Draft Environmental Assessment

for the Instrument Flight Procedures Low-Level Helicopter System (ILHS) to support Helicopter Air Ambulance (HAA) Operations

(ILHS-HAA Project)

April 2023

Prepared by:

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1 Introduction

The National Environmental Policy Act of 1969 (NEPA), [42 United States Code (U.S.C.) § 4321 *et seq.*], requires federal agencies to disclose to decision makers and the interested public a clear, accurate description of the potential environmental impacts that could arise from proposed federal actions. Through NEPA, Congress has directed federal agencies to consider environmental factors in their planning and decision-making processes and to encourage public involvement in decisions that affect the quality of the human environment. As part of the NEPA process, federal agencies are required to consider the environmental effects of a proposed action, reasonable alternatives to the proposed action, and a no action alternative (i.e., analyzing the potential environmental effects of not undertaking the proposed action). The Federal Aviation Administration (FAA) has established a process to ensure compliance with the provisions of NEPA through FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1F).

The Proposed Action, the subject of this Environmental Assessment (EA), is called the Instrument Flight Procedures Low-Level Helicopter System (ILHS) to support Helicopter Air Ambulance (HAA) Operations (ILHS-HAA) Project. The ILHS-HAA Project seeks to optimize helicopter air ambulance operations in the ILHS-HAA Project General Study Area (GSA) by employing advanced navigational technology. **Exhibit 1-1** presents the GSA and is further discussed in later Chapters. The routes designed for the ILHS-HAA Project would be used by helicopter air ambulances operating under Instrument Flight Rules (IFR) at the GSA Airports/Heliports ("the Study Airports/Heliports").[1]

This EA, prepared in accordance with FAA Order 1050.1F, documents the potential effects to the environment that may result from the optimization of Air Traffic Control (ATC) routes at the Study Heliports/Airports. These heliports/airports were selected based on whether they would be directly served by a proposed routing under IFR filed operations. **Table 1-1** provides the airport/heliport, location, and relevant airport details. Heliports consist of a clear and defined landing area only, and thus have no runway or associated information.

Table 1-1 ILHS-HAA Project Study Airports/Heliports

Airport/Heliport Name	FAA Code	Location	Runways[1/]
Airports			
Banks Airport	ME5	Swans Island, Maine	Helipad H1, 10, 28
Bethel Regional Airport	K0B1	Bethel, Maine	14, 32
Newton Field Airport	59B	Jackman, Maine	Helipad H1, 13, 31
Portland International Jetport	KPWM	Portland, Maine	11, 29, 18, 36
Sanford Seacoast Regional Airport	KSFM	Sanford, Maine	7, 25, 14, 32
Stephen A Bean Municipal Airport	K8B0	Rangeley, Maine	14, 32
Vinalhaven Airport[2]	ME55	Vinalhaven, Maine	Helipad H1, NE, SW[2]
Heliports			
AR Gould Hospital Heliport	16ME	Presque Isle, Maine	N/A
Bar Harbor Heliport	22ME	Bar Harbor, Maine	N/A
Blue Hill Memorial Hospital Heliport	ME15	Blue Hill, Maine	N/A
Boston Medical Center Hospital Heliport	0MA4	Boston, Massachusetts	N/A
Bridgton Hospital Heliport	ME37	Bridgton, Maine	N/A
C A Dean Memorial Hospital Heliport	ME49	Greenville, Maine	N/A
Calais Regional Heliport	46ME	Calais, Maine	N/A
CMMC Air Ambulance Landing Site Heliport	ME95	Lewiston, Maine	N/A

1 For the purposes of this document, "heliport" is intended to encompass all non-airport (e.g. those not having a fixed-wing aircraft runway) helicopter-only facilities that may include elevated (e.g. rooftop or other raised pads), ground level, and other prepared and FAA certified surfaces for helicopter landing and takeoff.

Airport/Heliport Name	FAA Code	Location	Runways[1/]
Cranberry Isles Heliport	ME77	Cranberry Isles, Maine	N/A
Down East Community Hospital Heliport	ME52	Machias, Maine	N/A
Eastern Maine Medical Center Heliport	ME02	Bangor, Maine	N/A
Franklin Memorial Hospital Heliport	ME23	Farmington, Maine	N/A
Houlton Regional Hospital Heliport	79ME	Houlton, Maine	N/A
Huggins Hospital Heliport	NH27	Wolfeboro, New Hampshire	N/A
Lincoln Health Miles Campus	45ME	Damariscotta, Maine	N/A
Maine Coast Memorial Heliport	39ME	Ellsworth, Maine	N/A
Maine General Medical Center Waterville Heliport	1ME2	Waterville, Maine	N/A
Maine Medical Center Heliport	68ME	Portland, Maine	N/A
Millinocket Regional Heliport	ME50	Millinocket, Maine	N/A
Monhegan Island Heliport	ME78	Monhegan Island, Maine	N/A
Northern Light Mayo Hospital Heliport	ME43	Dover-Foxcroft, Maine	N/A
Northern Maine Medical Center Heliport	ME48	Fort Kent, Maine	N/A
Penobscot Bay Medical Center Heliport	ME76	Rockport, Maine	N/A
Portsmouth Regional Hospital Heliport	3NH4	Portsmouth, New Hampshire	N/A
PVH Heliport	10ME	Lincoln, Maine	N/A
Rumford Community Hospital Heliport	ME63	Rumford, Maine	N/A
Southern Maine Health Care SMMC Helipad	60ME	Biddeford, Maine	N/A
Southern Maine Health Care/Sanford Heliport	ME87	Sanford, Maine	N/A
Stephens Memorial Hospital Heliport	4ME9	Norway, Maine	N/A
Waldo County General Hospital Heliport	98ME	Belfast, Maine	N/A
Wentworth Douglass Hospital Heliport	NH56	Dover, New Hampshire	N/A
York Hospital Heliport	ME94	York, Maine	N/A

Notes:
1/ Airport runways can be used in both directions, but are named in each direction separately. Runway number is based on the magnetic direction of the runway (e.g., Runway 09 points to 90 degrees, in the east direction). The two numbers on either side always differ by 180 degrees (e.g., If one runway end is labeled 09 (for 90 degrees), the other runway end is labeled 27 (for 270 degrees). If there is more than one runway pointing in the same direction, each runway number includes an 'L,' 'C,' or 'R' at the end. This is based on which side a runway is next to another one in the same direction.
2/ Vinalhaven Airport has a gravel runway that has no markings on the runway ends and are therefore identified by the intercardinal headings flown on arrival to land.

Source: Department of Transportation, Federal Aviation Administration. Chart Supplements. December 12, 2022 (https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/search/; accessed December 12, 2022).
Prepared by: ATAC Corporation, December 2022

This EA includes the following Chapters and appendices:

- **Chapter 1: Introduction.** Chapter 1 provides basic background information on the air traffic system, the Next Generation Air Transportation System (NextGen) program, Performance-Based Navigation (PBN), and information on the ILHS-HAA Project and the Study Airports/Heliports.
- **Chapter 2: Purpose and Need.** Chapter 2 discusses the need (i.e., problem) and purpose (i.e., solution) for airspace and routing optimization in the ILHS-HAA Project GSA, and identifies the Proposed Action.
- **Chapter 3: Alternatives.** Chapter 3 discusses the Proposed Action and the No Action Alternative analyzed as part of the environmental review process.
- **Chapter 4: Affected Environment.** Chapter 4 discusses existing environmental conditions within the ILHS-HAA Project GSA.
- **Chapter 5: Environmental Consequences.** Chapter 5 discusses the potential environmental impacts associated with the Proposed Action and the No Action Alternative.

- **Appendix A: Agency and Public Coordination and List of Receiving Parties.** Appendix A documents agency and public coordination associated with the EA process and lists the local agencies and parties identified to receive copies of the Draft and Final EA documents.
- **Appendix B: List of Preparers.** Appendix B lists the names and qualifications of the principal persons contributing information to this EA.
- **Appendix C: References.** Appendix C provides references to documents used to prepare the EA document.
- **Appendix D: List of Acronyms and Glossary.** Appendix D lists acronyms and provides a glossary of terms used in the EA.
- **Appendix E: Basics of Noise.** Appendix E presents information on aviation noise as well as the general methodology used to analyze noise associated with aviation projects.
- **Appendix F: ILHS-HAA Project Noise Technical Report.** Appendix F presents detailed and technical information on the noise analysis conducted in support of this EA.
- **Appendix G:** Appendix G is reserved for Comments on the Draft EA received within a FAA to-be-identified and legally noticed public comment period following the public release of the Draft EA and is not included in this Draft EA.

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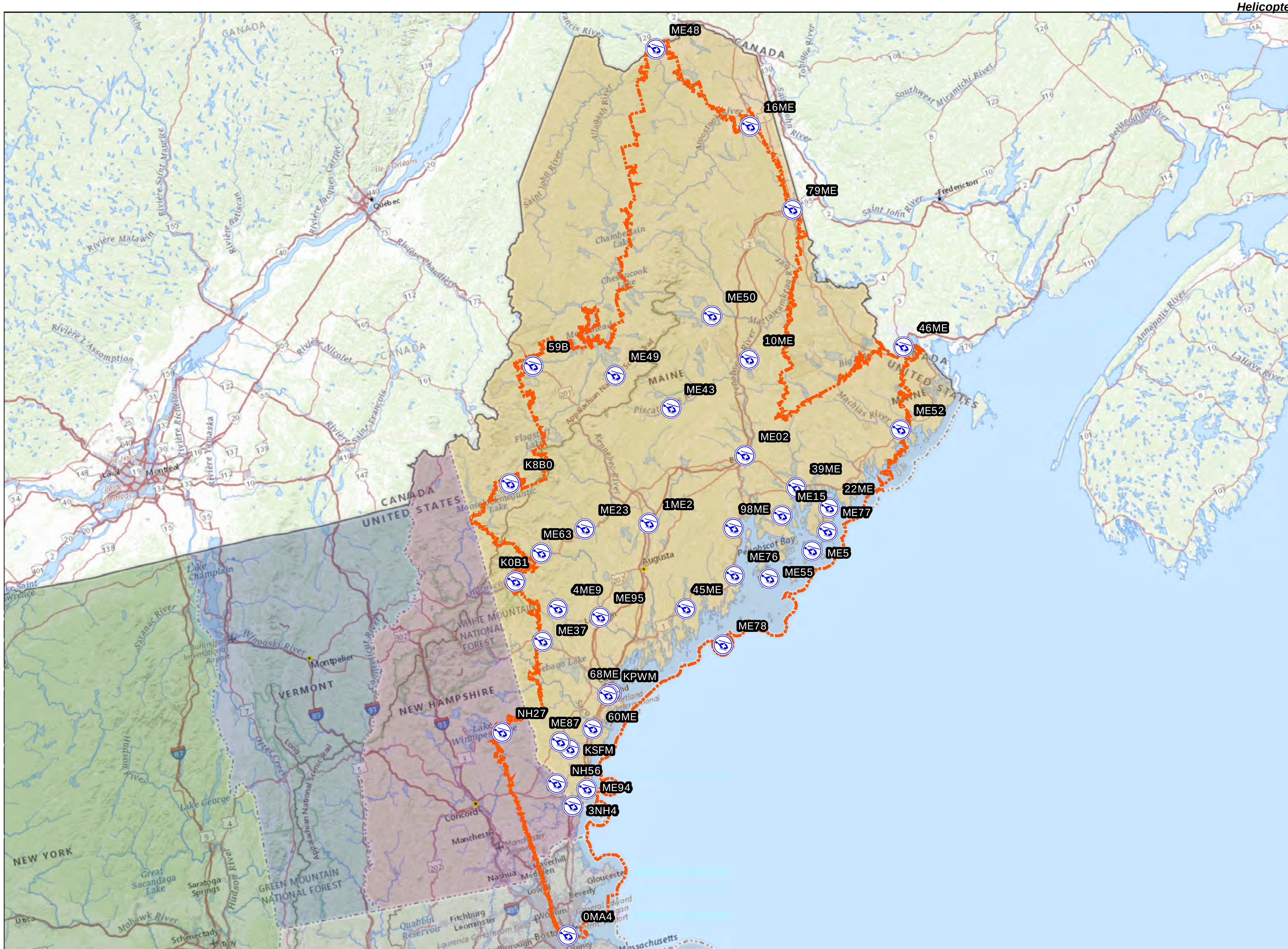

LEGEND

- Airport/Heliport
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:

60ME - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
45ME - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
ME50 - Millinocket Regional Heliport
ME52 - Down East Community Hospital Heliport
ME55 - Vinalhaven Airport
ME63 - Rumford Community Hospital Heliport
ME76 - Penobscot Bay Medical Center Heliport
ME77 - Cranberry Isles Heliport
ME78 - Monhegan Island Heliport
ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data. Federal Aviation Adminstration, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, February 2023.

Exhibit 1-1

General Study Area

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1.1 Project Background

On January 16, 2009, the FAA asked RTCA[2] to create a joint government-industry task force to make recommendations for implementation of NextGen operational improvements for the nation's air transportation system. In response, RTCA assembled the NextGen Mid-Term Implementation Task Force (Task Force 5), which included more than 300 representatives from commercial airlines, general aviation, the military, aerospace manufacturers, and airport stakeholders. **Section 1.1.1** discusses the NextGen Program in more detail.

In 2013 the RTCA established the Tactical Operations Committee to provide an open venue for the FAA to work in partnership to identify and resolve operational issues.[3] Later, in 2016 the FAA published the "Performance Based Navigation [PBN] National Airspace System [NAS] Navigation Strategy 2016," which set priorities to transition to a more PBN-based NAS.[4] In March 2017, the FAA issued RTCA's recommendations for the performance-based navigation route system. One of the Continental United States (CONUS) Low Altitude recommendations was that the FAA should initiate a demonstration project implementing a Required Navigation Performance (RNP)[5] 0.3 Nautical Mile (NM) helicopter route. The proposed helicopter route system should allow access to congested city centers and critical areas, such as hospitals, while reducing minimum en route altitudes to as low as possible to avoid icing, and improve air traffic services for instrument flight rules helicopters.[6]

The purpose of the ILHS-HAA initiative is to create a helicopter low altitude route system on a statewide scale. This is accomplished by developing special low altitude helicopter Instrument Flight Rules (IFR) routes requiring specific authorization by FAA Flight Standards. These routes are designated by FAA as "ZK" routes[7] and take advantage of technological advances in navigation, such as satellite based Area Navigation (RNAV) and Required Navigation Performance (RNP). This approach addresses congestion and other factors that reduce efficiency in critical areas. The ILHS-HAA Project Study Airports/Heliports are further discussed in **Section 1.6**. The overall intent is to use RNAV/RNP technology as efficiently as possible for congested critical areas.[8]

1.1.1 Next Generation (NextGen) Air Transportation System

The NextGen program is the FAA's long-term plan to modernize the NAS from a ground-based system of air traffic control to a Global Positioning System (GPS)-based system of air

2 RTCA, Inc. (RTCA is not an acronym, simply the name for the organization) is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance (CNS), and air traffic management (ATM) system issues. RTCA functions as a federal advisory committee and includes roughly 400 government, industry, and academic organizations from the United States and around the world. Members represent all facets of the aviation community, including government organizations, airlines, airspace users, airport associations, labor unions, and aviation service and equipment suppliers. More information is available at http://www.rtca.org.

3 RTCA, https://www.rtca.org/tactical-operations-committee/, (accessed December 4, 2022).

4 RTCA Tactical Operations Committee, *Recommendations for the Performance Based Navigation Route System.*

5 A type of performance-based navigation (PBN) that allows an aircraft to fly a specific path between two 3-dimensionally defined points in space. RNP differs from RNAV systems in that there is a requirement for on-board performance monitoring and alerting specification within route defined tolerances (e.g. RNP 0.3 means laterally adhering to within 0.3NM of a satellite-defined centerline).

6 U.S Congressional Act, *Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2019*, June 7, 2018, p. 25.

7 ZK routes are a special operator approved use only designation of the public use "TK" helicopter IFR routes established by 76 FR 37261 June 27, 2011. A TK route can be used by any qualified helicopter operator. A ZK route can only be used by a FAA specified and qualified helicopter operator.

8 U.S Congressional Act, *Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2019*, June 7, 2018, p. 25.

traffic management which allows for the development of PBN procedures.[9] Achieving the NextGen system requires implementing RNAV (Area Navigation) and RNP (Required Navigation Performance) PBN procedures and aircraft[10] "auto-pilot" and Flight Management System (FMS) capabilities.[11] RNAV and RNP capabilities are now readily available, and PBN can serve as the primary means aircraft use to navigate along a route. Helicopter-specific FMS capabilities are being introduced and implemented that support RNAV RNP requirements. The FAA continues to develop the NAS deploying NextGen technology in projects such as the ILHS-HAA Project. The following sections describe PBN procedures in greater detail.

1.1.1.1 RNAV and RNP

Exhibit 1-2 compares conventional, RNAV, and RNP routes. RNAV enables aircraft traveling through various airspace to follow more accurate and better-defined routes. This results in more predictable routes and altitudes that can be pre-planned by the pilot and air traffic control. Predictable routes improve the ability to ensure vertical, longitudinal, and lateral separation between aircraft.

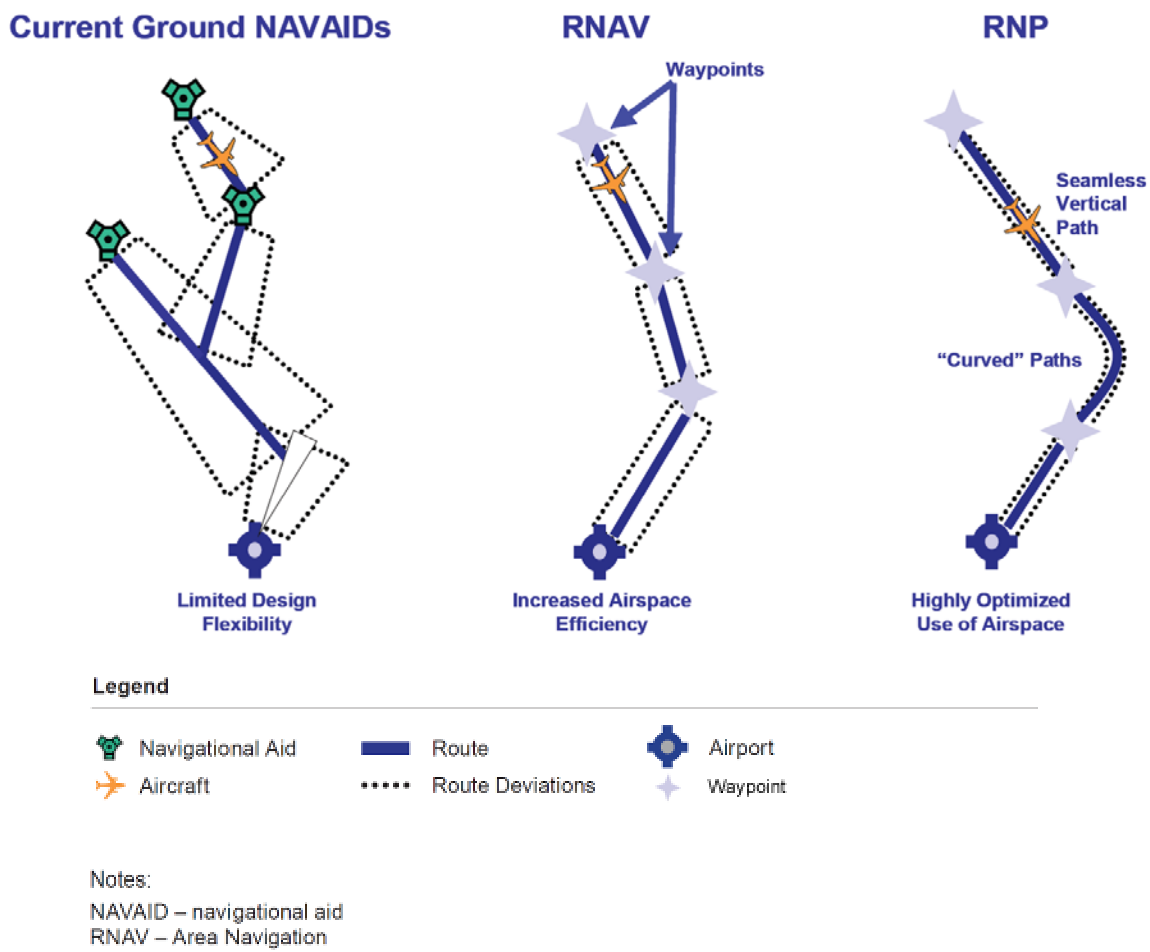
Ground-based NAVAID[12] routes are referred to as "conventional" routes and rely on the aircraft equipment directly communicating with the NAVAID radio signal and are often limited by issues such as line-of-sight and signal reception accuracy. NAVAIDs such as Very High Frequency Omnidirectional Ranges (VORs) are affected by variable terrain and other obstructions that can limit their signal accuracy. Consequently, a route that is dependent upon ground-based NAVAIDS requires at least six NM of clearance on either side of its main path to ensure accurate signal reception. As demonstrated by the dashed lines in **Exhibit 1-3**, this clearance requirement increases with an aircraft's distance from the VOR. In comparison, RNAV signal accuracy requires only two NM of clearance on either side of a route's main path.

RNAV routes can mirror conventional routes or, by using satellite technology, provide paths within the airspace that were not previously possible with ground-based NAVAIDs.

RNP is an RNAV procedure with signal accuracy that is increased through the use of onboard performance monitoring and alerting systems. A defining characteristic of an RNP operation is the ability for an RNP-capable aircraft navigation system to monitor the accuracy of its navigation (based on the number of GPS satellite signals available to pinpoint the aircraft location) and inform the crew if the required data becomes unavailable. A RNP-capable aircraft navigation system provides a more precise location (down to less than a mile from the intended path) and will follow a highly predictable path. The enhanced precision and predictability make it possible to implement procedures within controlled airspace that are not always possible under the current air traffic system.

9 U.S. Department of Transportation, Federal Aviation Administration, Fact Sheet, "NextGen Goal: Performance-Based Navigation," April 24, 2009 [http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=8768 (accessed April 11, 2012)].
10 For the purposes of this analysis, "aircraft" encompasses all FAA certificated flying craft, including helicopters. Where contextually appropriate and/or specific, the analysis uses "helicopter" as a reference to those FAA certificated flying craft capable of vertical flight and having other unique identifying characteristics common to helicopters.
11 A Flight Management System (FMS) is an onboard computer that uses inputs from various sensors (e.g., GPS and inertial navigation systems) to determine the geographic position of an aircraft and help guide it along its flight path.
12 NAVAIDs are facilities that transmit signals defining key points or routes.

Exhibit 1-2 Navigational Comparison – Conventional/RNAV/RNP



Source: U.S. Department of Transportation, Federal Aviation Administration, "Performance-Based (PBN) Brochure," October 2009.
Prepared by: ATAC Corporation, December 2022.

1.2 The National Airspace System and Air Traffic Control

The following sections provide basic background information on the National Airspace System (NAS) and air traffic control (ATC). This information includes a description of the NAS, the role of ATC, the methods air traffic controllers use to provide services within the air traffic control system, and the different phases of helicopter flight within the NAS. Following this discussion, information on the ILHS-HAA initiative is provided in **Section 1.5**.

1.2.1 National Airspace System

Under the Federal Aviation Act of 1958 (49 USC § 40101 *et seq*.), the FAA is delegated control over use of the nation's navigable airspace and regulation of domestic civil and military aircraft operations in the interest of maintaining safety and efficiency. To help fulfill this mandate, the FAA established the NAS. Within the NAS, the FAA provides air traffic services for aircraft takeoffs, landings, and the flow of aircraft between airports through a system of infrastructure (e.g., air traffic control facilities), people (e.g., air traffic controllers, maintenance, and support personnel), and technology (e.g., radar, communications equipment, ground-based NAVAIDs, etc.). The NAS is governed by various FAA rules and regulations.

The NAS is one of the most complex aviation networks in the world. The FAA continuously reviews the design of all NAS resources to ensure they are effectively and efficiently managed. The FAA Air Traffic Organization (ATO) is the primary organization responsible for managing airspace and flight procedures in the NAS. When changes to the NAS are proposed, the FAA works to ensure that the changes maintain or enhance system safety and improve efficiency. One way to accomplish this mission is to employ emerging technologies to increase system flexibility and predictability.[13]

1.2.2 Air Traffic Control

The combination of infrastructure, people, and technology used to monitor and guide (or direct) aircraft within the NAS is referred to collectively as ATC. One of ATC's responsibilities is to maintain safety and expedite the flow of traffic in the NAS by applying defined minimum distances or altitudes between aircraft (referred to as "separation"). This is accomplished through required communications between air traffic controllers and pilots, and the use of navigation technologies.

Aircraft operate under two distinct categories of flight rules: Visual Flight Rules (VFR) and IFR.[14] Under VFR, pilots are responsible to "see and avoid" other aircraft and obstacles such as terrain to maintain safe separation. Under IFR, aircraft operators are required to file flight plans and use navigation instruments to operate within the NAS. The majority of commercial air traffic operates under IFR, however most helicopter traffic has historically operated under VFR, in part due to a lack of infrastructure supporting IFR helicopter operations.[15]

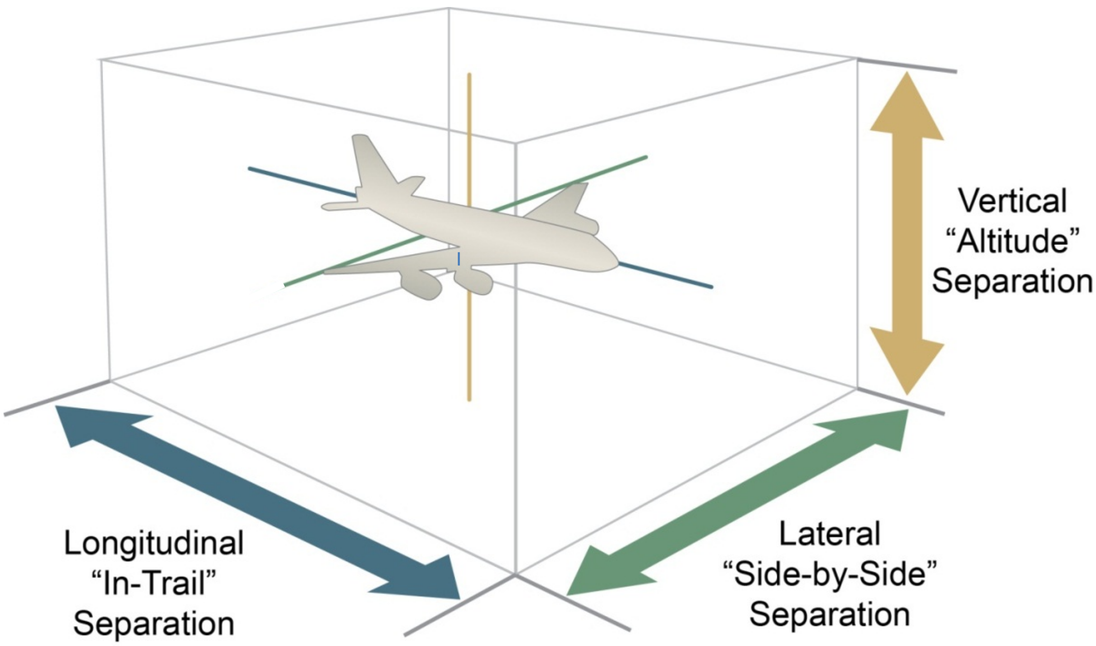
Depending on whether aircraft are operating under IFR or VFR, air traffic controllers apply various techniques to maintain separation between aircraft,[16] including the following:

- **Vertical or "Altitude" Separation:** separation between aircraft operating at different altitudes
- **Longitudinal or "In-Trail" Separation:** separation between two aircraft operating along the same flight route, referring to the distance between a lead and a following aircraft
- **Lateral or "Side-by-Side" Separation:** separation between aircraft (left or right side) operating along two separate but nearby flight routes

Exhibit 1-3 depicts the three dimensions around an aircraft used to determine separation. For the purposes of illustration, the aircraft in this instance is portrayed as a large commercial jet engine aircraft. However, these illustrated concepts apply equally to helicopters as aircraft operating within the NAS.

13 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.2N, Change 3, *Procedures for Handling Airspace Matters*, Section 32-3-5(b) "National Airspace Redesign," June 17, 2021.
14 14 Code of Federal Regulations (C.F.R.), Part 91.
15 RTCA, Tactical Operations Committee, Meeting Summary, August 22, 2017.
16 Defined in FAA Order JO 7110.65Y, *Air Traffic Control*.

Exhibit 1-3 Three Dimensions Around an Aircraft



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, December 2022.

In its effort to modernize the NAS, the FAA is developing IFR helicopter-specific routes that use advanced technologies. A primary component in this effort is RNAV. RNAV uses Global Positioning System (GPS) and other technology to allow an RNAV-equipped helicopters to fly a more efficient route. This route is based on instrument guidance that references a helicopter's position relative to satellite-based NAVAIDs. In addition to RNAV, the FAA is utilizing RNP, which differs from RNAV systems in that there is a requirement for on-board performance monitoring and alerting specification.

ATC uses a variety of methods and coordination techniques to maintain safety within the NAS, including:

- **Vectors:** Directional headings issued to aircraft to provide navigational guidance and to maintain separation between aircraft and/or obstacles.
- **Speed Control:** Instructions issued to aircraft to reduce or increase aircraft speed to maintain separation between aircraft.
- **Holding Pattern/Ground Hold:** Controllers assign aircraft to a holding pattern in the air or hold aircraft on the ground before departure to maintain separation between aircraft and to manage arrival/departure volume.
- **Altitude Assignment/Level-off:** Controllers assign altitudes to maintain separation between aircraft and/or to protect airspace. This may result in aircraft "leveling off" during ascent or descent.
- **Reroute:** Controllers may change an aircraft's route for a variety of reasons, such as avoidance of inclement weather, to maintain separation between aircraft and/or to protect airspace for safety reasons.

- **Point-out:** Notification issued by one controller to another when an aircraft might pass through or affect another controller's airspace and radio communications will not be transferred.

As an aircraft moves from origin to destination, ATC personnel function as a team and transfer control of the aircraft from one controller to the next, and from one ATC facility to the next.

1.3 Typical Helicopter Flight Phases within the NAS

The phases of flight described below assumes a helicopter traveling from airport/heliport to airport/heliport, and a typical operation is through five phases of flight. Helicopters used for air ambulance operations are frequently landing and departing from a wide variety of off-airport/off-heliport scenes such as highways, fields, and other safe landing and departure surfaces that encompass situational and contextual qualifiers not covered below.

- **1 – Taxi[17]/Takeoff:** If necessary, the helicopter's transition across the airport/heliport taxiing on or above the surface to a designated, ATC directed, or pilot selected takeoff point. If no taxi is necessary, helicopters can takeoff directly from their ground location. Due to the vertical capability of a helicopter, takeoffs are typically initially significantly steeper in vertical angle than a fixed wing aircraft,[18] particularly when safety margins for fixed obstacles, IFR procedures, or operational norms necessitates such a vertical takeoff. The helicopter itself remains fairly level despite the verticality of a takeoff.
- **2 – Departure:** The phase of helicopter flight after taking off from an airport/heliport. Helicopter departures are still climbing in altitude, but typically at a slower rate and higher forward speed than at takeoff. The helicopter departure phase typically ends at the point the pilot enters (or is ATC-approved to enter) level cruise flight.
- **3 – En Route:** Generally, the level segment of flight (i.e., cruising altitude) between the departure and descent to/from airports/heliports. Unlike fixed wing aircraft, helicopters are uniquely authorized by FAA to operate at very low altitudes with appropriate safety observances. Helicopters typically achieve the highest forward speeds during this phase.
- **4 – Arrival:** The helicopter's in-flight transition from a cruising altitude to the point at which the pilot initiates (or is ATC-approved to initiate) the landing to a specific airport/heliport. Helicopter arrivals begin a descent in altitude, but typically at a defined rate to achieve a target altitude and forward speed.
- **5 – Landing:** Arrival of the helicopter at the landing airport/heliport. Due to the vertical capability of a helicopter, landings are typically significantly steeper in vertical angle than a fixed wing aircraft, particularly when safety margins for fixed obstacles, IFR procedures, or operational norms necessitates such a vertical arrival. The helicopter itself remains fairly level despite the nearly vertical descent. Landing may involve taxiing to a final shutdown or parking position at larger facilities, or landing directly on a designated area such as a hospital helipad.

17 Skid-equipped helicopters air (hover) taxi to move as needed. Wheeled helicopters can taxi along the ground surface like fixed wing aircraft to move as needed and may also air taxi.
18 "Fixed Wing Aircraft" refers to those aircraft with wings that are attached (or affixed) to the aircraft fuselage as a primary source of lift as opposed to a "rotary wing aircraft" which is synonymous with "helicopter" whose rotating blades provide lift.

1.3.1 Helicopter Instrument Flight Procedures

IFR helicopters use an FAA-approved Instrument Flight Procedure (IFP) for takeoff and departure, in IFR conditions. An IFP provides pilots with defined lateral and vertical guidance to facilitate safe and predictable navigation to or from an airport/heliport. For the ILHS-HAA project, all RNAV departure IFPs have a VFR segment with defined heading, speed, visibility, and ceiling requirements along with minimum altitudes at a defined waypoint or waypoints.[19] The VFR segment joins a RNAV segment at a defined heading and minimum altitude enabling the helicopter to reach a typical en route altitude or continue higher as warranted.

IFR helicopters that are arriving an airport/heliport normally follow an IFP. An IFR helicopter transitions from the en route phase of flight to an initial approach fix that also defines a minimum safe altitude. The helicopter will follow an IFP defined heading while descending to a final approach fix with a defined minimum altitude. The helicopter will then continue descending until reaching a "missed approach point" which has a defined minimum altitude and waypoint. If the pilot can safely see FAA defined components of the heliport and complete the arrival to landing, the helicopter continues, otherwise, the helicopter will execute a defined missed approach procedure for either another attempt at the arrival IFP or a diversion to another landing area.

IFR helicopters that are departing an airport/heliport would follow a designated departure procedure if one is present, and may follow the arrival IFP in reverse, while observing certain criteria and processes.

