CHAPTER 6 – DEVELOPMENT AND EVALUATION OF ALTERNATIVES

Chapter 5 identified various facility requirements necessary to meet the Airport's needs through the planning period (2018-2038). This chapter explores alternative ways to implement the facility requirements identified in Chapter 5 while considering operational, environmental, security, and financial impacts, given the existing constraints presented in previous chapters.

6.1 METHODOLOGY

This chapter presents alternative development scenarios for airside, landside, and support facilities for consideration. Included in each alternative is a no-build scenario to identify the operational, environmental, security, and financial impacts of leaving the Airport in its current configuration and as a baseline upon which to compare relevant alternatives. These improvements include runway approach evaluations, administration building renovation/construction, hangar construction, automobile parking, Jet-A fuel facility construction, and reservation of land for non-aeronautical development. Preferred alternatives for each facility evaluation are then identified and incorporated as part of the Ultimate Airport Layout Plan.

6.2 ENVIRONMENTAL

Permitting costs associated with each development scenario described will vary drastically depending on the type of project(s) pursued, size of impact, location, and resources affected. Therefore, permitting costs need to be addressed on an individual project basis as the Airport develops. This includes coordination with federal, state, and local agencies responsible for oversight of natural and cultural resources (Cape Cod Commission, U.S. Fish and Wildlife Service, Massachusetts Department of Environmental Protection, Massachusetts Division of Fisheries and Wildlife – Natural Heritage Program, and Massachusetts Historical Commission, etc.) to better understand each project's requirements, and in some cases achieve a reduction in permitting requirements, particularly for projects that are safety related (e.g., tree removal).

Any alternative improvement that has an impact on natural (wetlands, rare species, etc.) or cultural resources (archaeological, historic, architecture, etc.) will likely require an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA). Typically, following the completion and approval of an AMPU and ALP, an EA is completed for most, if not all, improvements shown on the ALP.

Similarly, for alternatives involving tree clearing in wetlands, the Airport must develop a Vegetation Management Plan (VMP) in accordance with Massachusetts Department of Environmental Protection (MassDEP) Wetlands Protection Act Regulations (310 CMR 10[1]) Limited Project Status. The VMP, at minimum, must contain a purpose and goals statement, identify all airport protective zones, identify proposed vegetation management areas within the protective zones, and identify and prioritize future vegetation removal and maintenance projects. This will likely require a survey of all Part 77 surfaces, as defined by FAR 14 CFR Part 77 (i.e. primary, approach, transitional, horizontal, conical).

[1] https://www.mass.gov/files/documents/2016/08/vy/310cmr10a.pdf

Therefore, the costs for the preparation of an EA, VMP, and associated Part 77 airspace analysis is estimated at $500,000 for all projects in this chapter and is not calculated into the individual cost of each project.

Additionally, the Town of Chatham is within the jurisdiction of the Cape Cod Commission (CCC), a regulatory department of Barnstable County regional government responsible for the oversight of regional land use planning and economic development for 15 towns of Barnstable County, Massachusetts. A Development of Regional Impact (DRI) permit must be submitted for review by the CCC for any development meeting or exceeding the thresholds defined by the *Enabling Regulations Governing Review of Developments of Regional Impact, Chapter A, Section 3*[2].

[2] http://www.capecodcommission.org/resources/regulatory/EnabRegsChA_FeeSchedule_7-1-18.pdf

6.3 APPROACH CLEARING ALTERNATIVES

As discussed in Chapter 5, Facility Requirements, the Airport wishes to establish a non-precision (straight-in) instrument approach to Runway 6-24 for the purposes of reducing ceiling minimums, enhancing public safety, and maximizing the utility (access) of the Airport, particularly during inclement weather conditions. An aeronautical survey was conducted as part of this Master Plan Update to identify obstructions within the existing runway approach surfaces, as well as evaluate mitigation measures necessary to establish a non-precision (straight-in) instrument approach. Analysis of the data obtained from this survey revealed obstructions within the Airport's existing approach surfaces for each Runway end, which must be addressed in order for the Airport to comply with FAA safety requirements and Grant Assurances (FAA Contracts), and to be eligible for a non-precision approach to Runway 6-24. In order for FAA Flight Procedures to publish a non-precision (straight-in) instrument approach at the Airport, these obstructions must be removed, lighted, or otherwise mitigated.

As highlighted in Chapter 5, two sets of standards exist that define protected airspace approach surfaces at airports, which are:

- **FAR Part 77** is a federal regulation that governs the airspace surrounding public use airports. Part 77 identifies and specifies the dimensions of "imaginary" or "protected" surfaces surrounding the airport based on the existing or planned approach category for each runway. These protected surfaces must be kept clear of penetrating objects, known as "obstructions".
- **TERPS** is an FAA Order containing the criteria used to formulate, review, approve, and publish procedures for instrument flight operations to and from civil and military airports. This order recommends minimum obstacle clearances considered by the FAA to supply a satisfactory level of protection to aircraft approaching an airport.

The FAA, through its Grant Assurances, requires that airport sponsors comply with all applicable regulations, including making all reasonable efforts to protect instrument and visual operations to and from the airport. As explained above, Part 77 is a federal regulation that governs navigable airspace, which must be kept clear of penetrating objects; however, there are instances when clearing obstructions to Part 77 standards is not practicable for a variety of reasons (cost, environmental, community disruption, etc.). In these circumstances, the FAA may consider the use of TERPS requirements for obstruction clearing.

As part of the obstruction analysis for this Master Plan, an evaluation of obstructions to the Airport's approach surfaces for both Part 77 and TERPS requirements were identified. Table 6-1 below, summarizes affected parcels identified in Chapter 5 for the Airport's existing Part 77 and TERPS surfaces, as well as proposed future Part 77 and TERPS surfaces required to establish a non-precision approach:

Table 6-1: Part 77 vs. TERPS Easement Comparison

Surface	Easements (RW 6)	Easements (RW 24)
Existing Part 77	7	9
Existing TERPS	3	1
Non-Precision Part 77	9	13
Non-Precision TERPS	8	13

The subsequent approach clearing alternatives focus on Part 77 obstructions only. This is done for several reasons:

1. Part 77 establishes standards and notification requirements for objects affecting navigable airspace. Obstructions identified within Part 77 approach surfaces are presumed to be hazards by FAA until further analysis of specific obstructions is conducted to determine the potential hazardous effect of the object on air navigation. Therefore, for the purposes of the alternatives analysis under this Master Plan, it is assumed that all obstructions to the Airport's Part 77 approaches are hazards and must be removed or otherwise mitigated.
2. FAA Grant Assurance #19[3] (Operation and Maintenance) states that the Airport shall be operated at all times in a safe and serviceable manner and specifically requires the Airport to make arrangements for promptly marking and lighting hazards.
3. FAA Grant Assurance #20 (Hazard Removal and Mitigation) states that the Airport will take appropriate action to assure that its airspace remains adequately cleared and protected by removing, lowering, relocating, marking, lighting, or otherwise mitigating existing hazards and preventing the establishment or creation of future hazards.
4. Part 77 standards are more restrictive than TERPS standards, and therefore provide a conservative estimate of the number of easements required, total areas to be cleared, and total project costs.
5. The difference in project scope/number of easements required to clear to Part 77 standards versus TERPS standards, particularly in the case of upgrading to a non-precision approach, is nominal (22 easements for Part 77 vs. 21 easements for TERPS).

The following sections offer three alternatives (plus a no action alternative) to mitigate obstructions to the Runway 6-24 Part 77 approaches. For a detailed explanation of obstructions (i.e. vegetative vs. manmade) contained within the various approach surfaces mentioned above, refer to Chapter 5, Sections 5.1.2.6 through 5.1.2.10.

In an effort to provide conservative cost estimates for each alternative, it is assumed that the Airport will pursue avigation easements over all parcels affected by obstructions. However, at the time of the project, the Airport may elect to explore the degree of jurisdiction permitted by the Chatham Airport Approach Zone Bylaws in an effort to pursue tree clearing agreements with select property owners as an alternative to acquiring easements. Airport Approach Zone Bylaws are further analyzed in Chapter 8, *Airport Compliance*. It is important to note that FAA will only fund obstruction removal projects on properties where the Airport has perpetual rights to maintain the airspace (e.g. avigation easement).

Cost estimates for easement acquisitions include project development, grant administration, acquisitions/negotiations, appraisal, review appraisal, survey, legal and avigation easements[4]. Cost

[3] Grant Assurances are a contract, enforceable by the federal government, entered into by the Town of Chatham each time a federal grant is accepted.

[4] Easement costs for Chapter 6 are based on 10% of the current assessed value of each property. Actual fair market values will be assessed by a professional appraiser at the time of the easement acquisition. Professional appraisals consider, among other things, the assessed value of the property and the size of the easement area required. Property values for this report were obtained from the Town of Chatham Web Assessor Database: https://www.mapsonline.net/chathamma/web_assessor

estimates for obstruction clearing/mitigation include project development, grant administration, design, bidding, resident engineering, vegetative obstruction removal, and obstruction mitigation (chimney and pole).

6.3.1 NO ACTION APPROACH CLEARING ALTERNATIVE

The no action approach alternative presumes that no action will be taken to mitigate, or clear obstructions identified in Chapter 5 (see Figure 6-1). The purpose of this alternative is to provide a baseline alternative on which to compare subsequent alternatives and examine the impacts of leaving obstructions unaddressed.

Environmental Impacts:

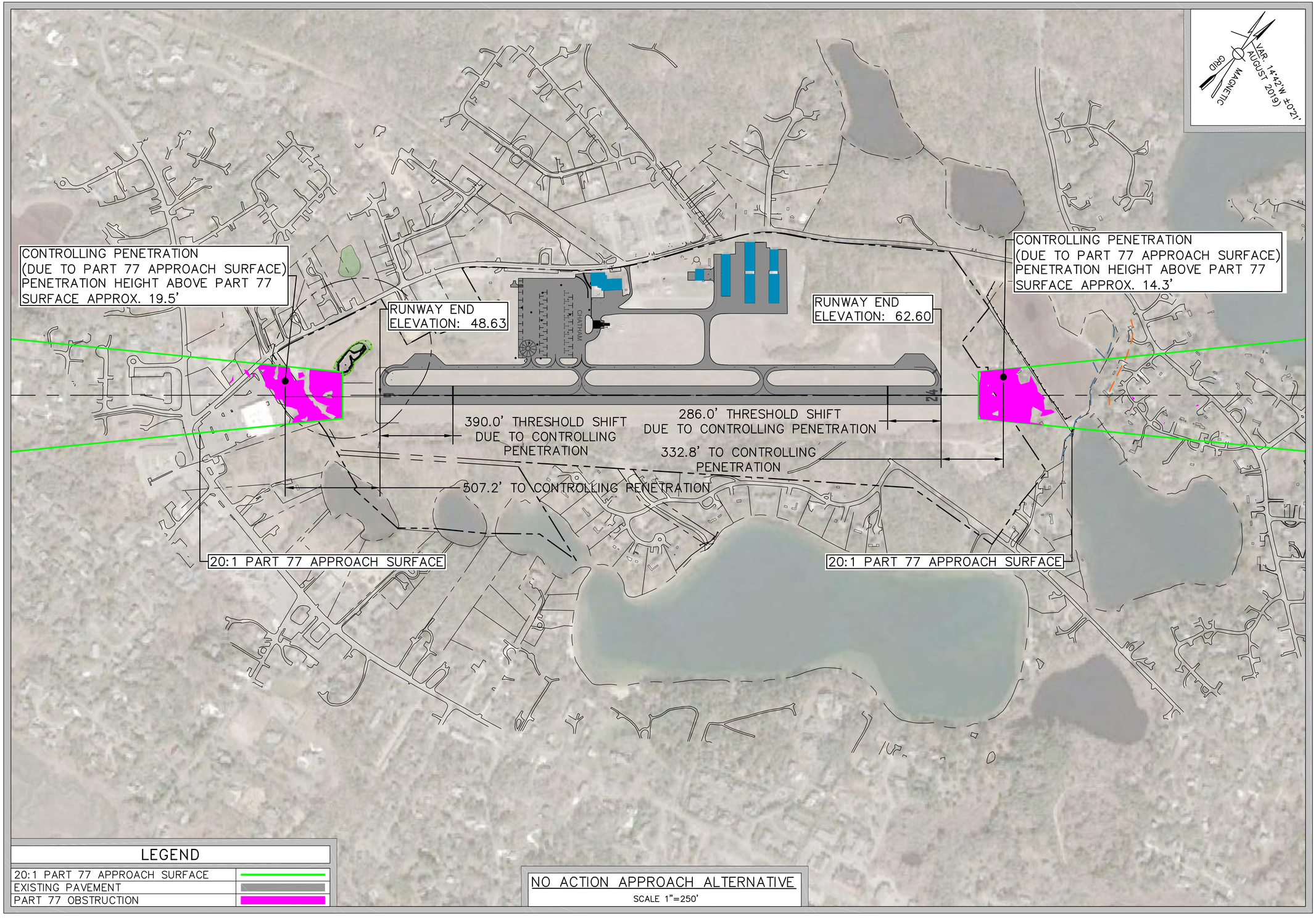
- Because no runway approach clearing will take place as part of this scenario, no environmental resources will be impacted by implementing this alternative, and therefore no permitting efforts will be necessary.

