well as safety concerns with the land under airport imaginary surfaces. Most land uses occurring adjacent to and within the bounds of airport property involve aviation and commercial activities and are considered compatible with airport operations. Rural residential, agricultural and industrial (landfill) development comprise the principal land uses adjacent to airport property. Rural residential and agricultural land uses are typically regarded as compatible with standard general aviation operations. |
| *Construction Impacts** | Airport construction may cause various environmental effects primarily due to dust, aircraft and heavy equipment emissions, storm water runoff containing sediment and/or spilled or leaking petroleum products and noise. In most cases, these effects are subject to Federal, State, or local ordinances or regulations. While the long-term impacts of the proposed action are usually greater than construction impacts, sometimes construction may also cause significant short-term impacts. Descriptions of the many construction impacts associated with airport actions are often covered in the descriptions of other environmental impact categories. |
| *Controlled Airspace* | Airspace of defined dimensions within which ATC service is provided to IFR and VFR flights in accordance with the airspace classification. It includes Class A, Class B, Class C, Class D, and Class E airspace. |
| *Critical Design Airplane* | The airplane (or family grouping of airplanes) with the longest wingspan and fastest approach speed that conducts at least 500 or more annual itinerant operations at the airport. |
| *CSASP* | Connecticut Statewide Aviation System Plan |
| *CTAF* | Common Traffic Advisory Frequency |
| *CTDEEP* | Connecticut Department of Energy and Environmental Protection |
| *CTDOT* | Connecticut Department of Transportation |
| *DA* | Decision Altitude |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Day Operation* | Aircraft operation occurring between the hours of 7 am and 10 pm (for the purpose of INM noise study) |
| *Decision Altitude (DA)* | A specified altitude in the precision approach, charted in feet MSL, at which a missed approach must be initiated if the required visual reference to continue the approach has not been established. |
| *Decision Height (DH)* | A specified altitude in the precision approach, charted in height above threshold elevation, at which a decision must be made either to continue the approach or to execute a missed approach. |
| *Declared Distances* | The distances the airport owner declares available for the airplane's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:<br>· Takeoff run available (TORA). The runway length declared available and suitable for the ground run of an airplane taking off;<br>· Takeoff distance available (TODA). The TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA;<br>· Accelerate-stop distance available (ASDA). The runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff; and<br>· Landing distance available (LDA). The runway length declared available and suitable for a landing airplane. |
| *Departure Procedure* | Preplanned IFR ATC departure, published for pilot use, in textual and graphic format. |
| *Deplanement* | A person getting off of an aircraft at an airport. See also enplanement. |
| *Design Aircraft/Airplane* | See Critical Design Airplane |
| *Differential Global Positioning System (DGPS)* | A system that improves the accuracy of Global Navigation Satellite Systems (GNSS) by measuring changes in variables to provide satellite positioning corrections. |
| *Displaced Threshold* | A threshold that is located at a point on the runway other than the designated beginning of the runway. |

| Term – Abbreviation | Definition |
|---|---|
| *Distance Measuring Equipment (DME)* | Distance Measuring Equipment (DME) is a radio navigation technology that measures distance by timing the propagation delay of VHF or UHF radio signals. Aircraft use DME to determine their distance from a land-based transponder by sending and receiving pulse pairs - two pulses of fixed duration and separation. The ground stations are typically collocated with VORs. DME in an aircraft shows the pilot, by an instrument-panel indication, the number of nautical miles between the aircraft and a ground station or waypoint. |
| *DME* | Distance Measuring Equipment |
| *EMAS* | Engineered Material Arresting System |
| *Engineered Material Arresting System (EMAS)* | An Engineered materials arrestor system or Engineered materials arresting system (EMAS) is a bed of lightweight, crushable concrete built at the end of a runway. The purpose of an EMAS is to stop an aircraft overrun with no human injury and minimal aircraft damage (usually none). The aircraft is slowed by the loss of energy required to crush the concrete blocks. An EMAS is similar in concept to the runaway truck ramp made of gravel. It is intended to stop aircraft that have overshot a runway when there is an insufficient free space for a standard runway safety area (RSA). |
| *Enhanced Traffic Management Systems Count (ETMSC)* | Enhanced Traffic Management System Counts (ETMSC) are flight counts designed to provide information on traffic counts by airport or by city pair for various data groupings such as aircraft type or by hour of the day (City Pair). |
| *Enplanement* | When a passenger boards an aircraft at an airport. Industry standards typically identify enplanements as the measure of activity at an airport. See also deplanement. Note: For the purposes of airport classifications under NPIAS, an enplanement refers to a passenger boarding an aircraft for commercial or for hire purposes. |
| *ETMSC* | Enhanced Traffic Management Systems Count |
| *FAF* | Final Approach Fix |
| *FAR* | Federal Aviation Regulation |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *FAR Part 121* | FAR Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations. Among other applications, this part prescribes rules governing the domestic, flag, and supplemental operations of each person who holds or is required to hold an Air Carrier Certificate or Operating Certificate under FAR part 119. |
| *FAR Part 135* | Part 135, Operating Requirements: Commuter and On Demand Operations. Among other applications, this part prescribes rules governing the commuter or on-demand operations of each person who holds or is required to hold an Air Carrier Certificate or Operating Certificate under part 119 of this chapter. |
| *FAR Part 77* | Part 77, Objects Affecting Navigable Airspace. This part: Establishes standards for determining obstructions in navigable airspace; Sets forth the requirements for notice to the Administrator of certain proposed construction or alteration; Provides for aeronautical studies of obstructions to air navigation, to determine their effect on the safe and efficient use of airspace; Provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and Provides for establishing antenna farm areas. |
| *FAR Part 91* | FAR Part 91, General Operating and Flight Rules. Among other applications, this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons. |
| *Farmland** | Important farmlands include all pasturelands, croplands, and forests (even if zoned for development) considered to be prime, unique, or statewide or locally important lands. |
| *FBO* | Fixed Base Operator or Operation |
| *Federal Aviation Regulation (FAR)* | The FAR are published in Chapter 1 of Title 14 of the CFR. |
| *Final Approach* | Part of an instrument approach procedure in which alignment and descent for landing are accomplished. |
| *Final Approach Fix (FAF)* | The fix from which the IFR final approach to an airport is executed, and which identifies the beginning of the final approach segment. An FAF is designated on government charts by a Maltese cross symbol for nonprecision approaches, and a lightning bolt symbol for precision approaches. |

| Term – Abbreviation | Definition |
|---|---|
| *Fixed Base Operator (FBO)* | In the aviation industry, a fixed base operator (also known as fixed base of operation), or FBO, is a service center at an airport that may be a private enterprise or may be a department of the municipality that the airport serves. At a minimum, most FBOs offer aircraft fuel, oil, and parking, along with access to washrooms and telephones. Some FBOs offer additional aircraft services such as hangar (indoor) storage, maintenance, aircraft charter or rental, flight training, deicing, and ground services such as towing and baggage handling. FBOs may also offer services not directly related to the aircraft, such as rental cars, lounges, and hotel reservations. |
| *Fixed by Function Navigation Aid* | An air navigation aid (NAVAID) that must be positioned in a particular location in order to provide an essential benefit for civil aviation is fixed by function. An example is a runway light, which must by its nature by located along the edge of the runway. |
| *Fixed Wing Aircraft* | A fixed-wing aircraft is a heavier-than-air craft whose lift is generated not by wing motion relative to the aircraft, but by forward motion through the air. The term is used to distinguish from rotary-wing aircraft (rotorcraft), where the movement of the wing surfaces relative to the aircraft generates lift. |
| *Fleet Mix* | Breakout of aircraft categories (single engine, multiengine, etc.). |
| *Flight Level (FL)* | A measure of altitude (in hundreds of feet) used by aircraft flying above 18,000 feet with the altimeter set at 29.92" Hg. |
| *Flight Maneuvers* | Basic maneuvers, flown by reference to the instruments rather than outside visual cues, for the purpose of practicing basic attitude flying. The patterns simulate maneuvers encountered on instrument flights such as holding patterns, procedure turns, and approaches. |
| *Flight Path* | The line, course, or track along which an aircraft is flying or is intended to be flown. |
| *Flight Service Station (FSS)* | A flight service station (FSS) is an air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but unlike air traffic control, is not responsible for giving instructions or clearances or providing separation. The people who communicate with pilots from an FSS are referred to as specialists rather than controllers, although in the U.S., FSS specialists' official job title is air traffic control specialist - station. |

| Term – Abbreviation | Definition |
|---|---|
| *Flight Strips* | Paper strips containing instrument flight information, used by ATC when processing flight plans. |
| *Floodplains** | To meet Executive Order 11988, Floodplains, and the U.S. Department of Transportation (DOT) Order 5650.2, Floodplain Management and Protection, all airport development actions must avoid the floodplain, if a practicable alternative exists. If no practicable alternative exists, actions in a floodplain must be designed to minimize adverse impact to the floodplain's natural and beneficial values. The design must also minimize the potential risks for flood-related property loss and impacts on human safety, health, and welfare. |
| *Frangible Navigation Aid* | A navigational aid (NAVAID) which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft. The term NAVAID includes electrical and visual air navigational aids, lights, signs, and associated supporting equipment. |
| *FSS* | Flight Service Station |
| *GA* | General Aviation |
| *GDP* | Gross Domestic Product |
| *General Aviation* | General aviation refers to all flights other than military and scheduled airline flights, both private and commercial. General aviation flights range from gliders and powered parachutes to large, non-scheduled cargo jet flights. As a result, the majority of the world's air traffic falls into this category, and most of the world's airports serve general aviation exclusively. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *General Aviation Airport* | Communities that do not receive scheduled commercial service or that do not meet the criteria for classification as a commercial service airport may be included in the NPIAS as sites for general aviation airports if they account for enough activity (usually at least 10 locally based aircraft) and are at least 20 miles from the nearest NPIAS airport. The activity criterion may be relaxed for remote locations or in other mitigating circumstances. The 2,574 general aviation airports in the NPIAS tend to be distributed on a one-per-county basis in rural areas and are often located near the county seat. These airports, with an average of 33 based aircraft, account for 40 percent of the nation's general aviation fleet. They are the most convenient source of air transportation for about 19 percent of the population and are particularly important to rural areas. |
| *General Aviation Operation* | Civil aircraft operations not classified as air carrier or air taxi. |
| *Geographic Information System (GIS)* | A geographic information system (GIS), also known as a geographical information system, is an information system for capturing, storing, analyzing, managing and presenting data which is spatially referenced (linked to location). In the strictest sense, it is any information system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically referenced information. In a more generic sense, GIS applications are tools that allow users to create interactive queries (user created searches), analyze spatial information, edit data, maps, and present the results of all these operations. |
| *GIS* | Geographic Information System |
| *Glideslope (GS)* | Part of the ILS that projects a radio beam upward at an angle of approximately 3° from the approach end of an instrument runway. The glideslope provides vertical guidance to aircraft on the final approach course for the aircraft to follow when making an ILS approach along the localizer path. |
| *Global Navigation Satellite Systems (GNSS)* | Satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. It allows small electronic receivers to determine their location (longitude, latitude, and altitude) to within a few meters using time signals transmitted along a line of sight by radio from satellites. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Global Positioning System* | A space-based radio-navigation system consisting of a constellation of satellites and a network of ground stations used for monitoring and control. A minimum of 24 GPS satellites orbit the Earth at an altitude of approximately 11,000 miles providing users with accurate information on position, velocity, and time anywhere in the world and in all weather conditions. |
| *Global Positioning System (GPS)* | Navigation system that uses satellite rather than ground-based transmitters for location information. |
| *GON* | FAA identifier for Groton-New London Airport (see also KGON) |
| *GPA* | Glidepath Angle |
| *GPS* | Glidepath Qualification Surface |
| *GPS* | Global Positioning System |
| *Gross Domestic Product (GDP)* | The gross domestic product (GDP) or gross domestic income (GDI) is one of the measures of national income and output for a given country's economy. GDP is defined as the total market value of all final goods and services produced within the country in a given period of time (usually a calendar year). It is also considered the sum of value added at every stage of production (the intermediate stages) of all final goods and services produced within a country in a given period of time, and it is given a money value. |
| *GS* | Glideslope |
| *Gyrodyne* | Gyrodyne means a rotorcraft whose rotors are normally engine-driven for takeoff, hovering, and landing, and for forward flight through part of its speed range, and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system. |
| *Gyroplane* | Gyroplane means a rotorcraft whose rotors are not engine-driven, except for initial starting, but are made to rotate by action of the air when the rotorcraft is moving; and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system. |
| *HATH* | Height Above Threshold |

| Term – Abbreviation | Definition |
|---|---|
| *Hazard to Air Navigation* | An object which, as a result of an aeronautical study under 14 CFR part 77, the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities, or existing or potential airport capacity. |
| *Helicopter* | See Rotorcraft |
| *HIRL* | High Intensity Runway Lights. See Runway Edge Lights. |
| *Holding* | A predetermined maneuver that keeps aircraft within a specified airspace while awaiting further clearance from ATC. |
| *IAP* | Instrument Approach Procedure |
| *IFR* | Instrument Flight Rules |
| *ILS* | Instrument Landing System |
| *ILS Approach* | A precision instrument approach utilizing the ILS. |
| *IMC* | Instrument Meteorological Conditions |
| *Induced Socioeconomic Impacts** | Induced socio-economic impacts are those typically associated with large airport developments that cause secondary impacts to surrounding communities. Such impacts include shifts in patterns of population movement and growth, increases in public-service demands, and changes in business and economic activity to the extent influenced by airport development and operation. |
| *Initial Approach Fix (IAF)* | The fix depicted on IAP charts where the instrument approach procedure (IAP) begins unless otherwise authorized by ATC. |
| *INM* | Integrated Noise Model |

| Term – Abbreviation | Definition |
|---|---|
| *Instrument Approach* | A set of regulations and procedures for flying aircraft whereby navigation and obstacle clearance is maintained with reference to aircraft instruments only, while separation from other aircraft is provided by Air Traffic Control. In layman's terms, a pilot who is rated for IFR can keep a plane in controlled flight solely on the data provided by his instruments, even if that pilot cannot see anything out the cockpit windows; one of the benefits of these regulations is the ability to fly through clouds, which is otherwise not allowed. IFR is an alternative to visual flight rules (VFR), where the pilot is ultimately responsible for navigation, obstacle clearance and traffic separation using the see-and-avoid concept. The vast majority of commercial traffic (any flight for hire) and all scheduled air carriers operate exclusively under IFR (even on clear days). Commercial aircraft providing sightseeing flights, aerial photography, or lift services for parachute jumping usually operate under VFR. |
| *Instrument Approach Procedure (IAP)* | A series of predetermined maneuvers for the orderly transfer of an aircraft under IFR from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. |
| *Instrument Flight Rules (IFR)* | Rules and regulations established by the Federal Aviation Administration to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals. |
| *Instrument Landing System (ILS)* | A ground-based instrument approach system which provides precision guidance to an aircraft approaching a runway, using a combination of radio signals and, in many cases, high-intensity lighting arrays to enable a safe landing during Instrument meteorological conditions (IMC), such as low ceilings or reduced visibility due to fog, rain, or blowing snow. The two principal components of the ILS are the localizer and glideslope. |
| *Instrument Meteorological Conditions (IMC)* | Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than the minimums specified for visual meteorological conditions, requiring operations to be conducted under IFR. |
| *Instrument Takeoff* | Using the instruments rather than outside visual cues to maintain runway heading and execute a safe takeoff. |

| **Term – Abbreviation** | **Definition** |
| --- | --- |
| *Integrated Noise Model (INM)* | The Integrated Noise Model (INM) is a computer model that evaluates aircraft noise impacts in the vicinity of airports. |
| *Intermediate-Term* | The sixth through tenth year of an airport planning period. |
| *Itinerant Operation* | Operations not classified as "local" operations. See local operation. |
| *Jet Aircraft* | An aircraft propelled by jet engines. |
| *KGON* | International identifier for Groton-New London Airport (see also GON) |
| *KIAS* | Knots indicated airspeed |
| *Landside* | The part of the airport exclusive of aircraft operating areas (runways, taxiways, aircraft aprons/ramps). Landside includes the terminal building, hangars, other buildings and structures not on the airport's airside, automobile parking areas, access roads, etc. |
| *Large Aircraft* | Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight. |
| *Light Emissions** | Airport-related lighting facilities and activities could visually affect surrounding residents and other nearby light-sensitive areas such as homes, parks or recreational areas. |
| *LIRL* | Low Intensity Runway Lights. See Runway Edge Lights. |
| *LNAV* | Localizer Performance with Vertical |
| *Local Area Augmentation System (LAAS)* | A differential global positioning system (DGPS) that improves the accuracy of the system by determining position error from the GPS satellites, then transmitting the error, or corrective factors, to the airborne GPS receiver. |
| *Local Operation* | Aircraft operations remaining in the local traffic pattern, simulated instrument approaches at the airport, including military and civil operations, and operations to or from the airport and a practice area within a 20-mile radius of the tower. |
| *Localizer (LOC)* | The portion of an ILS that gives left/right guidance information down the centerline of the instrument runway for final approach. |
| *Localizer Approach* | A non-precision instrument approach procedure using only localizer component of the ILS. |
| *Long-Term* | The eleventh through twentieth year of an airport planning period |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *LP* | Localizer Performance |
| *LPV* | Localizer Performance with Vertical Navigation |
| *Marker Beacon* | A low-powered transmitter that directs its signal upward in a small, fan-shaped pattern. Used along the flight path when approaching an airport for landing, marker beacons indicate both aurally and visually when the aircraft is directly over the facility. |
| *Mean Sea Level (MSL)* | The height of the sea surface midway between its average high and low water positions |
| *Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)* | Medium-intensity approach light system with Runway Alignment Indicator Lights. See also Approach Lighting System. |
| *MGTOW* | Maximum Gross Takeoff Weight |
| *Military Operation* | Aircraft operations by all classes of military aircraft. |
| *Minimum Altitude* | An altitude depicted on an instrument approach chart with the altitude value underscored. Aircraft are required to maintain altitude at or above the depicted value. |
| *Minimum descent altitude (MDA)* | The lowest altitude (in feet MSL) to which descent is authorized on final approach, or during circle-to-land maneuvering in execution of a nonprecision approach. |
| *MIRL* | Medium Intensity Runway Lights. See Runway Edge Lights. |
| *Missed Approach Point (MAP)* | A point prescribed in each instrument approach at which a missed approach procedure shall be executed if the required visual reference has not been established. |
| *Modification to Standards* | Means any change to FAA design standards other than dimensional standards for runway safety areas. Unique local conditions may require modification to airport design standards for a specific airport. A modification to an airport design standard related to new construction, reconstruction, expansion, or upgrade on an airport that received Federal aid requires FAA approval. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Movement Area* | The maneuvering area, maneuvering area, or movement area is the part of the airport used by aircraft for landing and takeoff that does not include the airport ramp. The rest of the airport is considered the non-movement area. Movement Areas are defined areas on the airport or airfield which are controlled by the control tower, e.g. permission must be obtained to access these areas. |
| *MSL* | Mean Sea Level |
| *National Airspace System (NAS)* | The common network of United States airspace—air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information; and manpower and material. |
| *National Plan of Integrated Airport Systems (NPIAS)* | The National Plan of Integrated Airport Systems (NPIAS) is an inventory of U.S. aviation infrastructure assets. It is developed and maintained by the Federal Aviation Administration (FAA). Its purposes are to identify all the airports in the U.S. that are considered significant components of the national aviation infrastructure network; to qualify the current state of development, technology, and repair at each of these airports; and to estimate the funding needed to bring each airport up to current standards of design, technology, and capacity. Airports in the NPIAS are eligible for Federal grants from the Airport Improvement Program. |
| *Natural Resources and Energy Supply** | Airport development actions have the potential to change energy requirements or use consumable natural resources. To comply with the Council on Environmental Quality (CEQ) regulations mentioned in Section 2 of this chapter, Federal Aviation Administration (FAA) environmental documents must evaluate potential impacts on supplies of energy and natural resources needed to build and maintain airports. |
| *NAVAID* | Navigation Aid |
| *Navigation Aid (NAVAID)* | A navigational aid (also known as aid to navigation or navaid) is any sort of marker which aids the traveler in navigation; the term is most commonly used to refer to nautical or aviation travel. Includes electrical and visual air navigational aids, lights, signs, and associated supporting equipment. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Night* | Night means the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time. |
| *Night Operation* | For the purposes of noise analysis, a night operation occurs during the period between 10 pm and 7 am. See also Airport Operation. |
| *NM* | Nautical Mile |
| *No Procedure Turn (NoPT)* | Term used with the appropriate course and altitude to denote that the procedure turn is not required. |
| *Non-Hub Primary Airport* | Commercial service airports that enplane less than 0.05 percent of all commercial passenger enplanements, but which have more than 10,000 annual enplanements are categorized as non-hub primary airports. |
| *Non-Movement Area* | See Movement Area |
| *Nonprecision Approach* | Nonprecision approach procedure means a standard instrument approach procedure in which no electronic glide slope is provided. |
| *Non-Primary Commercial Service Airport* | Commercial service airports that have from 2,500 to 10,000 annual passenger enplanements are categorized as non-primary commercial service airports. There are 135 of these airports in the NPIAS, and they account for 0.1 percent of all enplanements. These airports are used mainly by general aviation and have an average of 38 based aircraft. |
| *NPIAS* | National Plan of Integrated Airport Systems |
| *Object* | Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft. |
| *Object Free Area (OFA)* | An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. |
| *Obstacle Clearance Surface (OCS)* | An inclined obstacle evaluation surface associated with a glidepath (glideslope). |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Obstacle Free Zone (OFZ)* | The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is sub-divided as follows: Runway OFZ. The airspace above a surface centered on the runway centerline. Inner-approach OFZ. The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system. Inner-transitional OFZ. The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to runways with approach visibility minimums lower than 3/4-statute mile. |
| *Obstruction to Air Navigation* | An object of greater height than any of the heights or surfaces presented in Subpart C of Code of Federal Regulation (14 CFR), Part 77. (Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study has determined otherwise.) |
| *OCS* | Obstacle Clearance Surface |
| *OIS* | Obstacle Identification Surface |
| *Operation* | A takeoff or landing of an aircraft. |
| *PAPI* | Precision Approach Path Indicator |
| *PCL* | Pilot Controlled Lighting |
| *PFAF* | Precision Final Approach Fix |
| *Pilot Controlled Lighting (PCL)* | Pilot Controlled Lighting (PCL), also known as Aircraft Radio Control of Aerodrome Lighting (ARCAL) or Pilot Activated Lighting (PAL), is a system which allows aircraft pilots to control the lighting of an airport or airfield's approach lights, runway edge lights, and taxiways via radio. PCL systems are most common at non-towered or little-used airfields where it is neither economical to light the runways all night, nor to provide staff to turn the runway lighting on and off. PCL enables pilots to control the lighting only when required, saving electricity and reducing light pollution. |
| *Piston Aircraft* | An aircraft powered by one or more piston engines (regardless of fuel type). |

