

## SECTION 3 - ALTERNATIVES

### 3.0 RANGE OF ALTERNATIVES REVIEWED

This section reviews six development alternatives and their associated consequences to wetlands, stormwater quality, and airport operations. The purpose of this section is to evaluate a range of alternatives designed to address the Airport's need to upgrade its facilities so that they comply with current aviation standards while, at the same time demonstrate how each alternative succeeds in avoiding or minimizing impacts to wetlands and stormwater quality (impervious cover added by an alternative) specifically. Impacts, if any, to other environmental review categories are discussed in Section 4. The alternatives reviewed are:

#### **Alternative 1 – No Action**

No improvements are proposed in this alternative. This alternative represents the existing condition and is presented as a “baseline” case to which impacts of other alternatives may be compared.

#### **Alternative 2 – Reconstruct runway/taxiway and RSA in place**

This alternative:

- reconstructs the existing runway, parallel taxiway, RSA and MALSR in place so that the RSA complies with FAA standards;
- removes obstructions to the Part 77 surfaces;
- replaces the existing approach lighting system in place; and
- constructs 63 T-hangars in nine buildings located in the northwest quadrant of the Airport.

This alternative is presented to demonstrate the probable impacts of limiting improvements to compliance with RSA and obstruction clearance standards only.

#### **Alternative 3 – Reconstruct the runway 150 feet to northeast of its current location**

This alternative:

- shifts the runway centerline 150 feet to the northeast of its current location to achieve the standard runway-to-taxiway separation of 400 feet;
- reconstructs the runway;
- relocates the Runway 14 approach light system to align with the relocated Runway 14 approach;
- extends the Runway 14 end by 500 feet to achieve a total runway length of 6,000 feet;

- constructs standard RSAs (500 feet wide by 1,000 beyond each runway end); and
- removes obstructions to the Part 77 Surfaces; and constructs an additional 63 T-hangars in the northwest quadrant of the Airport.

**Alternative 4 – Reconstruct the runway 300 feet and the parallel taxiway 150 feet to the northeast of their current locations**

This alternative:

- shifts the runway centerline 300 feet to the northeast of its current location to achieve the standard runway-to-taxiway separation of 400 feet and to allow the existing runway to remain operational during construction of the proposed relocated runway;
- reconstructs the runway;
- relocates the approach light system to align with the relocated Runway 14;
- extends the Runway 14 end by 500 feet to achieve a total runway length of 6,000 feet;
- constructs standard RSAs (500 feet wide by 1,000 beyond each runway end);
- removes obstructions to the Part 77 surfaces;
- constructs an additional 63 T-hangars in the northwest quadrant of the Airport; and
- expands the Main Apron to accommodate an additional 68 outdoor, aircraft parking tie-down spaces.

**Alternative 4a – Reconstruct the runway 300 feet and the parallel taxiway 150 feet to the northeast of their current locations and use “Declared Distances”**

This alternative:

- represents a modification to Alternative 4, where the Runway 14 end is extended by 150 feet (instead of 500 feet), and a 350 foot segment of the Runway 32 RSA is paved and declared distances are used to achieve 6,000 feet of available take-off distance when departing from Runway 32; and
- except for the modifications discussed above, this alternative includes all of the improvements reviewed in Alternative 4.

The purpose of this concept is to review the feasibility of further avoiding and minimizing wetland impacts at the Runway 14 end caused by construction of the RSA and the 500-foot runway extension.

**Alternative 4b – Same as Alternative 4a except that the Glideslope is relocated to the infield between the runway and taxiway**

This alternative

- Represents a modification to Alternative 4a. It proposes all the actions proposed in Alternative 4a but reviews the consequences of relocating the ILS Glideslope from the left side to the right side of the runway as viewed from an approaching aircraft (i.e., to the infield area between the runway and parallel taxiway).

The purpose of presenting this alternative is to determine whether it assists in further reducing wetland impacts.

The selection of these alternatives resulted from a review process that was conducted by the Client Group (FAA, NHDOT/BA and the Airport) during several feasibility studies prepared for the Airport since 1999. During these studies, development options that appeared impracticable or were clearly financially infeasible; or contrary to or in violation of FAA airport design standards or Federal regulations were dismissed without further review.

The alternatives are presented to determine which improvement scheme best addresses the following Airport needs with the least impact on the environment:

- The need to provide 6,000 feet of runway length for takeoff to enable greater efficiency in jet operations and to increase the margin of safety for aircraft operating at the Airport
- The need for FAA standard runway safety areas
- The need for FAA standard runway to taxiway separation
- The need to remove, lower or light all penetrating obstructions to the Airport's Part 77 surfaces, and to maintain those surfaces clear of obstructing vegetation into the future
- The need for additional aircraft parking spaces
- The need for aircraft hangars with suitable access for storage of small aircraft (aircraft with wingspans less than 40')

### **3.1 EVALUATION OF IMPACTS**

Each alternative is reviewed for its consequences to the Airport, its operations, natural resources, and other areas of concern, such as costs and environmental permitting requirements. Once an alternative is selected as preferred for implementation, a further evaluation including noise and other review parameters are presented in Section 4.

### 3.1.1 Consequences to Airport

Consequences to the Airport include the extent to which an alternative achieves compliance with FAA airport design standards and airspace regulations (TERPS and FAR Part 77), and whether an alternative may have a detrimental effect on aircraft operations or operational impacts to airport users. Some examples of consequences to the Airport and its operations may include, where appropriate, consequences to the Airport's compliance with FAA standards, operational safety, NAVAIDS, aircraft fuel efficiency, or airport capacity.

### 3.1.2 Consequences to Environmental Resources

Consequences to natural and cultural resources include impacts to wetlands<sup>1</sup>, rare species habitat, water quality, and noise<sup>2</sup>.

*Note: In calculating impacts to wetlands caused by tree clearing activities necessary to maintain unobstructed airspace, the calculations likely overstate the area of wetland impacted. This is due to limitations in the method of tree top mapping where only the tallest tree is identified within a 100-foot grid even though there may be several shorter trees in the grid that will not require removal. For example, four 100-foot grids may indicate that approximately 40,000 square feet (or approximately one acre) of trees need removal where, in actuality, there may be only one or two obstructing trees in each quadrant that will be removed during actual tree clearing activities.*

### 3.1.3 Other Consequences Reviewed

Other consequences reviewed in the analysis include project costs, and environmental permitting requirements.

