

Chapter 1. Defining the System: The Vision and Goals

1.1. Introduction and Project Overview

For more than a century, Illinois has been home to a vibrant and bustling aviation system, hosting the headquarters for international aircraft manufacturers and airlines, the world's ninth-busiest airport, and thousands of aviation businesses and private users alike. Today, the aviation industry sits on the precipice of the greatest air travel revolution since the dawn of the jet age. This shift—collectively referred to as Advanced Air Mobility (AAM)—varies from the jet technologies of the past that connected distant locations, as it focuses on improving connectivity within and between our local and regional communities using smaller, more sustainable aircraft. AAM represents the next generation of transportation systems that use autonomous or semi-autonomous aircraft to support efficient and sustainable regional mobility solutions. AAM is anticipated to revolutionize air transportation through advancements in aircraft technology, including electric and hybrid energy sources, various propulsion systems, and automation.

AAM has the potential to transform aviation, resulting in alterations to urban development plans, influencing the social, environmental, and economic environments. The Illinois Department of Transportation (IDOT) Office of Planning and Programing, Bureau of Planning, funded and procured the Illinois Advanced Air Mobility System Plan (Illinois AAM System Plan) in 2023,

initiating this preliminary planning process to lead engagement and support for AAM in Illinois. This plan was

The Illinois AAM System Plan prepared the state for anticipated AAM growth. It engaged stakeholders, built consensus on an AAM vision, adopted statewide goals, and leveraged existing facilities to support future use.



developed to foster collaboration with constituents, promote equity, and elevate opportunities. It included various components, such as:

- Identified the current aviation system capable of supporting AAM infrastructure (e.g., existing aviation facilities, airspace)
- Established a vision and goals that aligned with the State's Long Range Transportation Plan (LRTP)
- Created a framework for integrating AAM into the State's transportation network

Ultimately, the Illinois AAM System Plan laid the groundwork for the safe and efficient integration of AAM into the State's transportation network by prioritizing existing and near-term AAM opportunities.



Source: Archer Aviation

AAM operations are expected to begin commercially with a worldwide debut of commercial AAM flights during the 2024 Paris Olympics.¹ With a watchful eye on these initial operations, commercial AAM flights may appear in the U.S. as early as 2025. Initial operations are expected to rely on existing airports and heliports to transport passengers and cargo, leveraging existing infrastructure. As the industry matures, AAM is anticipated to

connect airports, mobility hubs, and regions currently underserved by traditional aviation. To prepare for this advancement, it is critical to employ a proactive approach that considers land use, infrastructure, investment planning, and policy planning, among many others.

1.1.1. Emergence of AAM in Illinois

Early emergence of AAM in Illinois is expected as the State offers a unique advantage in terms of its diverse landscape, which includes the bustling Chicagoland, the St. Louis region, and the more rural areas of the State.² This diversity allows for a wide range of AAM opportunities, from serving densely populated urban areas with air taxis and cargo delivery, to providing emergency medical services and transportation in remote regions. The proximity of these areas means that AAM operators in Illinois can potentially reach a large customer base, leading to increased demand and revenue opportunities. Illinois also boasts a strong transportation and logistics industry, with major airports, transportation hubs, and a robust aviation ecosystem. This existing infrastructure, combined with the State's commitment to innovation and technology, creates a supportive environment for the development and integration of AAM systems. As an example, Illinois is home to Vertiport Chicago, the largest vertical aircraft takeoff and landing facility in North America. These factors make Illinois an attractive location for the future AAM operators, as evidenced by the plans proposed by OEMs and future AAM operators discussed below.

Archer Aviation/United Shuttle

In 2023, United Airlines and Archer Aviation announced O'Hare International Airport (ORD) as the expected point-to-point route for their urban air mobility (UAM) network buildout. The operator plans to utilize Archer's electric vertical takeoff and landing (eVTOL) aircraft for this route. ORD, being United's largest operations hub, is an ideal location for United and Archer to initiate their UAM operations. Initially, their UAM network will focus on airport-to-city center transportation, also known as "trunk" routes. Once these trunk routes are established, their next plan is to establish

¹ Goldstein, Ben, "AAM Industry Looks to Pairs Olympics or First Major Showcase", *Aviation Week*, June 15, 2023, <https://aviationweek.com/shownews/paris-air-show/aam-industry-looks-paris-olympics-first-major-showcase>.