| Term – Abbreviation | Definition |
|---|---|
| *Plan View* | The overhead view of an approach procedure on an instrument approach chart. The plan view depicts the routes that guide the pilot from the en route segments to the IAF. |
| *Precision Approach* | Approaches are classified as either precision or nonprecision, depending on the accuracy and capabilities of the navigational aids (navaids) used. Precision approaches utilize both lateral (localizer) and vertical (glideslope) information. Nonprecision approaches provide lateral course information only. |
| *Precision Approach Category I (CAT I) Runway* | A runway with an instrument approach procedure which provides for approaches to a decision height (DH) of not less than 200 feet and visibility of not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800 with operative touchdown zone and runway centerline lights). |
| *Precision Approach Category II (CAT II) Runway* | A runway with an instrument approach procedure which provides for approaches to a minima less than CAT I to as low as a decision height (DH) of not less than 100 feet and RVR of not less than RVR 1200. |
| *Precision Approach Category III (CAT III) Runway* | A runway with an instrument approach procedure that provides for approaches to minima less than CAT II. |
| *Precision Approach Path Indicator (PAPI)* | The precision approach path indicator (PAPI) uses light units similar to the VASI but is installed in a single row of either two or four light units. These systems have an effective visual range of about 5 miles during the day and up to 20 miles at night. The row of light units is normally installed on the left side of the runway and the glide path indications are as depicted. Each box of lights is equipped with an optical apparatus that splits light output into two segments, red and white. Depending on the angle of approach, the lights will appear either red or white to the pilot. Ideally the total of lights will change from white to half red, moving in succession from right to left side. The pilot will have reached the normal glidepath (usually 3 degrees) when there is an even split in red and white lights. If an aircraft is beneath the glidepath, red lights will outnumber white; if an aircraft is above the glidepath, more white lights are visible. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Precision Approach Procedure* | Precision approach procedure means a standard instrument approach procedure in which an electronic glide slope is provided, such as ILS and PAR. |
| *Procedure Turn* | A maneuver prescribed when it is necessary to reverse direction to establish an aircraft on the intermediate approach segment or final approach course. |
| *Profile View* | Side view of an IAP chart illustrating the vertical approach path altitudes, headings, distances, and fixes. |
| *Public Aircraft* | An aircraft operated by or on behalf of the United States Government, a State, the District of Columbia, a territory or possession of the United States, or a political subdivision of one of these governments, but only when operated under the conditions specified by 49 USC 40125(b), 40125(c), or 40125(d). |
| *Ramp* | See Apron |
| *RCO* | Remote Communications Outlet |
| *Regional Jet (RJ)* | The term Regional jet, or RJ, describes a range of short-haul turbofan powered aircraft, whose use throughout the world expanded after the advent of Airline Deregulation in the United States in 1978. |
| *REIL* | Runway End Identifier Lights |
| *Reliever Airport* | High capacity general aviation airports in major metropolitan areas. These specialized airports provide pilots with attractive alternatives to using congested commercial service hub airports. They also provide general aviation access to the surrounding area. To be eligible for reliever designation, these airports must have 100 or more based aircraft or 25,000 annual itinerant operations. |
| *Remote Communications Outlet (RCO)* | Remote Communications Outlets (RCO) are remote aviation band radio transceivers, established to extend to communication capabilities of Flight Service Stations (FSS). |
| *RJ* | Regional Jet |
| *RNAV* | Area Navigation |
| *ROC* | Required Obstacle Clearance |
| *ROFA* | Runway Object Free Area |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Rotating Beacon* | A rotating beacon is a light system used to assist pilots in finding an airport, particularly those flying in IMC or VFR at night. Additionally, the rotating beacon provides information about the type of airport through the use of a particular set of color filters. Beacons for civil land airports emit a white and green light that appears as a flash. |
| *Rotorcraft* | A rotorcraft is a heavier-than-air flying machine that uses lift generated by wings that revolve around a mast called rotor blades. Several rotor blades mounted to a single mast is referred to as a rotor. Rotorcraft may also include the use of static lifting surfaces, but the primary distinguishing feature being lift provided by one or more rotors. Rotorcraft includes helicopters, autogyros, gyrodynes and tiltrotors. The Federal Aviation Administration places helicopters, autogyros (which it calls gyroplanes), and gyrodynes in the category Rotorcraft, and tiltrotors in the category Powered lift. |
| *RPZ* | Runway Protection Zone |
| *RSA* | Runway Safety Area |
| *Runway* | A runway is a strip of land on an airport, on which aircraft can take off and land. Runways may be a man-made surface (often asphalt, concrete, or a mixture of both) or a natural surface (grass, dirt, or gravel). |
| *Runway Blast Pad* | A surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Runway Edge Lights* | Runway Edge Lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity they are capable of producing: High Intensity Runway Lights (HIRL) Medium Intensity Runway Lights (MIRL) Low Intensity Runway Lights (LIRL) The HIRL and MIRL systems have variable intensity controls, whereas the LIRLs normally have one intensity setting. Runway Edge Lights are white, except on instrument runways where yellow replaces white on the last 2,000 feet or half the runway length, whichever is less, to form a caution zone for landings. The lights marking the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft. |
| *Runway End Identifier Lights (REIL)* | A pair of synchronized flashing lights, located laterally on each side of the runway threshold, providing rapid and positive identification of the approach end of a runway. |
| *Runway Protection Zone (RPZ)* | An area off the runway end to enhance the protection of people and property on the ground. |
| *Runway Safety Area (RSA)* | A runway safety area (RSA) or runway end safety area (RESA) is defined as "the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." |
| *Runway Visibility Range (RVR)* | The instrumentally derived horizontal distance a pilot should be able to see down the runway from the approach end, based on either the sighting of high-intensity runway lights, or the visual contrast of other objects. |
| *Runway Visibility Value (RVV)* | The visibility determined for a particular runway by a transmissometer. |
| *RVR* | Runway Visibility Range |
| *RVV* | Runway Visibility Value |
| *SAWS* | Standalone Weather Sensor |
| *SCCOG* | Southeastern Connecticut Council of Governments |
| *SDF* | Simplified Directional Facility |

| Term – Abbreviation | Definition |
|---|---|
| *Secondary and Cumulative Impacts** | Impacts the proposed action would have on a particular resource when added to impacts on that resource due to past, present, and reasonably foreseeable actions within a defined time and geographical area. |
| *Security Identification Display Area (SIDA)* | Security Identification Display Area, or SIDA, is a special security area designated by an airport operator in the US to comply with Federal Aviation Administration (FAA) requirements directed by Federal Aviation Regulation (FAR) part 107.205. An identification system must be used in this area. Before allowing unescorted access to this area, a person must be trained and their background investigated. Normally, the flight ramp of a US commercial airport is a SIDA. |
| *Short-Term* | The first five years of an airport planning period |
| *SHPO* | State Historic Preservation Commission |
| *SIDA* | Security Identification Display Area |
| *Small Aircraft* | Small aircraft means aircraft of 12,500 pounds or less, maximum certificated takeoff weight. |
| *Social Impacts** | Social impacts are those associated with the relocation of any business or residence, alter surface-transportation patterns, divide or disrupt established communities, disrupt orderly planned development, or create an appreciable change in employment. |
| *Solid Waste** | Construction, renovation, or demolition of most airside projects produces debris (e.g., dirt, concrete, asphalt) that must be properly disposed. In addition, new or renovated terminal, cargo, or maintenance facilities may involve construction, renovation, or demolition that produces other types of solid waste (bricks, steel, wood, gypsum, glass). Therefore, airport sponsors should follow Federal, state, or local regulations that address solid waste. Doing so reduces the environmental effects of airport-related construction or operation. |
| *SRE* | Snow Removal Equipment |
| *Standard Instrument Departure Procedures (SIDS)* | Published procedures to expedite clearance delivery and to facilitate transition between takeoff and en route operations. |

| Term – Abbreviation | Definition |
|---|---|
| *State System Plans* | Each state has an aviation system plan that determines the development needed to establish a viable system of airports. The effort involves examining the interaction of the airports with the aviation service requirements, economy, population, and surface transportation of a state's geographic area. State plans are cost-effective and define an airport system that is consistent with established state goals and objectives regarding economic development, transportation, land use, and environmental matters. State plans contain about 5,000 airports, about 33 percent more than the NPIAS. Airports included in the state plans, but not in the NPIAS, are usually smaller airports that have state or regional significance, but are not considered to be of national interest. |
| *Stopway* | A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff. |
| *Tactical Air Navigation (TACAN)* | An electronic navigation system used by military aircraft, providing both distance and direction information. |
| *TAF* | Terminal Area Forecasts. For the purposes of this study, TAF refers to the forecasts prepared by the FAA for airport planning purposes and not the aviation weather report by the same term. |
| *TASMG* | 1109th Theatre Aviation Sustainment Maintenance Group |
| *Taxilane* | The portion of the aircraft parking area used for access between taxiways and aircraft parking positions. |
| *Taxiway* | A taxiway is a path on an airport connecting runways with ramps, hangars, terminals and other facilities. They mostly have hard surface such as asphalt or concrete, although smaller airports sometimes use gravel or grass. |
| *Taxiway Safety Area* | A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. |
| *TCH* | Threshold Crossing Height |
| *Terminal Area* | Depicts airspace around major airports; normally associated with Class B and Class C airspace. |

| Term – Abbreviation | Definition |
|---|---|
| *Terminal Area Forecasts (TAF)* | The official forecast of aviation activity at FAA facilities. These forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public. |
| *Terminal Procedures* | See Instrument Approach Procedure |
| *Threatened and Endangered Species** | To satisfy the Endangered Species Act of 1973, the Federal Aviation Administration (FAA) must determine if a proposed action under its purview would affect a Federally-listed species or habitat critical to that species (critical habitat). For purposes of this Chapter, the following definitions apply: Major construction activity; Endangered species; Threatened species; Candidate species; and, Critical habitat. |
| *Threshold* | The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced. See also Displaced Threshold. |
| *Threshold Lights* | Threshold lights mark the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft. |
| *Title 14 of the Code of Federal Regulations (14 CFR)* | The federal aviation regulations governing the operation of aircraft, airways, and airmen. |
| *Towered Airport* | A control tower, or more specifically an air traffic control tower, is the name of the airport building from which the air traffic control unit controls the movement of aircraft on and around the airport. Most of the world's airports are non-towered — only a minority of airports has enough traffic to justify a control tower. |
| *Traffic Pattern* | Traffic pattern means the traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from, an airport. |
| *TRB* | Transportation Research Board |
| *TSA* | Taxiway Safety Area or Transportation Security Administration. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Turbofan* | A turbofan is a type of jet engine, similar to a turbojet. It essentially consists of a ducted fan with a smaller diameter turbojet engine mounted behind it that powers the fan. Part of the airstream from the ducted fan passes through the turbojet, where it is burnt to power the fan. But part, usually the majority, of the flow bypasses it, and doing this produces thrust more efficiently. |
| *Turbojet* | A turbofan is a type of jet engine, similar to a turbojet. It essentially consists of a ducted fan with a smaller diameter turbojet engine mounted behind it that powers the fan. Part of the airstream from the ducted fan passes through the turbojet, where it is burnt to power the fan. But part, usually the majority, of the flow bypasses it, and doing this produces thrust more efficiently. |
| *Uncontrolled Airspace* | Airspace within which ATC service is not provided. |
| *USDOT § 4(f)** | Section 4(f) of the Department of Transportation Act requires the Secretary of Transportation investigate all alternatives before impacting any publicly owned lands designated as public parks, recreation areas, wildlife or waterfowl refuges of national, state, or local significance, or land having national, state, or local historical significance. |
| *VAGL* | Visual Approach Guidance Lights |
| *VASI* | Visual Approach Slope Indicator |
| *Very High Frequency (VHF)* | A band of radio frequencies falling between 30 and 300 MHz |
| *Very High Frequency Omni-Direction Range (VOR)* | VHF Omni-directional Radio Range is a type of radio navigation system for aircraft. VORs broadcast a VHF radio composite signal including the station's Morse code identifier (and sometimes a voice identifier), and data that allows the airborne receiving equipment to derive a magnetic bearing from the station to the aircraft (direction from the VOR station in relation to the Earth's magnetic North at the time of installation). VOR stations in areas of magnetic compass unreliability are oriented with respect to True North. This line of position is called the "radial" in VOR. The intersection of two radials from different VOR stations on a chart allows for a "fix" or approximate position of the aircraft. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Very Light Jet (VLJ)* | A very light jet (VLJ), previously known as a micro jet, is, by convention, a small jet aircraft approved for single-pilot operation, seating 4-8 people, with a maximum take-off weight of under 10,000 pounds (4,540 kg). They are lighter than what is commonly termed business jets and are frequently used as air taxis. |
| *VFR* | Visual Flight Rules |
| *VGSI* | Visual Glideslope Indicators (VGSI) is a system of lights so arranged to provide visual descent guidance information during the approach to a runway. There are several VGSI systems; the most common are VASI and its replacement PAPI. |
| *VHF* | Very High Frequency |
| *VHF Omni-directional Radio Range (VOR)* | A type of radio navigation system for aircraft. VORs broadcast a VHF radio composite signal including the station's Morse code identifier (and sometimes a voice identifier), and data that allows the airborne receiving equipment to derive a magnetic bearing from the station to the aircraft (direction from the VOR station in relation to the Earth's magnetic North at the time of installation). VOR stations in areas of magnetic compass unreliability are oriented with respect to True North. This line of position is called the "radial" in VOR. The intersection of two radials from different VOR stations on a chart allows for a "fix" or approximate position of the aircraft. |
| *Victor Airways* | Airways based on a centerline that extends from one VOR or VORTAC navigation aid or intersection, to another navigation aid (or through several navigation aids or intersections); used to establish a known route for en route procedures between terminal areas. |
| *VIS* | Visibility |
| *Visual Approach* | An approach based on the pilot's perception of the correct alignment with the runway centerline and glideslope with no reference to navigational equipment. |
| *Visual Approach Slope Indicator (VASI)* | A visual aid of lights arranged to provide descent guidance information during the approach to the runway. A pilot on the correct glide slope will see red lights over white lights. See PAPI. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Visual Descent Point (VDP)* | A defined point on the final approach course of a nonprecision straight-in approach procedure, from which normal descent from the MDA to the runway touchdown point may be commenced, provided the runway environment is clearly visible to the pilot. |
| *Visual Flight Rules (VFR)* | Flight rules adopted by the FAA governing aircraft flight using visual references. VFR operations specify the amount of ceiling and the visibility the pilot must have in order to operate according to these rules. When the weather conditions are such that the pilot cannot operate according to VFR, he or she must use instrument flight rules (IFR). |
| *Visual Meteorological Conditions (VMC)* | Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling meeting or exceeding the minimums specified for VFR. |
| *Visual Runway* | A runway without an existing or planned straight-in instrument approach procedure. |
| *VLJ* | Very Light Jet |
| *VMC* | Visual Meteorological Conditions |
| *VNAV* | Vertical Navigation |
| *VOR* | Very High Frequency Omni-Direction Range |
| *VOR Approach* | A non-precision instrument approach utilizing the VOR system |
| *VORTAC* | A facility consisting of two components, VOR and TACAN, which provides three individual services: VOR azimuth, TACAN azimuth, and TACAN distance (DME) at one site. |
| *WAAS* | Wide Area Augmentation System |
| *Water Quality** | Construction often causes sediment-laden runoff to enter waterways. Biological and chemical breakdown of deicing chemicals in airport runoff can cause severe dissolved oxygen demands on receiving waters. Operations or maintenance are other activities that may affect water quality. Airport-related water quality impacts can occur from both point and non-point sources at airports. If not properly controlled, the resultant water quality impacts may adversely affect animal, plant, or human populations. |

| **Term – Abbreviation** | **Definition** |
|---|---|
| *Wetlands** | Executive Order 11990, Protection of Wetlands, sets the standard for a Federal agency action involving any wetland. The U.S. Department of Transportation (DOT) developed and issued DOT Order 5660.1A, Preservation of the Nation's Wetlands to provide more guidance to DOT agencies regarding their actions in wetlands. The DOT Order governs the Federal Aviation Administration's (FAA's) actions. |
| *Wide Area Augmentation System (WAAS)* | A differential global positioning system (DGPS) that improves the accuracy of the system by determining position error from the GPS satellites, then transmitting the error, or corrective factors, to the airborne GPS receiver. |
| *Wild & Scenic Rivers** | Those rivers having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values. Federal land management agencies in the Departments of the Interior and Agriculture manage the Wild and Scenic Rivers Act (Act). |

* An environmental impact category listed in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.*

# APPENDIX 2 – PART 139 CERTIFICATION

## INTRODUCTION

This paper describes the purpose of commercial airport certification requirements, under 14 CFR 139, Certification of Airports (Part 139), and the current and future requirement for certification at Groton-New London Airport (GON). It is an essential determination because it defines the classification of GON, which determines a wide-range of administrative, safety, and operational requirements required at commercial service airports. Included in this report is an analysis of the airport's existing Airport Rescue and Fire Fighting (ARFF) index, equipment, and work force requirements.

## BACKGROUND

The Federal Aviation Administration (FAA), through the National Plan of Integrated Airports System (NPIAS) classifies airports by size and function. The NPIAS includes all commercial service, reliever (high capacity general aviation airports in metropolitan areas), and select general aviation airports.

Unlike reliever and general aviation airports, commercial service airports (regardless of size) must be certificated by the FAA and operate under rules specified in Part 139. The certification is granted through an airport operating certificate (AOC) that serves to ensure safety in air transportation. To obtain an AOC, an airport must agree to certain operational and safety standards, providing for such things as firefighting, and rescue equipment. These requirements vary depending on the size of the airport and the type of flights available.

## PART 139 DEFINED

Part 139 is a federal statute that serves to ensure safety in air transportation, with the key component being the issuance of an AOC.

Application of Part 139, which is important in the assessment of GON, are rules governing the certification and operation of U.S. airports serving (1) scheduled passenger-carrying operations of an air carrier operating aircraft designed for more than nine passenger seats; and (2) unscheduled passenger-carrying operations of an air carrier operating aircraft designed for at least 31 passenger seats. This application requires an understanding of key terms as applicable to Part 139: air carrier aircraft, large air carrier aircraft, small air carrier aircraft, scheduled operations, unscheduled operations, charter, and public charter.

- **Air carrier aircraft** means an aircraft that is being operated by an air carrier and is categorized as either a large air carrier aircraft if designed for at least 31 passenger seats or a small air carrier aircraft if designed for more than 9 passenger seats but less than 31 passenger seats, as determined by the aircraft type certificate issued by a competent civil aviation authority.

- **Scheduled operation** means any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier for which the air carrier or its representatives offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 121 or public charter operations under 14 CFR Part 380 (see Charter Flight and Public Charter below).

- **Unscheduled operation** means any common carriage passenger-carrying operation for compensation or hire, using aircraft designed for at least 31 passenger seats, conducted by an air carrier for which the departure time, departure location, and arrival location are specifically negotiated with the customer or the customer's representative. This includes any passenger-carrying supplemental operation conducted under 14 CFR Part 121 and any passenger-carrying public charter operation conducted under 14 CFR Part 380.

- **Charter flight** means a flight operated under the terms of a charter contract between a direct air carrier and its customer. It does not include scheduled air transportation, scheduled foreign air transportation, or non-scheduled cargo air transportation, sold on an individually ticketed or individually way billed basis.

- **Public Charter** means a one-way or round-trip charter flight to be performed by one or more direct air carriers that is arranged and sponsored by a charter operator.

## AIRPORT CLASSIFICATIONS

Commercial service airports are classified according to the type of service they handle. Table 1 shows the types of air carrier operations that each Part 139 airport class can serve. The table lists the type of air carrier operation (schedule or unscheduled, large and small aircraft) that each of the four airport classifications can serve. For example, a Class I airport is certified for all types of aircraft and operations, while a Class IV airport can only service unscheduled large air carrier aircraft.

FAA requires airports that desire to serve operations of specified air carrier aircraft to comply with certain safety requirements in order to obtain an AOC. The FAA revised Part 139 in 2004, because of changes in industry practices and technology. It was the first major revision since 1987. The majority of changes had no impact on GON particularly because US Airways Express scheduled service concluded in October 2003. The termination of this commuter service meant that GON was no longer required to staff police and ARFF personnel for air carrier flights. Air carrier service has not yet resumed which means, in fact, the cost of staffing the airport has been reduced.

In all likelihood, the departure of US Air was a direct result of the aftermath of the post 9/11 events. As addressed later in this report, all scheduled service was severely impacted, and non-primary, non-hub airport like GON were hit the hardest resulting in suspension of all commercial activities at many similarly size and type airports; especially those operating without Essential Air Service subsidies.

**Table 1 – Airport Classifications**

| Type of Air Carrier Operation | Airport Class I | II | III | IV |
|---|---|---|---|---|
| Scheduled Large Air Carrier Aircraft | ✓ | | | |
| Unscheduled Large Air Carrier Aircraft | ✓ | ✓ | | ✓ |
| Scheduled Small Air Carrier Aircraft | ✓ | ✓ | ✓ | |

GON operates under a Class IV AOC, meaning the facility is certificated for <u>unscheduled large air carrier</u> aircraft. This classification is a holdover based on previous air carrier service that ended with the departure of U.S. Airways Express circa 2002. In all likelihood, the departure of U.S. Air was a direct result of the aftermath of the post 9/11 events. As addressed later in this report, all scheduled service was severely impacted, and non-primary, non-hub airports like GON were hit the hardest resulting in suspension of all commercial activities at many similarly size and type airports; especially those operating without Essential Air Service (EAS) subsidies.[1]

However, under the revised Part 139 rule, four classes of airports were developed. The classifications are based on two components; the type of operations (scheduled or unscheduled), and the size of aircraft (large or small), as defined earlier. GON operates under a Class IV AOC, meaning the facility is certificated for unscheduled large air carrier aircraft.

The airport classification defines the level of administrative, safety and operational requirements at the airport. These requirements identify not only the types of services required, such as aircraft rescue and firefighting (as discussed earlier), but also the numbers and type of equipment, the capacities of firefighting retardant, etc. Logically, the various AOC classes correlated to various operating and maintenance costs, as well as capital improvement costs, including runway safety area improvements which were installed for the primary runway at GON in 2011.

Today, the airport is in the process of implementing an Airport Business Plan. Its primary objective is to identify operational and economic development opportunities with aims to improve the Airport's financial performance and long term viability. This may or may not result in resuming scheduled air carrier operations.

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[1] GON is not now, nor was it an EAS airport.

## AIRPORT CERTIFICATION MANUAL

The Airport Certification Manual (ACM) serves as the bridge between the requirements of Part 139 and their application to a particular airport, taking into account the airport's size, type/level of activity, and configuration. The ACM provides direction and lines of responsibility in the day -to-day operation of the airport. The ACM details operating procedures to be followed for both routine matters and unusual circumstances or emergencies that may arise. The contents of the manual are designed to meet FAA rules and regulations for airport certification contained in Part 139. It is an FAA requirement that this manual remain current. Revisions to the ACM are made as FAA issues new or amended requirements of Part 139. The FAA must approve any change or amendment to this manual before it can take effect. Likewise, this manual must reflect any changes in operations staff, their responsibilities, or policy changes made by the airport sponsor. Updating the manual is typically responsibility of the airport manager. In essence, it must be kept current at all times.

Groton-New London Airport maintains an ACM. A review of the GON manual indicates it is current, contains all applicable components required by Part 139, as well as appropriate FAA signatures. The airport manager maintain the ACM.

## AIRPORT EMERGENCY PLAN

A major component of Part 139 and the ACM is the development and maintenance of an Airport Emergency Plan (AEP) (§139.325).

The AEP provides an overview and procedures for prompt emergency response operations, while minimizing the possibility and extent of personnel injury and property damage on the airport in an emergency. The Plan is developed such that it provides adequate guidance to each person who must implement it, as well as specifying persons responsible for performing specific actions, under specific circumstances. The AEP contains instructions for responding to:

- Aircraft incidents and accidents;
- Bomb incidents;
- Structural fires;
- Fuel fires;
- Natural disasters;
- Hazardous materials and dangerous goods incidents;
- Sabotage, hijack incidents, and other unlawful interference with operations events;
- Power failures; and
- Water rescue situations.

In addition, the AEP provides guidance for media and crowd control, removal of disabled aircraft, family assistance, as well as other related procedures and measures to follow in the event of an accident or incident.

A major component of the AEP is the need for training and exercises. At least once every twelve months, a meeting or exercise must be held with the services and mutual aid agencies. This includes training for airport fire fighting personnel as discussed in the following section on ARFF.

## AIRPORT RESCUE AND FIRE FIGHTING (ARFF)

Part 139 (specifically §139.315, 139.317, 139.319 and 139.325) govern the essentials of emergency services response on Part 139 certificated commercial airports. The regulations specify the firefighting equipment, extinguishing agents required, and the operational and emergency requirements including ARFF training requirements. Part 139 certificated airports are classified by indices A through E in accordance with §139.315.[2] The average length of the commercial transport aircraft that utilizes a particular airfield determines an airport's ARFF index. The index category of an airport ultimately determines the type and amount of extinguishing agent necessary to provide fire protection and the number of trucks required to respond to emergency situations as specified in §139.317. The amount of agent and quantity of trucks required by the regulation can directly affect the facility because it ultimately sets the stage for staffing requirements. Index A airports require less equipment and agents then Index E because the lower indexed airports handle fewer aircraft (and passengers) over a given period of time.

Currently the FAA does not set staffing requirements for airports. Part 139 simply states that the airport must provide sufficient staffing and training for the staff that they provide to perform the emergency service response. However, the FAA does encourage airport operators to adhere to the National Fire Protection Association (NFPA) national consensus standards as well as the International Fire Service Training Association (IFSTA) Certification Standards of Oklahoma State University (OK).

GON maintains the necessary equipment and agents consistent with an Index A airport, which consists of two ARFF vehicles housed in the Airport Fire Station building, maintained in a quick response status. ARFF trained personnel consist of four full-time employees who are employed principally as maintenance personnel. The personnel are normally scheduled Monday through Friday (6 am to 6 pm); Saturday and Sunday (7 am to 3 pm).

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[2] The Airport Index applies to all airports served by scheduled air carriers operating aircraft with a seating capacity greater than 30 passengers. The index determines the minimum number of ARFF vehicles required and the minimum types and quantities of extinguishing agents carried by those vehicles. For example, Index A requires a minimum of one ARFF vehicle, whereas Index E requires a minimum of three vehicles.

During air carrier operations, at least two ARFF trained personnel are in standby mode from 15 minutes before until 15 minutes after the aircraft operation, with at least one person in the response vehicle on the ARFF ramp.[3]

Consistent with Part 139 and the ACM is the need for training in firefighting, wildlife hazard management, safety and security inspections and other related needs in support of the Airport. This includes providing 7 day a week services. GON is budgeted to provide this service with a staff of five and one half full-time employees; four in maintenance with operations and ARFF duties, a part-time ARFF captain and one in a management position also with operations duties.

## Snow and Ice Control

While snow and ice control are typical of all airports in northern climates, commercial service airports are held to higher standards. The standards, outlined in §139.313, specify the need for an approved written plan and a speedy response in support of commercial aircraft operations. Unlike ARFF requirements, Part 139 does not specify equipment requirements, personnel training, etc., but it does require a specific plan be implemented (as approved by the FAA), which includes detailed clearing standards and timely removal of ice and snow. Unlike general aviation airports, commercial airports are under added pressure to keep operating areas clear and available to air carrier operators.

The airport has a fleet of snow removal equipment, which is operated by the maintenance staff as necessary to keep snow and ice under control. The current operational plan allows for the prompt removal or control of snow, ice, slush of each of the airport's primary movement areas. Non-movement and other non-primary movement areas are cleared on an as needed basis after the primary areas are contained. Snow and ice events require the full support of the entire maintenance staff as well as the airport manager. The ACM contains specific details.[4]

## Self-Inspections

Airport inspections carried out by the airport staff are a routine component of Part 139 certification (§139.327). Unlike general aviation airports, commercial service airports must be self-inspected on a regular schedule as approved by the FAA and outlined in the ACM. GON conducts daily safety inspections, and nightly lighting inspections (Monday – Friday). ARFF equipment and vehicles are inspected each morning. Inspections are recorded on an approved form and maintained for 12 months. Unsafe conditions are promptly corrected or action taken to ensure action is taken, and appropriate Notices to Airmen are published with the FAA.