Operational Impacts:

- Requires the Airport to displace the thresholds on both runway ends as follows:
    - Displaced threshold of approximately 390 feet on Runway 6 due to a 19.5-foot controlling penetration located approximately 507 feet off the runway end. This scenario reduces the available landing distance to approximately 2,611 feet on the Runway 6 end.
    - Displaced threshold of approximately 286 feet on Runway 24 due to a 14.3-foot controlling penetration located approximately 332 feet off of the runway end. This scenario reduces the available landing distance to approximately 2,715 feet on the Runway 24 end. This reduces the "available" pavement pilots are able to use for landing and takeoff, thereby reducing the margin of safety for aircraft and passengers.
- Trees will continue to grow, obstructing safe navigation at the Airport, resulting in further threshold displacements.

Costs associated with the No Action Alternative:

- Because no obstruction clearing will take place as part of this scenario, no financial resources will be required to implement this alternative.
- Reduction in available landing distance on Runway 6-24 has the potential to restrict the type of aircraft able to land at the Airport. This creates access and financial issues, as Chatham is heavily reliant upon seasonal tourism, and inability to access the runway at CQX will force pilots currently landing at CQX to utilize other airfields in the region. In turn, revenue generated from landside facilities and services (e.g. fuel, rental cars, etc.) will be diverted to other communities.
- Electing not to clear approaches ignores a known safety issue at the Airport, violates existing FAA grant assurances, and jeopardizes the Airport's eligibility for future federal funding.



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AIP NO. 3-25-0015-23-2018

OWNER
CHATHAM MUNICIPAL AIRPORT
TOWN OF CHATHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	ID
DRAWN BY	RSM
CHECKED BY	MPC
DATE	SEPT, 2018

GRAPHIC SCALE
0 250 500
SCALE: 1" = 250'

SHEET TITLE

NO ACTION APPROACH ALTERNATIVE

DRAWING NO.

FIG. 6-1

6.3.2 ALTERNATIVE 1 – MAINTAIN EXISTING PART 77 APPROACHES

Alternative 1 evaluates the necessary obstruction removal and costs associated with maintaining the existing approaches at CQX using Part 77 approach clearing standards as outlined in Chapter 5, *Table 5-4: Existing Runway 6-24 Part 77 Compliance*. Clearing obstructions from the Airport's approaches is a requirement of the Airport through its Grant Assurances and a critical element of accessibility for pilots and safety for the public. In order to maintain its existing approaches, the Airport will need to plan for the removal/mitigation of obstructions as follows:

- Vegetative obstructions on Airport property.
- Vegetative obstructions on 16 privately-owned parcels.
- Vegetative obstructions on George Ryder Road and Agnes Lane (town right of ways).
- One chimney obstruction on private property[5].
- One pole obstruction on George Ryder Road[6].

For a graphic representation of obstruction removal required for this alternative, see Figure 6-2.

Operational Impacts:

- Mitigates obstructions to the existing Runway 6-24 approaches, allowing the Airport to retain the landing distance of 3,001 feet and avoiding the need for a displaced threshold.
- Allows the Airport to maintain its existing Circling (Visual), NDB, and RNAV (GPS) approaches.
- Does not provide the Airport with a non-precision (straight-in) approach.

Environmental Impacts:

- Approximately 920 SF (0.02 AC) of temporary wetland impacts related to vegetative obstruction clearing.
- Approximately 30,280 SF (0.7 AC) of temporary wetland buffer impacts related to vegetative obstruction clearing efforts.
- Approximately 74,570 SF (1.7 AC) of temporary vernal pool buffer impacts related to vegetative obstruction clearing efforts.

Other Impacts or Considerations:

- Environmental Assessment (one EA for all Master Plan improvements).
- Vegetation Management Plan (VMP).
- Order of Conditions and Notice of Intent (OOC and NOI).
- Coordination with Cape Cod Commission (CCC).
- 16 avigation easement acquisitions over privately-owned parcels required for this alternative.
- Approximately 3.7 AC of vegetative obstruction clearing from the Runway 6-24 approaches on and off Airport property.

[5] This chimney obstruction, identified by the aerial survey on a private parcel off of the Runway 06 end, appears to have been removed since the time of the survey. Additional investigation is required to confirm that this chimney is no longer an obstruction.

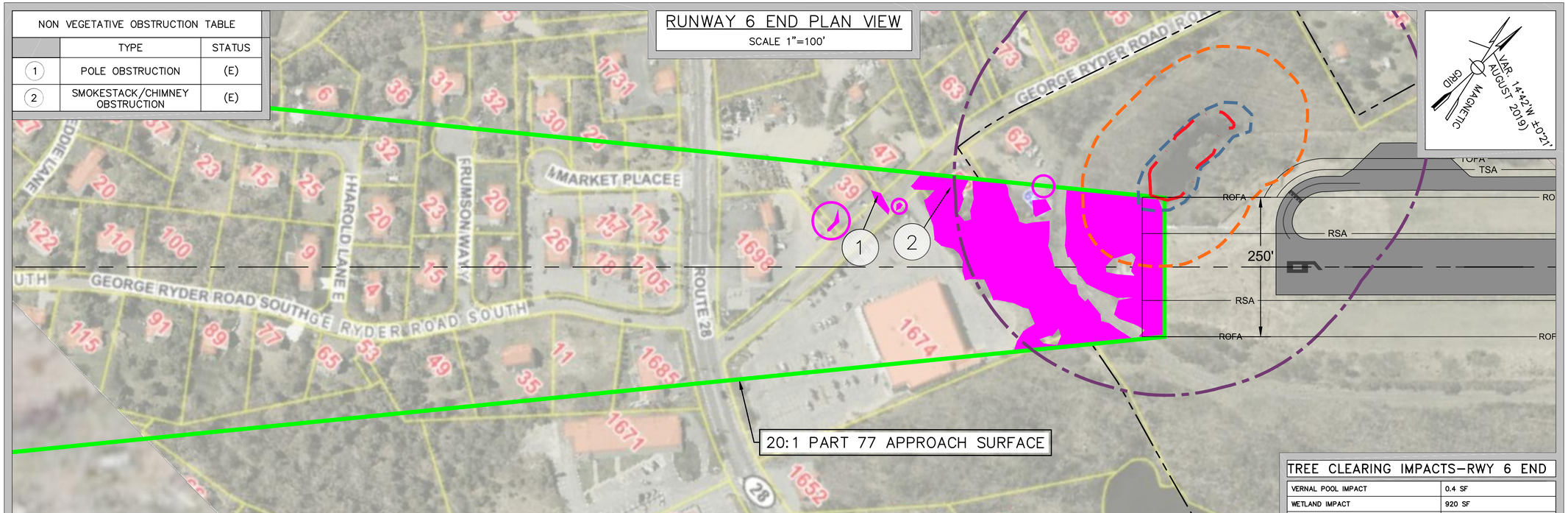
[6] This obstruction consists of a pole with power lines. The mitigation measure proposed as part of this alternative is to construct a separate pole with obstruction light in the vicinity of the obstructing pole.

- The Airport eliminates existing safety hazards by providing runway approach surfaces that are free of obstructions and comply with FAA safety standards and Grant Assurances.
- Positions the Airport to retain its existing client base, thereby preserving community revenue generated from landside sources (e.g. fuel, rental cars, etc.) and tourism (e.g. restaurants, hotels, property rentals, etc.).
- Estimated Cost:

Runway 06 Easement Acquisitions	$760,000 (7 Easements)
Runway 24 Easement Acquisitions	$790,000 (9 Easements)
Runway 06-24 Obstruction Removal	$330,000
Cost of Permits	$30,000
TOTAL	**$1,910,000**

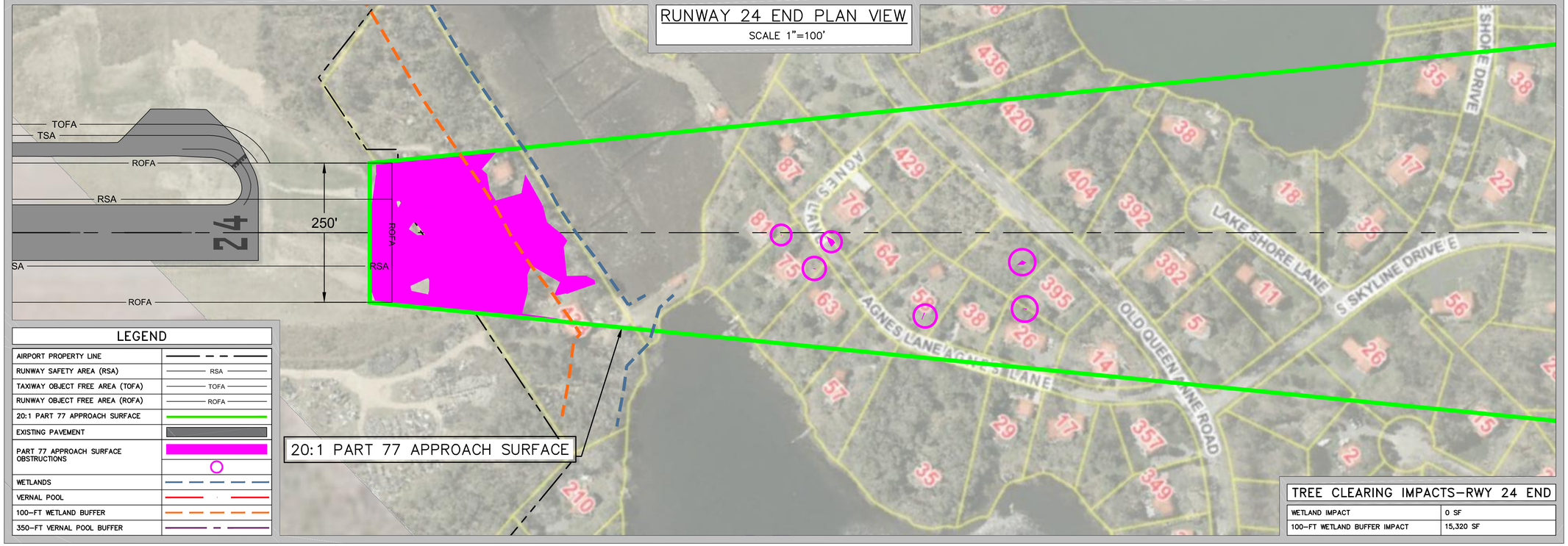
NON VEGETATIVE OBSTRUCTION TABLE		
	TYPE	STATUS
1	POLE OBSTRUCTION	(E)
2	SMOKESTACK/CHIMNEY OBSTRUCTION	(E)

RUNWAY 6 END PLAN VIEW
SCALE 1"=100'



TREE CLEARING IMPACTS–RWY 6 END	
VERNAL POOL IMPACT	0.4 SF
WETLAND IMPACT	920 SF
350–FT VERNAL POOL BUFFER IMPACT	74,570 SF
100–FT WETLAND BUFFER IMPACT	14,960 SF

RUNWAY 24 END PLAN VIEW
SCALE 1"=100'



LEGEND	
AIRPORT PROPERTY LINE	
RUNWAY SAFETY AREA (RSA)	RSA
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA
20:1 PART 77 APPROACH SURFACE	
EXISTING PAVEMENT	
PART 77 APPROACH SURFACE OBSTRUCTIONS	
WETLANDS	
VERNAL POOL	
100–FT WETLAND BUFFER	
350–FT VERNAL POOL BUFFER	

TREE CLEARING IMPACTS–RWY 24 END	
WETLAND IMPACT	0 SF
100–FT WETLAND BUFFER IMPACT	15,320 SF

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NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	ID
DRAWN BY	ID
CHECKED BY	MPC
DATE	SEPT, 2018

GRAPHIC SCALE
0 100 200
SCALE: 1" = 100'

SHEET TITLE
MAINTAIN EXISTING PART 77 APPROACHES

DRAWING NO.
FIG. 6–2

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6.3.3 ALTERNATIVE 2 – ESTABLISH A NON-PRECISION (STRAIGHT-IN) INSTRUMENT APPROACH

Alternative 2 evaluates the necessary obstruction removal and costs associated with establishing a non-precision (straight-in) instrument approach at CQX using Part 77 clearing standards, as outlined in Chapter 5, *Table 5-5: Non-Precision Instrument Runway Part 77 Compliance*.

In addition to establishing clear approaches, as outlined later in this section, the Airport must comply with primary and transitional surface dimension requirements for non-precision runways. This includes widening the primary surface from 250 feet to 500 feet. Due to the width increase of the primary surface, the starting point of the Airport's transitional surface is shifted 125 feet outward. See Figure 6-3.