*Note: The total estimated project cost includes design, permitting, construction, and construction oversight costs for the reconstruction of the runway, reconstruction of the runway safety areas, installation of runway edge lights, and relocation of NAVAIDS (ILS, REILS, MALSR, PAPI).<sup>3</sup> Costs estimates do not include construction of the 63 T-hangars and associated infrastructure which is expected to be constructed using private funds.*

## 3.2 ALTERNATIVE 1 – NO ACTION

This alternative reviews the consequences of taking no action to implement the suite of improvements identified in the proposed action. This alternative maintains the runway and taxiway in their current location and at their current length and

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<sup>1</sup> The boundaries of wetlands which could potentially be impacted by Airport actions were delineated, surveyed and mapped in 2007 and 2008.

<sup>2</sup> A Phase 1 Reconnaissance Survey was conducted by the University of Massachusetts, Amherst, Archaeological Services in May 2008. The survey identified no areas of archaeological sensitivity in the areas where airport improvements are proposed.

<sup>3</sup> ILS = Instrument Landing System (Glideslope, Localizer & Outer Marker); REILS = Runway End Identification Lights; MALSR = Approach Light System; and PAPI = Precision Approach Path Indicator

proposes no improvements to RSAs, the runway/taxiway system or associated airspace; nor does it propose the construction of additional aircraft storage or parking capacity.

This alternative is presented as a “baseline” case upon which the impacts of other alternatives may be compared (see Figure 3-1).

### **3.2.1 No Action Alternative Consequences**

#### **3.2.1.1 Runway to Taxiway Separation**

This alternative fails to correct the deficient runway-to-taxiway separation distance. The existing separation distance is 250 feet and the FAA design standard for a runway with a DII classification is 400 feet.

According to the Design AC, the separation distance between a runway and a parallel taxiway is to “satisfy the requirement that no part of an aircraft (tail tip, wing tip) on taxiway/taxilane centerline is within the runway safety area or penetrates the obstacle free zone”<sup>4</sup>. Maintaining a non-standard runway to taxiway separation and taking no action to correct this deficiency perpetuates a violation of critical safety standards. Currently, an aircraft operating on the parallel taxiway is within the Runway Safety Area of Runway 14-32, presenting a safety and operational hazard, particularly in times of poor visibility or high crosswinds. Maintaining this non-standard condition violates the Airport’s Federal obligations and jeopardizes its eligibility for Federal funding. The FAA will not fund the reconstruction of a runway/taxiway system that does not meet basic safety standards.

#### **3.2.1.2 Runway Safety Areas**

This alternative fails to construct a standard RSA at the Runway 14 end and the Airport remains non-compliant with FAA RSA standards due to unstable soils (wetlands) and poor grading (steep depressions). The RSA at the Runway 32 end is in compliance with FAA standards.

For an ARC DII runway, the required RSA is 500 feet wide, centered on the runway centerline, and extends 1,000 feet beyond each runway end. According to FAA Order 5200.8, *Runway Safety Program*, “The RSA is intended to provide a measure of safety in the event of an aircraft’s excursion from the runway, significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer offs”. The Design AC states that “RSA standards cannot be modified or waived like other airport design standards...”<sup>5</sup> The RSA standard is the FAA’s highest priority for compliance when funding runway improvements. The FAA may in unusual circumstances grant a “runway safety area determination” allowing a safety area that does not meet standard. These determinations are very difficult to obtain and are usually granted when minor modifications are requested.

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<sup>4</sup> Advisory Circular (AC) 150/5300-13 CHG 13, paragraph 209 (a), 2/14/97

<sup>5</sup> Advisory Circular (AC) 150/5300-13 CHG 13, paragraph 305 (c), 10/1/02

The FAA standard for a RSA requires that the RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations; be drained by grading or storm sewers to prevent water accumulation; be capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and be free of objects, except for objects that need to be located in the runway safety area because of their function<sup>6</sup>.

### ***3.2.1.3 Runway Length***

This alternative maintains the existing runway length of 5,500 feet, approximately 1,300 feet less than required and 500 feet less than deemed necessary by the Airport, FAA and NHDOT/BA. This condition fails to provide adequate runway length for the types of aircraft that regularly use the runway and therefore, this alternative fails to improve the efficient operation of the many business jets that operated at the Airport. It also fails to enhance the margin of safety for aircraft operating on the runway. The relationship between aircraft safety, efficiency, and runway length is discussed fully in Section 2.1.2.

### ***3.2.1.4 Airspace and Protected Surfaces***

Approximately 26 acres of tree clearing is required under existing conditions to maintain protected surfaces in compliance with FAR Part 77. Under this alternative no vegetation maintenance is conducted, the Airport remains in violation of FAR Part 77 requirements.

Further there are buildings located on and off of Airport property that obstruct the FAR Part 77 Transitional Surface. Under this alternative, these obstructions remain un-mitigated and in violation of FAR Part 77 requirements.

This alternative fails to enhance safety for aircraft and the public by failing to remove obstructions from the Airport's protected airspace.

### ***3.2.1.5 Aircraft Accommodations***

No additional aircraft tie-down spaces or T-hangars are proposed in this alternative therefore this alternative fails to properly and safely accommodate its users the needs of its users.

### ***3.2.1.6 Environmental Impacts***

Since no construction is implemented, there are no environmental impacts resulting from implementation of this alternative.

### ***3.2.1.7 Environmental Permitting***

No environmental permitting is required for this alternative.

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<sup>6</sup> Advisory Circular (AC) 150/5300-13 CHG 13, paragraph 305 (a), 10/1/02

### **3.2.1.8 Estimated Project Costs**

Since this alternative does not propose improvements in the Airport's runway-taxiway infrastructure, there is no capital cost associated with this alternative. However, the lack of investment in the Airport infrastructure will lead to deteriorating safety conditions; additional future maintenance costs to maintain the runway in operable condition; and likely stresses to the airport's revenue base as operators of aircraft will seek airports offering safer conditions.

### **3.2.1.9 Federal Obligations**

By failing to correct identified safety and design deficiencies, this alternative directly violates prior agreements made between the City of Nashua and the Federal government. The Airport is a "Federally obligated" facility. This means that in return for accepting Federal grants, the Airport (and by extension, the City) agreed to maintain its aviation facilities in a safe and serviceable condition. With a diminished capacity to raise revenue and increasing infrastructure improvement and maintenance costs, this alternative imposes undue financial, legal and other hardships on the Airport and the City.