1.4 Air Traffic Control Facilities and Airspace

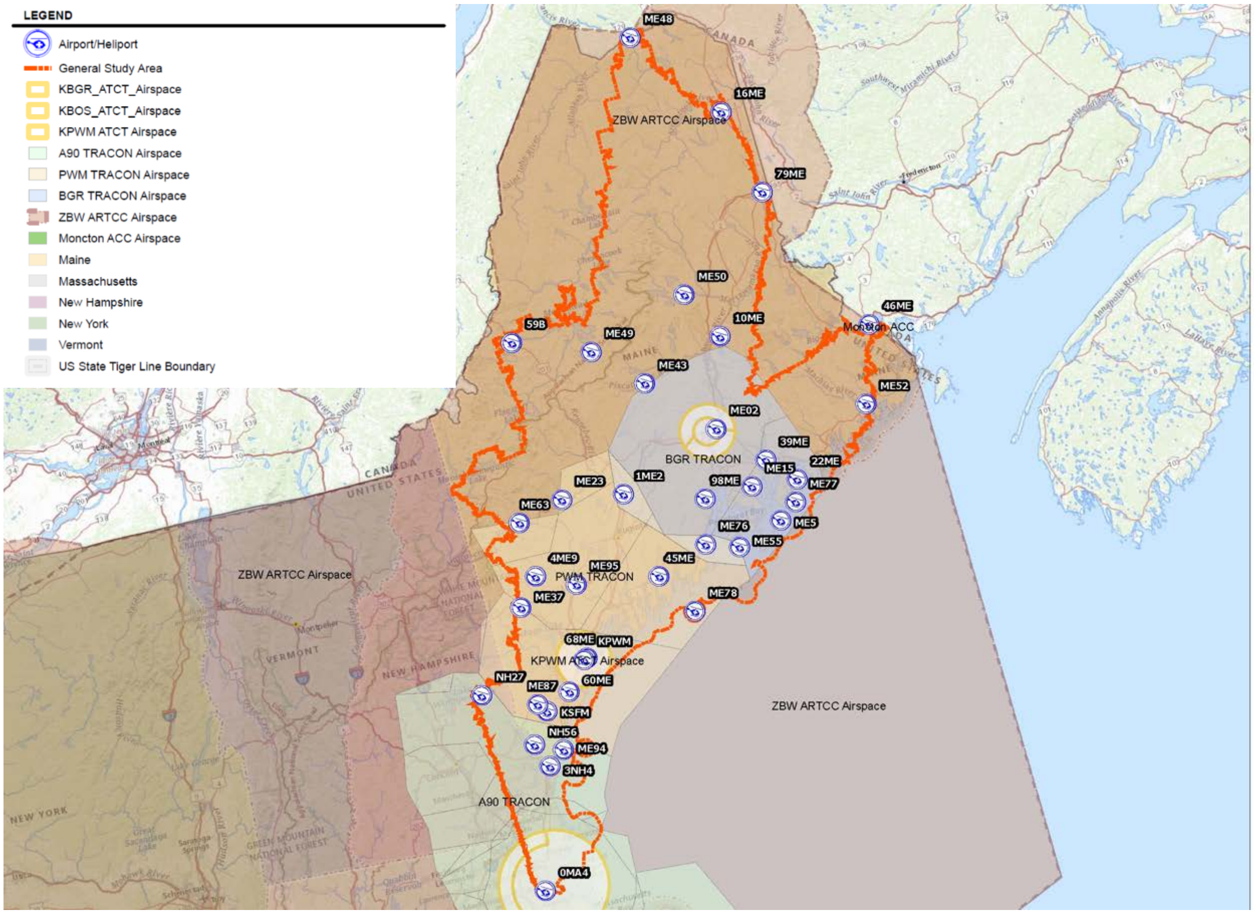
The NAS is organized into three-dimensional areas of navigable airspace that are defined by a floor, a ceiling, and a lateral boundary. Each is controlled by different types of ATC facilities:

- **Air Traffic Control Tower:** Controllers at an Air Traffic Control Tower (ATCT) provide air traffic services for phases of flight associated with aircraft takeoff and landing at airports only. The ATCT typically controls airspace extending from the airport out to a distance of several miles. Only one Study Airport, KPWM, shown in **Exhibit 1-4** has an ATCT associated with the facility. However, Bangor International Airport (KBGR), while not a Study Airport, does have an ATCT that serves nearby Study Heliport traffic and traffic transiting that airspace. Frequently, helicopters operating to/from heliports in the vicinity of an airport ATCT will contact that ATCT for service on departure, arrival, or as required to transit through the ATCT control area.
- **Terminal Radar Approach Control:** Controllers at a Terminal Radar Approach Control (TRACON) provide air traffic service to aircraft as they transition between an airport/heliport and the en route phase of flight, and from the en route phase of flight to an airport/heliport. Because helicopter flights are typically at lower altitudes and frequently regional in origin/destination, the TRACON may handle all phases of helicopter flight. The TRACON airspace is broken down into sectors. As an aircraft moves between sectors, responsibility for it transfers from controller to controller. Controllers maintain separation between aircraft that operate within their sectors. There are three terminal airspace TRACONs in the ILHS-HAA Project GSA including

19 A waypoint is a predetermined geographical position used for route/instrument approach definition, progress reports, published VFR routes, visual reporting points or points for transitioning and/or circumnavigating controlled and/or special use airspace that is defined relative to a VORTAC station or in terms of latitude/longitude coordinates.

the BGR TRACON, the PWM TRACON, and the A90 TRACON, each shown in **Exhibit 1-2**.

Exhibit 1-4 Airspace in the ILHS-HAA Project GSA and Region



Sources: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Airport and Heliport locations. Boston ARTCC/Bangor ATCT Letter of Agreement (KBGR TRACON Boundary, Boston ARTCC/Portland ARTCC Letter of Agreement (KPWM TRACON Boundary), Boston ARTCC/Boston TRACON Letter of Agreement (A90 TRACON boundary). FAA NFDC, KPWM ATCT boundary.

Prepared by: ATAC Corporation, December 2022.

- **Air Route Traffic Control Centers:** Controllers at Air Route Traffic Control Centers (ARTCCs or "Centers") typically provide air traffic services during the en route phase of flight. However, due to the lower altitudes used by helicopters, ARTCC radar contact may not be made with a low flying helicopter, thus the ARTCC may be unable to provide full separation service at these lower altitudes but will remain in contact with helicopters who report position, direction, and altitude. Similar to TRACON airspace, the Center airspace is broken down into sectors. As shown in **Exhibit 1-4**, the ILHS-HAA Project GSA and region is comprised of airspace delegated to the Boston ARTCC (ZBW). In addition to the ZBW airspace, a small section of airspace within the GSA, approximately 14 square miles, northeast of 46ME, is controlled by NavCanada's Moncton Area Control Center (ACC).[20]

Comprehensively, the ILHS-HAA Project consists of airspace delegated ZBW ARTCC, A90 TRACON, BGR TRACON, and PWM TRACON. ZBW provides Air Traffic Services to approximately 153,804 square miles of airspace covering the northeastern United States. The airspace overlies parts of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. It abuts New York Center to the south and west, Washington Center to the south, oceanic airspace to the east, and Canadian As (Montreal and Moncton) to the north. With exceptions due to geography and terrain influencing radar coverage, ZBW is responsible for most but not all aircraft operating inside its lateral boundaries when they are operating under IFR and offers select services to aircraft operating under VFR. ZBW controllers provide air traffic services in the airspace above and adjacent to the A90, BGR, and PWM TRACON airspace.

The lateral boundary of the BGR airspace is irregularly shaped, extending from BGR approximately 30 NM to the north, 30 NM to the east, 50 NM to the south, and 35 NM to the west. Excluding airspace delegated to the ATCTs within the TRACON boundaries, BGR controllers currently manage the airspace within these boundaries from the surface to 19,000 feet above mean sea level.

The lateral boundary of the PWM airspace is irregularly shaped, extending from PWM approximately 75 NM to the north, 40 NM to the east, 35 NM to the south and 40 NM to the west. Excluding airspace delegated to the ATCTs within the TRACON boundaries, PWM controllers currently manage the airspace within these boundaries from the surface to 19,000 feet above mean sea level.

The lateral boundary of the A90 airspace is irregularly shaped, extending from BOS approximately 85 NM to the north, 50 NM to the east, 85 NM to the south and 35 NM to the west. Excluding airspace delegated to the ATCTs within the TRACON boundaries, PWM controllers currently manage the airspace within these boundaries from the surface to 19,000 feet above mean sea level.

The TRACONs are generally the final radar facility responsible for separating and sequencing aircraft that are landing at and departing from airports/heliports in their respective airspace. This includes the initial sequencing of departures as well as providing safe and expeditious flows of traffic into and out of the other airports which have control towers (such as KPWM). The TRACONs provide air traffic control services to IFR-filed aircraft and, when requested or required, VFR aircraft. As with ZBW, the TRACONs also offers these services to military aircraft that are operating in its airspace.

The following sections discuss how air traffic controllers at GSA ATC facilities may be involved in positive control for the helicopter phases of flight operating under IFR. As indicated previously, helicopters frequently arrive to and depart from heliports and off-site ad-hoc landing/takeoff locations that may not follow a typical flow. The following descriptions are intended for a basic overview and are not intended to cover all potential unique and variable air ambulance helicopter operational situations.

20 Area Control Centers (ACCs) provide similar air traffic services as the FAA ARTCC facilities. NavCanada is the not-for-profit Canadian air navigation service provider covering designated Canadian airspace.

1.4.1 Airport/Heliport Departures

A helicopter takeoff from an airport/heliport may follow a defined departure IFP or depart VFR under defined visibility and cloud ceiling conditions, then seek either ATCT (in the vicinity of KPWM or KBGR) or TRACON service prior to entering IFR flight. Once ATC service is established, the helicopter follows an ATC assigned heading and altitude or a pilot selected and ATC confirmed heading and altitude that enables the helicopter to safely navigate the airspace. If initial service is from an ATCT, the helicopter will likely transition to TRACON service through the terminal airspace. In either departure scenario and depending on altitude, geographic location, and terrain, a helicopter may transition from TRACON contact and/or positive control to ARTCC contact and/or positive control while it proceeds on a specific route to its destination.

1.4.2 Airport/Heliport Arrival

A helicopter begins the arrival phase of flight from the en route phase of flight which may be under ARTCC or TRACON service. During descent, the helicopter bound for the destination airport/heliport remains in communication with ATC and may be directed to communicate with an ATCT, if applicable. The helicopter will execute the arrival while remaining in contact with ATC and report progress or deviations as warranted.

1.5 The ILHS-HAA Project

The ILHS-HAA Project would develop en route ZK routes for air ambulance helicopters operating in the GSA at the Study Airports/Heliports. The following sections describe the airspace constraints and existing instrument procedures of the ILHS-HAA Project airspace that would be involved.

1.5.1 ILHS-HAA Project Airspace Constraints

The following provide a general overview of the constraints related to controlling aircraft within the ILHS-HAA Project GSA airspace.

1.5.1.1 Mountainous Terrain

The ILHS-HAA Project GSA is situated, in part, within a designated mountainous terrain area including portions of the Appalachian mountain range. Designated mountainous areas include those areas having a terrain differential exceeding 3,000 feet within 10 nautical miles within those one arc-second quadrangles overlying terrain or U.S. territorial waters. The mountainous terrain in the GSA includes 38 peaks above 3,280 feet (1,000 Meters). The highest peaks in the GSA are Baxter Peak and Mount Katahdin at 5,260 feet. Both peaks reside in the northern half of the GSA. Other significant peaks along the western edge of the GSA include Sugarloaf Mountain and West Peak, at altitudes of 4,239 and 4,131 feet respectively. Mountainous terrain poses significant challenges due to disturbed airflow, causing potentially high downdrafts and turbulence. These areas are typically categorized as precipitous terrain. Routes with identified precipitous terrain require a higher than standard minimum altitude over the terrain. Due to the proximity of precipitous terrain and required higher standard minimum altitudes, location and altitude of helicopter flight routes are limited within the ILHS-HAA Project GSA.

1.5.1.2 Class B Airspace

Class B airspace is regulatory airspace, generally located around major airports, such as the Class B airspace surrounding Boston Logan International Airport (KBOS). Certain minimum pilot requirements and positive clearance is required to enter Class B and speed restrictions are also in place. Class B typically has the highest altitudes and widest reach to more efficiently separate aircraft to/from higher altitudes. Additionally, certain aircraft equipment and capability is also required within 30nm of Class B airspace. These rules and requirements make for an efficient flow of traffic within operationally complex Class B airspace.

1.5.1.3 Class C Airspace

Class C airspace is also regulatory airspace, generally located around small and mid-size commercial service airports with ATCTs. Two airports (KPWM and KBGR) in the GSA have Class C airspace. Class C requires the pilot to establish 2 way communication but does not require ATC clearance to enter. Speed restrictions are slower than Class B and those restrictions are closer to the airport and at lower overall altitudes. Weather minimums require greater clearance from clouds, and aircraft equipment and pilot requirements are not as restrictive as Class B. These differences recognize the lesser air traffic volume and greater balance of general aviation (non-commercial) and commercial aircraft operating around, to, and from KPWM and KBGR.

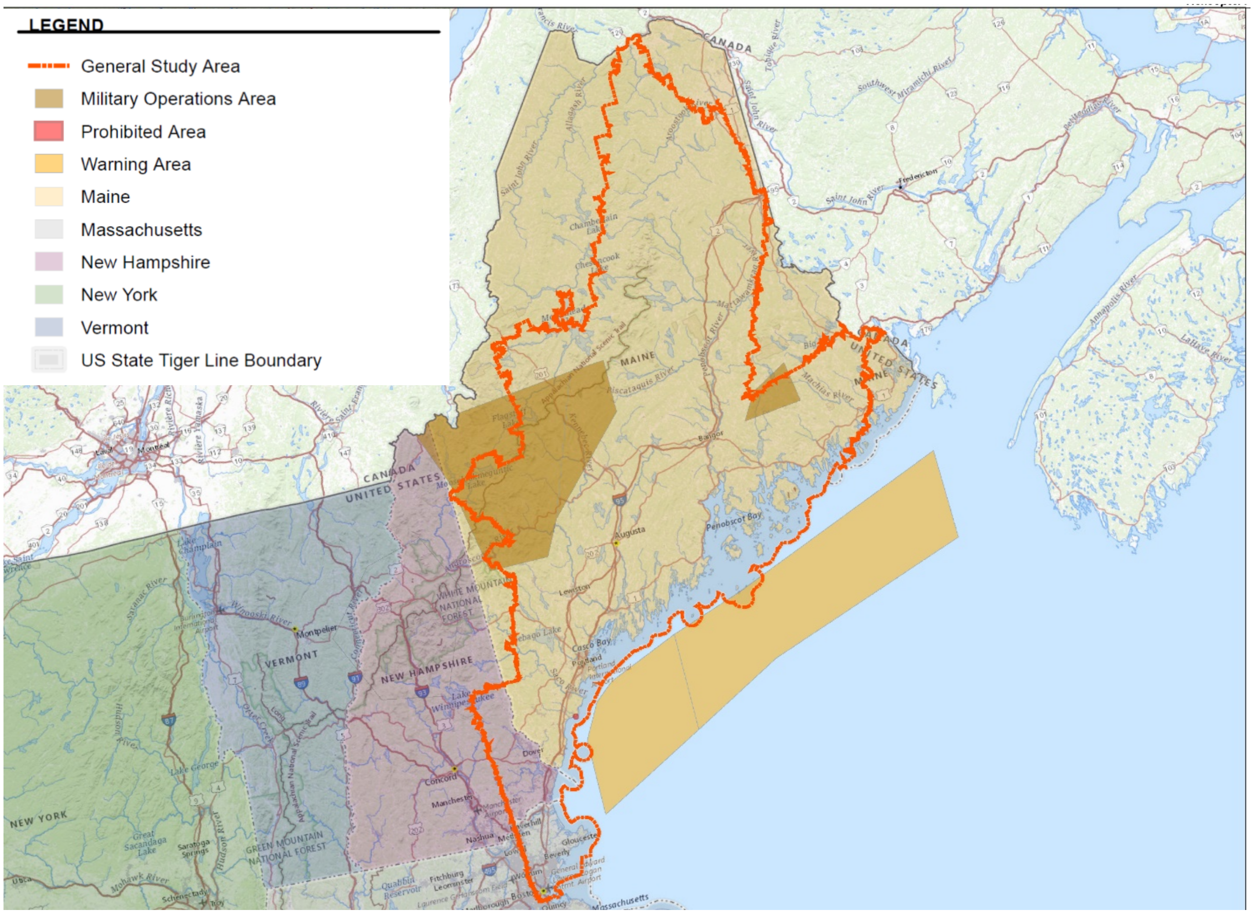
1.5.1.4 ILHS-HAA Project Special Use Airspace

Exhibit 1-5 depicts the boundaries of Special Use Airspace (SUA) in the ILHS-HAA GSA, illustrating the limited available options for entering and exiting the ILHS-HAA airspace. SUA is airspace with defined vertical and lateral boundaries containing certain hazardous activities such as military flight training and air-to-ground military exercises that must be confined. SUA-defined dimensions are identified by an area on the surface of the earth within which certain air traffic activities must be confined or where certain restrictions are imposed on aircraft operations that are not a part of those activities, or both. SUA is an important component of the NAS that allows for the safe use of the airspace by military and non-military air traffic. In addition to aviation activity, SUA can accommodate ground and combined arms training and testing. These areas either limit aircraft activity allowed within the airspace or restrict other aircraft from entering during specific days and/or times. Three types of SUA are found within the ILHS-HAA Project:

- **Military Operations Area:** A Military Operations Area (MOA) is airspace established outside of Class A airspace to separate/segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are established to contain certain military activities such as air combat maneuvers, air intercepts, acrobatics, etc.
- **Prohibited Area:** Prohibited areas contain airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare.
- **Warning Area:** A warning area is airspace of defined dimensions, extending from three NM outward from the coast of the U.S., which contains activity that may be

hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger.[21]

Exhibit 1-5 Special Use Airspace in the ILHS-HAA GSA



Sources: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Airport and Heliport locations and Special Use Airspace.
Prepared by: ATAC Corporation, December 2022.

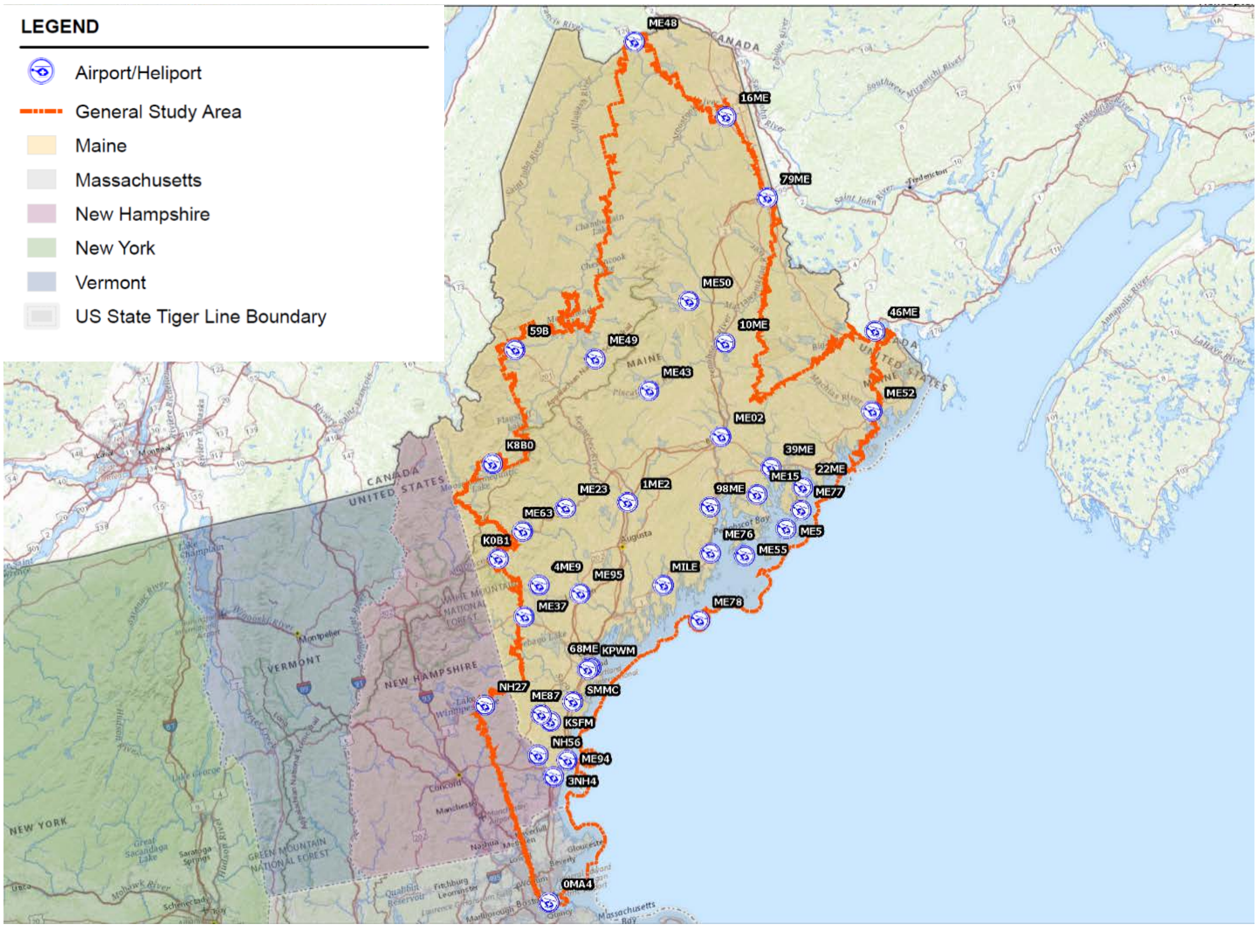
To illustrate SUAs relative to all airspace, ZBW has approximately 28,031 square miles of SUA, representing 18 percent of its total coverage area. Overall, ATC ensures that civilian or military aircraft (not under the authority of the United States Armed Forces)[22] are routed within the remaining 125,773 square miles of airspace when MOA, Prohibited Area, or Warning Area flight restrictions for civilian aircraft are in place. When developing routes that transect MOAs, it is generally less complex and more efficient to design procedures that avoid SUAs altogether considering usage limitations with this type of SUA.

21 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.10D, *Special Use Airspace*, February 16, 2022.
22 Aircraft under the direct control of the military air traffic control facilities are confined to Special Use Airspace or departure and arrival patterns near military airfields. These SUAs are specific areas of airspace that are used by military aircraft and are provided air traffic control services by the military. The United States military branches are specifically charged with management of that airspace when active.

1.6 ILHS-HAA Project Study Airports/Heliports

Exhibit 1-6 depicts the locations of the seven ILHS-HAA Project Study Airports and the 32 ILHS-HAA Project Study Heliports that are presented in **Table 1-1** previously.

Exhibit 1-6 Study Airport/Heliport Locations



Sources: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Airport/Heliport locations.
Prepared by: ATAC Corporation, December 2022.

The Study Airports/Heliports were selected based on specific FAA criteria: heliports or airports whose forecast helicopter operations in the period covered by the EA exceed 10 annual daily average operations or have hover times exceeding 2 minutes.[23]

Of the Study Airports, only KPWM is categorized as a primary airport in the National Plan of Integrated Airports System (NPIAS). KPWM is a small hub airport. KSFM is listed as a regional airport in the NPIAS. 0B1, 59B, and 8B0 are categorized as general aviation airports with either basic or local roles. ME5 and ME55 are not a part of the NPIAS.

None of the heliports are listed within the NPIAS, and most are operated privately and serve the communities with air ambulance services to various hospitals throughout the region. As shown in **Table 1-2**, from February 18, 2018 to February 9, 2021 there were approximately

7,420 average annual operations involving air ambulance helicopter at the Study Airports/Heliports.

Table 1-2 2018-2021 Study Airports/Heliports Helicopter Air Ambulance Operations

Airport/Heliport Name	Air Ambulance Annual Operations	Percent of Total Annual Operations
Airports		
Banks Airport	15.84	0.21%
Bethel Regional Airport	29.52	0.40%
Newton Field Airport	6.48	0.09%
Portland International Jetport	961.92	12.96%
Sanford Seacoast Regional Airport	254.16	3.43%
Stephen A Bean Municipal Airport	6.12	0.08%
Vinalhaven Airport	38.16	0.51%
Heliports		
AR Gould Hospital Heliport	138.24	1.86%
Bar Harbor Heliport	151.92	2.05%
Blue Hill Memorial Hospital Heliport	87.84	1.18%
Boston Medical Center Hospital Heliport	333.36	4.49%
Bridgton Hospital Heliport	144	1.94%
C A Dean Memorial Hospital Heliport	24.48	0.33%
Calais Regional Heliport	144	1.94%
CMMC Air Ambulance Landing Site Heliport	889.2	11.98%
Cranberry Isles Heliport	0.72	0.01%
Down East Community Hospital Heliport	176.4	2.38%
Eastern Maine Medical Center Heliport	2,074.32	27.95%
Franklin Memorial Hospital Heliport	97.2	1.31%
Houlton Regional Hospital Heliport	122.4	1.65%
Huggins Hospital Heliport	9.36	0.13%
Lincoln Health Miles Campus	69.12	0.93%
Maine Coast Memorial Heliport	228.24	3.08%
Maine General Medical Center Waterville Heliport	46.08	0.62%
Maine Medical Center Heliport	40.32	0.54%
Millinocket Regional Heliport	55.44	0.75%
Monhegan Island Heliport	5.04	0.07%
Northern Light Mayo Hospital Heliport	171.36	2.31%
Northern Maine Medical Center Heliport	128.88	1.74%
Penobscot Bay Medical Center Heliport	207.36	2.79%
Portsmouth Regional Hospital Heliport	31.68	0.43%
PVH Heliport	115.2	1.55%
Rumford Community Hospital Heliport	148.68	2.00%
Southern Maine Health Care SMMC Helipad	38.88	0.52%
Southern Maine Health Care/Sanford Heliport	93.6	1.26%
Stephens Memorial Hospital Heliport	48.96	0.66%
Waldo County General Hospital Heliport	176.4	2.38%
Wentworth Douglass Hospital Heliport	48.24	0.65%
York Hospital Heliport	61.2	0.82%

Source: FAA Operations Counts from February 18, 2018 – February 9, 2021, 3 Year Outlook Report, February 2021.
Prepared by: ATAC Corporation, December 2022.

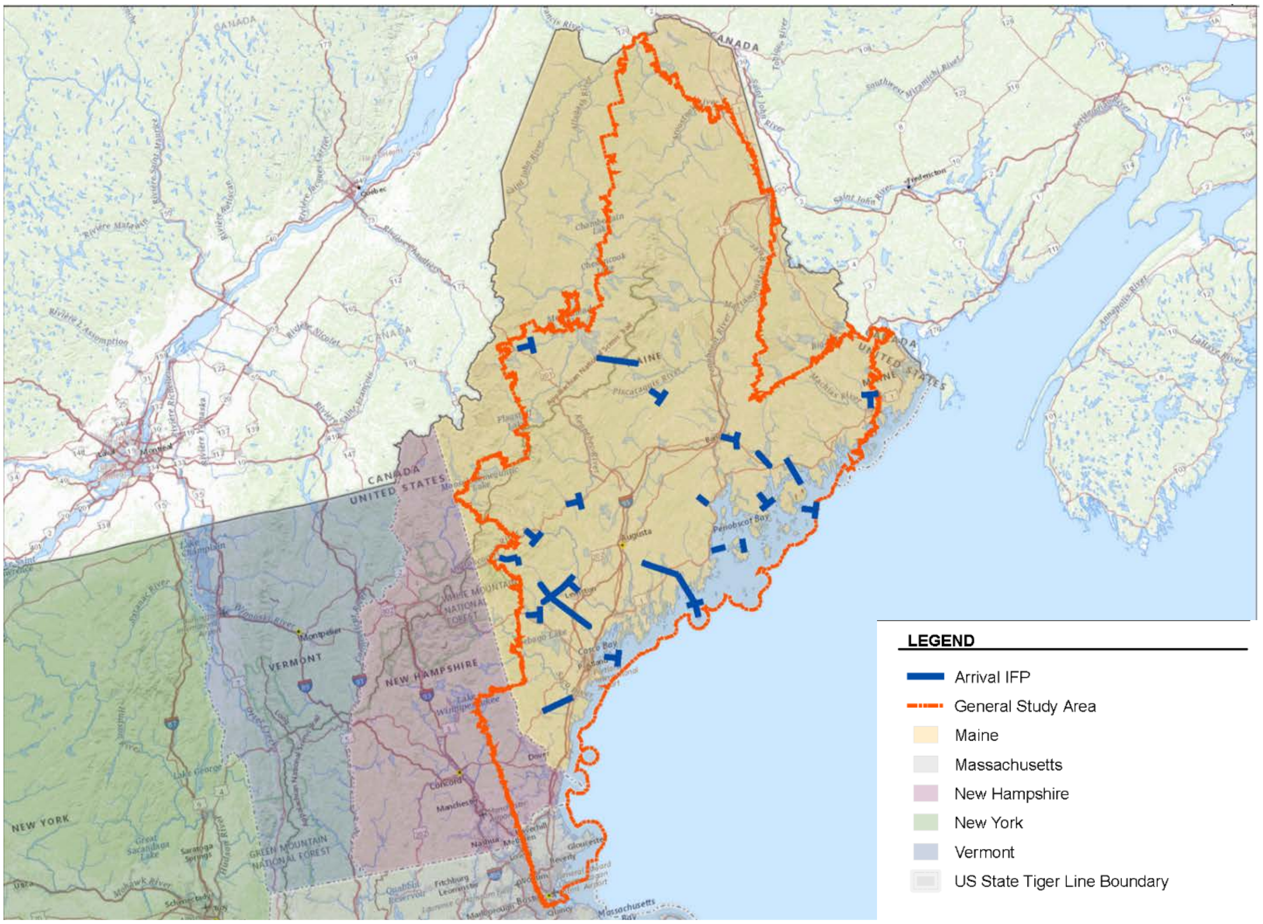
1.6.1 IFPs Serving Study Airports/Heliports

As of March 2023, 21 RNAV Arrival IFPs and 15 RNAV Departure IFPs serve the Study Airports/Heliports within the ILHS-HAA Project GSA. These IFPs are available under special FAA authorized use only and are designed specifically for helicopters.

23 U.S. Department of Transportation, Federal Aviation Administration, Order 1050.1F *Environmental Impacts: Policies and Procedures*, Appendix B, Section B-1, June 16, 2015.

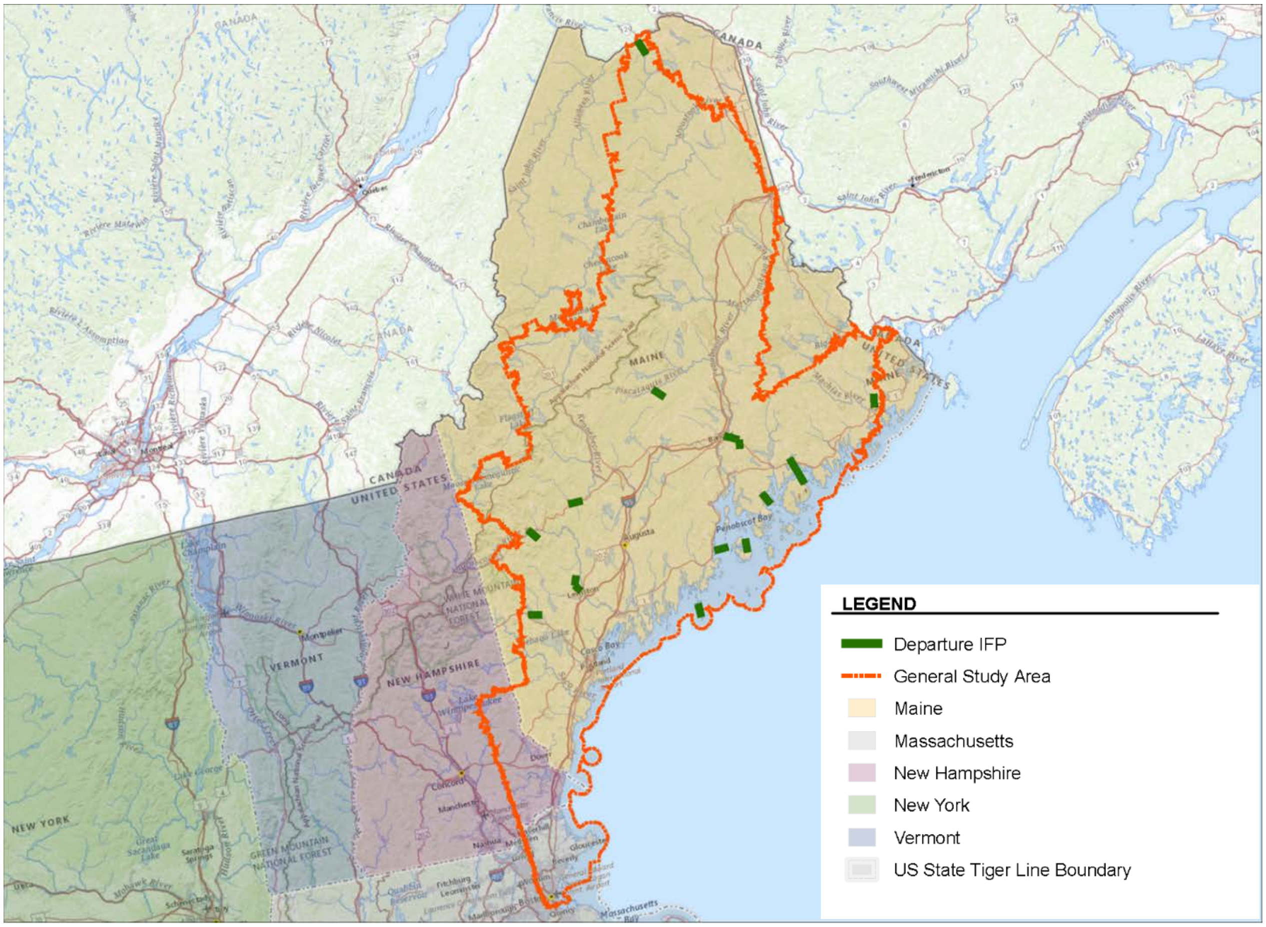
Exhibit 1-7 illustrates the Arrival IFPs, while **Exhibit 1-8** illustrates the Departure IFPs, used by helicopters operating to and from the ILHS-HAA Study Airports/Heliports. These procedures are operated by helicopters with special permission granted by the FAA Flight Services.

