6.0 RECOMMENDED PLAN

This chapter presents the Airport Layout Plan (ALP) for the recommended developments at Waterbury-Oxford Airport (OXC), and the associated Airport Capital Improvement Plan (ACIP). The ALP illustrates the recommended future airport layout, and serves as the official development plan for the Airport. A number of additional drawings that illustrate surrounding airspace and adjacent land use support the ALP. The combined set of drawings is termed the ALP Drawing Set, and is provided in Appendix E.

This chapter contains the following sections:

- Summary of the Recommended Plan
- Airport Capital Improvement Plan
- Airport Layout Plan

6.1 Summary of the Recommended Plan

Chapter 4 presented the overall recommended airport development plan for OXC. The plan contains recommendations for airfield and landside development, which have been organized into three implementation phases. The recommendations include the following:

Phase I (0 to 5 years)

1A - Extension of parallel Taxiway "B" south to the runway end (design, EA, permitting)
1B - Extension of exit Taxiway "E" on the west side of the runway to Taxiway "A"
1C - Airport service road construction parallel to Taxiway "A" (west side of airfield)
1D - T-hangar development adjacent to the Northeast Ramp
1E - T-hangar construction on the existing Northeast Ramp
1F - Expansion of the South Ramp
1G - Expansion of the Executive Flight Ramp
1H - Equipment Building Construction

Phase II (6 to 10 years)

2A - Extension of parallel Taxiway "B" south to the runway end (wetland mitigation)
2B - Extension of parallel Taxiway "B" south to the runway end (construction)
2C - Airport service road construction parallel to Taxiway "B" (east side of airfield)
2D - Burial/lowering of Northeast Utilities electrical lines and selective tree removal
2E - Expansion of the Transient Apron
2F - Construction of a bi-directional exit taxiway for Runway 18 landings
2G - Installation of MALSR approach lights for Runway 36

Phase III (11 to 20 years)

3A - Extension of exit Taxiway "H" on the east side of the runway to Taxiway "B"
3B - Airport service road construction north of Runway 18

3C - Airport service road construction to the Fuel Farm
3D - Hangar development south of Hangar "G"
3E - Taxiway "D" relocation

With the exception of the parallel Taxiway "B" extension, the recommended projects are not anticipated to result in significant environmental impacts. The Environmental Overview (Chapter 5) identified nearly four acres of wetland impacts resulting from the parallel Taxiway "B" extension, which would likely require offsite mitigation/replacement (see Appendix D). Due to the cost and complexity of this extension, it has been divided into three separate projects in Phases I and II of the ACIP (i.e., Projects 1A, 2A, and 2B).

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 OXC may receive 95% federal funding; ConnDOT would be responsible for the remaining 5%. Grant-eligible capital projects include planning and environmental studies, runway and taxiway development/rehabilitation, airport lighting, security enhancements, aircraft parking aprons, access roads, 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 party/developer (e.g., FBO or corporation) may fund and construct grant-ineligible projects under a lease agreement with ConnDOT. In some cases, ConnDOT may fund the total cost of an ineligible project, or an eligible project with a lower FAA priority (e.g., vehicle garage).

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) and replace maintenance equipment (e.g., snow plows). 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. Additionally, recommendations of the OXC FAR Part 150 Noise Study may require significant expenditures for a potential multi-year property acquisition and/or a noise insulation program. As such, potential noise mitigation expenditures are also included in the ACIP.

Note that the ACIP does not constitute a commitment on behalf of the FAA or ConnDOT 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.

