

Environmental Assessment for Houston Optimization of Airspace and Procedures in the Metroplex

January 2013

Prepared by:
Federal Aviation Administration



Washington D.C.

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1 BACKGROUND

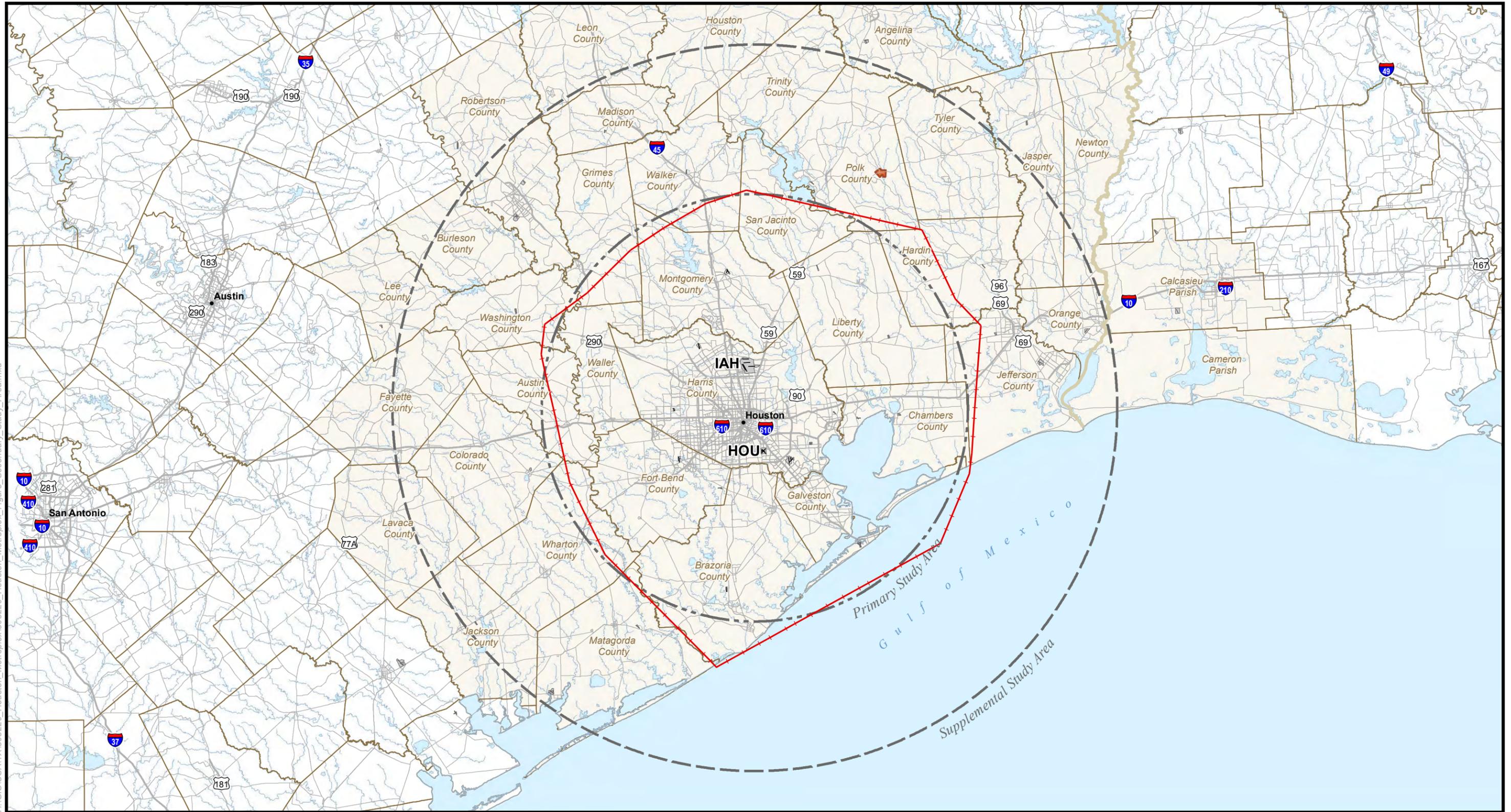
The Federal Aviation Administration (FAA) has prepared this Environmental Assessment (EA) to identify the potential environmental effects associated with the FAA's proposal to improve the management of air traffic by incorporating the newest navigation technology in the Houston, Texas metropolitan area. The Proposed Action includes implementing proposed modifications to Performance Based Navigation (PBN)¹ air traffic control procedures and associated changes to the supporting airspace management structure.² Section 4.1 describes the Primary Study Area (PSA) and Supplemental Study Area (SSA) for this EA, as depicted in Figure 1.