Due to funding constraints, the obstruction analysis for this report was limited to the Airport's runway approach surfaces only, and therefore a detailed obstruction analysis of the Airport's primary and transitional surfaces was not conducted. However, a preliminary review of available information indicates additional obstructions to the transitional surface and primary surface that would likely require further mitigation (i.e. removal, relocation, or lighting). The following areas must be further investigated to determine associated impacts to the primary and/or transitional surfaces and required mitigation measures:

- Main apron paved tie-down spaces:
  - Approximately 6 paved tie-down spaces within the primary surface must be removed.
  - Paved tie-down spaces within the transitional surface must be further investigated to determine if mitigation is required (e.g. additional paved tie-down removal, reconfiguration of aircraft parking to head-in only, construction of additional apron space in a different location, etc.).
- Turf tie-down spaces:
  - Approximately 28 turf tie-down spaces within the primary surface must be removed.
  - Turf tie-down spaces within the transitional surface must be further investigated to determine if mitigation is required (e.g. additional turf tie-down removal, reconfiguration of aircraft parking to head-in only, construction of additional turf tie-down spaces in a different location, etc.).
- Trees:
  - Trees and vegetation penetrating the primary surface must be removed (approximately 7.7 AC of tree removal, on and off Airport property, is required).
  - Trees located within the transitional surface must be further investigated to determine if removal or other mitigation measures are necessary.
- Perimeter fence:
  - Any section of fence penetrating the primary or transitional surface must be mitigated (e.g. relocated, lighted, etc.).
- Windcone and segmented circle:
  - The windcone and segmented circle, located within the primary and transitional surfaces, must be further investigated to determine if mitigation is required.
- Bike path:
  - Portions of the bike path located within the primary and transitional surfaces must be further investigated to determine if mitigation (e.g. relocation) is required.

- Fuel facility:
  - The fuel facility, located within the transitional surface, must be further investigated to determine if mitigation (e.g. lighting) is required.
- Baseball field:
  - The baseball field must be further investigated to determine if it will have an adverse impact to the transitional surface.
- Runway 24 end non-aeronautical storage area:
  - The storage area, located within the primary and transitional surfaces, must be further investigated to determine if mitigation is required.
- Other structures:
  - Structures located within the transitional surface must be further investigated to determine if they will have an adverse impact to the transitional surface.

In order for FAA Flight Procedures to establish a non-precision (straight-in) instrument approach to Runway 6-24, the Airport will need to plan for the removal or mitigation of obstructions from its approach surfaces as follows:

- Vegetative obstructions on Airport property.
- Vegetative obstructions on 22 privately-owned parcels.
- Vegetative obstructions on George Ryder Road, Agnes Lane, and Old Queen Anne Road (town right of ways).
- One chimney obstruction[7] on private property.
- Two pole obstructions[8] on George Ryder Road.
- The Airport must also arrange for the investigation, removal and mitigation of obstructions to the primary and transitional surfaces as outlined previously (see Figure 6-3).

A graphic representation of approach obstruction removal required for this alternative can be found in Figure 6-4.

Coordination efforts required by the Airport for this alternative, in addition to obstruction removal identified above, include but are not necessarily limited to:

- Coordination for the design of a proposed new approach procedure with FAA Flight Procedures.
- Community engagement prior to publishing the new approach procedure to give the public an opportunity to provide reasonable, meaningful input regarding proposed approaches, and consultation with FAA Flight Procedures to determine the validity of said input.

Operational Impacts

- Requires the Airport to install non-precision runway markings.

[7] This chimney obstruction, identified by the aerial survey on a private parcel off of the Runway 06 end, appears to have been removed since the time of the survey. Additional investigation is required to confirm that this chimney is no longer an obstruction.

[8] These obstructions consist of two poles with power lines. The mitigation measure proposed as part of this alternative is to construct a separate pole with obstruction light in the vicinity of the obstructing poles.

- Non-precision runways are generally 3,200 feet in length. However, "Runways less than 3,200 feet are protected by Part 77 to a lesser extent. However, runways as short as 2,400 feet could support an instrument approach provided the lowest HATh (height above threshold) is based on clearing any 200-foot obstacle within the final approach segment."[9]
- Enhances airspace safety by providing a more accurate, direct, and unobstructed approach to Runway 6-24.
- Creates approaches compatible with new technology (e.g. GPS), thereby providing more precise guidance to the Airport and enhancing safety and accessibility of Runway 6-24.
- Allows the Airport to retain night operations.
- Allows the Airport to retain its 600-foot ceiling to Runway 6-24.
- Allows FAA Flight Procedures to consider reducing the Airport's ceiling to as low as 250 feet and 3/4 statute mile.
- Allows FAA Flight Procedures publish LNAV approaches to Runway 06 and Runway 24.

Environmental Impacts

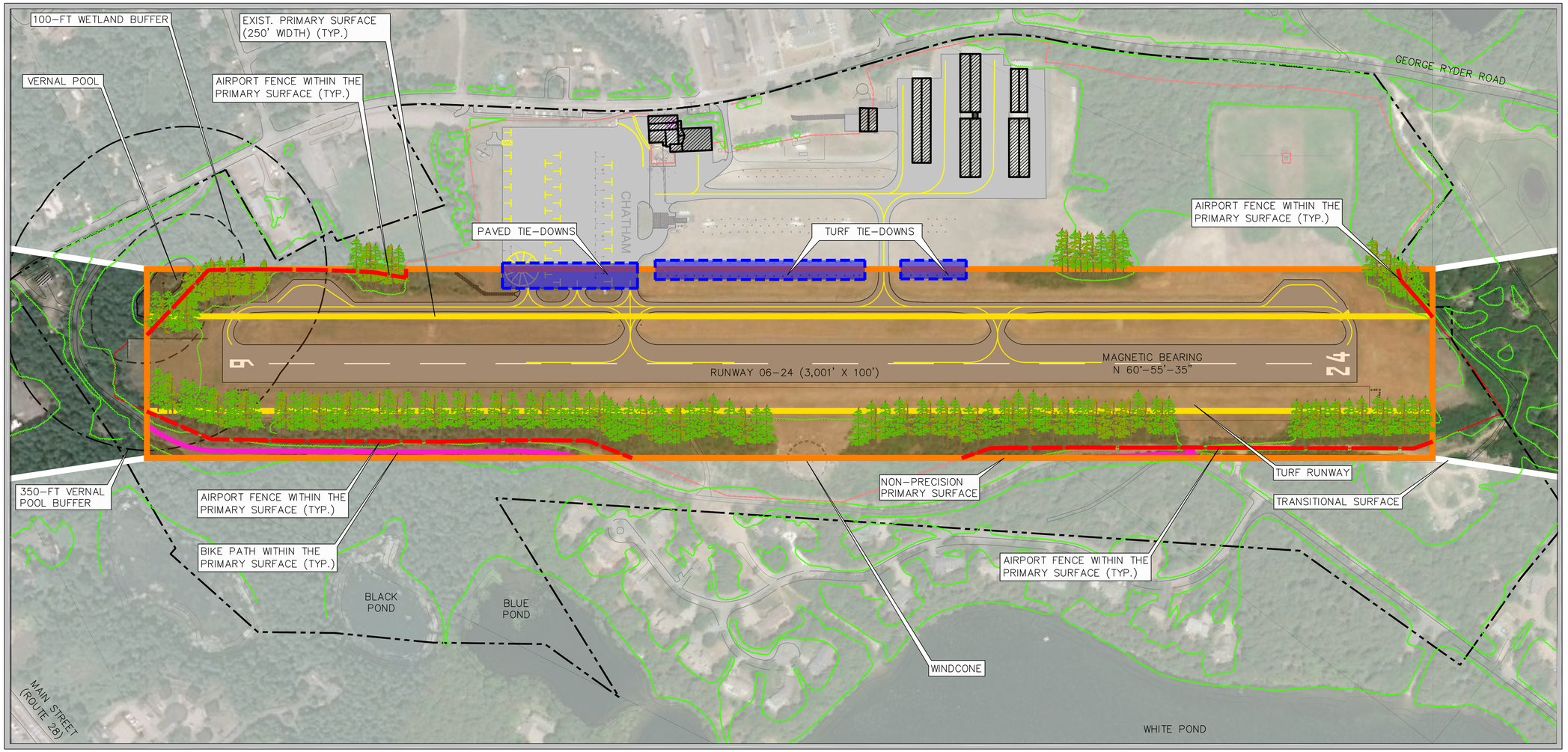
- Approximately 1,740 SF (0.04 AC) of temporary wetland impacts related to vegetative obstruction clearing.
- Approximately 162 SF of temporary vernal pool impacts related to vegetative obstruction clearing.
- Approximately 60,900 SF (1.4 AC) of temporary wetland buffer impacts related to vegetative obstruction clearing efforts.
- Approximately 126,200 SF (2.9 AC) of temporary vernal pool buffer impacts related to vegetative obstruction clearing efforts.

Other Impacts or Considerations

- EA, VMP, OOC/NOI, CCC Coordination.
- 22 avigation easement acquisitions required for this alternative.
- Approximately 8 AC of vegetative obstruction clearing from the Runway 6-24 approaches.
- Positions the Airport to retain its existing client base, thereby preserving community revenue generated from landside sources (e.g. fuel, rental cars, etc.) and tourism (e.g. restaurants, hotels, property rentals, etc.).
- Estimated Cost:

Runway 06 Easement Acquisitions	$895,000 (9 Easements)
Runway 24 Easement Acquisitions	$1,055,000 (13 Easements)
Runway 06-24 Obstruction Removal	$400,000
Cost of Permits	$90,000
TOTAL	**$2,440,000**

[9] FAA AC 150/5300-13A, Airport Design



PART 77 NON-PRECISION PRIMARY AND TRANSITIONAL SURFACES

SCALE: 1" = 150'

LEGEND

ITEM	(E) EXISTING
AIRPORT PROPERTY LINE	
BUILDINGS	
PAVEMENT	
MAIN APRON	
NON-PRECISION PRIMARY SURFACE (500' WIDE)	
EXIST. PRIMARY SURFACE (250' WIDE)	
TRANSITIONAL SURFACE	
8' CHAINLINK FENCE WITH BARBWIRE OUTSIDE OF THE PRIMARY SURFACE	
TREES IN PRIMARY SURFACE	
EXISTING TREE LINE	

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NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	DCQ
DRAWN BY	DCQ
CHECKED BY	MPC
DATE	APRIL, 2019

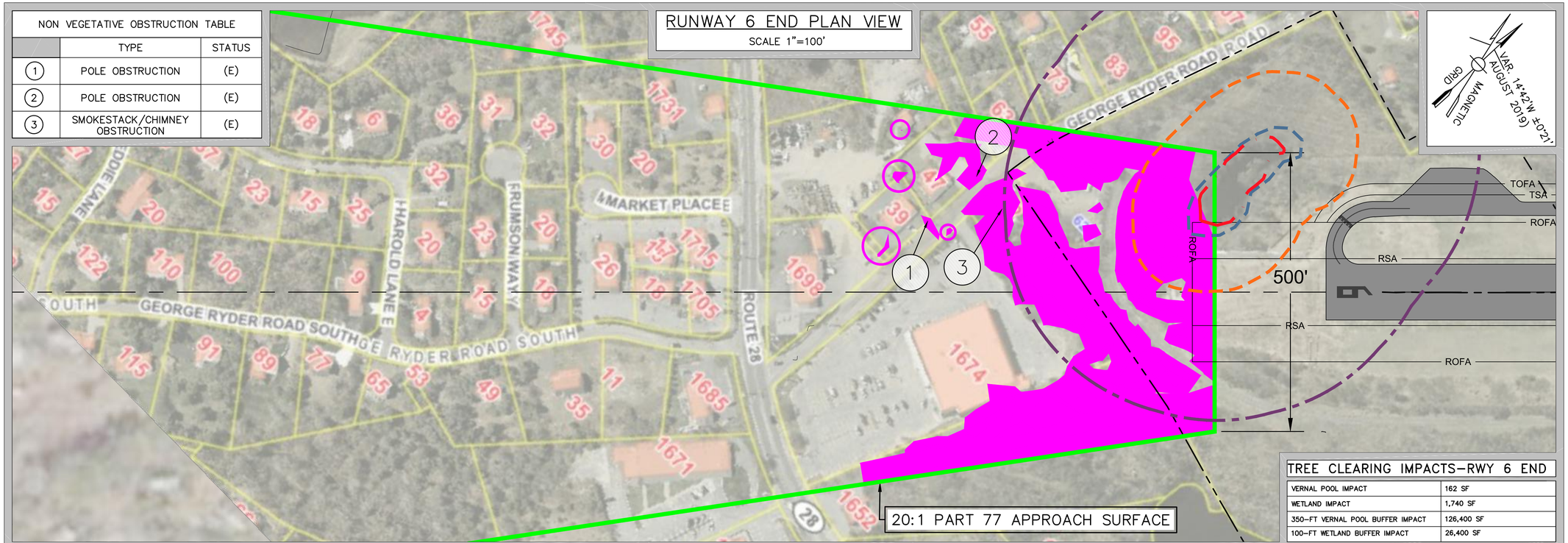
GRAPHIC SCALE
0 75 150 300
SCALE: 1" = 150