Table 6-1 provides the 20-year ACIP for OXC, 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 – AIRPORT CAPITAL IMPROVEMENT PLAN				
Project	**Total Estimated Cost**	**Anticipated Funding Source**		
		FAA	**State**	**Private**
PHASE I - (0 TO 5 YEARS)				
1.A. Extend Taxiway "B" (Design, EA, Permitting)	**$430,000**	$408,500	$21,500	
1.B. Extend Exit Taxiway "E"	**$325,000**	$308,750	$16,250	
1.C. Service Road Construction (West Side Airfield)	**$300,000**	$285,000	$15,000	
1.D. T-Hangar Development	**$2,300,000**			$2,300,000
1.E. T-Hangar Construction (NE Ramp)	**$860,000**			$860,000
1.F. Expand South Ramp[1]	**$420,000**			$420,000
1.G. Expand Executive Flight Ramp[1]	**$750,000**			$750,000
1.H. Construct Equipment Building	**$450,000**		$450,000	
Generator for State Building	**$300,000**		$300,000	
Signage Upgrades	**$30,000**		$30,000	
Security Improvements	**--**		UNDISCLOSED	
Noise Implementation Program	**$500,000**	$475,000	$25,000	
Implementation of Noise Study Recommendations (Multi-Year)[2]	**$5,000,000**	$4,750,000	$250,000	
Phase I Subtotal	**$11,665,000**	**$6,227,250**	**$1,107,750**	**$4,330,000**
PHASE II - (6 TO 10 YEARS)				
2.A. Extend Taxiway "B" (Wetland Mitigation)	**$1,600,000**	$1,520,000	$80,000	
2.B. Extend Taxiway "B" (Construction)	**$3,110,000**	$2,954,500	$155,500	
2.C. Service Road Construction (East Side Airfield)	**$200,000**	$190,000	$10,000	
2.D. Burial/Lowering Elec. Lines & Tree Removal[3]	**$5,000,000**	$2,375,000	$125,000	$2,500,000
2.E. Expand Transient Apron	**$170,000**	$161,500	$8,500	
2.F. Exit Taxiway Construction	**$420,000**	$399,000	$21,000	
2.G. Runway 36 MALSR Installation[4]	**$700,000**	$700,000		
Vehicle/Equipment Purchase	**$250,000**	$237,500	$12,500	
Rehabilitate/Resurface Main/Transient Ramp[5]	**$1,900,000**	$1,805,000	$95,000	TBD
Rehabilitate/Resurface Runway 18-36	**$4,000,000**	$3,800,000	$200,000	
Rehabilitate/Resurface NE Ramp	**$930,000**	$883,500	$46,500	
Rehabilitate/Resurface South Ramp	**$540,000**	$513,000	$27,000	
Rehabilitate/Resurface NW Ramp	**$1,000,000**	$950,000	$50,000	
Implementation of Noise Study Recommendations (Multi-Year)[2]	**$5,000,000**	$4,750,000	$250,000	
Phase II Subtotal	**$24,820,000**	**$21,239,000**	**$1,081,000**	**$2,500,000**

TABLE 6-1 – AIRPORT CAPITAL IMPROVEMENT PLAN (CONTINUED)				
Project	**Total Estimated Cost**	**Anticipated Funding Source**		
		FAA	**State**	**Private**
PHASE III - (11 TO 20 YEARS)				
3.A. Extend Exit Taxiway "H"	**$325,000**	$308,750	$16,250	
3.B. Service Road Construction (North Runway 18)	**$460,000**	$437,000	$23,000	
3.C. Service Road Construction (Fuel Farm)	**$150,000**	$142,500	$7,500	
3.D. Hangar Development[5]	**$10,000,000**			$10,000,000
3.E. Taxiway "D" Relocation	**$1,000,000**	$950,000	$50,000	
Vehicle/Equipment Purchase	**$500,000**	$475,000	$25,000	
Rehabilitate/Resurface Taxiway "A"	**$1,900,000**	$1,805,000	$95,000	
Rehabilitate/Resurface Taxiway "B"	**$2,300,000**	$2,185,000	$115,000	
Rehabilitate/Resurface Taxiway "C"	**$290,000**	$275,500	$14,500	
Rehabilitate/Resurface Taxiway "E"	**$290,000**	$275,500	$14,500	
Rehabilitate/Resurface Taxiway "G" (East Half)	**$160,000**	$152,000	$8,000	
Rehabilitate/Resurface Key Air Apron	**$740,000**			$740,000
Rehabilitate/Resurface T-Hangar Taxi Lanes	**$780,000**			$780,000
Rehabilitate/Resurface Double Diamond Apron	**$310,000**			$310,000
Rehabilitate/Resurface Executive Flight Ramp[6]	**$630,000**	$598,500	$31,500	TBD
Implementation of Noise Study Recommendations (Multi-Year)[2]	**$5,000,000**	$4,750,000	$250,000	
Phase III Subtotal	**$24,835,000**	**$12,354,750**	**$650,250**	**$11,830,000**
GRAND TOTAL	**$61,320,000**	**$39,821,000**	**$2,839,000**	**$18,660,000**