² St. Louis' dense population and proximity to Illinois creates a unique AAM opportunity for the State. For purposes of this plan, St. Louis' aviation facilities were considered and included in all analyses.

"branch" routes to surrounding communities "to provide a safe, sustainable, low-noise, and cost-competitive alternative to ground transportation for residents and visitors in the Chicago Metropolitan Area starting in 2025".

Vertiport Chicago

Vertiport Chicago is a privately owned facility located three miles southwest of downtown Chicago. It features a 78-foot by 78-foot concrete helipad and serves as a Fixed Base Operator (FBO) for helicopter owners and operators. The facility is situated on ten acres of land and offers 30,000 square feet of hangar space, 11,700 square feet of office space, a 24-hour refueling station, a single takeoff and landing area, and four helicopter parking stands. The location of Vertiport Chicago in the Illinois Medical District has made it an ideal hub for emergency medical services, specifically for handling emergency-medical flights for nearby hospitals. Additionally, Vertiport Chicago provides helicopter charter flight services and sightseeing tours. These charter services allow quick and convenient access in and out of the city, as well as to suburban airports and other Midwest destinations within a couple hundred miles. As such, the advantages offered by Vertiport Chicago have attracted operators such as Eve Air Mobility and Archer Aviation.



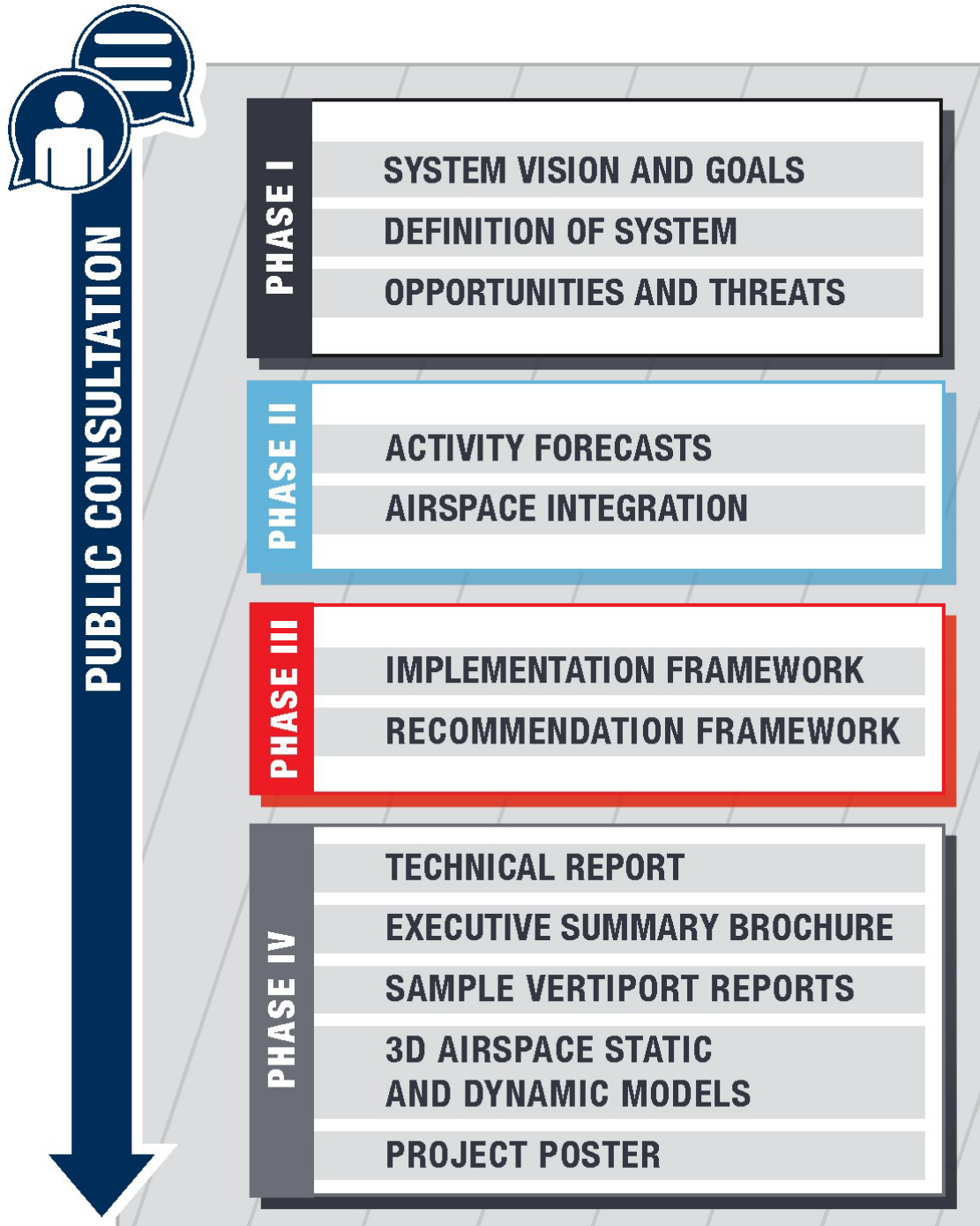
Source: Vertiport Chicago

United Airlines' partnership with Archer Aviation, as well as the existence of Vertiport Chicago, are existing and tangible opportunities for AAM in Illinois. Along with other examples, these opportunities will continuously be referenced and evaluated throughout the Illinois AAM System Plan.

