Worcester Regional Airport CAT-III Instrument Landing System and Taxiway Project

Environmental Assessment

Prepared for

massport

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March 2015

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Worcester Regional Airport CAT-III Instrument Landing System and Taxiway Project

This Environmental Assessment (EA) becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

March 17, 2015

Responsible FAA Official Date

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINSTRATION
FINDING OF NO SIGNIFICANT IMPACT

Category III ILS and Taxiway Improvements Project
Worcester Regional Airport

Proposed Action

The Massachusetts Port Authority (Massport) is the sponsor of the Worcester Regional Airport **Category III Instrument Landing System and Taxiway Improvement Project.** The purpose of the project is to enhance aviation safety and increase aeronautical access and the reliability of air service to the Worcester Regional Airport (ORH) during the very low visibility weather conditions that frequently occur due to the Airport's unique location and elevation.

The proposed safety improvements include:

- Constructing a partial jug-handle taxiway at the Runway 11 end. The taxiway will be built on a new terrace supported by a mechanically stabilized earth retaining wall.
- Upgrading the approach lighting system to a high intensity system with flashing lights (ALSF-2 system) by retaining old towers and placing new towers at 100-foot intervals. Upgrading the approach lighting system also requires installing buried electrical conduit and a new generator building.
- Relocating the glide slope antenna to meet Category III criteria on a new fill terrace retained by a mechanically stabilized earth wall system.

Massport also proposes upgrading the localizers at both the Runway 11 and 29 ends and installing taxiway centerline lighting. The project includes constructing a temporary haul road on airport property to provide short term construction access.

Federal Actions include approval of revisions to the Airport Layout Plan and a Department of the Army Section 404 Permit (Massachusetts General Permit). Massport and FAA prepared an Environmental Assessment (EA) to assess the proposed action. The proposed action will require permits under the Massachusetts Wetlands Protection Act and the Massachusetts Endangered Species Act. The proposed action will require a Water Quality Certificate Variance (Section 401 of the Clean Water Act) for placement of fill in Outstanding Resource Waters (issued by the Mass DEP).

Alternatives Considered

The EA included a review of alternatives to the proposed action, including a No-Action Alternative.

The alternatives considered for the jug-handle taxiway included a full length taxiway, a partial taxiway, fill slopes, and retaining walls. Alternative widths and offsets for the taxiway placement were considered. The proposed jug-handle taxiway was chosen because it meets the project purpose and need, increases safety and reliability of operations, and avoids all impacts to wetlands.

Alternatives to the approach lighting system included replacing the tower array with all new towers. The proposed action will utilize existing tower structures and has been designed to minimize impacts to wetlands. Electrical duct bank alternatives were evaluated to minimize impacts to natural resources and maximize reliability of service. These included conduit buried in line with the towers as well as placing the conduit on an elevated structure along the tops of the towers. The proposed action will place the conduit within the footprint of the existing ILS access road, and will minimize impacts to wetlands while maintaining reliability of service. Impacts from the lighting system and conduit will be limited to 227 sf of unavoidable impacts to wetlands.

The glide slope antenna and reflective surface will have approximately 3,295 sf of wetland impacts. The location of the glide slope is fixed by FAA requirements and cannot be moved away from the wetlands to avoid these impacts. Alternative designs included a fill slope and a retaining wall option. The proposed action includes the retaining wall to minimize impacts to adjacent wetland resources.

Assessment and Mitigation

EA Section 4 *Environmental Consequences* and Section 5 *Mitigation* evaluated the environmental consequences of the proposed action. Together with the proposed mitigation, all impacts to resource categories are anticipated to less than significant, based on the significance thresholds defined in FAA Order 1050.1E. Other than during construction, no air quality or noise impacts will occur since the proposed project will not increase airfield capacity.

The proposed action includes mitigation for unavoidable impacts to wetlands. The project will result in 3,522 sf (0.08 acres) of unavoidable impacts to wetlands. Massport has committed to providing a minimum of 2 square feet of wetland replacement for every square foot of impact within the Town of Leicester.

The proposed action will unavoidably alter areas that have been identified as habitat for state-listed grassland bird species. Habitat replacement or enhancement at a ratio of 2:1 (replacement:loss) will be provided through on-site and off-site measures. In accordance with NHESP's comment letter (Appendix D of the EA), Massport will coordinate with NHESP to develop a Conservation and Management Plan to mitigate impacts to this species.

All other impacts discussed in the EA are minor, construction related impacts that are temporary in nature. Massport commits to follow appropriate construction management practices to minimize minor temporary construction-related impacts.

Finding of No Significant Impact

I have carefully and thoroughly considered the facts contained in the EA. Based on that information, I find the proposed Federal action is consistent with the existing national environmental policies and objectives of Section 101(a) of the National Environmental Policy Act of 1969 (NEPA) and other applicable environmental requirements. I also find the proposed federal action will not significantly affect the quality of the human environmental or include any condition requiring consultation pursuant to Section 102(2)(C) of NEPA. As a result, FAA will not prepare an EIS for this action.

3/17/15

Richard Doucette, Date
Environmental Program Manager, FAA New England Region

DISAPPROVED

_____ _____

Richard Doucette, Date
Environmental Program Manager, FAA New England Region

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1 Introduction

The Massachusetts Port Authority (Massport) proposes to upgrade the existing instrument landing system (ILS) capabilities at the Worcester Regional Airport (ORH) to enhance aviation safety and increase aeronautical access and the reliability of air service during very low visibility weather conditions.

The proposed safety improvements require a modification of the ORH Airport Layout Plan (ALP). Approval of the modified ALP by the Federal Aviation Administration (FAA) is a federal action and requires review under the National Environmental Policy Act (NEPA). Pursuant to NEPA, this Environmental Assessment (EA) has been prepared to describe and assess the consequences to the human and natural environment that may result from the proposed improvements. This document discloses the direct, indirect, and cumulative impacts that may result from the proposed safety improvements. This analysis is conducted in compliance with NEPA requirements, the Council on Environmental Quality (CEQ) Regulations 40 Code of Federal Regulations (CFR) 1500 and 1508, and FAA Orders 5050.4B, *NEPA Implementing Instructions for Airport Actions* and 1050.1E, *Environmental Impacts: Policies and Procedures.* With the proposed mitigation measures, implementation of the project is not expected to result in significant environmental impacts.

1.1 Project Description

The project would upgrade the existing Runway 11 Category I Precision Approach to a Category III (CAT III) Precision Approach. Currently, when conditions at ORH restrict visibility to less than 1/4 of a mile, the airport is unavailable for landings. The proposed new CAT III ILS equipment and infrastructure upgrades would allow for aircraft to land on Runway 11 during virtually all weather conditions.

To implement these upgrades, Massport proposes to install additional ILS equipment and a new partial parallel taxiway. The existing ILS approach light towers extend approximately 2,400 feet west of Runway 11 and are at 200-foot intervals. The new CAT III ILS equipment would not lengthen the light tower array; rather, it would upgrade the existing towers and add 12 new light towers between the existing light towers, at 100-foot intervals. Additional CAT III Navigational Aid improvements will include a midpoint Runway Visibility Range monitor (RVR), an upgrade (or replacement) to the Runway 11 localizer platform, and buried

conduits for power and communications. The glide slope antenna and glide slope reflective area will be repositioned and reconfigured to meet CAT III requirements. Massport also proposes to construct a generator and support building to provide power to the CAT III ILS equipment.

In addition to the ILS upgrades, current FAA standards require a parallel taxiway for any runway approved for CAT III operations. The CAT I approaches at ORH are not currently served by a parallel taxiway. With a proposed upgrade to a CAT III approach, the FAA is requiring that some form of parallel taxiway be constructed. Massport is proposing to construct a 1,000-foot jug-handle partial parallel taxiway on the north side of Runway 11 end. The taxiway will be constructed utilizing a retaining wall to avoid wetland impacts.

1.2 Worcester Airport Overview

ORH was constructed in 1944 (opened in 1946) on top of Tatnuck Hill. In the 1960s Runway 11 was extended onto Little Asnebumskit Hill, spanning the Lynde Brook Valley. This extension of Runway 11-29 was constructed on fill as much as 100 feet above the valley. The Airport is located in both the City of Worcester and the Town of Leicester (Figure 1-1, Airport Location), and currently operates two runways: the primary Runway11-29 measuring 7,000 feet by 150 feet and the crosswind Runway 15-33 measuring 5,000 feet by 100 feet (Figure 1-2, Airport Layout). To the west of Mulberry Street, there are light towers associated with airport operations that are located on airport leased property owned by the City of Worcester. In 1995Massport began assisting with the operations of the airport for the City of Worcester and in 2010 assumed ownership of the airport.

Worcester Regional Airport serves Worcester County, the second fastest growing county in Massachusetts, along with the Boston Metro West region and the Interstate 495 corridor. A 2011 Massachusetts Department of Transportation economic impact study found that Worcester Regional Airport contributes $51.5 million to the regional economy.

Based on Massport operations data, total airport operations (takeoffs and landings) for 2012 were 44,600. At its peak in 1989, ORH served more than 350,000 passengers with over 133,000 operations. Major users are corporate aviation, flight schools, large air charter services and private pilots flying for business and recreational purposes. On Nov 7, 2013 jetBlue Airways began daily flights between ORH and destinations in Florida. In October 2014, jetBlue reached a milestone of 100,000 passengers served from ORH in less than a year of operations.

The existing 59,000-square foot terminal was completed in 1994.The terminal features four jet way gates, two ramp level gates, baggage carousels, a TSA-installed passenger and baggage screening system. In addition to commercial passenger facilities, ORH provides extensive general aviation (GA) services and amenities including a fixed-base operator. A fixed-base operator (FBO) is the primary provider of support services to GA aircraft and offers services such as aircraft parking and fueling, maintenance and hangar facilities and passenger services. Improvements to its FBO facility are currently under construction by Rectrix Aviation, including 27,000 square feet of new hangar and office space.

Source: USGS 2001

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

0 900 1,800 Feet

Figure 1-1
Airport Location

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ORH currently has 30 T-hangars and 50 general aviation tie-downs. An aircraft maintenance provider, a flight school, and an avionics repair company are additional airport tenants.

General aviation forecasts prepared for recent planning initiatives undertaken by the FAA, the Massachusetts Department of Transportation/Aeronautics Division, and Massport all project a steady increase in general aviation and commercial activity at ORH over the near and long-term planning horizon. The terminal area forecast projects future general aviation activity using the FAA's growth rates for ORH and projected annual operations of 70,325 in 2015, 75,103 in 2020, and 80,234 for 2025. Itinerant activity (meaning aircraft that are not based at ORH) accounted for 67 percent of the total operations in 2010. The Proposed Action discussed in this EA is illustrated in Figure 1-3.

1.3 Permits and Approvals

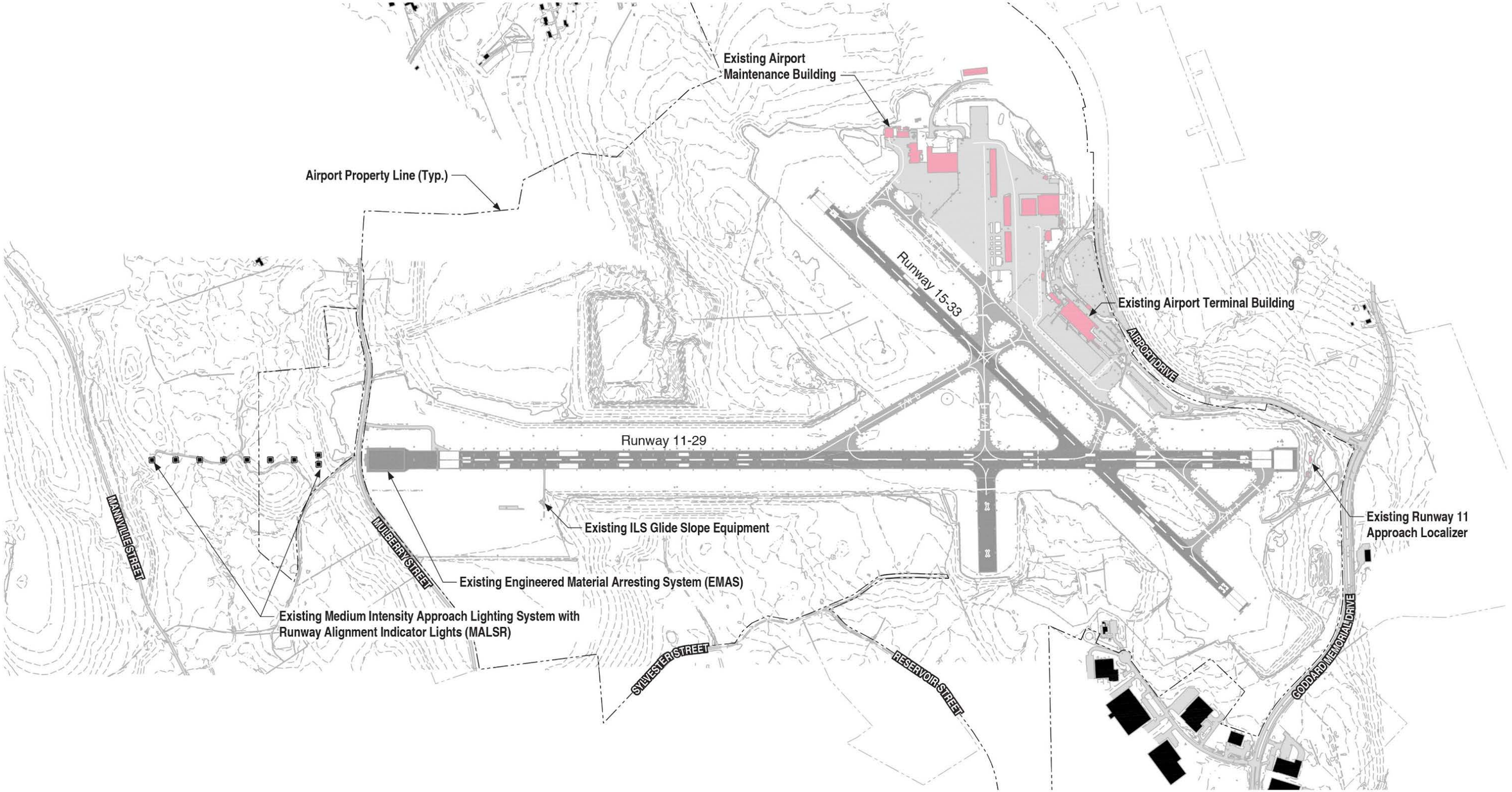
The project is subject to several federal and state level permits and approvals, listed in Table 1-1.

1.3.1 Permits and Approvals - Federal

The project will require FAA approval for the modification of ORH's Airport Layout Plan (ALP).

The project is subject to the Federal Clean Water Act (40 CFR part 230) Sections 401 and 404. In June of 2014, US Army Corps of Engineers (USACE) issued a Jurisdictional Determination to Massport approving the wetland boundary field determinations made by project staff. Due to anticipated wetland impacts, Massport plans to file for Section 404 coverage under the Massachusetts General Permit in February, 2015. The project wetland permanent and temporary impacts will total less than 5,000 sf and Massport anticipates that the project will qualify for coverage under the USACE Self Verification protocol.

Construction of the Project requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP) for coverage under the Construction General Permit under the Clean Water Act as administered by the U.S. Environmental Protection Agency (EPA).



Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 1-2
Airport Layout

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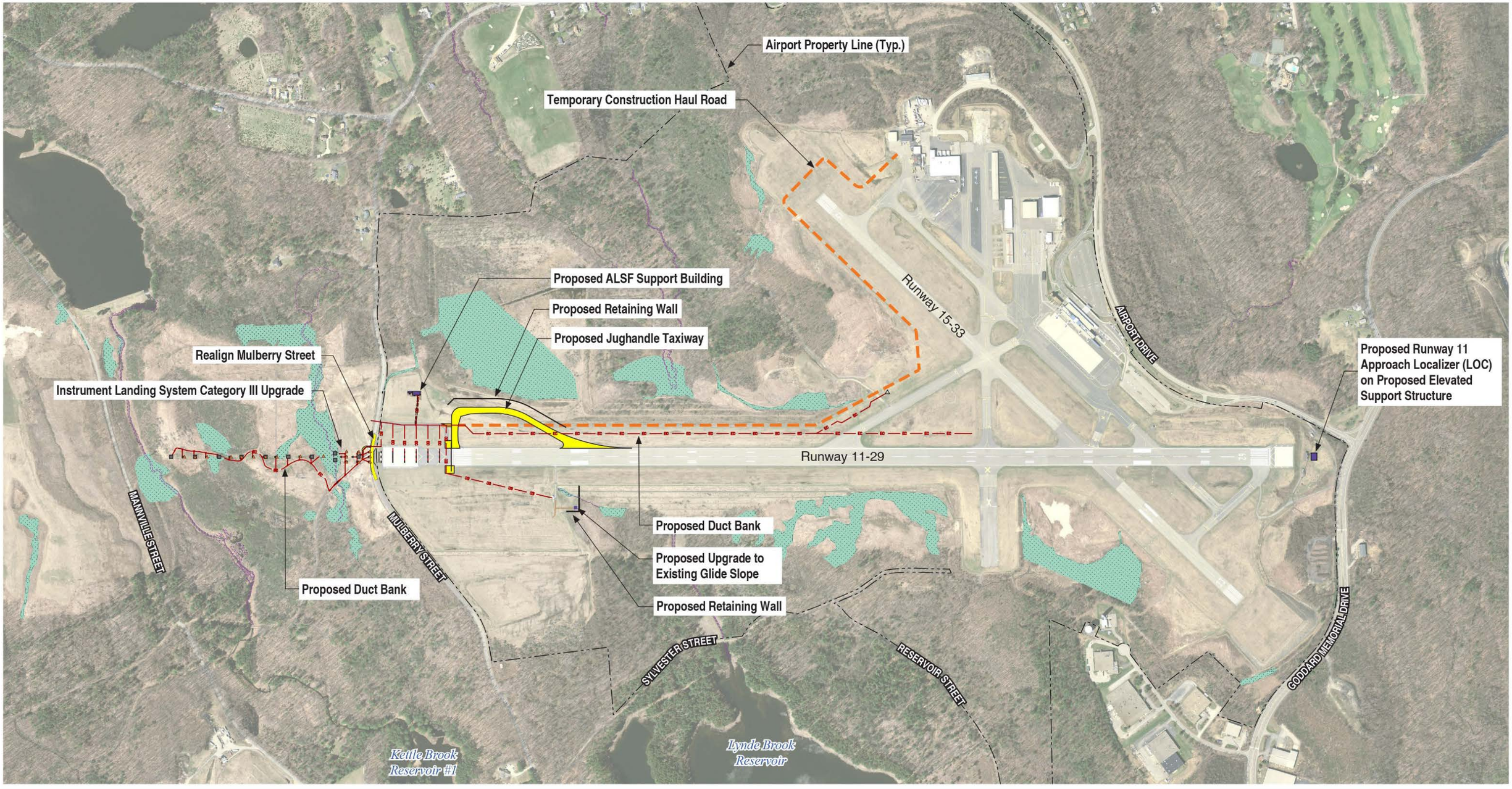

Source: Jacobs

Airport Property Boundary
New Pavement
EC Electric/Communication Duct Bank
Wetland
Bank
New Tower
Existing Tower

0 400 800 Feet

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 1-3
Proposed Action

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Table 1-1: Permits and Approvals

Permit/Approval	Issuing Authority	Date
Massachusetts Wetlands Protection Act Order of Resource Area Delineation	Leicester Conservation Commission	Issued January 2, 2014
Massachusetts Environmental Policy Act, Environmental Notification Form	Massachusetts Executive Office of Energy and Environmental Affairs	Certificate Issued February 28, 2014. No EIR required.
Wetlands Jurisdictional Determination	USACE	June 16, 2014
National Environmental Policy Act Environmental Assessment (this document)	FAA	FONSI anticipated early 2015
US CWA Section 404 General Permit	USACE	Anticipated 2015
Massachusetts Endangered Species Act Conservation and Management Permit	NHESP	Anticipated 2015
US CWA and Massachusetts Section 401 Permit	MassDEP	Variance Anticipated 2015
Massachusetts Wetlands Protection Act Order of Conditions	Leicester Conservation Commission	Filed January 30, 2015
NPDES Construction General Permit/Storm Water Pollution Prevention Plan	EPA	Prior to construction
Massachusetts Wetlands Protection Act Order of Conditions Amendment to Vegetation Management Plan	Leicester Conservation Commission	Prior to construction

1.3.2 Permits and Approvals - State

The project is subject to the Massachusetts Environmental Policy Act (MEPA). Massport submitted an Environmental Notification Form in accordance with 301 CMR 11.00 in January of 2014. The Massachusetts Secretary of Energy and Environmental Affairs issued a MEPA Certificate on February 28, 2014, indicating that no further MEPA review is needed for the project.

Due to the proximity of wetland resources, the project is subject to the Massachusetts Wetlands Protection Act (WPA) (MGL Chapter 131, Section 40) and its implementing regulations (310 CMR 10.00). The improvements proposed within the Town of Leicester will require an Order of Conditions from the Leicester Conservation Commission, pursuant to the WPA. In 2013Massport filed a Notice of Resource Area Delineation with the Leicester Conservation Commission and MassDEP and obtained confirmation of all but one of the field delineated state jurisdictional wetland boundaries in the project area. The wetland in the glide slope area was delineated after the approval and will be included in the project Notice of Intent. A small wetland south of the runway was delineated in July 2014 once the need for repositioning the glide slope antenna was identified by FAA; this area has not been reviewed by the Leicester Conservation Commission. There is no work located within the City of Worcester that would require a filing with the Worcester Conservation Commission. In the event there is a need for mitigation work in the City of Worcester, an NOI would be filed with the Worcester Conservation Commission.

Water Quality Certification under Section 401 of the Clean Water Act (CWA) is required for any discharge of dredge or fill material in areas subject to CWA jurisdiction. In

Massachusetts, MassDEP has oversight of the Water Quality Certification process. In accordance with 314 CMR 9.00, discharge of fill into wetland resources associated with an Outstanding Resource Water (ORW) requires a Variance. Jurisdictional wetland resources in the vicinity of the Worcester Regional Airport are classified as ORWs because they are tributaries to a back-up drinking water supply. Massport plans to submit an application to MassDEP for a 401 WQC Variance in early February 2015.

Certain project elements are located within areas mapped as potential habitat for state listed threatened bird species, and may result in a "take" of listed species due to habitat alteration or loss. Massport is actively coordinating with Massachusetts Natural Heritage and Endangered Species Program (NHESP) to develop a Conservation and Management Plan in support of a Conservation and Management Permit.

The new all-weather ILS will require adjustment of the runway approach surface to meet FAA safety requirements. This will necessitate a slight lowering of a 600-foot section of Mulberry Street in the immediate vicinity of the runway end. Realigning a short section of Mulberry Street at the runway end will require coordination with the Town of Leicester Highway Department.

1.4 Coordination

Massport coordinated with several federal agencies to solicit input on project goals and alternatives. The USACE, EPA, MassDEP and Massachusetts NHESP participated in a pre-application agency site walk in 2013 to review existing site conditions and identify areas where project elements may impact the natural environment. On September 9, 2014 The US Fish and Wildlife Service issued a letter confirming that there are no federally listed species within the project area.

Coordination with state agencies has included meetings and correspondence with Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (NHESP), Massachusetts Department of Environmental Protection (MassDEP), State Historic Preservation Officer (SHPO) and Massachusetts Environmental Policy Act staff (MEPA).

Massport also met on several occasions with the City of Worcester, Department of Public Works and Parks to review the project elements and construction related controls, and the locations of existing and proposed tower arrays that are located on a City- owned land parcel. Coordination with the Leicester Conservation Commission has taken place to preview the project and verify jurisdictional wetland boundaries.

Initial public outreach was conducted as part of the MEPA ENF review process. The public meeting including a brief presentation of the projects and anticipated impacts was held on February 6, 2014. This public meeting was also used by FAA in their development of this EA scope. Coordination with agencies and the public will continue through the project's final design, permitting, and construction phases.

Notice of availability of the Draft Environmental Assessment was published in the Worcester Telegram on February 4, 2015. A public meeting was held on February 17, 2015 to present alternatives considered and findings from the Draft Environmental Assessment. Two

comments were received in response to the publication of the Draft EA; the Worcester Chamber of Commerce submitted a letter of support for the project; and the MA Natural Heritage and Endangered Species Program submitted a comment letter addressing state-listed species impacts. Both are included in Appendix D.

Project environmental documents including the ENF and the EA are available to the public on the project website at www.massport.com/worcester-airport/about-worcester-regional/publications-reporting. The project team will continue to work closely with officials from the City of Worcester, the Town of Leicester, and other stakeholders. Information distribution will continue to be an important part of the project development process. Massport will conduct coordination meetings with interested parties throughout the final design process. All permit processes will be followed through to completion, and will include opportunities for public review.

1.5 Summary of Project Impacts and Mitigation Measures

The reasonably foreseeable environmental consequences of the project are discussed in Chapter 4. Anticipated impacts are categorized as permanent or temporary construction-period impacts. Based onsite conditions and FAA's critical design requirements for the taxiway and ILS improvements, impact to wetlands, and grassland habitat are unavoidable because navigational equipment locations are fixed by use and FAA standards. Impacts to these resources have been minimized to the extent possible, and modifications to design standards have been sought where reasonable to minimize impacts without compromising safety. Massport has requested a Modification of Standard from FAA to build a jug-handle taxiway, rather than a full length parallel taxiway.

Mitigation for permanent and construction related impacts are discussed in Chapter 5. Anticipated impacts to wetlands will require mitigation off site. Creating or restoring wetlands in close proximity to the airfield surface on airport property is discouraged by FAA due to the potential for safety conflicts between wildlife movements and aircraft operations. Massport is coordinating with the Town of Leicester and the City of Worcester Department of Public Works and Parks to develop plans for off-site wetland mitigation within Leicester.

Requirements for grassland habitat mitigation will be developed in coordination with the NHESP staff. It is expected that some mitigation for permanent alteration of grassland habitat will be provided on-airport as a result of constructing the new glide slope antenna surface and adjacent to the new taxiway. Off-airport mitigation, as required by NHESP, will also be provided.

Mitigation for construction period impacts will be undertaken to reduce temporary project impacts on natural resources and surrounding residential communities. Methods for controlling noise, air emissions, waste and traffic impacts from construction are addressed in Chapter 4. Massport will also implement rigorous construction controls and best management practices to protect water quality during construction, as this is a high priority due to proximity of water supply sources. Massport will develop site-specific detailed measures and methods for controlling runoff and construction materials that will be incorporated into

contract documents. Massport will conduct on-site inspections throughout construction, and require that the contractor employ an environmental monitor on the construction site to ensure compliance with contract specifications and permit conditions.

2
Purpose and Need

2.1 Project Purpose

The purpose of the project is to enhance aviation safety and increase aeronautical access and the reliability of air service to the Worcester Regional Airport (ORH) during the very low visibility weather conditions that frequently occur due to the Airport's unique location and elevation.

2.2 Need for the Project

ORH is currently served by a Category I Instrument Landing System (ILS), which does not allow for very low visibility operations and lacks a parallel taxiway to the primary runway 11-29. Due to the lack of landing instruments that can support very low visibility operations, the airport cannot operate when Category II or III conditions are present. Improvements to the ILS and addition of a taxiway are needed to provide enhanced safety and increased reliability at the Worcester Regional Airport.

2.2.1 Safety

The Worcester Regional Airport has two runways; the primary runway 11-29 is 7,001 feet long and the crosswind runway 15-33 is 5,000 feet long. The primary runway 11-29 is only rated for CAT I weather conditions. As a result, under very low visibility weather conditions the airfield is closed for all landings and takeoffs. Runway 11-29 also lacks a parallel taxiway. While the FAA has developed procedures that ensure safe operations, the lack of a parallel taxiway and CAT-III ILS precludes operations in low visibility conditions.

The lack of a parallel taxiway is a safety concern in poor weather because aircraft landing or departing Runway 11-29 must turn and back-taxi on the runway. The longer an aircraft occupies the runway before taking off or after landing increases the risk for an accident, especially during low visibility conditions. This runway occupancy time due to back-taxiing is increased for commercial jets that must make a very slow 180-degree turn at the end of the runway after they land or in preparation of takeoff. The construction of a parallel or partial parallel, taxiway to service Runway 11-29 would minimize the amount of time the aircraft has

to be on the runway, thereby reducing the risk and enhancing the airport's overall safety in all weather conditions. The requirement for a parallel taxiway in very low visibility conditions is outlined in Table 3-4 of FAA's Advisory Circular for Airport Design (AC 150/5300-13).

Worcester's Runway 11-29 currently has an FAA-approved CAT- I instrument approach that allows aircraft to safely use the runway when the visibility conditions are 200 foot ceiling height and 1,800 foot runway visual range (RVR). However, Worcester's weather conditions frequently result in ceiling and visibility well below these minimums. The proposed new CAT-III ILS equipment and infrastructure upgrades would allow aircraft to land on Runway 11 when the visibility conditions are below a ceiling height of 100 feet and less than 1,200 feet runway visual range.

2.2.2 Reliability

A key factor affecting reliability is the unique local weather conditions. The airport is located on top of Tatnuck Hill, with an elevation 1,009 feet above sea level. This elevation is higher than any other commercial service airport in New England. In fact, Pittsburgh and Worcester have the only airports east of the Mississippi above 1,000 feet elevation. This unique situation means that when the cloud ceiling is 1,000 feet at Boston Logan International Airport, 45 miles to the east, it is likely that ORH is in the clouds. This is why downtown Worcester – elevation 480 feet above sea level but only three miles away from the airport - could have fine weather, but the airport could be closed due to fog. The lack of a CAT-III landing system and parallel taxiway prohibit operations during very low visibility conditions.

A review of past on-time performance data supports the issue of poor reliability of commercial flights at the airport. Historical data from the US Department of Transportation's Research and Innovative Technology Administration, Bureau of Transportation Statistics shows that airlines cancelled flights to/from ORH 10 percent to 11 percent of the time, with some months as high as 29 percent. This is five times worse than the average cancelation rate of 2.2 percent at Logan (45 miles east at elevation 15 MSL), Providence (50 miles southeast at elevation 55 MSL), or Manchester Airport (70 miles north at elevation 266 MSL). All of these airports are equipped with a CAT-III ILS and all have parallel taxiways.

In order to determine the frequency of very low visibility conditions at ORH, a project-specific review of historical weather data was performed. As part of the analysis, weather conditions at nearby commercial airports were also studied. Table 2-1 summarizes the results of the analysis.

Table 2-1: Usable Hours Percent of Time

Airport (distance from ORH/Elev./ MSL)	Available instrument system	Instrument Flight Category		
		CAT-I[1]	CAT-II[2]	CAT-III[3]
Worcester	CAT I	91.90%	6.33%	1.77%
Manchester-Boston (70 miles/Elev. 266')	CAT III	99.12%	0.02%	0.85%
T.F. Green Airport (50 miles/ Elev. 55')	CAT III	98.68%	1.07%	0.25%
Bradley International (70 miles/Elev. 173')	CAT III	98.75%	0.84%	0.40%

Source: NOAA weather data for a 17-year period from 1996 to 2012.
1 CAT-I = Ceiling >= 200' and/or visibility >= 1,800' RVR
2 CAT-II = Ceiling >= 100' and <= 200' and/or visibility >= 0.2 miles but >= 1,200' RVR
3 CAT-III = Ceiling < 100' and visibility <1,200' RVR

The analysis confirmed that Worcester experiences CAT-II/III weather conditions six times more frequently than does Providence, Bradley, or Boston-Logan, and more than nine times more frequently than does Manchester. It is significant to note that each of these airports are at lower elevations, are already equipped with very low visibility CAT-III ILS equipment, and have a parallel taxiway system. The weather data confirm that without a very low visibility instrument approach (CAT-II/III), Worcester Regional Airport is incapable of sustaining the equivalent level of safety and reliability as the other regional airports because of its unique elevation and the disproportionately-high frequency of very low visibility conditions.

Installing a CAT-III instrument landing system would enable operations during low visibility conditions that are more frequent at ORH than any other New England regional commercial airport. Airlines that provide service at Worcester would be able to operate effectively without weather constraints resulting in reliable service to the region with fewer canceled or delayed flights. Constructing a partial parallel taxiway to Runway 11 would enhance the overall safety of airport operations in all weather conditions by reducing the time aircraft have to back-taxi on Runway 11-29. A runway's main purpose is for arrivals and departures; otherwise, to the extent practicable, nothing else should be in the runway environment, including taxiing aircraft.

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3 Alternatives

3.1 Introduction

In close coordination with FAA, Massport developed design alternatives for each major element of the CAT-IIIILS and Taxiway project in order to maximize compliance with FAA requirements, support the purpose of the project, and minimize impacts to the natural and built environment. This Chapter describes each of the alternatives considered, including the No-Action Alternative. Environmental consequences of the Proposed Action are described in detail in Chapter 4.

3.2 Alternatives Analysis - Taxiway

A parallel taxiway is required by FAA to support CAT-III operations. A parallel taxiway reduces runway occupancy time and provides a protected holding position if the air traffic controller needs to provide landing clearance to an arriving aircraft prior to a departure. Using FAA design guidelines, a range of taxiway alternatives were evaluated by Massport and the FAA, including:

- Locational alternatives -north or south of Runway 11-29;
- Full-length parallel taxiway segment or partial-length parallel taxiway extending from Taxiway Delta to the 11 end of Runway 11-29;
- Construction alternatives (conventional fill, pile-supported or retaining walls);
- Design alternatives: 50-foot-wide or 75-foot-wide taxiway, 400-foot or 500-foot separation between the runway and taxiway centerlines; and
- Shorter, “jug-handle” or “hammer-head” taxiways

3.2.1 Locational and Full-Length Taxiway Alternatives

Constructing a taxiway on the south side of Runway 11-29 was eliminated because a southern taxiway would require aircraft to cross the active runway without the benefit of substantially minimizing resource impacts.

Massport evaluated a "full parallel" taxiway segment extending the entire length of Runway 11-29 to the north side, as well as a partial taxiway extending from Taxiway Delta to the Runway 11 end. Figure 3-1 shows the conceptual design considered for the full length alternative.

The initial design alternatives included either a 50-foot-wide or 75-foot-wide taxiway with either a 400-foot or 500-foot separation between the runway and taxiway centerlines. These distances are dictated by FAA design criteria as outlined in FAA Advisory Circular 150/5300-13. The estimated impacts ranged from one acre (single retaining wall) to 21 acres, with floodplain impacts ranging from 0 to 19 acres and rare species habitat impacts ranging from 11 to 39 acres. The amount of fill material needed ranged from nearly one million cubic yards to more than three million cubic yards, and costs of taxiway construction ranged from $22 million to $52 million.

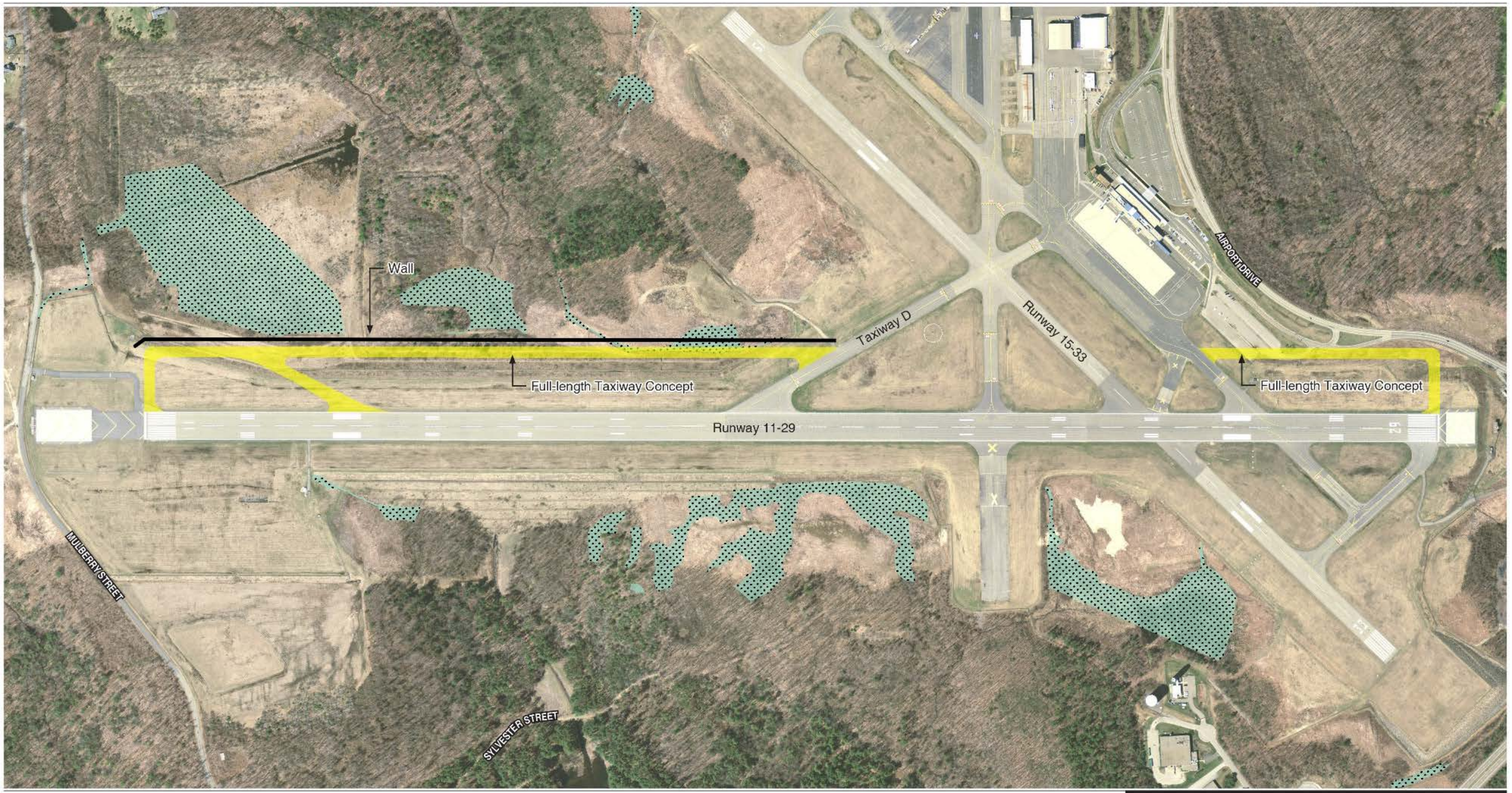
Full length alternatives considered included a pile-supported concrete taxiway deck to minimize fill in wetlands; however, the estimated costs for the deck-supported options were an order of magnitude higher than for the fill options, and these options did not fully avoid direct or indirect wetland impacts.