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[3] Airport Certification Manual, Section 9, page 9-1 (updated August 7, 2007).
[4] Section 7, page 7-1 (updated December 17, 2007).

Only authorized personnel are permitted to conduct the inspections. The airport manager conducts the training and maintains appropriate records.

### PERSONNEL

At the center of all commercial service airports are personnel. Because of the added cost in terms of paperwork, equipment, and service demands, such as ARFF services and snow removal, labor requirements are greater then a general aviation airport of equal size and number of operations. Part 139 (§139.303) requires airports to have sufficient and qualified personnel to comply the statute as well as the requirements of its ACM. Consistent with Part 139 and the ACM is the need for training in fire fighting, security, inspections, and other related areas in support of the airport. This includes providing round-the-clock services, including weekends. GON provides this service with a staff of six full-time employees; four in maintenance and ARFF, and two in administrative positions.

## AOC REQUIREMENTS AT GON

The current and future requirement for certification at GON is the principal purpose of this paper. Defining the need for an AOC will determine the level of administrative, safety, and operational requirements, including ARFF equipment and work force requirements.

**Table 2 – Average Operations (2003 – 2007)**

| | |
|---|---|
| Air Carrier | 0 |
| Air Taxi (including Charter) | 28,356 |
| General Aviation | 51,362 |
| Military | 4,276 |
| **Total** | **58,554** |

A brief discussion of the activity type at GON will help clarify the Part 139 certification process. Table 2 lists the average operations, including Air Taxi, during a recent five full calendar years (2003-2007). US Airways flew B1900 turboprop airplanes with nineteen (19) passenger seat commercial service for four round-trips daily to Philadelphia through October 2003. Four charter operators are also included in the air taxi counts. They are: 1) General Dynamics/Electric Boat who, since 2001 to present, operates B1900 turboprops for 1-3 scheduled corporate flights round trip to Newport News, VA and Washington Dulles Airport on weekdays; 2) Pfizer Inc. operated corporate flights from May 2003-June 2008 flying Embraer 135 with 35 maximum passenger loads round trip to Kalamazoo, Kansas sunday to friday; 3) Between the summer of 2006 and 2009, Mohegan Sun, 2nd largest casino in the U.S., contracted with Charter Air Services to fly from and to Republic Airport in Farmingdale, Long Island, New York with an Embraer 120, 30-seat turboprop each thursday through Sunday; and 4) In 2007-2011, Ultimate Jetcharters operated Dornier 30 seat charters between Montreal and GON on some summer weekends using U.S. Customs services. In April 2009, Aviation Technologies, Inc. dba Public Charters.com announced the launch of regularly scheduled public charter air service between GON, Long Island MacArthur-NY airport and Nantucket, MA on summer weekends only. Their plan was to offer this service on 30 seat Embraer aircraft operated by Charter Air Transport. However, the service start-up was cancelled due to the downturn in the national economy.

Same as today, the other operations in Table 2 were classified as either general aviation or military, which have no impact on Part 139 or the requirement for an AOC. However, we do not believe withdrawing the AOC is justified at this time. Moreover, a true assessment must first include a review of the past, present and future of the airline industry at GON, followed by conducting outreach and initiatives to bring commercial service to the market area as a destination airport so as to take advantage of southeastern Connecticut's historic coastline location and numerous thriving tourist attractions.

Given the above, the type of operations at GON today does not require an AOC because of one passenger seat! The EMB-120 has 30 passenger seats and the rules for unscheduled large aircraft specify 31 or more passenger seats. <u>However, we do not believe withdrawing the AOC is justified at this time</u>. Moreover, a true assessment must first include a review of the airline industry that existed before the loss of commercial service at GON and the potential return of an air carrier to this market area.

## AIRLINE MARKET ADJUSTMENTS

Since 2000, the aviation industry has been battered with the events of 9/11, the spread of Severe Acute Respiratory Syndrome, and record high fuel prices. Over the last seven years, major restructuring and downsizing among the mainline legacy carriers has occurred along with rapid growth among low-cost carriers, and exceptional growth among regional carriers. Legacy carriers have filed for and emerged from bankruptcy protection. Jet fuel, which is an airline's second largest expense, has more than tripled in cost in the past seven years, hampering the ability of the carriers to return to profitability or emerge from bankruptcy. As an example, the airline breakeven price of oil per barrel is $81;[5] while the current market price of oil has exceeded $140 per barrel in 2009, but has since relaxed to under $100.[6]

While the financial outlook for airlines is improving, U.S. airlines still posted losses in 2006, according to the International Air Transport Association. In 2005, U.S. commercial airlines reported a net loss of $11.8 billion with a net loss of more than $37 billion over the last five years, totally erasing the $23 billion that airlines earned between 1995 and 2000. In response, the air carrier airports have adjusted their capital spending plans to reflect the uncertain financial environment for their air carrier tenants. Consequently, airlines posted

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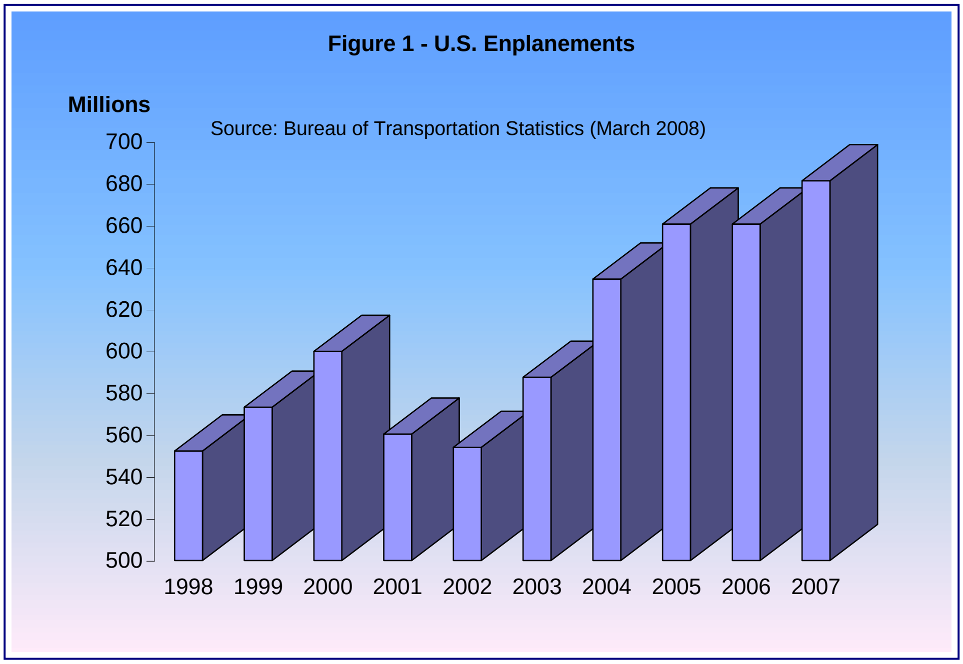
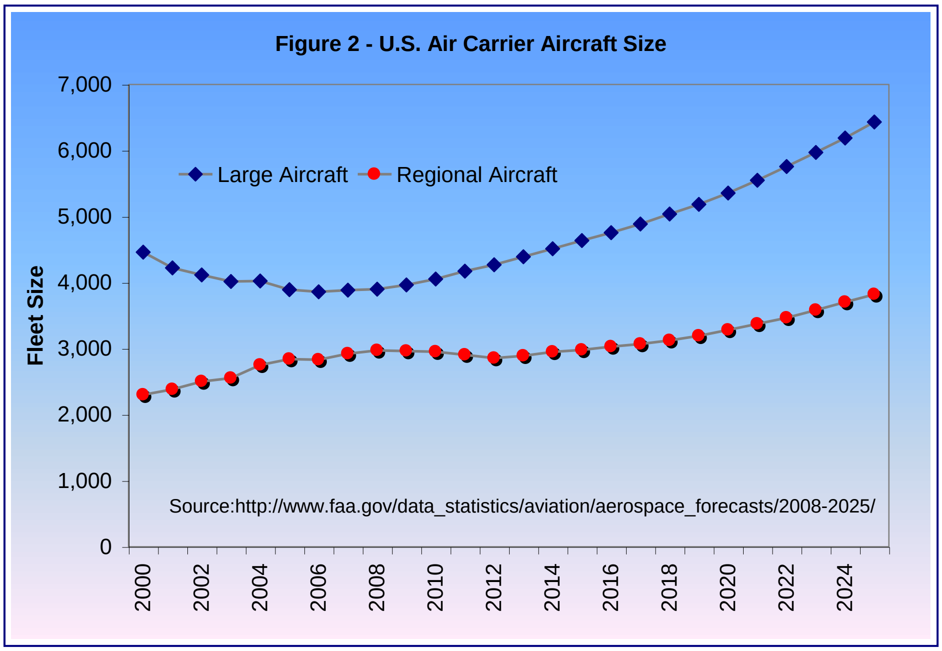
5 http://www.iata.org/pressroom/facts_figures/fact_sheets/fuel.htm
6 http://www.bloomberg.com/energy/

their first profit in years in 2007 and are projected to do the same in 2008 (assuming oil prices return to at or below the airlines breakeven price).

**Figure 1** illustrates the change in passenger demand on U.S. airlines; before and after 9/11. In 2005, commercial air carrier enplanements rose seven percent and were six percent higher than enplanements in 2000. By 2007, passenger demand growth on U.S. airlines rebounded from a weak year in 2006. System revenue passenger miles and enplanements grew 3.9 and 3.3 percent, respectively. Commercial air carrier domestic enplanements increased 3.1 percent while international enplanements grew 5.1 percent to a record 75.5 million. The system-wide load factor increased to an all-time high of just below 80 percent (79.9 percent) and coupled with a 2.3 percent increase in yield resulted in an industry-wide operating profit for the second year in a row.



As shown, passenger enplanements levels now exceed pre-9/11 levels; but more importantly for the GON market is the shift seen by air carriers from larger aircraft to smaller regional jets, in the 50-70 seat range, which bodes well for smaller airports, such as GON[7] (**Figure 2**). Another important aspect for GON is the growth in start-up airlines, such as Skybus and Jet Blue; two Part 119[8] operators who are working their way successfully into a market once the stronghold of earlier low-cost airlines such as Southwest. The low-cost carriers operate out of airports generally on the fringe of large market facilities, such as Portsmouth, NH, Portland, ME, and Westover, MA, because of lower operation costs at non-hub, non-primary commercial airports.




## FUTURE AOC REQUIREMENTS

The assessment discussed in the previous sections raises three important questions. First, if GON does not need an AOC under current conditions, should it continue to maintain the facility at Part 139 standards? Second, will GON require an AOC in the future? Third, what standards should the airport maintain without an AOC; specifically, what workforce, equipment, and airfield standards should the airport maintain?

On a purely economic basis, the answer to the first question is no; the airport does not require an AOC based on current conditions. However, the cost of maintaining the airport to Part 139 safety standards has not been full assessed. The immediate budgetary costs associated with this level of service in the area of personnel have decreased dramatically in recent years. The airport has five full- time employee positions allocated to management,

7 FAA Aerospace Forecasts, Fiscal Years 2012-2032.
8 Title 14 CFR Part 119, Certification: Air Carriers and Commercial Operators.

operations, maintenance and ARFF, plus a part time fire captain. A small portion of staffing labor is allocated in support of the AOC, including ARFF standby services when a 48 prior permission request is received for an unscheduled large air carrier operator. Such requests have been very minimal in recent years; and when they do, these services are invoiced by the State. In the meantime, ARFF service is provided by 1-3 maintainer/fire fighter staff on duty each day.

ARFF training and services, a component of commercial operations is not required for general aviation operations, but is required under the current lease with the on-airport Army National Guard helicopter repair operations. A focal point of managerial services is on AOC compliance, including security assessment, training and oversight. Operationally, while the airfield is maintained to Part 139 safety standards, only a small portion of the work force and costs (for examples, some airfield paint purchase and labor; record keeping) are likely attributed strictly to AOC compliance. In short, whether or not AOC compliance is dropped, the airport will still need the same size workforce it has today to maintain an airport of this size to FAA standards.

To answer the second question a study of the airline industry needs is briefly examined. Enplanements and commercial activities nationwide have strongly bounced back since 9/11 (refer to **Figure 1** on page 223). Whether this recovery has enough spin-off to warrant reintroduction of scheduled commercial service at GON depends on a number of factors. This will include assessment of competing service at the other nearby airports. Also considered is GON market demand, potential markets served, reliability, frequency, and aircraft type to be used. If all these factors are favorable to the GON market area, the return of scheduled service is a strong possibility (at least now compared to five/six years ago).

The current casino industry in the region will probably not have much impact on scheduled service because their size will probably not expand appreciably beyond the current market. A negative factor is the three commercial service airports on the fringes of the GON service area, which are well within 45 to 75 minutes by car for residents in Groton-New London metropolitan area (New Haven, Hartford, and Providence).

The answer to the second question may come from an earlier (1998) study on air service development.[9] Although written prior to the 9/11 attacks, several interesting and plausible trends are presented in the study.

[9] Air Service Development Study for Groton-New London Airport, Groton, Connecticut. Prepared by Kiehl Henrickson Group, for Connecticut Department of Transportation – Bureau of Aviation and Ports. September 1998

The executive summary of this report begins with, "Commercial air service at Groton Airport GON has historically struggled, but recently stabilized. There have been many carriers that have come and gone over the years, including Groton-based Pilgrim Airlines in the mid-1980, however, US Airways Express has experienced longevity, and its current success is a starting point." As stated earlier, US Airways Express left the market in 2003and the terminal has been quiet ever since.

The 1998 report goes on to say that the greatest hope for surviving as a commercial air service airport relies on two factors: 1) accepting a "niche" role within the region as a "convenience" airport; and 2) defending and strengthen current US Airways Express service. While the latter is no longer an option, the potential of fulfilling a "niche" market is still viable. The casino industry was not a factor when this 1998 report was written; today it is. While growth projections for either casino are not public knowledge,[10] it may be fair to assume that this commerce is not going away; but will in fact grow. Moreover, this growth is probably the "niche" market GON needs. In all likelihood, this will entail an expansion of charter operations and not a return of scheduled service. While the market is rebounding, the return of scheduled service to GON, even small aircraft in the 10-20-passenger seat range, is unlikely.

## RECOMMENDATIONS

Sound planning requires the preservation of options. In the case of GON, it is not recommended to suspend or revoke the AOC at this time. In reviewing the requirements of a Part 139 airport, the current needs for an AOC at Groton, and the preliminary labor, equipment, and service outlays, the following is recommend; an option that would partially preserve the airport's workforce, equipment inventory, and most important, level of operational and service commitment, exclusive of ARFF operational requirements.

1. Fully maintain the status quo for the time being (CTDOT should maintain, at least for now, AOC compliance to preserve options and enhance safety) with following considerations:

2. Allow the Master Plan Update to fully assess scheduled and charter service activities and assess the current and future design aircraft, which will establish the proper sizing of future airport infrastructure.

Specifically, we recommend that the Connecticut Department of Transportation:

1. Determine what the FAA intentions are concerning the AOC. Will its reissuance depend on, among other things, Part 139 requirements?

[10] An attempt to obtain data was made, but calls and email requests to the casinos and other trade representatives were not returned.

2. Establish a working dialog, possibly through a working committee, such as the Master Plan Advisory Committee or independent consultant, with regional chambers of commerce and other business leaders, including the two casinos, and airline representatives. The purpose of this is an open and candid discussion and interchange of ideas that focus on a single idea. What is the long-range potential for the GON, with particular emphasis on the possibility of the return of commercial air service?

3. Determine what the FAA's regional assessment of air service and airport capacity is for the region. Given the concentration of airports in the region, what are the FAA's forecasts for growth? This question will be analyzed in the master plan update.

Clearly, the long-term viability of commercial service at GON rests with development of the business market and whether the other regional commercial service airports can handle the growing demand as a visitor entrée to the Mystic Region.

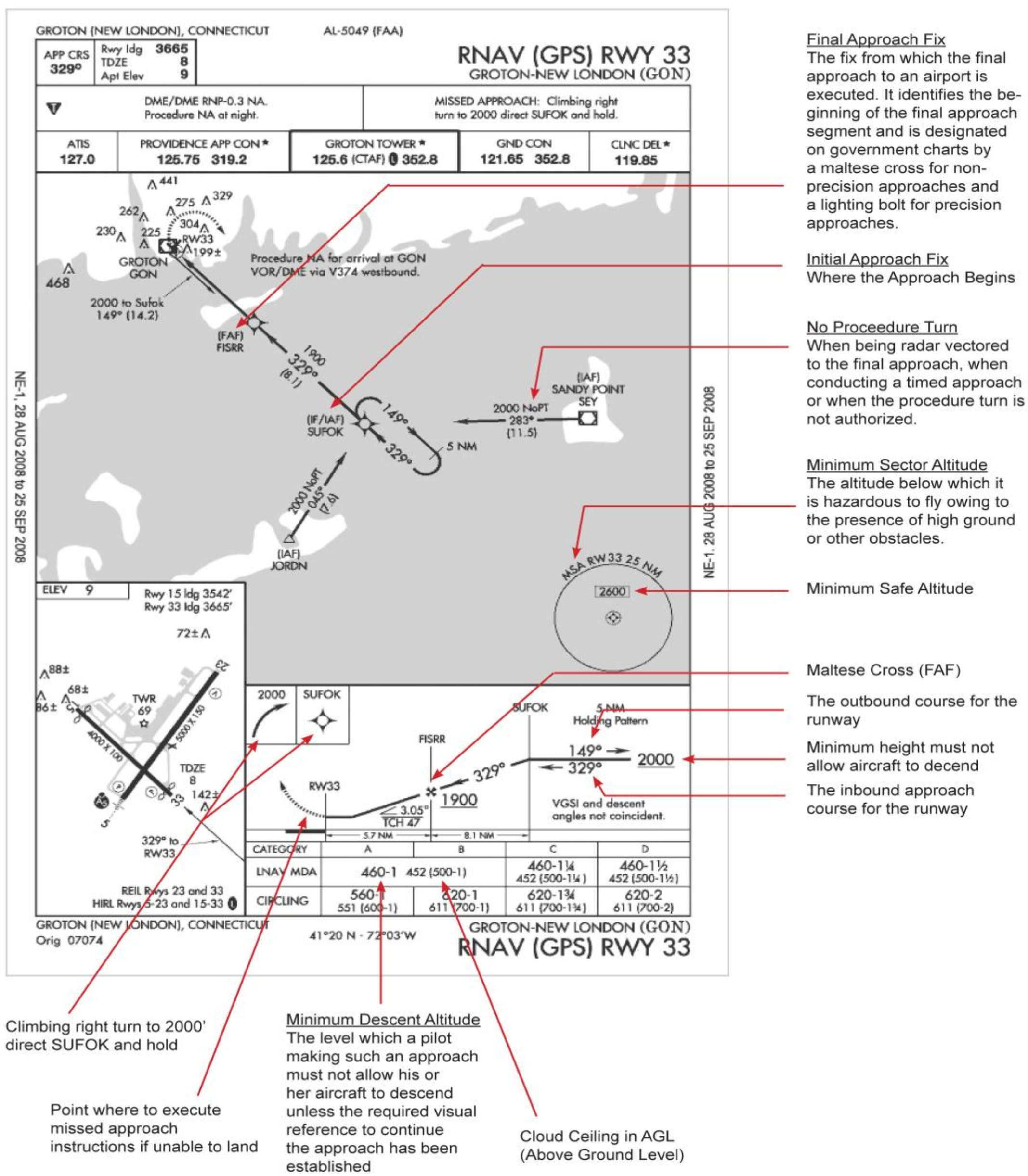
There is no question the general aviation market is strong and will remain so. Aviation is clearly a component of other modes of transportation in the area, including trains, ferries and buses. However, without further detailed analysis as part of the master plan update, it is impossible to know if the market area will once again support reintroduction of schedule service or witness increased charter aircraft activity. The best approach for GON is to remain viable and in a position to support commercial service when the market is ready.

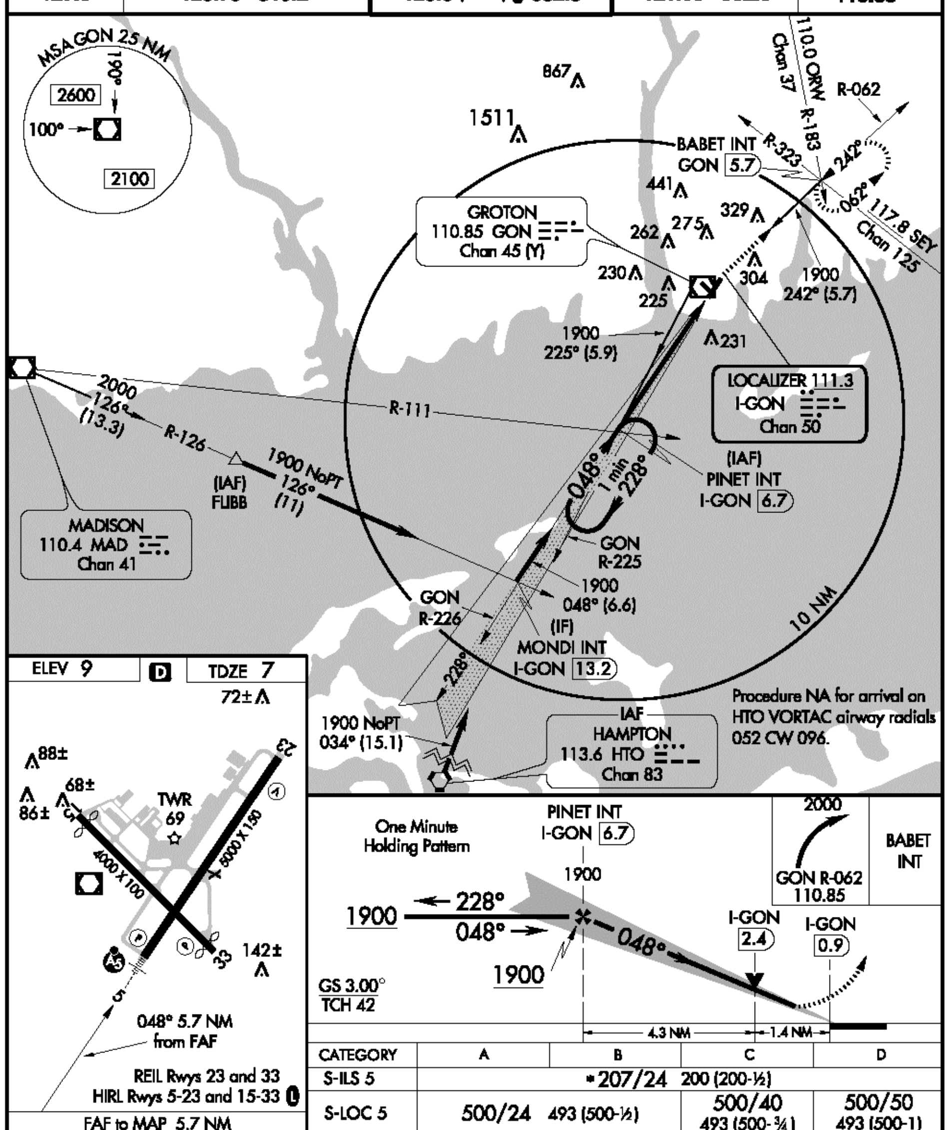
# APPENDIX 3 – INSTRUMENT APPROACH PROCEDURES

Appendix 3 contains graphic presentations of the six instrument approach procedures (IAP) serving GON. In addition, a graphic overview of what the information on the IAP represents is also provided on the next page.

