Sustainable Airport Master Plan Update
Hartford-Brainard Airport

Connecticut Department of Transportation

Final Report

November 2014

AIRPORT MASTER PLAN UPDATE

for

HARTFORD-BRAINARD AIRPORT

Final Report

November 2014

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Connecticut Department of Transportation
Connecticut Airport Authority

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Glossary

Term	Description
4B8	Robertson Airport
4B9	Simsbury Airport
7B6	Skylark Airport
7B9	Ellington Airport
A&P	Airframe and Powerplant
AAGR	Average Annual Growth Rate
ACOE	Army Corps of Engineers
ALP	Airport Layout Plan
AMP	Airport Master Plan
AOPA	Aircraft Owners and Pilots Association
ARC	Airport Reference Code
ARFF	Airport Rescue and Fire Fighting
ARTCC	Air Route Traffic Control Center
ASOS	Automated Surface Observation System
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
BAF	Barnes Municipal Airport
BDL	Bradley International Airport
BDL	Bradley International Airport
BOS	Boston-Logan International Airport
CAA	Connecticut Airport Authority
CERC	Connecticut Economic Resource Center
CFA	Connecticut Flight Academy
CSASP	Connecticut Statewide Airport System Plan
CTAF	Common Traffic Advisory Frequency
CTDOT	Connecticut Department of Transportation
DMAT	Disaster Medical Assist Team
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FBO	Fixed Based Operator
FOD	Foreign Object Debris
GA	General Aviation
GHG	Greenhouse Gases
GPS	Global Positioning Satellite
HFD	Hartford-Brainard Airport

Term	Description
HIRL	High Intensity Runway Lights
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
IJD	Windham Airport
LDA	Localizer Type Directional Aid
LL	Low-Lead
NMFS	National Marine Fisheries Service
MDC	Metropolitan District Commission
MITL	Medium Intensity Taxiway Lights
MMK	Meriden Markham Municipal Airport
MSL	Mean Sea Level
NM	Nautical Mile
NPIAS	National Plan of Integrated Airport Systems
NWS	National Weather Service
OPBA	Operations Per Based Aircraft
PAPI	Precision Approach Path Indicator
REIL	Runway End Identifier Lights
ROW	Right of Way
Rwy	Runway
SF	Square Foot
SPCC	Spill Prevention Control and Countermeasure
STAR	Standard Terminal Arrival
TAF	Terminal Area Forecast
USAR	Urban Search and Rescue Organization
VASI	Visual Approach Path Indicator
VFR	Visual Flight Rules
VGSI	Visual Glide Slope Indicators
VLJ	Very Light Jet
VOR	VHF Omnidirectional Radio

Hartford- Brainard Sustainable Airport Master Plan

A Sustainable Airport Master Plan (AMP) provides long-range recommendations for the improvement and development of an airport. It also identifies areas that may need improvement to accommodate future growth over the next 20 years and methods for making the airport more economically and environmentally efficient. The AMP will review national and local trends that may affect the aviation activity, such as sustainability initiatives, market rates, federal regulations, and new technologies. The products of an AMP consist of a narrative report and a set of drawings called the Airport Layout Plan (ALP), which identify, schedule, and illustrate all major projects anticipated at the airport within the 20-year planning period. An approved ALP is the prerequisite for an airport to qualify for federal funding assistance. Thus, updates to the ALP and AMP are periodically conducted to provide justification for future development at an airport.

Hartford-Brainard Airport (HFD), owned by the State of Connecticut, is a general aviation (GA) airport located near downtown Hartford, Connecticut. At the onset of this study HFD was operated by the Connecticut Department of Transportation (CTDOT), but in 2013 was transferred to the newly established Connecticut Airport Authority (CAA).

HFD serves as a regional economic driver, while being environmentally and socially conscientious. Corporate travel, flight training, recreational flights, and many other aviation activities take place at HFD. Across the 201 acres, there are two paved runways, one turf runway, and two helipads, with parking for over 200 aircraft.

Sustainability

The term “sustainability” is not a singular, concrete concept with a defined strategy that is applicable to all industries or governmental entities. Rather, it can be described as a comprehensive approach framed by the type and scale of a given entity and its current effects on the environment. In broad terms, sustainability is balancing the needs of the present without compromising the ability of future generations to meet their own needs.

According to the Sustainable Aviation Alliance, airport operators across the country are embarking on creating their own sustainability plans as well as implementing sustainability programs and new initiatives at their facilities. Along with benefiting their communities and the environment, airports are finding that sustainability is helping the bottom line. Airports implementing sustainable practices are finding benefits including reduced operating costs, reduced capital asset life cycle costs, and enhanced relationships with the neighboring communities.

Another factor leading to the creation of sustainability plans is new federal, state and local directives requiring public agencies to become more sustainable. These laws and ordinances direct public agencies, including airports, to develop sustainability programs or incorporate sustainable practices into their development projects and operations.

Vision for Sustainability for HFD

It is important for airport operators to create a sustainability vision for their airports that is suitable to its type, scale, geographical setting, and role within its community and environment. This AMP will use the vision presented below to establish the groundwork for future planning and implementation. HFD's vision for sustainability is:

To maintain and enhance the Hartford Brainard Airport into a transportation asset that serves the needs of central Connecticut businesses and residents, and operates in an economically and environmentally sustainable manner.

Sustainability Goals

In addition to creating a sustainability vision for HFD, it is necessary to isolate specific operations and facilities within its airport management and infrastructure which can benefit from sustainable practices. Once identified, sustainability goals are defined laying the foundation for establishing future sustainability practices and measures for implementation. Many of these practices can be quantitatively measured, such as greenhouse gas emissions, while others are only procedural changes, such as ensuring chemical spills are properly cleaned up.

For large, commercial airports, sustainability practices are generally provided for a wide range of services and procedures such as administrative procedures, water usage, ground transportation, energy efficiency, indoor environmental quality, facility operations and more.

For GA airports like HFD that have limited day-to-day users and ground traffic, it is reasonable to focus efforts on improving sustainability primarily in the areas of:

Energy Use: Airport activities and facilities, such as heating and cooling, airport power units, and lighting, require large amounts of energy. Practices can be identified to reduce energy consumption by using more energy efficient equipment, vehicles, and materials or reconsidering current procedures.

Goal: *Reduce energy consumption and use clean/renewable energy resources.*

Objectives:

- Reduce energy consumption on an annual basis
- Use cleaner sources of energy

Measurements:

- Track energy usage by Building
- Inventory types of energy (i.e., electricity, natural gas, fuels, heating oil, solar, wind, etc.)

Air Quality: Federal regulations towards improving air quality are becoming increasingly stringent. Airports are now required to conform to air quality standards and initiate plans to offset increases to air pollution. This may include monitoring air quality, reducing greenhouse gas emissions (GHG), or converting to electric vehicles.

Goal: *Minimize HFD's contribution to climate change, air pollution, and the depletion of the ozone layer*.

Objectives:

- Reduce GHG emission on an annual basis

Measurements:

- GHG Emissions (every three to five years)

Design and Construction: Construction and demolition waste constitutes about 40% of the total solid waste stream in the US. New and refurbished buildings can be built with sustainability in mind to reduce their impact on the environment and the community. Airports can require their engineers and contractors to conform to sustainability design and construction standards regarding their materials and building practices.

Goal: *Ensure that design and construction projects at HFD conform to the concept of sustainability; making it a core objective in site readiness and building construction.*

Objectives:

- Implement design and construction sustainability guidelines that minimize the impacts of construction and demolition
- Institute a construction site recycling program

Measurements:

- Construction waste recycled
- LEED Certifications for new projects and developments

Waste Management/Recycling: Waste at general aviation airports comes primarily from office materials food services, and maintenance activities. Bringing awareness to the amount of waste produced on an annual basis and promoting waste management programs, such as recycling or composting, can contribute significantly to the environment.

Goal: *Enhance efforts to minimize solid waste generation and to recycle collected waste.*

Objectives:

- Reduce solid waste production on an annual basis
- Recycle as much solid waste as possible
- Reuse construction waste
- Be prepared to respond to accidental releases in a swift manner, and then minimize the damage to the environment and risk to the public.

Measurements:

- Waste generated annually
- Amount recycled annually
- Number of tenants with recycling programs

Hazardous Materials: Hazardous materials are substances with chemical or physical properties that are harmful to human health or the environment when handled, stored, or disposed of incorrectly. At the airport, these materials may include Jet-A fuel, Avgas, oil, paint, and cleaning agents. Properly managing these types of materials helps protect the environment and the community.

Goal: *Reduce the use and risks associated with hazardous materials.*

Objectives:

- Eliminate use of hazardous materials when possible
- Ensure proper use, storage, disposal, and spill clean-up

Measurements:

- Number of products and types in use
- Use, storage, disposal, and spill clean-up procedures of all hazardous materials

Vegetation and Wildlife Management: It can be difficult to protect the biodiversity and local habitats of plants and animals while ensuring the safety of aircraft operating at an airport. Sustainable practices should be employed to maintain the airport’s airspace and preserve the local environment. This can be accomplished by such practices as providing wildlife fencing or the use of noise cannons to scare animals away.

Goal: *Develop a wildlife hazard control plan that specifies and maintains all vegetative areas of the airport.*

Objectives:

- Maintain vegetative areas so they do not attract wildlife
- Remove local wildlife from the area by using non-harmful methods

Measurements:

- Wildlife sightings

Based on the goals for sustainability presented above, a baseline assessment will be completed to determine the current conditions of HFD and then used to evaluate the development alternatives for the Recommended Development Plan. Strategies for implementing these sustainability goals will also be provided with the recommendations.

If decide to pursue the sustainability effort, the following are recommended ways to ensure the goals are met:

- Establish a sustainability coordinator or committee
- Develop partnerships with community groups and local businesses
- Provide annual report of measurements and new initiatives

1.0 REGIONAL AND AIRPORT OVERVIEW

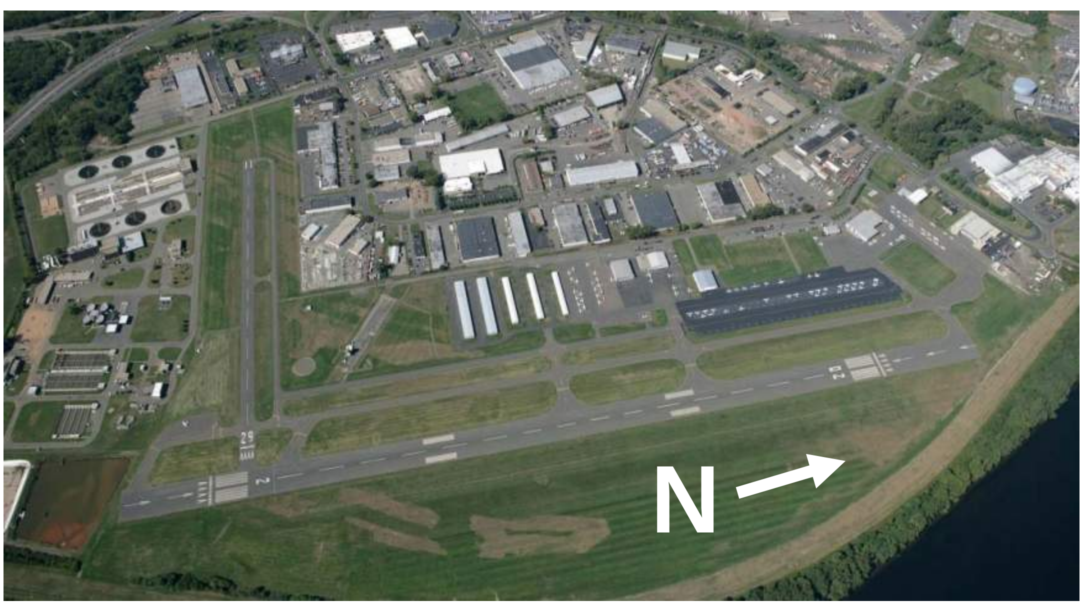
This chapter contains an inventory of existing facilities and characteristics of the Hartford-Brainard Airport (HFD). The inventory is referenced throughout the preparation of the Master Plan Update (MPU) to determine how well the airport meets today's demands, and to identify areas that may need improvement to accommodate future growth. An inventory of airport pavements, buildings, and other structures is presented, as well as a summary of the airport location, airspace, activity, and environment. This information is presented in the following sections:

- Study Area
- Regional Economic Development
- Existing Airport Facilities
- Proposed and On-going Development
- Airport Services
- Airspace, Air Traffic Control, and Noise Abatement
- Existing Airport Activity
- Greenhouse Gases Emission
- Energy Audit

1.1 <u>Study Area</u>

1.1.1 Airport Location

HFD is located approximately two miles southeast of downtown Hartford near the intersections of Interstates I-84 and I-91 and approximately 12 miles south of Bradley International Airport, as shown as Figure 1-1. This location is excellent for corporations that desire quick, easy access to downtown Hartford and are not restricted by the 4,400 foot runway.



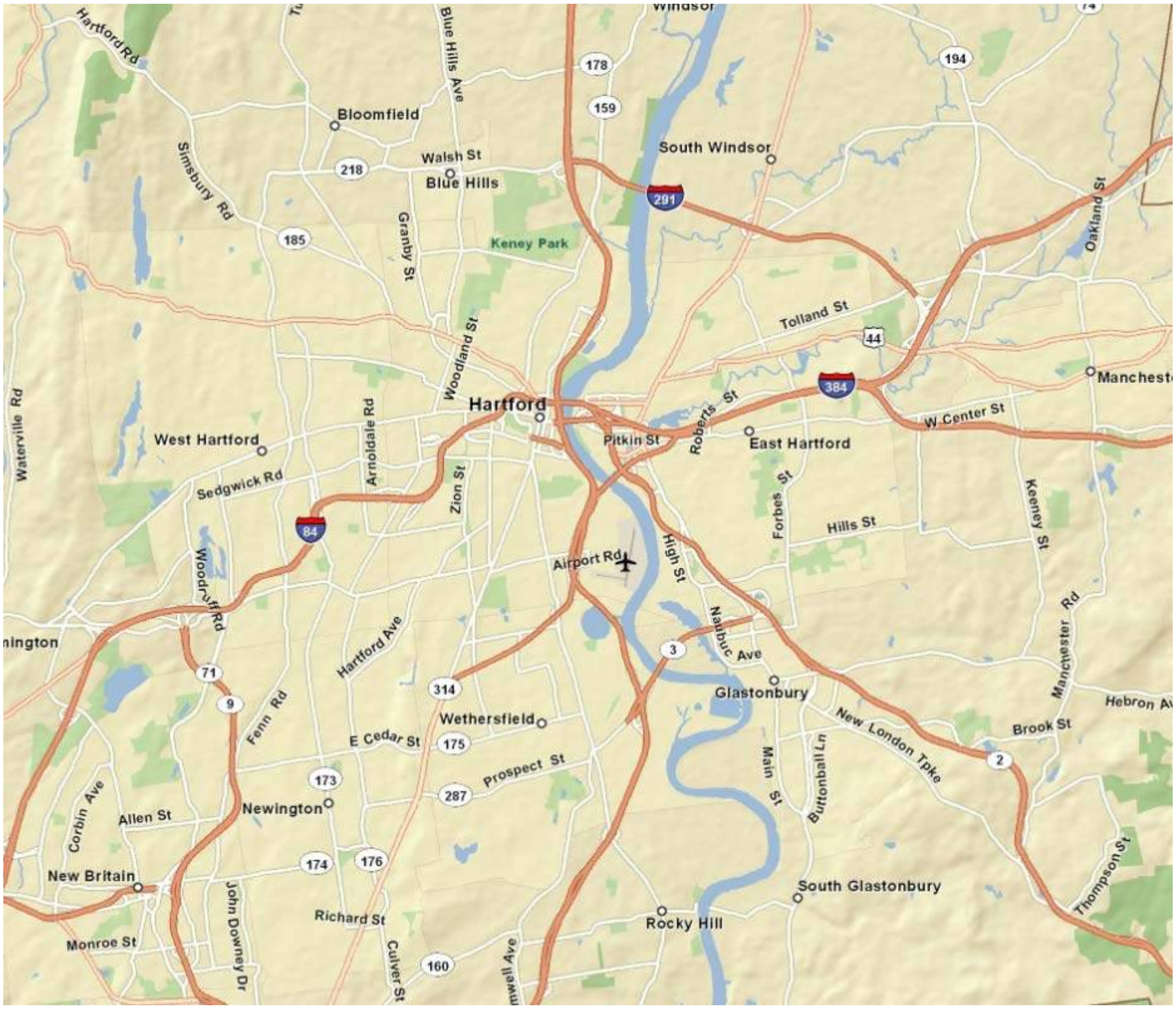
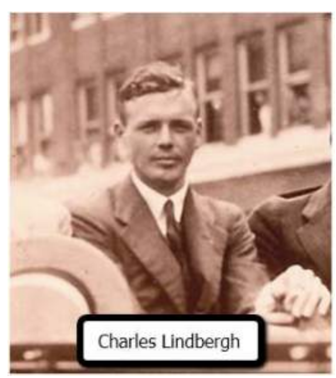


Figure 1-1 Hartford-Brainard Airport Location

1.1.2 Airport History



HFD was dedicated as Brainard Field after Mayor Newton C. Brainard on June 10, 1921 at a site north of the existing location. It holds historical significance as being the first landing spot of Charles Lindbergh after his historic first transatlantic flight. The Connecticut (CT) National Air Squadron was organized at HFD in 1923. The Clark Dike was constructed by the Army Corps of Engineers (ACOE) in 1936 to prevent future flooding of the airport by the Connecticut River. The Dike is now owned by the City of Hartford, run by the Dike Commission, and overseen by the ACOE.

There were originally four runways on 351 acres. In 1959, the State purchased 201 acres of the airport, including Runway 2-20. The 150 acres between Brainard Road and Lindbergh Drive was also purchased by the State, but then converted into a Business

Park. The three other runways were abandoned and the crosswind Runway 11-29 was constructed in 1966 for small aircraft landing in high east-west wind conditions.

1.1.3 Airport Service Area and Role

Airport service areas illustrate the location from which people are expected to use the airport as a first choice over other neighboring facilities. Based on general planning guidelines for general aviation (GA) facilities, airport service area boundaries comprise a 20-mile radius or a 30-minute driving time to the airport. These geographic areas encompass the majority of businesses, passengers, and based aircraft owners utilizing an airport, as well as the tourist destinations of visitors. Service area data can serve as the basis for compiling socioeconomic data to be used in developing forecasts of aviation demand. Table 1-1 provides a list of other airports in the Hartford region and their distance from HFD. Hartford-Brainard has the longest runway in the region after Bradley International Airport (BDL).

Table 1-1 – Regional Airport Facilities

Airport Name	# of Runways	Runway Length	Surface Type	Instrument Approach	NM to HFD
Hartford-Brainard (HFD)	*2*	*4,417*	*Asphalt*	*GPS, LDA, VOR*	-
Robertson (4B8)	1	3,665	Asphalt	-	10
Skylark (7B6)	1	3,242	Asphalt	-	12
Simsbury (4B9)	1	2,205	Asphalt	-	12
Bradley Int'l (BDL)	3	9,510	Asphalt	ILS, RNAV, VOR	12
Ellington (7B9)	1	1,800	Asphalt	-	14
Meriden Markham (MMK)	1	3,100	Asphalt	GPS, VOR	16
Windham (IJD)	2	4,271	Asphalt	RNAV, VOR	21
NM: Nautical Miles					

As illustrated on Figure 1-2, the service area for HFD consists of a 20 nautical mile (NM) ring (shown in yellow). Skylark, Simsbury, and Ellington Airports are not competitors to HFD for business aircraft due to their smaller runways and lack of instrument approaches.

While BDL is a commercial service airport, it is the largest competitor for HFD due to BDL's available amenities, its relative proximity to downtown, and the lack of congestion. There is a large amount of available land and airspace that can be utilized by business aircraft. BDL's long-term strategic goal is to serve commercial airline and cargo activity, with business aircraft as a secondary goal. HFD's primary role is to serve business and light GA activities. Proposed improvements included in the master plan update will address this overall goal.

It is considered a reliever airport by the Federal Aviation Administration's (FAA) National Plan of Integrated Airports System (NPIAS), to relieve congestion at the commercial service airport, BDL, and to provide improved general aviation (GA) access to the overall community. Due to the operating differences between smaller GA aircraft and larger commercial aircraft, pilots can find congested commercial airspace difficult to maneuver. In order to be eligible for the reliever designation, an airport must have 100 or more based aircraft or at least 25,000 annual operations.

In May 2012, the FAA released the *General Aviation Airports: A National Asset*, which reviewed the current classification system. The FAA understood that the previously classifications did not always provide the information necessary to effectively plan for future infrastructure and under the value to the community of an airport. Under this study, HFD has a service level of Reliever and category of Regional. A regional airport supports regional economies by connecting communities to statewide and interstate markets. They are located in metropolitan areas and serve relatively large populations. More sophisticated aircraft operate at these airports and account for 37 percent of total flying at GA airports. The specific criteria used to define the regional category include located in Metropolitan Statistical Area (MSA) and 10 or more domestic flights over 500 miles, 1,000 or more instrument operations, 1 or more based jets, or 100 or more based aircraft. The NPIAS program will begin utilizing these categories in their 2013 to 2017 report.

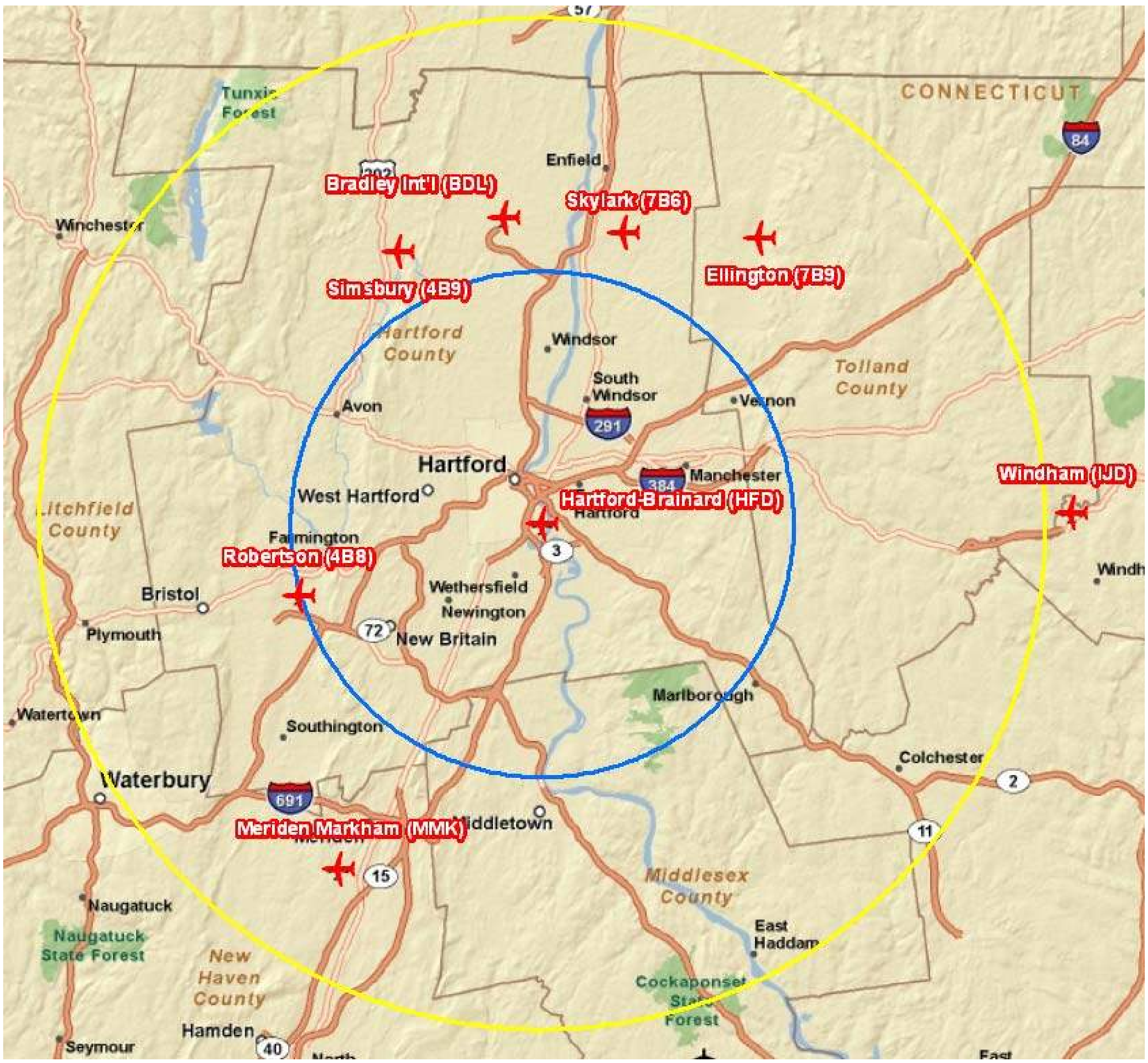


Figure 1-2 Hartford-Brainard Airport Service Area

1.1.4 Socioeconomic Characteristics

Demand for aviation facilities depends largely upon the demographic and economic characteristics of a given region. Population represents the most significant socioeconomic indicator used to determine aviation demand. Table 1-2 provides city, county, state, and national population levels for 1990, 2000, and 2010, as well as projected values for 2015 from the Connecticut Economic Resource Center (CERC).

Table 1-2 – Population

Area	1990	2000	2010	% Change (1990-2010)	AAGR (1990-2010)	2015, Projected
City of Hartford	139,739	121,578	121,599	-13.0%	-0.65%	121,689
Hartford County	851,783	857,183	880,467	3.4%	0.17%	890,564
Connecticut	3,287,116	3,405,565	3,511,137	6.8%	0.34%	3,545,169
United States	248,765,170	281,421,906	308,745,538	24.1%	1.21%	322,365,787

Source: Connecticut Economic Resource Center
AAGR: Average Annual Growth Rate

The City of Hartford's population declined by 13 percent over the 20-year period from 1990-2010. This local decline stands in contrast to the population gains experienced at the county, state, and national levels: Hartford County's population increased by 3.4 percent, the State of Connecticut's population increased by 6.8 percent, and the total United States (U.S.) population increased by 24.1 percent over this time period. Population loss has occurred within the city itself as residential preferences have shifted to increasingly favor suburban over urban living. Connecticut has grown at a slower rate than the country as a whole, due to declines in manufacturing and other key regional industries, and less immigration relative to states in the southern and western U.S.

Positive, but minimal, population growth (less than 0.1 percent) is projected for the City of Hartford over the period from 2010 to 2015, with more significant growth anticipated at the larger geographic levels over this period.

Table 1-3 summarizes 2010 unemployment and per capita income values at each level of geography. While unemployment rates change regularly, the comparative values typically remain consistent.

Table 1-3 – Unemployment & Income

Area	Unemployment %*	Per Capita Income**
City of Hartford	16.1%	Not Available
Hartford County	9.7%	$51,234
Connecticut	9.1%	$55,296
United States	9.6%	$39,635

Source: *U.S. Bureau of Labor Statistics, 2010 Averages;
**U.S. Bureau of Economic Analysis, 2009 Values

2010 unemployment rates are high at all levels of geography summarized in Table 1-3, due to the challenging economic conditions experienced during that year. The City of Hartford's 16.1 percent unemployment rate is particularly high, indicating that the area's urban center has experienced a greater degree of recent economic hardship than the region as a whole.

1.2 Regional Economic Development

The Metropolitan District Commission (MDC) has managed the region's water and sewer systems since 1929. One of their largest waste water processing facilities is located adjacent to the airport along the southern border. The MDC is moving forward with a one billion dollar investment to improve the area's water quality and protect health and safety of the local community during high water events such as storms. This project will expand the capacity and capabilities of the facility, including upgrading to more modern technologies. In order to accommodate the new facilities the MDC has purchased a significant amount of property to the west of HFD.

In 2011, the Aircraft Owners and Pilots Association (AOPA) held their annual conference at HFD for the second time in four years. 2007 had one of the highest attendance levels and 2011 was a great year for the vendors. HFD hopes to hold another AOPA conference in 2015. This conference is a great economic stimulator for the region as numerous pilots use the airport's services and purchase products within the local community.

1.3 Existing Airport Facilities

This section describes the Airport's runways, taxiways, aprons, lighting, and navigational aids. The conditions reported in this section are based on a review of the Airport's plans and documents, site visits, and discussions with the airport manager and CT Department of Transportation (CTDOT) staff. Figure 1-3 displays the airport facilities and tenants.

1.3.1 Airside Facilities

A primary role of master planning is developing a detailed listing of recommended facilities and improvements for implementation over the planning period. As such, the first step in this process is to inventory existing facilities and review their current condition.

Airport facilities are often described as either airside or landside. Airside (or airfield) facilities are those directly used by aircraft, such as runways, taxiways, aprons, lighting and instrumentation. Landside facilities are support buildings and structures, typically with access to the airside, such as the terminal, hangars, maintenance buildings, parking lots, and access roads. As part of this study, all airport facilities were inspected and inventoried, and are described in the sections below.

Runways

HFD has two paved runways, Runway 2-20 and Runway 11-29, a turf runway referred to as Runway NE/SW, and two helipads, H1 and H2.

Runway 2-20 is the primary runway and is 4,417 feet long and 150 feet wide. The runway thresholds have been displaced on both ends to meet approach clearance requirements, as the runway is surrounded by the Clark Dike – a Connecticut River flood control dike of approximately 25 to 30 feet tall. The runway is equipped with High Intensity Runway Lights (HIRL), Visual Glide Slope Indicators (VGSI), and Runway End Identifier Lights (REIL). Runway 2 has two non-precision approaches, a Localizer Directional Aid and a GPS-RNAV approach. The airport also has a VOR approach (circling only) and a published visual approach for noise abatement. The runway markings are non-precision and in good condition.

Runway 2 has a displaced threshold of 411 feet and Runway 20 has a displaced threshold of 560 feet. A displaced threshold relocates the landing threshold to a spot other than the edge of pavement and requires pilots to land at this location. At HFD, the displaced thresholds are in place to ensure adequate clearance of obstructions on the approach paths over Clark Dike to either runway end. At HFD, the pavement behind the displaced threshold can be used for takeoff.

Runway 11-29 is 2,314 feet by 71 feet and is used exclusively for smaller GA aircraft. It is equipped with HIRL. The runway has visual markings, which are in good condition. Runway 29 has a displaced threshold of 265 feet due to the Clark Dike.

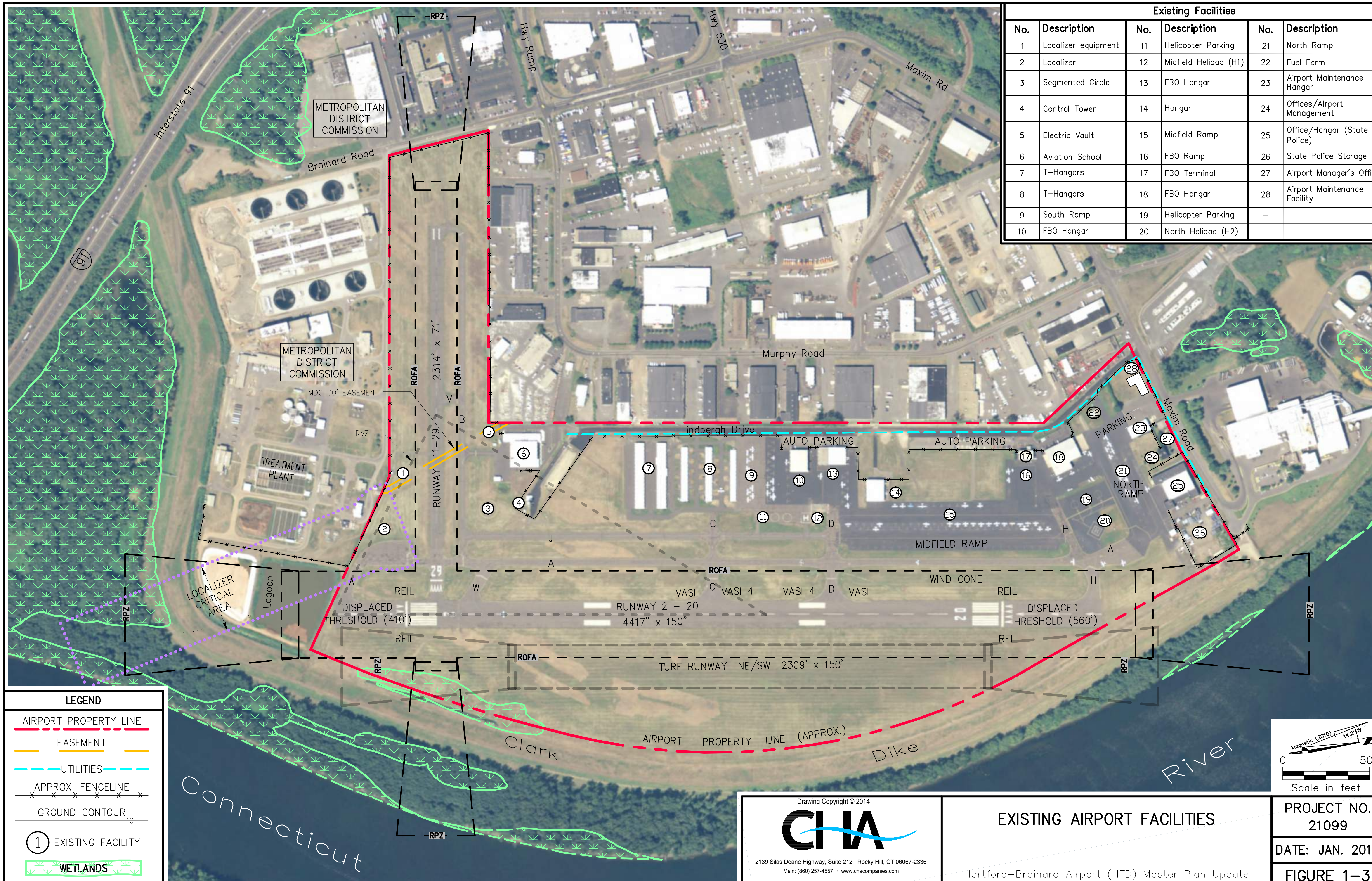
The turf runway is 2,309 feet by 150 feet and closed during the winter months. It is not lighted, but is demarcated by orange markers and flags.

The Midfield Helipad, H1, located near Taxiway D, is 44 feet by 44 feet and has medium intensity lights. Two helicopter parking spaces are located next to the helipad. The North Helipad, H2, located near the Runway 20 end, is 70 feet by 77 feet and has medium intensity lights. Three parking spaces are located next to H2.

Table 1-4 – Runways at Hartford-Brainard Airport

Runway	Length	Width	Displaced Threshold	Surface Type	Lighting
Runway 2-20	4,417’	150’	Rwy 2: 411 feet Rwy 20: 560 feet	Asphalt Grooved	HIRL Rwy 2: REIL, PAPI Rwy 20: REIL,VASI
Runway 11-29	2,314’	71’	Rwy 11: None Rwy 29: 265 feet	Asphalt	HIRL
Runway NE-SW	2,309’	150’	None	Turf	None

PAPI = Precision Approach Path Indicator; VASI = Visual Approach Path Indicator



Existing Facilities

No.	Description	No.	Description	No.	Description
1	Localizer equipment	11	Helicopter Parking	21	North Ramp
2	Localizer	12	Midfield Helipad (H1)	22	Fuel Farm
3	Segmented Circle	13	FBO Hangar	23	Airport Maintenance Hangar
4	Control Tower	14	Hangar	24	Offices/Airport Management
5	Electric Vault	15	Midfield Ramp	25	Office/Hangar (State Police)
6	Aviation School	16	FBO Ramp	26	State Police Storage
7	T-Hangars	17	FBO Terminal	27	Airport Manager's Office
8	T-Hangars	18	FBO Hangar	28	Airport Maintenance Facility
9	South Ramp	19	Helicopter Parking	–	
10	FBO Hangar	20	North Helipad (H2)	–	

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EXISTING AIRPORT FACILITIES

Hartford–Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: JAN. 2014

FIGURE 1–3

Taxiways

Both paved runways are served by full length, parallel taxiways on the west side of the airfield and provide access for the tenants and aircraft storage facilities to the runways. The taxiways are equipped with Medium Intensity Taxiway Lights (MITL) and range from 25 feet to 50 feet wide. Taxiway A is a full-length, parallel taxiway for Runway 2-20 and was last reconstructed in 1995. Taxiway B is a full-length, parallel taxiway for Runway 11-29 and was last reconstructed in 1999. Taxiway J provides a secondary parallel taxiway for Runway 2-20 and enables bi-directional simultaneous taxi operations between the landside facilities and the two runways; it was reconstructed in 1999. The other taxiways are connector taxiways, which provide access to and from the facilities and the runways. No airside access is available to the south and east side of the airfield, except for the turf runway which is accessed by crossing runway 2-20 at Taxiway D.

Air Traffic Control Tower (ATCT)

The ATCT is owned and maintained by the FAA and staffed by contract personnel. It is located on the west side of the airfield at the intersection of Taxiways J and B. A review of the Tower Line of Sight is located in another section of this report. The ATCT is estimated to be 66 feet tall, with the cab floor at 34 feet. Additional information regarding the operation of the ATCT is in Section 1.6 - Airspace and Air Traffic Control.

Automated Surface Observation System

An Automated Surface Observation System (ASOS) is located to the north of the ATCT. The ASOS provides pilots with current meteorological conditions such as wind speed, direction, and cloud ceiling when the ATCT is closed. The ASOS was commissioned in May 1997 and is maintained by the National Weather Service (NWS). The data is uploaded directly in the NWS database and is available for review.

Additional Visual Aids

The wind direction indicator includes a lighted wind cone within a segmented circle, located on the west side of the airport near the ATCT. A secondary wind cone is located north of Taxiway D. The Clark Dike is lighted at either end with obstruction beacons to aid pilots.

1.3.2 Landside Facilities

An inventory of the existing landside facilities was conducted through field observations, review of existing airport plans, and discussions with airport management.

Hangars

There are numerous hangars at the airport. The State owns all of the property and buildings, and leases them to tenants. Information regarding the services provided by these tenants and structures is located in Section 1.5. Table 1-5 lists the location and size of the hangars. Most of the structures are considered in good condition. Buildings 24 and 25 could use some upgrades during a future renovation project.

Table 1-5 – Hangars

Type	Figure 1-3 Location	Capacity	Size (SF)
Aviation School	6	-	34,000
T-Hangar (1 of 2)	7	18	19,800
T-Hangar (2 of 2)	7	18	19,800
T-Hangar (1 of 3)	8	10	11,500
T-Hangar (2 of 3)	8	10	11,500
T-Hangar (3 of 3)	8	10	11,500
Conventional Hangar	10	6*	12,800
Conventional Hangar	13	8*	15,500
Conventional Hangar	14	5*	12,000
FBO Terminal	17	-	4,600
Conventional Hangar	18	13*	26,000
Maintenance Hangar	23	-	8,200
Offices	24	-	2,500
Conventional Hangar & Offices	25	22*	36,000
Offices	27	-	3,000
Maintenance Facility	28	-	7,800

*Estimated for Conventional Hangars based on industry standard of 1,600 SF per aircraft and considered a portion of the hangar is used for office space and maintenance.

Aprons

As shown in Table 1-6, there are four main aprons at HFD. The majority of the tiedowns on the South Ramp, Midfield Ramp, and North Ramp are owned by the State and leased directly to aircraft owners; a few of the spaces are leased to the Fixed Based Operator (FBO). Additionally, several hangars have tiedown locations in front or side of their buildings that are typically used for their business aircraft, customers or itinerant aircraft.

Table 1-6 – Aircraft Parking Aprons					
	Figure 1-3 Location	**Size (SF)**	**Tiedowns**	**Surface Type**	**Users**
South Ramp	9	122,000	38*	Asphalt	Based/Itinerant
Midfield Ramp	15	335,000	92	Asphalt	Based/Itinerant
FBO Ramp	16	36,000	8*	Asphalt	Based/Itinerant
North Ramp	21	108,000	33	Asphalt	Based

***Two spots are reserved for helicopters.

Perimeter Fence

A perimeter fence is situated along much of the border of the airport property as shown in Figure 1-3. There is currently no fence to the east of the airport along the Clark Dike. This allows animals and the occasional person or vehicle to access the airfield.

1.3.3 Utilities

Information on utilities was obtained from a review of the previous Master Plan, CTDOT files, and discussions with airport personnel. The utilities typically run underground along the side or under Maxim Road and Lindbergh Drive with service laterals to individual buildings.

Electric

Electric power is provided on utility poles above ground by Northeast Utilities HELCO along both access roads to the HFD. These power lines carry three phase 23,000 V phase to phase 13,200 volt phase to ground. Service to airport buildings is through underground cables. The electrical vault that controls airfield lighting is located southwest of the ATCT (Number 5 on Figure 1-3).

Gas

Gas service is proved by Connecticut Natural Gas through gas mains located beneath Lindbergh Drive. Service laterals from the gas main serve buildings along the airport access road and Maxim Road.

Water

The Metropolitan District Commission provides water through a water main east of the airport access road and south of Maxim Road with service laterals to buildings.

Sewer

Three pump stations are located on the airport property to serve the buildings along Lindbergh Drive, at the ATCT, the FBO South Complex, and the southwest corner of the large parking lot for the FBO. Other airport buildings are connected to the sewer line just north of Maxim Road via lateral connections. Currently, the storm and sewer lines are combined within the City of Hartford, causing the occasional overload of the system during large storms. The MDC is in the process of separating these lines to rectify this issue.

Right of Ways

MDC has a right of way (ROW) along the western edge of the property and under Runway 11-29. This underground easement is 30 feet wide.

Additionally, Buckeye Partners owns and maintains a petroleum transportation pipe line that runs along the western edge of the dike and is serviced twice a year. The company is currently trying to move the service location off airport property so it does not disrupt operations while being serviced.

1.3.4 Airport Access and Parking

HFD is highly accessible due to its proximity to Downtown Hartford. The intersection of three major highways, I-84, I-91, and Route 2, is just north of HFD. Vehicle access to the airport is provided via I-91 and the Wilbur Cross Highway (Highway 5 and Route 15) to Maxim Road and Lindbergh Drive. These two streets provide access to the west side of the airfield for all existing tenants. Vehicle access is not available to the south and east of the airfield due to the Clark Dike/Connecticut River and the MDC Treatment facility.

While there appears to be adequate roadway signage to direct users to the airport, an airport directional sign on Airport Road should be located closer to the off-ramp of I-91 to indicate a left-hand turn is needed.

Automobile parking is provided in paved lots at or near each respective tenant facility. It is estimated that there are at least 360 parking spaces throughout the airport. The large lot near the FBO terminal has approximately 180 spaces, 70 of which are leased by the United States Post Office for employee parking. T-Hangar tenants are also allowed to park their personal vehicles next to their T-hangar bay. However, the parking for individual tiedown customers on the midfield ramp does not have convenient parking, which makes these tiedowns less desirable.

1.3.5 Fuel

HFD provides aircraft fuel storage at one location on the Airport. While HFD owns the tanks and pumps, which are located on the northwest side of the Airport along Lindberg Drive, Atlantic Aviation leases the tanks and provides the fuel services to aircraft. They provide Jet-A and 100 Low-Lead (LL) fuel via four trucks. The Jet-A trucks hold 2,200 gallons and 2,600 gallons. The 100LL trucks both hold 1,000 gallons. The fuel is stored in aboveground tanks with a capacity of

12,000 gallons for Jet-A and 12,000 gallons for 100LL. The FBO staff that provide fuel are trained under a Spill Prevention Control and Countermeasure (SPCC) Plan. There is a concrete pad to capture any accidental spillage. Airport staff conducted quarterly inspections of the fuel facilities as outlined in FAR Part 139 requirements.

Underground tanks provide gasoline and diesel fuel to vehicles on the airfield for the airport. FBO fuel trucks and ground support equipment use Jet-A fuel for the aircraft fueling facilities.

1.3.6 Airport Rescue and Fire Fighting (ARFF)

As a GA airport, HFD is not subject to any official standard or requirements for ARFF. Currently the airport staff maintains two fire fighting vehicle in their maintenance facility; with cross-trained personnel available during business hours should the need for one arise. Professional firefighters from the City of Hartford are available to respond to an incident at all times.

The ATCT has a direct line to the Hartford Fire Dispatch Center, which are called for all airport alerts. The ATCT will then call Airport staff for airport personnel to respond if at the airport or come back if after normal work hours if there is actual accident or incident.

The new maintenance facility that will be located at the corner of Maxim Road and Lindbergh Drive will also house ARFF vehicles.

1.3.7 Snow Plowing

During snow events, HFD plows continuously to keep the runway and ramps clear of snow as much as possible. In the event of a temporary airport closure, HFD expedites opening the primary runway and associated taxiways. Sand is spread for traction and urea to melt ice as needed. HFD operates six vehicles during snow conditions; the new Oshkosh snow blower is in good condition along with the street side truck and payloader. Airfield plowing is done by highway type plow trucks, one of which is but the other two vehicles from the 1980’s are in poor condition and should be replaced.

1.3.8 Foreign Object Debris (FOD)

FOD is any substance, debris or article alien to the engine, equipment or aircraft that if ingested into the engine or lodged in a mechanism, would potentially cause damage which may render the system unusable or unsafe for operation. Due to HFD’s proximity to multiple trash and recycling centers on Maxim and Murphy Roads, FOD is an ongoing issue. HFD does not have any equipment to assist the airport staff in collecting trash and regular trash collection by hand by personnel is conducted to ensure FOD does not reach aircraft movement areas to the extent possible.

1.4 Proposed and On-going Development

There are a few capital improvement projects HFD currently moving forward. Location 28 on Figure 1-3 is the site of a new maintenance facility; the project is scheduled for construction in 2012. The facility will house the maintenance equipment and vehicles, including ARFF, mowing, and snow removal. Additionally, HFD intends to place graphical signs at the ends of the runway to reinforce the noise abatement procedures for departing aircraft.

A CTDOT project to upgrade the taxiway lighting system to LED has been put on hold as of march 2012.

1.5 Airport Services

HFD serves a variety of general aviation users, including those flying for business, government, and recreational purposes. As such, various types of services are provided by tenants to meet the needs of the users, as described in Table 1-7. Location references Figure 1-3. While the State owns all of the airport property much of the property is leased to various tenants.

Table 1-7 – Airport Services / Tenant Summary

Company	Service Provided	Location^	Fuel	Itinerant Parking
Atlantic Aviation*	Fuel, Parking, Storage, Lounge, Supplies, Rental Cars, and Catering	17	100LL & Jet-A	Yes
Connecticut Aero Tech School	Maintenance Instruction	6	N/A	N/A
Connecticut Flight Academy†	Flight Instruction	18	No	No
CT Bureau of Aviation and Ports	Airport Management	24	N/A	N/A
CT Bureau of Aviation and Ports	ARFF and Maintenance	27 & 28	N/A	N/A
CT State Police Aviation Unit	Public Service	25 & 26	N/A	N/A
CT T-Hangars	Based Aircraft Storage	7	N/A	N/A
Doyle Group	Lobbyist†	10	N/A	N/A
Excel Avionics†	Sale and Maintenance of Avionics and Instrumentation	18	N/A	N/A
Executive Jets†	Charter	10	No	Yes
Hartford T-Hangars	Based Aircraft Storage	8	N/A	N/A

Table 1-7 – Airport Services / Tenant Summary				
Company	**Service Provided**	**Location^**	**Fuel**	**Itinerant Parking**
Midwest ATC (ATCT)	Air Traffic Control	4	N/A	N/A
Premier Flight Center†	Flight Instruction	13	No	No
Star Base CT	Student Instruction in Science	24	N/A	N/A
Sutton James Aviation Insurance†	Insurance Broker	10	N/A	N/A
Total Aircraft Repair†	Wholesale Aircraft Parts	18	N/A	N/A
VIP Avionics†	Sale and Maintenance of Avionics and Instrumentation	13	N/A	N/A
Wings Sports Bar & Grill†	Restaurant	17	N/A	N/A
*Formerly Million Air and Charter Oak ^ See Figure 1-3 † Subtenant of Atlantic Aviation				

- Atlantic Aviation is the FBO at HFD. They provide a wide range of services for pilots and passengers including fuel, aircraft and vehicle parking, aircraft storage in hangars and tiedowns, passenger and pilot lounges, pilot supplies, rental cars, and catering. Atlantic Aviation subleases much of their leased property to subtenants as noted in Table 1-7.

- Premier Flight Center provides full-time and part-time flight training to obtain sports, private, and commercial licenses, instrument rating, flight instructor license, and airline transport pilot. Their fleet includes six Cessna Skyhawks, model C172, a Piper Cherokee 140, a Cessna Commuter 150, as well as a Cirrus SR20GTS and a Flight Design CTLS Light Sport. They also provide simulator training.

- The Connecticut Flight Academy (CFA) provides full-time and part-time flight training to obtain sports, private, and commercial licenses, instrument rating, flight instructor license, and airline transport pilot. Their fleet includes a Tomahawk, Cherokee, Warrior II, Arrow, and a simulator.

- Connecticut Aero Tech provides a 20 month aircraft maintenance program that enables the student to develop operative skills that meet the requirements of the FAA for airframe and powerplant (A&P) licenses.

- VIP Avionics sells, installs and maintains avionics, auto-pilot systems, and aircraft instrumentation.

- Excel Avionics sells, installs and maintains avionics, auto-pilot systems, and aircraft instrumentation.

- Sutton James Aviation Insurance is broker for aircraft, commercial, agricultural, helicopter, and product liability insurance.

- Starbase Connecticut conducts five day science programs for younger students to explore chemistry, engineering, and technology. Starbase-CT intent is to respond to the needs of today's youth through hands-on activities and has locations across the country. It is a program funded by the Department of Defense and operated here by the State Military Department.

- Wings Sports Bar & Grill is a sports restaurant with activities such as pool, arcade, dart boards, and TVs. It is located in the lobby area of Atlantic Aviation and serves, pilots, passengers as well as a local customer base.

- Midwest ATC is a full service air traffic control operation dedicated to providing air traffic control, weather reporting, and related services. They operate through the FAA's Contract Tower Program, which certifies the controllers meet FAA standards.

- Doyle Group is a private firm that does public relations and lobbying.

- CT T-Hangars is a condominium type association for the T-Hangars. The association is in charge of the construction, maintenance, and management of two of the five T-hangars.

- Hartford T-Hangars is a condominium type association for the T-Hangars. The association is in charge of the construction, maintenance, and management of three of the five T-hangars.

- The State Police utilize the building for several departments including aviation, the Department of Health's Disaster Medical Assist Team (DMAT), the bomb squad, and Connecticut Task Force 1 Urban Search and Rescue organization (USAR). The police have used their aircraft to patrol, perform search and rescue operations, prisoner transport, and speed enforcement. In the aftermath of the 2011 Hurricane Irene, State helicopters were utilized to conduct aerial surveys of storm damage.

1.6 Airspace, Air Traffic Control, and Noise Abatement

Airspace

Aircraft approaching and departing the Airport are subject to a system of controls designed to serve the safe separation of aircraft from one another. The FAA has the statutory duty to establish, operate, and maintain air traffic control facilities and procedures. The proximity to BDL results in some restrictions on aircraft operating in and out of the HFD. All aircraft using HFD must operate in controlled airspace and adhere to specific flight rules. The airspace surrounding Hartford is illustrated in Figure 1-4.

There are two basic types of aircraft flight rules in the air traffic control system: those operating under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). VFR operations depend primarily on visual conditions. IFR operations depend primarily on radar detection for separation by Air Traffic Control (ATC). IFR operations are controlled from takeoff to touchdown, while VFR operations are actively controlled only within the vicinity of busy airports with complex airspace.

The United States airspace is structured into Controlled, Uncontrolled, and Special Use airspace, as defined below.

- **Controlled Airspace** – Airspace that is supported by ground to air communications, navigational aids, and air traffic services. Controlled airspace is further divided into five different Classes (A, B, C, D, and E). The classification of any airspace is determined by its location.
- **Uncontrolled Airspace** – All airspace that has not been designated as Controlled or Special Use, and within which ATC has neither the authority nor the responsibility for control. All uncontrolled airspace is considered Class G.
- **Special Use** – Designated airspace where unique or hazardous situations (e.g., military activities) require special attention and restrictions.

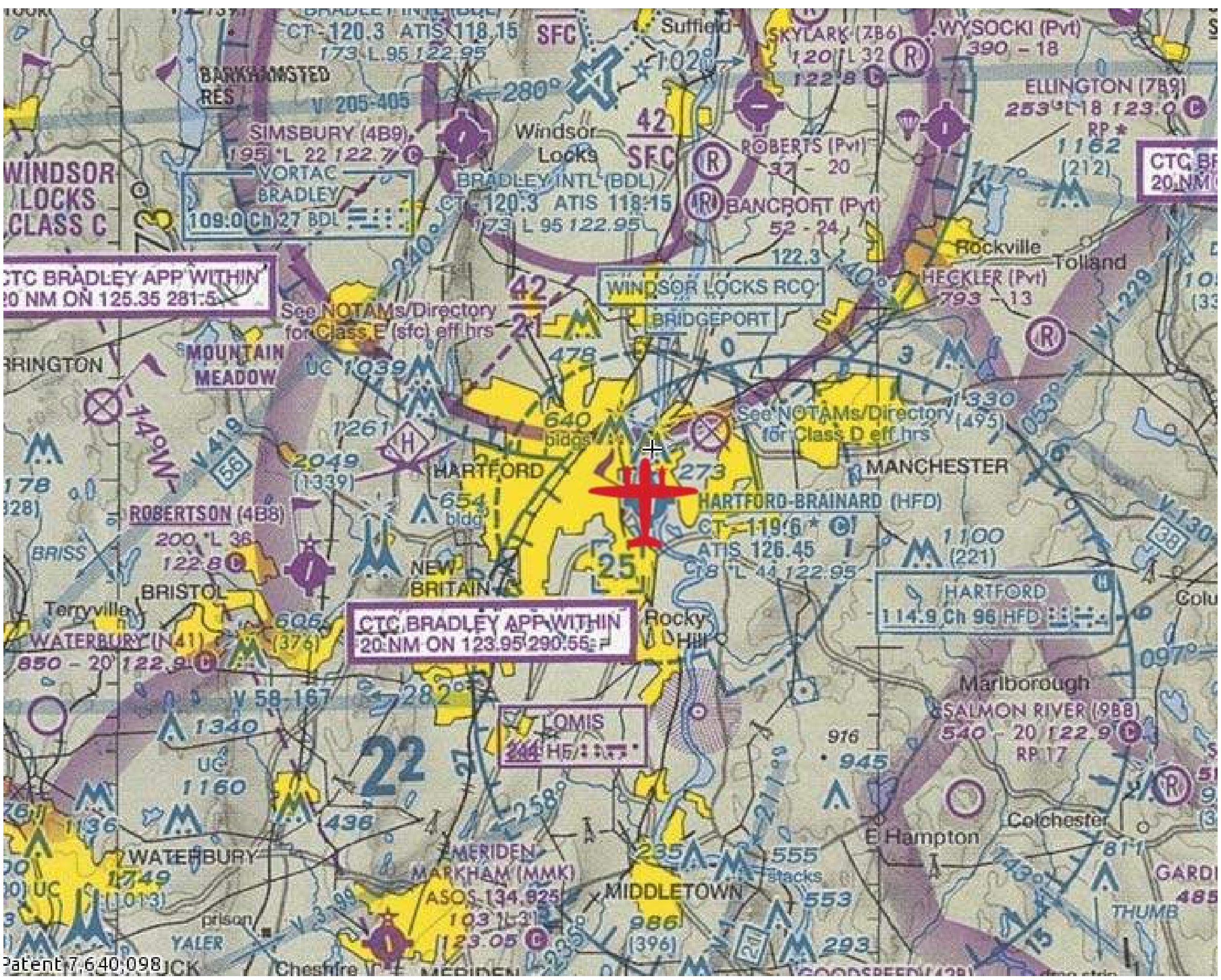

Figure 1-4 Hartford-Brainard Airport Surrounding Airspace

These airspace classifications impose several requirements upon the operations of aircraft, including visibility minimums, cloud clearances, contact with air traffic control, and special aircraft equipment. The classification system is summarized as follows:

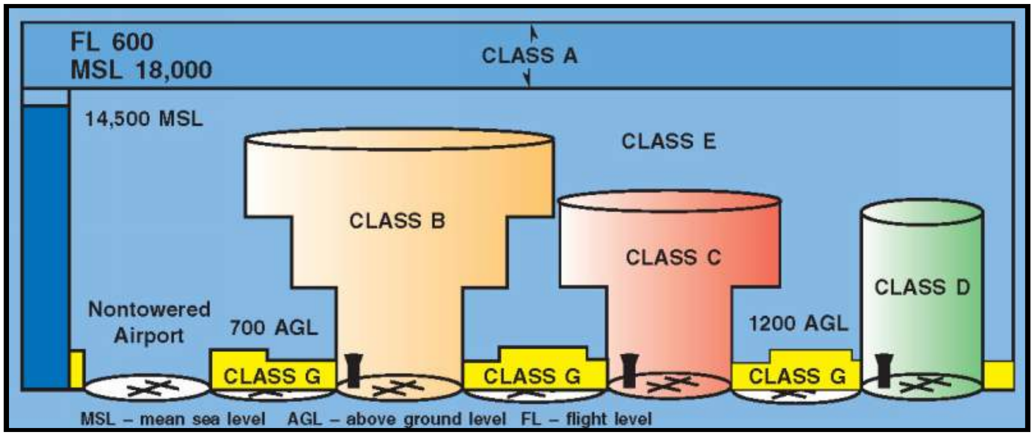

Figure 1-5 National Airspace Configuration

- Class A: All airspace above 18,000 feet mean sea level (MSL). Class A airspace contains all high altitude airways (jet-routes).

- Class B and C: The airspace surrounding major commercial airports. To enter this airspace, communication and/or clearances must be received from ATC. The closest Class B airspace (covers surface to 7,000 feet MSL) surrounds the Boston-Logan International Airport (BOS) to the northeast. BDL contains Class C airspace (covers surface to 4,200 feet MSL) to the north. Class B and C airspace, aircraft are required to communicate with ATC.

- Class D: The terminal area airspace surrounding towered and military airports with a radius of five nautical miles. Within Class D airspace, aircraft are required to communicate with ATC. HFD is within Class D airspace when the ATCT is operational.

- Class E: General controlled airspace that includes most of the remaining airspace (up to 18,000 feet MSL). This airspace begins at 700 feet above ground level, which means that all flights to and from the airport, as well as local operations remaining within the airport traffic pattern, will enter the Class E Airspace. The airspace above HFD becomes Class E airspace when the control tower is closed (Saturday to Sunday from 11PM to 6AM).

  Aircraft operating in Class E airspace must follow the Federal Aviation Regulations (FAR) for controlled airspace, including a 3-mile visibility requirement for basic VFR activity, separation requirements from clouds, and all applicable operating rules.

- Class G: Uncontrolled airspace; the airspace below Class E. Although airport itself may be located within Class G airspace, it is typically located under Class E airspace. Aircraft climbing into or descending from the overlying Class E controlled airspace (700 feet above ground level), thus aircraft at a Class G airport may operate in a controlled environment.

HFD becomes Class G airspace when the control tower is closed (Saturday to Sunday from 11PM to 6AM).

- Special Use Airspace: An area of special concern or restriction due to unusual hazards (e.g., military activity). Special Use airspace includes designated Prohibited Areas, Restricted Areas, Warning Areas, Military Operation Areas, and Alert Areas. The closest special use airspace is Restricted Area (R-5206), which surrounds the West Point Military Academy, located approximately 45 nautical miles south of HFD.

Overall, the airspace surrounding HFD is relatively uncongested and will not hinder or restrict any potential improvements to the airport. Noise abatement procedures at HFD are addressed later in the study report.

Procedures

VFR Flight procedures at HFD follow standard traffic patterns established by the FAA. The patterns include flying straight-in to or straight-out from either runway end, or flying a standard rectangular traffic pattern with all left-hand turns. The full left-hand traffic pattern for aircraft staying in the pattern includes the departure leg, followed by left turns to the crosswind, downwind, base legs, and a turn to final for landing. However, at HFD when Runway 2 is active, right traffic is used for better visibility from the control tower (and a supplemental benefit for noise abatement). Pilots are expected to maintain an altitude of 1,018 feet MSL or higher (approximately 1,000 above airport elevation) on the downwind leg of the traffic pattern.

Ideally, all takeoffs and landings are conducted into the wind in order to reduce aircraft ground speed and improve safety. Thus, the runway end in use is primarily determined by the current wind. HFD mostly experiences winds from the north and northwest.

During IFR conditions (visibility under 1-mile and cloud ceiling 1,000 feet above ground level), aircraft must file instrument flight plans and obtain “clearances” from ATC. IFR departure procedures all start with straight-out takeoffs, followed by the specific IFR flight clearance (heading and climbing instructions).

Instrument Approach Procedures (IAP) are written and published by the FAA for specific runway ends. Two non-precision procedures have been published to the Runway 2 end, including Global Positioning Satellite (GPS) and Localizer Type Directional Aid (LDA) approaches. The River Visual approach requires radar and assists pilots landing on Runway 2 by providing an approach path over the Connecticut River that avoids the noise sensitive area of Old Wethersfield to the south. The VOR or GPS-A approach brings pilots to the east side of the airfield to then begin a visual approach into the airfield. A precision approach is not available at HFD. Additionally there is the Standard Terminal Arrival (STAR) SWEDE ONE and the COASTAL THREE Departure Procedure in effect at HFD.

Table 1-8 shows the existing instrument approaches for each runway end and the lowest visibility minimums in statute miles (sm).

Table 1-8 – Instrument Approach Procedures

	Existing	**Lowest Visibility Minimums**
Runway 2	RNAV GPS, LDA, VOR, Visual	1 (RNAV/LDA)
Runway 20	None	Visual
Runway 11	None	Visual
Runway 29	None	Visual

Air Traffic Control

The ATCT is operational from 6:00 am to Midnight seven days a week. HFD is located within the Boston Air Route Traffic Control Center (ARTCC), which organizes the traffic flow over a certain area at higher altitudes for aircraft approaching and departing airports. The Bridgeport Flight Service Station (FSS) provides pilots information before, during, and after flights, but does not provide air traffic control. The information may include weather and notices to airmen (NOTAMS) and allow for the filing, opening, and closing of flight plans.

When the HFD tower is open, the ATCT staff control the lighting system for the runways and taxiways. When the tower is closed, the lights can be activated by pilots over the common traffic advisory frequency (CTAF). There is no flight traffic radar at HFD, but the HFD ATCT has a display of the radar from BDL.

Noise Abatement Procedures

Due to a large number of noise complaints, an FAR Part 150 Noise Control and Land Use Compatibility Plan was conducted in the 1980s. That study included Noise Exposure Map (NEM) and a Noise Compatibility Program (NCP), which provided a series of recommendations to help mitigate the noise exposure to the surrounding community due to airport activity. While there are now a relatively low number of complaints compared to the number of annual operations, there were more complaints than normal in 2011. Many of these complaints focused on low flying aircraft and aircraft not following the voluntary noise abatement procedures established in the 1989 study. The HFD Noise Committee wrote a letter to a Congressional Representative in 2012 (See Appendix D) regarding their recommendations for how noise might be mitigated.

Below are the recommendations provided in the 1989 study, which were then approved by the FAA in a Record of Approval dated May 14 1990 (See Appendix D), and how they have been implemented. The majority of the recommendations were implemented and are still in operation to this day. Those that are not in use were due to budget or would items that would now be considered unnecessary or obsolete. It is anticipated that a portion of the 1989 recommendations not be included to continue as part of the AMPU recommendations.

Airport Operations Measures

- Flight Tracks: The following measures were approved by the FAA for Runway 2-20:
  - Departures:
    - Runway 2 – IFR departures should climb to 800 feet and then turn left to a heading of 360 degrees. VFR departures should turn left 20 degrees after crossing the Connecticut River until two nautical miles (NM) north of the airport.
    - Runway 20 – IFR departures should turn left to a heading of 175 degrees immediately after takeoff until at least two NM south of the airport.
  - Arrivals:
    - Runway 2 – IFR arrivals should be assigned either the LDA or VOR approach and continue inbound on the published headings until reaching altitude minimums, even in VFR weather. If the aircraft cancels its IFR clearance or requests a visual approach it should be directed to fly the noise abatement procedure for VFR Arrivals. VFR arrivals to Runway 2 should follow the visual flight procedure over the Connecticut River.
    - Runway 20: No new arrival recommendations made.

- Nighttime Restrictions: The restriction of nighttime activity was not approved by the FAA as no significant benefit of this action could be determined in the Part 150 Study. No nighttime flight restriction is in place today.

- Preferential Runway Use: Aircraft are directed to land on Runway 20 and depart Runway 2 when available. While the ATCT attempts to direct pilots to the preferred runway when the weather and operating conditions permit, it is not always the case. The airport Automated Terminal Information Services (ATIS) Advisory regularly states "Landing and Departing Runway 2" which is inconsistent with the recommendation.

- Departure Procedures: Pilots were encouraged to fly manufacturers' or National Business Aviation Association (NBAA) published noise abatement departure procedures. It is posted that copies of these procedures are available from the airport manager. These procedures are widely publicized as part of the NBAA organization and are typically known by business / corporate aviation pilots. These are available at: http://www.nbaa.org/ops/environment/quiet-flying/

- Helicopter Flight Corridors: Created flight corridors to reduce overflight of residential properties. Helicopters continue to use these flight corridors when weather and operating conditions permit. Complaint regarding helicopter traffic in rare.

- Nighttime Maintenance Run-up Restriction: A voluntary restriction on engine run-ups for maintenance purposes between 10PM and 7AM. This topic has not been cited as an issue at HFD, but was adopted as a preventative measure.

Administrative Measures

- Part-time Noise Abatement Officer: Assign a staff member to handle complaints, collect and compile noise measurement data, and act as a liaison to the community. The airport manager currently handles this role.

- Noise Complaint and Response Procedures: Continue with current protocol, but assign to a different staff member than the airport manager. Although the airport manager leads this effort, he is assisted by other staff at HFD. The staff receives and record noise complaints and helps determine the aircraft associate with the complaint when possible. The ATCT will review the recordings when the approximate time of the flight is known to help determine the aircraft. The airport manager attempts to follow up with each noise complaint, including actions to prevent future occurrences.

- Noise Monitoring System: Purchase portable monitors. The CTDOT has not implemented this recommendation. Sample ground monitoring was conducted as part of this AMPU.

- Automated Aircraft Recording System: Recording device to monitor tower frequencies when the tower is closed at night. This system was purchased and utilized.

- Public Information Program (Review and Implementation): Establish a long-term noise abatement committee. This committee is in place and meets quarterly. The committed is represented on the AMPU Advisory Committee. The brochure and poster provided to airport users are shown in Appendix D.

- Program Publicity – Letters to Airmen: Publicize efforts through Letters to Airmen. Four Letters to Airmen include noise abatement procedures for different aircraft types, preferential runway use, and engine run-up restrictions (See Appendix D).

- Program Publicity – Airside Signs: Installed noise abatement procedures signs at the ends of the runway to make pilots aware of the procedures. The airport is working to replace the textual signs with graphical signs.

- Program Publicity – Automated Terminal Information Services (ATIS) Advisories: Use ATIS to briefly notify pilots of noise abatement procedures. The ATIS did previously state “Voluntary noise abatement procedures are in effect” but no longer does. While the FAA does not typically encourage this type of message to be broadcast over the ATIS, as it is for operational messages, this statement was allowed at HFD.

- Program Publicity – Tower Advisories: Bradley Departure Control and HFD Tower will issue and advise pilots on the noise abatement measures. It is further included in the recommendations to advise pilots when they are not complying with noise abatement procedures and to recommend pilots follow all noise abatement procedures or flight corridors.

It should be noted that due to federal policy changes, ATC is unable to provide as frequent advisories as originally approved by the FAA in 1990 as part of the study. The HFD ATCT is advising pilots of the noise abatement procedures as dictated in federal regulatuions.

- Program Publicity – Informational Brochures: Create and distribute a brochure of the noise abatement procedures. The brochure is available to pilots at the FBO terminal. The CTDOT has also mailed copies of the brochure to flight schools that are known to conduct regular training at HFD.

- Quantitative Evaluation of Cumulative Changes in Noise Exposure: Compute and report the potential changes in noise exposure utilizing the microcomputer program developed for this use. This recommendation was not implemented.

- Assessment of NEM and NCP with Changes in the Airport Layout or Operation: Report any modifications to the airport layout or operations to the noise committee to determine if the NEM or NCP needs to be revised. The noise committee has a representative on the AMPU Advisory Committee to provide comments on the recommended development plan.

- Assessment of NEM and NCP at Minimum Intervals of Time: The noise contours will be revised every five years and reviewed by the noise committee and FAA. The noise contours have been updated as part of this AMPU.

In addition to the measures recommended as part of the 1989 study, these additional measures were implemented:

- To assist with publicizing the noise abatement procedures, the Experiment Aircraft Association (EAA) publishes a notice in their quarterly newsletter.

- FAA's Airport/Facility Director and Airport Master Record (5010 Form) includes the following "Additional Remark" on the "ARPT LCTD IN NOISE SENSITIVE AREA & POPULATED AREAS TO SOUTH & WEST SHOULD BE AVOIDED; APCH/DEP OVER RIVER WHEN POSSIBLE. SEE BRAINARD TWR LTRS TO AIRMEN." This remark is also listed on a commercial airport website: http://airnav.com/airport/KHFD

- The CTDOT subscribes to Whispertrack, which is a website dedicated to flying the quiet route, on which HFD is listed as "High" for noise sensitivity. The following message appears under "Overview:" Welcome to Hartford-Brainard Airport. Safety is first, being a good neighbor is second. Please request and follow noise abatement procedures with the Tower whenever possible. Thank you, Airport Manager." The site discusses the curfew, diagrams, arrivals, departures, preferential runways, pattern altitudes, flight training, airport contact info, NBAA procedures, and AOPA noise awareness steps for specific types of aircraft and each runway. The site is located at: https://whispertrack.com/airports/KHFD

- The CTDOT has supplied airport tenants and users and flight schools at other airports that regularly send students to HFD with the informational brochure and flyers in hopes they will become better aware of the noise abatement procedures.

1.7 Existing Airport Activity Data

This section provides a summary of activity as of October 2011 at HFD, which will be used as the base year for this study. This data is incorporated into the forecasts of aviation demand in Chapter 2.

Although HFD is not served by scheduled commercial flights, the airfield is very active with several different types of activity, both public and private users. The majority of the activity is generated by light private, recreational, and training aircraft, with substantial corporate or business users, with corporate jets or twin-engine aircraft making up the balance of activity. The CT State Police base four aircraft at HFD. As discussed in Section 1.5, there are several businesses at HFD that fly their aircraft for commercial uses such as charter or training.