### **3.2.2 Alternative 1 - Summary**

Consequences of Alternative 1:

- Fails to comply with FAA standards for RSAs
- Fails to comply with FAA standards for airspace clearing requirements
- Fails to comply with FAA standard runway-to-taxiway separation
- Increases runway/taxiway maintenance costs and gradually decreases safety of operations; places further financial burden on Airport and City
- Could lead to closure of Airport
- Fails to provide an additional 500 feet of runway length
- Fails to provide additional outdoor and indoor aircraft parking spaces
- Violates the Airport's Federal obligations and jeopardizes the Airport's eligibility to receive Federal funds
- Does not add impervious surface nor disturb wetlands

### **3.3 ALTERNATIVE 2 – RECONSTRUCT RUNWAY/TAXIWAY AND RSA IN PLACE**

Improvements proposed in this alternative include (see Figure 3-2):

- Reconstruction of the existing runway, in place
- Reconstruct the RSA to FAA standards, in place
- Remove obstructions to the Part 77 surfaces
- Reconstruct the parallel taxiway, in place
- Replace the existing approach lighting system (MALSR) in place
- Construct 63 T-hangars in nine buildings proposed for construction in the northwest quadrant of the Airport

The purpose of this alternative is to determine the impacts to wetlands associated with reconstructing the runway, runway safety area, and taxiway system in place meeting only the FAA, RSA and obstruction removal standards.

### **3.3.1 Alternative 2 Consequences**

#### **3.3.1.1 Runway to Taxiway Separation**

This alternative does not correct the runway-to-taxiway separation distance, therefore the separation remains non-standard as in Alternative 1.

#### **3.3.1.2 Runway Safety Areas**

This alternative includes the reconstruction of the RSA to FAA standards, particularly the non-compliant Runway 14 end RSA, thereby substantially improving the safety characteristics of the runway environment.

#### **3.3.1.3 Runway Length**

This alternative maintains the existing runway length of 5,500 feet, approximately 500 short of the needed runway length and 1,300 fewer feet than recommended for the design airplane (GIV). It thereby fails to enhance operational efficiency and safety for aircraft by restricting runway length.

#### **3.3.1.4 Airspace & Protected Surfaces**

This alternative includes clearing approximately 23.8 acres of vegetative obstructions to the FAR Part 77 surfaces. Building obstructions located mostly to the north of the runway along the railroad track are expected to be mitigated through the use of obstruction lights since the penetrations are not severe and the acquisition of easements is economically infeasible due to the high value of the commercial properties involved. An FAA Aeronautical Study is underway to validate the use of obstruction lights to mitigate obstructions along the northeasterly side of the runway.

The obstruction removal and mitigation proposed in this alternative complies with FAA regulations.

#### **3.3.1.5 Environmental Impacts**

Construction of the 63 T-hangar complex in the northwest quadrant of the Airport increases impervious surfaces on the Airport by approximately 6.3 acres.

Construction of the Runway 14 end RSA results in approximately 11.1 acres of wetland impact through dredge and fill activity. The impacted wetlands are largely wet-meadow type wetlands that are mown routinely by Airport maintenance personnel. These wetlands have low functional value due to the regular maintenance (mowing), and they perform a minor localized flood control function along with providing some minor wildlife habitat value.

Tree clearing in wetlands required to remove obstructions results in approximately 23.8 acres of impact. These impacted wetlands located near the northeasterly airport property line (abutting the railroad tracks) are forested wetlands that have moderate functional value as wildlife habitat and localized flood control. Tree clearing is required in this wetland to remove vegetation that is obstructing the FAR Part 77 surfaces. The clearing activity is expected to convert it from a forested wetland to a scrub shrub wetland, but the wetland will not be directly impacted through dredging or filling and will remain a wetland. An Aeronautical Study is underway to determine whether these tree obstructions can be mitigated through the use of obstruction lighting rather than tree clearing. Other areas of tree clearing in wetlands include isolated patches of trees in wetlands obstructing the approaches to both runway ends

Construction of the 63 T-hangars and taxilane development located in the northwest quadrant of the Airport results in approximately 0.10 acres of wetland impact through dredge and fill activity.

<b>Summary of wetland/stormwater impacts for Alternative 2</b>	
Dredge & Fill Impacts to Wetlands	11.2 acres
Tree Clearing in Wetlands	23.8 acres
Impervious Area Added	06.3 acres

**3.3.1.6 Environmental Permitting**

The following environmental permits are required to implement this alternative:

- Section 404 Individual Permit (USACE<sup>7</sup>)
- Section 401 Water Quality Certification (NHDES<sup>8</sup> – Watershed Management Bureau)
- Standard Dredge and Fill Permit (NHDES – Wetlands Bureau)
- Alteration of Terrain Permit (NHDES – Water Division)
- Wetland Review Application (Nashua Conservation Commission)

**3.3.1.7 Estimated Project Costs: \$14,900,100**

<b>Estimated Cost Breakdown</b>
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<sup>7</sup> United States Army Corps of Engineers

<sup>8</sup> New Hampshire Department of Environmental Services

Runway Reconstruction	\$12,442,500
Easement Acquisition and Tree Clearing	\$ 800,000
Environmental Mitigation	\$ 1,657,600

### **3.3.1.8 Runway Closure**

A consequence of implementing Alternative 2 is the necessity to close or shut down the existing runway while the new, relocated runway is being reconstructed. The reconstruction of the relocated runway can be phased to allow for the small aircraft requiring less runway length (i.e., 3,000 feet) to operate while the reconstruction is ongoing however, use of the runway by the larger turboprop and jets would not be possible, effectively shutting down the runway for several months or longer for these aircraft. The consequences of runway closure were fully discussed in Section 2.1.2.5. Requiring based aircraft that need more than 3,000 feet of runway to relocate to other airports in the region would likely result in devastating financial consequences for the Airport and the businesses that rely on these aircraft for revenue.

### **3.3.1.9 Federal Obligations**

Alternative 2 does not correct the required safety deficiencies at the Airport and like Alternative 1, violates the Airport's Federal obligations rendering it potentially ineligible for Federal funding support.