Note: Actual costs to be determined based upon final design
[1]Privately funded if conducted in coordination with project 1E
[2] This value is a placeholder for long-term planning purposes and does not represent anticipated funding. Preliminary cost estimates and schedule are provided in the FAR Part 150 Noise Study. Actual costs would be determined at the time of implementation.
[3]NE Utilities may fund some of the project cost
[4]Assumed FAA installation
[5]May involve private funding for leased portion of apron
[6]Cost would depend on hangar size/layout

6.3 Airport Layout Plan

The ALP drawings illustrate all development projects identified for OXC throughout the 20-year planning horizon. Upon approval by ConnDOT and the FAA, the ALP becomes the official development document for the Airport. The FAA requires that all new airport facilities be consistent with the ALP. As such, keeping the drawings accurate and up to date is a high priority. FAA policy now 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.

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	Data Sheet	ALP-3
4	Inner Approach Surface Drawing - Runway 18-36	ALP-4
5	Airport Airspace Plan	ALP-5
6	Land Use Plan	ALP-6
7	Airport Property Plan	ALP-7
Note: The ALP Drawing Set is provided in Appendix E.		

6.3.1 Existing & Proposed Airport Layout Plan

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

The proposed ALP (ALP-2) includes all features of ALP-1, and illustrates each recommended facility for OXC. 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, ConnDOT 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 Connecticut Environmental Policy Act (CEPA), or compliance with permit requirements. Such approvals must be obtained prior to development, and are not part of the ALP process.

It is also noted that ALP approval does not represent a commitment on behalf of ConnDOT, the FAA, or others to fund or pursue the projects depicted. Rather, the Master Plan Update 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) D-III. Aircraft within ARC D-III include the Gulfstream V and Global Express, which are based at OXC.

The following publications were used during the drawing preparation:

- FAA Advisory Circular 150/5300-13, *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 taxiway improvements, a service road, apron expansion, and hangars. A substantial amount of pavement rehabilitation and maintenance is also incorporated into the ACIP. Finally, it is worth highlighting that no new runway or runway extension is included on the ALP.

Currently, Runway 36 has a precision instrument approach using an Instrument Landing System (ILS). To provide the lowest visibility minimums possible for a precision approach (½ mile is the lowest visibility minimum for a standard "Category I" procedure), the runway end must be equipped with an Approach Lighting System (ALS). Runway 36 currently provides Runway End Identifier Lights (REILs), which consist of strobe lights at the runway end. However, the standard lighting system for airports with an ILS is a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), and is recommended for Runway 36. If the MALSR is installed, and all critical obstructions are removed, the visibility minimums for the Runway 36 ILS would decrease to ½ mile.

Currently, Runway 18 has a non-precision instrument approach, with no runway approach lighting. During the planning period, it is recommended that the FAA publish an LPV approach using satellite-based GPS on Runway 18. Although runway approach lighting is not required for this approach, REIL installation is recommended. An LPV approach is also recommended on Runway 36 to provide a backup system for the ILS.

The Runway Protection Zone (RPZ) is a ground area that underlies the inner portion of each runway approach. The purpose of the RPZ is to provide land use protections beneath the inner portion of the approach surface, thereby enhancing the protection of people and property on the ground. The dimensions of the OXC RPZs are listed in Table 9-2 below.