The six IAPs serving GON include:

This sheet provides basic information about how to read an instrument approach chart, and what each element of the approach chart means. Additional information is available from the FAA *Instrument Procedures Handbook* available free of charge over the Internet at http://www.faa.gov/library/manuals/aviation/instrument_procedures_handbook/

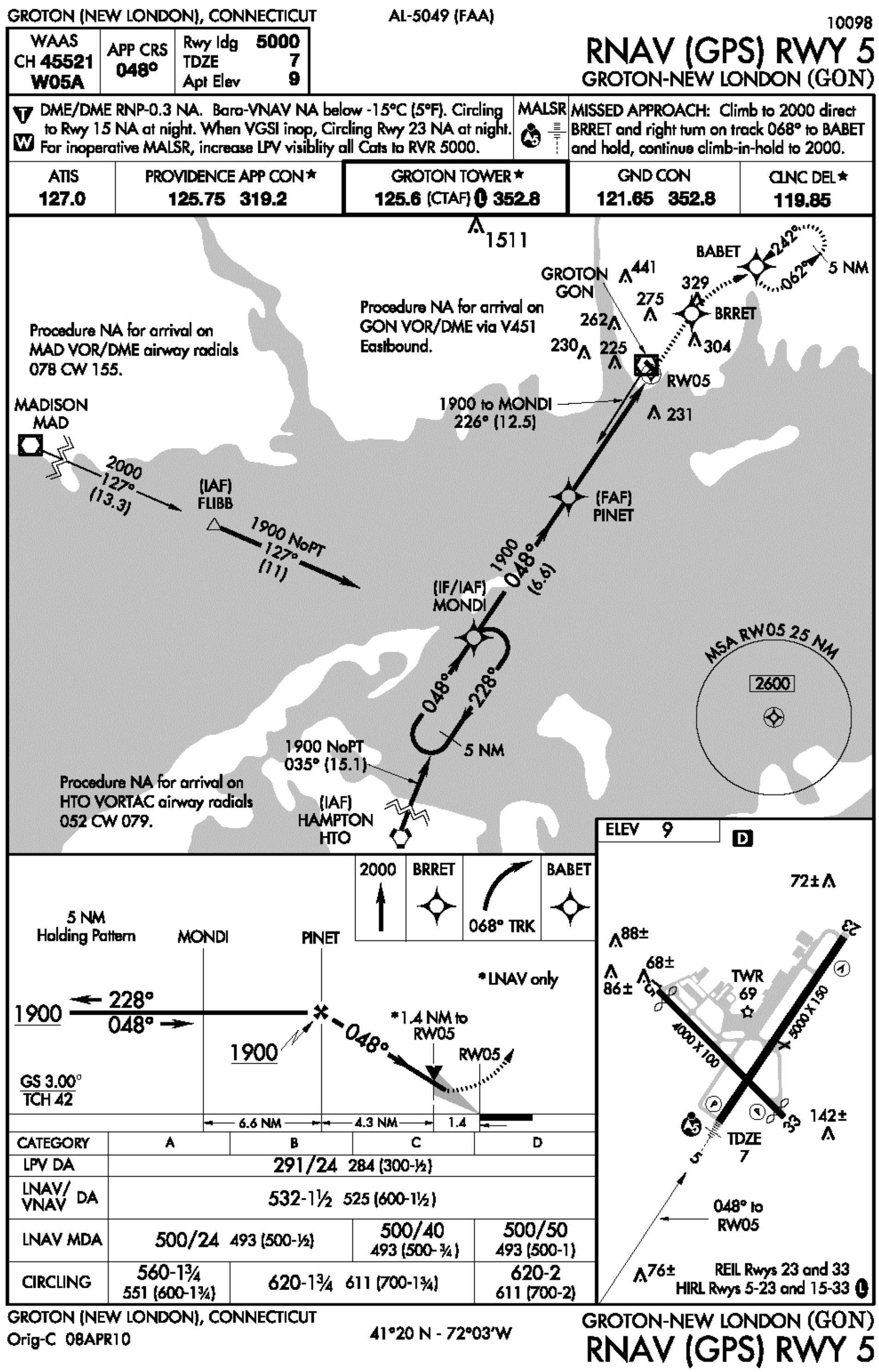




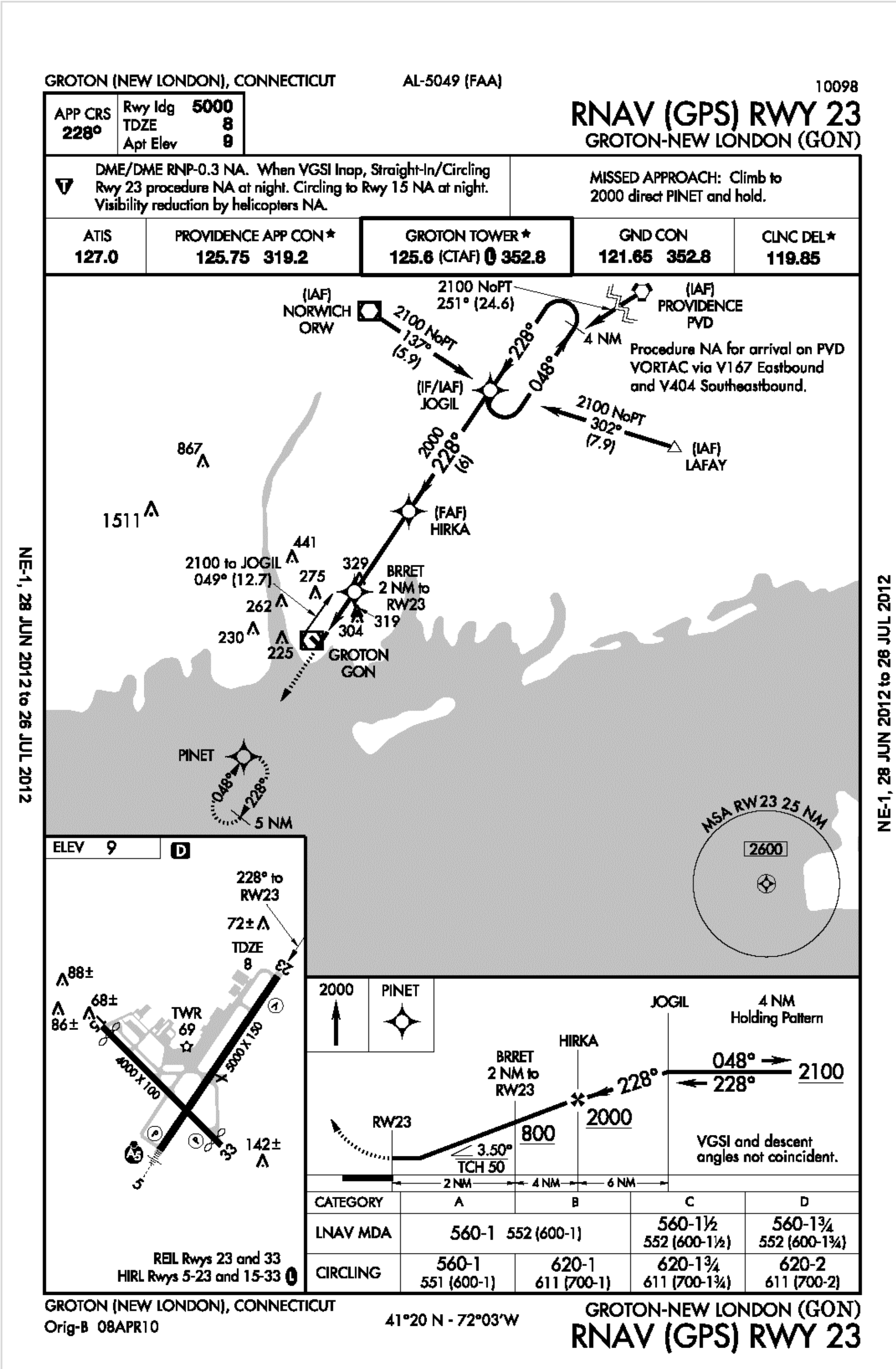

| FAF to MAP 5.7 NM | | | | | |
|---|---|---|---|---|---|
| Knots | 60 | 90 | 120 | 150 | 180 |
| Min:Sec | 5:42 | 3:48 | 2:51 | 2:17 | 1:54 |

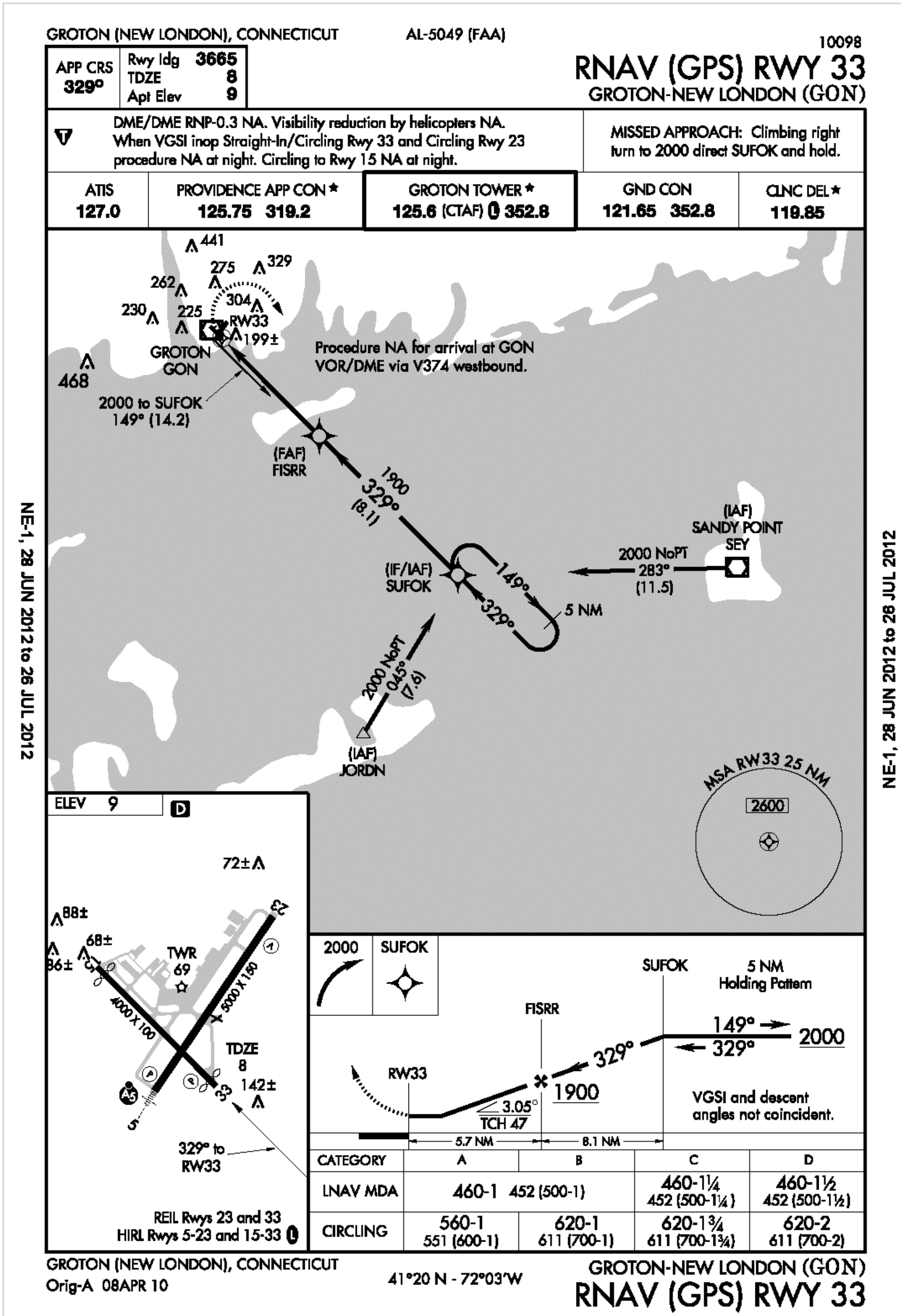
| CATEGORY | A | B | C | D |
|---|---|---|---|---|
| S-ILS 5 | •207/24 200 (200-½) | | | |
| S-LOC 5 | 500/24 493 (500-½) | | 500/40 493 (500-¾) | 500/50 493 (500-1) |
| CIRCLING | 560-1 551 (600-1) | 620-1 611 (700-1) | 620-1¾ 611 (700-1¾) | 620-2 611 (700-2) |

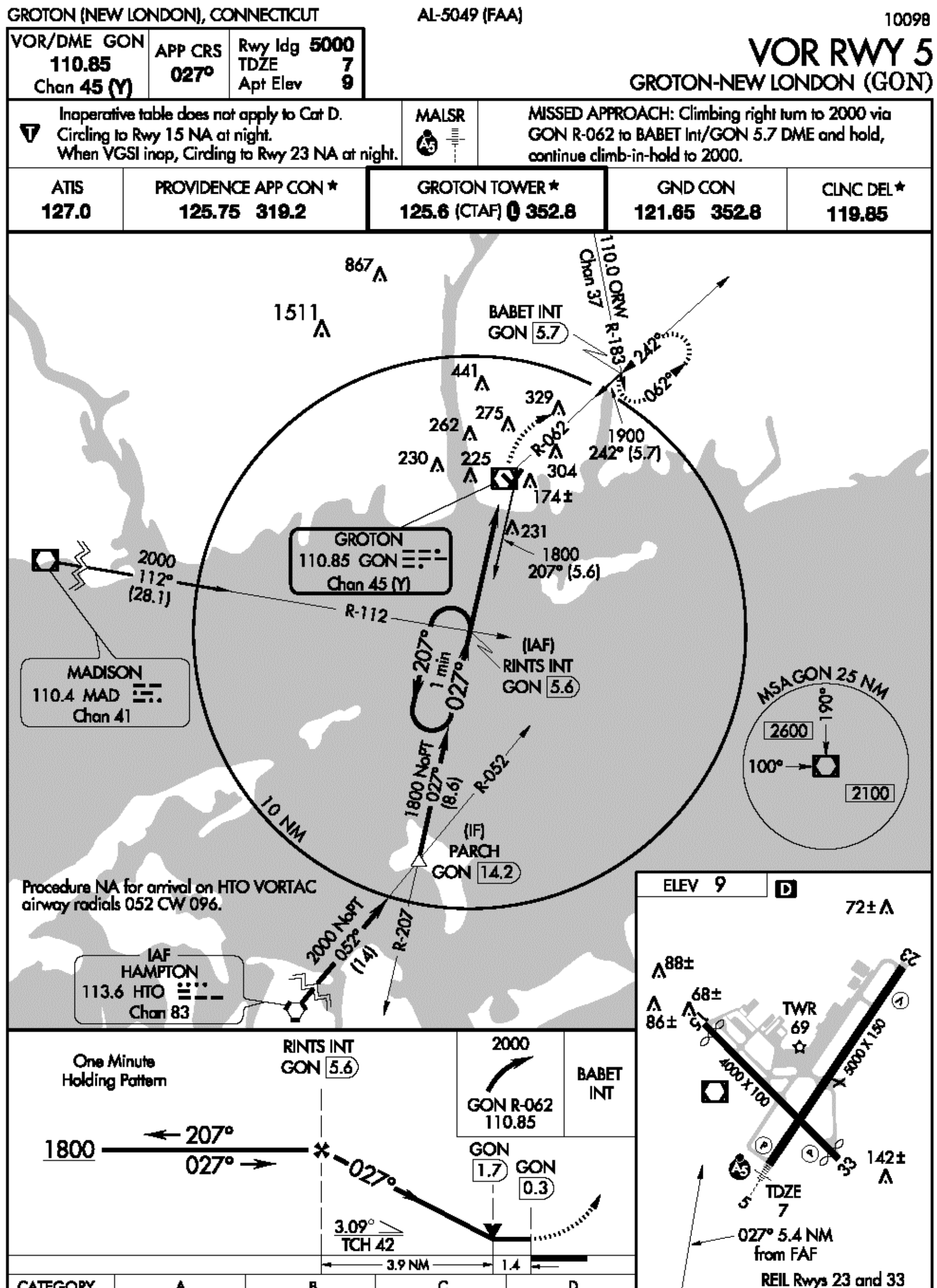
GROTON (NEW LONDON), CONNECTICUT
Amdt 11C 05MAY11
41°20'N - 72°03'W
GROTON-NEW LONDON (GON)
ILS or LOC RWY 5




| CATEGORY | A | B | C | D |
|---|---|---|---|---|
| LPV DA | 291/24 284 (300-½) | | | |
| LNAV/VNAV DA | 532-1½ 525 (600-1½) | | | |
| LNAV MDA | 500/24 493 (500-½) | | 500/40 493 (500-¾) | 500/50 493 (500-1) |
| CIRCLING | 560-1¾ 551 (600-1¾) | 620-1¾ 611 (700-1¾) | | 620-2 611 (700-2) |


GROTON (NEW LONDON), CONNECTICUT
AL-5049 (FAA)
10098
RNAV (GPS) RWY 23
GROTON-NEW LONDON (GON)
APP CRS 228°
Rwy ldg 5000
TDZE 8
Apt Elev 9
DME/DME RNP-0.3 NA. When VGSI Inop, Straight-In/Circling Rwy 23 procedure NA at night. Circling to Rwy 15 NA at night. Visibility reduction by helicopters NA.
MISSED APPROACH: Climb to 2000 direct PINET and hold.
ATIS 127.0
PROVIDENCE APP CON★ 125.75 319.2
GROTON TOWER★ 125.6 (CTAF) 352.8
GND CON 121.65 352.8
CLNC DEL★ 119.85
(IAF) NORWICH ORW
2100 NoPT 137° (5.9)
2100 NoPT 251° (24.6)
(IAF) PROVIDENCE PVD
4 NM
Procedure NA for arrival on PVD VORTAC via V167 Eastbound and V404 Southeastbound.
(IF/IAF) JOGIL
2100 NoPT 302° (7.9)
(IAF) LAFAY
2000 228° (6)
(FAF) HIRKA
2100 to JOGIL 049° (12.7)
BRRET 2 NM to RW23
GROTON GON
PINET
5 NM
MSA RW23 25 NM
2600
NE-1, 28 JUN 2012 to 26 JUL 2012
ELEV 9
228° to RW23
TDZE 8
TWR 69
5000 X 150
4000 X 100
REIL Rwys 23 and 33
HIRL Rwys 5-23 and 15-33
2000
PINET
JOGIL
4 NM Holding Pattern
048° 228° 2100
HIRKA
BRRET 2 NM to RW23
228° 2000
RW23
800
3.50° TCH 50
VGSI and descent angles not coincident.
2 NM 4 NM 6 NM
CATEGORY A B C D
LNAV MDA 560-1 552 (600-1) 560-1½ 552 (600-1½) 560-1¾ 552 (600-1¾)
CIRCLING 560-1 551 (600-1) 620-1 611 (700-1) 620-1¾ 611 (700-1¾) 620-2 611 (700-2)
GROTON (NEW LONDON), CONNECTICUT
Orig-B 08APR10
41°20 N - 72°03′W
GROTON-NEW LONDON (GON)
RNAV (GPS) RWY 23

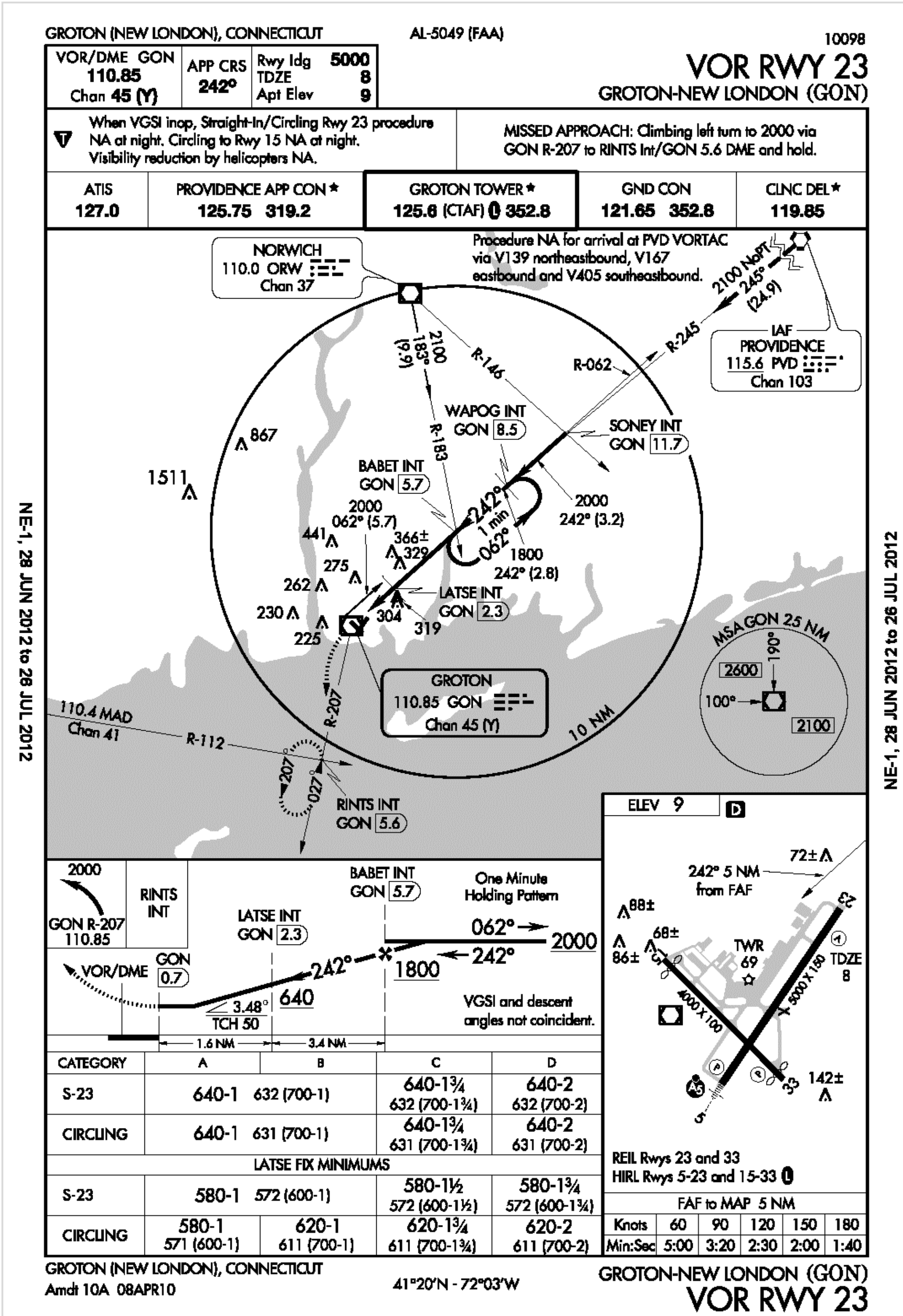

GROTON (NEW LONDON), CONNECTICUT
AL-5049 (FAA)
10098
APP CRS 329°
Rwy ldg 3665
TDZE 8
Apt Elev 9
RNAV (GPS) RWY 33
GROTON-NEW LONDON (GON)
DME/DME RNP-0.3 NA. Visibility reduction by helicopters NA. When VGSI inop Straight-In/Circling Rwy 33 and Circling Rwy 23 procedure NA at night. Circling to Rwy 15 NA at night.
MISSED APPROACH: Climbing right turn to 2000 direct SUFOK and hold.
ATIS 127.0
PROVIDENCE APP CON ★ 125.75 319.2
GROTON TOWER ★ 125.6 (CTAF) 352.8
GND CON 121.65 352.8
CLNC DEL ★ 119.85
Procedure NA for arrival at GON VOR/DME via V374 westbound.
GROTON GON
2000 to SUFOK 149° (14.2)
(FAF) FISRR
1900 329° (8.1)
(IF/IAF) SUFOK
149°
329°
5 NM
(IAF) SANDY POINT SEY
2000 NoPT 283° (11.5)
2000 NoPT 045° (7.6)
(IAF) JORDN
MSA RW33 25 NM
2600
NE-1, 28 JUN 2012 to 26 JUL 2012
ELEV 9
TWR 69
4000 X 100
5000 X 150
TDZE 8
329° to RW33
REIL Rwys 23 and 33
HIRL Rwys 5-23 and 15-33
2000
SUFOK
FISRR
5 NM Holding Pattern
149°
329°
2000
RW33
3.05°
TCH 47
1900
VGSI and descent angles not coincident.
5.7 NM
8.1 NM
CATEGORY A B C D
LNAV MDA 460-1 452 (500-1) 460-1¼ 452 (500-1¼) 460-1½ 452 (500-1½)
CIRCLING 560-1 551 (600-1) 620-1 611 (700-1) 620-1¾ 611 (700-1¾) 620-2 611 (700-2)
GROTON (NEW LONDON), CONNECTICUT
Orig-A 08APR 10
41°20 N - 72°03'W
GROTON-NEW LONDON (GON)
RNAV (GPS) RWY 33

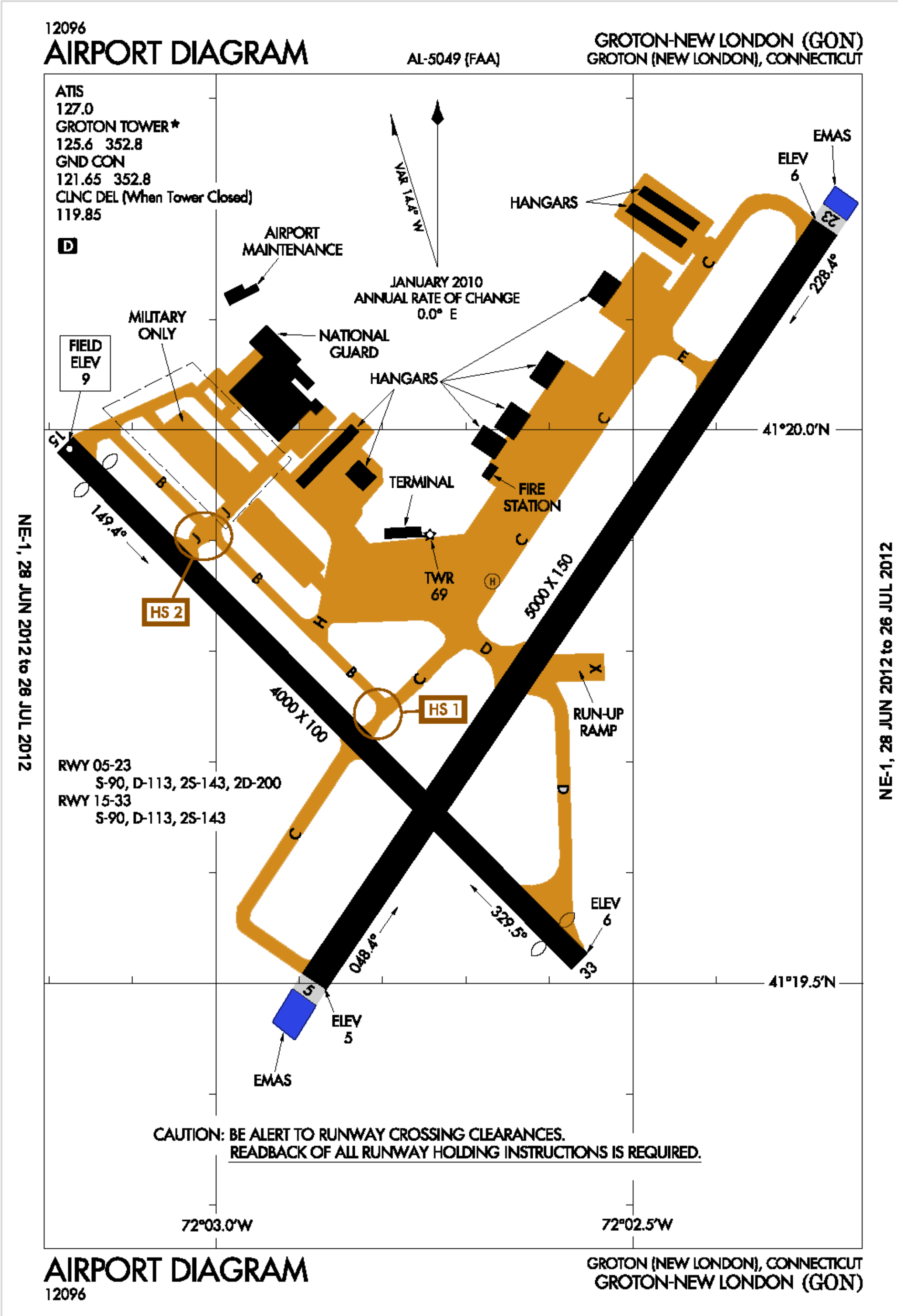



| CATEGORY | A | B | C | D |
|---|---|---|---|---|
| S-5 | 500/24 | 493 (500-½) | 500/40 493 (500-¾) | 500-1½ 493 (500-1½) |
| CIRCLING | 560-1 551 (600-1) | 620-1 611 (700-1) | 620-1¾ 611 (700-1¾) | 620-2 611 (700-2) |