### **3.3.2 Alternative 2 - Summary**

Consequences of Alternative 2:

- Complies with FAA standards for RSAs
- Complies with FAA standards for airspace clearing requirements
- Fails to comply with FAA standard runway-to-taxiway separation
- Jeopardizes the Airport's eligibility to receive Federal funds
- Does not allow for turboprop/jet operations during construction
- Fails to provide an additional 500 feet of runway length
- Fails to provide additional outdoor and indoor aircraft parking spaces
- Violates the Airport's Federal obligations
- Requires that a 11.2 acres of wetland be impacted by dredge and fill and 23.8 acres by tree clearing activities

### **3.4 ALTERNATIVE 3 – RECONSTRUCT THE RUNWAY 150 FEET TO NORTHEAST OF ITS CURRENT LOCATION**

Improvements proposed in this alternative include (see Figure 3-3):

- Reconstruction of the runway 150 feet northeast of its existing location to obtain the FAA standard 400-foot runway-to-taxiway separation for a runway with a DII classification.

- Construction of a 500-foot extension to the Runway 14 end to achieve a total runway length of 6,000 feet (see Section 2).
- Construction of a 500-foot extension to the parallel taxiway to meet the extended runway end.
- Construction of the RSA at a width of 500 feet for the entire runway length and extending 1,000 feet beyond each runway end.
- Relocation of the Runway 14 Approach Lighting System, ILS Glideslope and Localizer facilities
- Clearing of vegetative obstructions from the FAR Part 77 Surfaces.
- Construction of 63 T-hangars and associated taxilanes in the northwest quadrant of the Airport.

### 3.4.1 Alternative 3 Consequences

#### 3.4.1.1 Runway to Taxiway Separation

Alternative 3 provides the FAA standard runway-to-taxiway separation of 400 feet.

#### 3.4.1.2 Runway Safety Areas

Alternative 3 provides the FAA standard RSAs.

#### 3.4.1.3 Runway Length

Alternative 3 provides the needed runway length of 6,000 feet.

#### 3.4.1.4 Airspace & Protected Surfaces

Alternative 3 removes penetrating vegetation from the Airport Part 77 surfaces in compliance with FAA regulations.

#### 3.4.1.5 Aircraft Accommodations

Alternative 3 provides the needed 63 T-hangars for housing small aircraft however it does not provide for the needed 100 outdoor, aircraft parking tie-down spaces.

#### 3.4.1.6 Environmental Impacts

Approximately 8.1 acres of additional impervious area is proposed in this alternative:

Net New Impervious Area Breakdown	
500-Foot Runway Extension	1.1 acres
900-Foot Taxiway Extension	0.7 acres

63 T-hangar Complex	6.3 acres
Total	8.1 acres

Construction of the 63 T-hangars and taxilane development in the northwest quadrant of the Airport impacts approximately 0.10 acres of wetland by dredge and fill activity.

The runway and RSA construction impact approximately 16.1 acres of wetland by dredge and fill activity.

Approximately 24.0 acres of wetlands are impacted through tree clearing activities to clear the obstructions from the Part 77 surfaces. The nature of this activity is the same as explained in Alternative 2.

The type of wetlands impacted by the construction activity is the same as in Alternative 2.

<b>Summary of wetland/stormwater impacts for Alternative 3</b>	
Dredge & Fill Impacts to Wetlands	16.1 acres
Tree Clearing in Wetlands	24.0 acres
Impervious Area Added	08.1 acres

**3.4.1.7 Environmental Permitting**

Alternative 3 requires the same environmental permits as Alternative 2.

**3.4.1.8 Estimated Project Cost: \$15,625,300**

<b>Estimated Cost Breakdown</b>	
Runway Reconstruction	\$12,442,500
Easement Acquisition and Tree Clearing	\$14,825,300
Environmental Mitigation	\$ 2,382,800

**3.4.1.9 Runway Closure**

Implementation of Alternative 3 will require that aircraft operations on the existing Runway 14-32 be halted for the duration of the construction period (estimate 4-6 months) however; it is possible that runway closure of up to one year could occur depending upon weather, funding availability and other conditions. Such an extended closure of the runway would have financially devastating effects on the Airport and dependent businesses as previously discussed.

**3.4.1.10 Federal Obligations**

This alternative complies with the Airport's Federal obligations and maintains its eligibility to receive Federal funding support.

### **3.4.2 Alternative 3 - Summary**

Consequences of Alternative 3:

- Complies with FAA standards for RSAs
- Complies with FAA standard runway-to-taxiway separation
- Complies with FAA standards for airspace clearing requirements
- Enhances efficiency & safety by providing 6,000 feet of runway length
- Maintains the Airport's eligibility to receive Federal funds
- Fails to address the Airport's need to maintain aircraft operations during runway reconstruction (closes runway for duration of construction)
- Meets Airport's Federal obligations
- Provides needed additional aircraft hangar space
- Fails to provide needed additional outdoor aircraft parking spaces
- Requires that a larger area of wetland be impacted by dredge and fill and tree clearing activities than impacts presented by Alternative 2

Though this alternative does meet more of the Airport's needs than Alternatives 1 & 2, it has greater environmental impacts than previously reviewed alternatives and it introduces the requirement to close the existing runway during construction of the relocated runway. For a full discussion of the potential effects of a runway closure see Section 2.1.2.5.

### **3.5 ALTERNATIVE 4 – RECONSTRUCT THE RUNWAY AT 300 FEET AND THE PARALLEL TAXIWAY 150 FEET TO THE NORTHEAST OF THEIR CURRENT LOCATIONS**

This alternative includes all the improvements reviewed in Alternative 3 however, it shifts the runway centerline 300 feet northeast of its current position (instead of 150 feet as in Alternative 3) so that the existing runway can remain operational during construction of the relocated runway. Additionally, the taxiway is relocated 150 feet to the northeast so that the FAA standard runway-to-taxiway separation of 400 feet is achieved. The shifting of the parallel taxiway 150 feet to the northeast creates additional area adjacent to the existing Main Aircraft Parking Apron to accommodate additional outdoor aircraft tie-downs.