TABLE 6-2 – RUNWAY PROTECTION ZONE DIMENSIONS				
Runway End – Current	**Visibility Minimum**	**Inner Width**	**Outer Width**	**Length**
Runway 18 (Non-Precision)	1-mile	500’	1,010’	1,700’
Runway 36 (Precision)	1-mile	500’	1,010’	1,700’
Runway End – Proposed	**Visibility Minimum**	**Inner Width**	**Outer Width**	**Length**
Runway 18 (LPV)	1-mile	500’	1,010’	1,700’
Runway 36 (Precision w/MALSR)	½-mile	1,000’	1,750’	2,500’

The lower visibility minimum that would be enabled by the Runway 36 MALSR would change the size of the Runway Protection Zone (RPZ), as depicted on ALP-2. The MALSR installation would first require removing or lowering the Northeast Utilities electrical towers located beyond the runway end, as well as burying or lowering the associated lines.

6.3.2 Airport Airspace Plan

The next two sheets of the ALP Drawing Set (ALP-4 and 5) illustrate the airspace requirements described in 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 the Airport’s runways and define the 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 OXC 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 1,000 feet for precision instrument Runway end 36 and 500 feet for non-precision Runway end 18. However, the primary surface of a runway is defined as the largest width required by either runway end, and therefore, the width of the entire Runway 18-36 primary surface is 1,000 feet.

Horizontal Surface: A horizontal plane 150 feet above the airport elevation. The elevation of OXC is 725 feet above mean sea level (MSL); therefore, the horizontal surface at OXC is situated at 875 feet above MSL. 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. At OXC, the elevation of the outer edge of the conical surface is 1,075 feet above MSL.

Approach Surface: Surfaces longitudinally centered on the extended runway centerlines, extending outward and upward from the ends of the primary surface. For OXC, the dimensions and slopes of the approach surfaces are listed below.

TABLE 6-3 – APPROACH SURFACE DIMENSIONS

Runway End – Current	**Inner Width**	**Outer Width**	**Length**	**Slope**
Runway 18 (Non-Precision)	1,000’	3,500’	10,000’	34:1
Runway 36 (Precision)	1,000’	16,000’	50,000’	50:1 & 40:1*
Runway End – Proposed	**Inner Width**	**Outer Width**	**Length**	**Slope**
Runway 18 (LPV)	1,000’	3,500’	10,000’	34:1
Runway 36 (Precision)	1,000’	16,000’	50,000’	50:1 & 40:1*

*50:1 for the first 10,000 feet, then 40:1 thereafter.

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 into an imaginary surface are depicted on ALP-4 and ALP-5.

Sheet 4, 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.

A few close-in trees penetrate the primary and transitional surfaces on the south end of the airfield. These include several trees within the wetland east of Runway 18-36, as well as other sporadic trees near the edges of the primary surface. Removal of these trees, which are located on airport property, is recommended, as illustrated on ALP-4.

Several trees penetrate the precision approach surface to Runways 36. However, many of these obstructions are mitigated by a 500-foot displaced threshold. As such, the obstruction analysis also included the Threshold Siting Surface (TSS), as depicted on ALP-4. The TSS identified a scatter of tree penetrations located approximately 2,000 feet southeast of Runway 36 on undeveloped industrially-zoned property. Although Runway 36 approach surface obstructions remain undesirable, operational safety would be provided by clearing the TSS to the displaced threshold. Clearing of these trees would require easements from the property owners.

In addition to the tree penetrations in the Runway 36 approach surface, several Northeast Utilities electrical transmission towers are located within the RPZ, and penetrate the 50:1 approach surface and the 34:1 TSS. Although these towers are equipped with obstruction lighting, removal or lowering of the towers and burial or lowering of the associated lines is

recommended to improve safety. This should be done prior to the tree removal discussed above, as the towers are the current "controlling" obstruction. Note that the tower removal is required in order to install the recommended MALSR.

No approach surface penetrations have been identified for non-precision Runway 18. However, RPZ issues have been identified for Runway 18, as described in the Section 6.3.3.