An aircraft operation is defined as either a landing or a takeoff. Thus, each flight includes at least two operations – one takeoff and one landing. There were approximately 79,600 annual operations in 2010 at HFD, with approximately 50 percent of all operations are local. Local flights are conducted mostly by based aircraft, and include primarily single and multi-engine piston aircraft. Itinerant operations (those arriving from outside the local area) are conducted by a mix of based and transient aircraft.

The number of based aircraft at an airport is used to determine the need for hangars, apron area, and other related facilities. Based aircraft include those owned by individuals, businesses, or organizations that are stored at HFD on a regular basis.

Table 1-9 – Existing Based Aircraft (2011)

	Single Engine	Multi-Engine	Turboprop	Jet	Helicopter	Total
Based Aircraft	136	11	3	2	2	154

Table 1-10 – Representative Aircraft at HFD			
Type of Aircraft	**Representative Aircraft**	**Type of Aircraft**	**Representative Aircraft**
Single Engine	**Piper Cherokee** 	Small Jet	**Cessna Citation Bravo** 
Multi-Engine	**Beech Baron** 	Medium Jet	**Gulfstream G150** 
Turbo-prop	**Cessna Conquest** 	Helicopter	**Sikorsky S76** 

1.8 Greenhouse Gases Emissions

In review of the sustainability of HFD, a baseline assessment of greenhouse gas emissions associated with airport operations was generated. Emissions associated with the airport occur as a result of the following activities:

- Aircraft operations
- Ground support equipment operations
- Ground access vehicles (e.g. people driving to the airport)
- Stationary sources (e.g. combustion, refrigerants, fire suppressants)
- Electricity use

The assessment reviewed six principal greenhouse gases (GHG): carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFC), and perfluorocarbons (PFC) and based on the guidance in the Airport Cooperative Research Program Report 11 – Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories (ACRP, 2009). Based on the forecasts discussed in Chapter 2 of this MPU, it is anticipated that the greenhouse gas emissions for HFD will increase 0.6 percent from 2011 to 2020. The standalone report is available by request of the CTDOT.

1.9 Energy Audit

In review of the sustainability of HFD, an audit of the energy usage associated with airport buildings was generated. The energy savings were calculated using data collected in the field, historical utility usage data, staff interviews and best engineering judgment to show an order of magnitude of potential energy savings. A more in depth study should be performed prior to implementing Energy Conservation Measures (ECM) using actual logged temperatures, operating hours and fuel consumed. The may be significant utility rebates and incentives available from the utility supplier or other agencies that could reduce the first cost and therefore the payback term. The ECM's are located in Chapter 5 – Development Recommendations and discussed in detail in the standalone report available by request of the CTDOT.

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2.0 FORECASTS OF AVIATION DEMAND

Aviation forecasts represent a key component in the master planning process. Based aircraft forecasts largely establish the need for aircraft storage space (e.g., hangars) and other landside developments at an airport, while operations forecasts help to determine the need for airside and landside improvements.

Forecasts were developed for based aircraft and operations at Hartford-Brainard Airport (HFD). The forecasts are presented in five-year intervals, with a base year of 2010 through to year 2030. This chapter describes the forecast methodologies and results. Note that the forecasts are based on an unconstrained growth scenario, which assumes that the airport will provide adequate facilities to accommodate growth, and that potential obstacles to growth (e.g., airport property, wetlands, land use compatibility, lack of public and private funding) can be overcome. This information is provided in the following sections:

- Airport Role
- Existing Design Aircraft & Operations
- Forecasting Methods
- Recommended Forecasts
- Derivative Forecasts
- Scenarios Forecasts
- Forecast Summary
- Future Design Aircraft

2.1 Airport Role

HFD serves corporate, public safety, and charter aircraft operating for business, training, law enforcement, medical evacuation, and recreational/personal purposes. HFD is classified as a "Reliever" facility and is included in the National Plan of Integrated Airport Systems (NPIAS). HFD relieves the commercial activity at Bradley International Airport (BDL) of the small general aviation (GA) traffic better served at HFD. According to the 2010 Strategic Plan, BDL is focusing on improving commercial service to the Hartford community and increasing cargo opportunities. As GA does not fit within BDL's long-term strategic goals, HFD needs to be prepared to accommodate these business and GA aircraft with the amenities they need and desire.

2.2 Existing Design Aircraft & Operations

Many airport facility requirements are predicated on the level of activity and the largest or most demanding aircraft forecast to regularly use the airport (at least 500 itinerant operations), which is referred to as the "design aircraft.", see the FAA Airport Improvement Handbook, Order 5100.38C and FAA Advisory Circular 150/5325-4B, Runway Length Requirements. Thus, the future design aircraft is defined at the end of this chapter.

Based on operation data recorded at HFD, the existing design aircraft for the Airport is a "light jet" such as the Cessna CJ4. Light jet is an informal industry term that refers to corporate jets up to 20,000 lbs. takeoff weight, 6 to 8 passengers, and designed for use at smaller airports. The Cessna Citation fleet is by far the largest manufacturer of light jets (e.g., CJ series, Bravo/Encore, etc.). Other aircraft examples in this category include the Hawker Beechcraft 400 and a recent newcomer the Embraer Phenom 300. As discussed in Chapter 3, these aircraft are classified by FAA into Airport Reference Code (ARC) B-II.

Through discussions with airport management and tenants, site visits, and review of the FAA's Airport Master Record (i.e., SF 5010 Form), it is concluded that are a total of 154 based aircraft and 79,618 annual operations at HFD in 2011. The fleet mix consists of 137 single-engine, 11 multi-engine, 3 turboprops, 3 jets, and 3 helicopters. This information was used in the forecasts as the 2010 based year data.

2.3 Forecasting Methods

At HFD numerous approaches were investigated to forecast airport activity levels. The most common approaches generally incorporate regional population or economic conditions, industry trends, and past airport activity levels. The following approaches were applied for HFD:

- **Population (Regression) Forecasting Method** – Uses the population forecasts of Hartford County to develop the growth rates of HFD's based aircraft and operations.
- **CSASP Forecasting Method** – Uses the Connecticut Statewide Airport System Plan (CSASP) growth rate factors for based aircraft and operations at HFD.
- **FAA Aerospace Forecasting Method** – Uses the Federal Aviation Administration's (FAA) nationwide growth rates for Active Fleet and Hours Flown, which is based on both economic and industry trends.
- **Terminal Area Forecast Method** – Incorporates the current FAA Terminal Area Forecast (TAF) for HFD, which is based on economic and historical trends at the airports.

2.3.1 Population Forecasting Method

Population is a key indicator of based aircraft and operations levels at GA airports. In general, as the population of an airport's service area increases or decreases, based aircraft and operations levels typically increase or decrease correspondingly. Table 2-1 shows the projected population forecast for Hartford County, and the State of Connecticut based on the Connecticut State Data Center.

The population forecasts, Table 2-1, were adjusted since the US Census Bureau's midyear estimates from 2001-2009 were tracking lower than the population recorded by the US Census in 2010. When 2009 and 2010 are examined, the increase based on the census figures shows an appreciable difference (increase); hence the estimates were running lower during the decade until the 2010 Census was enumerated. This in turn skews the population projections slightly. The population forecasts were "adjusted" holding the growth rates to those contained in the population projections, and then projected from the actual 2010 Census enumeration.

Table 2-1 – Population Forecasts		
Area	**Hartford County**	**Connecticut**
2010	894,014	3,576,343
2015	896,341	3,666,650
2020	899,482	3,759,238
2025	904,802	3,854,163
2030	911,517	3,951,486
Change	2%	10%
AAGR	Variable by Year	0.50%

The population regression used the historic population and projections for Hartford County as shown in Table 2-2. Socioeconomic regression is based upon an assumed causal relationship between population, income, or employment and aviation activity in a particular area. To obtain this projection of demand, socioeconomic data are related via regression analysis to aviation activity. The resulting set of regression equations, coupled with independent projections of future socioeconomic data, produces a projection of aviation activity. Table 2-3 shows the results of this methodology for the based aircraft and annual operations at HFD.

Table 2-2 - Historical Population for Regression	
Year	**Population**
2001	861,183
2002	864,497
2003	868,343
2004	868,109
2005	870,039
2006	871,743
2007	874,107
2008	876,319
2009	879,835
2010	894,014
Source: CT State Data Center	

Table 2-3 - Population Forecasting Method		
Year	**Based Aircraft**	**Annual Operations**
2010	154	79,618
2015	156	80,652
2020	157	81,169
2025	161	83,237
2030	167	86,339
Change	**8%**	**8%**

2.3.2 CSASP Forecasting Method

The 2006 CSASP was developed by CTDOT in an effort "*to provide a comprehensive review of the current state aviation system, to support the continued operation and maintenance of Connecticut's airports, and to recommend modifications to the airport system to meet existing and projected aviation needs.*"

The Average Annual Growth Rates (AAGR) used in the CSASP are based on a statewide forecast of registered aircraft and population. For the CSASP a based year of 2004 was used, with forecasts of based aircraft and operations to the year 2025. The growth rate was then extrapolated to 2030 for this study. The CSASP's AAGR of 0.85 percent for based aircraft and one percent for operations were applied to the updated activity data. The CSASP forecasts do not reflect the economic downturn in the economy that has occurred since 2008, and thus may be considered aggressive or optimistic. Table 2-4 displays the original forecast, which forecast 191 based aircraft in 2010. As there were only 154 based aircraft in 2010, the forecast data has been updated and shown in Table 2-5.

Table 2-4 - CSASP Forecasting Method		
Year	**Based Aircraft**	**Annual Operations**
2010	191	110,000
2015	199	119,000
2020	203	120,100
2025	208	137,800
2030	217	144,750
AAGR	**0.85%**	**1%**
Change	**14%**	**32%**

Table 2-5 - Updated CSASP Forecasting Method		
Year	**Based Aircraft**	**Annual Operations**
2010	154	79,618
2015	161	83,679
2020	168	87,948
2025	175	92,434
2030	182	97,149
AAGR	**0.85%**	**1%**
Change	**18%**	**22%**

As shown in Table 2-5, total based aircraft are forecast to increase from 154 in 2010 to 182 by 2030, with total operations increasing to approximately 97,149 by 2030.

2.3.3 FAA Aerospace Forecasting Method

The FAA publishes nationwide forecasts for GA activity that provides an AAGR by aircraft type by year. Their most recent publication is *Aerospace Forecasts Fiscal Years 2011-2031*. Thus, depending on the period of time between 2011 and 2031, a different AAGR was utilized. As discussed below, the variable AAGR were applied to existing based aircraft and operations levels at HFD, and applied through 2030 to determine the forecasts summarized in Table 2-6.

Table 2-6 - FAA Aerospace Forecasting Method		
Year	**Based Aircraft**	**Annual Operations**
2010	154	79,618
2015	152	78,138
2020	152	76,769
2025	154	76,657
2030	157	75,869
Change	**2%**	**-5%**

Based Aircraft – The based aircraft forecasts were developed using the FAA General Aviation Active Fleet Forecasts. The FAA forecasts the total GA aircraft fleet to increase at an AAGR of 0.9 percent nationwide (from 2010 to 2031), with the greatest growth forecast for rotorcraft, turbine, and light sport aircraft, and the lowest growth forecast for single- and multi-engine piston aircraft. Piston aircraft, the most common type based at HFD, were forecast as negative growth of -0.6 percent from 2010 to 2020 and 0.2 percent growth from 2010 to 2031. Under this method, the HFD based aircraft forecasts were developed using an AAGR of 0 percent for single- and multi-engine piston aircraft, but with positive growth rates for the other aircraft types. As such, the resulting based aircraft forecast increases slowly using this approach.

Operations – The operations forecasts were developed using the *FAA General Aviation Hours Flown Forecasts*. The FAA forecasts total GA hours flown to increase at an AAGR of 2.2

percent nationwide (from 2010 to 2031), with the greatest growth forecast for jet, rotorcraft, and light sport aircraft, and a negative growth forecast for single engine and multi-engine piston aircraft. While the overall growth was forecast at 2.2 percent, the large number of single and multi-engine aircraft at HFD produced an overall negative growth (i.e., a decline) in annual operations.

2.3.4 Terminal Area Forecasting

As shown in Table 2-7, the FAA publishes nationwide Terminal Area Forecasts (TAF) for individual airport historical and forecasted operational activity and based aircraft. This method relies upon the historical national share of activity as well as additional trends that affect the specific airport. At the time of this writing, the FAA is updating the AAGR for GA airports for both operations and based aircraft for the most recent forecasts. At this time, the TAF for HFD has not been updated to fully reflect the current conditions for both operations and based aircraft, but instead is based on conditions prior to the economic recession. While Table 2-7 displays the TAF forecasts utilizing the published growth rates, it should not be used as the main source of forecast data for this study.

Table 2-7 - FAA Terminal Area Forecasts (TAF) for HFD

	Based Aircraft	**Annual Operations**
2010	154	79,618
2015	170	76,986
2020	188	74,442
2025	208	71,981
2030	231	69,602
Change	**50%**	**-13%**
AAGR	**2.04%**	**-0.67%**

2.3.5 Summary & Evaluation of Forecasting Methods

As shown in Table 2-8, of the four forecasting methods, the CSASP forecasting method shows the greatest growth in based aircraft and operations. The FAA Aerospace Forecast method is the most conservative, showing little overall change.

Table 2-8 - Summary of Forecasting Methods								
	1. Population		2. CSASP		3. FAA Aerospace		4. TAF	
Year	**Based**	**Operations**	**Based**	**Operations**	**Based**	**Operations**	**Based**	**Operations**
2010	154	79,618	154	79,618	154	79,618	154	79,618
2015	156	80,652	161	83,679	152	78,138	170	76,986
2020	157	81,169	168	87,948	152	76,769	188	74,442
2025	161	83,237	175	92,434	154	76,657	208	71,981
2030	167	86,339	182	97,149	157	75,869	231	69,602
Change	**8%**	**8%**	**18%**	**22%**	**2%**	**-5%**	**50%**	**-13%**

2.4 Recommended Forecasts

Each of the four forecasting methods in Table 2-8 has a reasonable justification for its use, but also has limitations. The population method although rooted in a statistical analysis discounts the City of Hartford as a major economic center in the state. The CSASP projections did not account for the severe recession of 2008-2009 which significantly slowed aviation demand and development. The FAA Aerospace method as a macro-model nationally, reflects the economic conditions of the country and consequently tempered growth rates that produced lower forecasts for general aviation. As discussed above, while the TAF forecast reflects more positive expectation for economic recovery and allows some flexibility for planning airport improvements, it may not be basing its growth rates on the most current conditions for HFD.

A review of all four forecasting methods reflects an averaging of the national and local economic conditions and presents a situation that more reasonably reflect the future expectations for the economy and the aviation industry as a whole. Table 2-9 shows the recommended forecast for HFD. There is a growth of 14 aircraft with an increase of 6,000 annual operations by 2030.

Table 2-9 - Recommended Forecast		
Year	**Based Aircraft**	**Annual Operations**
2010	154	79,600
2015	157	80,700
2020	159	81,800
2025	163	83,700
2030	168	85,600
Change	**9%**	**8%**
Note: Operations rounded		

In addition, two scenarios are examined in Section 2.6 that could impact operational activity in the future, a runway extension and the closing of privately-owned airports within the service area of HFD.

Operations Per Based Aircraft (OPBA) is useful in determining the total number of annual operations at an airport. With this methodology, the projected number of based aircraft is multiplied by an appropriate ratio to yield the projected total annual general aviation aircraft operations. This measure accounts for operations performed by the based aircraft (local operations) and itinerant operations. It is typical for an OPBA to decrease as more aircraft operate at an airport due to increased activity. Table 2-10 displays the OPBA for the recommended forecast listed in Table 2-9.

Table 2-10 - Operations Per Based Aircraft Ratio	
2010	517
2015	514
2020	514
2025	513
2030	510

2.5 Derivative Forecasts

The derivative forecasts help to determine requirements for facilities and services at the airport. The derivative forecasts for HFD include:

- Fleet Mix
- Local and Itinerant Operations
- Peak Period Operations
    - Peak Month
    - Average Peak Day
    - Peak Hour
- General Aviation Enplaned Passengers

2.5.1 Fleet Mix

In the forecasting process, the based aircraft fleet mix is used to determine operational fleet forecasts. The fleet mix forecasting process typically involves examining historic records including the FAA 5010 forms, airport and FBO records and visual inspections. The based aircraft fleet can then be projected using regional and national trends of active fleet mix for comparison purposes.

For this study, the CSASP and FAA Aerospace forecasts were examined to determine the GA aircraft fleet trends over the 20-year planning period. Over time, assuming that airside and landside improvements are conducted, it is expected that higher performing aircraft will have an increased presence at HFD and become a larger percentage of the overall fleet. This is partially due to the development of the Very Light Jet (VLJ) and the increased use of turbine aircraft.

VLJs were designed to operate at airports with runways as short as 3,000 feet with a non-precision instrument approach and availability of Jet-A fuel. The clientele most likely to utilize a VLJ tend to be business oriented and expect a certain level of service at each airport they visit. HFD should ensure they provide the level of services VLJ owners are seeking should they decide to base their aircraft there.

Variations of VLJs arrived in the GA fleet after several years of development. Past orders for the Cessna Mustang, Phenom100, and the Eclipse Jet have demonstrated that a market does exist for the mission capabilities and cost efficiency that these aircraft have been designed to provide. As the current market downturn has affected all aspects of the economy including the VLJ industry (i.e., the Eclipse jet is no longer in production).

While not as strong as before, the existing backlog of VLJ category aircraft orders demonstrates that this class of aircraft is still viable. The FAA has stated in their Aerospace Forecast Fiscal Years 2010-2030: "The current forecast calls for 440 units to join the fleet over the next three years. With respect to other turbine aircraft the FAA forecasts suggest turboprop and jet aircraft as having the highest growth rates through 2030 compare to single and multi-engine piston aircraft. The average annual growth rate for turbine aircraft is 3.2 percent through 2030.

Table 2-11 shows the forecasts fleet mix for HFD.

Table 2-11 - Fleet Mix

Year	Single Engine	Multi-Engine	Jet/Turboprop	Helicopter	Total
2010	136	11	5	2	154
2015	138	11	5	3	157
2020	139	11	6	3	159
2025	141	12	7	3	163
2030	143	13	8	4	168

2.5.2 Local and Itinerant Operations

Local operations are performed by aircraft that operate within the traffic pattern or take-off from the airport and stay within 20 miles of the airport. Itinerant operations are performed by aircraft arriving from (or departing to) an airport outside of the local area. Discussions with airport management and tenants revealed that the operations at HFD are fairly similar for both itinerant and local. Additionally, a review of FAA data for the past years showed an almost equal number of annual operations for both itinerant and local. Thus, a 50 percent local to 50 percent itinerant operational ratio was utilized in this study and shown in Table 2-12.

Table 2-12 - Local vs. Itinerant Operations			
Year	**Total**	**Local**	**Itinerant**
2010	79,600	39,800	39,800
2015	80,700	40,350	40,350
2020	81,800	40,900	40,900
2025	83,700	41,850	41,850
2030	85,600	42,800	42,800
Note: 50% Local - 50% Itinerant			

2.4.3 Peak Period Operations

Peak period operations indicate the amount of activity that occurs during the busy times of the year and busy times of the day. Peak period operations can be used to determine the recommended size of administration/terminal buildings, itinerant apron spaces, and automobile parking lots. Peak month, day, and hour were forecast as follows:

- **Peak Month** - The peak month is the time of year where activity levels are higher than average month. Peak month operations were calculated by reviewing the last three complete years of ATCT counts for HFD, 2008-2010. Over that period the peak month average was 10.5 percent of annual operations. It is interesting to note that the peak month was different in each of the three years. See Table 2-13.

Table 2-13 - Peak Month Operations	
Year	**Operations**
2010	8,358
2015	8,474
2020	8,589
2025	8,789
2030	8,988

- **Average Peak Day –** The average peak day operations are defined as the average day during the peak month. It is calculated by dividing the peak month by 30**.** See Table 2-14.

Table 2-14 - Peak Day Operations	
Year	**Operations**
2010	279
2015	282
2020	286
2025	293
2030	300

- **Peak Hour Operations –** The hour during which most activity occurs on an average day. Total peak hour operations generally equate between 12 and 20 percent of the average day total operations. HFD's peak hour operations were calculated as 15 percent of the average day total operations. See Table 2-15.

Table 2-15 - Peak Hour Operations	
Year	**Operations**
2010	42
2015	42
2020	43
2025	44
2030	45

2.5.4 General Aviation Enplaned Passengers

Forecasts of annual general aviation enplaned passengers play an important role in determining such landside facilities as the general aviation terminal building sizes and the amount of automobile parking required. To forecast general aviation enplaned passengers, an aircraft occupancy rate is typically multiplied by the number of itinerant departures from the airport. The Aircraft Owners and Pilots Association (AOPA) estimate that an average of 2.5 passengers per general aviation departure is a reasonable estimate of GA aircraft occupancy. As shown in Table 2-15, this factor was applied to forecast itinerant departures. General aviation pilots and passengers include those traveling for all purposes including corporate/business, charter, air taxi, and other itinerant departures. Scheduled commercial airline departures do not apply for HFD.

Table 2-16 - Enplaned Passengers			
	Operations		
Year	**Total**	**Departures**	**PAX**
2010	79,600	39,800	99,500
2015	80,700	40,350	100,875
2020	81,800	40,900	102,250
2025	83,700	41,850	104,625
2030	85,600	42,800	107,000
PAX: Enplanements			

2.6 <u>Scenario Forecasts</u>

In preparing aviation forecasts, local conditions or events can influence the forecasts of aviation demand at an airport. To complete the evaluation of aviation demand, two different scenarios were evaluated to determine their potential impact on HFD. The first is a 583-foot extension of the runway to reach 5,000 feet and the second is the possible closure of privately-owned airports within the service area of HFD. In each instance, the scenario would play a significant role in changing the aircraft fleet and the number of based aircraft at HFD. This review allows the airport to assess the development implications to the airport were the scenario to occur.

2.6.1 Scenario 1: Extension of Runway to 5,000'

According to aircraft manufacturer operational data, many light jets are designed to operate from runways shorter than 4,400 feet, including each of the jets discussed above. Nevertheless, most light jet operators in the Capital Region use Bradley International Airport (BDL) in lieu of HFD for three basic reasons. First, insurance underwriters for corporate jets typically prefer a 5,000 foot or greater runway length for safety purposes, which avoids higher premiums or reduced coverage. There are many corporate jets that may therefore avoid HFD due to a runway length of only 4,417 feet.

Second, air charter operators (that fly under FAR Part 135) have additional runway length requirements for safety reasons. For example, every corporate jet aircraft has certain runway length requirement for takeoff, which varies based on the passenger and fuel load and meteorological conditions (i.e., takeoff run distance). When operating Part 135, the runway must also be long enough for the aircraft to accelerate to takeoff speed, decelerate, and stop prior to the end of the runway (i.e., accelerate to stop distance). This required length is always longer then the takeoff run length.

A third reason for favoring BDL over HFD is the available facilities. BDL has precision instrument approaches, a 24-hour control tower, as well as more choices for aircraft services and maintenance. BDL is a commercial service airport, 12 nautical miles (NM) northwest, in Windsor Locks (15 miles from downtown Hartford). If facilities were improved at HFD, some jet operators may prefer to fly in and out of HFD due to its proximity to downtown Hartford, less than 10 minutes away. HFD is also more convenient to other locations including East Hartford, West Hartford, Manchester, and locations to the south such a New Britain.

Additionally, a longer runway at HFD could relieve BDL of the GA traffic and based aircraft to focus on long-term strategic goals of expanding commercial airline and air cargo service. It is anticipated that a runway extension to 5,000 feet at HFD would increase the based jet forecast from 8 to 12 (50 percent increase), as shown in Table 2-17. There would also be a corresponding increase in aircraft operations to reflect the new based jets over the 20 year period. The scenario assumptions are based on the following:

- There are corporate jets at BDL number whose characteristics would be within the recommended ARC of B-II for HFD.

- With the longer runway and closer proximity to Hartford corporate jet owners would relocate to HFD for the convenience of reducing their driving time to downtown Hartford.

- HFD would maintain adequate navigational aids and other facilities and amenities to serve jet aircraft.

- The OPBA was held constant with the Recommended Forecast, as shown in Table 2-10, to include operations from the increased number of both based and itinerant jets. This is comparable to an estimated 1,000 additional annual itinerant operations that would operate out of HFD instead of BDL in 2030. Under this scenario the additional based aircraft and operations are all assumed to be jets.

Table 2-17 - Runway Extension Scenario

Year	**Recommended Forecast**		**Scenario Forecast**	
	Based Aircraft	**Annual Operations**	**Based Aircraft**	**Annual Operations**
2010	154	79,600	154	79,600
2015	157	80,700	157	80,700
2020	159	81,800	162	83,100
2025	163	83,700	167	85,700
2030	168	85,600	172	87,700
Change	**9%**	**8%**	**12%**	**10%**
Note: Operations rounded				

2.6.2 Scenario 2: Private Airport Closures

There are currently three airport facilities in the Capital Region that are open to the public, but are privately-owned. Each of these are located within 15 NM of HFD. Because of land development pressures, property taxes, high maintenance costs and other financial issues, privately-owned airports have been closing throughout the nation and Connecticut is not immune to such airport closures. The three private-owned airports include Simsbury, Ellington, and Skylark (in East Windsor), which combined store 147 based aircraft.

Under this scenario, it is assumed that all three of privately-owned airports will close prior to 2030. Thus, nearly 150 based aircraft would be displaced to neighboring airports. The address of based aircraft owners of the three privately-owned airports were input into a mapping software by zip code to calculate distances and approximate driving times to the closest airport. Approximately 50 percent of the owners were closer to HFD than any surrounding GA airport, such as Windham, CT (IJD) or Barnes, MA (BAF). As such, it is expected that up to 50 percent of the aircraft may relocate to HFD; the remaining based aircraft owners would most likely relocate to other airports as storage facilities were available or sell their aircraft. As shown in Table 2-18, an additional 75 aircraft are anticipated to be based at HFD by 2030 in this scenario. The OPBA was kept consistent with the Recommended Forecast, as shown in Table 2-10, to include operations from the increased number of based aircraft.

If these privately-owned airports close, there are significant challenges to find a location with the applicable facilities to base these aircraft. Additional pressure for tie down and hangar space will require the airport to examine its full development capability to accommodate these aircraft.

Table 2-18 - Private Airport Closures Allocation Scenario

Year	Recommended Forecast		Scenario Forecast	
	Based Aircraft	Annual Operations	Based Aircraft	Annual Operations
2010	154	79,600	154	79,600
2015	157	80,700	157	80,700
2020	159	81,800	184	94,600
2025	163	83,700	213	109,300
2030	168	85,600	243	123,900
Change	**9%**	**8%**	**58%**	**56%**

Note: Operations rounded

2.6.3 Growth Potential at HFD

If both of these scenarios were to take place, HFD would see a large increase in based aircraft and operations, as shown in Table 2-19. More importantly they are considerable ramifications to outline the airport's facility requirements should one or both of these scenarios occur in the future. For scenario two, if the airport closures include only one or two airports, this would still have major impacts for HFD. For long term planning purposes, this discussion will be helpful to evaluate the airport's overall needs in the events either scenario comes into play at HFD.

Table 2-19 - Potential Growth at HFD					
Year	**Recommended Forecast**		**Potential Growth Forecast**		**Change**
	Based Aircraft	**Annual Operations**	**Based Aircraft**	**Annual Operations**	
2010	154	79,600	154	79,600	**0%**
2015	157	80,700	157	80,700	**0%**
2020	159	81,800	187	95,900	**17%**
2025	163	83,700	217	111,300	**33%**
2030	168	85,600	247	126,000	**47%**
Change	**9%**	**8%**	**60%**	**58%**	
Note: Operations rounded					

2.7 Forecast Summary

Local economic strength and socioeconomic growth are key indicators for general aviation activity. The population, employment and personal income in Hartford County are anticipated to maintain slow to moderate grow throughout the 20 year period. These trends suggest modest but positive indicators for continued increase in demand for general aviation services at HFD.

Table 2-20 - Forecast Summary					
	2010	**2015**	**2020**	**2025**	**2030**
Based Aircraft					
Single Engine	136	138	139	141	143
Multi-Engine	11	11	12	13	14
Jet / Turboprop	5	5	5	6	7
Helicopter	2	3	3	3	4
Total	**154**	**157**	**159**	**163**	**168**
Operations					
Annual	79,600	80,700	81,800	83,700	85,600
Local	39,800	40,350	40,900	41,850	42,800
Itinerant	39,800	40,350	40,900	41,850	42,800
Peak Hour	37	37	38	39	39

2.8 Future Design Aircraft

The Design Aircraft is defined as the largest or most demanding aircraft forecast to regularly use an airport (at least 500 annual operations). The existing Design Aircraft was identified in Section 2.2 as a light jet, such as the Cessna CJ4. The future Design Aircraft for HFD is not expected to change, including the designated ARC B-II (see Chapter 3). However, additional activity by light jets, as well as some mid-size jets is anticipated, particularly if runway improvements or an extension can be accomplished at HFD.

3.0 FACILITY REQUIREMENTS

This chapter identifies the need for improved and new facilities at Hartford-Brainard Airport (HFD) to meet FAA standards and accommodate existing and potential users. The facility requirements are based on the aviation forecasts in Chapter 2 and FAA standards and planning guidelines.

This information is provided in the following sections:

- Airfield Capacity
- Airport Design Standards
- Wind Coverage and Runway Use
- Runway Analysis
- Taxiway Requirements
- Pavement Maintenance
- Instrument Approach Procedures
- Landside Facilities
- Control Tower Line of Sight
- Facility Requirements Summary

3.1 Airfield Capacity

This section reviews the airfield capacity of HFD, evaluates any capacity surpluses or deficiencies, and identifies airfield improvements that may be required during the 20-year planning period. Airfield capacity is defined as the maximum rate that aircraft can arrive at, or depart from, an airfield with an acceptable level of delay. It is a measure of the number of operations that can be accommodated at an airport during a given time period, which is determined based on the available airfield system (runways, taxiways, navaids, etc.) and airport activity characteristics.

The current procedure employed by the FAA to evaluate airfield capacity is described in Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

- **Annual Service Volume (ASV) –** A reasonable estimate of the airport's annual maximum capacity, accounting for annual changes in weather, runway use, aircraft fleet mix, and other conditions.

- **Hourly Airfield Capacity –** The maximum number of aircraft operations that can take place on the runway system in one hour. As airport activity occurs in certain peaks throughout the day, accommodating the peak hour activity is most critical.

For airports that have multiple runways, multiple operating procedures can be used (e.g., landing on one runway with departures on another). The AC provides tables of estimated capacity based on specific airport characteristics. For HFD, three capacity scenarios may be evaluated:

- Current Airfield Configuration
- Elimination of Runway 11-29
- Elimination of Runway 11-29 and Taxiway J

The following characteristics and assumptions were applied to the analysis:

- Operations of "Large" aircraft (i.e., aircraft over 12,500 pounds) are set at seven percent[1] throughout the forecast period
- No "Heavy" aircraft (i.e., aircraft over 300,000 pounds)
- No scheduled commercial service
- No airspace limitations
- Landings generally equal takeoffs during peak periods
- Simultaneous operations on intersecting runways are not employed
- Land and hold Short Operations (LAHSO) are not employed
- There are full-length parallel taxiways and ample exit taxiways for each runway
- No precisions approaches (ILS) are in place
- The turf runway is not used in the estimation of runway capacity

3.1.1 Annual Service Volume (ASV)

Table 3-1 displays the ASV for the three scenarios based on the assumptions described above. At airports with two intersecting runways, air traffic control procedures can enable simultaneous operations on both runways. For example, during operations on Runway 11-29, intersections departures may occur on Runway 2 (from Taxiway W). Alternatively, landings on Runway 20 can "hold short" of Runway 11-29. However, as such procedures are rarely employed; the capacity analysis is based on only one runway in operation at a time. This is the more conservative approach and appropriate for HFD. As such, the elimination of Runway 11-29 will not affect the ASV of HFD. As Taxiway J is a dual-parallel taxiway, its elimination will also not affect the ASV of HFD. Therefore, the ASV is considered identical under each scenario at 230,000 operations per year.

The current airfield configuration currently provides ample capacity to accommodate existing and future operations of 80,000 and 85,600 flights per year, respectively in 2010 and 2030. HFD would still be under the ASV if the 127,000 annual operations in the potential growth scenario of Chapter 2 were to occur.

1 This assumption is based on a review of the forecast data completed as part of Chapter 2.

Table 3-1 – Annual Service Volume

Scenario	2010		2030	
	Demand	ASV	Forecasted Demand	ASV
Current Airfield Configuration	80,000	230,000	85,600	230,000
Elimination of Runway 11-29		230,000		230,000
Elimination of Runway 11-29 and Taxiway J		230,000		230,000

3.1.2 **Hourly Capacity**

Table 3-2 displays the estimated VFR and IFR hourly capacities of HFD based on the assumptions described above. VFR capacity is estimated at 98 flights per hour and IFR capacity is estimated at 59 flights per hour for both 2010 and 2030. As only one runway is in operation at a time, the elimination of Runway 11-29 will not affect the hourly capacity of HFD. As Taxiway J is a dual-parallel taxiway, its elimination will not affect the hourly capacity of HFD. As such, airfield improvements will be based on safety considerations.

The current airfield configuration currently provides ample capacity to accommodate existing and future operations with peak hour operations of 37 and 39 flights per hour respectively.

Table 3-2 – Hourly Capacity

Scenario	2010			2030		
	Peak Hour Operations	VFR Capacity	IFR Capacity	Peak Hour Operations	VFR Capacity	IFR Capacity
Current Airfield Configuration	37	98	59	39	98	59
Elimination of Runway 11-29		98	59		98	59
Elimination of Runway 11-29 and Taxiway J		98	59		98	59

3.2 <u>Airport Design Standards</u>

As discussed in previous chapters, the design aircraft is defined as the largest aircraft or aircraft class that uses, or is anticipated to use, an airport on a regular basis (i.e. at least 500 annual itinerant operations). The current design aircraft class at the airport includes twin-engine aircraft or light jet, such as the Cessna CJ4.

FAA AC 150/5300-13A Airport Design, was

published in 2012 and contains revised federal design standards Airports. The FAA uses the Aircraft Approach Category (AAC), Aircraft Design Group (ADG), and visibility minimums of an airport's design aircraft to classify the runways. The FAA term for this classification is Runway Design Code (RGC) and is applied to individual runways. An example would be B-II-4000. The AAC is based on the speed of the design aircraft during the landing approach. The ADG is based on the wingspan and tail height of the design aircraft, whichever is more restrictive (i.e., greater). The flight visibility category is listed as the Runway Visibility Range (RVR) and is based on the lowest approach visibility minimums for that runway. Table 3-3 lists the specifications associated with the three parameters of RDC.

The Airport Reference Code (ARC) is the airport's highest RDC, minus the visibility component, such as B-II. As HFD currently has two runways with different intended users, two RDCs are necessary; the most demanding RDC would be considered the ARC.

Table 3-3 – Runway Design Code (RDC)

Aircraft Approach Category (AAC)		Aircraft Design Group (ADG)			Flight Visibility	
Category	**Speed**	**Group**	**Wingspan Size**	**Tail Height**	**RVR (ft)**	**Approach Minimums (sm)**
A	Less than 91 knots	I	Up to 48'	<2 0'	VIS	Visual Only
B	91 to 120 knots	II	49' to 78'	20' - < 30'	4000	<1 & > ¾
C	121 to 140 knots	III	79' to 117'	30' - < 45'	2400	< ¾ & > ½
D	141 to 165 knots	IV	118' to 170'	45' - < 60'	1600	< ½ & < ¼
E	166 knots or more	V	171' to 213'	60' - < 66'	1200	< ¼
-	-	VI	214' to 261'	66' - <80'	-	-

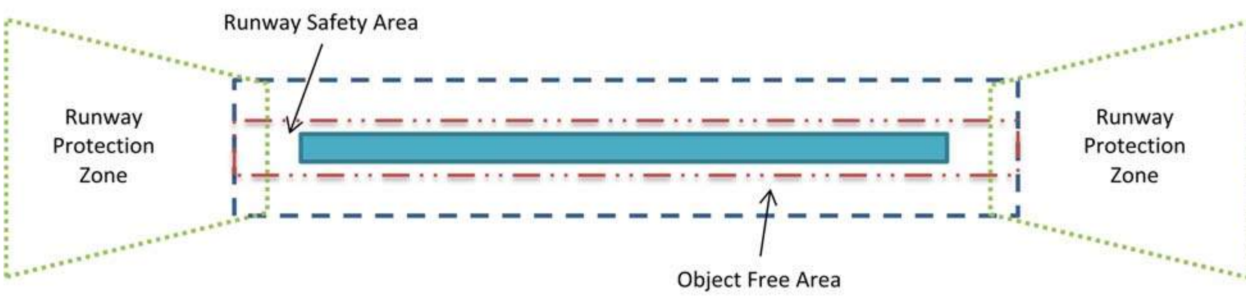
The CJ4 would be considered a B-II. This includes an AAC of B, with an approach speed of up to 120 knots, and ADG II, wingspans of up to 78 feet. The crosswind runway is primarily used by smaller aircraft such as the Cessna 182 Skylane. The Skylane has an AAC of B and an ADG of I. Thus, the ARC of HFD is B-II.

The third component of the RDC is the visibility minimums. Table 1-8 displays the lowest visibility minimums for each runway end, which can then be converted into RVR using Table 3-3. Runway 2-20 has an RVR of 4000 and Runway 11-29 has an RVR of VIS. Table 3-4 displays the RDC for each runway.

Table 3-4 – Runway Design Codes (RDC)			
Runway	**AAC**	**ADG**	**RVR**
2-20	B	II	4000
11-29	B	I	VIS

FAA AC 150/5300-13A - Airport Design, contains federal design standards for each RDC. For example, according to the RDC, a B-II airport should provide a Runway Safety Area that extends 300 feet beyond the runway end and is 150 feet in width. HFD is forecast to remain a B-II airport throughout the planning period. Therefore, B-II standards were used to assess the future airfield requirements. Four key runway design standards are defined below.

- **Runway Safety Area (RSA) –** A defined surface surrounding a runway prepared for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. This area must also support snow removal, aircraft rescue, and firefighting equipment. The RSA should be free of objects, except for objects that must be located in the area because of their function.
- **Runway Object Free Area (ROFA) –** A ground area surrounding runways that should be clear of objects (e.g., roads, buildings, etc.), except for objects that need to be within the area due to their function.
- **Runway Protection Zone (RPZ) –** Areas off the runway ends that are used to enhance the protection of people and property on the ground. The RPZ is achieved through airport ownership control (i.e., title or avigation easements) and the clearing of objects and undesired activities.
- **Runway Visibility Zone (RVZ) -** A defined area with a clear line-of-sight between two intersecting runways. The RVZ is created by imaginary lines between designated visibility points located on each runway. Terrain needs to be graded and permanent objects need to be designed so that there will be an unobstructed line of sight.



In 2012, the newly published AC 150/5300-13A also introduced the Taxiway Design Group (TDG). The previous standards for taxiways were the ADG, which was based on wingspan and tail height, but not on the dimensions of the aircraft undercarriage. As taxiways are designed for “cockpit over centerline” the taxiway must be wide enough to allow “judgmental oversteering.”

Adequate pavement fillets provide a large enough margin on turns for safety purposes. The design of these pavement fillets must consider the aircraft undercarriage. The TDG is based on the overall Main Gear Width (MGW) and Cockpit to Main Gear (CMG); see Figure 3-1. In some cases (e.g., general aviation aircraft), the wheel base may be used in lieu of the CMG.

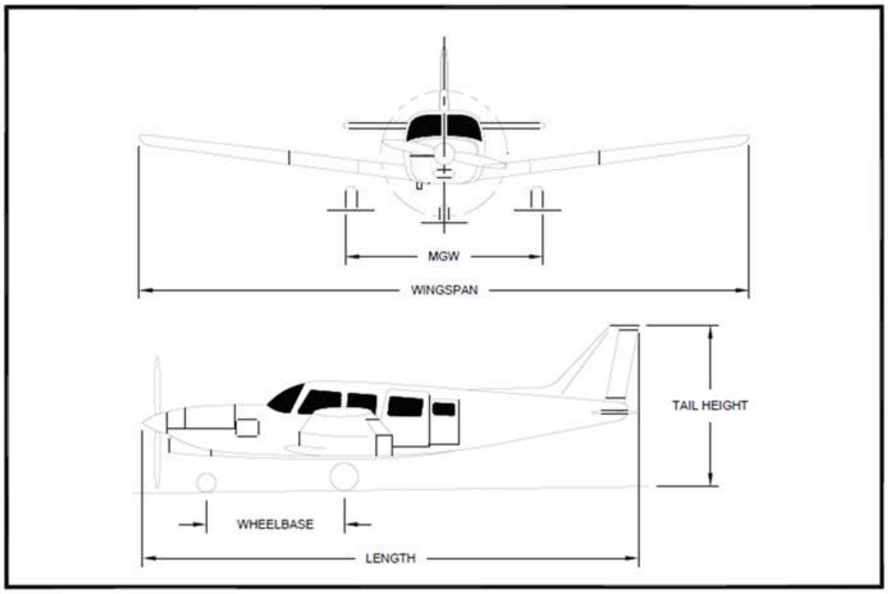


Figure 3-1 – Taxiway Design Group Measurements

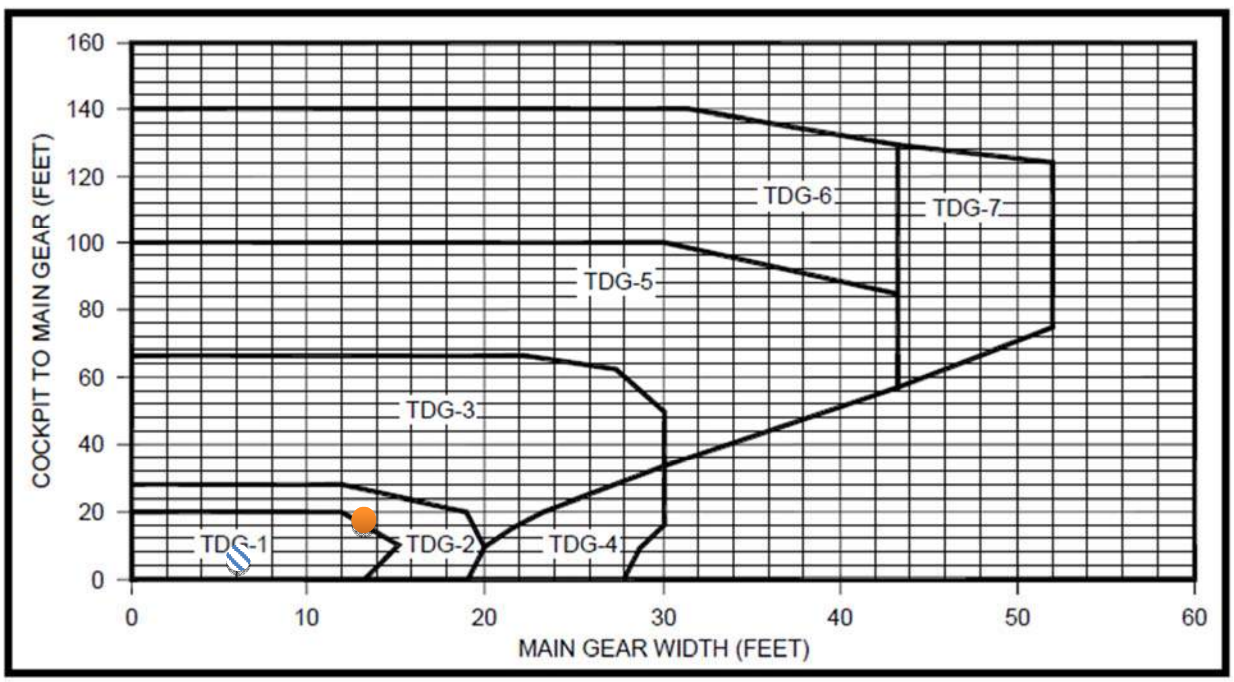


Figure 3-2 – Taxiway Design Groups

Figure 3-2 displays the TDG's based on the two measurements; the solid orange dot is the Citation CJ4 and the blue striped dot is the Cessna 182 Skylane. Table 3-5 displays the TDG for the two aircraft.

Table 3-5 – Taxiway Design Group

Aircraft	Main Gear Width	Cockpit to Main Gear	Taxiway Design Group
Citation CJ4	13.5'	17'	2
Cessna 182 Skylane	6'	9'	1

Tables 3-6 and 3-7 provide the FAA standards associated with RDC B-II and B-I Small. In regards to FAA design standards, HFD's major issues are the Runway 2-20 RSA and OFA. This AMP will address these issues in the development alternatives.

Table 3-6 – ARC Airfield Design Standards for Runway 2-20 (RDC B-II, TDG 2)

Airfield Facility	Existing	2030 Requirement	Deficit
Runway Width	150'	Minimum 75'	None
Taxiway Width	40'	35'	None
Runway Wind Coverage	97% (13kts)	95% All-Weather	None
Runway Safety Area (RSA): Length (beyond Runway 2) Length (beyond Runway 20) Width	 0' 0' 150'	 300' 300' 150'	 300' 300' None
Object Free Area (OFA): Length (beyond Runway 2) Length (beyond Runway 20) Width	 0' 0' 329'	 300' 300' 500'	 300' 300' 171'
Runway Protection Zone (RPZ): Inner Width Outer Width Length	 500' 700' 1,000'	 500' 700' 1,000'	None
Runway Centerline To: Parallel Taxiway Centerline Edge of Aircraft Parking	 300' 300'	 240' 250'	None
Taxiway Centerline To: Fixed or Moveable Object	66.5'	66.5'	None
Taxiway Safety Area Width	79'	79'	None
Taxiway OFA Width	131'	131'	None

Table 3-7 – ARC Airfield Design Standards for Runway 11-29 (RDC B-I Small, TDG 1)			
Airfield Facility	**Existing**	**2030 Requirement**	**Deficit**
Runway Width	71’	60’	None
Taxiway Width	30’	25’	None
Runway Wind Coverage	93% (10.5kts)	95%	Satisfied by Runway 2-20
Runway Safety Area (RSA): Length (beyond Runway 11) Length (beyond Runway 29) Width	 240’ 240’ 120’	 240’ 240’ 120’	None
Object Free Area (OFA): Length (beyond Runway 11) Length (beyond Runway 29) Width	 250’ 250’ 240’	 250’ 250’ 240’	None
Runway Protection Zone (RPZ): Inner Width Outer Width Length	 250’ 450’ 1,000’	 250’ 450’ 1,000’	None
Runway Centerline To: Parallel Taxiway Centerline	150’	150’	None
Taxiway Centerline To: Fixed or Moveable Object	44.5’	44.5’	None
Taxiway Safety Area Width	49’	49’	None
Taxiway OFA Width	89’	89’	None

3.2.1 Runway Safety Area (RSA) / Runway Object Free Area (ROFA)

As shown on Figure 1-3, two waste water treatment lagoons owned by the Metropolitan District Commission (MDC) are located immediately beyond the Runway 2 end, approximately 20 to 30 feet below the runway elevation, which create a non-standard RSA and OFA. This will need to be addressed as part of this study.

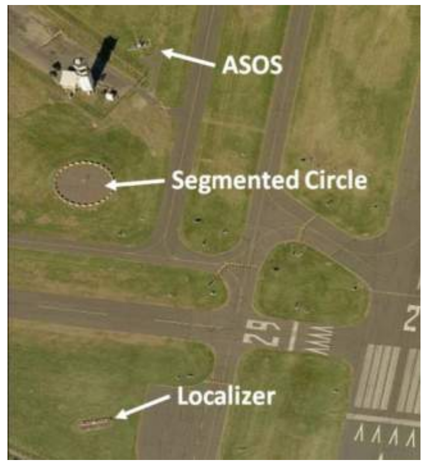
3.2.2 Runway Protection Zone (RPZ)

Airport ownership and control of RPZs, either through easement or acquisition, is desirable to prevent future development, clear tree obstructions, and ensure compatible land use. Although RPZs are primarily designated to protect people and property on the ground, the FAA considers the clearing of all objects within RPZs a safety benefit, particularly objects that obstruct the runway approach surface. At HFD, commercial buildings (former motels) are located within the

Runway 11 RPZ; it is recommended that avigation easements be pursued. Table 3-8 lists the acreage not controlled by the airport and any obstructions that are present.

Table 3-8 - RPZ Control		
RPZ	**Area Not Controlled by Airport (Acres)**	**Obstructions**
Runway 2	13	Dike & Trees
Runway 20	13	Dike and Trees
Runway 11	6	Road & Commercial Building
Runway 29	7	Dike and Trees

3.2.3 Clearance Areas



The areas around the segmented circle, automated surface observation system (ASOS), and localizer should remain clear to ensure proper operation of the equipment. Within 500 feet of the ASOS, any structures should be at least 15 feet below the antenna height. While there are buildings currently within 500 feet of the ASOS, coordination with the FAA should be conducted for any new structures.

3.2.4 Taxilane Object Free Area (TLOFA)

FAA AC 150/5300-13A, *Airport Design*, also contains taxiway and taxilane standards for each Airplane Design Group.The TLOFA width equals 1.2 times the airplane wingspan plus 20 feet. Table 3-9 displays the widths of the TLOFA based on the specific wingspans of different aircraft. Typically, FAA approval through Modification to Standard is needed for this to be approved on the Airport Layout Plan (ALP). Additionally, the centerline of the taxilane needs to be half the TLOFA width from any fixed or movable object for proper wingtip clearance.

Table 3-9 – Taxilane Design Standards		
Wingspan	**Object Free Area**	**Centerline to Fixed or Movable Object**
49' to 78' (TDG 2)	115'	57.5’
Less than 49' (TDG 1)	79'	39.5’
40' (sample)	68’	34’
36' (sample)	63.2'	31.6’

There are several locations at HFD where the existing taxilanes do not accommodate all Design Group I aircraft, as they do not meet the design standard. These deficiencies will be addressed as part of the development alternatives.

Figure 3-3 displays the taxilane serving the tiedowns along the South Ramp near the Midfield Helipad (H1). Those on the newer asphalt are operated by Atlantic Aviation and the remaining by the CTDOT. The taxilane centerline is approximately 34 feet from parking positions associated with H1, which is a 5.5 feet deficiency. Additionally, the helicopter parking positions are only 20 feet from the taxilane centerline. Overall this is a TLOFA of only 54 feet. If the tiedowns in this location were restricted to wingspans of 36 feet, a TLOFA of only 63.2 feet would be required; this would reduce the deficiency to only 9.2 feet.

Similar to the South Ramp, the North Ramp's TLOFA is nonstandard for Design Group I. As the wingspan for these tiedowns is restricted to 36 feet, 63.2 feet can be utilized as the OFA width. As shown in Figure 3-4, the current width of the TLOFA is 65 feet on the North Ramp, which would be adequate with an FAA Modification to Standards.

3.2.5 Helipad & Hold Lines

Figure 3-5 shows a standard Group I TLOFA of 79 feet where the Midfield Ramp and FBO hangar parking area join. However, the taxilane centerline to the aircraft parking on the FBO Ramp is only 36 feet, whereas the standard is 39.5 feet. Additionally, if an aircraft with a larger wingspan was parked at the highlighted tiedown or parked slightly off-center from the pavement markings, it would further encroach upon the TLOFA.

Helicopters have the ability to approach the airport from any direction and land on either the runway or a heliport if it does not interfere with another aircraft operation currently in progress. If a helicopter intends to land at H1, Air Traffic Control (ATC) ensures that all aircraft taxiing hold their current position until the helicopter has landed. Figure 3-6 highlights the hold lines along the midfield ramp to stop aircraft from entering the movement area of the runway and helipad; the point when the aircraft should be communicating with ATC. No hold lines are present on Taxiway C or the taxilane next to the helicopter parking spaces. ATC has a limited ability to control pedestrians, vehicles, and aircraft on the FBO ramp since it is a non-movement area. This can be dangerous to the safety of people on the ground as well as the helicopter, especially if the helicopter is approaching H1 from the west rather than from the runway.

The alternatives chapter provides recommendations to address each of these design standard considerations.

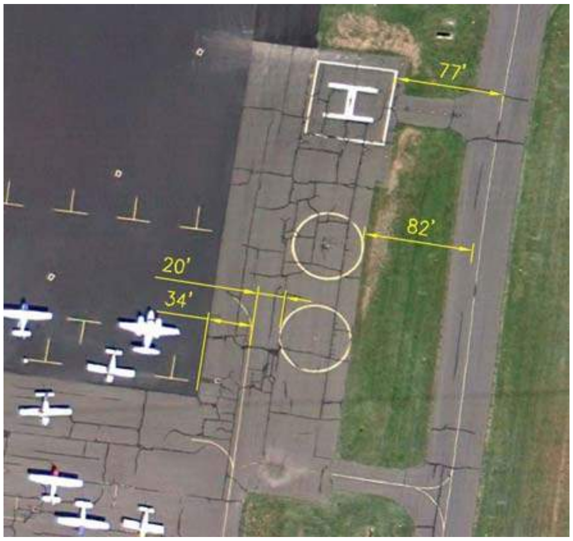


Figure 3-3 South Ramp

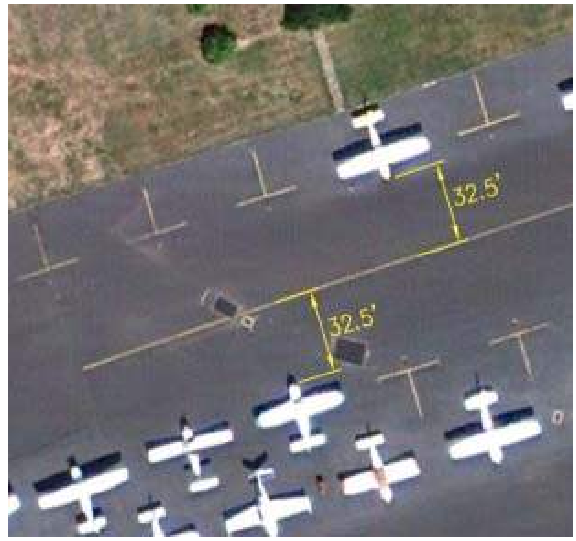


Figure 3-4 North Ramp

Figure 3-5 FBO Ramp and Midfield Ramp

Figure 3-6 Midfield Helipad (H1)

3.3 <u>Wind Coverage and Runway Use</u>

The ideal orientation of a runway is based on a function of wind speed and direction, and the ability of aircraft to operate under crosswind conditions. As a general principle, runways should be oriented as closely as practical to the direction of the prevailing winds. This enables aircraft to take off and land in the direction of the wind, which improves the safety and efficiency of operations. The most ideal runway alignment provides the highest wind coverage percentage. The desired wind coverage for an airport has been set by the FAA at 95 percent. In cases where a single runway cannot provide adequate wind coverage, a crosswind runway may be considered, but is not an FAA requirement. The FAA assumes that small, ARC B-I aircraft can safely handle crosswinds of no greater than 10.5 knots (12 mph), and is referred to as the crosswind component. ARC B-II aircraft can handle crosswinds of up to 13.0 knots (15 mph).

The current runway system at HFD with Runway 2-20 (true azimuth 9 degrees) and Runway 11-29 (true azimuth of 099 degrees) can adequately accommodate both ARC B-I and B-II aircraft (10.5-knots and 13-knots). The wind coverage during both all-weather and poor weather conditions is 99 percent. This information was calculated by the FAA's Airport Design Software using 10 years of recorded wind data from the weather station located at HFD from 2000 to 2009.

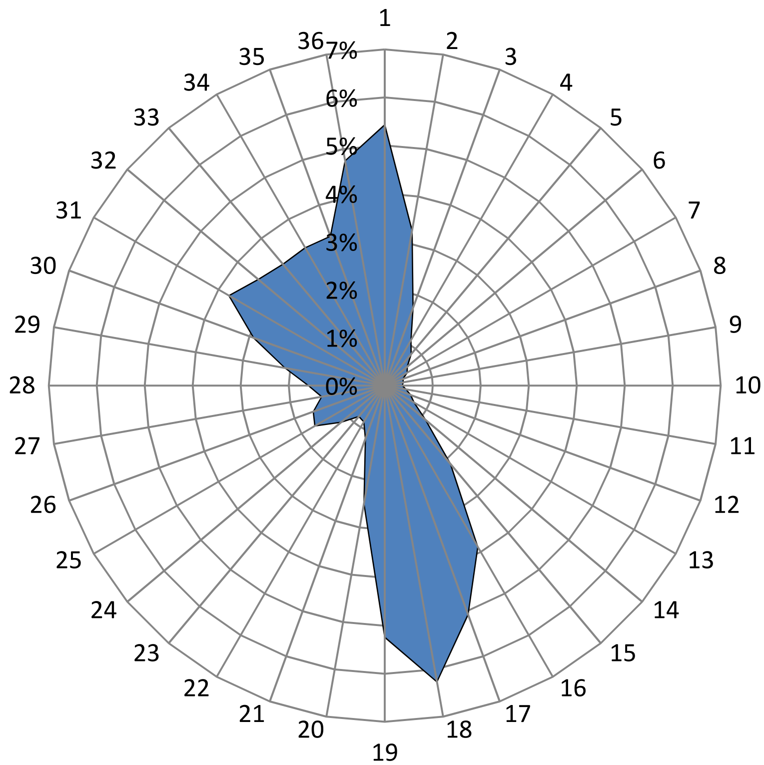
Table 3-10 – Wind Coverage

	Runway					
	2-20		11-29		Both	
	10.5kts	13kts	10.5kts	13kts	10.5kts	13kts
All-Weather	95.24	97.64	93.18	N/A	99.56	N/A
VFR (good weather)	94.79	97.42	93.25	N/A	99.53	N/A
IFR (poor weather)	99.38	99.7	N/A	N/A	N/A	N/A

Table 3-10 also indentifies that if Runway 11-29 were to be closed, HFD would still provide over 95 percent wind coverage with only Runway 2-20, with 95 to 99 percent coverage in all conditions for ARC B-I.

Figure 3-7 displays the frequency of the wind based on direction. This graph displays the strong dominance of both north and south winds by percentage at HFD, with winds from the northwest as a distant third in frequency.

Figure 3-7 - Wind Frequency



Seasonal variations were also reviewed to identify any acute differences between the winter and summer seasons in CT. The month of January has an average high of 36 degrees, with the average high temperature in July of 84 degrees. Table 3-11 shows the wind coverage based on the season. As is typical, average wind speed is greater in winter, which reduces the wind coverage of the single-runway coverage. However, training and recreations activity by light aircraft is also reduced in winter due to weather conditions. The seasonal evaluation identifies that in January, the 10.5 knot coverage for Runway 2-20 is 94 percent, slightly below the desired level, but can still be considered reasonable.

Table 3-11 Seasonal Wind Coverage

	Runway					
	2-20		11-29		Both	
	10.5kts	13kts	10.5kts	13kts	10.5kts	13kts
January All-Weather	93.9	96.83	92.36	N/A	99.13	N/A
January IFR	98.97	99.62	N/A	N/A	N/A	N/A
July All-Weather	98.51	99.36	95.11	N/A	99.91	N/A
July IFR	99.66	99.86	N/A	N/A	N/A	N/A

Table 3-12 displays the expected runway usage based exclusively on the recorded wind data. However, several other factors affect the runway end of use, mainly runway length. Many of the aircraft cannot land on Runway 11-29 due to the reasons discussed in Section 3.4.2 - Runway Length. One of the main reasons is the recommended length for a B-II aircraft is 5,300 feet, and Runway 11-29 is only 2,314 feet long. Thus, many of the aircraft operating at HFD could not safely land on Runway 11-29. Additionally, any aircraft over 10,000 pounds cannot land on Runway 11-29 due to the limiting pavement strength.

<table>
<tr><th colspan="3">Table 3-12 – Predicted Runway Use Based on Recorded Wind Data</th></tr>
<tr><th>Runway End</th><th colspan="2">Percentage</th></tr>
<tr><td>2</td><td>27%</td><td rowspan="2">55%</td></tr>
<tr><td>20</td><td>28%</td></tr>
<tr><td>11</td><td>5%</td><td rowspan="2">25%</td></tr>
<tr><td>29</td><td>20%</td></tr>
<tr><td>Calm</td><td colspan="2">20%</td></tr>
<tr><td>Total</td><td colspan="2">100%</td></tr>
</table>

During calm winds, an aircraft can safely land in any direction. During these conditions, pilots review other factors beyond runway length to determine the ideal landing, such as the displaced thresholds, potential obstructions to the runway, the amount of fuel onboard, and runway conditions. Another consideration is the location of the aircraft's amenities; if an aircraft is parking on the north side of the airport, they will not want to land on Runway 29 and taxi the longer distance when they could land on Runway 2 and exit the runway near their hangar or destination on the Airport. On a daily basis, this reduction in taxing can result in savings for an aircraft owner on fuel expenditures.

Table 3-13 displays the runway usage that typically occurs at HFD on an annual basis based on historical activity. As Runway 2 is the designated calm wind runway (20 percent of the wind conditions), it can be expected that Runway 11-29 is used only one to two percent of the time, and Runway 2-20 the other 98 percent.

Table 3-13 – Observed Runway Use

Runway End	Percentage
2-20	98%
11-29	2%
Total	100%

Based on the wind coverage discussed previously, if Runway 11-29 were to close, the majority of the two percent of operations are that currently estimated to use Runway 11-29 could safely use Runway 2-20; where the occasional high wind conditions that would restrict activity of light aircraft due to the lack of the crosswind runway. Runway 2-20's width of 150 feet is an added advantage as it will allow for a greater margin of error for pilots during high wind conditions.

Table 3-14 shows the wind coverage if the runway alignment were to be rotated one degree to Runway 1-19. With the exception of the minor deficit in January, rotating Runway 2-20 to 1-19 would be acceptable to FAA standards.

Table 3-14 - Wind Coverage for Runway 2-20 Rotated to Runway 1-19

	Runway 2-20	
	10.5kts	**13kts**
Annual All-Weather	96.15	N/A
Annual IFR	99.47	99.76
January All-Weather	94.25	N/A
January IFR	99.54	99.85
July All-Weather	98.64	N/A
July IFR	99.79	99.9

When considering the factor of wind, no changes to the runway alignments are recommended.

3.4 Runway Analysis

This section includes an evaluation of the following runway requirements:

- Runway Pavement Strength
- Runway Length
- Runway Width
- Runway Lighting, Markings, & Instrumentation
- Turf Runway

3.4.1 Runway Pavement Strength

The pavement on Runway 2-20 can currently accommodate aircraft with takeoff weights of 30,000 pounds for single-wheel and 43,000 pounds for dual-wheel[2]. The light and medium corporate jets that use the airport fall within this range, thus the pavement strength is adequate for the planning period.

Runway 11-29 can currently accommodate aircraft with takeoff weights of 10,000 pounds for single-wheel. This is considered sufficient for the planning period.

[2] The single- and dual-wheel refers to the number of wheels on the main struts of the landing gear. A single-wheeled aircraft would have two wheels on the main gear, while the dual-wheel would have four wheels on the main gear. The nose gear main have one or two wheels in either configuration.

3.4.2 Runway Length

Runway length requirements depend upon the most demanding aircraft group anticipated to use an airport on a regular basis. The FAA groups GA aircraft by maximum takeoff weight (i.e. small, large, or heavy) and number of passenger seats. The aircraft group for HFD includes aircraft with less than 10 passenger seats. Runway length requirements also depend on a number of specific physical and meteorological factors, as listed below for HFD.

- Airport Elevation: 18 feet
- Mean Maximum Daily Temperature: 84°F (hottest month – July)
- Runway Gradient: Less than one percent

FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, describes the procedure for determining recommended runway lengths. The AC provides “Runway Length Curves” that use specific airport characteristics to determine recommended runway lengths. Applying the “Runway Length Curves” to the specific physical and meteorological factors of HFD, a runway length of 5,300 feet is the minimum recommended length to accommodate large aircraft of 60,000 pounds or less. The existing Runway 2-20 length of 4,417 feet does not meet this recommendation.

The minimum recommended length to accommodate 75 percent of all small aircraft (ARC B-I) is 2,450 feet. Runway 11-29 is 2,314 feet, 136 feet short of the recommended length. While this need is currently satisfied by the longer Runway 2-20, it should be considered in any future runway development projects.

According to aircraft manufacturer operational data, many light jets are designed to operate from runways shorter than 4,400 feet (i.e. Cessna CJ4). Jets that do require a 5,300’ runway, may still be able to operate at HFD with reduces payload (i.e., fuel load and passengers below the maximum) Nevertheless, most light jet operators in the region use Bradley International Airport (BDL) in lieu of HFD, partially due to the runway length. Insurance underwriters for corporate jets typically prefer a 5,000 foot or greater runway length for safety purposes, and a runway of this length allows aircraft owners to avoid higher premiums or reduced coverage. There are many corporate jets that may therefore avoid HFD due to a runway length of only 4,417 feet.

Aircraft operating under the Federal Aviation Regulations (FAR) Part 135 are commonly known as charter operations. They are flights that are conducted by a hired aircraft and crew, typically for business purposes. Charter operations represent a large share of the total activity at HFD. These operators have additional mandated runway length requirements for safety reasons. For example, every corporate jet aircraft has a certain runway length requirement for takeoff, which varies based on the passenger and fuel load and meteorological conditions (i.e. takeoff run distance). When operating Part 135, the runway must also be long enough for the aircraft to accelerate to takeoff speed, decelerate, and stop prior to the end of the runway (i.e. accelerate to stop distance). This required length is always longer then the takeoff run length.

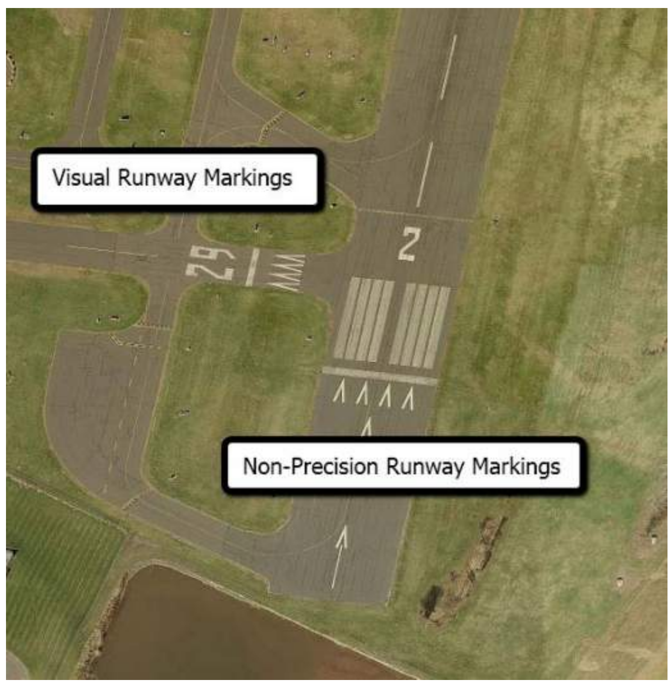
Per the aviation industry, a 5,000 to 6,000 foot runway is considered ideal for corporate jets. When a 5,500 feet runway is not available, options to reach the maximum length possible should be considered as part of the planning process. As such, a Runway 2-20 extension should be considered so HFD can continue to move forward with its goal of safely accommodating corporate aircraft.

3.4.3 Runway Width

The current width of Runway 2-20 is 150 feet. This width meets the minimum design standard of 75 feet for ARC B-II airport. The current width of Runway 11-29 is 71 feet, which meets the minimum design standard of 60 feet for an ARC B-I small airport.

Although the minimum requirement for a B-II runway is only 75 feet, a wider width of 100 feet to 150 feet would provide improved crosswind coverage and an added safety for pilots operating during crosswind weather conditions. Upon review by FAA, it was determined that a runway width of 100 feet would be eligible for FAA funding. However, if the Sponsor choses to retain the full existing 150' width, the additional pavement would not be eligible for federal funding during the next runway rehabilitation project.

3.4.4 Runway Lighting, Markings, and Navigational Aids



Runway lighting, marking and instrumentation allows for the safe operation of aircraft during nighttime hours and low visibility conditions. As previously discussed in Chapter 1, Runway 2-20 is equipped with High Intensity Runway Lights (HIRL) and Runway End Identifier Lights (REIL) on both ends. Runway 11-29 is equipped with HIRL. The turf runway is demarcated by orange markers and flags, is not equipped with lights, and is closed during the winter months.

A Visual Glide Slope Indicator (VGSI) provides lights that guide a pilot to the appropriate approach slope to the runway touchdown point; these systems improve safety and help standardize approach altitudes. Runway 2 has a Precision Approach Path Indicator (PAPI), a four light set with a 4.00 degree glide slope. Runway 20 has a Visual Approach Slope Indicator (VASI), a four light set with a 4.00 degree glide slope. Both indicators are located west of the runway.

Currently the runway markings for Runway 2-20 are Non-Precision (NPI) and Visual for Runway 11-29. The lighting and marking facilities at HFD will require maintenance and replacement during the planning period, but are considered adequate for the airport's activity and service level.

3.4.5 Turf Runway

A turf runway provides safe operation of aircraft such as gliders, ultralights, taildraggers, or blimps. The turf runway at HFD is used sparingly, especially during wet periods. There is approximately 300 feet between the runway centerline and the centerline of Runway 2-20, which does not allow for simultaneous operations. The location of the turf runway is inaccessible to vehicles due to the Clark Dike. The runway is the only turf runway that is publically owned in the State. Thus, it is recommended that the turf runway remain available, unless a critical alternative use for the property is identified.

3.4.6 Summary of Runway Requirements

Table 3-15 summarizes the runway requirements at HFD. These requirements are justified based on FAA guidelines and are intended to improve airfield safety.

Table 3-15 – Summary of Runway Requirements

Runway Category	Existing	Recommended	Future Action
Runway 2-20			
Strength (Dual Wheel)	43,000 lbs	43,000 lbs	None
Length	4,417'	5,300'*	883' Additional Runway Length
Width	150'	100' to 150'	None
Orientation (Wind Coverage)	97% (13kts)	95%	None
Lighting	HIRL & REIL	HIRL & REIL	None
VGSI	PAPI & VASI	PAPI & VASI	None
Markings	Non-Precision	Non-Precision	None
Runway 11-29			
Strength (Single Wheel)	10,000 lbs.	10,000 lbs.	None
Length	2,314'	2,450 (75% small aircraft)	None, Satisfied by Runway 2-20
Width	71'	60'	None
Orientation (Wind Coverage)	93% (10.5kts)	95%	None, Satisfied by Runway 2-20
Lighting	HIRL	MIRL	None
VGSI	None	None	None
Markings	Visual	Visual	None
*5,000' or greater, to meet requirements for corporate aircraft, charter operators, and insurance requirements			

As shown, HFD provides virtually all identified facility requirements, with the exception of runway length. A downtown corporate airport would benefit by having a runway of at least 5,000 feet in length.