Improvements proposed in this alternative include (see Figure 3-4):

- Reconstruction of the runway 300 feet northeast of its existing location
- Construction of a 500-foot extension to the Runway 14 end to achieve a total runway length of 6,000 feet
- Reconstruction of the parallel taxiway 150 feet to the northeast of its current located to obtain the FAA standard 400-foot runway-to-taxiway separation for a runway with a DII classification

- Construction of a 500-foot extension to the parallel taxiway to meet the extended runway end
- Construction the FAA standard RSA at a width of 500 feet for the entire runway length and extending 1,000 feet beyond each runway end
- Clearing of vegetative obstructions from the FAR Part 77 Surfaces
- Construction of 63 T-hangars and associated taxilanes in the northwest quadrant of the Airport
- Removal of the existing runway upon commissioning of the new runway
- Relocation of the parallel taxiway so that its centerline is separated by 400 feet from the new runway's centerline
- Removal of the existing parallel taxiway once the relocated taxiway is constructed
- Construction of a 65-foot wide expansion to the Main Apron along the length of the main aircraft parking apron to accommodate approximately 100 additional outdoor aircraft tie-down spaces

### **3.5.1 Alternative 4 Consequences**

#### ***3.5.1.1 Runway to Taxiway Separation***

Alternative 4 provides the FAA standard runway-to-taxiway separation of 400 feet.

#### ***3.5.1.2 Runway Safety Areas***

Alternative 4 provides the FAA standard RSAs.

#### ***3.5.1.3 Runway Length***

Alternative 4 provides the needed runway length of 6,000 feet.

#### ***3.5.1.4 Airspace & Protected Surfaces***

Alternative 4 removes penetrating vegetation from the Airport Part 77 surfaces in compliance with FAA regulations (approximately 31.9 acres).

#### ***3.5.1.5 Aircraft Accommodations***

Alternative 4 provides the needed 63 T-hangars and 100 outdoor, aircraft parking tie-down spaces.

#### ***3.5.1.6 Environmental Impacts***

This alternative presents stormwater impacts through the addition of approximately 16.4 acres of impervious area to the Airport:

<b>Net New Impervious Area Breakdown</b>	
500-Foot Runway Extension	1.1 acres
900-Foot Taxiway Extension	0.7 acres
Stub Taxiway Extensions	0.5 acres
Additional Outdoor Apron Spaces	7.8 acres
63 T-hangar Complex	6.3 acres
<b>Total</b>	<b>16.4 acres</b>

Construction of the 63 T-hangars and taxilane development in the northwest quadrant of the Airport impacts approximately 0.10 acres of wetland by dredge and fill activity.

The runway and RSA construction impact approximately 14.7 acres of wetland by dredge and fill activity.

Approximately 16.6 acres of wetlands are impacted through tree clearing activities to clear the obstructions from the Part 77 surfaces. The nature of this activity is the same as explained in Alternative 2.

The type of wetlands impacted by the construction and tree clearing activity is the same as in Alternative 2 & 3.

<b>Summary of wetland/stormwater impacts for Alternative 4</b>	
Dredge & Fill Impacts to Wetlands	14.7 acres
Tree Clearing in Wetlands	16.6 acres
Impervious Area Added	16.4 acres

**3.5.1.7 Environmental Permitting**

Alternative 4 requires the same environmental permits as Alternatives 2 & 3.

**3.5.1.8 Estimated Project Cost: \$16,685,800**

<b>Estimated Cost Breakdown</b>	
Runway Reconstruction	\$13,725,000
Easement Acquisition and Tree Clearing	\$ 2,160,800
Environmental Mitigation	\$ 800,000

**3.5.1.9 Runway Closure**

Alternative 4 does not require closure of the existing runway.

### **3.5.1.10 Federal Obligations**

This alternative complies with the Airport's Federal obligations and maintains its eligibility to receive Federal funding support.

### **3.5.2 Alternative 4 - Summary**

Consequences of Alternative 4:

- Complies with FAA standards for RSAs
- Complies with FAA standards for runway-to-taxiway separation
- Complies with FAA standards for airspace clearing requirements
- Enhances efficiency & safety by providing 6,000 feet of runway length
- Addresses the Airport's need to maintain aircraft operations during runway reconstruction
- Complies with the Airport's Federal obligations and does not jeopardize the Airport's eligibility to receive Federal funds
- Provides needed additional outdoor and hangar aircraft parking spaces
- Requires that a smaller area of wetland be impacted by dredge and fill than in Alternative 3 but more than Alternative 2; and requires less tree clearing activity impacts to wetlands than either Alternatives 2 or 3
- Presents more stormwater impacts than Alternatives 1, 2 & 3 (16.4 acres as compared to Alternative 1 - 0.0 acres, Alternative 2 - 10.1 acres, and Alternative 3 - 8.3 acres)

Though Alternative 4 does reduce dredge and fill impacts to wetlands over Alternative 3, the amount of impacted wetland remains high and efforts to minimize this impact is required by the Airport, FAA, NHDOT and environmental regulations.

### **3.6 ALTERNATIVE 4A – RECONSTRUCT THE RUNWAY 300 FEET AND THE PARALLEL TAXIWAY 150 FEET TO THE NORTHEAST OF THEIR CURRENT LOCATIONS AND USE “DECLARED DISTANCES”**

Alternative 4a represents a modification to Alternative 4. Instead of constructing a 500-foot runway extension at the Runway 14 end, Alternative 4a utilizes an FAA authorized runway design alternative called “Declared Distances” to achieve the needed runway length for takeoff of 6,000 feet. The declared distance design concept is allowed for use by the FAA where it is demonstrated that its use is necessary to achieve a desired runway length that is otherwise impracticable to achieve due to environmental constraints. The concept allows the limited use of RSAs (which are not ordinarily available for aircraft operations) for certain takeoff operations.

Except for small aircraft, certain aircraft (turboprops, jets and other large aircraft) must calculate their required runway length for takeoff and landing before each operation to assure the aircraft has the runway length needed. For a takeoff

operation, the aircraft must calculate its Accelerate Stop Distance Available (ASDA). The required ASDA will provide the runway length needed for takeoff while reserving sufficient runway length in the case where the aircraft may have a mechanical or other problem that requires aborting the takeoff. Declared distances allow an aircraft to utilize a portion of an RSA (the runway end RSA from which the aircraft is departing) in its ASDA calculation. However, it cannot utilize any portion of the runway end RSA at the opposite end of the runway since this RSA must remain available in the case of an aborted takeoff that cannot safely stop on the runway. For a landing operation, the aircraft must calculate the length of runway available for a safe landing, called Landing Distance Available (LDA). In the landing calculation, the aircraft cannot utilize any part of the RSAs located at either runway end – it must have sufficient runway length to safely land without utilizing either runway end RSA, otherwise the aircraft is not allowed to land and must divert to an airport with sufficient landing length available. The RSAs are reserved for the case where the aircraft either “lands short” of the runway or “lands long” and cannot stop before reaching the RSA. Many conditions affect the calculation of ASDA and LDA such as the aircraft’s weight, wind conditions, other meteorological conditions, air temperature, air pressure, runway condition and other factors. The takeoff operation typically demands the availability of more runway length than the landing operation for the same aircraft.