FAF to MAP 5.4 NM

| Knots | 60 | 90 | 120 | 150 | 180 |
|---|---|---|---|---|---|
| Min:Sec | 5:24 | 3:36 | 2:42 | 2:10 | 1:48 |


GROTON (NEW LONDON), CONNECTICUT
AL-5049 (FAA)
10098
VOR/DME GON 110.85 Chan 45 (Y)
APP CRS 242°
Rwy Idg 5000
TDZE 8
Apt Elev 9
VOR RWY 23
GROTON-NEW LONDON (GON)
When VGSI inop, Straight-In/Circling Rwy 23 procedure NA at night. Circling to Rwy 15 NA at night. Visibility reduction by helicopters NA.
MISSED APPROACH: Climbing left turn to 2000 via GON R-207 to RINTS Int/GON 5.6 DME and hold.
ATIS 127.0
PROVIDENCE APP CON ★ 125.75 319.2
GROTON TOWER ★ 125.6 (CTAF) 352.8
GND CON 121.65 352.8
CLNC DEL ★ 119.85
NORWICH 110.0 ORW Chan 37
Procedure NA for arrival at PVD VORTAC via V139 northeastbound, V167 eastbound and V405 southeastbound.
2100 NoPT 245° (24.9)
IAF PROVIDENCE 115.6 PVD Chan 103
R-245
R-062
R-146
2100 183° (9.6)
WAPOG INT GON 8.5
SONEY INT GON 11.7
R-183
BABET INT GON 5.7
2000 062° (5.7)
2000 242° (3.2)
1 min
242°
062°
1800 242° (2.8)
LATSE INT GON 2.3
GROTON 110.85 GON Chan 45 (Y)
110.4 MAD Chan 41
R-112
R-207
207°
027°
RINTS INT GON 5.6
10 NM
MSA GON 25 NM
190°
100°
2600
2100
NE-1, 28 JUN 2012 to 26 JUL 2012
2000
GON R-207 110.85
RINTS INT
GON 0.7
VOR/DME
LATSE INT GON 2.3
BABET INT GON 5.7
One Minute Holding Pattern
062°
242°
2000
1800
640
3.48° TCH 50
VGSI and descent angles not coincident.
1.6 NM
3.4 NM
CATEGORY A B C D
S-23 640-1 632 (700-1) 640-1¾ 632 (700-1¾) 640-2 632 (700-2)
CIRCLING 640-1 631 (700-1) 640-1¾ 631 (700-1¾) 640-2 631 (700-2)
LATSE FIX MINIMUMS
S-23 580-1 572 (600-1) 580-1½ 572 (600-1½) 580-1¾ 572 (600-1¾)
CIRCLING 580-1 571 (600-1) 620-1 611 (700-1) 620-1¾ 611 (700-1¾) 620-2 611 (700-2)
ELEV 9
242° 5 NM from FAF
TWR 69
TDZE 8
4000 X 100
5000 X 150
REIL Rwys 23 and 33
HIRL Rwys 5-23 and 15-33
FAF to MAP 5 NM
Knots 60 90 120 150 180
Min:Sec 5:00 3:20 2:30 2:00 1:40
GROTON (NEW LONDON), CONNECTICUT
Amdt 10A 08APR10
41°20'N - 72°03'W
GROTON-NEW LONDON (GON)
VOR RWY 23


12096
AIRPORT DIAGRAM
AL-5049 (FAA)
GROTON-NEW LONDON (GON)
GROTON (NEW LONDON), CONNECTICUT
ATIS
127.0
GROTON TOWER*
125.6 352.8
GND CON
121.65 352.8
CLNC DEL (When Tower Closed)
119.85
D
VAR 14.4° W
JANUARY 2010
ANNUAL RATE OF CHANGE
0.0° E
AIRPORT
MAINTENANCE
HANGARS
EMAS
ELEV
6
23
228.4°
MILITARY
ONLY
NATIONAL
GUARD
HANGARS
FIELD
ELEV
9
15
149.4°
41°20.0'N
TERMINAL
FIRE
STATION
TWR
69
5000 X 150
HS 2
HS 1
4000 X 100
X
RUN-UP
RAMP
RWY 05-23
S-90, D-113, 2S-143, 2D-200
RWY 15-33
S-90, D-113, 2S-143
329.5°
048.4°
ELEV
6
33
41°19.5'N
5
ELEV
5
EMAS
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
72°03.0'W
72°02.5'W
NE-1, 28 JUN 2012 to 26 JUL 2012
AIRPORT DIAGRAM
12096
GROTON (NEW LONDON), CONNECTICUT
GROTON-NEW LONDON (GON)

# APPENDIX 4 - TERMINAL INSTRUMENT PROCEDURE (TERPS) ANALYSIS

## INTRODUCTION

Note: This appendix has been prepared for FAA review and analysis and is highly technical in nature. Abbreviations and acronyms used in this appendix can be found in Appendix 1.

## BACKGROUND

The potential of establishing new instrument approach procedures is presented in the following sections. Inasmuch as Runway 5 is currently served with a Category I ILS that offers the lowest approach minimums that can be authorized for such a procedure (200-½), it was determined to limit the analysis to Runways 15, 23 and 33. Presently, with the exception of Runway 15, instrument approach procedures based on the use of Area Navigation (RNAV) Global Positioning System (GPS) technology are available to these runway ends. However, these nonprecision procedures offer only Lateral Navigation (LNAV) capability to the landing runway threshold. Another type of nonprecision instrument approach that provides both lateral and vertical navigation guidance is termed Localizer Performance with Vertical Guidance (LPV). These procedures require the use of a Wide Area Augmentation System (WAAS) receiver, and general aviation aircraft are becoming more frequently equipped with this capability.

The analyses consider an RNAV (GPS) LNAV to Runway 15; and RNAV (GPS) LPV procedures to Runways 15, 23 and 33. These analyses were based on the guidance presented in applicable FAA orders:

8260.3B United States Standard for Terminal Instrument Procedures (TERPS)

8260.54A The United States Standard Area Navigation (RNAV)

FAA Order 8260.3B is the primary document associated with instrument procedures design. FAA Order 8260.54A addresses procedures designed to LNAV, LNAV/Vertical Navigation (VNAV), Localizer Performance (LP), and LPV minimums. There are a series of other FAA orders that complement these basic documents and are specific to different design features of the procedures. The Terminal Instrument Procedure (TERPS) analyses reviewed below represent a partial design of the potential instrument approach procedures and are intended to determine their feasibility and possible approach minimums.

## BASIC TERPS METHODOLOGY

TERPS prescribes a complex series of approach and missed approach imaginary surfaces that serve as obstacle identification or clearance surfaces and are employed to assess the impact that an obstacle may have on achievable approach minimums. Obstacles that penetrate these surfaces result in increases to the approach minimums from initially set levels. TERPS guidance provides means, within defined limits, to potentially eliminate or minimize the impact of obstacle penetrations. Instrument approach procedures include four basic segments – initial, intermediate, final and missed. The imaginary surfaces differ in size and slope among these segments and the procedure must also consider the descent gradients that result when transitioning from one segment to another. TERPS analyses begin with the assessment of the final and missed approach segments and then continue in reverse order to the intermediate and initial approach segments. In these latter segments, primary emphasis is placed on setting elevations for each fix that provide the Required Obstacle Clearance (ROC) and acceptable descent gradients between them. The resultant minimums are published for approach category A through E aircraft, as appropriate. These minimums may differ depending on TERPS standards.

The extent to which an obstacle is defined with respect to its horizontal and vertical data is indicated by an accuracy code. These codes, identified by a number and letter, indicate tolerance levels that range from 1 through 9 (20 feet to Unknown) for horizontal data, and from A through I (3 feet to Unknown) for vertical data. The minimum acceptable accuracy code for obstacles in the final approach segment is 2C (50 feet horizontal and 20 feet vertical). Obstacles with lesser accuracy codes are assigned the associated tolerance level during TERPS evaluations until a survey can certify more exact data.

TERPS approach surfaces for RNAV (GPS) procedures with LNAV minimums are the least complex and generally involve an Obstacle Clearance Surface (OCS) that is level. The missed approach segment incorporates an OCS that rises as the aircraft climbs during the missed approach procedure. The TERPS surfaces for an RNAV (GPS) LPV procedure incorporate level and sloping surfaces. The TERPS algorithms for procedures providing lateral and vertical navigation guidance also incorporate adjustments for earth curvature.

The LPV final approach segment OCS is comprised of three sloping areas (W, X and Y) that begin 200 feet from the runway landing threshold. Its width increases as it extends to the precise final approach fix. The W surface rises at slope of 34:1 based on a 3.00º glidepath angle for its entire length. The X and Y surfaces rise at slopes of 4:1 and 7:1, respectively, from the adjacent elevation of the W surface. Obstacles that are not located within or penetrate the W, X or Y OCS need not be considered in determining the achievable approach minimums. When there are penetrations to the OCS, the instrument approach procedure may be modified in one or more of several ways to eliminate or reduce the amount of the penetration. Aside from removal of the obstacle or reducing its height, these mitigation measures include one or a combination of actions – realignment of the final approach course within a range of 3.00° to either side of the runway centerline extended, displacing the landing threshold, raising the Glidepath Angle (GPA), adjusting the Decision Altitude (DA) and increasing the Threshold Crossing Height (TCH). TERPS guidance prioritizes the use of these mitigation measures.

To achieve LPV minimums for a RNAV (GPS) procedure, a defined Glide Path Qualification (GQS) surface must be clear of penetrations. The GQS is a trapezoidal shape with variable dimensions and a slope rising at an angle equal to ⅔ of the GPA. The width of the GQS increases as it extends further from the landing runway threshold to the Decision Altitude (DA) point. Obstacles that penetrate the GQS may either be removed or lowered in elevation, the landing threshold may be displaced and/or the GPA may be increased within limits. In the latter case, the lowest achievable approach minimums may be raised for all or specific aircraft approach categories depending on the required GPA value.

The visual portion of the final approach segment is a TERPS criterion that is used to assess the need for limiting the visibility component or restricting use of the approach procedure at night. There are two Obstacle Identification Surfaces (OIS) defined for the visual portion. Penetration of the 20:1 OIS requires that the obstacle be removed or lowered in elevation. Otherwise they are to be marked and lighted, and the instrument approach procedure is not to include a visual descent point, the visibility minimum is limited to 1 statute mile (s.m.) and nighttime landings are prohibited. The nighttime landing restriction can be lifted only for obstacles that cannot be marked and lighted if a Visual Guidance Slope Indicator System (VGSI) is provided at an angle $\geq$3° to clear the penetrating obstacle. A 34:1 OIS penetration will require that the visibility minimum be limited to ¾-mile if the obstacle cannot be removed or lowered in elevation.

The missed approach segment for obstacle evaluation associated with procedures that provide lateral and vertical guidance differs from that associated with that offering only lateral navigation information, particularly with respect to the location of the missed approach point and its elevation. Missed approach procedures can be designed with straight-out alignments, climbing turns and combinations. Under certain circumstances, the missed approach surface can be the greatest factor in the determination of approach minimums, especially in obstacle-rich environments.

The TERPS analysis considers natural and man-made obstacles that underlie the initial, intermediate, final and missed approach segments to determine the potential minimums, fix altitudes and descent gradients. Additionally, the runway layout needs to meet a number of landing surface requirements applicable to the achievable minimums in order to establish an instrument approach procedure.

## PREMISE OF THE TERPS ANALYSIS

The conduct of the TERPS feasibility analyses was based on the use of currently available mapping and data as indicated below.

National Aeronautical Charting Office Digital Obstacle File, October 2008

National Geodetic Survey Aeronautical Data Sheet, August 4, 2004, Preliminary Airport Layout Plan

**Table D.1** presents a summary of the key data associated with each runway threshold at the Airport.

**Table D.1 - Runway End Data**

| Runway Landing End | Latitude | Longitude | True Bearing | Landing Threshold Elevation (AMSL) |
|---|---|---|---|---|
| 5 | 41º19'30.1176"N | 72º02'52.8977"W | 33º58'18.067"E | 5.3' |
| 23 | 41º20'11.0870"N | 72º02'16.2705"W | | 6.4' |
| 15* | 41º19'57.0693"N | 72º03'08.0054"W | 315º03'22.151"E | 8.6' |
| 33* | 41º19'32.6827"N | 72º0235.7131""W | | 5.9' |

* Displaced Threshold

Source: QED with data from Federal Aviation Administration

The text that follows is, by necessity, technical and reflects the complexity associated with the use of TERPS design criteria. The key elements of the procedure design as discussed above are presented. These include:

The obstacle that controls the determination of the approach minimums

The location and elevation of approach fixes

The characteristics of the missed approach procedure and obstacle impacts on the missed approach surface

The visual portion of the final approach segment

Depending on the situation, the controlling obstacle may change as the procedure design progresses through its iterative process. TERPS design allows a measure of flexibility to minimize or eliminate the impact of obstacles. It is this iterative process that adds to the complexity of the procedure design and often results in identifying obstacles other than that initially controlling the determination of the achievable approach minimums.

## RNAV (GPS) LNAV 15

### Controlling Obstacle and Approach Fixes

A tower located at 41°22'40"N latitude, 72°06'35"W longitude and an elevation of 324 feet above mean sea level (AMSL) (84 feet above ground level - AGL) without an assigned accuracy code was initially determined to be the controlling obstacle for this RNAV (GPS)

LNAV procedure. To account for the unassigned accuracy code, the tower was evaluated at an elevation of 374 feet AMSL. Because this tower is located 22,824 feet or about 3.8 nautical miles (n.m.) from the Runway 15 landing threshold, as measured along the extended runway centerline, the potential to establish a stepdown fix (SDF) at this location to eliminate it from consideration in the analysis was evaluated and found to be viable.

The SDF elevation was set at 1,260 feet AMSL in order to provide the ROC at the tower and to meet the required descent gradient between it and the Precise Final Approach Fix (PFAF) based on a 3.00º glidepath angle. Additionally, this elevation meets the required descent gradient between the SDF and the landing threshold incorporating a 45-foot threshold crossing height. The PFAF altitude of 2100 feet AMSL is established by a tower located at 41º25'03.00"N latitude and 72º11'53.28"W at an elevation of 1,511 feet AMSL (accuracy code 1A) and is 6.43 n.m. from the landing threshold. The resulting descent gradients between the PFAF and SDF and between the SDF and the landing threshold are 298 feet/n.m. and 322 feet/n.m., respectively. These values are near optimum for RNAV nonprecision approaches in the final approach segment.

Ultimately, the controlling obstacle for the RNAV (GPS) LNAV procedure is a tower at 41°21'13"N latitude, 72°05'52"W longitude and an elevation of 254 feet AMSL (84 feet AGL) with an assigned accuracy code of 2D. Consequently, this tower was evaluated at an elevation of 304 feet AMSL. This factor and a penalty due to the excessive length of the final approach segment set the approach minimums at 571-1 (height above threshold, or HATh, and visibility – VIS, in statute miles) for approach category B aircraft as shown in **Table 2.**

The intermediate approach fix altitude is 2,400 feet AMSL at the optimum distance of 10 n.m. from the landing threshold, and the initial approach fix at 3,700 feet AMSL and 5 n.m. from the intermediate fix. These altitudes and distances between fixes yield acceptable descent gradients. Transition from one fix to the next is unencumbered in the terminal and en route airspace. Two separate initial approach fixes should be positioned at about a 90° angle to the northwest and a 90° angle to the southeast as measured from the extended runway centerline.

### Missed Approach

The missed approach point is the Runway 15 runway departure end and the missed approach surface is clear of obstacles. The missed approach procedure provides for a straight climb to a fix that can be positioned southeast of the Airport at an elevation of 2,000 feet AMSL. The SUFOK waypoint, which is associated with the RNAV (GPS) approach procedure to Runway 33, may serve this function.

### Visual Portion of the Final Approach Segment

There are several obstacles (poles, railroad and trees) that penetrate the 20:1 OIS and, therefore, nighttime operations are restricted unless these obstacles are removed or lowered in elevation, marked or lighted, or a VGSI is installed at an angle to clear the most critical obstacle. This obstacle is a tree or a cluster of trees southeast of Thomas Road at 41º20'03.94"N latitude, 72º03'13.40"W longitude at an elevation of 52 feet AMSL (accuracy code 1A). The railroad penetrates the 20:1 OIS by 8 feet. These and several additional obstacles penetrate the 34:1 OIS; however, inasmuch as the lowest achievable visibility minimum is 1 s.m., the penetration of this OIS is moot.

### Approach Minimums

Based on the above factors, the approach minimums for an RNAV (GPS) LNAV procedure to the Runway 13 end is presented in **Table 2**.

**Table D.2 - RNAV (GPS) LNAV Minimums - Runway 15**

| Approach Minimums (HATh -VIS) for Aircraft Approach Category | | | |
|---|---|---|---|
| A | B | C | D |
| 571 – 1 | 571 – 1 | 571 – 1½ | 571 – 1½ |

## RNAV (GPS) 15 LPV

The analysis was initially premised on the use of a 3.00° GPA and a 45-foot threshold crossing height that are the optimum values for the type aircraft regularly using the Airport.

### Controlling Obstacle and Approach Fixes

Numerous obstacles within 5,000 feet of the landing runway threshold penetrate the W surface of the OCS. Of these, the most critical is a tree or a cluster of trees located at 41º20'26.17"N latitude, 72º03'58.07"W longitude at an elevation of 176 feet AMSL (accuracy code 1A). This set the ceiling approach minimum at 353 feet AMSL, which incorporates a slight penalty to account for the location of the PFAF at 6.20 n.m.

Evaluation of the GQS identified several penetrations that, as a consequence, preclude the establishment of the LPV procedure. Mitigation of these obstacle penetrations to the GQS addressed the alternatives of increasing the GPA or further displacement of the landing runway threshold. The required increases to the GPA were between 3.11º and 4.76º depending on the obstacle under consideration. These results limit the use of the runway to certain aircraft types as well as the achievable approach minimums. The required additional displacement of the landing runway threshold ranged between 78 feet and 462 feet, which results in landing runway lengths of between 3,231 feet and 3,615 feet.

Given the outcomes described above, consideration was given to increasing the GPA to 3.10º and the TCH to 50 feet. The higher GPA allows for unrestricted use of the RNAV (GPS) LPV procedure to approach category A through E aircraft. The 50-foot TCH is an acceptable value for general aviation aircraft. The results of this evaluation identified that the same tree/cluster is the controlling obstacle and yields a ceiling minimum of 355 feet AMSL. This outcome is essentially equivalent to that obtained in the initial analysis. The basis for the nominal increase in the ceiling minimum is a function of the algorithms used in the TERPS guidance and in particular the distance from the runway landing threshold to the start of the OCS. The higher GPA and TCH do not eliminate obstacle penetrations to the GQS; however, the extent is slightly less and the required additional landing threshold displacements range between 6 feet and 419 feet. This yields a slightly longer, landing runway length of between 3,274 feet and 3,687 feet.

The initial, intermediate and final approach fixes determined for the RNAV (GPS) LNAV procedure are also applicable to the RNAV (GPS) LPV procedure.

### Missed Approach Segment

The missed approach segment for the RNAV (GPS) LPV to the Runway 15 landing threshold is clear of obstacles. The missed approach procedure provides for a straight climb to a fix that can be positioned southeast of the Airport at an elevation of 2,000 feet AMSL, similar to that for the RNAV (GPS) LNAV procedure evaluated for Runway 15.

### Visual Portion of the Final Approach Segment

The 20:1 OIS and 34:1 OIS of the visual portion of the final approach segment are equivalent for RNAV (GPS) LNAV and RNAV (GPS) LPV procedures. Consequently, under current conditions VIS is limited to 1 sm.

Approach Minimums

**Table 3** presents the approach minimums for the RNAV (GPS) LPV procedure to the Runway 15 landing threshold.

**Table D.3 - RNAV (GPS) LPV Minimums - Runway 15**

| Approach Minimums (HATh -VIS) for Aircraft Approach Category | | | |
|---|---|---|---|
| **A** | **B** | **C** | **D** |
| 346-1 | 346-1 | 346-1 | 346-1 |

## RNAV (GPS) LPV 23

Application of the TERPS guidance was based on the use of a 3.00º GPA and 45 feet TCH; those normally applied at general aviation airports.

### Controlling Obstacle and Approach Fixes

The obstacle environment in the approach to Runway 23 is less severe than that to Runway 15 and Runway 33. Nonetheless, the W surface of the OCS is penetrated by several obstacles including trees or clusters of trees, bushes, terminal navigation aids (localizer), a road, a pole and terrain within 2,500 feet of the Runway 23 landing threshold. However, these penetrations to the OCS do not generate a need to raise the ceiling approach minimum above that defined under TERPS criteria for such circumstances. The initial achievable ceiling approach minimum is 256 feet AMSL and the VIS is ¾ s.m. for all aircraft approach categories.

The GQS is clear of obstacles, thereby allowing the establishment of an RNAV (GPS) LPV procedure.

The PFAF is set an elevation of 2,100 feet AMSL based on a tower located at 41º27'39"N latitude, 71º55'44"W longitude at an elevation of 793 feet AMSL (353 feet AGL) with an accuracy code of 1D, and as adjusted to yield the optimum descent gradient of 318 feet/n.m. to the Runway 23 landing threshold. This sets the intermediate approach fix at 2,400 feet AMSL, which is located 10 n.m. from the landing threshold.

The initial approach fix is positioned 5 n.m. from the intermediate approach fix at an altitude of 3,700 feet AMSL. This altitude and distance between fixes yields an acceptable descent gradient of 260 feet/n.m.. Two initial approach fixes, each about 90º to either side of the final approach course should be incorporated into the procedure. This is similar to those fixes (Norwich VOR/DME and LAFAY waypoint) specified in the existing RNAV (GPS) LNAV procedure to Runway 23.

Because the PFAF location is 6.23 n.m. from the landing runway threshold, the initially determined ceiling minimum is increased to 278 feet AMSL to account for the excessive length of the final approach segment and results in an increase of the VIS to 1 sm.

### Missed Approach

The missed approach surface is penetrated by a light on a building located at 41º20'25.57"N latitude, 72º01'52.07"W at an elevation of 79 feet AMSL (accuracy code 1A) and a tree or cluster of trees at 41º20'32.02"N latitude, 72º01'59.49"W longitude at an elevation of 71 feet AMSL (accuracy code 1A). These penetrations, on the order of 0.6 feet to 1.5 feet, have an impact on the achievable approach minimums. Unless these penetrations can be mitigated, the ceiling component of the approach minimum is increased to 280 feet AMSL and the VIS remains at 1 sm.

The missed approach provides can incorporate a straight climb to 2,000 feet AMSL to the PINET waypoint as defined for the existing RNAV (GPS) LNAV procedure to Runway 23.

### Visual Portion of the Final Approach Segment

Three obstacles (a tree or cluster of trees, bush and the DME equipment) penetrate the 20:1 OIS by between 1 and 2 feet. This triggers a requirement to eliminate or reduce the elevation of these obstacles in order to enable nighttime instrument approaches. Absent that ability, the obstacles are to be marked and lighted the obstacles if nighttime landings are to be allowed. In the event marking and lighting is not viable, then a VGSI set at the appropriate angle is to be provided to enable nighttime landings. Because the VASI-4 serving Runway 23 is set at 3.00º (as is the GPA for the evaluated procedure) and a 49.1 feet TCH, which is slightly higher than the 45-foot standard utilized in the analysis, it is likely that this VASI-4 provides adequate clearance such that nighttime approaches need not be restricted. These same obstacles penetrate the 34:1 OIS; however, inasmuch as the lowest achievable visibility minimum is 1 s.m., the penetration of this OIS is not a factor.

### Approach Minimums

Based on the above factors, the approach minimums for a RNAV (GPS) LPV procedure to Runway 23 are presented in **Table 4.**

**Table D.4 - RNAV (GPS) LPV Minimums - Runway 23**

| Approach Minimums (HATh -VIS) for Aircraft Approach Category | | | |
|---|---|---|---|
| **A** | **B** | **C** | **D** |
| 280-1 | 280-1 | 280-1 | 280-1 |

## RNAV (GPS) LPV 33

The evaluation utilized the same GPA (3.05º) and TCH (47 feet) as that for the design of the existing RNAV (GPS) LNAV procedure to Runway 33.