All full length alternatives were eliminated due to their greater costs and potential environmental effects. However, FAA has stated that when operational activity significantly increases at ORH, consideration of an extension to the proposed partial taxiway may become necessary. It is expected that activity levels warranting additional taxiway improvements would not be experienced within the next 10 years. Additional environmental review and approvals would be required at that time.

3.2.2 Partial Taxiway Alternatives

In consideration of environmental factors, costs, and current and projected aircraft activity levels, Massport developed several partial parallel taxiway alternatives that would meet FAA's safety and design requirements for ORH for the foreseeable future. A partial taxiway would avoid direct wetland impacts, minimize construction-phase impacts, and reduce overall construction costs. A partial taxiway would allow aircraft to exit the runway or hold short of the runway on the taxiway. Figure 3-2 shows the partial taxiway layouts considered.

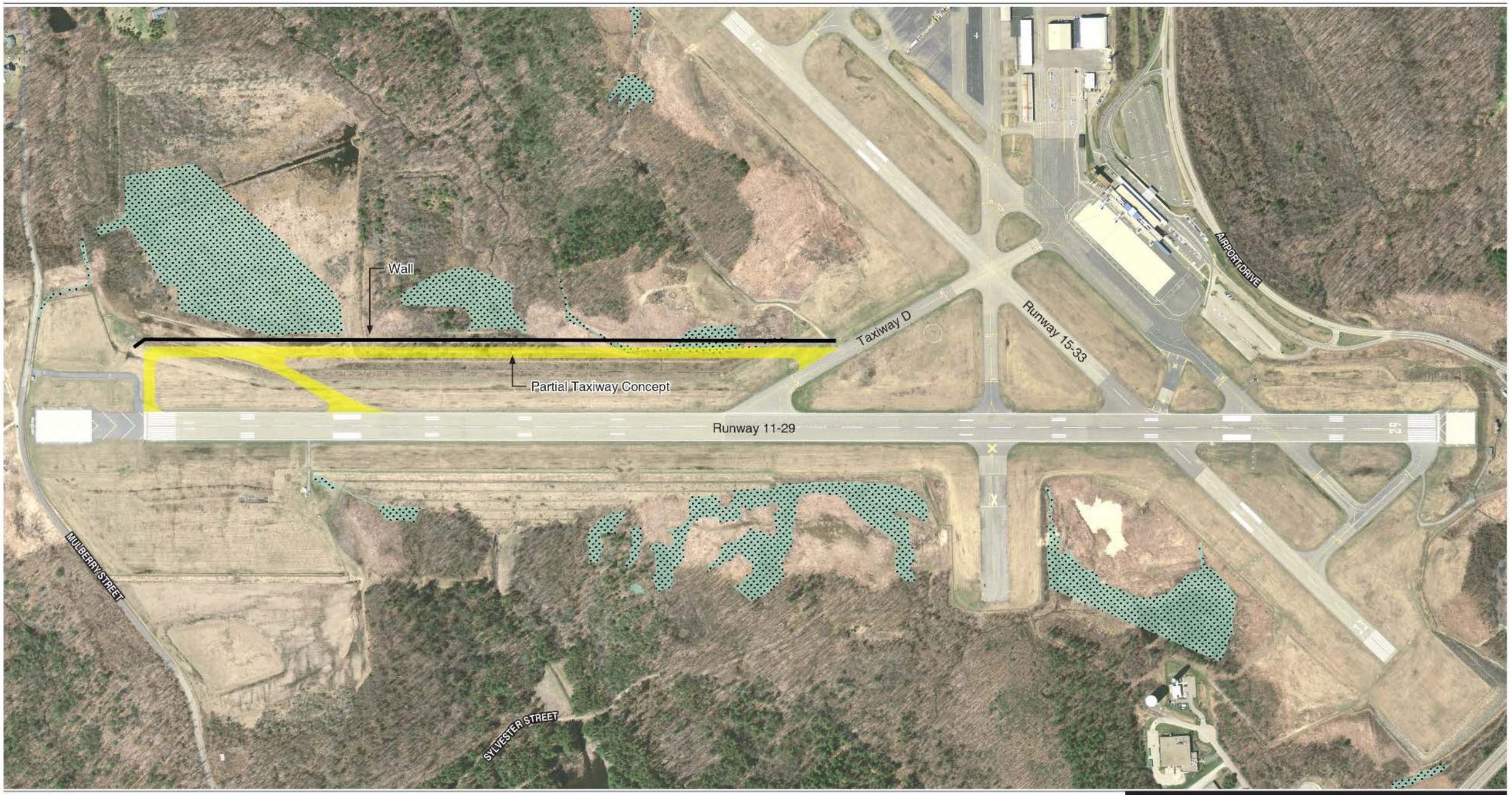
Partial taxiway alternatives would still require limited back-taxi use of the runway, but under more controlled and less lengthy operations. Partial taxiway alternatives would therefore require a Modification to Standard (MOS) from FAA, as they would not fully meet the FAA design requirements. The MOS is under review by the FAA. As an additional safety measure, operations at the airport during very low visibility conditions will be restricted to one aircraft at a time on the airfield.



Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 3-1
Full Length
Taxiway Alternative



Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 3-2
Partial
Taxiway Alternative

Three partial taxiway alternatives were studied. These alternatives, similar to the full length taxiway alternatives, included designs with non-standard offsets and taxiway widths in an effort to minimize impacts to adjacent resources. The longer Partial Taxiway alternatives were subsequently dismissed because of wetland and habitat impacts and cost.

3.2.3 Jug-handle Taxiway Alternative (Proposed Action)

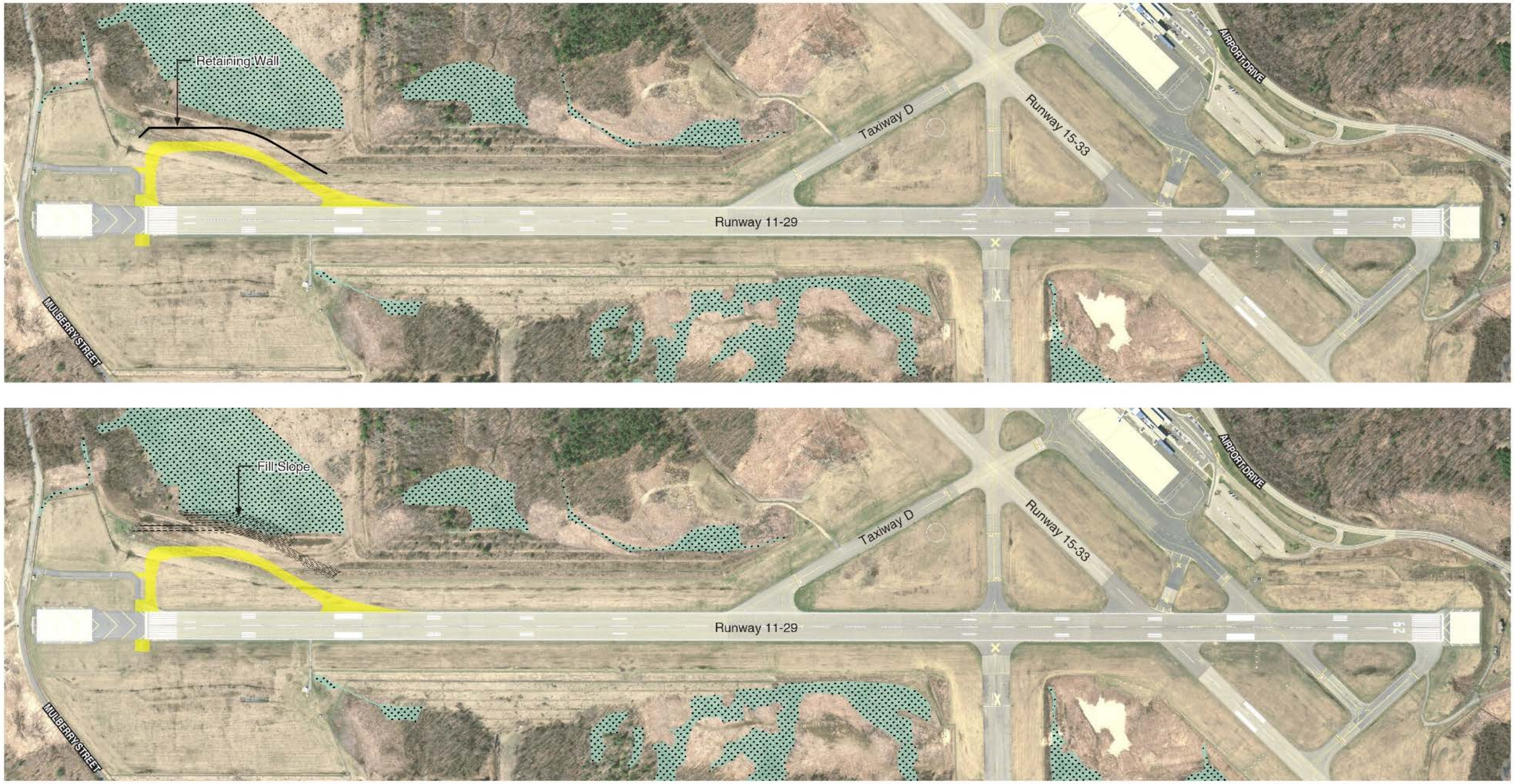
In an effort to further minimize environmental consequences and costs, a partial taxiway alternative was developed that consists of a shortened taxiway located at the 11 end of Runway 11-29 that resembles a jug-handle. Although the jug-handle alternative will require some back taxi operations on Runway 11-29 under controlled conditions, there will be less back-taxiing than under the current and No-Action Alternative. By reducing back-taxiing times, the jug-handle taxiway will enhance safety under all weather conditions.

Initial designs included consideration of 50-foot wide or 75-foot wide taxiway widths, and 400-foot or 500-foot offset from the centerline of the runway. FAA guidelines for taxiway design, including both widths and offsets, are based on aircraft dimensions such as undercarriage, wingspan, and tail height for typical aircraft using the airport. Based on aircraft types that regularly use ORH FAA design guidelines allow the use of a 50-foot wide taxiway at a distance of 400-foot from the runway centerline. The construction of the jug-handle alternative would extend the existing terrace adjacent to the runway. The narrower taxiway width and closer proximity to the runway, minimizes the amount of fill required to construct the taxiway terrace while maintaining compliance with design guidance and enhancing operational safety. Two alternatives were evaluated:

- Fill Slope
- Retaining wall

The fill slope alternative, shown in Figure 3-3, would extend into adjacent wetland resource areas associated with Lynde Brook and hydrologically-connected to a drinking water reservoir. This alternative would permanently impact 29,000 square feet of wetland and would require an additional 13,000 square feet of construction impact. The fill slope alternative was dismissed due to the amount of wetland impact.

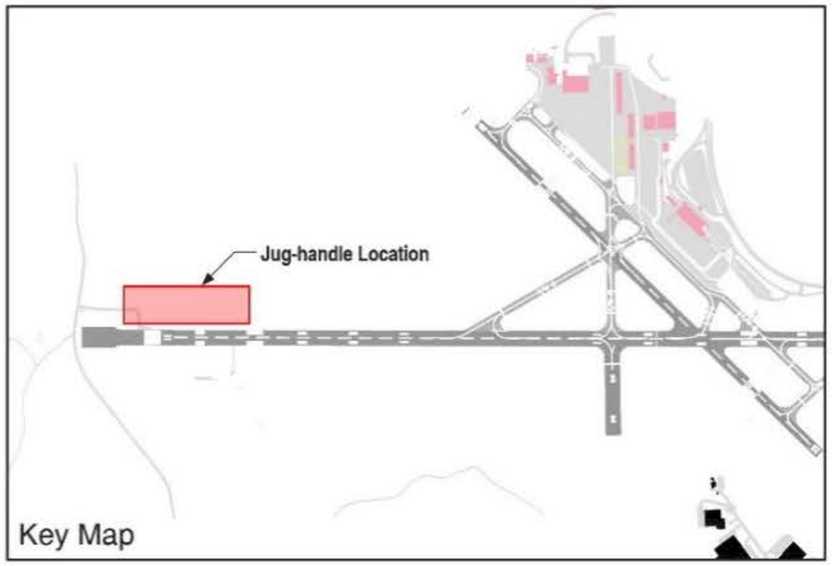
The retaining wall alternative, shown in Figure 3-3, was advanced to minimize wetland impacts. This alternative includes a mechanically stabilized earth (MSE) wall to retain the fill slope and avoids all taxiway impacts to wetlands. Two versions of this alternative were developed, one with a wall at 69 feet from the centerline of the taxiway, and one at 100 feet from the centerline of the taxiway. The FAA guidelines require a 100-foot offset to be fully complaint with the taxiway object free area (TOFA). The TOFA is the area on either side of the taxiway that must be maintained free of obstructions that could interfere with the ground movement of aircraft. Neither the 69-foot wall offset option nor the 100-foot option would result in impacts to wetlands, therefore the fully compliant 100-foot option, with the wall positioned outside the TOFA was selected as the proposed action. Figure 3-4 shows the proposed jug-handle taxiway.

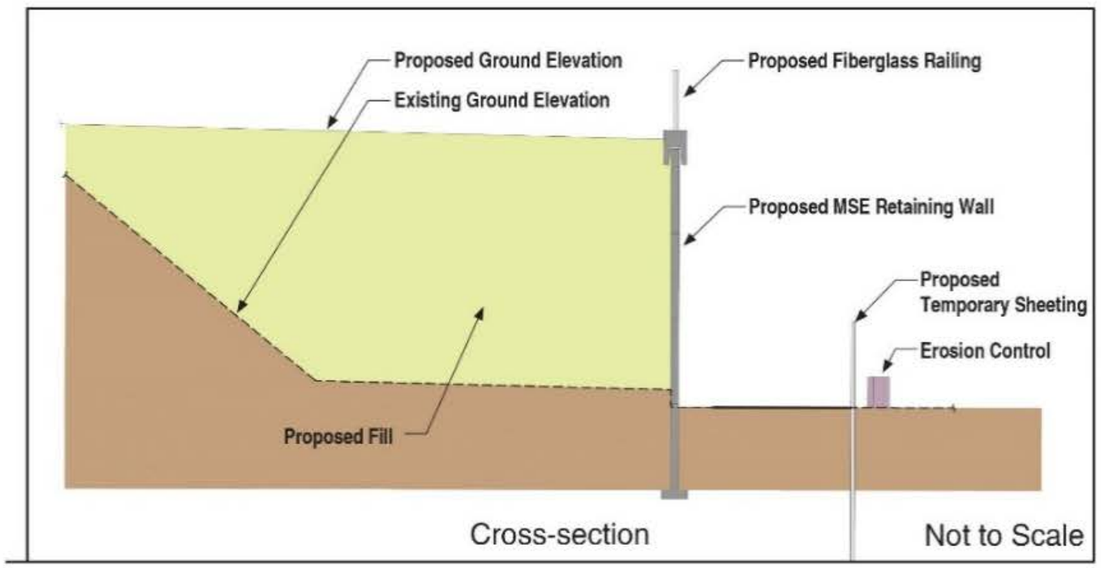


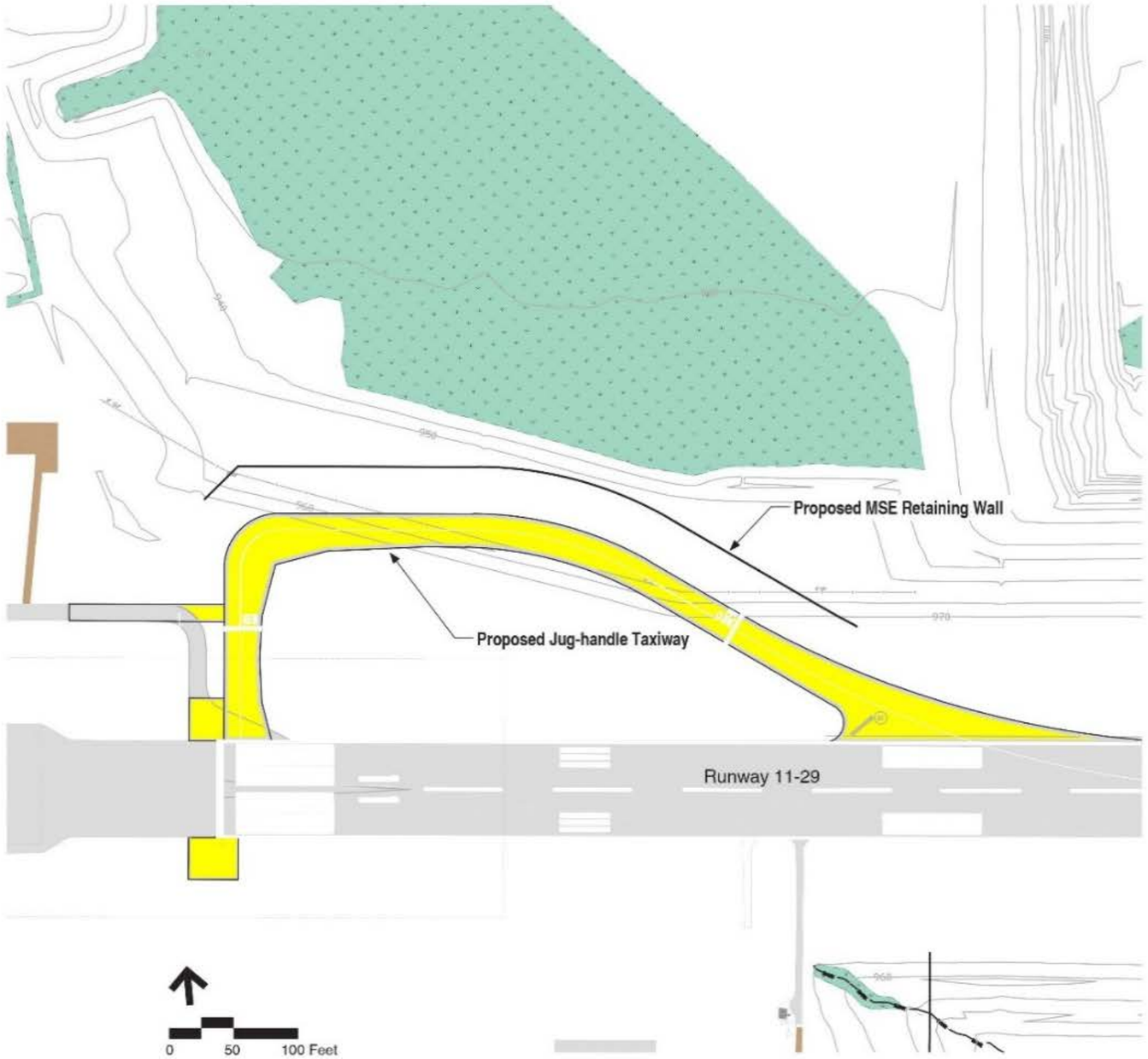
Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 3-3
Jug-handle
Taxiway Alternatives







Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Wetland

New Pavement

Figure 3-4
Proposed
Jug-handle Taxiway

Centerline taxiway lighting will be installed in conjunction with the jug-handle Taxiway to improve the safety of taxi operations during very low visibility conditions. While the jug-handle alternative completely avoids all wetland impacts, it does not fully meet the requirements for a CAT-III full length parallel taxiway (AC 150/5300-13) and will require a Modification to Standard from FAA to construct. A request for a Modification to Standard is under final review by FAA.

3.3 Alternatives Analysis – Cat III ILS

The Instrument Landing System (ILS) consists of ground-based-equipment that facilitates landing in low visibility conditions. Approach lighting systems provide highly visible aids to pilots on approach. Airfield instrumentation transmits radio signals to approaching aircraft providing information on height and horizontal alignment with respect to the runway. Information on relative height is provided by the glide slope antenna; the localizer provides horizontal alignment information. The ILS equipment at ORH is currently rated for CAT-I approaches only. In order to support very low visibility landings (CAT-III conditions) the ILS equipment will need to be upgraded. This includes the approach light system, localizer and glide slope antenna. Because both facilities will impacts wetlands, Massport evaluated alternatives.

3.3.1 Approach Lighting System

The Approach Lighting System consists of a series of lights extending from the end of the runway that are used by pilots to visually align the aircraft with the runway as the aircraft approaches the airport for landing. There are several different types of Approach Lighting Systems that vary in design and lighting intensity.

In order to support CAT-III ILS operational capabilities, the project will upgrade the Runway 11 approach lighting system. The existing approach light system is classified as a medium intensity light system (MALSR). The existing light towers extend 2,400 feet west of Runway 11 and are spaced at 200-foot intervals. The new lighting system is classified as a high intensity approach lighting system (ALSF-2) and will facilitate the transition between the instrument and visual descent to landing during low visibility conditions. The new ALSF-2 system will not require lengthening of the light tower array, but requires towers spaced at 100-foot intervals and an enhanced electrical system.

Using FAA guidelines for CAT-III rated ILS, Massport developed three alternative designs for the approach lighting and the supporting electrical and communications infrastructure. Tower heights will also need to be modified to achieve a level light plane (the relative height of the lights from one tower to the next) rather than at a gradient as exists today. The new high voltage electrical system includes high voltage wiring that must be fully encased in a duct bank. The duct bank would be approximately 8 feet in width and 2 feet deep.

Alternatives for the approach light towers included:

- Replace all existing towers and add new towers
- Replace existing towers and add new light arrays on catwalk structure
- Modify existing towers and add new towers

Alternatives for the electrical system included:

- Buried conduit on-alignment
- Above-grade conduit on structure
- Buried conduit off-alignment

Lights on New Towers Alternative

Full replacement of the towers was considered early in the project design development process. This alternative would replace all existing towers in new locations and the footings for new towers would require three tower footings in wetlands. This alternative results in greater temporary and permanent wetland impacts to wetlands than the proposed action with much higher cost and was therefore dismissed.

New Light Towers on a Catwalk Alternative

Design of the new light structures on catwalk systems suspended between existing towers was investigated as an alternative to all new towers. This alternative would build a platform for the new lights above grade connected to the existing towers. Structural integrity of this system could only be achieved through the use of pilings to support the structural loads, resulting in wetland impacts in three locations. The existing tower footings in the location of the 1,000-foot light bar are within a wetland and would need to be modified to support the proposed new loads, resulting in new wetland impacts and costs that are greater than other alternatives. This alternative was also dismissed.

Modify Existing Light Towers Alternative (Proposed Action)

The proposed action for the Approach Light System is to utilize the existing light towers and footings and, where necessary, reconstruct the existing towers to achieve the appropriate lighting height. Placing new towers at 100-foot intervals between the existing towers can be accomplished without impacts to wetlands in all but one location.

Electrical Equipment Installation Alternatives

In addition to the physical tower structures, the ASLF-2 system requires new and upgraded electrical and communications systems. The new high voltage electrical service requires a duct bank approximately 8 feet wide by 2 feet deep. Alternative methods for providing upgraded power to the new lighting array were also investigated.

Alternative 1- Buried Conduit on Alignment would bury the conduit in a duct bank located beneath the lighting array. This alternative would have the shortest route and would run directly under the lighting system. However, this alternative would result in extensive wetland impacts, as a wetland complex associated with Kettle Brook runs beneath and between portions of the tower array. In an effort to avoid wetland impacts from this conduit alignment, directional drilling construction methods were investigated. This methodology involves drilling horizontally at a shallow angle to align the duct bank under the tower array at the correct depth. Development of this design alternative revealed that the topography

and bedrock in the area is unsuitable for this type of construction. Due to the extensive wetland impacts, this alternative was dismissed.

Alternative 2 – Above-Grade Conduit on Structure would install the power systems on a catwalk system along the tops of the towers. This alternative was considered to avoid wetland impacts. Placing the conduit on the top of the structures has the potential to disrupt lighting reliability during the times when it is most critical to approaching aircraft due to the vulnerability of the exposed conduit to foul weather events. Due to the distance between the existing towers, and the size and weight of the duct bank, the catwalk would need to have pile supports to maintain the load of the conduit. The footings for supports would impact wetland resources and would result in a higher cost for this alternative. Therefore, this alternative was dismissed from consideration.

Alternative 3 –Conduit in Roadway would bury the conduit primarily within the footprint of the existing unpaved ILS service road that runs west from Mulberry Street to the end of the light array. Although the overall route for this alternative is longer, this route minimizes impacts to wetland resources and facilitates future maintenance. With the exception of the steep slope section, the road will not be paved. Placing the conduit along the maintenance road minimizes wetland impacts and was selected as the recommended alternative.

3.3.2 Glide Slope Antenna

The glide slope allows pilots to maintain a vertical landing path clear of obstructions and reach the appropriate landing height on the runway threshold during an instrument landing. The glide slope antenna uses radio frequencies to transmit information to the aircraft as it approaches the runway. Currently, the ORH glide slope antenna is rated for a CAT-I approach. Reflections, obstructions and uneven terrain need to be considered in designing the glide slope system to ensure that the path from the antenna to the approaching aircraft is clear.

To support CAT-III operations, the existing glideslope equipment must be relocated to meet FAA design criteria for vertical runway clearance. The equipment must be placed 400 feet from the runway centerline parallel to the 1000-foot runway marker. The area between the antenna and the end of the runway must be free of obstructions and provided with a flat reflection surface for the glide slope signal. The height of the antenna is positioned so that the glide slope signal brings the aircraft to a minimum height of 55 feet above the runway threshold.

The glide slope antenna is on the south side of the runway outside the runway safety area. Due to critical FAA design restrictions, alternative locations for glide slope equipment placement are not possible. Figure 3-5 shows the proposed location of the glide slope antenna equipment. The terrain in this location slopes steeply away from the existing runway safety area and requires fill to bring the grade of the side slope reflective area to the elevation of the runway. Two alternatives were evaluated:

- Fill slope
- Retaining wall

A glide slope design alternative with a full fill slope into the adjacent wetland had a higher wetland impact and was dropped from consideration. A retaining wall alternative was selected to minimize impacts to wetland resources.

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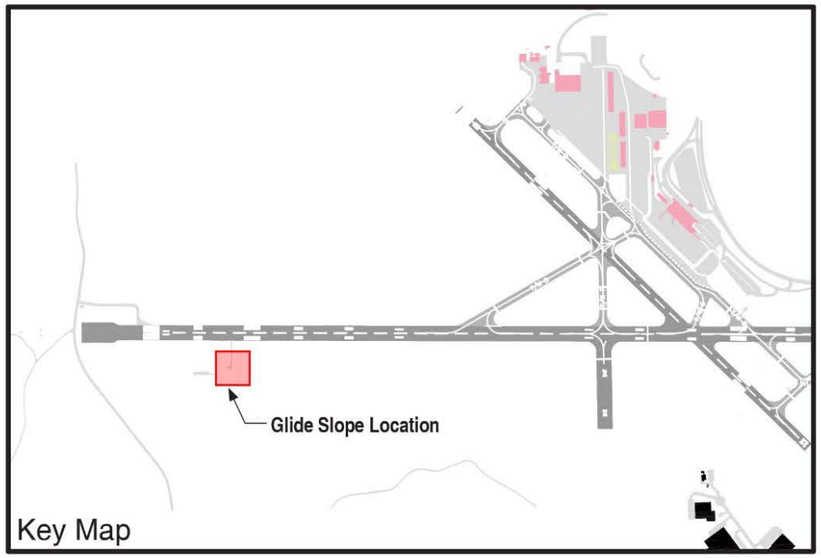

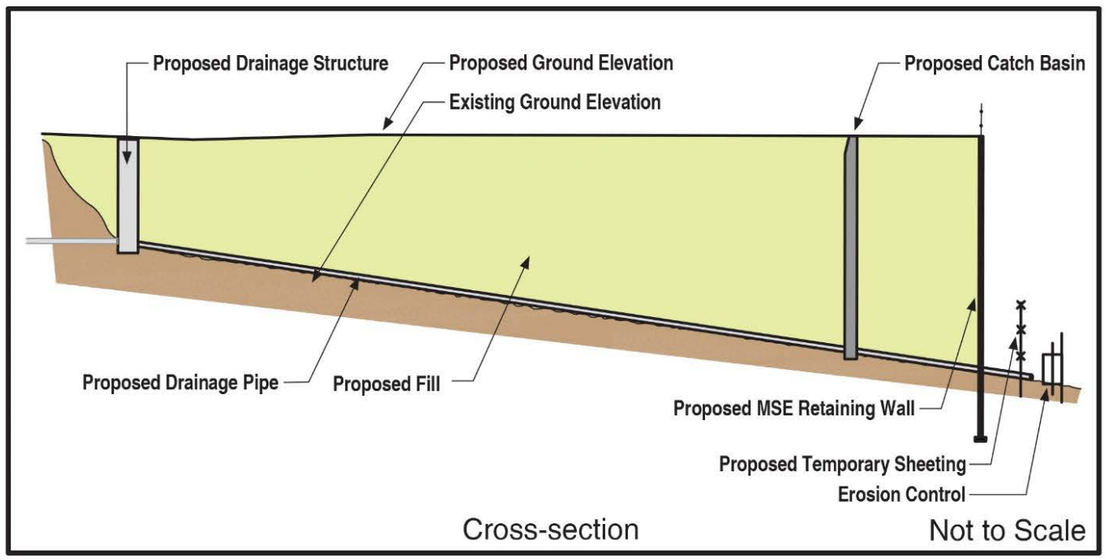

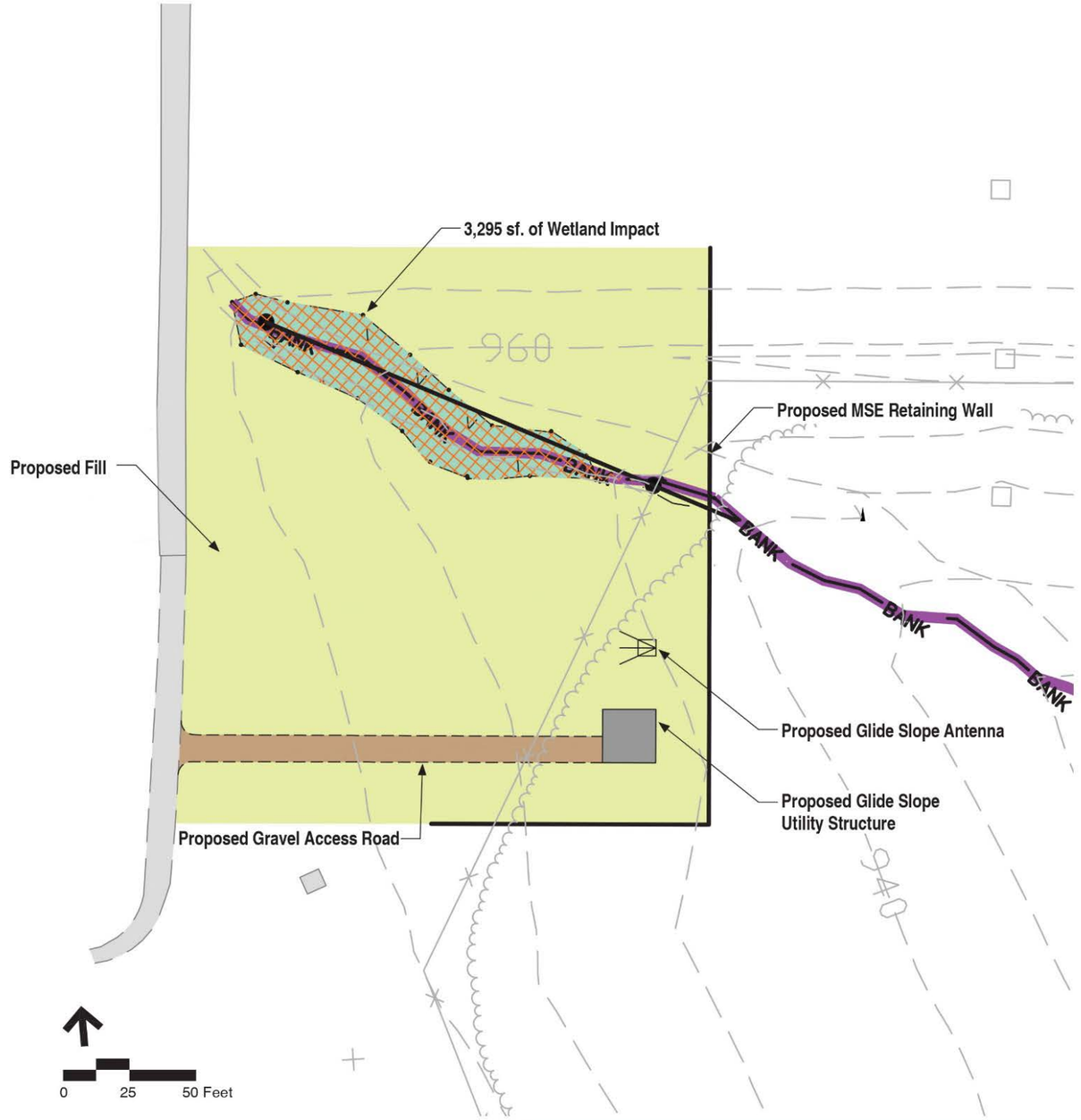

Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Wetland Impact

Fill

Figure 3-5
Proposed Glide Slope Antenna

massport

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3.4 No-Action Alternative

The No-Action Alternative was retained for evaluation in the EA for comparative purposes pursuant to 40 Code of Federal Regulations (CFR) 1502.14(d) and FAA Orders 1050.1E and 5050.4B. With the No-Action Alternative, Worcester Regional Airport could not achieve CAT- III operations. The airport would continue to experience constraints due to frequent weather events that make operations at the airport more challenging than at other airport locations. Under the No-Action Alternative, ORH would continue to have rates of commercial flight cancellation that are five times greater than other airports in the region. This alternative does not address the lack of reliability at ORH that encourages passengers from the Worcester area to drive to alternate airports, increasing demands on those airports and failing to provide needed economic growth in Worcester. The no-action alternative does not provide the operational safety enhancements, for all weather conditions, or a partial parallel taxiway. Most importantly, the No-Action Alternative would fail to provide the safety benefits of providing very low visibility landing operations at ORH and would not meet the purpose of the project.

3.5 Description of the Proposed Action

The Proposed Action will provide the suite of safety and operational improvements required to provide CAT-III conditions operational capability at ORH. Figure 1-1 illustrates the major elements of the Proposed Action.

3.5.1 Jug-handle Parallel Taxiway

The proposed parallel taxiway is a 1,000-foot long stub taxiway at a 400-foot centerline offset from the runway. The jug-handle taxiway is designed with a 90-degree angle entrance to Runway 11-29 at the far western end, and a 30-degree angled entrance at the eastern end. The 90-degree entry onto the Runway 11 end maximizes the pilot's ability to observe aircraft on approach or on the runway. The angled approach to the taxiway at its eastern end allows higher speed access for landing aircraft.

The jug-handle taxiway will be constructed on the airfield to the north of the 11 end of Runway 11-29 using a new embankment and mechanically stabilized earth (MSE) wall. FAA advisory circular 150/5300-13A provides guidance on standards and recommendations for airport design, including offsets to provide sufficient clearance between aircraft wingspans and object free areas to avoid interference with all aircraft ground movements. Following these guidelines, the wall system is required to be offset approximately 100 feet from the centerline of the new taxiway. In order to minimize fill volumes required, the area between the runway and the wall will slope downward slightly while meeting all design criteria and will result in a wall that is approximately 24 feet high, which is slightly lower than the runway height.

Massport will construct a subsurface infiltration system to collect and treat stormwater runoff from the surface of the new paved taxiway. The drainage design includes collection points within the infield between the taxiway and runway. The collected stormwater will be piped to an underground infiltration structure. Figure 3-6 shows the proposed stormwater system.

3.5.2 ILS and Navigational Aids

The proposed upgrades to the Instrument Landing System include improvements to the Approach Lighting System, the glide slope antenna, localizers and navigational aids.