3.5 Taxiway System

A taxiway system provides safe access to and from the runways and landside areas. The FAA recommends full length, parallel taxiways for each runway. At HFD, there are full length, parallel taxiways to both runways. The existing taxiway system is considered adequate for the current conditions at HFD. The 2011 CTDOT Pavement Report and Section 3.6 should be reviewed for further information regarding the current pavement conditions, construction dates, and rehabilitation dates.

Should Runway 11-29 be taken out of service, the dual parallel taxiway, Taxiway J, would no longer be necessary. Currently, Taxiway J is utilized for aircraft connecting to Taxiway B. If Runway 11-29 and Taxiway B were closed, the property occupied by Taxiway J south of Taxiway C may also be used for additional aviation development. Aircraft utilize the dual taxiways or “racetrack” pattern between Taxiways C and D to improve the flow of aircraft between the runways and aircraft parking areas.

All FAA design standards would need to be evaluated to ensure compliance prior to any redevelopment of the Taxiway J property. With B-II, only 240 feet is necessary between the runway and taxiway centerlines, thus allowing for additional landside development. The evaluation process would include a review of topics such as separation distances, potential airspace conflicts (i.e., transitional surface penetrations), and the tower line of sight.

3.6 Pavement Maintenance

A Pavement Evaluation was conducted by CTDOT in November 2011, which analyzed the current conditions and made maintenance recommendations for each section of pavement at HFD. Pavement rehabilitation or reconstruction is typically conducted every 15 to 20 years, with crack sealing and other minor repairs conducted in the interim years as necessary. A rehabilitation or reconstruction project is eligible for FAA funding, while minor maintenance such as crack filling is not. The conditions, recommendations, and scheduled repairs were current at the time of the reporting of this report in May 2012. Table 3-14 illustrates the various types of pavement distress.

A reconstruction project for Runway 2-20 was conducted in 1993, and the pavement is currently in good condition with sealed joint and thermal cracks. While the Runway 2-20 asphalt surface is nearing the end of its life expectancy, only a mill and overlay is recommended. Additional crack filling is scheduled for 2012 in the interim

Runway 11-29 was last reconstructed in 1997, and the pavement is currently in good condition with sealed joint and thermal cracks. The pavement has recently undergone crack sealing, but will need rehabilitation in the near future due to the widening of the cracks.

With the exception of the CT Aero Tech School, each of the taxiways had either sealed joint and thermal cracking or raveling. The taxiway requires additional maintenance consisting of crack filling or micro-paving at a minimum. Taxiways A, C, D, and W are scheduled for repairs in 2012. The pavement on the remaining taxiways has recently undergone crack sealing, but are each experiencing widening of the cracks.

The tiedowns on the South Ramp are scheduled for crack sealing in 2012 to repair the minor sealed joints, thermal, and block cracks. The remaining portion of the South Ramp in front of the hangars is in excellent condition and currently requires no maintenance. The Midfield Ramp has some raveling and sealed joint and thermal cracking that is scheduled for repair in 2012. The FBO Ramp has sealed thermal and aging cracks, along with alligator cracking. It is scheduled for repair in 2012. The North Ramp has sealed joint, thermal, and block cracks and slight raveling. It is scheduled for repair in 2012. The State Police Ramp has slight raveling, but no improvements are scheduled at this time.

The pavement for the Midfield Helipad (H1) has sealed joint, thermal, and block cracks, and is scheduled for repair in 2012. The North Helipad (H2) is in excellent condition and does not require any maintenance.

Table 3-16 lists the desired year for major pavement work such as milling and asphalt overlays or reconstruction, based on a 20-year pavement cycle. All pavements require regularly scheduled maintenance such as crack sealing, which can be used to defer rehabilitation if funding is not available for pavement resurfacing. In Table 3-16, rehabilitation refers to asphalt milling and overlay or a full reconstruction.

Table 3-16 – Pavement Condition & Maintenance

Facility	Condition*	Rehabilitation Year
Runway 2-20	3	2013
Runway 11-29	4	2017
Midfield Helipad (H1)	3	2019
North Helipad (H2)	5	2027
Taxiway A	3	2015
Taxiway B	4	2017
Taxiway C	4	2015
Taxiway D	4	2015
Taxiway H	3	2015
Taxiway J	4	2019
Taxiway V	4	2017
Taxiway W	3	2015
CT AeroTech School Taxiway	5	2028
North Ramp^	5	2019 / 2027
Midfield Ramp	4	2023
FBO Ramp^	3	2019 / 2028

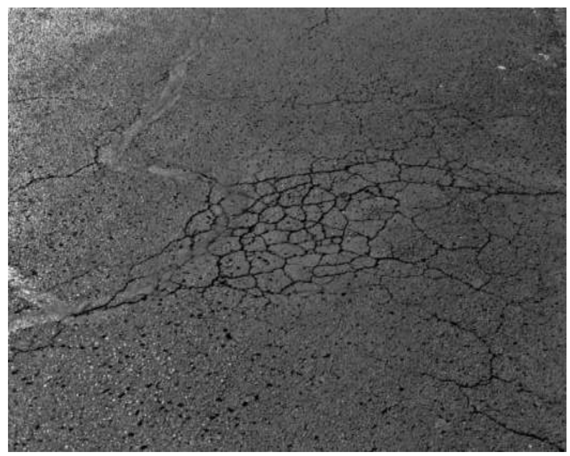
Conditions Ratings: 5 – Excellent, 4 – Good, 3 – Fair, 2 – Poor, 1 – Failed
*Based on the 2011 Hartford-Brainard Pavement Evaluation
^A portion of this ramp was reconstructed in 2007/2008 and does not require maintenance.

Examples of Pavement Distress

Widening of Sealed Cracks

Raveling

Unsealed Cracks



Alligator Cracking

3.7 Instrument Approach Procedures

Instrument Approach Procedures (IAP) are published by the FAA for specific runway ends. Several non-precision procedures have been published to the Runway 2 end, including Global Positioning Satellite (GPS) and Localizer Type Directional Aid (LDA) approaches. The River Visual approach requires radar and assists pilots to Runway 2 by providing an approach path over the Connecticut River that avoids the noise sensitive area of Old Wethersfield to the south of HFD. The VOR or GPS-A approach brings pilots to the east side of the airfield to then begin a visual approach into the airfield. A precision approach is not available at HFD.

By definition, a precision approach provides lateral and vertical guidance to landing aircraft whereas a non-precision approach offers only lateral guidance. Given the types of aircraft utilizing HFD on a daily basis, and those that are anticipated in the future, it would desirable to provide precision approaches to both runway ends.

An IAP to Runway 2 that provides vertical guidance may be achieved without the use of ground-based navigational aids such as an Instrument Landing System (ILS). Satellite-based navigation using the Global Positioning System (GPS) in conjunction with the Wide Area Augmentation System (WAAS) can be employed to generate an IAP with lateral precision with vertical guidance (LPV) minimums. While this may not be considered a full precision approach, it will provide better accuracy than a typical RNAV GPS approach. The term RNAV denotes “area navigation” and may or may not include vertical guidance.

The existing localizer for Runway 2 used in the LDA procedures, could be considered for an upgrade to an ILS through the installation of a glide slope antenna and an approach lighting system. Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) would be the recommended approach lighting system. However, this system is costly and would require construction of light units within wetlands and the Connecticut River, and thus is not included in the alternative evaluation. The FAA is also moving away from ground based navigation equipment (i.e., localizers and electronic glideslopes). As of July 2011, there were twice as many WAAS procedures (LPVs and LPs) as there are ILS IAPs in the country.

To provide a non-precision approach to Runway 20, the FAA may be able to publish a RNAV GPS approach. The addition of an approach lighting system would also result in lower visibility minimums, but is not considered practical due to the River. As the localizer is aimed a slight angle away from the actual runway alignment, it cannot be used for a non-precision, back-course localizer approach for Runway 20.

A summary of the existing IAP at HFD and the facility recommendations is provided in Table 3-17.

Table 3-17 – Recommended Instrument Approach Procedures

	Existing	**Recommended**	**Deficit**
Runway 2	RNAV GPS, LDA, VOR/DME, & Visual	LPV	LPV
Runway 20	None	RNAV GPS/LPV	RNAV GPS/LPV
Runway 11	None	None	None
Runway 29	None	None	None

3.8 Landside Facilities

This section describes the guidelines and methodologies used to develop the landside facility requirements for HFD. The following categories were examined as part of the landside facility analysis:

- Aircraft Hangar
- Aircraft Aprons (Parking and Tiedowns)

- Administration Building
- Fueling Facilities
- Automobile Parking
- Roadway Access
- Perimeter Fencing
- Obstruction Marking and Lighting
- Security Features
- Wildlife Control Features

3.8.1 Aircraft Hangars

Due to various weather conditions, hangars are highly desirable in the Northeast. Snow storms, frost, and intense cold cause icing on parked aircraft, which can be extremely disrupting to charter and training operators. Heat and sun exposure can damage avionics and fade paint. For GA airports, hangar requirements are a function of the number of based aircraft, type and relative value of aircraft to be accommodated, owner preferences, hangar rental costs, and area climate. The requirements for hangar space at HFD were estimated based on standard planning ratios, discussions with the airport owner/manager, and discussion with airport users. The requirements were calculated using the following standard planning assumptions in Table 3-18.

Table 3-18 - Aircraft Storage Planning Assumptions

Aircraft Type	Desired Storage Type	Percentage	Requirement (SF)
Single-Engine	Paved Tiedown	25%	2,700
	T-Hangar	75%	1,050
Multi-Engine	T-Hangar	25%	1,200
	Conventional Hangar	75%	1,600
Turboprop / Jet	Conventional Hangar	100%	1,600
Helicopter	Conventional Hangar	100%	1,000

Table 3-19 summarizes the based aircraft forecast calculated in Chapter 2.

Table 3-19 – Based Aircraft Forecast Summary

Year	Current	2030
Single-Engine	136	143
Multi-Engine	11	13
Turboprop / Jet	5	8
Helicopter	2	4
Total	**154**	**168**

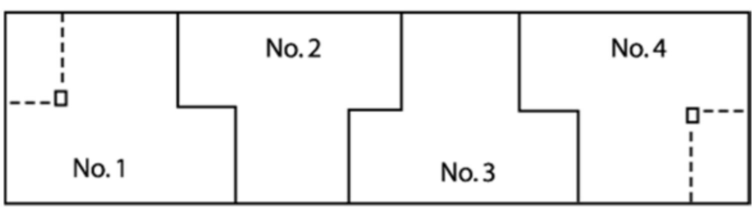
Table 3-20 displays the number of based aircraft by their desired storage using the assumptions in Table 3-18.

Table 3-20 - Aircraft Storage Forecasts			
Aircraft Type	**Desired Storage Type**	**2010**	**2030**
Single-Engine	Paved Tiedown	34	36
	T-Hangar	102	107
Multi-Engine	T-Hangar	3	3
	Conventional Hangar	8	10
Turboprop / Jet	Conventional Hangar	5	8
Helicopter	Conventional Hangar	2	4
Total		**154**	**168**

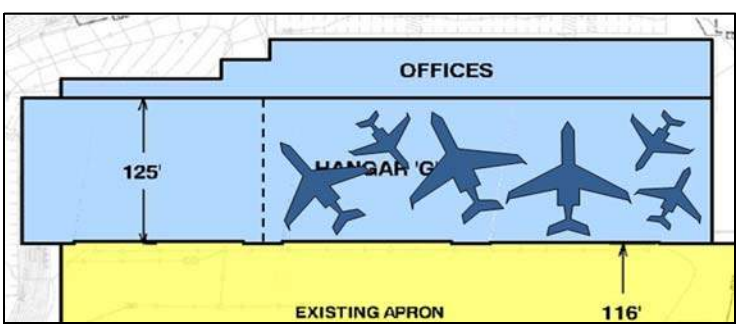
Based on the assumptions and forecast above, the hangar space requirements were calculated for HFD, as summarized in Table 3-19. Tiedown space was allocated as part of the airport apron area, and is discussed in Section 3.8.2. The existing conventional hangar area in Tables 3-19 and 3-21 do not include Building 25 (Figure 1-3) as it is used exclusively for the CT State Police.

Table 3-21 shows a need for additional hangar storage at HFD. There are currently 66 T-hangar bays located at HFD, with an estimated demand of 105 in 2012. Thus, an additional 39 bays may be needed.

There are an additional 10 aircraft that could be accommodated in the existing conventional hangars, thus this may reduce the demand for additional T-hangars bays in 2012. Though, in 2030 there will not be enough space in the conventional hangars to accommodate the future demand of both aircraft desiring to be in T-hangars and conventional hangars. Additionally, some tenants will not wish to pay the higher cost of a conventional hangar or share their space with other aircraft. As conventional hangars require positioning aircraft behind others, regular aircraft towing and repositioning is required. T-hangar storage avoids this requirement.



Nested T-hangars



Conventional Hangar

Table 3-21 – Based Aircraft Storage Requirements				
Location/Aircraft	**Current**		**2030**	
	Aircraft	**Area (sf)**	**Aircraft**	**Area (sf)**
Conventional Hangar				
Multi-Engine	8	13,200	10	15,600
Turboprop / Jet	5	8,000	8	12,800
Helicopter	2	2,000	4	4,000
Total Recommended	*15*	*23,200*	*22*	*32400*
Existing Area Available	32	51,200	32	51,200
Surplus (Deficit)	***17***	***28,000***	***10***	***18,800***
T-Hangar / Small-Individual Hangar				
Single-Engine	102	107,100	107	112,613
Multi-Engine	3	3,300	3	3,900
Total Recommended	*105*	*110,400*	*111*	*116,513*
Existing Area Available	66	74,100	66	74,100
Surplus (Deficit)	***(39)***	***(36,300)***	***(45)***	***(42,413)***
Paved Tiedown				
Single-Engine	34	91,800	36	96,525
Total Recommended	*34*	*91,800*	*36*	*96525*
Existing Area Available	167	601,000	167	601,000
Surplus (Deficit)	***133***	***509,200***	***131***	***504,475***
Total Based Aircraft	**154**	**-**	**168**	**-**

Note that the hangar demand evaluation does not fully address costs. To build new hangars and rent them at a reasonable profit may require a monthly rent $400. Thus, although essentially all aircraft owners may prefer hangar storage, a certain percentage would not choose to pay a hangar rent of that level.

The large number of surplus tiedowns at HFD indicates that there is additional landside property that could be utilized for the construction of new hangars to accommodate future demand. Of the 167 tiedowns at HFD, 20 are designated for transient aircraft and not included in the based aircraft storage calculations.

Table 3-22 displays the potential based aircraft if both Runway 2-20 was extended, thus attracting four additional based jets from BDL, and nearby private airports closed, attracting 75 additional based aircraft. Section 2.6 contains more information regarding the potential scenario at HFD.

Table 3-22 – Potential Growth Based Aircraft Forecast Summary		
Year	**Current**	**2030**
Single-Engine	136	213
Multi-Engine	11	18
Turboprop / Jet	5	12
Helicopter	2	4
Total	**154**	**247**

Overall, the number of based aircraft could increase by 92 through 2030. Table 3-23 displays the potential storage requirements if the growth scenario were to happen. The number of desired T-hangars would increase from 111 in 2012 to 164 in 2030; creating a potential deficit of 98 T-hangars bays. However, as many of the aircraft at the private airports are older and less costly light aircraft, the preference for tiedowns would like increase. As with the recommended forecast, some of these aircraft could be accommodated in conventional hangars, but there would still be an immediate shortage of hangar space.

Table 3-23 – Potential Growth Scenario Based Aircraft Storage Requirements		
Location/Aircraft	**2030**	
	Aircraft	**Area (sf)**
Conventional Hangar		
Multi-Engine	14	21,600
Turboprop / Jet	12	19,200
Helicopter	4	4,000
Total Recommended	*30*	*44800*
Existing Available	32	51,200
Surplus (Deficit)	***3***	***6,400***
T-Hangar / Small-Individual Hangar		
Single-Engine	160	167,738
Multi-Engine	5	5,400
Total Recommended	*164*	*173,138*
Existing Available	66	74,100
Surplus (Deficit)	***(98)***	***(99,038)***
Paved Tiedown		
Single-Engine	53	143,775
Total Recommended	*53*	*143775*
Existing Available	147	601,000
Surplus (Deficit)	***94***	***457,225***
Total Based Aircraft	**247**	**-**

3.8.2 Aircraft Aprons (Tiedowns)

Aircraft aprons provide parking and tiedown positions for based and transient aircraft, as well as staging areas for aircraft stored in conventional hangars.

Based Aircraft

As shown in Table 3-16, there are a total of 147 paved tiedowns at HFD; an additional 20 tiedowns are designated for transient aircraft. Although Table 3-16 shows a surplus of paved tiedowns, the T-hangar storage deficit results in increased utilization and demand for paved tiedowns. Assuming that no new hangars are developed, a total of 45 additional paved tiedowns would be utilized in the combined long-term hangar requirements. As there is currently a surplus of 111 tiedowns, no additional tiedowns are necessary to accommodate the long-term storage goals of based aircraft.

If the potential growth scenario were to take place, 53 tiedown locations would be needed. If no new T-hangars were constructed, 151 aircraft would need a tiedown; 53 aircraft desiring tiedowns and 98 additional aircraft desiring T-hangars, but not able to obtain one. In this scenario there would not be adequate aircraft storage at HFD.

Transient Aircraft

Transient aircraft include visiting corporate and private GA aircraft, and aircraft using maintenance services. Transient aircraft parking is needed on a short-term basis, typically from a few hours to several nights. The size of the apron necessary to satisfy future transient aircraft demands was estimated from the forecast number of itinerant operations, using the following procedure:

- From the itinerant operations forecasts (Table 2-12), calculate the average number of daily itinerant landings.
- Assume a busy day is 10 percent busier than the average day.
- Assume that 25 percent of itinerant landings are conducted by transient aircraft needing apron parking (the remaining 75 percent are returning based aircraft).
- Calculate the transient ramp requirements using a factor of 3,240 SF per aircraft.

Applying this approach to the itinerant operations forecasts yields the apron requirements summarized in Table 3-24. 16 transient parking positions (requiring 51,800 SF of apron) are needed to accommodate future demand. As there are 20 existing transient tiedowns, this capacity is sufficient for the planning period.

Table 3-24 – Transient Aircraft Apron Requirements		
Activity/Requirement	**Current**	**2030**
Annual Itinerant Operations	39,800	42,800
Average Daily Itinerant Operations	109	117
Busy Day Itinerant Landings	60	64
Transient Tiedowns Required	15	16
Transient Apron Area Required	48,600	51,800
Existing Transient Tiedowns	20	20
Surplus (Deficit)	***5***	***4***

3.8.3 Administration and GA Terminal Building

A GA terminal and administration building typically provides space for management offices, flight planning, a pilot lounge, and restrooms. The building may consist of a separate facility, or a space attached to a hangar. For airports similar to HFD, 5,000 to 6,000 square feet (SF) of terminal/operations space typically meets management and pilot/passenger needs. Currently, the FBO terminal building is 4,600 SF. The airport management office and maintenance is located in another building. It is anticipated that the existing terminal space would be considered adequate for the planning period assuming the airport management remains in a separate building.

3.8.4 Fueling Facilities

HFD currently stores aircraft fuel in aboveground tanks which store 12,000 gallons of 100 Low-Lead (LL) fuel and 12,000 gallons of Jet-A fuel. This capacity if considered sufficient for the planning period. Commonly, 10,000 gallons of both fuel types are recommended. If the airport were to experience a significant growth in corporate activity, an additional tank for Jet-A may be necessary.

3.8.5 Automobile Parking

The number of automobile parking spaces at a GA airport primarily depends on aircraft activity. HFD currently provides approximately 360 parking spaces in various locations. As such, the overall number of automobile parking spaces is considered adequate for the number of peak daily operations expected by 2030 (i.e., approximately 120 operations).

However, the parking is concentrated near the Midfield Ramp and FBO. Parking is inadequate near the South Ramp and T-hangar area. More accessible vehicle parking lots will be reviewed as part of this study.

3.8.6 Roadway Access

As previously discussed in Chapter 1, vehicle access to the airport is provided via I-91 and the Wilbur Cross Highway (Routes 5 and 15) to Maxim Road and Lindbergh Drive. These two streets provide access to the west side of the airfield for all existing tenants. Vehicle access is not available from other locations due to the Clark Dike and Connecticut River, and existing development.

The existing access is considered adequate, but a second access directly from Brainard or Murphy Road would be beneficial.

3.8.7 Perimeter Fencing

While it is not required for GA airports to have a perimeter fence, a perimeter fence is situated along much of the border of the airport property at HFD. There is currently no fence to the east of the airport along the Clark Dike. This allows potentially hazardous wildlife and the occasional person to access the airfield. It is recommended that fencing be installed along this location to prevent future access to the airfield.

3.8.8 Obstruction Marking and Lighting

In 2010, an Obstruction Evaluation was completed through the CTDOT. The evaluation listed all obstructions identified to each of the Federal Aviation Regulations (FAR) Part 77 Imaginary Surfaces, as well as the Approach, Departure, and Threshold Siting Surfaces. These obstructions will be displayed on the Airport Layout Plan (ALP).

Table 3-25 displays the surfaces that are currently penetrated by each runway end. In general, existing obstruction include:

- The Clark Dike
- Trees along the Connecticut River
- Towers and stacks to the north of the Airport

The Clark Dike is currently equipped with appropriate obstruction lighting per AC 70/7460-1K *Obstruction Marking and Lighting.* There are numerous tree obstruction areas surrounding the airport and more that have the potential to become obstructions as they grow. These obstructions will be addressed as part of this master plan.

Table 3-25 - Airspace Obstructions

Runway	Surfaces Penetrated
Runway 2	Approach Surface, Threshold Siting Surface, Final Approach Segment for the IAP, and Departure Surface
Runway 20	Approach Surface, Departure Surface, and Final Approach Segment for the IAP
Runway 29	Approach Surface, Departure Surface, and Final Approach Segment for the IAP,

3.8.9 Security Features

The security review provides an evaluation of HFD’s current security features and procedures based on the Transportation Security Administration (TSA) *Security Guidelines for General*

Aviation Airports (May 2004). For HFD, many of the items suggested by TSA are procedural in nature. The TSA guidelines specific to HFD include consideration of the following items:

- Potential Midfield Ramp Lighting
- Vehicle Identification
- Secondary Aircraft Locking Devices
- An Airport Security Committee and Procedures Document that incorporate the following:
  - Law Enforcement Officer procedures
  - Challenge Procedures (for confronting unfamiliar individuals and suspicious activity)
  - Transient Pilot Sign-in/Sign-out Procedures
  - A procedure for charter and flight training operators to positively identify all passengers and cargo

In October 2008, TSA issued a Notice of Proposed Rulemaking (NPRM) for the Large Aircraft Security Program (LASP). The LASP regulation would require all U.S. operators of aircraft exceeding 12,500 pounds maximum take-off weight to implement security programs that would be subject to compliance audits by TSA, such as:

- Verifying that passengers are not on the No Fly and/or the federal government's consolidated terrorist watch list
- Conduct fingerprint based criminal history records on all employees.

At the time of the writing, this regulation has not been enacted. If federal action is taken on this program, the operators at HFD would be required to follow its mandates as many of their aircraft are over 12,500 pounds. New airport facilities are not included in the NPRM.

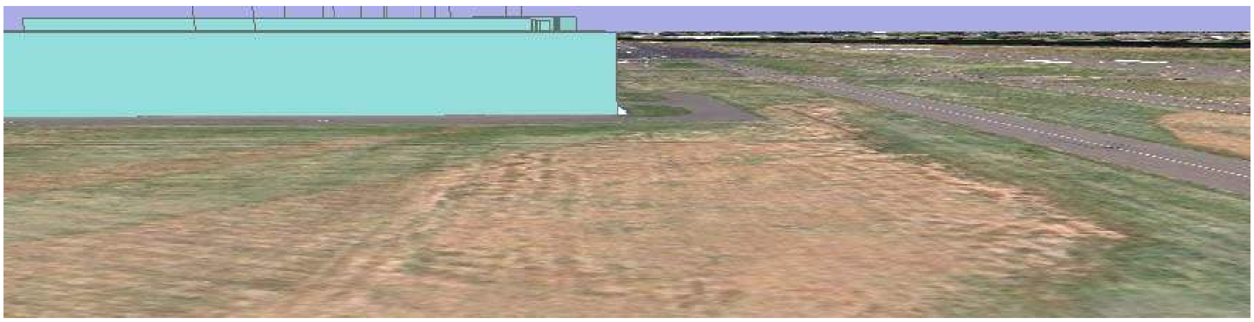
In July 2010, TSA launched the General Aviation Secure Program, which builds upon AOPA's Airport Watch Program. The program encourages every person at the airport to be vigilant of the happenings of the airport and report any suspicious activity. The programs tagline is "If you see something, say something." If it raises your suspicions, it might be a problem. For emergencies or time-sensitive issues, TSA recommends calling 911 first, otherwise provides 1-866-GA-SECURE as an alternative for reporting suspicious activity.

Additionally, aircraft operators and fixed base operators are encouraged to review the TSA's Security Action Items (SAI) available on their website. These voluntary action items are intended to provide guidance to aircraft operators and fixed base operators as they implement security measures best suited to their particular circumstances. While these initiatives are in TSA's Security Guidelines for GA Airports, these documents provide information geared directly towards aircraft operators and fixed based operators.

3.9 Control Tower Line of Sight

Controllers in the Air Traffic Control Tower (ATCT) need to be able to see all areas of the airport for which ATC services are provided. These areas are classified as "movement areas" and encompass the runways, parallel taxiway systems, and heliports. Taxilanes, apron areas, and hangar areas are typically considered "non-movement areas," meaning aircraft in these areas are not provided with ATC services and are not under ATC control. Before an aircraft leaves a non-movement area, it must contact ATC and receive instructions.

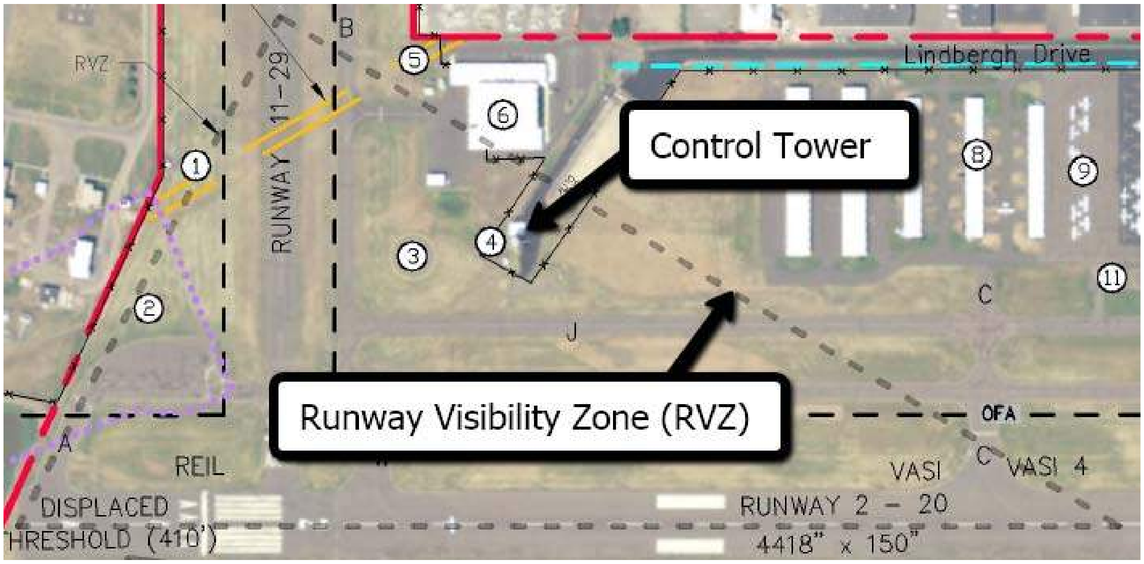
Ensuring a clear line-of-sight for the ATCT can affect areas available for future development. Utilizing 3-D technology, the line of sight from the tower can be determined for individual areas on the airfield. Figure 3-6, shows the areas that cannot be adequately seen by the controllers from the cab of the ATCT (i.e., the "shadow" areas). As shown in the image below, there are several aircraft parking areas that cannot be seen by the ATCT due to the existing hangars. These apron areas are not within the movement area. However, due to equipment within the ATCT and mechanical facilities atop the roof of the CT Aero Tech School, aircraft on Taxiway B near the Runway 11 end are partially obscured.



Visual Depiction of Sight from ATCT

Due to the ATCT location, the airport should avoid constructing any structures closer to the Runway 2-20 than the existing T-hangars.

A second line-of-sight consideration is the RVZ. At HFD, the RVZ encompasses the infield area to the northwest of the runway intersection as shown below. Development of any type should be avoided in this location as it would block the view from aircraft on one runway to an aircraft on the other runway. This FAA standard is applicable regardless of the operation of the control tower. It is intended to enable pilots to actively see and avoid other aircraft operating at the Airport's runways. As the RVZ standard only applies to intersecting runways, if Runway 11-29 was closed, it would eliminate the RVZ.



The current ATCT location enables controller to observe aircraft landing on Runway 11. The elimination of Runway 11-29 would allow the ATCT building to be relocated if desired. If it was relocated to midfield of Runway 2-20, the aircraft parking areas could be seen much more easily by the ATCT. Additionally, if the runway were to close and the ATCT remain in its current location, future development along Taxiway J will need to be closely reviewed to ensure it does not impact the line of sight to the Runway 20 end.

3.10 Potential Air Traffic Control Tower Closure

In early 2013, the FAA identified 149 ATCT that may be closed due to the recent sequester's requirement that the 2013 budget be reduced by $600 million dollars. HFD's tower was amongst those identified. The original closure date was in April, but in May 2013, Congress passes legislation that allowed the FAA to transfer funds from other FAA funding sources to prevent the closures; as of June 2013 the closures have been cancelled. The 2014 FAA fiscal year begins October 1, 2014 and the 2014 operating budget has not yet been approved. As such, it is unknown at the time of this study whether there will be budget for the towers to remain open through 2014 and beyond.

Therefore, the CTDOT has reviewed the potential implications to HFD and the necessary steps. Many of the steps are operational or maintenance items, but a few of them may have a larger impact. These include:

- Turf Runway Closure – The turf runway and Runway 2-20 are too close to be utilize without the tower open. The turf runway will have to be deemed inoperable.
- Right Traffic Pattern – The standard traffic pattern for Runway 2 is left traffic, but right traffic is utilized when the tower is open to assist with noise abatement. If the tower were to close the right traffic pattern would need to be formalized with the FAA to maintain this procedure.

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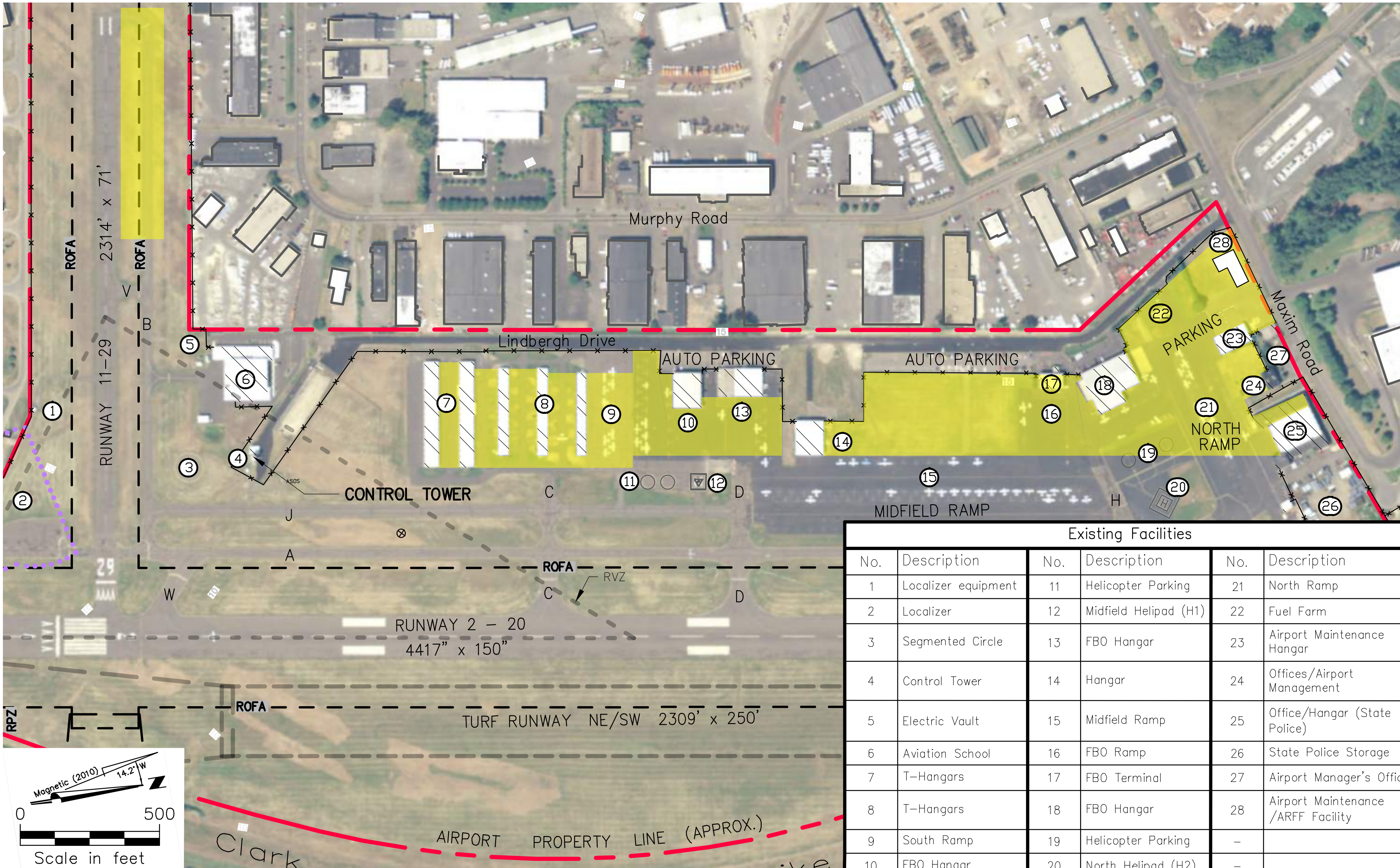


No.	Description	No.	Description	No.	Description
1	Localizer equipment	11	Helicopter Parking	21	North Ramp
2	Localizer	12	Midfield Helipad (H1)	22	Fuel Farm
3	Segmented Circle	13	FBO Hangar	23	Airport Maintenance Hangar
4	Control Tower	14	Hangar	24	Offices/Airport Management
5	Electric Vault	15	Midfield Ramp	25	Office/Hangar (State Police)
6	Aviation School	16	FBO Ramp	26	State Police Storage
7	T-Hangars	17	FBO Terminal	27	Airport Manager's Office
8	T-Hangars	18	FBO Hangar	28	Airport Maintenance /ARFF Facility
9	South Ramp	19	Helicopter Parking	–	
10	FBO Hangar	20	North Helipad (H2)	–	

Existing Facilities

LEGEND

AIRPORT PROPERTY LINE

1 EXISTING FACILITY

APPROX. FENCELINE

SHADOW AREA

CHA

2139 Silas Deane Highway, Suite 212 • Rocky Hill, CT 06067-2336
Main: (860) 257-4557 • www.chacompanies.com

ATCT LINE OF SIGHT

Hartford–Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: JAN. 2014

FIGURE 3-8

3.11 Facility Requirements Summary

The facility deficits that have been identified in this chapter are listed in Tables 3-26 and 3-27.

Table 3-26 – Summary of Airside Facility Deficits

Airfield Facility	Existing	2030 Recommendation	Deficit
Runway 2-20			
Runway Protection Zone	Uncontrolled Acreage	Controlled by Sponsor	Controlled by Sponsor
Runway Safety Area (RSA): Length (beyond Runway 2) Length (beyond Runway 20)	 0’ 0’	 300’ 300’	 300’ 300’
Object Free Area (OFA): Length (beyond Runway 2) Length (beyond Runway 20) Width	 0’ 0’ 329’	 300’ 300’ 500’	 300’ 300’ 171’
Runway Length	4,417'	5,000*	583'
Taxilane Object Free Area (TLOFA) Width	54’ to 115’	63.2’ to 115’	9.2’
Instrument Approach Procedures (Runway 2)	RNAV GPS, LDA, VOR/DME, & Visual	LPV	LPV
Instrument Approach Procedures (Runway 20)	None	RNAV GPS	RNAV GPS
Obstructions	Trees & Dike	Further Study	Further Study
Runway 11-29			
Runway Protection Zone	Uncontrolled Acreage	Controlled by Sponsor	Controlled by Sponsor
Obstructions	Trees & Dike	Further Study	Further Study

*5,000’ or greater, to meet requirements for corporate aircraft, charter operators, and insurance requirements

Table 3-27 – Summary of Landside Facility Deficits			
Airfield Facility	**Existing**	**2030 Recommendation**	**Deficit**
T-Hangar	66 Bays	111 Bays	45 Bays
Automobile Parking	360	Additional Near Aircraft Storage	Additional Near Aircraft Storage
Perimeter Fencing	Partial	Complete Perimeter	Complete Perimeter
Security Features	Various	Lighting, Secondary Locks, Vehicle Identification, Formal Procedures	Lighting, Secondary Locks, Vehicle Identification, Formal Procedures

4.0 ENVIRONMENTAL OVERVIEW

The following sections provide information on the existing environmental conditions and constraints within the Study Area for the Hartford-Brainard Airport (HFD) Master Plan Update (MPU). The various sections presented in this chapter were obtained from the environmental impact categories provided in the Federal Aviation Administration (FAA) Order 1050.1E. The Study Area includes property owned by HFD and the immediate surrounding area. Agency correspondence is available as Appendix A of this MPU.

The information presented in the following sections was obtained from site visits, GIS data from Connecticut Environmental Conditions Online, and a review of available maps and reports, including the 1999 Airport Master Plan Update. This information is presented in the following sections:

- Air Quality
- Biotic Resources
- Coastal Resources
- Compatible Land Use & Zoning
- Construction
- Cumulative Impacts
- DOT Section 4(f)
- Federally-listed Endangered and Threatened Species
- Energy Supplies, Natural Resources, and Sustainable Design
- Environmental Justice
- Farmlands
- Floodplains
- Hazardous Materials and Solid Waste
- Historical and Archeological
- Induced Socioeconomic
- Light Emissions and Visual Effects
- Noise
- Social Impacts
- Water Quality
- Wetlands
- Wild and Scenic Rivers
- Wildlife Assessment

4.1 <u>General Setting</u>

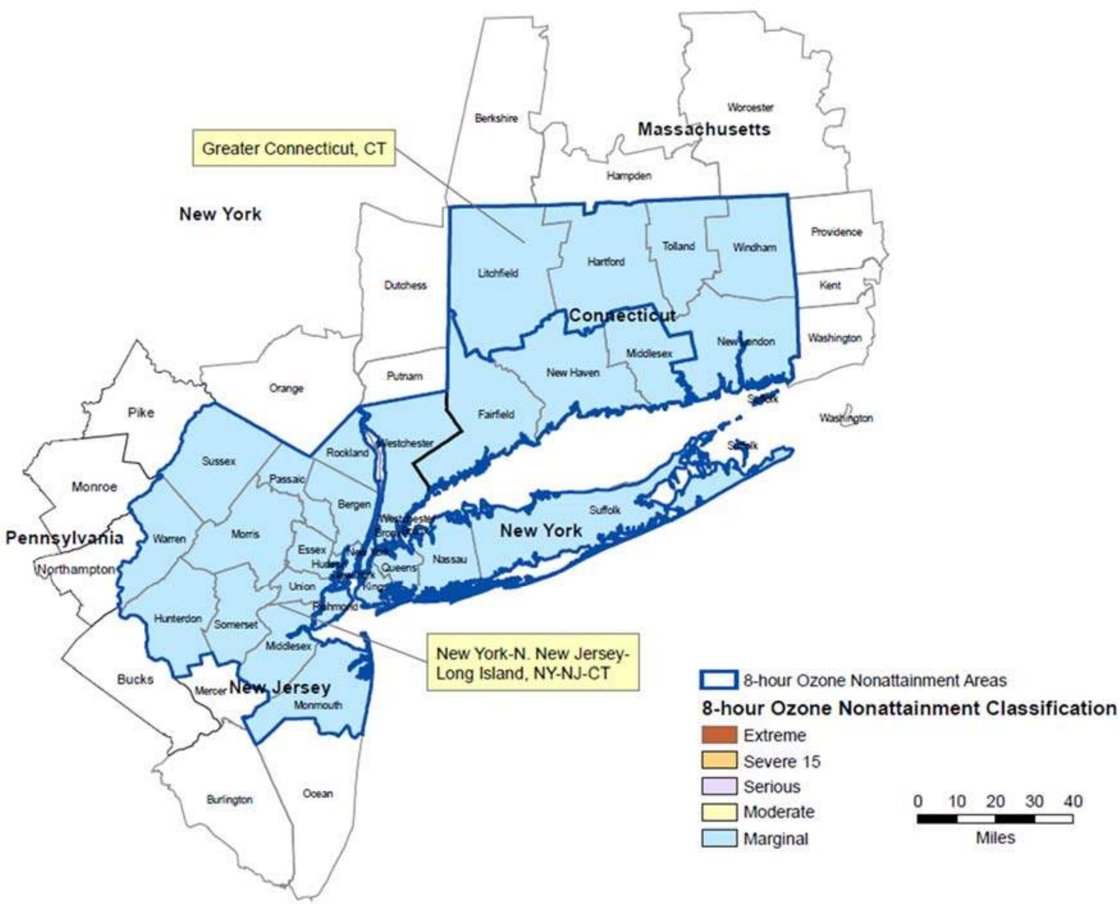
HFD is located approximately two miles southeast of downtown Hartford near the intersections of Interstates I-84 and I-91 and approximately 12 miles south of Bradley International Airport, as shown as Figure 4-1. The airport's property is approximately 201 acres in size.

4.2 Air Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six "criteria air pollutants" (i.e., ozone, carbon monoxide, particulates, sulfur dioxide, nitrogen dioxide, and lead). States must identify geographic areas, termed "nonattainment" areas that do not meet the NAAQS. A non-attainment area is an area that does not meet, or contributes to the air quality in a nearby area that does not meet the NAAQS for a given pollutant. Areas that meet the NAAQS are termed "attainment" areas. The U.S. EPA designates areas as non-attainment for air quality and classifies them according to severity.

According to the EPA Green Book, Hartford County is part of the Greater Connecticut Area and is classified as a marginal 8-hour Ozone Nonattainment Area (2008 Standard). Monitoring between 2008 and 2011 indicates that ozone concentration of the 5 counties within this area is 0.079 ppm. This value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentrations. According to Clean Air Act (CAA), Hartford County is subject to planning and emission reduction requirements as specified in the CAA.

Connecticut 8-hour Ozone Nonattainment Areas (2008 Standard) 7/2012



Hartford County is not indicated as a Carbon Monoxide, or Nitrogen Dioxide Maintenance Areas, and meets attainment requirements for Sulfur Dioxide, Particulate Matter (PM-10), Particulate Matter (PM-2.5) (1997 Standard), and lead (2008 Standard).

In the past, there have been complaints of soot deposits occurring on and off the airport property. Some of the complainants have indicated that they suspect that the airport and its activities are the main contributor to the soot deposition. An analysis, available from CTDOT by request, determined if there is a soot deposition condition in Wethersfield and other communities adjacent to HFD; and, if so, whether or not the airport is a significant contributor to that condition. As it was anticipated that there are multiple sources of the soot within the area, it was not the intention of this analysis to conclude the one specific source for these complaints.

In order to assess the potential for a soot deposition condition, the analysis evaluated the emissions and concentrations of the two categories of particulate matter (PM) for which there are National and Connecticut Ambient Air Quality Standards. The two categories of PM are particulate matter of 10 microns or less (PM_{10}) and particulate matter of 2.5 microns or less ($PM_{2.5}$). In order to calculate PM emissions from On-Airport and Off-Airport sources, source activity data were entered into the latest version of the Federal Aviation Administration's (FAA's) Emissions and Dispersion Modeling System (EDMS) program, Version 5.1.3 (FAA, 2010a). EDMS is FAA's official program for calculating pollutant emissions from aircraft sources. EDMS also calculates emissions from many other source types including motor vehicles on roadways, boilers, generators, and incinerators (FAA, 2010b).

Table 4-1 below lists the emissions from the identified sources. While the on-airport sources are estimated to be 12 and 16 percent, aircraft were only estimated to be 1 and 2 percent of the total. The highest contributor, 51 and 65 percent, was the vehicles on non-airport related roads, such as I-91 and Routes 2, 3, and 5. As such, HFD's impact on soot deposition in communities adjacent to the airport is not considered to be significant.

Table 4-1 - Hartford-Brainard Airport PM_{10} and $PM_{2.5}$ Emissions for 2011

Source Category	PM_{10} Emissions (tons/year)	$PM_{2.5}$ Emissions (tons/year)
On-Airport Sources Only		
Aircraft	0.26	0.26
GSE	0.05	0.05
Roadways	0.24	0.12
Stationary Sources	1.95	1.95
Total All On-Airport Sources	**2.50**	**2.38**
Off-Airport Roads	**13.40**	**7.51**
Incinerators	**4.59**	**4.59**
Total All Sources	**20.49**	**14.48**

4.3 Biotic Resources

Potential wildlife habitat on Airport property mostly consists of the maintained grassy airfield, a vegetated ditch, asphalt surfaces and airport structures. During site visits in 2011, various bird species were noted on the airfield, including crows (*Corvus brachyrhynchos*), red-tailed hawks (*Buteo jamaicensis*), gulls (*Larus sp.*), bald eagles (*Haliaeetus leucocephalus*), and various songbirds. Mammal burrows were also noted in the grassy area east of Runway 2-20.

Natural wildlife habitat surrounding HFD is mostly limited to the Connecticut River and floodplain area located east of HFD, along with the Wethersfield Cove and Folly Brook Natural Area located south of HFD. These areas mostly consist of forested, floodplain wetlands and lacustrine and riparian habitats. As described in Connecticut's Comprehensive Wildlife Conservation Strategy, large rivers provide holding, migration staging areas, and foraging and spawning areas for many fish species.

Several commercial and industrial areas are also located within the vicinity of HFD that are huge attractants to wildlife species. These areas include the Metropolitan District Commission's Water Pollution Control Plant, the Connecticut Resource Recovery Authority's Trash to Energy Plant and the All-Waste transfer facility. An abundance of wildlife, especially birds, are drawn to these areas and utilize HFD for feeding and loafing.

According to information received from the National Marine Fisheries Service (NMFS) Habitat Conservation Division in March 2012, the Connecticut River provides Essential Fish Habitat (EFH) for Atlantic salmon and other anadromous fishery resources. The Magnuson-Stevens Fisheries Conservation Management Act and the Fish and Wildlife Coordination Act require federal agencies to consult with the NMFS for proposed activities that could impact EFH. If proposed projects at HFD involve any in-water work or other potential impacts to the Connecticut River, coordination with the NMFS Habitat Conservation Division should occur and the preparation of an EFH assessment may be required.

4.4 Coastal Resources

Coastal Resources include resources protected under the Federal Coastal Zone Management Act and the Coastal Barrier Resources Act. No such resources are located within the Study Area.

4.5 Compatible Land Use & Zoning

According to FAA Order 1050.1E, the compatibility of existing and planned land uses near an airport is generally associated with the extent of the airport's noise impacts. The land use categories discussed in this section were selected to be consistent with the requirements of the FAA regulations on noise and land use compatibility planning (14 CFR 150, referred to as Part 150). The residential category includes all single- and multi-family dwellings. The commercial/industrial category includes all businesses, offices, industrial uses, warehouse uses, utilities, and institutions that are not noise-sensitive. The open space/recreation category includes areas of vacant land, parks and recreational facilities, conservation land, watercourses, and wetlands. General land use is discussed for each municipality in the following sections. Figure 4-1 shows the general locations of the various land use categories within the Study Area.

4.5.1 Hartford

The majority of the Study Area within Hartford includes commercial and industrial uses. These uses are located north and west of the Airport, along Murphy Road, Maxim Road, and Brainard Road. An open space area is located east and south of HFD, along the flood levee.

According to the Hartford Zoning Map, dated February 11, 2008, (Figure 4-2) HFD is zoned as an Industrial District (I-2). Properties located north and west of the Airport are also zoned as an Industrial District (I-2). The I-2 industrial district allows medium to heavy industry characterized by a minimum of noise, odor, glare, and pollution, and by moderate traffic on public streets. This zoning district is designed to encourage the maintenance and expansion of industry and to develop a more compatible relationship with surrounding residential areas.

A Commercial District (C-1) is located southwest of HFD, between Brainard Road and Interstate 91. C-1 zones allow wholesale or other large scale commercial land uses, such as storage warehouses, laboratories, computer centers, and offices of equipment manufacturers.

East of HFD, along the Connecticut River, there is a Public Property and Cemetery District (P). The area between Interstate 91 and the Wilbur Cross Highway is also zoned P.

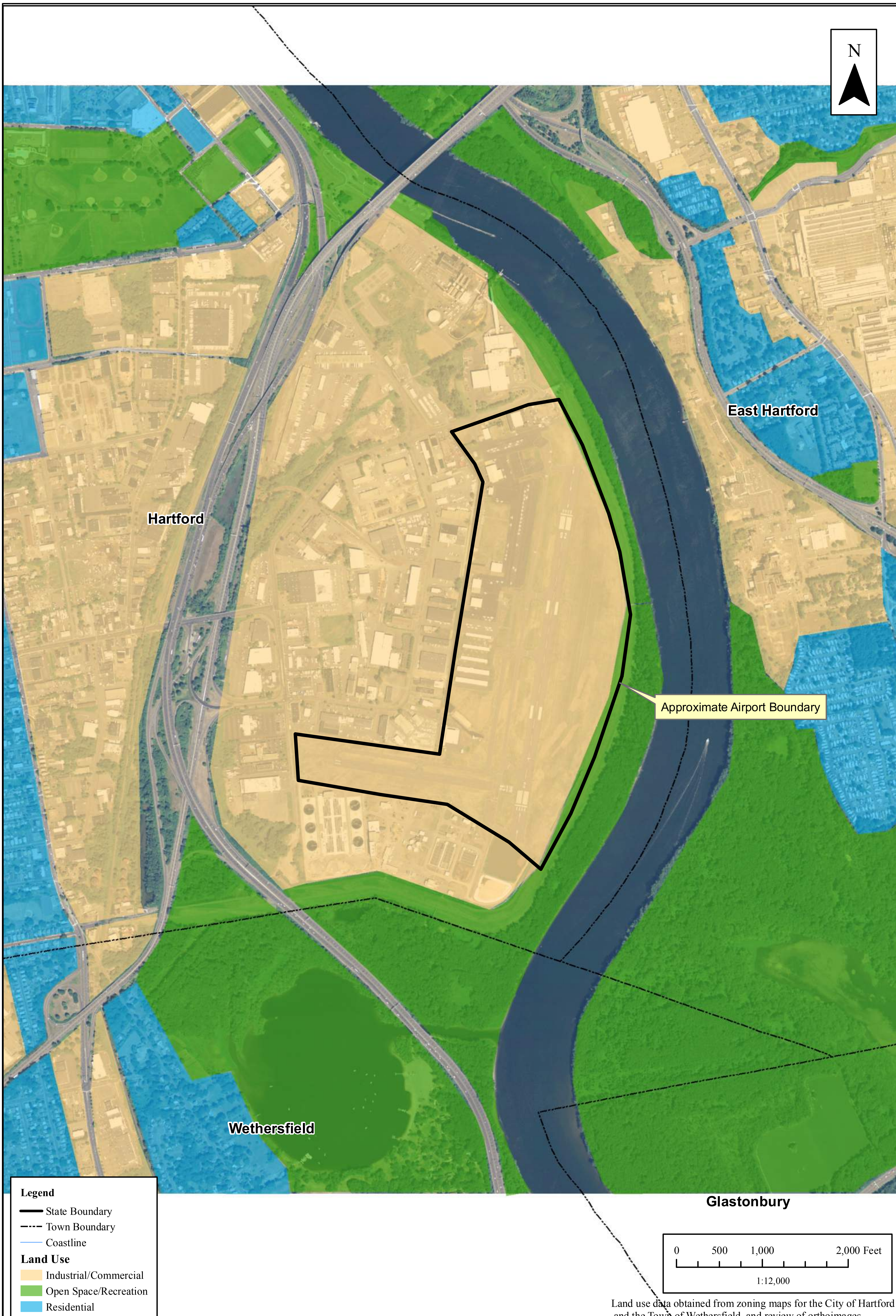
No residentially-zoned districts are located within the City of Hartford in the immediate vicinity of HFD. The nearest residentially zoned district within the City of Hartford is located approximately 1.5 miles northwest of the Airport, between Interstate 91 and Colt Park. This area, zoned R-1, high density residential district, allows 150 persons per acre in multiple family residential structures.

4.5.2 Wethersfield

Land use immediately south of HFD, within the Town of Wethersfield, generally includes open space. The area consists of wetland and floodplain areas associated with the Connecticut River and Wethersfield Cove. Residential areas are located south and west of Wetherfield Cove, further away from HFD.

According to the Wethersfield Zoning Map, dated June 2006, (Figure 4-3) the area south of HFD, near Wethersfield Cove and the Connecticut River is zoned as Agricultural (AG). This includes the Folly Brook Natural Area, which is located north of Wethersfield Cove.

The residential areas located south and west of Wethersfield Cove are zoned as Single Family Residence (A, B, and C). The nearest residential areas within the Town of Wethersfield are located approximately 0.7 miles south of the southern boundary of HFD. The potential impact to these residents due to HFD airport activity is discussed further in Section 4.17.



Land use data obtained from zoning maps for the City of Hartford and the Town of Wethersfield, and review of orthoimages.

Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 4-1
Land Use

The Smart Associates
Environmental Consultants, Inc.

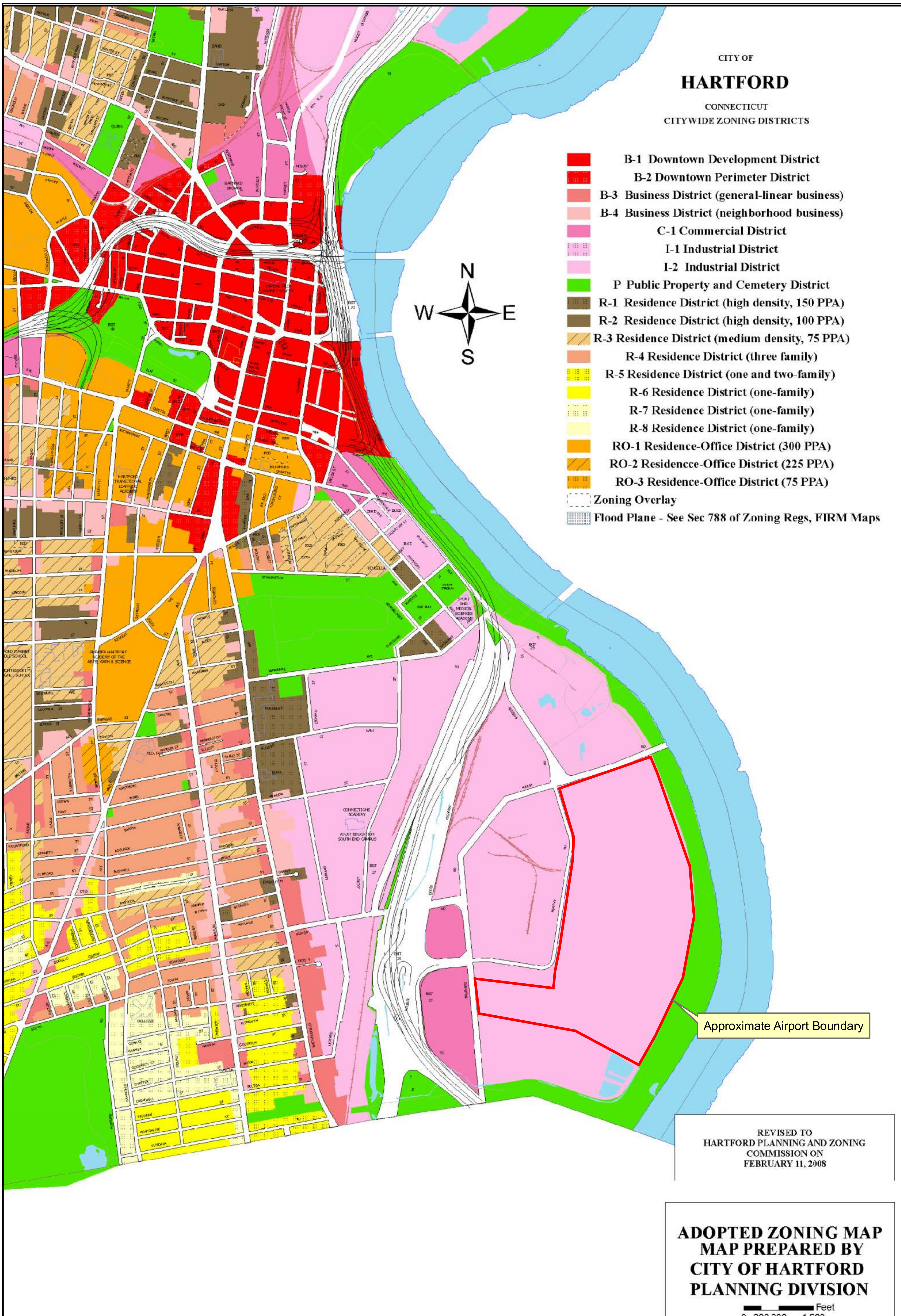
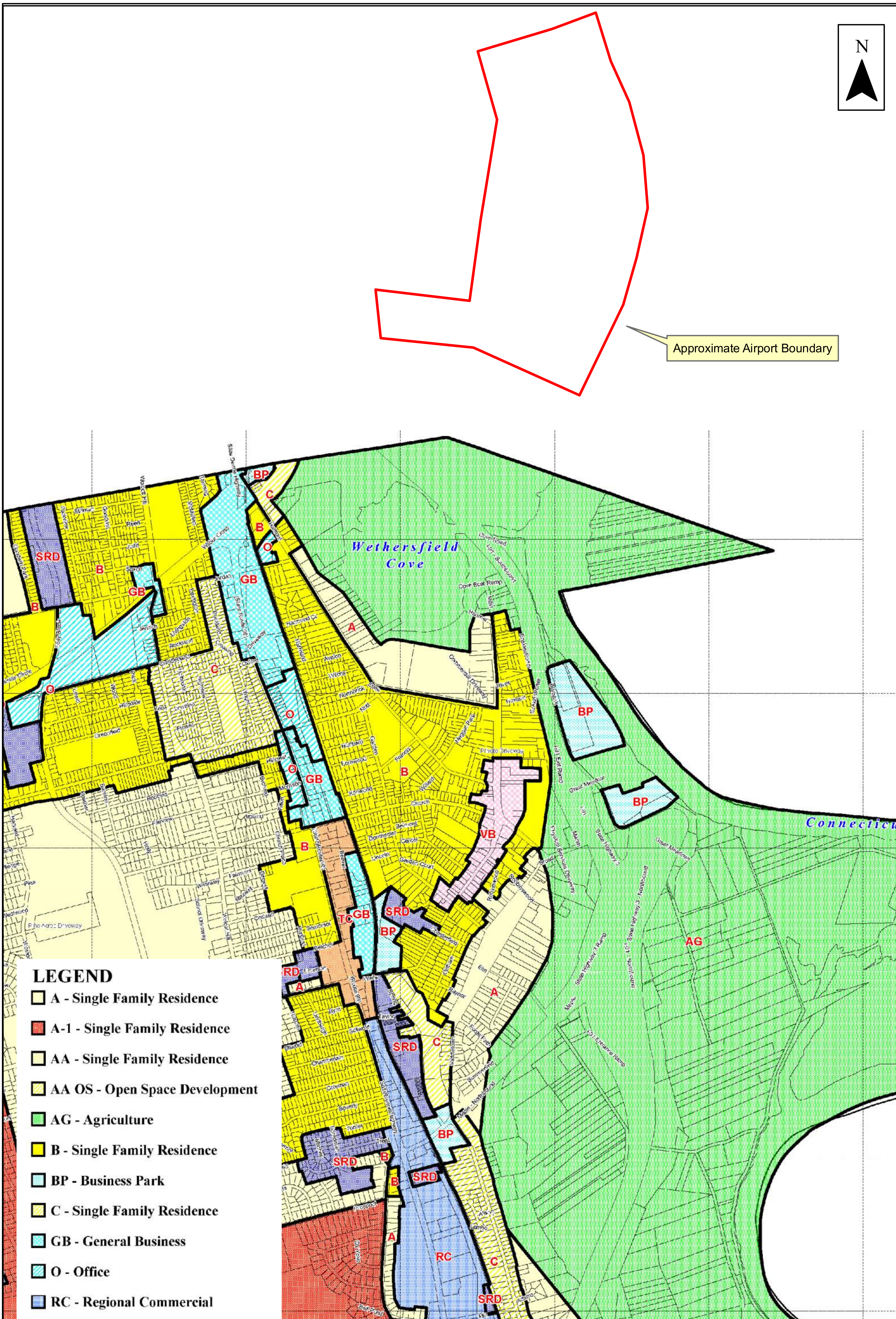


Figure 4-2
City of Hartford Zoning Map



Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 4-3
Town of Wethersfield Zoning Map

The Smart Associates
Environmental Consultants, Inc.

4.6 Construction

Impacts relating to construction activities include construction noise, dust and noise from heavy equipment, traffic, disposal of construction debris and air and water pollution. State and Federal ordinances and regulations will be reviewed to determine the proper permits or certifications that will be required for each specific project. Potential adverse effects associated with construction activities conducted under this MPU will be minimized according to specifications of the provisions of Advisory Circular 150/5370-10A, Standards for Specifying Construction of Airports. Prior to any construction activities that would disturb one acre or more a General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities (DEP-PERD-GP-015) will be obtained.

4.7 Cumulative Impacts

Cumulative impacts consider past, present, and reasonably foreseeable actions, based on the fact that environmental impacts can accumulate over time or within a geographical area on the same resource. As part of FAA funded Airport Improvement Program (AIP), FAA is required to assess a proposed action's direct and indirect impacts on a particular resource. Under various sections in this chapter, environmental resources and potential permitting or project coordination have been addressed.

The AMPU recommendations do not include projects that would have the potential to change the general character of the area or result in a cumulative impact from other planned (present or future) activities within the area. If a proposed action is subject to Federal or State government permitting, an EA or EIS would evaluate the secondary and cumulative impacts associated with the recommended developments and recent or planned projects in the vicinity of HFD.

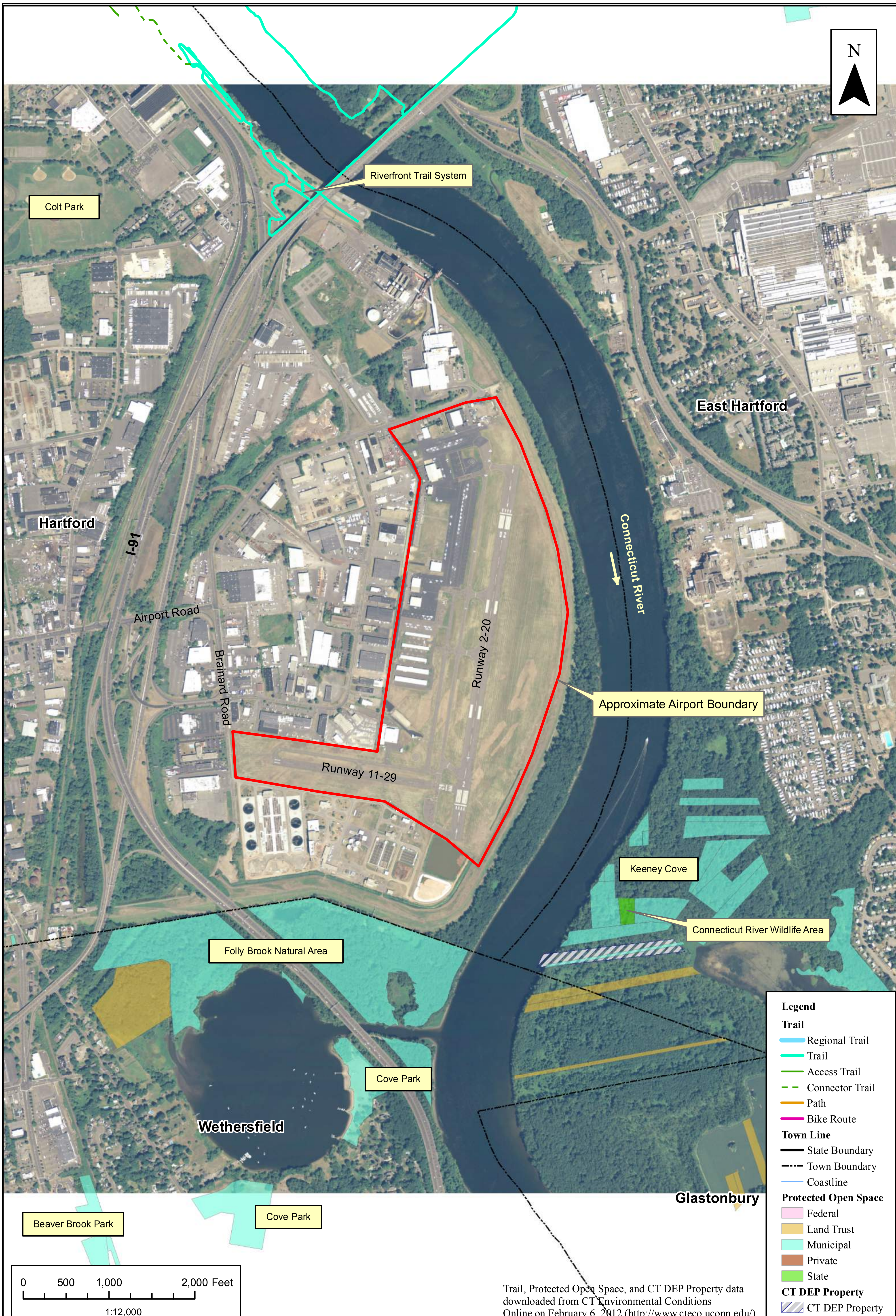
4.8 DOT Section 4(f)

Section 4(f) of the Department of Transportation (DOT) Act requires the approval of the Secretary of Transportation for any project that impacts publicly owned land such as a public park, recreation area, or wildlife refuge of national, state, or local significance or a historic site of national, state, or local significance.

Parks within the immediate vicinity of HFD include Cove Park and Folly Brook Natural Area, located south of the Airport in the Town of Wethersfield, and Colt Park, located northwest of HFD in the City of Hartford. A riverfront trail system is located north of HFD along the Connecticut River. Southeast of HFD, on the opposite side of the Connecticut River, there are several protected open space areas associated with the forested floodplain.

Folly Brook Natural Area is primarily wildlife habitat, with little human use. Cove Park, which includes 110 acres and is located south of Wethersfield Cove, has a boat launch, park grounds, and soccer fields. Colt Park is used for recreation and includes several athletic fields.

Figure 4-4 shows the locations of public lands and recreation areas within the Study Area.



Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 4-4
Public Lands and Recreation Areas

The Smart Associates
Environmental Consultants, Inc.

4.9 Federal and State listed Endangered and Threatened Species

Endangered species are provided protection on both federal and state levels. The Federal Endangered Species Act of 1973 (16 USC 1531-1543, Sec. 2A) is the federal legislation that provides protection, while the State of Connecticut protects species through the Connecticut Endangered Species Act, passed in 1989. Under the Connecticut Endangered Species Act, Endangered, Threatened, and Species of Special Concern are defined as follows:

- Endangered: Any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an "endangered species" pursuant to the federal Endangered Species Act.

- Threatened: Any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the state and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the federal Endangered Species Act, except for such species determined to be endangered by the Commissioner of the Department of Energy and Environmental Protection (DEEP).

- Species of Special Concern: Any native plant species or any native non-harvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its regulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

To obtain information on rare, threatened, and endangered species that may be present within the Study Area, a request for review of the Natural Diversity Data Base (NDDB) was sent to the Connecticut DEEP. A response from the DEEP, dated March 1, 2012, indicated that several rare, threatened, and endangered species are known to occur on or in the vicinity of the Airport, including yellow lamp mussel (*Lampsilis cariosa*), tidewater mucket (*Leptodea ochracea),* and bald eagle (*Haliaeetus leucocephalus*). The following provides information on each species.

Yellow Lamp Mussel and Tidewater Mucket – The yellow lamp mussel is listed as endangered and the tidewater mucket is listed as a species of special concern in Connecticut. The following information was provided by DEEP:

> "Freshwater mussels, such as tidewater mucket and yellow lamp mussel would be seriously impacted if any project activities are conducted on or near the Connecticut River."
>
> The Wildlife Division recommends:
>
> - No vegetation be removed from the stream banks adjacent to the mussel habitat since land

clearing activities will affect the mussels.
- There can be no erosion or siltation discharged into the river that can bury and kill these mussels.
- There can be no polluted runoff such as chemicals or fertilizer discharged into the river, resulting from this project that can contaminate the water.

Bald Eagle – The bald eagle is listed as threatened in Connecticut and disturbing the species is an illegal activity pursuant to Section 26-93 of the Connecticut General Statutes. Although the bald eagle is no longer a federally-listed species, it is still protected under the federal Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). The following information was provided by DEEP:

> "Natural year-round habitat of bald eagles includes lakes, marshes, rivers, or seacoasts, where there are tall trees nearby for nesting and roosting and plenty of fish for eating. Although bald eagles feed primarily on fish, they also are opportunistic predators and scavengers that will eat anything that can be caught easily or scavenged.
>
> The breeding season in Connecticut begins in January, and most pairs lay their eggs in February and March. Bald eagles return to the same nesting areas year after year. The nest, which sometimes measures 7 to 8 feet across, is a flat-topped mass of sticks, with a lining of fine vegetation such as rushes, mosses, or grasses. It is built in trees, 10 to 150 feet above ground. Disturbance at nest sites may cause the birds to abandon their nest, even if there are eggs or young in the nest.
>
> Winter is a difficult time for any wildlife species, including bald eagles. Food is harder to find and cold temperatures cause energy stress. If the birds are frequently disturbed from feeding and forced to travel to a different area for food, their lives may be threatened. Adult eagles are more easily disturbed than juveniles.
>
> At night, wintering eagles often congregate at communal roost trees; in some cases, they travel 12 or more miles from a feeding area to a roost site. Roosts are often used for several years. Many roosts are protected from the wind by vegetation or terrain, providing a favorable thermal environment. Use of these protected sites helps minimize energy stress. In addition, communal roosting may aid the birds in their search for food.