### Controlling Obstacle and Approach Fixes

The controlling obstacle is a tree or cluster of trees at 41º19'13.37"N latitude, 72º01'59.76"W at an elevation of 156 feet AMSL (accuracy code 1A). This obstacle as well as others (bushes, trees and the glide slope antenna serving Runway 5) that are located within 3,800 feet of the landing runway threshold penetrates the W surface of the OCS. It is noted that obstacles located within the along-track tolerance are considered in the approach surface. This applies to the glide slope antenna mentioned above. Although the W surface of the OCS is penetrated, no adjustment to the approach minimums is required by the TERPS guidance. This initially sets the ceiling component of the approach minimums at 335 feet AMSL and the VIS component at 1 sm.

Evaluation of the GQS identified several penetrations that, as a consequence, preclude the establishment of the LPV procedure. These obstacles are trees or clusters of trees located within an area of some 3,200 feet to 3,800 feet out from the runway landing threshold and along its extended centerline, and between 200 feet left of and 260 feet right of that course. This is an area is generally described as residential and educational/recreational northwest of Midway Oval and Fort Hill Road.

Mitigation of these obstacle penetrations to the GQS addressed the alternatives of increasing the GPA or further displacement of the landing runway threshold. The required increases to the GPA were between 3.24º and 3.88º depending on the obstacle under consideration. These results limit the use of the runway to certain aircraft types as well as the achievable approach minimums. The required additional displacement of the landing runway threshold ranged between 235 feet and 895 feet, which results in a landing runway length of between 2,900 feet and 3,560 feet.

The PFAF can be set as utilized in the existing RNAV (GPS) LNAV procedure to Runway 33. This continues the use of an intermediate approach fix at 2,000 feet AMSL. The initial approach fix can be similarly set at 2,000 feet AMSL as provided in the current LNAV procedure, which also allows for two courses to the intermediate approach fix based on the SEY VOR/DME and JORDN waypoint.

**Missed Approach**

A tank located at 41º20'28"N latitude, 72º04'07"W at an elevation of 226 feet AMSL (accuracy code 1B) penetrates the missed approach surface by 6.3 feet. The tank is sufficiently close to the beginning of the missed approach surface that it cannot be eliminated from consideration by incorporating an immediate turn. Consequently, the penetration has the effect of increasing the achievable approach minimums to 341 feet AMSL, and the visibility remains at 1 s.m. Another obstacle, a tower located at 41º25'03"N latitude, 72º11'53.28"W longitude at an elevation of 1,511 feet AMSL (1,202 feet AGL) with an accuracy code of 1A, also penetrates the straight-out missed approach procedure. However, unlike the tank above, this tower is located sufficiently distant (some 9.7 n.m.) from the start of the missed approach and nearly 1.1 n.m. offset from the extended runway centerline. This affords the opportunity to incorporate a climbing left turn that will allow the missed approach course and associated surface to avoid inclusion of or penetration by the tower.

**Visual Portion of the Final Approach Segment**

A bush located at 41º19'29.22"N latitude, 72º02'35.52"W at an elevation of 11 feet AMSL (accuracy code 1A) penetrates the 20:1 OIS by 2.2 feet. If this bush cannot be eliminated or lowered in elevation, it must marked and lighted to avoid the prohibition of nighttime approaches. If lighting and marking is not a viable option, a VGSI should be installed. Runway 33 is currently equipped with a PAPI-4. It is likely that this PAPI-4 will provide adequate clearance to maintain 24-hour operations. This PAPI-4 is set at 3.75º, which is significantly higher than the 3.05º GPA used in the evaluation, and the TCH is lower at 33.5 feet. This same bush and other obstacles that penetrate the GQS penetrate the 34:1 OIS by between 3 feet and 59 feet. This outcome limits the achievable VIS component of the approach minimums to 1 s.m.

### Approach Minimums

Based on the above factors, the approach minimums for a RNAV (GPS) LPV procedure to Runway 33 are presented in Table D.5.

**Table D.5 - RNAV (GPS) LPV Minimums - Runway 33**

| Approach Minimums (HATh -VIS) for Aircraft Approach Category | | | |
|---|---|---|---|
| **A** | **B** | **C** | **D** |
| 341-1 | 341-1 | 341-1 | 341-1 |

## COMPARISON WITH APPLICABLE LANDING SURFACE REQUIREMENS

The FAA has established a set of landing surface requirements that airports are to meet when seeking a new instrument approach procedure. These design standards are presented in FAA Advisory Circular 150/5300-13, Airport Design. They are related to achievable approach minimums as determined in this analysis. The results of the compliance review are summarized in Table D.6 and Table D.7 on the following pages for each runway end.

## FINDINGS AND RECOMMENDATIONS

The results of these analyses suggest that an RNAV (GPS) procedure with LNAV minimums to Runway 15 has merit. The achievable approach minimums are appropriate for this type of instrument approach and an improvement over the current visual-only capability that is afforded to aircraft operators, especially when strong winds are from the southeast. The runway meets applicable landing surface requirements, although it would be desirable to mark and light those obstacles that penetrate the 20:1 OIS of the visual portion of the final approach segment.

Establishing an RNAV (GPS) LPV procedure to Runway 15 is not recommended unless the GQS can be cleared of all penetrations. Otherwise, the required runway landing threshold displacement results in a less than desirable, although acceptable, landing runway length. This same conclusion applies to the potential upgrade of the RNAV (GPS) LNAV procedure to LPV minimums on Runway 33, particularly as the potential approach minimums (341-1) are not sufficiently lower than those currently available (452-1).

The establishment of an RNAV (GPS) LPV procedure to Runway 23 offers an improved operational capability when the achievable approach minimums of 280-1 are compared to the existing 522-1 levels. This outcome demonstrates the benefit of the smaller and upward sloping obstacle clearance surface associated with the LPV procedure design. It would be prudent to pursue the RNAV (GPS) LPV for this reason and because it provides aircraft operators with a second instrument approach offering lateral and vertical navigation guidance in the event that the Category I ILS serving Runway 5 is unavailable for maintenance or other reasons. The installation of an Omni-Directional Approach Lighting System (ODALS) can lower the approach minimums to 280-¾. The benefit/cost of this improvement should be evaluated and if shown to be viable, the ODALS should be installed.

In order to implement these instrument approach procedures, appropriate aeronautical surveys (airport airspace analysis surveys) are to be conducted. This ensures that the FAA has the latest and most accurate data when it initiates the final design, flight check and publication of the instrument approach procedures. These surveys will update the obstacle information utilized in the TERPS feasibility analyses presented above, especially with respect to the status and elevation of trees and other natural growth that were last surveyed in August 2004.

**Table D.6 – Compliance with Applicable FAA Landing Surface Requirements – LNAV Minimums**

| Landing Surface Requirement | Runway 15 DT (571 – 1) | Comments |
|---|---|---|
| TERPS ¶ 251 - Visual Portion of the Final Approach Segment | 20:1 and 34:1 OIS | Poles, railroad and trees penetrate 20:1 and 34:1 OIS. Mark and light 20: penetrations. If not marked and lighted, install a VGSI set at 7.75º to provide a clear VGSI obstacle clearance surface to maintain nighttime approaches. 34:1 OIS penetrations are not a factor as lowest VIS achievable is 1 sm. |
| Airport Layout Plan | Yes | In process |
| Runway Length | Normally, 3,200' minimum | 3693' landing length available |
| Runway Markings | Nonprecision | None required |
| Holding Position Signs and Markings | Nonprecision | None required |
| Runway Edge Lights | MIRL / LIRL | HIRL |
| Parallel Taxiway | Recommended | Partial parallel T/W to R/W 15; T/W access to R/W 33 |
| Approach Lights | Recommended | None required. TERPS ¶251 limits to 1 mile VIS |
| Runway Design Standards | ≥ ¾-mile VIS | Meets ARC B-II with 307' threshold displacement |
| Threshold Siting Criteria | Appendix 2, Table A-2-1, Rows 1-5 (straight-in night operations by A and B aircraft only) | Poles, railroad and trees penetrate 20:1 threshold siting surface. Displace threshold an additional 285'or apply TERPS ¶251 restrictions (see above) |
| Survey Required for Lowest Minima | 571 - 1 | Conduct non-vertically guided airport airspace analysis survey |

Source: QED with FAA Data

The TERPS analyses conducted for reflect an initial assessment of the potential instrument approach minimums achievable for RNAV (GPS) procedures based on readily available data. The results are subject to review by the FAA, which may have access to other information related to the runway end environment and obstacles. Further, the FAA may opt to modify the potential approach and missed approach procedures, fix locations and altitudes. Any published instrument approach procedure is also subject to the conduct of a flight check by the FAA, the results of which may necessitate revisions to the procedure design.

**Table D.7 - Compliance with Applicable FAA Landing Surface Requirements - LPV Minimums**

| Landing Surface Requirement | Runway 15 DT (346-1)<br>Runway 23 (280-1)<br>Runway 33 DT (341-1) | Comments |
|---|---|---|
| TERPS ¶ 251 - Visual Portion of Final Approach Segment | 20:1 and 34:1 OIS | Runway 15 - Poles, railroad and trees penetrate 20:1 and 34:1 OIS. Mark and light the 20:1 penetrations. If not marked and lighted, install a VGSI set at 7.75° to provide a clear VGSI obstacle clearance surface to maintain nighttime approaches. 34:1 OIS penetrations are not a factor as lowest visibility achievable is 1 sm.<br><br>Runway 23 - 20:1 OIS clear. Trees and DME penetrate 34:1. Visibility limited to 3/4 sm. |
| Airport Layout Plan | Yes | Currently under revision |
| Runway Length | Normally 3,200' Minimum | Runway 15 - Additional displacement required to meet GQS. Resultant runway landing length can range between 3274' and 3687' depending on obstacle mitigation.<br><br>Runway 23 - 5000'<br><br>Runway 33 - Additional displacement required to meet GQS. Resultant runway landing length can range between 2900' and 3560' depending on obstacle mitigation. |
| Runway Markings | Nonprecision | None required |
| Holding Position Signs and Markings | Nonprecision | None required |
| Runway Edge Lights | MIRL/LIRL | HIRL (Runway 15-33 and 5-23) |

continued next page

**Table D.7 - Compliance with Applicable FAA Landing Surface Requirements - LPV Minimums (continued)**

| | | |
|---|---|---|
| Parallel Taxiway | Recommended | Partial parallel T/W to Runway 15: T/W access to Runway 33.<br><br>Parallel T/W to Runway 23 |
| Approach Lights | Recommended | Runways 15, 33 - Visibility limited to 1 sm.<br><br>Runway 23 - Approach lights may be cost beneficial. |
| Runway Design Standards | $\geq$ 3/4 mile Visibility | Runway 15 - Meets ARC B-II with 307' displacement.<br><br>Runway 23 - Does not meet RSA requirement; EMAS installation approved and pending.<br><br>Runway 33 - Meets ARC B-II with 205' displacement. |

# APPENDIX 5 – MEETING MINUTES/COMMENTS

Early in the development of the master plan, a Planning Advisory Committee (PAC) was formed to encourage information-sharing and collaboration among the airport sponsor, users and tenants, resource agencies, elected and appointed public officials, residents, and the general public. Collectively, these various groups form the stakeholders who have an interest in the outcome of the study.

Three meetings were held during the early development of the master plan to provide these stakeholders with an early opportunity to comment, before major decisions were made. In addition, one Public Information Meeting (PIM) was held.

This appendix contains copies of minutes from the four PAC and two PIMs held during development of this report, as well as comments received from the final draft report and ALP.

- PAC Meeting #1 ........................November 19, 2008
- PAC Meeting #2 ........................May 20, 2009
- PAC Meeting #3 ........................April 26, 2011
- PIM #1 ..........................................June 9, 2011
- PAC #4...........................................January 31, 2013
- PIM #2 ..........................................May 2, 2013
- Comments on final draft........May 2, 2013

# Meeting Notes

## Advisory Committee (AC) Meeting

**Groton-New London Airport Master Plan Update**
**Working Paper #1**

Stantec

| | |
|---|---|
| **Date:** | November 19, 2008 |
| **Place/Time:** | Groton-New London Airport<br>CT AVCRAD (Connecticut Army National Guard building)<br>1:00 PM |
| **Next Meeting:** | January/February 2009 |
| **Attendees:** | Mr. Tom Seidel (Southeastern Connecticut Council of Governments)<br>Mr. Nick Burlington (Columbia Aviation Companies)<br>Mr. Tom Dunn (Columbia Aviation Companies)<br>Ms. Syma Ebbin (Jupiter Point Resident)<br>Mr. David Head (ConnDOT)<br>Mr. Denny Hicks (Chamber of Commerce of Eastern CT)<br>Mr. David Fox (CT Department of Environmental Protection) for David Kozak<br>Mr. Chet Moore (Midwest Aviation – Air Traffic Control Tower)<br>Mr. Peter Pappas (Economic Development Commission; Town of Groton)<br>Mr. Chris Rixon (Greater Mystic Chamber of Commerce)<br>Mr. Carl Strand (Groton-New London Airport Advisory Committee)<br>Mr. Robert Taylor (Based Aircraft Owner/Pilot)<br>Mr. Eric Thompson (General Aviation Pilot)<br>Ms. Catherine Young (Groton-New London Airport - Manager)<br>Mr. Ervin Deck (Stantec)<br>Ms. Chavan Pinder (Stantec)<br>Mr. Paul Stanton (Fitzgerald & Halliday Inc.)<br>Dr. Susan Cullen (Town of Groton<br>Mr. Don Bartley (CT Army National Guard)<br>Mr. Jeffrey Nelson (Governor's Eastern Office)<br>Mr. Barry Pallanck (ConnDOT/ Aviation & Ports)<br>Mr. Robert Hammersley (Office of Policy & Management)<br>Ms. Diane Bray (ConnDOT/ Airport Planning)<br>Mr. Carmine Trotta (ConnDOT/Intermodal Planning)<br>Mr. James Edwards (Lanmar Aviation) |
| **Distribution:** | Email to AC members and Project Website<br>http://www.groton-newlondonairport-ampu.org/ |

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The meeting started with an overview of the agenda given by Mr. Ervin Deck. He discussed the various topics that would be presented and handed the meeting over to Mr. David Head.

Mr. Head gave the opening remarks and stated that the role of the advisory committee was to share the information of the meeting with their various constituents and bring their communities constituents concerns and comments to the study process. The attendees then introduced themselves.

Mr. Deck then proceeded with the presentation. He spoke about the Community Outreach component of the master plan and briefly discussed the website as a place to share information and collect comments, and informed the attendees that this was the first of four meetings scheduled for the Master Plan Update. The website address is www.groton-newlondonairport-ampu.org

The next topic of discussion was Airports and Planning and Mr. Deck explained what a Master Plan is, the process involved in creating a Master Plan and touched on the topics of design surfaces, critical design aircraft, types of airports and airport funding. He also explained that the master plan would consist of four working papers and that it would take approximately eight months for the rest of the working papers to be completed. He explained that the four working papers would be combined, with recommended and approved changes to form the draft Master Plan, which would be reviewed and developed into the final report and airport layout plan.

The master plan update was the next topic of discussion. Mr. Deck spoke about the existing conditions currently at Groton-New London Airport (international identification is KGON) and talked about the importance of the Part 139 certification (a Federal aviation statute under Title 14)

Mr. Deck explained that the Embraer-135 was chosen as the design aircraft and the reasons for this decision. He also discussed that the ERJ-135 generally only used one runway, Runway 5-23, and that that particular runway would have an airport reference code of C-II and explained the crosswind runway (15-33) would have an airport reference code of B-II, because it typically handles smaller aircraft.

Mr. Deck then went on to explain the two components of an airport; the landside and the airside. After the explanation was given about the parts of an airport the VOR was discussed. It was stated that the VOR was located in an area that could not be developed, and that two questions were being considered: Should the VOR be moved or will it eventually be taken off the airport property? A decision will be made as the project continues.

Mr. Deck also discussed the Runway 5-23 Safety Area. He explained that available land would not allow for a full RSA. Mr. Deck explained that the alternative previously selected was EMAS (Engineered Material Arresting System). He explained that the EMAS would mitigate the inability to achieve full RSA's and allow the runway to meet FAA requirements. The RSAs and the EMAS system was discussed. Ms. Young offered to bring a sample of the material to the next meeting, and informed everyone that construction for the EMAS was on the FAA calendar for 2011.

The next topics of discussions were the based aircraft, operations and commercial operations for the Airport.

The meeting was then handed over to Mr. Paul Stanton who discussed the environmental overview and the threatened and endangered species in the area. He also spoke about the general land use and the zoning mix on and off the airport.

Mr. Deck then proceeded to give an overview of the forecasts of aviation activity for KGON. He explained that it is very important to not overestimate or underestimate the forecast activity for KGON and to realize the market for aviation can go either way with no definite way to predict the future.

The meeting ended with Mr. Deck addressing the timeline for the working papers and the AC meetings and asked that all comments on Working Paper #1 be submitted in writing by December 5, 2008. Comments can be submitted through the website or by emailing Mr. David Head at David.Head@po.state.ct.us or Mr. Ervin Deck at Ervin.Deck@stantec.com.

At this time questions were taken from the AC and a discussion ensued on these points. The AC was encouraged to submit comments by the December 5th, 2008 deadline, even if they were discussed at the meeting in order for the study team to have a record.

The meeting adjourned at 2:30 PM.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

**STANTEC CONSULTING SERVICES INC.**

Reviewed and approved by:
Ervin C. Deck
Senior Aviation Planner/Project Manager

Submitted by:
Chavan Pinder
Aviation Planner
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# DRAFT Meeting Notes

| **Advisory Committee Meeting** | |
|---|---|
| Groton-New London Airport Master Plan Update<br>Working Paper #2 | |
| Date: | May 20, 2009 |
| Place/Time: | Groton-New London Airport<br>CT AVCRAD (Connecticut Army National Guard building)<br>1:00 PM |
| Next Meeting: | Mid Summer 2009 |
| Attendees: | Denny Hicks, Chamber of Commerce of Eastern Connecticut<br>Syma Ebbin, resident<br>Harry Smith, City of New London<br>Krys Kowalski, ConnDOT<br>Gail Lattrell, FAA<br>Barry Pallanack, ConnDOT<br>Carl Straud,, Chair, Airport Advisory Comm.<br>Tom Seidel, SCCOG<br>David Head, ConnDOT<br>Catherine Young. ConnDOT GON APM<br>David Kozak, DEP<br>Ron Price, QED<br>Ervin Deck, Stantec<br>Carol Morris, Morris Communications. |
| Distribution: | All Attendees; Project Web Site |

Ervin Deck, Stantec, began the meeting with introductions of all attendees and an overview of the agenda.

Erv reviewed Working Paper #1, stating that overall Groton-New London Airport (GON) is an exceptionally well-run and well-maintained airport, with a very moderate growth forecast. Working Paper #2 will look at these conditions and evaluate what could be needed over the next 20 years. Based on the forecast, there is not going to be a huge demand for services..

A correction for Working Paper #1 was to revise the Based Aircraft Forecast slightly upward; this was not based on increased forecast, but based on a correction in the number of current based aircraft.

*Forecast*: General discussion ensued on why the forecast is for an increase when use of the airport has declined. It was explained that the forecast has indicated growth to be flat for the next five years, and then all indications are that activity will pick up. Aviation fuel prices have been stable for the past year and a half. The Noise Analysis will be run based on existing and also on projected usage so it is important not to underestimate. Also, if the need for new apron space or hanger space increases, a plan must be in place to provide it. This increase would be based on demand.

From an FAA perspective, they evaluate industry trends, aircraft orders, activity at other airports, terminal forecasts for general aviation, etc. The industry has been flat for four years, but aviation is not expected to flounder permanently. Typically, to be prepared, a slight increase is forecasted, unless such a forecast would trigger a big difference in a corresponding action, for example a runway extension. This forecast does not mean we are not growing the airport; it does allows us to be prepared.

Erv emphasized that the growth rate is very conservative. There are no predictions for major changes in any airport operations. Stantec looked at infrastructure and facilities, and asked, “Do they meet forecast needs.” Other than apron space and hangers, GON does meet forecast needs.

*Runways:* The length is adequate for most circumstances, and width is more than adequate in the main runway. This was illustrated by the list of various sizes of aircraft runway requirements. The crosswind runway, which is more important for smaller aircraft, is also adequate.

It was noted that there is an error in the report, stating that the crosswind runway is 50 feet wider than it needs to be, and this is being corrected: it is the main runway that is wider than it needs to be.

Rather than correct runway length now, it is more cost effective to wait until a reconstruction is already scheduled. Airport Manager Catherine Young said that the main runway was just reconstructed.

*Taxiways*: All are in good shape and need no change.

*Safety Areas:* Runway safety areas and runway protection zones are the two areas where there is a problem. These areas are getting a lot of attention nationwide in many airports.

Erv explained that both ends of the main runway have inadequate runway safety areas, as there is water and rocky shore area at the end of the runway, not safe for landings. This can be fixed by filling the water and grading it, which is not a good idea environmentally. Another solution is to shorten the runway, which is not viable as it reduces the utilization of the airport. The best solution is to install an EMAS, which is a cellular concrete block system, providing for a softer, safer impact. The permit for this is in process. Runway safety areas are FAA’s highest priority and requirements are legislatively mandated.

There was a general discussion of safety issues. It was commented that fog is a real problem at coastal airports, and it was questioned as to why pilots are allowed to land in bad weather, that it would be cheaper to change flight regulations than to install expensive safety equipment. Airport officials responded that landing is at the pilot’s discretion, and that they, not the tower, are in command of the aircraft. It was noted that the FAA has been working with the Transportation Board to make pilots more knowledgeable and make better decisions. The EMAS would stop an error in judgment from being more dangerous and tragic.

It was asked how many accidents have taken place on the crosswinds runway at GON, and the airport manager stated that none have taken place.

*Runway Protection Zones*: Erv then showed a map of the runway protection zones, which extend outside airport land into a residential area called Jupiter Point. It was noted that these runway protection zones have been in every master plan for this airport and at some point an easement could be considered as protection for these zones. FAA recommends that airports try to get zoning or easements to try to protect these zones from development, but that outright purchase is not typically financially feasible.

Erv introduced Ron Price to give his presentation on TERPS (Terminal Instrument Procedures).

*TERPS:* TERPS define different procedures for different runways. The FAA sets visual and ceiling minimums, and these lowest values are published. This should be checked, because any obstruction (also called penetration of air space) could have changed over time. At the minimum in this approach is a 200-foot ceiling and ½-mile visibility. This is for a non-instrument approach. Some of the approach minimums shown at GON are higher than normal, and usually this is because of an obstacle. It may be possible to look at these and get the minimums lower. The higher-level values are affected by trees and could be improved by better lighting.

*GON VOR Status:* Ron explained that the VOR is a navigational aid that pilots use to fly from point to point. He said they checked on if the FAA was planning to decommission the VOR, and the answer is no. It was upgraded ten years ago. It is still used by area airports for approach fixes as well as by other planes. Planes now use satellite navigation, and VORs are expensive to maintain. The VOR may or may not serve as part of the backup system for sat nav. The VOR is not costing the state any money.

Erv noted that Stantec wanted to find out if the VOR land would be needed for something else, and we have found it will not be.

Ron noted that there are some obstacles (trees) on the approach to runway 15 and that in order to pursue use of this, improvements in lighting are necessary. An LED upgrade was noted. Ron also noted that the tree should be marked or lit. If not, nighttime approaches would be prohibited. He stated that it is important for safety reasons to get this procedure published.

There was a discussion about the purpose of a recent tree clearing and was it possible to use the discussed technique to avoid taking more trees down. Airport officials noted that the cut was nowhere near that approach path and had nothing to do with the nav system.

It was also commented that the public wants to avoid the need to light trees in a coastal preserve, and it was noted that curved approaches will be developed soon and that will help.

*Runway Protection Zones, continued:* Erv noted that the plan shows runway protection zone areas that are not under the control of the airport. The Spicer Tree Farm, and the golf course are included, along with the park, part of the highway and the railroad.

There was brief discussion of the possibility of a land swap with land around the VOR, but it was concluded that the FAA would not allow it and that it was not marketable.

*Lights:* All lighting met standards and requirements. The new technology is moving toward LED lights. This is controversial because some opinions are that they do not melt off snow, but others say that snow just blows off them and they don't stick. In any event, the price is such that they are typically only replaced when existing fixtures need to be replaced.

*Apron Space:* The amount of space needed is based on how many itinerant airplanes there are. Based on projections, GON will need an increase in apron space. If the numbers hold true, the airport would not have to add space, but can simply change usage.

*Hangers:* Needs are hard to predict because capacity depends on the type of aircraft being housed. Hangers are now at 80% of GON capacity and this means that GON should begin to think about where and how to build more, especially conventional hangers. Sometime in the next five years, GON will need apron space. If you build hangers, you need less apron space. Looking at the map, the following evaluates where this space could come from. GON cannot use the VOR space. The triangular piece by Airport Road (2 acres) would be excellent for hangers or aprons – and there is also a large tract between the two FBOs that would be good for both. Another possibility is the area that is now used as parking. With no commercial activity in sight, GON does not need as much parking as is currently available. That is prime space for an FBO. Also, it is possible that the other side of the road from the terminal could be used for non-aviation uses. These locations are all dry and available for use.

It was noted that some of the land across the road is adjacent to wetlands and that land would not likely be the best choice.

*Terminal Building*: The terminal building is fine now, with no expansion needed. The maintenance and snow removal building is a somewhat small for what it needs to do. In time an expansion may be necessary.

*Security:* In terms of airport security, no systems are required because GON is not a commercial airport. The staff is doing a good job. In terms of security fencing, the land is fenced, the water is not. Water fencing is not required and is very expensive. One recommendation is that GON form an aviation security committee.