Exhibit 1-7 ILHS-HAA Current Arrival IFPs for Select Study Airports/Heliports



Source:	Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Special Procedures.
Prepared By:	ATAC Corporation, December 2022.

Exhibit 1-8 ILHS-HAA Current Departure IFPs for Select Study Airports/Heliports



Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Special Procedures.

Prepared By: ATAC Corporation, December 2022.

2 Purpose and Need

The FAA has prepared this Draft EA to evaluate the potential environmental impacts associated with implementation of new RNAV-based flight routes for the ILHS-HAA Project (Proposed Action). As required by FAA Order 1050.1F, an EA must include a discussion of the underlying purpose and need for the Proposed Action. This includes a discussion of the problem(s) being addressed and what the FAA plans to achieve by implementing the Proposed Action. The following sections describe the need for the Proposed Action (i.e., the existing issues in the ILHS-HAA Project that would be addressed by the Proposed Action), as well as the description of the Proposed Action itself.

2.1 The Need for the Proposed Action

In the context of an EA, "need" describes the problem that the Proposed Action is intended to resolve. The problem in this case is the lack of existing instrument helicopter flight routes in the ILHS-HAA Project GSA. As introduced in **Section 1.1.1**, recent advancements in technology and design criteria have allowed the FAA to develop ZK Routes. The routing of helicopters serving the ILHS-HAA Project can be improved to increase the efficient use of the airspace to the benefit of pilots, controllers, and the general public. Additionally, VFR flights lack efficiencies inherent in RNAV-based design. This is because they rely on line of sight piloting technics that cannot provide specific and precise navigational benefits for aircraft, including predetermined speeds or altitudes. Furthermore, as discussed in **Section 1.2.2**, conventional arrival and departure IFPs and VFR flights are subject to lateral and vertical flight path buffers eliminated through use of RNAV technology. RNAV routes can reduce the need for pilots/controllers to employ vectoring and speed adjustments, thus reducing controller and pilot workload. In turn, this adds efficiency to an air traffic system by enhancing predictability, flexibility, and route segregation. By taking advantage of the increased benefits associated with RNAV technology, the FAA is better able to meet one of its primary missions as mandated by Congress – to provide for the efficient use of airspace, to develop plans and policy for the use of the navigable airspace, and to assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace.

The following sections describe the problem in greater detail.

2.1.1 Description of the Problem

There are several issues associated with the helicopter routing currently implemented in the ILHS-HAA Project. These issues are predominantly caused by inefficient lateral and vertical paths associated with weather limitations of VFR flight, conflicts between arriving and departing traffic, and delays associated with the close proximity of the heliports and surrounding infrastructure.

Most of the airports/heliports serving ILHS-HAA GSA only offer arrivals and departure IFPs serving the immediate area adjacent to the facility. For en route travel, helicopters are subject to either flying VFR with flight following, requiring good visibility and coordination with ATC; or flying in IFR conditions limited conventional automated navigational route guidance and frequent ATC position reporting. When ATC issues instructions for a pilot to follow a ZK route, ATC knows when and where the helicopter will fly until it reaches the arrival to the airport/heliport. VFR traffic with flight following (or in designated airspace requiring contact with ATC) requires increased communication between controller and pilot. Consequently, less-precise flight paths due to helicopter speed and request/response time may result due to the time it takes the controller to issue an instruction to the pilot and for the pilot to read the instruction back to the controller for confirmation before the instruction can be executed. As a result, flight route predictability is reduced, as is efficient use of the airspace.

Current traffic flows operate on RNAV arrival IFPs that end close to the airport/heliport increasing task complexity en route and also contributes to inefficient routes and altitudes at the termination of the RNAV departure procedure. Transfer to VFR flight can require sequencing and separation through the vectoring of helicopters reducing the predictability and repeatability of the routing while increasing cockpit and ATC task complexity.

Predictability is also reduced due to a lack of RNAV routes between Study Airports/Heliports. None of the Study Airports/Heliports have helicopter RNAV routes. The proposed ZK routes allow controllers to give precise routing to helicopters between the departure and arrival flight segments.

In addition, some arrival and departure flight paths intersect, requiring pilots to level off to maintain adequate vertical and lateral separation between helicopters. Upon termination of the departure procedure helicopters are required to maintain visual separation with other aircraft without any RNAV route guidance provided. These complex, converging interactions require more frequent controller-to-pilot and controller-to-controller communication, reducing efficient airspace use.

The FAA's ability to meet one of its primary missions as mandated by Congress – to provide for the efficient use of airspace – is impeded as a result of these types of air traffic interactions for air ambulance helicopters. Therefore, the problem is the inability to fully employ the additional efficiency provided by current RNAV design criteria and guidance. By developing RNAV routes that take full advantage of current design criteria and guidance, the air traffic system would experience increased efficiency demonstrated by enhanced predictability, increased connectivity from origin to destination, and flexibility.

It is important to note that a key design constraint is safety. Any proposed change to or introduction of a new procedure to resolve a problem must not compromise safety, and if possible must enhance safety. To enhance safety, the ZK routes were designed to have the lowest possible en route altitudes to reduce the potential impacts of icing conditions on air ambulance helicopter operations during inclement weather. Although the current VFR routings are less efficient, they meet current FAA safety criteria.

2.1.2 Causal Factors

The inefficiencies and resulting complexities associated with the lack of existing helicopter routes are the primary foundation for the problem in the ILHS-HAA Project. A problem (or need) is best addressed by examining the circumstances or factors that cause it. Addressing the causal factors behind the problem will help develop a reasonable alternative designed to resolve the problem (i.e., meet the "purpose").

As summarized above, several issues have been identified as causes for the inefficiencies in the ILHS-HAA GSA. For purposes of this EA, these issues were grouped into three key causal factors:

- Lack of predictable standard routes defined by a series of waypoints in the en route environment to the airport/heliport arrivals/departures.

- Complex converging and dependent route procedure interactions
- Lack of flexibility in the efficient transfer of traffic between the en route and terminal area airspace

These three causal factors are discussed in the following sections.

2.1.2.1 Lack of Predictable RNAV Routes

Predictable standard RNAV routes allow both pilots and controllers to know ahead of time how, where, and when a helicopter should be operated along a defined route. This also allows controllers and pilots to better plan airspace use and the control of helicopters in the given volume of airspace. A predictable RNAV route may include expected locations (where), altitudes (where and how high), and speeds (how fast and when) at key points. A procedure that provides these elements results in a more predictable route for the pilot and controller.

Helicopter performance and/or piloting technique can vary, and as a result, may also be a factor in reducing predictability. Because VFR flight is less precise and predictable than RNAV routes, controllers will use vectoring, as well as instructions governing speed and altitude level-offs, to ensure safe vertical and lateral separation between aircraft. As discussed in **Section 1.1.1.1**, RNAV routes enable aircraft to follow more accurate and better-defined, direct flight routes in areas covered by GPS-based navigational aids. This allows for predictable routes with fixed locations and altitudes that can be planned ahead of time by the pilot and ATC.

The following sections describe some of the issues with predictability in the ILHS-HAA Project airspace.

Current En Route Traffic Lacks Full Advantage of RNAV Capabilities

As shown in **Table 2-1**, many of the Study Airports/Heliports are currently served by restricted (e.g. FAA-approved operator only, also referred to as "Specials") RNAV Arrival and Departure Instrument Flight Procedures. As depicted in **Exhibits 1-7 and 1-8**, many phases of flight do not have RNAV routings. While the helicopters are able to fly RNAV procedures into and out of many of the Study Airport/Heliports, they then transition to VFR flight. Flying the majority of the route under VFR reduces the predictability and efficiency of the routing and does not allow for controllers to issue a specific routing to the pilots. Without specific routing the repeatability of the flight is reduced as the pilots and controllers will behave in a different manner each flight. Since the helicopters in the ILHS-HAA study are RNAV equipped, the overall benefit of RNAV En Route Navigation is not realized. Additional benefits derived from the use of RNP are not realized either under the No Action Alternative.

Table 2-1 ILHS-HAA Project – Existing Arrival IFP and Departure IFPs

Airport/Heliport Served	Gate Served	Procedure Name	Procedure Type	Transitions
ARRIVALS (IAPs)				
0B1	NW	COPTER RNAV (GPS) Z RWY 32	RNAV	1
4ME9	SE	COPTER RNAV (GPS) 353°	RNAV	3
22ME	N	COPTER RNAV (GPS) 182°	RNAV	1
39ME	NW	COPTER RNAV (GPS) 170°	RNAV	1
98ME	NW	COPTER RNAV (GPS) 160°	RNAV	1

Airport/Heliport Served	Gate Served	Procedure Name	Procedure Type	Transitions
59B	NE, SE	COPTER RNAV (GPS) Z RWY 31	RNAV	2
ME02	NE, SE	COPTER RNAV (GPS) 317°	RNAV	2
ME15	SE, SW	COPTER RNAV (GPS) 352°	RNAV	2
ME23	NE, SE	COPTER RNAV (GPS) 288°	RNAV	2
ME37	NE, SE	COPTER RNAV (GPS) 299°	RNAV	2
ME43	SE, SW	COPTER RNAV (GPS) 335°	RNAV	2
ME48	SE, SW	COPTER RNAV (GPS) 002°	RNAV	2
ME49	SE	COPTER RNAV (GPS) 310°	RNAV	1
ME52	NE, NW	COPTER RNAV (GPS) 210°	RNAV	2
ME55	N	COPTER RNAV (GPS) 202°	RNAV	1
ME63	NE, SE	COPTER RNAV (GPS) 341°	RNAV	2
ME76	E	COPTER RNAV (GPS) 287°	RNAV	1
ME77	NE, SE	COPTER RNAV (GPS) 309°	RNAV	2
ME78	NE, NW	COPTER RNAV (GPS) 196°	RNAV	2
ME87	E	COPTER RNAV (GPS) 275°	RNAV	1
ME95	NE, NW	COPTER RNAV (GPS) 163°	RNAV	2
ME98	NE, SE	COPTER RNAV (GPS) 306°	RNAV	2
DEPARTURES (IFPs)				
22ME	N	HURLA ONE DEPARTURE (COPTER) (RNAV)	RNAV	1
ME02	S	DUFFE ONE DEPARTURE (COPTER) (RNAV)	RNAV	1
ME15	S	KUCEV ONE DEPARTURE (RNAV)	RNAV	1
ME23	NE. SE	FEMIG ONE DEPARTURE (RNAV)	RNAV	2
ME37	E	WASAL ONE DEPARTURE (RNAV)	RNAV	1
ME43	SE	CAPUK ONE DEPARTURE (RNAV)	RNAV	1
ME48	S	IDATE ONE DEPATURE (RNAV)	RNAV	1
ME52	N	FODAG ONE DEPARTURE (RNAV)	RNAV	1
ME55	N	MASST ONE DEPARTURE (RNAV)	RNAV	1
ME63	SE	FEPUV ONE DEPARTURE (RNAV)	RNAV	1
ME76	E	HUVIR ONE DEPARTURE (RNAV)	RNAV	1
ME78	NW	IGILE ONE DEPARTURE (COPTER) (RNAV)	RNAV	3
ME95	SW	ZATIS ONE DEPARTURE (RNAV)	RNAV	1

Note: IFPs in Canadian airspace are not noted herein but may be flown and are available.

Source: U.S. Department of Transportation, Federal Aviation Administration, March 2023.
Prepared by: ATAC Corporation, March 2023.

Efficient helicopter operations depend on factors such as weather, wind direction, and air traffic conditions. As a result, it is possible for the routing of helicopters to change several times throughout a day. Inclement weather for helicopters flying VFR can cause them to be rerouted around storms and other adverse events. ZK routes allow for helicopters to traverse areas in IFR conditions at lower altitudes than are possible in VFR.

The extensive vectoring of VFR helicopter traffic due to inclement weather and high traffic levels requiring separation, results in more frequent controller-to-pilot and controller-to-controller communication, increasing controller and pilot workload and reducing predictability.

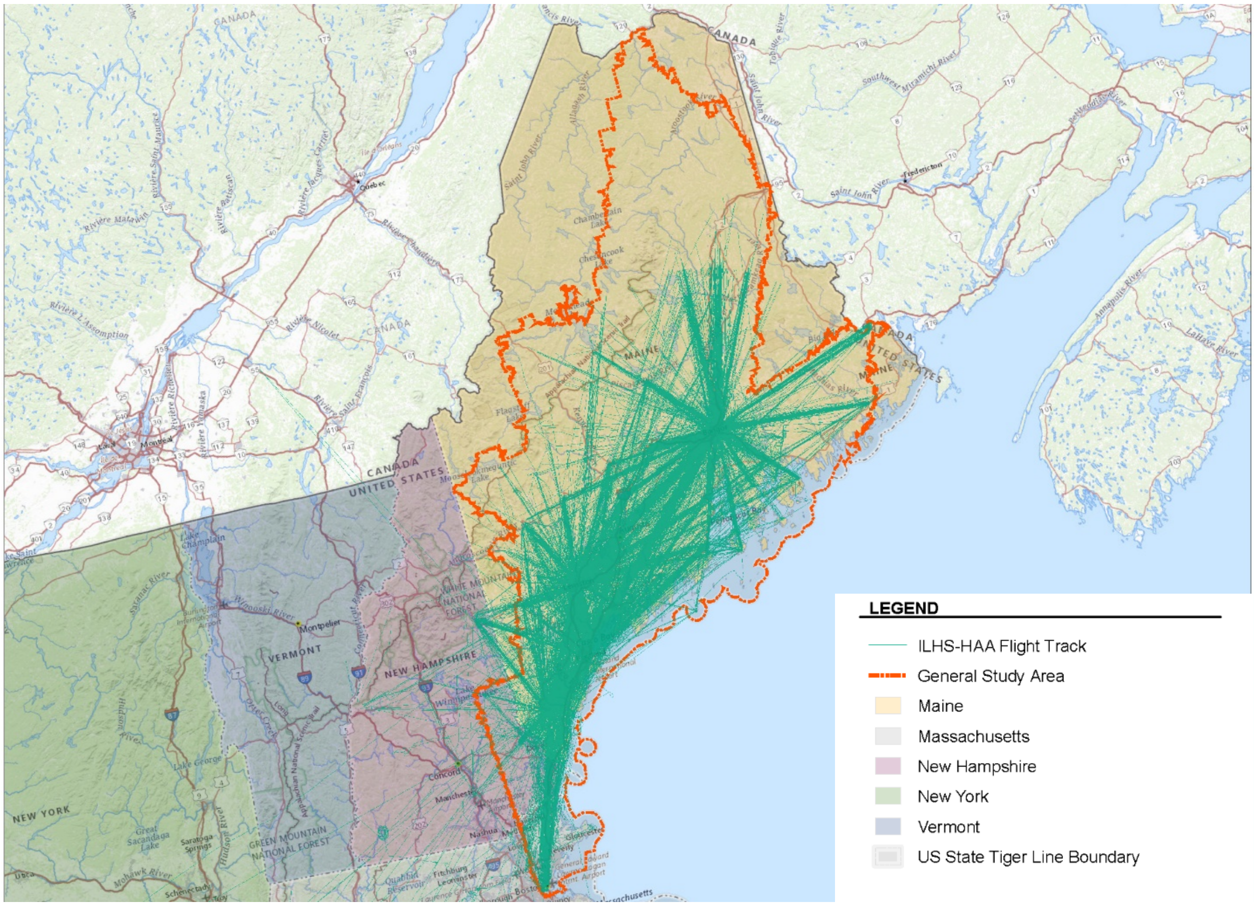
2.1.2.2 Complex Converging and Dependent Route Procedure Interactions

Current helicopter routing often involves helicopters departing from a Study Airport/Heliport and flying VFR to their destination. Most often pilots will attempt to fly the most direct routing to their destination, avoiding other aircraft visually. As depicted in **Exhibit 2-1**, this direct routing often leads to aircraft converging and intersecting one another. While **Exhibit 2-1** depicts only the air ambulance helicopters involved in this study, in addition, fixed wing aircraft and other helicopters traverse the airspace as well, increasing the complexity. In some areas, the separation between flight routes (e.g., lateral separation between two routes or vertical separation between crossing routes) does not allow for efficient use of the airspace. This requires that controllers and or pilots carefully observe aircraft activity along the nearby or crossing flight routes and be prepared to provide air traffic services or have pilots alter their route to ensure standard separation is maintained.[24] For example, where arrival and departure flight routes intersect, flight level-offs may be required for either arrivals or departures to ensure adequate vertical separation between aircraft. In some cases, arriving and departing aircraft on nearby flight routes may need to be vectored to ensure safe lateral separation. In other cases, controllers may need to issue point-outs (a physical or automated action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred).

Because the en route phase of flight in the ILHS-HAA Project would not take advantage of RNAV capabilities, multiple routes use the same NAVAIDs. This may result in conflicts such as aircraft flying at different speeds along adjacent routes, requiring greater separation to prevent operations at similar altitudes or occupation of the same airspace. To avoid potential conflicts, controllers/pilots may need to reroute aircraft by issuing/flying vectors or directing aircraft to level off. This increases pilot and controller workload and system complexity.

24 Areas where the lateral or vertical separation distances are inadequate to allow efficient use of the airspace are referred to as "confliction points" by air traffic controllers.

Exhibit 2-1 ILHS-HAA Radar Flight Tracks



Source: Performance Data and Reporting System (PDARS) radar data, January 2, 2020 to November 6, 2021, ATAC Corporation.
Prepared by: ATAC Corporation, January 2023.

2.1.2.3 Lack of Flexibility for Efficient Traffic Transfer between ATCT, En Route and Terminal Area Airspace

Flexibility allows controllers to plan for and adapt to traffic demands, which change frequently throughout the day. ZK routes allow controllers to transfer control of helicopters at various waypoints along the route efficiently. In airspace that requires contact with ATCT prior to entering, ZK routes establish a point and routing that allows controllers to efficiently manage the sequencing and separation of helicopters. Controllers require options to manage shifting traffic demand that can be caused by weather or temporal shifts in the number of aircraft operating in a given area.

Factors such as a lack of defined RNAV routing, requiring multiple aircraft flows to be sequenced over the same point, can increase the amount of vectoring needed to merge traffic and maintain safe separation. The following sections further discuss flexibility issues specific to ILHS-HAA Project airspace.

Lack of Connectivity in the En Route Structure

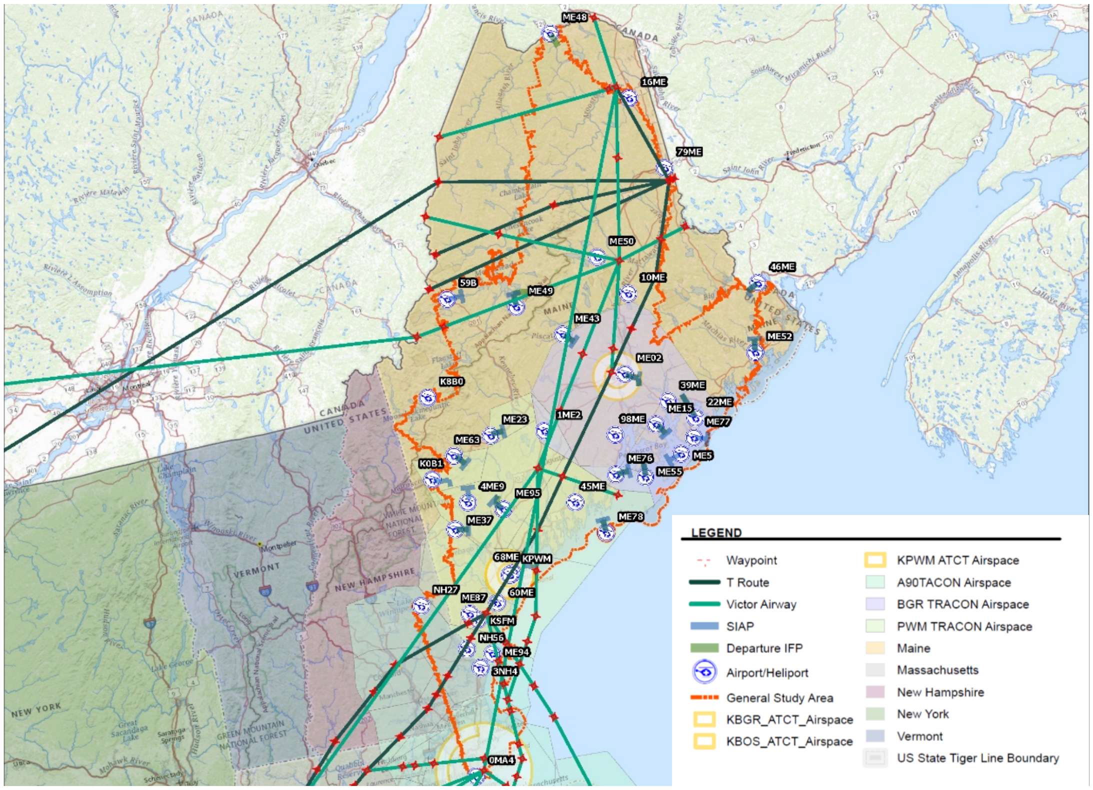
There are currently no ZK routes within the GSA. While the helicopters within the study may fly existing Victor Airways and T Routes,[25] these are primarily designed for fixed wing aircraft and do not directly serve many of the Study Airports/Heliports directly. The existing low altitude routing does not offer any connectivity to the existing arrival and departure IFPs at the Study Airports/Heliports. The current Victor Airways and T Routes often conflict with the arrival and departure IFPs creating confliction points along the routes. **Exhibit 2-2** depicts the existing low altitude routing available today.

The Victor Airways rely on VOR navigational aids that do not provide the same flexibility that RNAV waypoints do and another FAA project, the VOR Minimum Operating Network (VOR MON) is reducing the number of VORs within the United States and thereby reducing the utility of the existing Victor Airways. The existing T routes were not designed specifically for helicopters (publicly available helicopter routes are called TK Routes) and do not take advantage of the navigational precision offered by RNP capabilities offered by the proposed ZK Routes.

The minimal utility provided by the existing low altitude routes leads to many ILHS-HAA operations to be conducted under VFR, thereby negating the efficiency gains the FAA's NextGen program is designed to provide including a predictable transfer control point between the ATCT, TRACON, and en route environments.

25 Victor Airways are low altitude airways that utilize VOR navigational aids. T Routes are low altitude RNAV routes that utilize GPS waypoints.

Exhibit 2-2 Existing Victor Airways and T Routes



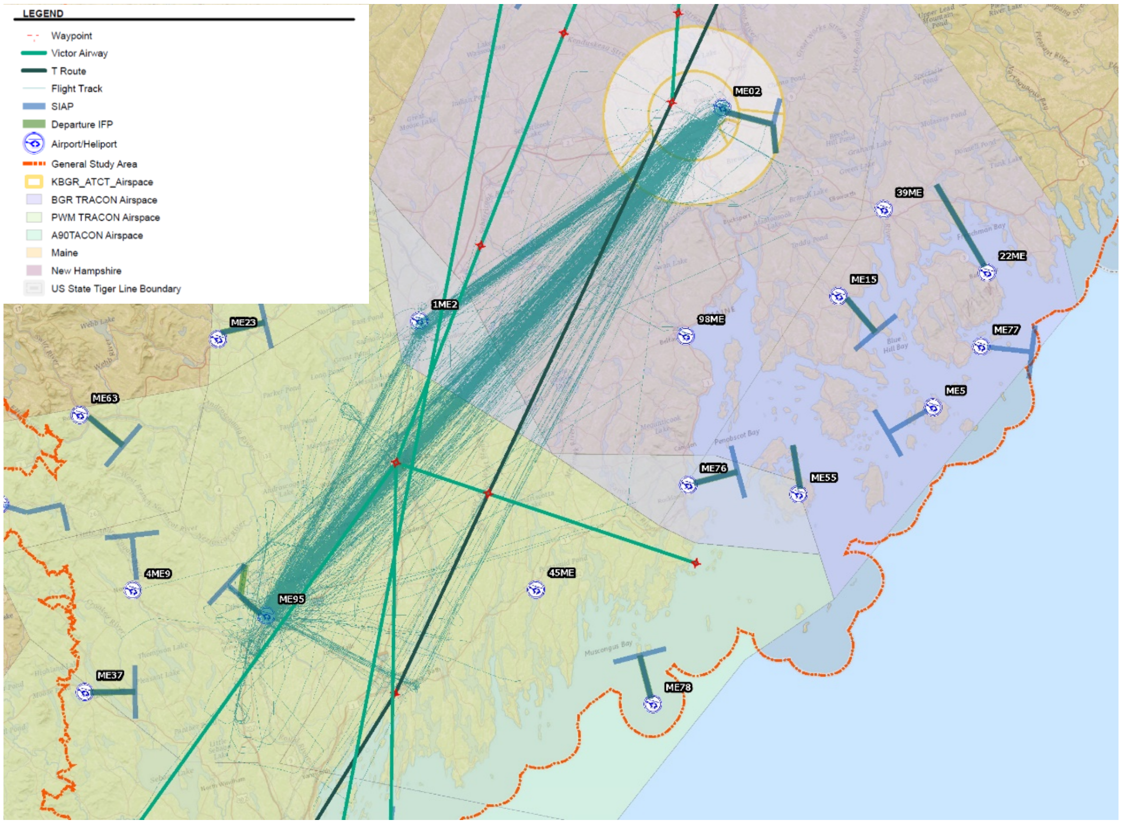
Source: FAA, NFDC Airways (accessed January 2, 2022).
Prepared by: ATAC Corporation, January 2022.

Helicopters in the ILHS-HAA study are typically flying VFR or are on a designated route such as that depicted in **Exhibit 2-3**. The routes do not offer direct connectivity to the arrival and departure IFPs, thereby necessitating ATC to issue inefficient vectors to the pilots, have the pilots confirm the vector route instructions, and monitor the helicopter joining a designated route (such as an Airway) from a departure IFP or to join an arrival IFP from the designated route. These verbally exchanged vectors create additional workload for both the controllers and helicopter pilots while reducing the predictability and repeatability of the operations. In terms of air traffic, to maintain safe separation, controllers must create sufficient gaps between aircraft along a route to safely separate helicopters from multiple streams of air traffic at varying speeds and altitudes. This may require controllers to employ airspace management techniques such as vectoring aircraft off procedures or directing pilots to reduce speed, which can increase congestion. The need to employ these management techniques commonly results in increased workload for both the controller and pilot.

Helicopters destined for the Study Airports/Heliports share arrival IFPs that enter the terminal airspace on a single arrival flow through a series of vectors. Helicopters are then split from a single arrival flow and follow the arrival IFP to touchdown or executing a missed approach.

Exhibit 2-3 depicts an exemplary routing from ME95 (CMMC Air Ambulance Landing Site Heliport) to ME02 (Eastern Maine Medical Center Heliport). After helicopters depart ME95, there are no routes providing direct access to ME02. Helicopters will need to enter the BGR TRACON and BGR ATCT airspace on an undefined path. The helicopter may then be vectored by ATC to join the COPTER RNAV (GPS) 317° arrival IFP. Due to a lack of connectivity, departing helicopters often proceed directly en route rather than receiving a vector to the arrival IFP. This direct routing does not provide the precision guidance associated with RNAV routes and is less predictable and repeatable.

Exhibit 2-3 Existing Routing Between ME95 and ME02



Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data. Federal Aviation Administration, NFDC, Special Procedures. ATAC Corp, PDARS Radar Data.
Prepared by: ATAC Corporation, January 2022.

2.2 Purpose of the Proposed Action

The purpose of the Proposed Action is to address the issues discussed in the previous sections in order to improve the efficiency of the procedures and airspace utilization in the ILHS-HAA Project. To meet this goal, the Proposed Action would optimize routing to and from the Study Airports/Heliports, while maintaining or enhancing safety, in accordance with FAA's mandate under federal law. This goal would be achieved by creating RNAV (RNP) routes reducing dependence on ground-based NAVAID technology and VFR flight in favor of more efficient satellite-based navigation. Specifically, the objectives of the Proposed Action are as follows:

- Improve the predictability in transitioning air traffic between en route and terminal area airspace and between terminal area airspace area and the runways/helipads
- Provide en route connectivity for arrivals and departures in in the GSA

- Improve the flexibility in transitioning air traffic between en route and terminal area airspace and between terminal area airspace area and the runways/helipads

The FAA expects that the frequency of controller/pilot communication would decrease, reducing both controller and pilot workload by decreasing the complexity of the routes flown. Improvements from RNAV routes would reduce the need for vectoring and level flight segments, resulting in more predictable traffic flows.

Each objective of the Proposed Action is discussed in greater detail below.

2.2.1 Improve the Predictability of Transitioning Air Traffic

As discussed in **Section 2.1.2.1**, the lack of up-to-date RNAV routes requires controllers/pilots to use air traffic management techniques such as vectoring to ensure safe vertical and lateral separation between aircraft during the arrival and departure phases of flight. As a result, controllers and pilots experience a more complex workload. These factors affect predictability within the ILHS-HAA Project.

This objective can be measured with the following criteria:

- Ensure that the majority of the Study Airports/Heliports have RNAV low altitude routes utilizing the most current RNAV criteria (measured by count of RNAV ZK routes for an individual Study Airport/Heliport).

2.2.2 Segregate Arrivals and Departures

As discussed in **Section 2.1.2.2**, aircraft frequently converge and intersect requiring helicopters to level off or vector to ensure adequate separation between different traffic flows. RNAV routes can be designed with capabilities such as speed control and altitude restrictions that segregate helicopters on the route while reducing controller and pilot workload by reducing the complexity of the procedures. The objective of the Proposed Action is to implement ZK routes that would better segregate en route traffic within the airspace. This objective can be measured by number of route legs that are to be used to/from Study Airports/Heliports.

2.2.3 Improve Flexibility in Transitioning Air Traffic

As discussed in **Section 2.1.2.3**, the limited number of available transfer control points and associated waypoints along the routing of helicopters constrain efficiency in the terminal and en route transitional airspace. This requires merging multiple traffic flows before aircraft arrive at and depart from terminal airspace. One objective of the Proposed Action is to minimize the need for merging traffic flows by increasing the number of transfer control points and routes that are dedicated to specific Study Airports/Heliports. This objective can be measured with the following criteria:

- Where possible, increase the number of RNAV routes connected to IFP arrivals and departures compared with the No Action Alternative (measured by total count of ZK routes connected to IFP arrivals/departures for the Study Area)

2.3 Criteria Application

The FAA will evaluate the Proposed Action to determine how well it meets the purpose and need based on the measurable criteria and objectives described above. The evaluation of alternatives will include the No Action Alternative, under which the 2020/2021 air traffic routes serving the Study Airports/Heliports would remain unchanged except for planned procedure modifications, independent of the ILHS-HAA Project, which were or are expected to be approved for implementation. The criteria are intended to help compare the Proposed Action with the No Action Alternative.

2.4 Description of the Proposed Action

The Proposed Action would implement optimized RNAV ZK Routes in the ILHS-HAA Project. This would improve the predictability and segregation of air traffic routes, as well as increase flexibility and efficiency in providing air traffic services. The Proposed Action is described in detail in **Chapter 3**, *Alternatives*.

Implementation of the Proposed Action would not increase the number of helicopter operations at the Study Airports/Heliports. Furthermore, the Proposed Action would not involve physical construction of any facilities such as additional runways or taxiways, and would not require permitting or other approvals or actions at either the state or local level. Therefore, the implementation of the proposed changes to procedures in the ILHS-HAA Project would not require any physical alterations.

2.5 Required Federal Actions to Implement Proposed Action

Implementing the Proposed Action requires the FAA to publish new ZK routes and transitions and undertake controller training.

2.6 Agency Coordination

On August 31, 2022, the FAA distributed a notice of intent to prepare an EA letter to 732 federal, state, regional, and local officials as well as to five area Tribes. The FAA sent the early notification letter to:

- Advise agencies and tribes of the initiation of the EA study
- Request background information about the General Study Area established for the EA
- Provide an opportunity to advise the FAA of any issues, concerns, policies or regulations that may affect the environmental analysis that the FAA will undertake in the EA

On September 4, 2022, a notice of intent to prepare an EA was published in the Portland Press Herald (ME), the Bangor Daily News (ME), the Portsmouth Herald (NH) and the New Hampshire Union Leader (NH) newspapers. Three comments were received in response to the notice of intent and were considered in preparation of the Draft EA. **Appendix A**, *Agency and Public Coordination and List of Receiving Parties*, includes a copy of the notice of intent letter (and attachments), an affidavit of newspaper publication, and a list of the receiving agencies.

On May 5, 2023 the FAA initiated Section 106 consultation with the Maine, New Hampshire, and Massachusetts SHPO offices and Tribal Historic Preservations Officers from five tribes within the GSA; namely: Houlton Band of Maliseets, Aroostook Band of Micmacs, Penobscot Nation, Passamaquoddy Tribe of Indian Township, Passamaquoddy Tribe of Pleasant Point, and the Cowasuck Band of the Pennacook/Abenaki PeopleTribe that may have interests within the General Study Area in accordance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq.) and the implementing regulations at 36 C.F.R. Part 800.

Appendix A, *Agency and Public Coordination and List of Receiving Parties*, includes a copy of the notice of intent letter (and attachments), affidavits of newspaper publication, as well as a list of the receiving agencies.

3 Alternatives

The alternatives analysis is prepared pursuant to Council on Environmental Quality (CEQ) regulations and Federal Aviation Administration (FAA) guidance provided in FAA Order 1050.1F. This Chapter discusses the following topics:

- Alternative Development Process
- Alternatives Overview
- Comparison of Alternatives
- Listing of Federal Laws and Regulations

The technical terms and concepts discussed in this Chapter are explained in **Chapter 1**, *Background*.