1.1.2. Project Process

The Illinois AAM System Plan was broken into four phases, as illustrated in **Figure 1.1** below. Public involvement was prioritized throughout the project which included a Project Advisory Committee (PAC), project website, and presentations at aviation advocacy conferences.

Figure 1.1: Illinois AAM System Plan Process



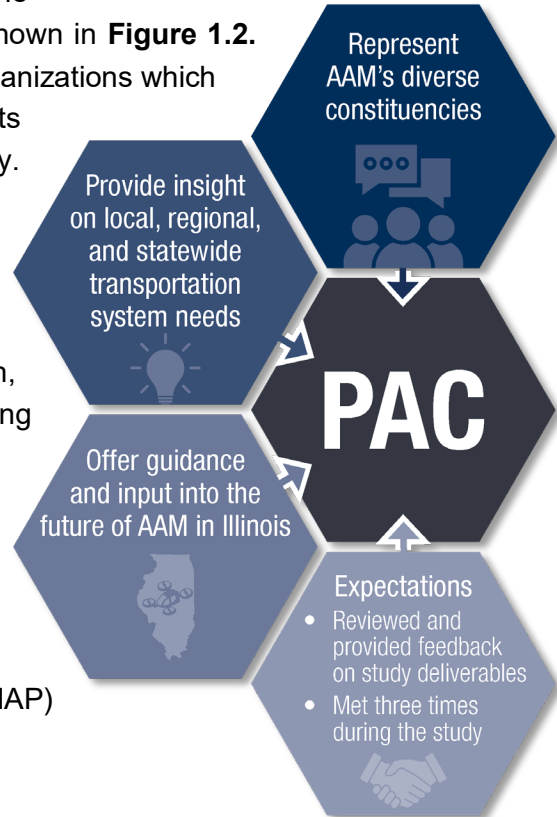
Source: Kimley-Horn

1.1.3. Project Advisory Committee

A Project Advisory Committee (PAC) was established to provide ongoing guidance and support during the development of the Illinois AAM System Plan, as shown in **Figure 1.2**. IDOT selected members from a diverse range of organizations which offered local, regional, statewide, and national insights on various issues affecting the AAM industry. Throughout the process, the PAC members were consulted, engaged, and provided feedback on the usefulness and effectiveness of each study task. The PAC consisted of stakeholders with extensive knowledge and experience in traditional aviation, AAM, transportation, and related fields. The following entities were represented on the PAC, including various offices from IDOT:

- AAM Institute
- Archer Aviation
- BETA Technologies
- Chicago Executive Airport (PWK)
- Chicago Metropolitan Agency for Planning (CMAP)
- Chicago Transit Authority (CTA)
- Community Air Mobility Initiative (CAMI)
- Great Lakes Airport District Office (ADO)
- Greater Chicago Flight Standards District Office (FSDO)
- Illinois Department of Commerce and Economic Opportunity
- Invest Quebec Exportation
- Joby Aviation
- Lewis University
- MedForce Air
- Northwestern University
- Skypoints Infrastructure
- St. Louis Bi-State Development
- St. Louis Downtown Airport (CPS)
- St. Louis East-West Gateway Council of Governments (EWGCoG)
- Thales
- United Airlines
- Vertiport Chicago