¹ Performance-Based Navigation (PBN) is comprised of Area Navigation (RNAV) and Required Navigation Performance (RNP) and describes an aircraft's capability to navigate using performance standards. RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or space-based navigation aids, or within the limits of the capability of aircraft self-contained systems, or a combination of both capabilities. RNP is RNAV with the addition of an onboard performance monitoring and alerting capability. The ability of the aircraft navigation system to monitor the navigation performance it achieves and inform the crew if the requirement is unmet during an operation is a defining characteristic of RNP operations. This onboard monitoring and alerting capability enhances the pilot's situation awareness and can enable reduced obstacle clearance. U.S. Federal Aviation Administration (FAA), *FAA Fact Sheet*, "NextGen Goal: Performance-Based Navigation," March 12, 2010.

² "Supporting airspace management structure" means the internal administrative procedures the FAA uses to support air traffic operations in the National Airspace System (NAS), including sectorization (lateral and vertical boundaries), as well as the inter- and intra-facility rules (including, but not limited to, FAA directives, Standard Operating Procedures and Letters of Agreement). For the Houston OAPM, the FAA designed the proposed arrival and departure procedures and then examined the supporting airspace management structure for changes necessary to enable the use of the procedures. The proposed action does not include changes to any controlled airspace boundaries (e.g., Class B airspace).

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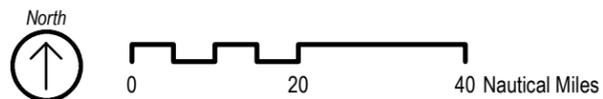
Data Source: Environmental Systems Research Institute, Inc. (ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Houston-Galveston Area Council (Water Features), March 14, 2012; National Atlas (Lakes/Rivers), September 10, 2012 (Updated); National Atlas (Tribal Land/Wilderness Areas), February 08, 2012

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- | | | | |
|--|----------------------|--|--|
| | Primary Study Area | | Interstate Highway |
| | Secondary Study Area | | Highways |
| | TRACON Boundary | | Secondary Roads |
| | State Boundary | | Water |
| | County Boundary | | River/Stream |
| | | | Alabama-Coushatta Tribe of Texas Reservation |

Primary and Supplemental Study Areas

Figure 1



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Following recommendations of the aviation community³, the FAA created an initiative called the Optimization of the Airspace and Procedures in the Metroplex (OAPM). Metroplexes are geographic areas containing several airports serving major metropolitan areas and a diversity of aviation stakeholders. Congestion, airport activity in close geographical proximity, and other limiting factors combine to reduce the efficient management of air traffic in busy Metroplexes. The OAPM initiative involves optimization of airspace and air traffic procedures on a regional scale, rather than focusing on a single airport or set of procedures. This approach takes into account all airports and airspace that support operations in the Metroplex, as well as connectivity with other Metroplexes.⁴ The Houston OAPM project is one of many underway or planned across the United States.

One of the major elements of the OAPM program is to optimize and modernize Air Traffic Control (ATC) procedures to take advantage of technological advances in navigation and aircraft surveillance⁵ equipment installed on aircraft, also known as equipage, while ensuring continued access to terminal area⁶ airspace for aircraft without that level of equipage. These new technologies are the basis of PBN, a primary component of the Next Generation Air Transportation System (NextGen), which involves shifting from fixed, ground-based radio navigation transmitting facilities and radar to satellite, or Global Positioning System (GPS)⁷, navigation and onboard surveillance. This transition to NextGen would allow a reduction in costly construction and maintenance of FAA ground-based navigation aids (NAVAIDs)⁸, as well as

³ In September 2009, the FAA received the RTCA's Task Force 5 Final Report on Mid-Term NextGen Implementation, containing recommendations concerning the top priorities for the implementation of NextGen initiatives. A key component of the FAA response to the RTCA recommendations was the formation of teams leveraging FAA and Industry PBN expertise and experience to expedite implementation of optimized airspace and procedures. Optimization of Airspace and Procedures in the Metroplex (OAPM) is a systematic, integrated, and expedited approach to implementing PBN procedures and associated airspace changes. The FAA developed OAPM in direct response to the recommendations from Task Force 5 on the quality, timeliness, and scope of Metroplex solutions.

⁴ Michael P. Huerta, Hon., FAA Deputy Administrator, "Statement before the Committee on Transportation and Infrastructure, Subcommittee on Aviation, On the Benefits of the Next Generation Air Transportation System," October 5, 2011: <http://republicans.transportation.house.gov/Media/file/TestimonyAviation/2011-10-04%20Huerta.doc>.