SHEET TITLE
PART 77 NON-PRECISION PRIMARY AND TRANSITIONAL SURFACES

DRAWING NO.
FIG 6-3

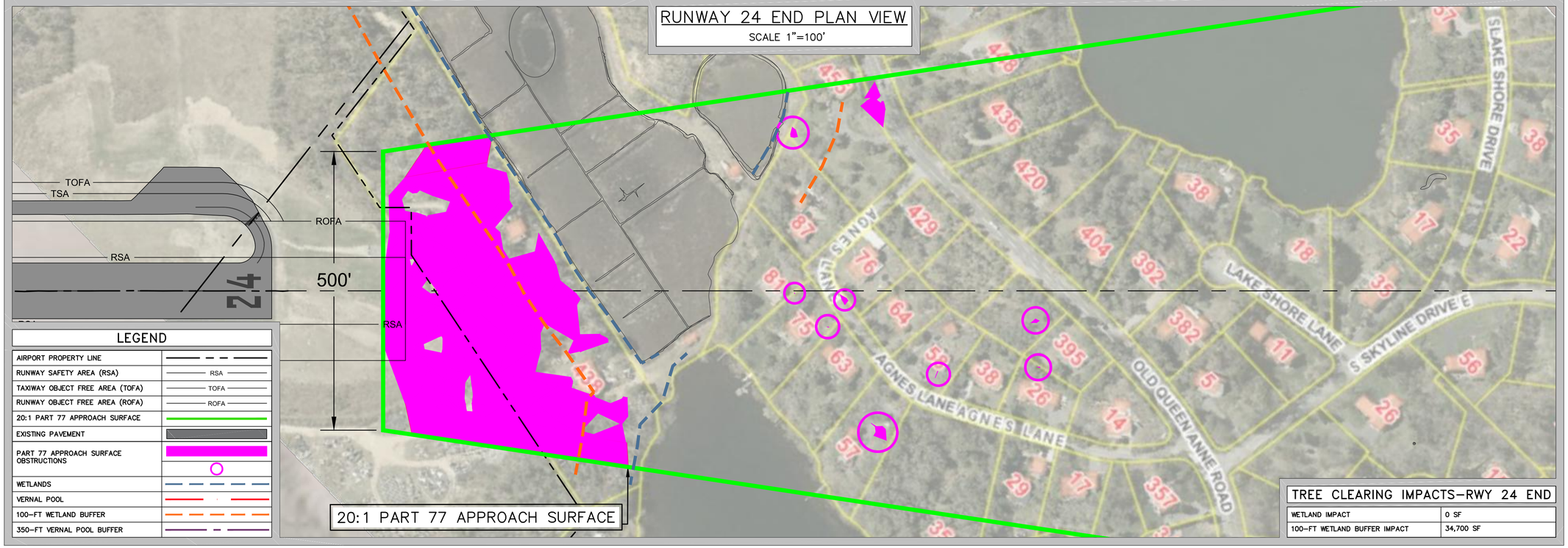
NON VEGETATIVE OBSTRUCTION TABLE		
	TYPE	STATUS
1	POLE OBSTRUCTION	(E)
2	POLE OBSTRUCTION	(E)
3	SMOKESTACK/CHIMNEY OBSTRUCTION	(E)

RUNWAY 6 END PLAN VIEW
SCALE 1"=100'



TREE CLEARING IMPACTS–RWY 6 END	
VERNAL POOL IMPACT	162 SF
WETLAND IMPACT	1,740 SF
350–FT VERNAL POOL BUFFER IMPACT	126,400 SF
100–FT WETLAND BUFFER IMPACT	26,400 SF

RUNWAY 24 END PLAN VIEW
SCALE 1"=100'



LEGEND	
AIRPORT PROPERTY LINE	
RUNWAY SAFETY AREA (RSA)	RSA
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA
20:1 PART 77 APPROACH SURFACE	
EXISTING PAVEMENT	
PART 77 APPROACH SURFACE OBSTRUCTIONS	
WETLANDS	
VERNAL POOL	
100–FT WETLAND BUFFER	
350–FT VERNAL POOL BUFFER	

TREE CLEARING IMPACTS–RWY 24 END	
WETLAND IMPACT	0 SF
100–FT WETLAND BUFFER IMPACT	34,700 SF

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PROJECT NO.	777064
DESIGNED BY	ID
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CHECKED BY	MPC
DATE	SEPT, 2018

GRAPHIC SCALE
0 100 200
SCALE: 1" = 100'

SHEET TITLE
ESTABLISH NON–PRECISION (STRAIGHT–IN) PART 77 APPROACH

DRAWING NO.
FIG. 6–4

8/1/2019 6:02:25 PM U:\777064 COX AMPU_MPC\Obstruction Analysis\Obstruction Drawings\03-777064-COX-ALP-Proposed Part 77 Non Precision Instrument type 'A'.dwg (DCG)

6.3.4 ALTERNATIVE 3 – ESTABLISH A NON-PRECISION (STRAIGHT-IN) INSTRUMENT APPROACH WITH VERTICAL GUIDANCE

Alternative 3 evaluates the necessary obstruction removal and costs associated with establishing a non-precision (straight-in) instrument approach with vertical guidance at CQX using Part 77 and Glideslope Qualification Surface (GQS) approach clearing standards. In order for FAA Flight Procedures to establish a non-precision (straight-in) approach with vertical guidance to Runway 6-24, the Airport will need to plan for the investigation/removal/mitigation of obstructions as follows:

- Investigation and/or mitigation of obstructions to the Primary and Transitional surfaces as outlined in section 6.3.3 and identified in Figure 6-3.
- FAA Part 77 obstructions in accordance with dimensions for a non-precision approach.
- Glidepath Qualification Surface (GQS) obstructions.

A graphic representation of approach obstruction removal required for this alternative can be found in Figure 6-5.

Coordination efforts required by the Airport for this alternative, in addition to obstruction removal referenced above, include but are not necessarily limited to:

- Coordination for the design of a proposed new approach procedure with FAA Flight Procedures.
- Community engagement prior to publishing the new approach procedure to give the public an opportunity to provide reasonable, meaningful input regarding proposed approaches, and consultation with FAA Flight Procedures to determine the validity of said input.

Operational Impacts

- Requires the Airport to install non-precision runway markings.
- Per FAA AC 150/5300-13A, approach procedures with vertical guidance require a runway length of at least 3,200 feet, with a width of at least 60 feet. Where an extension to the Airport's existing 3,001-foot runway is not practicable, this alternative would require the Airport to coordinate with FAA to determine what approvals may be needed with respect to runway length less than 3,200 feet to support a non-precision approach procedure with vertical guidance.
- Creates approaches compatible with new technology (e.g. GPS), thereby providing more precise guidance to the Airport and enhancing safety and accessibility of Runway 6-24.
- Enhances airspace safety by enabling a continuous descent final approach guidance for pilots into Runway 6-24. Vertically guided approaches provide a significant safety improvement over non-vertically guided approaches, as vertical guidance means that pilots are able to use GPS navigation to follow an even approach plane from a considerable distance away from the Airport with a decision altitude as low as 200 feet. This use of GPS technology lowers the margin of human error for pilots approaching the Airport.
- Allows the Airport to retain night operations.
- Allows FAA Flight Procedures to consider establishment of 460-foot ceiling on the Runway 24 end and 250-foot ceiling on the Runway 06 end, as estimated by FAA Flight Procedures.
- Allows FAA Flight Procedures to publish LPV approaches to Runway 6-24.

Environmental Impacts

- Approximately 1,740 SF (0.04 AC) of temporary wetland impacts related to vegetative obstruction clearing in Part 77 and GQS approach surfaces.
- Approximately 149 SF of temporary vernal pool impacts related to vegetative obstruction clearing in Part 77 and GQS approach surfaces.
- Approximately 61,500 SF (1.4 AC) of temporary wetland buffer impacts related to vegetative obstruction clearing efforts in Part 77 and GQS approach surfaces.
- Approximately 123,500 SF (2.8 AC) of temporary vernal pool buffer impacts related to vegetative obstruction clearing efforts in Part 77 and GQS approach surfaces.

Other Impacts or Considerations

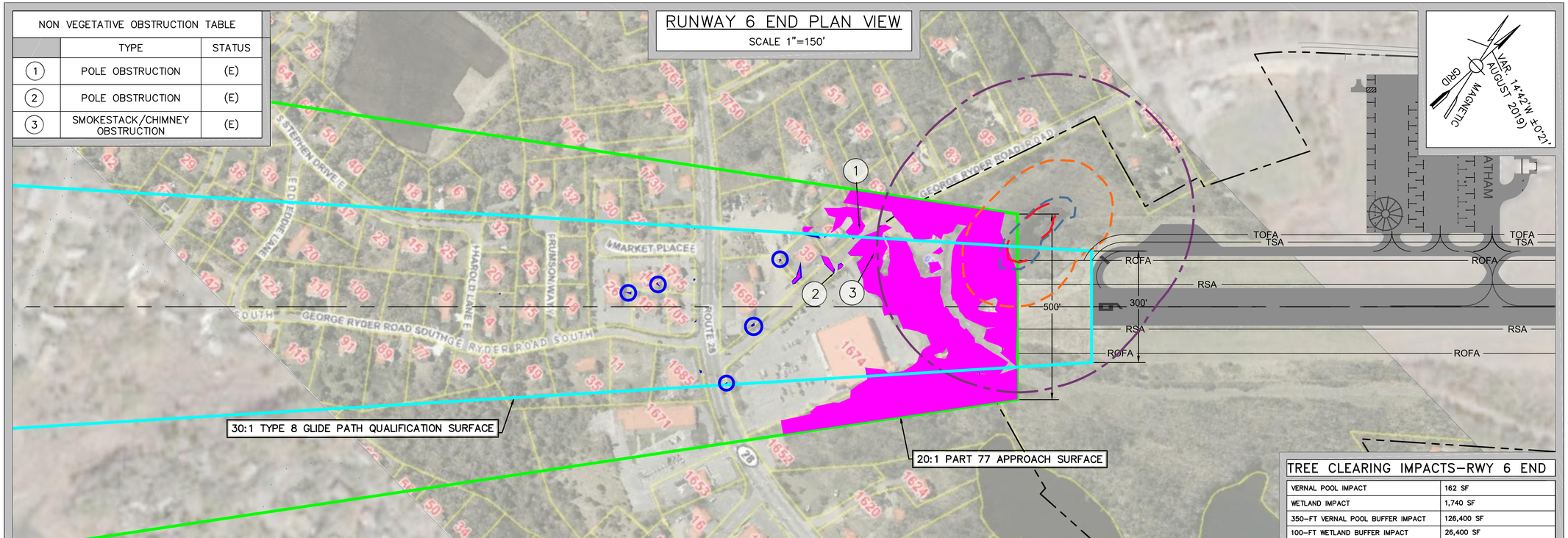
- EA, VMP, OOC/NOI, CCC Coordination.
- This alternative assumes that the Airport will pursue easements over 22 parcels containing obstructions to the FAA Part 77 approach surface in accordance with non-precision requirements **PLUS** an additional 24 easements over parcels containing obstructions to the GQS surfaces.
- This alternative assumes approximately 8 AC of vegetative obstruction removal from the Part 77 approach surfaces **PLUS** approximately 8.1 AC of additional vegetative obstruction clearing from the GQS approach surfaces.
- Allows the Airport to retain its existing client base, thereby preserving community revenue generated from landside sources (e.g. fuel, rental cars, etc.) and tourism (e.g. restaurants, hotels, property rentals, etc.).
- Estimated Cost:

Part 77 Easement Acquisitions Runway 06	$895,000[10] (9 Easements)
Part 77 Easement Acquisitions Runway 24	$1,055,000 (13 Easements)
Part 77 Obstruction Removal in Approaches	$490,000[11]
GQS Easement Acquisitions Runway 06	$230,000[12] (3 Easements)
GQS Easement Acquisitions Runway 24	$2,360,000[13] (21 Easements)
GQS Obstruction Removal in Approaches	$125,000[14]
Cost of Permits for GQS Surfaces	$45,000[15]
TOTAL	**$5,200,000 (Local Share: $260,000)**

[10] Part easement cost estimates, taken from Alternative 2, include costs for project development and grant administration.
[11] Obstruction removal cost estimate, taken from Alternative 2, includes costs for project development and administration, design, bidding, and resident engineering.
[12] This cost estimate includes efforts for the acquisition of the 24 additional GQS easements only. Costs for project development and grant administration included in the Alternative 2 easement total only.
[13] This cost estimate includes efforts for the acquisition of the 24 additional GQS easements only. Costs for project development and grant administration included in the Alternative 2 easement total only.
[14] This cost estimate includes efforts for the clearing of vegetative obstructions on GQS easements only. Costs for Part 77 approach surface obstruction removal, project development and administration, design, bidding, and resident engineering included in the Alternative 2 obstruction removal total only.
[15] This cost estimate includes permitting efforts for the clearing of vegetative obstructions on GQS easements only. Costs for permitting Alternative 2 obstruction removal is included in the Part 77 total.