Figure 1.2: Role of PAC

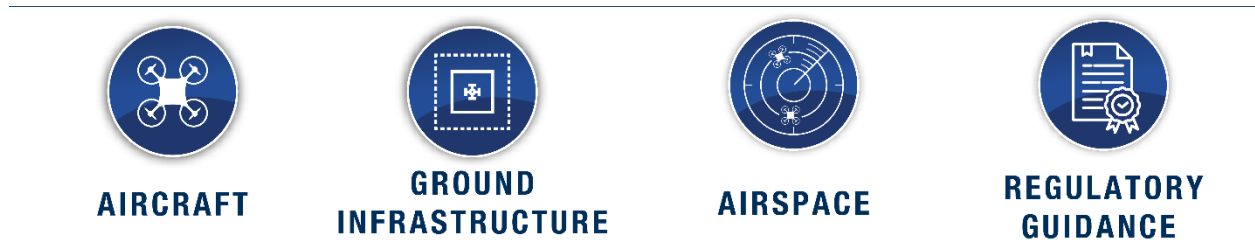


Throughout the 24-month project duration, the study team conducted two in-person meetings and one virtual PAC meeting.

1.1.4. Illinois AAM Components

The Illinois AAM System Plan recognized four main components of AAM, shown in **Figure 1.3**: Aircraft, Ground Infrastructure, Airspace, and Regulatory Guidance (also referred to as policy).

Figure 1.3: Illinois' Four Components of AAM



Each component is integral to the growth of AAM in the coming years, both nationally and in Illinois. This plan focused on the ground infrastructure, airspace, and regulatory guidance components with the ultimate intent of providing IDOT an implementation framework for each. Although the aircraft being developed for AAM are a critical component of the system, this study did not focus on making recommendations related to aircraft as IDOT cannot influence their development. Therefore, this section provides a brief introduction to the existing and anticipated AAM aircraft technologies present in the industry. Subsequent chapters of this plan provide additional information, analysis, and recommendations for the remaining three components.



Aircraft

Aircraft are the first and perhaps most critical component that will dictate how AAM evolves in Illinois and around the world. While traditional aircraft require long runways and large facilities, AAM operators aim to integrate air travel into local and regional communities to improve connectivity. The two primary technologies being employed to achieve this goal are electric propulsion systems and vertical takeoff and landing (VTOL) aircraft. Electric propulsion systems have been found to be quieter and less pollutive than their jet- or piston-engine counterparts, making them more attractive for operations in densely populated areas. Electric VTOL (eVTOL) aircraft have emerged as the preferred platform thus far for AAM aircraft, with companies including Joby, Wisk, Archer Aviation, and Beta Technologies all selecting the format for their upcoming aircraft.

These aircraft are currently powered by batteries and electric motors, intended to carry between one and four passengers over short distances of 100 miles or less. In the future, however, it is anticipated new technologies such as hydrogen fuel cells, may provide additional options for increased performance or sustainability. Electric short- (eSTOL) and conventional takeoff and landing (eCTOL) aircraft are likely to provide AAM connectivity over longer distances between communities. eCTOL technologies such as the Eviation Alice are expected to carry between nine and 19 passengers between 250-500 miles, providing air connectivity between destinations that

cannot currently be viably served by conventional aircraft. **Figure 1.4** depicts a selection of existing or planned aircraft expected to compete in the AAM market.

Figure 1.4: Primary AAM Aircraft Platforms in Development



Sources: Archer Aviation, Beta Technologies, Electra, Eviation, Joby, Lilium, Volocopter



Ground Infrastructure

While aircraft will be the primary focus of AAM developers and operators, ground infrastructure will be equally necessary for enabling and supporting AAM. For the purposes of this study, ground infrastructure relates to four primary areas, shown in **Figure 1.5**: vertiports, energy infrastructure (for aircraft charging), navigational aids (NAVAIDs), and safety and security systems. Each component is critical to ensuring the AAM network can operate and integrate safely with communities and the existing airspace system. In the near term, AAM will likely rely on existing aviation facilities (airports and heliports), equipment, sufficient energy grid capacity, unique charging stations, and the NAVAIDs required for AAM operations. Therefore, it is anticipated a specialized network of ground infrastructure will be developed specifically for AAM use. Other components of ground infrastructure may emerge as the industry evolves, which will require additional planning to integrate into the conventional aviation system.