In applying the Declared Distance concept at the Airport, the Airport can further reduce its impacts on wetlands by dredge and fill activities that were required in Alternative 4 by the need to construct the 500-foot runway extension and 1,000-foot long RSA. The use of Declared Distances allows designers to reduce the 500-foot runway extension to 150 feet, and regain the remaining 350 feet of needed runway by paving 350 feet of the Runway 32 RSA leaving the remaining 650 feet of the RSA as turf. By reducing the length of the runway extension at the Runway 14 end from 500 to 150 feet, it is possible to reduce the amount of wetland impact proposed at that location.

*Note: Prior to approving the use of Declared Distances, the Airport was required to explore the concept of placing the 500-foot runway extension and its 1,000-foot long RSA at the Runway 32 end. This concept was dismissed however as impracticable for a variety of sound reasons including the necessity to: relocate over 30 businesses and several residences, demolish numerous commercial and residential structures, and eliminate and remove Charron Avenue, Wheaton Drive, Juniper Lane, and portions of Pine Hill Road, among other necessary actions. This concept was dismissed by the Airport, FAA and NHDOT early in the screening process for its severe disruption to the inhabitants of the area and its economic impracticability.*

The 350 foot paved section of the Runway 32 RSA will only be available for aircraft for takeoff operations when departing from Runway 32. Limiting the pavement on the Runway 32 RSA to 350 feet is required due to the placement of the Localizer located at the end of the 1,000-foot Runway 32 RSA. The FAA requires that the Localizer be located at least 1,000 feet from the end of the runway pavement but may approve a shorter distance. Approval has been granted to locate the Localizer

650 feet from the runway end in this case. The Localizer is an electronic device used for landings made under instrument flight rule conditions (IFR) when visibility is reduced. The Localizer is sensitive to electronic interference and cannot be moved further from the Runway 32 end due to its close proximity to Charron Avenue where vehicular traffic could interfere with the Localizer's operation. The Localizer assists the aircraft in aligning it with the runway centerline on landing and it operates in tandem with another device called the "Glideslope" located at the opposite end of the runway. The Glideslope assists in orienting an approaching aircraft to the runway elevation. Together these devices constitute the backbone of the Instrument Landing System (ILS) used to align an aircraft both horizontally to the runway centerline and vertically to the runway elevation when visibility conditions do not allow the pilot to see the runway upon descent to landing.

All other improvements proposed in Alternative 4a are the same as those proposed in Alternative 4.

Improvements proposed in this alternative include (see Figure 3-4a):

- Reconstruction of the runway 300 feet northeast of its existing location
- Reconstruction of the parallel taxiway 150 feet to the northeast of its current location to obtain the FAA standard runway-to-taxiway separation for a runway with a DII classification
- Construction of a 150-foot extension to the Runway 14 end to achieve a total runway length of 6,000 feet with the use of declared distances
- Construction of a 150-foot extension to the parallel taxiway to meet the extended runway end
- Construction of standard RSAs at a width of 500 feet for the entire runway length and extending 1,000 feet beyond each runway end
- Paving 350 feet of the Runway 32 RSA in order to utilize the declared distances concept
- Clearing of vegetative obstructions from the FAR Part 77 Surfaces.
- Construction of 63 T-hangars and associated taxilanes in the northwest quadrant of the Airport
- Removal of the existing runway and taxiway upon commissioning of these relocated facilities
- Construction of a 65-foot wide expansion to the Main Apron along the length of the apron to accommodate approximately 100 additional outdoor aircraft tie-down spaces

**3.6.1 Alternative 4a Consequences**

Alternative 4a presents the same consequences as those enumerated in Alternative 4 except for its environmental impacts as discussed below.

**3.6.1.1 Environmental Impacts**

Construction of the 63 T-hangar complex in the northwest quadrant of the Airport, and other plan elements increase impervious surfaces on the Airport by approximately 16.0 acres.

<b>Net New Impervious Area Breakdown</b>	
350-Foot Paved RSA	0.8 acres
150-Foot Runway Extension	0.3 acres
350-Foot Taxiway Extension	0.3 acres
Stub Taxiway Extensions	0.5 acres
Additional Outdoor Apron Spaces	7.8 acres
63 T-hangar Complex	6.3 acres
<b>Total</b>	<b>16.0 acres</b>

The runway and RSA construction impact approximately 13.3 acres of wetland by dredge and fill activity.

Approximately 10.3 acres of wetlands are impacted through tree clearing activities to clear the obstructions from the Part 77 surfaces. The type activity proposed and the type of wetlands impacted are the same as explained in Alternatives 2 through 4.

<b>Summary of wetland/stormwater impacts for Alternative 4a</b>	
Dredge & Fill Impacts to Wetlands	13.3 acres
Tree Clearing in Wetlands	10.3 acres
Impervious Area Added	16.0 acres

**3.6.1.2 Environmental Permitting**

Alternative 4a requires the same environmental permits as Alternatives 2 through 4.

**3.6.1.3 Estimated Project Cost: \$16,495,000**

<b>Estimated Cost Breakdown</b>	
Runway Reconstruction	\$13,725,000
Easement Acquisition and Tree Clearing	\$ 800,000

Environmental Mitigation	\$ 1,970,000
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### **3.6.1.3 Runway Closure**

Alternative 4a does not require closure of the existing runway.