3.1 ILHS-HAA Project Alternative Development

Developing alternatives for the ILHS-HAA Project was a multi-step process that began with the formation of the ILHS-HAA Routes Design Team (Design Team). The Design Team defined operational issues related to improving efficiency, reducing complexity, and improving predictability in the ILHS-HAA Project and recommended conceptual designs for routes that would address these issues.[26] The recommended routes were reported to the working groups and reviewed subject matter experts from the ARTCC and TRACON for feasibility and other experts for locations served, ERAM capabilities, ADS-B coverage, and NAS resource processing. The Design Team designed individual routes based on the recommendations received from Helicopter Air Ambulance operators that would fly the routes. Each route that the Design Team designed had to meet several design criteria as well as the Project purpose and need. The FAA rejected individual routes if, on their own merit, they did not meet the purpose and need of the project.

The Proposed Action that this EA evaluates is a package of many individual, interrelated routes combined into one alternative derived from a complex, iterative process. These routes were considered and evaluated individually and in combination with one another to determine whether the component route would meet the Project's purpose and need. The FAA considered multiple versions of each air traffic route. Several versions were not carried forward as they failed to meet the purpose of the Project.

The following sections describe the alternatives development process the FAA used to create and evaluate a series of routes that, when employed together, would enhance the air traffic efficiency to the ILHS-HAA geographic region.

3.1.1 ILHS-HAA Project Design Team

In March 2020, the Design Team began work to identify routes that would be best served by RNAV ZK routes in the ILHS-HAA Project and began to define potential solutions to those problems. The Design Team included experts in the Air Traffic Control (ATC) system for the ILHS-HAA Project. The Design Team's work was completed following a multi-step process that included: (1) working collaboratively with local aviation facilities and industry stakeholders to identify and characterize existing issues in the ILHS-HAA Project, (2) proposing conceptual

26 ILHS-HAA Route Design Team Meeting Notes, 2020-2022. Conversation with Design Team staff February 2023.

route designs and airspace changes to address these issues, and (3) identifying the expected benefits and potential risks associated with the conceptual designs.

During the first two steps above, the Design Team held meetings with local FAA ATC facilities, industry representatives, and other stakeholders.[27] These meetings were held to learn more about the challenges of operating helicopters in the ILHS-HAA geographic region, including identifying operational challenges associated with existing routings and potential solutions that would increase airspace efficiency. Finally, the Design Team engaged with specialized experts to help identify the benefits and risks associated with the conceptual procedure designs. The specialized experts were from various FAA lines of business, including environmental, safety, and flight standards.

The Design Team identified several performance-based navigation (PBN) solutions expected to improve operational efficiency. The proposed modifications were first conceptual in nature, and did not include a detailed technical assessment to evaluate route feasibility of the. A detailed technical assessment of the proposed solutions was conducted after the initial conceptual designs were evaluated.[28] In developing the proposed routes, the Design Team was responsible for following regulatory and technical guidance, as well as meeting criteria and standards in three general categories:

1. **Performance Based Navigation (PBN) Design Criteria and Air Traffic Control Regulatory Requirements** – Flight procedure design is subject to requirements found in several FAA Orders, including but not limited to:
    a. FAA Order 8260.58C, *The United States Standard Performance Based Navigation (PBN) Instrument Procedure Design*
    b. FAA Joint Order 7110.65Z, *Air Traffic Control*
    c. FAA Order 8260.3E, *United States Standards for Terminal Instrument Procedures (TERPS)*
    d. FAA Order 7100.41A, *Performance Based Navigation Implementation Process*
    e. FAA Order 8260.19I, *Flight Procedures and Airspace*
    f. FAA Order 8260.42B, *United States Standard for Helicopter Area Navigation (RNAV)*
    g. FAA Order 7100.41A*, Performance Based Navigation Implementation Process*
    h. FAA Order JO 7400.2N*, Procedures for Handling Airspace Matters*
    i. FAA Order 8260.46J, *Departure Procedure (DP) Program*

    These FAA Orders define processes, procedures, and methods for PBN flight procedure and route design, amendment, and implementation. Requirements governing air traffic control procedures, routes, air traffic management, and appropriate technical terminology are additionally considered as integral process components.

2. **Operational Criteria** – Operational criteria were consistent with the purpose and need for the project. This includes increasing predictability and repeatability while decreasing complexity in air traffic management. These criteria were evaluated by potential users who have extensive helicopter operational experience in the ILHS-HAA geographic region. These operator evaluations further validated that operations in the ILHS-HAA Project would not be limited by the proposed routes. The evaluations also

27 Id.
28 Id.

confirmed that helicopters could fly the proposed routes as designed without any negative effects on efficiency (e.g., pilot workload).

3. **Safety Factors** – Proposed changes were evaluated against FAA's internal safety evaluation processes, orders, and regulations. If a proposed change introduced a new hazard or increased the severity and/or likelihood of an existing hazard, the design was adjusted or mitigated to reduce the hazard to acceptable levels.

3.1.1.1 **Community Involvement in the Design Process**

The primary operator and FAA engaged in community involvement meetings and briefings held in the Project geographic region. The goal was to educate and involve the participants about the ILHS-HAA Project.

3.1.1.2 **Alternative Design Process**

While the design of one procedure into one Airport or Heliport can be a fairly straightforward process, the ILHS-HAA Design Team was charged with providing a more complete and integrated solution to air traffic complexities and inefficiencies over a large area. The Design Team worked to design routes that would remain laterally separated from each other to the extent feasible. Route designs that remain laterally separated are most efficient when they allow helicopters to operate unaffected by other flight procedures or obstructions.

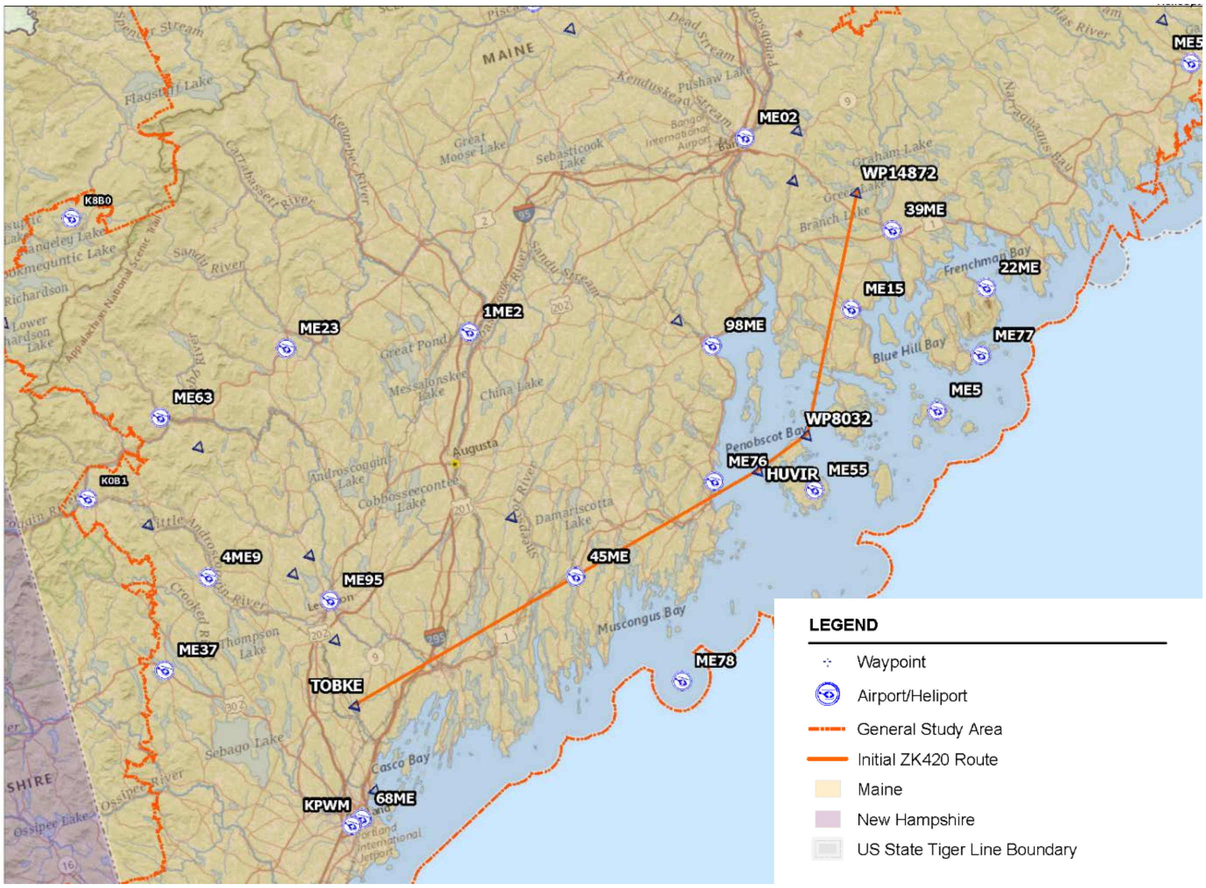
PBN route designs were developed with lateral routings, crossing points, and altitude restrictions that were as optimal as possible, considering the constraints inherent in the ILHS-HAA Project. The Design Team considered a multitude of factors and continuously refined designs. The initial design efforts were focused on a single ZK route to serve Study Airports/Heliports and then were expanded to encompass five routes before the final design consisted of eight ZK routes. The combined final route designs in this Draft EA are the Proposed Action. The following sections provide an example of the process used to develop procedures carried forward as part of the Proposed Action.

ILHS-HAA Proposed ZK420 Route

The development of the proposed ZK420 route provides a good example of the alternative development process. The FAA developed and evaluated several versions of the proposed ZK420 Route. The first version was the Design Team's notional recommendation for improvements for helicopters traversing between the Portland area and Penobscot Bay. The second version was the Design Team's initial route based on the notional recommendations. Finally, after several revisions, the Design Team finalized the proposed version of the route.

The initial design depicted in orange in **Exhibit 3-1** extended northward from TOBKE to HUVIR and on to WP14872. There are approximately 137 annual operations that would fly the route depicted in **Exhibit 3-1**. The altitudes along the route needed to be high enough due to a lack of adequate communications coverage. Currently, helicopters either fly VFR or are directed by BGR and PWN TRACONs along a notional routing by issuing vectors. The Design Team identified several issues resulting from these conditions, including not providing repeatable and predictable course guidance to/from Study Airports/Heliports. The lack of published routing requires controllers to vector helicopters, increasing pilot/controller task complexity.

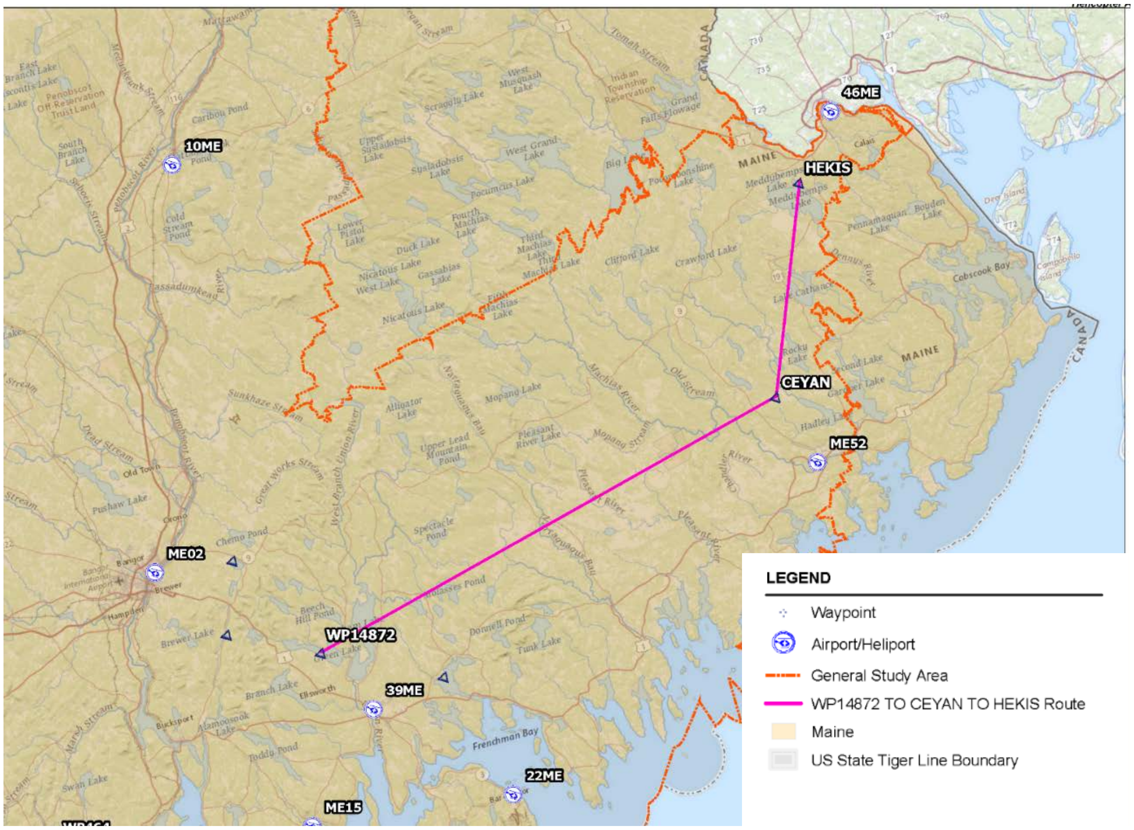
Exhibit 3-1 Initial Design ZK420 Route



Source: *ILHS-HAA TARGETS file version 1*, November 2021.
Prepared by: ATAC Corporation, January 2022.

A second route, depicted in magenta in **Exhibit 3-2**, was developed extending north from the Penobscot Bay area to the Canadian border, near the Calais Regional Heliport (46ME). This route would serve approximately 245 annual operations. Helicopters operating in the area currently are directed by BGR TRACON and ZBW ARTCC air traffic controllers. The lack of existing routing reduces predictability and repeatability and increases controller/pilot workload.

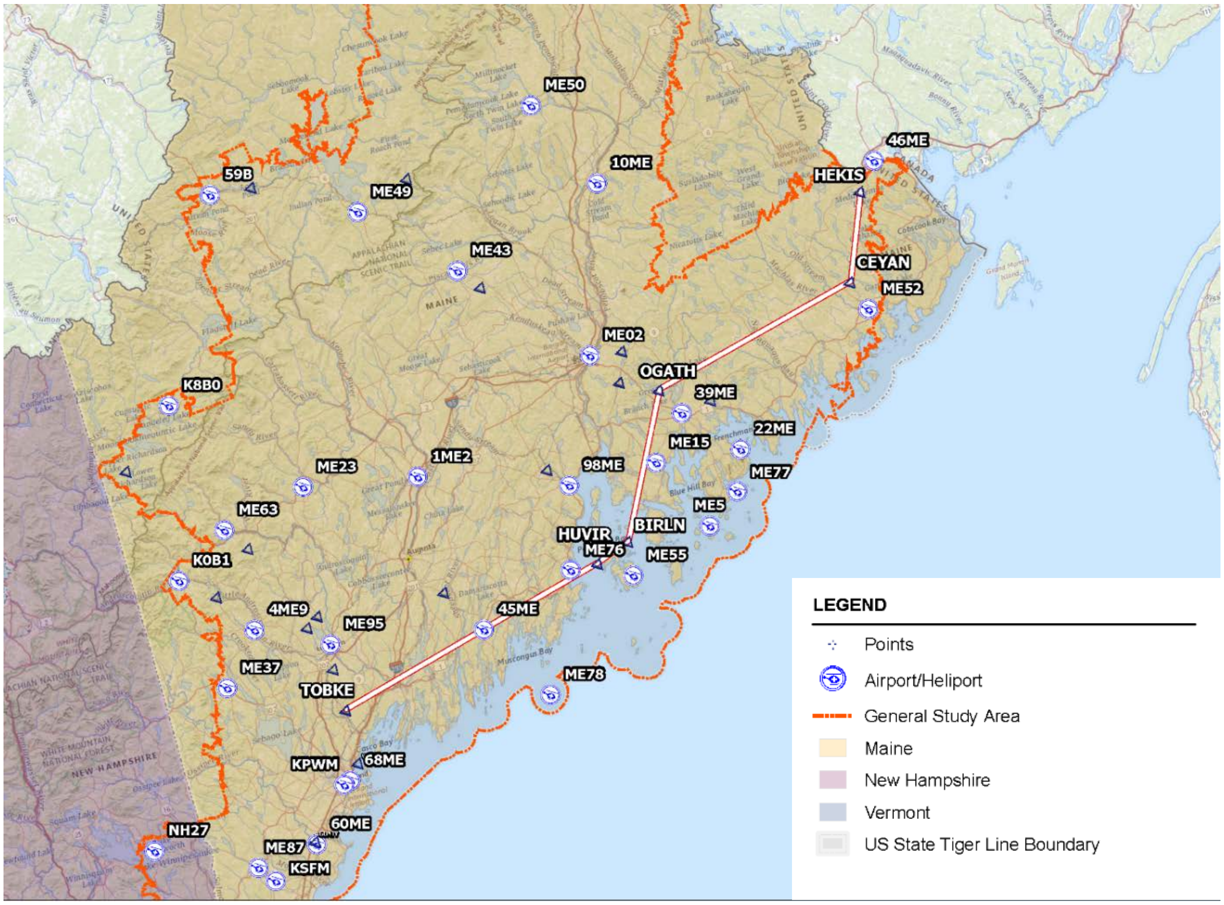
Exhibit 3-2 Initial WP14872 to CEYAN to HEKIS Route



Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Administration, 90% Design TARGETS File, July 2022, ZK Routes, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, February 2023.

Based on these initial designs, the Design Team developed a single new proposed RNAV ZK Route designated ZK420. The Design Team modified the route several times to increase the efficiency of the design and to ensure the route complied with current design criteria. In addition, the Design Team found that approximately 20 annual operations would fly the entirety of the newly proposed ZK route. **Exhibit 3-3** depicts the proposed design for ZK420.

Exhibit 3-3 Proposed Final ZK420 Route



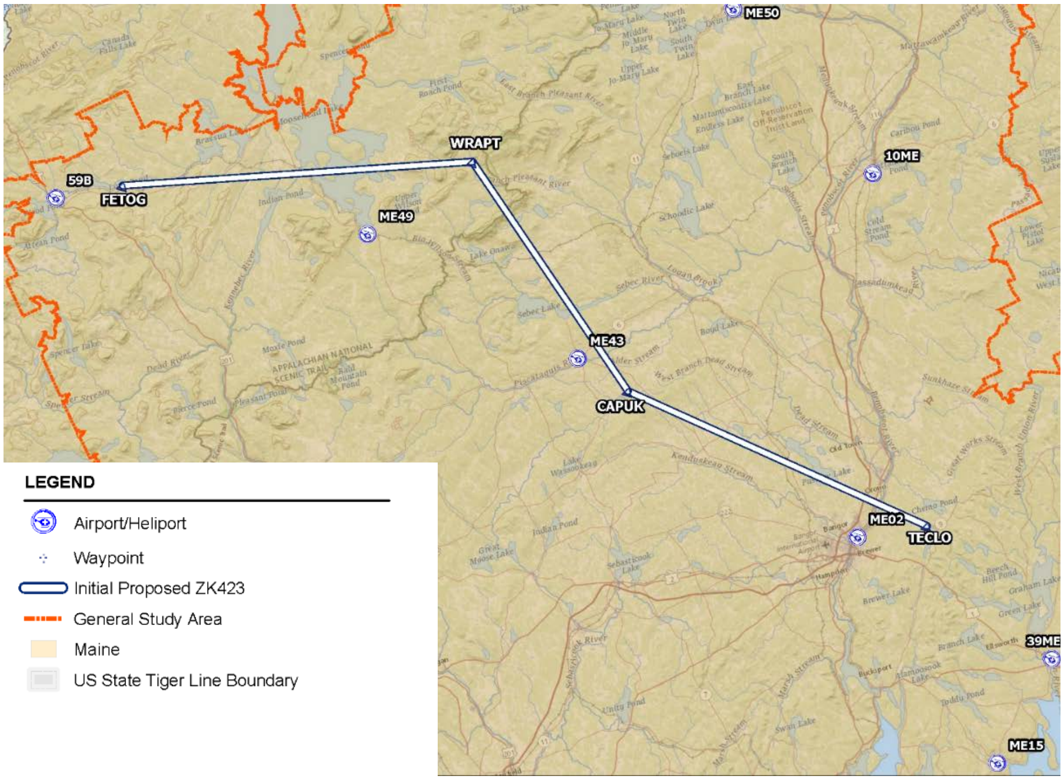
Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Administration, 100% Design TARGETS File, December 2022, ZK Routes, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, February 2023.

ILHS-HAA Proposed Route ZK423

The development of the proposed ZK423 route), that are proposed to primarily serve 59B, ME49, ME43, and ME02 in the western side of Maine, is another good example of the alternative development process. The FAA developed and evaluated several versions of the proposed ZK route. The first versions were the Design Team's recommendations for improvements to the aforementioned Study Airports/Heliports. The final proposed version was the route designed by the Design Team based on the initial design, but then altered to allow for greater connectivity to the Newton Field Airport's (59B) IFP arrival.

Exhibit 3-4 depicts the initial Design team alternative, going from the TECLO to the CAPUK, WRAPT and terminating at FETOG (note the route is bidirectional, meaning it can be flown to and from the arrival/departure Instrument Flight Procedure). The Design Team identified numerous issues with the initial design, including limited radar and frequency coverage, and a lack of connectivity with neighboring procedures.

Exhibit 3-4 Initial Design ZK423 Route



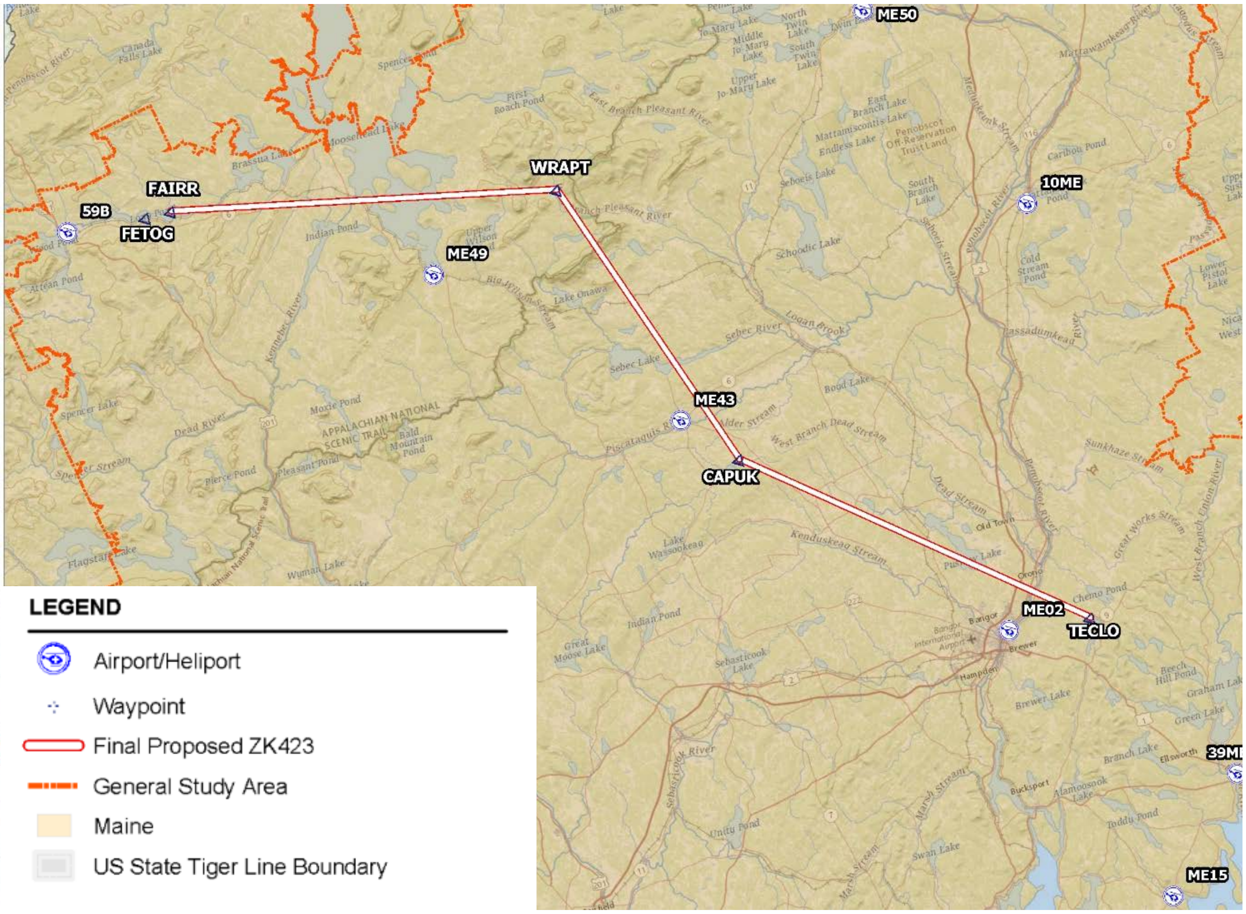
Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Administration, 90% Design TARGETS File, July 2022, ZK Routes, NFDC, Airport and Heliport locations.

Prepared by: ATAC Corporation, February 2023.

The Design Team made changes to the routing including changing altitudes to address radar and frequency coverage. Additionally, the FETOG waypoint was moved and the name changed to FAIRR to connect to the IFP arrival procedure into 59B.

Exhibit 3-5 illustrates the Design Team's final proposed Action Routing for ZK423.

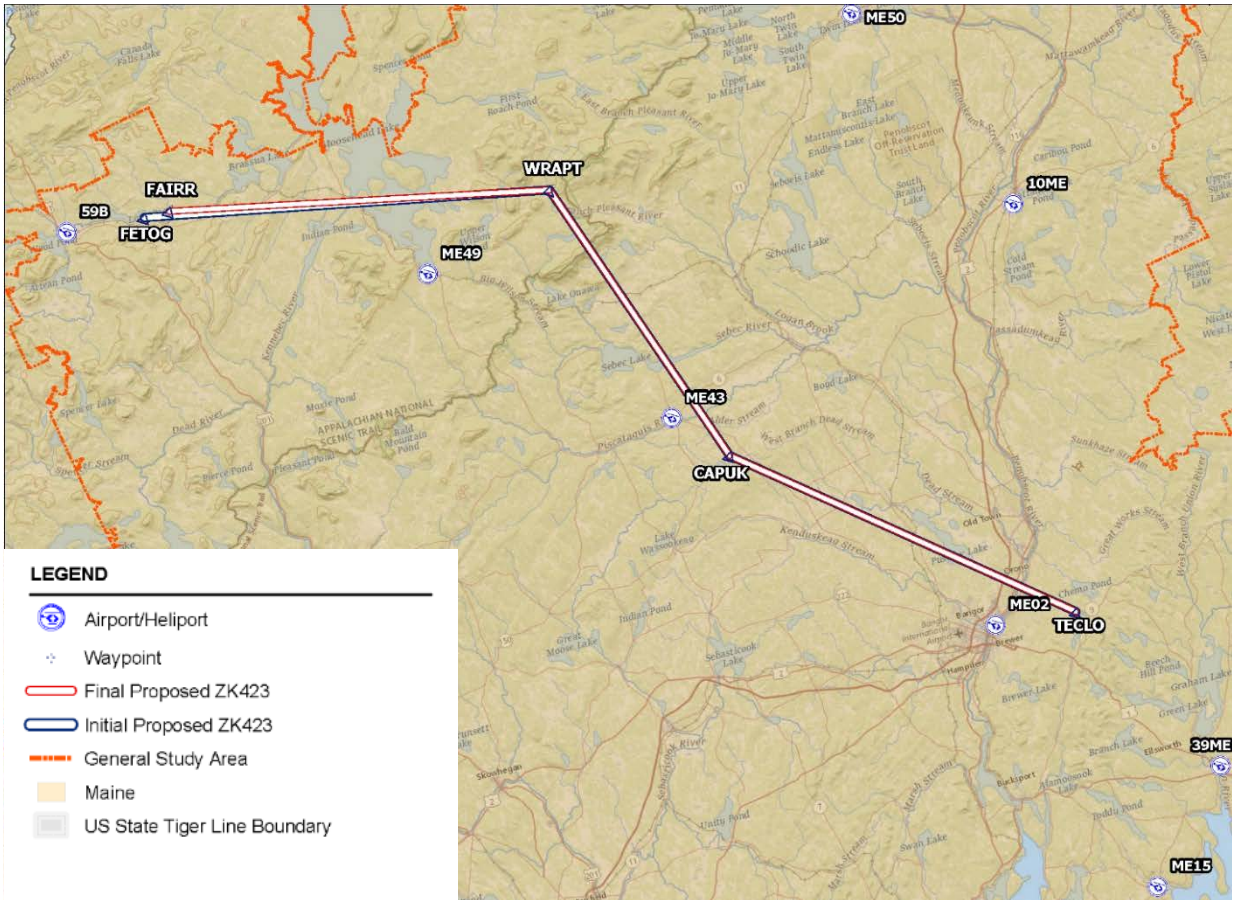
Exhibit 3-5 Proposed Final ZK423 Route



Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Administration, 100% Design TARGETS File, December 2022, ZK Routes, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, February 2023.

Exhibit 3-6 depicts both the initial design and the final proposed design highlighting the changes that were made near 59B.

Exhibit 3-6 Comparison of Initial and Proposed Final ZK423 Route



Source: Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Administration, 90% Design TARGETS File, July 2022, 100% Design TARGETS File, December 2022, ZK Routes, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, February 2023.

3.2 Alternatives Overview

The following sections discuss the No Action Alternative and the Proposed Action, which are the two alternatives carried forward for analysis in the EA.

3.2.1 No Action Alternative

Under the No Action Alternative, the FAA would maintain existing IFP arrival and departure procedures but would not create any routes for the en route environment requiring helicopters to fly VFR or be vectored by various Air Traffic Control facilities. The related procedures/routes and air traffic flow in use in the ILHS-HAA Project as of 2020 would remain the same under the No Action Alternative. Some procedure modifications and/or cancellations independent of those recommended as part of the ILHS-HAA Project are intended to be implemented prior to the Proposed Action to deal with specific issues separate from this Project. Existing publicly flyable procedures with expected modifications are listed on the FAA's Instrument Flight Procedure Gateway website. Details related to changes to procedures were collected and defined for purposes of the No Action Alternative.

In addition, work is underway on the FAA's Very High Frequency Omnidirectional Range (VOR) Minimum Operational Network (MON) program, which involves gradual reduction of the current VOR network to a minimum level necessary to provide a conventional navigation backup as the National Airspace System (NAS) transitions to PBN. The FAA plans to conduct the program in two phases. Phase 1 was between 2016 and 2020, and Phase 2 is currently being conducted between 2021 and 2025. However, there are no forecast procedure changes and/or cancellations related to Phase 1 and Phase 2 VORs located within the ILHS-HAA Project GSA.

The No Action Alternative accounts for current airport runway, heliport, and facility modifications under construction or those to be implemented during the planning horizon of the EA (2023 and 2028). These changes are taken into account in the analyses of impacts associated with the No Action Alternative (see **Chapter 5**, *Environmental Consequences*).

3.2.1.1 No Action Alternative Routes

The No Action Alternative includes 21 low altitude routes: 16 conventional routes (routes that use conventional NAVAIDs), and 5 RNAV routes. It should be noted that none of the helicopters flight tracks appear to fly these routes as they are not specifically designed for helicopter traffic and are not inherently designed to serve the Study Airports/Heliports. As a result, the flight tracks depicted in **Exhibit 3-7** are assumed to be either VFR flights or ATC vectors issued to the pilots in flight. There are zero TK or ZK routes within the ILHS-HAA GSA that would specifically serve the helicopter traffic in the study. **Table 3-1** lists the names of the No Action Alternative routes, the route type (i.e., T Route or V Airway), the basis of design, and the if the routes is specifically design for use by helicopters.

Table 3-1 ILHS-HAA Project – No Action Alternative Routes in the GSA

No Action Alternative Route	Procedure Type	Basis of Design	Helicopter Specific Route[1]
T295	T Route	RNAV	No
T314	T Route	RNAV	No
T662	T Route	RNAV	No
T698	T Route	RNAV	No
T700	T Route	RNAV	No
V1	Victor Airway	Conventional	No
V3	Victor Airway	Conventional	No
V16	Victor Airway	Conventional	No
V39	Victor Airway	Conventional	No
V99	Victor Airway	Conventional	No
V139	Victor Airway	Conventional	No
V141	Victor Airway	Conventional	No
V167	Victor Airway	Conventional	No
V268	Victor Airway	Conventional	No
V270	Victor Airway	Conventional	No
V292	Victor Airway	Conventional	No
V300	Victor Airway	Conventional	No

No Action Alternative Route	Procedure Type	Basis of Design	Helicopter Specific Route[1]
V302	Victor Airway	Conventional	No
V314	Victor Airway	Conventional	No
V431	Victor Airway	Conventional	No
V471	Victor Airway	Conventional	No

Notes:
1\ A TK or ZK route is specifically design for helicopter traffic, T Routes and Victor Airways are designed to serve fixed wing aircraft.

Sources: National Flight Data Center National Airspace System Resources Database, accessed February 2023; Department of Transportation, FAA Operational Procedure Files, December 2022.
Prepared by: ATAC Corporation, February 2023.

Under the No Action Alternative, the final arrivals and initial departure flows from the runways remain as currently in use for all of the Study Airports/Heliports.

3.2.1.2 No Action Alternative Airspace Control Structure

When aircraft depart from or arrive on an assigned route, transfer of control occurs between multiple air traffic facilities. Under the No Action Alternative, the transfer areas would remain unchanged from current conditions. For purposes of this EA, the areas where transfers occur are defined based on entry and exit gates/points. The gates/points are purposely located to segregate arrivals and departures where possible.

Study Airport/Heliport traffic flows can interact with other Study Airport/Heliport traffic flows in different operating configurations. Therefore, the Design Team was required to consider all possible combinations of the various operating configurations.

Exhibit 3-7 show all arrival and departure flows to the Study Airports/Heliports associated with the No Action Alternative. Depending on specific airport traffic flows (Heliports generally do not have traffic flows like airports due to the non-directional nature of the landing area), the interaction between specific flows changes.