Recommendations: The Wildlife Division is aware of at least one pair of bald eagles that nest near HFD. Though somewhat tolerable of human disturbance, the bald eagles will be negatively affected if work is too close to a nest or roosting site. Delineating protection zones around areas of high eagle use is important. Therefore, the following precautions shall be adhered to:

- February 1st through August 1st (bald eagle breeding season)
  - Any machinery or equipment shall maintain, at a minimum, a 600-foot

protection zone around any nest site.
    - If a bald eagle is found to be nesting on or within 600 feet of the project area, work shall be halted immediately until after the breeding season.

- December 31st through March 1st (wintering bald eagles)
    - Any machinery or equipment shall maintain, at a minimum, a 600-foot protection zone around areas of high eagle use, particularly winter roosting sites."

Maintenance of the dike is necessary during the breeding and wintering periods, however all maintenance activities will be kept to a minimum and will only involve the equipment necessary to complete maintenance tasks especially within 600 feet of winter roosting sites. Maintenance activities along the dike can be considered harassment of the eagles therefore a permit has been issued to the Airport by USFWS and DEEP which is renewed on an annual basis.

The DEEP also indicated that airports are very popular areas for grassland birds, although they are not currently aware of any grassland birds nesting at HFD. The DEEP recommended minimizing impacts to grassland areas. In addition, the DEEP mentioned that along the eastern border of HFD, adjacent to the Connecticut River, there is a floodplain-forest critical habitat and natural community. This community is located between the dike and the Connecticut River. Potential impacts to this natural community should be considered during the design of any future airport development. Direct impacts should be avoided and any indirect impacts that could result from stormwater discharges or adjacent development should be avoided or mitigated through the use of stormwater treatment measures or other Best Management Practices.

The U.S. Fish and Wildlife Service's (USFWS) website was reviewed to determine if any federally-listed threatened or endangered species are known to exist within the Study Area. No federally-listed species are known to occur within the City of Hartford or the Town of Wethersfield. Additionally, a letter response from the USFWS confirmed there are no federally-listed threatened or endangered species known to exist within the Study Area.

A letter was sent to the NMFS Protected Resources Division to request information on any listed species known to occur in proximity to HFD. A response from the NMFS, dated February 15, 2012, indicated that several Distinct Population Segments (DPS) of the Atlantic Sturgeon were recently proposed for listing under the Endangered Species Act. The effective date of these listings was April 6, 2012. According to the NMFS, listed species that may occur in the Connecticut River near Hartford include Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*). The Distinct Population Segments of Atlantic sturgeon that may occur in the Connecticut River include Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic. Both species are also protected by the State of Connecticut. The Atlantic sturgeon is state-listed as threatened and the shortnose sturgeon is state-listed as endangered.

<u>Great Blue Heron</u> – This bird is not threatened or endangered, but is protected under the Migratory Bird Act. While conducting the Wildlife Habitat Assessment in the spring of 2012,

wildlife biologists identified an active great blue heron (*Ardea herodias*) heronry containing at least 3 active nests, located within the approach zone of runway 2-20. This species breeds in colonies, in trees close to open water. From reviewing previous reports, this appears to be a newly established colony which may grow over time if allowed to persist. Colonies can range between 5-500 nests. The great blue heron is migratory non-game species protected under the Migratory Bird Act (MBTA) of 1918 and listed by the state of Connecticut as a vulnerable breeding species (S3B). A USFWS and state permit will be required for any lethal take.

4.10 <u>Energy Supplies, Natural Resources, and Sustainable Design</u>

Under Executive Order 13123, Greening the Government Through Efficient Energy Management (64 FR 30851) Federal agencies are encouraged to expand the use of renewable energy within their facilities and in their activities. Additionally, it is the policy of the FAA to encourage the development of facilities that exemplify the highest standards of design including principles of sustainability.

The MPU does not propose any major changes in stationary facilities and only a minor increase in the movement of aircraft and ground vehicles. This increase will not result in any significant impact on local supplies of energy or natural resources.

4.11 <u>Environmental Justice</u>

Environmental justice ensures that no low-income or minority population bears a disproportionate burden of effects resulting from a Federal Action. Executive Order 12898 and U.S. Department of Transportation Order 5610.2 requires FAA to analyze impacts on low-income and minority populations and to provide for meaningful public involvement.

Few residential areas are located in the immediate vicinity of the Airport. The nearest residential areas are located south and west of HFD, on the opposite side of Interstate 91. Residential areas are also located east of HFD, across the Connecticut River. Several schools and playgrounds are located within these residential areas.

The estimated median household income in 2009 for the City of Hartford ($28,300) was well below the median household income for the State of Connecticut ($67,034) (www.city-data.com). The estimated median household income in 2009 for the Town of Wethersfield ($69,628) was above the average for Connecticut.

The City of Hartford has a high minority population (81% in 2009) compared to the surrounding towns and the State of Connecticut (www.city-data.com) Minority populations for the surrounding towns in 2009 were 52 percent for East Hartford, 22 percent for West Hartford, 11 percent for Wethersfield, and 8 percent for Glastonbury. The minority population percentage for the State of Connecticut was 27 percent in 2009.

Since it is likely that low income or minority populations could be impacted by airport development or expansion, coordination with local community outreach agencies is recommended for any projects that could have adverse impacts on the adjacent community.

4.12 Farmlands

The Farmland Protection Policy Act (FPPA) regulates Federal actions that have the potential to convert farmland to non-agricultural uses.

Several areas of prime agricultural soils and agricultural soils of statewide importance are mapped on airport property and within the vicinity of HFD. These areas are located between Runway 2-20 and the Connecticut River, and south of HFD near Wethersfield Cove. There are also a few small, isolated areas of agricultural soils adjacent to Interstate 91, located west of HFD.

None of the areas mapped as agricultural soils are currently being used for agricultural purposes. Current land use within these areas generally consists of open space, conservation land, and park facilities. The remaining portions of the Study Area are already in or committed to urban development.

4.13 Floodplains

Flood Insurance Rate Maps (FIRMs) for Hartford County were reviewed to determine the locations of floodplains within the Study Area. HFD is located in an area that is designated as being protected from the one percent annual chance or greater flood hazard by a levee system. This levee is part of the Hartford Dike System, which provides protection against flooding from the Connecticut River. The levee adjacent to HFD is referred to as the Clark Dike. Beyond the levee, along the Connecticut River, the flood zone is mapped as Zone AE, which is defined as an area that has a one percent annual chance of flooding (100-year floodplain).

The Connecticut River channel is mapped as a floodway, which is defined as the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachments so that the one percent annual chance flood can be carried without substantial increases in flood heights.

Figures 4-5 through 4-8 show the locations of floodplain and floodway areas near HFD.

4.14 Hazardous Materials and Solid Waste

Potentially hazardous materials stored and used at the Airport include gasoline, diesel fuel, heating oil, Jet A and 100 low lead AvGas aviation fuels, vehicle anti-freeze, lubricants, batteries, aircraft deicing fluid (propylene glycol), pavement deicers (urea), cleaning solvents, and paint.

HFD's 2011 Stormwater Pollution Prevention Plan (SWPPP) states that gasoline, diesel fuel, and heating oil are stored in underground storage tanks. Aviation fuel, used oil, and used anti-freeze are stored in aboveground tanks. Aviation fuel is also stored in and dispensed from mobile re-fuelers that are parked, when not in use, on impervious surfaces. The remaining potentially hazardous materials are generally stored in small quantities inside airport facilities. No documentation regarding the use or storage of pesticides and herbicides was found.

Solid waste generated at the airport is stored in covered dumpsters that are regularly emptied by a licensed waste hauling sub-contractor. Lined, covered dumpsters are provided for the temporary storage of empty motor oil containers, used oil filters, and small quantities of spent spill clean-up materials.

General structural and non-structural best management practices (BMPs) are implemented to minimize the release of spilled materials and any adverse impacts to human health and the environment. These include employee training in response activities, floor drains in some buildings that are connected to the municipal sanitary sewer, use of general good housekeeping practices, and the implementation of storm water pollution prevention activities (refer to Section 4.20). HFD's fixed base operator (FBO) is also required to prepare and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan that details standard facility operation procedures, spill response procedures, training requirements, etc.

4.15 Historical and Archeological

No formal archaeological or historical surveys were conducted as part of this Master Plan Update. Information obtained from the previous Master Plan Update indicated that two airport buildings, the former Department of Aeronautics Headquarters and a circa 1935 hangar, are listed on the State Register of Historic Places as part of a statewide inventory of state-administered properties. Correspondence with Connecticut's State Historic Preservation Office (SHPO) in February 2012 indicated that no additional buildings at HFD have been added to the State Register of Historic Places since the previous MPU.

Although the majority of the ground at HFD has been disturbed from construction and development, the floodplain and terraces of the Connecticut River have the potential to contain Native American archaeological sites. Any proposed project that may impact undeveloped floodplain or terraces would likely require a detailed archaeological study.

The Old Wethersfield Historic District is located south of HFD, in the Town of Wethersfield, between the Connecticut River and the railroad right-of-way. This historic district was established in 1962 and is the largest historic district in the State of Connecticut. It contains over 150 structures built prior to 1850. Any work within the historic district would require coordination with the Wethersfield Historic District Commission.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0506G

FIRM

FLOOD INSURANCE RATE MAP

HARTFORD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

PANEL 506 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

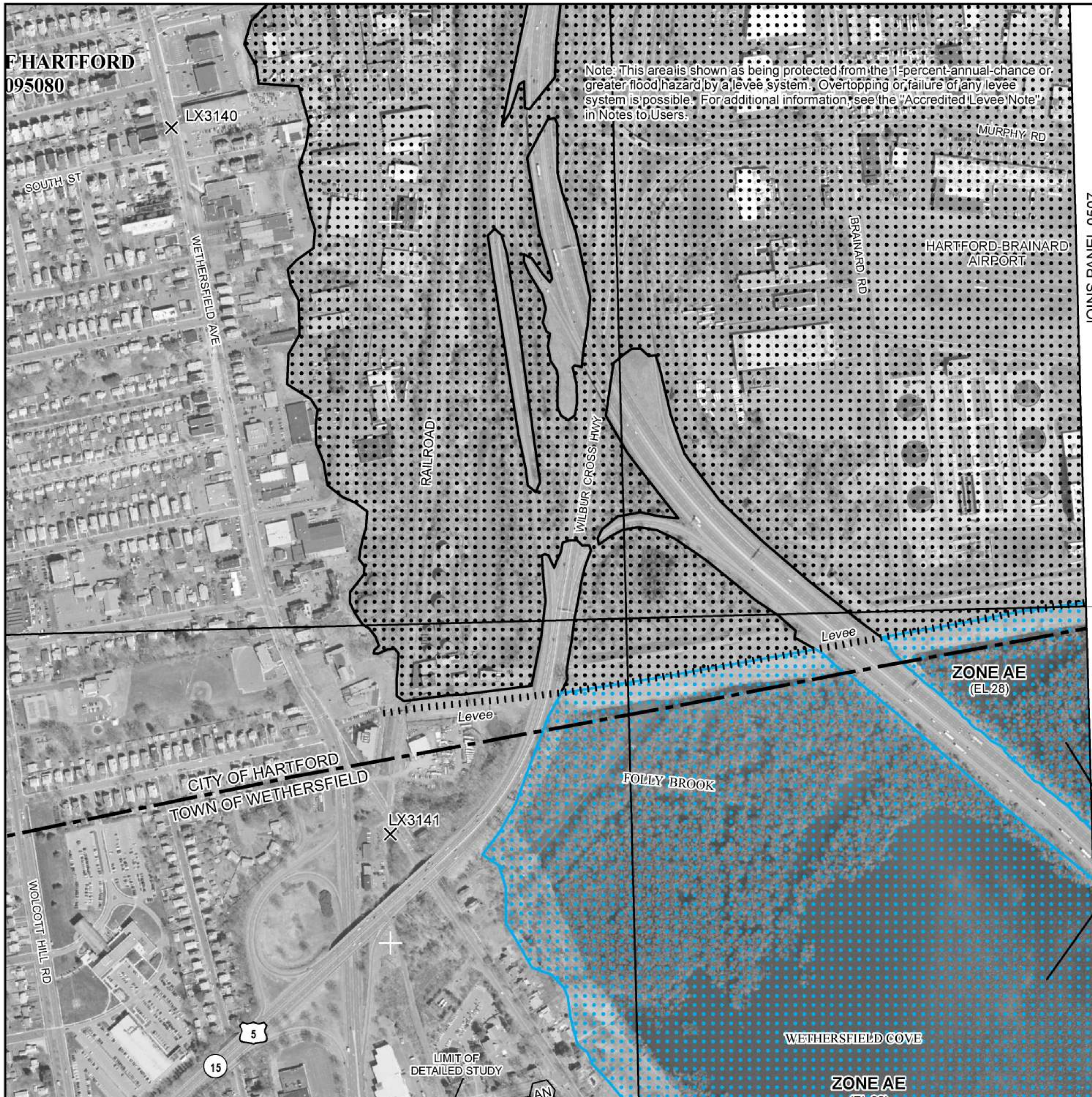
COMMUNITY	NUMBER	PANEL	SUFFIX
HARTFORD, CITY OF	095080	0506	G
WETHERSFIELD, TOWN OF	090040	0506	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 09003C0506G

MAP REVISED SEPTEMBER 16, 2011

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506G

FIRM

FLOOD INSURANCE RATE MAP

HARTFORD COUNTY, CONNECTICUT

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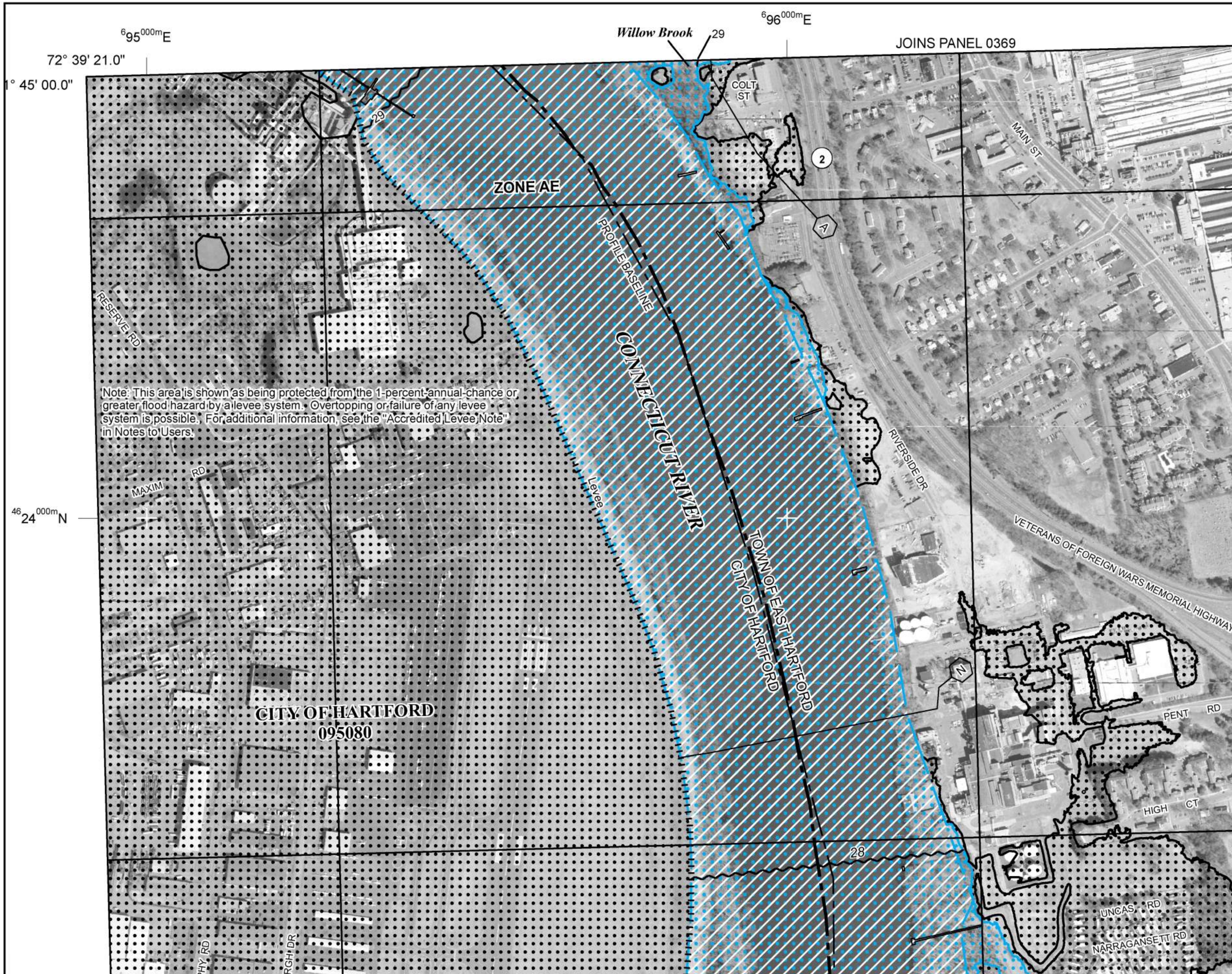
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET
METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0507G

FIRM
FLOOD INSURANCE RATE MAP
HARTFORD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)

PANEL 507 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

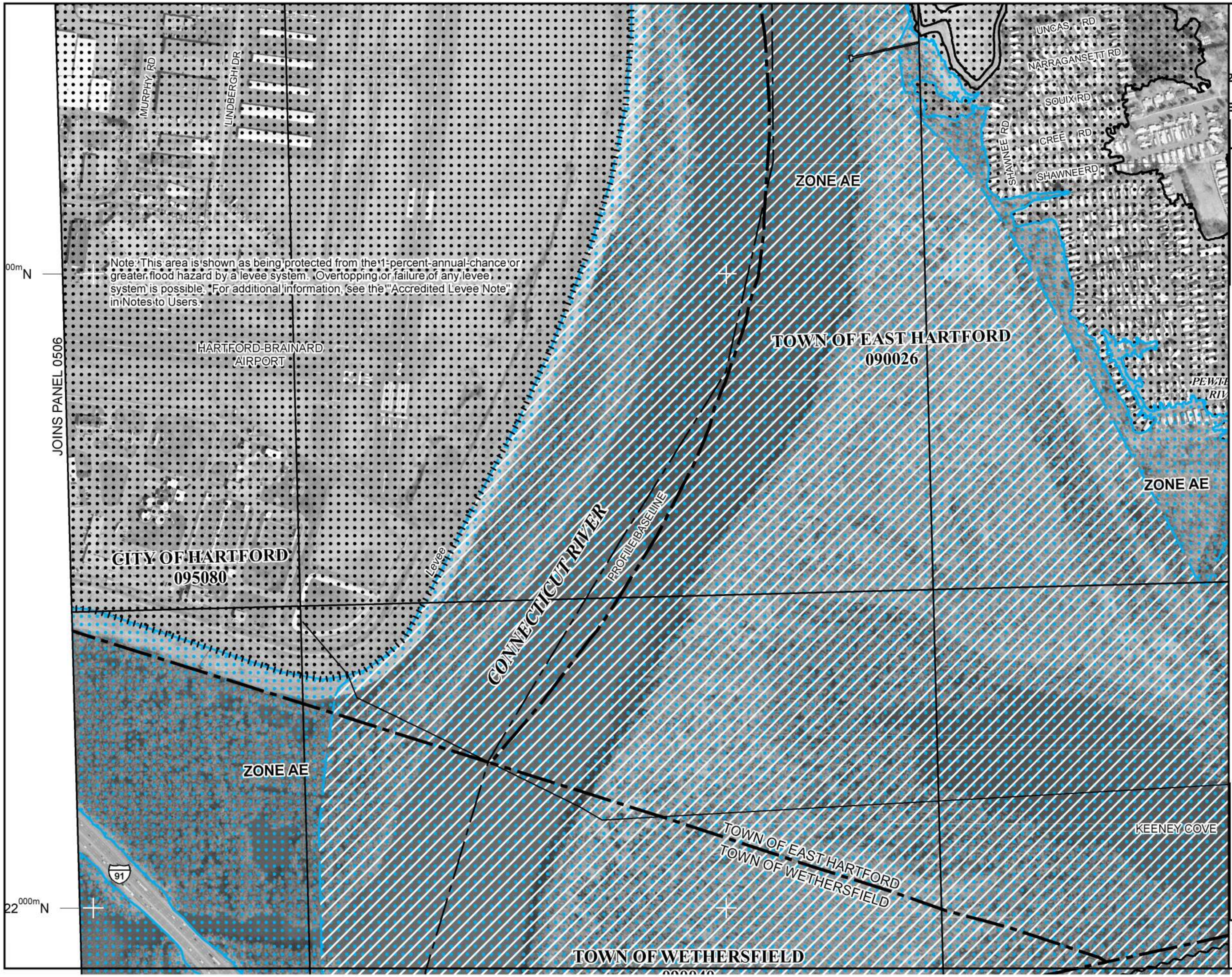
COMMUNITY	NUMBER	PANEL	SUFFIX
EAST HARTFORD, TOWN OF	090026	0507	G
GLASTONBURY, TOWN OF	090124	0507	G
HARTFORD, CITY OF	095080	0507	G
WETHERSFIELD, TOWN OF	090040	0507	G

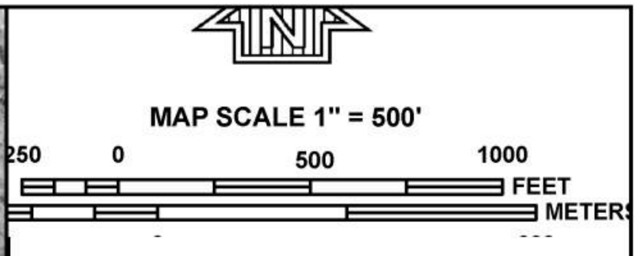
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 09003C0507G

MAP REVISED SEPTEMBER 16, 2011

Federal Emergency Management Agency





NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0507G

FIRM
FLOOD INSURANCE RATE MAP
HARTFORD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)

PANEL 507 OF 675
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST HARTFORD, TOWN OF	090026	0507	G
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MAP NUMBER
09003C0507G

MAP REVISED
SEPTEMBER 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

4.16 Induced Socioeconomic

Induced socioeconomic impacts are those that may result in changes to social or economic characteristics in the community such as shifts in patterns of population movement and growth, public service demands, changes in business and economic activities or other factors identified by the public. The Council on Environmental Quality (40 CFR Part 1500, Section 1508.27 requires Federal agencies to consider the intensity and context of a proposed action and the significance of the impact. Section 1508.8 address foreseeable impacts caused by an action that may be farther removed in space or time.

An Advisory Committee has established and contains members of the surrounding communities and local government agencies. This committee will be consulted concerning any socioeconomic impacts that may be experienced by project activities.

4.17 Light Emissions and Visual Effects

Runway lighting, marking and instrumentation allows for the safe operation of aircraft during nighttime hours and low visibility conditions. Runway 2-20 is equipped with High Intensity Runway Lights (HIRL), Visual Glide Slope Indicators (VGSI), and Runway End Identifier Lights (REIL). Runway 11-29 is equipped with HIRL and visual markings. Light intensity levels associated with these air navigation facilities (NAVAIDS) and other activities at HFD are relatively low compared to background levels in the area.

4.18 Noise

Aircraft noise surrounding an airport can cause an impact on a local community. A detailed report, available as Appendix B, provides background information regarding noise characteristics and measurement, as well as baseline and potential future noise levels based on the recommendations of the Master Plan. The noise evaluation was conducted for year 2010 and 2030 forecast aircraft activity levels.

The FAA has adopted land use compatibility guidelines for preparing airport noise studies. According to federal regulations, airport noise is evaluated based on the average noise generated by aircraft. The metric use is titled the Day-Night Average Noise Level or DNL. Per federal guidelines, an average noise level below DNL 65 dB is considered to be compatible with all land uses. Whereas noise levels above DNL 65 incompatible with noise-sensitive uses such as residential areas, schools, and churches.

As part of the analysis, the 55 and 60 DNL contours are shown for informational purposes, as it is known that noise complaints are common in locations south of the Airport with noise levels well below DNL 65 dB. As airport activity has declined significantly in the past 20 years at HFD, the study documents the accompanying reduction in airport noise. In addition, noise per aircraft operation has also declined slightly as older aircraft are replaced with modern aircraft (with a lower noise footprint).

For this analysis, the FAA's Integrated Noise Model (INM) version 7.0 was used to develop DNL noise contours. The INM noise model was used to develop DNL noise contours for the 2010 Base Year and the 2030 future year with and without the improvements to Runway 2-20 shown on Figure 5-12. Runway 2-20 is currently 4,418 feet long, and the proposed improvements would increase the length of the runway to up to the recommended 5,000 feet.

The analysis included the use of both straight-in/out operations and the voluntary noise abatement flight track for approach to Runway 2 – the River Visual Runway 02 procedure. This noise abatement flight track request that pilots arrive to the east of the runway over the Connecticut River as much as possible to avoid the residential area of Old Wethersfield, which located directly south of the airport. Note that use of the procedure is not mandatory.

As shown on ALP 6, the DNL 65 dB noise contour for the 2010 is contained within the existing airport property, thus noise levels are considered compatible. The DNL 55 extends toward but not over residential property. ALP 6 displays airport noise based on 2030 forecast activity with the current runway system. Although the DNL 55 extends further to the north and south, the DNL 65 dB contour is still within the airport area.

ALP 6 shows the noise contours with the 2030 forecasted activity based on the recommended Runway 2-20 improvements. Again, noise levels would be higher; however, the DNL 65 dB contour does not extend over any incompatible land uses. As such, according to FAA regulations, the airport noise level is considered compatible with local land uses.

4.19 <u>Social Impacts</u>

Social impacts are the results of actions that may have an effect on the human environment, the health and safety of children, and socioeconomic welfare of the community. Under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, FAA must meet the requirements indicated in 40 CFR Part 24 if a proposed action involving FAA approval or funding would require the purchase of real property or displace people or business.

Executive Order 13045 directs Federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children. There are areas in the surrounding areas where children congregate such as parks, recreation areas and schools. Project activities are not anticipated to attribute to products or substances that a child is likely to touch or consume.

The primary land use within immediate vicinity of HFD consists of commercial and industrial use and public property (see above Section 4.5). The only acquisition of property that is anticipated at this time is a vacant property located west of Runway 11-29. This may result in a slight change in tax base.

4.20 Water Quality

4.20.1 Groundwater Quantity/Quality

The surficial material that underlies HFD has been mapped as "alluvium overlying fines" (DEP, 2009). Groundwater in the vicinity of HFD is designated by DEEP as Class GB. The designated uses for Class GB groundwater include industrial process water and cooling water, and base flow for hydraulically-connected water bodies (DEP, 2011). Class GB groundwater is presumed to be unsuitable for human consumption without treatment.

Groundwater quality at the Airport has historically been impacted by the release of petroleum related compounds from leaking underground storage tanks (LUST). The DEEP *List of Contaminated or Potentially Contaminated Sites* (updated on February 7, 2012) lists two "completed" (LUST) sites, and one "pending" LUST site at or near HFD. An unlined sewerage lagoon located just south of HFD at the Hartford waste water treatment plant, has likely impacted the groundwater quality in proximity to it.

4.20.2 Surface Water Quality

The federal Clean Water Act (CWA) and the Connecticut General Statutes establish water quality standards for all surface waters of the state.

HFD lies within the drainage basin of the Connecticut River (refer to Figure 4-9), which is the largest river in New England and the major drainage feature of the central portion of the state. The river abuts HFD to the East and flows from north to south through the study area. HFD is separated and protected from flooding by the Connecticut River by the Clark Dike. The dike, which has an approximate elevation of 43 feet, was constructed by the U.S. Army Corps of Engineers in the 1930's in response to a number of floods. The dike also limits the flow of storm water runoff and associated contaminants from HFD property into the river.

Wethersfield Cove is an 80-acre natural inlet located approximately 0.5 miles south of HFD. It was originally an oxbow in the Connecticut River and is now separate from the River except for a small channel that flows under Interstate 91.

From its confluence with the Farmington River in Windsor, approximately 10 miles north of HFD, to the Long Island Sound, the Connecticut River is designated as coastal marine waters by the DEEP. The water quality of the River in the vicinity of HFD is classified by DEEP as a Class SB. Designated uses for Class SB water bodies are habitat for marine fish and aquatic life and wildlife, commercial shellfish harvesting, industrial water supply, and navigation (DEP, 2011).

The CWA requires each state to submit two surface water quality documents to the EPA every two years. Section 305(b) of the CWA requires the submittal of a report that describes the quality of surface waters and an analysis of the extent to which all such waters provide for the protection and propagation of a "balanced population of shellfish, fish, and wildlife and allow recreational activities in and on the water."

The second document is commonly referred to as the 303(d) List because it is required by Section 303(d) of the CWA. The 303(d) List includes all surface waters that are:

- Impaired or threatened by a pollutant or pollutants;
- Not expected to meet water quality standards within a reasonable time even after application of best available technology standards for point sources or best management practices for nonpoint sources; and
- Require development and implementation of a comprehensive water quality study, referred to as a Total Maximum Daily Load (TMDL) study that is designed to facilitate achievement of applicable water quality standards.

The 2010 303(d) List identifies the reach of the Connecticut River adjacent to the Airport (4000-00-03) as being impaired for “fish consumption” by polychlorinated biphenyl compounds (PCB’s) and for “recreation” by bacteria. As a requirement of its state-issued industrial storm water permit (refer to Section 4.20 – Storm Water), the Airport is required to collect storm water quality samples from all storm water outfalls that discharge to impaired waters.

Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 4-9
Surface Waters

The Smart Associates
Environmental Consultants, Inc.

4.20.3 Stormwater

Historic drainage plans indicate included in the HFD's industrial stormwater permit SWPPP depict four airport drainage areas or sub-basins that are designated A, B, C, and D (refer to Figure 4-10). Drainage Area A covers approximately 51 acres and includes the northern portion of Runway 2-20, associated taxiways and grassed infield areas, and the aircraft tie-down areas west of Runway 2-20.

Drainage Area B covers approximately 123 acres and includes the southern portion of Runway 2-20, the eastern half of Runway 11-29, and associated taxiways and grassed infield area. HFD's 1995 SWPPP states that no airport buildings contribute stormwater drainage to this sub-basin..

Drainage Area C covers approximately 79 acres and includes the western end of Runway 11-29, associated airport taxiways and grassed infields, and airport buildings, such as the control tower and T-hangars.

Drainage Area D covers approximately 36 acres of the northern portion of the airport. This area includes CTDOT office buildings, the Connecticut Army National Guard facility, the FBO fuel farm, and various other airport buildings.

A plan prepared in 1993 and included in 1995 SWPPP describe two stormwater drainage outlets, A and B, that discharge directly to the Connecticut River. Outlet C and D are described as discharging to the Metropolitan District Commission's (MDC) storm drains. Data provided by CTDOT in a September 30, 2013 telephone conversation indicate that currently drainage from the eastern portion of HFD flows easterly, discharging to a drainage ditch at the base of the Clark Dike along the eastern boundary of the Airport, and then flows parallel to the dike off airport property. Stormwater drainage from the western portion of HFD (sub-basin C) is described as flowing through drainage pipes to the southwest corner of the airport where it discharges to an open drainage ditch and thereafter flows off the property to the south/southwest. The most current information provided by CTDOT indicates that the drainage from sub-basin D discharges to an MDC storm drain near Murphy Road. The CTDOT data further indicates that all airport drainage is directed to an MDC pump station near Interstate 91, where it is pumped over the dike to the Connecticut River.

Storm water discharges from HFD are regulated by state statutes and are subject to the requirements of the state Stormwater Associated with Industrial Activities permit (DEP-PERD-GP-014). This general permit applies to all discharges from any conveyance which is used for collecting and conveying stormwater and which is directly related to manufacturing, processing, or storage areas at an industrial facility. Airports are included in Sector G of the permit (Transportation and Public Works Facilities). The goal of the permit is to eliminate or minimize exposure of potential water quality contaminants to storm water and subsequent discharge to surface water. Key elements of the permit include:

- Development and maintenance of a SWPPP
- Designation of a facility Pollution Prevention Team

- Annual training of personnel involved with activities that might expose contaminants to storm water
- Use of appropriate spill prevention and response actions
- Implementation of general good “housekeeping” activities and structural BMPs
- Conducting routine inspections of airport and tenant facilities
- Monitoring of storm water discharges.

HFD’s current industrial permit (GSI002507) was issued on October 1, 2011 and will expire on September 30, 2016. The previous SWPPP (M&E, 1995) was updated in September 2011. The current pollution prevention team is comprised of the airport manager, airport maintenance personnel, the airport fire captain, and airport emergency services personnel. Storm water pollution prevention activities performed at HFD are listed in Table 4-1.

Table 4-2 - Storm Water Pollution Prevention Activities[1]

Scheduled Task	Frequency
General Good Housekeeping	Daily
Routine Facility Inspections	Monthly
Comprehensive Site Compliance Evaluation	Quarterly
Visual Outfall Monitoring	Quarterly
Benchmark Sampling	Annually (during the deicing season)
Effluent Toxicity Sampling	Annually (during the first two years)
Monitoring of Discharges to Impaired Waters	Annually (depending on results)
Employee Training	Annually

1. Data Source: 2011 SWPPP

The most recent round of water quality sampling conducted for HFD was completed on June 4, 2008. The results are included in Table 4-2. The samples were collected from the outfalls that discharge storm water from Drainage Areas A and B to the Connecticut, River. Since the state benchmarks for the respective parameters were not exceeded in either sample, no further sampling has been conducted.

Master Plan Update Hartford-Brainard Airport Hartford, Connecticut	Figure 4-10 Drainage Areas	The Smart Associates *Environmental Consultants, Inc.*

Table 4-3 - Brainard Airport Storm Water Sampling Results – June 2008

Parameter	Analytical Method	Benchmark	Results (units)		
			Outfall A	Outfall B	Outfall D
Oil & Grease	EPA 1664	5.0mg/l	<1.4 mg/l	<1.4 mg/l	<1.4 mg/l
pH	pH Meter	5-9 S.U.	5.87 S.U.	5.19 S.U.	5.64 S.U.
COD	EPA 410.4	75 mg/l	53.8 mg/l	30.5 mg/l	42.1mg/l
Total Suspended Solids	SM 2540 D	90 mg/l	15.0 mg/l	9.0 mg/l	13.0 mg/l
Total Phosphorus	SM 4500-P E	0.40 mg/l	0.21 mg/l	0.1 mg/l	0.16
Total Kjeldahl Nitrogen	SM 4500-NO	2.30 mg/l	1.06 mg/l	<0.1 mg/l	<1.0 mg/l
Nitrate Nitrogen	SM 4500-NO3F	1.10 mg/l	0.1 mg/l	0.09 mg/l	0.09 mg/l
Total Copper	EPA 200.7	0.059 mg/l	<0.01mg/l	<0.01 mg/l	<0.015 mg/l
Total Zinc	EPA 200.7	0.160 mg/l	0.04 mg/l	0.047 mg/l	0.041
Total Lead	EPA 200.7	0.075 mg/l	<0.015 mg/l	<0.015 mg/l	<0.015 mg/l
24-Hour LC_{50}	EPA-821-R-02	n/a	>100%	>100%	>100%
48-Hour LC_{50}	EPA-821-R-02	n/a	>100%	>100%	>100%

< - Concentration less than analytical equipment detection limit
Mg/l – Milligrams per liter
S.U. – Standard units

In the event that future airport projects will disturb one or more acres of surface area, HFD will be required to apply for a General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities (DEP-PERD-GP-015). Furthermore, significant changes to the total acreage of impermeable surfaces at HFD and/or changes to the storm water drainage system or structural BMPs would require updates to the current Industrial Permit SWPPP.

4.21 Wetlands

4.21.1 Regulatory Summary

Wetlands are federally protected under the Clean Water Act and activities resulting in impacts to them require a permit from the U.S. Army Corps of Engineers (ACOE) under Section 404 of that same Act. In Connecticut, tidal wetlands are protected under the Tidal Wetlands Act (CGS sections 22a-28 through 22a-35) and inland wetlands are protected under the Inland Wetlands and Watercourses Act (CGS sections 22a-36 through 22a-45).

Wetlands within the limits of HFD's property were delineated on December 16 and 22, 2011. Federally-regulated wetlands were delineated in accordance with the *U.S. Army Corps of Engineers Wetland Delineation Manual* (ACOE, 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (ACOE, 2009). The Wetland Delineation Report is available from the CTDOT by request. State-regulated wetlands were delineated in accordance with the Connecticut Inland Wetlands and Watercourses Act (Sec. 22a-38, Definitions). Wetlands within the vicinity of HFD, but not on airport property were identified based on a review of available mapping (soils maps, National Wetland Inventory maps, and aerial photographs). Wetlands located within the Study Area, but off-airport property were not field-delineated.

Federally-regulated wetlands are delineated using a three-parameter approach (soils, vegetation, and hydrology). The U.S. Army Corps of Engineers (ACOE) defines wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (ACOE, 1987).

State-regulated wetlands in Connecticut are delineated based on soils. The Connecticut Inland Wetlands and Watercourse Act defines wetlands as "land, including submerged land, not regulated pursuant to Sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United States Department of Agriculture."

The Connecticut Inland Wetlands and Watercourses Act defines watercourses separately from wetlands. According to the Act, watercourses are defined as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through, or border upon this state or any portion thereof, not regulated pursuant to Sections 22a-28 to 22a-35, inclusive. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (a) Evidence of scour or deposits of recent alluvium or detritus, (b) the presence of standing or flowing water for a duration longer than a particular storm incident, and (c) the presence of hydrophytic vegetation."

As improvement projects at HFD are proposed and designed, it is recommended that coordination with the ACOE and the Connecticut DEEP occur to obtain their input regarding wetland impacts. Projects should be designed to avoid and minimize wetland impacts to the maximum extent practicable.

4.21.2 On-Airport Wetland Resources

Federally-Regulated Wetlands

Two federally-regulated wetlands (Wetlands 1 and 2) are located on airport property, southeast of Runway 2-20 between the runway and the flood levee (refer to Figure 4-11). The majority of Wetland 1 is located on the airfield and consists of mowed, grassy areas. A drainage ditch is located along the eastern edge of Wetland 1. Water from this ditch flows south through a culvert into a second drainage ditch (Wetland 2) located south of Runway 2-20. Wetland 2 then continues west beyond the limits of the wetland delineation.

According to the federal classification system (Cowardin et. al.), the majority of Wetland 1 is classified as partially drained/ditched, seasonally flooded, palustrine emergent with persistent vegetation (PEM1Cd). Portions of the wetland adjacent to the ditch are also classified as partially drained/ditched, seasonally flooded, palustrine scrub-shrub with broad-leaved deciduous vegetation (PSS1Cd). Wetland 2 is classified as partially drained/ditched, seasonally flooded, palustrine emergent with persistent vegetation/scrub-shrub with broad-leaved deciduous vegetation (PEM1/PSS1Cd).

Functions and values provided by Wetlands 1 and 2 include floodflow alteration and wildlife habitat. Of these two functions, floodflow alteration was determined to be the only principal function. The wetlands were noted to have signs of variable water levels and they appear to retain water, although the amount of flood storage is limited due to the size of the wetlands. Several plastic pipes entering the ditch were noted along the drainage ditch. These pipes may be associated with the levee system, but information on where they drain to/from could not be obtained.

State-Regulated Wetlands

One state-regulated wetland (Wetland A) is located between Runway 2-20 and the flood levee (refer to Figure 4-11). The majority of this wetland consists of floodplain soils, with a small area of poorly drained soils that corresponds to the federally-regulated wetlands described above (Wetlands 1 and 2). The floodplain soils are mapped as Winooski silt loam (Map Unit 106), which is classified as a moderately well drained floodplain soil. The rest of the Airport is mapped as Udorthrents-Urban Land Complex (Map Unit 306) and Udorthrents, smoothed (Map Unit 308). Both of these soil types are classified as well drained or moderately well drained and are not identified as floodplain soils.

The ditched portions of Wetlands 1 and 2 would be considered intermittent watercourses regulated under the Connecticut Inland Wetlands and Watercourses Act since there is a defined channel and bank, there is the presence of standing and flowing water for a duration longer than a particular storm event, and there is hydrophytic vegetation.

4.11.3 Wetland Resources Adjacent to the Airport

Federally-Regulated Wetlands

The National Wetland Inventory Map was reviewed to determine the locations of wetland resources in the vicinity of HFD. Several areas of floodplain wetlands, which are associated with the Connecticut River, are located south and east of HFD (refer to Figure 4-12). Wethersfield Cove, which is classified as a lacustrine wetland, is located south of the Airport. Floodplain wetlands are also located along the east side of the Connecticut River. Most of the floodplain wetlands are classified as palustrine forested.

The majority of the area north and west of HFD is developed, although there are pockets of palustrine wetlands located along Interstate 91 and in between developed areas. These wetland pockets include palustrine emergent, scrub/shrub, and forested communities. Several areas are identified as excavated or ditched.

Immediately south of Runway 2-20 are several treatment lagoons for a wastewater treatment plant. Although these are shown as wetlands on the NWI map, they would not be considered jurisdictional wetlands, since they appear to have been created for the purpose of wastewater treatment.

State-Regulated Wetlands

State-regulated wetlands include areas of poorly drained, very poorly drained, alluvial, and floodplain soils. Areas of poorly drained and very poorly drained soils generally correspond to the areas identified as federally-regulated wetlands in the above section. In addition, state-regulated wetlands also include floodplain soils, which are associated with the Connecticut River and are located east and south of HFD. The floodplain soil units mapped near HFD include Winooski silt loam, Limerick and Lim soils, Saco silt loam, Occum fine sandy loam, and Pootatuck fine sandy loam.

Watercourses in the vicinity of HFD include the Connecticut River, Wethersfield Cove, and Folly Brook. These watercourses are also regulated federally as waters of the U.S.

Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 4-11
On-Airport Wetland Resources

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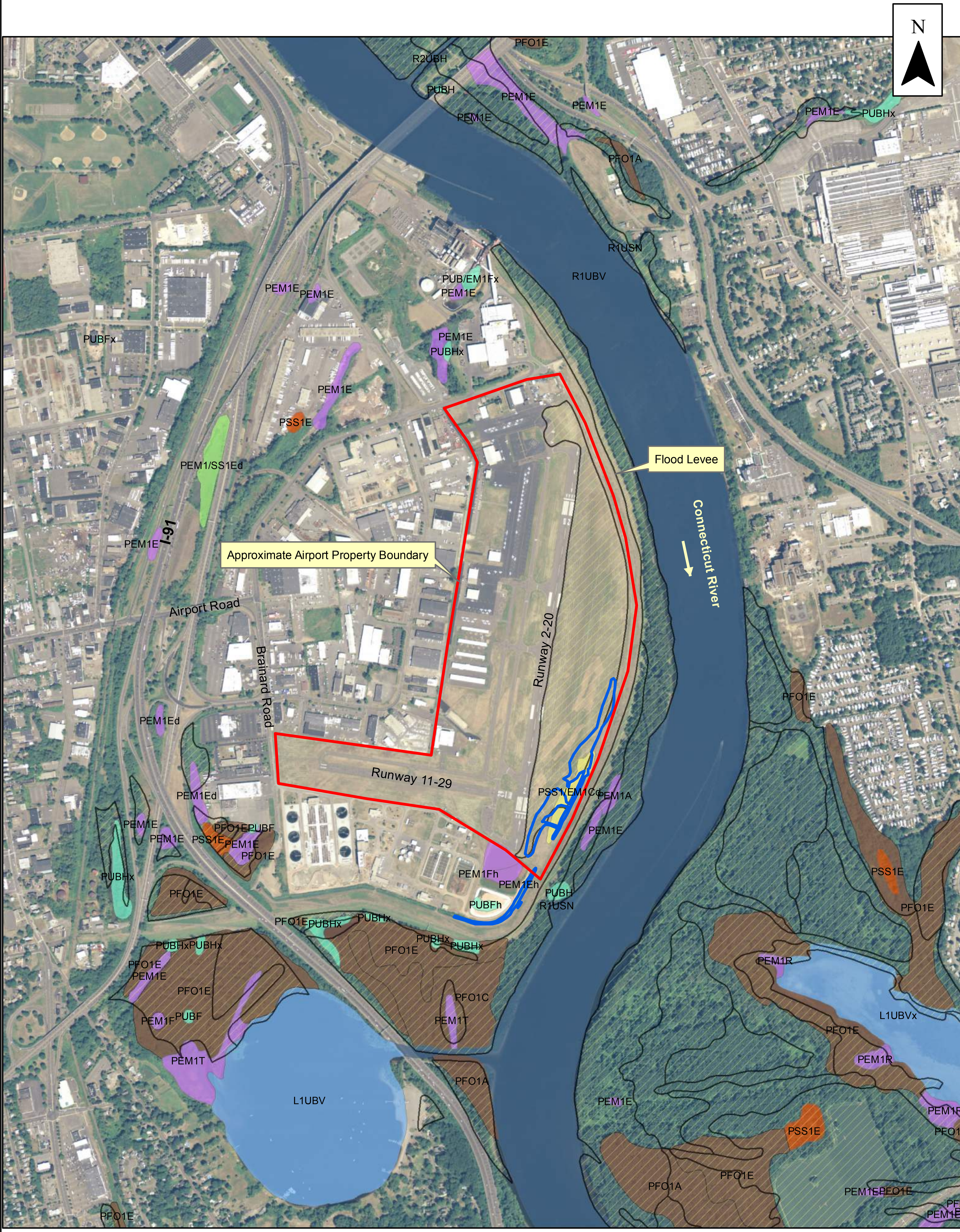

Legend

— Field-Delineated Wetland Boundary

CT Inland Wetland Soils

- Alluvial and Floodplain Soils
- Poorly Drained and Very Poorly Drained Soils

NWI Wetlands

- L1UB
- PEM/PSS
- PEM
- PFO
- PSS/PEM
- PSS
- PUB
- R1UB, R2UB

0 500 1,000 2,000 Feet

1:12,000

Wetlands on airport property delineated by
The Smart Associates, Inc. on December 16 and 22, 2011.
National Wetland Inventory Wetlands Downloaded from NWI website on
January 20, 2011 (http://www.fws.gov/wetlands/Data/DataDownload.html)
CT Inland Wetland Soils downloaded from CT Environmental Conditions
Online on January 20, 2011 (http://www.cteco.uconn.edu/)

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Figure 4-12
Wetland Resources Adjacent to
the Airport

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4.22 Wild and Scenic Rivers

In 1968, the US Congress passed the Federal Wild and Scenic Rivers Act (P.L. 90-542) in order to preserve “certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values”. Currently, there are no river segments within the Study Area that are included in the federal Wild and Scenic Rivers Program.

4.23 Wildlife Assessment

A Wildlife Hazard Assessment (WHA) was completed in February 2013 by a set of certified wildlife biologists, who conducted 85 standardized surveys over a period of one year at HFD. The WHA was conducted to determine if and what birds and mammals within the AOA and surrounding areas create a hazard for air traffic that frequent the facilities of HFD and to provide a foundation for starting a Wildlife Hazard Management Plan so that HFD can manage its wildlife problems in the future. A total of 39,154 birds and mammals were observed. Seventy-eight (78) different bird and 12 mammal species were observed. The top five species observed were:

- European starling (12,233 birds)
- Ring-billed gulls (9,485)
- American crow (4,099)
- Red-winged blackbird (1,759)
- Brown-headed cowbird (1,503)

Though several species were observed in flocks contain more than five (5) individuals, the majority of species were observed only as single birds or in pairs. Seasonal bird distribution shows a peak during the early spring and fall which would coincide with bird migration. However, the large influx of gulls, crows and starlings utilizing the airport and surrounding area, especially the Connecticut Resource Recovery Authority (CRRA) Trash to Energy Plant and the MDC facilities, during the winter months indicate these months having the greatest potential wildlife hazard to aircraft from birds.

Wildlife hazards posed by mammals at HFD are infrequent but still merit attention. Deer have full access to the runway and were observed frequently south of the Clark Dike, in the woods along the river side of the dike or along the vegetated ditch. Rabbits, squirrels, woodchucks, and domestic cats were regularly observed during daylight surveys. Rabbits, skunks, raccoons and opossums were observed during nighttime surveys. Both red fox and gray fox were occasionally observed hunting along ditch or the top of the dike.

The WHA determined that the wildlife populations associated with the Airport Operations Area (AOA) at HFD are a serious hazard to aircraft safety. The hazards identified can be reduced to an acceptable level providing the CTDOT implements the recommendations provided in WHA. The conclusions and recommendations were based on a comprehensive study of the airport operations, the bird and mammal populations that frequent the area and their habitat, and various wildlife control measures. Wildlife populations associated with adjacent properties are also a very high risk for aviation safety. Working with adjacent landowners to implement recommendations will be critical in reducing the threat wildlife pose on aircraft safety.

The recommendations, which will require coordination with other entities such as CRRA, MDC and USACOE, were divided into five sections:

General includes the administration and coordination of wildlife management at the airport, and working with adjacent businesses and property owners. The following recommendations were made:

- Assign a Wildlife Coordinator
- Develop a Comprehensive Wildlife Hazard Management Plan Based on the Wildlife Hazard Assessment
- Obtain Permits to Control Wildlife
- Use Multiple Types of Pyrotechnic Devices and have Control Supplies on Hand
- Keep a Log of Hazardous Wildlife Observations and Wildlife Hazard Management Control Activities and Reporting of Activities
- Train Personnel in Wildlife Hazing Procedure and Species Identification
- Strike Reports and Ensuring Personnel and Pilots are Familiar with Reporting Procedures
- Organize a Wildlife Hazards Local Working Group
- Maintain Zero Tolerance Policy

Habitat Modification includes providing ways to alter the habitat to reduce the amount of food, water, and cover available to target animals. Recommendations under habitat manipulation will have the most lasting effect on reducing the use of the airport by hazardous wildlife. The following recommendations were made:

- Turf Management
- Vegetated Ditch
- Reduce Earthworm, Grub and Grasshopper Populations
- Trees and Shrubs

Exclusion, Repulsion, and Removal addresses ways to deal specifically with individual animals or groups of animals. The following recommendations were made:

- Install a Wildlife Exclusion Fence
- Install Anti-Perching Devices
- Remove Nesting Opportunities
- Harass Early and Often
- Use a Variety of Pyrotechnic Devices
- Adopt a Policy of Lethal Control (Shooting) for Persistent Wildlife

Operational Considerations provides ways to relay information between air traffic control and pilots. Recommends include:

- PIREPS
- UNICOM
- NOTAM
- Flight Scheduling
- Pilot Training

Other recommendations involved the other local agencies. The following recommendations were made:

- U.S. Army Corps of Engineers - Clark's Dike
  - Mowing Clark's Dike
  - Removing Mammal Burrows
  - Tree Removal
- MDC
  - Land Acquisition
  - Exclude Wildlife from Settling Ponds
- CRRA
  - Proper Waste Storage
- City Parks, Recreational Areas and Surrounding Businesses
  - Proper Waste Storage
  - Discontinue Feeding Wildlife

When applying recommendations, it must be understood that there are many actions that can be taken to decrease wildlife hazards. Actions taken will depend on the species, time of year, why wildlife is using the airfield, habitat characteristics on and around the airfield, and a host of other variables. A variety of methods are available for managing hazardous wildlife species found on and around HFD above and beyond those provided in the recommendations.

A detailed and comprehensive two-volume manual for the prevention and control of wildlife has been developed by the USDA in partnership with the University of Nebraska Cooperative Extension and the Great Plains Agricultural Council (Hygnstrom et al. 1994) and can be found by visiting the USDA website at this link. http://icwdm.org/handbook/index.asp. It is important to remember that creativity and persistence can greatly augment the duration and effectiveness of any wildlife hazard reduction measure.

5.0 ALTERNATIVES & RECOMMENDED PLAN

This chapter identifies and evaluates potential development alternatives for Hartford-Brainard Airport (HFD) leading to a recommended plan. The alternatives have been designed to address the airport facility deficits identified in Chapter 3, and are presented as follows:

- Influencing Development Factors
- Airside Alternatives
- Landside Alternatives
- Recommended Plan
- Sustainability Recommendations
- Potential Environmental Impacts

The goal of this chapter is to identify a range of alternatives for airfield and landside development that are consistent with the Federal Aviation Administration (FAA) guidelines and standards and goals of HFD. The alternatives are based on a review of Airport's needs as well as current environmental, physical, and financial constraints. Section 5.4 presents the recommendations for HFD. Note that prior to the development of any airport project, an environmental analysis and permitting may be required.

5.1 Influencing Development Factors

There are several factors that influence the evaluation of the alternatives and determine the final recommended development plan. These factors include:

- **FAA Design Standards and Recommendations –** Meeting and improving the airfield to align with the FAA standards and recommendations.

- **Overall Airport Property Needs and Constraints:**

    - **Activity Forecasts –** The forecasted demand of based aircraft storage, amenities, and operational capacity.

    - **Adjacent Property Use –** The usage of property adjacent to HFD and future development for the community.

    - **Clark Dike and Connecticut River –** the proximity of the Dike adjacent to the airport property affects every airfield alternative identified.

- **Air Traffic Control Line of Sight** – The ability for the Air Traffic Control Tower (ATCT) to see the aircraft movement activity on, approaching, and departing the airfield.

- **Environmental Impacts –** The potential impact individual projects may have on the environment.

- **Cost and Funding –** The cost of the project, funding availability and sources, and financing.

- **Airfield and Vehicle Access –** The ability for pilots and passengers to obtain access to amenities they need easily and efficiently.

- **Alignment with Goals (Airport and other Agencies) –** Ensuring the development plan does not hinder the overall airport goals, including sustainability and economic development.

5.2 Airside Alternatives

This section describes the airside alternatives for HFD. As shown in Table 5-1, the alternatives are intended to satisfy the airside facility deficits identified in Chapter 3.

Table 5-1 – Summary of Airside Facility Deficits

Airfield Facility	Existing	2030 Recommendation	Deficit
Runway 2-20			
Runway Protection Zone	Uncontrolled Acreage	Controlled by Sponsor	Controlled by Sponsor
Runway Safety Area (RSA):			
Length (beyond Runway 2)	0’	300’	300’
Length (beyond Runway 20)	0’	300’	300’
Object Free Area (OFA):			
Length (beyond Runway 2)	0’	300’	300’
Length (beyond Runway 20)	0’	300’	300’
Width	329’	500’	171’
Runway Length	4,417'	5,000*	583'
Taxilane Object Free Area (TLOFA) Width	54’ to 115’	63.2’ to 115’	9.2’
Instrument Approach Procedures (Runway 2)	RNAV GPS, LDA, VOR/DME, & Visual	LPV	LPV
Instrument Approach Procedures (Runway 20)	None	RNAV GPS	RNAV GPS
Obstructions	Trees & Dike	Further Study	Further Study
Runway 11-29			
Runway Protection Zone	Uncontrolled Acreage	Controlled by Sponsor	Controlled by Sponsor
Obstructions	Trees & Dike	Further Study	Further Study

*5,000’ or greater, to meet requirements for corporate aircraft, charter operators, and insurance requirements

5.2.1 Runway Protection Zone

Airport ownership and control of RPZs, either through easement or acquisition, is desirable to prevent future development, clear tree obstructions, and ensure compatible land use. Although RPZs are primarily designated to protect people and property on the ground, the FAA considers the clearing of all objects within RPZs a safety benefit, particularly objects that obstruct the runway approach surface. Table 3-6 lists the acreage not controlled by the airport and any obstructions that are present. For all four RPZs at HFD, there is a total of nearly 40 acres beyond the airport property boundaries.

At HFD, two commercial buildings (motels) are located within the Runway 11 RPZ, and are considered existing non-compatible developments. If these properties become available for sale, it would be recommended that they be purchased and converted to a compatible land use. It is also recommended that easements or acquisition be pursued of the uncontrolled portions of the Runway 2-20 RPZs. These avigation easements should also include language about tree removal.

Additional information regarding the removal of the obstructions in the RPZs is discussed within Sections 5.2.2 and 5.2.7.

5.2.2 Runway Alternatives

As summarized in Table 5-1, the facility requirements of Chapter 3 identified the runway deficiencies. The main deficiencies are the length of the RSA and OFA, the width of the OFA, and the runway length. The RSA and OFA should be free of objects. The RSA must also be able to support an aircraft in the event of an overrun, as well as aircraft rescue and firefighting (ARFF) equipment. As shown on Figure 1-3, two waste water treatment lagoons owned by the MDC are located immediately beyond the Runway 2 end, approximately 10 to 20 feet below the runway elevation, which create a non-standard RSA and OFA. Additionally, the Clark Dike creates a non-standard OFA for the Runway 20 end.

Section 3.4.2 discussed the recommended runway length of Runway 2-20, which is currently 4,417 feet long. The FAA guidelines recommend 5,300 feet as the minimum length to accommodate large aircraft of 60,000 pounds or less. Insurance underwriters and charter operators prefer between 5,000 and 6,000 depending on the aircraft in order to meet the appropriate safety standards. As the runway is currently 583 feet short of the 5,000 foot minimum recommendation, a series of alternatives were developed and evaluated that reduce this deficit.

The FAA minimum standard runway width is 75 feet for an Airport Reference Code (ARC) B-II; see Table 3-4; the current width of Runway 2-20 is 150 feet. This provides a safety advantage as it allows for a greater margin of error for pilots of light aircraft during high wind conditions. It is recommended that the runway remain at 150 feet (although a reduced 100 foot width could be considered based on funding limitations).

Alternative 1 – Declared Distances (No Build)

This alternative would maintain the airfield in its current configuration, which does not meet FAA design standards. The FAA would require the RSA and OFA deficiencies to be addressed prior to funding for projects. If the property containing the lagoons is not acquired by the CTDOT to provide a standard OFA and RSA on the southern end of the Runway, declared distances would need to be implemented until the standards could be met. Implementing declared distances avoids the need to physically shorten the runway by declaring portions of the existing runway as RSA and OFA, thus not available for certain landing or takeoff calculations. Note that on the north end of the runway, declared distances would also be required as the runway end abuts the Clark Dike preventing a standard OFA. Declared distance standards are defined in FAA Advisory Circular 150/5300-13, and are briefly summarized below.

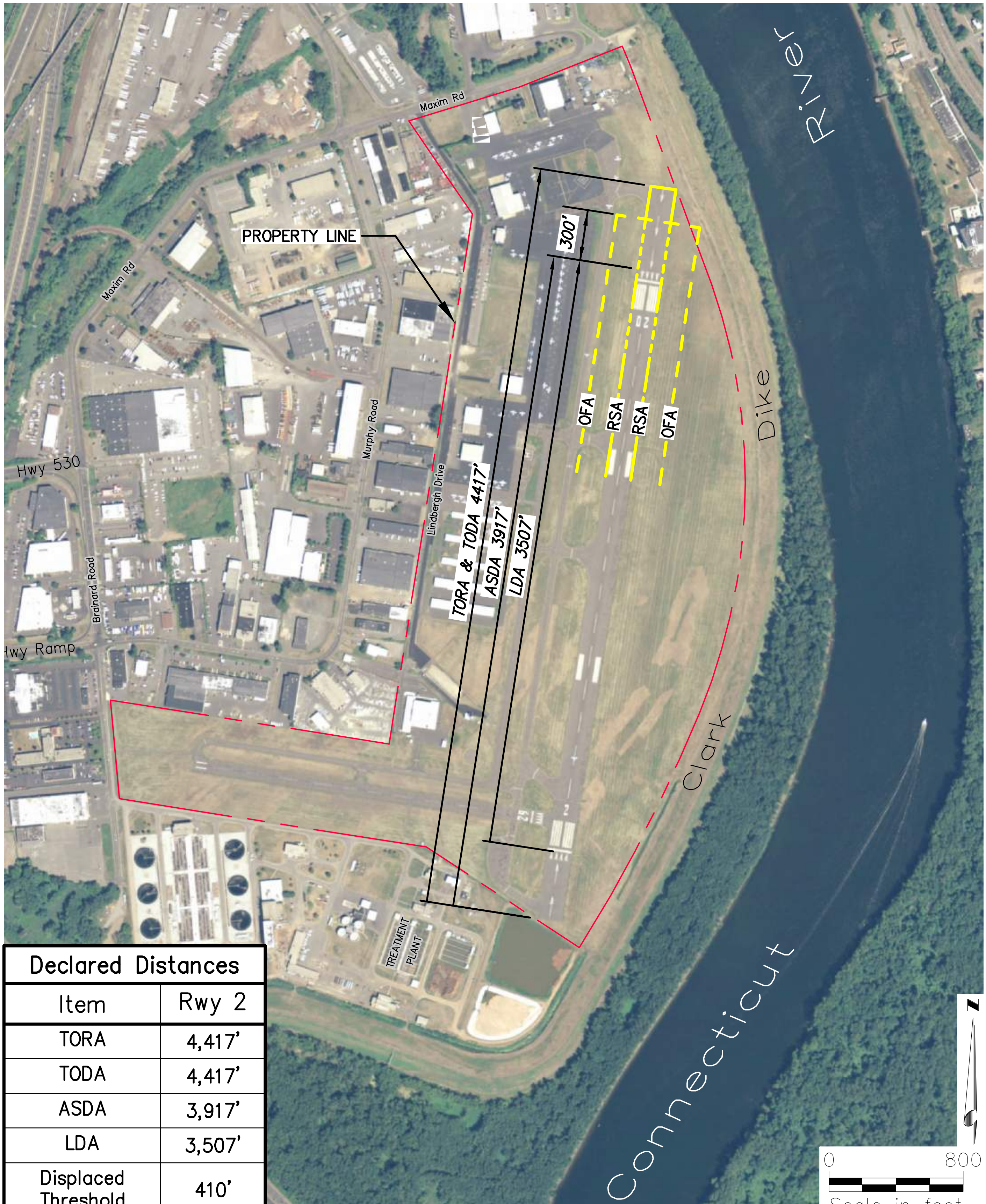
Takeoff Run Available (TORA) - The length of runway declared available and suitable for the ground run of an airplane taking off. At HFD, the entire length of the runway can be utilized for takeoff. However, as pilots are still required to consider objects in the runway departure path, the proximity of the Dike may functionally reduce the usable runway for larger corporate aircraft.

Takeoff Distance Available (TODA) - The length of the takeoff run available plus the length of the clearway. As clearways are not applicable at HFD, TODA and TORA are equivalent.

Accelerate-Stop Distance Available (ASDA) - The length of the runway available for satisfying accelerate-stop distances requirements. At HFD, the OFA must extend 300’ beyond the declared ASDA.

Landing Distance Available (LDA) – The length of runway that is declared available and suitable for the ground run of an airplane landing. This distance is reduced from the full runway length at HFD due to the lack of standard OFA’s and the use of displaced thresholds. The LDA is equal to the ASDA, minus the displaced threshold distance.

Table 5-2 and Figures 5-1 and 5-2 display the impact to Runway 2-20 if declared distances were implemented and the lagoons remain in place.



Declared Distances	
Item	Rwy 2
TORA	4,417'
TODA	4,417'
ASDA	3,917'
LDA	3,507'
Displaced Threshold	410'

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DECLARED DISTANCES – RUNWAY 2

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FIGURE 5–1

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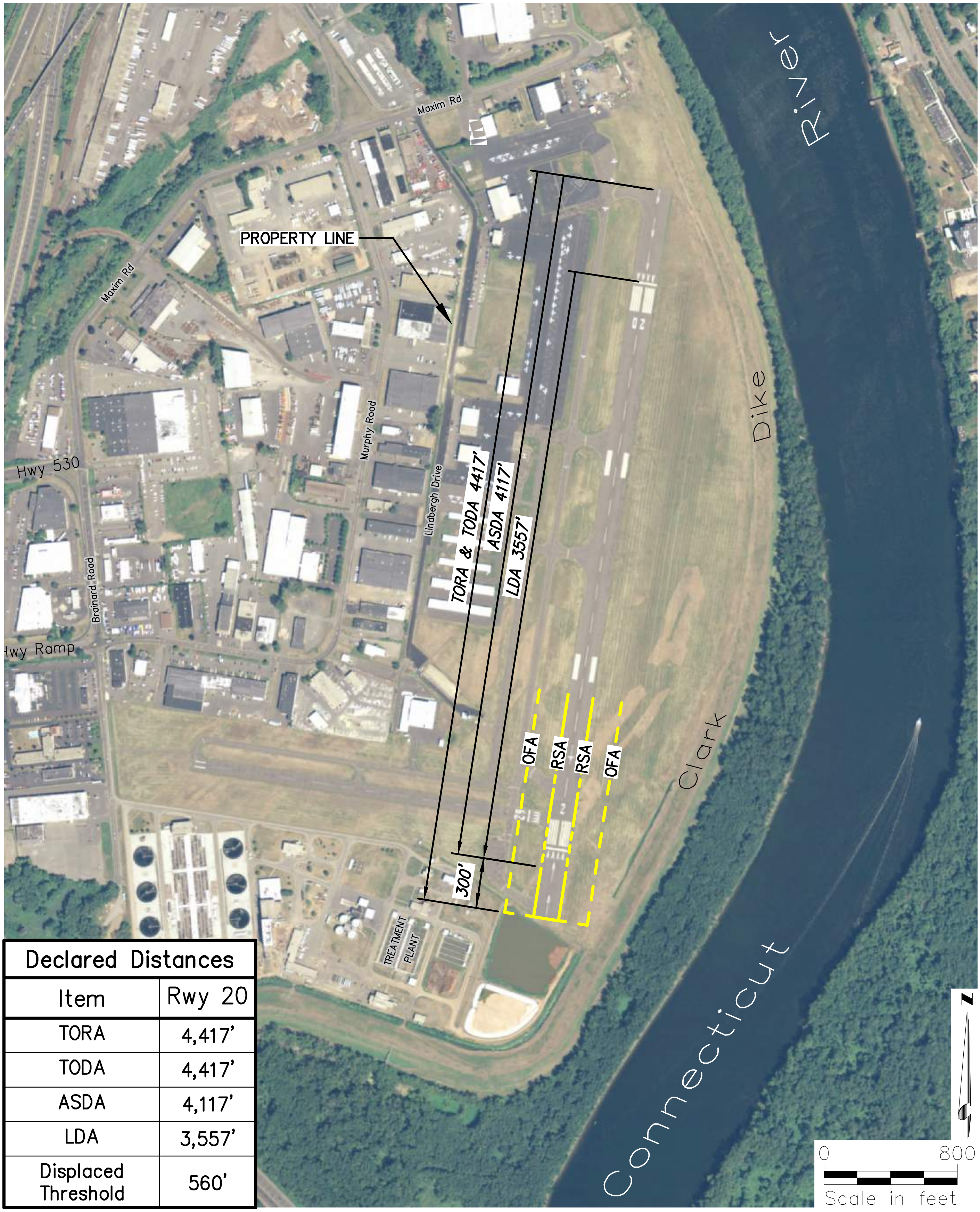

Declared Distances

Item	Rwy 20
TORA	4,417'
TODA	4,417'
ASDA	4,117'
LDA	3,557'
Displaced Threshold	560'

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DECLARED DISTANCES – RUNWAY 20

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FIGURE 5–2

Table 5-2 – Declared Distances (Feet)		
Item	**Runway 2**	**Runway 20**
Takeoff Run Available (TORA)	4,417	4,417
Takeoff Distance Available (TODA)	4,417	4,417
Accelerated-Stop Distance Available (ASDA)	3,917	4,117
Landing Distance Available (LDA)	3,507	3,557
Displaced Threshold	410	560

Specifically, the lagoons will reduce the ASDA and LDA for Runway 20, significantly affecting the ability for the runway to be utilized by corporate aircraft. At the north end of the runway, the Dike is within the OFA and impacts the ASDA and LDA for Runway 2 operations. Additionally, the displaced thresholds would still be necessary on both ends as the Clark Dike would still penetrate the approach surface creating an obstruction.

As HFD serves downtown Hartford, one of its main roles is to provide a safe airport for corporate traffic. Implementing declared distances will severely impact this role as the available runway distances would be inadequate and many insurance underwriters require a certain runway length for specific aircraft types. As such, current jet users and charter operators may need to relocate their activities under this alternative.

Alternative 2 – Shorten Runway

If the FAA or CTDOT chooses to not implement declared distances and the property containing the lagoons is not acquired, Runway 2-20 will have to be physically shortened to provide standard RSA and OFA on both runway ends. As shown in Figure 5-3, Runway 2-20 would be shortened from 4,417 feet to 3,606 feet. The pavement and taxiway entrances would be reconfigured to the new runway ends. Additionally, small displaced thresholds would still be necessary as the Clark Dike would still be an obstruction.

As HFD serves downtown Hartford, one of its main roles is to provide a safe airport for corporate traffic. Physically shortening the runway will impact this role as the available runway distances would be inadequate for most business activity and virtually all corporate jet traffic.

Alternative 3 – Runway 11-29 Closure

Improvements to the Runway 2-20 for safety purposes have been included in the previous Master Plans for HFD. These improvements would require the acquisition of land currently owned by the MDC. As a separate, but related issue, the MDC is moving forward with a multi-billion dollar investment to improve the area’s water quality and protect health and safety of the local community during high water events and storms. As part of this effort, MDC needs to expand the capacity of the adjacent treatment facility, which requires additional property in close proximity to the existing facility.

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ALTERNATIVE 2
SHORTEN RUNWAY 2-20

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FIGURE 5-3

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Initial discussions between MDC and DOT indicated there may be an opportunity to integrate the two projects. CTDOT could pursue a land swap for MDC property located at the southern end of Runway 2-20 for property adjacent to MDC's existing facility. Development alternatives that varied the impacts on up to and including the closure of Runway 11-29 were discussed. Alternative 3 proposes permanently closing Runway 11-29; the MDC facility expansion would occupy approximately one third of the runway property and two thirds for airport and commercial development. The configuration shown in Figure 5-3 allows for Runway 11-29 to still be used as a taxiway with the standard safety areas. An avigation easement would be placed on the property sold to MDC to ensure all FAA design standards and airspace requirements are satisfied.