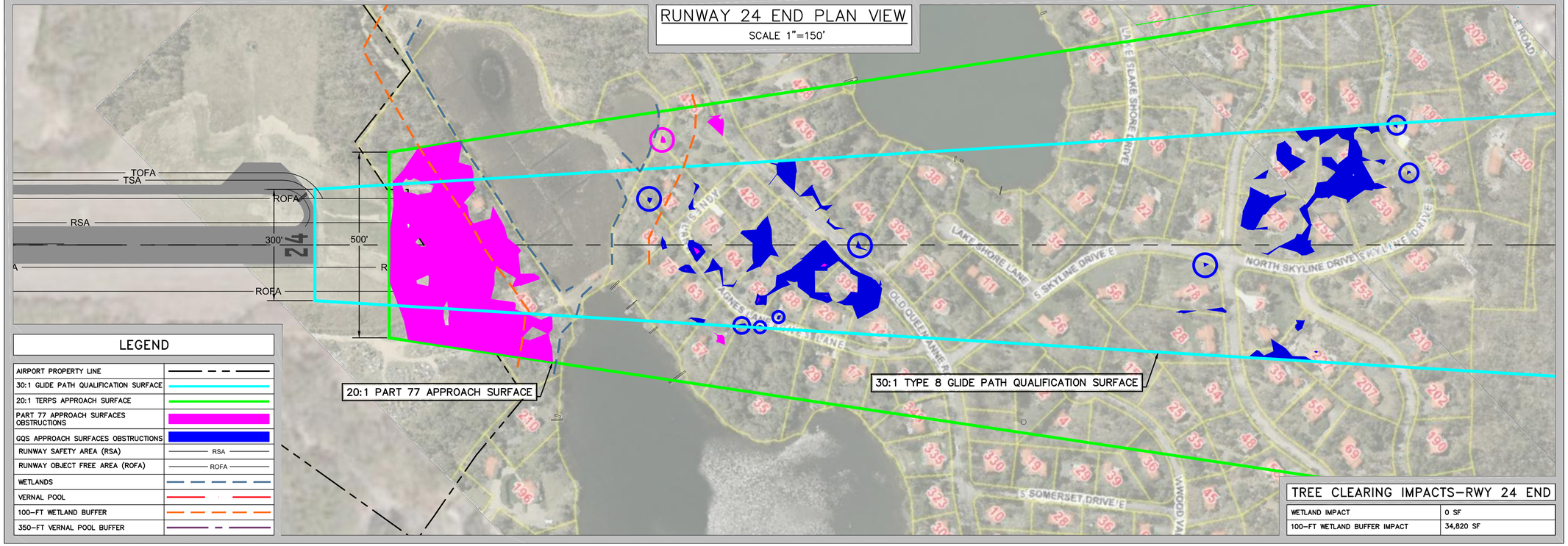
NON VEGETATIVE OBSTRUCTION TABLE		
	TYPE	STATUS
1	POLE OBSTRUCTION	(E)
2	POLE OBSTRUCTION	(E)
3	SMOKESTACK/CHIMNEY OBSTRUCTION	(E)

RUNWAY 6 END PLAN VIEW
SCALE 1"=150'



TREE CLEARING IMPACTS–RWY 6 END	
VERNAL POOL IMPACT	162 SF
WETLAND IMPACT	1,740 SF
350–FT VERNAL POOL BUFFER IMPACT	126,400 SF
100–FT WETLAND BUFFER IMPACT	26,400 SF

RUNWAY 24 END PLAN VIEW
SCALE 1"=150'



TREE CLEARING IMPACTS–RWY 24 END	
WETLAND IMPACT	0 SF
100–FT WETLAND BUFFER IMPACT	34,820 SF

LEGEND

AIRPORT PROPERTY LINE	
30:1 GLIDE PATH QUALIFICATION SURFACE	
20:1 TERPS APPROACH SURFACE	
PART 77 APPROACH SURFACES OBSTRUCTIONS	
GQS APPROACH SURFACES OBSTRUCTIONS	
RUNWAY SAFETY AREA (RSA)	RSA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA
WETLANDS	
VERNAL POOL	
100–FT WETLAND BUFFER	
350–FT VERNAL POOL BUFFER	

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3–25–0015–23–2018

OWNER
CHATHAM MUNICIPAL AIRPORT
TOWN OF CHATHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	ID
DRAWN BY	ID
CHECKED BY	MPC
DATE	APRIL, 2019

GRAPHIC SCALE
0 150 300
SCALE: 1" = 150'

SHEET TITLE
ESTABLISH NON–PRECISION (STRAIGHT–IN) APPROACH WITH VERTICAL GUIDANCE (PART 77 AND GQS STANDARDS)

DRAWING NO.
FIG. 6–5

6/21/2019 9:41:14 AM U:\777064 COX AMPU_MPC\Obstruction Analysis\Obstruction Drawings\07-777064-COX-ALP-Proposed GQS and PART 77 approaches.dwg (ID)

6.3.5 PREFERRED APPROACH CLEARING ALTERNATIVE

After careful consideration, the Airport Commission has selected Alternative 3- *Establish a Non-Precision (Straight-In) Instrument Approach with Vertical Guidance* as the preferred approach alternative. This alternative will require coordination with the FAA to determine what approvals may be required with respect to runway length less than 3,200 feet to support a non-precision approach procedure with vertical guidance. However, it addresses and complies with FAA Grant Assurances by taking appropriate action to assure that the Airport's airspace, as required to protect instrument and visual operations, will be adequately cleared and protected by removing, lowering, relocating, marking, lighting, or otherwise mitigating existing hazards.

As highlighted in Chapter 5, Section 5.1.2.10 *Glideslope Qualification Surface,* and Chapter 6, Section 6.3.4, Alternative 3 requires additional obstruction removal on approximately 24 privately owned properties to comply with the requirements of a GQS surface (30:1 slope) as outlined in FAA AC 150/5300-13A. However, recognizing the potential impact additional obstruction removal for a GQS surface may have on the neighboring community, the Airport Commission does not wish to pursue this level of clearing. It is the intention of the Airport Commission to coordinate with FAA Flight Procedures and examine whether a procedure could be developed on less than a 30:1 GQS slope to eliminate the need for obstruction removal on the additional parcels. Preliminary discussions with FAA Flight Procedures indicate that such alternatives may be possible.

Alternative 3, the preferred approach alternative, enables the Airport to coordinate with FAA Flight Procedures in examining an LPV approach to Runway 6-24, which is outside the scope of this study. Among the benefits, the implementation of an LPV approach has the potential to reduce a pilot's workload by allowing a stabilized straight-in descent from several miles away. The result is a far higher safety factor than is afforded with the current circling approaches. A secondary benefit is the lower noise profile generated by aircraft on a steady descent at a constant low power setting. The use of precise satellite-based GPS navigation also saves costs by obviating the need for ground-based transmitters at the Airport.

6.4 ADMINISTRATION BUILDING ALTERNATIVES

As highlighted in Chapter 5, the Airport's existing administration building is aging and in need of repair or replacement. Additionally, in its current configuration, there are safety and security concerns with several uncontrolled access points that lead directly onto the Main and Terminal Aprons and subsequent aircraft movement areas. One uncontrolled access point is located on George Ryder Road, and the other two uncontrolled access points are located in the outdoor seating area. The following sections offer two alternatives (plus a No Action Alternative) to address these issues, including renovating the existing building and constructing a new building.

6.4.1 NO ACTION ADMINISTRATION BUILDING ALTERNATIVE

The No Action Alternative assumes that the administration building remains in its current configuration with no improvements. The purpose of this alternative is to provide a baseline alternative on which to compare subsequent alternatives and examine the impacts of leaving the administration building in its existing configuration.

Environmental Impacts:

- Because no construction will take place as part of this alternative, no environmental resources will be impacted by implementing this alternative, and therefore no permitting efforts will be required.

Operational Impacts:

- The Airport's three uncontrolled access points remain in place, leaving associated security and safety concerns unaddressed.
- Airport Management continues to lack adequate office, storage, and meeting space.
- The building continues to violate Americans with Disabilities Act (ADA) compliance requirements (e.g. the existing entrance from the sidewalk to the main door requires airport users and restaurant patrons to travel down a set of stairs, there is a step up to the main door of the building, the only access to the second-floor restaurant is via a set of stairs, etc.).
- The building fails to meet building codes identified in the 2003 AMPU[16].
- The existing gravel parking lot continues to limit the Airport's ability to maximize the number of available parking spaces.
- The Airport continues to lack delineated vehicle parking spaces inside the fence, creating potential to conflict with aircraft movement areas as parking areas remain undefined.

Other Impacts or Considerations:

- No construction will take place as part of this alternative, and therefore, no financial resources will be required to implement this alternative.

[16] https://www.chatham-ma.gov/sites/chathamma/files/uploads/cqx_final_ampu.pdf

6.4.2 ALTERNATIVE 1 – RENOVATION OF EXISTING ADMINISTRATION BUILDING AND CONSTRUCTION OF VEHICLE PARKING LOT

This alternative is for the renovation of the existing administration building to include updated and reconfigured office, meeting, and flight planning space; removal of uncontrolled access points to the airfield located on George Ryder Road and in the restaurant's outdoor seating area; and construction of automobile parking both inside and outside of the fence, between the administration building and the SRE building. Uncontrolled access points will be removed by constructing a new, ADA-accessible entrance outside of the fence on George Ryder Road, replacing fencing in the outdoor seating area with 8-foot high security fence, and installing keypads or card readers on all gates leading from the seating area onto the airfield. For a graphic representation of this alternative, refer to Figure 6-6.

Operational Impacts:

- Avoids constructing a stand-alone facility, leaving the area of Airport property between the rear hangar and the SRE building available for the construction of other facilities in the future.
- Reconfigures office, storage, and flight planning space.
- Addresses security concerns by removing uncontrolled access points.
- Brings existing administration building into compliance with ADA standards.
- Maximizes the number of vehicles able to park in the Airport's parking lot by constructing a paved, delineated lot in the area of the existing gravel parking lot.
- Enhances safety by providing parking spaces inside the fence to clearly differentiate between automobile parking areas and aircraft movement areas.
- Requires the Airport administrative offices and restaurant to close during renovation activities.

Environmental Impacts:

- No anticipated wetland impacts.
- Approximately 34,000 square feet of additional impervious surface.

Other Impacts or Considerations:

- Order of Conditions, Notice of Intent, and Coordination with Cape Cod Commission.
- Building permits.
- Estimated Cost:

Administration Building Renovation	$3,085,000[17]
Cost of Permits	$5,000
TOTAL	**$3,090,000**

[17] Estimated administration building renovation with auto parking area from 2003 AMPU calculated at $2,228,000. 2019 project cost calculated using inflation rate calculator from U.S. Department of Labor, Bureau of Labor Statistics: https://www.bls.gov/data/inflation_calculator.htm

6.4.3 ALTERNATIVE 2 – CONSTRUCTION OF NEW ADMINISTRATION BUILDING AND VEHICLE PARKING LOT

This project is for the construction of a new administration building between the rear hangar and the SRE storage building. The updated facility will be designed to meet current building and handicap access codes and will include controlled access points, a transient aircraft apron adjacent to the new building, a new parking lot outside of the fence, and adequate space for offices, storage, flight planning, pilots lounge, and restaurant. For a graphic representation of this project, refer to Figure 6-6.

Operational Impacts:

- Addresses existing building code and ADA access issues.
- Provides direct line-of-sight from the new building to the transient aircraft parking area and fuel facility for monitoring by Airport management.
- Expands office, storage, flight planning, pilot lounge, and restaurant space.
- Removes uncontrolled access points to the airfield.
- Provides a clearly delineated parking lot for vehicles.
- Does not require Airport administrative offices or restaurant to close during construction.

Environmental Impacts:

- No anticipated wetland impacts.
- Approximately 78,000 square feet of additional impervious surface.
- Building permits.