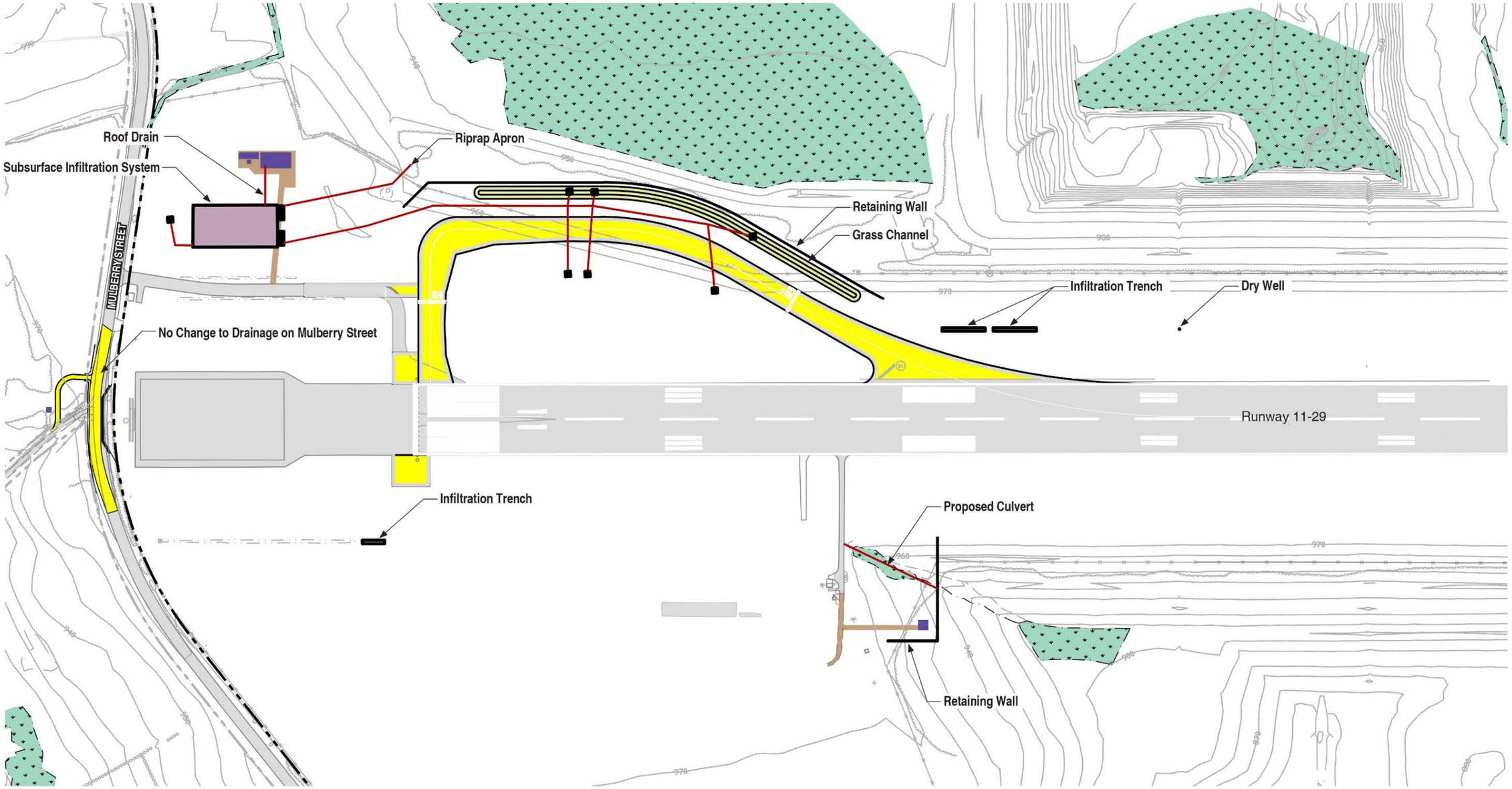
Approach Lighting System and Electrical Conduit

The proposed Approach Lighting System will upgrade the light array to meet CAT III standards. This will be accomplished by using existing tower light foundations and placing new light towers between the existing towers at 100-foot intervals. The existing towers will be modified to achieve a level elevation of approximately 990 MSL. Since the CAT I light array has a sloped grade, some existing towers will require additional height and some require lowering. Nine towers will be built on new foundations, three existing towers will be replaced with Low Impact Resistance (LIR) foundations, and one tower will be expanded to become three LIR towers wide. One new tower will be located within a wetland resource that is jurisdictional under state and federal regulations. In two locations, conduit to the light towers from the main duct bank will be located within a wetland resource.

The new power conduit routing is designed to minimize wetland impacts to the maximum extent practicable and ensure the reliability of the equipment. To minimize impacts, the conduit will be placed largely within the footprint of the existing ILS maintenance road that runs from Mulberry Street to the end of the lighting array. The conduit will be placed within a concrete duct bank measuring approximately 8 feet wide and 2 feet deep.

With the lowering of the overall height of the light plane, there are several areas where tree heights now exceed the maximum allowable height. Selective clearing of trees that are classified as obstructions will take place under an amendment to the Airport's vegetation management plan.

A new 250 KW generator, located on the north side of Runway 11, will power the ALSF-2 system. A new substation will distribute the primary high-voltage power via voltage regulators to the ALSF lights. This 2,000-square foot building will be located on the grassed airfield and accessed by a new service road. The building must be placed in the vicinity of the ASLF System to provide adequate power for the lighting system. Placing the power supply further away can result in diminished power over the length of the transmission line.



Source: Green International Affiliates, Inc.

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 3-6
Proposed
Stormwater System

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Glide Slope Antenna and Localizers

To achieve CAT-III operational capability, the airport is required by FAA to upgrade the Runway 11-29 ILS. The equipment to be upgraded in the proposed action will include both the localizers and the glide slope antenna. The new glide slope antenna must be placed at a distance of 1000 feet from the Runway 11 end and will be offset 400 feet from the runway centerline to achieve a 55-foot threshold crossing height (TCH) by design aircraft at the threshold to the runway. This will result in permanent impacts to the wetland in this location. To reduce fill requirements, a 100-foot long mechanically stabilized earth wall will be constructed to a height of approximately 35 feet and backfilled.

The localizer upgrades will require replacing existing equipment at both the 11 end and the 29 end of Runway 11-29. A 600-foot section of Mulberry Street, immediately adjacent to the runway end, will be re-aligned and the roadway profile lowered to accommodate the 11 end localizer and clearance for the new approach lights. At the 29 end of the runway, the existing localizer will be replaced with a new localizer built on a new platform and extended to support the localizer equipment at its required position and height. There are no wetland or protected habitat resources in either location.

Additional Navigational Aids

In addition to the ILS upgrades and taxiway components of the project, additional navigational aids are required by FAA to increase operational safety during very low visibility conditions.

A midfield Runway Visual Range (RVR) monitor will be installed on the airfield to measure the visibility conditions at the airport. The RVR measures the distance at which pilots are able to see taxiway and runway markers on the ground. These distances are transmitted to pilots to determine if instrument landings are required due to very low visibility conditions. The RVR equipment will be located on the north side of Runway 11-29 at midfield with electrical conduit support running along the top of the slope.

Surface Movement Guidance and Control (SMGCS) routes will be implemented for on-the-ground taxiing during very low visibility conditions. This in-pavement lighting system provides a series of centerline lights along the preferred taxiway route to provide additional visual cues for pilots taxiing at the airport during very low visibility conditions.

Conduit to support electrical and communications service associated with the new navigational and ILS systems will be installed within the grassed portion of the airfield, parallel to the runway. This conduit will be buried and will run from the new generator along the north side of the runway to the light vault near the terminal complex. Two far field monitors will be placed in line with the lighting array, off the 11 end of Runway 11-29. The far field monitor works as part of the localizer, monitoring the signal.

3.5.3 Construction Haul Road

An on-airfield haul road running from the gated entrance to the north, along the north side of Runway 11 will provide primary site access to construction vehicles. The temporary roadway will have a gravel surface, and will be a minimum width necessary to provide safe two-way travel for construction vehicles. Providing construction access primarily on the airfield will minimize disruption to adjacent neighborhood and traffic on rural roads such as Mulberry Street during construction. Upon completion of construction the haul road will removed and the area will be returned to its preconstruction condition. It is expected that some limited trucking along Mulberry Street will still be required for select elements of the ILS system upgrades.

4

Affected Environment and Environmental Consequences

4.1 Introduction

This chapter describes the potential impacts of the Project on the natural and human environment. Federal Aviation Administration (FAA) Order 1050.1E states that the environmental consequences analysis should include "consideration of the direct effects and their significance, the indirect effects and their significance, and cumulative effects and their significance." Impacts are evaluated in comparison to the No-Action Alternative.

A summary of the resource assessment is provided in Table 4-1 below. The table provides a comprehensive list of categories in FAA Order 1050.1E and 4040.4B and explanations for considering or not considering these categories within this EA. Environmental resources in the vicinity of the site are shown on Figure 4-1. The proposed suite of improvements to achieve CAT-III operational capabilities at ORH are intended to increase safety for the current level of operations at ORH and are not intended to increase airport capacity. Consequently, it is not anticipated that there will be long term effects from this project on air quality, compatible land uses, environmental justice populations, or noise levels. There are no Section 4(f) resources, coastal resources, wild and scenic rivers, or farmlands in the project vicinity.

4.2 Project Location and Setting

The Worcester Regional Airport is located in Worcester County, Massachusetts, in both the City of Worcester and the Town of Leicester. The Airport sits atop Tatnuck Hill, and Runway 11-29spans the Lynde Brook valley. The Project, which consists of upgrades to the existing approach light and instrument landing systems and construction of a partial parallel taxiway, will be built on previously altered areas presently used for Airport operations. Figures 1-1 and 1-2 provide an overview of the project location and setting.

The areas immediately surrounding the Project in Leicester are sparsely developed. The area predominantly consists of forested lands and Airport infrastructure. The closest residence is

approximately 1,400 feet north of the Project area on Mulberry Street. Mulberry Street, a low volume local road, forms the western airfield boundary.

Source: MassGIS

Potential Vernal Pools
NHESP Certified Vernal Pools
Perennial Stream
Intermittent Stream
Pond/Lake
Reservoir
ZONE A Surface Water Protection Area
NHESP Priority Habitats of Rare Species
NHESP Estimated Habitats of Rare Wildlife
Public Water Supply Watershed

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 4-1
Environmental Resources

massport

Table 4-1: Resource Category Applicability

Resource	Summary of Applicability
Air Quality	Not affected. Project will not increase airport capacity. Increase in operational efficiency is not expected to have negative air quality impacts. Section 4.3. Construction related air quality is addressed in Section 4.10.
Coastal Resources	Not present. Project is not within the Coastal Zone.
Compatible Land Use	Not affected. Project will not change any land uses and would not increase or decrease operations.
Construction Impacts	Construction period impacts related to traffic, noise, air and solid waste are discussed in Section 4.10.
Section 4(f) and Section 6(f)	Not present. There are no Section 4(f) or Section 6(f) lands present on the site.
Farmlands	Not present within project area.
Fish Wildlife and Plants	No federal listed species; State listed habitat is discussed in Section 4.5.
Floodplains	Floodplains are discussed in Section 4.9.
Hazardous Materials and Solid Waste	Not affected. Project will not involve any change to hazardous materials or solid waste management at the airport. Construction related controls are discussed in Section 4.10.
Historic, Architectural, Archaeological and Cultural Resources	Historic and Archaeological Resources are discussed in Section 4.6.
Light Emissions and Visual Impact	Light and Visual impacts are discussed in Section 4.7.
Natural Resources and Energy Supply	Massport will include best practices for energy conservation during construction such as warm mix asphalt and long term such as use of LED lighting.
Noise	Not affected. Project will not increase airport capacity or change operations. Increase in operational efficiency is not anticipated to result in significant noise impacts. Construction related noise is addressed in Section 4.10.
Secondary (Induced) Impacts	Project will not change airport operations or have any secondary impacts.
Socioeconomic Impacts, Environmental Justice and Children's Environmental Health and Safety Risks	Temporary job creation during 13-month construction period. On-airport project is not expected to have disproportionate impacts on EJ communities, nor negatively affect Children's Environmental Health. Construction period transportation is discussed in Section 4.10.
Water Quality	Stormwater is addressed in Section 4.8.
Wetlands	Wetlands and waterways are addressed in Section 4.9.
Wild and Scenic Rivers	Not present. There are no Wild and Scenic Rivers located in the project area.

The project lies within the Blackstone River watershed. Kettle Brook and Lynde Brook, two waterways adjacent to the Project site, flow into the Blackstone River and connect several drinking water reservoirs in the Town of Leicester but owned and operated by the City of Worcester. Wetlands are present on both sides of Runway 11-29, and are directly adjacent to Kettle Brook and Lynde Brook or their tributaries. The Massachusetts Department of Environmental Protection (MassDEP) designated these waterways and wetlands as Class A Outstanding Resource Waters due to their proximity to a public water supply. The Airport, including portions of the Project area, also includes mapped habitat for state-listed grassland bird species.

4.3 Air Quality

According to FAA Order 1050.1E, Change 1, Appendix A.2, and 5050.4B the FAA must assess whether the project is likely to result in significant impacts to air quality including air quality of the human environment. For certain actions, the impact on air quality is anticipated to be so minor (*de minimis*) as to not require detailed analysis. A final rule for determining conformity of federal actions (40 CFR Part 93) was published in the Federal Register on November 30, 1993, and became effective January 31, 1994.Called a Conformity Applicability test, a formal conformity determination must be performed when the emissions resulting from a federal action (the net emissions when Proposed Action emissions are compared to No-Action Alternative emissions) equal or exceed what are known as *de minimis* levels. Federal Register 41570 vol 72, No. 145 published FAA's Final Rule on July 30, 2007 for *Federal Presumed To Conform Actions Under General Conformity*. This rule details the criteria for projects that are presumed to conform to air quality standards and do not require a conformity determination.

The proposed action consists of upgrading the Instrument Landing System (ILS) and constructing a jug-handle taxiway. The proposed ILS and taxiway improvements are intended to enhance airfield all-weather reliability and operational safety. With the improvements in place, the airfield will be capable of operations in most weather conditions, thus allowing aircraft that are already scheduled or planned to arrive and depart ORH to complete those operations. The purpose of the project is to enhance aviation safety and increase aeronautical access and the reliability of air service to the Worcester Regional Airport (ORH) during the very low visibility weather conditions. Since the runways at ORH are already capable of handling the number and types of aircraft operations reasonably expected for the airport, the proposed improvements will not increase overall capacity at the airport or promote changes in aircraft types using the airport. Accordingly, the project is not expected to increase capacity or accommodate additional operations that could be expected to increase aircraft emissions at ORH.

If emissions are below the *de minimis* levels, it can be presumed that the Proposed Action conforms to the CAA. If emissions are above the *de minimis* levels, a conformity determination must be prepared. The following sections evaluate the proposed action project elements and their consistency with the requirements for presumptive conformity.

4.3.1 ILS Installation Conformity Requirements

FAA's Final Notice for *Federal Presumed To Conform Actions Under General Conformity* (2007)[1], states that installation of ILS equipment is presumed to conform when the following criteria are met:

> "*The routine installation, in-kind replacement, and maintenance of navigational aids are presumed to conform because these activities will not generate emissions that exceed de minimis levels. Moreover, emissions generated by construction equipment and maintenance vehicles used to transport workers and equipment to communications, navigation and security system (CNS) sites are negligible considering the temporary nature of construction and maintenance activities and the limited number of vehicles involved. If the installation of new or upgraded navigational aids for improved safety and efficiency also increases the capacity of the airport or changes the operational environment of the airport, these CNS activities are not presumed to conform…Also presumed to conform are CNS emergency or standby generators powered by natural gas or propane*."

The proposed upgrades to the ILS system will not increase the capacity of the airport or promote changes to the type of aircraft using the airport. Installing improved instrumentation systems will facilitate a more efficient and reliable operating environment by facilitating all-weather operations. The proposed action to upgrade the ILS system at ORH therefore meets the criteria for presumptive conformance for ILS installation.

Implementing a CAT III ILS at Worcester Regional Airport will reduce the number of currently scheduled operations at the airport that are diverted. Currently up to 10 percent of flights are diverted from landing at ORH due to weather conditions. Using 2012 operations data, 10 percent of landings would be just over 200 landings per year. A recent analysis of emissions associated with a hangar development project at ORH, discussed below, showed that the net emission changes from 208 additional landings and 208 additional take offs are well below the *de minimis* levels for each pollutant.

In August 2014, Massport prepared an Environmental Assessment for a potential new maintenance hangar at ORH. While a new maintenance hangar would be expected to service aircraft already operating at ORH, an assessment of potential air quality effects of added operations was conducted for that EA. That study assumed a worst case condition using an Airbus A320-232. This aircraft can and has operated at ORH with the current airfield and ILS equipment, but would be new to the airport as a regular operation. The Embraer 190 with the CF34-10E engine that currently operates regular daily commercial service operations at ORH has slightly lower emissions compared to the A320-232 used for the analysis. Therefore, the A320-232 was assumed for that analysis since it is worst case from an emissions perspective. Under this condition, the annual operations were assumed to increase by 416 operations [or 208 landing- takeoff operations (LTO's)], assuming the new operations would equal to four landings and four takeoffs per week. As noted above, this is compared to the 2013/14 level of over 31,000 annual operations and over 53,000 annual operations in 2002. Note that in 1988 when four commercial airlines operated regular services, ORH accommodated 145,622 aircraft operations.

The 2014 hangar air quality analysis estimated net changes in emissions due to the proposed hangar and associated improvements at ORH. Emissions associated with each aircraft operation, and associated ground support operations and on-road surface vehicle trips were estimated using the latest FAA's EDMS model. EDMS uses EPA databases, methodology, and algorithms to calculate

1 41570 Federal Register Volume 72, No. 145 (July 30, 2007) p.6

emissions for CO, PM10, and PM2.5, various sulfur oxides (SOx), VOCs, and oxides of nitrogen (NOx) from aircraft, ground support equipment, parking lots, roadways, and stationary sources.

The analysis demonstrated that the net emission changes from activities associated with additional A-320 operations would be well below the *de minimis* levels for each pollutant analyzed. Attachment C includes the full technical memo. Because the number of operations at ORH that would not be diverted due to bad weather is less than the number of operations evaluated in the prior analysis, this provides additional supporting documentation that the proposed CAT III ILS system would result in a *de minimis* increase in air quality emissions.

4.3.2 Taxiway Construction Conformity Requirements

Per FAA's Final Notice for *Federal Presumed To Conform Actions Under General Conformity* (2007), taxiway projects are presumed to conform when they meet the following criteria (emphasis added);

> "*Taxiway construction projects are limited to improvements of existing taxiways that will not affect runway use, increase capacity, enable new aircraft types, or change existing airfield operations when complete (e.g., new high speed exits would represent such a change). Construction projects in this category do not include blasting or substantial cut and fill activity to level the terrain or prepare the surface area.*"

The project proposes to construct a new jug-handle taxiway to serve the existing primary Runway 11-29. This runway is unique in that it is not served by a taxiway as current FAA design standards require. FAA requires a parallel taxiway to increase safety of operations at the airport for current levels of service and activity and the action will not increase capacity at the airport. Since the proposed action includes construction of a new taxiway, it is not characterized as an improvement of an existing taxiway and does not meet the conditions for presumed conformance.

Currently, the 7,000 foot long Runway 11-29 must serve both as the runway and taxiway. Once constructed, arriving and departing aircraft will use the jug-handle for a portion of its taxiing. Use of the taxiway by arriving and departing aircraft will increase ground travel distance by 500 feet per operation. Emissions from this additional movement – 500 feet for two operations per day - will be negligible. The taxiway will therefore result in negligible increases in emissions, and can be considered to meet the *de minimis* criteria.

Pollutant emissions from taxiway construction are also evaluated in Section 4.8, *Construction*, to determine if the proposed construction activities would exceed *de minimis* levels of emissions.

4.4 Noise

As described above, the proposed ILS and taxiway improvements are intended to enhance airfield all-weather reliability and operational safety. With the improvements in place, the airfield will be capable of operations in most weather conditions, thus allowing aircraft that are already scheduled or planned to arrive and depart ORH to complete those operations. Accordingly, the project will not increase capacity or accommodate additional operations that could be expected to increase noise levels at or around at ORH.

The August 2014 Technical Memorandum (Appendix C) prepared by Massport in support of an Environmental Assessment for a potential new maintenance hangar at ORH considered the potential noise effects of additional aircraft operations and associated airfield activity. The hangar study provides a benchmark for evaluating the potential noise impacts associated with not diverting a small percentage of scheduled arrivals at ORH. The current project is intended to enhance all-weather reliability rather than increase capacity and therefore the operations levels would be the same for the Proposed Action and No-Action alternatives.

The hangar study TM used FAA's Area Equivalent Method (AEM) as a screening procedure used in determining the need for further analysis with the Integrated Noise Model (INM) as part of Environmental Assessments and Impact Statements (EA/EIS) and Federal Aviation Regulations (FAR) Part 150 studies. AEM is a mathematical procedure that provides an estimated change in noise contour area for an airport given the types of aircraft and the number of operations for each aircraft. The purpose of the AEM is to show change in airport annual average day DNL noise contour area relative to a change in aircraft mix and number of operations. The latest version of the AEM (Version 7.0c) was used for the analysis.

The AEM produces noise contour areas (in square miles) for the DNL 65 dB noise level and the purpose of AEM is to screen for significant impact within the DNL 65 dB contour area. The AEM is used to develop insight into the potential increase or decrease of noise resulting from a change in aircraft operations. In their report dated August 1992, the Federal Interagency Committee on Noise (FICON) recommended the use of AEM as a screening tool to determine the need for additional environmental noise analysis. FICON, which was composed of representatives from several Federal Government agencies, was chartered to review specific elements of federal agency procedures for the assessment of airport noise impacts and to make appropriate recommendations.

In their report, FICON recommend the use of screening to determine the extent of noise analysis required. FICON also established an increase of 17-percent or more in contour area as the threshold of significance for AEM within a DNL 65 dB contour. A 17-percent increase indicates that the proposed action could result in a DNL 1.5 dB or greater increase at a noise sensitive area and that further analysis is required. Conversely, if the screening process shows less than a 17-percent increase, it may be concluded that there are no significant impacts on a noise sensitive area.

The AEM model input consists of aircraft fleet mix data and annual day and night operations. The aircraft fleet mix and day night breakdown was developed from the FAA Traffic Flow Management System Counts for June 2013 through May 2014 and data provided by Massport. These operations were then scaled to the reported totals from the FAA Operational Network tower counts for the same 12-month period.

However, for the purpose of the hangar analysis it was assumed a worst case condition using an Airbus A320-232. This aircraft can and has operated at ORH with the current airfield and ILS equipment, but would be new to the airport as a regular operation. Under this condition, the annual operations would increase by 416 operations (or 208 landing- takeoff operations (LTO's)), assuming the new operations would equal to four landings and four takeoffs per week. As noted above, this is compared to the 2013/14 level of over 31,000 annual operations, the over 53,000 annual operations in 2002 both of which were dramatically lower than the 1988 operations peak of over 145,000 annual operations.

The Area Equivalent Method noise modeling for the proposed hangar project indicated that if the 416 new operations were conducted there would be a very minor increase in the DNL 65 dB contour (1.2 percent). A 1.2-percent increase is well below the 17-percent threshold increase in contour area and

therefore does not result in a significant impact due to proposed action. Table 2 of the TM presents the increase in size of the DNL 65 dB contour and the percent change in area due to the proposed action. Even the addition of another 400 annual operations would be expected to remain well below historic levels and have impacts well below the AEM 17-percent increase threshold of significance.

The proposed CAT-III ILS system would enhance the airport's all-weather capabilities and the operations levels would be expected to be the same for the Proposed Action and No-Action alternatives. The ILS would eliminate the need to divert inbound aircraft under poor weather conditions, currently estimated to occur less than 10 percent of the time. As shown by the hangar analysis, this would not have a significant noise impact.

4.5 Fish, Wildlife and Plants

According to FAA Order 1050.1Eand 5050.4B the FAA must assess whether the project is likely to result in significant impacts to fish, wildlife, and plants.[2] This section describes the existing plant communities and wildlife observed in the vicinity of the airport and assesses the potential for significant impacts (as compared against thresholds specified in the Order) to these resources.

4.5.1 Affected Environment

The sections below describe the existing fish, wildlife, and plants, including vernal pools and state listed threatened and endangered species, in the vicinity of the project. USFWS confirmed that there are no federal listed species or habitat areas within the project vicinity. Project correspondence, including USFWS, is included in Appendix A.

Plant Communities

The upland plant community surrounding Runway 11-29 is primarily Cultural Grassland. This community is defined as a human made and maintained grassland area. At ORH the grassland is dominated by many non-native species, including oriental bittersweet (*Celastrus orbiculatus*), birdsfoot-trefoil (*Lotus corniculatus*), field-madder (*Galium mollugo*), Queen Anne's lace (*Daucus carota*), common stitchwort (*Stellaria graminea*), and bird-vetch (*Vicia cracca*).

Massport recently completed a comprehensive five-year Vegetation Management Plan (VMP) for ORH to fulfill FAA requirements to maintain protected airspace surfaces by eliminating obstructions and maintaining visibility of the approach lights. Due to this active management, the areas along the light array west of the 11 end of the runway are also cleared of vegetation to allow unobstructed views of the runway. Uplands in this area contain Pennsylvania sedge (*Carex pensylvanica*), bluet (*Houstonia caerulea*), boreal wood-rush (*Luzula multiflora*), and arrow-leaf violet (*Viola sagittata*).

Wetlands North and South of Runway 11-29and the light array consist of Deep Emergent Marshes dominated by narrow-leaved cat-tail (*Typha angustifolia*) and sensitive fern (*Onoclea sensibilis*), grading into Shallow Emergent Marshes with soft rush (*Juncus effusus*), fox-sedge (*Carex vulpinoidea*), awl-fruited sedge (*Carex stipata*), sallow sedge (*Carex lurida*), wool-grass (*Scirpus cyperinus*),meadow foxtail (*Alopecurus pratensis*),and fowl-meadow grass (*Poapalustris*). Farther

2 Federal Aviation Administration. 20 March 2006. Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

out from the runways, there are also areas of Shrub Swamps with mixes of winterberry (*Ilex verticillata*), sweet pepper-bush (*Clethra alnifolia*), hybrid honeysuckle (*Lonicera ×bella*), arrowwood (*Viburnum dentatum*), highbush-blueberry (*Vaccinium corymbosum*), meadowsweet (*Spiraea alba*), sensitive fern, interrupted fern (*Osmunda claytoniana*), cinnamon fern (*Osmundastrum cinnamomeum*), and orange jewelweed (*Impatiens capensis*).

Forested wetlands along the light array are Red Maple Swamps; in addition to red maple (*Acer rubrum*), co-dominant species include yellow birch (*Betula alleghaniensis*), interrupted fern, and cinnamon fern.

Wildlife

Birds and other species are controlled on the airfield in accordance with the FAA's wildlife hazard management requirements. Bird species are the most common form of wildlife observed during site visits. Species included yellow warbler (*Dendroica petechial*), common yellowthroat (*Geothlypis trichas*), red-winged blackbird (*Agelaius phoeniceus*), bobolink (*Dolichonyx oryzivorus*), house wren (*Troglodytes aedon*), willow flycatcher (*Empidonax traillii*), song sparrow (*Melospiza melodia*), eastern meadowlark (*Sturnella magna*), American kestrel (*Falco sparverius*), tree swallow (*Tachycineta bicolor*), savannah sparrow (*Passerculus sandwichensis*), wild turkey (*Malaegris gallopavo*) and killdeer (*Charadrius vociferous*).

In the approach lighting array system area west of the runways, eastern towhee (*Pipilo erythrophthalmus*), song sparrow, field sparrow (*Spizella pusilla*), gray catbird (*Dumetella carolinensis*), blue jay (*Cyanocitta cristata*), black-and-white warbler (*Mniotilta varia*), downy woodpecker (*Picoides pubescens*), and northern cardinal (*Cardinalis cardinalis*) were observed in the shrubs and wetlands; and broad-winged hawk (*Buteo platypterus*), tree swallow, great blue heron (*Ardea herodias*), and common raven (*Corvus corax*) were spotted overhead.

Signs of white tailed deer (*Odocoileus virginanus*) were common throughout the wooded areas surrounding the airport outside the fenced limits, as were Eastern grey squirrel (*Sciurus carolinensis*), beaver (*Castor canadensis*) and chipmunk (*Tamias striatus*). Recently, black bear (*Ursus americanus*) have been sighted near the airport. These are common species assemblages for grassland, successional, and wetland habitats in central Massachusetts.

Vernal Pools

There are no Certified Vernal Pools in the vicinity of the project. There is one Potential Vernal Pool (PVP 12312) identified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) within 500feet of the approach lighting system. Figure 4-1 shows locations of all potential vernal pools within the project area. A vernal pool survey, conducted in 2013 found that Pool 12312 consists of a complex of connected pools and found evidence of beaver activity as well as masses of wood frog eggs, mole salamander eggs, and caddis fly larvae. The pool therefore meets the NHESP and USACE certification criteria. No other potential vernal pools were identified during field surveys.

Threatened and Endangered Species

Correspondence with US Fish and Wildlife Service, in a letter dated September 9, 2014, and included in Appendix A, confirmed that there are no federally listed fish, wildlife, or plants known to occur in the vicinity of the Airport. However, the project area is located within mapped Priority Habitat (PH 373) for grasshopper sparrow (*Ammodramus savannarum*), a bird that is state-listed as a Threatened species. Figure 4-1 shows the limits of the habitat areas mapped at the airport. Suitable habitat for the grasshopper sparrow includes grassy areas, preferably bunch type grasses, absent of shrubs. As previously discussed, much of the land immediately surrounding the runways is maintained as low grassy areas in accordance with Worcester Regional Airport (ORH)'s Vegetation Management Program to ensure that there are no safety hazards that obstruct flight paths or visibility. Maintaining airfields as grasslands promotes the type of habitat preferred by this species. However, areas of bare ground, the grasshopper sparrow's preferred area for insect foraging, are absent and grassed areas are densely vegetated creating less than ideal conditions for this species.

On June 24, 2014, Andrew Vitz, MA State Ornithologist, conducted a breeding bird survey at ORH. Several grassland birds (bobolink, savannah sparrow, eastern meadowlark) were observed, but no state-listed species were present. The preliminary coordination with the NHESP advised that no additional field surveys would be necessary.

4.5.2 Environmental Consequences

According to Section 8.3 of FAA Order 1050.1E, the significant impact threshold for impacts to federally listed threatened and endangered species is reached when the Fish and Wildlife Service or National Marine Fisheries Service "determines that the proposed action would be likely to jeopardize the continued existence of the species in question, or would result in the destruction or adverse modification of Federally-designated critical habitat in the affected area." The NEPA standard of significance may also be met by lesser impacts, including impacts to non-listed species, based on consultation with agencies and organizations having jurisdiction or special expertise concerning the protection and/or management of the affected species.

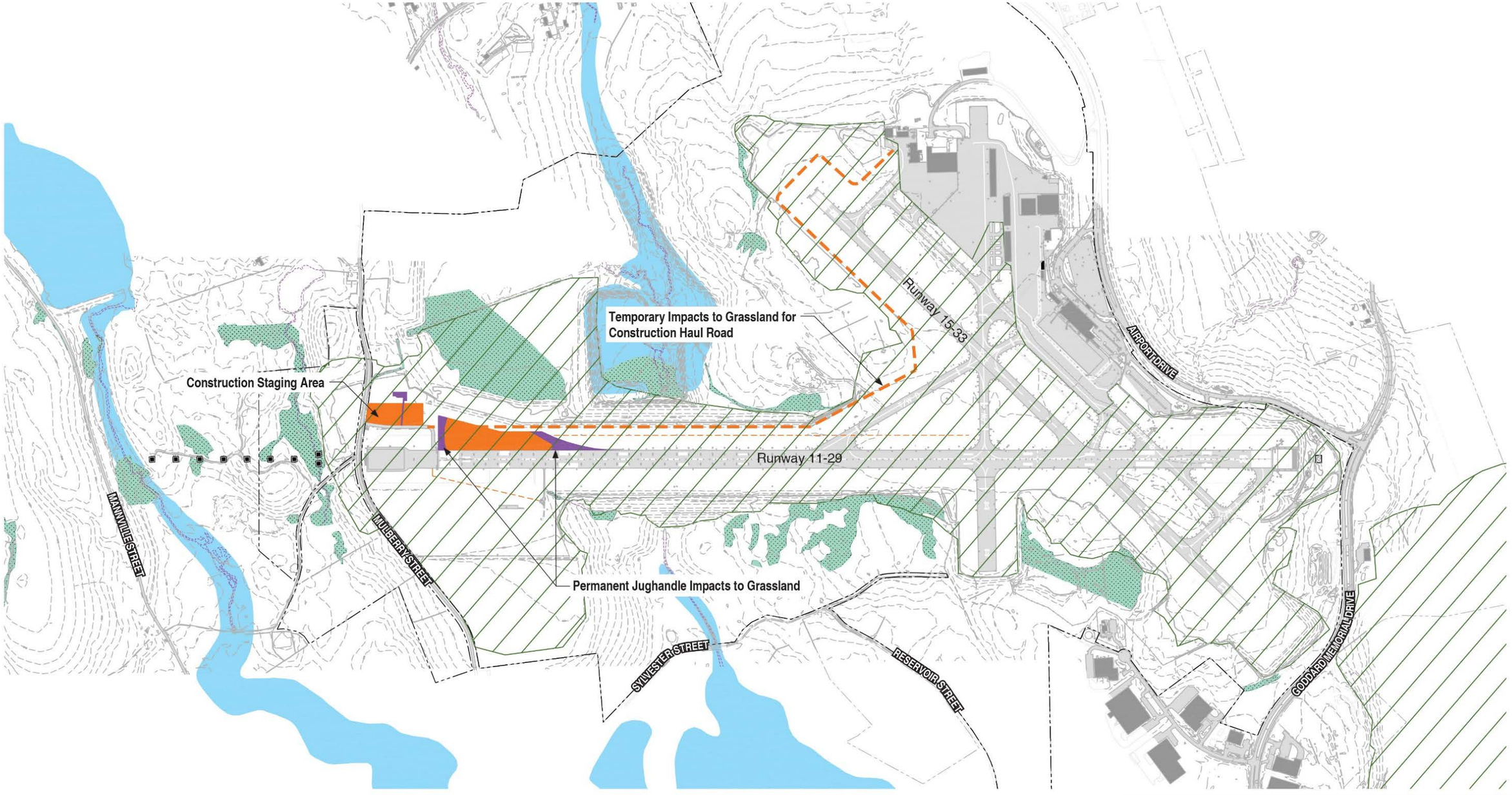
Threatened and Endangered Species

As described above, there are no federally listed species threatened or endangered species or habitats in the project area. However, the area is located within mapped Priority Habitat for the state-listed grasshopper sparrow. There are three areas of permanent impact to grassland habitat: 1) from the construction of the new paved surfaces on existing grassland areas associated with the jug-handle taxiway 2) from the construction of the new generator and support building north of Runway 11 and 3) from the construction of the temporary road for construction access. Grassland impacts are illustrated in Figure 4-2. The proposed project will result in the loss of 1.8 acres of grassland habitat (Table 4-2) but will provide new grassland through off site mitigation at a ratio of 2:1. NHESP submitted a comment letter during the Draft EA comment period (Appendix D) encouraging the development of construction period controls to minimize impacts to the grasshopper sparrow during the nesting season (May 1 – August 15), and outlining permitting requirements for the project. Massport will continue to coordinate with NHESP to minimize project impacts and develop appropriate mitigation measures as part of the Conservation and Management Plan.

The project requires temporary impacts to approximately 3 acres of grassland due to construction and utilization of the haul road. This area will be restored to its preconstruction condition upon completion of work. Additional temporary impacts to grassland areas will occur in association with electrical conduit buried within the airfield to support navigational aids. During construction, vehicle movement on the construction access road may also disturb birds nesting in adjacent areas.

Table 4-2: Grassland Habitat

Project Element	Grassland Loss
Jug-handle Taxiway	60,561 sf
ALSF-2 Support Buildings	9,089 sf
Misc. Pavement	8,736 sf
Total Permanent	78,386 sf (1.8 ac)
Construction Access Road	129,488 sf
Total Temporary	129,488 sf (3 ac)



Source: Jacobs

Worcester Regional Airport/Environmental Assessment
CAT III Instrument Landing System and Taxiway Project

Figure 4-2
Grassland Impacts

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Vernal Pools

There will be no direct impacts to vernal pools. In the Massachusetts General Permit, the USACE evaluates impacts to the Vernal Pool Critical Terrestrial Habitat (CTH), the upland within 750 feet around a vernal pool. The USACE New England District Compensatory Mitigation Guidance also identifies a 250-foot "vernal pool buffer." There will be a small amount of upland habitat loss within the areas surrounding PVP 12312 from the installation of the new light towers, and from selective removal of vegetation that obstructs visibility of the new lighting system. However, these impacts will be minimal and will not exceed the USACE's impact thresholds (for both the CTH and the vernal pool buffer) of 25 percent loss of contiguous forest with undisturbed ground cover. Massport will follow its existing Vegetation Management Plan to ensure that the removal of vegetative obstructions is performed in a manner that avoids, minimizes, and mitigates impacts to aquatic resources.

4.5.3 Regulatory Compliance

Work within regulated areas associated with fish, wildlife and plants will require adherence to state and federal level protections. The project is anticipated to require construction within areas regulated as habitat for state listed species, and within the upland envelope for vernal pools. Construction activities and all proposed mitigation measures will be reviewed by NHESP and USACE during the permitting process.

Threatened and Endangered Species

As previously described, there are no federally listed threatened or endangered species or habitats known on the project site. However, the site is within mapped habitat for a state-listed bird that is protected under the Massachusetts Endangered Species Act (MESA). The Massachusetts Endangered Species Act MGL 131A, as regulated under 321 CMR 10.00, dictates that activities within Priority Habitat must be reviewed by the state Division of Fish and Wildlife to determine whether a Take will result from temporary or permanent impacts to the habitat. Massport will continue to coordinate with NHESP and will prepare a Conservation and Management Plan as part of a Conservation and Management Permit, as required.

Vernal Pools

The USACE considers impacts to upland habitat surrounding vernal pools as secondary impacts (if there is wetland/waterway fill on the project site). For projects involving less than 5,000 square feet of fill, the Massachusetts General Permit requires that project proponents minimize upland impacts within 750 feet of vernal pools to the greatest extent practicable. Specifically, work must not individually or cumulatively impact greater than 25 percent of the 750-foot Vernal Pool CTH; a minimum of 75 percent of the CTH must be contiguous, unfragmented forest with undisturbed ground cover. Although, in accordance with Massachusetts General Permit Appendix A, these conditions do not apply to linear

transportation projects such as airport runways and taxiways (as long as a VMP exists that avoids, minimizes, and mitigates impacts to aquatic resources), the Project will minimize impacts to the extent possible and will not exceed 25 percent of the CTH. Massport will follow its existing VMP for Worcester Airport. The project as proposed is consistent with the requirements of the USACE Massachusetts General Permit.