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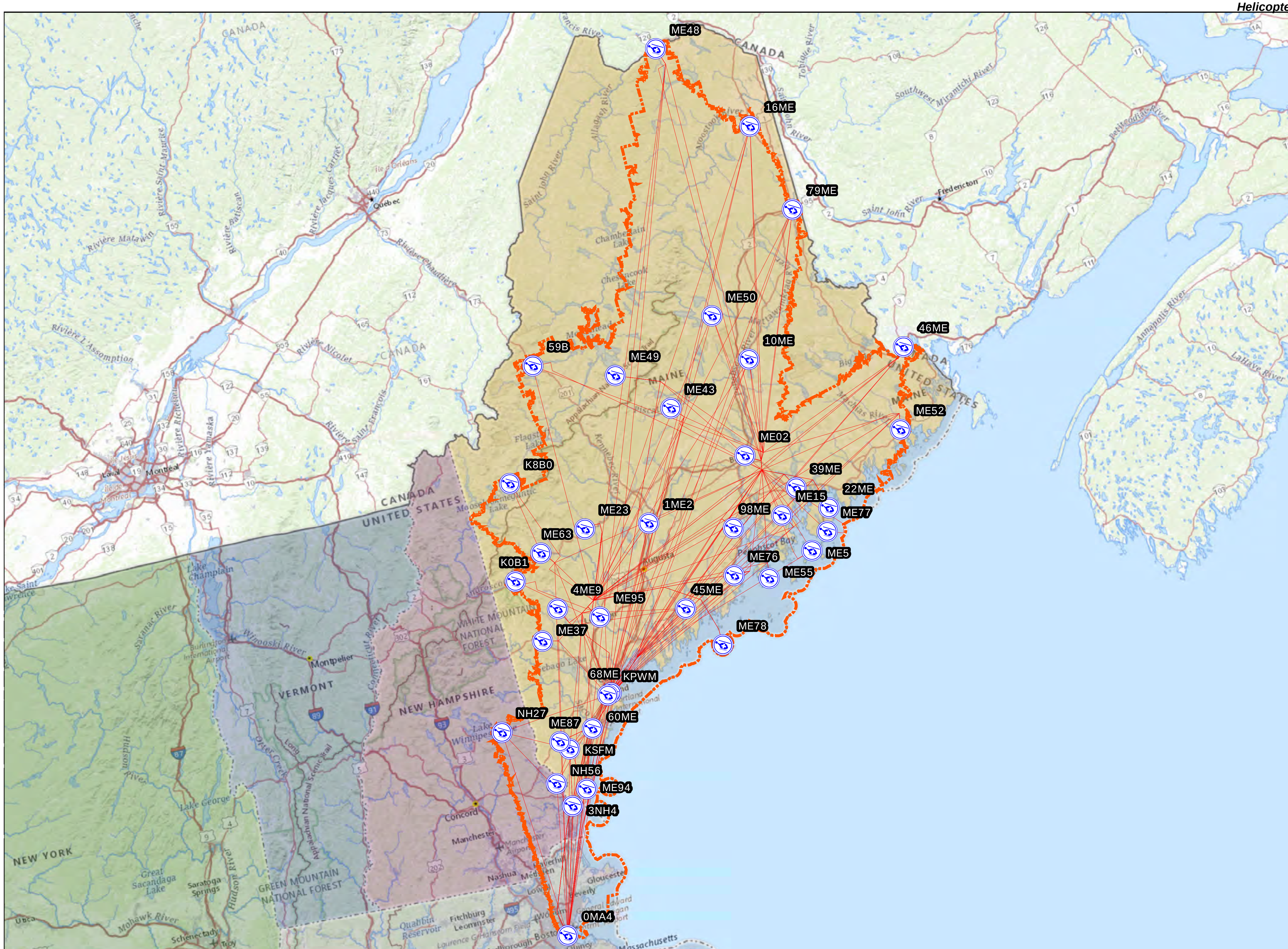

LEGEND

- Airport/Heliport
- No Action - AEDT Flight Track
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:

60ME - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
45ME - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
ME50 - Millinocket Regional Heliport
ME52 - Down East Community Hospital Heliport
ME55 - Vinalhaven Airport
ME63 - Rumford Community Hospital Heliport
ME76 - Penobscot Bay Medical Center Heliport
ME77 - Cranberry Isles Heliport
ME78 - Monhegan Island Heliport
ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data. Federal Aviation Adminstration, NFDC, Airport and Heliport locations. ATAC, AEDT Flight Tracks.
Prepared by: ATAC Corporation, February 2022.

Exhibit 3-7

No Action - AEDT Flight Tracks

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3.2.2 Proposed Action

As discussed in **Section 3.1**, the Proposed Action includes the Proposed Final Designs for all routes the Design Team developed, plus existing IFP arrivals and departures that would continue to be used. This alternative would increase efficiency in the ILHS-HAA Project airspace by improving flexibility in transitioning aircraft, further segregating helicopter traffic from fixed wing traffic, and improving the predictability of air traffic flows.

The Proposed Action includes 8 new ZK routes for a new en route structure, while continuing 21 existing Arrival IFPs and 13 existing Departure IFPs noted previously in **Table 2-1**.

The Draft EA also includes actions related to existing procedures with planned modifications that are carried forward as part of the Proposed Action, and any reasonably foreseeable projects that would alter/affect airspace procedures.

Table 3-2 lists the Proposed Action procedures, the No Action Alternative procedure that the Proposed Action alternative would replace (if applicable), the procedure type, and the basis of design. Finally, the table lists the objectives each procedure design achieves.

Table 3-2 Proposed Action Routes

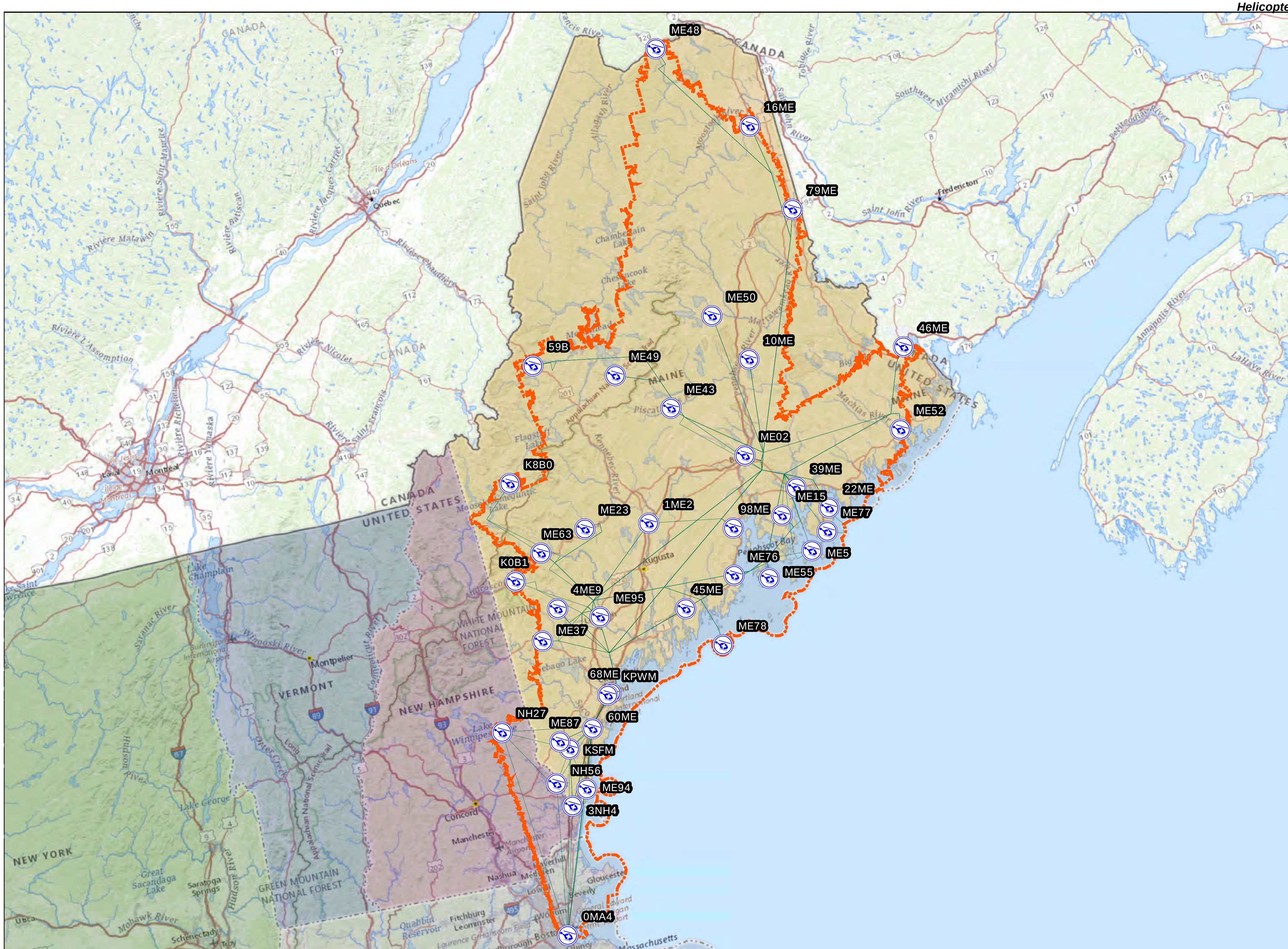
Proposed Action Route	No Action Route	Route Type	Basis of Design	Helicopter Specific Route[1]	Objectives
ZK362	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK411	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK412	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK420	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK421	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK422	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK423	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
ZK415	N/A	ZK Route	RNAV	Yes	Complexity/Predictability/ Repeatability
T295	T295	T Route	RNAV	No	No Change
T314	T314	T Route	RNAV	No	No Change
T662	T662	T Route	RNAV	No	No Change
T698	T698	T Route	RNAV	No	No Change
V1	V1	Victor Airway	conventional	No	No Change
V3	V3	Victor Airway	conventional	No	No Change
V16	V16	Victor Airway	conventional	No	No Change
V39	V39	Victor Airway	conventional	No	No Change
V99	V99	Victor Airway	conventional	No	No Change
V139	V139	Victor Airway	conventional	No	No Change
V141	V141	Victor Airway	conventional	No	No Change

Proposed Action Route	No Action Route	Route Type	Basis of Design	Helicopter Specific Route[1]	Objectives
V167	V167	Victor Airway	conventional	No	No Change
V268	V268	Victor Airway	conventional	No	No Change
V270	V270	Victor Airway	conventional	No	No Change
V292	V292	Victor Airway	conventional	No	No Change
V300	V300	Victor Airway	conventional	No	No Change
V302	V302	Victor Airway	conventional	No	No Change
V314	V314	Victor Airway	conventional	No	No Change
V431	V431	Victor Airway	conventional	No	No Change
V471	V471	Victor Airway	conventional	No	No Change
T700	T700	T Route	RNAV	No	No Change

Notes:
1\ A TK or ZK route is specifically design for helicopter traffic, T Routes and Victor Airways primarily serve fixed wing aircraft.

Sources: ILHS-HAA Project Team 100% Design TARGETS File, December 2022. National Flight Data Center National Airspace System Resources Database, accessed February 2023; Department of Transportation, FAA Operational Procedure Files, February 2023.
Prepared by: ATAC Corporation, February 2023.

The Study Airports/Heliports all have independent operating configurations dependent upon weather and wind. Airport traffic flows can interact with other airport traffic flows in different runway operating configurations. Therefore, the Design Team was required to take into consideration all possible runway operating configurations or combinations thereof. **Exhibit 3-8** shows all arrival and departure flows to the Study Airports associated with the Proposed Action. Dependent upon specific airport flows, the interaction between specific flows changes.



LEGEND

- Airport/Heliport
- Proposed Action - AEDT Flight Tracks
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:
60ME - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
45ME - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
ME50 - Millinocket Regional Heliport
ME52 - Down East Community Hospital Heliport
ME55 - Vinalhaven Airport
ME63 - Rumford Community Hospital Heliport
ME76 - Penobscot Bay Medical Center Heliport
ME77 - Cranberry Isles Heliport
ME78 - Monhegan Island Heliport
ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data. Federal Aviation Adminstration, NFDC, Airport and Heliport locations. ATAC, AEDT Flight Tracks.
Prepared by: ATAC Corporation, February 2023.

Exhibit 3-8

Proposed Action - AEDT Flight Tracks

ILHS-HAA Environmental Assessment

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3.3 Summary Comparison of the Proposed Action and No Action Alternative

This section provides a comparative summary between the Proposed Action and No Action Alternative based on the objectives defined in **Section 2.2**:

- Improve the flexibility in transitioning traffic between en route and terminal area airspace and between terminal area airspace and the runways
- Improve the segregation of arrivals and departures in terminal area and en route airspace
- Improve the predictability in transitioning traffic between en route and terminal area airspace and between terminal area airspace area and the runways

3.3.1 Improve the Predictability of Transitioning Air Traffic

Section 2.2.1 includes criteria established to measure the objective to increase the predictability in transitioning aircraft between the terminal and en route airspace:

- Ensure that the majority of the Study Airports/Heliports have RNAV low altitude routes utilizing the most current RNAV criteria (measured by count of RNAV ZK routes utilized by an individual Study Airport/Heliport)

Table 3-3 provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above. Under the No Action Alternative, there are zero ZK Routes in the ILHS-HAA Project airspace. Under the Proposed Action, the number of ZK routes increases to 189. These newly introduced routes allow for more efficient use of the airspace.

Table 3-3 Improve Predictability in Transitioning Helicopters

Airport/Heliport	Alternative: No Action ZK Routes	Alternative: Proposed Action ZK Routes
AR Gould Hospital Heliport - 16ME	0	4
Banks Airport - ME5	0	4
Bar Harbor Heliport - 22ME	0	5
Bethel Regional Airport - K0B1	0	1
Blue Hill Memorial Hospital Heliport - ME15	0	5
Boston Medical Center Hospital Heliport - 0MA4	0	8
Bridgton Hospital Heliport - ME37	0	3
C A Dean Memorial Hospital Heliport - ME49	0	5
Calais Regional Heliport - 46ME	0	5
CMMC Air Ambulance Landing Site Heliport - ME95	0	8
Cranberry Isles Heliport - ME77	0	3
Down East Community Hospital Heliport - ME52	0	5
Eastern Maine Medical Center Heliport - ME02	0	8
Franklin Memorial Hospital Heliport - ME23	0	4
Houlton Regional Hospital Heliport - 79ME	0	5
Huggins Hospital Heliport - NH27	0	1
Lincoln Health Miles Campus - 45ME	0	6
Maine Coast Memorial Heliport - 39ME	0	7
Maine General Medical Center Waterville Heliport - 1ME2	0	4
Maine Medical Center Heliport - 68ME	0	5
Millinocket Regional Heliport - ME50	0	8
Monhegan Island Heliport - ME78	0	5

Airport/Heliport	Alternative	
	No Action ZK Routes	**Proposed Action ZK Routes**
Newton Field Airport - 59B	0	7
Northern Light Mayo Hospital Heliport - ME43	0	7
Northern Maine Medical Center Heliport - ME48	0	7
Penobscot Bay Medical Center Heliport - ME76	0	7
Portland International Jetport - KPWM	0	8
Portsmouth Regional Hospital Heliport - 3NH4	0	1
PVH Heliport - 10ME	0	7
Rumford Community Hospital Heliport - ME63	0	7
Sanford Seacoast Regional Airport - KSFM	0	3
Southern Maine Health Care SMMC Helipad - 60ME	0	2
Southern Maine Health Care/Sanford Heliport - ME87	0	1
Stephen A Bean Municipal Airport - K8B0	0	1
Stephens Memorial Hospital Heliport - 4ME9	0	6
Vinalhaven Airport - ME55	0	7
Waldo County General Hospital Heliport - 98ME	0	7
Wentworth Douglass Hospital Heliport - NH56	0	1
York Hospital Heliport - ME94	0	1
Total	**0**	**189**

Note: A ZK route is determined to be utilized by the airport/heliport if an aircraft flies at least one leg of the route to/from the airport/heliport.

Sources: National Flight Data Center National Airspace System Resources Database, accessed February 2023; Department of Transportation, FAA Operational Route Files, February 2023.
Prepared by: ATAC Corporation, February 2023.

3.3.2 Reduce Complexity of Converging and Routes and Procedure Interactions

Section 2.1.2.2 includes one criterion to measure the objective to reduce complexity in in the en route environment by developing PBN routes that would separate helicopter flows from other traffic:

- Reduce the number of helicopter routes and the number of interactions (measured by number en route routings used within the Study Area)

Table 3-4 provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above.

Table 3-4 Reduce Complexity of Converging Flows in the En Route Environment

Criteria	Alternative	
	No Action	**Proposed Action**
Number of En Route Legs Used[1]	212	138

Notes:
1\ En Route .Legs include all legs of a route that are not included in an IFP Arrival or Departure

Sources: FAA TARGETS Package, LOM ZK Routes for Environmental 4.tgs, Instrument Flight Automation Procedures Database, accessed February 2023; ATAC Corporation, PDARS radar data.
Prepared by: ATAC Corporation, February 2023.

3.3.3 Improve Flexibility of Air Traffic Flow

Section 2.1.2.3 includes two criteria to measure the objective to increase flexibility in transitioning helicopters between the terminal and enroute airspace:

- ZK Routes with altitude controls (measured by count of procedures with altitude controls)

- Where possible, increase the number of RNAV routes connected to IFP arrivals and departures compared with the No Action Alternative (measured by total count of ZK routes connected to IFP arrivals/departures for the Study Area)

Under the No Action Alternative, there are zero routes, therefore, there are zero with altitude controls. In comparison, the Proposed Action includes 8 routes, all of which have altitude controls. **Table 3-5** provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above. The total number of ZK Routes increases from zero under the No Action Alternative to eight under the Proposed Action. **Table 3-6** lists the number of routes that are directly connected to an IFP arrival or departure through a common waypoint which reduces the need for vectoring of aircraft and VFR segments.

Table 3-5 Alternatives Evaluation: Improve Predictability of Air Traffic Flow ZK Routes

Criteria	Alternative	
	No Action	**Proposed Action**
ZK routes with altitude controls	0	8

Sources: FAA TARGETS Package, LOM ZK Routes for Environmental 4.tgs, Instrument Flight Automation Procedures Database, accessed February 2023; ATAC Corporation, PDARS radar data.
Prepared by: ATAC Corporation, February 2023.

Table 3-6 Alternatives Evaluation: Improve Predictability of Air Traffic Flow Connectivity

Criteria	Alternative	
	No Action	**Proposed Action**
IFP Arrivals and Departures connected to ZK routes via common waypoint	0	17

Sources: FAA TARGETS Package, LOM ZK Routes for Environmental 4.tgs, Instrument Flight Automation Procedures Database, accessed February 2023; ATAC Corporation, PDARS radar data.
Prepared by: ATAC Corporation, February 2023.

3.4 Preferred Alternative Determination

Of the two alternatives carried forward for analysis, only the Proposed Action would meet the Purpose and Need for the ILHS-HAA Project based on the criteria discussed above. Therefore, the Proposed Action is the Preferred Alternative. Although it would not meet the Purpose and Need, the No Action Alternative was carried forward, as required by Council on Environmental Quality (CEQ) regulations, to establish a norm against which decision makers can measure the environmental effects of undertaking the Proposed Action.

3.5 Listing of Federal Laws and Regulations Considered

Table 3-7 lists the relevant federal laws and statutes, Executive Orders, and regulations applicable to the Proposed Action and the No Action Alternative and considered in preparation of this EA.

Table 3-7 List of Federal Laws and Regulations Considered – ILHS-HAA Project

Federal Laws and Statutes	Citation
National Environmental Policy Act of 1969	42 U.S.C. § 4321 *et seq.*
Clean Air Act of 1970, as amended	42 U.S.C. § 7401 *et seq.*
American Indian Religious Freedom Act of 1978	42 U.S.C. § 1996
Department of Transportation Act of 1966, Section 4(f)	49 U.S.C. § 303(c)
Aviation Safety and Noise Abatement Act of 1979	49 U.S.C. § 47501 et seq.
Federal Aviation Act of 1958, as amended	49 U.S.C. § 40101 et seq.
Endangered Species Act of 1973	16 U.S.C. § 1531 *et seq*.

Table 3-7 List of Federal Laws and Regulations Considered – ILHS-HAA Project

Fish and Wildlife Coordination Act of 1958	16 U.S.C. § 661 *et seq*.
The Bald and Golden Eagle Protection Act of 1940	16 U.S.C. § 668 *et seq*.
Lacey Act of 1900	16 U.S.C. § 3371 *et seq*.
Migratory Bird Treaty Act of 1918	16 U.S.C. § 703 *et seq.*
National Historic Preservation Act of 1966, as amended	16 U.S.C. § 470
The Wilderness Act of 1964	16 U.S.C. § 1131-1136
Archaeological and Historic Preservation Act of 1974, as amended	16 U.S.C. § 469 *et seq*.
Executive Orders	**Citation**
11593, Protection and Enhancement of the Cultural Environment	36 Federal Register (FR) 8921
12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	59 FR 7629
13045, Protection of Children from Environmental Health Risks and Safety Risks	62 FR 19885
13423, Strengthening Federal Environmental, Energy, and Transportation Management	72 FR 3919
115th Congress, 2d Session, Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2019	Report 115-268
Federal Regulations	**Citation**
Council for Environmental Quality Regulations	40 C.F.R. Part 1500 to Part 1508
General Conformity Regulations	40 C.F.R. Part 93 Subpart B
Protection of Historic Properties Regulations	36 C.F.R. 800
Airport Noise Compatibility Planning Regulations	14 C.F.R. Part 150
Federal Aviation Regulations (FAR) Part 71: Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points, December 17, 1991	14 C.F.R. Part 71

FAA/U.S. Department of Transportation Orders

U.S. DOT Order 5610.2C: *U.S. Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low Income–Populations*, May 16, 2021.
FAA Order 8260.58C, *The United States Standard Performance Based Navigation (PBN) Instrument Procedure Design*, September 15, 2022.
FAA Order 8260.43C, *Flight Procedures Management Program*, April 09, 2019.
FAA Joint Order 7110.65AA, *Air Traffic Control*, April 20, 2023.
FAA Order 1050.1F: *Environmental Impacts: Policies and Procedures*, June 16, 2015.
FAA Order 7100.41A, *Performance Based Navigation Implementation Process*, April 28, 2016.
FAA Order JO 7400.2N, *Procedures for Handling Airspace Matters*, May 13, 2021
FAA Order 8260.3E, *United States Standard for Terminal Instrument Procedures (TERPS)*, September 17, 2020.
FAA Order 8040.4B, *Safety Risk Management Policy*, May 02, 2017
FAA Joint Order 1000.37C, *Air Traffic Organization Safety Management System*, October 1, 2021.
FAA Order 8260.19I, *Flight Procedures and Airspace*, June 29, 2020.
FAA Order 8260.42B, *United States Standard for Helicopter Area Navigation (RNAV)* (Incl Chg. 2), May 22, 2020
FAA Order 8260.46J, *Departure Procedure (DP) Program*, July 12, 2022.

FAA Advisory Circulars

FAA Advisory Circular 150/5020-1: *Noise Control and Compatibility Planning for Airports*, August 5, 1983.
FAA Advisory Circular 150/5200-33C: *Hazardous Wildlife Attractants on or near Airports*, February 21, 2020.
FAA Advisory Circular 36-3H: *Estimated Airplane Noise Levels in A-Weighted Decibels*, April 25, 2002.

Source: ATAC Corporation, February 2023.
Prepared by: ATAC Corporation, February 2023

4 Affected Environment

This Chapter describes the human, physical, and natural environmental conditions that could be affected by the Proposed Action. Specifically, this Draft EA considers effects on the environmental resource categories identified in FAA Order 1050.1F and 1050.1F *Desk Reference*. The potential environmental impacts of the Proposed Action and No Action Alternatives are discussed in **Chapter 5**, *Environmental Consequences.*

The technical terms and concepts discussed in this Chapter are explained in **Chapter 1**, *Background*.

4.1 General Study Area

To describe current conditions in the ILHS-HAA Project, the FAA developed a GSA (presented as **Exhibit 1-1** previously). The GSA is used to evaluate the potential for environmental impacts under the Proposed Action. The following objectives guided the development of the GSA:

1. The FAA requires consideration of impacts of airspace actions from the surface to 10,000 feet AGL if the study area is larger than the immediate area around an airport or involves more than one airport or up to 18,000 feet AGL if the proposed action or alternative(s) are over a national park or wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.[29,30] Furthermore, policy guidance issued by the FAA Program Director for Air Traffic Airspace Management states that for air traffic project environmental analyses, noise impacts should be evaluated for proposed changes in arrival procedures between 3,000 feet AGL and 7,000 feet AGL and departure procedures between 3,000 feet AGL and 10,000 feet AGL for large civil jet aircraft weighing over 75,000 pounds.[31]
2. The unique nature of this analysis being focused solely on a proposed action serving IFR air ambulance aircraft that operate at altitudes different from those delineated in FAA Order 1050.1F precludes the FAA's delineated methodology and necessitated an alternative approach to identifying a GSA via other means and methods that takes into account the unique nature and operational characteristics of IFR air ambulance helicopters.
3. The GSA captures all helicopter radar flight tracks identified for the No Action Alternative using radar data from the period of January 2, 2020 to November 6, 2021 (hereafter referred to as 2020/2021). The 2020/2021 flight trajectory data was the most recent available at the outset of the study. The 2020/2021 radar data was analyzed to identify patterns indicating commonly used flight paths. These identified common flight paths and air ambulance operator information were analyzed to derive a network of straight line, point to point flight tracks that considered the air ambulance helicopter paths between certain pairs of identified Study Airport/Heliports. To account for

29 U.S. Department of Transportation, Federal Aviation Administration, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Appendix B. *Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303)*, Para. B-1.3, *Affected Environment*. July 16, 2015.
30 U.S. Department of Transportation, Federal Aviation Administration, *1050.1F Desk Reference*, Ch. 11, *Noise and Noise-Compatible Land Use*, Para 11.2, *Affected Environment*., July 2015.
31 U.S. Department of Transportation, Federal Aviation Administration, *Memorandum Regarding Altitude Cut-Off for National Airspace Redesign (NAR) Environmental Analyses*, September 15, 2003.

potential variability, each derived straight line flight path was buffered by a 2 NM boundary. The collection of derived and buffered flight tracks were used to create an initial GSA, then was adjusted to remove Canadian territory and account for off shore anomalies and areas lacking terrain data that is used within the noise model. The initial GSA boundary was compared against US Census block boundaries and adjusted to match those boundaries appropriately. These adjustments resulted in a final lateral boundaries of the GSA used for all analyses.

4. The upper altitude of the GSA complies with all FAA Order 1050.1F requirements for analysis, however, the unique nature and operational profiles of air ambulance helicopters meant the maximum observed altitude in the 2020/2021 data was no greater than 6,000 feet MSL. With limited exceptions, observed radar data was at or below 5,000 feet MSL. Thus, the GSA upper altitude was no greater than 5,000 feet MSL.

Exhibit 1-1, presented previously, depicts the GSA. **Table 4-1** lists the 24 counties that are wholly or partially included in the GSA.

Table 4-1 Counties Partially or Wholly Within the GSA

Maine		**New Hampshire**	**Massachusetts**
Androscoggin	Oxford	Belknap	Essex
Aroostook	Penobscot	Carroll	Middlesex
Cumberland	Piscataquis	Rockingham	Norfolk
Franklin	Sagadahoc	Strafford	Suffolk
Hancock	Somerset		
Kennebec	Waldo		
Knox	Washington		
Lincoln	York		

Sources: ESRI, U.S. Census Bureau, 2022
Prepared by: ATAC Corporation, December 2022.

4.2 Resource Categories or Sub-Categories Not Affected

This section discusses the environmental resource categories or sub-categories that would remain unaffected by the Proposed Action. These resource categories would remain unaffected because the resource either does not exist within the GSA or the types of activities associated with the Proposed Action would not affect them. The resource categories or sub-categories are:

- **Coastal Resources**: The Proposed Action would not involve any actions (physical changes or development of facilities) that would be inconsistent with management plans for the 34 designated Coastal Barrier Resource System (CBRS) units covering 5,768 Acres in Maine, and the 11 designated CBRS units covering 17,442 acres in Massachusetts.[32] The Proposed Action would not directly affect any shorelines or change the use of shoreline zones and be inconsistent with any NOAA-approved state Coastal Zone Management Plan (CZMP).
- **Farmlands**: The Proposed Action would not involve the development of any land regardless of use, nor does it have the potential to convert any farmland to non-agricultural uses.

32 https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/ Accessed December 28, 2022.

- **Biological Resources (including fish and plants only)**: Air traffic airspace and procedure changes do not involve ground disturbance activities. They will not destroy or modify critical habitat for any species. The Proposed Action would not affect habitat for non-avian fish or plants, and thus no further analysis is required.
- **Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)**
    - **Wetlands**: The Proposed Action would not result in the construction of facilities and would therefore not encroach upon areas designated navigable waters. Therefore, no further analysis is required.
    - **Floodplains**: The Proposed Action would not result in the construction of facilities. Therefore, it would not encroach upon areas designated as a 100-year flood event area as described by the Federal Emergency Management Agency (FEMA), and thus no further analysis is required.
    - **Surface Waters**: The Proposed Action would not result in any changes to existing discharges to water bodies, create a new discharge that would result in impacts to surface waters, or modify a water body. The Proposed Action would, therefore, not result in any direct or indirect impacts on surface waters.
    - **Groundwater**: The Proposed Action would not involve land acquisition or ground disturbing activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to ground water resources through the introduction of new impervious surfaces, and thus, no further analysis is required.
    - **Wild and Scenic Rivers**: The Allagash River in northern Maine[33] and the Lamprey River in southeastern New Hampshire[34] are the only designated wild and scenic rivers located within the GSA. However, the Proposed Action would not foreclose or downgrade Wild, Scenic, or Recreational river status of a river or river segment included in the Wild and Scenic River System and therefore, no further analysis is required.
- **Hazardous Materials, Solid Waste, and Pollution Prevention:** The Proposed Action would not result in any construction or development or any physical disturbances of the ground. Therefore, the potential for impact in relation to hazardous materials, pollution prevention, and solid waste is not anticipated, and no further analysis is required.
- **Historical, Architectural, Archeological, and Cultural Resources – Archeological and Architectural sub-category only**: The Proposed Action would not involve excavation of archaeological resources on Federal and Indian lands or disposition of cultural items. It would not affect the access to or the physical integrity of American Indian sacred sites. The Proposed Action would not result in any construction, development, or physical disturbances of the ground. Therefore, the potential for impact in relation to architectural compatibility with the

33 92.5 miles of the Allagash River are designated Wild, and 0.0 miles are designated Scenic (https://www.rivers.gov/maine.php, accessed January 2023).
34 On November 12, 1996, 11.5 miles were designated Recreational and on May 2, 2000, an additional 12.0 miles were designated Recreational for a total of 23.5 miles designated Recreational (https://rivers.gov/rivers/Lamprey.php, accessed January 2023).

character of a surrounding historic district or property is not anticipated, and therefore, no further analysis is required.

- **Land Use:** The Proposed Action would not involve any changes to existing, planned, or future land uses within the GSA. Therefore, no further analysis is required.
- **Visual Effects – Light Emissions only**: The Proposed Action will not change aviation lighting; therefore, no further analysis is required.
- **Natural Resources and Energy Supply – Natural Resources sub-category only**: The Proposed Action would not require the need for unusual natural resources and materials, or those in short supply. Therefore, no further analysis is required.
- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks** –
    - **Socioeconomic Impacts sub-category**: The Proposed Action would not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community.
    - **Children's Environmental Health and Safety Risks sub-categories**: The Proposed Action would not affect products or substances that a child would be likely to come into contact with, ingest, use, or be exposed to, and would not result in environmental health and safety risks that could disproportionately affect children.

4.3 Potentially Affected Resource Categories or Sub-Categories

This section provides information on the current conditions within the GSA for environmental resource categories or components that the Proposed Action could potentially affect. These environmental resource categories or sub-categories include:

- **Noise and Compatible Land Use** (Section 4.3.1)
- **Department of Transportation Act, Section 4(f)** (Section 4.3.2)
- **Historic, Architectural, Archeological, and Cultural Resources – Historic and Cultural Resources sub-categories only** (Section 4.3.3)
- **Biological Resources – Wildlife sub-category only** (Section 4.3.4)
- **Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks – Environmental Justice sub-category only** (Section 4.3.5)
- **Natural Resources and Energy Supply – Energy Supply sub-category only (aircraft fuel only**) (Section 4.3.6)
- **Air Quality** (Section 4.3.7)
- **Climate** (Section 4.3.8)
- **Visual Effects (Visual Resources / Visual Character Only)** (Section 4.3.9)

The following sections discuss each of the above listed environmental resource categories in detail.

4.3.1 Noise and Compatible Land Use

Aircraft noise is often the most noticeable environmental effect associated with any air traffic project. This section discusses FAA guidance on conducting noise analyses, noise model input development, and existing aircraft noise conditions. **Appendix E**, *Basics of Noise*, provides background information on the physics of sound, the effects of noise on people, and noise metrics. Detailed results of the noise analysis are included in **Appendix F,** *ILHS-HAA Project Noise Technical Report*.

4.3.1.1 Noise Modeling Methodology

To comply with NEPA requirements, the FAA has issued policies and procedures for assessing aircraft noise in FAA Order 1050.1F. That Order requires that aircraft noise analysis, including helicopters, use the yearly Day-Night Average Sound Level (DNL) metric. The DNL metric is a single value representing an aircraft sound level over a 24-hour period and includes all of the sound energy generated within that period. The DNL metric includes a 10-decibel (dB) weighting for noise events occurring between 10:00 p.m. and 6:59 a.m. (nighttime). This weighting helps account for the greater level of annoyance caused by nighttime noise events. Accordingly, the metric essentially equates one nighttime flight to 10 daytime flights. The DNL metric is further discussed in **Appendix E**, *Basics of Noise*.

FAA Order 1050.1F also requires the FAA to evaluate aircraft noise using the current FAA-approved computer model at the beginning of the environmental analysis process. In accordance with this requirement, the FAA is using the Aviation Environmental Design Tool Version 3d (AEDT 3d), to analyze noise associated with the Proposed Action and No Action Alternative.

The DNL calculations reflect noise from AEDT 3d defined and project specified helicopters on IFR flight plans that could be affected by the Proposed Action.