⁵ Surveillance systems are set up to enable the ATC system to know the location of an aircraft and where it is heading. Aircraft positions are displayed for controllers as they actively monitor the traffic to ensure that aircraft do not violate separation criteria. (FAA, *Instrument Procedures Handbook*, 2007.)

⁶ Terminal Area: A general term used to describe airspace in which approach control service or airport traffic control service is provided. (FAA, *Pilot-Controller Glossary*, July 26, 2012.)

⁷ Global Positioning System (GPS): A U.S.-owned space-based system of 24 satellites that provides users with positioning, navigation, and timing services. The user segment of the system receives signals from the GPS satellites and calculates the user's three-dimensional position and time. The accuracy attained depends on factors such as atmospheric effects and receiver quality, but real-world data collected by the FAA show that high quality GPS receivers currently provide better than 3-meter horizontal accuracy. (U.S. National Coordination Office for Space-Based Position, Navigation, and Timing, "GPS Accuracy": <http://www.gps.gov/systems/gps/performance/accuracy>.)

⁸ Navigational Aid (NAVAID): Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

improvements in operational efficiency due to more direct routings, without reliance upon fixed locations of NAVAIDs.⁹

Each OAPM project consists of a Study Team phase, which analyzes Metroplex operational challenges and situations and explores the opportunities, followed by a Design and Implementation (D&I) Team phase, which provides very detailed information on expected enhancements and committed improvements in the airspace and procedures areas. In May 2011, the Houston OAPM Study Team began the process of identifying and characterizing operational challenges facing the Houston Metroplex Area. The Study Team determined that a collaborative approach for optimization using PBN procedures would deliver the most efficient and beneficial operations to this Metroplex. The team included subject matter experts from non-local facilities (for an outside perspective), airspace and air traffic procedure design specialists experienced in NextGen PBN, the National Air Traffic Controllers Association (NATCA), and industry representatives (technical pilots from major airlines).¹⁰ The team held three rounds of outreach involving local facilities and other National Airspace System (NAS) users – including Department of Defense (DoD), airlines, business and general aviation (GA), and airport operators – to identify operational issues and propose PBN procedures. In August 2011, the Study Team completed its final report, capturing these issues and proposed solutions, as well as projected benefits of those solutions. See Appendix E, *Houston OAPM Study Team Documents*, for more information.

The Department of Transportation selected the Houston OAPM as a high priority infrastructure project for inclusion on the Federal Infrastructure Projects Dashboard (“Dashboard”). Established pursuant to an August 2011 Presidential Memorandum,¹¹ the Dashboard is part of an inter-agency initiative, spearheaded by the Office of Management and Budget, to institutionalize best practices to reduce the amount of time required to make permitting and review decisions and improve environmental and community outcomes. The Federal government is enhancing and expanding the Dashboard to serve as a government-wide tool to enable and support collaboration within and among the Federal agencies, as well as to provide increased public transparency regarding the schedules and status of nationally or regionally significant projects, permitting timelines, and overall Federal infrastructure project permitting and review processes.¹² The Houston OAPM is the first aviation project selected for inclusion in the Dashboard; other projects include green infrastructure, surface

⁹ For more information on NextGen and PBN, refer to Section 1.3.1 and Appendix D.

¹⁰ Federal Infrastructure Projects Dashboard, “NextGen Infrastructure Initiative – Houston Metroplex (OAPM)”:
<http://permits.performance.gov/permits/study>.

¹¹ White House, “Presidential Memorandum – Speeding Infrastructure Development through More Efficient and Effective Permitting and Environmental Review,” August 31, 2011: <http://www.whitehouse.gov/the-press-office/2011/08/31/presidential-memorandum-speeding-infrastructure-development-through-more>.

¹² Federal Infrastructure Projects Dashboard, “Federal Infrastructure Plan,” June 2012:
http://permits.performance.gov/sites/default/files/Federal_Infrastructure_Plan.pdf.

transportation, renewable energy, community development, and electricity transmission.¹³

The implementation of these proposed ATC procedures, as with any major Federal action, requires compliance with the National Environmental Policy Act of 1969 (NEPA)¹⁴ and regulations of the Council on Environmental Quality (CEQ) implementing NEPA.¹⁵ FAA actions must also comply with FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, which supplements the CEQ regulations for FAA actions. The FAA has prepared this EA in accordance with NEPA, the CEQ regulations, and FAA Order 1050.1E.