The Massachusetts Wetlands Protection Act regulates Certified Vernal Pools. There are no Certified or uncertified Vernal Pools within 100 feet of the proposed work. The closest potential vernal pool is over 300 feet from the work area.

4.6 Historic and Archaeological Resources

Section 106 of the National Historic Preservation Act requires Federal agencies to consider the effects the Project on properties on or eligible for inclusion in the National Register of Historic Places. Compliance with Section 106 requires consultation with the State Historic Preservation Officer (SHPO), and/or the Tribal Historic Preservation Officer (THPO).

In accordance with Section 106 of the National Historic Preservation Act (NHPA) of l966, as amended, and FAA Order 5050.4B and Order 1050.1E, Change 1, Massport has conducted research and coordinated with the SHPO to identify any sensitive resources within the project area and determine whether the Project has the potential to have an adverse effect on historic or cultural resources. This section describes the results of the research and coordination. Correspondence is included in Appendix A.

4.6.1 Affected Environment

There are no historic resources within one-half-mile of the proposed project that are currently listed in the National Register of Historic Places (National Register) or the State Register, or included in the Massachusetts Cultural Resource Information System (MACRIS) or the Inventory maintained by the Massachusetts Historical Commission (MHC). Research completed for the airport Vegetation Management Plan indicates that the land around the airport was historically a peripheral farming area with low-density development. The closest listed property is located in Leicester, which is a 2.5-story, federal style house built in the early nineteenth century and is approximately 0.6 miles north of the project area.

The proposed taxiway is located immediately north of the existing Runway 11. The current grade in this location is flat, before sloping steeply down on both sides of the runway to a wetland associated with Lynde Brook. In the glide slope area to the south of Runway 11, the grades are similar, sloping steeply down from the grassed airfield. These steep grades are the result of past filling and extensive construction episodes conducted to facilitate airport improvements. A review of historical aerial photographs depicting the airfield indicates that between 1960 and 1963 this portion of the Lynde Brook wetland was filled and graded. Between 1963 and 1971 the runway was extended and the remaining graded areas were landscaped.

The additional approach lights and associated navigational aids west of Mulberry Street were surveyed as part of the airport's Vegetation Management Plan. The 1870 Beers and 1898 Richards maps of Leicester identify what is believed to be several farmsteads west of and adjacent to Mulberry Street and north of Earle Street. The general area where these farmsteads were located was disturbed over 40 years ago by roadway and airport maintenance activities and no evidence of former structures remains. Based on the presence of steep slopes, predominately poorly-drained soils, and prior disturbance in the area, the proposed location of the additional approach lights and navigational aids are assigned low archaeological sensitivity for pre- and post-contact period sites.

4.6.2 Environmental Consequences

The project will not impact any known areas of historic or archaeological sensitivity, or change visual cohesion within historic districts. As described below, on December 12, 2014, The SHPO concurred with FAA's "Finding of No Historic Properties Affected". All agency correspondence is included in Appendix A**.**

4.6.3 Regulatory Compliance

Due to the low cultural sensitivity of the work area, the project is not expected to have an adverse effect on cultural resources. Pursuant to Section 106 of NHPA, FAA issued a "Finding of No Historic Properties Affected" on December 3, 2014. On December 12, 2014, the SHPO concurred with FAA's the no adverse effect finding for the project.

4.7 Light Emissions and Visual Impacts

According to FAA Order 1050.1E, Change 1, the FAA must consider the extent to which any lighting associated with any action would create an annoyance among people in the vicinity or interfere with their normal activities.[3] Further, per FAA Order 5050.4B and FAA Order 1050.1E, Change 1, the FAA must evaluate any impacts to the visual and aesthetic environment on and around airports.

This section describes the existing viewsheds near Runway 11-29, with emphasis on the 11 end, and assesses the potential for proposed changes to impact the viewshed(s) from the addition of new approach lighting. This evaluation was conducted through a review of aerial photography, field visits, assessments of surrounding land uses, and review of topographic maps to identify important existing viewsheds from areas accessible to the public.

4.7.1 Affected Environment

Lighting systems at the Worcester Regional Airport provide for the safe and secure movement of aircraft, vehicles, and pedestrians. The existing approach lighting system at Runway 11-

3 Federal Aviation Administration. 20 March 2006. Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

29consists of a series of medium intensity white lights positioned every 200 feet and extending 2,400 feet west from the 11 end of Runway 11-29.The heights of the light structures range from 1,021 feet to 991 feet above mean sea level.

From Mulberry Street, passersby facing east can see Runway 11, and facing west can see the backside of the existing light structures (refer to Figure 1-1 for street locations).Passersby on Manville Street are not able to see views of the airport due to its lower elevation. From the hill on Paxton Street, passersby can see the lighting structures and the lights. There are no businesses or residences located at these locations; views of the airport facilities would be primarily by those passing by in vehicles. The closest residences located on Mulberry Street are approximately 0.33 miles north of the runway end. Additional locations evaluated (receptors) are residences on Manville Street approximately 0.45 miles to the southwest, and a school with housing, approximately 0.69 miles to the south. None of these receptors have views of Runway 11 or the existing approach lighting system.

4.7.2 Environmental Consequences

The existing airport lighting array extends 2,400 feet beyond the end of the runway. The new lighting array will not extend beyond this area. The new lighting system will increase the intensity of light, with double the number of light towers within the area. However, the tower heights near the far end of the lighting array will be rebuilt to be lower in height by up to 31.4 feet and there are no houses or other receptors in the vicinity of the lighting array. The high intensity lights will only be used during low visibility conditions at the airport. For these reasons it is not anticipated that the project will have negative impacts due to light emissions.

Other elements of the project will be situated entirely within the confines of the airfield, associated with the taxiway and ILS improvements, and will not affect any off airport viewsheds.

FAA Order 1050.1E provides thresholds for environmental impacts. The threshold for light emissions is when an action's light emissions creates annoyance among individuals nearby or interferes with their normal activities. The threshold for visual effects is when consultation with federal, state, or local agencies; tribes; or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable. The proposed action is not anticipated to create lighting or visual impacts that interfere with normal activities, nor will they create annoyance among nearby individuals.

4.8 Water Quality

FAA Order 5050.4B and FAA Order 1050.1E, Change 1, require that the EA include sufficient description of a proposed action's design, mitigation measures developed for non-point sources under section 319 of the CWA, and construction controls to demonstrate that water quality standards and any permit requirements will be met.

Section 4.8.1 includes a summary of the baseline water quality conditions of water resources within the project and local study area, including surface waters and stormwater. Section 4.8.2

evaluates the impacts of the project on water resources within the project and local study area. Section 4.8.3 presents the permanent mitigation measures incorporated as part of the proposed design, and Section 4.8.3 includes a discussion of regulatory compliance with respect to the MassDEP Stormwater Management Standards. The information for this analysis was collected from existing data, maps, and reports as they relate to water quality.

4.8.1 Affected Environment

This section describes the surface water resources within the project area and describes the existing airport stormwater management system.

Blackstone River Watershed

The project area lies within the Blackstone River Watershed. This watershed includes densely populated municipalities, such as Worcester and Providence, which are interspersed with sparsely developed rural areas. The Blackstone River Regional Watershed includes all or part of 30 communities in south central Massachusetts and 10 communities in northern Rhode Island, with 335 square miles (out of the total 540 square miles) of its drainage area in Massachusetts.[4]

The Blackstone River forms at the confluence of the Middle River and Mill Brook in the City of Worcester and flows southward for approximately 48 miles, ultimately becoming the Seekonk River in Pawtucket, Rhode Island. The Blackstone River Watershed encompasses approximately 11 square miles of lakes, ponds, and reservoirs in Massachusetts, including the Kettle Brook and Lynde Brook Reservoirs. Major tributaries include the Quinsigamond, West, and Mumford Rivers. Worcester Regional Airport lies along the border between Leicester and Worcester in the headwaters to Middle River.

Surface Water Quality

Kettle Brook and Lynde Brook pass through the project Area, with Mulberry Street along the divide between their respective watersheds: Both of these are perennial bodies of water that flow into the Blackstone River.

Kettle Brook / Kettle Brook Reservoir No. 1

The portion of the project Area west of Mulberry Street is within the watershed of a small unnamed stream that flows south for approximately 0.5 miles before entering Kettle Brook Reservoir No. 1. Kettle Brook Reservoir No. 1 is one of four reservoir impoundments of Kettle Brook located within the Town of Leicester that supply drinking water to the City of Worcester.

Kettle Brook is a major northern headwater of the Blackstone River that begins in Paxton and passes through Leicester, connecting four of the City of Worcester's drinking water reservoirs

4 Massachusetts Department of Environmental Protection Division of Watershed Management, *Blackstone River Watershed: 2003-2007 Water Quality Assessment Report* (Worcester, 2010): 5-6.

before flowing through southwest Leicester, Auburn, and Millbury to the Blackstone River. The watershed is largely undeveloped and the waters are not available for primary and secondary contact recreation because of its drinking water supply status. The U.S. Environmental Protection Agency (EPA)'s Water Quality Assessment determined that the overall status for Kettle Brook was "Good."[5] As a source for a public water supply, Kettle Brook is designated by the state as a Class A Outstanding Resource Water (ORW).

The City of Worcester began acquiring land adjacent to Kettle Brook before 1870 to create and protect reservoirs for the city water supply, and in a series of major civil engineering projects, three of the four reservoirs were built and Kettle Brook's banks were cleared and channelized.[6]

In 1960, the U. S. Army Corps of Engineers (USACE) completed a diversion project in the Auburn and Millbury portions of Kettle Brook involving a concrete control dam, a diversion structure, a 4,205-foot-long tunnel, and an 11,000-foot-long channel. This project diverts flood flows from 30.5 square miles of Kettle Brook into the Blackstone River, bypassing seven miles of congested river channel in Worcester and reducing flooding within this reach.[7]

The project area lies within the Zone A and Zone B Surface Water Protection Areas for Kettle Brook Reservoir No. 1. MassDEP covers Kettle Brook and Kettle Brook Reservoir No. 1 under its 2003-2007 Water Quality Assessment for the Blackstone River.[8] The unnamed stream, which has a total contributing watershed of only approximately 0.2 square miles, is not discussed in the document. The bulleted items below provide water-quality related information pertaining to Kettle Brook Reservoir No. 1 and Kettle Brook.

Kettle Brook Reservoir No. 1: Kettle Brook Reservoir No. 1 occupies approximately 11 acres in the Town of Leicester. MassDEP's 2012 Integrated List of Waters places Kettle Brook Reservoir No. 1 (MA51079) under Category 3, indicating that no uses have been assessed.[9]As a public water supply, Kettle Brook Reservoir No. 1 has Class A ORW protection under the Massachusetts Surface Water Quality Standards, 314 CMR 4.00.

Kettle Brook: MassDEP's 2012 Integrated List of Waters places Kettle Brook (MA51-01) under Category 5, indicating that a Total Maximum Daily Load (TMDL) is needed for this waterbody. Segment MA51-01 of Kettle Brook begins at the outlet to Kettle Brook Reservoir No. 1 and ends at the inlet to Leesville Pond in Auburn, giving it a total length of seven miles. The impairments listed for Kettle Brook (MA51-01) include debris/floatables/trash, low flow alterations, non-native aquatic plants, aquatic macro invertebrate bioassessments, aquatic plants (macrophytes), fecal coliform, nutrient/eutrophication biological indicators, and turbidity.[10] The impairments for aquatic plants and turbidity are covered under MassDEP's 2002 TMDL entitled, *"Total Maximum Daily Loads of Phosphorus for Selected Northern*

5 U.S. Environmental Protection Agency, *2012 Waterbody Report for Kettle Brook*. http://iaspub.epa.gov/tmdl_waters10/attains_waterbody.control?p_au_id=MA51-19&p_cycle=2012&p_state=MA
6 Massachusetts Department of Conservation and Recreation, *Leicester Reconnaissance Report: Blackstone Valley/Quinebaug-Shetucket Landscape Inventory* (Boston, 2007): 9.
7 U.S. Army Corps of Engineers, *Blackstone River Watershed Reconnaissance Investigation* (Concord, MA, 1997): 6–7.
8 Massachusetts Department of Environmental Protection Division of Watershed Management, *Blackstone River Watershed: 2003-2007 Water Quality Assessment Report* (Worcester, 2010): 5-6.
9 Massachusetts Department of Environmental Protection, Division of Watershed Management, *Massachusetts Year 2012 Integrated List of Waters* (Worcester, 2013): 55.
10 Massachusetts Department of Environmental Protection, Division of Watershed Management, *Massachusetts Year 2012 Integrated List of Waters* (Worcester, 2013): 112.

Blackstone Lakes." The TMDL report applies to Smiths Pond (MA51156), which is now included as a run-of-river impoundment in Kettle Brook (MA51-01).[11]

Lynde Brook / Lynde Brook Reservoir

The portion of the project area east of Mulberry Street lies within the watershed to Lynde Brook. Lynde Brook flows through a 1,150-foot long culvert under Runway 11-29. After exiting the culvert, Lynde Brook flows south for approximately 0.25 miles before entering Lynde Brook Reservoir. Lynde Brook Reservoir is an impoundment of Lynde Brook that supplies drinking water to the City of Worcester. Lynde Brook Reservoir discharges to a lower reach of Lynde Brook, which flows for approximately 0.6 miles to its confluence with Kettle Brook. The project area lies within the Zone A, Zone B, and Zone C Surface Water Protection Areas for Lynde Brook Reservoir. The bulleted items below provide water-quality related information pertaining to Lynde Brook.

- Lynde **Brook:** MassDEP covers Lynde Brook Reservoir under its 2003-2007 Water Quality Assessment for the Blackstone River.[12] Lynde Brook is not discussed in that document.
- **Lynde Brook** Reservoir**:** Lynde Brook Reservoir occupies approximately 130 acres in the Town of Leicester. MassDEP's 2012 Integrated List of Waters places Lynde Brook Reservoir (MA51090) under Category 3, indicating that no uses have been assessed.[13] As a public water supply, Lynde Brook Reservoir has Class A ORW protection under the Massachusetts Surface Water Quality Standards, 314 CMR 4.00.

Existing Drainage Areas

The only stormwater infrastructure within the project is located east of Mulberry Street, where the existing Project Area includes a half-mile section of airport runway, the engineered materials arrest system (EMAS), access roads, and the surrounding grassed Runway Safety Area. The entire eastern portion of the project discharges stormwater overland to Lynde Brook or to a series of vegetated drainage ditches with inlet structures that discharge to Lynde Brook wetlands. Figure 4-3 shows the existing drainage areas.

The existing runway is crowned in the middle and the surrounding grass area is graded to allow stormwater to flow away from the runway to the north or south. The crown along the middle of the runway acts as the hydrologic divide between the two drainage areas, described in more detail below and in Table 4-3.

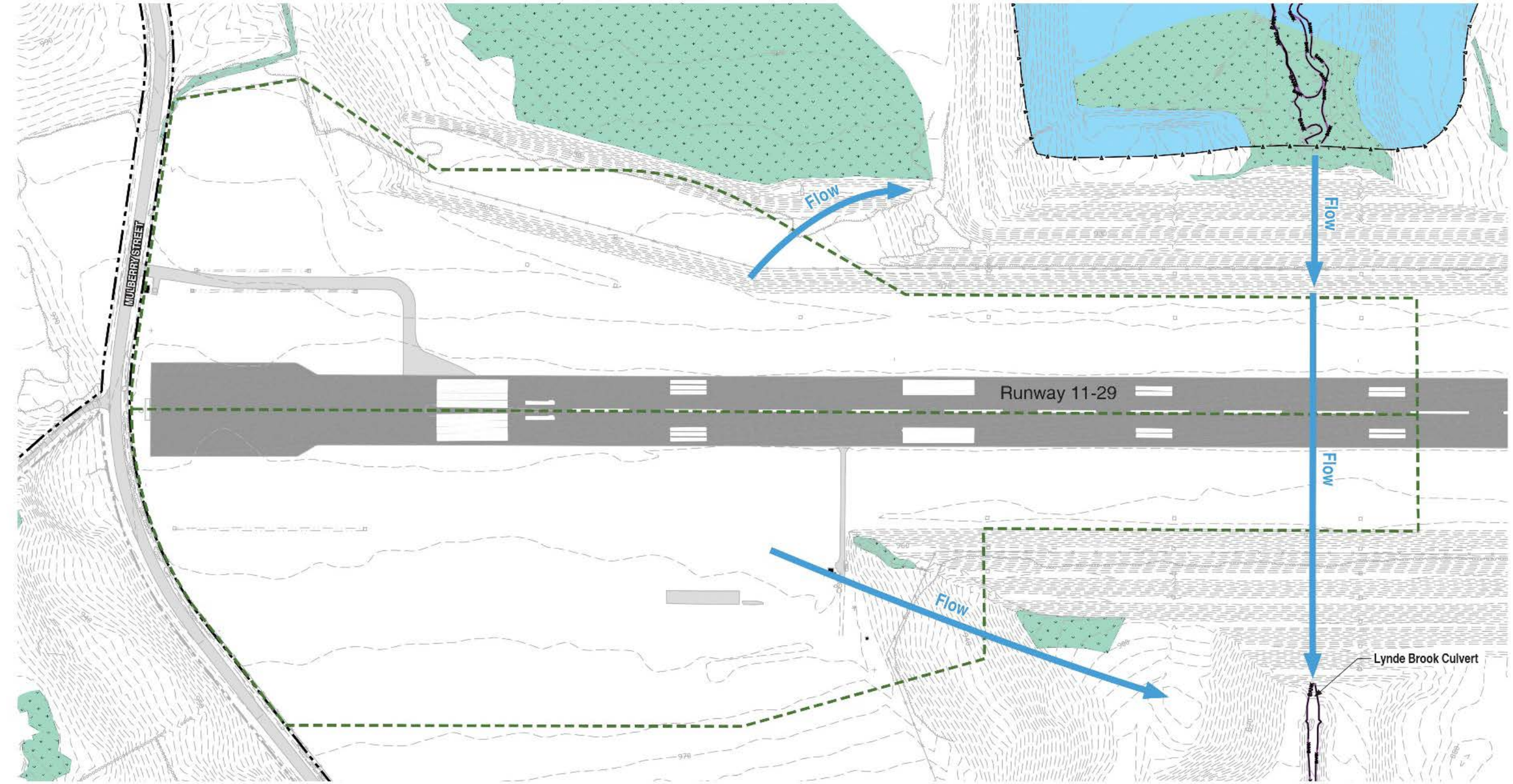
11 Massachusetts Department of Environmental Protection, Division of Watershed Management, *Total Maximum Daily Loads of Phosphorus for Selected Northern Blackstone Lakes* (Worcester, 2002).
12 Massachusetts Department of Environmental Protection Division of Watershed Management, *Blackstone River Watershed: 2003-2007 Water Quality Assessment Report* (Worcester, 2010): 5-6.
13 Massachusetts Department of Environmental Protection, Division of Watershed Management, *Massachusetts Year 2012 Integrated List of Waters* (Worcester, 2013): 55.

Existing Drainage Area 1 (EDA-1)

This area includes the northern side of the runway, the access road to Mulberry Street, and the grass area to the north of the runway. The existing drainage system, which collects sheet flow from the runway and some of the grass area, consists of inlets in terraced grass swales adjacent to the runway that convey stormwater vertically down the terraces and ultimately into Lynde Brook. Runoff from the remaining grass area and the Mulberry Street access road sheet-flows north and into a wetland associated with Lynde Brook and its tributaries. This entire drainage area discharges upstream of the culvert that conveys Lynde Brook under the runway, which is referred to as Design Point 1 (DP-1).

Existing Drainage Area 2 (EDA-2)

This area includes the southern side of the runway, a small building supporting the glide slope antenna, and an access road connecting the building and the runway. The existing drainage system, which collects sheet flow from the runway and some of the grass area, consists of inlets in terraced grass swales adjacent to the runway that convey stormwater vertically down the terraces and ultimately into Lynde Brook. Runoff from the remaining grass area sheet-flows southeast and into Lynde Brook. This entire drainage area discharges downstream of the culvert that conveys Lynde Brook under the runway, which is referred to as Design Point 2 (DP-2).



Source: Green International Affiliates, Inc.

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Figure 4-3
Existing
Drainage Areas

massport

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Table 4-3: Existing Drainage Area Characteristics

Drainage Area	Area (acres)	Impervious Area (acres)	Impervious Area (%)	Curve Number	Design Point for Stormwater Standard Compliance	Receiving Water
EDA-1	26.1	5.4	21%	69	DP-1	Lynde Brook
EDA-2	31.0	5.1	16%	67	DP-2	Lynde Brook

Stormwater Management and Operations

Worcester Regional Airport has an existing National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit (Permit No. MAR050000) effective 02/04/2009 for coverage under the NPDES General Permit for Stormwater Discharges for Multi-Sector General Permit Activity.[14]

Runway 11-29 drains by overland flow through grassed areas on either side of the runway and runoff is captured in a series of constructed drainage ditches that parallel the runway. This area is located at the west end of the airport property and over 1 mile from the terminal area and General Aviation aprons where refueling occurs. No fueling or any other activities that are potential sources of pollutants occur at the Runway 11 end. The terminal areas and the Runway 11 end are not connected by any drainage system. The terminal complex drainage system discharges to the east at various locations.

Portions of the Airport (aircraft fueling areas, fuel farm) are considered Land Uses with Higher Potential Pollutant Loadings (LUHPPL) due to activities that involve greater potential for spills to occur. These areas are covered under an NPDES Multi-Sector General Permit and are listed in 310 CMR 22.20 and 22.21. The existing fuel storage facility in the northeast corner of the airport property is at elevation 970, which is 30 feet in elevation below the terminal complex and over 2,000 feet from the project area. Drainage from the fuel storage facility is independent of the airport terminal complex, and will not be connected to any drainage associated with this project. The fuel farm is described in more detail in the Notice of Intent (NOI) filed for fuel storage improvements (an Order of Conditions was issued on July 13, 2013).

The Worcester Regional Airport deicing season is generally November 15 through March 30. During deicing, plows mechanically clear snow from the runways, taxiways, and roadways at the airport. Massport currently uses sodium formate and sodium acetate on the runways and taxiways. Massport stores sodium acetate south of the air cargo facility and other deicing materials and equipment in the cold storage facility. Both of these location are outside of the project area.

14 Massachusetts Port Authority, *Stormwater Pollution Prevention Plan, Worcester Regional Airport* (East Boston, 2009).

4.8.2 Environmental Consequences

This section describes the environmental consequences that the project will have on water quality, focusing on the proposed stormwater infrastructure design and construction period erosion and sediment controls.

Drainage Area Improvements

There is no stormwater infrastructure proposed along Mulberry Street or the ILS array. East of Mulberry Street, within the airfield, Massport plans improvements that will alter the existing drainage and increase the amount of impervious cover. Among the improvements are a new, jug-handle taxiway, and a reconstructed gravel access road to the relocated glide slope equipment.

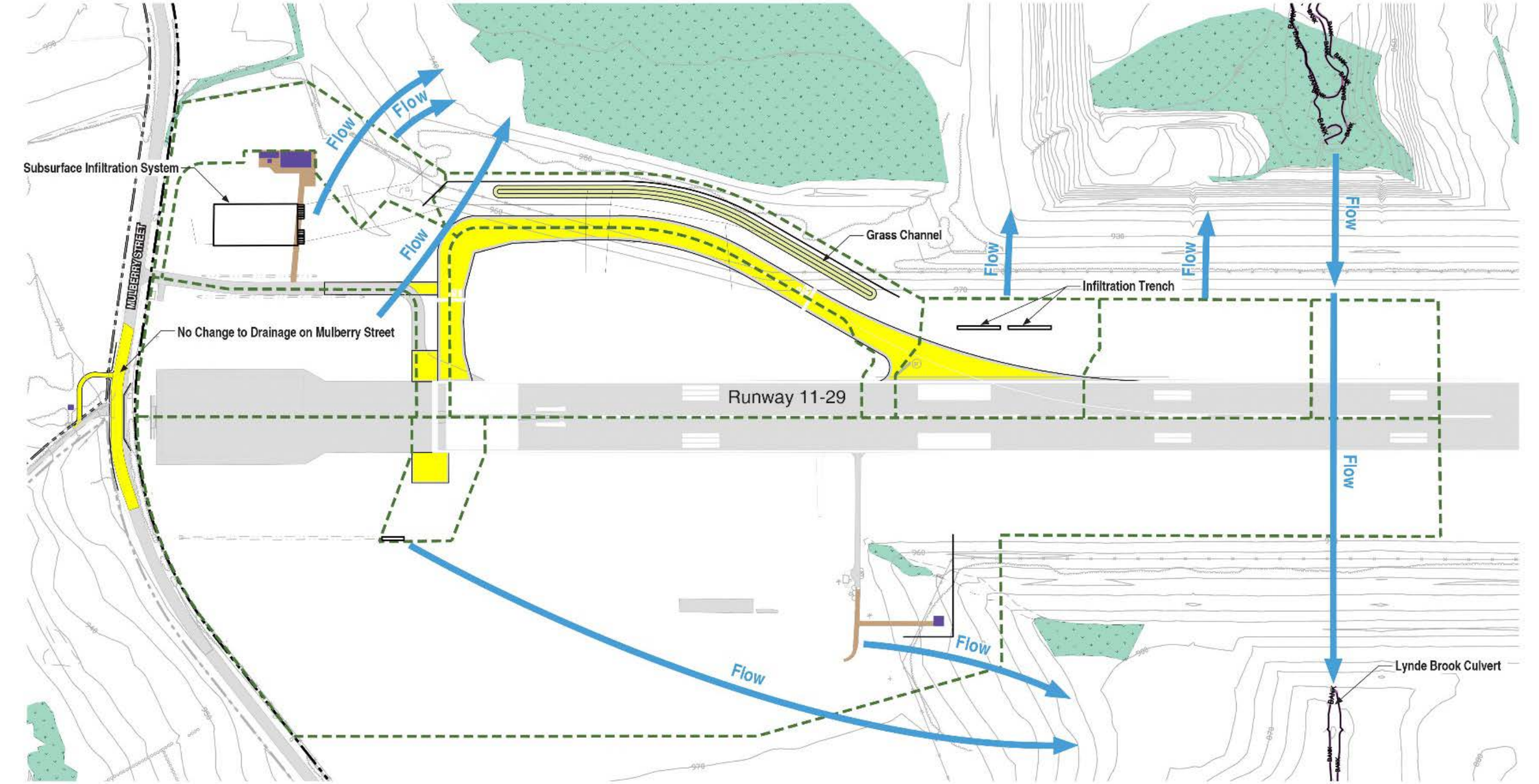
Under the proposed design, the drainage characteristics of the runway will remain the same, with the crown in the middle acting as the hydrologic divide between areas draining to the upstream or downstream side of the Lynde Brook culvert. The proposed taxiway drainage system will not connect with the drainage system serving the terminal complex, aprons, and fueling areas due to the distance separating these areas and because the terminal complex has a functioning, separate drainage system in place. Figure 4-4 shows the proposed drainage areas, which are described in more detail below and in Table 4-4.

The proposed stormwater system has been designed to fully comply with the Massachusetts Stormwater Standards (310 CMR 10.05) and includes infiltration trenches, a dry well, and a subsurface infiltration system. The proposed stormwater system is at a conceptual level of design and subject to change during the final design process.

Drainage Area 1 (PDA-1)

This drainage area is coincident with EDA-1. It includes the northern side of the runway, the proposed jug-handle taxiway, new and existing access buildings and roads, and the surrounding grass area. The proposed drainage system will alter and expand on the existing drainage system to provide water quality treatment to the impervious cover that is being added as part of the proposed design. PDA-1 is divided into eight sub-basins:

- **PDA-1A:** This sub-basin is at the most eastern end of PDA-1. No new impervious cover is being added so the existing drainage patterns and infrastructure will remain unaltered.
- **PDA-1B:** This sub-basin contains sections of the runway and jug-handle taxiway, as well as the grass infield separating the two. Sheet flow from the impervious cover will enter the grass area and collect in drain inlets. Flow that enters the drain inlets will be piped north under the taxiway into a collector pipe, which will redirect flow west and into a subsurface infiltration system.
- **PDA-1C:** This sub-basin contains the northern portion of the jug-handle taxiway and the grass area that abuts it to the north. A grass swale adjacent to the taxiway will convey sheet flow from the impervious area into drain inlets. This flow will be directed into the subsurface infiltration system via the collector pipe.



Source: Green International Affiliates, Inc.

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Figure 4-4
Proposed
Drainage Areas

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- **PDA-1D**: This sub-basin contains sections of the runway and jug-handle taxiway, as well as new and existing access roads north of the runway and the grass areas that separate them. The proposed action will result in a 30 percent increase in impervious surface within this sub-basin. Sheet flow from these impervious areas will collect in drain inlets and enter the subsurface infiltration system, which is also located within this area.
- **PDA-1E:** This sub-basin contains sections of the runway and jug-handle taxiway, as well as the grass area that abuts the taxiway to the north. Sheet flow from the impervious area will be collected in an infiltration trench.
- **PDA-1F:** This sub-basin contains a section of the runway and small section of the jug-handle taxiway, as well as the grass area to the north. Sheet flow from the impervious area will be collected in a dry well.
- **PDA-1G:** This sub-basin contains the grass area north of PDA-1D. No new impervious cover is being added within its extents, so the existing drainage patterns and infrastructure will re

- main unaltered.
- **PDA-1H:** This sub-basin contains the Engineering Material Arresting System (EMAS) at the end of the runway and the grass area that abuts it to the north. No new impervious cover is being added within its extents, so the existing drainage patterns and infrastructure will remain unaltered.

Drainage Area 2 (PDA-2)

This drainage area is coincident with EDA-2. It includes the southern side of the runway, upgrades to the building supporting the glide slope antenna, and the surrounding grass area. PDA-2 is divided into two sub-basins:

- **PDA-2A:** This sub-basin contains most of the southern portion of the runway, upgrades to the building supporting the glide slope antenna, and most of the grass area south of the runway. No new impervious cover is being added within its extents, so the existing drainage patterns and infrastructure will remain unaltered.
- **PDA-2B:** This sub-basin contains a section of the runway and the grass area that abuts it to the south. Sheet flow from the impervious area will be collected in an infiltration trench.

Table 4-4: Post Construction Drainage Area Characteristics

Drainage Area	Area (acres)	Impervious Area (acres)	Impervious Area (%)	Curve Number	Design Point for Stormwater Standard Compliance	Receiving Water
PDA-1A	1.6	0.5	29%	72	DP-1	Lynde Brook
PDA-1B	7.1	2.3	33%	73	DP-1	Lynde Brook
PDA-1C	3.2	0.9	27%	71	DP-1	Lynde Brook
PDA-1D	3.5	0.9	25%	70	DP-1	Lynde Brook
PDA-1E	2.3	1.1	48%	79	DP-1	Lynde Brook
PDA-1F	2.7	0.8	31%	72	DP-1	Lynde Brook
PDA-1G	2.1	0.0	0%	61	DP-1	Lynde Brook
PDA-1H	3.7	1.4	37%	75	DP-1	Lynde Brook
TOTAL PDA-1	26.1	7.8	30%	72	DP-1	Lynde Brook
PDA-2A	30.1	4.8	16%	67	DP-2	Lynde Brook
PDA-2B	0.9	0.4	40%	72	DP-2	Lynde Brook
TOTAL PDA-2	31.0	5.2	17%	67	DP-2	Lynde Brook

Stormwater Best Management Practices

These structures will reduce pollutant loading and peak runoff rates for the stormwater discharging from the site in compliance with the MassDEP Stormwater Management Standards, discussed in more detail in Section 4.8.3.

Dry Well

A dry well is planned to capture and infiltrate the first inch of runoff from the 544 square feet (0.01 acres) of new impervious cover that will drain to it from PDA-1A. A vegetative filter strip will be used as pretreatment to the dry well, providing approximately 45 percent removal of Total Suspended Solids (TSS). The dry well will provide 80 percent removal of TSS.

Infiltration Trenches

Two infiltration trenches, filled with crushed stone, are planned as part of the proposed action, both of which are located on the newly filled land associated with the jug-handle Taxiway. The first will capture and infiltrate the first inch of runoff from 17,961 square feet (0.4 acres) of new impervious cover that will drain to it from PDA-1E. The second will capture and infiltrate the first inch of runoff from 4,599 square feet (0.1 acres) of new impervious cover that will drain to it from PDA-2B. In both cases, a vegetative filter strip will be used as pretreatment to the trenches, providing approximately 45 percent removal of TSS. The infiltration trenches will provide 80 percent removal of TSS.

Subsurface Infiltration System

A subsurface infiltration system is planned to capture and infiltrate the first inch of runoff from 87,056 square feet (2.0 acres) of new impervious cover that will drain to it from PDA-1B, PDA-1C, and PDA-1D.

Drain inlets intercepting flow that is piped to the system will be equipped with deep sumps (minimum 4-feet) and hooded outlets to trap debris, sediments, and floating contaminants, which are the largest constituents of urban runoff. The inlets will perform pretreatment and provide 25 percent removal of the initial TSS load.

Two of the rows in the subsurface infiltration system will be wrapped in filter fabric, which will act as a sediment fore-bay to provide pretreatment prior to discharging to the remaining rows. These filter rows will provide an additional 25 percent removal of TSS. The remaining sixteen rows will provide 80 percent removal of TSS.

Operation and Maintenance Requirements

The goal of regular operation and maintenance is not only to protect resources on-site or nearby, but also to protect resources in the region that may be affected by the activities at the site. Water quality treatment measures and the implementation of BMPs for structural controls

will result in the treatment of site stormwater and the removal of a minimum of 80 percent of the TSS load from runoff prior to discharge from the site, consistent with MassDEP's TSS removal standard. Massport will be responsible for the operation and maintenance of the stormwater management system.

Drain Inlets

The proper removal of sediments and associated pollutants and trash occurs only when drain inlets and sumps are cleaned out regularly. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future deposition and enhances the overall performance.

In compliance with the 2014 SWPPP, all drain inlets are inspected quarterly and must be cleaned whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Any structural damage or other indication of malfunction must be reported to the site manager and repaired as necessary. During colder periods, the drain inlet grates must be kept free of snow and ice, and during warmer periods, they must be kept free of leaves, litter, sand, and debris.

Dry Well

The dry well must be inspected after every major storm in the first few months after construction to ensure proper stabilization and function. Thereafter, it must be inspected annually. During inspections, debris must be removed and any functional problems must be repaired. The vegetated filter strip providing pretreatment must be inspected and debris must be removed at least once every six months and after every major storm.

Infiltration Trenches

The infiltration trenches and the vegetated filter strip providing pretreatment must be inspected and debris must be removed at least once every six months and after every major storm.

Subsurface Infiltration System

The subsurface infiltration systems must be inspected at least once each year by removing the access port covers and determining the thickness of sediment that has accumulated in the system. If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vacuum truck. Emergency overflow pipes must be examined at least once each year and verified that no blockage has occurred. Systems must be observed after rainfalls to see if they are properly draining.

4.8.3 Regulatory Compliance

The project is categorized as "New Development" under the Massachusetts Stormwater Management Standards and thus needs to meet the Stormwater Standards to the full extent. Descriptions of how each of the ten standards is met are provided below.

Standard 1: No New Untreated Discharges

The project is designed so that no new untreated stormwater outfalls or discharges will be constructed. The project will not discharge untreated stormwater into surface water or cause erosion to surface water or wetland resource areas. Several existing stormwater discharges will be displaced and their flow will be rerouted through the proposed stormwater BMPs, described in detail in Section 4.8.3.

Standard 2: Peak Rate Attenuation

The peak flow rates were calculated using HydroCAD for the 2-, 10-, and 100-year storm events under existing and proposed conditions. Although the project will increase the impervious area on-site, the stormwater management system has been designed to mitigate any increase in the peak rate of stormwater runoff. The proposed dry well, infiltration trenches, and subsurface infiltration system will result in a decrease in peak rates for the project. Table 4-5 compares existing and proposed conditions for peak runoff rates to the two design points selected for analysis. The existing and proposed drainage areas to these design points are identified in in Sections 4.8.1 and 4.8.2 and shown in Figures 4-3 and 4-4, respectively.

Table 4-5: Peak Runoff Rates (cfs)

Design Point	Status	2-Year Storm	10-Year Storm	100-Year Storm
DP-1	Existing	12.6	34.2	68.8
	Proposed	10.6	27.9	67.8
	Percent Reduction	16%	18%	1%
DP-2	Existing	23.5	67.2	137.8
	Proposed	17.5	58.2	132.0
	Percent Reduction	26%	13%	4%

Standard 3: Stormwater Recharge

The stormwater BMPs included in the project infiltrate a greater volume of stormwater than is required by the recharge standard. Calculations were performed by applying the Static Method to the new impervious area. The soils onsite are classified as Hydraulic Soil Group "B". The recharge calculations also include a drawdown calculation showing that the infiltration BMPs will drain within 72 hours.

Table 4-6: Recharge Characteristics

BMP	Impervious Area (sf) Treated	Recharge Volume Required (cf)	Recharge Volume Provided (cf)	Time to Drawdown (hrs)
Dry Well	544	16	131	24.2
Infiltration Trench (PDA-1E)	17,961	524	1,647	5.5
Infiltration Trench (PDA-2B)	4,599	134	449	13.8
Subsurface Infiltration System	87,056	2,539	7,348	5.5

Standard 4: Water Quality

Standard 4 requires that all stormwater management systems be designed to remove 80 percent of the average annual post-construction load of TSS. The stormwater BMPs are designed to attain the required TSS load reduction by adhering to the Massachusetts Stormwater Handbook and incorporating appropriate pretreatment.