When operating outside certain categories of controlled airspace, helicopters operating under Visual Flight Rules (VFR) are not required to be in contact with ATC. Because helicopters operate at the pilot's discretion and often are not required to file flight plans, the FAA has limited specifics about these operations. However, even if complete information were available for VFR operations, the Proposed Action would not require any changes to routing or altitudes to accommodate these operations. If they could be modeled, they would use the same flight routes and altitudes under the Proposed Action and No Action Alternative scenarios. Their operations would not be affected by the forecast conditions in 2028 (five years after implementation) for either the Proposed Action or the No Action Alternative. Therefore, VFR aircraft were not included in the analysis.

AEDT 3d requires a variety of inputs, including local environmental data temperature and humidity, number and type of helicopter operations, and flight tracks. Accordingly, the FAA assembled detailed information on air ambulance helicopter operations for the Study Airports/Heliports for input into AEDT 3d. This includes specific aircraft information such as aircraft type, arrival and departure times, and origin/destination airport/heliport.

The 2020/2021 flight data span all seasons and representative Study Airport/Heliport pairings. The FAA used this data to develop the average annual day (AAD) fleet mix, time of day and night, and arrival/departure directional input for AEDT 3d. More detailed information about the AEDT 3d input for the No Action Alternative can be found in **Appendix F,** *ILHS-HAA Project Noise Technical Report*.

The FAA used the 2020/2021 flight trajectory data to define the AAD trajectory locations and use as representing a typical flow of traffic, as well as the typical climb and descent patterns that occur. The FAA analyzed the tracks using proprietary software. All trajectories were “bundled” into a set of tracks. The sets comprise all the typical flight routings within the GSA for an AAD.[35] AEDT 3d tracks were then developed based on the group of radar tracks representing each flow.

The AEDT 3d model was used to calculate noise levels for the following specific locations on the ground:

Census Block Population Centroids: The AEDT 3d model was used to calculate DNL at the geographic centers (centroids) of census blocks to estimate the population exposed to varying levels of helicopter noise. This EA analyzed population within the GSA using 2020 U.S. Census block geometry. A census block is the smallest geographical unit that the United States Census uses to collect data. The census block population centroid DNL represents the DNL for the total maximum potential population within that census block. Because noise levels are analyzed only at the centroid point and applied to the entire census block area population, and because the area represented by each centroid varies depending on the density of population, the actual noise exposure level for individuals will vary from the reported level based on their proximity to the geographic centroid.

Grid Points: The AEDT 3d model calculated noise exposure at evenly spaced grid points. This EA covered the GSA with a grid of noise receptor points spaced evenly at 0.5 NM intervals. Noise values were calculated for these grid points throughout the GSA. In addition, these grid points were evaluated for noise at any Section 4(f) resource or historic property not captured using unique points as described below.

Unique Points – Section 4(f) and Historical and Cultural Resources: The AEDT 3d model analyzed noise levels at unique sites of interest that are not captured in the 0.5 NM grid. These sites include individual Section 4(f) resources that are less than one square NM in area or may be linear in nature (such as small public parks or trails), and specific historic sites listed on the National Register of Historic Places (NRHP) such as individual buildings.[36] See **Section 4.3.2** for a discussion of what constitutes a Section 4(f) resource and **Section 4.3.3** for a discussion of historic properties in the GSA.

Unique Points – Noise Sensitive Areas and Uses: In addition to the unique points identified for individual Section 4(f) resources and specific listed historic sites, the AEDT 3d model was used to analyze noise at noise sensitive areas and uses generally exposed to existing noise of DNL 65 dB and above. These locations are further discussed in **Section 4.3.1.3**.

In total, noise exposure levels were calculated at 48,261 census block population centroids, 80,956 grid points, and 224,613 unique points throughout the GSA.

4.3.1.2 Existing Helicopter Noise Exposure

Table 4-2 identifies the total population exposed to helicopter noise between DNL 45 dB and 60 dB, DNL 60 dB and 65 dB, and DNL 65 dB and higher. This data establishes a baseline

35 Appendix F, ILHS-HAA Project Noise Technical Report.
36 Id.

for existing helicopter noise exposure. **Exhibit 4-1** provides a graphical representation, by DNL 5 dB bands, of existing noise exposure based on radar data collected for 2020/2021 within the GSA. Each point on the exhibit represents a Census block population centroid.

Table 4-2 GSA Population Exposed to Helicopter Noise (DNL)

DNL Range (dB)	Population
DNL 45 dB to DNL 60 dB	9,568
DNL 60 dB to less than DNL 65 dB	66
DNL 65 dB and higher	6
Total above DNL 45 dB	9,640

Sources: AEDT version 3d; US Census Bureau, 2020 Tracts and American Community Survey Selected Economic Characteristics, 2011-2015.
Prepared by: ATAC Corporation, December 2022.

4.3.1.3 Noise Sensitive Areas and Uses

Appendix B to FAA Order 1050.1F, paragraph B-1.3, *Affected Environment,* requires the FAA to identify the location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) that could be significantly impacted by noise. As defined in FAA Order 1050.1F Paragraph 11-5.b(10), a noise sensitive area is “[a]n area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites.” Potential impacts to residential population are considered using US Census block population centroids as described in **Section 4.3.1**. Parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are further discussed in **Sections 4.3.2** and **4.3.3**, below.

4.3.1.4 Compatible Land Use

The Noise compatibility of land use is determined by comparing the aircraft DNL values at a site to the values of the FAA’s land use compatibility guidelines in Title 14, Code of Federal Regulations, Part 150, Appendix A, Table 1.

Existing land use in the GSA is depicted in **Exhibit 4-2**. It is characterized using generalized land coverage data from the USGS National Land Cover Database 2019 (NLCD 2019). As depicted in the exhibit, the majority of the GSA is dominated by a combination of evergreen and deciduous forest. Open water lakes are located throughout the GSA. The majority of urban development lies within 50 miles of the coastline, predominantly characterized by areas of low-, medium-, and high-intensity urban development with the highest intensity near Boston. The GSA also includes numerous large parks, recreational areas, wilderness areas, and other types of resources managed by local, state, and federal agencies. These resources are further discussed in **Section 4.3.2**.

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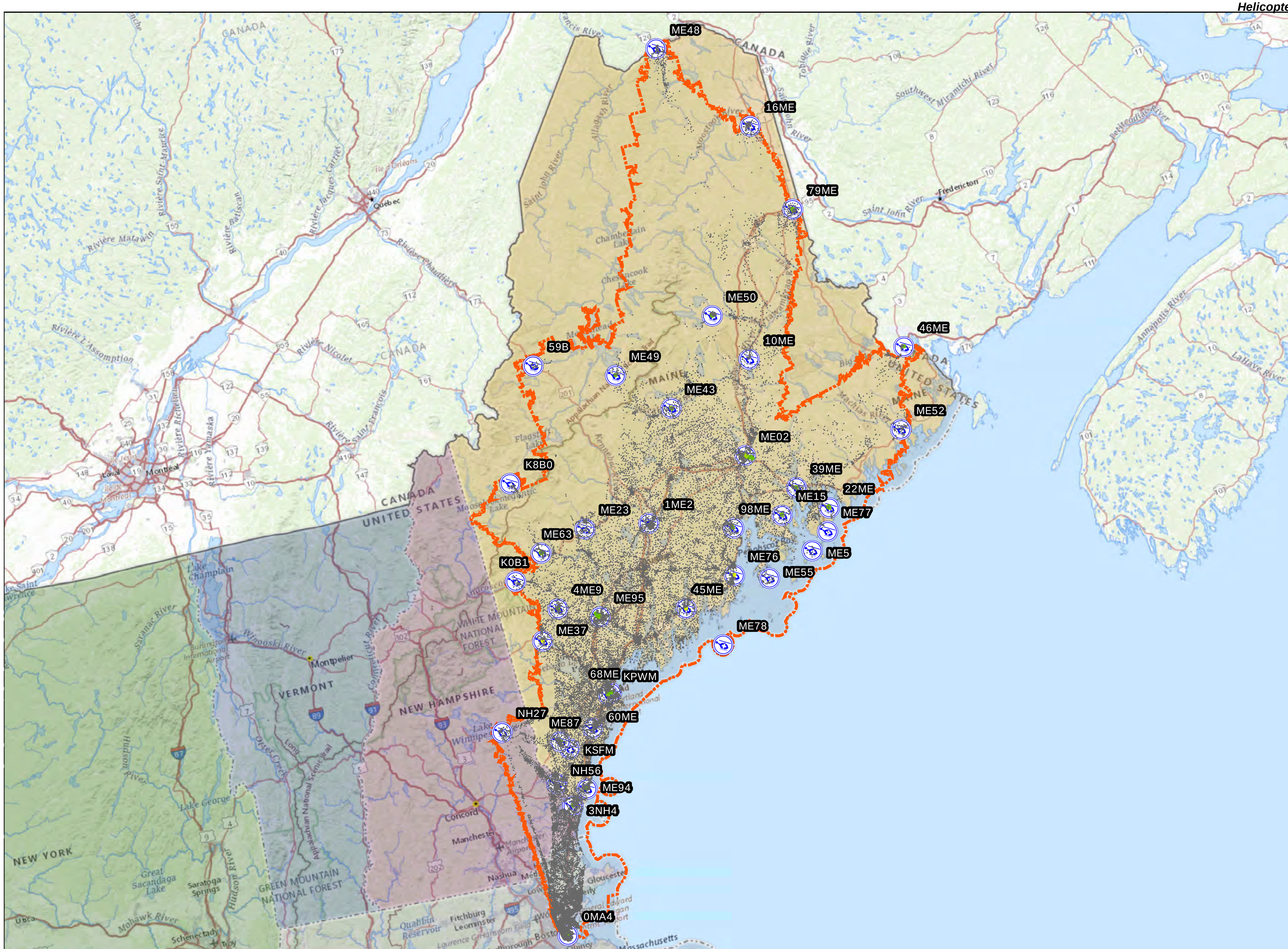

LEGEND

DNL Noise Level

- <45 dB
- 45-50 dB
- 50-55 dB
- 55-60 dB
- 60-65 dB
- 65-70 dB
- Airport/Heliport
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:
60ME - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
45ME - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
ME50 - Millinocket Regional Heliport
ME52 - Down East Community Hospital Heliport
ME55 - Vinalhaven Airport
ME63 - Rumford Community Hospital Heliport
ME76 - Penobscot Bay Medical Center Heliport
ME77 - Cranberry Isles Heliport
ME78 - Monhegan Island Heliport
ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Adminstration, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, April 2023.

Exhibit 4-1

Baseline DNL - Noise Exposure by Census Block

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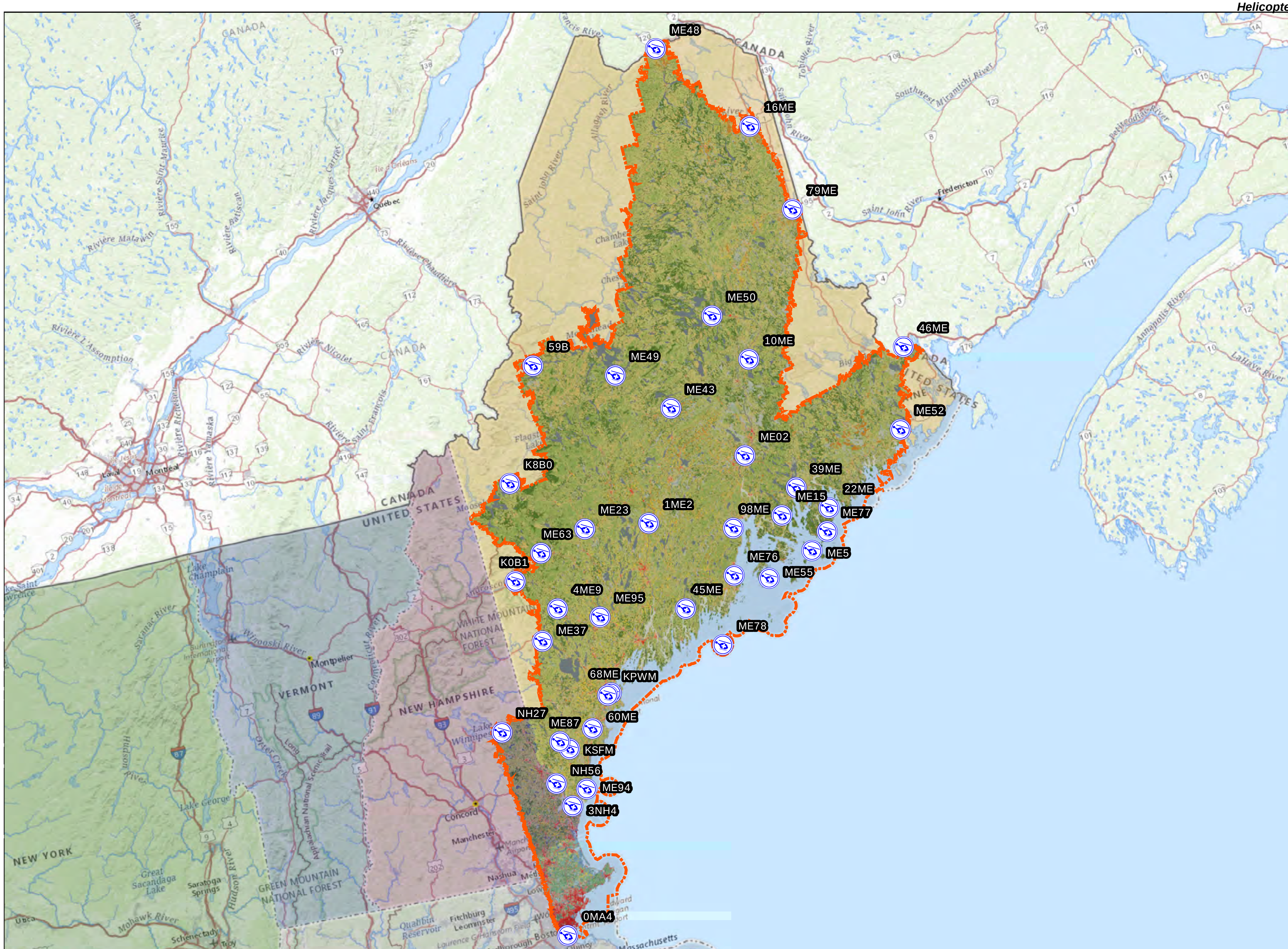

LEGEND

- Airport/Heliport
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Land Coverage

- Ocean water
- Open Water
- Developed, open space
- Developed, low intensity
- Developed, medium intensity
- Developed. high intensity
- Barren land
- Deciduous forest
- Evergreen forest
- Mixed forest
- Shrub / scrub
- Grassland / herbaceous
- Pasture hay
- Cultivated crops
- Woody wetlands
- Emergent herbaceous wetlands
- 101

Notes:
Airport/Heliport Identifier and Name:
60ME - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
45ME - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
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ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data.
Federal Aviation Adminstration, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, April 2023.

Exhibit 4-2

Land Coverage

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4.3.2 Department of Transportation Act, Section 4(f)

Section 4(f) of the DOT Act (codified at 49 U.S.C. § 303(c)), states that, subject to exceptions for *de minimis* impacts:

> the Secretary may approve a transportation program or project (other than any project for a park road or parkway under section 204 of title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if--
>
> (1) there is no prudent and feasible alternative to using that land
>
> (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use

The term "use" includes both physical and indirect or "constructive" impacts to Section 4(f) resources. Direct use is the physical occupation or alteration of a Section 4(f) property or any portion of a Section 4(f) property. A "constructive" use does not require direct physical impacts or occupation of a Section 4(f) resource. A constructive use would occur when a proposed action would result in substantial impairment of a resource to the degree that the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. The determination of use must consider the entire property and not simply the portion of the property used for a proposed project.

Parks and natural areas where a quiet setting is a generally recognized purpose and attribute receive special consideration. In these areas, the FAA "…must consult all appropriate Federal, State, and local officials having jurisdiction over the affected Section 4(f) resources when determining whether project-related noise impacts would substantially impair the resource." Privately-owned parks, recreation areas, and wildlife refuges are not subject to the Section 4(f) provisions.

4.3.2.1 Section 4(f) Resources

The FAA used data from federal and state sources to identify 224,613 Section 4(f) resources within the GSA.[37] **Exhibit 4-3** depicts the locations of Section 4(f) resources, other than those listed or eligible for listing in the National Register of Historic Places (NRHP). The locations of Section 4(f) resources that are listed or eligible for listing in the NRHP are discussed in **Section 4.3.3** and depicted in **Exhibit 4-4**.

37 4,079 points were excluded because they were over water in a region that did not have applicable AEDT 3d terrain tiles, thus no noise values would be obtained for those points.

4.3.3 Historic Properties and Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. §470 et seq., as amended) requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the NRHP. Compliance requires agencies to consider the effects of such undertakings on properties listed, or eligible for listing, in the National Register of Historic Places (NRHP). Regulations implementing Section 106 of the NHPA are located in Title 36 CFR Part 800, *Protection of Historic Properties*. In accordance with Executive Order 13175 Consultation and Coordination with Indian and Tribal Governments and FAA Order 1210.20 American Indian and Alaska Native Tribal Consultation Policy and Procedures the FAA invited identified tribal government-to-government consultations regarding any concerns that uniquely or significantly affect a Tribe related to the proposed project.

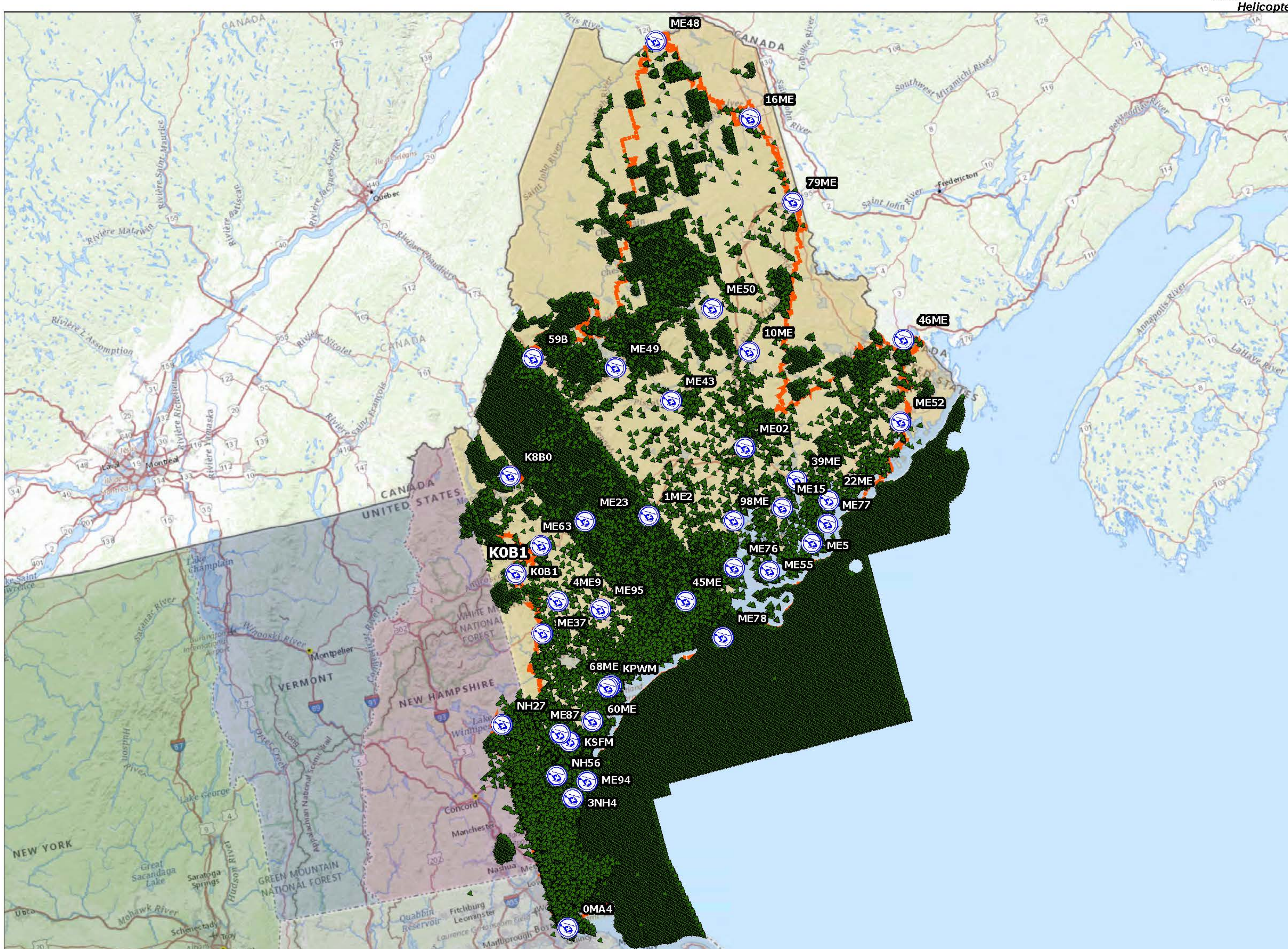
Consistent with Section 106, this EA defines "historic property" as "…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria."[38] It is possible that changes in helicopter flight routes associated with the Proposed Action could introduce or increase helicopter routing over historic properties and result in potential adverse noise impacts. As noted in **Section 4.2**, the Proposed Action would not involve ground disturbance that could physically impact archaeological or architectural resources. The Proposed Action is located above the ground and would not result in the construction, disturbance, or alteration of any physical structure on, in, or emanating from the ground. Thus, the EA does not further discuss these resources.

4.3.3.1 Historic Properties in the Area of Potential Effect/GSA Boundary

Exhibit 4-4 shows the location of historic properties identified in the GSA. A total of 2,291 National Register of Historic Places (NRHP) listed historic points and 404 NRHP Polygon points were identified and consultations to identify other listed or eligible resources are on-going.

Federal regulations require the FAA to define an area of potential effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[39] The FAA defined the APE as coterminous with the GSA boundary. The FAA subsequently determined that the Proposed Action would not introduce helicopter overflights to any area within the GSA where they do not already occur, thus continuing the APE coverage coterminous with the GSA and all identified Section 106

38 Title 36 CFR Part 800.16(l)(1)
39 Title 36 CFR 800.16(d).



LEGEND

- Airport/Heliport
- Section 4(f)/106 Historic and Cultural Resources
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:

SMMC - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
MILE - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
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ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. Federal Aviation Adminstration, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, April 2023.

Exhibit 4-3

Section 4(f) Resources

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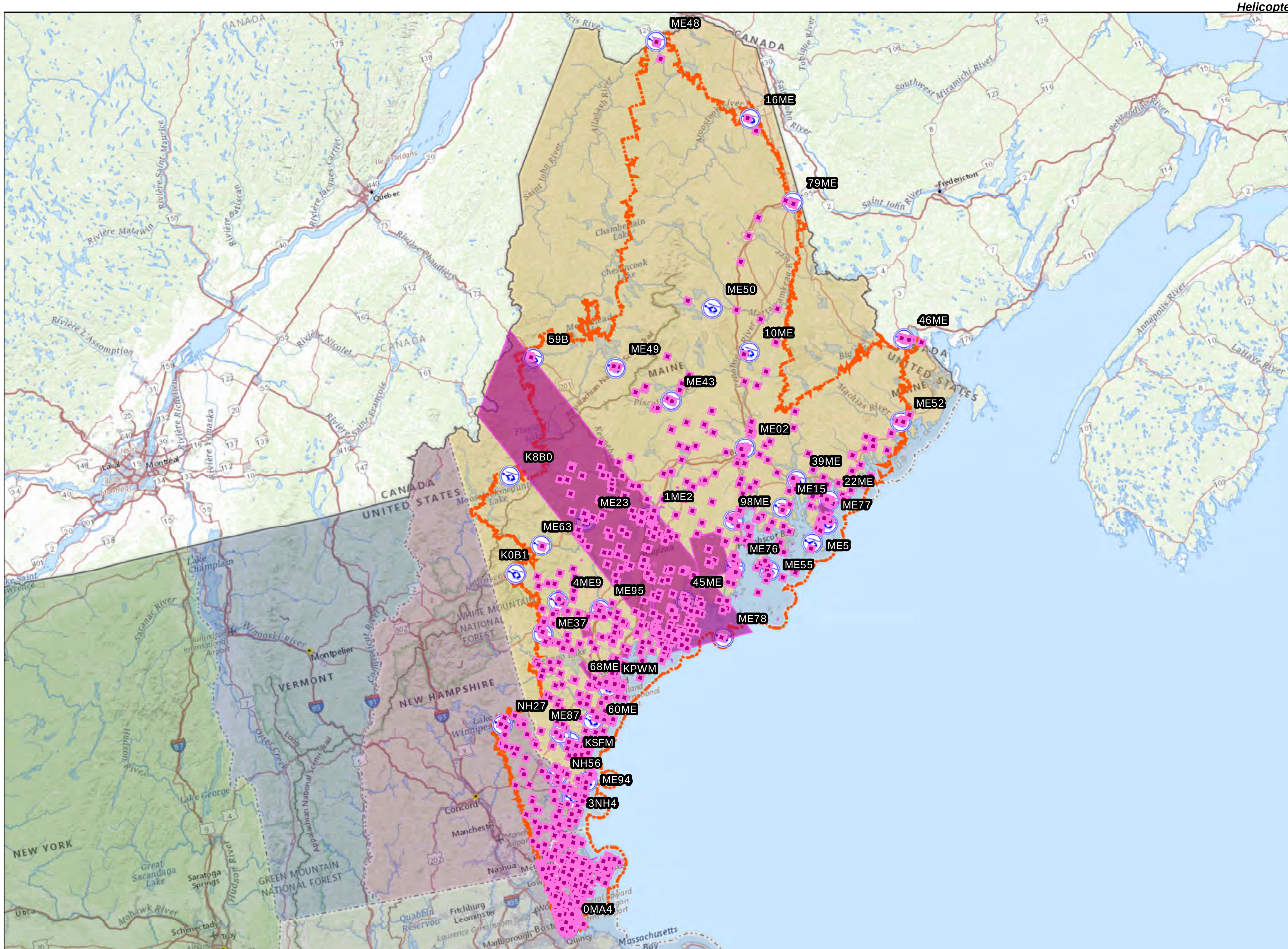

LEGEND

- National Register of Historic Places - Points
- National Register of Historic Places - Polygons
- Airport/Heliport
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary

Notes:

Airport/Heliport Identifier and Name:

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Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

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Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Block Receptors. National Register of Historic Place, points and polygons. Federal Aviation Adminstration, NFDC, Airport and Heliport locations.
Prepared by: ATAC Corporation, April 2023.

Exhibit 4-4

Historic and Cultural Resources

ILHS-HAA Environmental Assessment

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4.3.4 Wildlife

This section discusses the existing wildlife resources within the GSA. The Proposed Action involves new en route helicopter RNAV procedures and the supporting airspace management structure serving the Study Airports/Heliports. Accordingly, the discussion is limited to avian and bat species that may be present within the GSA.

4.3.4.1 Threatened and Endangered Species and Migratory Birds

The Endangered Species Act (ESA) of 1973, (16 U.S.C. § 1531 et seq. (1973)), requires the evaluation of all federal actions to determine whether a Proposed Action is likely to jeopardize any proposed or listed threatened or endangered species or proposed or designated critical habitat. A federal action is one conducted, funded, or permitted by a federal agency. Section 7 of the ESA requires the lead federal agency (in this case the FAA) to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries to determine whether the proposed federal action would jeopardize the continued existence of any species listed or proposed for listing as threatened or endangered or result in the destruction or adverse modification of designated or proposed critical habitat. Critical habitat includes areas that will contribute to the recovery or survival of a listed species. Federal agencies are responsible for determining if an action “may affect” listed species. If so, the federal agency is required to prepare a Biological Assessment (BA) to determine if the action is “likely to adversely affect the species.” The potential for federal and state listed avian and bat species was assessed based on agency lists and reports. Data from the USFWS was used to identify potential federally-listed species.

4.3.4.2 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703-712) prohibits the taking of any migratory bird and any part, nest, or egg of any such bird, without a permit issued by the USFWS. “Take” under the MBTA is defined as the action or attempt to “pursue, hunt, shoot, capture, collect, or kill.” Migratory birds listed under the ESA are managed by the agency staff members who handle compliance with Section 7 of the ESA; management of all other migratory birds is overseen by the Migratory Bird Division of the ESA. Several migratory bird species occur in, or migrate through, the GSA.

Birds migrate along four main routes or flyways in North America: the Atlantic, the Central, the Mississippi, and the Pacific flyways, which are loosely delineated over geographic regions indicated by the name. The GSA is located within the Atlantic flyway. These flyways are not specific lines the birds follow but broad areas through which the birds migrate.

Migration routes may be defined as the various lanes birds travel from their breeding ground to their winter quarters. The actual routes followed by a given bird species differ by distance traveled, starting time, flight speed, and geographic position and latitude of the breeding and wintering grounds. Hundreds of bird species make the round-trip each year along the Pacific Flyway from their breeding grounds in the Arctic tundra and northern United States to wintering grounds found in South America.

Table 4-3 identifies the federally listed threatened or endangered bat and bird species, while **Table 4-4** identifies the respective state listed threatened or endangered bat and bird species found within the GSA by county where they occur.

Table 4-3 Federally Listed Bird & Bat Species Potentially Found in the GSA

Status	Species	Type	County of Occurrence within the GSA
Threatened	Piping Plover (*Charadrius melodus*)	Bird	Cumberland, Hancock, Knox, Lincoln, Rockingham, Sagadahoc, Suffolk, Waldo, Washington, York
Threatened	Red knot (*Calidris canutus rufa*)	Bird	Androscoggin, Cumberland, Essex, Hancock, Knox, Lincoln, Middlesex, Norfolk, Penobscot, Plymouth, Rockingham, Sagadahoc, Strafford, Suffolk, Washington, York
Threatened and Endangered	Roseate tern (*Sterna dougallii dougallii*)	Bird	Cumberland, Essex, Hancock, Knox, Lincoln, Middlesex, Norfolk, Plymouth, Rockingham, Sagadahoc, Strafford, Suffolk, Waldo, Washington, York
Endangered	Northern Long-Eared Bat (*Myotis septentrionalis*)	Bat	Androscoggin, Aroostook, Belknap, Carroll, Coos, Cumberland, Essex, Franklin, Hancock, Kennebec, Knox, Lincoln, Middlesex, Norfolk, Oxford, Penobscot, Piscataquis, Plymouth, Rockingham, Sagadahoc, Somerset, Strafford, Suffolk, Waldo, Washington, York

Sources: US Fish and Wildlife Service, http://www.fws.gov/endangered/ (accessed December 2022). U.S. Department of the Interior, Fish and Wildlife Service, https://ecos.fws.gov (accessed December, 2022).

Prepared by: ATAC Corporation, December 2022.