Figure 1.5: Primary AAM Ground Infrastructure Components



Source: Kimley-Horn

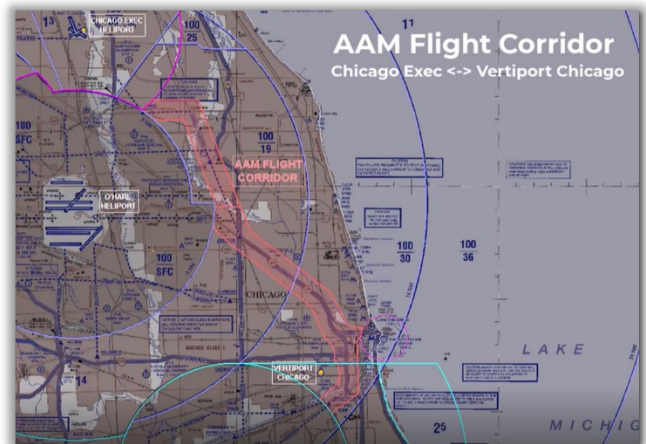
Vertiports are aviation facilities specifically designed for the landing and takeoff of VTOL aircraft. Early vertiports are likely to be shared with traditional helicopters, such as how Vertiport Chicago currently operates. Energy infrastructure will be needed to charge battery-electric aircraft or refuel hydrogen or hybrid aircraft. NAVAIDs may be comprised of both ground-based and satellite-based systems that help guide autonomous or semiautonomous aircraft while in flight and are likely to

change as new technologies emerge. Safety and security systems will be required to ensure AAM can integrate with the existing air transportation without compromising the safety standards currently in place. Subsequent sections of this plan evaluate Illinois' existing aviation infrastructure to identify facilities that may viably accommodate AAM operations in the near term.



Airspace

The current National Airspace System (NAS) is primarily designed for conventional aircraft operations, which presents challenges when integrating AAM vehicles. Initially, AAM operations are likely to adhere to existing helicopter routes and traditional air traffic regulations. However, as technology matures, modifications of airspace structure, regulations, standards, and procedures are likely to be needed to effectively accommodate the unique characteristics and capabilities of AAM vehicles. Many factors will have to be addressed when formulating this airspace, particularly the impacts of AAM (noise, safety, and privacy) on those on the ground near AAM corridors. Considerations for the impact of AAM vehicles on the NAS will become more prevalent as AAM technology evolves and the vehicles are certified by the FAA. Subsequent sections of this plan evaluate and document some of those items, further delving into the existing airspace in Illinois and how AAM may impact the system.



Regulatory Guidance

Understanding the regulatory context for the AAM industry is essential to effectively integrate this technology into the State and national transportation network. The innovative features of AAM do not fit the mold of the existing regulations and policies related to aircraft manufacturing, testing, and operations. Consequently, stakeholders are faced with the challenge of developing technologies and creating markets within the boundaries of the current regulatory frameworks potentially slowing innovation and development. To overcome this challenge, various agencies are actively working to develop guidance that will better facilitate the development and operation of AAM aircraft, airspace, and infrastructure.

In the United States, the Federal Aviation Administration (FAA) and the National Aeronautics and Space Administration (NASA) are leading efforts to establish technical guidance and regulations governing AAM aircraft design, airspace management, and overall safety. At a state and local level, governments are working to develop legislation that will both promote the integration of AAM, and its associated infrastructure, while protecting communities and the surrounding environment. State governments, including IDOT, will be among the primary bodies overseeing

the development, licensure, and operation of vertiports and AAM, further emphasizing the need to be educated on the benefits and implications associated with these technologies. Subsequent sections of this plan include the review of existing statutes and requirements, and ultimately document recommendations for IDOT to update and implement for the safe and efficient integration of AAM.

1.2. Illinois AAM: Vision and Goals

The first step in this planning process was to create an overall project vision and corresponding set of goals. In the case of an emerging market, it is important to develop a vision that allows for flexibility as the industry continues to evolve. While performance measures are primarily used to quantify goals in planning documents, the AAM industry is still in its early stages and lacks a baseline for which to evaluate. As a result, the vision and goals for AAM provide broad guidance to IDOT and the State to foster successful AAM growth until the industry matures enough to establish quantifiable performance metrics.

1.2.1. A Vision for AAM in Illinois

The vision statement for AAM in Illinois was developed and curated through collaboration with the PAC, which provided diverse perspectives in an evolving industry and ever-changing social, political, and economic environment. The PAC provided feedback on the State’s AAM vision statement during their first in-person meeting. As shown in **Figure 1.6**, the collaborative effort resulted in the following comprehensive vision statement.