The long-term pollution prevention measures are combined with the operation and maintenance recommendations, and will be fully presented in the Stormwater Management Report submitted in conjunction with the Notice of Intent (NOI) filing.

The stormwater BMPs are sized to capture the required water quality volume of 1 inch, which is required because the project is within an ORW and is therefore considered a "critical area."

Standard 5: Land Uses with Higher Potential Pollutant Loads

Because the project does not qualify as a Land Use with Higher Potential Pollutant Loads (LUHPPL), this standard is not applicable. Areas classified as LUHPPL at the airport are not connected through drainage with the project area, or the proposed drainage features. The project fully complies with this standard.

Standard 6: Critical Areas

Stormwater from the project area discharges to Outstanding Resource Waters, which are defined as a critical area. Standard 6 is applicable and requires that all stormwater management systems within a critical area be designed to remove 80 percent of the average annual post-construction load of TSS prior to discharge and that the treatment train shall provide for at least 44 percent TSS removal prior to discharge to the infiltration structure. The water quality standards for the proposed stormwater system have been discussed under Standard 4. The proposed action fully meets Standard 6 requirements.

Standard 7: Redevelopment

The project is classified as a "New Development" under Massachusetts Regulations and does not qualify as "Redevelopment," therefore this standard is not applicable.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

The project will disturb more than 1 acre of land during the construction process and will require a NPDES Construction General Permit issued by the Environmental Protection Agency. As a result, a stormwater pollution prevention plan (SWPPP) will be required. The SWPPP document will satisfy the requirements of the Construction General Permit and the construction period erosion, sedimentation and pollution prevention plan requirements outlined in Standard 8. A narrative of many of the strategies that will be implemented is included in Section 4.8.2.

Standard 9: Operation and Maintenance Plan.

The operation and maintenance recommendations are combined with the long-term pollution prevention measures, discussed in Section 4.8.3 and will be fully presented in the Stormwater Management Report submitted in conjunction with the NOI filing.

Standard 10: Prohibition of Illicit Discharges

Massport certifies that there are no illicit discharges associated with the existing or proposed site drainage.

4.9 Wetlands and Floodplains

Wetlands and their potential impacts due to construction of project elements are evaluated in this EA as required by FAA Order 5050.4B and FAA Order 1050.1E, Change 1, and Executive Order (EO) 11990. Floodplains and their potential impacts due to construction of project elements are evaluated as required by FAA Order 5050.4B and Order 1050.1E, Change 1, and EO 11988.[15] EO 11990 requires FAA to ensure the Project minimizes the "destruction, loss, or degradation of wetlands". DOT Order 5660.1A requires transportation facilities be planned, constructed, and operated to assure protection and enhancement of wetlands.

4.9.1 Affected Environment

There are federal and state regulatory resource areas within the project area. The federal regulations under Section 404 of the Clean Water Act define the wetlands associated with

15 Executive Order 11988, *Floodplain Management.*May24, 1977.

Lynde Brook and Kettle Brook as waters of the US (WUS). The Massachusetts Wetlands Protection Act Regulations define these resources as Bank, Bordering Vegetated Wetland (BVW), Bordering Land Subject to Flooding (BLSF), Land Under Water (LUW), and Riverfront Area. The presence of each of these resources within the Project area is discussed in the sections below. Several of these wetland areas are subject to the Airport's Vegetation Management Plan, as approved by the Leicester Conservation Commission under a prior Order of Conditions (MassDEP file number 349 1016, 5/4/2011).

Wetlands

The eight vegetated wetlands in the vicinity of the project were delineated in 2013 and 2014 in accordance with USACE and MassDEP criteria. The Leicester Conservation Commission (LCC) issued an Order of Resource Area Delineation on January 2, 2014, confirming the jurisdictional limits of all but one of these resources. Wetland G was delineated in July 2014 once the need for repositioning the glide slope antenna was identified by FAA. LCC has not yet reviewed wetland G. On June 16, 2014, the USACE issued a Jurisdictional Determination confirming that the stormwater drainage ditches were not jurisdictional wetlands. Table 4-7 shows the regulatory status of project area wetlands within the Town of Leicester, as shown on Figure 4-5A - B. Wetlands were categorized under 310 CMR 10.55(2)(a) as "wet meadows, marshes, and swamps and under Section 404 of the US Clean Water Act as Palustrine Emergent wetlands, Palustrine Forested wetlands, and Palustrine Unconsolidated Bottom.

Table 4-7: Project Area Wetlands

Wetland	Approximate Location	Type/Description	Resource Classification				
			Bank[1]	BVW[2]/ WUS[3]	BLSF[4]	LUW[5]/WUS	Riverfront Area[1]
D	Directly west of runway and Mulberry Street	Shrub swamp; tributary to Kettle Brook Reservoir No. 1 runs through this wetland	X	X	-	X	X
E	Between Manville Street and Mulberry Street along ALS access road	Forested swamp; borders intermittent stream tributary to Kettle Brook (stream flows out of Wetland E—no Bank was delineated within the wetland)	-	X	-	-	-
G	South of runway, just east of service road to existing glide slope monitor	Marsh; associated with intermittent tributary to Lynde Brook	X	X	-	-	-
F	Directly east of Manville Street, west of final light tower	Forested swamp; Kettle Brook runs through this wetland	X	X	X	X	X
S	South of runway, bisected by Leicester/Worcester municipal boundary	Shrub swamp; associated with intermittent tributary to Lynde Brook Reservoir	-	X	-	-	-
T	North of runwaynorth of Drainage Feature I	Marsh; associated with Lynde Brook and tributaries; receives runoff from Drainage Features I and U via intermittent streams	-	X	-	-	-
X	North of runway and Drainage Feature U	Shrub swamp; Lynde Brook runs through this wetland	X	X	X	X	X
Y	North of runway and Drainage Feature U; east of Wetland X	Marsh; associated with Lynde Brook and intermittent tributary	-	X	-	-	-

Source: Jacobs Engineering, 2013 and 2014.
Only the limits of Bank and BVW were field-delineated.

1. MassDEP defined resource area only
2. Bordering Vegetated Wetland
3. Waters of the US (Federal Section 404 Jurisdiction)
4. Bordering Land Subject to Flooding
5. Land Under Waterway

Floodplains/BLSF

As shown in Figures 4-5 (A and B), the latest (July 2014) Federal Emergency Management Administration (FEMA) mapping identifies the area along Lynde Brook and the area west of the airport along Kettle Brook as Zone A, indicating that these areas are subject to inundation by the 1-percent-annual-chance flood event (also known as the 100-year flood and defined by the WPA as BLSF). No detailed hydraulic analyses have been performed in these areas, and no Base Flood Elevations or flood depths are known.

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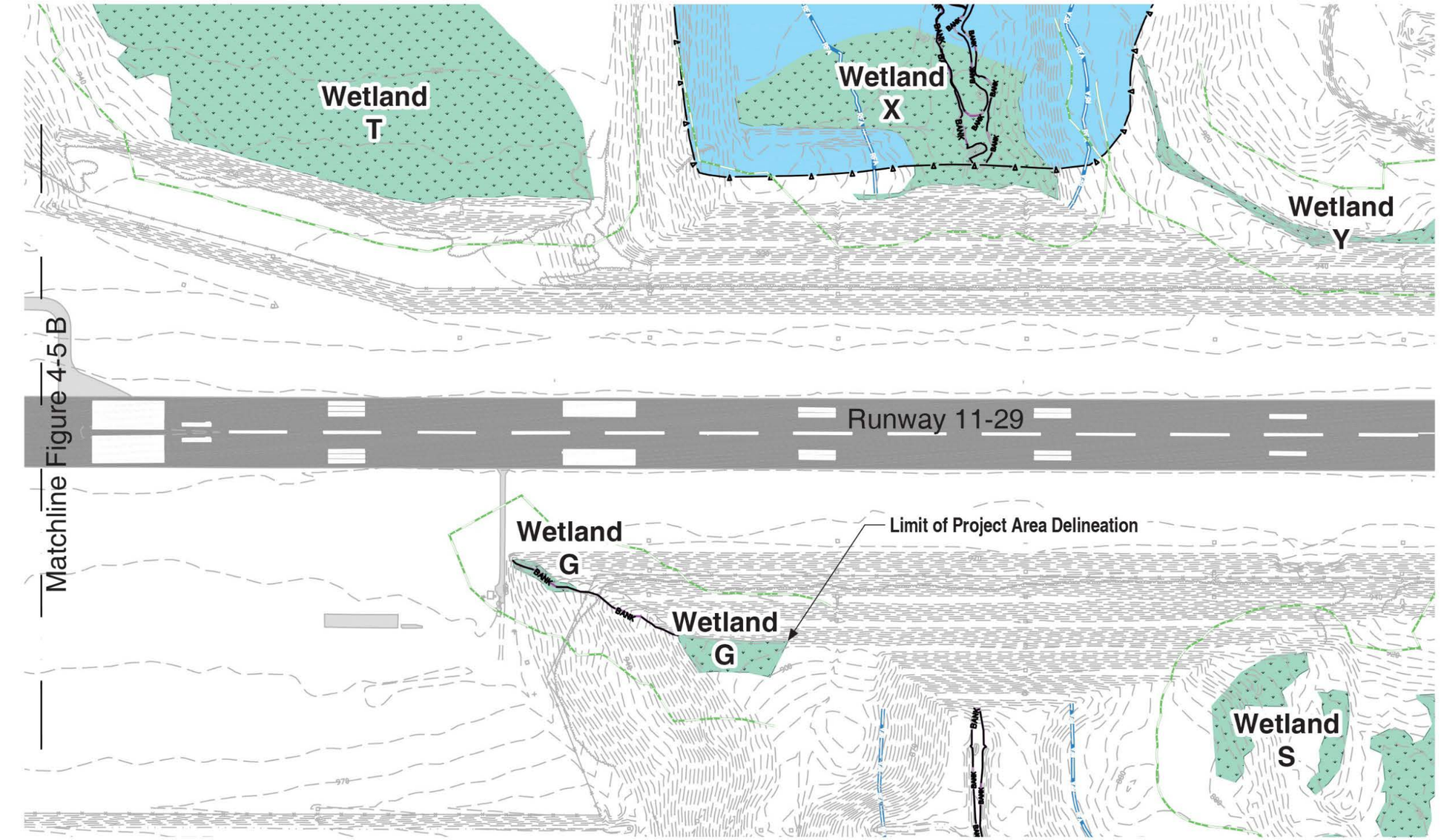

Source: MassGIS 2013, VHB 2014

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Figure 4-5A
Existing Wetlands and Floodplains

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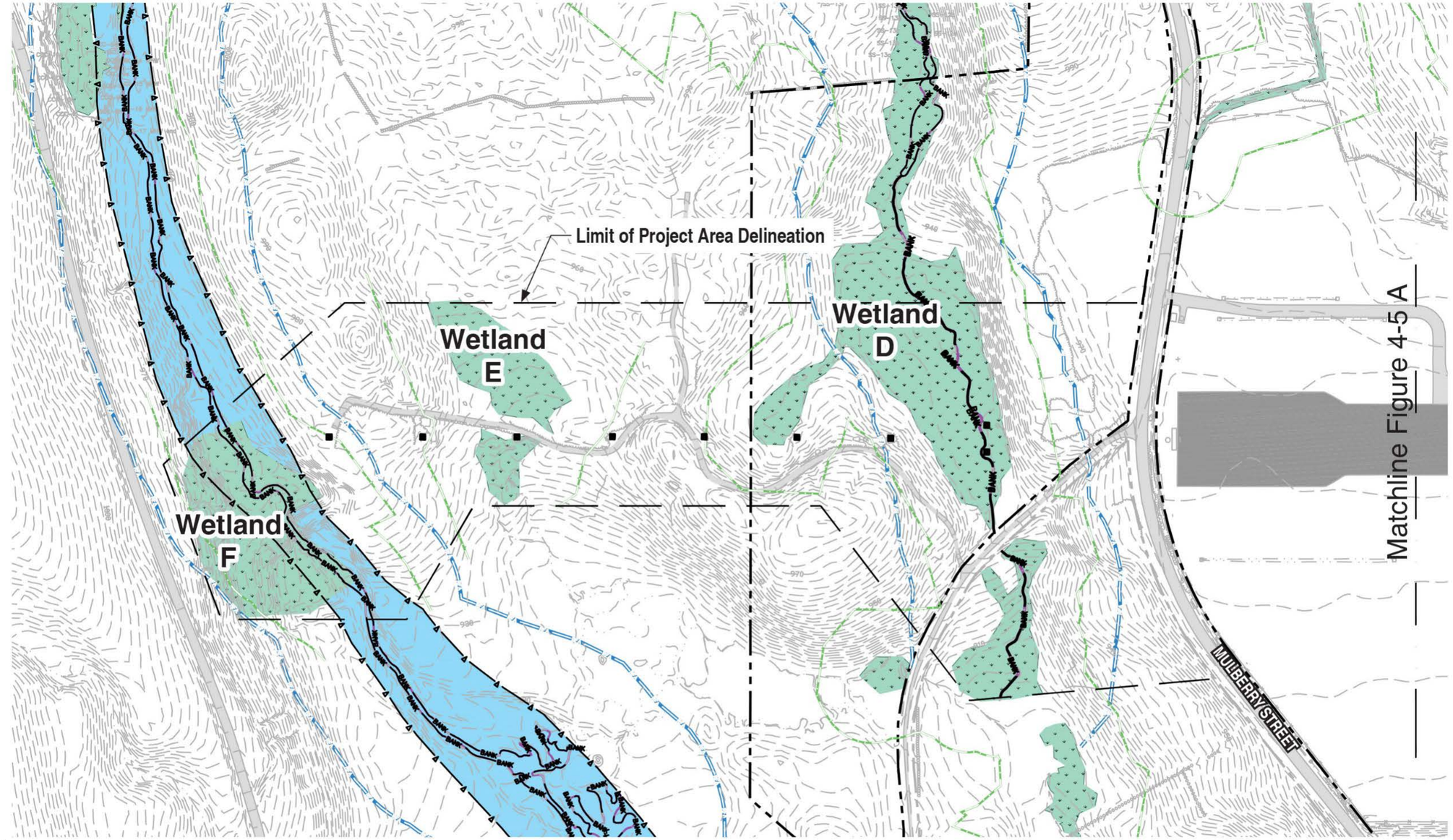

Source: MassGIS 2013, VHB 2014

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Figure 4-5B
Existing Wetlands and Floodplains

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Wetlands D, E, and F (Figure 4-5B) are west of Mulberry Street, in the vicinity of the Approach Lighting System. Wetland D borders an unnamed perennial stream that is tributary to Kettle Brook, and consists of a scrub-shrub wetland dominated by winterberry, sweet pepper-bush, and sphagnum moss. Wetland E borders an intermittent tributary to Kettle Brook, and is a red maple swamp with yellow birch, interrupted fern, and cinnamon fern. Wetland F borders Kettle Brook, a perennial stream, and consists of a red maple swamp with an herbaceous layer dominated by reed canary grass (*Phalaris arundinacea*). These wetlands provide the following principal functions as defined by federal regulation: groundwater recharge/discharge, floodflow alteration, wildlife habitat, sediment/toxicant/pathogen retention, and nutrient removal /retention /transformation. Wetland F also provides sediment/shoreline stabilization. Similarly, the wetlands contribute to the following public interests protected by the WPA: flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, and wildlife habitat.

Wetlands G and S are south of Runway 11-29, bordering intermittent streams that are tributary to Lynde Brook and its surrounding wetlands. Wetland G serves the following principal functions under the federal wetland classification system: groundwater recharge/discharge, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat. This emergent marsh is dominated by narrow-leaved cat-tail and sensitive fern, with soft rush, fox-sedge, awl-fruited sedge, sallow sedge, wool-grass, meadow foxtail, and fowl-meadow grass. Under state classification this wetland contributes to flood control, prevention of pollution and storm damage, protection of water supplies, groundwater supply, and wildlife habitat. Wetland S consists of scrub-shrub vegetation including hybrid honeysuckle, arrowwood, and sensitive fern; and serves the following federally classified functions: groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat. Under state classification this wetland contributes to flood control, prevention of pollution and storm damage, protection of water supplies, groundwater supply, and wildlife habitat.

Wetlands T, X, and Y are north of Runway 11-29. Wetland T is an emergent marsh bordering an unnamed intermittent stream, dominated by highbush-blueberry and sensitive fern. Wetland X borders Lynde Brook, a perennial stream, and consists of a scrub-shrub wetland with meadowsweet, arrowwood, and sensitive fern. Wetland Y also borders an unnamed intermittent stream; at the time of delineation, the area had been recently cleared of trees and shrubs under the airport's vegetation management plan, but some wetland vegetation was visible including interrupted fern, cinnamon fern, orange jewelweed, and sensitive fern. These wetlands provide the following principal functions: groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat. Wetland X also provides sediment/shoreline stabilization. Under state classification these wetlands contribute to flood control, prevention of pollution and storm damage, protection of water supplies, groundwater supply, and wildlife habitat.

4.9.2 Environmental Consequences

Various components of the project will result in temporary or permanent impacts to wetlands and/or floodplains. FAA Order 1050.1E defines significant impacts to these resources. The sections below describe these definitions as well as the work that will take place within these resource areas.

Wetlands

Section 18 of FAA Order 1050.1E Appendix A specifies that a significant impact to wetlands would occur when the proposed action causes any of the following:

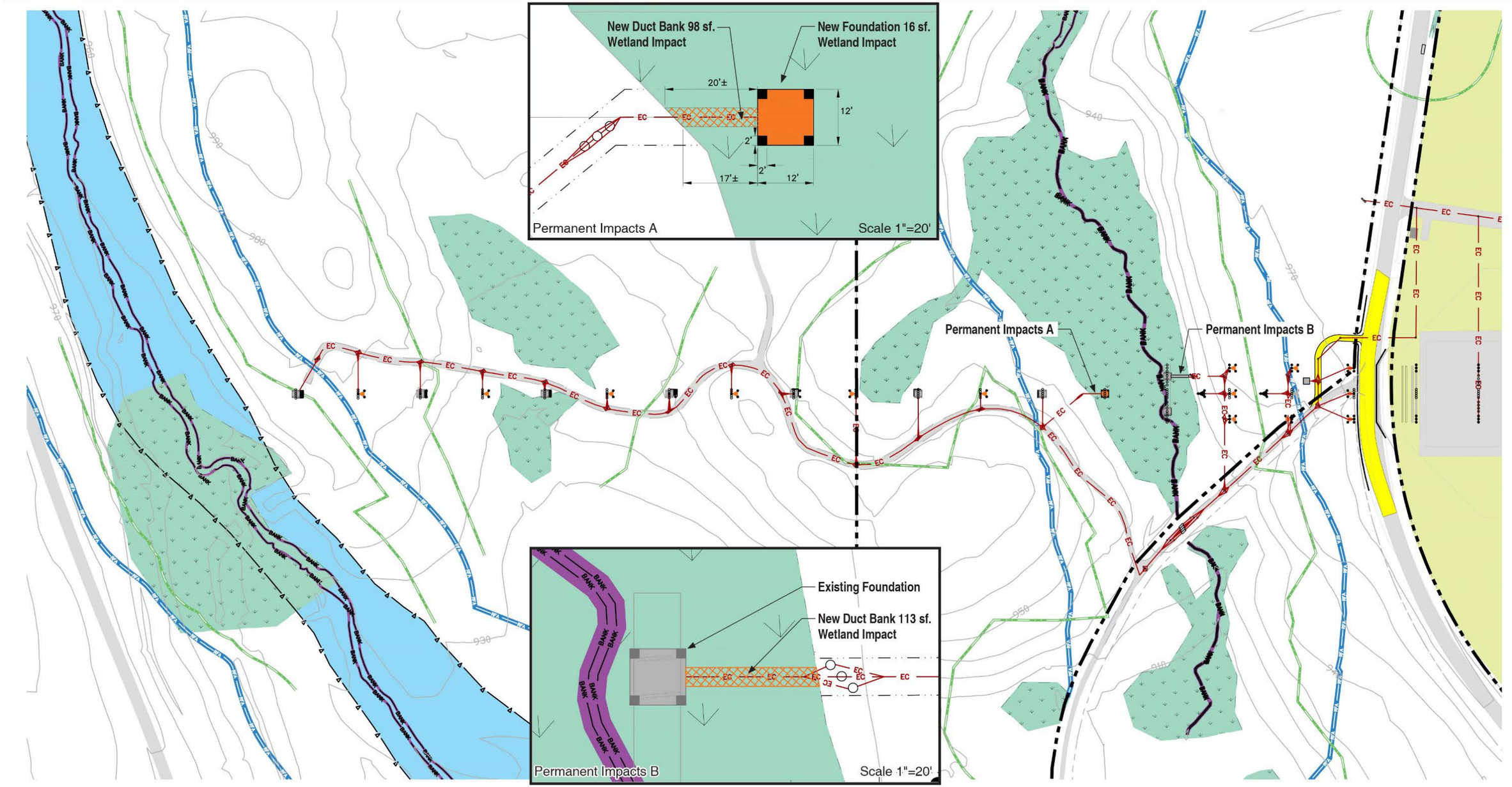
1. The action would adversely affect the function of a wetland to protect the quality or quantity of municipal water supplies, including sole source, potable water aquifers.
2. The action would substantially alter the hydrology needed to sustain the functions and values of the affected wetland or any wetlands to which it is connected.
3. The action would substantially reduce the affected wetland's ability to retain floodwaters or storm-associated runoff, thereby threatening public health, safety or welfare (this includes cultural, recreational, and scientific resources important to the public, or property).
4. The action would adversely affect the maintenance of natural systems that support wildlife and fish habitat or economically-important timber, food, or fiber resources in the affected or surrounding wetlands.
5. The action would promote development of secondary activities or services that would affect the resources mentioned in items (1) through (4) in this section.
6. The action would be inconsistent with applicable State wetland strategies.

Work will take place within the state-regulated 100-foot buffer zone to wetland resources and within the 200-foot regulated riverfront area. Work within the buffer zone will consist of the jug-handle taxiway, five of the light towers, the glide slope antenna, the stormwater management system, and portions of the electrical conduit. The jug-handle taxiway has been selected as the proposed action because it avoids all impacts to wetland resources. The glide slope area cannot be designed to meet design standards and avoid wetland impacts. Three of the light towers, portions of the electrical conduit, and selective tree clearing for obstruction removal will take place within the state regulated Riverfront Area.

Massport has promoted avoidance and minimization measures throughout the design selection process to ensure consistency with FAA guidelines, as well as federal and state requirements for avoidance of wetland impacts. One new light tower must be installed within a wetland resource area since no feasible alternative could be identified. Permanent fill will also be necessary for the CAT-III glide slope antenna. There will be temporary wetland impacts from the new light tower installation and from the installation of electrical conduits to the upgraded light towers. The details of each of these impacts are described below.

New Light Tower

One of the new towers to be installed as part of the ILS upgrades, at station 11+00, will be located within a wetland. The tower foundation will result in 16 square feet of permanent fill. Installation of the tower will also result in approximately 196 square feet of temporary impact to install a buried support plate for the tower. The tower at station 11+00 is shown on Figure 4-6.



Source: Jacobs

Wetland
100 Foot Wetland Buffer Zone
Bordering Land Subject to Flooding
Bank
Airport Property Boundary
New Pavement
Existing Pavement
Electric/Communication Duct Bank
200 Foot Riverfront Area
New Tower
Existing Tower
New Far Field Monitor

0 75 150 Feet

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Figure 4-6
Wetland Impacts,
Approach Light System

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Glide Slope Antenna

Relocation of the glide slope antenna and reflector area will require approximately 3,295 square feet of new fill within a wetland on the south side of Runway 11-29 to bring the area up to runway grade. A retaining wall, rather than a full fill slope, will be used to minimize impacts to wetland resources.

Approach Lighting System Electrical Duct Bank

The electrical conduit needed to support the new Approach Lighting System will be installed in a duct bank primarily within the footprint of the existing unpaved ILS service road between Mulberry Street and the end of the light array. Connections to the towers from the mainline conduit will require placement of fill within wetlands in two locations; one at tower location 11+00 and one at tower location 10+00. The impacts from causeway installation will total 101 and 113 sf respectively.

Obstruction Removal

Locations where individual trees extend above the height of the proposed new lighting array are shown in Figure 4-7. These obstructions present an obstacle to landing aircraft and need to be removed to comply with safety standards. Selective removal of tree obstructions will occur within buffer zones, wetlands and riverfront areas. Tree removal will be conducted in accordance with procedures outlined in the airport's Vegetation Management Plan and existing permits. An amendment to the VMP Order of Conditions will be required for new clearing heights associated with the ALSF-2 lighting tower array.

Table 4-8: Summary of Wetland Impacts

	Bank		BVW		Riverfront Area	
Project Element	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
Light Towers (11+00, 9+00, 8+00)	--	--	16 SF	180 SF	101 SF	180 SF
Electrical Conduit	--	--	211 SF	205 SF	211 SF	6,135 SF
Glide Slope System	202 LF	--	3,295 SF	--	--	--
Far Field Monitors	--	--	--	--	42 SF	--
Duct Bank Support (above culvert)	--	--	--	--	589 SF	--
TOTALS	202 LF	--	3,522 SF	385 SF	943 SF	6,315 SF

Floodplains/BLSF

Section 9 of FAA Order 1050.1E specifies that floodplain impacts would be considered significant if the project results in notable adverse impacts on natural and beneficial floodplain values. The floodplains present on the site are associated with Lynde Brook and Kettle Brook. No work is proposed in these areas.

4.9.3 Regulatory Compliance

Wetlands and waterways are regulated under multiple federal and state level review and permitting processes. The compliance of the proposed action with these regulations is detailed below.

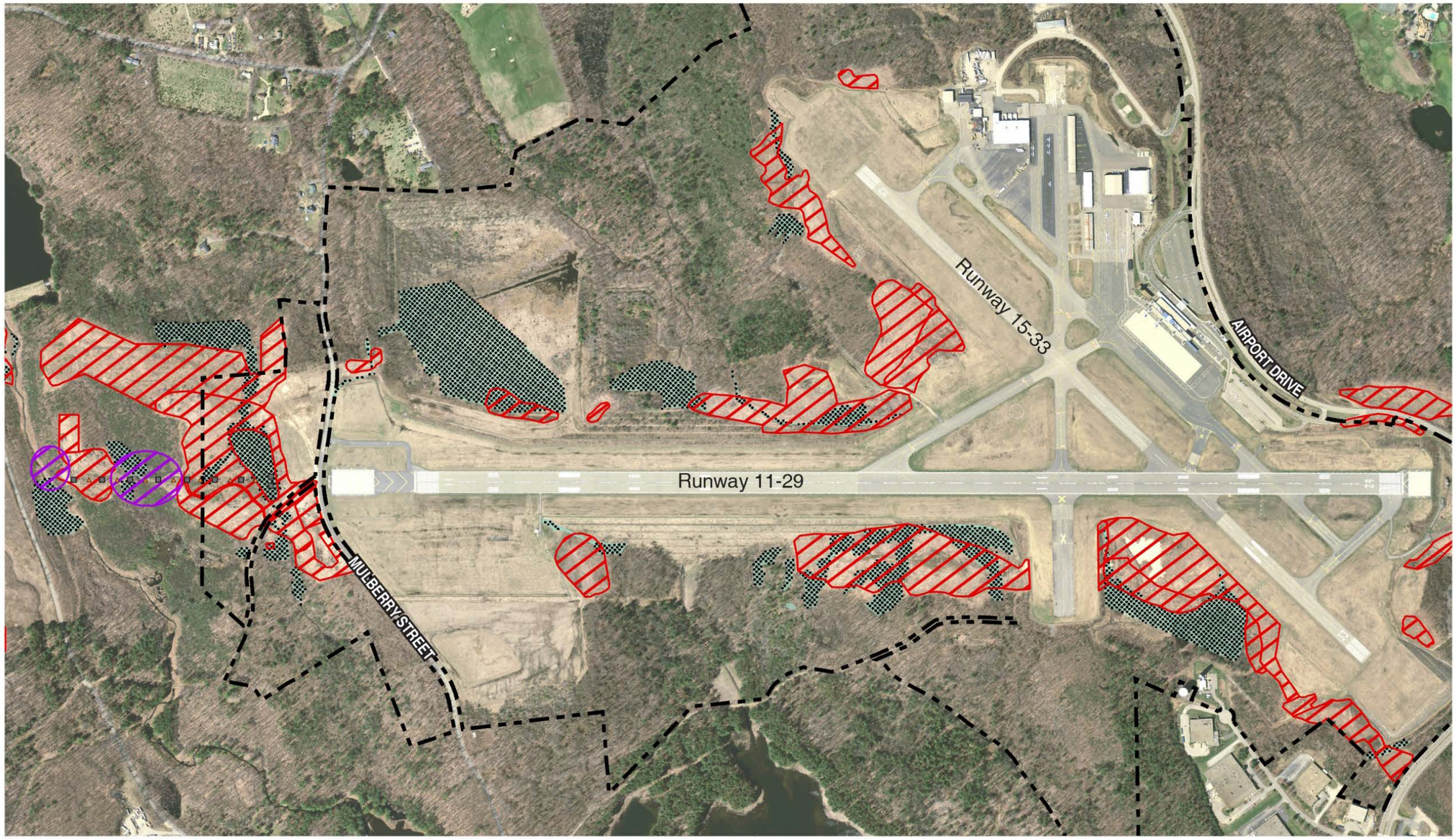
Executive Order 11990

The provisions of Executive Order 11990 of May 24, 1977 require that agencies shall "avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use." The project has been designed, and alternatives selected to avoid and minimize wetland impacts to the extent practicable. Safety requirements dictated by FAA design guidelines, constrain certain aspects of the project and make full avoidance of wetland impacts impracticable. Best management practices will be implemented to further protect these resource areas from construction impacts.

Clean Water Act Sections 404 and 401 (Water Quality Certification)

Inland waters and wetlands are regulated by the USACE under Sections 404 and 401 of the Clean Water Act. Under the Section 404 Massachusetts General Permit, work that results in less than 5,000 square feet of new fill qualifies for coverage under Category 1 review under Section 404 provided the project complies with all of the General Permit's applicable terms and general conditions. The proposed action and construction period controls comply with the terms and conditions of the Massachusetts General Permit.

Projects that require discharge of fill material within Waters of the US must comply with provisions of Section 401, Water Quality Certification (WQC) process and the Massachusetts Water Quality Regulations. Performance standards set forth under the WQC regulations in 314 CMR 9.00state that no discharge of dredged or fill material shall be permitted to Outstanding Resource Waters. The proposed action will result in placement of fill within Waters of the US that are classified as Outstanding Resource Waters in association with the construction of new light towers for the ALSF system. For this reason, the project does not comply with this regulation and will seek a Variance under 214 CMR 9.08.



Source: Jacobs

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Figure 4-7
Obstruction
Removal Locations

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Massachusetts Wetlands Protection Act

M.G.L. c. 131, § 40 defines the process by which activities affecting jurisdictional wetlands are regulated and specifically requires consideration of project impacts on public interests presumed to be provided by jurisdictional wetlands. The proposed action and its impacts on wetlands have been evaluated for the following interests

- protection of public and private water supply:
- protection of ground water supply
- flood control
- storm damage prevention
- prevention of pollution
- protection of land containing shellfish
- protection of fisheries
- protection of wildlife habitat

The proposed action will comply with all regulatory performance standards as described below. Construction controls will be utilized to ensure that prevention of pollution, protection of public water supply and flood control are not impacted during the construction phase.

Bank

The MWPA regulations provide performance standards for work within regulated Inland Banks (310 CMR 10.54). The project will alter Bank in one location, at the glide slope antenna and reflective surface. The intermittent stream flowing through the wetland will be placed in a culvert. This work will result in the loss of 202 linear feet of Bank, but will not impair the physical stability of the Bank; the water carrying capacity of the existing channel within the Bank; ground water and surface water quality; the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries; or the capacity of the Bank to provide wildlife habitat. Pursuant to 310 CMR 10.54(4)(a)5, projects that alter more than 10 percent or 50 feet (whichever is less) of the length of the bank may be permitted if they will have no adverse effects on wildlife habitat as determined by a wildlife habitat evaluation. A detailed analysis of wildlife habitat (included in the NOI) demonstrated that the Bank in this location does not provide valuable wildlife habitat. The Bank will be replaced with a culvert that will allow the stream to maintain its current carrying capacity. The project fully complies with this regulation and will not impair the Bank's ability to support the interests of the Act.

Bordering Vegetated Wetlands

310 CMR 10.55 allows up to 5,000 square feet of alteration of Bordering Vegetated Wetland when replacement of the wetland is proposed. The replacement area must be equal to or greater than the size of impact and provided in the same general area and watershed. All temporary

impacts associated with the proposed action will be restored to preconstruction elevations upon completion of construction. Unavoidable permanent wetland impacts associated with the proposed action will total 3,522 square feet of BVW. Massport is providing 2:1 wetland replacement in compliance with this performance standard. Due to safety concerns associated with wildlife conflicts with aircraft, wetland replacement will take place in a location that will not create wildlife movements in line with the runway. The project complies with this regulation.

Riverfront Area

310 CMR 10.58 provides protection for areas within 200 feet of banks of perennial streams. These areas provide important functions for flood control, water quality protection and wildlife habitat. The majority of work within Riverfront Area consists of installing subsurface electrical conduit (duct bank) within the existing access road. These impacts would be considered temporary and redevelopment, and would comply with all performance standards for redevelopment. Under 310 CMR 10.02 (2)(b)(2)(i), utility installation within an existing roadway is considered a minor activity not otherwise subject to regulation under M.G.L. c. 131, § 40. New work in Riverfront Area includes constructing two new light towers and their connecting conduits, and two far field monitors. Because of the FAA's requirements for the spacing and location of light towers with respect to the runway, there are no economically equivalent alternatives to placing the new towers within Riverfront Area. The Riverfront Area on this project is divided into three parcels; the proposed work will not impair the functions of the riverfront area and will not exceed the 10-percent alteration threshold on any of these parcels.

4.10 Construction Impacts

In accordance with Order 5050.4B and Order 1050.1E, Change 1, Appendix A Section 5, Massport has analyzed potential construction-related impacts, including construction noise, dust and noise from heavy equipment traffic, disposal of construction debris, and air and water pollution. Construction impacts alone are rarely significant pursuant to NEPA, however, Massport has identified areas for best practices that will minimize the likelihood of negative impacts on the natural and built environments

4.10.1 Description of Construction

The project is anticipated to take approximately 13 months over two construction seasons to construct and is anticipated to start in the spring of 2016. Sequencing and phasing will minimize the amount of area disturbed at any one time, and will lessen impacts on airport operations and surrounding areas. The project is proposed to be constructed in three phases:

- Phase A: Jug-handle taxiway and subsurface stormwater management system
- Phase B: Glide slope antenna, localizer platform, and additional navigational aids
- Phase C: Approach light system/conduit and Mulberry Street realignment

Construction activities will include excavation, installing retaining walls, placing fill material, installing concrete footings, installing underground electrical conduit, installing a subsurface stormwater management system, and paving. Materials, including fill, concrete, structural materials for the new ALSF building, towers, and asphalt, will be brought to the site by truck. Table 4-9 provides details of estimated construction durations and fill volumes. The project will require approximately 72,000 cubic yards of common borrow and 12,500 cubic yards of structural backfill.

Table 4-9: Estimated Construction Statistics

Project Element	Common Borrow (cubic yards)	Structural backfill *(cubic yards)*	Duration of Construction (days)	Truck trips per day
Jug Handle Taxiway	60,500	10,300	300	12
Mulberry Relocation	0	0	220	2
Glide Slope	11,500	2,200	60	5
ALSF-2	0	0	150	2
Localizer	0	0	132	2
Totals	72,000	12,500		

The jug handle is the most substantial element of construction and is expected to take 300 days to construct. Other phases of the project will range from 150 days (ALSF-2 installation) to 60 days (Glide Slope Antenna and reflector surface) and may run concurrently with the jug handle construction as they are geographically separate and can advance independently.

Construction controls have been developed to minimize short term impacts are detailed in the sections below. Airport security and operational flexibility for aircraft will be required to be maintained during project construction. Fencing of work areas to separate them from the secure areas of the airfield will facilitate movement of labor forces onto and off of the work site and preserve secure control of the airport operational areas.

4.10.2 Air Quality

FAA Order 5050.4B provides the basis for delineating the scope of the FAA's assessment of air quality impacts under NEPA and the Federal Clean Air Act (CAA), and contains guiding criteria for determining the extent of the air quality analysis. Additionally, FAA Order 1050.1E, Change 1, [16] directs agency personnel to ensure than an air quality assessment prepared under NEPA includes an analysis and summary of conclusions of the proposed activities' impacts on air quality. Under Section 176(c) of the CAA, federal agencies (such as FAA) must make a determination of conformity with the applicable State Implementation Plan (SIP) before taking any action on a Proposed Action (e.g., setting aside money, granting a permit, etc.). The EPA published a rule (referred to as the General Conformity Rule) that indicates how most federal

16 Federal aviation Administration, Order 1050.1E, Change 1, Environmental Impacts: Policies and Procedures, March 20, 2006.

agencies are to make such a determination. Per FAA Order 1050.1E, a final rule for determining conformity of federal actions (40 CFR Part 93, Subpart B) was published in the Federal Register on November 30, 1993, and became effective January 31, 1994.

Called a Conformity Applicability test, a formal conformity determination must be performed when the emissions resulting from a federal action (the net emissions when Proposed Action emissions compared to No-Action Alternative emissions) equal or exceed what are known as *de minimis* levels. If emissions are below the *de minimis* levels, it can be presumed that the Proposed Action conforms to the CAA and the applicable SIP. If emissions are above the *de minimis* levels, a formal conformity determination must be prepared. The applicable *de minimis* thresholds are presented in Table 4-9. Emissions calculations were preformed to determine whether the maximum annual construction-related emissions would equal or exceed the applicable *de minimis* thresholds during any year of construction.