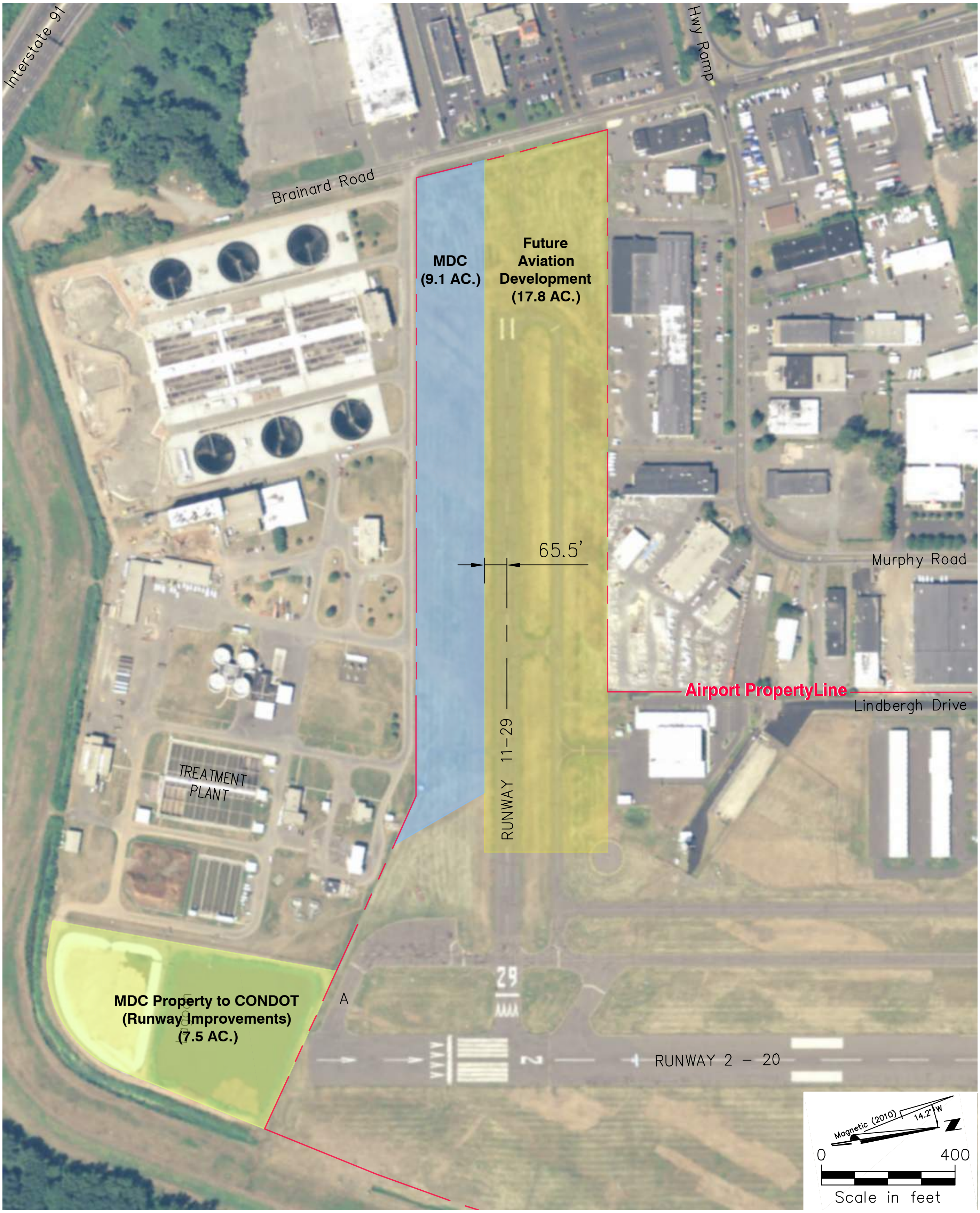
The feasibility and the impacts on the airport and its users of closing Runway 11-29 as a worst case scenario was evaluated. A standalone document was developed to discuss the details of the potential closure evaluation and is available as Appendix C.

Runway 11-29 is only 2,314 feet long and is used exclusively by light GA aircraft. The 2010 estimated activity was 1 to 2 percent of the total airport activity. The benefit of retaining the runway is for its use by light aircraft during strong westerly winds, as well as for flight training activity. The availability of the second runway can be considered a safety benefit; however, the wind analysis identified that the runway is not necessary per FAA guidelines as primary Runway 2-20 provides 95 percent annual wind coverage for all aircraft. The large 150 foot width of Runway 2-20 also provides a margin of error during crosswind conditions.

Closing Runway 11-29 would reduce maintenance and operational costs for the airport, reduce tree clearing requirements, and improve land use compatibility (i.e., an existing hotel is located within the western RPZ). Closing the runway would also provide additional property for aviation and compatible commercial/industrial development.

Numerous comments were received from airport users and tenants requesting that the runway remain open for both safety and training purposes. Based on the comments, it was decided to retain the runway for continued use at this time, and also to seek to accommodate MDC expansion without closing the runway.

In lieu of closing Runway 11-29, CTDOT could pursue a smaller land swap for MDC property located at the southern end of Runway 2-20. That property would be used by CTDOT to improve safety by providing a standard RSA and ROFA beyond the Runway 2 end. This possibility is further discussed in Alternative 4.



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ALTERNATIVE 3
POTENTIAL RUNWAY 11-29 LAND USE

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FIGURE 5-4

Alternative 4 – Runway 2 Improvements

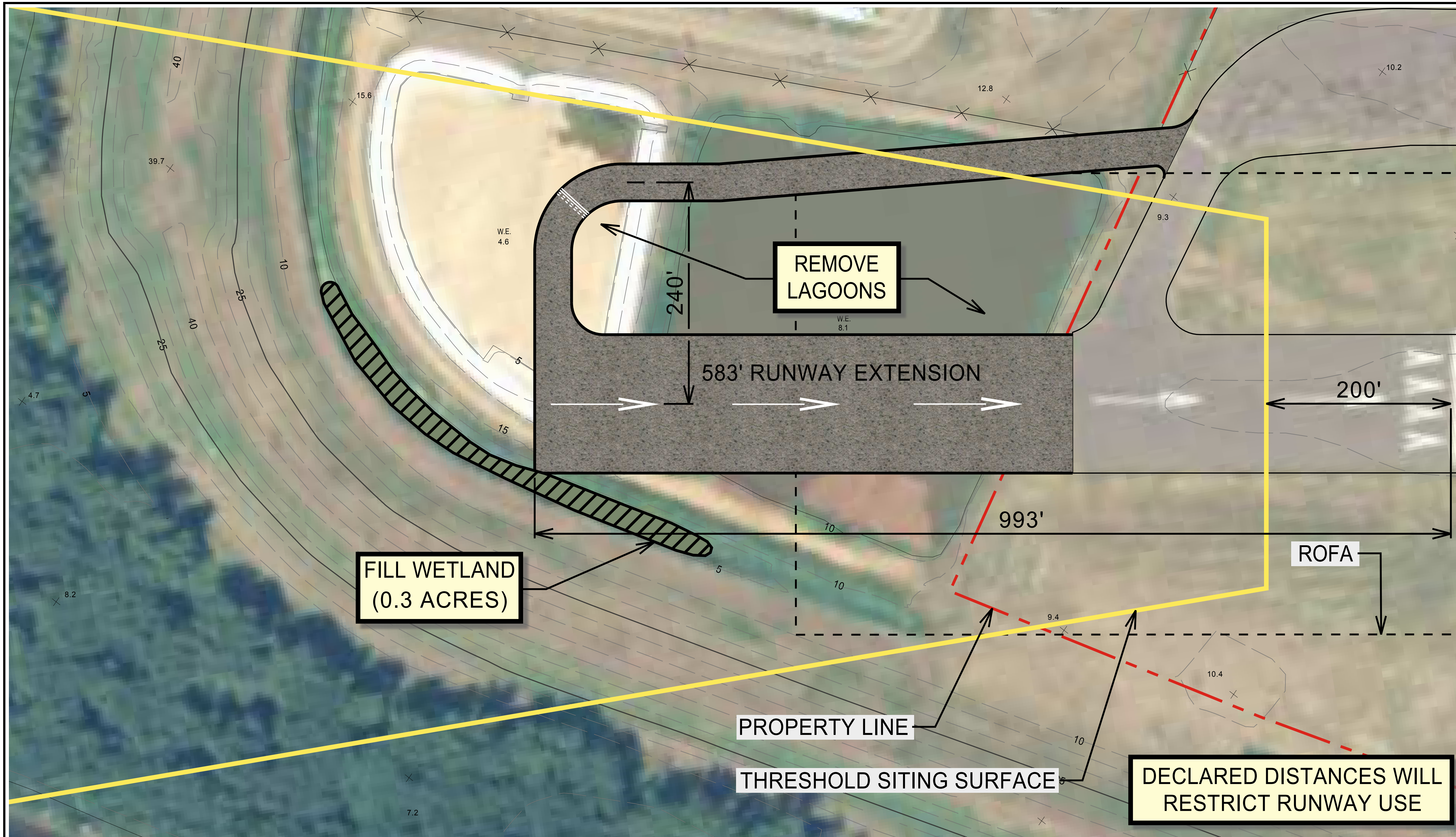
Providing aircraft with a safe and functional airfield is essential to maintaining airport operations, financial viability, and good relationships with the tenants and users of HFD. As discussed above, Runway 2-20 has a non-standard RSA and OFA and does not meet the recommended length. This alternative recommends improvements to Runway 2-20 for safety purposes, including lengthening the runway to the minimum recommended length and creating a standard RSA and OFA, with declared distances.

For HFD to make improvements to Runway 2-20 additional land is needed beyond the Runway 2 end. Acquiring MDC property along the southern end of Runway 2-20, through a trade (or "swap") of a similar amount of land to the south of Runway 11-29 was evaluated. MDC would utilize a narrow strip of the airport property in their facility expansion, while allowing for aircraft to still operate safely on Runway 11-29. The trade of these properties and the removal of the lagoons would enable the necessary safety improvements. This alternative differs from Alternative 3 as Runway 11-29 would remain open.

The property contains 0.3 acres of wetlands along the edge of the existing lagoons that would be impacted and likely require mitigation. The CT Department of Environmental and Energy (CTDEEP) would determine the need for permitting requirements during the design of the project. If it is decided that mitigation is necessary, it is possible that another wetland on airport property can be improved or expanded to satisfy permit requirements. Precautions would be necessary to ensure any new wetlands do not become a wildlife attractant.

Figure 5-5 illustrates the runway improvements under this alternative that are possible with the property swap. These improvements are important to meet FAA design standards and provide overall airport safety.

The extended runway would have no change on flight activity over Old Wethersfield as the runway landing point will remain the same. These improvements do not result in any capability to accommodate large aircraft as the usable runway length remains at 4,500 feet or less (per the ASDA and LDA). Rather, these improvements provide safety enhancements, addressing the issues created by the Clark Dike.



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ALTERNATIVE 4
RUNWAY 2 IMPROVEMENTS

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FIGURE 5-5

Table 5-3 shows the declared distances for the existing Runway 2-20 (per Alternative 1) and the runway after the safety improvements have been completed (per Alternative 3). It is assumed under this alternative that no modifications are made to the Clark Dike, thus the displaced thresholds would remain at their current locations. The displaced thresholds and OFA requirements for Runway 2-20 would considerably impact the ASDA and LDA for aircraft operations. The listed 5,000 foot runway length below would be the physical pavement length, however, corporate/charter aircraft must account for the safety standards (referred to as the "balanced runway length") that incorporate the restrictions discuss above.

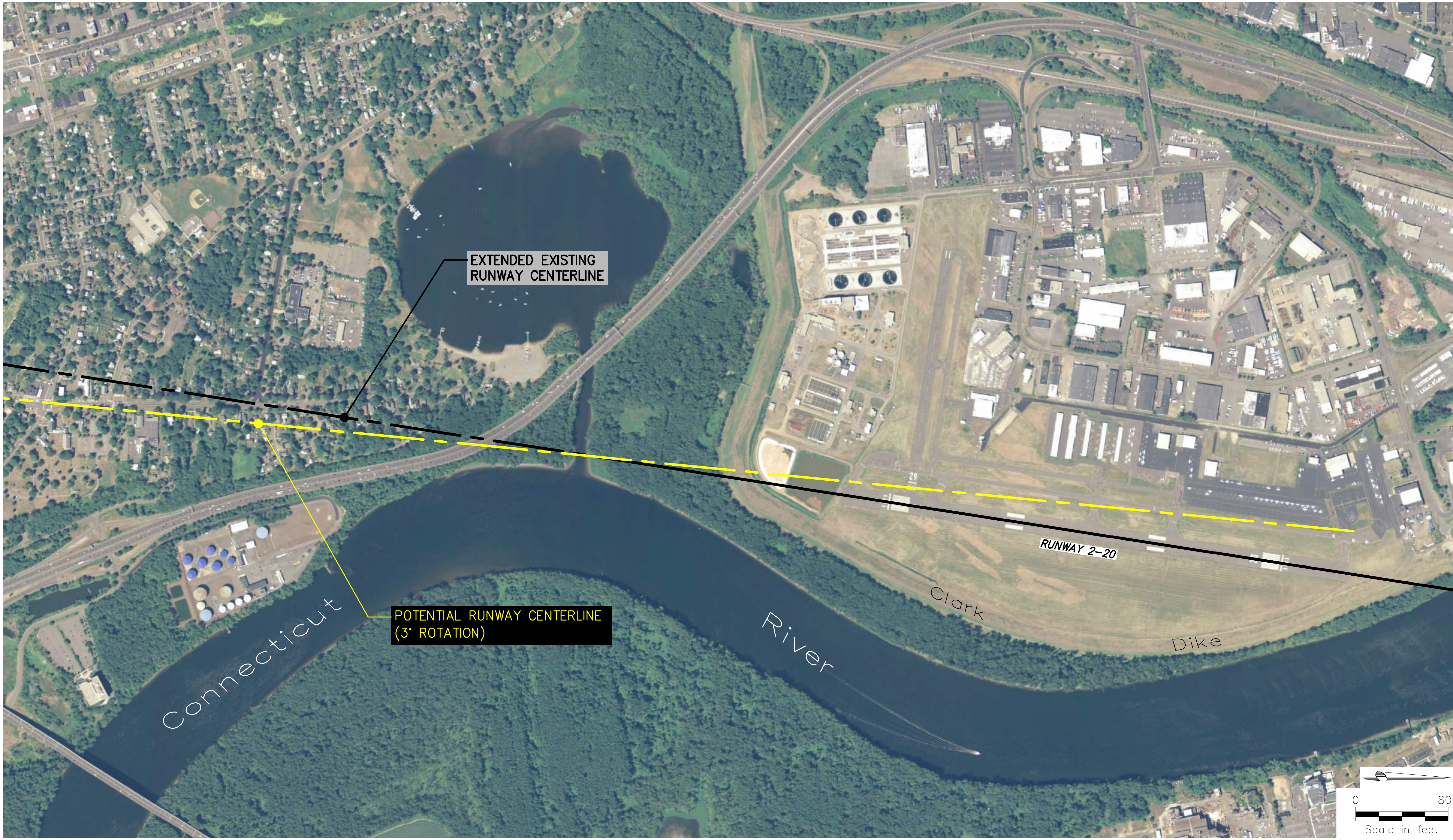
Table 5-3 - Declared Distances for Runway 2-20

	No Build		With Improvements	
	Runway 2	**Runway 20**	**Runway 2**	**Runway 20**
TORA	4,417'	4,417'	5,000'	5,000'
TODA	4,417'	4,417'	5,000'	5,000'
ASDA	3,917'	4,117'	4,500'	4,460'
LDA	3,507'	3,557'	3,507'	3,900'
Displaced Threshold	410'	560'	993'	560'

Alternative 5 – Rotated Runway

HFD has received numerous noise complaints from local residents of the Town of Wethersfield, as they are under the approach path to Runway 2. Therefore a rotation of the Runway 2-20 was suggested to potentially reduce the noise levels. A counterclockwise rotation would shift the approach path of aircraft towards the Connecticut River and away from the residential properties.

Figure 5-6 displays the current extended centerline of Runway 2-20 and the potential centerline after a three degree rotation of the runway. The figure shows that a rotation of three degrees from the runway end point will not relieve residents of Wethersfield from aircraft overflying their homes. Additionally, the rotation may impact other residents that would now be under the flight path, whereas they previously were not. This alternative would render much of the existing landside development as unusable, as shown in the photo below.



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ALTERNATIVE 5
ROTATED RUNWAY

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FIGURE 5–6

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A rotation larger than three degrees was dismissed due to the loss of useable airport property, impacts to existing airport facilities, costs, and additional obstructions from towers and stacks to the north of the runway. A rotation from the runway midpoint was also dismissed due to the location of the river, Clark Dike, and limited available property. The FAA would not support an alternative that decreased the safety of the runway. Thus, the runway would need to be substantially shortened if rotated at midfield in order to provide standard RSAs and ROFAs.

Alternatives Summary

Although there are many permutations of the above alternatives and additional options that may be considered, some options were dismissed at the onset of the study, including the following:

- Alteration of the Clark Dike was considered in detail, including relocation of the Dike, conversion to a retractable flood wall, and use of inflatable bladder dams. However, each of these alternatives were determined infeasible at this time, and were dismissed from further consideration Problems with these concepts included environmental impacts, very high costs, and extensive coordination and approvals necessary with the Army Corps of Engineers, CTDEEP, and City of Hartford.

- Although FAA standards only require the runway and parallel taxiway to be 240 feet apart, HFD's offset is 300 feet. Reducing the separation was evaluated, and determined to have no benefit to airport users. However, it would require considerable financial resources. Thus this alternative was dismissed.

Table 5-4 shows the evaluation of each alternative based on the applicable influencing factors described in Section 5.1.

Table 5-4 – Runway Alternatives Summary

Alternative	Figure	FAA Design Standards	Meets Property Needs	Environmental Impact	Cost	Alignment with Goals
1 – Declared Distances	5-1 & 5-2	Yes	No	None	Minimal	No
2 – Shorten Runway	5-3	Yes	No	None	Minimal	No
3 – Runway Closure	5-4	Yes	Yes	Minimal	Minimal	No
4 – Runway Improvements	5-5	Yes	Yes	Minimal	Moderate	Yes
5 – Rotation	5-6	Yes	No	Moderate	Extensive	No

Alternative 4 – Runway Improvements is recommended as it appears to provide the highest benefit to HFD. The phasing of the property acquisition and runway extension is discussed in Chapter 6 as part of the Airport Capital Improvement Plan (ACIP).

5.2.3 Taxilane Object Free Area (TLOFA)

As discussed in Section 3.2.4, several areas do not have a standard TLOFA for the Airport Reference Code (ARC) B-II or B-I. In many cases, a modified TLOFA based on the wingspan of the aircraft that typically use the area may provide a solution; in other cases, a physical change to the aircraft parking may be needed.

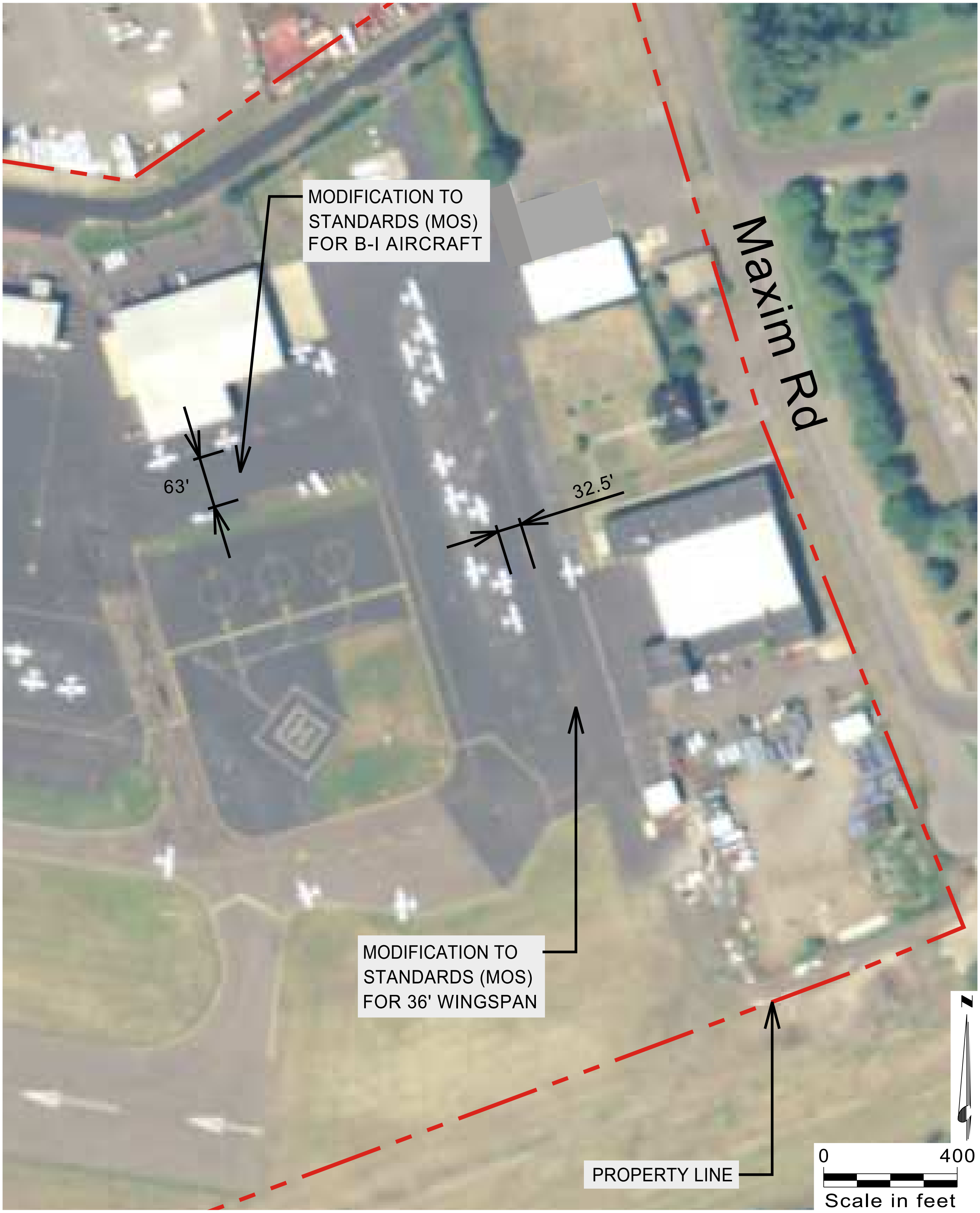
Figure 5-7 displays the Modification to Standards (MOS) needed for the taxilanes on the North Ramp. The MOS's was filed with the FAA in Fall 2012 and will be listed on the Airport Layout Plan (ALP).

Figure 5-8 displays the MOS filed for the Midfield and FBO Ramps. One tiedown should be removed on the Midfield Ramp to ensure B-I standards can be met at all times. On the FBO Ramp, removing two fixed-wing and one helicopter tiedown will provide a TLOFA that meets B-II standards. As there is a surplus of tiedowns, the removals will not negatively impact airport tenants.

5.2.4 Midfield Helipad (H1)

As discussed in Section 3.2.5, Air Traffic Control (ATC) has a limited ability to control pedestrians, vehicles, and aircraft on the FBO ramp near the Midfield Helipad (H1) since it is a non-movement area. This can be dangerous to the safety of people on the ground as well as a landing helicopter, especially if the helicopter is approaching H1 from the west rather than from the runway. It is recommended that this helipad be decommissioned and converted to a helicopter parking position, as shown in Figure 5-8.

The North Helipad (H2) is sufficient for the current and future activity of HFD and is within the movement area and controlled by ATC. Helicopter operators will maintain the ability to approach the airport from any direction and land on either the runway or North Heliport, and then taxi to their desired location.



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NORTH RAMP TAXILANES

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FIGURE 5-7

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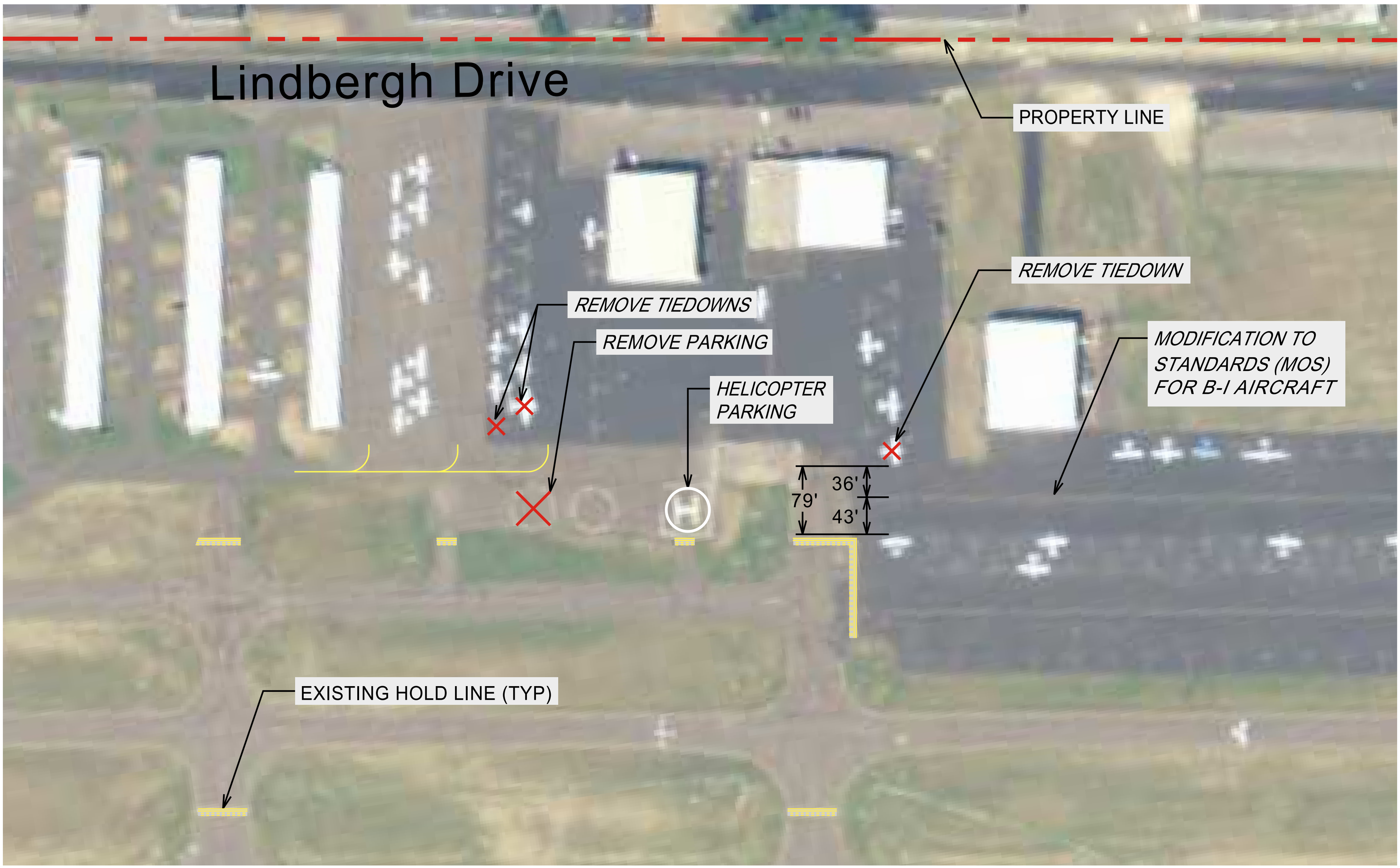

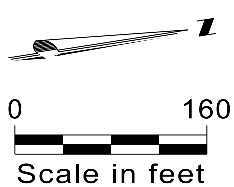

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MIDFIELD & FBO RAMPS, TAXILANES, AND HELIPAD

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FIGURE 5-8

5.3 Landside Alternatives

This section describes the landside alternatives for HFD. As shown in Table 5-5, the alternatives are intended to satisfy the landside facility deficits identified in Chapter 3.

Table 5-5 – Summary of Landside Facility Deficits

Airfield Facility	Existing	2030 Recommendation	Deficit
T-Hangar	66 Bays	111 Bays	45 Bays
Automobile Parking	360	Reposition Near Aircraft Storage	Reposition Near Aircraft Storage
Perimeter Fencing	Partial	Complete Perimeter	Complete Perimeter
Security Features	Various	Lighting, Secondary Locks, Vehicle Identification, Formal Procedures	Lighting, Secondary Locks, Vehicle Identification, Formal Procedures

5.3.1 Aircraft Storage, Vehicle Access and Parking Alternatives

Additional T-hangar bays are currently needed, and as listed in Table 5-5 an additional 45 T-hangar bays may be needed by 2030 to accommodate the future demand of aircraft storage at HFD. Additionally, better vehicle access and parking near the storage facilities is desired by tenants. The expansive available property at HFD allows for numerous potential layouts and combinations of aircraft storage facilities to accommodate short and long-term demands. It should be noted that the actual development would be based on demand, funding, and needs of the individual tenants. As tenants and private developers would build the hangars under a property lease with the airport, it is these tenants that determined the specific configurations. As such, the layout shown is for planning purposes only. Figure 5-9 demonstrates several possible hangar layouts to meet future demand while having still surplus airport property for future use.

The two rows of tiedowns between the existing T-hangars and FBO could easily be converted to T-hangars as the area is already designed for proper separations to meet FAA design standards. This property could also accommodate conventional hangars for corporate tenants. This location is easily served by the FBO and is adjacent to a vehicle parking lot.

The surplus property to the west of the Midfield Ramp may be used for a combination of conventional hangars and for vehicle parking for the tiedown tenants. The first (western) row of tiedowns would need to be removed in order to provide access to this area. Depending on size of aircraft that utilize future conventional hangars, the existing taxilane may need to be adjusted to accommodate the larger wingspan.

The area adjacent to the North Ramp could accommodate some smaller hangar development, near the airport management office, or the area as a whole could be redeveloped if demand warranted. Depending on the lease arrangements, the current storage area of the State Police Hangar could also be redeveloped to provide additional aircraft storage or other facilities.

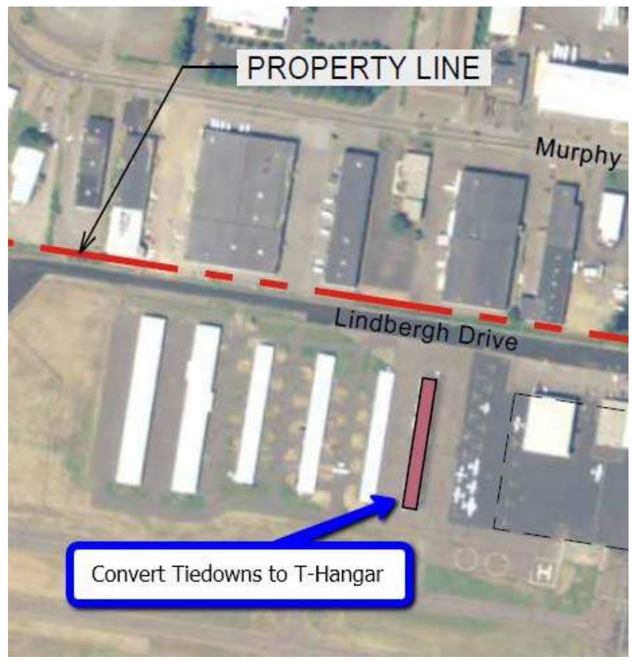
Near the ATCT, a series of T-hangars can be constructed. All buildings in this area will need to ensure that they do not further restrict the ATCT Line-of-Sight to the runway. As such, the buildings should be no taller than the existing T-hangars nor extend further to the east.

A vehicle access could be constructed to provide access from Murphy Road to Lindbergh Drive. This would need to be coordinated with the current property owners.

Tiedown Redevelopment

As discussed in Tables 3-19 and 3-22, 36 based aircraft tiedowns and 16 transient tiedowns are needed to accommodate 2030 demand. The airport currently has 167 tiedowns, leaving a significant surplus of tiedowns. The existing tiedowns adjacent to the FBO could be used by transient pilots; these pilots are more likely to need the full set of services provided by the FBO than tenants.

The row of nested tiedowns on the FBO ramp could be used as overflow transient aircraft and based aircraft. The adjacent row of nested T-hangars, owned by CTDOT, could be converted to a T-hangar.



The open property to the west of the Midfield Ramp could be utilized for a series of hangars based on developer needs. A standard B-II TLOFA would be provided by removing the first row of tiedowns. This location is ideal for corporate tenants as they are close to the FBO to use their services and amenities, is near the airport vehicle entrance, and close to vehicle parking. Additional vehicle parking could be provided near each hangar if desired.

As there ample property available to be developed, there are a multitude of layout combinations that can be explored for HFD. Figure 5-10 shows the available areas for development or redevelopment. This figure can be used as a reference for CTDOT when talking to tenants and developers about potential locations for future facilities.

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HANGAR ALTERNATIVE

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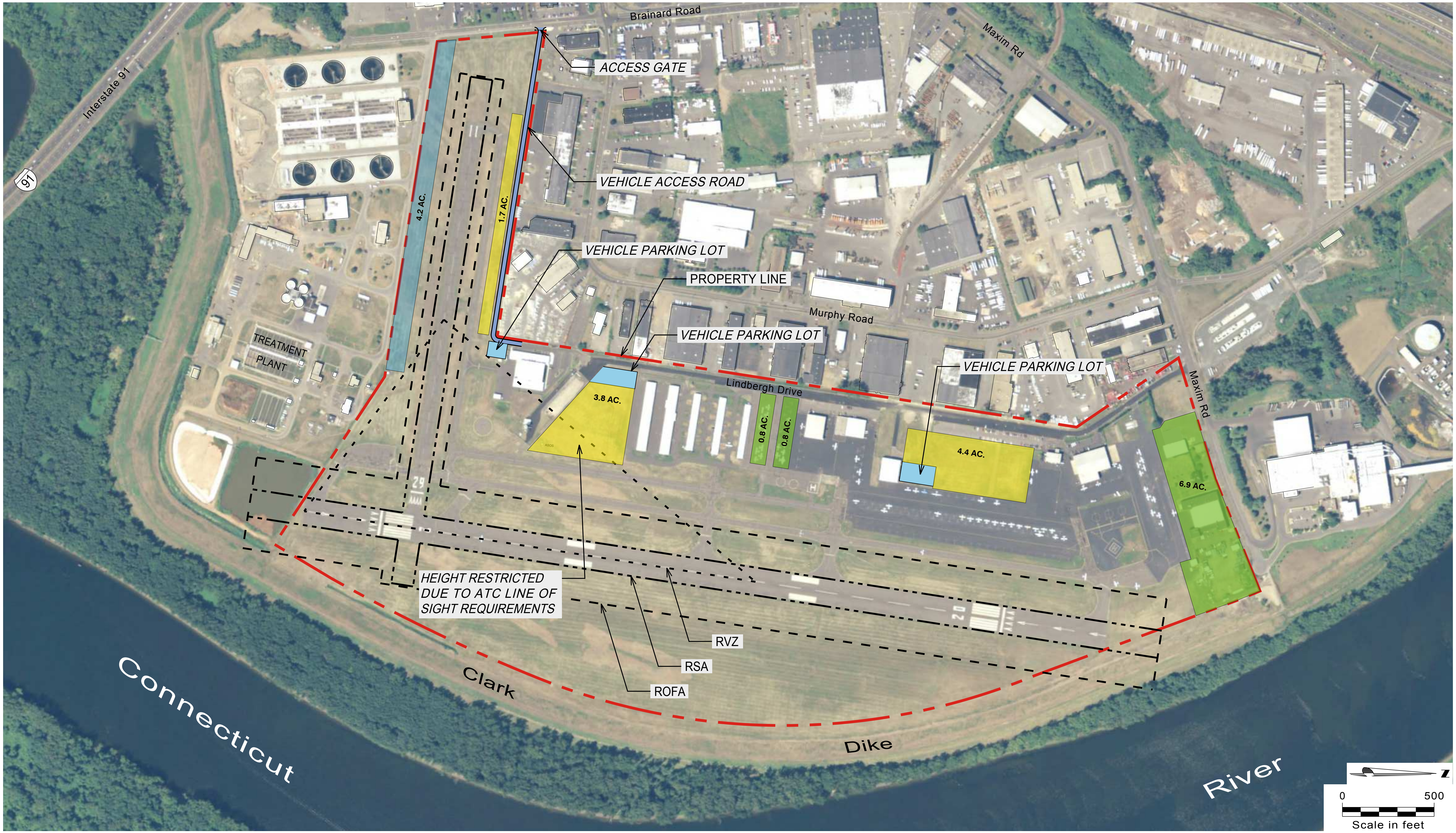
FIGURE 5-9



LEGEND

MDC (4.2 ACRES)

AVIATION DEVELOPMENT (9.9 ACRES)

POTENTIAL AVIATION REDEVELOPMENT (8.5 ACRES)

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POTENTIAL LANDSIDE REDEVELOPMENT

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FIGURE 5-10

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5.3.2 Perimeter Fencing

As discussed in Chapter 3, while neither the federal or state governments have mandated specific security features for GA airports, security fencing is a recommended feature. Perimeter control delineates the boundary of the airport property and limits access to authorized access points. The fencing also prevents wildlife from accessing the airfield and posing a danger to operating aircraft. Note that a Wildlife Hazard Assessment study is being conducted in coordination with this AMPU.

At HFD the security fence currently runs along the western and northern boundary of the property, but there is no fencing along the remaining boundary along the Clark Dike. It is recommended that HFD complete the fence along the boundary of the entire airport property. It should be noted that Dike is not located on airport property. The Clark Dike is owned and maintained by the City of Hartford (City) and regulated by the USACOE. Figure 5-11 shows several potential alignments of a possible security fence at HFD.

The function of the perimeter fence is to prevent people and mammals from accessing the airfield and the perimeter fence should be in a location to fulfill that function. Each potential location for the perimeter fence was reviewed based on several factors, including the following:

- Fence effectiveness/functionality
- FAA design standards (RSA and OFA)
- Airport Airspace (i.e., obstructions)
- Structural integrity of the Dike
- Dike maintenance and access
- Impact on the Connecticut River floodplain
- Potential wetland impacts

Seven potential alternatives were identified. However, each alternative has several shortcomings, which are discussed below:

Alternative 1 - Airport Property

Alternative 1 would place the fence along the airport property line and act as a divider between airport property and municipal property. However, as both the north and south end of Runway 2-20 are adjacent to the property line, a fence in such location would be within the RSA, OFA, Primary Surface, as well as other defined areas and surfaces. As such, this location would not be permissible as it would impact airport safety by further compromising FAA design standards beyond their existing deficiencies. Note that Alternative 1 is the only fence layout located on existing airport property.

Alternative 2 - Toe of Dike - Airport Side

Alternative 2 places the fence along the toe of slope of the dike, on the HFD (western) side. This location has the same problems as stated above for Alternative 1. The fence in this location would penetrate the RSA and OFA nearly as much as Alternative 1. As this location is on City property, coordination, approval, and an easement would be necessary.

Per ACOE policy, due to concern for structural integrity and access for mowing and maintenance activities, no development should occur within 15 feet of the Dike. As such, this option would not be desirable to the City.

Alternative 3 - Top of Dike

Alternative 3 places a fence along the entire length of the top of the Dike. Such a location would provide excellent wildlife protection as mammal activity is generally reduced in areas that do not provide visible protection from potential predators. However, as the Dike sits 20 to 28 feet above the runway elevation and the standard wildlife fence height is eight feet, a fence in this location would further obstruct the approach and departure surfaces of Runway ends 2, 20, and 29. Therefore, this location would further impact the displaced thresholds and reduce the usable runway length.

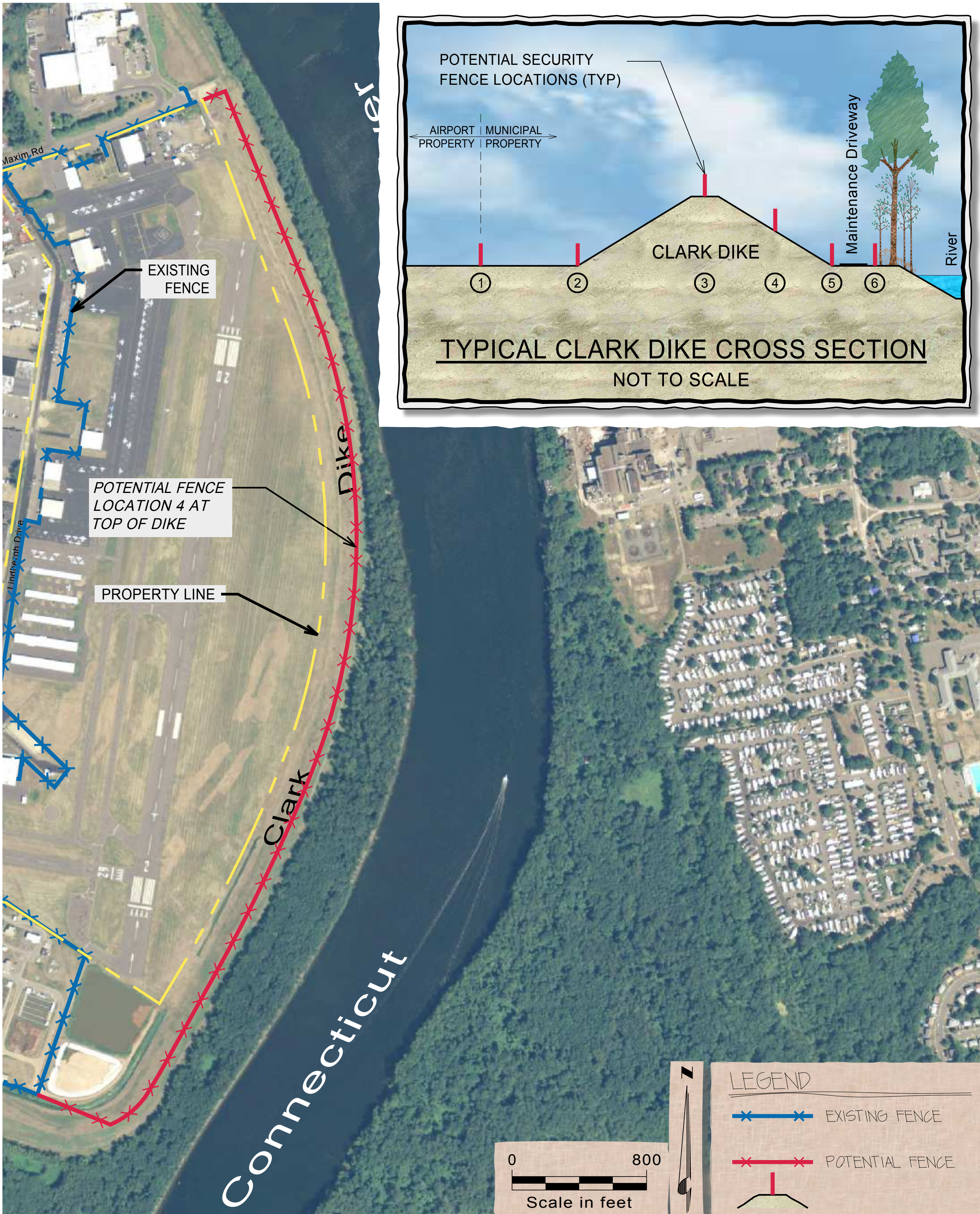
As similar to Alternative 2, the City’s maintenance policy would not typically permit construction of the fence on the Dike. This policy affects most of the identified alternatives, including alternatives 2, 3, 4, and 5. Coordination with the City and ACOE would be needed.

Alternative 4 - Slope of Dike - River Side

Alternative 4 would place the fence on the Dike embankment, along the eastern slope that faces the Connecticut River. This option provides a location that does not penetrate the approach or departure surfaces, and enables a fence location to remain clear of the 100 year floodplain. This location would also provide excellent wildlife protection (similar to Alternative 3), as mammal activity is reduced in visually exposed locations. A concern with this option is that maintenance of the Dike will become difficult with a fence located in the center of the slope. Gates would need to be provided for mowing equipment and access.

Alternative 5 - Toe of Dike - River Side

Like Alternative 2, Alternative 5 would set the fence on the toe of slope of the Dike, but on the Connecticut River side (eastern side). Between the Dike and the Connecticut River there is an unpaved access driveway that is used by the City for maintaining the Dike. Placing a fence on the toe of slope will act as a barrier between the maintenance driveway and the Dike. Gates would need to be provided to mowing equipment and access. In addition, this location is within the floodplain, and thus periodic flood damage from debris is likely.



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POTENTIAL AIRPORT PERIMETER FENCE LOCATIONS

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PROJECT NO. 21099

DATE: JAN. 2014

FIGURE 5-11

Alternative 6 - River Edge

Alternative 6 would set the fence along the river edge. This option would place the fence on the opposite side of the maintenance driveway and provide adequate access for dike maintenance. The fence would also be positioned over 15 feet from the Dike, which eliminates any impacts to the Dike itself. However, this location is within the floodplain (and may be within the floodway), and thus regular flood damage from debris would be anticipated

This location is also with an area of trees and wetlands. The trees create maintenance issues, and wetland permits would be required. As alternative locations are available, it is anticipated that CTDEEP would not issue the necessary permits for a fence in this locations.

Alternative 7 – Hybrid Option

A combination of these options is also possible. For example, Alternative 1, which satisfies ACOE and City policy, could be employed along the center portion of the airfield. However, beyond the runway ends (i.e., within the OFA) the fence would then be located along the riverside of the Dike (as shown in Alternatives 4 or 5) to avoid substantial airfield impacts. Thus, this combination requires transition sections where the fence would traverse over the top of the Dike in two areas. Approximately half of the total fence length, approximately 7,400 linear feet, would be located on the airport property and half would be located on the Dike property.

This combination option still infringes upon ACOE policy, but less than if the entire fence was located as in Alternatives 4 or 5. The option would require access gates for maintenance of the Dike in two locations. Unfortunately, based on the juxtaposition of the Runway and Dike, over half of the new fence would still be located on or adjacent to the Dike, reducing the potential benefit.

Summary

Alternatives 1, 2, and 3 would impact airport safety and are eliminated. Alternatives 4 and 5 would hinder maintenance of the Dike, but satisfy safety requirements and therefore could be pursued. Alternative 6 is not practical since the fence would be within wetlands and floodplain. As shown in Table 5-6, the alternatives were evaluated based on the criteria mentioned previously.

Table 5-6 - Fence Alternatives Evaluation						
Evaluation Criteria	**Alternative**					
	1	**2**	**3**	**4**	**5**	**6**
Functionality	No	Yes	Yes	Yes	Yes	No
Standard RSA/OFA	No	No	Yes	Yes	Yes	Yes
Clear Airspace Surfaces	No	No	No	Yes	Yes	Yes
Dike Structural Integrity	Yes	No	No	No	No	Yes
Dike Maintenance and Access	Yes	No	No	No	No	Yes
Clear of Floodplains	Yes	Yes	Yes	Yes	No	No
Clear of Wetlands	Yes	Yes	Yes	Yes	No	No

Based on this review, Alternative 4 is recommended as the preferred alternative. Additional discussion with the City of Hartford and ACOE is needed if this project is to be implemented.

5.3.3 Security Features

Additional lighting on the Midfield Ramp was recommended as part of the evaluation of the Transportation Security Administration (TSA) Security Guidelines for General Aviation Airports (May 2004). The ideal location of the light poles is within the middle row of nested tiedowns so that both edges of the ramp may be illuminated with the least amount of light poles. The light poles may require the removal of select tiedowns. As there is a surplus of tiedown locations, the removal of tiedowns in this location is not anticipated to negatively impact airport tenants. The light poles may not be higher than 50 feet so they do not penetrate the transitional surface of Runway 2-20. An alternative location includes light poles along the western edge of the apron, which would regard taller pole and higher power light fixtures do to the additional distance for light projection. The specific location for the poles may be determined during the design process. . It is also recommended that light-emitting diode (LED) lights be installed to pursue the sustainability goals of the airport.

5.3.4 Noise Abatement

As discussed in Section 1.6, an FAR Part 150 Noise Control and Land Use Compatibility Plan was conducted in the 1980s and a series of recommendations were made and implemented. Additional measures have also been implemented to assist with the publicizing of the noise abatement measures. The measures listed below from the 1989 study are recommended to continue being implemented, some with minor modifications.

Airport Operations Measures

- Flight Tracks: Utilize the approved departures and arrivals for Runway 2-20.
- Preferential Runway Use: Utilize Runway 20 for landings and Runway 2 for departs when weather and operating conditions permit.
- Departure Procedures: Continue to promote use to the manufacturers' or National Business Aviation Association (NBAA) published noise abatement departure procedures.
- Helicopter Flight Corridors: Continue to promote use of the flight corridors by helicopters.
- Nighttime Maintenance Run-up Restriction: Continue to requested restriction of engine run-ups for maintenance purposes between 10PM and 7AM.

Administrative Measures

- Part-time Noise Abatement Officer: Airport manager continue to to handle complaints, collect and compile noise measurement data, and act as a liaison to the community.
- Noise Complaint and Response Procedures: Continue with current protocol of recording and following up on noise complaints.
- Public Information Program (Review and Implementation): Continue meeting with the noise abatement committee.
- Program Publicity – Letters to Airmen: Continue with availability of the Letters to Airmen.
- Program Publicity – Airside Signs: Replace the textual signs with graphical signs. A sample is shown in Appendix D.
- Program Publicity – Automated Terminal Information Services (ATIS) Advisories: Although the ATIS is intended to be brief and included at the discretion of the FAA, a minor addition is recommended to remind pilots to review the noise abatement procedures. "Please review Airport/Facility Directory for noise abatement procedures in effect."
- Program Publicity – Tower Advisories: ATCT continue to advise pilots on noise abatement procedures.
- Program Publicity – Informational Brochures: Update brochures and flyers to simplify information on procedures and make more graphical for pilots. Continue to provide

brochures and flyers to flight schools in the area to increase promotion of the noise abatement procedures. A sample is shown in Appendix D.

- Assessment of NEM and NCP with Changes in the Airport Layout or Operation: Continue providing a representative from the noise committee on future airport planning studies.

- Assessment of NEM and NCP at Minimum Intervals of Time: Update contours as part of future master plan updates.

The following are additional measures recommended as part of this AMPU that were not part of the 1989 Part 150 study.

- EAA Newsletter - Continue to publish procedures in the Experiment Aircraft Association (EAA) quarterly newsletter.

- Airport/Facility Directory (A/FD) – The A/FD listed for HFD currently states "Arpt located in noise sensitive area and populated areas to S and W should be avoided. Apch/depart over river when possible. See Brainard twr letters to airmen."

  However, the listing does not state there are voluntary noise abatement procedures in effect or what they may be besides trying to avoid certain areas. Pilots may not be aware of which areas to avoid. It is recommended that HFD be added to the Supplemental section of the A/FD to detail the noise abatement procedures. For example: the noise abatement procedures for Westchester County Airport (New York) and Nantucket Memorial Airport (Massachusetts) are examples of more detailed information that pilots may review prior to flight. A note on the main page of the A/FD should be added to refer pilots directly to the Special Notices section. A sample for HFD is shown in Appendix D.

- Whispertrack - Continue subscription to Whispertrack.

- Website - The noise abatement procedures can be more prominently displayed on the airport's website. This information could include the brochure, a link to Whispertrack, the Letters to Airmen, the A/FD pages, NBAA departure procedures, and contact information. The airport website is located at:
  http://www.ct.gov/dot/cwp/view.asp?a=1390&q=260082&dotPNavCtr=|40038|

- Right Traffic Pattern – VFR Flight procedures at HFD follow standard "left hand" traffic patterns established by the FAA. The patterns include flying straight-in to or straight-out from either runway end, or flying a standard rectangular traffic pattern with all left-hand turns. However, at HFD when Runway 2 is active, right traffic is used for better visibility from the control tower (and a supplemental benefit for noise abatement).

  However, standard left traffic is listed in pilot information sources. The segmented circle on the ground indicates that left traffic should be used. It is recommended that right traffic become formally listed as the standard traffic pattern for Runway 2 and the segmented circle modified for pilots that are operating while the ATCT is closed.

- Aeronautical Charts – A notation can be made on aeronautical charts to identify the areas that are noise sensitive so pilots may better understand which areas to avoid.

5.4 Recommended Development Plan

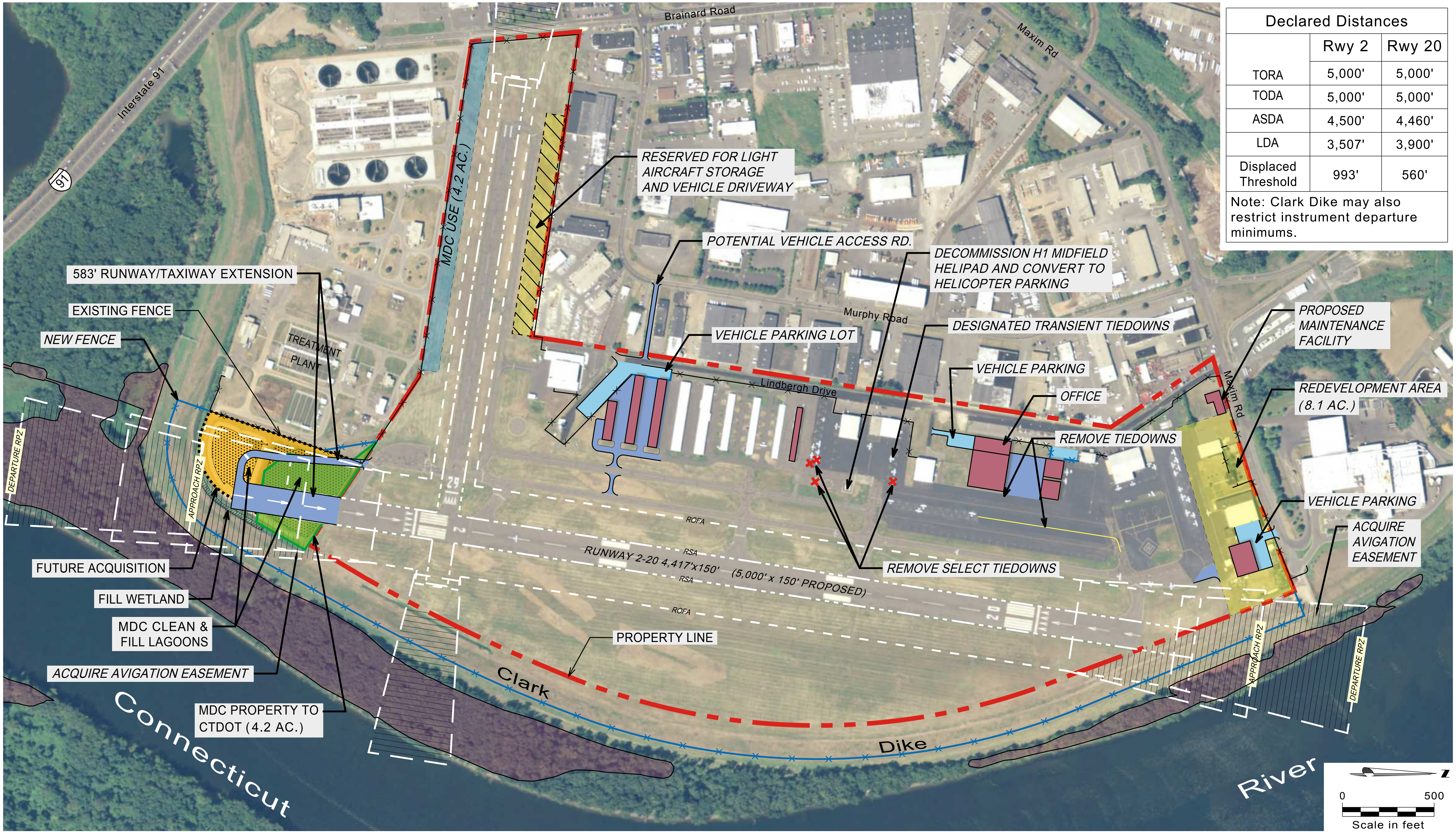
Based on a further review of airport's goals and constraints, the alternatives were refined to form a recommended plan for HFD. The plan improves safety, provides flexibility to airport users, and incorporates all potential necessary facilities. The recommended plan is illustrated on Figure 5-12, and summarized below.

5.4.1 Airside Recommendations

- **Runway Safety Improvements:** Removal of the sewage treatment lagoons for a standard RSA. Declared distances will be implemented for both runway ends to satisfy OFA requirements.
- **Runway Extension**: Potential southern extension of the runway to the recommended length of 5,000 feet.
- **Decommission H1 (Midfield Helipad):** Conversion of the helipad to a helicopter parking position.
- **Tree Removal:** The indicated trees should be removed as they are obstructions to HFD's airspace.
- **Instrument Approaches**: Publish "Localizer Precision with Vertical Guidance" (LPV) procedures to both runway ends. FAA must confirm it this is permissible based on the location of the Dike.

5.4.2 Landside Recommendations

- **Vehicle Access Road:** A vehicle access road between Murphy Road and Lindbergh Drive.
- **T-Hangars:** To fulfill the deficiency, T-hangars can be built in the locations shown, provided they are no taller than the existing structures so they do not obstruct the ATCT line-of-sight. A taxiway connection to Taxiway A would also be provided. Vehicle parking would be located near the ATCT.
- **Tiedown Removals:** To provide FAA standard TLOFA dimensions, select tiedowns will need to be removed.



Declared Distances	Rwy 2	Rwy 20
TORA	5,000'	5,000'
TODA	5,000'	5,000'
ASDA	4,500'	4,460'
LDA	3,507'	3,900'
Displaced Threshold	993'	560'

Note: Clark Dike may also restrict instrument departure minimums.

LEGEND

- NEW AIRFIELD PAVEMENT
- NEW AUTO PARKING
- NEW BUILDING
- NEW FENCE
- MDC USE
- REDEVELOPMENT AREA
- EXISTING OBSTRUCTIONS
- PROPERTY ACQUISITION
- FUTURE ACQUISITION
- AVIGATION EASEMENT

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RECOMMENDED DEVELOPMENT PLAN

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FIGURE 5-12

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- **Conventional Hangars:** The area shown is ideal for a series of conventional hangars, associated apron, and vehicle parking. The existing tiedowns and taxilanes would be removed or modified as necessary. Hangars should be outfitted with floodlights to provide light on the Midfield Ramp.

- **Proposed Maintenance Facility:** The depicted maintenance facility will be developed by CTDOT for airport operations staff.

- **Wildlife Incursion Control Fence:** Although it will require coordination among several parties, wildlife incursion control fence construction is recommended on the eastern slope of the Clark Dike.

- **Hangar Redevelopment:** The area along Maxim Road is a prime location for the redevelopment of buildings as their useful life expires or as market conditions permit.

- **Midfield Ramp Lighting:** Increase nighttime visibility on the midfield to increase security.

- **Security Policies:** TSA guidelines also included the following policy items that the CTDOT should consider implementing at HFD:
  - Vehicle Identification
  - Secondary Aircraft Locking Devices
  - An Airport Security Committee and Procedures Document that incorporate the following:
    - Law Enforcement Officer procedures
    - Challenge Procedures (for confronting unfamiliar individuals and suspicious activity)
    - Transient Pilot Sign-in/Sign-out Procedures
    - A procedure for charter and flight training operators to positively identify all passengers and cargo

- **Noise Abatement –** Continue current protocol for promotion of the noise abatement procedures with these adjustments:
  - Replace the textual signs with graphical signs.
  - Revise ATIS to state "Please review Airport/Facility Directory for noise abatement procedures in effect."
  - Update brochures and flyers to simplify information on procedures and make more graphical for pilots.
  - Update contours as part of future master plan updates.
  - Increase information listed in the A/FD.
  - Provide noise abatement procedure materials on airport website
  - Formalize the right traffic pattern
  - Depict noise sensitive areas on Aeronautical Charts

A summary of the entire recommended plan, including cost estimates and anticipated funding sources, is provided in Chapter 6.

5.5 Sustainability Recommendations

As discussed in the introduction of this AMP, HFD's vision for sustainability is:

To maintain and enhance the Hartford Brainard Airport into a transportation asset that serves the needs of central Connecticut businesses and residents, and operates in an economically and environmentally sustainable manner.

As part of this effort, a series of assessments were conducted to inventory the existing and future conditions at HFD to determine the best way to achieve the goals and objectives outlined in the introduction. Please see the introduction of this AMP for more detailed information on the goal, objectives, and measurements of each topic. The following sections provide a series of strategies for the key sustainability topics identified for HFD. It should be noted that this is not an exhaustive list of the potential strategies, but focuses on small changes that may not require significant resources, but have a higher impact. The Sustainable Aviation Guidance Alliance (SAGA) offers an online database that consolidates various sources into one searchable database. Users can search based on airport size, topic, facility, and function.

As many of these strategies are policy changes, they will require coordination between the airport users, tenants, and CTDOT. It is not reasonable to expect all of the strategies to be implemented within the next year. Some of them can easily be implemented, such as replacing bulbs with energy efficient bulbs or carpooling, and can be completed by individual tenants. Others, such as establishing construction recycling requirements on new construction need to be evaluated first to determine the best execution procedures for the CTDOT as the airport sponsor.

5.5.1 Energy Use

Airport activities and facilities, such as heating and cooling, airport power units, and lighting, require large amounts of energy. Strategies can be identified to reduce energy consumption by using more energy efficient equipment, vehicles, and materials or reconsidering current procedures and policies. The following strategies were identified for obtaining the goal of *Reduce energy consumption and use clean/renewable energy resources:*

- Follow Energy Conservation Measures (ECM) for each building (see below)
- Convert to LED lighting for airfield and in buildings
- Participate in local, regional, state, and national incentive programs that provide funding for equipment or reimbursements
- Purchase and install energy star appliances
- Establish an office equipment shut off policy

A detailed energy use and efficiency study was conducted for the airport buildings including the cost of the measure, the annual energy savings, and payback period. A summary of the associated recommendations is listed below.

A more in depth study should be performed prior to implementing Energy Conservation Measures (ECM) using actual logged temperatures, operating hours and fuel consumed. The may be significant utility rebates and incentives available from the utility supplier or other agencies that could reduce the initial investment and therefore the payback term.

FBO Terminal Building (#17 on Figure 1-3)

1. Replace Standard Efficiency Boilers with Condensing Boilers
2. Replace Domestic Hot Water Heater
3. Replace A/C Units
4. Add Ceiling Insulation
5. Install Occupancy Sensors
6. Lighting Upgrades
7. Window Tinting

Aircraft Storage Building (#18 on Figure 1-3)

8. Replace Boilers with Condensing Boilers
9. Replace Domestic Hot Water Heaters
10. Install Occupancy Sensors

Aircraft Storage Building (#14 on Figure 1-3)

11. Install Wall Insulation
12. Replace Domestic Hot Water Heater
13. Lighting Upgrade (Further study recommended)

Aircraft Storage Building (#13 on Figure 1-3)

14. Replace DX Gas Rooftop Units
15. Reduce Temperature Setpoint

Aircraft Storage Building (#10 on Figure 1-3)

16. Install Programmable Thermostats

Airport Management Office (#27 on Figure 1-3)

17. Replace Windows

Airport Maintenance Hangar (#23 on Figure 1-3)

18. Replace Unit Heaters with Infrared Heaters

Star Base Office (#27 on Figure 1-3)

19. Install Programmable Thermostats

State Police Hangar (#25 on Figure 1-3)

20. Replace Rollup Hangar Bay Door with Curtain

21. Lighting Upgrade
22. Add Infrared Heaters

5.5.2 Air Quality

Federal regulations towards improving air quality are becoming increasingly stringent. Airports are now required to conform to air quality standards and initiate plans to offset increases to air pollution. This may include monitoring air quality, reducing greenhouse gas emissions (GHG), or converting to electric vehicles. The following strategies were identified for obtaining the goal of *Minimize HFD's contribution to climate change, air pollution, and the depletion of the ozone layer.*

- Discourage idling vehicles (including commercial and construction vehicles) and aircraft for more than 2 minutes. Post signs as reminders
- Discourage idling within 100 feet of buildings
- Utilize alternative fuel vehicles for FBO & DOT (hybrid, electric, natural gas, etc)
- Establish preferred parking for hybrid and electric vehicles
- Promote carpooling for employees and students
- Ensure continuous maintenance on vehicles; track maintenance electronically
- Phase out use of CFCs, HCFG, and Halons; conduct inventory and determine replacement options
- Encourage the use of local vendors/suppliers

5.5.3 Design and Construction

Construction and demolition waste constitutes about 40 percent of the total solid waste stream in the US. New and refurbished buildings can be built with sustainability in mind to reduce their impact on the environment and the community. Airports can require their engineers and contractors to conform to sustainability design and construction standards regarding their materials and building practices. The following strategies were identified for obtaining the goal of *Ensure that design and construction projects at HFD conform to the concept of sustainability; making it a core objective in site readiness and building construction.*

- Provide RFP and Bid documents electronically
- Telecommunicate when possible to reduce printing meeting materials and transportation emissions
- Develop a sustainable review panel
- Strive to achieve US Green Building Council LEED certification for airport-owned and tenant projects
- Purchase Environmental Preferable Products (EPP) (See the EPA's EPP website)
- Ensure all buildings adhere to the Building Energy Conservation Codes
- Utilize the SAGA database to determine applicable initiatives for the design of specific projects

- Require contractors to include in the contract documents the minimum quantities of excess materials that will be accepted for return by the vendor and the required conditions of such materials.
- Request proposed procedures for waste minimization
- Require plan to protect existing vegetation during all construction activities
- Provide rewards for contractors who substantially exceed sustainability goals.
- Promote installation of equipment with low life cycle maintenance requirements
- Build on a previously developed site or one that is close to existing infrastructure
- Donate vegetation removed during construction to community
- Use “just-in-time” delivery of construction materials to reduce staging requirements
- Minimize extent and duration of staging areas on bare ground surfaces
- Ask suppliers to reuse pallets and empty containers

5.5.4 Waste Management / Recycling

Waste at general aviation airports comes primarily from office materials food services, and maintenance activities. Bringing awareness to the amount of waste produced on an annual basis and promoting waste management programs, such as recycling or composting, can contribute significantly to the environment. The following strategies were identified for obtaining the goal of *Enhance efforts to minimize solid waste generation and to recycle collected waste.*

- Expand recycling program to include batteries, oil, paints, light bulbs, tires, electronics, etc
- Promote recycling plans for each tenants, including educational flyers or training
- Promote electronic filing and distribution of information and forms
- Set printers to double-sided printing as a default
- Use concentrated cleaning solutions to reduce product packaging
- Require contractors to recycle a portion of the construction debris (land-clearing debris, cardboard, metal, brick, concrete, asphalt, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation)
- Use recycle office materials (cups, binder clips, paper, etc)
- Promote the use of reusable cups
- Reuse asphalt as available for other projects (on-site or local)
- Reuse shipping materials (cardboard, bubble wrap, etc)
- Purchase Environmental Preferable Products (EPP) (See the EPA’s EPP website)
- Promote the use and installation of more durable products to reduce future replacement waste
- Donate surplus food to a local food bank or other charitable organization
- Provide incentive to concessionaires to minimize product packaging and using recyclable or biodegradable cutlery, plates, and to-go containers

5.5.5 Hazardous Materials

Hazardous materials are substances with chemical or physical properties that are harmful to human health or the environment when handled, stored, or disposed of incorrectly. At the airport, these materials may include Jet-A fuel, Avgas, oil, paint, and cleaning agents. Properly managing these types of materials helps protect the environment and the community. The following strategies were identified for obtaining the goal of *Reduce the use and risks associated with hazardous materials.*

- Replace chemical based cleaning solutions with "greener" products
- Develop a list of easily replaced products commonly used by the airport and its tenants (See the EPA's Environmental Preferable Products website)
- Provide waste oil containers for tenants use
- Ensure a spill prevention and clean-up plan is in place; train employees in plan
- Ensure Spill Control Kits are easily accessible
- Review other chemicals used, such as pest control and deicing of aircraft and sidewalks, to determine if a replacement can be found
- Conduct maintenance in an area that any hazardous materials can be contained, such as impervious surfaces
- Utilize biodegradable soap to wash vehicles and aircraft

5.5.6 Vegetation and Wildlife Management

It can be difficult to protect the biodiversity and local habitats of plants and animals while ensuring the safety of aircraft operating at an airport. Sustainable practices should be employed to maintain the airport's airspace and preserve the local environment. This can be accomplished by such practices as providing wildlife fencing or the use of noise cannons to scare animals away. The following strategies were identified for obtaining the goal of *Develop a wildlife hazard control plan that specifies and maintains all vegetative areas of the airport.* The following recommendations from the 2013 Wildlife Hazard Assessment (WHA) will require coordination with other entities such as CRRA, MDC and USACOE and were divided into four sections:

General includes the administration and coordination of wildlife management at the airport, and working with adjacent businesses and property owners. The following recommendations were made:

- Assign a Wildlife Coordinator
- Develop a Comprehensive Wildlife Hazard Management Plan Based on the Wildlife Hazard Assessment
- Obtain Permits to Control Wildlife
- Use Multiple Types of Pyrotechnic Devices and have Control Supplies on Hand

- Keep a Log of Hazardous Wildlife Observations and Wildlife Hazard Management Control Activities and Reporting of Activities
- Train Personnel in Wildlife Hazing Procedure and Species Identification
- Strike Reports and Ensuring Personnel and Pilots are Familiar with Reporting Procedures
- Organize a Wildlife Hazards Local Working Group
- Utilization of NOTAM
- Maintain Zero Tolerance Policy

Habitat Modification includes providing ways to alter the habitat to reduce the amount of food, water, and cover available to target animals. Recommendations under habitat manipulation will have the most lasting effect on reducing the use of the airport by hazardous wildlife. The following recommendations were made:

- Turf Management
- Vegetated Ditch
- Reduce Earthworm, Grub and Grasshopper Populations
- Trees and Shrubs

Exclusion, Repulsion, and Removal addresses ways to deal specifically with individual animals or groups of animals. The following recommendations were made:

- Install a Wildlife Exclusion Fence
- Install Anti-Perching Devices
- Remove Nesting Opportunities
- Harass Early and Often
- Use a Variety of Pyrotechnic Devices
- Adopt a Policy of Lethal Control (Shooting) for Persistent Wildlife

Other recommendations involved the other local agencies. The following recommendations were made:

- U.S. Army Corps of Engineers - Clark’s Dike
    - Mowing Clark’s Dike
    - Removing Mammal Burrows
    - Tree Removal
- MDC
    - Land Acquisition
    - Exclude Wildlife from Settling Ponds
- CRRA
    - Proper Waste Storage
- City Parks, Recreational Areas and Surrounding Businesses
    - Proper Waste Storage
    - Discontinue Feeding Wildlife

When applying recommendations, it must be understood that there are many actions that can be taken to decrease wildlife hazards. Actions taken will depend on the species, time of year, why wildlife is using the airfield, habitat characteristics on and around the airfield, and a host of other variables.

5.5.7 Implementation

There are a few recommendations to assist in implementing the sustainability goals for HFD. It is recommended that the CTDOT establish a sustainability committee or designate any employee as the sustainability coordinator. This committee or employee can focus on HFD alone, the statewide airport system, or CTDOT as a whole. This committee or employee would be in charge of completing an annual report of measurements, strategies implemented, and any new strategies. The report will promote sustainability overall as well provide motivation for the CTDOT to continue to reach the goals.

CTDOT could also development partnerships with community groups and local businesses to assist the community driven strategies such as recycling. If the community is behind recycling as a whole the residents are more likely to recycle at work as well and local businesses will wish to participate as well.

5.6 Potential Environmental Impacts

Based on Chapter 4 – Environmental Overview, it is not anticipated that the proposed projects listed in this study will have significant impact on the environment. Further coordination will take place with the FAA, CTDOT, and other applicable agencies on individual projects prior to construction.