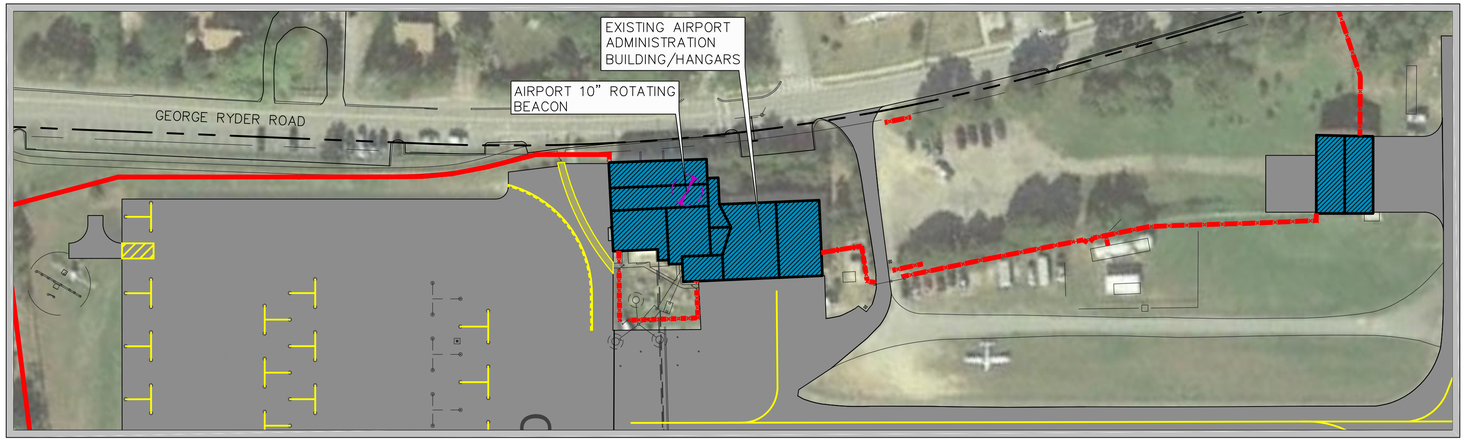
Other Impacts or Considerations:

- Order of Conditions, Notice of Intent, and Coordination with Cape Cod Commission.
- Building permits.
- Estimated Cost:

Administration Building Construction	$4,600,000
Cost of Permits	$15,000
TOTAL	**$4,615,000**

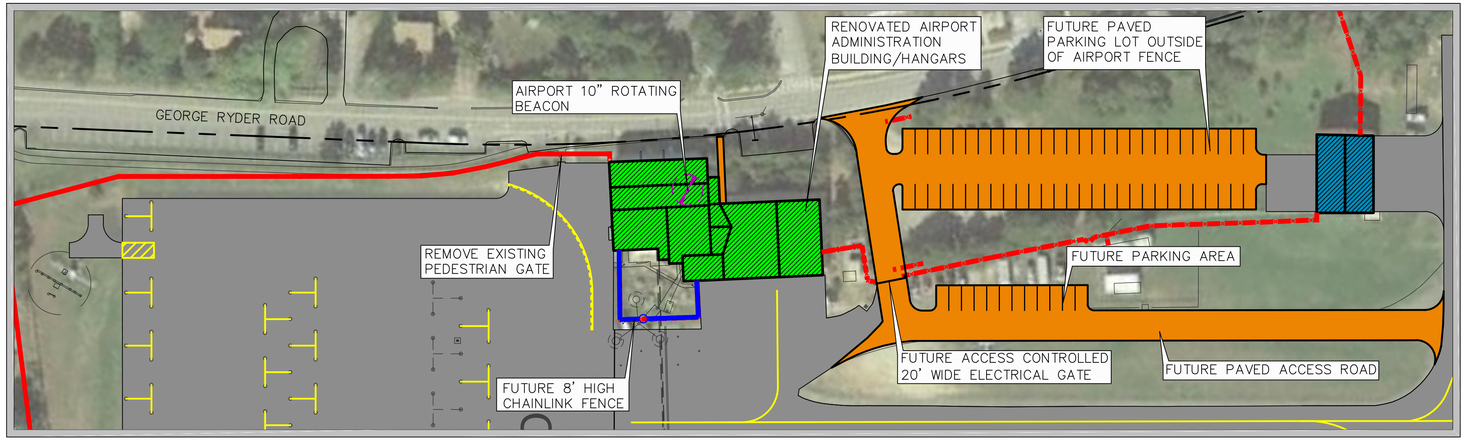
6.4.4 PREFERRED ADMINISTRATION BUILDING ALTERNATIVE

Alternative 2 has been selected as Airport Commission's preferred Administration Building Alternative. Alternative 2 addresses building code, ADA access, and uncontrolled access point issues. It also expands available office, storage, flight planning, pilot lounge, and restaurant space for Airport users and tenants and provides the public with an upgraded, attractive town facility. From an operational standpoint, Alternative 2 does not require the Airport's administrative offices or restaurant to close for renovations. This allows the Airport to remain functional during construction and avoids disrupting Airport users. Further, Alternative 2 includes construction of additional apron spaces within the line of sight of management offices to account for spaces lost when upgrading the Airport's approaches, where the renovation alternative does not provide the Airport with any additional apron spaces. Currently, CQX is on the MassDOT/AD Statewide Airport Administration Building (SAAB) schedule for administration building design in FY-2023 and construction in FY-2024. Under the existing program, approved buildings are funded by MassDOT at 95 percent, requiring a 5 percent local share.



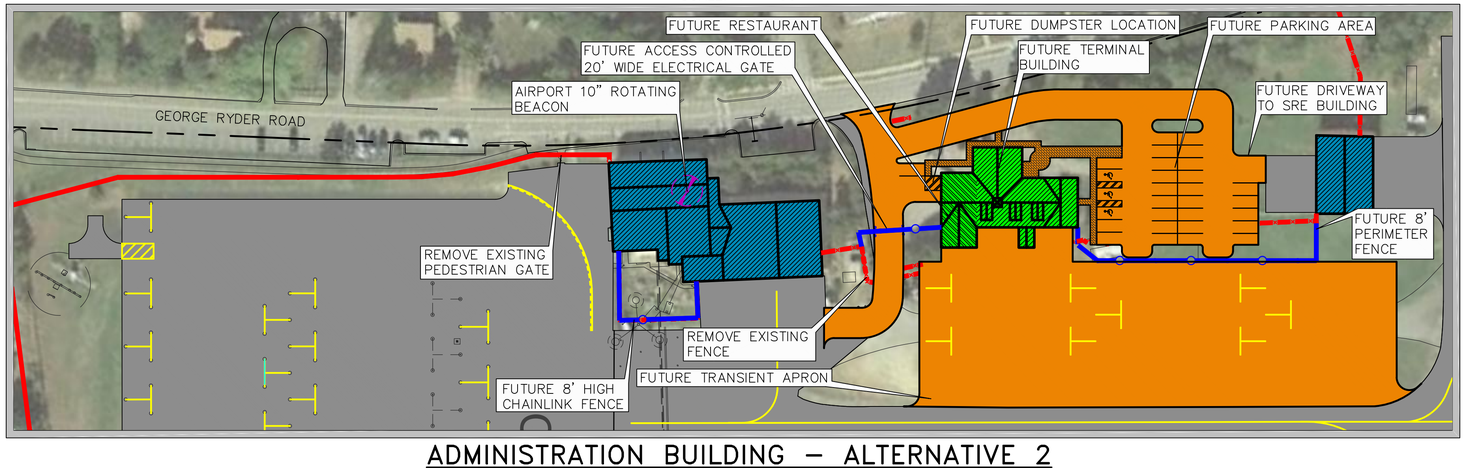
ADMINISTRATION BUILDING – NO BUILD

SCALE: 1" = 60'



ADMINISTRATION BUILDING – ALTERNATIVE 1

SCALE: 1" = 60'

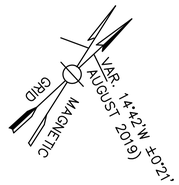


ADMINISTRATION BUILDING – ALTERNATIVE 2

SCALE: 1" = 60'

LEGEND

ITEM	(E) EXISTING	(F) FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS/HANGARS		
PAVEMENT		
8' CHAINLINK FENCE		



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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-25-0015-23-2018

OWNER
CHATHAM MUNICIPAL AIRPORT
TOWN OF CHATHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	DCQ
DRAWN BY	DCQ
CHECKED BY	MPC
DATE	APRIL, 2019

GRAPHIC SCALE
0 30 60 120
SCALE: 1" = 60'

SHEET TITLE
ADMINISTRATION BUILDING ALTERNATIVES

DRAWING NO.
FIG 6-6

6.5 HANGAR ALTERNATIVES

As highlighted in Chapter 5, the Airport's existing aircraft hangar buildings are at capacity, and demand for additional units is present. The following sections offer two alternatives (plus a no action alternative) to construct additional hangar units to meet this demand. This includes constructing two T-hangar buildings with vehicle parking adjacent to the existing hangar complex and constructing a new hangar complex with vehicle parking in the nondirectional beacon (NDB) area, following decommissioning of the NDB.

6.5.1 NO ACTION HANGAR ALTERNATIVE

The No Action Hangar Alternative presumes that no action will be taken to construct additional hangar facilities to address capacity requirements, as highlighted in Chapter 5, Facility Requirements. The purpose of this alternative is to provide a baseline alternative on which to compare subsequent alternatives and examine the impacts associated with not constructing additional hangar units.

Operational Impacts:

- The Airport continues to lack the adequate infrastructure to fulfill existing demand for hangar units.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted by implementing this alternative, and therefore no permitting efforts will be required.

Other Impacts or Considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required to implement this alternative.
- Revenue remains limited to that generated from existing hangar units.

6.5.2 ALTERNATIVE 1 – CONSTRUCTION OF T-HANGAR BUILDINGS ADJACENT TO H-3 HANGARS

This project is for the construction of two (2) T-hangar buildings (approximately 22 units) with vehicle parking to the north of the existing H-3 T-hangar row, including access taxilanes, and a small vehicle parking area adjacent to the SRE building. For a graphic representation of this project, refer to Figure 6-7.

Operational Impacts:

- The project area for this proposed alterative is currently vacant, allowing the Airport to address hangar capacity in the short-term.
- Enhances safety by providing parking spaces inside the fence to clearly differentiate between automobile parking areas and aircraft movement areas.
- This alternative constructs approximately 22 additional hangar units.

Environmental Impacts:

- No anticipated wetland impacts.
- Approximately 118,500 square feet of additional impervious surface.
- Coordination with Cape Cod Commission.
- Cost of Permits: $15,000.

Other Impacts or Considerations:

- Requires geotechnical investigation of project area to confirm suitable soils as there is a significant elevation change in a portion of this area.
- Construction of T-hangar facilities provides additional revenue for the Airport.
- It is anticipated that the new T-hangars will be funded by private developers and that the Airport will incur no costs associated with their construction.

6.5.3 ALTERNATIVE 2 – CONSTRUCTION OF HANGAR COMPLEX IN NDB AREA

This project is for the construction of a hangar complex in the area of land currently occupied by the NDB to include a combination of T-hangars and box hangars, as well as connecting taxilanes and vehicle parking along the perimeter fence, following the decommissioning of the NDB. For a graphic representation of this project, refer to Figure 6-7.

Operational Impacts:

- The project area for this proposed alternative is currently occupied by the NDB, requiring the Airport to leave existing hangar needs unaddressed until such time that a new approach is established and the NDB is decommissioned.
- Enhances safety by providing parking spaces inside the fence to clearly differentiate between automobile parking areas and aircraft movement areas.
- This alternative constructs approximately 49 additional hangar units.

Environmental Impacts:

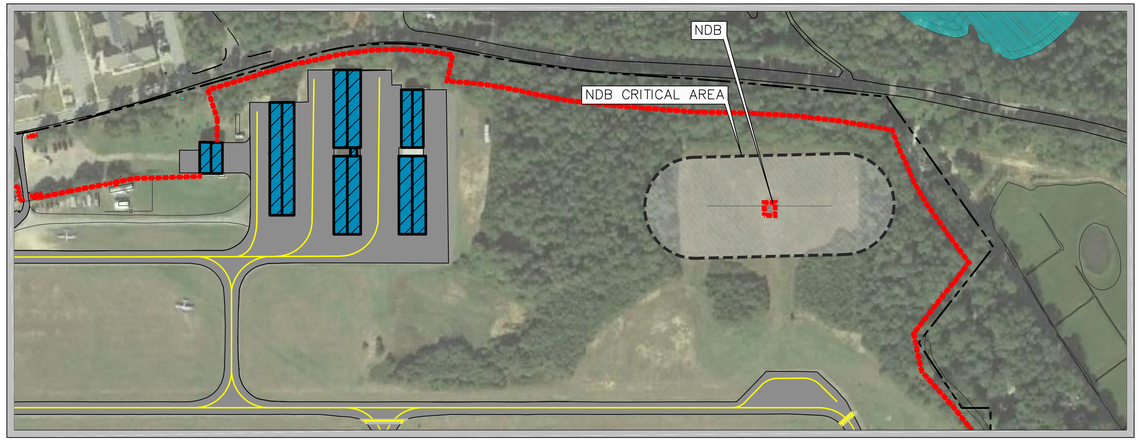
- No anticipated wetland impacts.
- Approximately 309,500 square feet of additional impervious surface.
- Coordination with Cape Cod Commission.
- Cost of Permits: $30,000.

Other Impacts or Considerations:

- Requires geotechnical investigation of project area to confirm suitable soils as there is a significant elevation change in a portion of this area.
- Construction of a hangar complex provides additional revenue for the Airport.
- It is anticipated that the new hangar complex will be funded by private developers and that the Airport will incur no costs associated with their construction.