Figure 1.6: Illinois AAM Vision

“Transform Illinois into a global leader in advanced air mobility by safely integrating cutting-edge technologies with existing transportation systems and revolutionizing mobility through increased efficiency, enhanced economic growth, and improved quality of life for all residents.”



Sources: Kimley-Horn, IDOT, Illinois AAM System Plan PAC

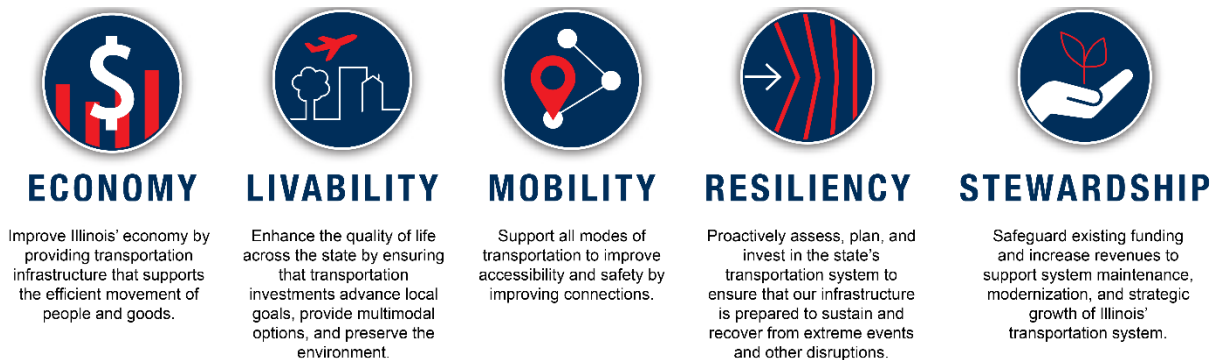
1.2.2. Illinois AAM Goals

While the vision statement provides a broad objective for IDOT and the State to progress towards, goals provide clear direction for how to develop and implement AAM in the State. Goals are established to guide future decision-making and resource allocation. As the AAM industry matures and a baseline is defined, these goals serve as a basis for measuring progress and success towards fulfilling the State’s AAM vision. Developing metrics that align with these goals will allow for the evaluation of the plan’s effectiveness over time, enabling necessary adjustments and improvements to be made. This ensures that the AAM system continues to meet the evolving needs and priorities of Illinois.



An aviation system plan’s goals, as described in the FAA’s Advisory Circular (AC) 150/5070-7, Change 1, *The Airport System Planning Process*, should parallel the State’s Long Range Transportation Plan (LRTP) goals to the greatest extent feasible. Alignment of goals promotes continuity between aviation/AAM and the greater multimodal system. The Illinois Aviation System Plan (IASP), which was completed in 2020, aligned its aviation system goals with Illinois’ LRTP. Those goals, shown in **Figure 1.7**, were also adopted in the Illinois AAM System Plan, and are as follows:

Figure 1.7: LRTP, IASP, and AAM System Plan Goals



Sources: Illinois LRTP, IASP

The Illinois AAM System Plan vision and goals served as a guide for future decision-making. Future analyses within this plan, such as the Opportunities and Threats documented in **Chapter 4**, as well as the ultimate implementation and recommendation frameworks, were related to one or more of these overarching goals.