Coordination with the ACOE and CTDEEP will need to take place prior to tree removal due to the nesting sites and wetlands to ensure minimal impacts are made. Trees may be removed during winter months during frozen ground conditions to reduce any impact to wetlands. Ideally, the trees beyond Runway 2 should be removed by the end of February as the Great Blue Herons are typically nesting by the first week of March. Additionally, a few of the trees to the south of the runway are located within the Folly Brook Natural Area, which may be considered a Section 4(f) impact. Coordination and review under both the National and Connecticut Environmental Policy Acts (NEPA) and the Connecticut Environmental Protection Act (CEPA) may be necessary prior to any tree removals. Additionally, the 1990 Tree Maintenance Plan between the City of Hartford and the Nature Conservancy of Connecticut, Inc will need to be consulted prior to any tree removal. The Plan outlines the types of tree clearing possible and approvals needed for four pieces of property to the south of Runway 2.

The stormwater discharge would be reviewed prior to the construction of new pavement and hangars as the overall amount of impervious surface would increase, and require appropriate permits to be completed during the design stage of the project. Additionally, any project with over one acre of ground disturbance a Construction General Permit would be required.

6.0 RECOMMENDED PLAN

This chapter presents the Airport Capital Improvement Plan (ACIP) and Airport Layout Plan (ALP) that is associated with the recommended future developments at Hartford-Brainard Airport (HFD). The ACIP provides a phasing plan for the projects proposed during the 20-year planning period. The ALP illustrates the proposed future airport layout, and serves as the official development plan for the Airport.

6.1 Summary of the Recommended Plan

Chapter 5 presented development alternatives and the recommended airport development plan for HFD. The plan contains recommendations for airfield and landside development, which are further discussed in terms of three implementation phases. The recommendations include the following (See Figure 5-12 for number corresponding with each recommendation):

Airfield Recommendations

- **Runway Safety Improvements:** Removal of the sewage treatment lagoons for a standard RSA. Declared distances will be implemented for both runway ends to satisfy OFA requirements.

- **Runway Extension**: Potential southern extension of the runway to the recommended length of 5,000 feet.

- **Decommission H1 (Midfield Helipad):** Conversion of the helipad to a helicopter parking position.

- **Tree Removal:** The indicated trees should be removed as they are obstructions to HFD’s airspace.

- **Instrument Approaches**: Publish “Localizer Precision with Vertical Guidance” (LPV) procedures to both runway ends. FAA must confirm it this is permissible based on the location of the Dike.

Landside Recommendations

- **Vehicle Access Road:** A vehicle access road between Murphy Road and Lindbergh Drive.

- **T-Hangars:** To fulfill the deficiency, T-hangars can be built in the locations shown, provided they are no taller than the existing structures so they do not obstruct the ATCT line-of-sight. A taxiway connection to Taxiway A would also be provided. Vehicle parking would be located near the ATCT.

- **Tiedown Removals:** To provide FAA standard TLOFA dimensions, select tiedowns will need to be removed.

- **Conventional Hangars:** The area shown is ideal for a series of conventional hangars, associated apron, and vehicle parking. The existing tiedowns and taxilanes would be removed or modified as necessary. Hangars should be outfitted with floodlights to provide light on the Midfield Ramp.

- **Proposed Maintenance Facility:** The depicted maintenance facility will be developed by CTDOT for airport operations staff.

- **Wildlife Incursion Control Fence:** Although it will require coordination among several parties, security fence construction is recommended on the eastern slope of the Clark Dike.

- **Hangar Redevelopment:** The area along Maxim Road is a prime location for the redevelopment of buildings as their useful life expires or as market conditions permit.

- **Midfield Ramp Lighting:** Increase nighttime visibility on the midfield to increase security.

- **Security Policies:** TSA guidelines also included the following policy items that the CTDOT should consider implementing at HFD:

    - Vehicle Identification
    - Secondary Aircraft Locking Devices
    - An Airport Security Committee and Procedures Document that incorporate the following:
        - Law Enforcement Officer procedures
        - Challenge Procedures (for confronting unfamiliar individuals and suspicious activity)
        - Transient Pilot Sign-in/Sign-out Procedures
        - A procedure for charter and flight training operators to positively identify all passengers and cargo

- **Noise Abatement –** Continue current protocol for promotion of the noise abatement procedures with these adjustments:
    - Replace the textual signs with graphical signs.
    - Revise ATIS to state "Please review Airport/Facility Directory for noise abatement procedures in effect."
    - Update brochures and flyers to simplify information on procedures and make more graphical for pilots.
    - Update contours as part of future master plan updates.
    - Increase information listed in the A/FD.
    - Provide noise abatement procedure materials on airport website
    - Formalize the right traffic pattern
    - Depict noise sensitive areas on Aeronautical Charts

6.2 Airport Capital Improvement Plan

The Airport Capital Improvement Plan (ACIP) lists the recommended projects and associated cost estimates for the 20-year planning period. Grant-eligible projects at HFD may receive 95 percent federal funding, with CTDOT responsible for the remaining share. Grant-eligible capital projects include planning and environmental studies, runway and taxiway development and rehabilitation, airport lighting, security enhancements, aircraft parking aprons, obstruction removal, land acquisition, and navigational aids.

Projects that are ineligible for funding include those that generate revenue and do not directly benefit the general public, such as hangars, fuel farms, and office buildings. A private entity or developer, such as a fixed base operator (FBO) or other corporation, may fund and construct grant-ineligible projects. Periodically, CTDOT has funded the cost of an ineligible project, or an eligible project with a lower FAA priority (e.g., new hangar) as part of the state transportation budget or infrastructure bond act. If such opportunities are available in the future, the State will pursue this funding.

In addition to the potential new airport developments, the airport must also continually rehabilitate existing airfield facilities (e.g., pavement rehabilitation typically occurs every 20 years). As such, the ACIP includes these additional items. Although these items are not considered new capital developments, the associated costs can comprise the majority of an airport’s annual capital investment.

Note that the ACIP does not constitute a commitment on behalf of the State or FAA to fund any of the projects. In addition, the ACIP does not imply that the projects would receive environmental approvals. Thus, the ACIP serves as a planning document that must remain flexible. The ACIP should undergo regular updates as project priorities and demands indicate. It should also be noted that the costs are planning level estimates and will need to be refined prior to obtaining a grant.

Table 6-1 provides the 20-year ACIP for HFD, organized into the following three phases:

- Phase I (0 to 5 years)
- Phase II (6 to 10 years)
- Phase III (11 to 20 years)

Table 6-1 - Hartford-Brainard Airport Capital Improvement Plan				
Project	**Est. Cost**	**Federal (90%)**	**State (10%)**	**Private / Other**
Short-Term (2013 - 2017)				
Runway 2 Safety Area Improvements*	$ -	$ -	$ -	$ -
Runway 2 Extension to 5,000' Environmental Assessment (EA)	$ 150,000	$ 135,000	$ 15,000	$ -
Runway 2 Property Acquisition Phase II*	$ -	$ -	$ -	$ -
Decommission H1 (Midfield Helipad) & Remove Tiedowns**	$ 1,000	$ 900	$ 100	$ -
Develop Pavement Management Plan	$ 75,000	$ -	$ 75,000	$ -
Runway 2-20 Reconstruction (Design & Construction)	$ 8,000,000	$ 7,200,000	$ 800,000	$ -
T-Hangar (18 Bay)	$ 990,000	$ -	$ -	$ 990,000
T-Hangar (10 Bay)	$ 575,000	$ -	$ -	$ 575,000
Wildlife Incursion Control Fence	$ 430,000	$ 387,000	$ 43,000	$ -
Tree Removal (Design & Construction)**	$ 300,000	$ 270,000	$ 30,000	$ -
Add Ceiling Insulation in Terminal (ECM 1.4)	$ 11,500	$ -	$ -	$ 11,500
Lighting Upgrades in Terminal (ECM 1.6)	$ 4,600	$ -	$ -	$ 4,600
Window Tinting in Terminal (ECM 1.7)	$ 1,080	$ -	$ -	$ 1,080
Replace Domestic Hot Water Heaters in Building #18 (ECM 2.2)	$ 4,000	$ -	$ -	$ 4,000
Install Occupancy Sensors in Building #18 (ECM 2.3)	$ 2,250	$ -	$ -	$ 2,250
Add Wall Insulation in Building #14 (ECM 3.1)	$ 30,000	$ -	$ -	$ 30,000
Replace Domestic Hot Water Heaters in Building #14 (ECM 3.2)	$ 4,000	$ -	$ -	$ 4,000
Replace DX Gas Rooftop Units in Building #13 (ECM 4.1)	$ 5,000	$ -	$ -	$ 5,000
Install Programmable Thermostats in Building #10 (ECM 5.1)	$ 300	$ -	$ -	$ 300
Install Programmable Thermostats at Starbase (ECM 8.1)	$ 1,200	$ -	$ -	$ 1,200
Install Insulated Curtain on Bay Door in Police Hangar (ECM 9.1)	$ 17,000	$ -	$ -	$ 17,000
Lighting Upgrades in State Police Hangar (ECM 9.2)	$ 16,750	$ -	$ -	$ 16,750
Replace A/C Units in FBO Terminal (ECM 1.3)	$ 1,800	$ -	$ -	$ 1,800
Runway 2, 20, & 29 RPZs Avigation Easements	$ 215,000	$ 193,500	$ 21,500	$ -
Total	**$10,835,480**	**$ 8,186,400**	**$ 984,600**	**$ 1,664,480**
Mid-Term (2018 - 2022)				
Runway 2 Extension to 5,000' (including preparation site work)	$ 3,200,000	$ 2,880,000	$ 320,000	$ -
T-Hangar (18 Bay)	$ 990,000	$ -	$ -	$ 990,000
Midfield Ramp Lighting (including electrical)	$ 25,000	$ 22,500	$ 2,500	$ -
Runway 11-29 Pavement Rehabilitiation	$ 1,380,070	$ 1,242,063	$ 138,007	$ -
Conventional Hangar - 200' x 200' (No Office)	$ 2,000,000	$ -	$ -	$ 2,000,000
Conventional Hangar - 100' x 100'	$ 500,000	$ -	$ -	$ 500,000
Vehicle Access Road (includes ROW)	$ 63,100	$ -	$ 63,100	$ -
Pavement Rehabilitiation (Twys A, C, D, H, & W)	$ 3,483,480	$ 3,135,132	$ 348,348	$ -
Replace Boilers with Condensing Boilers in FBO Terminal (ECM 1.1)	$ 15,000	$ -	$ -	$ 15,000
Install Occupancy Sensors in FBO Terminal	$ 3,000	$ -	$ -	$ 3,000
Replace Windows at Airport Manager's Building (ECM 6.2)	$ 15,000	$ -	$ 15,000	$ -
Install Infrared Heaters in State Police Hangar (ECM 9.3)	$ 40,000	$ -	$ -	$ 40,000
Runway 11 RPZ Avigation Easement	$ 140,000	$ 126,000	$ 14,000	$ -
Total	**$11,854,650**	**$ 7,405,695**	**$ 900,955**	**$ 3,548,000**
Long-Term (2023 - 2033)				
Pavement Rehabilitiation (Taxiway J & H1)	$ 1,310,400	$ 1,179,360	$ 131,040	$ -
Pavement Rehabilitiation (Taxiways B & V)	$ 823,200	$ 740,880	$ 82,320	$ -
T-Hangar (8 Bay)	$ 500,000	$ -	$ -	$ 500,000
Conventional Hangar - 100' x 100'	$ 500,000	$ -	$ -	$ 500,000
Conventional Hangar - 150' x 50'	$ 375,000	$ -	$ -	$ 375,000
Pavement Rehabilitiation (H2, North Ramp, FBO Ramp, Midfield Ramp, CT Aerotech Taxiway)	$ 6,988,800	$ 6,289,920	$ 698,880	$ -
Replace Domestic Hot Water Heaters in FBO Terminal (ECM 1.2)	$ 4,000	$ -	$ -	$ 4,000
Lighting Upgrades in Building #14 (ECM 3.3)	$ 5,000	$ -	$ -	$ 5,000
Replace Unit Heaters with Infrared Heaters in DOT Maintenance Garage (ECM 7.1)	$ 16,000	$ -	$ 16,000	$ -
Total	**$10,522,400**	**$ 8,210,160**	**$ 928,240**	**$ 1,384,000**
ACIP Grand Total	**$33,212,530**	**$ 23,802,255**	**$ 2,813,795**	**$ 6,596,480**
*While unknown at this time, it is anticipated that these costs will be covered by agencies outside of CTDOT.				
** Project will likely be included as part of another pavement project.				

6.3 Airport Layout Plan

The ALP drawing set illustrates all development projects identified for Sidney Airport throughout the 20-year planning horizon. Upon approval by FAA and NYSDOT, the ALP becomes the official document to be referenced for future development at the Airport. The FAA requires that the ALP be followed consistently regarding all new airport facilities. As such, keeping the drawings accurate and up to date is a high priority. FAA policy requires that the ALP be updated at least every five years.

Although the ALP is the only drawing that is signed by the FAA, it is part of a larger drawing set that includes the sheets listed below. These ALP drawings can be found in Appendix c.

Table 6-2 – Drawing Index

Sheet No.	Sheet Title	Drawing No.
	Cover Sheet & Drawing Index	---
1	Existing Airport Layout	ALP-1
2	Airport Layout Plan	ALP-2
3	Terminal Area Plan	ALP-3
4	Inner Approach Surface Drawing	ALP-4
5	Airport Airspace Plan	ALP-5
6	Land Use Plan	ALP-6
7	Property Plan	ALP-7

6.3.1 Existing and Proposed Airport Layout Plan

The first sheet of the drawing set (ALP-1) illustrates the existing airport layout as it exists today. The drawing identifies key FAA airfield design standards (e.g., Runway Safety Areas, Object Free Areas, and Runway Protection Zones) and illustrates existing landside facilities. Key information, such as runway end elevations and runway-taxiway offsets, is also illustrated on ALP-1.

The proposed ALP (ALP-2) includes all features of ALP-1, and illustrates each recommended facility for HFD. Several offices within the FAA review this drawing for consistency with airport design standards, flight procedures, surrounding airspace, and environmental requirements. Approval of ALP-2 represents the acceptance of the general location of future facilities. However, prior to the development phase of each project, the State is required to submit the final locations, heights, and exterior finish of each proposed structure for approval. ALP approval does not represent environmental clearance under the National Environmental Policy Act (NEPA), or compliance with permit requirements. Such approvals must be obtained prior to development, and are not part of the ALP process. ALP-3 displays the terminal area in greater detail.

It is also noted that ALP approval does not represent a commitment on behalf of FAA, NYSDOT, or others to fund or pursue the projects depicted. Rather, this Master Plan and associated ALP represent the first products of the planning and development process, and are intended to depict a broad and long-range view of the potential improvements to the Airport.

The ALP drawings were prepared in accordance with FAA design standards for Airport Reference Code (ARC) B-II. Aircraft within ARC B-II include Cessna Citation Jet or Beech King Air.

The following publications were used during the drawing preparation:

- FAA Advisory Circular 150/5300-13A, *Airport Design*
- FAA Advisory Circular 150/5070-6B, *Airport Master Plans*
- Federal Aviation Regulations, Part 77, *Objects Affecting Navigable Airspace*

The major proposed facilities on the ALP include a land release of property to the south of Runway 11-29, extending Runway 2-20 to 5,000 feet, and hangar construction.

6.3.2 Airport Airspace Plan

The next two sheets of the ALP Drawing Set (ALP-5 and 6) illustrate the airspace requirements associated with Federal Aviation Regulations (FAR) Part 77, *Objects Affecting Navigable Airspace*. Part 77.23 identifies a series of geometric planes (i.e., imaginary surfaces) that extend outward and upward from an airport's runways to define obstruction clearing requirements. These surfaces identify the maximum acceptable height of objects by defining three dimensional surfaces surrounding all sides of the airfield. When an object penetrates an imaginary surface, it is considered an airspace obstruction and may present a hazard to air navigation.

The height and dimensions of the imaginary surfaces are determined by the airfield elevation, design aircraft, and the type of approach to each runway end. The specific surfaces for HFD are described below.

Primary Surface: A surface longitudinally centered at the runway elevation extending 200 feet beyond each runway end. The width of the primary surface is 500 feet for the existing non-precision GPS IAP Runway 2-20. The width of the primary surface for Runway 11-29 is 250 feet as it is a utility runway with only visual approaches.

Horizontal Surface: A horizontal plane 150 feet above the airport elevation. As the elevation of Sidney Airport is 18 feet above mean sea level (AMSL), the horizontal surface is situated at 168 feet AMSL. The shape of the surface is created using radial arcs of 10,000 feet, from the ends of the primary surface, connected by lines tangent to the arcs.

Conical Surface: A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1, for a horizontal distance of 4,000 feet. The elevation of the outer edge of the conical surface at HFD is 368 feet AMSL.

Approach Surface: Surfaces longitudinally centered on the extended runway centerlines, extending outward and upward from the ends of the primary surface. For HFD, the dimensions and slopes of the approach surfaces are listed in Table 6-3.

Table 6-3 – Approach Surface Dimensions

Runway End – Current	Inner Width	Outer Width	Length	Slope
Runway 2 (NPI)	500’	3,500’	10,000’	34:1
Runway 20 (Visual)	500’	1,500’	5,000’	20:1
Runway 11(Visual)	250’	1,250’	5,000’	20:1
Runway 29 (Visual)	250’	1,250’	5,000’	20:1

Transitional Surface: Surfaces extending outward and upward at right angles from the sides of the primary and approach surfaces at a slope of 7 to 1. The transitional surfaces terminate at the overlying horizontal surface.

Objects that penetrate the imaginary surfaces are depicted on ALP-4 and ALP-5. Currently, there are numerous tree penetrations within the Inner Approach Surface. The State is currently working on a plan to remove these trees.

ALP-3, the Inner Approach Surface Plan and Profile Drawing, provides greater detail regarding the close-in airspace obstructions, particularly to the inner portions of each approach surface. For each obstruction, the height, penetration, ownership, and proposed action/disposition are indicated in the associated tables.

ALP-4, Airport Airspace Plan, illustrates the overall dimensions of the Part 77 surfaces, and highlights penetrations to the outer surfaces. As shown, there are some penetrations to the outer portions of the imaginary surfaces; including trees, utility poles, and buildings.

6.3.3 Land Use Plan

This plan (ALP-6) depicts the existing and proposed land uses within proximity to the airport. More detailed information on the land use and zoning is located in Section 4.5 – Compatible Land Use & Zoning.

The majority of the Study Area within Hartford, CT includes commercial and industrial uses. These uses are located north and west of the Airport, along Murphy Road, Maxim Road, and Brainard Road. An open space area is located east and south of HFD, along the flood levee. According to the Hartford Zoning Map, dated February 11, 2008, HFD is zoned as an Industrial District (I-2). Properties located north and west of the Airport are also zoned as an Industrial District (I-2). No residentially-zoned districts are located within the City of Hartford in the immediate vicinity of HFD.

Land use immediately south of HFD, within the Town of Wethersfield, generally includes open space. The area consists of wetland and floodplain areas associated with the Connecticut River and Wethersfield Cove. Residential areas are located south and west of Wetherfield Cove, further away from HFD.

As discussed in Section 5.2.1 – Runway Protection Zone, for all four RPZs at HFD, there is a total of nearly 40 acres beyond the airport property boundaries. As the property is not owned or controlled by the airport, the FAA guidance recommends acquiring avigation easements.

Land use compatibility is also related to airport noise exposure. The FAA uses a Day-Night Average Sound Level (DNL) expressed in decibels (dB), which is a 24-hour average noise level used to define the level of noise exposure on a community. The DNL represents the average sound exposure during a 24-hour period and does not represent the sound level for a specific noise event. The threshold of significance (i.e., noise impact) is when noise exposure over sensitive areas is at or above DNL 65 dB.

The current and future noise exposure anticipated at HFD is a maximum noise level of DNL 55 dB in locations beyond the airport property. The DNL 65 dB is situated with the airport property. Because the average airport-generated noise level is low, all land use surrounding the Airport (beyond the RPZs) is considered compatible. The noise contours are illustrated on ALP-6.

ALP-7 provides a detailed Airport Property Map, including acquisition history. The primary purpose of this sheet is to provide information indicating how various tracts of airport property were acquired (i.e., federal programs, local funds only, etc.). The map identifies for the FAA the aeronautical use of properties acquired with federal funds.

7.0 ON-AIRPORT LAND USE ALTERNATIVES

A recommended development plan was prepared as part of this Master Plan Update (MPU) and is presented in Figure 5-12. The recommended plan highlights several areas within the existing airport property limits that are available for development or redevelopment. This chapter evaluates the development potential of the property at Hartford-Brainard Airport (HFD) based on current market trends and physical characteristics of the available property. This information is presented in the following sections:

- Competitive Facilities Analysis
- Property Development Analysis
- Sustainability Review of Development

An analysis on the regional socioeconomics, market supply, and pipeline are available in Appendix G. At this time, the Connecticut Department of Transportation (CTDOT) does not anticipate non-aviation development to take place on airport property and the focus is the market potential for aviation-dependent activities.

7.1 Competitive Facilities Analysis

The following section compares the HFD's facilities with those of other regional airports in order to provide a baseline of information to determine the regional competitiveness of the airport. The airports that were compared to HFD include the four other facilities in the Hartford area of the Capital Region Council of Governments (CRCOG), as well as Meriden and Plainville located immediate to the south:

- Bradley International Airport - BDL (Windsor Locks)
- Ellington Airport – TB9 (Ellington)
- Meriden-Markham Municipal Airport – MMK (Meriden)
- Robertson Field Airport – 4B8 (Plainville)
- Skylark Airport – 7B6 (East Windsor)
- Simsbury Airport – 4B9 (Simsbury)

The airports that are comparable to HFD were selected based on an approximate 30 to 40-minute drive time market area from HFD. This market area represents the most likely (and reasonable) catchment area for aircraft owners residing in the region to base their aircraft at HFD, and also encompasses the majority of businesses, residents and others who may use the airport. The location of HFD and the competitive airports are shown in Figure 1-2.

The key facility components and characteristics that were compared at each of the airports included:

- Runways
- Operations and based aircraft
- Aircraft storage hangars and tie-downs
- Fuel availability

- FBOs

The following provides a narrative summary of the HFD's facilities in comparison to the other regional airports.

7.1.1 Runways

With three runway options, including a 4,417 foot by 150 foot primary runway, a crosswind 2,314 foot by 71 foot runway, and 2,309 foot by 200 foot turf runway, HFD has the second longest landing facilities of any competitive airport. As a commercial airport, BDL has the longest primary runway (at 9,510 feet) of the competitive airports. BDL's landing facilities, although substantial, cater primarily to commercial aircraft as well as air cargo and corporate jet aircraft (business jets). According to FBOs, airport operators and aircraft owners, commercial operations and other large aircraft at BDL can often "push" the operators of smaller general aviation aircraft (both itinerant or local) to the smaller airports in the market area (including HFD).

7.1.2 Operations and Based Aircraft

Based on estimates provided by the FAA, HFD's 79,500 annual operations in 2011 ranked it the second highest of the competitive airports, with only BDL's 107,300 annual operations eclipsing HFD. At close to 80,000 annual operations, HFD has several times the operations at the next largest airport (Robertson at 21,200 operations). Based on qualitative assessments provided by officials at BDL and the other competitive airports, aircraft operations at each facility over the past three or more years has generally declined due to the "Great Recession" and slow pace of the economic recovery. However, there are indications that this trend has started to reverse as operations and general airport activity are slowly moving in a positive direction, particularly in the business sector.

Although HFD's operations rank it second compared to the other regional airports, HFD's 159 based aircraft are more than double compared to the other facilities. Skylark's 60 based aircraft rank it second compared to HFD, while BDL (56), Simsbury (53), Meriden-Markham (51), Robertson (49), and Skylark (46). Ellington has the fewest number of based aircraft estimated at 20. The total number of based aircraft within HFD's service area is estimated at approximately 450 planes, which represents a decline of about 50 aircraft over the past three years.

7.1.3 Aircraft Storage Hangars and Tie-downs


Tie-Downs at Robertson

To determine the market area rates, charges, supply and demand for aircraft storage hangars, a telephone survey of airport managers, owners and hangar condominium associations was conducted. Table 7-1 summarizes the rates, charges and sale prices for aircraft storage options for HFD and the other competitive airports in the market area. Tie-down fees range from $55 a month for a State tie-down at HFD at the time of the survey at the low end, to $272 a month for a tie-down space at BDL. The price of tie-downs at HFD was increased to $90 in October 2012. While the difference between low- and high-end pricing is significant (at $217 a month), tie down fees throughout the region are generally within a range of $75 to $100 a month.

The airport owners, managers and FBO officials interviewed indicated that there is a surplus of tie-downs available at airports throughout the region, as has been the case for several years. Due to the significant cost to own, operate and maintain an airplane, aircraft owners typically prefer to store their aircraft in a hangar to prevent exposure to the outside elements and for added security. As such, tie-downs, although the least costly option, are generally not the preferred storage option and therefore are in abundant supply at each of the airports within the HFD market area.

Table 7-1 - Aircraft Storage Fees and Pricing

Airport	Tie-Downs	Hangar Storage
Hartford-Brainard (HFD)	$75/Month (FBO Tie-Downs) $90[1]/Month (State Tie-Downs)	T-Hangar Condos (older units) @ $30,000 to $33,000 (plus $185/Month condo fee)
		T-Hangar Condos (newer units) @ $65,000 to $68,000
		Conventional Hangar Space @ $0.75-$0.80/SF
Bradley Int'l (BDL)	$272/Month	Conventional Hangar Space @ $1,700/Month
Ellington (7B9)	$60/Month	Hangars Privately Owned - Not Available for Sale or Rent
Meriden Markham (MMK)	$86-$107/Month	T-Hangars @ $306/Month
		Conventional Hangar Space @ $184/Month
Robertson (4B8)	$75-$80/Month	Conventional Hangar Space @ $475-$1,700/Month
Skylark (7B6)	$80/Month	Open T-Hangar @ $240/Month
		Closed T-Hangar @ $365/Month
Simsbury (4B9)	$121/Month	Fabric Hangar Condos @ $13,000-$14,000 (Shared With Another Aircraft)

Source: Airport visits and telephone interviews by RKG Associates, Inc.

While all of the competitive airports within the region have excess capacity for aircraft tie-downs, all of the regional airports are at or near capacity relative to T-hangar and conventional hangar space. In terms of T-hangars, with the exception of Bradley and Robertson, all of the other competitive airports have T-hangars either as rental units or condominiums. The total capacity of the T-hangar units in the market area is estimated at 126 aircraft with Simsbury (40 units), HFD (35 units), Meriden-Markham (24 units) and Skylark (24 units) comprising the majority of the bays.

1 The price was increased from $55 in October 2012.

Fabric Hangars at Simsbury

Rental rates for T-hangars range from $240 a month to $365 a month (both prices are for units at Skylark), while Meriden-Markham offers units at $306 a month. Current purchase pricing for hangar condominiums start at $13,000 to $14,000 for shared space in a fabric hangar at Simsbury. The mid-point is $30,000 to $33,000 for older units at HFD, which also commands the highest prices at $65,000 to $68,000 for newer units.

T-hangar rental and purchase prices have increased less than 10 percent over the past three years. It should be noted that, like residential condominiums, T-hangar condominiums may also have monthly association fees (e.g. $185 a month for units at HFD). With only one T-hangar space currently available (at Simsbury), occupancy is at approximately 99 percent. Currently, Skylark has a waiting list of three aircraft owners who are interested in T-hangars, while the other airports do not have formal waiting lists for hangars. Anecdotal information provided by airport officials and condominium association representatives indicated that the "days on market" for an available T-hangar is short (estimated at 14 to 21 days).

Conventional Hangar at Bradley

As the current T-hangar market is essentially near equilibrium (but with high occupancy), only Meriden-Markham Airport is actively considering the construction of additional T-hangars. Under the plan being considered, the City would demolish an existing community hangar which currently housing five aircraft and develop five T-hangar units. Additionally, land would be leased to a developer to construct five additional T-hangar condominium units.

Conventional hangar space in the region is also at or near full capacity. With the exception of a small conventional hangar at Meriden-Markham, conventional hangars are typically operated by an FBO, which provides a line person to facilitate the movement of aircraft in and out of the hangars. Current market rates for conventional hangars range between $475 a month to $1,700 a month depending on the size of the aircraft being stored and the condition of the hangar. It should be noted that Meriden-Markham Airport currently rents a conventional hangar at $184 a month; however, this rate is well below the market range likely due to small size and poor condition of the hangar.

7.1.4 Aviation Fuel Availability

Avgas (100LL) is available at HFD and all the other competitive airports. Jet A is only available at HFD, Bradley, and Robertson. As of July 2012, Meriden-Markham charged the lowest rates for 100LL ($5.60 a gallon), while Robertson offered the cheapest Jet A ($5.55 a gallon). Fuel prices were considerably higher at HFD at $6.41 a gallon for 100 LL and $6.30 a gallon for Jet A.

7.1.5 Airport Facilities Comparison Summary

The discussion below presents a summary of the comparison of facilities found at the HFD with the other comparative airports. A summary of technical information is provided in Table 7-2.

- HFD's runways, aprons, aircraft storage facilities, aircraft services and ease of access to I-91 make it the premier GA airport in the region. Infrastructure and facilities (runways, aircraft storage and services) at BDL are clearly more substantial than HFD's, which is to be expected at a commercial service airport.

- The current T-hangar market is near equilibrium. However, there may be some modest latent demand for new hangar space as occupancy is estimated at 99 percent. Market pricing for T-hangars ranges between $240 a month to $365 a month for rental units, while T-hangar condominiums are priced at a mid-point of $30,000 to $33,000 (plus monthly association dues). Rental rates and purchase prices have increased less than 10 percent over the past three years indicating a generally static market.

- Although the T-hangar market is near equilibrium, HFD should consider the development of a modest amount of additional aircraft storage facilities as a realistic and viable development option for the following reasons:

    - The "pipeline" of new T-hangars is very limited with only the net addition of five proposed new T-hangar units (at MMK)

    - Occupancy is very high and the "days on market" for T-hangars is generally less than three weeks indicating that, although there may not be organic growth in the market, there is demand for quality aircraft storage hangars (at a reasonable price) from the existing base of aircraft owners in the region

    - HFD's infrastructure, facilities, services, and ideal location make it very attractive to based aircraft owners in the market area

    - Construction cost is an impediment, as modern units with electric doors typically require a monthly rental rate of approximately $500 to recoup the financial investment. Smaller (38' wide doors), wood frame, or open bay T- hangars may be a consideration to reduce costs.

- Should any of the privately owned facilities which include Ellington, Simsbury or Skylark close within the next decade, the demand for aircraft storage options in the market area will likely increase.

It is recommended that HFD designate the currently undeveloped land areas adjacent to the Midfield ramp and on the north side of the control tower for additional hangar development. It is suggested that the midfield area be considered for conventional hangars. The market review suggests that incremental development of a 10 to 12 unit T-hangar building and one conventional hangar could be supported over the next five years. To gauge the interest in the market, CTDOT should consider issuing a Request for Interest (RFI) to prospective developers to develop new hangar facilities in these two areas.

Table 7-2 - Infrastructure and Services at HFD and Competitive Airports

Airport	Runway(s)	Runway Dimensions	Fuel		Aircraft Maintenance	Avionics Repairs	Aircraft Tie-Downs	Aircraft Hangars	Flight Instruction	Aircraft Rental	Aircraft Charter	Instrument Approach	ILS Approach
			100LL	Jet A									
Hartford-Brainard (HFD)	2-20	4,417 x 150 ft	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	11-29	2,314 x 71 ft											
	Turf	2,309 x 150 ft											
Bradley International (BDL)	6-24	9,510 x 200 ft	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
	15-33	6,847 x 150 ft											
	1-19	4,268 x 100 ft											
Ellington (7B9)	1-19	1,800 x 50 ft	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No
Meriden Markham (MMK)	18-36	3,100 x 75 ft	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No
Robertson (4B8)	2-20	3,665 x 75 ft	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
Skylark (7B6)	10-28	3,242 x 60 ft	Yes	No	Yes	No	Yes	Yes	Yes	No	No	No	No
Simsbury (4B9)	3-21	2,205 x 50 ft	Yes	No	Yes	No	Yes	Yes	No	No	No	No	No

Source: RKG Associates, Inc. FAA and Airnav.com

7.2 Property Development Review

Section 7.1 recommends that additional aircraft storage be developed at HFD over the next five years to meet market demand. Figure 5-12 displays a recommended development plan, utilizing the currently undeveloped property at the airport. Understanding the opportunities and constraints of the property can assist in determining its best possible use and value. The information can be used as a marketing tool for potential developers as well as the airport itself in guiding its future.

Privately-developed facilities at HFD must meet state and national environmental requirements; therefor the impacts of proposed development must be evaluated. This topic was discussed in detail in the 2011 Airport Business Plan and is summarized here. Several factors affect the development of the parcel and may include:

- FAA Design Standards
- Airspace Obstructions
- Federal Obligations such as Environmental Standards or Permitted Land Use
- Topography
- Utilities
- Ground Access
- Airside Access
- Zoning & Compatible Land Use
- Environmental Considerations

Existing leases and potential development sites at HFD are shown on Figure 7-1. The existing leases are also listed on Table 7-3 by parcel number. It is likely that these leases will be renewed when they expire; however, it is also a potential opportunity for a new tenant of the same of alternative activity.

Table 7-3 - Existing Leases			
Parcel	**Lease**	**Description**	**Expiration**
1	State Department of Education	Aviation School	2057
2	FAA	Control Tower	N/A
3	Pine Tree Hangars, LLC	T-Hangars	2031
4	Hartford T's	T-Hangars	2023
5	Charter Oak / Million Air	Tie-downs	2015
6	Charter Oak / Million Air	Hangar	2015
7	Charter Oak / Million Air	Hangar	2015
8	Charter Oak / Million Air	Hangar	2015
9	HTFD. Atlantic Aviation	Aircraft Ramp	2020
10	HTFD. Atlantic Aviation	Hangar	2020
11	HTFD. Atlantic Aviation	Fuel Farm	2020
12	Central Auto	Easement	N/A
13	Department of Transportation	Offices	N/A
14	CT State Police Department	Office / Hangar	N/A
15	CT State Police Department	Parking / Storage	N/A
16	Department of Transportation	Maintenance/ARFF	N/A

The airport has access to all appropriate utility services including, water, sewer, gas, and electricity. These services would be readily available and adequate to support any future buildings constructed to meet future airport demands. As there are no wooded areas, critical habitat, or floodplains, and only a small area of wetlands on the airport property, no significant environmental concerns are anticipated from potential development. The existing ground elevation is such that only minor grading or filling will be necessary for development.

The area to the east of Runway 2-20 is not readily developable due to the lack of vehicle access and the turf runway. The areas around the segmented circle and localizer should remain clear to ensure proper operation of the equipment.

The parcel lines in Figure 7-1 and the potential uses are guidelines and may be modified based on a tenant’s or developer’s desires. Potential developers may also combine parcels to create a larger development area (i.e., C and D, E and F).

Parcel A – Parcel A is currently a large open area that provides access to the Air Traffic Control Tower (ATCT), but could be used for multiple T-hangars, conventional hangars, and apron space. This 4.3 acre site has access to both Lindbergh Drive and the airfield. This parcel may be subdivided if desired, with the frontage along Lindbergh Drive potentially used for non-aviation development or aviation dependent businesses. Any non-aviation development would require an FAA land release. Depending on the height of the structures, they may penetrate the transitional surface and would require obstruction lighting.

Parcel B – Parcel B is a 0.9 acre site which is currently used for paved tiedowns operated by the State that could be converted to a T-hangar. As a large number of tiedowns are already present on the airfield, ample state tiedowns would remain available. Access to the taxilane on Parcel 5 must be maintained, but a single-nested T-Hangar could be accommodated while maintaining offset requirements. The parcel is located on Lindbergh Drive, which contains ample vehicle parking along the east side of the road.

Parcel C – This undeveloped 0.4 acre parcel adjacent to the Parcel 8 driveway could accommodate either non-aviation development or an aviation dependent business. The parcel, located on Lindbergh Drive, contains ample vehicle parking along the east side of the road. Airfield access is not readily available, but could be provided by incorporating a portion of Parcel D.

Parcel D – Parcel D is a 5.5 acre open area that could be used for multiple conventional hangars and apron space. It has access to both Lindbergh Drive and the airport vehicle parking lot. The markings on the adjacent tiedown ramp will need to be modified to allow taxilane access for this parcel. This could be accomplished by removing a portion of the first row of tiedowns. This parcel may be subdivided if desired and the area with parking and road frontage used for non-aviation development. Any non-aviation development would require an FAA land release. Depending on the height of the structures, they may penetrate the transitional surface and would require an obstruction light.

Parcel E – Parcel E contains an older hangar that was previously used for maintenance and office space. Located along Maxim Road, it is 1.1 acres with both road and airfield access, and a vehicle parking lot.

Parcel F – Parcel F is a level, open area near Maxim Road and adjacent to the north apron. The site could support one small hangar. The tie-downs along this parcel would need to be removed to provide airfield access for this parcel. The parcel is 0.5 acres. Access to Maxim Road would require coordination with the leasers of Parcel 13.

Parcel G – Parcel G is a level, narrow open area along the existing airport property fence adjacent to Runway 11-29. It could support a series of small aircraft storage hangars. Based on the developer, this space could be improved for paved or turf tiedowns, one-sided T-hangars, or small conventional hangars. A vehicle access road from Brainard Road would need to be constructed. Depending on the height of the structures, they may penetrate the transitional surface and would require an obstruction light. The limitations and restricted access to this location reduce it potential as compared to the other sites.

LEGEND

AVIATION DEVELOPMENT	A POTENTIAL DEVELOPMENT SITE
AVIATION OR NON-AVIATION DEVELOPMENT	1 EXISTING PROPERTY LEASE
WETLANDS	UTILITIES

AIRPORT PROPERTY LINE

EXISTING LEASE LINE

GROUND CONTOUR

TOWN LINE

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CHA

2139 Silas Deane Highway, Suite 212 • Rocky Hill, CT 06067-2336
Main: (860) 257-4557 • www.chacompanies.com

POTENTIAL DEVELOPMENT AREAS

Hartford-Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: JAN. 2014

FIGURE 7-1

File: V:\PROJECTS\ANY\TRANS\21099\CADD\ACAD\FIGURES\21099_FIGURE_7-1.DWG Saved: 1/22/2014 8:39:20 AM User: Medina, Perry LastSavedBy: 976

Parcels 13, 14, and 15 – Parcel 13 is currently the Airport Management and Starbase Offices and Parcels 14 and 15 are utilized by the State Police for hangar and storage. This area could be improved by rehabilitating the existing buildings or constructing new aircraft storage facilities. If Parcel 13 were redeveloped, it could be combined with Parcel F to provide an area for a conventional hangar and vehicle parking, or a second FBO.

Parcel 6 – The current leasers of Parcel 6 may consider constructing a T-hangar or small conventional hangars in place of a portion of the row of tiedowns to the south of their hangar. The parcel could still contain provide tiedowns for transient aircraft while increasing their potential hangar capacity. The site current provide 20 tiedowns, as well as helicopter parking positions.

7.3 Sustainability Review for Redevelopment

Any future development at HFD should follow the sustainability goals and initiatives outlined in the Introduction of this Master Plan and Section 5.5 Sustainability Recommendations. The CTDOT should ensure that buildings are built to be energy efficient and tenants promote recycling. Leadership in Energy and Environmental Design (LEED) construction certification (developed by the U.S. Green Building Council) would be encouraged.Sustainability should be core objective in design, site readiness, and building construction. Materials and procedures used by the future tenants should be compatible with the goals, such as green cleaning supplies, and landscaping should not be a wildlife attractant. At this time, it is not anticipated that any of the planned development will hinder the sustainability goals of the airport.

The Smart Associates
Environmental Consultants, Inc.

August 10, 2012

Supervisor
U.S. Fish and Wildlife Service
70 Commercial St., Suite 300
Concord, NH 03301

Re: Hartford-Brainard Airport
Hartford, Connecticut
Master Plan Update

To Whom It May Concern:

The Smart Associates, Environmental Consultants, Inc. is currently teamed with CHA to provide professional planning and environmental services for the 2012 Airport Master Plan Update at Hartford-Brainard Airport in Hartford, Connecticut. The Smart Associates is responsible for the environmental inventory portion of the Master Plan Update.

In order to evaluate all issues and resources within the vicinity of the Airport, we request your agency's input. Information you may have concerning resources or issues within the study area will assist in the preparation of the environmental portion of the Master Plan Update. Maps showing the location of the Airport and the approximate extent of the study area are attached.

The Connecticut Department of Energy and Environmental Protection (CTDEEP) Bureau of Natural Resources was contacted to determine if any state-listed species are present within the study area. CTDEEP responded that bald eagle (*Haliaeetus leucocephalus*), yellow lamp mussel (*Lampsilis cariosa*), tidewater mucket (*Leptodea ochracea*), and a floodplain-forest critical habitat and natural community are known to exist within the study area. A copy of the response from the CTDEEP is attached.

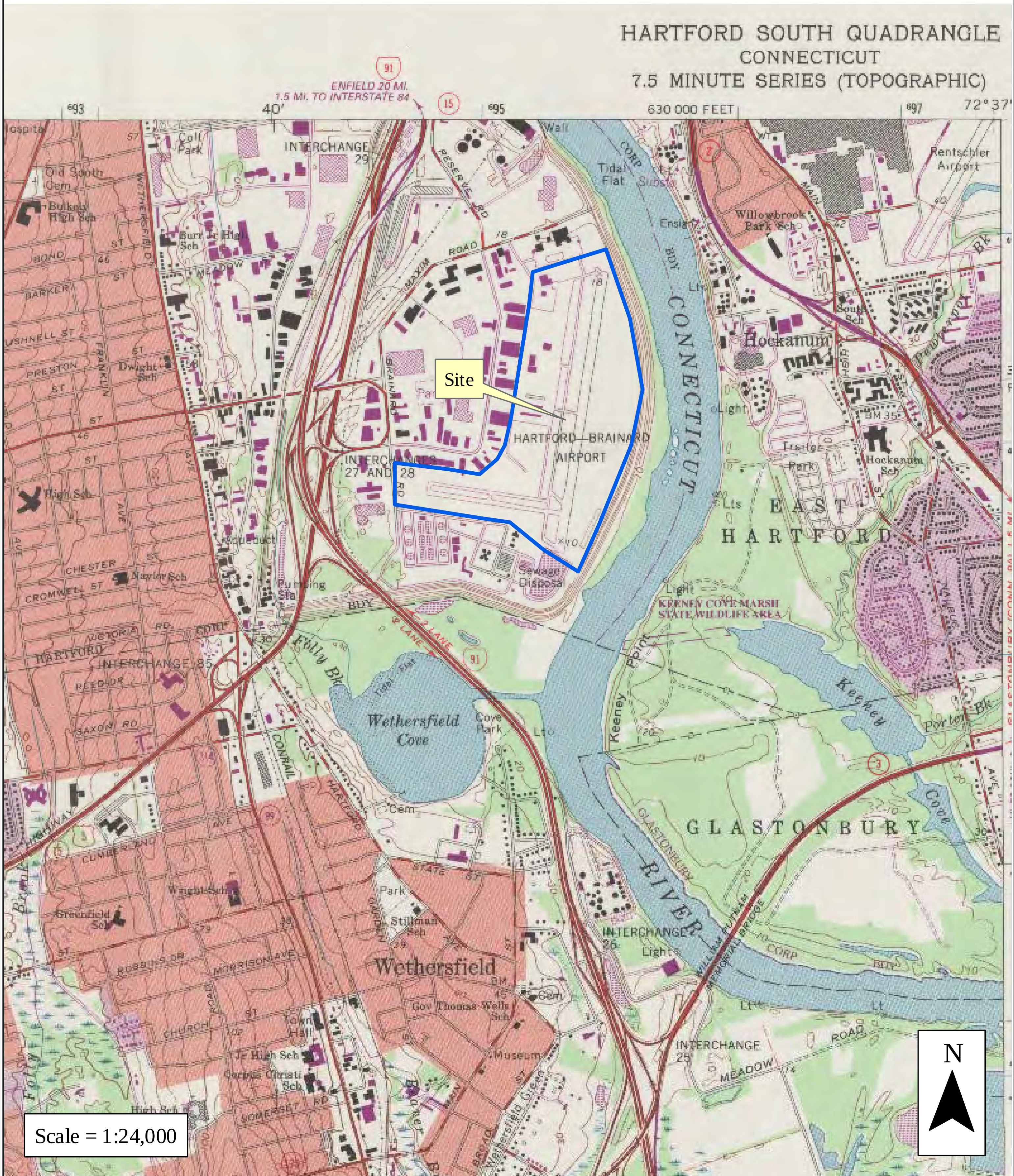
The National Marine Fisheries Service (NMFS) was also contacted to identify any listed species within the study area. The NMFS responded that Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) may occur in the Connecticut River near Hartford. A copy of the response from the CTDEEP is attached.

Any further information or recommendations you could provide that would assist the Airport with future project planning would be helpful. If you have any questions, please feel free to contact me at (603) 224-7550 or jriordan@smartenvironmental.com. Thank you for your assistance.

Sincerely,

The Smart Associates
Environmental Consultants, Inc.

Jennifer Riordan
Environmental Scientist



Master Plan Update
Hartford-Brainard Airport
Hartford, Connecticut

Figure 1
Site Locus Map

The Smart Associates
Environmental Consultants, Inc.

Master Plan Update Hartford-Brainard Airport Hartford, Connecticut	Figure 2 Study Area	The Smart Associates Environmental Consultants, Inc.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

September 26, 2012

Reference:	Project	Location
	Airport Master Plan Update	Hartford, CT

RECEIVED
SEP 2 8 2012
THE SMART ASSOCIATES

Ms. Jennifer Riordan
The Smart Associates
72 North Main Street
Concord, NH 03301-4983

Dear Ms. Riordan:

This responds to your recent correspondence requesting information on the presence of federally listed and/or proposed endangered or threatened species in relation to the proposed activity referenced above.

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

To obtain updated lists of federally listed or proposed threatened or endangered species and critical habitats, it is not necessary to contact this office. Instead, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/newengland/endangeredspec-consultation.htm

On the website, there is also a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no such habitat exists, then no federally listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact Maria Tur of this office at 603-223-2541, extension 12, if we can be of further assistance.

Sincerely yours,

Acting for

Thomas R. Chapman
Supervisor
New England Field Office

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

Bureau of Natural Resources
Wildlife Division
Natural History Survey – Natural Diversity Data Base

March 1, 2012

Ms. Jennifer Riordan
The Smart Associates, Environmental Consultants, Inc.
72 North Main Street
Concord, NH 03301

Regarding: Hartford-Brainard Airport Master Plan Update, Hartford, CT
Natural Diversity Data Base 201200232

Dear Ms. Riordan:

In response to your request for a Natural Diversity Data Base (NDDB) Review of State Listed Species for Hartford-Brainard Airport Master Plan Update, our records for this site indicate the following extant populations of species on or within the vicinity of the site:

Bald Eagle (*Haliaeetus leucocephalus*) Protection Status: Threatened

Disturbing bald eagles is an illegal activity pursuant to Section 26-93 of the Connecticut General Statutes.

Natural year-round habitat of bald eagles includes lakes, marshes, rivers, or seacoasts, where there are tall trees nearby for nesting and roosting and plenty of fish for eating. Although bald eagles feed primarily on fish, they also are opportunistic predators and scavengers that will eat anything that can be caught easily or scavenged.

The breeding season in Connecticut begins in January, and most pairs lay their eggs in February and March. Bald eagles return to the same nesting areas year after year. The nest, which sometimes measures 7 to 8 feet across, is a flat-topped mass of sticks, with a lining of fine vegetation such as rushes, mosses, or grasses. It is built in trees, 10 to 150 feet above ground. Disturbance at nest sites may cause the birds to abandon their nest, even if there are eggs or young in the nest.

Winter is a difficult time for any wildlife species, including bald eagles. Food is harder to find and cold temperatures cause energy stress. If the birds are frequently disturbed from feeding and forced to travel to a different area for food, their lives may be threatened. Adult eagles are more easily disturbed than juveniles.

At night, wintering eagles often congregate at communal roost trees; in some cases, they travel 12 or more miles from a feeding area to a roost site. Roosts are often used for several years. Many roosts are protected from the wind by vegetation or terrain, providing a favorable thermal environment. Use of these protected sites helps minimize energy stress. In addition, communal roosting may aid the birds in their search for food.

Recommendations: The Wildlife Division is aware of at least one pair of bald eagles that nest near Hartford-Brainard Airport. Though somewhat tolerable of human disturbance, the bald eagles will be negatively affected if work is too close to a nest or roosting site. Delineating protection zones around areas of high eagle use is important. Therefore, the following precautions shall be adhered to:

February 1st through August 1st (bald eagle breeding season)

- Any machinery or equipment shall maintain, at a minimum, a 600' protection zone around any nest site.
- If a bald eagle is found to be nesting on or with 600' of the project area, work shall be halted immediately until after the breeding season.

December 31st through March 1st (wintering bald eagles)

- Any machinery or equipment shall maintain, at a minimum, a 600' protection zone around areas of high eagle use, particularly winter roosting sites.

Yellow Lamp Mussel (*Lampsilis cariosa*) Protection Status: Endangered Species

Tidewater Mucket (*Leptodea ochracea*) Protection Status: Species of Special Concern

Freshwater mussels, such as Tidewater Mucket and Yellow Lamp Mussel would be seriously impacted if any project activities are conduct on or near the Connecticut River.

Recommendation: The Wildlife Division recommends:

- 1. No vegetation be removed from the stream banks adjacent to the mussel habitat since land clearing activities will affect the mussels.
- 2. There can be no erosion or siltation discharged into the river that can bury and kill these mussels.
- 3. There can be no polluted runoff such as chemicals or fertilizer discharged into the river, resulting from this project that can contaminate the water.

Airports are very popular areas for grassland birds, and they are most susceptible to human disturbance during the breeding season. Though we are not currently aware of any grassland birds nesting on site, you may want to include in the plan mitigation measures to eliminate or minimize impact to grass areas. Also, there is a portion of the eastern border of the airport, along the Connecticut River that is recognized as floodplain-forest critical habitat and natural community. Here again your plan may want to identify and mitigate any negative impacts to this area.

The Natural Diversity Data Base includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of

DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. If the project is not implemented within 12 months, then another Natural Diversity Data Base review should be requested for up-to-date information.

Please be advised a more detailed review may be conducted as part of any subsequent environmental permit applications submitted to the Department of Energy and Environmental Protection for the proposed site. Should state involvement occur in some other manner, specific restrictions or conditions relating to the species discussed above may apply.

Thank you for consulting the Natural Diversity Data Base. If you have further questions, I can be reached by email at Elaine.hinsch@ct.gov or by phone at (860) 424-3011.

Sincerely,

/s/
Elaine Hinsch
Program Specialist II
Wildlife Division

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 15 2012

Jennifer Riordan
The Smart Associates
72 North Main Street
Concord, New Hampshire 03301-4983

RECEIVED
FEB 16 2012
THE SMART ASSOCIATES

Re: Hartford-Brainard Airport

Dear Ms. Riordan,

Your February 6, 2012, letter requests information on the presence of listed species in proximity to the Hartford-Brainard Airport in Hartford, Connecticut.

The following listed species may occur in the Connecticut River near Hartford:

Species	Status
Gulf of Maine DPS of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)[1]	Threatened
New York Bight DPS of Atlantic sturgeon	Endangered
Chesapeake Bay DPS of Atlantic sturgeon	Endangered
Carolina DPS of Atlantic sturgeon	Endangered
South Atlantic DPS of Atlantic sturgeon	Endangered
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered

It is unclear from your letter whether any in-water work is proposed. As you may know, any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. If the proposed project has the potential to affect listed species and it is being approved, permitted or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the

[1] We published two rules listing 5 DPSs of Atlantic sturgeon on February 6, 2012 (see 77 FR 5880 and 77 FR 5914). The effective date of the listing of all 5 DPSs is April 6, 2012. For more information, please see: http://www.nero.noaa.gov/prot_res/atlsturgeon/.

ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA. Should you have any questions regarding these comments, please contact Julie Crocker of my staff at (978)282-8480 or Julie.Crocker@Noaa.gov.

NMFS' Habitat Conservation Division (HCD) is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA trust resources. If you have not done so already, I encourage you to contact HCD staff to determine if any coordination with HCD is necessary. Jenna Pirrotta of the New England Field Office can be reached at (978)281-9332 or Jenna.Pirrotta@Noaa.gov.

Sincerely,

for Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

CC: Pirrotta, F/NER4

File Code: Sec 7 technical assistance 2012– Smart Assoc. Hartford-Brainard Airport CT

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

Bureau of Natural Resources
Wildlife Division
Natural History Survey – Natural Diversity Data Base

March 1, 2012

Ms. Jennifer Riordan
The Smart Associates, Environmental Consultants, Inc.
72 North Main Street
Concord, NH 03301

Regarding: Hartford-Brainard Airport Master Plan Update, Hartford, CT
Natural Diversity Data Base 201200232

Dear Ms. Riordan:

In response to your request for a Natural Diversity Data Base (NDDB) Review of State Listed Species for Hartford-Brainard Airport Master Plan Update, our records for this site indicate the following extant populations of species on or within the vicinity of the site:

Bald Eagle (*Haliaeetus leucocephalus*) Protection Status: Threatened

Disturbing bald eagles is an illegal activity pursuant to Section 26-93 of the Connecticut General Statutes.

Natural year-round habitat of bald eagles includes lakes, marshes, rivers, or seacoasts, where there are tall trees nearby for nesting and roosting and plenty of fish for eating. Although bald eagles feed primarily on fish, they also are opportunistic predators and scavengers that will eat anything that can be caught easily or scavenged.

The breeding season in Connecticut begins in January, and most pairs lay their eggs in February and March. Bald eagles return to the same nesting areas year after year. The nest, which sometimes measures 7 to 8 feet across, is a flat-topped mass of sticks, with a lining of fine vegetation such as rushes, mosses, or grasses. It is built in trees, 10 to 150 feet above ground. Disturbance at nest sites may cause the birds to abandon their nest, even if there are eggs or young in the nest.

Winter is a difficult time for any wildlife species, including bald eagles. Food is harder to find and cold temperatures cause energy stress. If the birds are frequently disturbed from feeding and forced to travel to a different area for food, their lives may be threatened. Adult eagles are more easily disturbed than juveniles.

At night, wintering eagles often congregate at communal roost trees; in some cases, they travel 12 or more miles from a feeding area to a roost site. Roosts are often used for several years. Many roosts are protected from the wind by vegetation or terrain, providing a favorable thermal environment. Use of these protected sites helps minimize energy stress. In addition, communal roosting may aid the birds in their search for food.

Recommendations: The Wildlife Division is aware of at least one pair of bald eagles that nest near Hartford-Brainard Airport. Though somewhat tolerable of human disturbance, the bald eagles will be negatively affected if work is too close to a nest or roosting site. Delineating protection zones around areas of high eagle use is important. Therefore, the following precautions shall be adhered to:

February 1st through August 1st (bald eagle breeding season)

- Any machinery or equipment shall maintain, at a minimum, a 600' protection zone around any nest site.
- If a bald eagle is found to be nesting on or with 600' of the project area, work shall be halted immediately until after the breeding season.

December 31st through March 1st (wintering bald eagles)

- Any machinery or equipment shall maintain, at a minimum, a 600' protection zone around areas of high eagle use, particularly winter roosting sites.

Yellow Lamp Mussel (*Lampsilis cariosa*) Protection Status: Endangered Species

Tidewater Mucket (*Leptodea ochracea*) Protection Status: Species of Special Concern

Freshwater mussels, such as Tidewater Mucket and Yellow Lamp Mussel would be seriously impacted if any project activities are conduct on or near the Connecticut River.

Recommendation: The Wildlife Division recommends:

- 1. No vegetation be removed from the stream banks adjacent to the mussel habitat since land clearing activities will affect the mussels.
- 2. There can be no erosion or siltation discharged into the river that can bury and kill these mussels.
- 3. There can be no polluted runoff such as chemicals or fertilizer discharged into the river, resulting from this project that can contaminate the water.

Airports are very popular areas for grassland birds, and they are most susceptible to human disturbance during the breeding season. Though we are not currently aware of any grassland birds nesting on site, you may want to include in the plan mitigation measures to eliminate or minimize impact to grass areas. Also, there is a portion of the eastern border of the airport, along the Connecticut River that is recognized as floodplain-forest critical habitat and natural community. Here again your plan may want to identify and mitigate any negative impacts to this area.

The Natural Diversity Data Base includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of

DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. If the project is not implemented within 12 months, then another Natural Diversity Data Base review should be requested for up-to-date information.

Please be advised a more detailed review may be conducted as part of any subsequent environmental permit applications submitted to the Department of Energy and Environmental Protection for the proposed site. Should state involvement occur in some other manner, specific restrictions or conditions relating to the species discussed above may apply.

Thank you for consulting the Natural Diversity Data Base. If you have further questions, I can be reached by email at Elaine.hinsch@ct.gov or by phone at (860) 424-3011.

Sincerely,

/s/
Elaine Hinsch
Program Specialist II
Wildlife Division

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN CONNECTICUT

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Fairfield	Piping Plover	Threatened	Coastal Beaches	Westport, Bridgeport and Stratford
	Roseate Tern	Endangered	Coastal beaches, Islands and the Atlantic Ocean	Westport and Stratford
	Bog Turtle	Threatened	Wetlands	Ridgefield and Danbury.
Hartford	Dwarf wedgemussel	Endangered	Farmington and Podunk Rivers	South Windsor, East Granby, Simsbury, Avon and Bloomfield.
Litchfield	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Sharon.
	Bog Turtle	Threatened	Wetlands	Sharon and Salisbury.
Middlesex	Roseate Tern	Endangered	Coastal beaches, islands and the Atlantic Ocean	Westbrook
	Piping Plover	Threatened	Coastal Beaches	Clinton, Westbrook, Old Saybrook.
	Puritan Tiger Beetle	Threatened	Sandy beaches along the Connecticut River	Cromwell, Portland
New Haven	Bog Turtle	Threatened	Wetlands	Southbury
	Piping Plover	Threatened	Coastal Beaches	Milford, Madison and West Haven
	Roseate Tern	Endangered	Coastal beaches, Islands and the Atlantic Ocean	Branford, Guilford and Madison
	Indiana Bat	Endangered	Mines, Caves	
New London	Piping Plover	Threatened	Coastal Beaches	Old Lyme, Waterford, Groton and Stonington.
	Roseate Tern	Endangered	Coastal beaches, Islands and the Atlantic Ocean	East Lyme, New London and Waterford.
	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Waterford
Tolland	None			

-Eastern cougar, gray wolf, Indiana bat, Seabeach amaranth and American burying beetle are considered extirpated in Connecticut.
-There is no federally-designated Critical Habitat in Connecticut.

7/31/2008

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 15 2012

Jennifer Riordan
The Smart Associates
72 North Main Street
Concord, New Hampshire 03301-4983

RECEIVED
FEB 16 2012
THE SMART ASSOCIATES

Re: Hartford-Brainard Airport

Dear Ms. Riordan,

Your February 6, 2012, letter requests information on the presence of listed species in proximity to the Hartford-Brainard Airport in Hartford, Connecticut.

The following listed species may occur in the Connecticut River near Hartford:

Species	Status
Gulf of Maine DPS of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)[1]	Threatened
New York Bight DPS of Atlantic sturgeon	Endangered
Chesapeake Bay DPS of Atlantic sturgeon	Endangered
Carolina DPS of Atlantic sturgeon	Endangered
South Atlantic DPS of Atlantic sturgeon	Endangered
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered

It is unclear from your letter whether any in-water work is proposed. As you may know, any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. If the proposed project has the potential to affect listed species and it is being approved, permitted or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the

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ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA. Should you have any questions regarding these comments, please contact Julie Crocker of my staff at (978)282-8480 or Julie.Crocker@Noaa.gov.

NMFS' Habitat Conservation Division (HCD) is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA trust resources. If you have not done so already, I encourage you to contact HCD staff to determine if any coordination with HCD is necessary. Jenna Pirrotta of the New England Field Office can be reached at (978)281-9332 or Jenna.Pirrotta@Noaa.gov.

Sincerely,

for Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

CC: Pirrotta, F/NER4

File Code: Sec 7 technical assistance 2012– Smart Assoc. Hartford-Brainard Airport CT

Jennifer Riordan

From: "Jenna Pirrotta" <jenna.pirrotta@noaa.gov>
To: "Jennifer Riordan" <jriordan@smartenvironmental.com>
Sent: Tuesday, March 06, 2012 8:52 AM
Attach: Response to request for info letter.pdf
Subject: Re: Hartford-Brainard Airport

Hi Jennifer,

Please see the attached letter for information on essential fish habitat (EFH) and the requirements of an EFH assessment. It is unclear from your email if any in-water work is proposed, however the letter should contain the information you need. EFH resources of concern within the Connecticut River include Atlantic salmon and other anadromous fishery resources.

Thanks,
Jenna

On Mon, Mar 5, 2012 at 2:51 PM, Jennifer Riordan <jriordan@smartenvironmental.com> wrote:

> Hi Jenna,
>
> The Smart Associates, Environmental Consultants, Inc. is currently teamed with CHA to provide professional planning and environmental services for the 2012 Airport Master Plan Update at Hartford-Brainard Airport in Hartford, Connecticut. The Smart Associates is responsible for the environmental inventory portion of the Master Plan Update.
>
> In order to evaluate all issues and resources within the vicinity of the Airport, we request your agency's input. Information you may have concerning resources or issues within the study area will assist in the preparation of the environmental portion of the Master Plan Update. A map showing the location of the Airport is attached. We recently contacted the Protected Resources Division and they recommended that we contact you to determine if any coordination is necessary regarding Essential Fish Habitat.
>
> If you have any questions or require further information regarding this project, please feel free to contact me at (603) 224-7550 or jriordan@smartenvironmental.com. Thank you for your assistance.
>
> Jennifer Riordan
> The Smart Associates
> Environmental Consultants, Inc.
> 72 N. Main Street
> Concord, NH 03301-4983
> (603) 224-7550 Phone
> (603) 224-7890 Fax

--
Jenna (Flynn) Pirrotta

Environmental Specialist
National Marine Fisheries Service
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930
(978) 675-2176

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2290

RESPONSE TO INFORMATION REQUEST

This standard form is provided in response to your request for information regarding the presence and distribution of essential fish habitat (EFH) and fishery resources in the vicinity of your proposed action.

Essential Fish Habitat
A complete list of species and life stages for which EFH has been designated can be found on the National Marine Fisheries Service (NMFS) Habitat Conservation Division website at: http://www.nero.noaa/ro/doc/webintro.html. The website also contains information on descriptions of EFH for each species, guidance on the EFH consultation process including EFH assessments, and information relevant to other NMFS mandates.

The Magnuson-Stevens Fisheries Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) require federal agencies to consult with the NMFS on their proposed activities. Insofar as a project involves EFH, this process is guided by the requirements of our EFH regulations at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The required contents of an EFH assessment include: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the federal agency's conclusion regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable. Other information that should be contained in the EFH assessment, if appropriate, includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 4) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH. Upon submittal of an EFH assessment by the federal action agency, the NMFS will provide conservation recommendations for the proposed project, as necessary.

Protected Species
Information regarding the Endangered Species Act or Marine Mammal Protection Act will be provided under separate cover from the NMFS Protected Resources Division. Questions regarding Endangered Species Act Section 7 consultations should be directed to Julie Crocker, Julie.Crocker@noaa.gov, 978-281-9300 x 6530.

Additional Information
Should you require additional information regarding EFH or FWCA consultations, please contact Lou Chiarella, New England Field Office Supervisor for Habitat Conservation, Lou.Chiarella@noaa.gov, 978-281-9277.

Jennifer Riordan

From: "Vairo, Stacey" <Stacey.Vairo@ct.gov>
To: "'Jennifer Riordan'" <jriordan@smartenvironmental.com>
Sent: Wednesday, February 29, 2012 11:44 AM
Subject: RE: Hartford-Brainard Airport

Hi Jennifer,

It seems that nothing has changed according to our records.

Thanks!

Stacey

From: Jennifer Riordan [mailto:jriordan@smartenvironmental.com]
Sent: Tuesday, February 28, 2012 12:13 PM
To: Vairo, Stacey
Subject: Hartford-Brainard Airport

Hi Stacey,

I'm working on a Master Plan Update for Hartford-Brainard Airport and am looking for information on buildings that are listed on the State Register of Historic Places. Our study area includes the airport's property and immediate surrounding area (see attached map).

The previous Master Plan, completed in 1999, mentioned two buildings at the airport that are listed on the State Register - the former Department of Aeronautics Headquarters (referred to as the Administration Building) and a circa 1935 hangar. These buildings were listed as part of a statewide inventory of state-administered properties.

Any updated information you could provide would be much appreciated.

Thanks,

Jenn

Jennifer Riordan
The Smart Associates
Environmental Consultants, Inc.
72 N. Main Street
Concord, NH 03301-4983
(603) 224-7550 Phone
(603) 224-7890 Fax

CHA

Sustainable Airport Master Plan Update
Hartford-Brainard Airport

Connecticut Department of Transportation

Noise Assessment

May 2013

HARTFORD-BRAINARD AIRPORT

NOISE ASSESSMENT

May 2013

Prepared for:
CHA Consulting, Inc.
Albany, NY 12205

Prepared by:
KM Chng Environmental Inc.
Woburn, MA 01801

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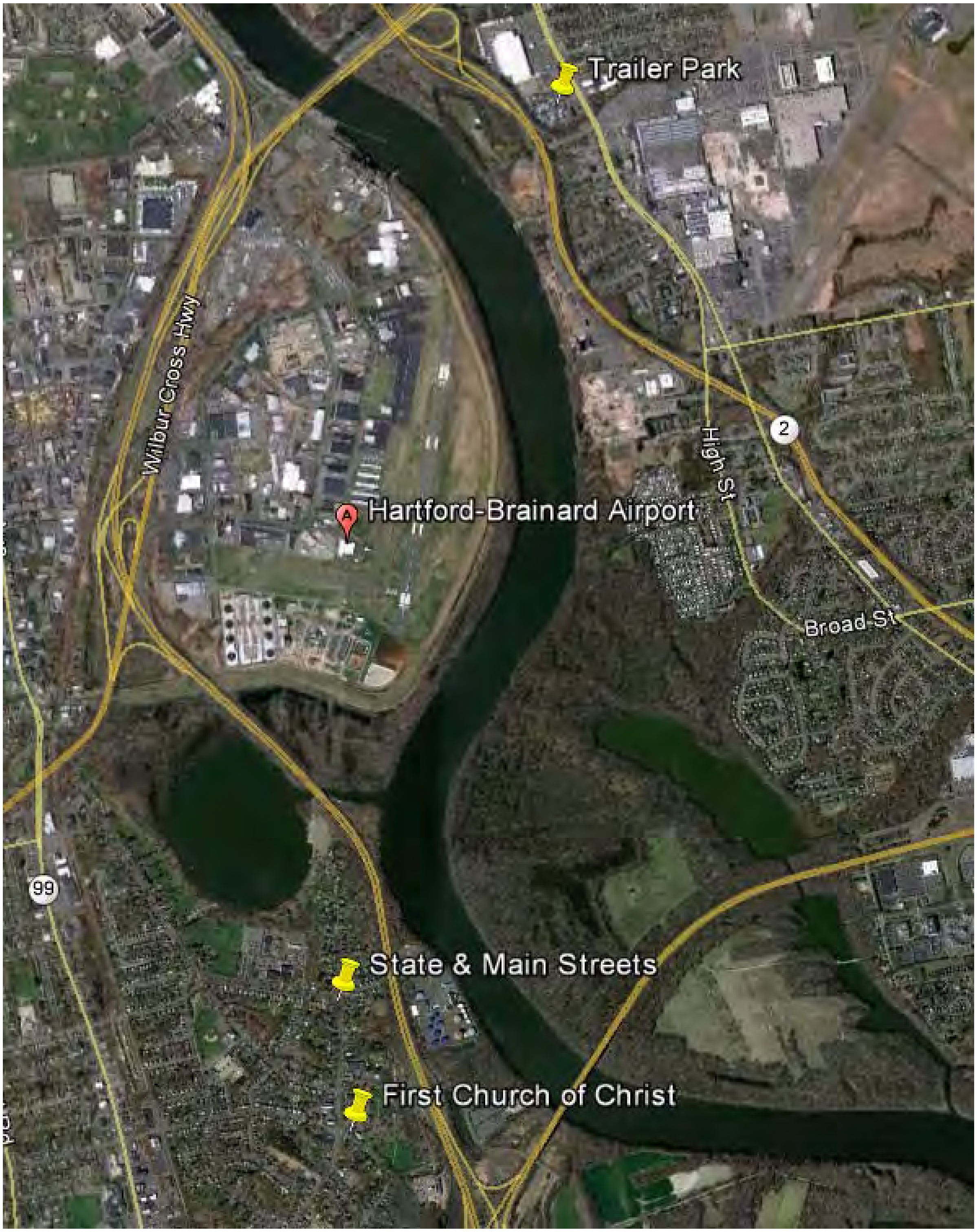
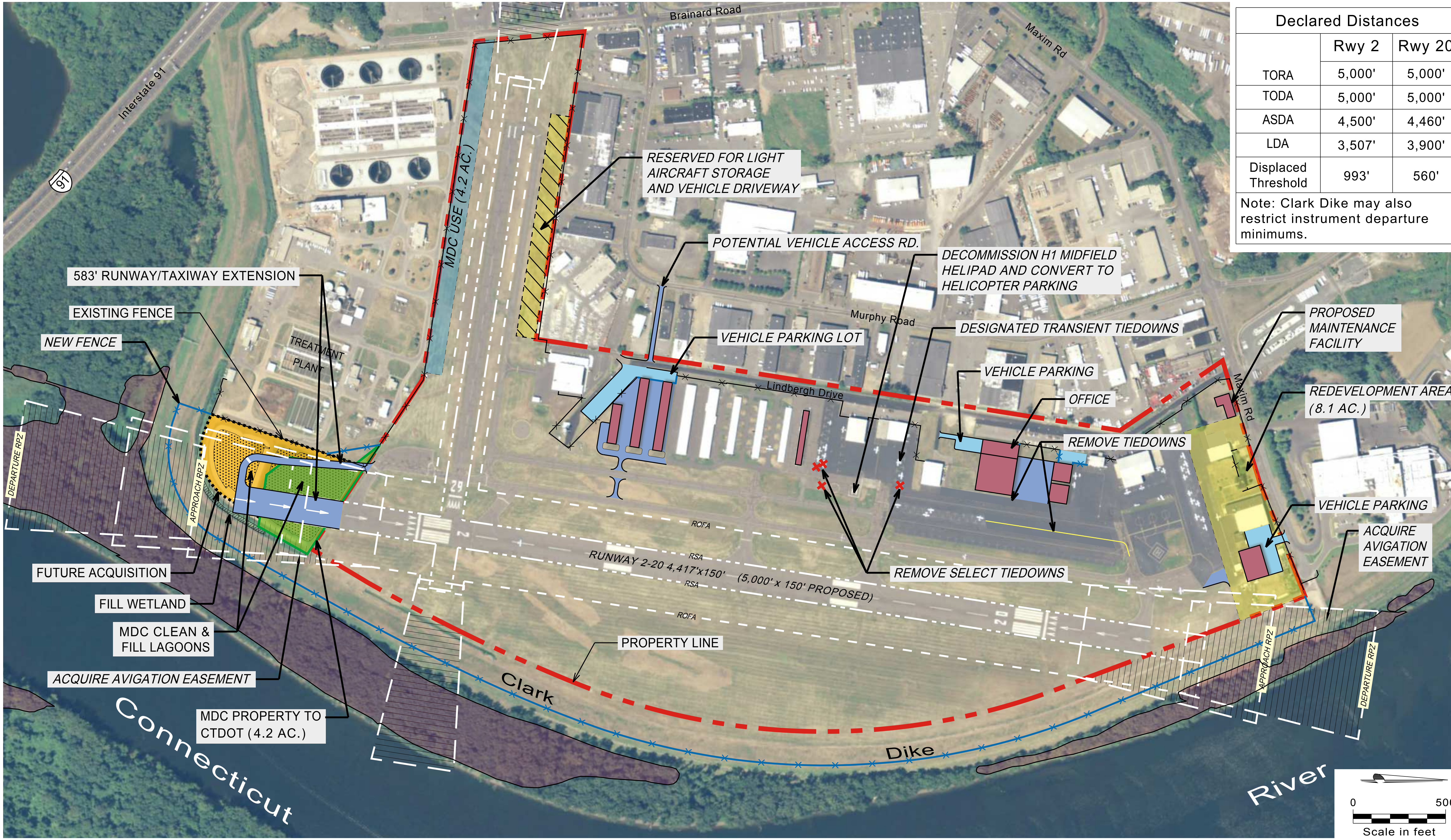
1. Introduction

As part of the Hartford-Brainard (HFD) Airport Master Plan Update (AMPU) being prepared by Clough, Harbour & Associates (CHA), a detailed noise analysis was prepared to assess the existing and future noise levels generated by the Airport. Figure 1 shows HFD and the surrounding area. For this analysis, the Federal Aviation Administration's (FAA) Integrated Noise Model (INM) version 7.0 was used to develop DNL noise contours. The INM noise model was used to develop average airport noise contours for the 2010 Base Year and the 2030 future year with and without the improvements to Runway 2-20. Runway 2-20 is currently 4,418 feet long, and the proposed improvements will increase the length of the runway to the FAA recommended 5,000 feet. Figure 2 shows the long term airport development plan.