6.5.4 PREFERRED HANGAR ALTERNATIVE

As the Airport's current hangar buildings are full and demand for additional hangar units is present, the Airport Commission has selected Alternative 1 as its preferred hangar alternative. Alternative 1 was selected because it provides approximately 22 additional hangar units and constructs additional parking inside the fence to enhance safety by clearly differentiating between vehicle parking and aircraft movement areas. It was determined that Alternative 2 was not practical, as the Airport would like to leave the NDB area available for other potential revenue generating projects, such as solar.



HANGAR – NO BUILD

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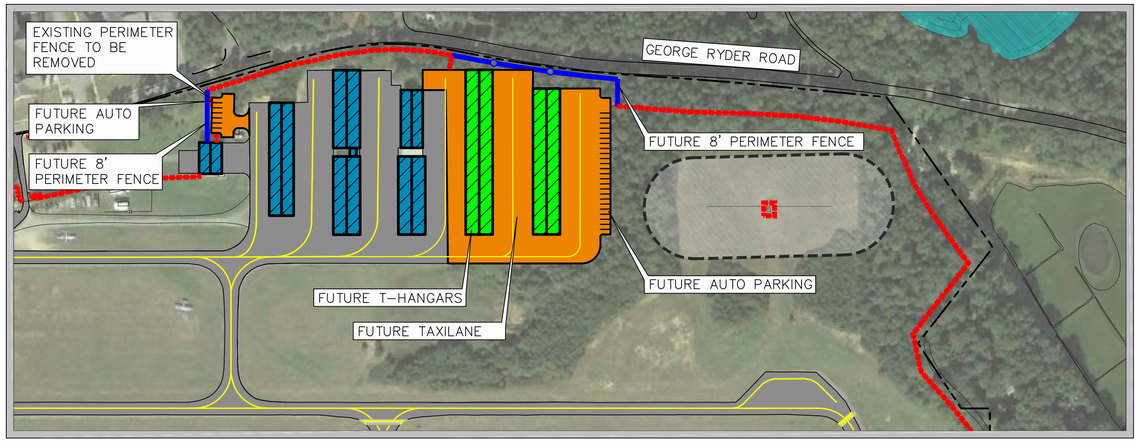
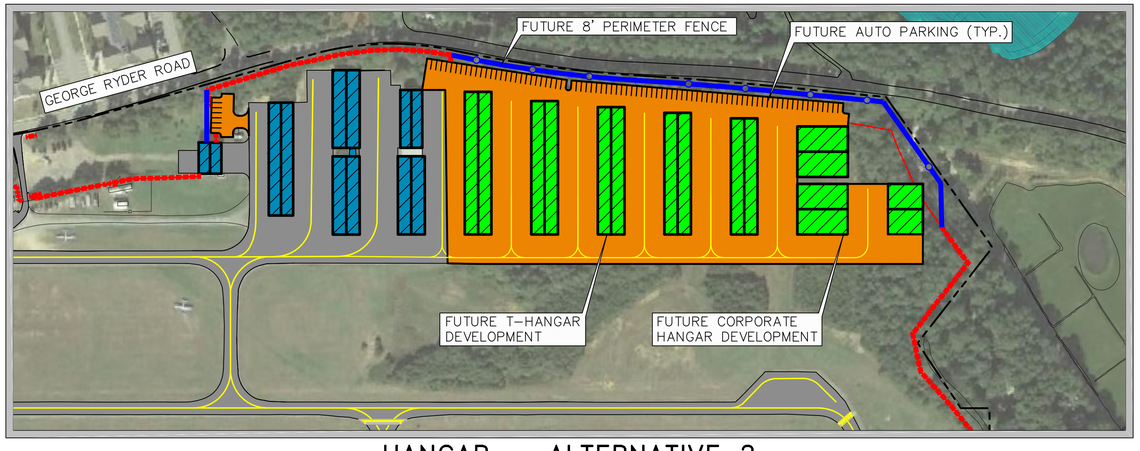


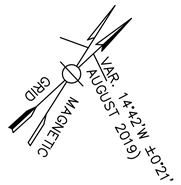
HANGAR – ALTERNATIVE 1

SCALE: 1" = 150'



HANGAR – ALTERNATIVE 2

SCALE: 1" = 150'



NOTES:

1) THE NDB SHALL BE DECOMMISSIONED FOR ALTERNATIVE 2

LEGEND

ITEM	(E) EXISTING	(F) FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS/HANGARS		
PAVEMENT		
8' CHAINLINK FENCE		

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NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
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DATE	APRIL, 2019

GRAPHIC SCALE
0 75 150 300
SCALE: 1" = 150'

SHEET TITLE
HANGAR ALTERNATIVES

DRAWING NO.
FIG 6-7

6.6 FUEL FACILITY ALTERNATIVES

As highlighted in Chapter 5, the Airport's Jet-A mobile refueler with 3,000-gallon capacity is limiting the Airport's ability to meet increasing demand for Jet-A fuel, as highlighted in Chapter 4. The following sections offer a no-action scenario and one alternative to construct a fixed Jet-A fuel facility.

6.6.1 NO ACTION FUEL FACILITY ALTERNATIVE

The no action Jet-A fuel facility alternative presumes that the Airport will not construct fixed Jet-A fuel facility, as highlighted in Chapter 5. The purpose of this alternative is to provide a baseline alternative on which to compare subsequent alternatives and examine the impacts associated with leaving the Airport's existing Jet-A fuel capacity issues unaddressed.

Operational Impacts:

- The Airport continues to risk running out of fuel during time of peak aviation activity due to inadequate fuel storage capacity.

Environmental Impacts:

- Because no construction will take place as part of this alternative, no environmental resources will be impacted by implementing this alternative, and therefore no permitting efforts will be required.

Other Impacts or Considerations:

- The Airport Manager continues to purchase fuel in small amounts (3,000 gallons per delivery), paying a fee for each delivery.
- Unnecessary delivery fees continue to be reflected in fuel prices and passed on to Airport users.
- No construction will take place as part of this scenario, and therefore, no financial resources will be required to implement this alternative.

6.6.2 ALTERNATIVE 1 – CONSTRUCTION OF FIXED JET-A FUEL FACILITY

This project is for the construction of a fixed Jet-A fuel facility consisting of one (1) 10,000-gallon storage tank with fueling apron in the area adjacent to the existing 100-LL fuel facility to meet increasing demand for Jet-A fuel, as outlined in Chapter 5, Facility Requirements. For a graphic representation of this project, refer to Figure 6-8.

Operational Impacts:

- The increase in fuel storage capacity reduces the Airport's risk of running out of fuel during peak activity.

Environmental Impacts:

- No anticipated wetland impacts.
- New fuel facility with updated containment system provides increased environmental protection.
- Risk of fuel spillage is reduced due to fewer deliveries.
- Approximately 440 square feet of additional impervious surface.

- Coordination with Cape Cod Commission.

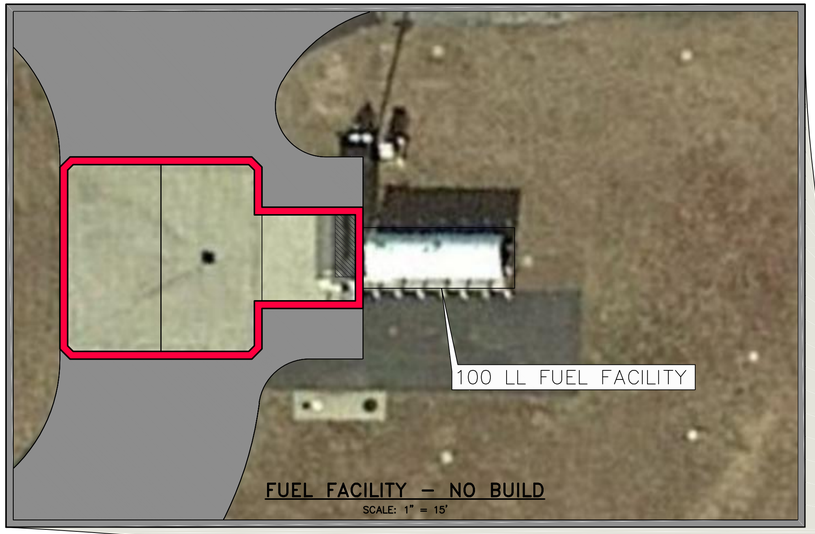
Other Impacts or Considerations:

- Delivery cost savings between $2,400 and $4,500 per year due to increased fuel capacity from 3,000 gallons to 10,000 gallons.
- Delivery cost savings can be reflected in fuel prices and passed on to Airport users and Airport stakeholders.
- The Commission can consider negotiating a fuel flowage fee for Jet-A fuel to generate revenue for the funding of future projects.
- The construction of a jet-A fuel facility is eligible for AIP funding; however, only nonprimary entitlements may be used. Further, the sponsor must certify that all airfield needs have been accommodated before the FAA can fund a revenue-producing aeronautical support facility.
- Estimated Cost:

Jet-A Fuel Facility Construction	$800,000
Cost of Permits	$5,000
TOTAL	**$805,000 (Local Share: $40,250)**

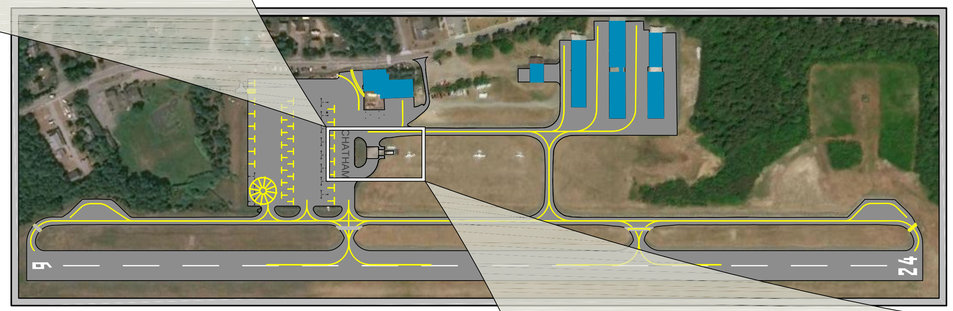
6.6.3 PREFERRED FUEL FACILITY ALTERNATIVE

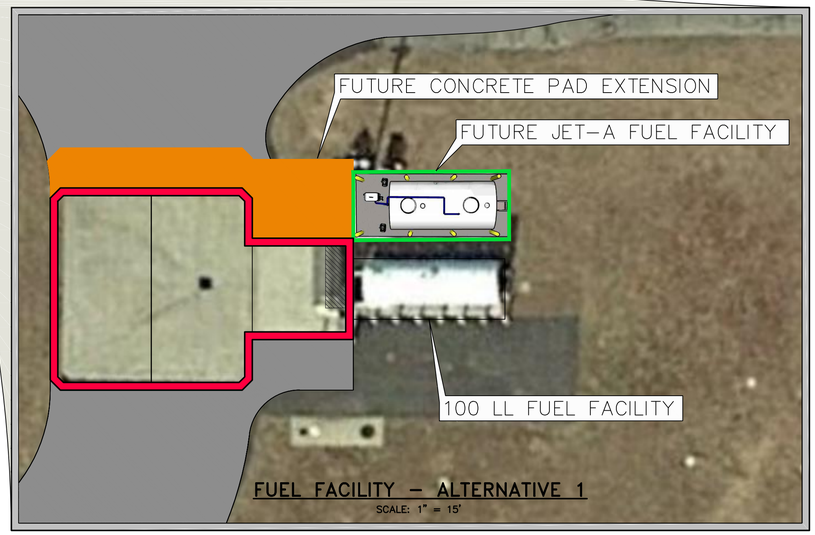
Since the Airport began offering jet-A fuel via fuel truck in 2016, demand has risen steeply (i.e. 7,100 gallons sold in 2016 and 11,095 gallons sold in 2018). In response to this significant increase in demand, the Airport Commission has selected Alternative 1 as its preferred Fuel Facility Alternative. Construction of a new jet-A fuel facility allows the Airport to meet growing demand for jet fuel while lowering delivery costs by providing the tank capacity necessary to purchase larger quantities of fuel at one time (i.e. 3,000-gallon fuel truck capacity vs. 10,000-gallon fixed-tank capacity). Delivery cost savings can then be passed on to Airport stakeholders and Airport users. Further, Alternative 1 also reduces environmental risks by constructing an updated containment system and cutting down on the number of fuel deliveries and potential for fuel spills.