Sheet 5, Airport Airspace Plan, illustrates the overall dimensions of the Part 77 surfaces, and highlights penetrations to the outer surfaces. As shown, there are only a handful of identified penetrations to the outer portions of the imaginary surfaces. These include trees and towers, which range in height from 900 to 964 feet MSL. Obstruction lighting is provided on all but one of the identified tower penetrations.

6.3.3 Land Use Plan

Airport property is surrounded by a mix of open, wooded, residential, commercial, and industrial land uses, as depicted on ALP-6, Land Use Plan. The land to the south of the Airport is predominately wooded and/or open, with light industrial establishments along Christian Street, and several low density residential areas south of an electrical transmission line. The Larkin State Park Trail is located just south of Runway 36. A wide mixture of industrial and residential land uses are located to the north and west of the Airport along Christian Street, Route 188, and other roadways. The land to the east is predominately wooded with scattered residential areas.

Residences are scattered along virtually every roadway in the vicinity of the Airport (excluding I-84). The highest density of housing near the Airport is located to the north of Juliano Road and west of Christian Street (i.e., the Triangle Hills neighborhood). This area includes over 50 single-family homes and is located one-quarter mile north of the runway. In this vicinity, an additional 19 homes are located along Christian Street.

To control land use immediately beyond runway ends, the FAA recommends easements or acquisition of the property within the RPZs. Approximately 31 residences exist within the RPZ north of the runway in the Triangle Hills neighborhood. Voluntary acquisition of homes within this RPZ is recommended, particularly with additional consideration of their exposure to aircraft noise. South of the runway, the Airport does not control all land within the existing or future RPZ, but no development currently exists. For this industrially-zoned area, easements are recommended to control development. Areas of suggested property acquisition and easement are illustrated on the ALP drawings.

Other than the RPZ issues described above, land use compatibility is primarily related to airport noise exposure. The residential area that would experience the highest noise levels would continue to be north of the Airport in and near the Triangle Hills neighborhood. Many of these houses are within the 65 and 70 DNL contours (described in Chapter 5), which could make them eligible for a property acquisition or insulation program.[1]

[1] With approval of the ongoing FAA Part 150 Noise Study and Noise Compatibility Plan

The FAA uses a DNL of 65 dB to determine if non-compatible activities exist in the vicinity of an airport. For this Master Plan Update, noise contours were prepared for forecast year 2008 using the FAA Integrated Noise Model (INM). The associated noise contours are illustrated on ALP-6. The noise contours indicate that airport noise would continue to be incompatible with residential areas north of Runway 18-36 in the Town of Middlebury, with less residential disturbance south of the runway in the Town of Oxford.

The Land Use Plan depicts the current zoning districts in the Towns of Middlebury and Oxford. The Plan depicts municipal zoning, general land use, and future airport noise contours in order to provide guidance for future development in the vicinity of the Airport. The land use plan also identifies the airport property owned by ConnDOT. ALP-7 provides a more detailed Airport Property Map, including the acquisition history.

As discussed in Chapter 1, the development of a power plant has been proposed in Oxford, in a location approximately ½-mile to the east of the Airport. The power plant would be constructed within the planned Woodruff Hill Industrial Park, and operated by Calpine/Towantic Energy LLC. Although this development is not associated with the Airport or the Master Plan Update, it has been discussed throughout the process due to concerns regarding the emission of vertical plumes and their associated impact to aviation activity.

Based on these concerns, the FAA has agreed to conduct a "Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes" for the development of the Calpine facility. The FAA analysis will address the appropriateness of the power plant site from an aviation safety standpoint. Based on their findings, the previous conclusions regarding the power plant may be revised, including re-examination of a 2001 Declatory Ruling for the proposed facility. Furthermore, if the development moves forward, Calpine/Towantic Energy will have to submit an FAA Notice of Actual Construction or Alteration (FAA Form 7460-2), which would prompt the FAA to perform an standard Aeronautical Study of the proposed project addressing airspace and obstruction issues.