In addition to the noise contours, noise measurements of real-time aircraft flyover events were obtained at three locations (selected by CTDOT) to determine the noise levels during aircraft takeoff and landing operations at the Airport. Measurement Site 1 is located south of Runway 2-20 at the intersection of State Street and Main Street in Wethersfield, CT, approximately 5,200 feet from the end of Runway 2. Measurement Site 2 is also located south of Runway 2-20 at the First Church of Christ on Main Street in Wethersfield, CT, approximately 6,700 feet from the end of Runway 2. Measurement Site 3 is located north of Runway 2-20 within a mobile home development at 503 Main Street in East Hartford, CT, approximately 3,500 feet from the end of Runway 20. These three noise measurement locations are also shown in Figure 1.

Figure 1: Hartford-Brainard Airport and Noise Measurement Locations





Declared Distances	Rwy 2	Rwy 20
TORA	5,000'	5,000'
TODA	5,000'	5,000'
ASDA	4,500'	4,460'
LDA	3,507'	3,900'
Displaced Threshold	993'	560'

Note: Clark Dike may also restrict instrument departure minimums.

LEGEND

- NEW AIRFIELD PAVEMENT
- NEW AUTO PARKING
- NEW BUILDING
- NEW FENCE
- MDC USE
- REDEVELOPMENT AREA
- EXISTING OBSTRUCTIONS
- PROPERTY ACQUISITION
- FUTURE ACQUISITION
- AVIGATION EASEMENT

CHA

2139 Silas Deane Highway, Suite 212 · Rocky Hill, CT 06067-2336
Main: (860) 257-4557 · www.chacompanies.com

DRAFT

RECOMMENDED DEVELOPMENT PLAN

Hartford-Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: DEC. 2012

FIGURE 2

File: V:\PROJECTS\ANY\TRANS\21099\CADD\ACAD\FIGURES\21099_FIGURE_5-12_RECOMMENDED.DWG Saved: 5/9/2013 11:13:57 AM User: Medina, Perry LastSavedBy: 976

2. Noise Metrics

Noise is "unwanted sound" and, by this very definition, the perception of noise is a subjective process. Several factors affect the actual level and quality of sound (or noise) as perceived by the human ear and can generally be described in terms of loudness, pitch (or frequency), and time variation.

Loudness. The loudness, or magnitude, of noise determines its intensity and is measured in decibels (dB). The noise decibel is used to describe a large range of sound levels. For example, ambient noise ranges from 40 decibels from the rustling of leaves to over 70 decibels from a truck passby to over 100 decibels from a rock concert.

Pitch. Pitch describes the character and frequency content of noise. Measured in Hertz (Hz), frequency is typically used to identify the annoying characteristics of noise and thereby identify the proper mitigation to help eliminate or minimize its magnitude. The human ear is typically sensitive to noise frequencies between 20 Hz (low-pitched noise) and 20,000 Hz (high-pitched noise). For example, noise may range from very low-pitched "rumbling" noise from stereo sub-woofers to mid-range traffic noise to very high-pitched whistle noise.

Time Variation. The time variation of some noise sources can be characterized as continuous, such as a building ventilation fan, intermittent, such as for an aircraft flyover, or impulsive, like a car backfire.

Various levels are used to quantify noise from aircraft operations including a sound's loudness, duration, and tonal character. For example, the A-weighted decibel (dBA) is commonly used to describe the overall noise level. Because the decibel is based on a logarithmic scale, a 10-decibel increase in noise level is generally perceived as a doubling of loudness, while a 3-decibel increase in noise is just barely perceptible to the human ear. The A-weighting is an attempt to take into account the human ear's response to audible frequencies. The following A-weighted noise descriptors are typically used to determine impacts from aircraft operations:

- Lmax represents the maximum noise level that occurs during an event or aircraft operation and is the noise level actually heard during the event or flyover.

- Leq represents a level of constant noise with the same acoustical energy as the fluctuating noise levels observed during the flyover event.

- DNL, the day-night noise level, represents the average noise level evaluated over a 24-hour period. A 10-decibel penalty is added to events that occur during the nighttime hours (10:00 PM to 7:00 AM) to account for people's increased sensitivity to noise while they are sleeping. For airport projects, the DNL noise level is used to describe the noise from aircraft operations in the vicinity of the airport. It includes the both peak aircraft noise events, as well as the times with no aircraft activity, averaged over a full day.

- SEL is the sound exposure level typically used to predict overall aircraft noise levels. The SEL converts the time period of the Leq into a one-second time interval allowing for the direct comparison of aircraft events or flyovers with different time durations.

The Federal Aviation Administration (FAA) uses the DNL noise metric to determine noise impact in residential areas. The FAA has established 65 DNL as the threshold above which aircraft noise is considered to be incompatible with residential areas. The FAA's Part 150 Airport Noise Compatibility Planning Program is the primary Federal regulation guiding and controlling planning for aviation noise compatibility around airports. Part 150 establishes the use of the FAA's Integrated Noise Model (INM) as the standard noise modeling methodology for developing noise contours (Noise Exposure Maps – NEM) for airport noise impact assessment. For residential areas that exceed the FAA's 65 DNL noise impact level, the Part 150 Program establishes procedures and criteria for making projects eligible for Federal funding for residential sound insulation programs to reduce indoor noise levels from aircraft operations.

3. 2010 Base Year Noise Contours

A noise assessment was performed to determine the DNL noise contours at HFD for the 2010 Base Year. The results of the noise modeling analysis for 2010 are described in the following sections.

3.1 Noise Model Input Data

The FAA's INM was used to generate the DNL noise contours for HFD for the 2010 Base Year. Input data required for the INM noise model include the following: aircraft fleet mix, runway and aircraft flight track geometry, runway and flight track utilization, the number and type of aircraft operations (departures and arrivals) by aircraft type, and the number of daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) aircraft operations for a typical average annual day at the Airport. Aircraft operations at Hartford-Brainard Airport consist of the following categories: 1) single-engine piston general aviation aircraft, 2) multi-engine piston general aviation aircraft, 3) small general aviation jet aircraft, and 4) helicopters.

Table 1 summarizes the Airport's annual aircraft operations and average daily aircraft operations by aircraft type for the base year 2010. Also included in Table 1 is the INM representative aircraft for each aircraft type used in the noise modeling analysis.

Table 1: Aircraft Operations – 2010 Base Year

Aircraft Category	Typical Aircraft Type	INM Representative Aircraft	Annual Operations	Average Daily Aircraft Operations
GA Single Engine Piston	Cessna 172	CNA172	70,296	192
GA Twin Engine Piston	Beechcraft Baron 58P	BEC58	5,686	16
GA Small Jet	Cessna Citation Bravo	CNA558B	2,584	7
Helicopter	Robinson R-22	R22	1,034	3
Total			79,600	218

The aircraft operations data in Table 1 indicate that in 2010, single-engine piston aircraft accounted for approximately 88 percent of the total aircraft operations at HFD. Twin-engine piston aircraft accounted for approximately 7 percent of the aircraft operations, small GA jets accounted for approximately 3 percent of aircraft operations, and helicopters accounted for approximately 1 percent of the operations at HFD. Included with the small jet category are turboprop aircraft. Daytime aircraft activity (between 7:00 AM and 10:00 PM) at the airport accounted for approximately 95 percent of the airport operations, and nighttime aircraft activity (between 10:00 PM and 7:00 AM) accounted for 5 percent of the airport operations. In addition, half of the single engine and twin-engine daily aircraft activity at the airport are touch-and-go operations.

Runway and flight track utilization are also a major component of the INM noise modeling input data. At HFD there are two runways. Runway 2-20 is the main runway, and accounts for over 85 percent of the aircraft operations at HFD; Runway 11-29 accounts for the remaining aircraft operations. Table 2 shows the percent of aircraft operations by runway for each of the various aircraft types that operate at the airport.

Table 2: Runway Utilization by Aircraft Type

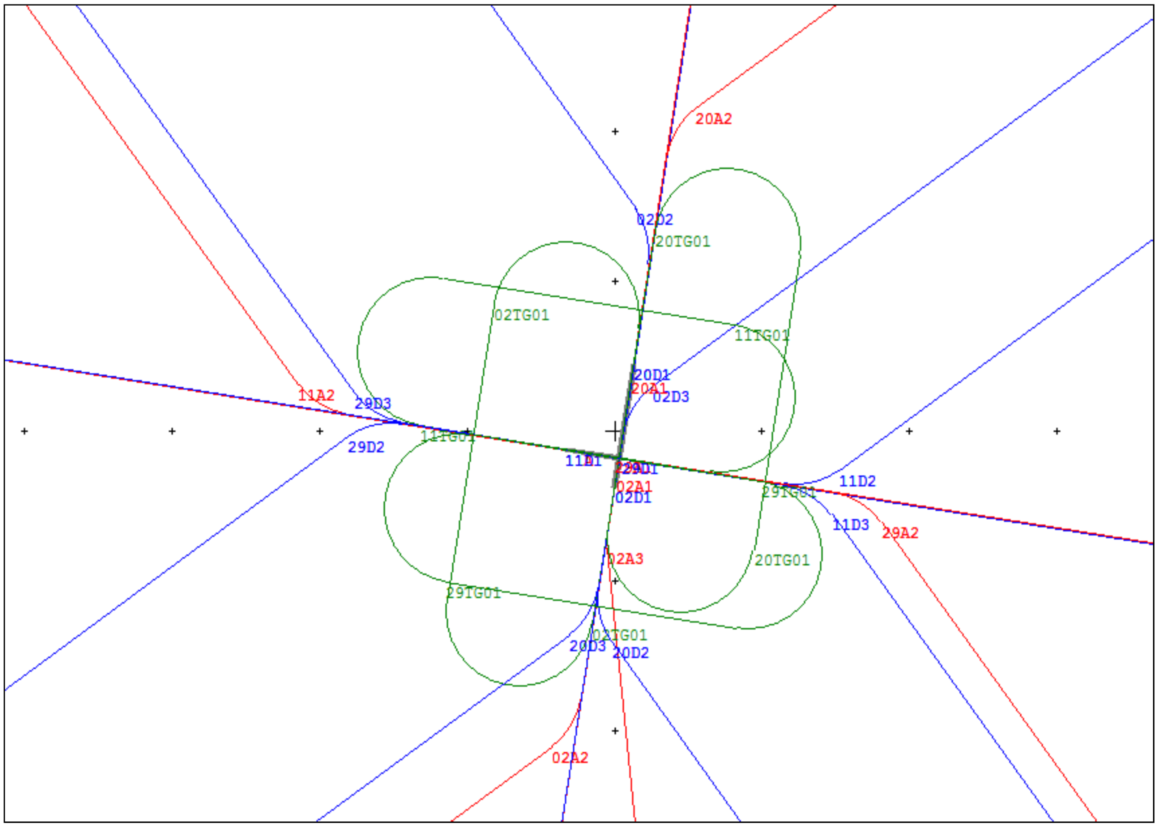
Aircraft Type	Runway Utilization by Aircraft Type			
	Runway 2	Runway 20	Runway 11	Runway 29
GA Single Engine	57%	28%	5%	10%
GA Twin Engine	57%	28%	5%	10%
GA Small Jet	65%	35%	0%	0%
Helicopter	57%	28%	5%	10%

Once aircraft operations are distributed by runway, the designated aircraft departure and approach flight tracks were determined based on information provided by the Airport's Air Traffic Control (ATC) personnel and from previous noise studies. A flight track specifies the path along which aircraft will travel during departure, arrival, and touch & go operations. The shape of the flight track is dependent on many factors such as aircraft destination, aircraft size and type, and avoidance of noise-sensitive areas. Table 3 describes the various approach and departure flight tracks for each of the runways, and Figure 3 graphically shows the flight tracks that were used in the noise modeling analysis for HFD. Flight track 02A3 is the voluntary noise abatement flight track used by aircraft on approach to Runway 2, the River Visual Rwy 02. This noise abatement flight track request that pilots arrive to the east of the runway over the Connecticut River as much as possible to avoid the residential area, Old Wethersfield, directly south of the airport.

Table 3: Description of Aircraft Flight Tracks

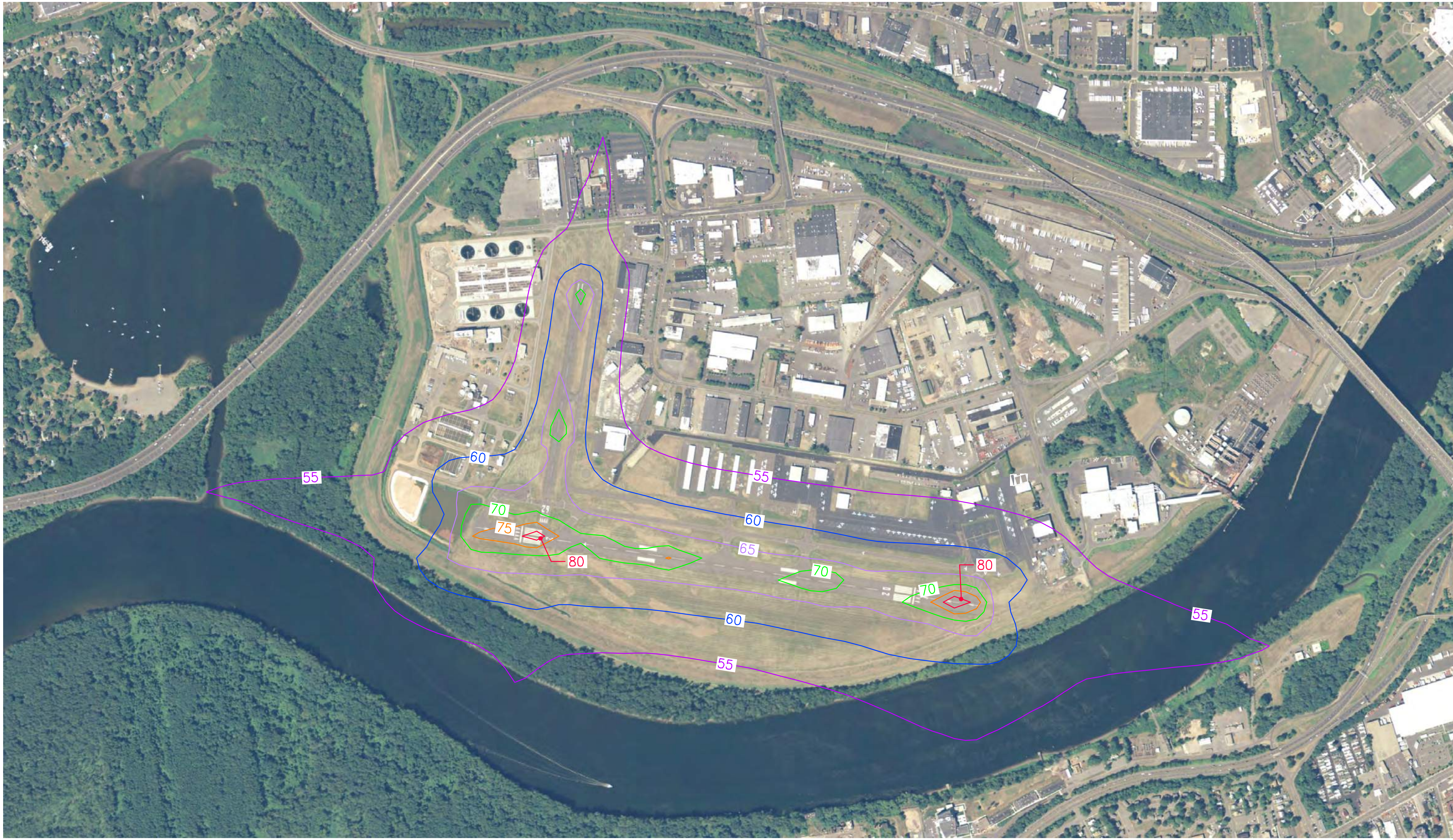
Runway Procedure	Flight Track Description	Flight Track ID
	Straight-In	02A1
Runway 2 Approach	Downwind/Base Entry	02A2
	Noise Abatement	02A3
	Straight-Out	02D1
Runway 2 Departures	Left Turn to Crosswind	02D2
	Right Turn to Crosswind	02D3
Runway 20 Approach	Straight-In	20A1
	Downwind/Base Entry	20A2
	Straight-Out	20D1
Runway 20 Departure	Left Turn to Crosswind	20D2
	Right Turn to Crosswind	20D3
Runway 2 Touch & Go	Closed Loop Left	2TGO1
Runway 20 Touch & Go	Closed Loop Left	20TGO1
Runway 11 Approach	Straight-In	11A1
	Downwind/Base Entry	11A2
	Straight-Out	11D1
Runway 11 Departure	Left Turn to Crosswind	11D2
	Right Turn to Crosswind	11D3
Runway 29 Approach	Straight-In	29A1
	Downwind/Base Entry	29A2
	Straight-Out	29D1
Runway 29 Departure	Left Turn to Crosswind	29D2
	Right Turn to Crosswind	29D3
Runway 11 Touch & Go	Closed Loop Left	11TGO1
Runway 29 Touch & Go	Closed Loop Left	29TGO1

Figure 3: Aircraft Flight Tracks at Hartford-Brainard Airport



3.2 DNL Noise Contours

The aircraft operations data from Table 1, the runway utilization data from Table 2, and the flight track data from Table 3 were used in the INM noise model to develop the DNL noise contours for the 2010 Base Year. Figure 4 shows the 55, 60, 65, 70, 75 and 80 DNL noise contours for the 2010 Base Year. The 65 DNL noise contour is completely within the property line of the Airport. In addition, there are no residential receptors located within the 55 DNL noise contour. The Federal Aviation Administration (FAA) considers the 65 DNL noise level as non-compatible for residential, and other noise sensitive land use.



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DNL NOISE CONTOURS FOR THE 2010 BASE YEAR

Hartford–Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: MAY. 2013

FIGURE 4

4. 2030 Noise Contours

DNL noise contours were also developed for the 2030 future year Build and No Build Alternatives. For the Build Alternative, the length of Runway 2/20 was extended to the FAA's recommended length of 5,000 feet (583 foot extension to the south). Figure 2 shows the proposed location of the Runway 2 end.

4.1 2030 No Build Alternative

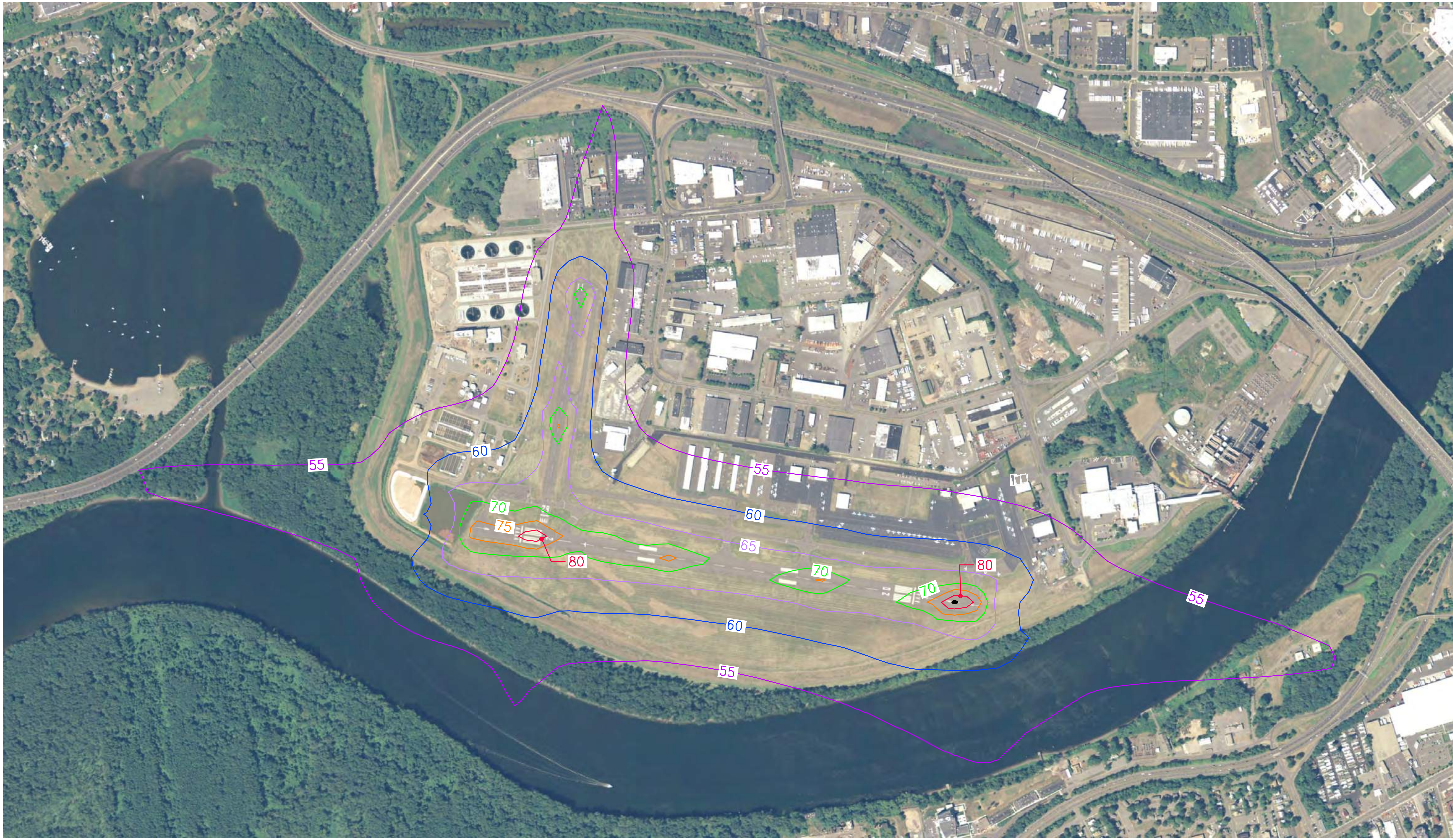
Table 4 summarizes the Airport's annual aircraft operations and average daily aircraft operations by aircraft type for the future year 2030 No Build Alternative. Total annual aircraft operations at the airport are forecast to increase from 79,600 to 85,600, for an increase of 7.5 percent over a 20 year period. Average daily aircraft operations are expected to increase from 218 to 235.

Single-engine piston aircraft would account for approximately 85 percent of the total aircraft operations at HFD. Twin-engine piston aircraft would account for approximately 8 percent of the aircraft operations, small GA jets would account for approximately 5 percent of aircraft operations, and helicopters would account for approximately 2 percent of the operations at HFD. As with the 2010 Base Year, daytime aircraft activity (between 7:00 AM and 10:00 PM) at the airport would account for 95 percent of the airport operations, and nighttime aircraft activity (between 10:00 PM and 7:00 AM) accounted for 5 percent of the airport operations. Also, half of the single engine and twin-engine daily aircraft activity at the airport are expected to be touch-and-go operations. Runway utilization from Table 2 and the aircraft flight tracks described in Table 3 for the 2010 Base Year are the same for the 2030 future year No Build Alternative.

Table 4: Aircraft Operations – 2030 No Build Alternative

Aircraft Category	Typical Aircraft Type	INM Representative Aircraft	Annual Operations	Average Daily Aircraft Operations
GA Single Engine Piston	Cessna 172	CNA172	72,862	200
GA Twin Engine Piston	Beechcraft Baron 58P	BEC58	6,624	18
GA Small Jet	Cessna Citation Bravo	CNA558B	4,076	11
Helicopter	Robinson R-22	R22	2,038	6
Total			85,600	235

The aircraft operations data from Table 4, the runway utilization data from Table 2, and the flight track data from Table 3 were used in the INM noise model to develop the DNL noise contours for the future year 2030 No Build Alternative. Figure 5 shows the 55, 60, 65, 70, 75 and 80 DNL noise contours for the 2030 No Build Alternative. Once again, the 65 DNL noise contour is completely within the property line of the Airport. There is one residential receptor located north of Runway 2-20 across the Connecticut River that is within the 55 DNL noise contour.



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DNL NOISE CONTOURS FOR THE
2030 No Build Alternative

Hartford–Brainard Airport (HFD) Master Plan Update

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FIGURE 5

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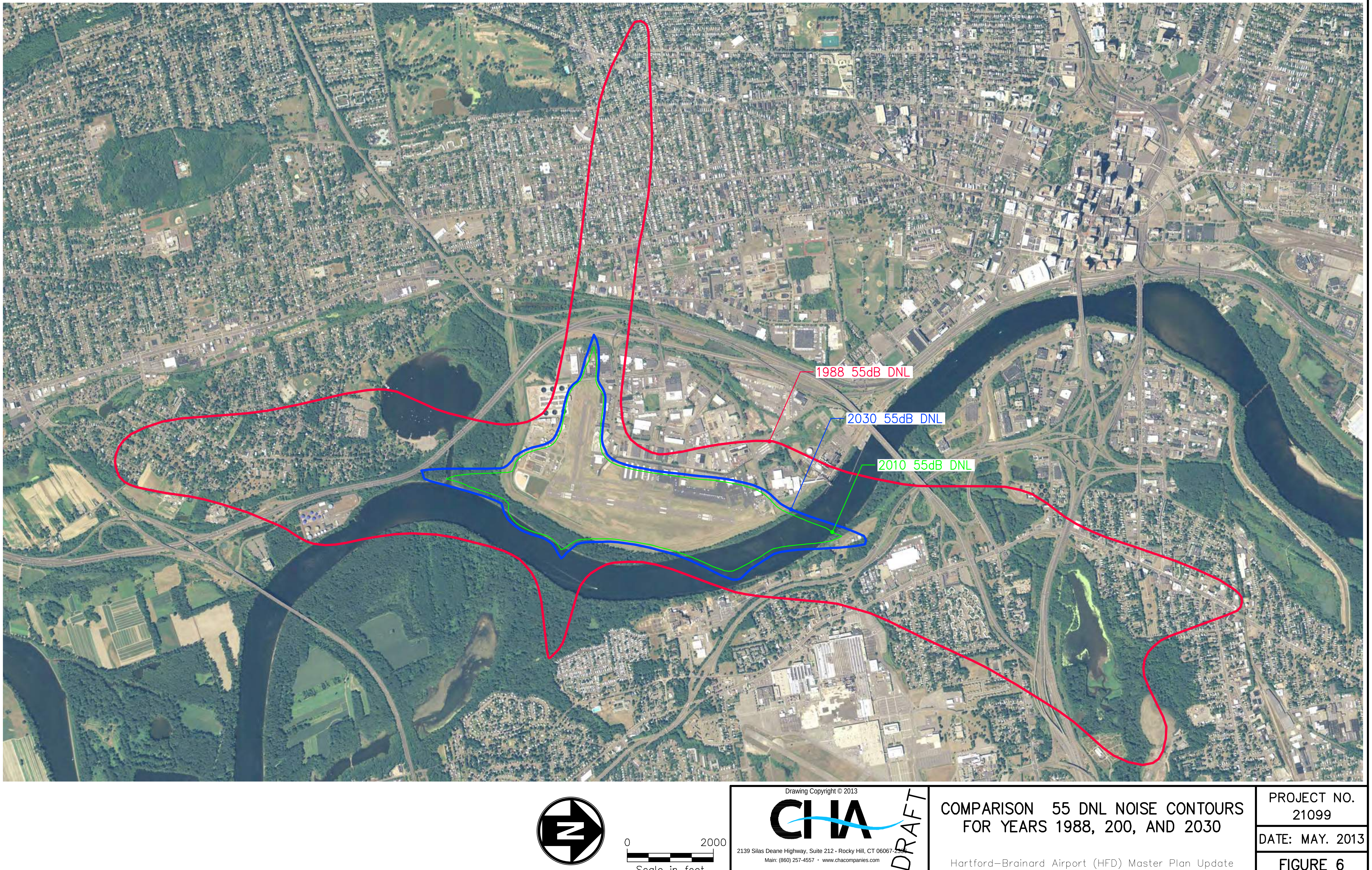
For comparison purposes, Figure 6 show the 55 DNL noise contours for HFD for the 2010 base year and 2030 future year No Build Alternative, along with the 55 DNL noise contour for 1988. The 55 DNL noise contours for 2010 and 2030 are much smaller than the 1988 noise contour due to the significant decrease in current and the forecasted aircraft operations since 1988, and the decreased use of older jets (Stage II aircraft). The previous modeling forecasted over 114,000 operations for 1988, while only 85,000 operations were forecast for 2030 as part of the 2013 AMPU. In addition, the older noisier Stage II aircraft have been nearly phased out of use due to age.

4.2 2030 Build Alternative

Table 4 summarizes the Airport's annual and average daily aircraft operations by aircraft type for the future year 2030 Build Alternative. For the Build Alternative, the length of Runway 2-20 was extended 583 feet to the south, to increase the total runway length to the FAA recommended 5,000 feet. This length provides a safety margin for the smaller business jets within the region to operate in and out of HFD. It is anticipated that a percentage of the jets that currently operate out of Bradley International Airport (BDL) would operate out of HFD with the increased runway length as it is closer to downtown Hartford; see Chapter 2 of the 2013 AMPU for additional details on the operational forecasts. Total annual aircraft operations at the airport are forecast to increase from 79,600 to 87,700 for the 2030 Build Alternative, for an increase of 10 percent. Average daily aircraft operations are expected to increase from 218 to 240.

Single-engine piston aircraft would account for approximately 83 percent of the total aircraft operations at HFD. Twin-engine piston aircraft would account for approximately 8 percent of the aircraft operations, small GA jets would account for approximately 5 percent of aircraft operations, medium GA jets will account for approximately 2 percent of aircraft operations, and helicopters would account for approximately 2 percent of the operations at HFD. As with the 2010 Base Year, daytime aircraft activity (between 7:00 AM and 10:00 PM) at the airport would account for 95 percent of the airport operations, and nighttime aircraft activity (between 10:00 PM and 7:00 AM) accounted for 5 percent of the airport operations. Also, half of the single engine and twin-engine daily aircraft activity at the airport are expected to be touch-and-go operations. Runway utilization from Table 6 indicates that the small and medium sized GA jets will operate on Runway 2-20. The aircraft flight tracks described in Table 3 for the 2010 Base Year are the same for the 2030 future year Build Alternative.



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COMPARISON 55 DNL NOISE CONTOURS FOR YEARS 1988, 200, AND 2030

Hartford–Brainard Airport (HFD) Master Plan Update

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DATE: MAY. 2013

FIGURE 6

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Table 5: Aircraft Operations – 2030 Build Alternative

Aircraft Category	Typical Aircraft Type	INM Representative Aircraft	Annual Operations	Average Daily Aircraft Operations
GA Single Engine Piston	Cessna 172	CNA172	72,913	200
GA Twin Engine Piston	Beechcraft Baron 58P	BEC58	6,628	18
GA Small Jet	Cessna Citation Bravo	CNA558B	4,079	11
GA Medium Jet	Gulfstream G150	HS748A	2,040	6
Helicopter	Robinson R-22	R22	2,040	6
Total			87,700	240

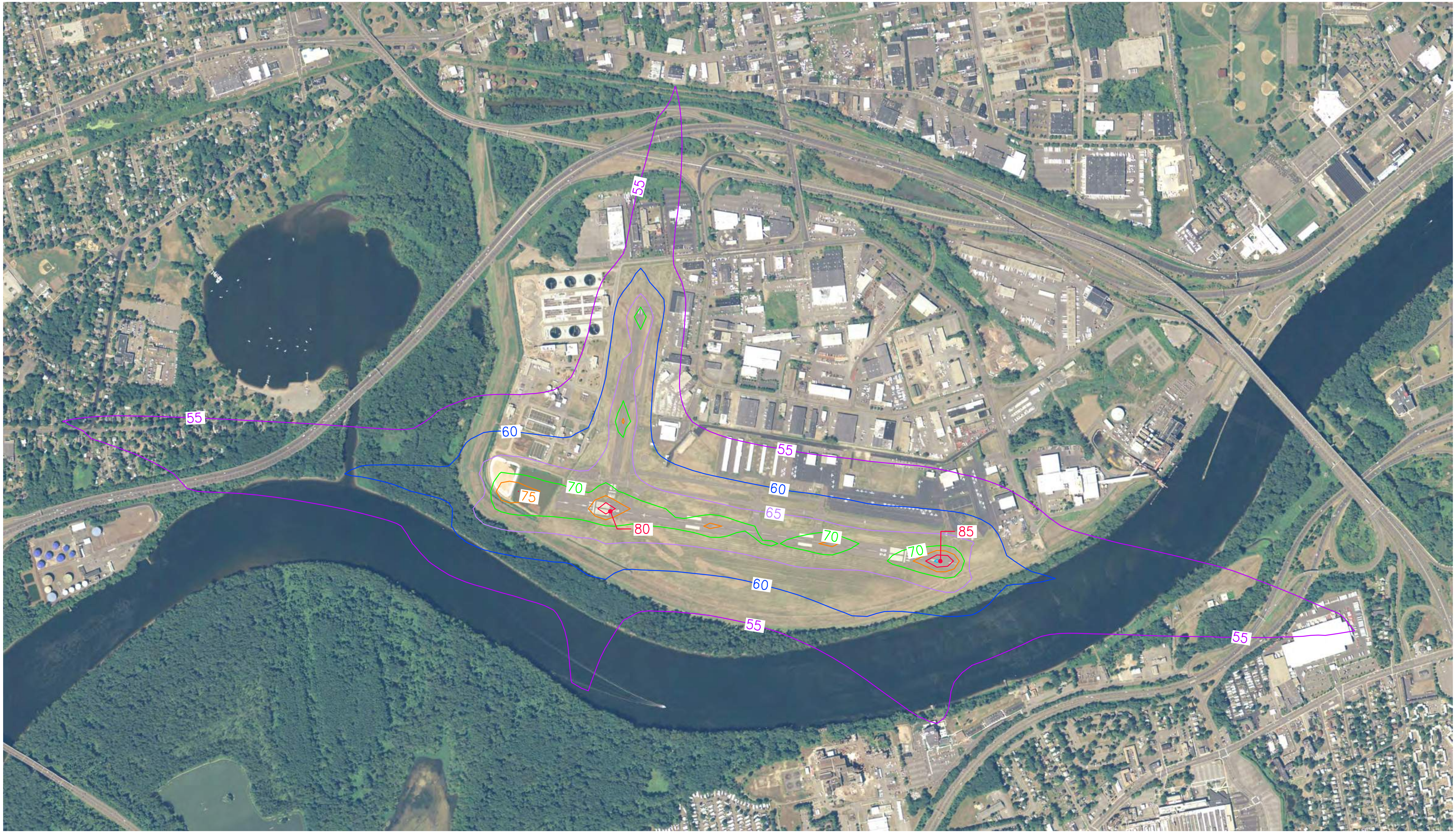
Table 6: Runway Utilization by Aircraft Type for the 2030 Build Alternative

Aircraft Type	Runway Utilization by Aircraft Type			
	Runway 2	Runway 20	Runway 11	Runway 29
GA Single Engine	57%	28%	5%	10%
GA Twin Engine	57%	28%	5%	10%
GA Small Jet	65%	35%	0%	0%
GA Medium Jet	65%	35%	0%	0%
Helicopter	57%	28%	5%	10%

The aircraft operations data from Table 5, the runway utilization data from Table 6, and the flight track data from Table 3 were used in the INM noise model to develop the DNL noise contours for the future year 2030 Build Alternative. Figure 7 shows the 55, 60, 65, 70, 75, 80 and 85 DNL noise contours for the 2030 Build Alternative. Again, the 65 DNL noise contour is completely within the property lines of the Airport. With the small and medium sized GA jets operating on Runway 2-20, the 55 DNL noise contour would extend into the residential area of Wethersfield south of Runway 2-20. There are approximately 40 residences between Main Street and I-91 that would be within the 55 DNL noise contour. In addition, there is one residential receptor located north of Runway 2-20 across the Connecticut River that is within the 55 DNL noise contour. However, the FAA considers the 55 DNL noise level as being compatible for residential land use.

5. Grid Point Analysis

In addition to the noise contours, the INM noise model was also used to calculate the DNL noise levels at ten locations surrounding HFD for the 2010 base year and the 2030 No Build and Build Alternatives. These locations were selected CTDOT to be representative of noise sensitive locations along the aircraft flight tracks. The addresses provided in the complaints made to the airport's hotline were reviewed to assist in making this determination. These locations are shown in Figure 8, and the calculated DNL noise levels are shown in Table 7. The slight increase in noise levels between the 2010 base year and the 2030 No Build Alternative is due to the increase in daily aircraft operations at the airport (218 versus 235). The increase in noise levels between the 2030 No Build and Build Alternatives is primarily due to the addition of medium sized GA jets that may operate at the airport more regularly because of the extension of Runway 2-20.



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DNL NOISE CONTOURS FOR THE 2030 BUILD ALTERNATIVE

Hartford–Brainard Airport (HFD) Master Plan Update

PROJECT NO. 21099

DATE: MAY. 2013

FIGURE 7

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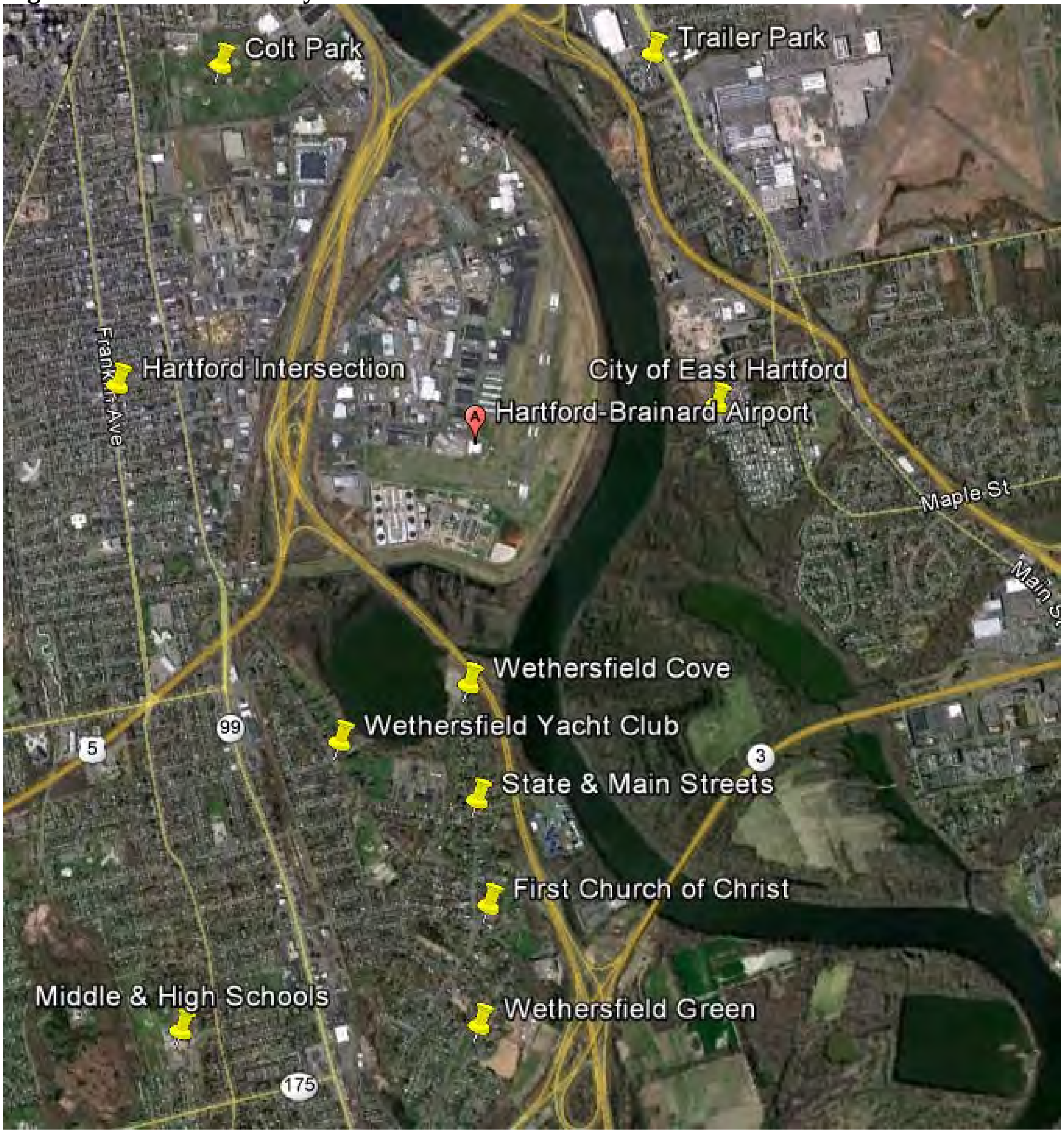
For the 2010 base year, the DNL noise levels at all ten locations are well below the FAA noise impact level of 65 dBA for residential receptors.

For the 2030 No Build Alternative, the increase in aircraft operations over the 2010 base year results in a DNL noise increase of approximately one dBA at all ten locations. For the 2030 Build Alternative, the addition of medium sized GA jets at the airport results in an increase in the DNL noise levels of approximately two to four dBA over the 2030 No Build Alternative at locations directly under the flight track of Runway 2-20. The largest increase in DNL noise level is at location 1 (the intersection of Main Street and State Street), where the DNL noise level is expected to increase from 51.7 to 55.4 dBA, an increase of 3.7 dBA. However, even with the addition of the medium sized GA jets, the DNL noise levels at each of the ten locations is expected to be 55 dBA or lower. These levels are 10 dB or more below the FAA noise impact level of 65 DNL for residential receptors.

Table 7: Comparison of Calculated DNL Noise Levels

Site	Name	Location	Modeled DNL Noise Level (dBA)		
			2010 Base Year	2030 No Build	2030 Build
1	Wethersfield Intersection	State & Main Street, Wethersfield, CT	50.6	51.7	55.4
2	First Church of Christ	250 Main Street Wethersfield, CT	46.6	47.7	50.6
3	Mobile Home Park	503 Main Street East Hartford, CT	48.5	49.2	50.2
4	Middle & High Schools	Wells Rd & Wolcott Hill Rd, Wethersfield, CT	39.2	40.1	41.8
5	City of East Hartford	89 Shawnee Rd, East Hartford, CT	43.0	43.7	44.8
6	Hartford Intersection	Brown St & Franklin Ave, Hartford, CT	47.1	48.0	49.7
7	Colt Park	30 Wawarme Ave, Hartford, CT	40.4	40.8	40.9
8	Wethersfield Yacht Club	270 Hartford Avenue, Wethersfield, CT	40.3	41.0	42.5
9	Wethersfield Cove	Main St, Wethersfield, CT	50.4	51.4	53.7
10	Wethersfield Green	Garden & Broad St, Wethersfield, CT	43.1	44.3	47.7

Figure 8: Grid Point Analysis Locations



6. Aircraft Noise Measurements

In addition to the INM noise modeling analysis, noise measurements of aircraft flyover events were obtained at three locations (selected by CTDOT) to determine the noise levels during aircraft takeoff and landing operations at the Airport.

- Location 1 is located south of Runway 2-20 at the intersection of State Street and Main Street in Wethersfield, CT, approximately 5,200 feet from the end of Runway 2.
- Location 2 is also located south of Runway 2-20 at the First Church of Christ on Main Street in Wethersfield, CT, approximately 6,700 feet from the end of Runway 2.

- Location 3 is located north of Runway 2-20 at the mobile home park on Main Street in East Hartford, CT, approximately 3,500 feet from the end of Runway 20.

The noise measurements were obtained using a CEL Model 583 sound level meter that meets ANSI Standards for Type 1 accuracy and performance. The noise measurements consisted of a time history of the Lmax noise level in one-second intervals. The noise meter was mounted on a tripod at a height of approximately five feet above the ground. The sound level meter was calibrated at the beginning and the end of each measurement period.

Noise measurements were obtained during the week of November 12th. On Monday, November 12th, noise measurements were obtained at location 2. On Tuesday, November 13th, noise measurements were obtained at location 3, and on Wednesday, November 14th, noise measurements were obtained at location 1.

At each location, noise measurements were obtained over several hours during the day in an effort to obtain as many aircraft events as possible. In addition to the time history of the aircraft flyover, other noise metrics include the Lmax (or maximum) noise level during the event, as well as the overall Leq (or average noise level during the event) and SEL (the total acoustic energy during the event compressed into a one-second time interval) levels of the event.

6.1 Noise Measurements at Location 1

Table 8 shows the measured Lmax, Leq, and SEL noise levels obtained at location 1 (the intersection of Main Street and State Street). The measured Lmax noise levels ranged from 53.2 dBA during the landing of a GA single engine aircraft (Piper Saratoga), to 76.9 dBA during the landing of a GA jet (Cessna Citation). As expected, these single-event measurements are higher than average aircraft noise level of DNL.

Several graphs (Figures 9 through 13) are also provided which show the time history of the measured Lmax noise level of a sample of aircraft during flyover operations. The graphs and associated aircraft operations are listed below:

Figure 9 - GA jet aircraft during takeoff (event 12 from Table 8)
Figure 10 - GA jet aircraft during landing (event 11)
Figure 11 - GA twin-engine aircraft during landing (event 6)
Figure 12 - GA single-engine aircraft during landing (event 4)
Figure 13 - Helicopter flyover (event 14)

Table 8: Measured Aircraft Noise Levels at Location 1

Event	Aircraft Type	Aircraft Operation	Measured Lmax Level	Measured Leq Level	Measured SEL Level
1	GA Single Engine/Cessna 172	Landing	63.3 dBA	55.7 dBA	68.9 dBA
2	GA Single Engine/Cessna 172	Landing	54.6 dBA	52.1 dBA	65.6 dBA
3	GA Jet/Cessna Citation	Takeoff	65.4 dBA	56.5 dBA	72.1 dBA
4	GA Single Engine/Cessna 172	Landing	71.5 dBA	62.4 dBA	78.8 dBA
5	GA Single Engine/Cessna 172	Landing	61.9 dBA	52.6 dBA	72.2 dBA
6	GA Twin Engine/Beech Baron 58	Landing	75.3 dBA	67.3 dBA	82.4 dBA
7	Helicopter/Robinson R-22	Landing	59.7 dBA	53.7 dBA	72.1 dBA
8	GA Twin Engine/Beechcraft King Air 200	Landing	70.5 dBA	62.9 dBA	75.6 dBA
9	GA Jet/Cessna Citation	Landing	71.1 dBA	62.1 dBA	76.2 dBA
10	GA Single Engine/Cessna 172	Takeoff	61.6 dBA	54.7 dBA	68.9 dBA
11	GA Jet/Cessna Citation	Landing	76.9 dBA	69.0 dBA	83.2 dBA
12	GA Jet/Cessna Citation	Takeoff	59.4 dBA	53.8 dBA	70.2 dBA
13	GA Single Engine/Piper Saratoga	Landing	53.2 dBA	50.7 dBA	64.0 dBA
14	Helicopter/Robinson R-22	Landing	70.8 dBA	62.1 dBA	81.9 dBA
15	Helicopter/Robinson R-22	Landing	66.5 dBA	56.5 dBA	71.7 dBA

Figure 9

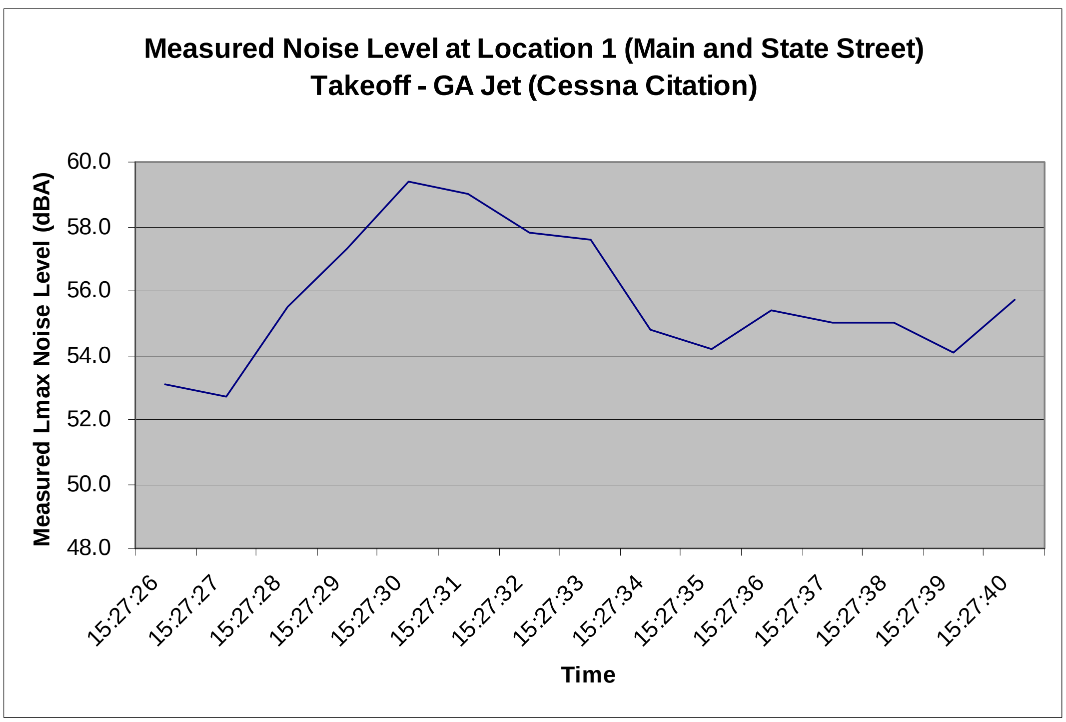


Figure 10: Measured Noise Levels During GA Jet Aircraft Landing

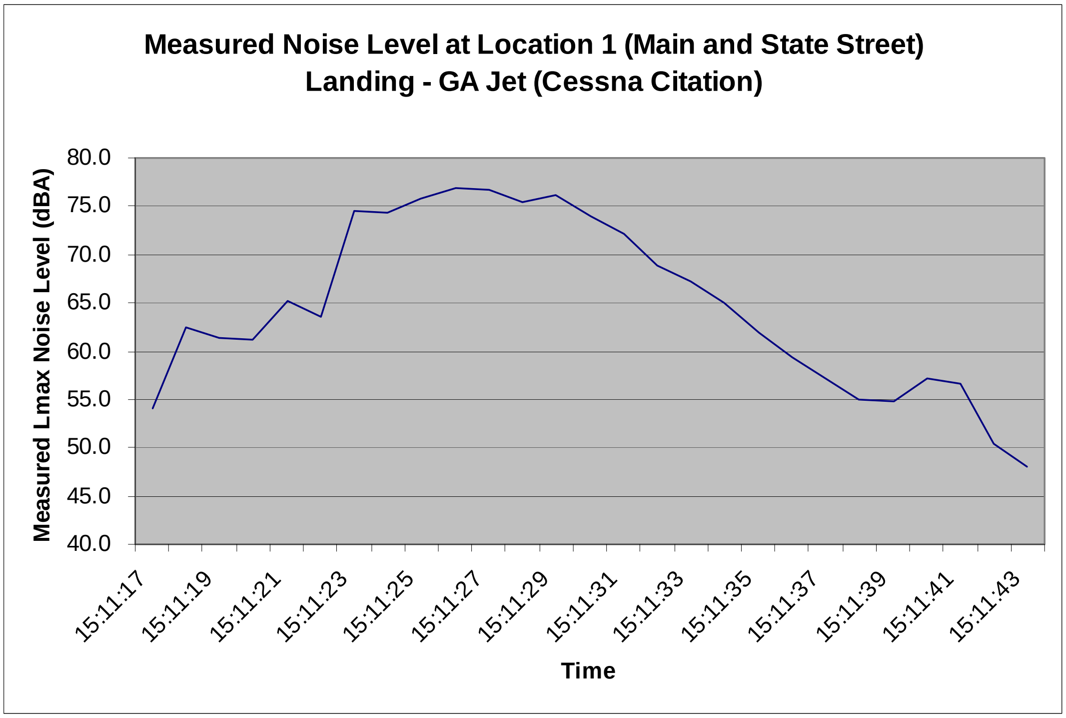


Figure 11: Measured Noise Levels During GA Twin-Engine Aircraft Landing

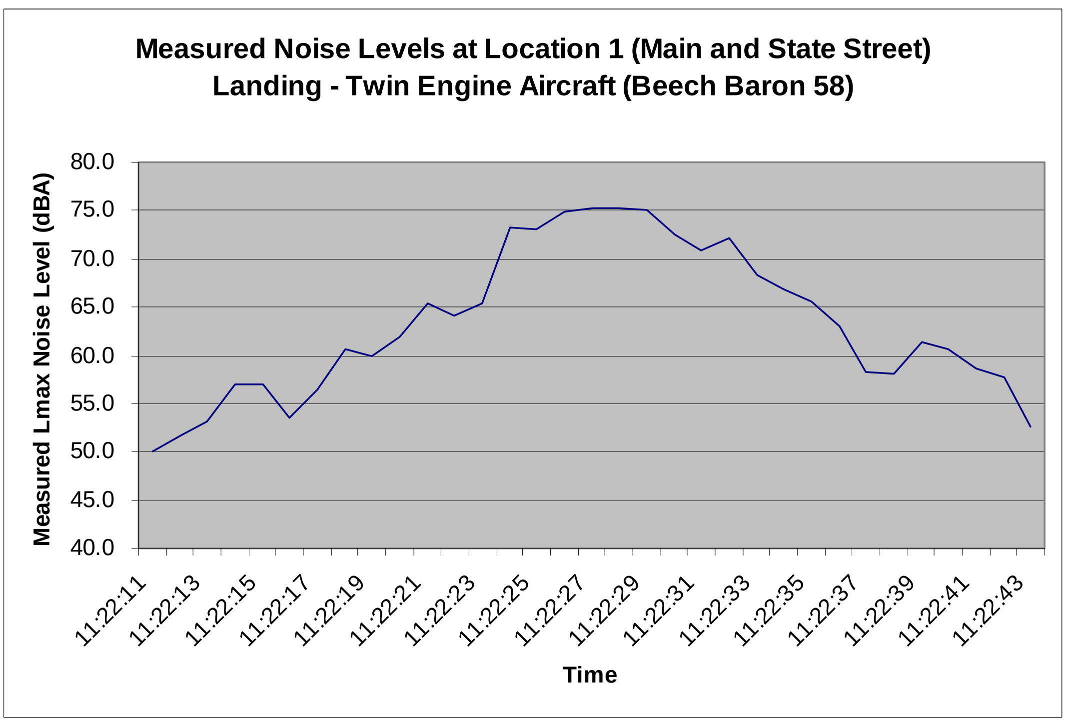


Figure 12: Measured Noise Levels During GA Single-Engine Aircraft Landing

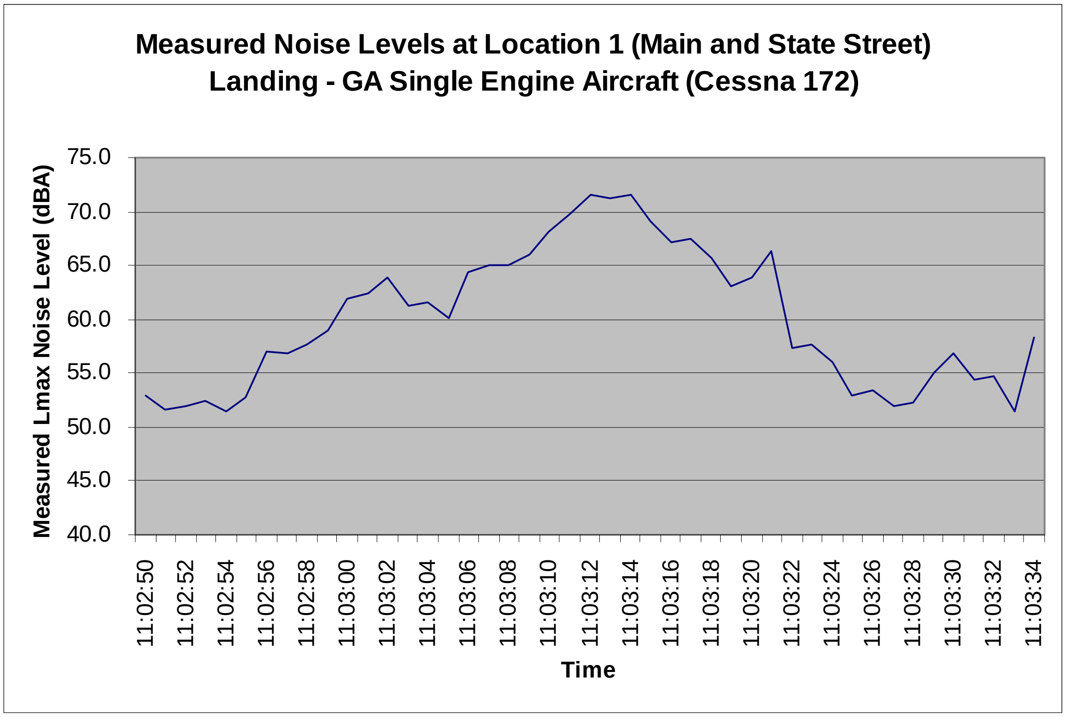
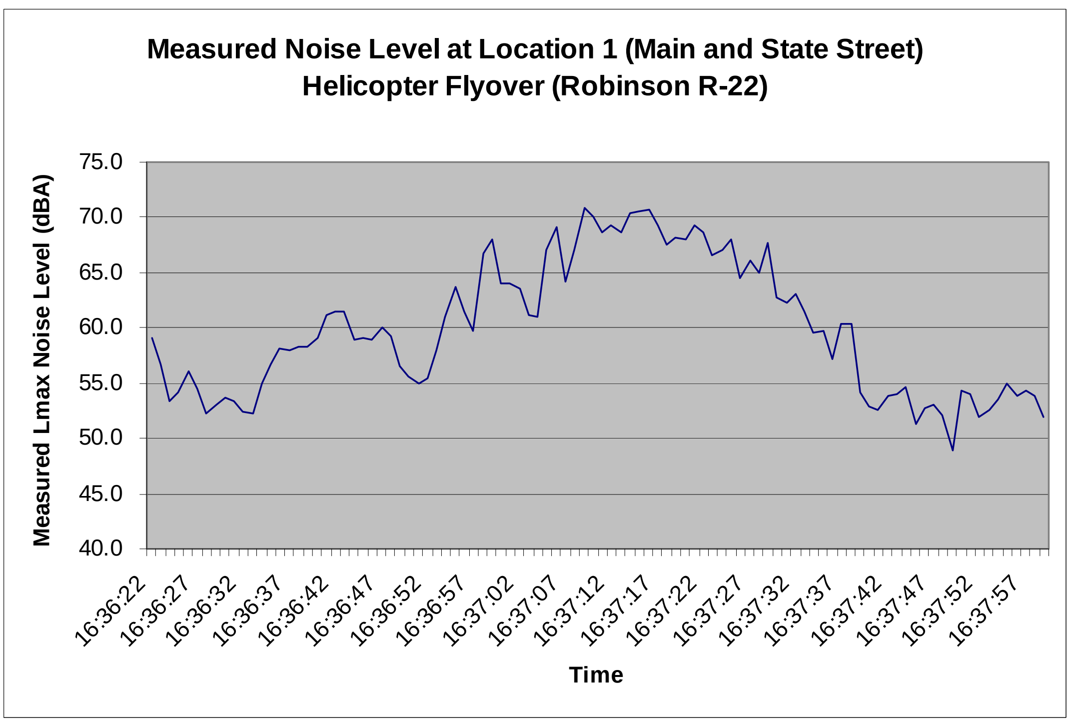


Figure 13: Measured Noise Levels During Helicopter Flyover



6.2 Noise Measurements at Location 2

Table 9 shows the measured aircraft Lmax, Leq, and SEL noise levels obtained at location 2 (First Church of Christ). The measured Lmax noise levels ranged from 64.9 dBA during the takeoff of a GA single engine aircraft (Piper Saratoga), to 76.3 dBA during the takeoff of a GA single-engine aircraft (Cessna 172).

Table 9: Measured Aircraft Noise Levels at Location 2

Event	Aircraft Type	Aircraft Operation	Measured Lmax Level	Measured Leq Level	Measured SEL Level
1	GA Jet/Cessna Citation	Takeoff	67.1 dBA	60.1 dBA	76.5 dBA
2	GA Single Engine/Cessna 172	Takeoff	68.1 dBA	60.8 dBA	78.5 dBA
3	GA Single Engine/Cessna 172	Takeoff	76.1 dBA	67.5 dBA	84.0 dBA
4	GA Single Engine/Cessna 172	Takeoff	76.3 dBA	68.8 dBA	84.5 dBA
5	GA Single Engine/Piper Saratoga	Takeoff	73.3 dBA	66.7 dBA	81.0 dBA
6	GA Single Engine/Piper Saratoga	Takeoff	64.9 dBA	61.2 dBA	74.3 dBA
7	GA Single Engine/Piper Saratoga	Takeoff	72.7 dBA	65.6 dBA	82.9 dBA
8	GA Single Engine/Piper Saratoga	Takeoff	71.2 dBA	66.1 dBA	81.7 dBA
9	GA Single Engine/Cessna 172	Takeoff	74.6 dBA	67.4 dBA	81.7 dBA
10	GA Single Engine/Cessna 172	Takeoff	69.2 dBA	62.9 dBA	77.6 dBA

Figure 14 shows the time history of the measured Lmax noise levels during takeoff of a GA single engine aircraft (Cessna 172) (event 9 from Table 9), and Figure 15 shows the time history of the measured Lmax noise levels of a GA single engine aircraft (Piper Saratoga) during takeoff (event 5).

Figure 14: Measured Noise Levels During Cessna 172 Aircraft Takeoff

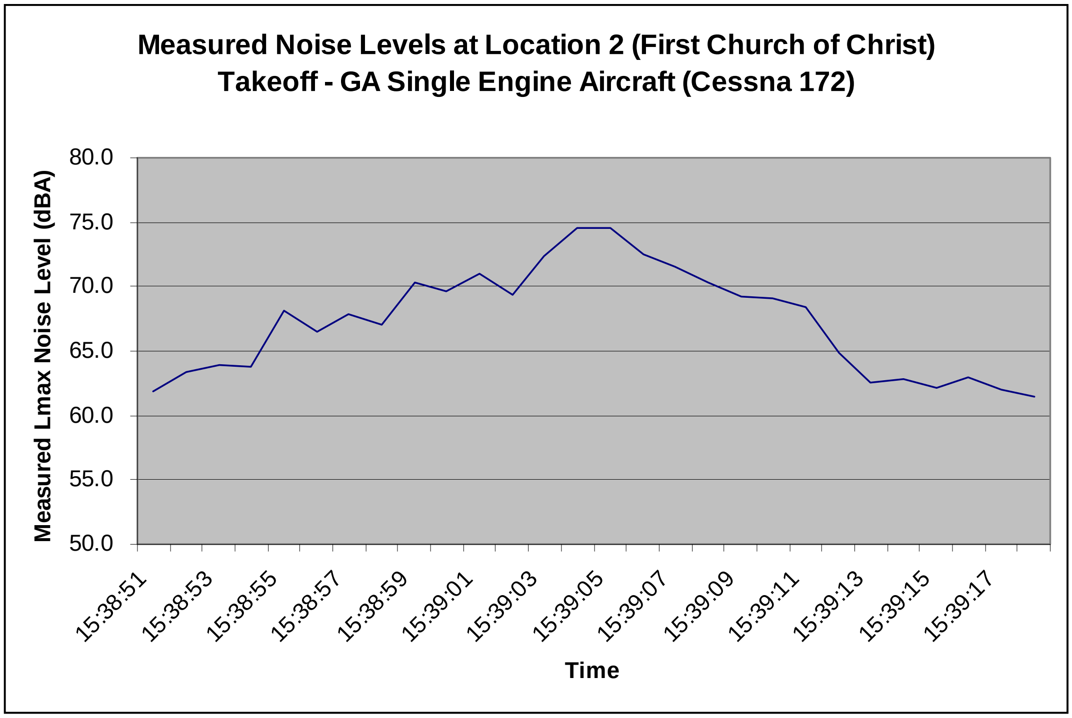
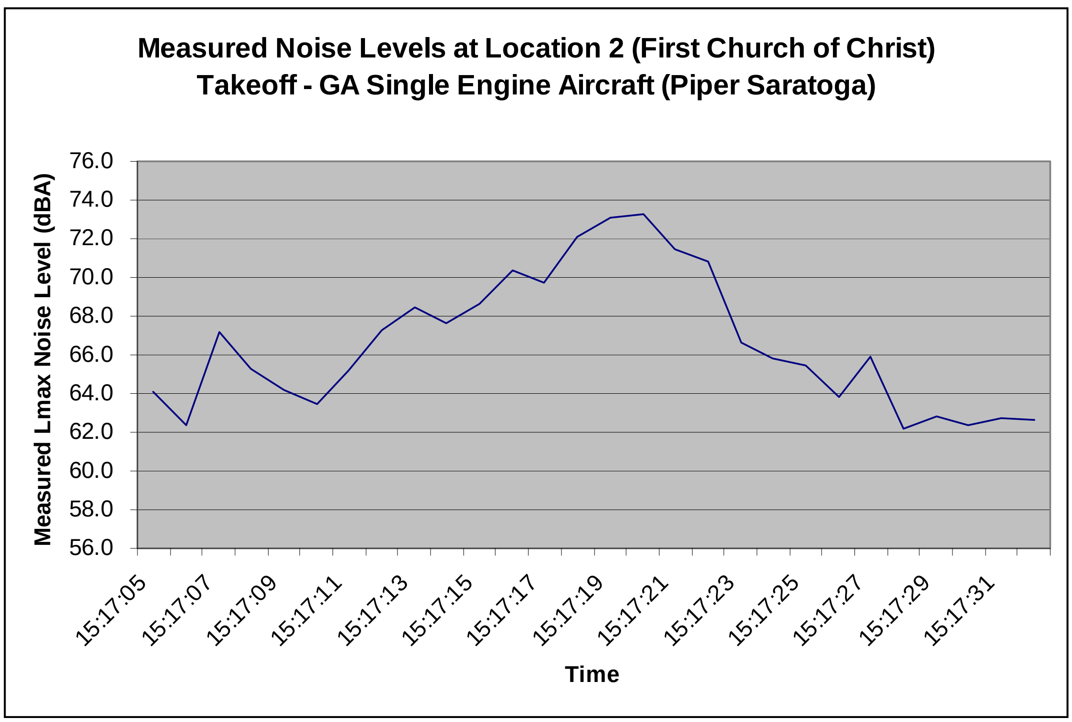


Figure 15: Measured Noise Levels During Piper Saratoga Aircraft Takeoff



6.3 Noise Measurements at Location 3

Table 10 shows the measured aircraft Lmax, Leq, and SEL noise levels obtained at location 3 (Mobile Home Park in East Hartford). The measured Lmax noise levels ranged from 56.0 dBA during a helicopter flyover (Robimson R-22), to 75.3 dBA during the takeoff of a GA single-engine aircraft (Cessna 172).

Table 10: Measured Aircraft Noise Levels at Location 3

Event	Aircraft Type	Aircraft Operation	Measured Lmax Level	Measured Leq Level	Measured SEL Level
1	GA Single Engine/Cessna 172	Takeoff	75.2 dBA	67.8 dBA	81.9 dBA
2	GA Single Engine/Piper Saratoga	Takeoff	73.2 dBA	64.5 dBA	81.4 dBA
3	GA Single Engine/Cessna 172	Takeoff	74.7 dBA	66.5 dBA	82.7 dBA
4	GA Single Engine/Cessna 172	Takeoff	75.3 dBA	67.9 dBA	82.9 dBA
5	GA Single Engine/Piper Saratoga	Takeoff	70.6 dBA	63.1 dBA	79.1 dBA
6	GA Single Engine/Piper Saratoga	Takeoff	69.3 dBA	61.8 dBA	77.8 dBA
7	GA Single Engine/Piper Saratoga	Takeoff	72.1 dBA	65.5 dBA	79.3 dBA
8	Helicopter Flyover/Robinson R-22	Flyover	61.8 dBA	57.3 dBA	76.9 dBA
9	Helicopter Flyover/Robinson R-22	Flyover	58.6 dBA	55.5 dBA	70.9 dBA
10	Helicopter Flyover/Robinson R-22	Flyover	56.0 dBA	52.8 dBA	67.7 dBA
11	Helicopter Flyover/Robinson R-22	Flyover	62.1 dBA	56.2 dBA	71.1 dBA

Figure 16 shows the time history of the measured Lmax noise levels during takeoff of a GA single engine aircraft (Cessna 172) (event 4 from Table 10), and Figure 17 shows the time history of the measured Lmax noise levels of a GA single engine aircraft (Piper Saratoga) during takeoff (event 5). Figure 18 shows the time history of the measured Lmax noise levels from a helicopter circling overhead (event 11).