### **3.6.2 Alternative 4a - Summary**

Consequences of Alternative 4a:

- Complies with FAA standards for RSAs
- Complies with FAA standards for runway-to-taxiway separation
- Complies with FAA standards for airspace clearing requirements
- Enhances safety by providing 6,000 feet of runway length
- Addresses the Airport's need to maintain aircraft operations during runway reconstruction
- Complies with the Airport's Federal obligations and does not jeopardize the Airport's eligibility to receive Federal funds
- Provides needed additional outdoor and hangar aircraft parking spaces
- Requires fewer wetland impacts by dredge and fill than in Alternatives 3 & 4 but greater impacts than Alternative 2; and requires the fewest tree clearing activity impacts to wetlands than previously reviewed Alternatives
- Presents greater stormwater impacts than Alternatives 1, 2 & 3 and slightly fewer than Alternative 4 due to the use of declared distances

Alternative 4a meets all of the Airport's requirements with respect to maintaining aircraft operations during construction, compliance with FAA design and safety standards, compliance with Federal regulations, and the need to accommodate aircraft. However, the amount of wetland impact through dredge and fill continues to remain high.

### **3.7 ALTERNATIVE 4B – SAME PROPOSED ACTIONS AS THOSE PROPOSED IN ALTERNATIVE 4A EXCEPT THAT THE GLIDESLOPE IS RELOCATED TO THE INFIELD BETWEEN THE RUNWAY AND TAXIWAY**

Alternative 4b is a modification of Alternative 4a and proposes the same improvements as Alternative 4a except that the Glideslope located at the Runway 14 end is relocated from the north side to the south side of the runway (i.e. in the infield between the runway and taxiway). Typically, the Glideslope is located to the left of a runway as viewed by an approaching aircraft as is the existing Glideslope. However, the FAA may approve an alternate location if it determines that the alternate location will not interfere with the operation of the Glideslope. In this case, the FAA has agreed to utilize either 1) a Glideslope antenna system that is located to the left of the runway on approach, within the RSA that requires no additional grading or wetland impact beyond the area disturbed for the construction of standard RSAs; or 2) a Glideslope antenna system that it feels will work in the alternate location in the runway infield but which will require the removal of several

aircraft parking tie-downs. It is a safety imperative that the Glideslope signals to an approaching aircraft not be degraded, therefore the approval by FAA of the alternate location is tentative pending adequate testing results of the Glideslope. In Alternative 4b, the Glideslope location depicted is that which would have the greatest impact in terms of Airport operations.

As discussed in Alternative 4a, the Glideslope is an electronic device used by aircraft to land in diminished meteorological conditions. It works by “bouncing” an electronic signal off the ground. The ground upon which the signal is “bounced” is called the Glideslope’s “critical area”. The “bounced” signal is then received by the approaching aircraft and the pilot can determine the elevation of the aircraft above the runway, a critical part of performing an instrument landing. The critical area must be free of uneven topography, including pooling water and snow, and any metallic objects.

Except for the relocation of the Glideslope, all other improvements proposed in Alternative 4b are the same as those proposed in Alternative 4a (see Figure 3-6).

### **3.7.1 Alternative 4b Consequences**

Alternative 4b presents the same consequences as those enumerated in Alternative 4 except for its environmental impacts and the relocation of the Glideslope will require that an “ILS Holdline” be placed on the parallel taxiway to prevent aircraft from entering the Glideslope’s critical area at time when the Glideslope is operating. Further, the location of the ILS Holdline can reduce the capacity of the runway particularly at very busy airports but according to the Airport’s management, operations at the Airport during conditions requiring the ILS are fairly low and the holdline location should not present operational problems for the Airport.

#### **3.7.1.1 Environmental Impacts**

This alternative presents stormwater impacts through the addition of approximately 15.2 acres of impervious surfaces to the Airport:

<b>Net New Impervious Area Breakdown</b>	
350-Foot Paved RSA	0.8 acres
150-Foot Runway Extension	0.3 acres
350-Foot Taxiway Extension	0.3 acres
Stub Taxiway Extensions	0.5 acres
Additional Outdoor Apron Spaces	7.0 acres
63 T-hangar Complex	6.3 acres
Total	15.2 acres

Less area is impacted by impervious surfaces in this alternative due to a decrease of additional outdoor aircraft parking spaces at the west end of the Airport’s Main Apron due to the location of the Glideslope critical area which does not allow parked

aircraft. By placing the Glideslope critical area in the infield between the runway and taxiway, the critical area overlaps a portion of the Airport’s Main Apron. The portion that is overlapped by the critical area must remain clear of objects including aircraft; therefore the Airport will lose approximately nine outdoor aircraft parking spaces in this alternative.

Relocation of the Glideslope presents significantly fewer wetland impacts than any alternative previously reviewed. If the Airport were to pursue the FAA alternative of using an antenna that is located within the RSA, the impact to wetlands as a result of grading the Glideslope critical area would remain the same as for the Glideslope located within the infield.

Construction of the 63 T-hangars and taxiway development in the northwest quadrant of the Airport impacts approximately 0.10 acres of wetland by dredge and fill activity.

The runway and RSA construction impact approximately 8.8 acres of wetland by dredge and fill activity.

Approximately 16.6 acres of wetlands are impacted through tree clearing activities to clear the obstructions from the Part 77 surfaces. The nature of this activity is the same as explained in Alternative 2.

Approximately 15.3 acres of wetlands are impacted through tree clearing activities to clear the obstructions from the Part 77 surfaces and clear the Glideslope critical area. The additional tree clearing in wetlands required as compared to Alternative 4a is due to a change in the nature of the wetland disturbance from dredge and fill impacts to tree clearing impacts. Since the Glideslope critical area is relocated away from the wetland located in the northeast quadrant of the Airport, it is no longer necessary to re-grade this wetland to conform to the critical area requirements.

The type of wetlands impacted by the construction activity is the same as in Alternative 2 through 4a.

<b>Summary of wetland/stormwater impacts for Alternative 4b</b>	
Dredge & Fill Impacts to Wetlands	8.8 acres
Tree Clearing in Wetlands	15.3 acres
Impervious Area Added	15.2 acres

**3.7.1.2 Environmental Permitting**

Alternative 4b requires the same environmental permits as Alternatives 2 through 4a.