1.3. Definition of System

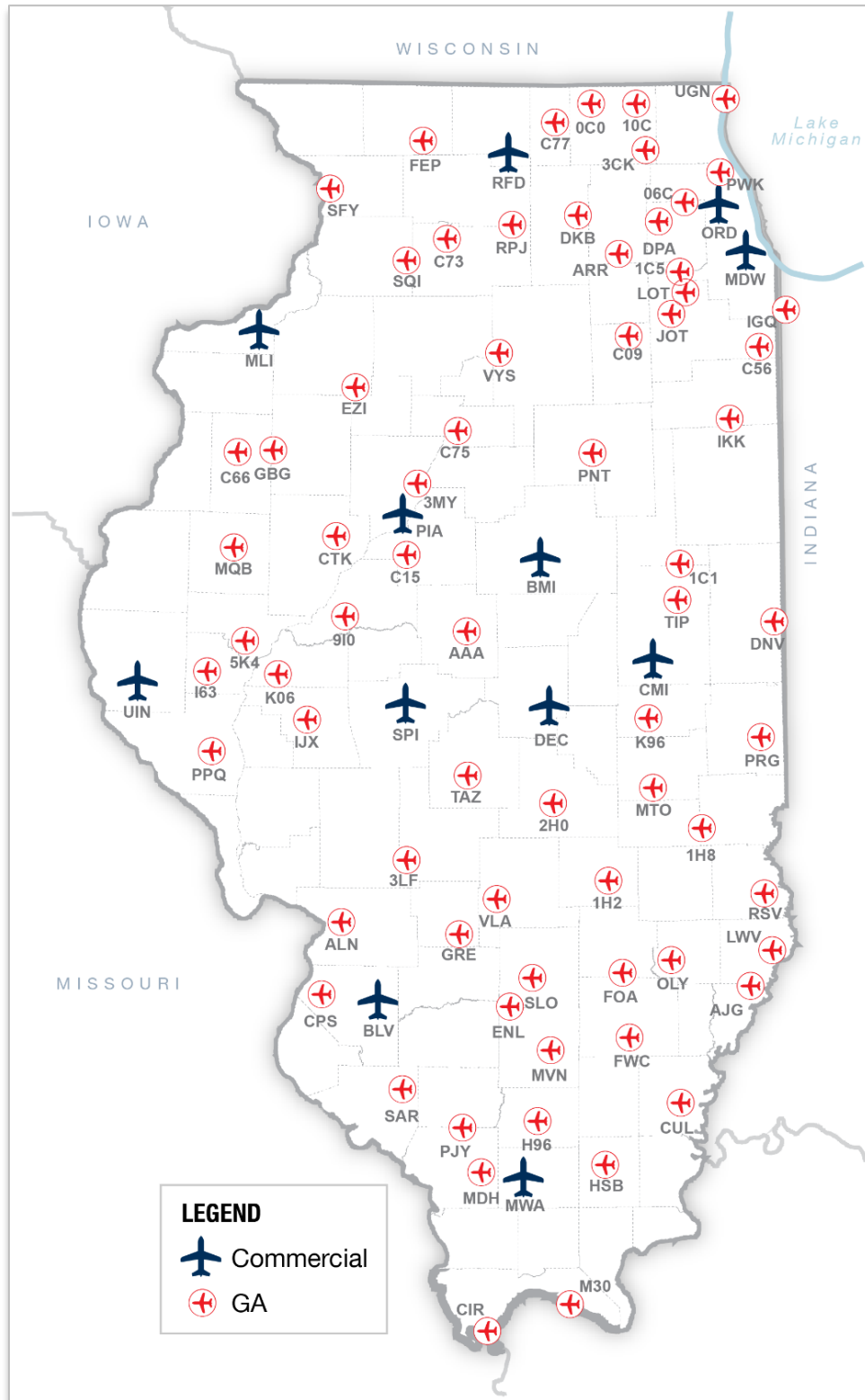
Illinois is home to nearly 700 aeronautical facilities, ranging from small private-use airstrips to Chicago O’Hare International (ORD). These facilities vary in their type, ownership, and accessibility, affecting the feasibility to support AAM.

1.3.1. IASP System

Illinois’ network of aeronautical facilities are a mixture of public and private ownership and use, which influences their contributions to the NAS. The IASP, most recently completed in 2022, identified 85 aeronautical facilities in the system and are, in part, overseen by IDOT. Being part of the IASP System indicates that these facilities are part of the State’s strategic transportation plan and can receive state funding for enhancement if the funding allocation is deemed to advance appropriate transportation objectives.

The IASP categorizes airports into two types of facilities: General Aviation (GA) and Commercial Service. The FAA defines GA airports as public-use airports that either do not have scheduled service or have scheduled service with less than 2,500 passenger boardings (enplanements) per year. Commercial airports are publicly owned airports that have at least 2,500 annual enplanements and scheduled air carrier service. Illinois has 73 GA airports and 12 commercial airports. Commercial airports typically experience higher transportation demand in their respective areas, while GA airports play a vital role in providing accessibility and connections to adjacent or outlying communities within the State. Both types of airports serve unique aeronautical uses and are critical to the efficacy of the overall system. As such, the IASP Airport System, shown in **Figure 1.8** serves as the baseline for the AAM system.