1.1 Airport Operations Considered in the EA (Houston OAPM Airports)

The Houston Metroplex consists of airspace under the jurisdiction of the Houston Terminal Radar Approach Control (I90 TRACON)¹⁶, the Houston Air Route Traffic Control Center (ZHU ARTCC)¹⁷, or respective airport Air Traffic Control Towers (ATCTs)¹⁸. The Metroplex also includes those portions of uncontrolled airspace¹⁹ at satellite airports served by instrument approach²⁰ and departure²¹ procedures.

¹³ Federal Infrastructure Projects Dashboard, “NextGen Infrastructure Initiative – Houston Metroplex (OAPM)”: <http://permits.performance.gov/projects/nextgen-infrastructure-initiative-houston-metroplex-oapm>

¹⁴ *National Environmental Policy Act (NEPA) of 1969, U.S. Code*. Title 42, sec. 4321-4347 (1970). (Pub. L. 91-190, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, sec. 4(b), Sept. 13, 1982)

¹⁵ *Code of Federal Regulations*, Title 40, Parts 1500-1508.

¹⁶ Terminal Radar Approach Control Facility (TRACON): A terminal ATC facility that uses radar and non-radar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility. For further information, please see Appendix D. (FAA Pilot Controller Glossary, July 26, 2012)

¹⁷ Air Route Traffic Control Center (ARTCC): A facility established to provide air traffic control service to aircraft operating on Instrument Flight Rule (IFR) flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to Visual Flight Rule (VFR) aircraft. For further information, please see Appendix D. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

¹⁸ Air Traffic Control Tower (ATCT): A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or take off at the airport controlled by the tower or to transit the Class D airspace area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or non-radar). For further information, please see Appendix D. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

¹⁹ Controlled Airspace: An airspace of defined dimensions within which ATC service is provided to IFR flights and to VFR flights in accordance with the airspace classification. Uncontrolled airspace is any space not designated as controlled. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

²⁰ Instrument Approach Procedure: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

²¹ Instrument Departure Procedure (DP): A preplanned IFR departure procedure published for pilot use, in graphic or textual format, that provides obstruction clearance from the terminal area to the appropriate en route structure. There are two types of DP: 1) an Obstacle Departure Procedure (ODP), printed either textually or graphically, and 2)

The focus of the Houston OAPM effort centers on the area's two busiest airports.²²

- George Bush Intercontinental/Houston, Houston, TX (IAH)
- William P. Hobby, Houston, TX (HOU)

The Houston OAPM Study Area also includes the following satellite airports:²³

- David Wayne Hooks Memorial, Houston, TX (DWH)
- Ellington Field, Houston, TX (EFD)
- Lone Star Executive, Houston, TX (CXO)
- Sugar Land Regional, Houston, TX (SGR)
- Scholes International at Galveston, Galveston, TX (GLS)
- West Houston, Houston, TX (IWS)
- Houston Executive, Houston, TX (TME)
- Houston-Southwest, Houston, TX (AXH)
- Texas Gulf Coast Regional, Angleton/Lake Jackson, TX (LBX)²⁴
- Pearland Regional, Houston, TX (LVJ)
- Chambers County, Anahuac, TX (T00)
- La Porte Municipal, La Porte, TX (T41)
- RWJ Airpark, Baytown, TX (54T)
- Weiser Air Park, Houston, TX (EYQ)
- Baytown, Baytown, TX (HPY)

This EA refers to the two major and 15 satellite airports collectively as the Houston OAPM Airports. Figure 2 shows the airports' locations within the PSA boundary and various landmarks. Figure 3 and Figure 4 depict the runway layouts of IAH and HOU.