Figure 16: Measured Noise Levels During Cessna 172 Aircraft Takeoff

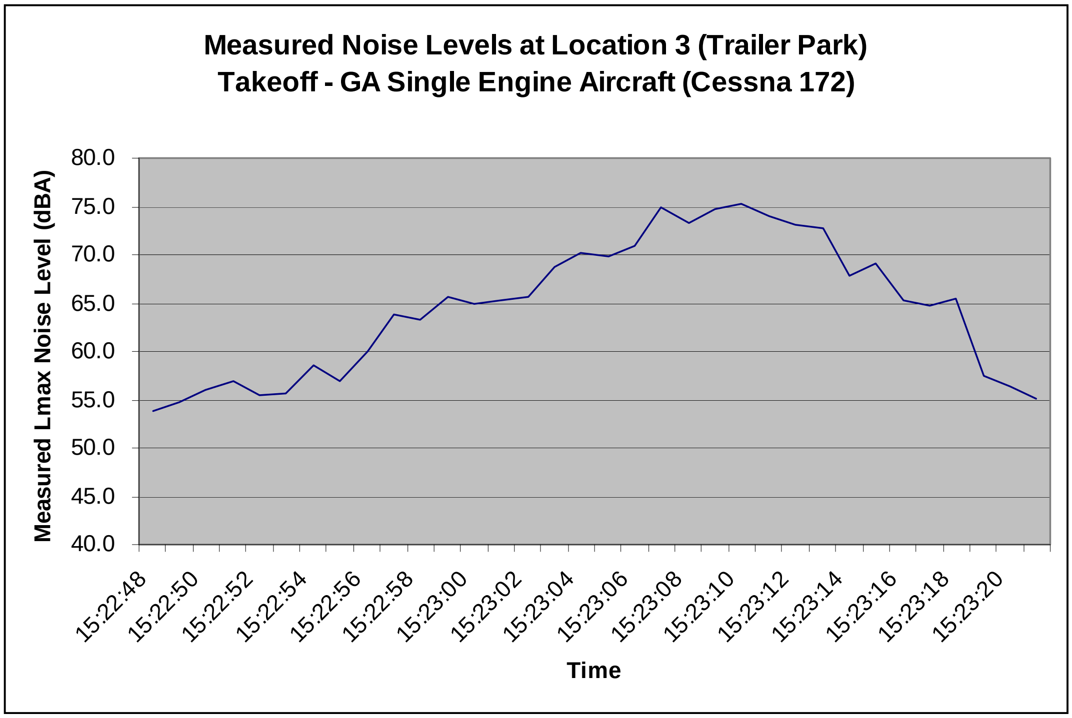


Figure 17: Measured Noise Levels During Piper Saratoga Aircraft Takeoff

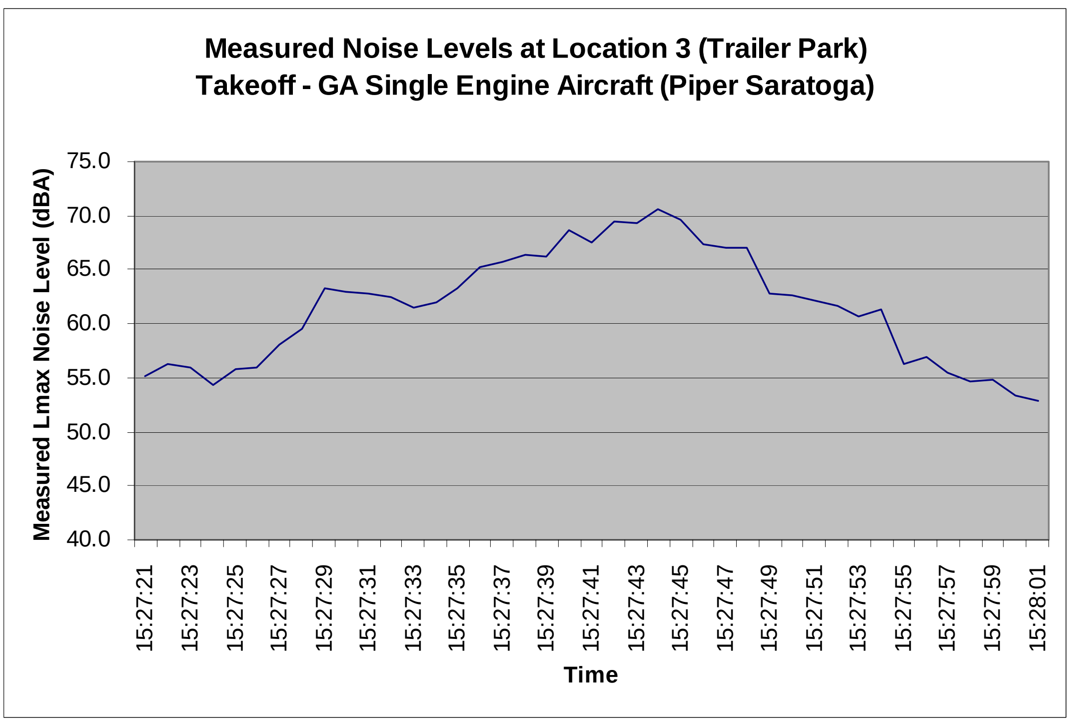
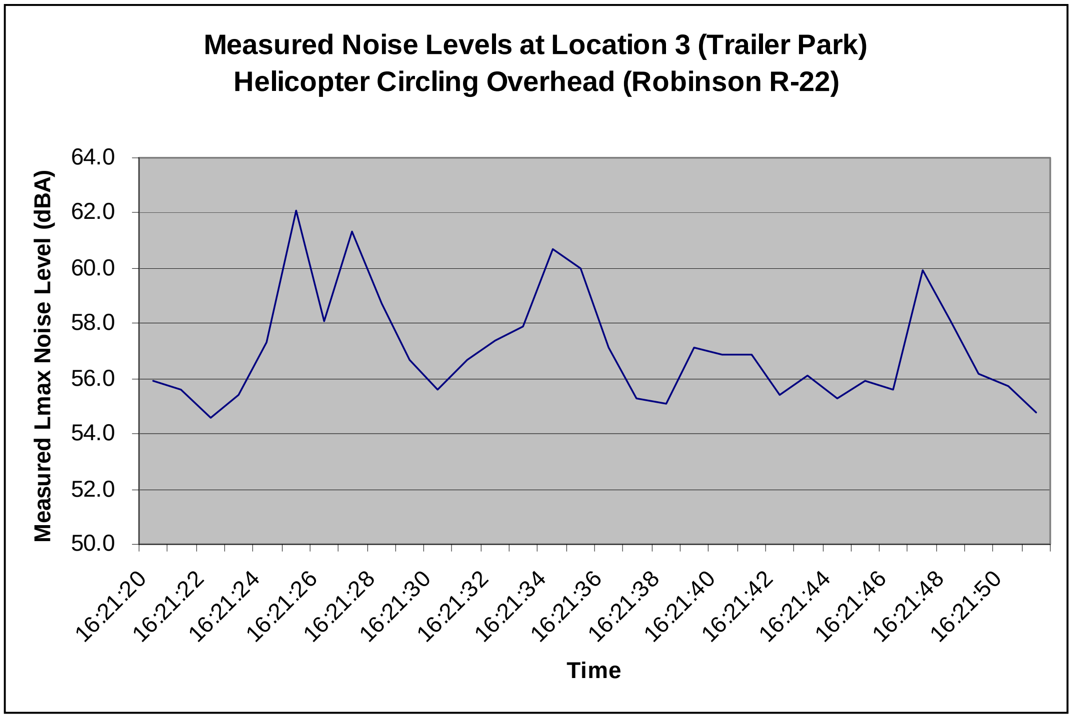


Figure 18: Measured Noise Levels During Helicopter Circling Overhead



7. Summary

The results of the noise modeling analysis for HFD indicate that the 65 DNL noise contours for the 2010 base year and the 2030 No Build and Build Alternatives are entirely located within the property lines of the airport. The FAA defines the 65 DNL noise level as being incompatible with residential land use. The Build Alternative, that includes the improvements Runway 2-20 to a recommended length of 5,000 feet, will allow for the operation of medium sized GA jets at the airport. With the addition of medium sized jets at the airport, the 55 DNL noise contour will extend into the residential area of Wethersfield, south of Runway 2-20.

A comparison of the 55 DNL noise contours for 1988, 2010 and the 2030 No Build Alternative are shown in Figure 6. The 55 DNL noise contours for 2010 and 2030 are substantially smaller than the 1988 noise contour due to the significant decrease in aircraft activity at the airport since 1988 and the lack of older Stage II aircraft.

The grid point analysis results shown in Table 7 indicate that the DNL noise levels at the ten locations selected are 10 dBA or more below the FAA's noise impact level of 65 DNL.

Hartford-Brainard Airport
Potential Runway 11-29 Closure
White Paper

August 2012

In recent years there has been discussion regarding the necessity of Runway 11-29 to the Hartford-Brainard Airport (HFD) and its potential closure. As part of the recent Master Plan Update (MPU), the potential runway closure was evaluated. It is not the intention of the State of Connecticut, Department of Transportation (CTDOT), or Connecticut Airport Authority (CAA) to close HFD in its entirety. This standalone document discusses the following topics related to the closure of Runway 11-29:

- Airport Background
- User Consultation
- Wind Coverage
- Runway Use
- Airfield Capacity
- Benefits of Closure
- Future Use of Property
- Facility Relocation
- Summary

Airport Background

Hartford-Brainard Airport (HFD), owned by the State of Connecticut, is a general aviation (GA) airport located near downtown Hartford, Connecticut. Corporate travel, flight training, recreational flights, and many other aviation activities take place at HFD. Across the airport's 201 acres, there are two paved runways, one turf runway, and two helipads, with parking for over 200 aircraft. Air traffic is controlled by staff in the Air Traffic Control Tower (ATCT) from 6AM to midnight each day.

Runway 2-20 is the primary runway and is 4,417 feet long and 150 feet wide. The runway thresholds have been displaced on both ends to meet approach clearance requirements, as the runway is surrounded by the Clark Dike – a Connecticut River flood control dike approximately 25 to 30 feet tall. The runway is equipped with High Intensity Runway Lights (HIRL), Visual Glide Slope Indicators (VGSI), and Runway End Identifier Lights (REIL). Runway 2 has two non-precision approaches, a Localizer Directional Aid and a GPS-RNAV approach. The airport also has a VOR approach (circling only) and a published visual approach for noise abatement. The runway markings are non-precision and in good condition. Runway 2-20 serves the vast majority of the needs of the users of HFD.

Runway 11-29 is 2,314 feet long by 71 feet wide and is used exclusively for smaller GA aircraft (Airport Reference Code B-I). The pavement strength allows for regular use by aircraft up to 10,000 pounds. The runway has visual markings, which are in good condition. Runway 29 has a displaced threshold of 265 feet due to the Clark Dike. Runway 11-29 is served by a full-length, parallel taxiway.

User Consultation

As part of this study, the airport stakeholders have been consulted prior to the submission of the 7480 Form to the FAA. The airport sponsor, the CTDOT, made a previous version of this whitepaper available to the public via the study website along with a request for comments. A letter was email to the Advisory Committee and the airport tenants.

Based on the comments received, this whitepaper was slightly revised to include additional evaluation. The sponsor, airport manager, and consultant staff attended a local Experimental Aircraft Association (EAA) chapter meeting on August 10th, 2012. The meeting minutes of which are attached to this whitepaper.

The comments received from stakeholders and responses from the CTDOT and consultant staff are also attached. Based on the stakeholders input, the CTDOT will decide whether they wish to proceed with closing Runway 11-29. It should be noted that there is no intention to close HFD in its entirety. If the CTDOT decides to pursue closure of Runway 11-29, a 7480-1 Form will be submitted to the FAA. The website is located at www.brainardplanning.com

Wind Coverage

The ideal orientation of a runway is based on a function of wind speed and direction, and the ability of aircraft to operate under crosswind conditions. As a general principle, runways should be oriented as closely as practical to the direction of the prevailing winds. This enables aircraft to take off and land in the direction of the wind, which improves the safety and efficiency of operations. The most ideal runway alignment provides the highest wind coverage percentage. The desired wind coverage for an airport has been set by the FAA at 95 percent. In cases where a single runway cannot provide adequate wind coverage, a crosswind runway may be considered, but is not an FAA requirement. The FAA assumes that small, ARC B-I aircraft can safely handle crosswinds of no greater than 10.5 knots (12 mph), and is referred to as the crosswind component. ARC B-II aircraft can handle crosswinds of up to 13.0 knots (15 mph).

The current runway system at HFD with Runway 2-20 (true azimuth 9 degrees) and Runway 11-29 (true azimuth of 099 degrees) can adequately accommodate both ARC B-I and B-II aircraft (10.5-knots and 13-knots). The wind coverage during both all-weather and poor weather conditions is 99 percent. This information was calculated by the FAA's Airport Design Software using 10 years of recorded wind data from the weather station located at HFD from 2000 to 2009.

Table 1 – Wind Coverage

	Runway					
	2-20		11-29		Both	
	10.5kts	13kts	10.5kts	13kts	10.5kts	13kts
All-Weather	95.24	97.64	93.18	N/A	99.56	N/A
VFR (good weather)	94.79	97.42	93.25	N/A	99.53	N/A
IFR (poor weather)	99.38	99.7	N/A	N/A	N/A	N/A

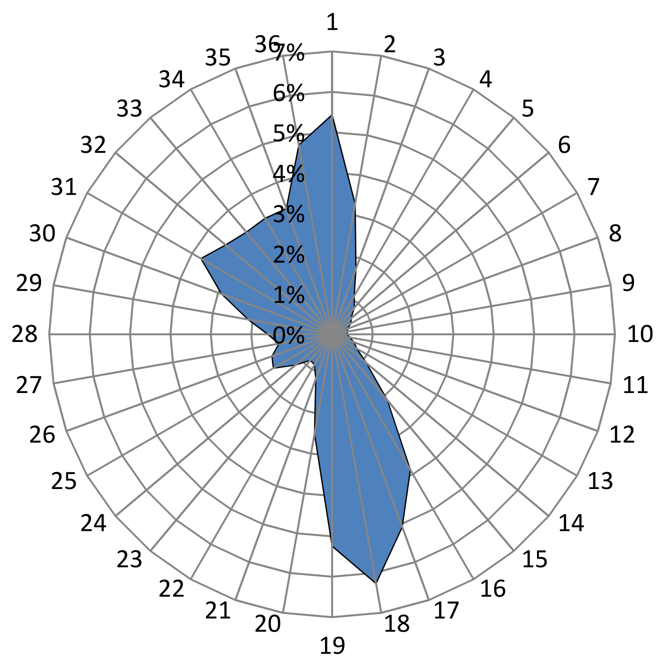
Table 1 also identifies that if Runway 11-29 were to be closed, HFD would still provide over 95 percent wind coverage with only Runway 2-20, with 95 to 99 percent coverage in all conditions for ARC B-I.

Seasonal variations were also reviewed to identify any acute differences between the winter and summer seasons in Connecticut. The month of January has an average high of 36 degrees, with the average high temperature in July of 84 degrees. Table 2 shows the wind coverage based on the season. As is typical, average wind speed is greater in winter, which reduces the wind coverage of the single-runway coverage. However, training and recreational activity by light aircraft is also reduced in winter due to weather conditions. The seasonal evaluation identifies that in January, the 10.5 knot coverage for Runway 2-20 is 94 percent, slightly below the desired level, but can still be considered reasonable.

Table 2 - Seasonal Wind Coverage						
	Runway					
	2-20		**11-29**		**Both**	
	10.5kts	**13kts**	**10.5kts**	**13kts**	**10.5kts**	**13kts**
January All-Weather	93.9	96.83	92.36	N/A	99.13	N/A
January IFR	98.97	99.62	N/A	N/A	N/A	N/A
July All-Weather	98.51	99.36	95.11	N/A	99.91	N/A
July IFR	99.66	99.86	N/A	N/A	N/A	N/A

Figure 1 displays the frequency of the wind based on direction. This graph displays the strong dominance of both north and south winds by percentage at HFD, with winds from the northwest as a distant third in frequency.

Figure 1 - Wind Frequency



In summary, the wind data analysis determined that if Runway 11-29 were closed, HFD would be able to operate safely from a wind coverage standpoint (i.e., Runway 2-20 provides 95% all weather wind coverage with a 10.5 knot crosswind component)

Runway Use

Table 3 displays the expected runway usage based exclusively on the recorded wind data, and demonstrates that Runway 11-29 would be used 25 percent of the time. However, several other factors affect the runway end of use, mainly runway length. Most twin-engine and corporate aircraft cannot land on Runway 11-29 due to the reasons discussed in the Airport Master Plan (Section 3.4.2 - Runway Length) and discussed below. Runway 11-29 is only 2,314 feet long. Although, light aircraft can often operate from this length, there is little margin for error.

Insurance underwriters for corporate jets typically prefer a 5,000 foot or greater runway length for safety purposes, and a runway of this length allows aircraft owners to avoid higher premiums or reduced coverage. Aircraft operating under the Federal Aviation Regulations (FAR) Part 135 are more commonly known as charter operations. They are flights that are conducted by a hired pilot, typically for business purposes. Charter operations represent a large share of the activity at HFD. These operators have additional runway length requirements for safety reasons. For example, every corporate jet aircraft has a certain runway length requirement for takeoff, which varies based on the passenger and fuel load and meteorological conditions (i.e. takeoff run distance). When operating under Part 135, the runway must also be long enough for the aircraft to accelerate to takeoff speed, decelerate, and stop prior to the end of the runway (i.e. accelerate to stop distance). This required length is always longer then the takeoff run length.

Furthermore, the Clark Dike and trees currently obstruct the landing approach; making the use of the short runway more challenging.

<table>
<tr><th colspan="3">Table 3 – Estimated Runway Use Based on Recorded Historical Wind Data</th></tr>
<tr><th>Runway End</th><th colspan="2">Percentage</th></tr>
<tr><td>2</td><td>27%</td><td rowspan="2">55%</td></tr>
<tr><td>20</td><td>28%</td></tr>
<tr><td>11</td><td>5%</td><td rowspan="2">25%</td></tr>
<tr><td>29</td><td>20%</td></tr>
<tr><td>Calm</td><td colspan="2">20%</td></tr>
<tr><td>Total</td><td colspan="2">100%</td></tr>
<tr><td colspan="3">Please note that these percentages are not based on actual use of the runway, only estimates based on the recorded wind data.</td></tr>
</table>

During calm winds, an aircraft can safely land in any direction. During these conditions, pilots review other factors beyond runway length to determine the ideal landing, such as the displaced thresholds, potential obstructions to the runway, the amount of fuel onboard, and runway conditions. Another consideration is the location of the aircraft's amenities; if an aircraft is parking on the north side of the airport, they will not want to land on Runway 29 and taxi the longer distance when they could land on Runway 2 and exit the runway near their hangar or destination on the Airport. On a daily basis, this reduction in taxing can result in savings for an aircraft owner on fuel expenditures.

Table 4 displays the runway usage that typically occurs at HFD on an annual basis based on historical activity. Table 3 shows that 20 percent of wind observations are considered calm. As Runway 2 is designated as the calm wind runway, operations during those conditions utilize Runway 2. Table 4 shows that Runway 2-20 is utilized 98 percent of the time. Thus, Runway 11-29 can be expected to be used only up to two percent of the time.

Table 4 – Observed Runway Use	
Runway	**Percentage**
2- 20	98%
11- 29	2%
Total	100%

Based on the wind coverage discussed previously, if Runway 11-29 were to close, the majority of the operations are that currently estimated to use Runway 11-29 could safely use Runway 2-20. Runway 2-20's width of 150 feet is an added advantage as it will allow for a greater margin of error for pilots of light aircraft during high wind conditions.

Airfield Capacity

This section reviews the airfield capacity of HFD, evaluates any capacity surpluses or deficiencies, and identifies airfield improvements that may be required during the 20-year planning period. Airfield capacity is defined as the maximum rate that aircraft can arrive at, or depart from, an airfield with an acceptable level of delay. It is a measure of the number of operations that can be accommodated at an airport during a given time period, which is determined based on the available airfield system (runways, taxiways, navaids, etc.) and airport activity characteristics.

The current procedure employed by the FAA to evaluate airfield capacity is described in Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

- **Annual Service Volume (ASV) –** A reasonable estimate of the airport's annual maximum capacity, accounting for annual changes in weather, runway use, aircraft fleet mix, and other conditions.

- **Hourly Airfield Capacity –** The maximum number of aircraft operations that can take place on the runway system in one hour. As airport activity occurs in certain peaks throughout the day, accommodating the peak hour activity is most critical.

For airports that have multiple runways, multiple operating procedures can be used (e.g., landing on one runway with departures on another). The AC provides tables of estimated capacity based on specific airport characteristics. For HFD, three capacity scenarios were evaluated:

- Current Airfield Configuration
- Elimination of Runway 11-29
- Elimination of Runway 11-29 and Taxiway J

The following characteristics and assumptions were applied to all three scenarios:

- Operations of aircraft over 12,500 pounds are set at seven percent[1] throughout the forecast

1 This assumption is based on a review of the forecast data completed as part of airport master plan (Chapter 2).

period

- No aircraft over 300,000 pounds
- No scheduled commercial service
- No airspace limitations
- Landings generally equal takeoffs during peak periods
- There are full-length parallel taxiways and ample exit taxiways for each runway
- No precisions approaches (ILS) are in place
- The turf runway is not used in the estimation of runway capacity

Annual Service Volume (ASV)

Table 5 displays the ASV for the three scenarios based on the assumptions described above: ASV is 230,000 flights per year under each scenario. As only one runway can be in operation at a time, the elimination of Runway 11-29 will not affect the ASV of HFD. As Taxiway J is a dual-parallel taxiway, its elimination will not affect the ASV of HFD.

The current airfield configuration currently provides ample capacity to accommodate existing and future operations of 80,000 and 85,600 flights per year, respectively. HFD would still be below 60% of the ASV if the 127,000 annual operations in the potential growth scenario in the airport master plan were to occur; thus, annual capacity is not an issue.

Table 5 – Annual Service Volume

Scenario	2010		2030	
	Demand	ASV	Forecasted Demand	ASV
Current Airfield Configuration	80,000	230,000	85,600	230,000
Elimination of Runway 11-29		230,000		230,000
Elimination of Runway 11-29 and Taxiway J		230,000		230,000

Hourly Capacity

Table 6 displays the estimated VFR and IFR hourly capacities of HFD based on the assumptions described above. VFR capacity is estimated at 98 flights per hour and IFR capacity is estimated at 59 flights per hour for both 2010 and 2030. As only one runway can be in operation at a time, the elimination of Runway 11-29 will not affect the hourly capacity of HFD. As Taxiway J is a dual-parallel taxiway, its elimination will not affect the hourly capacity of HFD.

The current airfield configuration currently provides ample capacity to accommodate existing and future operations with peak hour operations of 37 and 39 flights per hour respectively.

Table 6 – Hourly Capacity

Scenario	2010			2030		
	Peak Hour	VFR	IFR	Peak Hour	VFR	IFR

	Operations	Capacity	Capacity	Operations	Capacity	Capacity
Current Airfield Configuration	37	98	59	39	98	59
Elimination of Runway 11-29		98	59		98	59
Elimination of Runway 11-29 and Taxiway J		98	59		98	59

<u>Benefits of Closure</u>

While Runway 11-29 does provide a benefit to users, there is also a benefit to closing the runway related to the Metropolitan District Commission (MDC) adjacent waste water processing facility. The MDC has managed the region's water and sewer systems since 1929. One of their largest waste water processing facilities is located adjacent to the airport along the southern border. The MDC is moving forward with a one billion dollar investment to improve the area's water quality and protect health and safety of the local community during high water events such as storms. This project will expand the capacity and capabilities of the facility, including upgrading to more modern technologies. Figure 2 shows a concept to reuse approximately 10 acres of the Runway 11-29 property for MDC facilities. It is recommended that as part of the acquisition, a deed restriction and avigation easement be placed on the property being sold to MDC to ensure all FAA design standards, including Part 77 Imaginary Surfaces, are adhered to indefinitely. This would ensure that the MDC would not be allowed to construct any facilities that would interfere with the airport operations.

In exchange, the airport would gain a similar amount of property for Runway 2-20 safety improvements. The main benefit is the ability to provide standard Runway Safety Areas (RSA) and Object Free Areas (ROFA) to Runway 2-20. Table 7 displays the Federal Aviation Administration (FAA) design standards for Runway 2-20, and the existing deficiency for that standard.

- **Runway Safety Area (RSA) –** A defined surface surrounding a runway prepared for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. This area must also support snow removal, aircraft rescue, and firefighting equipment. The RSA should be free of objects, except for objects that must be located in the area because of their function.

- **Runway Object Free Area (ROFA) –** A ground area surrounding runways that should be clear of objects (e.g., roads, buildings, etc.), except for objects that need to be within the area due to their function.

Table 7 – ARC Airfield Design Standards for Runway 2-20
(ARC B-II)

Airfield Facility	**Existing**	*Requirement*	**Deficit**
Runway Safety Area (RSA): Length (beyond Runway 2) Width	 93’ 150’	 300’ 150’	 207’ None
Object Free Area (OFA): Length (beyond Runway 2) Width	 93’ 329’	 300’ 500’	 207’ 171’

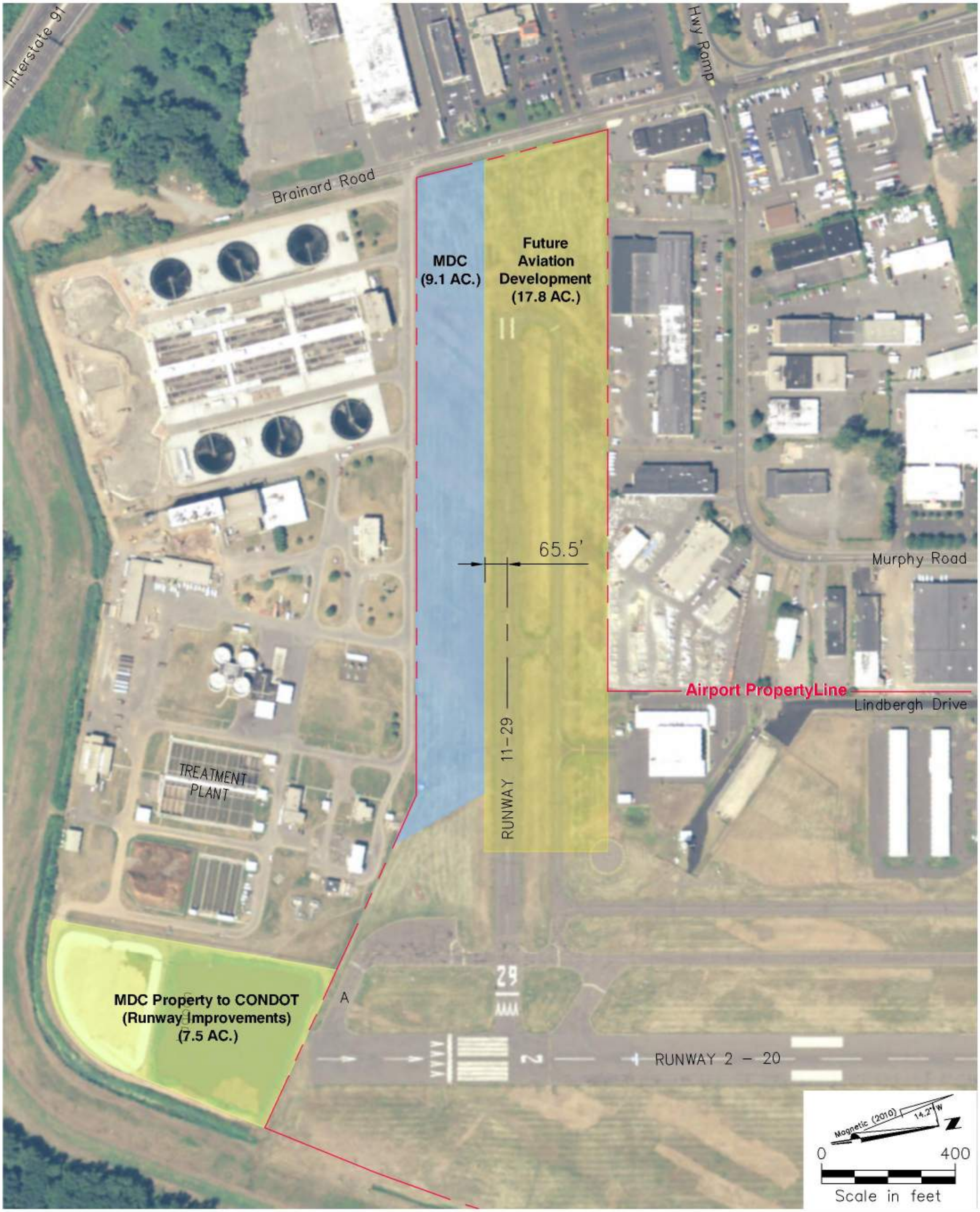
As shown in Figures 3 and 4, two sewage treatment lagoons owned by the MDC are located beyond the Runway 2 end, approximately 20 feet below the runway elevation, which create a non-standard RSA and OFA. By allowing the MDC to utilize a portion of the Runway 11-29 property for their operations, they are willing to deed the State of Connecticut the property where the lagoons are located. This property would then be used for improved RSA and OFA for Runway 2-20. Any necessary environmental remediation of the lagoons will need to be completed prior to the transfer of the property to the State.

If the property containing the lagoons cannot be acquired by the CTDOT to provide a standard OFA and RSA on the southern end of the Runway, the runway would have to be physical shortened or declared distances implemented until the standards could be met. Table 8 displays the impact to Runway 2-20 if declared distances were implemented. Specifically, the lagoons will reduce the Accelerate-Stop Distance Available (ASDA) and Landing Distance Available (LDA) for Runway 20 by 300 feet, significantly affecting the ability for the runway to be utilized by corporate aircraft. As HFD serves downtown Hartford, one of its main roles is to provide a safe airport for corporate traffic. Implementing declared distances or physically shortening the runway will severely impact this role. Furthermore, regardless of runway length requirements, existence of the lagoons within the OFA and RSA is a safety concern for all aircraft and all operations at the airport.

It should be noted that the cost to maintain Runway 11-29 was not factored into this evaluation.

Table 8 – Declared Distances (Feet)

Item	Runway 2	Runway 20
Takeoff Run Available (TORA)	4,417	4,417
Takeoff Distance Available (TODA)	4,417	4,417
Accelerated-Stop Distance Available (ASDA)	4,017	4,117
Landing Distance Available (LDA)	3,607	3,557
Displaced Threshold	410	560



CHA

DRAFT

2139 Silas Deane Highway, Suite 212 • Rocky Hill, CT 06067-2336
Main: (860) 257-4557 • www.chacompanies.com

RUNWAY 11–29 PROPOSED LAND USE

Hartford–Brainard Airport (HFD) Master Plan Update

PROJECT NO.
21099

DATE: MAY 2012

FIGURE 2

File: U:\21099\CADD\ACAD\FIGURES\21099_FIGURE_2.DWG Saved: 5/23/2012 3:10:51 PM Plotted: 5/23/2012 3:11:36 PM User: Medina, Perry

Figure 3 – Clark Dike and MDC Lagoons

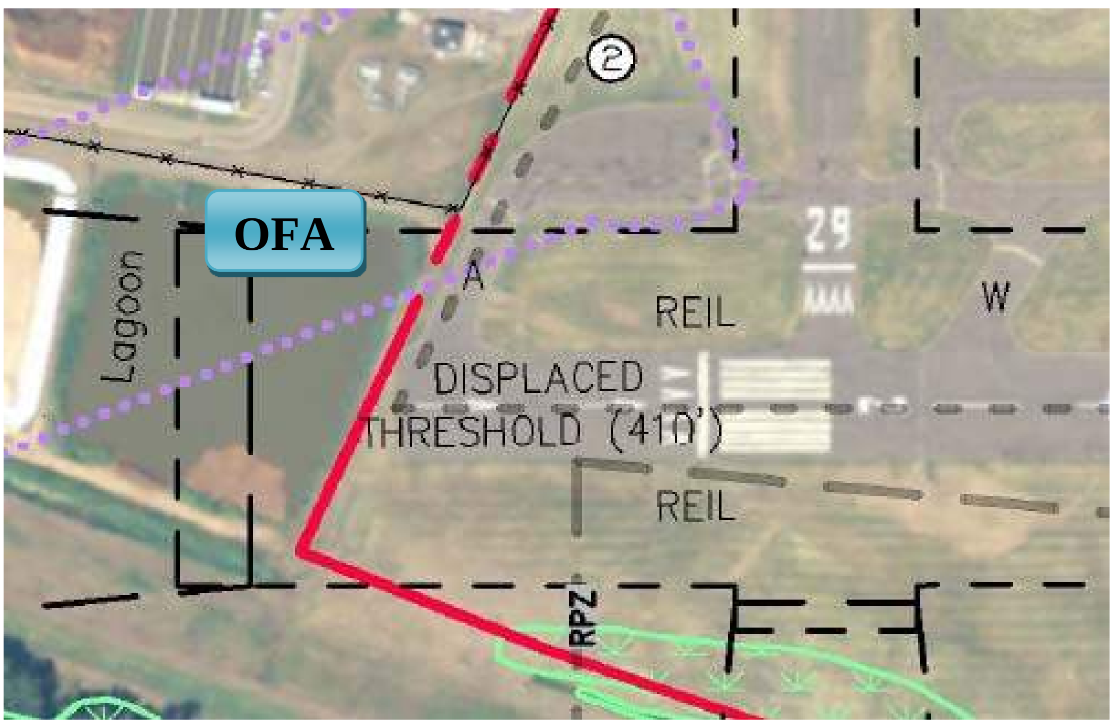


Figure 4 – Runway 2 Object Free Area

Future Use of Property

The remaining area of the former Runway 11-29 property would be reserved for future aircraft storage and associated infrastructure such as a taxiway and taxiway safety areas to access Runway 2-

20, aprons, and a vehicle access road. The access road would allow access from both Brainard Road and Lindbergh Drive to the airport.

As this property was not acquired using Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funds, the CTDOT is not required to financially reimburse the FAA for the sale or transfer of this property. Additionally, the Runway 11-29 pavement is towards the end of its useful life as it was last repaved in 1997. It is anticipated that the FAA would consider the grant assurances associated with accepting an AIP rehabilitation grant satisfied for this runway. Any funds derived from the sale of the property to MDC would be utilized solely at HFD for future airport projects.

Facility Relocation

There are currently no facilities that will need to be relocated if Runway 11-29 is closed. There are no navigational aids or aircraft storage associated with this runway. Runway and taxiway lighting and signage will need to be removed.

Suggested Alternatives

Based on comments and meetings, a series of alternatives to closing Runway 11-29 were suggested:

- **MDC acquire other properties located west of Brainard Road –** The property adjacent to the existing plant that has not already been purchased by MDC is designated as wetlands. It is highly unlikely the Connecticut Department of Energy and Environmental Protection (DEEP) would allow the MDC to construct any facility on this property.

- **Switch the runway and parallel taxiway** – As Taxiway B is only 30 feet wide and the FAA requirement for a runway for light aircraft is 60 feet, the taxiway would need to be widened and Runway 11-29 shifted and narrowed. This extensive cost is highly unlikely to be funded by the FAA as HFD would meet FAA standards with only Runway 2-20 in operation.

- **Shift Runway 11-29 100' to the North with no parallel taxiway –** This would require pilots to back taxi along the runway for takeoffs, which the FAA does not support. The FAA has made an effort in recent years to ensure all runways have parallel taxiways to remove the necessity of back taxiing. Additionally, the extensive cost is highly unlikely to be funded by the FAA as HFD would meet FAA standards with only Runway 2-20 in operation.

- **Shorten Runway 11-29 and give property along Brainard Road to MDC** – MDC would not be allowed to construct any facility within the RPZ of Runway 11-29 even if the runway was shorten per FAA design standards.

- **Allow MDC to utilize Turf Runway property –** There is very limited vehicle access along the Clark Dike to reach the turf runway. Any vehicle would need to pass through the Runway 2-20 ROFA, which would negatively impact any operations on Runway 2-20.

Summary

While there are some airport stakeholders that oppose the closure of Runway 11-29, it is anticipated that the closure of Runway 11-29 would not adversely impact overall operations at HFD. Runway 2-

20 is considered adequate to supply the current and future demand of HFD. Although, the closure would impact light aircraft activity during certain wind conditions (strong westerly winds), the closure could have a net safety benefit by allow for improvements to the Runway 2-20 Safety Area and Object Free Area.

Appendix D –
Noise Abatement

Town of Wethersfield
505 SILAS DEANE HIGHWAY
WETHERSFIELD, CONNECTICUT 06109

Town Manager's Office (860) 721-2801

February 6, 2012

Representative John B. Larson
United State Congressional District #1
221 Main Street
Hartford, CT 06106

Dear Representative Larson:

The Brainard Airport Noise Advisory Committee deeply appreciates the time Billy Ciotto spent with us regarding the airplane noise issue over Historic Wethersfield. His recommendation was that a letter should be sent to you stating the issue and identifying the specific actions the Committee is seeking your assistance on. To that end, the Committee seeks your assistance as follows:

The committee is seeking Congressional assistance in improving the use of noise abatement procedures by pilots at all airports, and in particular the Hartford-Brainard Airport. The members understand that these procedures are voluntary and clearly secondary to the safe operation of an aircraft. However, the committee has found that there is a distinct separation within the Federal Aviation Administration (FAA) between the Airports Division that funds and works with local airports to develop a noise abatement program (under Part 150 of the Federal Aviation Regulations) and the Air Traffic Division that regulates and oversees aircraft in flight and the related flight procedures. The FAA has established standards for aircraft design that reduce the noise output for new aircraft (known as Stage 3 and 4 aircraft), and in some cases implemented flight procedures for avoidance of noise sensitive areas, as well as gone as far as purchasing homes near airports. However, most of this involves noise impacts from jet aircraft at major airports. Small aircraft still generate noise and affect the general quality of life for those near any size airport.

The committee has found that most pilots are willing and eager to be good neighbors by following the local airport noise abatement procedures when possible but locating them before a flight for a specific airport is often not easy and almost impossible while in flight. The committee and the pilots we have spoken to agree that if there was a single source of clear and universally understandable documents with the local procedures, compliance would be much higher. An additional road block to voluntary compliance is unwillingness on the part of air traffic control personnel from conveying or requesting pilots to follow established voluntary procedures. From what we are told it is from a liability concern that, since these procedures are voluntary, should something happen the controller could be held partially to blame if an incident outcome was different because the pilot was using the noise procedures (an example cited was if the plane crashed into the water rather than made an emergency landing in a field because the procedure was to follow the river until near the airport).

The committee is looking for action in two general areas that we feel would make a positive improvement to communities that are near airports and impacted by aircraft noise that is often avoidable.

1) Require the FAA to develop a standardized format for noise abatement procedures uniform across all airports and that these then be available in the same documents as the standard airport diagrams, instrument approach procedures (know as approach plates) and other flight procedures. Currently the FAA Airports Division will pay 95%+ for F.A.R. Part 150 noise studies at individual airports. The results of these studies include development of recommended practices to minimize noise impacts from aircraft to areas around that airport. As part of the project, printing of handout pieces is paid for but follows no standard format or content. The FAA Air Traffic Division does not have a database of these practices/procedures to disseminate to pilots as it does other flight procedures. This then requires a pilot to search various sources and it is not part of the normal flight planning process (such as filing a flight plan, checking Notices to Airmen (NOTAM's) ,following instrument landing procedures, etc.). An interesting example of our frustration is that pilot manuals issued by the FAA and pilot training programs to not even address noise abatement

The largest data base of noise information is maintained by the Boeing Company (the aircraft manufacturer). Various pilot groups have recommended practices but they are generic and not appropriate for some airports.

2) The FAA revise its rules, regulations and/or procedures such that air traffic control personnel are approved to disseminate, convey and otherwise assist in voluntary compliance by pilots with local noise abatement procedures. This includes changes to the Automatic Terminal Information Service (ATIS) use to include noise abatement messages and information. The ATIS is a recorded, continuous broadcast to pilots with basic airport information such as local weather and Notices to Airmen (NOTAM). Pilots are supposed to listen to this broadcast before they taxi out to depart, or enter the airport area when landing. Current FAA guidance/policy is to limit this broadcast to as short as possible. Controllers use policy as a reason not to put the "Noise abatement procedures in effect" message on it to remind pilots. The group would like to see formal requirement that it be included at all airports with noise abatement procedures. In addition to the supporting documentation contained with this letter, additional information may be found at several web sites for this issue: http://www.faa.gov/airports/environmental/airport_noise/, http://www.airportnoiselaw.org/statutes.html.

Once again we would like to thank you for your assistance on this matter. Members of the committee can meet with you at your convenience to review these issues with you or provide more information upon your request. If you have any questions or would like to discuss next steps please call me at (860) 721-2801.

Sincerely

Jeff Bridges
Town Manager
Chairman, Brainard Airport Noise Advisory Committee

Att.

Cc. Brainard Airport Noise Advisory Committee Members
Mayor Donna Hemmann and Wethersfield Town Council Members

JOHN B. LARSON
First District, Connecticut

HOUSE DEMOCRATIC CAUCUS
Chair

COMMITTEE ON WAYS AND MEANS
Subcommittee on Trade
Subcommittee on Select Revenue Measures

DEMOCRATIC STEERING COMMITTEE

Congress of the United States
House of Representatives
Washington, DC 20515-0701

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INTERNET ADDRESS
http://www.larson.house.gov

TOLL-FREE NUMBER (IN STATE ONLY):
888-716-4734

September 23, 2013

Town of Wethersfield
Town Manager Mr. Jeff Bridges
505 Silas Deane Highway
Wethersfield, CT 06109

RECEIVED
SEP 24 2013
TOWN MANAGER'S OFFICE

Dear Mr. Bridges:

Enclosed you will find the response to our follow up with the FAA from the meeting the town had previously with Billy Ciotto.

I am not overly confident that this is the response the town was seeking regarding the issue of noise abatement, but wanted to provide your office with the official response we received from the FAA.

Sincerely,

Lisa H. Perrone – District Aide
John B. Larson - Member of Congress

U.S. Department
of Transportation
Federal Aviation
Administration

Mission Support Services
800 Independence Avenue, SW.
Washington, DC 20591

SEP 1 2 2013

The Honorable John B. Larson
House of Representatives
Washington, DC 20515

Dear Congressman Larson:

Thank you for your July 19, 2013, correspondence on behalf of your constituent, Mr. Jeff Bridges, Town Manager, Town of Wethersfield in Wethersfield, Connecticut.

The Federal Aviation Administration's (FAA) Office of Airports routinely provides Airport Improvement Program grants to airports that choose to conduct voluntary Noise Compatibility Programs under the Title 14 Code of Federal Regulations, Part 150. Those studies can include proposed noise abatement flight procedures, which the FAA reviews for viability prior to development, testing, and implementation. The FAA will confer internally to determine whether there may be opportunities to standardize the format and/or improve the dissemination. Such an effort may be challenging for a number of reasons, including regulatory, charting, and operational issues and this evaluation will take some time, but we are certainly willing to look into it. Meanwhile, basic noise abatement information is often provided in the FAA's Airport/Facility Directory (A/FD).

The Northeast A/FD entry for Hartford-Brainard advises pilots that the noise sensitive and populated areas to the south and west should be avoided. It also suggests that pilots should approach and depart the area over the river when possible and refers pilots to Letters to Airmen issued by the Brainard Airport Traffic Control Tower.

The Automatic Terminal Information Service (ATIS) broadcast provides advance non-control airport/terminal area and meteorological information for use by aircraft arriving, departing, and operating within the terminal area. ATIS is used to provide critical information needed for aircraft operations such as runway closures or construction and pertinent meteorological information. The broadcasts are kept as brief and concise as possible and are limited to easily understood information. Because noise abatement procedures may vary with time of day, runway in use, etc., it is not feasible to include this information as part of the ATIS broadcast.

Sincerely,

for

Elizabeth L. Ray
Vice President, Mission Support Services
Air Traffic Organization

Enclosure
Transmitted Correspondence

FAA-130723-009


Be a Good Neighbor
at Hartford-Brainard Airport
Avoid overflying residential areas
Preferred Runways:
Arrival—Runway 20
Departure—Runway 2
Avoid overflying residential areas
Putnam Bridge
Fly Over the River
20
2
91
2
5
15
3
N

Noise Abatement Procedures are in effect at Hartford-Brainard Airport

Safety is always first, but being a good neighbor is second!

Noise Abatement Procedures

Key procedures include:

Avoid Noise Sensitive Areas (See Map on Reverse)

Arrivals:

Runway 2—Remain east of I-91 and overfly the Putnam Bridge when possible

Runway 20 is preferred for all arrivals when conditions permit

Departures:

Runway 2 is preferred for all departures when conditions permit—Turn left at least 20° and follow the river until 2NM north

Runway 20—Turn left at least 20° as soon as practical and follow the river until 2NM south

Closed traffic and practice instrument approaches should be conducted between 7AM and 10PM (9AM Sundays). Right traffic is preferred for Runway 2

Turbojets utilize NBAA noise abatement procedures for takeoff over close-in residential communities when they cannot be avoided and for VFR & IFR Approaches
http://www.nbaa.org/ops/environment/quiet-flying/

Helicopters maintain altitude of 500ft prior to crossing boundaries and use designated flight corridors

These procedures have been approved by the CTDOT and FAA. The goal of the program is encourage participation by pilots to mitigate the overall noise generated by the airport.

Complaints concerning noise attributable to aircraft operations at HFD may be logged by calling: (860)566-2985.

Produced by Connecticut Department of Transportation (CTDOT), 2013

Hartford-Brainard Airport
239 Maxim Road,
Hartford, CT 06114
www.state.ct.us/dot

SPECIAL NOTICE

HARTFORD-BRAINARD AIRPORT
NOISE ABATEMENT PROCEDURES

NOISE SENSITIVE AREA LOCATED SOUTH & WEST OF AIRPORT

Noise abatement procedures in effect at all times

Runway 20 is preferred for arrivals, Runway 2 is preferred for departures

Preferred right traffic for Runway 2

Closed traffic and practice instrument approaches should be conducted between 7AM and 10PM (9AM Sundays)

ARRIVAL PROCEDURES

Runway 2: Remain east of I-91 and overfly the Putnam Bridge when possible

Runway20: Preferred for all arrivals when conditions permit

DEPARTURE PROCEDURES

Runway 2: Turn left at least 20 degrees and follow the river until 2 miles north

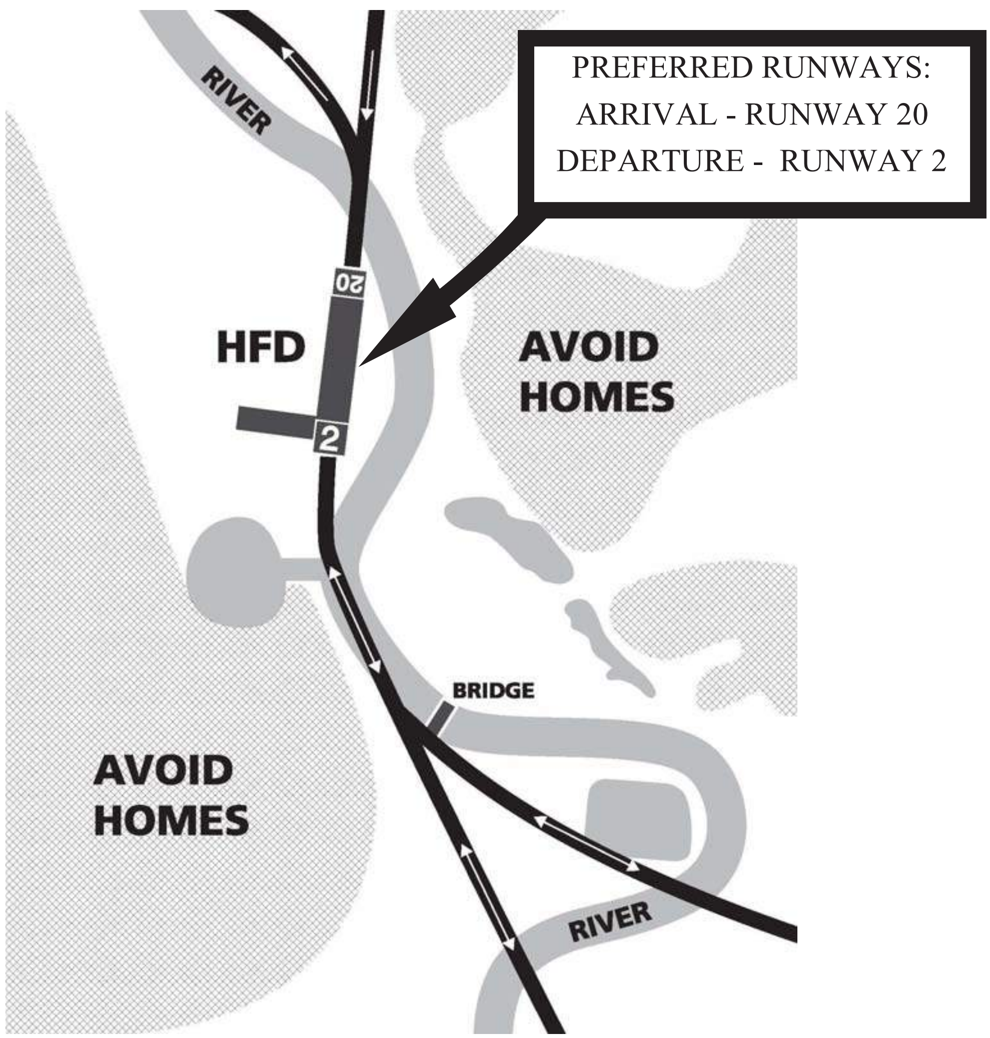
Runway 20: Turn left at least 20 degrees as soon as practical and follow the river until 2 miles south

TURBOJET & HELICOPTERS

Turbojets utilize NBAA noise abatement procedures for takeoff over close-in residential communities when they cannot be avoided and for VFR & IFR approaches

http://www.nbaa.org/ops/environment/quiet-flying/

Helicopters maintain altitude of 500 feet prior to crossing boundaries and use designated flight corridors



Potential Update to HFD Airport/Facility Directory for
Right Traffic and Noise Abetment Information

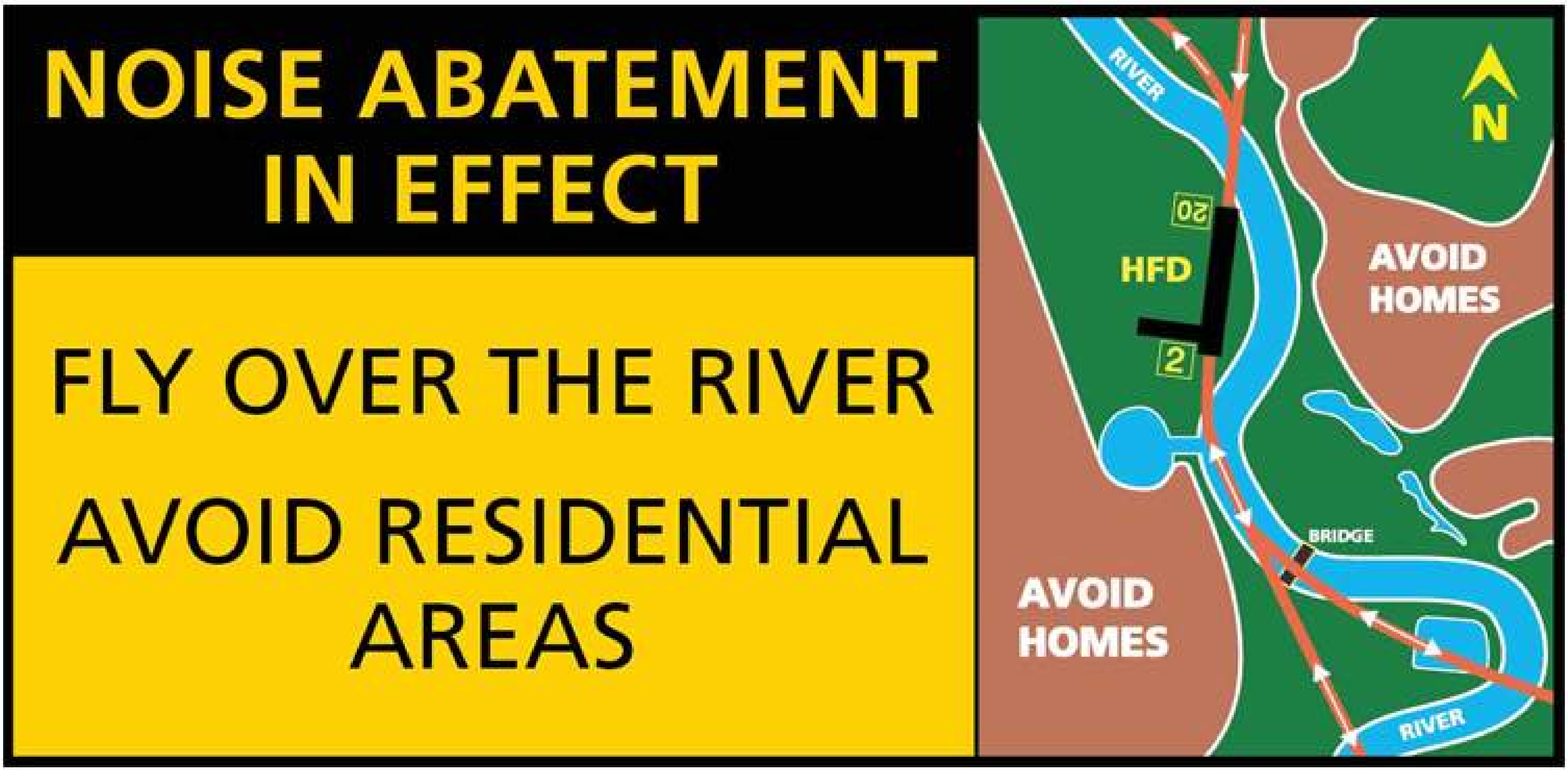
HARTFORD–BRAINARD (HFD) 3 SE UTC–5(–4DT) N41°44.20´ W72°38.97´ **NEW YORK**
18 B S4 **FUEL** 100LL, JET A TPA—1018(1000) NOTAM FILE HFD **L–33C, 34**
RWY 02–20: H4417X150 (ASPH–GRVD) S–30, D–43, 2D–70 HIRL **IAP, AD**
RWY 02: REIL. PAPI(P4L)—GA 4.0º TCH 42´. Thld dsplcd 411´. Trees.
RWY 20: REIL. VASI(V4R)—GA 4.0º TCH 60´. Thld dsplcd 560´. Trees.
RWY 11–29: H2314X71 (ASPH) S–10 HIRL
RWY 11: Trees.
RWY 29: Thld dsplcd 265´. Trees.
RWY NE–SW: 2309X150 (TURF)
RWY NE: Trees.
RWY SW: Trees.

Rgt Tfc.

AIRPORT REMARKS: Attended Mon–Fri continuously, Sat–Sun 1100–0400Z‡. Birds and deer on and invof airport. Be alert, (HFD) is located on west side of river. There is a clsd arpt 1 mile east northeast of (HFD). Turf Rwy NE–SW clsd during winter months from Nov 2 to Apr 30 exc for ski–equipped acft and helicopter training. Arpt clsd to air carrier ops. 20' drop off departure end Rwy 20. Voluntary compliance requested, no touch and go ldg and practice instrument apch Mon–Sat 0300–1100Z‡ and Sun 0300–1400Z‡. Arpt located in noise sensitive area and populated areas to south and west should be avoided. Apch/depart over river when possible. See Brainard twr letters to airmen. Rwy 02–20 grooving 130' wide. When twr clsd ACTIVATE HIRL Rwy 02–20, REIL Rwy 02 and Rwy 20—CTAF. PAPI Rwy 02 and VASI Rwy 20 on 24 hrs. Ldg fee for business, corporate and revenue producing acft.

WEATHER DATA SOURCES: ASOS (860) 527–5837 **HIWAS** 114.9 HFD. LA
COMMUNICATIONS: CTAF 119.6 **ATIS** 126.45 **UNICOM** 122.95
Ⓡ**BRADLEY APP/DEP CON** 127.8
BRAINARD TOWER 119.6 (1100–0500Z‡) **GND CON** 121.6 **CLNC D**

or Volutary Noise Abatement
in A/FD Special Notices.


NOISE ABATEMENT
IN EFFECT
FLY OVER THE RIVER
AVOID RESIDENTIAL
AREAS
N
RIVER
20
HFD
2
AVOID
HOMES
BRIDGE
AVOID
HOMES
RIVER

Letters to Airmen

Letter to Airmen No. 10-1 08-1
Subject: Voluntary Airport Noise Abatement
Cancellation: 1-1- 2012
Issued: 4-1-2010
Effective: 4-1-20101-1-2008

This Letter to Airmen identifies noise sensitive areas in the vicinity of Hartford-Brainard Airport, and describes procedures to minimize noise impact in these areas. The State of Connecticut developed these procedures with the assistance of the FAA, pilots, aviation business, community representatives and other interested parties. Your cooperation with these noise abatement efforts is urged.

Noise Sensitive Land Uses
When possible, please avoid overflight of the close-in noise sensitive areas (contact Airport Manager for a copy of this map).

Priority of Runway Use
A. When the wind is less than 5 knots, and traffic and other conditions permit, Hartford-Brainard Tower will utilize runway 2 for departures, and runway 20 for arrivals. This bi-directional use of the runway minimizes noise levels in the sensitive areas. When using a bi-directional flow, the runway must be clear and dry with braking action reported as "good".

B. Runway 2 will be designated as the "Calm Wind Runway". It will be used whenever the wind speed is less than 5 knots, and conditions do not allow the use of runway 20 for arrivals. If runway 2 is used with a tailwind component, the runway must be clear and dry with breaking action reported as "good".

C. If a pilot determines, in the interest of safety, another runway should be used, Hartford-Brainard Tower, to the extent traffic and other conditions permit, will assign that runway. Workload permitting, the pilot will be informed if the requested runway is noise sensitive. Also, it is recognized that Hartford-Brainard Tower personnel, when safety, traffic or other conditions require such an assignment, may have to assign a runway which is other than the preferred runway.

Fixed Wing Flight Track Procedures
A. Runway 2 VFR departures, traffic permitting should turn left at least 20 degrees and follow the river until 2 nautical miles north of the airport (one mile north of the Charter Oak Bridge).

B. Runway 20 VFR departures, traffic permitting, should turn left at least 25 degrees as soon as practical after take-off and follow the river until 2 nautical miles south of the airport (one mile south of the Putman Bridge).

C. Runway 2 arrivals from the south, traffic permitting and whenever possible, should remain east of Interstate 91 (I-91), and overfly the Putman Bridge.

Turbojet Business Aircraft
Pilots of turbojet business aircraft are requested to use NBAA recommended noise abatement procedures, developed for take-off over close-in residential communities, and for VFR and IFR approaches. A copy of the NBAA procedures manual is available at the Airport Manager's Office.

Helicopter Flight Corridors
Helicopter flight corridors have been designed to minimize overflight of noise sensitive areas. Pilots should maintain a minimum altitude of five hundred feet AGL, (519 MSL), before crossing the boundaries. Contact the Airport Manager for this map.

Letter to Airmen No. 10-3
Subject: Voluntary Airport
Issued: 4-1-2010
Effective: 4-1-2010
Cancellation: 1-1-2012

The State of Connecticut has adopted two voluntary programs related to reducing noise at Hartford-Brainard Airport.

A. Maintenance run-ups should be conducted between the house of 7:00am and 10:00pm.

B. Closed traffic and practice instrument approaches should be conducted between the hours of 7:00 am and 10:00 pm Monday through Saturday, and between the hours of 9:00 am and 10:00 pm on Sunday.

Letter to Airmen No. 08-1
Subject: Voluntary Airport
Issued: 12-21-07
Effective: 1-1-2008
Cancellation: 1-1-2010

Propriety of Runway Use

A. When the wind is less than 5 knots, and traffic and other conditions permit, Hartford-Brainard Tower will utilize runway 2 for departures, and runway 20 for arrivals. This bi-directional use of the runway minimizes noise levels in the sensitive areas. When using a bi-directional flow, the runway must be clear and dry with braking action reported as "good".

B. Runway 2 will be designated as the "Calm Wind Runway". It will be used whenever the wind speed is less than 5 knots, and conditions do not allow the use of runway 20 for arrivals. If runway 2 is used with a tailwind component, the runway must be clear and dry with breaking action reported as "good".

C. If a pilot determines, in the interest of safety, another runway should be used, Hartford-Brainard Tower, to the extent traffic and other conditions permit, will assign that runway. Workload permitting, the pilot will be informed if the requested runway is noise sensitive. Also, it is recognized that Hartford-Brainard Tower personnel, when safety, traffic or other conditions require such an assignment, may have to assign a runway which is other than the preferred runway.

Letter to Airmen No. 08-1
Subject: Voluntary Airport
Issued: 12-21-07
Effective: 1-1-2008
Cancellation: 1-1-2010

The State of Connecticut has adopted two voluntary programs related to reducing noise at Hartford-Brainard Airport.

A. Maintenance run-ups should be conducted between the house of 7:00am and 10:00pm.

B. Closed traffic and practice instrument approaches should be conducted between the hours of 7:00 am and 10:00 pm Monday through Saturday, and between the hours of 9:00 am and 10:00 pm on Sunday.

Concur X /s/
Nonconcur Chief Counsel, AGC-1 5/14/90

Approve X /s/
Disapprove Assistant Administrator for Airports, ARP-1 5/14/90

Record of Approval

Hartford-Brainard Airport
Hartford, Connecticut

Noise Compatibility Program

I. Introduction

The State of Connecticut sponsored an Airport Noise Canpatibility Planning Study under a Federal Aviation Administration (FAA) grant, in compliance with Federal Aviation Regulations (FAR), Part 150. The Noise Compatibility Program (NCP) and its associated Noise Exposure Maps (NEM) were developed concurrently and submitted to FAA for review and approval on October 25, 1989 and June 16, 1989, respectively. The NEM was approved on November 15, 1989. The determination was announced in the **Federal Register** on Novenber 30, 1989.

The Part 150 Study was closely monitored by an Airport Noise Advisory Committee which represented the State of Connecticut (including airport administration), the regional planning agency, fixed-base operators, airport users, local governments, and community residents. A series of Advisory Committee meetings were held, with the consultant presenting material and findings. Public information meetings were held on August 17, 1988, March 1, J.989, and June 28, 1989. The consultant addressed Comments at all of these meetings, and subsequent written comments as well.

The study focused on defining an optimum set of noise and land use mitigation measures to improve campatibility between airport operations and cammunity land use, presently and in the future.

The resultant program is described in detail in **Volume 2: NoiseCompatibility Program**, Chapters 2, 3, 4, and 6. Chapter 2 describes the NCP, Chapter 3 describes implementation, Chapter 4 covers program benefits, and Chapter 6 provides evaluation details. Table 3.1, on Pages 45 and 46, summarizes the program.

The approvals which follow include actions that the State recommends be taken by FAA. It should be noted that these approvals indicate only that the actions would, if implenented, be consistent with the purposes of Part 150. These approvals do not constitute decisions to implanent the actions. Later decisions concerning possible implementation of these actions may be subject to applicable environmental or other procedures or requirements.

II. Program Elements

A. Airport Operations Measures.

1. Fliqht Tracks (Sections 2.1, Table 3.1, 4.1.1, & 6.2.1).

IFR departures from Runway 02 would be given an initial departure clearance to climb 800 feet, then turn left to a heading of 360 degrees. VFR departures would be directed to turn left 20 degrees. IFR departures from Runway 20 would be given an initial departure clearance to turn left to a heading of 175 degrees or less. VFR departure clearance would be directed to turn left at least 25 degrees as soon as practical. IFR arrivals to Runway 02 would be assigned the LDA or VOR approach and continue inbound so as to avoid residential areas of Wethersfield. VFR arrivals to Runway 02 would follow a new charted visual flight procedure utilizing airspace over the Connecticut River.

Approved. This will result in a significant decrease of people impacted by noise.

2. Nighttime Use Restriction (Sections 2.2, Table 3.1, 4.1.2, & 6.3.1).

The Connecticut Department of Transportation (CONNDOT) would prohibit aircraft operations between 10:00 P.M. and 7:00 A.M., where takeoff noise exceeds 77.6 dBA, or approach noise exceeds 84.0 dBA, based on noise data published in Advisory Circular 36- 3E. The rule would prohibit night operations by some of the loudest, older technology aircraft that occasionally use Hartford- Brainard, including Westwind 1123's, Lear 23s, 24s, and 25s, Hawker-Siddelly HS125-400s, and Falcon 10s. Single-event noise levels from these aircraft reach approximately 102 dBA at the closest homes in Wethersfield and East Hartford. The rule would continue to permit regular nighttime use of the airport by aircraft operating as check couriers.

Disapproved pending additional information. The information available does not provide sufficient data regarding the potential impact on interstate commerce. The Part 150 documentation merely indicates the type of aircraft and the numerical percentage of nighttime IFR operations that would be affected. There is no discussion identifying the affected users, whether they are regular users of the airport or itinerants, or of the impact on these users of being precluded from operating at the airport between 10:00 P.M. and 7:00 A.M. The FAA also notes that there is no residential property currently existing or forecast within the 65 Ldn contour, that the proposed.nighttime restriction would result in a 1 db decrease in overall noise exposure to the residential population at levels below 65 Ldn, and that a number of land use measures were rejected from further consideration by the airport operator because of the relatively low levels of noise exposure in noise sensitive areas. Given the modest nature of the noise problem and of the noise benefit of this measure, the impact on commerce would indeed have to be minimal in order not to be an undue burden.

3. **Preferential Runway Use** (Sections 2.3, Table 3.1, 4.1.3, & 6.2.2).

This program would minimize the use of Runway 02 for arrivals and Runway 20 for departures.

Approved. Increased landings on Runway 20 and departures on Runway 02 would reduce residentially exposed populations between 55 and 65 DNL (Table 6.2, page 73).

4. Departure Procedures (Sections 2.4, Table 3.1, 4.1.4, & 6.2.5).

Pilots would be encouraged to fly manufacturer's or NBAA published noise abatement departure procedures.

Approved. Noise exposure can be reduced for communities less than 10,000 feet from brake release.

5. Helicopter Flight Corridors (Sections 2.5, Table 3.1, 4.1.5, & 6.2.3).

Formal flight corridors would be adopted for helicopters flying under VFR conditions (Figure 6.3).

Approved. Although DNL contours from helicopter operations are not significant, this measure would address annoyance from single-event overflights. The corridors would overfly as few residential areas as possible.

6. **Nighttime Maintenance Runup Restriction** (Sections 2.6, Table 3.1, 4.1.6, & 6.3.3).

This voluntary, informal restriction would eliminate maintenance runups between 10:00 P.M. and 7:00 A.M.

Approved. While this measure would be ineffective in dealing with current noise levels, it would be effective in preventing a future problem.

B. **ADMINISTRATIVE MEASURES**

7. **Part-time Noise Abatement Officer** (Sections 2.7, Table 3.1, & 6.4.5).

This individual would handle complaints, collect and compile noise measurement data, and act as a liaison to communities impacted by aircraft noise.

Approved. This measure would increase significantly the responsiveness of the State, as operator of the airport, in dealing with noise complaints.

8. **Noise Complaint and Receipt and Response Procedures** (Sections 2.8, Table 3.1, & 6.4.2).

While Hartford-Brainard has a noise reporting and follow-up procedure, the effectiveness of the procedure could be increased if measure 7 were implemented.

Approved. A Noise Abatement Officer would take over these responsibilities from the Airport Manager.

9. Noise Monitoring System (Sections 2.9, Table 3.1, & 6.4.3).

Two portable monitors would be purchased.

Approved. The system would provide a data base for aircraft-related noise events, correlate noise complaints with events, and detect changes in noise exposure which might warrant updating noise exposure maps.

10. Automated Aircraft Recording System (Sections 2.10, Table 3.1, & 6.4.2).

A voice-activated recorder would monitor frequencies when the air traffic control tower is closed at night.

Approved. This measure would enable the collection of noise data and facilitate compliance with the above operational noise abatement procedures.

11. **Public Information Program/Review and Implementation** (Sections 2.11, Table 3.1, & 6.4.4).

A long-term, comprehensive noise abatement.committee would be established.

Approved. The committee would monitor progress of the NCP and bring about a public information program to inform on noise abatement issues.

12. **Prograrn Publicity: Letters To Airmen** (Section 2.12 & Table 3.1).

NCP measures would be publicized through a tower-issued Letter to Airmen (Figure 2.4).

Approved. This is an effective way of generating compliance.

13. **Program Publicity: Airside Signs** (Sections 2.13, Table 3.1, & 6.4.1).

Operational noise abatement measures for Runways 02 and 20 departures and helipad operations would be publicized with airport signage.

Approved. Brief noise abatement messages would aid compliance with noise abatement operational measures. The signs will have to conform to FAA standards.

14. **Program Publicity: Automatic Terminal Information Service (ATIS) Advisories** (Sections 2.14, Table 3.1, & 6.4.6).

ATIS would be utilized to briefly advise of noise abatement procedures.

Approved. This implementation measure was largely the result of the interest of the Advisory Committee and the responsiveness of the Air Traffic Operations Service in establishing national policy covering the use of ATIS. The measure is generally believed to be most effective in advising of noise abatement procedures in a timely manner.

15. **Program Publicity: Tower Advisories** (Sections 2.15, Table 3.1 & 6.4.6).

This measure would have Bradley Departure Control and Hartford-Brainard Tower issue and advise, respectively, of the above operational noise abatement measures, as the performance of other duties permits.

Approved. Controller-pilot communications are an effective means of assuring compliance with noise abatement procedures which are currently being implemented by the HFD ATCT.

16. **Program Publicity: Infomrational Brochures** (Sections 2.16, Table 3.1, & 6.4.7).

An informational brochure would publicize all existing and proposed noise abatement procedures.

Approved. This measure would also act as an effective means of compliance.

17. **Quantative Evaluation of Cumulative Changes in Noise Exposure** (Section 2.17 & Table 3.1)

Potential changes in noise exposure would be computed and reported annually using a CONNOOT microcomputer.

Approved. NCP effectiveness can be tracked and, if a threshold is exceeded, noise exposure map (NEM) contours updated.

18. **Assessment of NEM and NCP with Changes in Airport Layout or Operation** (Section 2.17 & Table 3.1)

Changes in airport layout or operation, as well as changes in air traffic control procedures, would be reported to a continuing Noise Abatement Committee. This information would be evaluated to determine the need for a revised NEM or NCP.

Approved. This measure would facilitate compliance with NEM update provisions of Part 150.

CONNDOT would revise noise contours every five years and review the contours with the Noise Abatement Committee and FAA to obtain their recommendations concerning NEM/NCP revision.

Approved. This measure would also facilitate compliance with the NEM update provisions of Part 150.