Table 4-4 State Listed Bird & Bat Species Potentially Found in the GSA

Status	Species	Type	County of Occurrence within the GSA
Endangered	American Bittern (*Botaurus lentiginosus*)	Bird	Essex, Middlesex, Norfolk
Threatened	Arctic Tern (*Sterna paradisaea*)	Bird	Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, Washington, York
Threatened	Atlantic Puffin (*Fratercula arctica*)	Bird	Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, Washington, York
Threatened	Barrow's Goldeneye (*Bucephala islandica*)	Bird	Penobscot, Piscataquis
Endangered	Black Tern (*Chlidonias niger*)	Bird	Aroostook, Kennebec, Penobscot, Piscataquis, Somerset, Waldo, Washington
Endangered	Black-crowned Night Heron (*Nycticorax nycticorax*)	Bird	Androscoggin, Aroostook, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, Washington, York
Threatened	Cerulean warbler (*Setophaga cerulea*)	Bird	Rockingham
Threatened	Cliff Swallow (*Petrochelidon pyrrhonota*)	Bird	Belknap, Carroll, Rockingham, Strafford
Threatened	Common Gallinule (*Gallinula chloropus*)	Bird	Androscoggin, Aroostook, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, Washington, York

Table 4-4 State Listed Bird & Bat Species Potentially Found in the GSA

Status	Species	Type	County of Occurrence within the GSA
Threatened	Common loon (*Gavia immer*)	Bird	Belknap, Carroll, Rockingham, Strafford
Endangered	Common nighthawk (*Chordeiles minor*)	Bird	Carroll
Threatened	Common Tern (*Sterna hirundo*)	Bird	Rockingham, Strafford
Threatened	Eastern Meadowlark (*Sturnella magna*)	Bird	Belknap, Carroll, Rockingham, Strafford
Endangered	Eastern Small-footed Bat (*Myotis leibii*)	Bat	Rockingham, Strafford
Endangered	Golden Eagle (*Aquila chrysaetos*)	Bird	Aroostook, Belknap, Carroll, Franklin, Oxford, Piscataquis, Rockingham, Somerset, Strafford
Endangered	Golden-winged Warbler (*Vermivora chrysoptera*)	Bird	Essex
Endangered	Grasshopper Sparrow (*Ammodramus savannarum*)	Bird	Cumberland, Kennebec, Washington, York
Threatened	Grasshopper Sparrow (*Ammodramus savannarum*)	Bird	Belknap, Carroll, Essex, Middlesex, Norfolk, Rockingham, Strafford
Threatened	Great Cormorant (*Phalacrocorax carbo*)	Bird	Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, Washington, York
Threatened	Harlequin Duck (*Histrionicus histrionicus*)	Bird	Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, Washington, York
Endangered	Indiana Bat (*Myotis sodalis*)	Bat	Essex, Middlesex, Norfolk, Suffolk
Threatened	King Rail (*Rallus elegans*)	Bird	Essex, Middlesex
Endangered	Least Bittern (*Ixobrychus exilis*)	Bird	Androscoggin, Aroostook, Cumberland, Essex, Franklin, Hancock, Kennebec, Knox, Lincoln, Middlesex, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, Washington, York
Endangered	Least Tern (*Sterna antillarum*)	Bird	Cumberland, Essex, Hancock, Knox, Lincoln, Norfolk, Plymouth, Rockingham, Sagadahoc, Waldo, Washington, York
Endangered	Little Brown Bat (*Myotis lucifugus*)	Bat	Belknap, Carroll, Middlesex, Oxford, Rockingham, Strafford
Threatened	Northern Harrier (*Circus cyaneus*)	Bird	Essex, Norfolk
Endangered	Northern Long-eared Bat (*Myotis septentrionalis*)	Bat	Androscoggin, Aroostook, Belknap, Carroll, Coos, Cumberland, Essex, Franklin, Hancock, Kennebec, Knox, Lincoln, Middlesex, Norfolk, Oxford, Penobscot, Piscataquis, Plymouth, Rockingham, Sagadahoc, Somerset, Strafford, Suffolk, Waldo, Washington, York
Threatened	Northern Parula (*Setophaga americana*)	Bird	Essex
Endangered	Peregrine Falcon (*Falco peregrinus*)	Bird	Franklin, Hancock, Oxford, Penobscot, Piscataquis, Somerset, Washington
Threatened	Peregrine Falcon (*Falco peregrinus*)	Bird	Belknap, Carroll, Coos
Threatened	Pied-billed Grebe (*Podilymbus podiceps*)	Bird	Carroll, Rockingham, Strafford
Endangered	Pied-billed Grebe (*Podilymbus podiceps*)	Bird	Essex, Middlesex, Norfolk

Table 4-4 State Listed Bird & Bat Species Potentially Found in the GSA

Status	Species	Type	County of Occurrence within the GSA
Endangered	Piping Plover (*Charadrius melodus*)	Bird	Cumberland, Hancock, Knox, Lincoln, Rockingham, Sagadahoc, Waldo, Washington, York
Threatened	Piping Plover (*Charadrius melodus*)	Bird	Suffolk
Threatened	Purple Martin (*Progne subis*)	Bird	Belknap, Carroll, Rockingham, Strafford
Threatened	Razorbill (*Alca torda*)	Bird	Hancock, Knox, Waldo, Washington
Threatened	Red Knot (*Calidris canutus rufa*)	Bird	Coos, Essex, Middlesex, Norfolk,Rockingham
Endangered	Roseate Tern (*Sterna dougallii*)	Bird	Cumberland, Essex, Hancock, Knox, Lincoln, Middlesex, Norfolk, Plymouth, Rockingham, Sagadahoc, Strafford, Suffolk, Waldo, Washington, York
Endangered	Sedge Wren (*Cistothorus platensis*)	Bird	Androscoggin, Aroostook, Cumberland, Essex, Franklin, Hancock, Kennebec, Knox, Lincoln, Middlesex, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, Washington, York
Threatened	Short-eared Owl (*Asio flammeus*)	Bird	Androscoggin, Aroostook, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, Washington, York
Endangered	Tri-colored Bat (*Perimyotis subflavus*)	Bat	Carroll, Essex, Middlesex, Norfolk, Rockingham
Threatened	Upland Sandpiper (*Bartramia longicauda*)	Bird	Androscoggin, Aroostook, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Penobscot, Sagadahoc, Somerset, Waldo, Washington, York
Endangered	Upland Sandpiper (*Bartramia longicauda*)	Bird	Essex, Middlesex, Norfolk
Threatened	Vesper Sparrow (*Pooecetes gramineus*)	Bird	Essex, Middlesex, Norfolk, Suffolk

Sources: Maine *State List of Endangered & Threatened Species* and subpages (https://www.maine.gov/ifw/fish-wildlife/wildlife/endangered-threatened-species/listed-species.html [Accessed Dec 2022]); *Species Occurring in New Hampshire* and subpages (https://www.wildlife.state.nh.us/wildlife/species-list.html [Accessed Dec 2022]); *Massachusetts List of Endangered, Threatened, and Special Concern* species and subpages (https://www.mass.gov/info-details/list-of-endangered-threatened-and-special-concern-species [Accessed Dec 2022]).

Prepared by: ATAC Corporation, December 2022.

4.3.5 Environmental Justice

This section is limited to a discussion of Environmental Justice as it pertains to potential helicopter noise impacts in the GSA. An environmental justice analysis considers the potential of the proposed project alternatives to cause disproportionate and adverse effects on low-income or minority populations. In the event that adverse effects are determined, applicable mitigation ensures that no low-income or minority population bears a disproportionate burden of effects.

The FAA's 1050.1F *Desk Reference* notes that Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and the accompanying Presidential Memorandum, as well as DOT Order 5610.2a, *Final Order to Address Environmental Justice in Low-Income and Minority Populations,* require the FAA to provide for meaningful public involvement by minority and low-income populations. These documents encourage considering environmental justice impacts in EAs to determine whether a disproportionately high and adverse impact may occur.

The socioeconomic and racial characteristics of the population within the GSA are based on data from the U.S. Census, 2011-2015 American Community Survey (ACS) 5-Year Data Release. Minority and low-income populations for each census block group within the General Study are identified using the AEDT 3d noise model and depicted in **Exhibit 4-5** using geographical information systems (GIS).[40] This analysis defines and identifies minority population and low-income population as follows:

- **A minority census block group** is a census block group with a minority population percentage greater than the average minority population percentage of the overall GSA. Based on U.S. Census data, the average percentage of minority population residing in the GSA was 21.13 percent. Therefore, every census block group with a percentage of minority population greater than 21.13 percent is designated a census block group of environmental justice concern.
- **A low-income population census block group** is a census block group with a greater percentage of low-income population than the average percentage of low-income population in the overall GSA. The average percentage of low-income population residing in the overall GSA was 14.06 percent. Therefore, every census block group with a low-income population greater than 14.06 percent is designated a census block group of environmental justice concern.

Exhibit 4-5 depicts areas of environmental justice concern in the GSA. **Table 4-5** presents minority and low-income populations by county within the GSA.

Table 4-5 Low-Income and Minority Populations by County in GSA

County	Population	Minority	% of Total	Low Income	% of Total
Maine					
Androscoggin	61,992	4,045	6.53%	8,459	13.65%
Aroostook	29,169	1,507	5.17%	4,970	17.04%
Cumberland	138,961	15,072	10.85%	17,698	12.74%
Franklin	13,666	537	3.93%	1,836	13.43%
Hancock	35,904	1,714	4.77%	4,619	12.86%
Kennebec	62,664	3,143	5.02%	9,529	15.21%
Knox	18,578	640	3.44%	1,947	10.48%
Lincoln	24,905	733	2.94%	2,717	10.91%
Oxford	29,219	1,437	4.92%	5,487	18.78%
Penobscot	107,984	5,507	5.10%	17,101	15.84%
Piscataquis	11,814	449	3.80%	2,511	21.25%
Sagadahoc	22,115	1,055	4.77%	2,744	12.41%
Somerset	23,576	836	3.55%	3,576	15.17%
Waldo	28,666	1,230	4.29%	4,509	15.73%
Washington	18,422	1,037	5.63%	3,016	16.37%
York	67,401	2,559	3.80%	4,782	7.09%
New Hampshire					
Belknap	3,457	18	0.52%	79	2.29%
Carroll	3,169	165	5.21%	106	3.34%

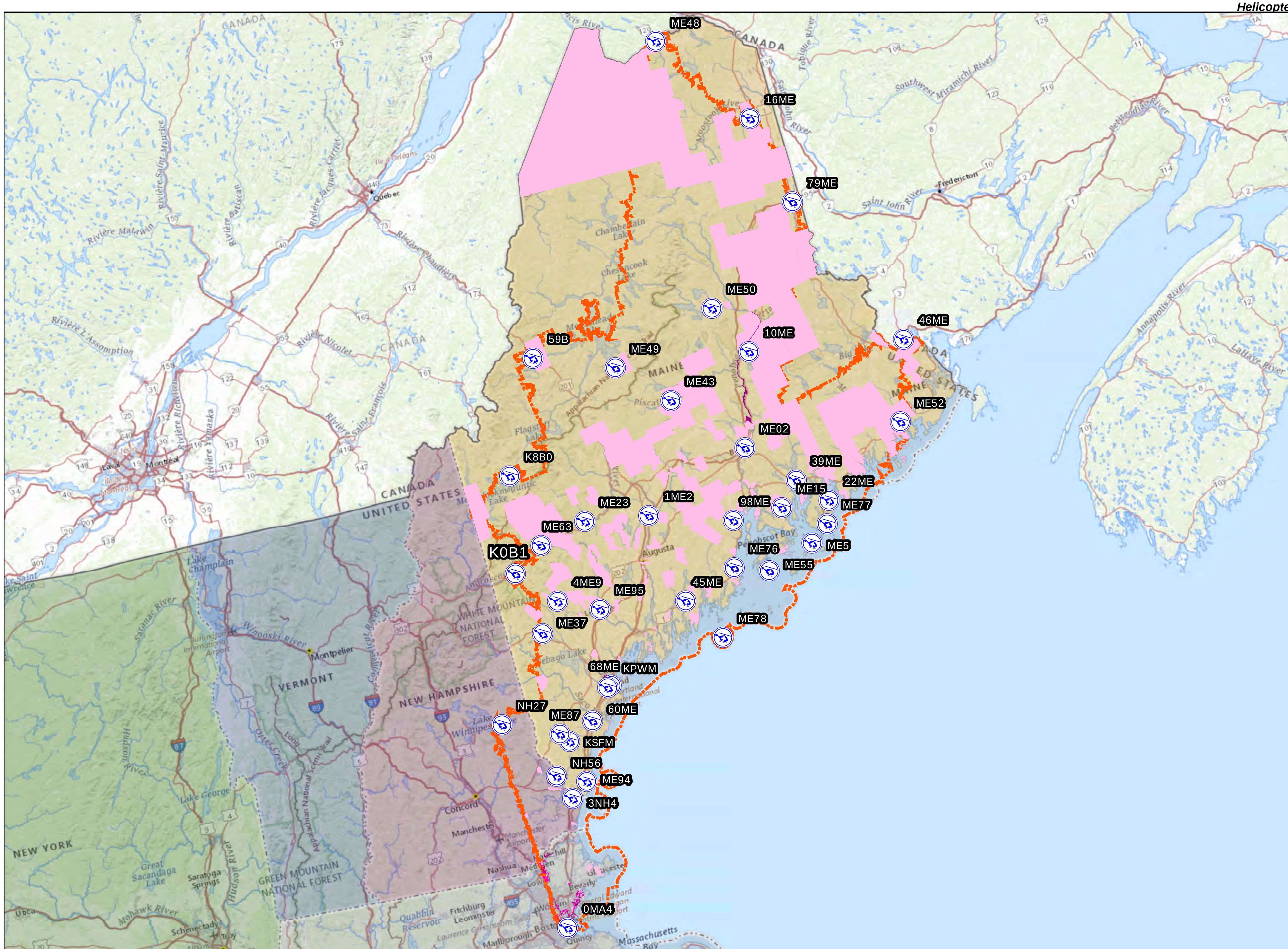
40 All GIS work was conducted using ESRI ArcGIS version 10.3 and Manifold System 8.0.30.

Table 4-5 Low-Income and Minority Populations by County in GSA

County	Population	Minority	% of Total	Low Income	% of Total
Rockingham	107,343	7,104	6.62%	6,228	5.80%
Strafford	57,086	5,174	9.06%	6,589	11.54%
Massachusetts					
Essex	437,670	109,296	24.97%	47,407	10.83%
Middlesex	281,157	76,576	27.24%	26,689	9.49%
Norfolk	16,910	5,605	33.15%	2,332	13.79%
Suffolk	313,798	168,794	53.79%	65,288	20.81%

Note: Highlighted items reflect those percentages exceeding the GSA average percentage of minority population or the GSA average percentage of low-income population.

Source: US Census Bureau, 2009-2014 American Community Survey (ACS) 5-Year Estimate.
Prepared by: ATAC Corporation, December 2022.



LEGEND

- Airport/Heliport
- General Study Area
- Maine
- Massachusetts
- New Hampshire
- New York
- Vermont
- US State Tiger Line Boundary
- Low Income Population
- Minority Population
- Low Income/Minority Population

Notes:
Airport/Heliport Identifier and Name:
SMMC - Southern Maine Health Care SMMC Helipad
ME23 - Franklin Memorial Hospital Heliport
ME15 - Blue Hill Memorial Hospital Heliport
MILE - Lincoln Health Miles Campus
98ME - Waldo County General Hospital Heliport
79ME - Houlton Regional Hospital Heliport
68ME - Maine Medical Center Heliport
4ME9 - Stephens Memorial Hospital Heliport
46ME - Calais Regional Heliport
3NH4 - Portsmouth Regional Hospital Heliport
39ME - Maine Coast Memorial Heliport
22ME - Bar Harbor Heliport
1ME2 - Maine General Medical Center-Waterville Heliport
16ME - AR Gould Hospital Heliport
10ME - PVH Heliport
59B - Newton Field Airport
0MA4 - Boston Medical Center Hospital Heliport
K0B1 - Bethel Regional Airport
K8B0 - Stephen A Bean Municipal Airport
KPWM - Portland International Jetport
KSFM - Sanford Seacoast Regional Airport
ME02 - Eastern Maine Medical Center Heliport
ME37 - Bridgton Hospital Heliport
ME43 - Northern Light Mayo Hospital Heliport
ME48 - Northern Maine Medical Center Heliport
ME49 - C A Dean Memorial Hospital Heliport
ME5 - Banks Airport
ME50 - Millinocket Regional Heliport
ME52 - Down East Community Hospital Heliport
ME55 - Vinalhaven Airport
ME63 - Rumford Community Hospital Heliport
ME76 - Penobscot Bay Medical Center Heliport
ME77 - Cranberry Isles Heliport
ME78 - Monhegan Island Heliport
ME87 - Southern Maine Health Care/Sanford Heliport
ME94 - York Hospital Heliport
ME95 - CMMC Air Ambulance Landing Site Heliport
NH27 - Huggins Hospital Heliport
NH56 - Wentworth-Douglass Hospital Heliport

Projection :GCS North American 1983
Scale: 1:2,631,162

0 10 20 40 Miles

N

Sources: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset: U.S. Census Bureau _ TIGER/Line; HERE Road Data, Census Blocks. Federal Aviation Adminstration, NFDC, Airport and Heliport locations. See Table 5 in the Noise Technical Report for a listing of all Section 4(f) resources.
Prepared by: ATAC Corporation, April 2023.

Exhibit 4-5

Environmental Justice Communities

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4.3.6 Energy Supply (Aircraft Fuel)

This section describes fuel consumption by IFR helicopters arriving at and departing from the Study Airports/Heliports. Using the AEDT 3d noise model, the FAA calculated helicopter fuel burn to estimate fuel consumption associated with air traffic flows under current conditions. AEDT 3d calculates fuel burn using the same input used for calculating noise. (See **Section 4.3.1.1** for a discussion of AEDT 3d model inputs.) Based on the AEDT 3d calculation in the 2023 No Action scenario, IFR helicopters arriving at and departing from the Study Airports/Heliports burn approximately 205 gallons of fuel[41] on an annual average day.

4.3.7 Air Quality

This section describes air quality conditions within the GSA. In the United States, air quality is generally monitored and managed at the county or regional level. The U.S. EPA, pursuant to mandates of the federal Clean Air Act, (42 U.S.C. § 7401 et seq. (1970)), has established the National Ambient Air Quality Standards (NAAQS) to protect public health, the environment, and quality of life from the detrimental effects of air pollution. Standards have been established for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). PM standards have been established for inhalable coarse particles ranging in diameter from 2.5 to 10 micrometers (µm) (PM_{10}) and fine particles less than 2.5 µm ($PM_{2.5}$) in diameter.

In accordance with the Clean Air Act Amendments (CAAA) of 1997, (91 Stat. 685, P.L. 95-95), the U.S. EPA uses air monitoring data it compiles, as well as data collected by local air quality agencies, to classify counties and some sub-county geographical areas by their compliance with the NAAQS. An area with air quality at or below the NAAQS is designated as an attainment area. An area with air quality that exceeds the NAAQS is designated as a nonattainment area. Nonattainment areas are further classified as extreme, severe, serious, moderate, and marginal by the extent the NAAQS are exceeded. Areas that have been reclassified from nonattainment to attainment are identified as maintenance areas. An area may be designated as unclassifiable when there is a temporary lack of data on which to base its attainment status. **Table 4-6** identifies those areas that fall within the GSA that are in nonattainment or maintenance status for these pollutants.

Table 4-6 NAAQS Nonattainment and Maintenance Areas in the GSA

Pollutant	Status	County, State (Partial/Specific Area)
Ozone (O3) – (8-Hour Standard [1997])	Moderate – Maintenance	Rockingham, NH (P) Strafford, NH (P)
Ozone (O3) – (8-Hour Standard [1997])	Moderate – Nonattainment	Essex, MA Middlesex, MA Norfolk, MA Suffolk, MA
Ozone (O3) – (8-Hour Standard [1997])	Marginal – Maintenance	Androscoggin, ME (P Durham only) Cumberland, ME (P) Sagadhoc, ME York, ME (P)
Ozone (O3) – (8-Hour Standard [1997])	(Former Subpart 1 – Maintenance)	Hancock, ME (P); Knox, ME (P); Lincoln, ME (P); Waldo ME (P Isleboro only)

(Continued)

41 For fuel burn purposes, jet fuel used by the air ambulance AW-109 helicopters is calculated at 6.7 pounds per gallon. Approximately 1,379.33 lbs. of fuel are burned by IFR helicopters arriving and departing the Study Airports/Heliports on an annual average day.

Table 4-6 NAAQS Nonattainment and Maintenance Areas in the GSA

Pollutant	Status	County, State (Partial/Specific Area)
Ozone (O3) – (1-Hour Standard [1979])	Moderate – Nonattainment	Cumberland, ME; Sagadahoc, ME; York, ME; Knox, ME; Lincoln, ME; Androscoggin, ME; Kennebec, ME
Ozone (O3) – (1-Hour Standard [1979])	Marginal – Maintenance	Hancock, ME; Waldo, ME
Ozone (O3) – (1-Hour Standard [1979])	Marginal – Nonattainment	Rockingham, NH (P)
Ozone (O3) – (1-Hour Standard [1979])	Serious – Nonattainment	Essex, MA; Middlesex, MA; Norfolk, MA; Suffolk, MA; Strafford, NH
Particulate Matter (PM) – (PM-10 Standard [1987])	Moderate – Maintenance	Aroostock County ME (P – City of Presque Isle)
Sulfur Dioxide (SO_2) – (2010)	Maintenance	Rockingham NH (P – Candia Town, Deerfield Town, Northwood Town)
Sulfur Dioxide (SO_2) – (1971)	Primary – Maintenance	Penobscot County, ME (P – Millinocket Air Quality Control Region 109)
Carbon Monoxide (CO) – (1971)	Moderate <= 12.7ppm – Maintenance	Middlesex County, MA (P – Cambridge, Everett, Malden, Medford, and Somerville); Suffolk County, MA (P – Boston, Chelsea, Revere); Norfolk County, MA (P – Quincy City)
Carbon Monoxide (CO) – (1971)	Not Classified – Maintenance	Middlesex County, MA (P – Lowell City, P – Waltham City)

Source: US Environmental Protection Agency *Nonattainment Areas for Criteria Pollutants (Green Book)* (https://www.epa.gov/green-book). Accessed December 2023.
Prepared by: ATAC Corporation, January 2023.

Both the EPA and the FAA have determined that aircraft operations at or above a mixing height of 3,000 feet AGL have a very small effect on pollutant concentrations at ground level.[42,43,44] The mixing height represents the height of the completely mixed portion of the atmosphere that begins at the earth's surface and extends to a few thousand feet overhead where the atmosphere becomes fairly stable.[45] Mixing heights will vary based on a variety of factors including topography, time of day, temperature, wind, and season. A mixing height of 3,000 feet AGL represents the annual national average mixing height. While 3,000 feet AGL is the threshold established by the EPA and the FAA, FAA research on mixing heights indicates that changes in air traffic procedures above 1,500 ft. AGL and below the mixing height would have little if any effect on emissions and ground concentrations.[46]

4.3.8 Climate

Greenhouse gases (GHGs) are naturally occurring and man-made gases that trap heat in the earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). According to the EPA, domestic aviation contributed approximately three percent of total

42 Wayson, Roger, and Fleming, Gregg, "Consideration of Air Quality Impacts by Airplane Operations at or Above 3000 feet AGL," Volpe National Transportations Systems Center and FAA Office of Environment & Energy, FAA-AEE-00-01-DTS-34, September 2000. (http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/)
43 40 C.F.R. § 93.150(c)(2) (xxii).
44 72 Fed. Reg. 6641 (February 12, 2007).
45 U.S. Department of Transportation, Federal Aviation Administration, *Air Quality Procedures For Civilian Airports & Air Force Bases*, April 1997.
(http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Handbook.PDF).
46 Report on ''Consideration of Air Quality Impacts by Airplane Operations At or Above 3,000 feet AGL,''FAA–AEE–00–01, September 2000, p. 5.

national CO_2 emissions.[47] The only GHG emissions AEDT 3d calculates are CO_2 emissions from aircraft engines, thus this EA will only consider CO_2 emissions.[48]

In January 2021, Section 7(e) of Executive Order 13990[49] directed the Council on Environmental Quality (CEQ) to rescind their 2019 Draft GHG Guidance and review, revise, and update its 2016 GHG Guidance. CEQ rescinded their 2019 Draft GHG Guidance. That action does not change any law, regulation, or other legally binding requirement. CEQ has not yet addressed its review of and any appropriate revisions and updates to the 2016 GHG Guidance. CEQ directs that, “In the interim, agencies should consider all available tools and resources in assessing GHG emissions and climate change effects of their proposed actions, including, as appropriate and relevant, the 2016 GHG Guidance.”[50]

This Draft EA calculated total MT of CO_2, reported as MT CO_2e, using AEDT 3d estimates of the amount of fuel burned by IFR helicopters arriving and departing from the Study Airports/Heliports in the GSA for the No Action and applying accepted Environmental Protection Agency factors to calculate CO_2e. Fuel burn calculations are discussed in **Section 4.3.6**.

4.3.9 Visual Resources / Visual Character

Visual resources and visual character deal with the extent to which a Proposed Action would result in visual impacts within the GSA. The Proposed Action includes in-flight changes for helicopters in-flight that would occur at altitudes consistent with current air ambulance helicopter operations. Currently, portions of the GSA are exposed to the visual resource of air ambulance helicopters arriving and departing from the Study Airports/Heliports, en route to or from various origins/destinations, and in unexpected emergency situations uncommon to the appearance of helicopters (e.g. highways, roads, fields, and open spaces). In these emergency appearances, the visual character is contextual in the same fashion as any other emergency response. The context being that while unusual, such visual appearances are of an emergency nature, temporary, and engaged in life-saving and life support activities. Many of the Study Heliports are at hospitals, where the visual effect would remain consistent with current arrival/departure practice, again within the same context of emergency activities. Any potential visual impacts would only arise from changes in the visibility of helicopters within the GSA as perceived from the ground.

47 U.S. Environmental Protection Agency. https://www.epa.gov/regulations-emissions-vehicles-and-engines/control-air-pollution-airplanes-and-airplane-engines-ghg, Accessed March 2023 to obtain *EPA Final Airplane Greenhouse Gas Emission Standards Fact Sheet - Resource Information(PDF), p2, December 2020, EPA-420-F-20-057).*
48 U.S. Department of Transportation, Federal Aviation Administration, *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA, Section 1.1.3 Fuel burn and greenhouse gas emissions*, https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf, Accessed January 2023.
49 Executive Office of the President. Executive Order 13990 of January 20, 2021 *Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis*, 86FR7037.
50 Council on Environmental Quality, *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions*. 86FR10252, February 19, 2021.

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5 Environmental Consequences

This Chapter discusses the potential environmental impacts that could result from implementing the Proposed Action and the No Action Alternative. Specifically, this EA considers effects on the environmental resource categories identified in FAA Order 1050.1F. Both the Proposed Action and the No Action Alternative were evaluated under forecasted 2026 conditions, which is the first year the Proposed Action could potentially be implemented. This evaluation considers the direct, indirect, and cumulative effects associated with the Proposed Action and No Action Alternative, as required under FAA Order 1050.1F.

Potential environmental impacts are identified for the environmental resource categories described in **Section 4.3**. Neither the Proposed Action nor the No Action Alternative would involve land acquisition; physical changes to the environment resulting from ground disturbance or construction activities; changes in patterns of population movement or growth, increases in public service demands, or business and economic activity; or generation, disturbance, transportation, or treatment of hazardous materials. Therefore, neither alternative is expected to result in impacts to certain environmental resource categories (please see **Section 4.2** for a list of excluded categories). The excluded environmental resource categories are not further discussed in this Chapter.

Table 5-1 identifies the environmental impact categories that the Proposed Action could potentially affect, the thresholds of significance used to determine the potential for impacts, and a side-by-side comparative summary of the potential for environmental impacts resulting from implementing the Proposed Action under 2026 forecast conditions.

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Impact? 2023	Impact? 2028
Noise and Noise Compatible Land Use	A significant noise impact would occur if the Proposed Action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65dB level due to a DNL 1.5dB or greater increase, when compared to the no action alternative for the same timeframe.	No	No
Department of Transportation Act, Section 4(f) Resources	A significant impact would occur if the Proposed Action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately-owned land from a historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.	No	No
Historical, Architectural, Archeological, and Cultural Resources	The FAA has not established a significance threshold for Historical, Architectural, Archeological, and Cultural Resources	No	No

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Impact? 2023	Impact? 2028
Wildlife (Avian and Bat Species)	A significant impact to federally-listed threatened and endangered species would occur when the United States Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) 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. Lesser impacts including impacts on non-listed species could also constitute a significant impact based on consideration factors such as long-term or permanent loss of unlisted wildlife species and adverse impacts to special status species or their habitats. The FAA has not established a significance threshold for non-listed species.	No	No
Environmental Justice	The FAA has not established a significance threshold for Environmental Justice. However, a significant factor to consider to determine potential significant impact is if the action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population due to significant impacts in other environmental impact categories, and/or causes impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique and significant to the environmental justice population	No	No
Energy Supply (Aircraft Fuel)	The FAA has not established a significance threshold for Energy Supply. However, a significant factor to consider is if the action would have the potential to cause demand to exceed available or future (2025) supplies of these resources.	No	No
Air Quality	A significant impact would occur if the Proposed Action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.	No	No
Climate	The FAA has not established a significance threshold for Climate and has not identified specific factors to consider in making a significance determination.	No	No
Visual Effects	The FAA has not established a significance threshold for Visual Resources / Visual Character. Significant factors to consider include the potential effect an action has on the nature of the visual character of the area, potential to contrast with the visual resources and/or visual character in the study area, and/or potential to block or obstruct the views of visual resources	No	No

Source: FAA Order 1050.1F, Exhibit 4-1, January 2023.
Prepared By: ATAC Corporation, January 2023.

The following sections describe the impact findings for each environmental resource category, followed by a discussion of potential cumulative impacts. In summary, no significant impacts to any environmental resource category have been identified.

5.1 Noise and Compatible Land Use

This section discusses the analysis of helicopter noise exposure under the Proposed Action and the No Action Alternative, under 2023 and 2028 forecast conditions. This discussion includes identifying the differences in noise exposure between the Proposed Action and the No Action Alternative. This comparison is used to determine if implementing the Proposed Action would result in significant noise impacts.

5.1.1 Summary of Impacts

Helicopter noise exposure was modeled for both the Proposed Action and the No Action Alternative under 2023 and 2028 forecast conditions. The noise analysis demonstrates that implementing the Proposed Action would not result in a day-night average sound level (DNL) increase of 1.5 dBA or higher in noise-sensitive areas exposed to DNL 65 dB or higher. Therefore, neither the Proposed Action nor No Action Alternative would result in a significant noise impact.

5.1.2 Methodology

The noise analysis evaluated noise exposure to communities within the GSA from helicopters forecasted to be operating under IFR-filed flight plans, at altitudes from ground level up to 10,000 feet above ground level (AGL). IFR-filed helicopter activity was forecasted for 2023 and used to model conditions under both the Proposed Action and the No Action Alternative. Noise modeling was conducted using Aviation Environmental Design Tool version 3d (AEDT 3d), the FAA-required noise model for aviation projects including air traffic changes over large areas and altitudes over 3,000 feet AGL.[51] Noise was modelled from the ground level up to and including 5,000 feet AGL for the GSA. Although FAA guidance requires noise modeling up to and including 18,000 feet for the presence of national parks and wildlife refuges; due to the unique flight characteristics, observed historic radar data, and operator interviews, no helicopter in the analysis is anticipated to regularly exceed 5,000 feet MSL.

If the FAA approves the Proposed Action, the FAA expects to begin implementation in 2023. Therefore, helicopter noise modeling was conducted for 2023, as required by FAA Order 1050.1F. Future year noise exposure levels modeled for the Proposed Action and the No Action Alternative for 2028 were compared to determine whether there is a potential for noise impacts. While the overall number and type of helicopter operations will increase in 2028, the number and type of aircraft operations are the same under the Proposed Action and No Action Alternative in 2023 and the same in the Proposed Action and No Action Alternative in 2028. The Proposed Action would not include developing or constructing facilities, such as heliports or helicopter landing area expansions that would be necessary to accommodate an increase in aviation activity; therefore, no additional growth in operations associated with the Proposed Action is anticipated. The noise analysis reflects the change in noise exposure resulting from the proposed changes in helicopter routes (i.e., flight tracks) under the Proposed Action compared to the No Action Alternative.

Detailed information on IFR-filed helicopter operations within the GSA was assembled for input into AEDT 3d, including the following data:

51 FAA 1050.1F *Desk Reference*, *Noise and Noise-Compatible Land Use*, Sec. 11.1.3, February 2020.

Average Annual Day IFR-Filed Helicopter Flight Schedules: The IFR-filed helicopter flight schedules identify arrival and departure times, helicopter type, and origin/destination information for an average annual day (AAD) in 2023. The AAD represents all the helicopter operations for every day in a study year divided by 365, the number of days in a year. The AAD does not reflect a particular day, but is meant to represent a typical day over a period of a year. The operational forecast was based on discussions with the primary helicopter air ambulance operator in the region,[52] and normalized for the AAD with additional details using previously identified origin/destination information.

Weather: The AEDT 3d model includes data for multiple meteorological parameters, including temperature, pressure, and humidity. Weather conditions for all Study Airports/Heliports were defined and used in the noise study. Further discussion on the weather data employed in the AEDT 3d model can be found in **Appendix F,** *ILHS-HAA Project Noise Technical Report*.

Flight Tracks: The flight tracks used in noise modeling were based on radar data collected for the No Action Alternative noise analysis and information provided by FAA and helicopter air ambulance personnel. Aircraft routings under both the No Action Alternative and Proposed Action are depicted in **Exhibits 3-7** and **3-8** in **Chapter 3**, *Alternatives*. For the Proposed Action, flight tracks were developed from the aircraft procedures created by the ILHS-HAA Project Design Team using the Terminal Area Route Generation, Evaluation, Traffic and Simulation (TARGETS) program. The majority of the No Action Alternative modeled flight tracks are based on the 2020/2021 flight track. The remaining No Action Alternative flight tracks for amended or new procedures were modeled based on input from the air traffic control experts who developed the procedures. Illustrations depicting 2020/2021 flight tracks and Proposed Action procedure designs were developed and shared with key personnel from the Design Team as part of the consultation process. The consultations were conducted to seek out key model input assumptions such as frequency of Proposed Action procedure usage, Study Airport/Heliport pairs and overall operational usage. The assumptions were then used for refining model trajectory locations, altitude profiles, and utilization.

TARGETS flyability lines, or the lines indicating the actual 3D path of helicopters ideally flying the Proposed Action procedures served as the center of the 0.3 nautical mile containment area for ZK RNAV routes.

More detail related to the development of the AEDT 3d model input files is provided in **Appendix F,** *ILHS-HAA Project Noise Technical Report***.**

As discussed in **Section 4.3.1.1**, the AEDT 3d model was used to compute DNL values for 2023 and 2028 Proposed Action and No Action Alternative conditions at multiple sets of data points throughout the GSA:

- 48,261 2020 Census block centroids;
- 80,956 uniform grid points at 0.5-nautical mile (NM) intervals on a uniform grid covering the GSA, which were also used to calculate DNL values at potential Department of Transportation (DOT) Act, Section 4(f) resources and historic sites;
- 224,613 unique points representing named Section 4(f) resources; including 2,291 National Register of Historic Places (NRHP) listed historic points; 404 NRHP Polygon

52 Various conversations with and documents from FAA and LifeFlight of Maine personnel 2021-2023.

points; and 16,540 points with no title (e.g. blank) or listed as "Unnamed Resource" representing unnamed locations of designated Section 4(f) Resources.

As discussed in **Section 4.3.1.1**, DNL is the FAA's primary noise metric. **Table 5-2** provides the criteria used to assess the changes in aircraft noise exposure attributable to the Proposed Action compared with the No Action Alternative. FAA Order 1050.1F defines a significant impact as an increase of DNL 1.5 dB at noise-sensitive land use locations (e.g., residences, schools, etc.) exposed to aircraft noise of DNL 65 dB or higher under the Proposed Action. For example, an increase from 63.5 dB to 65 dB is considered a significant impact.

FAA Order 1050.1F also recommends that when there are DNL increases of 1.5 dB or more at noise-sensitive locations in areas exposed to aircraft noise of DNL 65 dB and higher, DNL increases of 3 dB or more in areas exposed to aircraft noise between DNL 60 dB and 65 dB should also be evaluated and disclosed. It is important to note that DNL increases of 3 dB in areas exposed to aircraft noise below DNL 65 dB are not considered "significant impacts" but are to be considered in the environmental evaluation of a proposed project.

FAA Order 1050.1F also stipulates that changes in exposure of DNL 5 dB or greater in areas exposed to aircraft noise between DNL 45 dB and 60 dB should be considered for airspace actions such as changes to air traffic routes. This threshold was established in 1990, following issuance of an FAA noise screening procedure to evaluate whether certain airspace actions above 3,000 feet AGL might increase DNL levels by 5 dB or more. The FAA prepared this noise-screening procedure because experience indicated that DNL increases 5 dB or more at cumulative levels well below DNL 65 dB could be disturbing to people and become a source of public concern. As shown in **Table 5-2**, a 3 dB increase in areas exposed to DNL 60 to 65 dB and a 5 dB increase in areas exposed to DNL 45 to 60 dB are considered reportable noise increases.