Figure 1.8: Existing IASP System



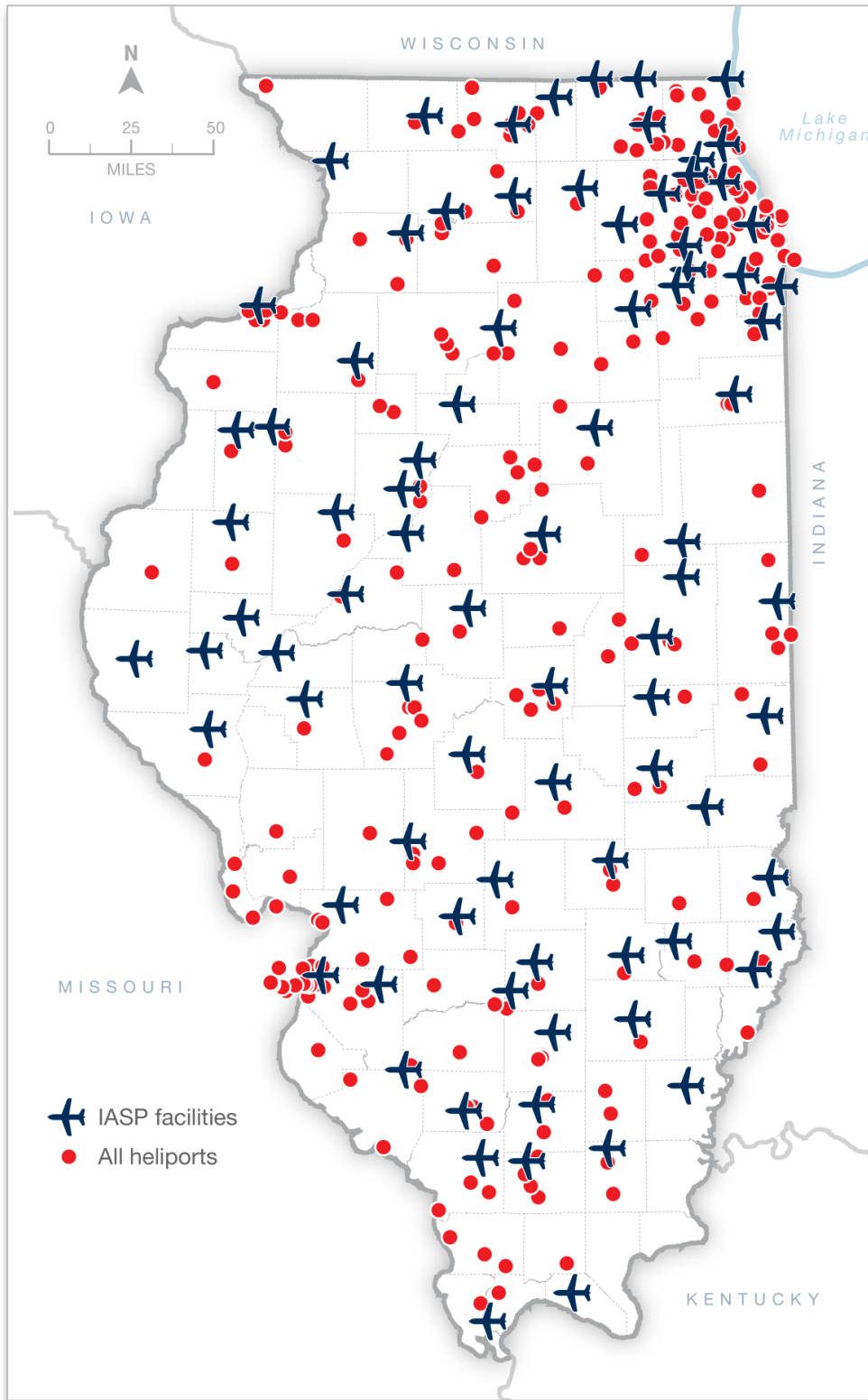
Sources: Illinois Aviation System Plan, Kimley-Horn

1.3.2. Illinois AAM System

While the IASP generally accounts for the publicly owned, public-use airports in Illinois, there are an additional 244 heliports that support aviation activity in the State. Although these facilities are not included in the IASP due primarily to private ownership, they accommodate a wide range including hospitals, medical centers, correctional facilities, fire departments, and public agencies.³ These facilities are crucial to serving many critical missions in Illinois and could be among the facilities that support AAM operations. Given this opportunity, the 244 heliport and vertiport facilities along with the 85 IASP airports are included to comprise the baseline AAM system, as shown in **Figure 1.9**.

³ The 244 identified heliports include twelve facilities in St. Louis, Missouri, as their proximity to the Illinois-Missouri State line makes them contributors to the Illinois aviation system.

Figure 1.9: Illinois AAM System



Source: Kimley-Horn