General Conformity *de minimis* Standards

The predominant source of air pollution anticipated from the Project is construction-related emissions from construction machinery and vehicles. Carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), and particulate matter ($PM_{2.5}$) are directly emitted by motor vehicles. Their concentrations can be calculated and compared to the applicable *de minimis* thresholds for the Project from the General Conformity Rule which are presented in Table 4-10.

Table 4-10: General Conformity *de minimis* Threshold[1]

Pollutant	*de minimis* Criteria
Carbon Monoxide[2]	100 tons/yr
Nitrogen Dioxide[3]	100 tons/yr
Volatile Organic Compounds[3]	50 tons/yr
Particulate Matter ($PM_{2.5}$) [2]	100 tons/yr

1. 40 CFR 93 § 153-- General Conformity Rule: *De minimis* Criteria
2. *De minimis* level shown for Maintenance Level (For Areas in Attainment)
3. *De minimis* level Moderate Nonattainment

Existing Pollutant Concentrations

The State of Massachusetts maintains an air quality monitoring system that measures and records the concentrations of various air pollutants within the State. These monitoring data were used to assess the existing air quality levels, or background concentrations, in the area. Background concentrations are ambient pollution levels from other stationary, mobile, and area sources.

The background concentration of criteria pollutant within the subject property area was determined using the monitoring data collected at receptor locations closest to the subject property. A review of MassDEP's Annual Air Monitoring Reports indicates that the closest

receptor location to the project site is Summer Street in Worcester, Massachusetts. The background concentrations for all criteria pollutants are summarized in Table 4-10. Data were compiled from the MassDEP for the latest calendar year for which data are available. Monitored levels for $PM_{2.5}$does not exceed national or state ambient air quality standards in the study area.

EPA has set National Ambient Air Quality Standards (NAAQS) for the principal pollutants. These standards are presented in Table 4-11 for comparative purposes to show the how the existing concentrations of the Project area compare to the NAAQS.

Table 4-11: Existing Pollutant Concentrations[1]

	Averaging Time	Existing Pollutant Concentrations	NAAQS[1]
Carbon Monoxide (CO)	8-Hour	1.7 ppm	9.0 ppm
	1-Hour	2.3 ppm	35.0 ppm
Nitrogen Dioxide (NO_2)	Annual	17.3 ppb	53.0 ppb
	1-Hour	51.7 ppb	100.0 ppb
Volatile Organic Compounds (VOC)	8-hour	0.067 ppm	0.075 ppm
Particulate Matter ($PM_{2.5}$)	Annual	8.3 µg/m³	12.0 µg/m³
	24-Hour	20.7µg/m³	35.0 µg/m³

Source: 2011, 2012, and 2013 Massachusetts Air Quality Report, Department of Environmental Protection

1 Monitor used: Summer Street, Worcester, Massachusetts (Site ID: 25-027-0023)

Units: ppm=Parts per Million; ppb= Parts per Billion; µg/m³= Micrograms per Cubic Meter

Construction Emissions

Project construction would generate temporary construction period air emissions and fugitive dust associated with building the jug-handle taxiway, the approach light system, the localizer platform, the glide slope antennae and the Mulberry Street relocation including the related construction vehicles and equipment. Air quality in the area is not expected to be substantially affected by project construction because of the temporary nature of the construction and the confined construction area. The construction schedule is expected to extend up to a 13-month period. Emissions from the operation of construction machinery would mostly contain particulate matter however other criteria pollutants have been assessed for comparative purposes. Massachusetts Clean Air Quality requirements will be enforced during the construction.

The proposed Project would not increase Airport-wide mobile or stationary source direct and indirect emissions, including emissions from construction vehicles and equipment, such that they would be substantially below the Federal General Conformity *de minimis* thresholds.

Most of the heavy construction equipment would be stored on the Airport property during non-work hours. The following types of equipment would enter and leave the Airport for each work shift:

- Concrete transit mixers
- Dump trucks
- Dump trailers
- Truck/High-bed trailers
- Water trucks
- Utility trucks

Construction Air Quality Methodology

The construction is projected to occur between June 2016 to August 2017, resulting in a 13-month construction schedule, with overlapping phases and construction activities. A preliminary construction schedule, equipment and delivery amounts were assumed in order to demonstrate that construction impacts to air quality would be negligible. Using emission factors developed from NONROAD and EPA AP42, overall criteria pollutant emissions including CO, NO_X, VOC, and $PM_{2.5}$, were quantified in terms of annual emissions. A planning level assessment of the construction activity and equipment to be used was modeled.

Project-Related Construction Air Quality

The construction emissions were calculated for NOx, CO, VOC and $PM_{2.5}$. Conservatively, a maximum average annual emission of 0.02 tons of $PM_{2.5}$, 0.19 tons of NOx, 0.06 tons of VOC and 0.09 tons of CO per year was calculated by the spreadsheet model. This spreadsheet is provided in Appendix B. In order to meet general conformity, the EPA has set forth "*de minimis*" levels which dictate the amount of pollutant a project may generate annually (as presented earlier in Table 4-10).

As shown in Table 4-12, the Project-related air quality impacts due to construction represent a very small percentage the General Conformity *de minimis* thresholds. Thus, construction activities associated with the project will not impact general conformity or public health. Nevertheless, emission mitigation techniques will still be employed throughout construction of the project.

Table 4-12: Construction Period Air Quality Impacts

Criteria Pollutant	Proposed Project Construction (Kg/day)	Proposed Project (Tons/year)	General Conformity *de minimis* threshold (Tons/year)	Percent of Threshold
Carbon Monoxide	0.23	0.09	100 tons/yr	0.09%
Nitrogen Oxides	0.47	0.19	100 tons/yr	0.19%
Volatile Organic Compounds[3]	0.16	0.06	50 tons/yr	0.12%
Particulate Matter ($PM_{2.5}$)	0.04	0.02	100 tons/yr	0.02%

4.10.3 Construction Noise

The Proposed Project will not affect runway length or airport capacity. Therefore, the noise from airport operations is not projected to change from existing conditions. As a result, the characterization of existing noise levels and an analysis of aviation impacts on surrounding noise sensitive land use for long term impacts from the project are not required Section 4.x does, however, demonstrate that even with some existing flight operations at ORH, the airport's noise profile would not change significantly. Any potential for noise impacts from construction activities will be identified and minimized to the extent practicable in accordance with Order 5050.4B and Order 1050.1E, Change 1, Appendix A.

The construction of the proposed project would generate noise. Construction equipment is expected to be used intermittently throughout the construction phase. The noise in the area is not expected to be substantially affected by project construction because of the temporary nature of the construction and the confined construction area. The construction schedule is expected to extend up to a 13-month period, during daytime hours. Normal flight operations will continue to function during project construction.

Noise Criteria

Although Massport, as a state agency, is not subject to local by laws or regulations, the project will comply with local noise regulations.

The Town of Leicester has not established regulations for evaluating sound levels or construction noise. The City of Worcester has established regulations for limiting noise nuisance during certain periods. In general, sound originating from the operation of any commercial establishment may not increase sound level by more than 10 dB(A) above ambient sound levels or produce a pure tone condition. Pure tone is created when any octave band center frequency sound level exceeds the two adjacent frequency sound levels by three decibels or more. Construction activity is limited by the City of Worcester to the hours of 7:00 AM to 9:00 PM on Monday through Saturday and to the hours of 9:00 AM to 7:00 PM on Sunday. As the City of Worcester has not established noise limits associated with construction

activities, the noise analysis will utilize the general noise criteria for evaluating consistency with the City's noise ordinance.

Construction Noise Methodology

The noise analysis used the Federal Highway Administration's (FHWA) Roadway Construction Noise Model 1.1 (RCNM)[17]to calculate the sound levels associated with construction equipment at the closest receptor locations, typically residential areas. The noise analysis presents conservative results because it assumes that all of the construction equipment from the various construction activities are operating at the same time.

Construction sound levels are a function of the types of equipment being used, the quantity for each type of equipment, the frequency of the operation of equipment, and the distances between the construction equipment and the sensitive receptor locations. Overall construction sound levels are governed primarily by the noisiest pieces of equipment operating at a given time. The RCNM contains both equipment specification reference sound level data and actual measured sound level data. The noise analysis used the highest value for all equipment. The noise analysis used the default equipment usage factor from the model. In addition, the projected construction activity-related sound levels were projected to specific receptor locations adjusting for sound propagation over soft ground terrain. The existing and proposed construction-related project generated sound levels were added together to determine their potential impact on existing sound levels.

The type and units for each piece of equipment vary depending on the construction phase. During any particular activity, multiple pieces of equipment may operate simultaneously and for various durations throughout the construction period. Table 4-13 shows the construction equipment and the reference sound levels associated with the various types of construction equipment. The table presents sound levels expressed in Lmax, the maximum noise level for a single event, measured in decibels.

Table 4-13: Construction Equipment Reference Sound Levels, dB(A)

Equipment	Usage Factor (%)	Lmax at 50 feet[1]
Backhoe	40	78
Crane (mobile or stationary)	16	81
Dozer	40	82
Dump Truck	40	76
Excavator	40	81
Front End Loader	40	79
Paver	50	77
Roller	20	80

Source: Usage factors and Lmax based on the FHWA Roadway Construction Noise Model User's Guide, January 2006.
[1] Actual Measured Lmax Values

17 FHWA *Roadway Construction Noise Model: User's Guide* Federal Highway Administration, FHWA-HEP-05-054, January 2006.

The study area was evaluated to identify areas that are sensitive to construction activities associated with the Project. The noise analysis identified the four closest sensitive receptor locations in the vicinity of the Project. These receptor locations include two locations to the north, one location to the east, and one location to the south of the Project. These receptor locations included;

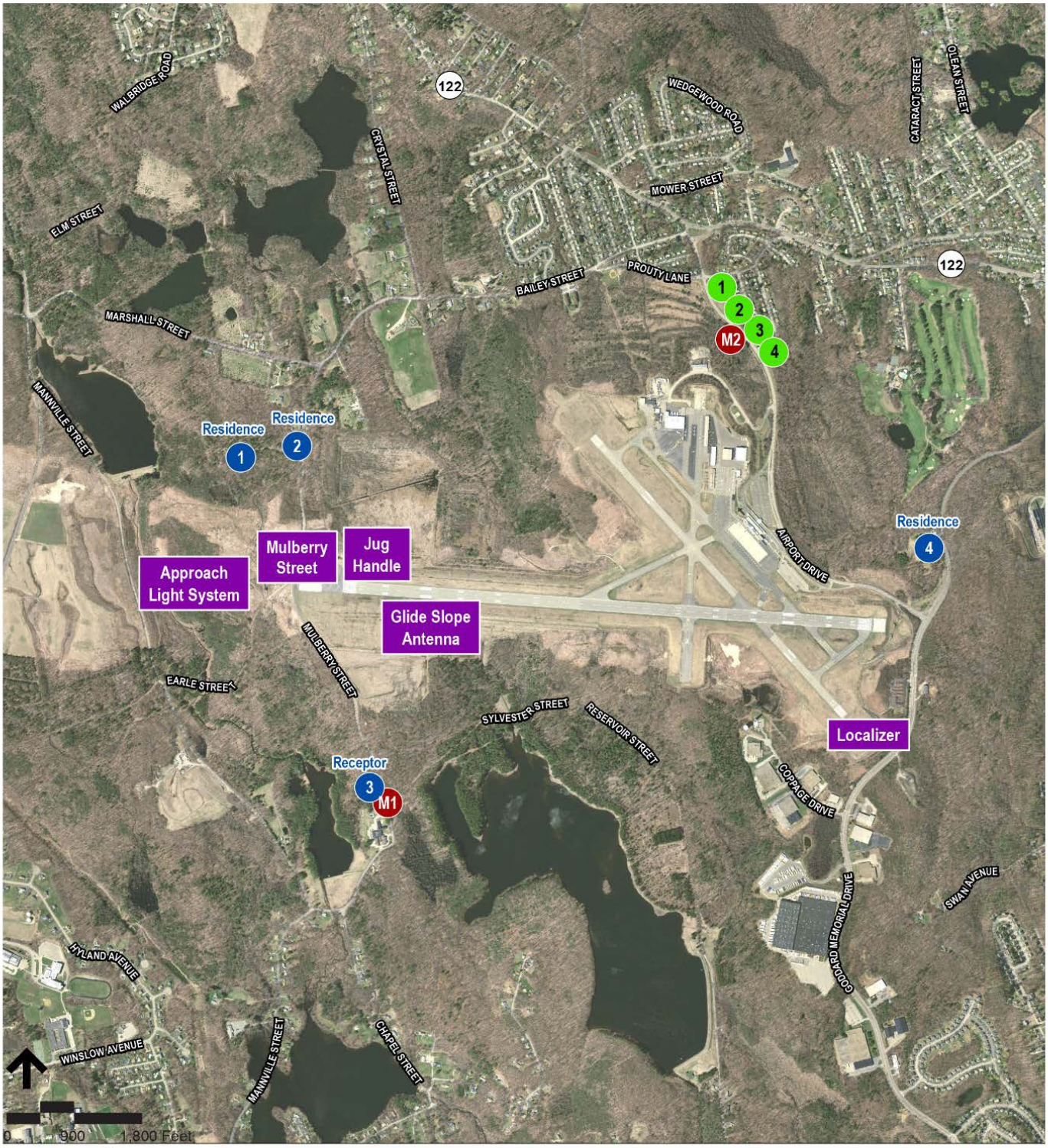
- Receptor 1 – 397 Mulberry St, Leicester, MA;
- Receptor 2 – 401 Mulberry St, Leicester, MA;
- Receptor 3 – ARCHway Inc, Mulberry St; and
- Receptor 4 – 44 Airport Drive, Worcester, MA

These receptor locations were selected based on land use considerations and represent the most sensitive locations (predominantly residential uses) in the study area that are likely to experience temporary changes in sound levels due to the proposed project construction. Figure 4-8 shows the receptor locations used in the noise analysis.

In addition to the on-site construction equipment assessment, potential noise impacts from construction truck traffic traveling from/to the site along the roadways adjacent to Worcester Regional Airport were also evaluated. The project is estimated to require 20 truck trips per day on average. The Federal Highway Administration (FHWA's) traffic noise model (TNM) propagation methodology was applied in calculating the sound levels associated with the truck traffic along the adjacent local roadways. The modeled truck sound levels were added to the measured ambient sound levels to calculate overall sound levels at the sensitive receptor locations. Sensitive receptor locations adjacent to the truck route were evaluated.

Existing Ambient Sound Levels

Noise monitoring was conducted to establish existing background ambient sound levels for sensitive receptor locations in the vicinity of the project site. The noise monitoring followed the procedures outlined by the American National Standards Institute's Standard Methods (ANSI). Type 1 noise monitors (Larson Davis 831) were used to conduct the measurements at two locations for a period of approximately 24 hours from Tuesday, October 14, 2014 to Wednesday, October 15, 2014. The noise monitors were located at the corner of Mulberry Street and Sylvester Street in Leicester, MA (Monitoring Location 1) and on Airport Drive adjacent to the Glen Ellen Road neighborhood in Worcester, MA (Monitoring Location 2).



Source: MassGIS 2013, VHB 2014

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- Construction Elements
- Existing Background Ambient Monitoring Location
- Construction Noise Modeled Location
- Construction Traffic Noise Modeled Location

Figure 4-8
Locations of Construction Noise Analysis

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As shown in Table 4-14 below, the existing sound levels during the daytime period range from 58.1 dB(A) at Monitoring Location 1 to 60.9 dB(A) at Monitoring Location 2. The existing nighttime period sound levels were 49.7 dB(A) and 53.5 dB(A) for Monitoring Locations 1 and 2 respectively. These ambient sound levels represent Leq values. Leq is defined as an averaged sound level over a certain period (in this case,sound averaged over daytime or evening hours).

The ambient sound levels were then assigned to represent the existing condition at each receptor based on common noise environments. Ambient sound levels measured at Monitoring Location 1 were assigned to Receptor 1, Receptor 2, and Receptor 3. Levels measured at Monitoring Location 2 were assigned to Receptor 4.

Table 4-14: Ambient Sound Levels, Leq, dB(A)

Monitoring Location[1]	Day (7:00 AM-9:00 PM)	Night (9:00 PM-7:00 AM)	Represents Receptors
Monitoring Location 1 - Mulberry Street	58.1	49.7	Receptors 1, 2 and 3
Monitoring Location 2 - Airport Drive	60.9	53.5	Receptor 4

Source: VHB
1 Refer to Figure 4-8 for receptor locations.

Construction Sound Levels

The Project is expected to generate typical sound levels associated with construction activities, including use of heavy equipment operations for excavation, material transport, and pile driving. Heavy machinery would be used intermittently throughout construction and these activities would typically occur during normal weekday working hours. The type of equipment and unit of equipment will vary between the different construction phases. The construction phases are:

- Approach Light System
- Glide Slope Antenna
- Jug Handle Taxiway
- Localizer Platform
- Mulberry Street Relocation (600-foot section)

The noise analysis represents cumulative sound levels assuming all phases of construction and all equipment within each phase are in operation at the same time (although this situation is highly unlikely to occur). Table 4-15 presents the sound levels associated with the construction activities of the Project. With all construction phases occurring simultaneously, the sound levels at the closest sensitive receptor locations evaluated are below the City of Worcester's general noise criteria. The highest L_{eq} value is 58.0 dB(A).

Compared to the existing condition, the maximum increase is at 8.0 dB(A), which is below the City of Worcester's maximum increase of 10 dB(A).

Additionally, pure tone condition is not expected to be generated by the construction equipment, as the operating conditions of the equipment will vary throughout the construction period, which will result in fluctuating sound level conditions.

The noise analysis demonstrated that the sound levels from on-site construction activities associated with the proposed Project comply with the City of Worcester's noise criteria. The methodology (FHWA's Roadway Construction Noise Model) used in the noise analysis was conservative because it assumes that all of the construction equipment from all construction phases is operating at the same time.

The on-site construction noise analysis evaluated the potential cumulative impacts associated with the construction activities of the Project at the nearest sensitive receptor locations. Since sound levels decreases with distance, receptor locations located further away will experience lower sound levels and therefore, will have negligible noise impacts from the Project.

Off-site Construction Roadway Sound Levels

In addition to on-site construction equipment noise, the noise study also evaluated the potential noise impact associated with truck traffic traveling from/to the site along the local roadways adjacent to Worcester Airport. These roadways included Chapel Street, Mulberry Street, Marshall Street, and Airport Drive. The off-site noise analysis assumed truck traffic will access the site via Mulberry Street and exiting north along Marshall Street, and then south along Airport Drive. Similar to the on-site construction equipment evaluation, the measured ambient sound levels established existing conditions at each sensitive receptor locations along the truck routes.

Using the TNM propagation methodology, sound levels associated with the truck traffic along the roadways were calculated at each sensitive receptor location, shown in **Figure 4-8**. These calculated sound levels were combined with the measured ambient sound levels to determine overall total sound levels at each sensitive receptor locations. Shown in Table 4-16, the receptor locations are predicted to experience overall sound levels ranging from approximately 59 dB(A) to 61 dB(A). This results in sound level increases of up to 1.3 dB(A).These sound level increases are well below the City of Worcester's threshold of 10 dB(A).

Surface Transportation

In accordance with FAA Order 1050.1E and FAA Order 5050.4B paragraph 706(e), this section describes the roadway network within the transportation study area. There are no additional vehicle trips anticipated as part of this project other than those related to construction. The analysis below relates solely to potential impacts from construction vehicle use of the project area roadway network.

Table 4-15: On-Site Construction Activity Sound Levels, dB(A)

	Receptor 1					Receptor 2					Receptor 3					Receptor 4				
Phase	Existing Leq[1]	Project Construction Leq[2]	Total Sound Level Leq[3]	Δ	Exceeds Impact Threshold (>10dB(A))	Existing Leq[1]	Project Construction Leq	Total Sound Level Leq[3]	Δ	Exceeds Impact Threshold (>10dB(A))	Existing Leq[1]	Project Construction Leq	Total Sound Level Leq[3]	Δ	Exceeds Impact Threshold (>10dB(A))	Existing Leq[1]	Project Construction Leq	Total Sound Level Leq[3]	Δ	Exceeds Impact Threshold (>10dB(A))
Approach Light System	49.7	50.2	53.0	3.0	No	49.7	48.6	52.2	2.2	No	49.7	44.1	50.8	0.8	No	53.5	35.1	53.6	3.6	No
Glide Slope Antenna	49.7	45.4	51.1	1.1	No	49.7	46.5	51.4	1.4	No	49.7	49.3	52.5	2.5	No	53.5	39.5	53.7	3.7	No
Jug Handle Taxiway	49.7	52.3	54.3	4.3	No	49.7	54.1	55.5	5.5	No	49.7	43.2	52.9	2.9	No	53.5	41.3	53.8	3.8	No
Localizer Platform	49.7	36.2	49.9	-0.1	No	49.7	36.9	49.9	-0.1	No	49.7	34.5	50.0	0.0	No	53.5	54.0	56.8	6.8	No
Mulberry Street Relocation	49.7	51.8	53.9	3.9	No	49.7	51.6	53.8	3.8	No	49.7	41.6	50.9	0.9	No	53.5	36.5	53.6	3.6	No
Overall sound levels	50	56.7	57.5	7.5	No	50	57.3	58.0	8.0	No	50	54.0	55.4	5.4	No	54	54.5	57.0	7.0	No

1 Background Leq represents the ambient background noise monitored at the study receptor.
2 Represents sound level of construction equipment for that construction phase.
3 Represents Background Leq and Construction Equipment sound levels combined.

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Table 4-16: Off-Site Construction Activity TNM Model Sound Levels, dB(A)

Receptor	Location	Existing Leq[1]	Modeled Truck Contributions[2]	Overall Sound Level[3]	change
1	45 Prouty Ln	60.9	41.5	61.0	0.0
2	20 Glen Ellen Rd	60.9	39.3	61.0	0.0
3	29 Glen Ellen Rd	60.9	38.9	61.0	0.0
4	31 Glen Ellen Rd	60.9	40.4	61.0	0.0
5	137 Marshall St	58.1	35.6	58.0	0.0
6	123 Marshall St	58.1	34.4	58.0	0.0
7	50 Mulberry St	58.1	51.2	58.8	0.8
8	399 Mulberry St	58.1	47.0	58.3	0.3
9	401 Mulberry St	58.1	46.1	58.3	0.3
10	434 Mulberry St	58.1	42.6	58.1	0.1
11	445 Mulberry St	58.1	37.9	58.0	0.0
12	Archway Inc	58.1	41.7	58.1	0.1
13	Archway Inc. School	58.1	46.4	58.3	0.3
14	185 Chapel St	58.1	50.4	58.7	0.7
15	190 Chapel St	58.1	52.7	59.1	1.1
16	192 Chapel St	58.1	52.8	59.1	1.1
17	196 Chapel St	58.1	52.6	59.1	1.1
18	200 Chapel St	58.1	51.9	59.0	1.0
19	202 Chapel St	58.1	53.5	59.3	1.3
20	204 Chapel St	58.1	52.0	59.0	1.0
21	223 Chapel St	58.1	51.6	58.9	0.9

1 Existing Leq represents the daytime ambient background sound levels.
2 Represents sound level of truck traffic.
3 Represents Existing Leq and truck traffic sound levels combined.

Affected Environment

The primary access point for all construction-related traffic for the CAT-III ILS and taxiway improvements is expected to be via Goddard Memorial Drive, a minor arterial owned and maintained by the City of Worcester that serves as the main access road to the Worcester Regional Airport. This roadway is suitable to handle the traffic and loads from construction traffic.

Construction Routing

Materials required for the construction of the taxiway and MSE wall are likely to arrive to the site from the towns of Ashland and Millbury, Massachusetts, via Goddard Memorial Drive.

Contractor Parking

Contractor worker parking will be provided on-airport, using existing surface lots. Workers will be transported to the work areas by van using the temporary construction haul road. All

construction access will be from north service area entrance, then via the perimeter access road to the work site.

4.11 Cumulative Impacts

Cumulative impacts are defined in 40 CFR 1508.7 as "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions..." Presently, there are two projects underway at the Airport; The Rectrix facilities improvements projects and the Airport Fire-Fighting and Rescue (ARFF) facilities demolition/renovation. The Environmental Assessment for the Rectrix FBO project was published in July of 2013 and construction began on October 2013. The FBO project would not have additional impacts to resources and is anticipated to be completed prior to commencement of construction of the CAT III ILS and taxiway improvements. Massport is also renovating the facilities that currently house the Airport Fire Fighting and Rescue (ARFF) operations to better accommodate modern safety equipment to protect and serve passengers and the airport. The ARFF building renovation project began in April 2014 and is anticipated to be completed by April 2015.

Massport is also planning two projects in 2015. Taxiways A and B (located adjacent to Runway-Ends 33 and 29 at the east end of the airfield) are scheduled to be reconstructed to replace deteriorated pavement which has exceeded its useful life. During that project, taxiway edge lighting system within the existing grassed shoulders will be replaced and the shoulders will be regraded to promote proper drainage to meet current FAA criteria. Once the shoulder area is regarded, it will be returned to grass. These ~~same~~ shoulders will continue to be ~~are currently~~ maintained by mowing and edge light maintenance will continue on a frequent basis.

An infield area north of Runway 15 is also being studied for potential regrading with a possible installation of a stone swale to promote proper drainage and direct any surface water further away from runway and taxiway surfaces.

The proposed action does not include any increase in capacity that would lead to future increases in development, or traffic volumes. The project will result in expenditures on construction and manufacturing labor and materials which will provide beneficial short term inputs to segments of the local economy.

4.12 Summary of Environmental Consequences

The majority of environmental consequences of the Proposed Action are temporary in nature and related to the construction period only. The only long-term impact associated with the CAT III ILS and Taxiway upgrades is to wetlands and grassland habitat. These impacts will be mitigated off site in coordination with local officials and regulatory agencies. Table 4-17 provides a summary of FAA defined thresholds for each resource category and anticipated project impacts.

Table 4-17 Summary of Environmental Consequences

Resource	Significance threshold (from Table 7-1, FAA Order 5050 4B)	Impact
Air Quality	When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS).	Not affected. Project will not increase airport capacity or operations
Coastal Resources	None established	Not present.
Compatible Land Use	FAA to determine if any alternative would have land use consequences such as: • community disruption; • business relocations; • induced socioeconomic impacts; • wetland, or floodplain impacts; or • critical habitat alterations.	Not affected. Project will not change any land uses, increase operations or encroach upon adjacent lands
Section 4(f) 6(f)	When the action's physical use would be more than minimal or its constructive use substantially impairs the 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	Not present.
Farmlands	When the total combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	Not present within the project area.
Fish, Wildlife and Plants	Consider scientific literature on and information from agencies having expertise addressing on the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population	Impacts to grassland habitat will be mitigated
Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.	No work is proposed within floodplains. The project will not have an adverse impact on floodplains natural and beneficial values.
Hazardous Materials and Solid Waste	When an action involves a property on or eligible for the National Priority List (NPL).	Not affected. Project property is not on NPL and will not involve any change to hazardous materials or solid waste at the airport.
Historic, Architectural, Archaeological and Cultural Resources	When an action adversely affects a protected property and the responsible FAA official determines that alternatives that may avoid adverse effects warrant further study.	The proposed action will not have an adverse effect on architectural, historical or cultural resources because no properties are present within the work area. FAA has issued a finding of no adverse effect for the proposed action. The SHPO has concurred.
Light Emissions and Visual Impact	For light emissions: When an action's light emissions create annoyance to interfere with normal activities. For visual effects: When consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	The existing approach light system is generally not visible from residential location but is visible by roadway passersby. The overall height of the light plane will be reduced and thus less visible. The additional lights will not create annoyance or interfere with any off-airport activities. The proposed action is not anticipated to have an adverse visual effect.
Natural Resources and Energy Supply	None	Project will not increase operations at ORH. During construction, Massport will include BMP's such as use of warm mix asphalt as energy reduction strategy.

Table 4-17 Summary of Environmental Consequences (Continued)

Resource	Significance threshold (from Table 7-1, FAA Order 5050 4B)	Impact
Socioeconomic Impacts, Environmental Justice and Children's Environmental Health and Safety Risks	For Socioeconomic issues: extensive relocation, but sufficient replacement housing is unavailable; extensive relocation of community businesses that would cause severe economic hardship for affected communities; disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities; a substantial loss in community tax base. For Environmental justice issues: disproportionately high an adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. For Children's Health & Safety Risks: disproportionate health and safety risks to children, may indicate a significant impact.	Temporary job creation during two year construction period will have a positive impact on socioeconomics. Construction related impacts will not substantially disrupt local traffic or business. On airport project is not expected to have disproportionate impacts on EJ communities, nor negatively affect Children's Environmental Health.
Surface Water and Water Quality	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	The project will require a Variance from the state water quality standards due to the designation of Lynde Brook and Kettle Brook as Outstanding Resource Waters. A Water Quality Variance is anticipated to be issued for the project. The project complies with state stormwater standards.
Wetlands and Waterways	When an action would: • Adversely affect a wetland's function to protect the water quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer • Substantially alter the hydrology needed to sustain the affected wetland's functions and values or those of wetlands to which it is connected • Substantially reduce the affected wetlands' ability to retain floodwater or stormwater runoff, thereby threatening public health, safety and welfare. • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber resources of the affected or surrounding wetlands. • Promote development that causes any of the above impacts. • Be inconsistent with applicable State wetland strategies	The project will result in approximately 3,522 sf of unavoidable permanent and 385 sf of temporary impacts to wetland resources. The impacts will not substantially alter hydrology or functions and values of the adjacent wetlands. The impacts will not substantially reduce the capacity of the wetlands to retain runoff and flood waters. The project is consistent with State wetland laws and regulations. Impacts have been minimized to the extent practicable and will be mitigated at a ratio of 2:1.
Wild and Scenic Rivers	None established	Not present
Construction Period Impacts	Air Quality: When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS). Noise: When an action compared to the no action alternative in the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB is a significant impact. Solid Waste: Not established	The project does not exceed the NAAQS. Construction noise will be temporary. The airport is not located in a noise sensitive area, and impacts to receivers are not anticipated to exceed local noise thresholds. Sound levels would be substantially below the Federal General Conformity *de minimis* thresholds. Solid Waste associated with construction will be recycled or reused where possible, or will be disposed in accordance with applicable regulations.

5 Mitigation

The development and construction of the proposed action will incorporate the mitigation measures described below.

5.1 Fish Wildlife and Plants

Massport is coordinating with NHESP to determine the appropriate mitigation for impacts to grassland habitat on the project site. NHESP typically requires compensatory mitigation for habitat loss of Threatened species at a 2:1 ratio. The project is anticipated to provide off-site mitigation or in-lieu mitigation to provide an equivalent of 2:1 replacement ratio. Massport will continue to coordinate with NHESP to determine the appropriate means of meeting the off-site mitigation requirement.

During construction, all wetlands will be protected by erosion and sedimentation controls. To preserve the ability of amphibians and other small animals to move through these areas upon project completion, erosion control structures within critical terrestrial habitat will be removed within 30 days of final site stabilization, and any ruts will be smoothed out to avoid creating water-filled depressions that may intercept amphibian movement and/or induce egg deposition. If possible, construction within the Critical Terrestrial Habitat will be avoided during peak amphibian movement periods; if construction must occur in this area during these periods, silt fencing will be used to exclude amphibians from active construction areas to avoid direct mortalities.[18]

5.2 Natural Resources and Energy

Massport will use warm mix asphalt on all new paved surfaces. LED lighting will be the preferred lighting type for taxiway and used where guidelines allow. These measures will reduce energy consumption during both construction and operations.

18 Calhoun, A. J. K. and M. W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York. http://www.nae.usace.army.mil/Portals/74/docs/regulatory/VernalPools/BestDevelopmentPractices20Oct2014.pdf

5.3 Water Quality

All precautions to prevent sediment from entering the water and wetlands will be taken as described in Section 4.6 and below in Section 5.5.4. In areas where retaining walls are proposed, the contractor will utilize additional controls to prevent material from entering Lynde Brook. A sheet pile coffer dam will be installed between the wetland area and the proposed wall location at the jug-handle taxiway and glide slope area, to provide a secondary barrier to sedimentation and erosion during construction. Massport will continue to coordinate with the City of Worcester to implement any additional controls that are deemed necessary to prevent sedimentation or erosion from construction activities.

The proposed drainage and storm water treatment system for the project will meet the requirements of the Massachusetts Storm Water Standards. Stormwater Best Management Practices (BMPs) act as the permanent water quality mitigation measures for the proposed design. The project will incorporate updated drain inlets, a dry well, infiltration trenches, and a subsurface infiltration system.

5.4 Wetlands and Waterways

All work within jurisdictional wetland resource areas is subject to the provisions in the USACE General Permit, and the Order of Conditions to be obtained from the Leicester Conservation Commission. The proposed action will not alter the configuration of any river banks or impair storage capacities of any floodplain.

Impacts to federal and state jurisdictional resources will be mitigated at a location south of the airfield located along Lynde Brook. The mitigation location has been coordinated with the Worcester Water Division. The proposed mitigation site is shown in Figure 5-1. Wetlands will be replaced at a ratio of 2 square feet of mitigation for every square foot of impact. The project will result in 3,522 sf (0.08 acres) of unavoidable impacts to wetlands. Massport has committed to providing wetland replacement within the Town of Leicester, at a 2:1 ratio. Design of the mitigation area will take place during project permitting, subject to the approval of the Leicester Conservation Commission and DEP.

Source: MassGIS 2013

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Figure 5-1
Proposed Wetland
Mitigation Location

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5.5 Construction Period

Massport will incorporate the following mitigation measures into contract documents to minimize any potential construction related impacts.

5.5.1 Air Quality

Massport will incorporate a specification on Air Quality in the contract documents to ensure compliance with the provisions of Massachusetts General Law Chapter 111 Section 142A, "Pollution or contamination of atmosphere; prevention; regulations; violations; enforcement," and the Massachusetts Department of Environmental Protection Code of Massachusetts Regulations (CMR) 310 CMR 7.09 "Dust, Odor, Construction and Demolition." Work shall be conducted in a manner that will not result in excessive particulate matter emissions, nuisance dust conditions, or PM_{10} (particulate matter with an aerodynamic diameter less than or equal to 10 microns) concentrations exceeding the National and Massachusetts Ambient Air Quality Standard of 150 microns per cubic meter on a 24-hour basis, not to be exceeded more than once per year.

The contractor will cover all stockpiled materials within staging areas. Wet suppression shall be used to provide temporary control of dust. In an effort to reduce air quality emissions from temporary construction activities, the proposed project will require the construction contractors to adhere to all applicable regulations regarding control of construction vehicles emissions. Massport is committed to the mitigation of construction-related emissions at the airport through the implementation of several emission reduction requirements and initiatives that are already in place.

Massport will require the contractor to utilize ultra-low sulfur diesel fuel for off-road construction vehicles and/or equipment. Construction contracts will require that gasoline and diesel motorized construction equipment be well maintained and in good running order during the work effort on the proposed Project.

The facility shall be operated in a manner to prevent the occurrence of dust or odor conditions that may cause or contribute to a condition of air pollution as defined in Regulation 310 CMR 7.01 and 7.09. Fugitive dust emissions are proportional to the amount of earth moved and the length of travel on unpaved roads. Any impacts from fugitive dust particles would be of short duration and localized. The contractor will also be responsible for protective measures around the construction and demolition work to protect pedestrians and prevent dust and debris from leaving the Site or entering the surrounding community. Dust generated from earthwork and other construction activities like stockpiled soils will be controlled by spraying with water to mitigate wind erosion on open soil areas. Other dust suppression methods will be implemented to ensure minimization of the off-site transport of dust. There will be regular sweeping of the pavement of adjacent roadway surfaces during the construction period to minimize the potential for vehicular traffic to create airborne dust and particulate matter.

The construction of the project will comply with the requirements of the Massachusetts Department of Environmental Protection's (MassDEP) Clean Construction Equipment Initiative aimed at reducing air emissions from diesel-powered construction equipment. Massport requires that construction contractors install emission control devices, such as diesel oxidation catalysts and/or diesel particulate filters on certain equipment types (front-end loaders, backhoes, excavators, cranes, and air compressors).[19] Idle reduction and dust and odor control would also be addressed.

Massport requires all contractors to adhere to construction worker vehicle trip management, including requiring contractors to utilize on-airport parking and using high-occupancy vehicle transportation modes for employees.

In addition, the prohibition of excessive idling of construction equipment engines will be implemented as required by MassDEP regulations in 310 CMR 7.11.

5.5.2 Noise

Consideration of the noise impact of construction activities will be given when scheduling for late evening and nighttime activities, with consideration given to transportation routes accessing the airport property. The project will require a noise control plan be developed and implemented on the construction site to control and minimize noise emissions.

Sound levels from activities associated with the construction of the proposed action comply with the City of Worcester noise criteria; therefore no noise mitigation is required. However, construction equipment will use noise-reduction measures to minimize noise impacts at sensitive receptor locations.

All exterior construction activities, including demolition, site excavation/grading and new building construction would typically be limited to normal daytime working hours. Construction activities beyond normal daytime work hours would be minimized to the extent practicable and would adhere to local noise regulations.

Massport is proposing to implement mitigation measures to reduce or minimize noise from construction activities. Construction vehicles and equipment would be required to maintain their original engine noise control equipment. Specific mitigation measures may include the following:

- Construction equipment would be required to have installed and properly operating appropriate noise muffler systems.
- Appropriate traffic management techniques would be implemented during the construction period would mitigate roadway traffic noise impact.
- Proper operation and maintenance, and prohibition of excessive idling of construction equipment engines, would be required.