Table 5-2 Criteria for Determining Impact of Changes in Aircraft Noise

DNL Noise Exposure Level	Increase in DNL with Proposed Action	Aircraft Noise Exposure Change Consideration
DNL 65 and higher	DNL 1.5 dB or more 1/	Exceeds Threshold of Significance
DNL 60 to 65	DNL 3.0 dB or more 2/	Reportable Noise Increase (Considered When Evaluating Air Traffic Actions)
DNL 45 to 60	DNL 5.0 dB or more 3/	Reportable Noise Increase (Information Disclosed When Evaluating Air Traffic Actions)

Notes:
1/ Source FAA 1050.1F Desk Reference, Pg. 11-9; Title 14 C.F.R. Part 150.21 (2) (d); and Federal Interagency Committee on Noise, Federal Agency Review of Selected Airport Noise Issues, August 1992.
2/ Source FAA 1050.1F Desk Reference, Pg. 11-9; and Federal Interagency Committee on Noise, Federal Agency Review of Selected Airport Noise Issues, August 1992.
3/ Source FAA 1050.1F Desk Reference, Pg. 11-9.

Source: FAA 1050.1F *Desk Reference*, Ch. 11, *Noise and Noise-Compatible Land Use*, July 2015.
Prepared by: ATAC Corporation, December 2023

5.1.3 Potential Impacts – 2023 and 2028

Table 5-3 summarizes the results of the noise analysis for 2023 and 2028 conditions. The results for both years indicate that, when compared to the No Action Alternative, the Proposed Action would not result in a DNL 1.5 dB or higher increase in noise-sensitive areas exposed to DNL 65 dB or higher. No census block centroids would experience a reportable noise increase in areas exposed to DNL between 60 dB and 65 dB or between 45 dB and 60 dB. These results indicate the Proposed Action would not result in a significant noise exposure impact on population exposed to DNL 65 dB or higher levels under the Proposed Action or produce reportable noise increases in populations exposed to DNL 45 dB to 65 dB.

Table 5-3 Change in Potential Population Exposed to Helicopter Noise – 2023 and 2028

DNL Noise Exposure Level Under the Proposed Action	Increase in DNL with the Proposed Action	Population Exposed to Noise that Exceeds the Threshold	
		No Action Alternative	**Proposed Action**
DNL 65 and higher	DNL 1.5 dB or greater	0	0
DNL 60 to 65	DNL 3.0 dB or greater	0	0
DNL 45 to 60	DNL 5.0 dB or greater	0	0

Sources: U.S. Census Bureau, 2020 Census (population centroid data), accessed August 2022; ATAC Corporation, March 2023 (AEDT 3d modeling results).
Prepared by: ATAC Corporation, March 2023.

Under the No Action Alternative and Proposed Action, no changes to air traffic routes in the ILHS-HAA Project would occur in 2023 and 2028, and no effects related to changes in aircraft noise exposure would be anticipated.

5.1.4 Noise Sensitive Uses and Areas

In addition to disclosing potential noise impacts to residential population, FAA Order 1050.1F requires the FAA to identify and describe noise sensitive uses and areas in the GSA. As defined in Paragraph 11-5b(10) of FAA Order 1050.1F, a noise sensitive area is “an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites.” Potential impacts to residential population are discussed in **Section 5.1.3**. Potential impacts to recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are discussed in **Sections 5.2** and **5.3**. The noise analysis results indicate that the Proposed Action when compared to the No Action Alternative would not result in a DNL 1.5 dBA or higher increase to noise sensitive uses or noise sensitive areas in locations exposed to DNL 65 dB or higher. In addition, these resources would not experience reportable noise increases between DNL 60 dB and 65 dB and DNL 45 and 60 dB.

5.1.5 Noise Compatible Land Use

FAA Order 1050.1F requires that EA documents discuss possible conflicts between the Proposed Action and the objectives of federal, regional, state, local, and tribal land use plans, policies, and controls for the area concerned. Analysis of the potential impacts to noise compatible land use was focused on changes in helicopter noise exposure resulting from implementing the Proposed Action. FAA Order 1050.1F states, “The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport’s noise impact. If the noise analysis concludes that there is no significant impact, a similar conclusion usually may be drawn with respect to compatible land use.” Air traffic actions like the ILHS-HAA Project do not result in direct impacts to land such as ground disturbance. Accordingly, the compatible land use analysis relies on changes in helicopter noise exposure between the Proposed Action and the No Action Alternative (discussed in **Section 5.1**) as the basis for determining compatible land use impacts within the GSA.

5.1.5.1 Potential Impacts – 2023 and 2028

As stated in **Section 5.1**, the Proposed Action, when compared with the No Action Alternative, would not result in changes in helicopter noise exposure in 2023 and 2028 that would exceed the FAA's significance threshold. Likewise, there are no conflicts with federal, regional, state, or local land use plans, policies, and controls. Therefore, the Proposed Action would not result in significant compatible land use impacts.

Under the No Action Alternative, there would be no changes to air traffic routing in the GSA and no changes in helicopter noise exposure expected to occur in 2023 and 2028. Therefore, the No Action Alternative would not result in significant compatible land use impacts.

5.2 Department of Transportation Act, Section 4(f) Resources

This section discusses potential impacts to DOT Act, Section 4(f) Resources. In **Chapter 4**, *Affected Environment*, **Exhibit 4-3** depicts Section 4(f) resources within the GSA as described in **Section 4.3.3**.

5.2.1 Summary of Impacts

Evaluating potential impacts to Section 4(f) resources focuses on changes in helicopter noise exposure resulting from implementing the Proposed Action. The FAA's helicopter noise exposure analysis indicates that the Proposed Action would not result in a reportable noise increase at any Section 4(f) resource identified within the GSA, when compared with the No Action Alternative. Changes in helicopter overflight would occur at altitudes and distances from viewers that would not substantially impair the view or setting of Section 4(f) resources. Therefore, no constructive use of a Section 4(f) resource associated with the Proposed Action would occur and no significant impact would be anticipated.

Under the No Action Alternative, no changes in air traffic routes in the GSA would occur. Therefore, no changes to helicopter noise exposure or aircraft overflight patterns would occur over Section 4(f) resources and no impacts would be anticipated.

5.2.2 Methodology

The FAA evaluates potential effects on Section 4(f) resources in terms of both physical impacts (i.e., physical use) and non-physical impacts (i.e., constructive use). A physical impact would occur as a result of land acquisition, construction, or other ground disturbance activities that would result in physical use of all or a portion of a Section 4(f) property. As land acquisition, construction, or other ground disturbance activities would not occur under either the Proposed Action or the No Action Alternative, neither alternative would have the potential to cause a physical impact to a Section 4(f) resource. Therefore, analysis of potential impacts to Section 4(f) resources is limited to identifying non-physical impacts resulting from constructive use. A constructive use of a Section 4(f) resource would occur if there were a substantial impairment of the resource to the degree that the activities, features, or attributes of the site that contribute to its significance or enjoyment are substantially diminished. This could occur as a result of both visual and noise impacts. Concerning helicopter noise, a constructive use would occur if noise levels substantially impair the resource. Refer to **Section 5.9**, regarding potential visual impacts within the GSA.

Noise exposure levels were calculated for grid points placed at Section 4(f) resources. A list of the resources evaluated is provided in **Appendix F,** *ILHS-HAA Project Noise Technical Report*. **Section 5.1.2** includes further discussion on the grid points used in the Section 4(f) analysis. The analysis of potential impacts to Section 4(f) resources considered whether these resources would experience a significant or reportable noise increase when comparing the Proposed Action with the No Action Alternative using the applicable thresholds shown in **Table 5-2**.

FAA Order 1050.1F identifies additional factors in deciding whether to apply the thresholds listed above to determine the significance of noise impacts on Section 4(f) resources. If a reportable noise increase were to occur, the Section 4(f) resources would be evaluated further to determine if the project-related effects would constitute a constructive use. Further evaluation can include confirming that the property is in fact a Section 4(f) resource and identifying the specific attributes for which the resource is managed (e.g., for traditional recreational uses or where other noise is very low and a quiet setting is a generally recognized purpose and attribute).

In cases where Land and Water Conservation Fund Act (LWCF)[53] resources are "used" by a transportation project, FAA Order 1050.1F stipulates that a replacement satisfactory to the Secretary of the Interior is required for recreation lands aided by the Department of Interior's LWCF. Therefore, these resources are considered as part of the Section 4(f) impact analysis process.

5.2.3 Potential Impacts – 2023 and 2028

As stated in **Section 5.1**, the Proposed Action, when compared with the No Action Alternative, would not result in changes in helicopter noise exposure in 2023 and 2028 that would exceed the FAA's significance threshold or result in reportable noise increases to Section 4(f) resources. As stated in **Section 5.9**, the Proposed Action, when compared with the No Action Alternative, would not cause a significant visual impact in 2023 and 2028. Any changes in helicopter traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of the Section 4(f) resources. Therefore, the Proposed Action would not result in potential impacts to Section 4(f) resources.

Under the No Action Alternative, no changes to air traffic routes in the ILHS-HAA Project would occur in 2023 and 2028, and no effects related to changes in helicopter noise exposure or impairment to the view or setting of Section 4(f) resources would be anticipated. Therefore, the No Action Alternative would not result in potential impacts to Section 4(f) resources.

5.3 Historic and Cultural Resources

This section discusses the analysis of impacts to historic and cultural resources under the Proposed Action and the No Action Alternative. **Section 4.3.3** provides information on historic or cultural resources within the GSA. The FAA initiated consultation with the State Historic Preservation Officers (SHPOs) for the States of Maine, New Hampshire, and Massachusetts; as well as Tribal Historic Preservation Officers (THPOs) of Indian tribes that may have interests within the GSA on May 5, 2023, in accordance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq.) and the implementing regulations at 36 C.F.R. Part 800. The original outreach effort included contacting five tribes within the

53 16 U.S.C. §§ 460l-4, et seq.

GSA; namely: Houlton Band of Maliseets, Aroostook Band of Micmacs, Penobscot Nation, Passamaquoddy Tribe of Indian Township, Passamaquoddy Tribe of Pleasant Point, and the Cowasuck Band of the Pennacook/Abenaki People. For additional information, see **Appendix A**, *Agency and Public Coordination and List of Receiving Parties*. The FAA is also in process with agency-to-agency informational mailings and potential consultations with various federal agencies at this time.

5.3.1 Summary of Impacts

The helicopter noise exposure analysis indicates that there would be no significant impact to the noise environment at any historic or cultural resources under the Proposed Action compared with the No Action Alternative. The helicopter noise exposure analysis indicates there would be no reportable noise increases within the GSA. Changes in historic and current helicopter traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of historic or cultural resources or those resources potentially eligible for NHRP listing. The Proposed Action would not directly or indirectly change any known characteristics qualifying or potentially qualifying a historic resource for inclusion in or its eligibility for the NRHP. Consultation is ongoing regarding historic resources in the APE. No adverse effects to historic or cultural resources under the Proposed Action would be anticipated for 2023 and 2028.

Under the No Action Alternative, no changes to air traffic routes in the ILHS-HAA Project would occur in 2023 and 2028 and no changes to helicopter noise exposure or changes in helicopter overflight patterns over historic or cultural resources would be anticipated. Therefore, no historic or cultural resources would be affected by helicopter noise, nor would there be any visual impacts at historic or cultural resources under the No Action Alternative.

5.3.2 Methodology

Section 106 of the National Historic Preservation Act of 1966 requires the FAA to consider the effects of its undertakings on historic properties listed or eligible for listing in the National Register of Historic Places (NRHP). **Exhibit 4-4** in **Section 4.3.3** shows the historic and cultural resources listed on the NRHP that are found within the GSA. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The Proposed Action is located over and above the ground and would not involve the construction, disturbance, or alteration of any physical structure on, in, or emanating from the ground. Consistent with the Section 106 regulations, the FAA has focused its analysis on whether the Proposed Action would introduce visual elements or noise effects that would diminish the integrity of any historic properties.

Federal regulations require the FAA to define an area of potential effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[54] The FAA has defined the APE as contiguous with the GSA boundary. The FAA subsequently determined that the Proposed Action would not introduce helicopter overflights to any area within the GSA where they do not already occur.

54 Title 36 CFR 800.16(d).

Accordingly, the FAA maintained the APE due to the lack of potential for the Proposed Action to cause adverse noise effects on Section 106 resources. The FAA presented the GSA defined APE lacking reportable or significant noise results to the Maine, Massachusetts, and New Hampshire SHPOs.

Noise exposure levels at points representing historic properties in the redefined APE were calculated to determine potential adverse effects. Noise exposure results for the uniform grid points located at 0.5 NM intervals throughout the APE were evaluated to identify potential adverse noise effects on historic properties that are eligible but may not be listed on the NRHP, or whose exact location may not be disclosed. The 0.5 NM grid provides noise results within 2,148 feet or less of any location within the GSA. Consultation with the SHPO is ongoing with respect to the FAA's methodology and findings for assessing potential effects on historic properties.

5.3.3 Potential Impacts – 2023 and 2028

As stated in **Section 5.1**, when compared with the No Action Alternative, the Proposed Action would not result in changes in helicopter noise exposure in 2023 or 2028 that would exceed FAA's significance threshold or result in reportable noise increases. Therefore, the Proposed Action would not result in potential impacts to historic or cultural resources.

Under the No Action Alternative no changes to helicopter routes in the ILHS-HAA would occur in either 2023 or 2028 and no effects related to changes in helicopter noise exposure would be anticipated. Therefore, the No Action Alternative would not result in impacts to historic or cultural resources.

5.4 Wildlife (Avian and Bat Species) and Migratory Birds

This section discusses the analysis of potential impacts to avian and bat species under the Proposed Action and the No Action Alternative.

5.4.1 Summary of Impacts

The greatest potential for impacts to wildlife species would result from wildlife strikes on avian and bat species. Changes to helicopter air ambulance flight paths under the Proposed Action would primarily occur with en route phases of flight intended for use in IFR conditions. Avian strikes with air ambulance helicopters in the GSA average roughly one every three years for the AW-109 air ambulance helicopter type. Therefore, the Proposed Action would not result in significant impacts to avian and bat species when compared with the No Action Alternative.

The No Action Alternative would not involve changes to air traffic flows, land acquisition, construction, or other ground disturbance activities. Therefore, the No Action Alternative would not result in significant impacts to fish, wildlife, or plants.

5.4.2 Methodology

The FAA's *Wildlife Strike Database* is the best information available for assessing potential impacts of helicopter on wildlife. Strike reports over the past 31 years aggregated nationally as well as for individual airports are available from the database to understand conditions. Strike reports are comparable to known information on the presence of specific species of concern to corroborate the reports.

This analysis involved a review of wildlife strike reports[55] for the Study Airports under both the Proposed Action and the No Action Alternative, and an evaluation of the potential for the presence of federal- and state-listed threatened and endangered species (i.e., special-status species) within the GSA. The FAA compared modifications in flight procedures to the occurrence of special-status species to qualitatively assess the likelihood of whether wildlife strikes might change under the Proposed Action.

5.4.3 Potential Impacts – 2023 and 2028

A significant impact would be likely to occur if the Proposed Action were to jeopardize the existence of special-status species or result in destroying or adversely modifying critical habitat in the GSA. Changes to helicopter air ambulance flight paths under the Proposed Action would primarily occur with en route altitudes and would not involve land acquisition, construction, or other ground disturbance activities, so there is no potential for these effects in the GSA. Accordingly, the analysis is focused on the potential for significant impacts to species resulting from increased wildlife strikes with air ambulance helicopters operating partially or fully in IFR conditions.

Since 1990, the FAA has compiled reports of wildlife strikes with aircraft. The information is available to the public through the FAA's *Wildlife Strike Database* and the "Wildlife Strikes to Civil Aircraft in the United States." Between 1990 and 2021, the Wildlife Strike Database reported 254,980 wildlife strikes nationally.[56] Of the records that identify the type of animal involved in the strike incident, birds represent 96 percent of all strikes (245,010).[57] Of those records, for commercial and GA aircraft (including all variety of helicopters), 71 percent of the strikes occurred at or below 500 feet AGL and declined by 32 percent for every 1,000-foot gain in height for commercial aircraft and 43 percent for general aviation aircraft. The Wildlife Strike Database reports that of identified species, waterfowl, gulls, and raptors are the species groups of birds with the most damaging strikes.[58]

Table 5-4 provides a summary of wildlife strikes reported for the helicopter type (AW-109, all variants) between January 1, 1990 and December 31, 2021.[59] In total, 11 reported strikes occurred for the AW-109 helicopter type. All reported strikes included altitude and weather information. Of the 11 reported strikes that included weather information, one occurred in conditions described as "overcast" and "rain," which is conservatively assumed to be IFR flight for the purposes of this analysis.[60] None of the reported strikes included species identification.

The *Migratory Bird Treaty Act (MBTA) of 1918* (16 U.S.C. §§ 703–712) protects all the bird species identified in these reports. Furthermore, federal and state laws protect listed endangered and threatened species. In **Chapter 4**, *Affected Environment*, **Tables 4-3 and 4-**

55 U.S. Department of Transportation, Federal Aviation Administration, *Wildlife Strike Database* (https://wildlife.faa.gov/search [Accessed March 2023]).
56 U.S. Department of Transportation, Federal Aviation Administration. *Wildlife Strikes to Civil Aircraft in the United States 1990-2021*, July 2021 (https://www.faa.gov/airports/airport_safety/wildlife/wildlife_strikes_civil_aircraft_united_states_1990_2021 [Accessed March 2023]).
57 Id. at pp. 34.
58 Id. at pp. vi.
59 The AW-109 is the primary Air Ambulance Helicopter used in IFR in the GSA. Originally Agusta, then AgustaWestland, the manufacturer has been purchased by Leonardo but maintains the AW-109 designation in the FAA database. Operators of the AW-109 are not always discerned, thus the conservative assumption that all AW-109 operators are Air Ambulance helicopters.
60 U.S. Department of Transportation, Federal Aviation Administration, Wildlife Strike Database (https://wildlife.faa.gov/search [Accessed March 2023]).

4 identify the federally and state listed bird species found in counties in the GSA. None of the 11 bird strike reports over the 31 years included the species listed in **Tables 4-3 and 4-4**.

The number of helicopter operations under the Proposed Action and No Action Alternative would be the same. Therefore, the assessment of the potential impacts focuses on changes to flight paths and the potential for impact due to wildlife strikes. As shown in **Table 5-4**, only 1 of the 11 bird/bat strikes in 31 years occurred in IFR conditions. For the primary air ambulance helicopter type (the AW-109) at all altitudes in VFR conditions, bird strikes average roughly 1 every 3 years and 1 in the 31 year history has been in IFR conditions. The types of birds are unknown due to the nature of the airborne incident. Under the Proposed Action, changes to proposed flight paths would involve IFR helicopters and no changes to arrival and departure corridors that are currently used in IFR operations would be expected. Therefore, no significant impacts to bird or bat species would occur.

The No Action Alternative would not involve changes to air traffic flows, land acquisition, construction, or other ground disturbance activities. Therefore, no impacts to avian and bat species would occur.

Table 5-4 FAA Wildlife Strike Database Records for Helicopter Type (1990 – 2021)

Type of Strike	Helicopter Type	500 ft. AGL to ≤ 1,000 ft. AGL or less	>1,000 ft. AGL to ≤ 3,000 ft. AGL	>3,000 ft. AGL	Total	IFR at Any Altitude AGL	Percentage IFR Strikes of Total Strikes
Known Bird or Bat Species	AW-109	0	0	0	0	0	0%
Unknown Bird or Bat Species	AW-109	3	6	2	11	1	9%
Grand Total		3	6	2	11	1	9%
Annual Average		0.097/yr	0.19/yr	0.065/yr	0.35	0.032	

Source: U.S. Department of Transportation, Federal Aviation Administration, FAA Wildlife Strike Database (https://wildlife.faa.gov/search) accessed March 2023.
Prepared by: ATAC Corporation, March 2023.

5.5 Environmental Justice

This section presents a summary of the analysis of environmental justice impacts under the Proposed Action and the No Action Alternative.

5.5.1 Summary of Impacts

Neither the Proposed Action nor the No Action Alternative would displace people or businesses; therefore, implementing the Proposed Action or No Action Alternative would not result in direct impacts in this category. No areas within the GSA would experience significant impacts to air quality or noise. While some areas would be exposed to reportable noise increases of DNL 5 dB within areas exposed to DNL 45 to 60 dB, these would not constitute a significant impact related to a change in DNL exposure to people, including members of minority and/or low-income populations (see **Section 5.1**). Therefore, no disproportionately high and adverse effects to minority populations or low-income populations would occur under either the Proposed Action or the No Action Alternative.

5.5.2 Methodology

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that federal agencies include environmental justice as part of their mission by identifying and addressing as appropriate, the potential for disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Environmental justice applies to all environmental resources. Therefore, a disproportionately high and adverse human health or environmental effect on minority and low-income populations may represent a significant impact.

5.5.3 Potential Impacts – 2023 and 2028

Under the Proposed Action, neither people nor businesses would be displaced. As discussed in **Section 5.1**, under the Proposed Action, no census block centroids in the GSA would experience a change in noise exposure in 2023 and 2028 that exceeds any of the FAA's significance or reportable thresholds for noise impacts on people. Therefore, no adverse direct or indirect effects would occur to any environmental justice populations within the GSA under the Proposed Action for 2023 and 2028.

Under the No Action Alternative, neither people nor businesses would be displaced. Furthermore, air traffic routes would not change and there would be no change in helicopter noise exposure in 2023 and 2028 that could result in an indirect impact. Therefore, the No Action Alternative would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.

5.6 Energy Supply (Aircraft Fuel)

This section discusses whether changes in the movement of helicopter would result in measurable effects on local energy supplies under the Proposed Action and the No Action Alternative.

5.6.1 Summary of Impacts

In comparison to the No Action Alternative, the Proposed Action would result in a relatively small increase in helicopter fuel burned in 2023 of 6.7 percent and in 2028 of 6.8 percent. These increases, which total roughly 7,000 gallons of additional Jet-A annually, would not be anticipated to negatively affect local aircraft fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

The No Action Alternative would not involve changes to air traffic flows, construction, or other ground disturbance activities. Therefore, the No Action Alternative would not result in the depletion of local energy supply.

5.6.2 Methodology

The Proposed Action would not change the number of helicopter operations relative to the No Action Alternative, but it would involve changes to air traffic flows during the en route phase of flight. These changes affect both the en route phase specified course a helicopter may follow as well as the initial point of arrival phase or conclusion of the departure phase. This in turn may directly affect helicopter fuel burn (or fuel expended). Helicopter fuel burn is considered a proxy for determining whether the Proposed Action would have a measurable effect on local fuel supplies when compared with the No Action Alternative.

In addition to calculating helicopter noise exposure, the FAA's AEDT 3d model calculates aircraft-related fuel burn (e.g., AAD flight schedules, flight tracks, and runway/helipad use). See **Section 5.1.2** for further discussion on AEDT 3d input data. Determining the difference in fuel burn between alternatives can be used as an indicator of changes in fuel consumption resulting from implementation of the Proposed Action when compared with the No Action Alternative.

5.6.3 Potential Impacts – 2023 and 2028

Table 5-7 presents the results of the fuel burn analysis for the Proposed Action and No Action Alternative. In comparison to the No Action Alternative, the Proposed Action would result in an increase in helicopter fuel burned in 2023 of 6.7 percent and in 2028 of 6.8 percent. The reason for this increase is that many airport/heliport pairs will need to travel additional distance during departure or arrival phases to join a ZK route. For perspective, the percentage fuel burn increases translate to less than 19 gallons of Jet-A fuel per average annual day or the need for roughly 7,000 additional gallons of Jet-A fuel annually. This translates to one 18 wheeler tanker truck per year increase, which is within the annual production delivery capacities for local Jet-A fuel suppliers. The FAA expects that when compared with the No Action Alternative, the Proposed Action would not have a measurable effect on local fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

Table 5-7 Energy Consumption Comparison

	2023		2028	
	No Action Alternative	**Proposed Action**	**No Action Alternative**	**Proposed Action**
Fuel Burn (MT)	0.626	0.668	0.676	0.722
Weight Change (MT) (Proposed Action – No Action Alternative)		0.042		0.046
Percent Change from No Action Alternative		+6.7%		+6.8%

Note: MT = Metric Ton

Source: ATAC Corporation, March 2023 (AEDT 3d modeling results).
Prepared by: ATAC Corporation, March 2023.

5.7 Air Quality

This section discusses the analysis of air quality impacts under the Proposed Action and the No Action Alternative.

5.7.1 Summary of Impacts

The Proposed Action would result in an increase in emissions when compared to the No Action Alternative. However, changes to flight paths under the Proposed Action would occur at or above 1,500 feet AGL, represent 0.042 (2023) and 0.046 (2028) Metric Tons (approximately 7,000 gallons) of Jet-A demand annually, and are presumed to conform to the applicable state implementation plans (SIPs). Furthermore, changes to flight paths below the mixing height are also presumed to conform when modifications to procedures are designed to enhance operational efficiency. The slight increase in emissions is expected to have little if any effect on emissions or ground concentrations. Therefore, no significant impacts to air quality would be anticipated.

The No Action Alternative would not result in a change in the number of helicopter operations or air traffic routes; therefore, no impacts to air quality would be anticipated.

5.7.2 Methodology

Typically, significant air quality impacts would be identified if an action would result in the exceedance of one or more of the NAAQS for any time period analyzed.[61] Section 176(c) of the *Clean Air Act* requires that federal actions conform to the appropriate SIP in order to attain the air quality goals identified in the CAA. However, a conformity determination is not required if the emissions caused by a federal action would be less than the *de minimis* levels established in regulations issued by EPA.[62] FAA Order 1050.1F provides that further analysis for NEPA purposes is normally not required where emissions do not exceed the EPA's *de minimis* thresholds.[63] The EPA regulations identify certain actions that would not exceed these thresholds, including ATC activities and adoption of en route procedures for helicopter operations above the mixing height specified in the applicable SIP (or 3,000 feet AGL in locations without an established mixing height). In addition, the EPA regulations allow federal agencies to identify specific actions as "presumed to conform" (PTC) to the applicable SIP.[64] In a notice published in the Federal Register, the FAA has identified several actions that "will not exceed the applicable *de minimis* emissions levels" and, therefore, are presumed to conform, including ATC activities and adoption of arrival, departure, and en route procedures for air operations.[65] The FAA's PTC notice explains that aircraft emissions above the mixing height do not have an effect on pollution concentrations at ground level. The notice also specifically notes that changes in air traffic procedures above 1,500 feet AGL and below the mixing height "would have little if any effect on emissions and ground concentrations."[66] Furthermore, "air traffic actions below the mixing height are also presumed to conform when modifications to routes and procedures are designed to enhance operational efficiency (i.e., to reduce delay)."[67]

5.7.3 Potential Impacts – 2023 and 2028

Under the Proposed Action there would be a slight decrease in fuel burn (-0.03 percent) in 2023 and 2028 when compared to the No Action Alternative. While increased fuel burn corresponds with an increase in emissions, operational changes that could result in an increase in fuel burn would primarily occur at 3,000 feet AGL or above and would not result in an increase in emissions and ground concentrations. Any operational changes that could result in an increase in fuel burn would occur at or above 3,000 feet AGL. Procedures above 3,000 feet AGL are considered a *de minimis* action, would have little if any effect on emissions and ground concentrations, and are presumed to conform to all SIPs for criteria pollutants. Therefore, no further air quality analysis is necessary, a conformity determination is not required, and the Proposed Action would not result in a significant impact to air quality. The

61 FAA 1050.1F *Desk Reference*, Section 1, February 2020.
62 40 C.F.R. § 93.153(b).
63 FAA 1050.1F *Desk Reference*, Section 1, February 2020.
64 40 C.F.R. § 93.153(f).
65 Federal Presumed to Conform Actions under General Conformity, 72 Fed. Reg. 41565 (July 30, 2007).
66 Id.
67 Id.

No Action Alternative would not result in a change in the number of helicopter operations or air traffic routes; therefore, no impacts to air quality would be anticipated.

5.8 Climate

This section discusses greenhouse gas (GHG) emissions and effects to the climate as they relate to the Proposed Action and the No Action Alternative.

5.8.1 Summary of Impacts

Although fuel burn would increase slightly under the Proposed Action as compared to the No Action Alternative, no significant impacts to the climate would be anticipated.

The No Action Alternative would not result in a change in the number of helicopter operations or air traffic routes; therefore, no impacts to climate would be anticipated.

5.8.2 Methodology

In accordance with FAA guidance, estimated CO_2 emissions were calculated from the amount of fuel burned under the No Action Alternative and the Proposed Action in 2023 and 2028 (see **Section 5.6**). The resulting CO_2 emissions were then reported as CO_2e (carbon dioxide equivalent).

5.8.3 Potential Impacts – 2023 and 2028

Table 5-8 shows project-related CO_2e emissions. In 2023, the Proposed Action would produce approximately 2.110 MT of CO2e, and the No Action Alternative would produce approximately 1.970 MT of CO2e. This represents a slight increase of approximately 0.14 MT of CO2e or 7.11 percent under the Proposed Action when compared to the No Action Alternative. This would compromise less than 0.0000000000277 percent of U.S.-based CO2e as reported for 2021.[68] Similarly, in 2028, the No Action Alternative would produce approximately 2.130 MT of CO2e, and the Proposed Action would produce approximately 2.280 MT of CO2e. This represents a slight decrease of approximately 2 MT of CO2e or 7.04 percent under the Proposed Action when compared to the No Action Alternative. This would compromise less than 0.0000000000277 percent of U.S.-based CO2e emissions as reported for 2021.

Table 5-8 CO_2e Emissions – 2023 and 2028

	2023		2028	
	No Action Alternative	**Proposed Action**	**No Action Alternative**	**Proposed Action**
CO_2e Emissions (MT)	1.970	2.110	2.130	2.280
Weight Change (MT)		+0.14		+0.15
(Difference)		7.11%		7.04%

Note: CO_2e = Carbon Dioxide Equivalent

Source: ATAC Corporation, March 2023 (AEDT 3d modeling results).
Prepared by: ATAC Corporation, March 2023.

68 U.S. Environmental Protection Agency. *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2021*, EPA430-D-23-001. Table ES-2. February 2023. https://www.epa.gov/system/files/documents/2023-02/US-GHG-Inventory-2023-Main-Text.pdf (accessed March 2023).

5.9 Visual Impacts

This section discusses the analysis of visual impacts under the Proposed Action and the No Action Alternative.

5.9.1 Summary of Impacts

As stated in **Section 5.1**, implementation of the Proposed Action would not increase the number of helicopter operations at the Study Airports/Heliports compared with the No Action Alternative. Changes in helicopter traffic patterns under the Proposed Action are expected to be at altitudes and distances sufficiently removed from viewers that visual impacts would not be anticipated.

Under the No Action Alternative, no changes in air traffic routes would occur and no changes in helicopter overflight patterns would be expected. Therefore, the No Action Alternative would not result in visual impacts.

5.9.2 Methodology

As discussed in FAA Order 1050.1F, visual, or aesthetic, impacts are difficult to define and evaluate because of the subjectivity involved. Aesthetic impacts deal more broadly with the extent that the project contrasts with the existing environment and whether the difference is considered objectionable by the agency responsible for the location in which the project is set. Visual impacts are normally related to the disturbance of the aesthetic integrity of an area caused by development, construction, or demolition, and thus, do not typically apply to airspace changes.

To evaluate the potential for indirect impacts resulting from changes in helicopter routings and visual intrusion, the general altitudes at which helicopter route changes occur beyond the immediate airport/heliport environs which experience overflights on a routine basis and are considered to evaluate the potential for visual impacts.

5.9.3 Potential Impacts – 2023 and 2028

According to FAA Order 1050.1F, the visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact. Changes in helicopter routes associated with the Proposed Action would generally occur in areas currently experiencing overflight from air ambulance helicopters in an emergency response; therefore, the visual sight of helicopter and helicopter lights would not be considered intrusive. Helicopters do not create contrails due to the low operating altitudes. Consequently, the Proposed Action would not result in significant visual impacts. Neither the Proposed Action nor the No Action Alternative would result in significant visual impacts.

5.10 Cumulative Impacts

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Proposed Action with other actions. CEQ regulations define a cumulative impact as "an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions."[69] The regulations also state that cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

5.10.1 Summary of Impacts

The implementation of the Proposed Action when considered with other past, present, and reasonably foreseeable future actions would not be expected to result in significant cumulative impacts.

The No Action Alternative would not result in a change in the number of helicopter operations or air traffic routes; therefore, no cumulative impacts would be anticipated.

5.10.2 Methodology

Research was conducted to identify planned airport/heliport improvement projects at all Study Airports that in combination with the Proposed Action might result in cumulative environmental impacts. Due to the nature of the resources affected by the Proposed Action, only past, present, and reasonably foreseeable future actions that would have direct or indirect effects on Air Ambulance Helicopter arrival and departure flight patterns within the GSA were to be considered. Therefore, the type of projects that would be considered under the cumulative impact analysis were primarily limited to airfield/heliport/helipad projects, specifically projects that directly affect or involve designated helicopter arrival and takeoff designated locations. "Reasonably foreseeable future actions" refers to projects that would likely be completed before 2023 implementation.

The same significance thresholds used to determine impacts associated with the Proposed Action are applied to determine significant cumulative impacts. Because there is no potential for impact, those environmental resource categories that are not affected by the Proposed Action (listed in **Section 4.2**) are not further evaluated for cumulative impacts. Similarly, if no impacts to an environmental resource category were identified under the Proposed Action when compared to the No Action Alternative, then no further analysis for cumulative impacts was required.

5.10.3 Potential Impacts – 2023 and 2028

As stated in **Section 5.10.2**, research was conducted to identify relevant airfield/heliport/helipad projects, specifically projects that directly affect or involve designated helicopter arrival and takeoff designated locations. Sources reviewed included private owner, FAA, state, and local Capital Improvement Project lists and websites for all airports/heliports and associated private owner, state, county, and local planning, public works, and transportation agencies. No documents identified included information on past, present, and reasonably foreseeable future actions with the potential for direct or indirect effects on air ambulance helicopter flight patterns within the GSA. Accordingly, no cumulative impacts would be anticipated for the Proposed Action when compared to the No Action Alternative for 2023 and 2028.

69 40 C.F.R § 1508.7.