**3.7.1.3 Estimated Project Cost: \$15,825,000**

<b>Estimated Cost Breakdown</b>	
Runway Reconstruction	\$13,725,000
Easement Acquisition and Tree Clearing	\$ 800,000
Environmental Mitigation	\$ 1,300,000

### 3.7.2 Alternative 4b Summary Discussion

Consequences of Alternative 4b:

- Complies with FAA standards for RSAs
- Complies with FAA standards for runway-to-taxiway separation
- Complies with FAA standards for airspace clearing requirements
- Enhances safety by providing 6,000 feet of runway length
- Addresses the Airport's need to maintain aircraft operations during runway reconstruction
- Complies with the Airport's Federal obligations and does not jeopardize the Airport's eligibility to receive Federal funds
- Provides needed additional outdoor and hangar aircraft parking spaces, however slightly fewer outdoor spaces are provided than in other alternatives
- Requires the fewest wetland impacts by dredge and fill than in previously reviewed alternatives, except the No-Action
- Requires for slightly more wetland impact through tree clearing than Alternative 4a but has fewer tree clearing impacts to wetlands than any other previously reviewed alternative, except the No-Action
- Presents more stormwater impacts than Alternatives 1, 2 & 3, and slightly fewer impacts than Alternatives 4 and 4a

By combining the use of declared distances and relocating the Glideslope to the infield between the runway and taxiway, this alternative presents the lowest level of wetland impact while providing the Airport with the ability to comply with FAA safety requirements and its Federal obligations (See comparison table on next page).

COMPARISON OF ALTERNATIVES											
ALTERNATIVES		IMPACTS TO WETLANDS & STORMWATER			IMPACTS TO THE AIRPORT						
No	DESCRIPTION	WETLANDS		Storm-water (Acres)	Meets FAA Standards	Meets Federal Obligations	OPERATIONS				COST
		Dredge & Fill (Acres)	TREE CLEARING (Acres)				Requires R/W Closure	R/W Extension	T Hangars	Tie Downs	
1	No- Action	0	0	0	No	No	No	No	No	No	\$0
2	Recon R/W & RSA in place	11.2	23.8	6.3	No	No	Yes	No	No	No	\$14.9 M
3	Relocate R/W 150' North	16.1	24.0	8.1	No	No	Yes	Yes	Yes	No	\$15.6 M
4	Recon R/W 300' North	14.7	16.6	16.4	Yes	Yes	No	Yes	Yes	Yes	\$16.6 M
4a	Alt 4 with Declared Distances	13.3	10.3	16.0	Yes	Yes	No	Yes	Yes	Yes	\$16.5 M
4b	Alt 4a with Glideslope Relocation	8.8	15.3	15.2	Yes	Yes	No	Yes	Yes	Yes	\$15.8 M
<b>Fewest Impacts</b>		<b>Alt 4b</b>	<b>Alt 4a</b>	<b>Alt 2</b>	<b>Alts 4,4a,4b</b>	<b>Alts 4,4a,4b</b>	<b>Alt 4, 4a</b>	<b>Alts 3-4b</b>	<b>Alts 3-4b</b>	<b>Alts 4-4b</b>	<b>Alt 2</b>

R/W = Runway

RSA = Runway Safety Area

Shaded areas indicate the alternative with the fewest impacts of all alternatives reviewed for the impact category indicated

### 3.8 SELECTION OF THE PREFERRED ALTERNATIVE

As the previous comparison of the alternatives indicates, there is no alternative that meets the needs of the Airport and presents no environmental impacts. Except for the No-Action alternative, each alternative reviewed carries with it some impacts either to the environment or the Airport, or both. With respect to project costs, all alternatives were within minimal margins of each other, therefore project cost is not a major factor in the selection process. In addition, because impacts to stormwater quality can be mitigated through sound stormwater management practices including the use of current 'best management practices', stormwater impacts are not a major determinant in the decision to select a preferred alternative.

*Alternative 1 – No Action* serves well to establish a “base case” for the analysis but it does not meet any of the Airport’s needs nor does it have any environmental impacts associated with it since no work is contemplated. Therefore, this alternative is dismissed.

*Alternative 2 – Reconstruct runway and taxiway in place* meets two of the three critical FAA standards (RSA and Obstruction Clearing), but fails to meet the runway-to-taxiway separation standard. Meeting the runway-to-taxiway separation standard is always important but it is critical to a runway with an ILS particularly when frequented by jet traffic. This alternative also fails to meet the airport’s need for additional runway length for takeoff by jets. In addition, this alternative has a relatively high level of wetland impact through dredge and fill and tree clearing activities. It does have the fewest impacts to stormwater quality, primarily because no runway extension is contemplated in this alternative. This alternative requires that the existing runway be closed to aircraft operations, particularly jet traffic, during the runway reconstruction process. This alternative is dismissed from further consideration because it does not meet critical FAA standards, it proposes a greater level of wetland impact than other available alternatives, it requires that the runway be closed to high performance aircraft traffic during reconstruction, and it fails to assure that the Airport Authority meets its Federal obligations.

*Alternative 3 – Reconstruct the runway 150 feet to northeast of its current location.* This alternative meets all critical FAA standards (RSA, runway-to-taxiway separation and Obstruction Clearing). It also meets the Airport’s need for additional runway length for takeoff. However, this alternative also proposes a high level of wetland impact through dredge and fill and tree clearing activities in comparison to other available alternatives. It does have the fewest impacts to stormwater quality, primarily because no runway extension is contemplated in this alternative. This alternative further requires that the existing runway be closed to all aircraft operations during the construction of the new runway. Therefore, this alternative is dismissed from further consideration because other alternatives are available that meet the Airport’s needs but have fewer environmental impacts.

*Alternative 4 – Reconstruct the runway 300 feet and the parallel taxiway 150 feet to the northeast of their current locations.* This alternative also meets all FAA standards and all of the Airport’s needs but still maintains a higher level of

environmental impact than other available alternatives; therefore this alternative is dismissed from further consideration.

**Alternative 4a – Reconstruct the runway 300 feet and the parallel taxiway 150 feet to the northeast of their current locations and use “Declared Distances”.** This alternative represents a slight improvement over Alternative 4 with respect to fewer environmental impacts; however other available alternatives offer fewer impacts therefore, this alternative is dismissed from further consideration.

**Alternative 4b – Reconstruct the runway 300 feet and the parallel taxiway 150 feet to the northeast of their current locations, use “Declared Distances”, and Relocate Glideslope.** This alternative meets all of the Airport’s needs and requirements and has the fewest wetland impacts by dredge and fill activity. This is selected as the Preferred Alternative to replace the proposed Action because it meets all of the aviation related needs while avoiding and minimizing impacts to environmental resources to the degree practicable.

As previously stated, this study reviewed impacts to environmental resources in addition to wetlands and stormwater. A discussion of these impacts is contained in Section 4.

Mitigation proposals for unavoidable environmental impacts are discussed in Section 5 of this report.