Therefore, construction noise levels are proposed to be mitigated to the greatest extent possible.

19 The goal of these initiatives is to reduce the emissions associated with construction equipment. The effort involves retrofitting heavy construction equipment with emission control devices designed to reduce the amount of air pollution (volatile organic compounds (VOCs), carbon monoxide (CO), and particulate matter (PM)) emitted from the vehicle.

5.5.3 Hazardous Materials and Solid Waste

All hazardous materials will be handled and disposed of in accordance with all state and federal laws including the Massachusetts Contingency Plan. Characterization and classification of potentially hazardous materials for off-site disposal or treatment will be performed by the contractor according to criteria established by the permits of the receiving facilities. Based on records search results hazardous materials are not anticipated to be encountered on the site. Solid waste disposal will primarily consist of asphalt pavement material.

5.5.4 Water Quality

Without proper control measures, construction of the project could cause erosion and sedimentation, resulting in temporarily increased turbidity and suspended solid loads in receiving waterbodies. Erosion and sedimentation controls, described below, will be employed to prevent the erosion and transport of sediment into resource areas during the earthwork and construction phases of the project.

Minimization of Disturbed Areas and Protection of Natural Features

The most important aspects of controlling erosion and sedimentation are limiting the extent of disturbance and limiting the size and length of the tributary drainage areas to the worksite and drainage structures. These fundamental principles will be the key factors in the Contractor's control of erosion on the project site. If appropriate, the Contractor will construct temporary diversion swales and settling basins or use a settling tank. If additional drainage or erosion control measures are needed, they will be located up -gradient from str fences when possible. The Contractor is responsible for the maintenance and repair of all erosion control devices on -site. All eros time will silt -laden water systems). Any runoff from disturbed surfaces will be directed through a sedimentation process prior to being discharged.

Project Phasing

The project phases will be carefully planned to minimize erosion and the risk of suspended solids entering Lynde Brook or Kettle Brook. Construction of the jug-handle taxiway will require extending the terrace adjacent to the runway. This work will be completed as one of the first phases of construction. In order to minimize wetland impacts, an MSE wall will be constructed to retain the fill needed for the taxiway while avoiding all impacts to wetlands. Temporary sheet piling will be driven outside the limit of work to protect the wetland while construction of the MSE is underway. During storm events, this sheet piling will act as a protective reservoir, trapping runoff with high sediment loading before it can enter Lynde Brook. The Contractor will be responsible for dewatering all trenches and excavations.

Material Delivery

Earthwork materials will be delivered to the site as needed daily throughout the construction process to minimize staging of soils and aggregates at the airport. This just in time method of material delivery helps minimize the potential for turbid stormwater to enter Lynde Brook and further minimizes the risk to the City of Worcester drinking water supply in Lynde Brook Reservoir.

Erosion and Sediment Control Best Management Practices

A suite of mitigation measures is proposed to prevent short- and long-term impacts from construction site stormwater. An erosion and sedimentation control program would be implemented to minimize temporary impacts to wetland resource areas during the construction phase of the Project. Controls would comply with criteria contained in the NPDES General Permit for Discharges from Large and Small Construction Activities issued by the EPA and would comply with requirements of the Leicester Conservation Commission. The primary erosion control techniques proposed include metal sheeting behind MSE walls, straw wattle barriers, silt fence barriers, and drain inlet protection.

Stabilization Plan

The contractor will be required to develop a soils stabilization plan to ensure that all disturbed surfaces are stabilized within a reasonable timeframe after construction activities are halted or complete. The stabilization plan will incorporate Best Management Practices to ensure exposed soils are protected against erosion during construction. The Stabilization Plan will include the following minimum requirements:

- Soils will be stabilized within 14 days of completion of work
- The smallest practicable area of land will be exposed at a time.
- Temporary stabilized construction entrances
- Steeper slopes will be covered with a bonded fiber matrix.
- An approved erosion control barrier will be installed and maintained down-gradient of limit of work.
- All inlets located within the work area will be protected with filter fabric.

5.5.5 Transportation and Traffic

Construction period traffic impacts have been mitigated through the use of a temporary construction haul road to be constructed on airport property that will reduce or eliminate the need to utilize Mulberry Street for construction access.

5.5.6 Wetlands and Waterways

Protection of wetlands during construction is also governed by the Storm Water Pollution Prevention Plan that will be developed for the project under the National Pollution Discharge Elimination System (NPDES) Construction General Permit.

The top 24 inches of wetland soils excavated for the installation of the light tower foundation plate will be set aside and kept in their natural stratification so that they may be restored on top of the plate upon completion of the work. Best management practices will be used throughout construction to minimize risk of impacts to the wetlands surrounding the tower, the glide slope, and the culvert.

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6

Distribution List

City Clerk
City of Worcester
City Hall Room 206
455 Main Street
Worcester, MA 01608

Philip Guerin
Director of Environmental Systems
Worcester Div of Public Works & Parks
20 East Worcester Street
Worcester, MA 01604

Worcester Conservation Commission
City Hall Room 404
455 Main Street
Worcester, MA 01608

Worcester Historical Commission
455 Main Street
Worcester, MA 01608

Worcester Public Library
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Worcester City Council
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446 Main Street, Suite 200
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Leicester Town Administrator
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Leicester Conservation Commission
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Leicester Historical Commission
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1136 Main Street
Leicester, MA 01524

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8 New Bond Street
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Oriola Koci
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Airport Advisory Committee
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Leicester, MA 01524

Senator Elizabeth Warren
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Boston MA 02203
Att: Roger Lau

Senator Edward Markey
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Representative James P. McGovern
12 East Worcester Street, Suite 1,
Worcester, MA 01608

Senator Harriette Chandler
State House
Boston MA 02133

Senator Michael O. Moore
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Millbury, MA 01527

Rep James O'Day
State House
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Rep Daniel Donahue
State House
Boston MA 02133

Rep. Kate D. Campanale
State House Room 437
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Mass Audubon Advocacy Dept.
208 Great Road
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7

List of Preparers

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Heidi Richards
Thomas Wholley
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8

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9
Acronyms

ACRP	Airport Cooperative Research Program
ALP	Airport Layout Plan
ALSF-2	Approach Lighting System with Sequence Flashing Lights
ARFF	Airport Fire Fighting and Rescue Operations
BVW	Bordering Vegetated Wetland
BLSF	Bordering Land Subject to Flooding
CAA	Clean Air Act
CAT-I	Approach Category I
CAT-II	Approach Category II
CAT-III	Approach Category III
CEQ	Council on Environmental Quality
CGP	Construction General Permit
CFR	Code of Federal Regulations
CMP	Construction Management Plan
CO	Carbon Monoxide
CTH	Critical Terrestrial Habitat
dB(A)	A-Weighted Decibel
MassDEP	Massachusetts Department of Environmental Protection
EA	Environmental Assessment
EEA	Executive Office of Energy and Environmental Affairs
ENF	Environmental Notification Form
EO	Executive Order
FAA	Federal Aviation Administration
FONSI	Finding Of No Significant Impact
GHG	Greenhouse Gas

ILS	Instrument Landing System
LCC	Leicester Conservation Commission
LOS	Level of Service
LUW	Land Under Water
MACRIS	Massachusetts Cultural Resource Information System
MALSR	Medium Intensity Approach Lighting System
MHC	Massachusetts Historical Commission
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MGL	Massachusetts General Laws
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
ORH	Worcester Regional Airport
ORW	Outstanding Resource Water
PM_{10} and $PM_{2.5}$	Particulate Matter
PVP	Potential Vernal Pool
RCRA	Resource Conservation and Recovery Act
RTN	Release Tracking Number
RVR	Runway Visual Range
SHPO	State Historic Preservation Office
SO_X	Sulfur Oxides
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile Organic Compounds
WUS	Waters of the US

Appendix A
Correspondence

- US Fish & Wildlfe Service August 11, 2014; September 9, 2014
- State Historic Preservation Officer August 11, 2014; December 15, 2014

August 6, 2014

Vanasse Hangen Brustlin, Inc.

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston MA 02125-3314

Re: Worcester Regional Airport CAT-III ILS and Taxiway Improvements
Worcester and Leicester, Massachusetts

Dear Ms. Simon,

On behalf of Massport, Vanasse Hangen Brustlin, Inc. is collecting information in support of an Environmental Assessment being prepared for review by the Federal Aviation Administration (FAA) under the National Environmental Policy Act (NEPA).

The proposed project is to construct a new jughandle taxiway at the west end of the primary runway (Runway 11-29), upgrade the approach light system to a Category III Precision Approach, and upgrade other instrument landing system (ILS) navigational aids, including the glide slope indicator. The purpose of the project is to enhance aviation safety and increase aeronautical access and the reliability of air service during low visibility weather conditions. An Environmental Notification Form was filed for this project on January 15, 2014 and a copy was provided to your office. MHC did not submit comments on the ENF. We are therefore seeking SHPO comments on the proposed project pursuant to Section 106. Please note that the MA Executive Office of Energy and Environmental Affairs has determined that no further MEPA review is required for this project.

The attached figure illustrates the project area being studied. In 2011 and 2012, the Public Archaeology Laboratory (PAL) conducted historical research and reconnaissance level archaeological surveys for Worcester Regional Airport's Vegetation Management Program (VMP), including portions of the project area. The results are described below.

Historic Resources

There are no historic resources within one-half-mile of the proposed project that are currently listed in the National Register of Historic Places (National Register) or the State Register, or included in MACRIS or the Inventory maintained by the Massachusetts Historical Commission (MHC). Research completed for the VMP project indicates that the land around the airport was historically a peripheral farming area with low-density development. One property is listed in MACRIS, LEI.259, Maple Hill Farm, 132 Marshall Street in Leicester, which is a 2.5-story, federal style house built in the early nineteenth century approximately 0.6 miles north of the project area No further historic resources survey is recommended for

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email: info@vhb.com
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any areas in Leicester or Worcester outside the airport property for the proposed taxiway and ILS upgrades.

Archaeological Resources

The proposed taxiway is located immediately north of the existing Runway 11. The current grade in this location is flat, before sloping steeply down on both sides of the runway to a wetland associated with Lynde Brook. The steep grade is the result of past filling and extensive construction episodes conducted to facilitate airport improvements. A review of historical aerial photographs depicting the proposed runway location indicates that between 1960 and 1963 this portion of the Lynde Brook wetland was filled and graded. Between 1963 and 1971 the runway was extended and the remaining graded areas were landscaped. All taxiway improvements and navigational aids will be constructed on previously disturbed lands within the airport boundary.

The additional approach lights and associated navigational aids west of Mulberry Street will be located in and around VMAs 13-15 which were surveyed as part of the VMP. Elements of the airport's existing approach light system and access road to serve them are present in these VMAs. These areas are characterized by topography that exhibits sharp changes in elevation and slope. Vegetation is predominantly deciduous forest with dense undergrowth. A large pond and associated wetlands lie immediately west of Mulberry Street. The 1870 Beers and 1898 Richards maps of Leicester identify what is believed to be several farmsteads west of and adjacent to Mulberry Street and north of Earle Street. The general area where these farmsteads were located was disturbed over 40 years ago by roadway and airport maintenance activities and no evidence of former structures remains. Based on the presence of steep slopes, predominately poorly-drained soils, and prior disturbance in the area, the proposed location of the additional approach lights and navigational aids are assigned low archaeological sensitivity for pre- and post-contact period sites. PAL recommended that no further archaeological investigations are warranted.

Accordingly, based on available information and field studies, we recommend that FAA make the finding that the proposed safety and aeronautical efficiency enhancements will have no adverse effect on any cultural resources that may be present in the project area. On behalf of FAA, we would appreciate your written confirmation of this finding for FAA's use in, its Section 106 evaluation. If you have any questions or require additional information, please do not hesitate to contact me at (617) 924-1770 or Stewart Dalzell, Massport Project Manager, at (617) 568-3524.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Lisa A. Standley, Ph.D.
Chief Environmental Scientist

Attachment: Locus Map

Cc: Stewart Dalzell, Massport
Richard Doucette, FAA

August 7, 2014

Vanasse Hangen Brustlin, Inc.

Ms. Maria Tur
Environmental Reviewer
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Re: Worcester Regional Airport CAT-III ILS and Taxiway Improvements
Worcester and Leicester, Massachusetts

Dear Ms. Tur,

On behalf of the Massachusetts Port Authority (Massport), Vanasse Hangen Brustlin, Inc. is collecting information in support of an Environmental Assessment being prepared for review by the Federal Aviation Administration (FAA) under the National Environmental Policy Act (NEPA).

The proposed project is to construct a new jughandle taxiway at the west end of the primary runway (Runway 11-29), upgrade the approach light system to a Category III Precision Approach, and upgrade other instrument landing system (ILS) navigational aids, including the glide slope indicator. The purpose of the project is to enhance aviation safety and increase aeronautical access and the reliability of air service at the Worcester Regional Airport (ORH) during low visibility weather conditions.

The attached figure illustrates the project area being studied. The airfield portion of the site is located within a Mass Natural Heritage and Endangered Species Program estimated habitat polygon for grasshopper sparrow, but no federally-listed species have been recorded for the project area. The project area does not provide suitable habitat for any of the federally-listed animal or plant species known to occur in Massachusetts.

Please review the enclosed materials at your earliest convenience, and provide written confirmation that federally protected threatened and endangered wildlife, fish or plant species are not present in the project area. If you have any questions or require additional information, please do not hesitate to contact me at (617) 924-1770 (or email lstandley@vhb.com) or Stewart Dalzell, Massport Project Manager, at (617) 568-3524.

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Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Lisa A. Standley, Ph.D.
Chief Environmental Scientist

Attachment: Locus Map

Cc: Stewart Dalzell, Massport
Richard Doucette, FAA

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

September 9, 2014

Reference:	Project	Location
	Airport improvements	Worcester and Leicester, MA

Ms. Lisa Standley
Vanasse Hangen Brustlin, Inc.
P.O. Box 9151
Watertown, MA 02471-9151

Dear Ms. Standley:

This responds to your recent correspondence requesting information on the presence of federally listed and/or proposed endangered or threatened species in relation to the proposed activity referenced above. These comments are provided in accordance with the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531, *et seq.*).

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

To obtain updated lists of federally listed or proposed threatened or endangered species and critical habitats, it is not necessary to contact this office. Instead, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/newengland/endangeredspec-consultation.htm (accessed May 2014)

On the website, there is also a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no such habitat exists, then no federally listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact Maria Tur of this office at 603-223-2541, extension 12, if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

U.S. Department
of Transportation
**Federal Aviation
Administration**

Federal Aviation Administration
New England Region

12 New England Executive Park
Burlington, MA 01803

December 3, 2014

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Dear Ms. Simon:

The Massachusetts Port Authority has proposed a taxiway and navigation aid project at Worcester Regional Airport. This project causes a change to the Airport Layout Plan to be approved by the Federal Aviation Administration, and is considered a National Historic Preservation Act, Section 106 "undertaking".

Attached is a plan showing the Area of Potential Effect. The details of the project were described in the Environmental Notification Form submitted to your office in January 2014. A letter describing the project (attached) was sent to your office in August 2014. This information indicates much of the area of work has been substantially altered by past earthmoving, and is of low archaeological sensitivity.

After review of the relevant information, the FAA issues a Section 106 "Finding of No Historic Properties Affected" for this undertaking. Thank you for your review of this Finding. Please do not hesitate to contact me if you have any questions or comments on this matter.

Sincerely,

R. Doucette

Richard P. Doucette
Manager of Environmental Programs
FAA New England Region

CONCURRENCE Brona Simon
12/12/14 BRONA SIMON
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

CC: Tom Ennis, Massport
Nancy Nelson, Minute Man National Historical Park

Appendix B
Construction Air Quality Spreadsheets

- Background Concentrations
- Construction Vital Statistics
- Construction Emission Calculations

Background Concentrations

Carbon Monoxide Background Calculation

Data from Annual Reports on Air Quality in Massachusetts 2011-2013

Year	1-Hour* (ppm)	8-Hour** (ppm)	Monitor Site
2011	2.2	1.7	*Summer St. Worcester
2012	2.3	1.5	*Summer St. Worcester
2013	1.9	1.3	*Summer St. Worcester

*** 1-Hour values represent 2nd highest**

**** 8-Hour values represent 2nd highest**

1- Hour Background Calculation

Worcester Airport, Worcester, MA

Pollutant	2012* 1-Hour (ppm)	Molecular weight	Background Concentration (Micrograms/meter3)
Carbon Monoxide	2.3	28.0	2678.9

* Highest value of 2011, 2012, 2013

8-Hour Background Calculation

Worcester Airport, Worcester, MA

Pollutant	2011* 8-Hour (ppm)	Molecular weight	Background Concentration (Micrograms/meter3)
Carbon Monoxide	1.7	28.0	1980.0

* Highest value of 2011, 2012, 2013

PM 2.5 Background Calculation

Data from Annual Reports on Air Quality in Massachusetts 2011-2013

Year	Arithmetic Mean* (Micrograms/meter3)	24-Hour** (Micrograms/meter3)	Monitor Site
2011	9.0	23.7	*Summer St. Worcester
2012	8.8	20.4	*Summer St. Worcester
2013	7.2	18.0	*Summer St. Worcester

*** Values represent annual arithmetic mean**

**** 24-Hour values represent 98th percentile**

Annual Background Calculation

Worcester Airport, Worcester, MA

Pollutant	Arithmetic Mean (Micrograms/meter3)	Molecular Weight	Background Concentration (Micrograms/meter3)
PM2.5	8.3	---	8.3

* Average value of 2011, 2012, 2013

24-Hour Background Calculation

Worcester Airport, Worcester, MA

Pollutant	24-Hour (Micrograms/meter3)	Molecular Weight	Background Concentration (Micrograms/meter3)
PM2.5	20.7	---	20.7

* Average value of 2011, 2012, 2013

PM 10 Background Calculation

Data from Annual Reports on Air Quality in Massachusetts 2011-2013

Year	24-Hour** (Micrograms/meter3)	Monitor Site
2011	35.0	*Summer St. Worcester
2012	38.0	*Summer St. Worcester
2013	47.0	*Summer St. Worcester

*** Values represent annual arithmetic mean**

**** 24-Hour values represent 2nd highest**

24-Hour Background Calculation

Worcester Airport, Worcester, MA

Pollutant	24-Hour (Micrograms/meter3)	Molecular Weight	Background Concentration (Micrograms/meter3)
PM10	40.0	---	40.0

* Average value of 2011, 2012, 2013

Ozone (VOC) Background Calculation

Data from Annual Reports on Air Quality in Massachusetts 2011-2013

Year	8-Hour** (Micrograms/meter3)	Monitor Site
2011	0.065	*Summer St. Worcester
2012	0.070	*Summer St. Worcester
2013	0.067	*Summer St. Worcester

*** Values represent annual arithmetic mean**

**** 8-Hour values represent 4th highest daily maximum**

8-Hour Background Calculation

Worcester Airport, Worcester, MA

Pollutant	8-Hour (Micrograms/meter3)		Averaged over three years: Background Concentration (Micrograms/meter3)
VOC		---	0.067

* Average value of 2011, 2012, 2013

NO2 Background Calculation

Data from Annual Reports on Air Quality in Massachusetts 2011-2013

Year	Arithmetic Mean* (ppb)	1-hour** (ppb)	Monitor Site
2011	17.34	62.00	*Summer St. Worcester
2012	12.78	45.00	*Summer St. Worcester
2013	11.80	48.00	*Summer St. Worcester

*** Values represent annual arithmetic mean**

****Values Represent 98th Percentile**

Background Calculation

Worcester Airport, Worcester, MA

2011*

Pollutant	Arithmetic Mean (ppb)	Molecular Weight	Background Concentration (Micrograms/meter3)
Nitrogen Dioxide	17.34	46.0	33179.7

* Highest value of 2011, 2012, 2013

Background Calculation

Worcester Airport, Worcester, MA

Pollutant	1-hour (ppb)	Molecular Weight	Background Concentration (Micrograms/meter3)
Nitrogen Dioxide	51.67	46.0	98863.0

* Average value of 2011, 2012, 2013

Summary of Background Concentrations

Carbon Monoxide Background Concentrations

Worcester Airport, Worcester, MA

Time Period	Background Concentration* (ppm)	NAAQS Standard (ppm)
1-Hour	2.3	35.0
8-Hour	1.7	9.0
Calculated Persistance Factor	0.74	

* Highest value of 2011, 2012, 2013

PM 2.5 Background Concentrations

Worcester Airport, Worcester, MA

Time Period	Background Concentration* (Micrograms/meter3)	NAAQS Standard (Micrograms/meter3)
24-Hour	20.7	35.0
Annual	8.3	12.0

* Average value of 2011, 2012, 2013

PM 10 Background Concentrations

Worcester Airport, Worcester, MA

Time Period	Background Concentration* (Micrograms/meter3)	NAAQS Standard (Micrograms/meter3)
24-Hour	40.0	150.0

* Average value of 2011, 2012, 2013

NO_2 Background Concentrations

Worcester Airport, Worcester, MA

Time Period	Background Concentration (ppb)	NAAQS Standard (ppb)
Annual Arithmetic Mean *	17.3	53.0
1-Hour**	51.7	100.0

* Highest value of 2011, 2012, 2013
* Average value of 2011, 2012, 2013

VOC (Ozone) Background Concentrations

Worcester Airport, Worcester, MA

Time Period	Background Concentration (ppm)	NAAQS Standard (ppm)
8-Hour	0.067	0.075

* Average value of 2011, 2012, 2013

Adjustment from 1 hour (DEP Standards, not project-specific)

Annual	24-Hour	8-Hour	3-Hour
0.08	0.40	0.70	0.90

Construction Vital Statistics

Vital Statistics

Jughandle Taxiway

1.5.1	Area of Pavement		110,193	SF
	Area of Disturbance		254,264	SF
1.5.2	Amount of Fill			
	Common Borrow		60,500	CY
	Structural Wall Backfill		10,500	CY
1.5.3	Height of Wall		24	FT
	Length of Wall		1,088	LF
1.5.4	Duration of Construction		210	Working Days
1.5.5	Potential Equipment			
	Type	Quantity		
	Excavators	4	210	Days
	Bulldozers	2	175	Days
	Site Trucks	5	175	Days
	Backhoes	2	210	Days
	Loaders	2	210	Days
	Cranes	1	45	Days
	Pavers	1	10	Days
	Rollers	4	10	Days
1.5.6	Traffic			
	Common Borrow		2,020	Truck Round Trips
	Structrual Wall Back Fill		350	Truck Round Trips
	Wall Materials		12	Truck Round Trips
	ALSF Shelter		6	Truck Round Trips
	Engine Generator		2	Truck Round Trips
	Supplies		12	Truck Round Trips
1.5.7	Labor			
	Equipment Operators		16	
	Truck Drivers		13	
	Laborers		58	
	Electricians		12	
	Engineers		2	
	Management		12	

Notes

Truck trips are based on 30 CY per truck
Truck trips are expected between 6:00 am - 6:00 pm
210 Construction Day Duration equal Approximately 12 truck trips per day
Common Borrow hauled from aggregate pits located in Marlborough and Ashland
Structrual Wall Backfill hauled from quarries located in Millbury and Ashland

Vital Statistics

Approach Light System

2.5.1	Area of Disturbance		76,512	SF	Ductbank excavation in existing gravel access road
2.5.2	Amount of Wetland Impact		550	SF	Includes new tower foundation at station 11+00 and associated utility causeways
2.5.3	Duration of Construction		239	Working Days	
2.5.4	Potential Equipment				
	Type	Quantity			
	Excavators	2	120	Days	
	Bulldozers	0		Days	
	Site Trucks	2	120	Days	
	Backhoes	1	120	Days	
	Loaders	0		Days	
	Cranes	1	30	Days	
	Pavers	1	5	Days	
	Rollers	1	45	Days	
2.5.5	Traffic				
	Mulberry Street Recon		30	Truck Round Trips	Excavation, gravel and pavement required to re-align Mulberry Street
	Supplies		250	Truck Round Trips	ALSF Infrastructure, Ductbank, Handholes and Concrete
2.5.6	Building / Structures				
	ALSF-2 Building (42x32)		1,344	SF	Building for ALSF Equipment Regulators, Switch Gear, Computer Equipment, Garage and Work Shop
	Generator Enclosure (39x12)		468	SF	
2.5.7	Labor				
	Equipment Operators		6		
	Truck Drivers		2		
	Laborers		16		
	Electricians		24		
	Engineers		1		
	Management		10		

Note

Truck trips are expected between 6:00 am - 6:00 pm

239 Construction Day Duration equal Approximately 2 truck trips per day

Vital Statistics

Glide Slope Antenna

3.5.1	Area of Disturbance		33,529	SF
3.5.2	Amount of Wetland Impact		3,295	SF
3.5.3	Duration of Construction		100	Working Days
3.5.4	Amount of Fill			
	Common Borrow		11,500	CY
	Structural Wall Backfill		2,200	CY
3.5.5	Height of Wall		40	FT
	Length of Wall		345	LF
3.5.6	Potential Equipment			
	Type	Quantity		
	Excavators	1	60	Days
	Bulldozers	1	20	Days
	Site Trucks	2	60	Days
	Backhoes	1	100	Days
	Loaders	1	20	Days
	Cranes	1	20	Days
	Pavers	1	5	Days
	Rollers	4	20	Days
3.5.7	Traffic			
	Common Borrow		385	Truck Round Trips
	Structrual Wall Back Fill		75	Truck Round Trips
	Wall Materials		6	Truck Round Trips
	Supplies		25	Truck Round Trips
3.5.7	Building / Structures			
	Glide Slope Shelter (10 x 10)		100	SF
3.5.8	Labor			
	Equipment Operators		10	
	Truck Drivers		2	
	Laborers		24	
	Electricians		12	
	Engineers		1	
	Management		12	

Building for Glide Slope Equipment, Switch Gear, Computer Equipment

Notes

Truck trips are based on 30 CY per truck
Truck trips are expected between 6:00 am - 6:00 pm
100 Construction Day Duration equal Approximately 5 truck trips per day
Common Borrow hauled from aggregate pits located in Marlborough and Ashland
Structrual Wall Backfill hauled from quarries located in Millbury and Ashland

Vital Statistics

Localizer Platform

4.5.1	Area of Pavement		5,000	SF
	Area of Disturbance		12,500	SF
4.5.2	Height of Strucrure		55	FT
	Length of Wall		100	LF
	Duration of Construction		132	Working Days
4.5.3	Potential Equipment			
	Type	Quantity		
4.5.4	Excavators	2	100	Days
	Site Trucks	2	100	Days
	Backhoes	1	132	Days
	Loaders	1	30	Days
	Cranes	1	30	Days
	Pavers	1	5	Days
	Rollers	2	5	Days
4.5.4	Traffic			
	Common Earth Materials		30	Truck Round Trips
	Localizer Support Structure		5	Truck Round Trips
	Localizer		2	Truck Round Trips
	Shelter		2	Truck Round Trips
	Engine Generator		1	Truck Round Trips
	Supplies		24	Truck Round Trips
4.5.5	Building / Structures			
	Slope Shelter (20 x 20)		400	SF
4.5.6	Labor			
	Equipment Operators		8	
	Truck Drivers		2	
	Laborers		20	
	Electricians		10	
	Engineers		1	
	Management		10	

Building for Loacalizer Equipment, Switch Gear, Computer Equipment

Note

Truck trips are expected between 6:00 am - 6:00 pm

Vital Statistics

Mulberry Street Relocation

5.5.1	Area of Pavement		9,600	SF
	Area of Disturbance		20,000	SF
5.5.2	Realignment Length		400	FT
	Duration of Construction		220	Working Days
5.5.3	Potential Equipment			
	Type	Quantity		
5.5.4	Excavators	2	150	Days
	Site Trucks	2	150	Days
	Backhoes	1	220	Days
	Loaders	1	30	Days
	Pavers	1	5	Days
	Rollers	2	5	Days
5.5.5	Traffic			
	Common Earth Materials		50	Truck Round Trips
	Supplies		12	Truck Round Trips
5.5.6	Labor			
	Equipment Operators		7	
	Truck Drivers		2	
	Laborers		18	
	Electricians		3	
	Engineers		1	
	Management		5	

Note

Truck trips are expected between 6:00 am - 6:00 pm

VHB Vanasse Hangen Brustlin, Inc.

JACOBS

PROJECT PHASING

Description	Phase	Comments	Start	Finish
Jughandle taxiway	A	Approximately 210 Working Days	1-Jun-16	17-Aug-17
Approach light system	C	To run concurrently with Phase A & B approximately 239 Working Days	28-Sep-16	9-May-17
Glide Slope Antenna	B	To run concurrently with Phase C approximately 100 Working Days	1-Jun-16	20-Oct-16
Localizer Platform	B	To run concurrently with Phase C approximately 132 Working Days	1-Jun-16	7-Dec-16
Mulberry Street Relocation	C	To run concurrently with Phase A & B approximately 220 Working Days	1-Jun-16	12-Apr-17

Phase	Duration	Comments
A	225 Working Days	To run concurrently with Phases B & C
B	150 Working Days	To run concurrently with Phases A & C
C	250 Working Days	To run concurrently with Phases A & B
	309 Working Days	**Total Construction Duration**

VHB Vanasse Hangen Brustlin, Inc.

JACOBS

Emission Calculations

Construction Emissions: Worcester Airport Improvements

Phase	$PM_{2.5}$ (Short Tons/Year)	CO (Short Tons/Year)	NO_x (Short Tons/Year)	VOC (Short Tons/Year)
Approach Light System	0.003	0.015	0.032	0.011
Glide Slope Antenna	0.001	0.007	0.013	0.006
Jug Handle	0.010	0.053	0.114	0.032
Localizer	0.002	0.010	0.021	0.008
Mulberry St	0.004	0.021	0.042	0.018
Total	0.02	0.09	0.19	0.06

Construction Emissions: Worcester Airport Improvements

Phase: Approach Light System

Equipment Name	Units	% Day Use	% Year Use	Annual Equipment Usage (days)	$PM_{2.5}$ Emission Factor (lb/day)	$PM_{2.5}$ Annual Emissions (Short Tons/yr)	CO Emission Factor (lb/day)	CO Annual Emissions (Short Tons/yr)	NO_x Emission Factor (lb/day)	NO_x Annual Emissions (Short Tons/yr)	VOC Emission Factor (lb/day)	VOC Annual Emissions (Short Tons/yr)
Backhoe	1	40%	33%	16.0	0.058	0.000	0.296	0.002	0.507	0.004	0.834	0.007
Crane (mobile or stationary)	1	20%	8%	2.0	0.035	0.000	0.183	0.000	0.826	0.001	0.087	0.000
Dump Truck	2	40%	33%	31.9	0.102	0.002	0.543	0.009	0.941	0.015	0.152	0.002
Excavator	2	40%	33%	31.9	0.033	0.001	0.203	0.003	0.672	0.011	0.097	0.002
Paver	1	50%	1%	0.8	0.076	0.000	0.334	0.000	0.778	0.000	0.088	0.000
Roller	1	20%	12%	3.0	0.060	0.000	0.264	0.000	0.621	0.001	0.068	0.000

Construction Emissions: Worcester Airport Improvements

Phase: Glide Slope Antenna

Equipment Name	Units	% Day Use	% Year Use	Annual Equipment Usage (days)	$PM_{2.5}$ Emission Factor (lb/day)	$PM_{2.5}$ Annual Emissions (Short Tons/yr)	CO Emission Factor (lb/day)	CO Annual Emissions (Short Tons/yr)	NO_x Emission Factor (lb/day)	NO_x Annual Emissions (Short Tons/yr)	VOC Emission Factor (lb/day)	VOC Annual Emissions (Short Tons/yr)
Backhoe	1	40%	27%	9.5	0.058	0.000	0.296	0.001	0.507	0.002	0.834	0.004
Crane (mobile or stationary)	1	20%	5%	0.9	0.035	0.000	0.183	0.000	0.826	0.000	0.087	0.000
Dozer	1	40%	5%	1.9	0.046	0.000	0.264	0.000	0.804	0.001	0.102	0.000
Dump Truck	2	40%	16%	11.4	0.102	0.001	0.543	0.003	0.941	0.005	0.152	0.001
Excavator	1	40%	16%	5.7	0.033	0.000	0.203	0.001	0.672	0.002	0.097	0.000
Front End Loader	1	40%	5%	1.9	0.106	0.000	0.582	0.001	1.136	0.001	0.176	0.000
Paver	1	50%	1%	0.6	0.076	0.000	0.334	0.000	0.778	0.000	0.088	0.000
Roller	4	20%	5%	3.8	0.060	0.000	0.264	0.001	0.621	0.001	0.068	0.000

Construction Emissions: Worcester Airport Improvements

Phase: Jug Handle

Equipment Name	Units	% Day Use	% Year Use	Annual Equipment Usage (days)	$PM_{2.5}$ Emission Factor (lb/day)	$PM_{2.5}$ Annual Emissions (Short Tons/yr)	CO Emission Factor (lb/day)	CO Annual Emissions (Short Tons/yr)	NO_x Emission Factor (lb/day)	NO_x Annual Emissions (Short Tons/yr)	VOC Emission Factor (lb/day)	VOC Annual Emissions (Short Tons/yr)
Backhoe	2	40%	58%	39.9	0.058	0.001	0.296	0.006	0.507	0.010	0.834	0.017
Crane (mobile or stationary)	1	20%	12%	2.1	0.035	0.000	0.183	0.000	0.826	0.001	0.087	0.000
Dozer	2	40%	48%	33.2	0.046	0.001	0.264	0.004	0.804	0.013	0.102	0.002
Dump Truck	5	40%	48%	83.1	0.102	0.004	0.543	0.023	0.941	0.039	0.152	0.006
Excavator	4	40%	58%	79.8	0.033	0.001	0.203	0.008	0.672	0.027	0.097	0.004
Front End Loader	2	40%	58%	39.9	0.106	0.002	0.582	0.012	1.136	0.023	0.176	0.004
Paver	1	50%	3%	1.2	0.076	0.000	0.334	0.000	0.778	0.000	0.088	0.000
Roller	4	20%	3%	1.9	0.060	0.000	0.264	0.000	0.621	0.001	0.068	0.000

Construction Emissions: Worcester Airport Improvements

Phase: Localizer

Equipment Name	Units	% Day Use	% Year Use	Annual Equipment Usage (days)	$PM_{2.5}$ Emission Factor (lb/day)	$PM_{2.5}$ Annual Emissions (Short Tons/yr)	CO Emission Factor (lb/day)	CO Annual Emissions (Short Tons/yr)	NO_x Emission Factor (lb/day)	NO_x Annual Emissions (Short Tons/yr)	VOC Emission Factor (lb/day)	VOC Annual Emissions (Short Tons/yr)
Backhoe	1	40%	36%	12.5	0.058	0.000	0.296	0.002	0.507	0.003	0.834	0.005
Crane (mobile or stationary)	1	20%	8%	1.4	0.035	0.000	0.183	0.000	0.826	0.001	0.087	0.000
Dump Truck	2	40%	28%	19.3	0.102	0.001	0.543	0.005	0.941	0.009	0.152	0.001
Excavator	2	40%	28%	19.3	0.033	0.000	0.203	0.002	0.672	0.006	0.097	0.001
Front End Loader	1	40%	8%	2.9	0.106	0.000	0.582	0.001	1.136	0.002	0.176	0.000
Paver	1	50%	1%	0.6	0.076	0.000	0.334	0.000	0.778	0.000	0.088	0.000
Roller	2	20%	1%	0.5	0.060	0.000	0.264	0.000	0.621	0.000	0.068	0.000

Construction Emissions: Worcester Airport Improvements

Phase: Mulberry St

Equipment Name	Units	% Day Use	% Year Use	Annual Equipment Usage (days)	$PM_{2.5}$ Emission Factor (lb/day)	$PM_{2.5}$ Annual Emissions (Short Tons/yr)	CO Emission Factor (lb/day)	CO Annual Emissions (Short Tons/yr)	NO_x Emission Factor (lb/day)	NO_x Annual Emissions (Short Tons/yr)	VOC Emission Factor (lb/day)	VOC Annual Emissions (Short Tons/yr)
Backhoe	1	40%	60%	29.3	0.058	0.001	0.296	0.004	0.507	0.007	0.834	0.012
Dump Truck	2	40%	41%	39.9	0.102	0.002	0.543	0.011	0.941	0.019	0.152	0.003
Excavator	2	40%	41%	39.9	0.033	0.001	0.203	0.004	0.672	0.013	0.097	0.002
Front End Loader	1	40%	8%	4.0	0.106	0.000	0.582	0.001	1.136	0.002	0.176	0.000
Paver	1	50%	1%	0.8	0.076	0.000	0.334	0.000	0.778	0.000	0.088	0.000
Roller	2	20%	1%	0.7	0.060	0.000	0.264	0.000	0.621	0.000	0.068	0.000

Equipment Emission Factors Calculated Using NonRoad 2008 (Within MOVES2014)						
Equipment Name	**Avg Horsepower**	**PM2.5 EF (g/hp-hr)**	**CO EF (g/hp-hr)**	**NOX EF (g/hp-hr)**	**THC EF(g/hp-hr)**	**VOC EF (g/hp-hr)**
Backhoe	125	0.008706323	0.044731803	0.0766768	0.119662539	0.126004654
Crane (mobile or stationary)	240	0.00278603	0.014427517	0.065067	0.0065119	0.006857031
Dozer	225	0.00388614	0.022195688	0.067560347	0.00815855	0.008590953
Dump Truck	175	0.011066301	0.058603854	0.101557505	0.01563195	0.016460443
Excavator	225	0.002807228	0.017080429	0.056411427	0.007698252	0.008106259
Front End Loader	300	0.006672792	0.036632583	0.071527561	0.010517415	0.011074838
Paver	170	0.008460104	0.037166503	0.086517538	0.009339469	0.009834461
Roller	125	0.009103101	0.03987823	0.093819348	0.009725347	0.010240791

Appendix C
Air Quality/Noise Context

- HMMH Memorandum August 22, 2014

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TECHNICAL MEMORANDUM

Subject:	Worcester Regional Airport - Hangar Development Noise and Air Quality Analysis
Prepared for:	Stewart Dalzell, Deputy Director Shailesh Gongal, C.M., Senior Airport Planner Massport, Economic Planning and Development Department Logan International Airport, 1 Harborside Drive, Boston, MA 02128
Prepared by:	Robert C. Mentzer Jr., Phil DeVita, Kurt M. Hellauer, HMMH
Date:	August 22, 2014
Reference:	HMMH Project Number 304090.006

1. INTRODUCTION AND TASK DESCRIPTION

The Massachusetts Port Authority (Massport), operator of the Worcester Regional Airport (ORH) requested that Harris Miller Miller & Hanson Inc. (HMMH) perform an analysis of potential noise and air quality impacts that would arise from implementation of Phase I of the Worcester Regional Airport Corporate/General Aviation Master Plan (the "CGA Master Plan"), specifically construction of a maintenance hangar and ancillary facilities on the north side of the airfield (Figure 1). Massport indicates that there are no current plans or schedule for additional hangar development at the airport and therefore additional phases of the CGA Master Plan are not reasonably foreseeable. Accordingly, this analysis only addresses the current development proposal.