**Summary**

- *Adequate facilities*: runway. taxiway, passenger terminal, access road, auto parking, ARFF facility.
- *Needs improvement:* the airfield lighting (due to technical upgrades), GA facilities (aprons and hangers), ARFF and SRE equipment – upgrades and replacements as equipment ages. (Note: These are expensive and need to be carefully considered, as this will be a slow transition for pilots), SRE maintenance building, instrument approach procedures, Security adjustments and LPV Runways 23 and 33.

It was noted that comments on this Working Paper should be submitted in writing as they will be part of the final document. The next step is developing alternatives and design concepts for alternatives and that will take place this summer. The first public information meeting will also take place in the summer, giving the Advisory Committee time to comment on the next Working Paper before it is presented to the public. The environmental overview will take place in the late summer, along with the second public meeting.

**Other Comments**

Question: Has FAA given any thought to expected sea level rise in terms of the airport.

Response: Runways are inspected every year and if there is a problem they are written up to make a plan to deal with the problem. We may look at this from a state perspective, i.e., will all these coastal airports still be viable in 50 years – and if not, what then? But a significant rise in sea level is 50 years out and is beyond the timeframe of this plan update.

The meeting adjourned at 2:55 PM.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Submitted by:
Carol Morris
Morris Communications

**STANTEC CONSULTING SERVICES INC.**

Reviewed and approved by:
Ervin C. Deck
Senior Aviation Planner/Project Manager

## Groton-New London Airport Master Plan
## Advisory Committee Meeting
## April 26, 2011, 1-3 pm
## Meeting Report / Working Paper #3

*Attending:* Marian Galbraith, City of Groton; Denny Hicks, Chamber of Commerce of Eastern Connecticut, City of New London; Robert Taylor, aircraft owner; Gail Lattrell, FAA Regional Planning Office; David Head, CTDOT; Andy Davis, CTDOT; Molly Parsons, CTDOT; Colleen Kissane, CTDOT; Catherine Young, Groton-New London Airport; Karen Buffkin, CT Office of Policy and Management; David Fox, DEP; Eric Thompson, aircraft owner; Tricia Cunningham, Mystic Chamber of Commerce; Denise Rose, City of New London; James Edwards, Lanmar Aviation; Jessica Power; Lanmar Aviation; Krys Kowalski, CTDOT; Josh Theodore, Columbia Air; Major Dawn Works-Dennis, CT ARNG-CFMO; Col. Jerry Lukowski, CT ARNG-CFMO; LTC Scott Panagrosso, 1109$^{th}$ AVCRAD/TASMG CT ARNG; Mark Oefinger, Town of Groton; Tim Seidel, SECT LOG; Carl Strand, Chair, Airport Advisory Committee; Liz Child, Avis Budget Group; Jim Bates, Groton Business Association; Ervin Deck, Stantec; Randy Christensen, Stantec; Carol Morris, Morris Communications.

*The meeting began at 1:10 pm*

### Introduction

David Head, CTDOT Study Manager, welcomed everyone and noted that the Master Plan Update process was first started in 2006, but due to Department of Transportation staffing issues; the process had undergone a hiatus. He noted that much has changed since 2006, not just the economy but also the airline industry itself, including the then-assumption that turbojets would be the aircraft of the future. As a result, he said that the first Working Papers, including projections, would be reviewed and revised. He then introduced Ervin Deck, study manager, Stantec.

### Review of Study Findings To-Date

Ervin Deck asked the committee members to introduce themselves, as many were new since the previous meeting in 2009, reminded the committee that everything they would be seeing was still a draft, and said that previous Working Papers were available for those who needed them.

Ervin noted that the Master Plan is a requirement of the Federal Aviation Authority (FAA), that it describes existing conditions and forecasts how an airport could look in 20 years. He said that nationwide, there are big changes due to the recession. Ervin reminded the Committee that the first Working Paper looked at existing conditions and the forecast and the second Working Paper looked at the facility requirements of the Airport, and projected what new facilities could potentially be needed, allowing FAA and the state to project costs.

**Working Paper #1**

Ervin reviewed Working Paper #1, summarizing the existing conditions at the Airport on both the airside and the landside. He indicated that in the case of Groton-New London, the landside (building, parking areas) was the area of focus because the airside (runways, taxiways) is in excellent condition, with plenty of room for growth. The landside is also in excellent shape but could be reconfigured to allow more economic opportunity. He noted that total operations at the Airport in 2008 were 53,500, and at that time were projected to be 54,800 now, but have actually declined to 41,000.

Ervin reviewed the definition of a Design Aircraft as the largest and fastest aircraft in use at an airport totaling at least 500 operations in a year. This Design Aircraft defines the size of runways, safety areas, etc. For Groton-New London, the ERJ-135 (Regional Jet) is the Design Aircraft, based on Pfizer's utilization of that aircraft. Ervin noted that since Pfizer no longer uses the Airport, he and the study team would evaluate if this aircraft were still the right choice.

Ervin went over the existing Forecast, stating that it will be reviewed and if needed revised:

- 45% increase in based aircraft
- 77% increase in turbojets
- 18% increase in operations
- 46% in passenger emplanements
- No change in design aircraft
- No change in Airport Reference Code (C-II).

**Working Paper #2**

Ervin reviewed the Airport Facility Requirements:

Airside

- No need for additional runway or taxiway capacity
- Correct safety area deficiencies (being done with current project)
- Reduce runway width (but will reassess when runway needs to be reconstructed)
- Upgrade airfield lighting (again, when lighting needs replacement)
- Upgrade instrument approach capability – new technology uses GPS, not land-based equipment

Landside

- Upgrade General Aviation facilities
- Replace ARFF equipment
- Increase SRE capacity
- Expand SRE building
- Expand aprons when demand reached 80% of capacity
- Expand hangers to maximize capacity

**Working Paper #3**

Ervin presented the three Alternatives studied: Do Nothing/No Build, Minimum Development and Full Build Out. He explained that with the exception of the first Alternative, which is required as part of the FAA environmental assessment process should one be required, these Alternatives would be demand-based and any improvements would only be implemented if they provide a clear economic opportunity.

Ervin showed a map of the terminal area and identified possible areas for expansion if desired.

- No Build: He explained that in this Alternative, the Airport is maintained as is, and Master Plans typically include this option.
- Minimum Development: Here, if the Airport wanted to develop additional hangar space, it could be done in a way that would not extend any development closer to the runways. He pointed out that the Airport has an over-capacity of automobile parking, so this Alternative looks at redesigning that space and adding hangars - two larger corporate hangars and one smaller. Ervin emphasized that these are planning concepts, and so are not in any way detailed or final. This Alternative also adds a new entrance road, relocates the ARFF building, with all other facilities staying the same.

- Full Build Out: Ervin explained that this Alternative illustrates what could be done to maximize revenue. He noted that the concept is to create a plan so that buildings could be added as demand grows. This concept includes a new terminal, new corporate hanger space, new T-hangars, a change in the tower location to as to make more space for hangars, relocating the ARFF, making parking more compact, setting aside an area for compatible aviation activities, and creating a new entrance road.

Ervin said that as part of the developing the Alternatives, the study team looked at operations, fiscal issues and environmental issues. He explained that they will look at all these in more depth once they know which direction the state wants to go. He noted that in terms of Operational Performance, one important piece is evaluating factors that go into a Part 139 Certificate. The benefit is that this maintains high safety standards at not much cost. Most General Aviation airports do not have full time staff, but Groton-New London does and Ervin explained that it is in extremely good shape, that Airport staff have done an exceptional job with the resources available. If the Airport were to expand, there is plenty capacity and room for expansion if it was desirable.

Ervin talked about the criteria used to develop a Master Plan and the importance of using the Best Planning Tenets. He also noted that:

- The Airport's existing hangar capacity is more than sufficient, but things can change quickly and opportunities can arise unexpectedly. Through the Master Plan process, the state can understand where expansion can occur and react when an opportunity arises.
- The Airport had commercial service and it is important to protect that capacity in case it comes back.
- The highest and best use is revenue production from hangars and fuel sales.
- There is plenty of room for growth on the landside.
- This process will show if expansion is socially feasible, and it does appear to be environmentally feasible, but further work will be done to evaluate that.

**Environmental**

Ervin introduced Randy Christiansen, Stantec, to talk about the environmental process.

Randy explained that FAA and state need consistency in airport plans. They need to review plans so they understand what will be addressed and in what order. This is a planning level document, a screening process to make sure all pieces are in place and actions are feasible in the long run. In a screening level document, he explained that they do not quantify, but simply rate the scenarios based on potential impact.

The environmental factors evaluated are:

- Air quality
- Coastal Barriers
- Coastal Zone Management
- Compatible Land Use
- Construction Impacts
- Aircraft Noise
- Social Impacts
- Water Quality
- USDOT 4(f)
- Cultural Resources
- Biotic Communities
- Threatened and Endangered Species
- Secondary/Cumulative Impacts
- Light Emissions
- Natural Resources/Energy Supply
- Farmland
- Wetlands
- Floodplains
- Solid Waste
- Wild and Scenic Rivers

Randy reviewed Table 4.2 which shows shows an evaluation of the impacts for the three Alternatives.

Question: What are the socio-economic impacts of the Alternatives?
Response: If the Airport has more FBOs, it will show a positive net effect for the community, and a negative impact would occur if the size and facilities of the Airport were reduced.

**Fiscal Considerations**

Ervin presented costs for the Alternatives, noting that these are rough planning level costs. He noted that the funding will come primarily from private development, with some allocation by the state and/or FAA depending on the project type

He indicated that the preferred Alternative should:

- Maintain to current high standards
- Maintain Part 139 Certification
- Generate revenue to cover operation and maintenance costs
- Look to Alternative 3 concept for
    - Planning
    - Promotion
    - Arrange for funding

Ervin then reviewed the facility upgrades contained in the Alternatives and explained what the trigger would be, i.e., at what timeframe or event the upgrade would occur. He reiterated that this is a demand-driven plan, not a "build it and they will come" plan. He noted that they are looking at 20 years down the road for these changes, not tomorrow.

**Next Steps**

Ervin reviewed the next steps, including the schedule for Working Papers and Meetings. He said the next step is a public information meeting so the public can get more involved and ask questions.

After gathering input from the Committee and the public, the state will decide on the preferred Alternatives, complete an environmental overview, and create Airport layout plans and financial plans, which will be included in the 4th working paper. All this will be combined into a Draft Master Plan. This will be presented to the public one more time, any final comments will be incorporated and the process will be complete. We intend to complete this final Master Plan the end of the year.

**Questions/Comments:**

Question: Can you provide a glossary of terms in the draft report?
Ervin: Yes, the first Working Paper includes an appendix with a glossary, and it is now on the website. (www.groton-newlondonairport-ampu.org/)

Question: Are you aware that there is other work being done at airport, a business plan, which is being worked on by the firm Louis Berger?
Ervin: Yes, we are aware of this and the work is complementary.

Question: Will this Working Paper we are looking at now be posted on the web site?
Ervin: Yes, in a week, and there is a link on the Airport website.

Question: You are going to make updates to the existing Working Papers, will they go back out to this group for comments?

Ervin: The revisions will be part of the information presented in the new draft; we will not be revising existing working papers.

Col. Jerry Lukowski asked if he could provide an overview of the role of the National Guard at GON. His remarks included such facts as:

- National Guard at GON supports army aviation
- Helicopter maintenance provided by 300 employees
- Guard has been here for 50 years
- The unconstrained plan includes a jump from 200,000 sq. ft. to 400,000 sq. ft., which would cost $135 million. This will have to be phased due to fiscal environment.
- Half would be upgrade to existing facilities; half would be a new location, potentially across the road.
- This would not take place until 2018 or later.
- The Airport is great to work with, and the Guard also works with NEPA, CEPA, EPA and DOT.

Questions included:

Q. What percentage of employees are civilians?
A. About 50-50.

Q. If you enlarged the facility to 400,000 sq. ft., how many employees would this add?
A. We do not know exactly, it is not proportionate.

Q. Do you need more ramp space or hanger space?
A. It is not about hanger space, we want to add shop space for maintenance work, painting, engine, corrosion, those kinds of activities. We could add a second floor, put all the administrative functions upstairs, and free up ground floor space for maintenance.

Q. My aircraft is tied down east of your area – can we extend our access so I can go directly to my tie-down space from the taxi area?
A. I would need to look at a map to answer that question.

Q. You made reference to across the street, and there is not a lot of land across the street. From a Groton perspective, you are very important and we want to address your needs, but do not see a lot of land. Are you looking at private land?
A. We want to have more buildable space next to the runway. We are looking 15 years out in terms of the parcel across the street. For closer space, on our property, we are looking at between 5-10 years in terms of expansion. We used to get funding every year and now we will be getting funding about every five years.

Q. What dictates the amount of aircraft you work on?
A. The Army makes that decision. The US is sectioned off and Connecticut gets east of Ohio and north of Georgia. We now maintain 200 aircraft and have to make sure the facility is improved as specific levels in order to get the work.

Ervin thanked everyone for attending.

*The meeting closed at 2:45 pm.*

**Groton-New London Airport Master Plan**
**Advisory Committee Meeting**
**January 31, 2013, 2:30 – 4 pm, TAMSG**

*The meeting opened at 2 pm.*

## Introductions

David Head, Transportation Supervising Planner and Study Manager, Connecticut Department of Transportation, thanked the committee for attending and introduced his staff, other key agency representatives and the consultant team. He noted that the public meeting previously scheduled for the end of February would be postponed, and a notice would go out with a new date. He then asked Ervin Deck, Stantec study manager, to begin the presentation.

## Review of Purpose and Study Process

Erv explained that they are very close to wrapping up the Master Plan Update, and this will be the last Advisory Committee meeting.

He reviewed the overall purpose of the study, which is to update the 1999 Groton New London Airport Master Plan (AMP) and Airport Layout Plan (ALP) to bring them up to date and to project potential needs 20 years in the future. He noted that the public outreach on this process has been directly to stakeholders: those in the communities that live and work around the airport and rely on it for economics, including the Army National Guard unit and the Fixed Base Operators.

He outlined the process that had been used for the study, indicating that a series of working papers were produced, and for each one, public input was asked for and incorporated. All input was then incorporated into the draft report, a copy of which was sent to the committee several weeks prior to the meeting. All additional comments moving forward will be incorporated into the final report, which will also be sent to the committee and posted on the study website.

The objective of the update is to look at all possible alternatives, evaluating how growth could happen and what would be needed if and when it does occur.

## Existing Conditions

Erv gave a brief description of the airport today, including specifications of both landside and airside, showing slides that illustrates the runways, taxiways parking aprons, lighting, navigation and building configurations: terminal, ARFF (airport rescue and firefighting), hangars, FBO buildings, and TASMG building.

He noted that major changes since the study began include new ARFF equipment, upgraded safety areas on Runways 5 and 23 and upgraded EMAS.

Erv then recapped existing and forecasted operation levels. In terms of aircraft usage, the number is projected to remain flat through 2015, although he sees some small growth in jet traffic. After 2015, projections show a two percent annual growth rate through 2030. On the operations side, local operations are likely to remain flat but itinerant, recreational aircraft use of the airport will increase by 25 percent through 2030.

**Airport Activity**

Erv then provided an overview of the types of aircraft currently using the Airport, noting that in general they are small, single engine, private or small-business owned planes and small jets, but also include Coast Guard, life flight and the Blackhawk helicopter, which is the staple of the TAMSG repair and maintenance operation.

Erv explained that a design aircraft is the one that sets the standard for an airport in terms of the facilities needed. The design aircraft generally would land at an airport 500 times a year. Groton-New London Airport's Design Aircraft is the Cessna Citation 650, a mid-size high performance business jet. This is designated as a C-II under FAA standards and part of the Master Plan Update was to ensure that the airport met standards for this aircraft, which Erv noted that it does.

The study also looked at the breakdown and projections for the different kinds of aircraft: single engine, multi-engine, helicopter and turbojet/jet. The projection is for the proportion of turbojet/jet and helicopters to increase through 2030.

A similar breakdown was generated for local versus itinerant flights, which showed local flights have dropped slightly.  Overall, a big increase is not expected. Erv noted that the noise analysis is based on this statistic, so it is important to get it as accurate as possible.

**Facility Requirements**

Erv explained that the most important takeaway from this section is that the airport's requirements are based on demand. If changes in demand occur, the facilities should be adjusted. If not, no action will be taken.

He provided the following overview of the facilities:

*Airport:* Runways are adequate. The runway width is actually too wide for the design aircraft. When the time comes to do maintenance on the runways, management will look at making a change. The taxiways are also adequate. Upgrading the lighting to LED lights should be a consideration, but there are downsides such as expense, poor visibility using night vision goggles and funding impediments. The recommendation is to keep evaluating.

*Landside:* The recommendation is to make minor upgrades to terminal as funding is available. The size is adequate. There is a surplus of apron space and auto parking. Hangar space should be increased as demand grows, relying on the private sector to drive this. The ARFF and SRE buildings should be replaced and upgraded.

Erv then went over the three alternatives that were considered under the Master Plan Update:

*Alternatives:*

- *Do Nothing/No Build:* Should there be little or no demand for development, leave everything the way it is. This incurs no new cost, but no increase in income either.
- *Minimum Build:* If demand somewhat exceeds the areas currently under lease, this alternative would focus on converting one-third of the central landside into space that could bring in revenue, reconfiguring auto parking and setting aside land along Tower Ave. for development.
- *Full Build Out:* Under this alternative, market forces would support high capacity growth. Should this occur, maximum development of the central terminal area would occur, as would replacement of many existing public facilities. Erv showed specifics on what would be possible under this kind of scenario.

There was a question regarding barriers to a potential change in use of the terminal, i.e., if the Master Plan Update Preferred Alternative indicated no change in terminal use, would that mean that a later change would require another Plan Update first? Erv and others explained that as long as the terminal use was aviation-related, a change to the plan would not be required.

Erv noted that the Preferred Alternative in the Plan Update is between No Build and Minimum Build, as industry experts do not see the economy driving the need for a Full Build Out.

Erv recapped what the Preferred Alternative would mean:

*Landside:*
- Redesign auto parking lot and entrance road
- Converts existing pavement into grass area reserved for future development
- Remodel terminal building
- Modernize ARFF
- Expand SRE Building

*Airport:*
- Runways: Reevaluate width at next major reconstruction, update edge lights at next major reconstruction or as needed and replace VASI with PAPI on Runway 23 as soon as practical
- Taxiways: Upgrade edge lights at next major reconstruction or as needed
- Terminal Building: Modernize as pubic and private funding permit
- SRE Building: Expand storage capacity as funding becomes available
- ARFF Building: Modernize as funding permits
- Equipment for ARFF & SRE: Replace and upgrade as required for aging fleet and as new technology and regulatory changes require
- Hangars: Monitor demand and develop as needed
- Aprons: Monitor based aircraft demand against actual capacity and develop as needed

**Environmental Overview**

Erv introduced Paul Stanton, environmental consultant with Fitzgerald Halliday, to talk about the environmental implications of the Plan Update.

Paul noted that there is a good base of information to document the existing conditions at the airport. He showed a chart that clarified how environmental impacts are rated, from the best rating, Level 1 (benefits/protects environmental and community resources) to the most impactful rating of Level 5 (significant impacts that cannot be mitigated.

Paul went on to explain that most of the impacts on the environment from improvements included in the Plan Update are rated at Level 2, or no impact. He said what stands out most as an issue is the development proposed on impervious surfaces. He noted that it would be good to add green space, which would add drainage and protect local wells. He said that water quality issues are the biggest concern, and added that much work on endangered species has already been completed.

A committee member volunteered that the new Endangered Species Assessment and Plan for the Airport has now been completed.

A committee member asked if storms like Sandy could have major effects?

Paul said that yes, the climate change and sea rise concerns are more than 20 years out in the future, but the airport will have to contend with this in the future to protect assets.

A committee member asked why there is so little climate change and storm surge information in the Plan Update? She wondered if we should be looking into a more robust and resilient infrastructure.

David noted that yes, storms are coming more frequently, and with an eight-foot elevation over sea level, we're looking for guidance on this from airports in similar situations, specifically what do they do for EMAS, taxiways and runways. He reminded the committee that this plan update does not go out to 50 years but that they had felt it was important to include some information.

A committee member noted that private hangar builders would need to build to new standards.

Gail Lattrell (FAA) noted that the agency is working right now with the technical center in New Jersey to look at what happens when water remains, when it dries out, what the end result is. Gail said they are looking at other airports but doing testing here.

Erv noted that everyone should be clear that FAA is now evaluating new standards for Master Plan Updates in regards to climate change. But he explained that for this plan document, we are required to stay with the existing standards.

**Noise Contours**

Erv provided an overview of the airport noise contours, indicating that the combination of newer and higher tech aircraft combined with significantly fewer aircraft operations since the last update is contributing to lower projected levels of sound. He noted that the noise contours represent a yearly average. He sees no significant concerns in this area.

**VOR**

Erv noted that the VOR needs a 1000-foot critical area with no development around it. He said they looked at moving or decommissioning the VOR to free up that space, as VOR navigation is being replaced by satellite navigation, but for the short term, the VOR will stay.

**Capital Plan**

Erv then discussed the plan to capitalize airport improvements, noting that they are broken into three phases. Phase I is today through 2015, Phase II is 2016 through 2020, Phase III is 2021 through 2030. For each phase, Erv identified the project upgrade, the cost and the funding source.

A committee member noted that the airport already has an LPV approach and Erv indicated that this recommendation would be removed from the list.

**Next Steps**

Erv outlined the final steps for the Master Plan Update. He reiterated that the public meeting would not take place at the end of February, but would be scheduled for later in March. Once that occurs, there is a 30-day comment period, after which any new comments will be resolved and the final documents will be prepared.

A committee member asked if the final version would go back to the Advisory Committee.

David said yes, as the final Master Plan Update, but that no further changes would occur once the final plan is printed

A member of the committee asked if there was any opportunity to adjust the taxiways. As a pilot, he said he has to dogleg almost to Runway 23, and it is inconvenient.

Erv said he would talk with the gentleman after the meeting to resolve this question.

NOTE: Ervin Deck did discuss this issue after the meeting with the committee member and confirmed that the taxiway was originally closed by FAA. Follow as to the reason why is currently taking place.

A committee member asked how comfortable the team was with the projections, because according to his information, pilot licenses, life flights, all air-related projections are going down.

Erv said that recent indications are that business aircraft use will continue to grow. Airport operations have dropped slightly, so he is comfortable with the projection that they will remain flat for a few more years. The projections allow management to look at what is possible and make sure the airport is prepared for growth should it occur.

David noted that the business plan for the airport has been completed and the Airport will be actively looking to attract growth. The Plan Update and the projections allow them to be prepared.

Erv added that the decision to keep the Part 139 Certification in place meant that in time, the airport could be positioned to attract a small airline.  It is not costly to keep the certification and it allows the airport to keep options and opportunities open.

A committee member asked if Erv had been asked to look at stormwater utilities for the Plan Update.

Erv said no, and in general in that area he didn't see anything that needed to be looked at more carefully.

A committee member asked if there are any current problems with airport operations due to rainfall or coastal flooding.

Catherine noted that the roadway that leads to the airport continues to flood.

David reminded the committee that this was outside the scope of the Master Plan.

Paul added that looking at these kinds of things is becoming more common and require hydrologic studies, but again, this is not in the scope of this Master Plan.

Erv explained that when the time comes to redo the runways, management would look at drainage and see what needs to be upgraded.

A committee member asked how often Tower Avenue becomes impassable.

Catherine responded that in 16 years, not including evacuation for Sandy, at three other times water at South Road made it impassable. She noted that this is happening more frequently, adding that the airport has a stormwater pollution permit, and all stormwater drainage is mapped.

A committee member asked if the EMAS would need redesign? If so, this would affect capitalization numbers.

Gail Lattrell (FAA) noted that they are currently working on finding out what the damage is, and that the events of Sandy are under study right now.

David noted that all capital cost numbers are estimates and there is no way to project what the exact cost of things will be many years out.

A committee member added that they would use what they know now for cost and provide an escalation model.

**Groton-New London Airport Master Plan**
**Public Meeting**
**June 9, 2011, 7-8:30 pm**
**Groton City Hall**
**Meeting Report**

*The meeting opened at 6:30 pm with a presentation at 7 pm.*

**Introduction:**

David Head, Transportation Supervising Planner and Study Manager, Connecticut Department of Transportation (Department), thanked folks for attending the public meeting and introduced the consultant team. He noted that the Master Plan Update process was first started in 2006-2007, but due to Department of Transportation staffing issues, the process had undergone a hiatus. He noted that much has changed since 2006-2007, not just the economy but also the aviation industry itself. As a result, he said that the first Working Papers, including projections, would be reviewed and revised. He then introduced Ervin Deck, study manager, Stantec.

Ervin Deck, Stantec Study Manager, introduced key attending individuals: Catherine Young, Airport manager; Gail Lattrell, Federal Aviation Administration (FAA), and members of the Public Advisory Committee. Erv explained that a Master Plan defines where an airport is today and where it might be in 20 years. It provides an inventory of the airport and assesses the function of the airport. The Master Plan forecasts what the economy and community needs will be, and evaluates the capacity to meet demand shown in the forecast. It evaluates what can be done to change the capacity, and these alternatives will be presented tonight. Then, the environmental issues are evaluated and an Airport Layout Plan (ALP) is developed. Finally, a financial plan will look at how any changes might be funded.

Erv detailed the Plan Update schedule, explaining that one additional Working Paper would be created, after which there would be another Public Advisory Committee meeting, and another Public Meeting to review the final update.

Erv noted that the ALP is the key technical document, a legal document that is signed off on by the FAA and Department, which allows for federal funding. The ALP it is the blueprint for the Airport's future. If an improvement is not included in the plan, it cannot be made a reality until the ALP is updated.