FUEL FACILITY – NO BUILD

SCALE: 1" = 15'



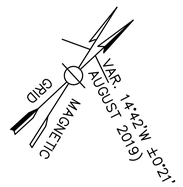


FUEL FACILITY – ALTERNATIVE 1

SCALE: 1" = 15'

LEGEND

ITEM	(E) EXISTING	(F) FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS/HANGARS		
PAVEMENT		
8' CHAINLINK FENCE		
CONCRETE PAD – FUEL AREA		
JET-A FUEL FACILITY		



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PREPARED FOR:

PROJECT

AIRPORT MASTER PLAN UPDATE
AIP NO. 3-25-0015-23-2018

OWNER

CHATHAM MUNICIPAL AIRPORT
TOWN OF CHATHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	DCQ
DRAWN BY	DCQ
CHECKED BY	MPC
DATE	APRIL, 2019

GRAPHIC SCALE
0 7.5 15 30
SCALE: 1" = 15'

SHEET TITLE

FUEL FACILITY ALTERNATIVES

DRAWING NO.

FIG 6-8

6.7 LAND RESERVATION ALTERNATIVES

Any property, when described as part of an airport in an agreement with the United States, defined by an Airport Layout Plan (ALP), or listed on the Exhibit 'A' property map, is considered to be "dedicated" or obligated property for airport purposes by the terms of the agreement. In order to produce additional sources of revenue, the Airport may wish to reserve land for non-aeronautical purposes, such as the construction of a solar farm. Although leasing Airport land for non-aeronautical purposes is allowable, the Airport must obtain FAA approval in order to designate land for such use. Additionally, FAA places certain restrictions on non-aeronautical use of Airport land, including but not limited to, requiring that the proposed use be approved by FAA and that the property be used to generate revenue for the benefit of the Airport[18].

6.7.1 NO ACTION LAND RESERVATION ALTERNATIVE

The no action land reservation alternative presumes that no land will be designated for non-aeronautical purposes. Impacts of the no action alternative are presented below.

Environmental Impacts:

- Because no action will take place as part of this scenario, no environmental resources will be impacted by implementing this alternative, and therefore no permitting efforts will be required.

Other Impacts or Considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required to implement this alternative.
- The Airport limits its ability to pursue non-aeronautical projects in the area currently occupied by the NDB.
- Revenue generation at the Airport remains limited to existing uses.

[18] For additional requirements regarding non-aeronautical land use, refer to FAA Order 5190.6B, *FAA Airport Compliance Manual*, https://www.faa.gov/airports/resources/publications/orders/compliance_5190_6/media/5190_6b.pdf

6.7.2 ALTERNATIVE 1 – RESERVATION OF LAND FOR FUTURE NON-AERONAUTICAL DEVELOPMENT

This project consists of designating the following areas of land for non-aeronautical development:

- Area of land to the west the Runway 24 end (existing NDB area), following decommissioning of the NDB.
- Area of land to the east of the Runway 24 end (existing fishermen's storage area).

For a graphic representation of this project, refer to Figure 6-9. It is important to note that any property, when described as part of an airport in an agreement with the United States or defined by an Airport Layout Plan (ALP) or listed in the Exhibit 'A' property map, is considered to be "dedicated" or obligated property for airport purposes by the terms of the agreement. Airport land proposed to be designated for "non-aeronautical" purposes requires FAA approval.

Operational Impacts:

- Designation of land to the west of the Runway 24 end following the decommissioning of the NDB for non-aeronautical use gives the Airport the ability to pursue non-aviation revenue projects, including but not limited to the construction of a solar farm.
- Designation of land to the east of the Runway 24 end for non-aeronautical use gives the Airport the ability to lease the land for compatible non-aeronautical storage.

Environmental Impacts:

- The designation of land for non-aeronautical purposes does not present any environmental concerns; however, implementation of future projects has the potential to cause environmental impacts, which should be considered at the time of the project.
- Coordination with Cape Cod Commission.

Other Impacts or Considerations:

- Designation of land for non-aeronautical development requires FAA approval.
- Estimated Cost:

Land Release for Non-Aeronautical Development:	$20,000
Cost of Permits	$2,000
TOTAL	**$22,000**

6.7.3 ALTERNATIVE 2 – RESERVATION OF LAND FOR POTENTIAL FUTURE REVENUE DEVELOPMENT AND NON-AERONAUTICAL DEVELOPMENT

This project consists of designating the area of land to the west the Runway 24 end (existing NDB area), following decommissioning of the NDB, for revenue generating projects, and designating the area of land to the east of the Runway 24 end (existing fishermen's storage area) for non-aeronautical development.

Operational Impacts:

- Designation of land to the west of the Runway 24 end following the decommissioning of the NDB for potential future revenue development gives the Airport the ability to pursue aviation-related revenue generating projects in the future, such as the construction of hangar buildings.

- Designation of land to the east of the Runway 24 end for non-aeronautical use gives the Airport the ability to pursue non-aviation revenue projects, including but not limited to constructing a solar farm or leasing the land for the construction of compatible storage.

Environmental Impacts:

- The designation of land for potential future revenue development does not present any environmental concerns; however, implementation of future projects has the potential to cause environmental impacts, which should be considered at the time of the project.
- Coordination with Cape Cod Commission.

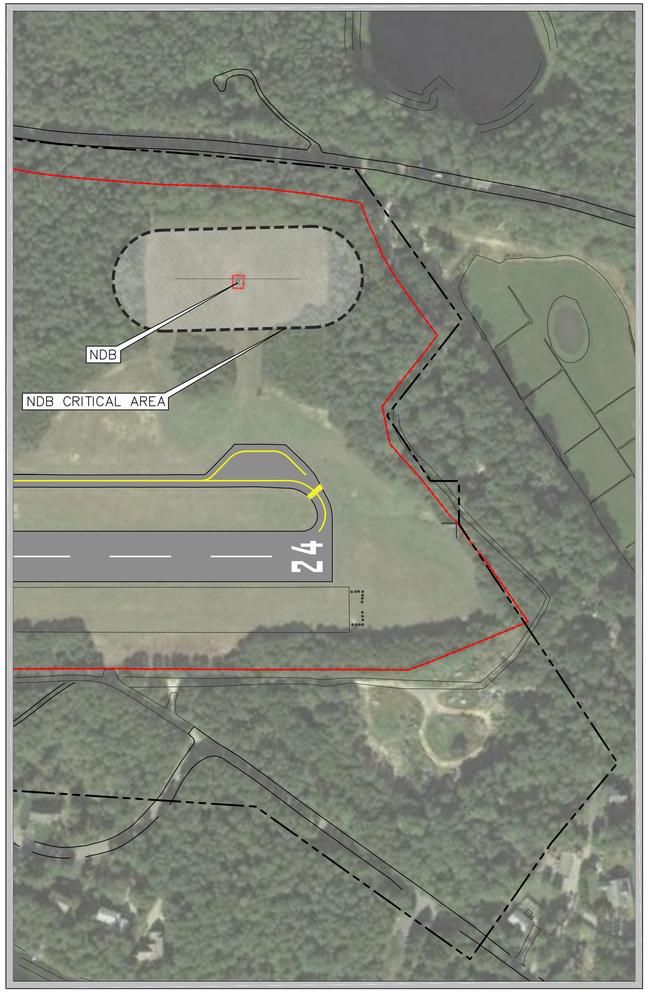
Other Impacts or Considerations:

- Designation of land for non-aeronautical development requires FAA approval.
- Estimated Cost:

Land Release for Non-Aeronautical Development:	$20,000
Cost of Permits	$2,000
TOTAL	**$22,000**

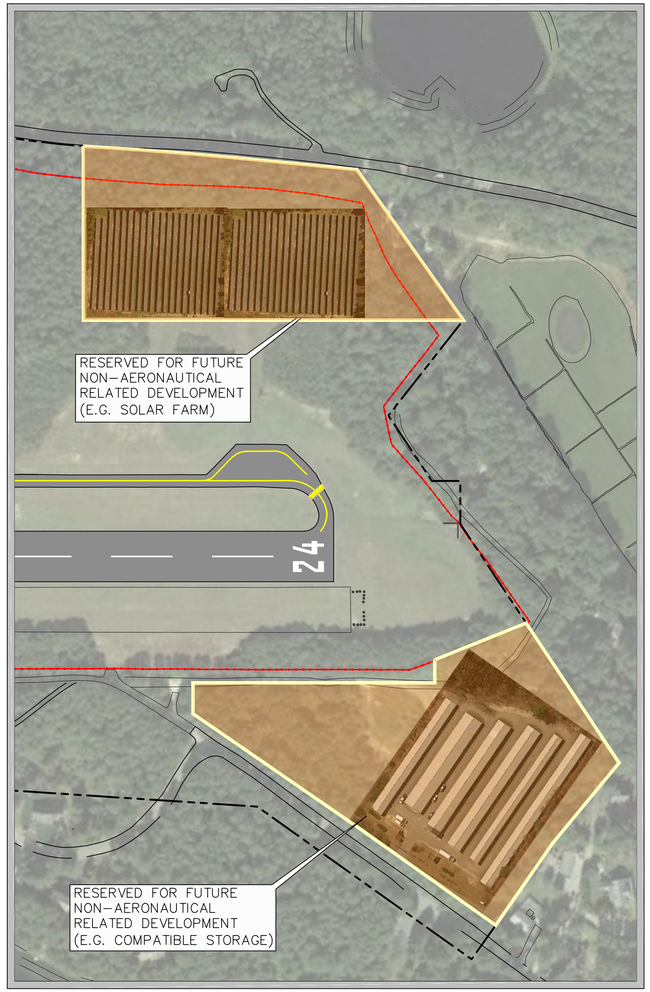
6.7.4 PREFERRED LAND RESERVATION ALTERNATIVE

In order to meet future goals for aeronautical and non-aeronautical revenue generating projects, the Airport Commission selected Alternative 2 as the preferred Land Reservation Alternative. Alternative 2 allows the Airport to pursue revenue-generating projects in the NDB area following the decommissioning of the NDB. Alternative 2 also allows the Airport to pursue non-aeronautical revenue-generating projects, such as compatible storage or a solar farm, in the area currently occupied by the fishermen's storage area.



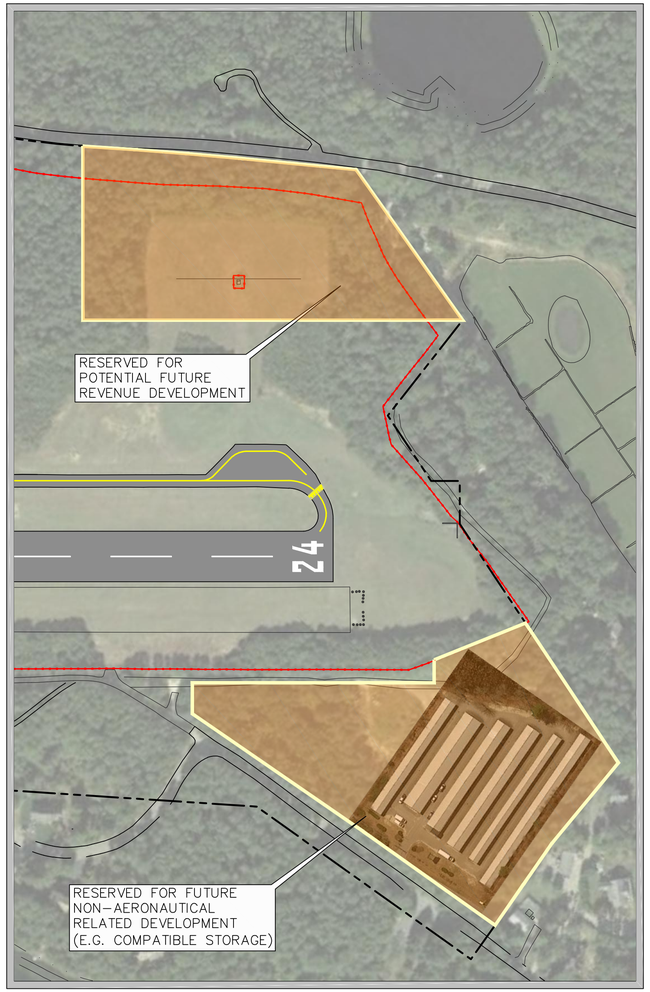
LAND RESERVATION – NO ACTION

SCALE: 1" = 150'



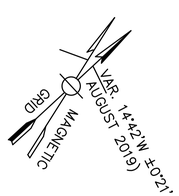
LAND RESERVATION – ALTERNATIVE 1

SCALE: 1" = 150'



LAND RESERVATION – ALTERNATIVE 2

SCALE: 1" = 150'



NOTES:

1) THE NDB SHALL BE DECOMMISSIONED FOR ALTERNATIVE 1 AND ALTERNATIVE 2

LEGEND

ITEM	(E) EXISTING	(F) FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS/HANGARS		
PAVEMENT		
8' CHAINLINK FENCE		

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PREPARED FOR:

PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-25-0015-23-2018

OWNER
CHATHAM MUNICIPAL AIRPORT
TOWN OF CHATHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	777064
DESIGNED BY	DCQ
DRAWN BY	DCQ
CHECKED BY	MPC
DATE	APRIL, 2019

GRAPHIC SCALE
0 75 150 300
SCALE: 1" = 150'

SHEET TITLE
LAND RESERVATION ALTERNATIVES

DRAWING NO.
FIG 6-9