The CGA Master Plan is based on the general recommendations of the 2008 Worcester Regional Airport Master Plan Study (the "2008 Master Plan") and developed to a conceptual plan level to provide a framework for the highest and best use of airport land and to take advantage of medium and long-term demand driven development opportunities compatible with general aviation. The 2008 Master Plan was funded by the Federal Aviation Administration (the "FAA") and the Massachusetts Aeronautics Commission (the "MAC") and was prepared in coordination with the FAA, MAC, the City of Worcester and surrounding towns and communities.

This memorandum provides the results of our analyses based on the facility sizes and locations (footprints) as shown on Figure 1 which is a graphic extracted from the CGA Master Plan prepared by Massport.

Section 2 presents our primary conclusions concerning the project with respect to potential changes in the noise and air quality setting, Section 3 provides a brief description of the elements of the project that are assumed to comprise the Proposed Action, and the remaining sections provide draft language for use by Massport in preparing an Environmental Assessment under the National Environmental Policy Act of 1970 (NEPA).

2. CONCLUSION AND RECOMMENDATIONS

The Proposed Action would not appreciably change the noise or air quality levels at Worcester Regional Airport. Based on the analysis of the potential effects of construction activities and aircraft operations on the current noise setting, no significant impacts would be anticipated. A Federal Aviation Administration (FAA) Area Equivalent Method (AEM) screening analysis was conducted for noise and results in only a 1.2 percent increase of the DNL 65 dB contour if all aircraft using the proposed hangar are new to the airport. Based on FAA guidance, if the AEM screening analysis shows less than a 17 percent increase, it may be concluded that there are no significant impacts on a noise sensitive area and no further noise analysis is warranted. The FAA Emissions and Dispersion Modeling System (EDMS) air quality modeling provides a similar result with no impact on air quality. Therefore mitigation for any noise or air quality impacts would not be required.

Figure 1: Worcester Regional Airport Phase 1 - Maintenance Hangar Development (Draft)

Source: Massport (February 20, 2014)

3. SUMMARY OF ALTERNATIVES EVALUATED IN DETAIL

3.1 Proposed Action

Under the Proposed Action, the improvements contemplated in the CGA Master Plan would be phased. This technical memorandum examines the potential effects on the noise environment arising from the construction projects identified for Phase I. As noted above, Massport has no current plans or schedule for future phases of the Master Plan. In general, the Phase I projects described below would be located at the end of a decommissioned runway north of Taxiway F and the T-hangar general aviation facility on the airfield (Figure 1). Although portions of this area are paved and have been used for various airport activities, this area is generally undeveloped at this time.

The Phase I improvements shown in Figure 1 are part of a larger conceptual plan for accommodating and servicing corporate and general aviation aircraft at Worcester Regional Airport outlined in the CGA Master Plan. Shown in Figure 2, the CGA Master Plan is essentially a spatial and land use planning exercise designed to prepare the airport to be able to take advantage of medium and long-term demand driven general aviation compatible development opportunities as recommended by the 2008 Master Plan.

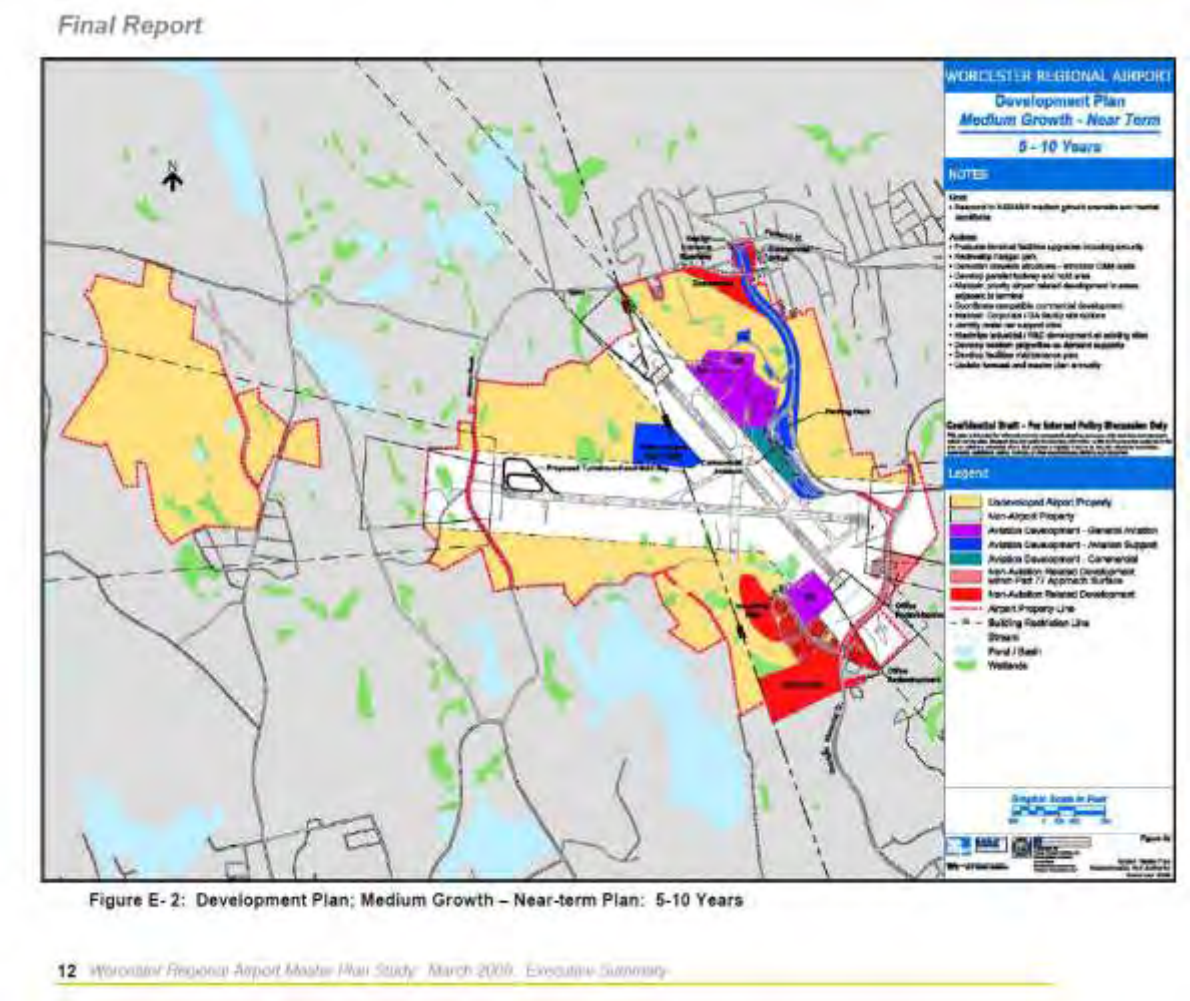
Figure 2: Worcester Regional Airport Corporate/General Aviation Master Plan (Draft)

Source: Massport (February 20, 2014)

Massport indicates that there are no current plans or schedule for additional hangar development as shown in Figure 2 at the airport and therefore additional phases of the CGA Master Plan are not reasonably foreseeable. Accordingly, this analysis only addresses the current development proposal shown in Figure 1

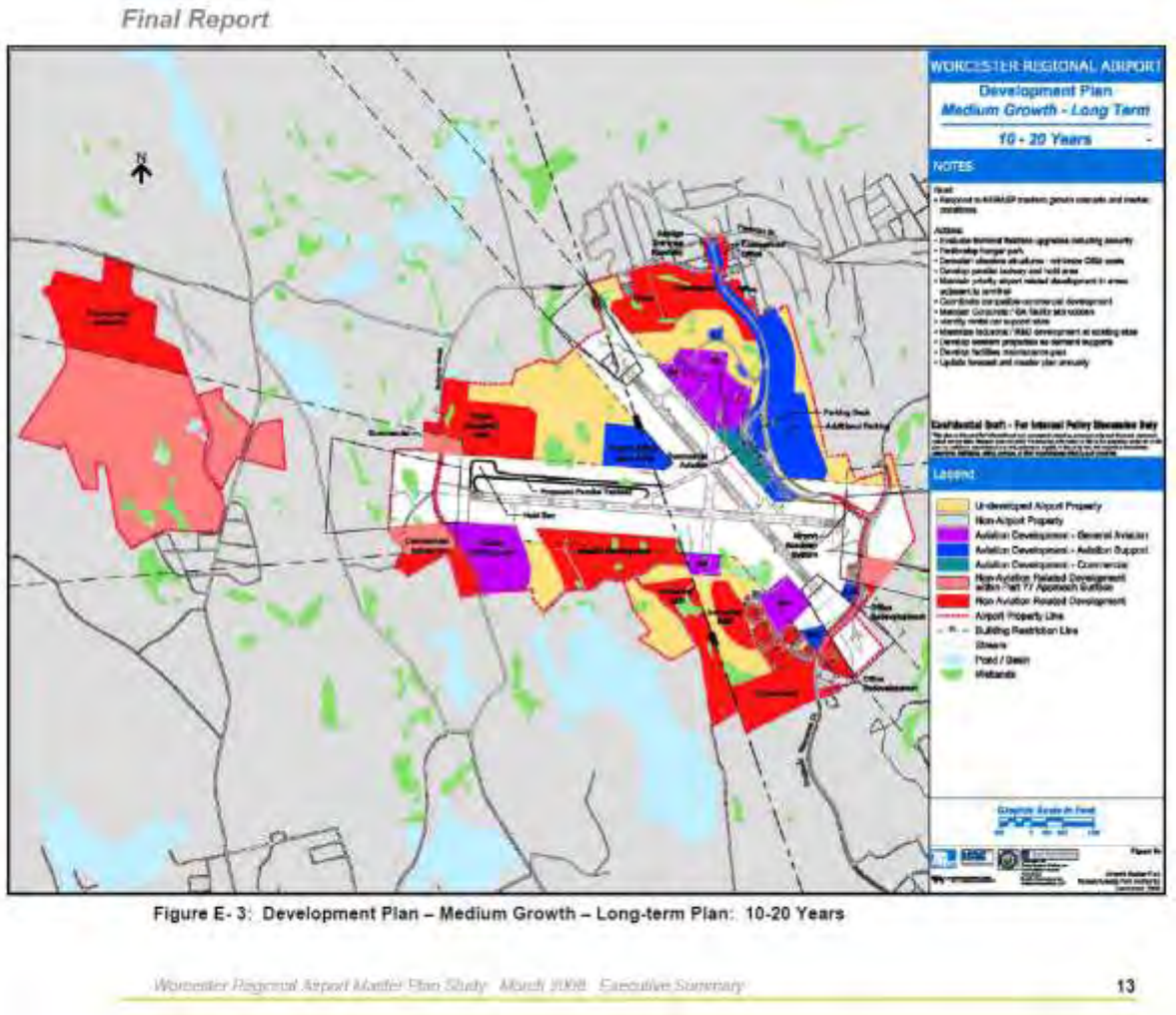
Figure 3 below displays the near term (5-10 years) development plan for medium growth from the 2008 Master Plan and Figure 4 displays the long term (10-20 years) development plan for medium growth from the 2008 Master Plan. As shown, the 2008 Master Plan had recommended that the area north of the Terminal Building was suitable for supporting corporate/general aviation development.

Figure 3: 2008 Master Plan - Development Plan: Medium Growth - Near Term (5-10 years)



Source: Worcester Regional Airport Master Plan Study – March 2008

Figure 4: 2008 Master Plan - Development Plan: Medium Growth - Long Term (10-20 years)



Source: Worcester Regional Airport Master Plan Study – March 2008

As shown in Figure 1, the primary elements of the Proposed Action include:

- New Maintenance Hangar including related office/employee space (40 - 50,000 SF)
- Relocated/extended taxi lane
- Infrastructure improvements (electrical, telecom, storm water, sewer, gas, etc..)
- Landside access improvements
- Relocation of existing aircraft tie-down area

If constructed, potential new activities occurring in this portion of the airfield would be aircraft maintenance operations occurring within a new hangar. The anticipated aircraft undergoing such maintenance would vary but may include aircraft ranging in size from the Boeing 737 types (twin engine, narrow body); Airbus A-319s, -320s or -321s types (twin engine, narrow body); Embraer 190s or 195s (twin engine, regional jet), or the Gulfstream 500 (twin engine, business jet).

In addition, taxiing to and from the hangar or occasional maintenance run-up operations by these same aircraft types may occur on this portion of the airfield. Similar activity from corporate jets and non-jet aircraft occurs south of this area near the Rectrix Aviation Fixed Based Operator (FBO) facility. The frequency of aircraft movement and operational activities (taxiing and engine run-up operations) to, from, or in the vicinity of the proposed hangar area are estimated to be at a rate of 2 to 4 additional aircraft per week, each of those possibly leaving and returning to the hangar area once or twice during their required maintenance stay.

The Proposed Action is separate from and in addition to the on-going Category III Instrument Landing System (CAT III ILS)/Taxiway project and is also in addition to a new 22,000 square foot Rectrix Aviation hangar and associated ramp area that is currently under construction. Massport is currently preparing NEPA documentation for the CAT III ILS and Taxiway project and previously completed NEPA documentation for the new Rectrix Aviation hangar. The Proposed Action has separate utility from and is not connected or related to those two actions, apart from their presence and inclusion in the 2008 Master Plan.

To summarize, the Proposed Action depicted in Figure 1 would consist of:

- A 40 - 50,000 SF Hangar
- Construction of 1,200-foot long by 50-foot wide pavement for Group III taxi-lane (most of which is paved and already used for aircraft movements)
- Relocation of existing aircraft tie-down to an unused paved area
- Airside (Vehicular) Access Gate Relocation
- Landside Roadway Upgrades
- Associated Utility Infrastructure Installation/Modification

3.2 No Action

Under the No Action alternative, none of these projects contemplated in Phase 1 would be constructed and the Proposed Action would not be implemented. However, the ongoing construction of the CAT III ILS/Taxiway project and the Rectrix hangar and ramp space would continue.

4. AFFECTED ENVIRONMENT (EXISTING CONDITIONS)

4.1 Noise

The most recent noise contours prepared for Worcester Regional Airport were developed for the Worcester Regional Airport Category II/III Feasibility Study in 2003 (Figure 3). Although this information is dated, it does provide general information about the existing noise levels on and in the vicinity of the airfield. The contours developed for that study were developed using the FAA Integrated Noise Model (INM) Version 6.0c for the 2002 calendar year (CY). The operations modeled for CY2002 were 53,504 which are significantly higher operations than reported over the prior 12 months during 2013/2014 used for this analysis (31,235 annual operations)[1]. The 2002 contours show that the project site on the north side of the airfield as well as adjacent and nearby properties in this general area are well below the annual average 65 decibel (dB) day-night sound

[1] FAA OPSNET data for June 2013 – May 2014

levels (DNL). The land use within the DNL 65 dB contour is primarily on airport property or undeveloped land.

Figure 5: 2002 Day Night Average Sound Level Contours for Worcester Regional Airport

Source: Worcester Regional CAT II & III Feasibility Study

4.2 Air Quality

Pursuant to the Federal Clean Air Act of 1970, as amended (CAA), the US Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for major pollutants, called "criteria pollutants." Currently there are six criteria pollutants: ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter, and lead (Pb). Particulate matter (PM) includes particles with a diameter less than 10 micrometers (PM10) and with a diameter less than 2.5 micrometers (PM2.5).

The standards apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area meets or is better than the national standard, it is called an attainment/unclassifiable area. Areas that do not meet the national standard are called non-attainment areas. Once a non-attainment area meets the standards and additional re-designation requirements in the CAA, the EPA re-designates the area as a "maintenance area."

Each state is required to draft a state implementation plan (SIP) to further improve the air quality in non-attainment areas and to maintain the air quality in attainment and maintenance areas. The plan outlines the measures that the state will take in order to improve air quality.

Table 1 presents the EPA-designated attainment status for Worcester area where ORH is situated. The EPA has classified the Eastern Massachusetts (Boston-Lawrence-Worcester) as non-attainment

for the 1997 eight-hour ozone standard, and Worcester County maintenance area for CO, and attainment area for the remaining pollutants. Table 1 also presents the corresponding de minimis levels associated with each non-attainment and maintenance area which are the pollutants of concern for this study. Under FAA Order 1050.1E, significant air quality impacts would occur if an action would exceed one or more of the NAAQS for any of the time periods analyzed.[2] Section 176(c) of the Clean Air Act (CAA) requires that Federal actions conform to the appropriate SIP in order to attain the CAA's air quality goals. Section 176(c) states: "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an implementation plan." A conformity determination is not required if the emissions caused by a Federal action would be less than *de minimis* levels established in regulations issued by EPA.[3]

Table 1 EPA Designated Attainment Status and Affiliated *De minimis* Levels

Airport	Pollutant	Classification	*De minimis* Levels (tons per year)
Worcester Regional Airport	8-hour Ozone – 2008 Standard	Attainment	N/A
	8-hour Ozone-1997 Standard	Non-attainment	NOx 100 VOC 50
	CO	Maintenance	100
	SO2, NOx, PM_{10}/$PM_{2.5}$, and Lead	Attainment	N/A

Notes:
1. *de minimis* levels from U.S. EPA, General Conformity de minimis levels [40 CFR Section 93.153(b) (1) (2)]
2. All other attainment classifications from US EPA Green book [http://www.epa.gov/air/oaqps/greenbk/index.html]

5. ENVIRONMENTAL CONSEQUENCES

5.1 Noise

5.1.1 Aircraft Operations

The Area Equivalent Method (AEM) is a screening procedure used to simplify the assessment step in determining the need for further analysis with the Integrated Noise Model (INM) as part of Environmental Assessments and Impact Statements (EA/EIS) and Federal Aviation Regulations (FAR) Part 150 studies. AEM is a mathematical procedure that provides an estimated change in noise contour area for an airport given the types of aircraft and the number of operations for each aircraft. The purpose of the AEM is to show change in airport annual average day DNL noise contour area relative to a change in aircraft mix and number of operations. The latest version of the AEM (Version 7.0c) was used for this analysis.

The AEM produces noise contour areas (in square miles) for the DNL 65 dB noise level and the purpose of AEM is to screen for significant impact within the DNL 65 dB contour area. The AEM is used to develop insight into the potential increase or decrease of noise resulting from a change in

[2] FAA Order 1050.1E, Chg.1, App. A, sec. 2.3.
[3] *Code of Federal Regulations,* title 40, sec. 93.153(b).

aircraft operations. In their report dated August 1992, the Federal Interagency Committee on Noise (FICON) recommended the use of AEM as a screening tool to determine the need for additional environmental noise analysis. FICON, which was composed of representatives from several Federal Government agencies, was chartered to review specific elements of federal agency procedures for the assessment of airport noise impacts and to make appropriate recommendations. In their report, FICON recommend the use of screening to determine the extent of noise analysis required. FICON also established an increase of 17 percent or more in contour area as the threshold of significance for AEM within a DNL 65 dB contour. A 17 percent increase indicates that the proposed action could result in a DNL 1.5 dB or greater increase at a noise sensitive area and that further analysis is required. Conversely, if the screening process shows less than a 17 percent increase, it may be concluded that there are no significant impacts on a noise sensitive area.

The AEM model input consists of aircraft fleet mix data and annual day and night operations. The aircraft fleet mix and day night breakdown was developed from the FAA Traffic Flow Management System Counts for June 2013 through May 2014 and data provided by Massport. These operations were then scaled to the reported totals from the FAA Operational Network tower counts for the same 12 month period.

It is likely that aircraft already using the airport (therefore included in the baseline operations) would use the proposed hangar. However, for the purpose of this analysis we have assumed a worst case condition using an Airbus A320-232 which would be new to the airport. Under this condition, the annual operations would increase by 416 operations (or 208 landing- takeoff operations (LTO's)), assuming the new operations would equal to four landings and four takeoffs per week. As noted above, this is compared to the 2013/14 level of over 31,000 annual operations and over 53,000 annual operations in 2002.

The Area Equivalent Method noise modeling for the Proposed Action project site indicates that there would be a very minor increase in the DNL 65 dB contour (1.2 percent). The 1.2 percent increase is well below the 17 percent threshold increase in contour area and therefore does not result in a significant impact due to proposed action. Table 2 presents the increase in size of the DNL 65 dB contour and the percent change in area due to the proposed action.

Table 2 Worcester Regional Airport Phase 1 Hangar AEM Results

DNL (dBA)	No Action Area (Sq. Mi.)	Proposed Action Area (Sq. Mi.)	Change in Area (Sq. Mi.)
65	0.3	0.3	1.2%
60	0.7	0.7	1.4%

Source: AEM Results, HMMH 2014

Occasional maintenance runups will occur on the ramp associated with the proposed hangar, these will be short in duration and conducted primarily during the day. There are no noise-sensitive areas immediately adjacent to the project site. The closest residential area is located 1,100 feet to the north/northeast of the project site and is separated from the project site by a roadway, a forested area and grade differential between the elevated heights of the airfield compared to the residences. The location of the building will also act as a sound barrier and will help to shield the closest residences to the north and northeast.

5.1.2 Construction Activities

Overall, the construction phase of this project would be expected to create minor and temporary impacts in the immediate project area. These impacts would be short-term in nature, lasting for the

duration of construction activities. Temporary contractor staging areas would be required throughout the construction process to store and assemble construction equipment and materials. Noise from the operation of construction equipment would be expected, but noise impacts would be generally localized to the vicinity of the construction site. Earthmoving equipment, pavers, and other construction equipment and vehicles will create localized increases in noise levels. These temporary noise impacts should not disrupt normal airport operations.

5.1.3 Mitigation Measures

The Proposed Action is not a capacity enhancement project and would not appreciably change the noise levels at Worcester Regional Airport. Based on the analysis of the potential effects of aircraft operations and temporary construction activities on the current noise setting, no significant impacts would be anticipated. Therefore mitigation would not be required. However, construction would be limited to typical daytime hours (Monday through Friday, 7am to 7pm), unless exigent schedule demands requires work on weekends.

Other typical construction-phase noise mitigation measures would be implemented such as:

- Maintain mufflers on construction equipment
- Keep truck idling to a minimum in accordance with MA anti-idling regulations
- Fit any air-powered equipment with pneumatic exhaust silencers
- Limit nighttime construction

It is recommended that any maintenance runups be conducted with the aircraft nose facing to the north or northeast whenever possible to reduce noise levels off airport property.

5.1.4 No Action Alternative

Under the No Action alternative, implementation of the Phase I airfield improvements would not occur. Accordingly, there would be no change to the affected environment described in Section 4 above. No mitigation measures would be required or proposed.

5.2 Air Quality

The air quality analysis estimated net changes in emissions due to the proposed hangar and associated improvements at ORH. Emissions associated with each aircraft operation, and associated ground support operations and on-road surface vehicle trips were estimated using the latest FAA's EDMS model.

The FAA has designated the EDMS to be the "preferred" guideline model for use in civil airports and military air bases. This analysis used the most up-to-date version, 5.1.4.1, which was released in August 2013. For on-road vehicle emissions factors, EDMS 5.1.4.1 internally uses MOBILE6.2. MOBILE6.2 has recently been replaced by the EPA MOVES model for the computation of emission factors. To date, MOVES has not been incorporated into EDMS and the on-road emissions are expected to be minimal, therefore, for this screening analysis the internal emission factors provided by MOBILE6.2 in EDMS were used.

EDMS uses EPA databases, methodology, and algorithms to calculate emissions for CO, PM_{10}, and $PM_{2.5}$, various sulfur oxides (SOx), VOCs, and oxides of nitrogen (NOx) from aircraft, ground support equipment, parking lots, roadways, and stationary sources.

5.2.1 Aircraft Operations

Although the Airbus A320-232 is not a regular user of ORH at this time, existing airfield facilities can easily accommodate regular A-320 operations. The A-320 is one of two aircraft in the JetBlue fleet and a likely candidate for increasing future JetBlue passenger capacity at ORH. Currently, the Embraer 190 is the JetBlue aircraft in use for air carrier service at ORH. The Embraer 190 with the CF34-10E engine has slightly lower emissions compared to the A320-232, therefore, the A320-232 was assumed for this analysis since it is worst case.

Projected operations data (Table 3) were input into EDMS to estimate the annual emissions associated with each aircraft operation. EDMS calculates aircraft emissions affiliated with taxi-out, takeoff, climb-out, approach, landing, and taxi-in for each operation. Emissions are estimated using an internal database of emissions factors based on aircraft type, associated engine type, and time spent in each above of the mentioned modes. For this analysis, EDMS default factors were used for each mode to calculate emissions associated with each operation.

Table 3 New Annual Operations (Landing and Takeoffs) Predicted at ORH due to Proposed Action

Aircraft Name	EDMS Database Equivalents		Forecast Operations (LTO's)
	Aircraft Type	Engine	
A320-232	A320-232	V2527-A5	208

Source: Massport, HMMH Analysis
Note: 1 LTO = 2 Operations (1 Landing & 1 Takeoff)

5.2.2 Auxiliary Power Unit and Ground Support Equipment

In addition to aircraft emissions, EDMS also estimates emissions from the ancillary equipment associated with aircraft operations; e.g., auxiliary power units (APUs) that provide electrical power to the aircraft while the aircraft's propulsion engines are not operating, and ground support equipment (GSE), such as luggage tractors, fuel trucks, catering trucks, lavatory trucks, service trucks, and ground power units. It is likely that several of the GSE types would not be used at the maintenance hangar but they were left in the analysis for completeness and to ensure a conservative analysis.

5.2.3 On-road Vehicle Operations

Indirect emissions associated with employee vehicle miles traveling to and from the airport hangar on the access road were also estimated. Conservatively, it was assumed that the hangar would operate 24 hours per day, seven days per week with multiple shifts. Assuming 30 vehicle trips (one-way) per shift, and three shifts per day during a seven day work week; a total of 32,760 one way trips would be conducted per year. The distance traveled was based on the distance a vehicle would travel within the ORH property boundary to and from the parking area (i.e. the distance from Airport Drive to the hangar parking).

Table 4 presents the distance traveled along with the annual traffic volume associated with the two aircraft types.

Table 4 Travel Distance and Total Number of Trips per year at ORH

Airport	One-Way Distance (feet)	Total Number of Trips Per Year
ORH	2388	32,760

**Assumes 30 vehicle trips per shift per day (one-way) to and from the Hangar.

EDMS estimates vehicle emissions using EPA MOBILE6.2 emission factors which are incorporated in the model for various vehicle speeds using default fleet mixes. For this analysis, a vehicle speed of 30 miles per hour was assumed. The total roadway emissions are then internally estimated in EDMS by multiplying the MOBILE6.2 emission factor for each pollutant at 30 miles per hour by the total round trip distance traveled and annual volumes.

The new parking lot associated with the hangar is also evaluated based on the number of vehicle trips per day assuming they all park for some length of time.

5.2.4 Air Quality Results

Table 5 presents the net emissions change (e.g. the addition of the A320-232 operations). The table presents both the pollutants of concern and the pollutants in attainment.

Table 5 includes the corresponding *de minimis* levels for the pollutants of concern. The analysis shows that the net emission changes from activities associated with the proposed action are well below the *de minimis* levels for each pollutant. Therefore, under the Clean Air Act and EPA General Conformity regulations, the net change in emissions associated with the proposed replacement aircraft are considered insignificant, and no further analysis is required.

Table 5 Net Change due to Proposed Hangar Development (tons/year)

Source	CO	VOC	NOx	SOx	PM-10	PM-2.5
Aircraft	1.26	0.08	2.00	0.22	0.04	0.04
GSE	1.15	0.04	0.12	0.00	0.00	0.00
APUs	0.02	0.00	0.09	0.01	0.01	0.01
Parking	0.18	0.02	0.01	0.00	0.00	0.00
Roadways	0.29	0.02	0.02	0.00	0.00	0.00
Total	2.90	0.15	2.25	0.23	0.05	0.050
De minimis	100	50	100	N/A	N/A	N/A

Source: HMMH 2014

The Proposed Action will conform to the SIP and will not cause or contribute to any new NAAQS violations or delay the timely attainment of a NAAQS.

5.2.5 Construction

Construction of the Project will result in a temporary increase in emissions of some pollutants (e.g. $PM_{10}/PM_{2.5}$ and nitrogen oxides) due to the use of construction equipment powered by diesel fuel along with fugitive emissions from earth-moving equipment. However, emissions from construction activities are estimated to be temporary and are not expected to be a significant source of air quality emissions, therefore, NAAQS violations would not be anticipated. Massport requires tenants to commit to the reduction of construction-related diesel emissions through the Clean Air Construction Initiative and all tenant projects must meet this commitment. Contractors are required to retrofit their heavy equipment with advanced pollution control devices such as oxidation catalysts and low particulate filters during construction of all projects on Massport property.

To minimize the generation of dust during dry and windy conditions, water will be applied to areas of exposed soil to prevent wind-borne transport of fine grained sediment.

5.2.6 Mitigation Measures

The Proposed Action is not a capacity project and would not appreciably increase the air quality levels at Worcester Regional Airport. Based on the analysis of the potential effects of construction activities and aircraft operations on the current setting, no violation of the NAAQS would occur or any changes to the SIP are necessary. Therefore mitigation would not be required. However, construction would be limited to typical daytime hours (Monday through Friday, 7am to 7pm), unless exigent schedule demands requires work on weekends. Steps should be taken to reduce fugitive dust emissions during construction activities.

5.2.7 No Action Alternative

Under the No Action alternative, implementation of the Phase I airfield improvements would not occur. Accordingly, there would be no change to the affected environment described in Section 4 above. No mitigation measures would be required or proposed.

APPENDIX A. AEM INPUT AND RESULTS

Federal Aviation Administration
Office of Environment and Energy
www.faa.gov/about/office_org/headquarters_offices/apl/research/models/aem_model/

Area Equivalent Method (AEM) Version 7.0c

Airport Name/Code:	ORH

DNL (dBA)	Baseline Area (Sq. Mi.)	Alternative Area (Sq. Mi.)	Change in Area (Sq. Mi.)
65	0.3	0.3	1.2%
60	0.7	0.7	1.4%
55	1.7	1.7	1.6%
50	4.0	4.1	1.7%

	No Action Case Annual Average Day		Proposed Action Case Annual Average Day	
Aircraft Type	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
74720B	0.02	0.00	0.02	0.00
A319-131	1.20	0.20	1.20	0.20
A320-232			0.57	
BEC58P	3.44	0.19	3.44	0.19
C130	0.03	0.01	0.03	0.01
CIT3	0.26	0.01	0.26	0.01
CL600	0.85	0.05	0.85	0.05
CL601	0.44	0.03	0.44	0.03
CNA172	3.46	0.18	3.46	0.18
CNA206	1.37	0.09	1.37	0.09
CNA182	1.47	0.08	1.47	0.08
CNA208	1.16	0.07	1.16	0.07
CNA441	1.24	0.07	1.24	0.07
CNA500	0.73	0.04	0.73	0.04
CNA510	0.29	0.02	0.29	0.02
CNA525C	0.63	0.04	0.63	0.04
CNA55B	0.33	0.02	0.33	0.02
CNA560E	0.40	0.04	0.40	0.04
CNA560XL	0.64	0.06	0.64	0.06
CNA680	0.96	0.06	0.96	0.06
CNA750	0.15	0.02	0.15	0.02
DHC6	0.01	0.00	0.01	0.00
DO228	2.96	0.15	2.96	0.15

ECLIPSE500	0.07	0.00	0.07	0.00
EMB145	0.05	0.00	0.05	0.00
F10062	0.95	0.05	0.95	0.05
GASEPF	0.45	0.02	0.45	0.02
GASEPV	8.40	0.44	8.40	0.44
GIIB	0.08	0.00	0.08	0.00
GIV	0.64	0.03	0.64	0.03
GV	0.65	0.03	0.65	0.03
IA1125	0.53	0.03	0.53	0.03
LEAR25	0.17	0.01	0.17	0.01
LEAR35	2.74	0.19	2.74	0.19
MU3001	0.39	0.03	0.39	0.03
PA28	2.28	0.12	2.28	0.12
PA30	0.04	0.00	0.04	0.00
PA31	0.36	0.02	0.36	0.02
PA42	0.06	0.00	0.06	0.00
SF340	0.25	0.07	0.25	0.07
F16A	0.03	0.01	0.03	0.01
Total LTO's	40.17	2.50	40.74	2.50

Appendix D
Draft EA Public Comments

- Massachusetts Natural Heritage and Endangered Species Program
- Worcester Chamber of Commerce

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

March 3, 2015

Mr. Richard Doucette
Federal Aviation Administration
New England Region
12 New England Executive Park Drive
Burlington, MA 01803

Project Name:	CAT-III Instrument Landing System and Taxiway Project
Proponent:	Worcester Regional Airport
Location:	375 Airport Drive, WORCESTER
Document Reviewed:	Environmental Assessment
Project Description:	Construction of a partial jug-handle at runway 11 end, upgraded lighting approach, and relocation of glide slope antenna
NHESP Tracking No.:	14-32906

Dear Mr. Doucette:

The Natural Heritage & Endangered Species Program ("NHESP") of the Massachusetts Division of Fisheries & Wildlife ("Division") has reviewed the Environmental Assessment (dated February 2015, the "EA") for the proposed CAT-III Instrument Landing System and Taxiway Project at the Worcester Regional Airport and would like to offer the following comments.

The proposed project is located within *Priority Habitat* as indicated in the 13th Edition of the MA Natural Heritage Atlas and therefore requires review through a direct filing with NHESP for compliance with the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (MESA, 321 CMR 10.00). The proposed project area is mapped for the Grasshopper Sparrow (*Ammodramus savannarum*), a grassland bird species listed as "Threatened" pursuant to the MESA.

Based on a review of the information provided in the EA, it appears that the proposed project will impact state-listed grassland birds and their habitats. In particular, work during the grassland bird breeding season (May 1 – August 15) may result in the direct harassment of individual birds. Additionally, the project appears to result in a net loss of available grassland habitat. However, as described in section 4.5.2 of the EA, it may be possible to minimize impacts through the restoration of areas temporarily disturbed during construction. The NHESP looks forward to continued careful coordination with you throughout the MESA review and subsequent permitting process, specifically to identify possible long-term mitigation measures.

We appreciate for the opportunity to comment on the EA. If you have any questions about this letter, please contact Eve Schlüter, Ph.D., Chief of Regulatory Review, at (508) 389-6346. We appreciate the opportunity to comment on this project.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Stewart Dalzell, Massport

WORCESTER REGIONAL
Chamber of Commerce

Recruit | Retain | Incubate

February 26, 2015

Mr. Richard Doucette
Federal Aviation Administration
New England Region
12 New England Executive Park Drive
Burlington, MA 01803

Dear Mr. Doucette,

I am writing today to express my support for the Massachusetts Port Authority (Massport) and their efforts to install a Category III Instrument Landing System (Cat III ILS) at the Worcester Regional Airport.

The Worcester Regional Chamber of Commerce is the largest Chamber of Commerce in New England with approximately 2,500 members from 36 different communities in Southern and Central Massachusetts. The arrival of JetBlue to the Worcester Regional Airport in November of 2013 has contributed to the economic growth and vitality of both the City and the region. In that year, the greater Worcester area saw an estimated $172 million in total economic output by visitors to the region, including $30 million in local spending on car rental, lodging, food and retail.

Massport's Environmental Assessment provides strong evidence for the purpose and need of the proposed upgrades at the Worcester Regional Airport and the report outlines the landing system and taxiway improvements needed to achieve safe, all-weather reliability. While we understand that all construction projects result in some impacts, Massport and their project team have made significant progress in reducing overall environmental impacts compared to the initial concepts shared in early 2014. They have proposed reasonable mitigation programs for wetlands, water quality and habitat impacts and understand the need to protect the area's critical watershed and associated public water supply resources.

It is our belief that these improvements will assist the Worcester Regional Airport in attracting additional carriers to provide service to and from the airport. These additional flights will increase the economic impact of the airport on the community and region. Further, the additional jobs that will be created by adding carriers and service to the Worcester Regional Airport will enhance the economic benefit provided to the region.

It is for these reasons that I offer the support of the Worcester Regional Chamber of Commerce to Massport in their efforts regarding the Cat III ILS. I thank you for your time and consideration of my comments.

Sincerely,

Timothy P. Murray
President and CEO

CC: Thomas P. Glynn, CEO, Massachusetts Port Authority
Joseph M. Petty, Mayor, City of Worcester
Edward M. Augustus, City Manager, City of Worcester
Congressman James P. McGovern, MA 2nd District, United States Congress
Senator Elizabeth A. Warren, United States Senate
Senator Edward J. Markey, United States Senate