Gail Lattrell, Federal Aviation Administration (FAA), pointed out that one of the purposes for the ALP is that it protects the Airport and FAA from development plans that could threaten the Airport's functionality. For example, if someone wanted to construct a cell tower near the Airport, they need FAA approval. The Plan allows FAA to determine where the best place for such a tower might be. It gives the FAA the power to protect the Airport from incompatible development.

Ervin clarified that the State is the sponsor of the airport, and determines its ultimate direction and focus. The FAA establishes guidelines so all master plans look the same, approves the forecasts and approves the ALP.

**Groton-New London Airport (GON)**

Ervin explained that GON is a designated General Aviation (GA) airport, a public use airport that anyone can use. It serves the Groton-New London area, handles a wide range of aircraft, mostly serving businesses, plus the Theater Aviation Sustainment Maintenance Group (TASMG), which repairs military helicopters and related aviation equipment.

Ervin then showed an aerial of the Airport and described the locations and uses of buildings and activities.

**Aviation Activity**

Erv noted there are 40-45 aircraft based at GON, with currently 42,000 operations year, which is down by about 10,000 in the last few years due to the loss of Pfizer and the economic downturn.

The design aircraft picked for GON is the ERJ-135, a twin-engine corporate turbojet aircraft.  Since Pfizer has left, this may need to be reassessed. The design aircraft is defined as the fastest aircraft using the Airport at least 500 times a year. The design aircraft defines length of runways and dictates the Airport Reference Code, which for GON is C-II for the main runway. Erv said that the airport is well designed for its use.

**Forecasts**

Erv said that developing forecasts is an art as opposed to a science. There is always lots of uncertainty and most are 40% off in a 5-6 year period. He looks at multiple scenarios to estimate a range of demand. He noted that the state would want to be prepared if and when the economy comes back, that we want the airport to be in a position to respond to the market. He noted that we want to include alternatives that will minimize risk for the state.

Erv said that they would take another hard look at the forecast, that in 2008 there were 10,000 more operations, and he believes that for the next five years, operations may stay flat.

Question: How off were the original Master Plan forecasts?

Erv: They were off. I will look in my files in a few minutes and check by how much. *(Later in the meeting, Erv confirmed that in 1999, operations forecasts for 2010 were projected at 116,000, much higher than the actual number.)*

**Demand capacity and facility requirements**

Erv explained that they are recommending maintaining Part 139 Certification, (this refers to FAA certification of commercial service airports), as it will not cost much more to do so, and positions the airport well for unexpected opportunities. He noted that the Airport Manager has done an excellent job and the Airport is in excellent shape.

*Airside:* Erv said that the airside, which is the runways and operating side of an airport, does not need additional infrastructure; possibly the runway width could be reduced when the asphalt begins to break up. Essentially, the State should continue to preserve and protect the infrastructure. When certain items need to be replaced, for example, the runway lights, that would be the time to upgrade to LED lights.

*Landside*: Erv pointed out that the focus of future development should be the landside (the part of the airport that includes access roads, the terminal and other related buildings such as hangars) and potential revenue production. While aircraft parking apron areas are in surplus, he noted that additional hangar space would be required in the next few years. He explained that as planes are becoming more expensive, people want hangar space versus apron space, so this may be a good opportunity for expansion. Erv noted that there is too much automobile parking currently available compared to need, and some of that space could be used for something more productive.

Erv explained that TASMG is preparing its own separate Master Plan and looking at doubling their total capacity from 200,000 to 400,000 square feet.

**Airport Alternatives**

Erv explained that there are three alternatives being evaluated, however further development of the airside will be minimal in all three alternatives examined:

1. Do nothing/No build. We do not need hangars today, but if Fixed Base Operators (FBOs) find they need it in the future, they can negotiate with the Airport sponsor in terms of building additional hangar space.
2. Plan for minimal change in capacity. This would involve looking at a plan for minimal change and reconfiguring some buildings
3. Plan for maximum change in capacity. This would include more changes and some new buildings.

Erv explained that the State will make this decision, and he recommends maximizing the Airport's potential in a way that will not place a burden on taxpayers. He noted that Catherine has done an excellent job balancing these two needs.

**Minimum Build**

Erv showed a map of the areas that would be changed based on the minimum build concept. There would be one parking area, plus employee parking, with a single road in and out, opening up more space for hangars. The space across the road is reserved for compatible aviation activity, that is, something that would not cause problems for aircraft-related activities. Hangar development in the form of conventional hangars (versus T-hangars) could be confined to an area adjacent to the existing terminal building by using the current surplus automobile parking space.

**Full Build**

Erv showed a map of the potential Full Build Concept. He explained that the control tower could be moved along with the terminal building, opening up much more area for hangar development. The reason for this potential change relates back to the airport reference code, or ARC, discussed earlier. Under the existing and forecasted ARC, buildings and other infrastructure can be located closer to the runway environment, opening up a large area currently excluded from development. Erv stressed that this is using his experiences to evaluate what might work, but that the Airport growth, if it occurs, could be different. He showed the location of a new terminal building with passenger waiting area. He emphasized that all this change could take place on an as-needed basis, and the decision is up to the state and private development pressure. In any scenario, development would be piecemeal, taking place as private developers and investors see the need and are willing to accept the financial risk.

**Environmental Overview**

Erv introduce Paul Stanton of Fitzgerald Halliday, the firm that is handling the environmental overview for the Plan update.

Paul explained that this is a high-level look at what environmental factors could be impacted by the different alternatives. In a federal project, on the coast, these factors are very carefully monitored. He explained that this is not a full-blown Environmental Impact Statement, but just an overview to provide planners with a sense of what they might face for the different alternatives.

Paul noted that they would examine the level of threatened and endangered species, coastal resources, wetlands, land use and community facilities and other natural resources. He said that there are endangered species and Connecticut state-listed birds in evidence.

Paul said that when looking at alternatives, the environmental factors will play a part, and each will be rated based on their environmental effect. He pointed out that some would have none, some will have negative effects that can be mitigated, but some could have larger negative effects that would delay or compromise a project. Paul explained that these are the basic issues that will affect the decision of selecting the preferred alternative.

**Evaluation of Alternatives**

Erv explained that there are four major categories in evaluating alternatives:

- Operational performance

- Best planning tenets
- Environmental factors
- Fiscal factors

Erv explained that in operational performance, the Airport's polices and practices and compliance with standards is assessed.

Finally, Erv went over the planning level costs for each alternative, showing what the estimated cost would for any potential new elements. The costs ranged from $750,000 for updated runway lighting in the No Build alternative, to $6.75 million for the Minimum Build to $18 million for the Full Build alternative. He noted that almost all of the cost for the minimum and full build alternatives would be privately funded.

**Next Steps**

Erv detailed the next steps. Working together and based on the plan data, the State and FAA will pick a preferred alternative, likely a combination of Minimum and Full Build. This would take place in a phased approach. By early August, Working Paper #4, which is on the environmental effects and includes a noise model, will be available to the State and FAA, then to the Public Advisory Committee (PAC). In October, a PAC Meeting will take place, after which they will hold another Public Meeting to review the preferred alternative.

Erv asked everyone who wanted to track the progress of the Plan Update to make sure their name is on the sign-in sheet

**Questions**

Question: I have concerns regarding soot from jet aircraft on the main runway. It goes on my boat and I have to paint my house yearly. Can you do anything to help the neighborhood?

Comment: This is something that needs to be addressed. In Boston they put in new windows, doors, and provide air-conditioning. There are ways of looking into this and taking care of things.

Gail Lattrell: Massport and Massachusetts Public Health did an air quality study and showed there were films on decks and cars. It was not just about soot but was about health and air quality. We will find this study and provide you with a copy

Comment: Thank you and can you get the study to the consultants and on the website as well?

David Head: Yes, we will do some research.

Question: The Department of Environmental Protection had developed what GON would look like under sea level rise and those images got a lot of play. You did not mention this in your report. The airport is at sea level. The plan goes out 20 years in the future and there will be a substantial sea level rise. What are the plans for this, as it is cheaper to plan ahead versus reacting. Also, more storms should be factored into repair costs.

David: This is a good comment. Sea level rise is being looked at from a statewide level for all infrastructure and we will be using that data for GON.

Paul Stanton: We went to Transportation Review Board conference. They are projecting that at 80 years out we will see significant rise. That is beyond the study period but we should have a note to that effect.

David: Yes, we will put a note in the plan now, even if a rise is not projected within the 20 years.

Question: Did you do a cost analysis of reducing runway width versus keeping it the same?

Erv: No, we did not. But maintaining versus reducing the width would be a significant amount of money.

David: When it comes time to rehabilitate the runway, we will be looking at it in detail. Reducing the width means less runoff, but a lot of things will go into the decision.

Comment: Usage has dropped so much over last 30 years – GON will never be what it was.  I don't see a rise in sea level, I see a decrease in the water levels. Are there studies that actively pursue getting short-term passenger service?

Catherine Young: DOT is doing a business plan for the Airport. They want to be aggressive in looking for additional business. It is difficult to forecast at this moment.

Comment: I do not see any growth taking place here.

Gail: Most of the expense in an airport is in the safety requirements and the taxiway. Most investment here is already made. Most of what Erv has been talking about is private investment, not public dollars. It will only happen if it is needed.

Comment: Groton got very aggressive with tax incentives, and I doubt anything will be needed. Connecticut doesn’t think that way – I see nothing aggressive.

Comment: We (Lanmar Aviation) are attending a lot of events for the purpose of increasing the visibility of Groton. Most people don’t know what GON has or where we are located. We need to work on being a destination airport. Lanmar and Columbia are taking on the burden of getting those aircraft here, which will generate revenue for the State of Connecticut.

Comment: You are speaking about private aircraft.

Lanmar: We would love to see other carriers coming in, as it would be better for fuel and income. But that takes a lot of personal effort.

Question: Are all the hangars rented?

Lanmar: We have 36 hangars and all but 5-6 are rented. We have a lot of transients that come in from Long Island, Rhode Island and Massachusetts. We won’t have the same type of airport but there is lots of business to be gained. We could increase hangar capacity, bring in additional aircraft, there would be growth and more business. This plan is good for us to help make the Airport grow.

Comment:  When I read Working Paper #3, I see you say that No Build will not cost anything or increase revenues.  You don’t need to build anything, just get tenants into existing space. When I see empty space and parking lots with weeds, I cannot see alternatives #2 or #3. This report is biased. With alternative #1, you can add revenue without spending money. You need to spend money on marketing, not building.

David: Yes, that is what we are trying to do. We will use what we have and as it starts to get full, if an economic upturn happens, we will be prepared. Erv has been stressing that we will do this in pieces.

Comment: You already told me that earlier forecasts were off – that is why we should do a cost benefit analysis. I want to see this before anything is done. We are at full buildout now.

Gail: That is true on the airside and we will not grow there. The growth will be on the landside. We will look carefully at the forecasts as well. It is not a build it and they will come scenario.

Question: Why did they build a new runway – why did they pave it that wide?

Gail: When a runway is reconstructed, it has a 20-year life. In this case it was rebuilt because of the age of the pavement, and they looked at length and width in terms of safety 10 years ago. A lot has changed since then, now they look at what do we need for a particular airport and design it for that. We will look at it again and adjust to each airport's needs. We are not building based on the projection numbers, we are building based on what is happening now. We look at the environment, the facility, and the need – and try to have good balance.

Comment: The business plan will answer many of those questions.

Catherine: It will benefit us that the Business Plan and the Master Plan are taking place at the same time. It is hard for people who remember what it used to be like here. Or see it now empty and with weeds and wonder why. It is because business has changed. The first Master Plan showed space to be developed and it has been developed by private industry. Now it is time to review again.

Question: What does the [airport's] profit and loss statement say?

Catherine: Erv referred to it. We now have fewer costs and increased income due to the additional buildings.

Erv: The Airport used to have just under $277,000 annual revenue; with expenses at just under $1 million. In 2006-2007, the last full year we have data for, revenue grew to $668,500 and expenses are down to $758,800. We are looking to give the State options and help the FBOs to grow their business.

Question: Looking at the optimal use of what we have, the 139 certificate requires a sterile area in front. Could that space be used for an event?

Catherine; Yes, that space is available.

*(A general discussion took place regarding marketing opportunities people had experienced or heard about that involved airports.)*

Comment: My bottom line is money. Pfizer is moving to Boston. It is scary, look at Mohegan Sun, it is just sitting there, not paying off. There is no free lunch. It ends up coming from here.

Question: When I was in business we had a 5-year strategic plan. We also had an operating marketing plan for the year. My question is, would DOT be amenable to that kind of thing?

David: I think the new CAA will be doing marketing for all Connecticut-owned airports.

Question: Are they looking at changing lease prices?

David: I do not know that yet.

Erv: Thank you, everyone, for attending.

*The meeting ended at 8:38 pm.*

**Groton-New London Airport**
**Public Informational Meeting**
**Groton City Hall Auditorium**
**April 2, 2012, 6-8 pm**

*The meeting opened at 6:05 pm.*

## Introductions

David Head, Transportation Supervising Planner and Study Manager, Connecticut Department of Transportation (CTDOT), thanked the committee for attending and introduced key members of CTDOT and the Federal Aviation Administration (FAA). He noted to those with concerns that he understood that the proposed Federal closing of the Control Tower at the airport was something that would be of major interest to members of the audience and asked if questions could be held until after the presentation on the Master Plan update. He then introduced Ervin Deck, Stantec Study Manager.

## Review of Purpose and Study Process

Erv thanked the audience for attending and noted that the update process for the Master Plan had been underway for several years but that it was now being wrapped up and this would be the final public meeting.

He noted that the previous Master Plan was created in 1999 and they are typically updated every 10 years. The purpose is to bring the Master Plan and the Airport Layout Plan (ALP) up to date and to project potential needs 20 years in the future. He noted that the public outreach on this process has been directly to stakeholders: those in the communities that live and work around the airport and rely on it for economics, including the Army National Guard unit and the Fixed Base Operators. He added that the Connecticut Airport Authority (CAA) will be managing the state’s airports going forward, and they have been brought into the process and fully briefed.

Erv reviewed the study process, in which Stantec created working papers, which were reviewed by the state and then by the Advisory Committee. The Advisory Committee is made up of pilots, FOBs, adjacent residents, business representatives and other citizens.

He explained that the Update is a technical report, designed to show systematically how the airport could grow and change – or not grow or change, based on the economy. The objective is to look at all possible alternatives, evaluating how growth could happen and what would be needed if and when it does occur.

The report starts with a snapshot of the airport, which is an inventory of existing conditions. Erv explained that Stantec then considered a series of questions to create a forecast. Will Groton-New London remain a General Aviation airport or might commercial service return? How would job and population growth affect this and other aspects of airport services?

The next step would be to look at what's needed to meet any future demand, Erv noted, after which an environmental review and a cost estimate are prepared. Finally, after developing a range of alternatives to meet possible future demand, the state and Stantec choose an alternative that is the most economically and environmentally responsible.

**Existing Conditions**

Erv gave a brief description of the airport today as shown in the report, including specifications for both landside and airside, slides that illustrates the runways, taxiways parking aprons, lighting, navigation and building configurations: terminal, ARFF (airport rescue and firefighting), hangars, FBO buildings, and TASMG building. He noted that the layout of the runways was excellent, and that if an airport was being designed today, it could not be done any better.

He noted that major changes since the study began include new ARFF equipment, upgraded safety areas on Runways 5 and 23 and upgraded EMAS.

Erv then recapped existing and forecasted operation levels. In terms of aircraft usage, the number is projected to remain flat through 2015, although he sees some small growth in jet traffic, perhaps 2% annually. After 2015, projections show a two percent annual growth rate through 2030. On the operations side, local operations are likely to remain flat but itinerant, recreational aircraft use of the airport could increase by 25 percent through 2030. He noted that this may be optimistic, as the price of fuel is very high and many pilots are cutting back hours in the air.

## Airport Activity

Erv then provided an overview of the types of aircraft currently using the Airport, noting that in general they are small, single engine, private or small-business owned planes and small jets, but also include Coast Guard, Life Flight and the Blackhawk helicopter, which is the staple of the TAMSG repair and maintenance operation.

Erv explained that a design aircraft is the one that sets the standard for an airport in terms of the facilities needed. The design aircraft generally would land at an airport 500 times a year. Groton-New London Airport's Design Aircraft is the Cessna Citation 650, a mid-size high performance business jet with two crew members and 11 passengers. This is designated as a C-II under FAA standards and part of the Master Plan Update was to ensure that the airport met standards for this aircraft. Erv noted that it does.

The study also looked at the breakdown and projections for the different kinds of aircraft: single engine, multi-engine, helicopter and turbojet/jet. The projection is for the proportion of turbojet/jet and helicopters to increase through 2030.

A similar breakdown was generated for local versus itinerant flights, which showed local flights have dropped slightly. This is important when estimating the need for parking. Overall, a big increase is not expected here. Erv noted that the noise analysis is based on this statistic and so it is important not to underestimate it.

## Facility Requirements

Erv explained that the most important takeaway from this section is that the airport's requirements are based on demand. If changes in demand occur, the facilities should be adjusted. If not, no action will be taken.

He provided the following overview of the facilities:

*Airport:* Runways are adequate. The runway width may be too wide for the design aircraft. When the time comes to do maintenance on the runways, management will look at making a change. The taxiways are also adequate. Upgrading the lighting to LED lights should be a consideration, but there are downsides such as expense, poor visibility using night vision goggles and funding impediments. The recommendation is to look at what is available in terms of lighting when the runways are reconstructed and make a decision based on replacements available at that time.

*Landside:* The recommendation is to make minor upgrades to the terminal as funding becomes available. There is a surplus of apron space and auto parking. Hangar space should be increased as demand grows, relying on the private sector to drive this. The ARFF and SRE buildings should be replaced and upgraded.

## Alternatives

Erv then went over the three alternatives that were considered under the Master Plan Update:

- *Do Nothing/No Build:* Should there be little or no demand for development, leave everything the way it is. This incurs no new cost, but no increase in income either.
- *Minimum Build:* If demand somewhat exceeds the areas currently under lease, this alternative would focus on converting one-third of the central landside into space that could bring in revenue, reconfiguring auto parking and setting aside land along Tower Ave. for development.
- *Full Build Out:* Under this alternative, market forces would support high capacity growth. Should this occur, maximum development of the central terminal area would occur, as would replacement of many existing public facilities. Erv showed specifics on what would be possible under this kind of scenario.

Erv noted that the Preferred Alternative in the Plan Update is between No Build and Minimum Build, as industry experts do not see the economy driving the need for a Full Build Out.

Erv recapped what the Preferred Alternative would mean:

*Landside:*
- Redesign auto parking lot and entrance road to reduce parking
- Convert existing pavement on both sides of Tower Ave. into area reserved for future development
- Remodel terminal building
- Modernize ARFF

- Expand SRE Building

*Airport:*

- Runways: Reevaluate width at next major reconstruction, update edge lights at next major reconstruction or as needed and replace VASI with PAPI on Runway 23 as soon as practical
- Taxiways: Upgrade edge lights at next major reconstruction or as needed
- Terminal Building: Modernize as pubic and private funding permit
- SRE Building: Expand storage capacity as funding becomes available
- ARFF Building: Modernize as funding permits
- Equipment for ARFF & SRE: Replace and upgrade as required for aging fleet and as new technology and regulatory changes require
- Hangars: Monitor demand and develop as needed
- Aprons: Monitor based aircraft demand against actual capacity and develop as needed

**Environmental Overview and Wrap Up**

Erv explained that Stantec and its subconsultant gave each of the Alternatives a rating in terms of its potential effect on the environment. He showed a slide indicating that many of the impacts would be short term, based on construction impacts. The firm also did a noise assessment based on the types of airplanes using the Airport. He noted that aircraft are getting quieter and more efficient, and that the analysis is based on a yearlong average, so it combines the noise of aircraft taking off and landing with long periods of no noise. He noted that while noise is not an issue at the Airport, that does not mean it is not noisy at times.

Erv also reported that projected capital costs for the Airport are primarily for routine items, such as updating the SRE and PAPI. He noted that there is a plan to fence the airport to keep wildlife off the runways, which will be a big expense. The total cost is about $33 million through 2039, with the state responsible for $3.8 million, the federal government responsible for $24.4 million, plus an expected $5 million investment by the private sector.

Erv said that the Airport currently still maintains its Part 139 commercial airport certification. This certification requires a higher standard than that required for General Aviation functions. He noted that the Airport used to have commercial service and part of the update analysis was to recommend whether or not the Part 139 Certification should be continued. He said that the airport manager does an excellent job of maintaining these higher standards with minimum staff, and the recommendation is to maintain the Part 139 certification. Erv explained that sometime when an airline expands they do so with very short public notice, and as long as the airport can keep the certification without spending extra dollars, it is smart to be ready in case an opportunity arises.

**Next Steps**

Erv explained that the next steps are to take final comments on the Update for a 30-day period. He asked that any comments be sent directly to David Head. Once any final comments are incorporated, Stantec will prepare the final report and close the project out, which should take place as of May 2013.

Erv then asked for any questions.

Q. How does the tower closure fit into any assumptions you have made in this update?

A. Erv said that given the nature of a Master Plan, it was not considered one way or the other; Stantec was not asked to study it.

Q. I do not see any focus is on climate change in this report. The sea level rise is supposed to be up to 2 meters in the next 90 years. A lower estimate is 9-20 inches. I do not see that anywhere in here. There is also nothing about increased frequency of storms.

A. Erv responded that this is beyond the scope and of federal requirements of the Master Plan as it does not fit into the 20-year Update timeframe.

Q. If not, then when and how will the airport address this?

A. David Head responded that the DEP had made a similar comment, and that the state will be adding notes to that effect. Catherine Young added that airport participated in the Climate Change Adaptation Study sponsored by the Town of Groton, and details on this will be part of the record and included in the appendices.

Erv asked if there were any more questions on the Master Plan Update, and as there were none, the meeting was officially closed at 7:05 pm.

**Meeting Addendum**

A further discussion took place with the audience regarding the proposed closing of the Air Traffic Control Tower, in which Eric Waldron, CAA, said that CTDOT and the CAA are pursuing every avenue to prevent the closure, including legal action.

David Head encouraged everyone to contact his or her federal representatives on this issue.

Chet Moore, air traffic controller for the airport, noted that people should also contact their state legislators, as the federal legislators have done all they can. He talked about the impacts a tower closure could have on safety. There was also general discussion about a more fundamental problem in that the airport usage is atrophying and that it is the community's job to get more people to use it. A suggestion was made to provide the restaurant facility to a vendor at no or minimal cost to draw in activity. Catherine Young noted that this was similar to the previous vendor contract. Further general discussion on the importance of the Airport ensued.

The discussion ended with Catherine assuring the audience that CTDOT and the CAA are planning to meet with airport tenants to address concerns and provide FAA guidance on the proposed Tower closure.

## Deck, Ervin

**From:** Deck, Ervin
**Sent:** Thursday, May 02, 2013 9:16 AM
**To:** Parsons, Molly; Head, David M (David.Head@ct.gov)
**Cc:** Carol Morris (cmorris@morriscomm.net)
**Subject:** GON AMPU Comments and REsponse

The following is the only comment received on the draft final master plan update. Mr. Olson submitted one comment sheet, however he discussed two separate issues which are discussed separately.

**Comment 1:** Submitted by James Olson Vice President and Chief Pilot Whelen Engineering Co.

First of all I would like to state that the airport is a vital part of the southeastern CT economy. Major employers, military, casinos and tourist activities are supported by the Groton New London airport. That being said I have major concerns about the possibility of narrowing the main runway 5-23. This runway supports all kinds of aircraft from small single engine aircraft to aircraft the size of 737 and C-17's or potentially larger. Repave / reconstruct the runway but do not narrow the runway. the perception with a narrower runway is a smaller runway. It might not be a fact but if we are trying to grow and promote the airport then do not give the flying public, corporate flight departments and the military the perception that the runways are smaller. It would only hurt not help.

**Stantec Response:** The required runway width is based on FAA design standards, which require an assessment of the existing and forecasted design aircraft. As noted in the report, under existing and forecasted conditions, both runways are wider than required. Runway 5-23 is 150 feet wide, however design standards suggest a 100 foot wide runway. Runway 15-33 is 100 feet wide, but again, design standards suggest a 75 foot wide runway. The Master Plan notes the requirements and suggests that each runway be evaluated when it is due for major reconstruction. The airport sponsor (Connecticut Airports Authority) should evaluate the required width and if nothing changes between now and then, the CAA can negotiate with the FAA to maintain a wider than required runway, and if the FAA does not concur, CAA can pay the difference between what the FAA standards recommend and the wider surface.

**Comment 2:** Submitted by James Olson Vice President and Chief Pilot Whelen Engineering Co.

The drawing showing a major reduction in terminal area parking. I think there are ways to increase hangar type buildings, etc. but you still need terminal area parking sufficient to handle any potential growth of the terminal area. If the restaurant is active again, if the rental car companies relocate to or expand at the terminal and mostly importantly airline traffic of some sort is reintroduced then you need adequate parking. Some depictions in the proposal in my opinion don't allow adequate parking. For your information we base our corporate jet at Mystic Jet.

**Stantec Response:** The drawing Mr. Olson is referring to is probably the Terminal Plan and yes, this plan does show a considerable reduction in the size of the parking area. We believe the parking area shown on the proposed layout plan is sufficient to meet both existing and future demand as forecasted in the master plan. This proposed lot size is based on the premise that commercial air carrier service will not materialize at GON. In addition, when the sponsor (CAA) is ready to undertake this project, they should reevaluate terminal parking needs based on the latest occupancy of the building, including restaurants, rental car and other tenant activity. Keep in mind that with construction of any new hangars, the developer should include sufficient space for both auto and aircraft parking. It's important to remember that the drawing is a concept, not a design build engineering document, and that the proposed plan leaves ample room for future expansion of the parking lot when and if the need arises.

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