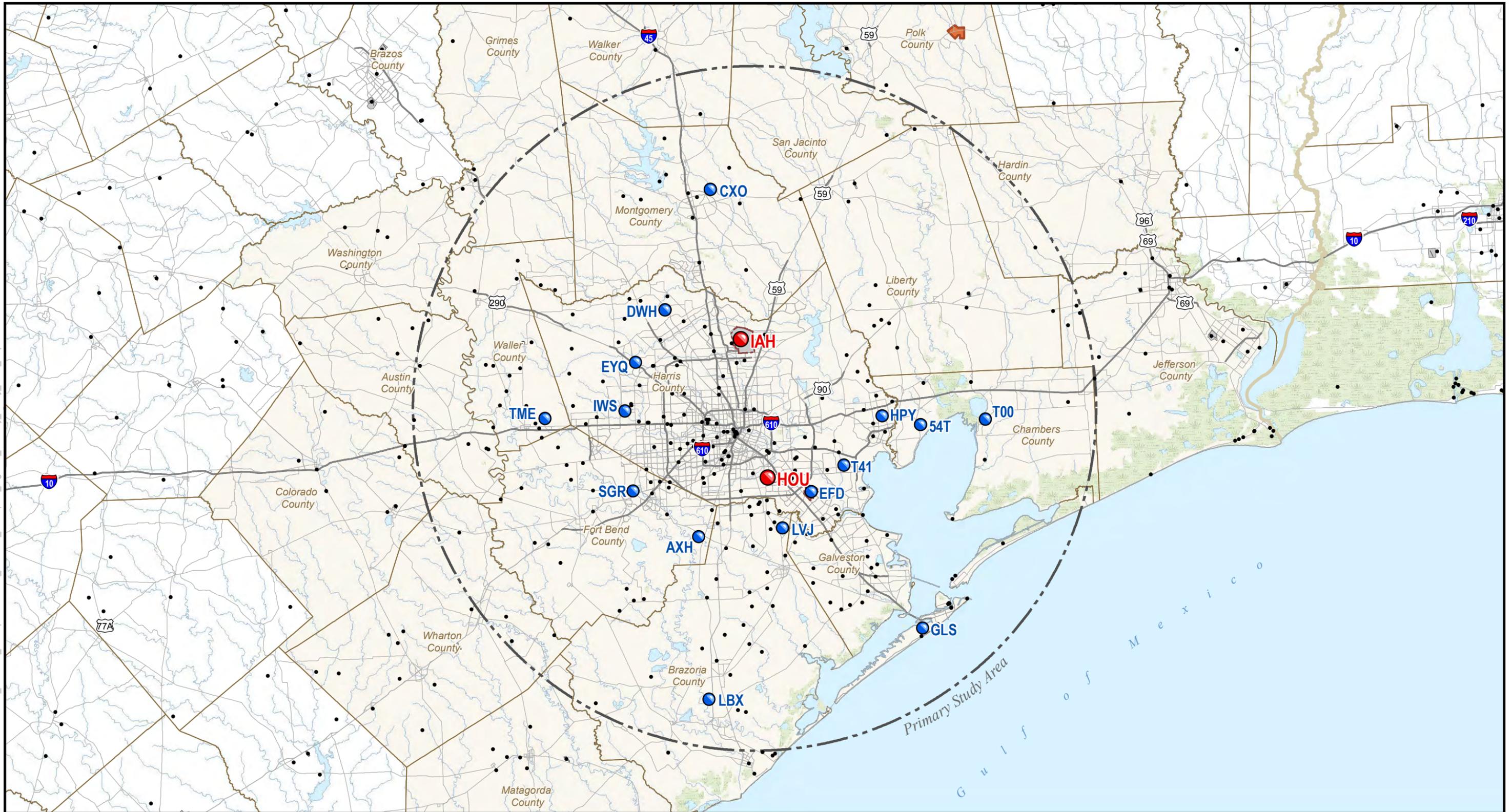
a Standard Instrument Departure (SID), which is always printed graphically. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

²² FAA, "Airport Data & Contact Information," derived from Forms 5010, "Airport Master Record" data: http://www.faa.gov/airports/airport_safety/airportdata_5010/ (accessed February 2, 2012).

²³ Ibid.

²⁴ Formerly named Brazoria County Airport.

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Data Source: Environmental Systems Research Institute, Inc. (ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Houston-Galveston Area Council (Water Features), March 14, 2012; National Atlas (Lakes/Rivers), September 10, 2012 (Updated); National Atlas (Tribal Land/Wilderness Areas), February 08, 2012;

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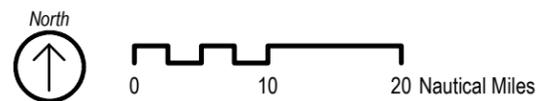
- Primary Study Area
- Airport Boundary
- State Boundary
- County/Parish Boundary

- Interstate Highway
- Highways
- Secondary Roads
- Water
- River/Stream
- Alabama-Coushatta Tribe of Texas Reservation

- Major Airports within the Study Area
- Satellite Airports within the Study Area
- Other Airports and Heliports

Houston OAPM Airports

Figure 2



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Data Source: Environmental Systems Research Institute, Inc. (ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Aerial Photography, (Bing Maps for ArcGIS Desktop), 2012

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-  Approximate Airport Boundary
-  Airport Runway
-  Interstate Highway
-  Highways
-  Secondary Roads

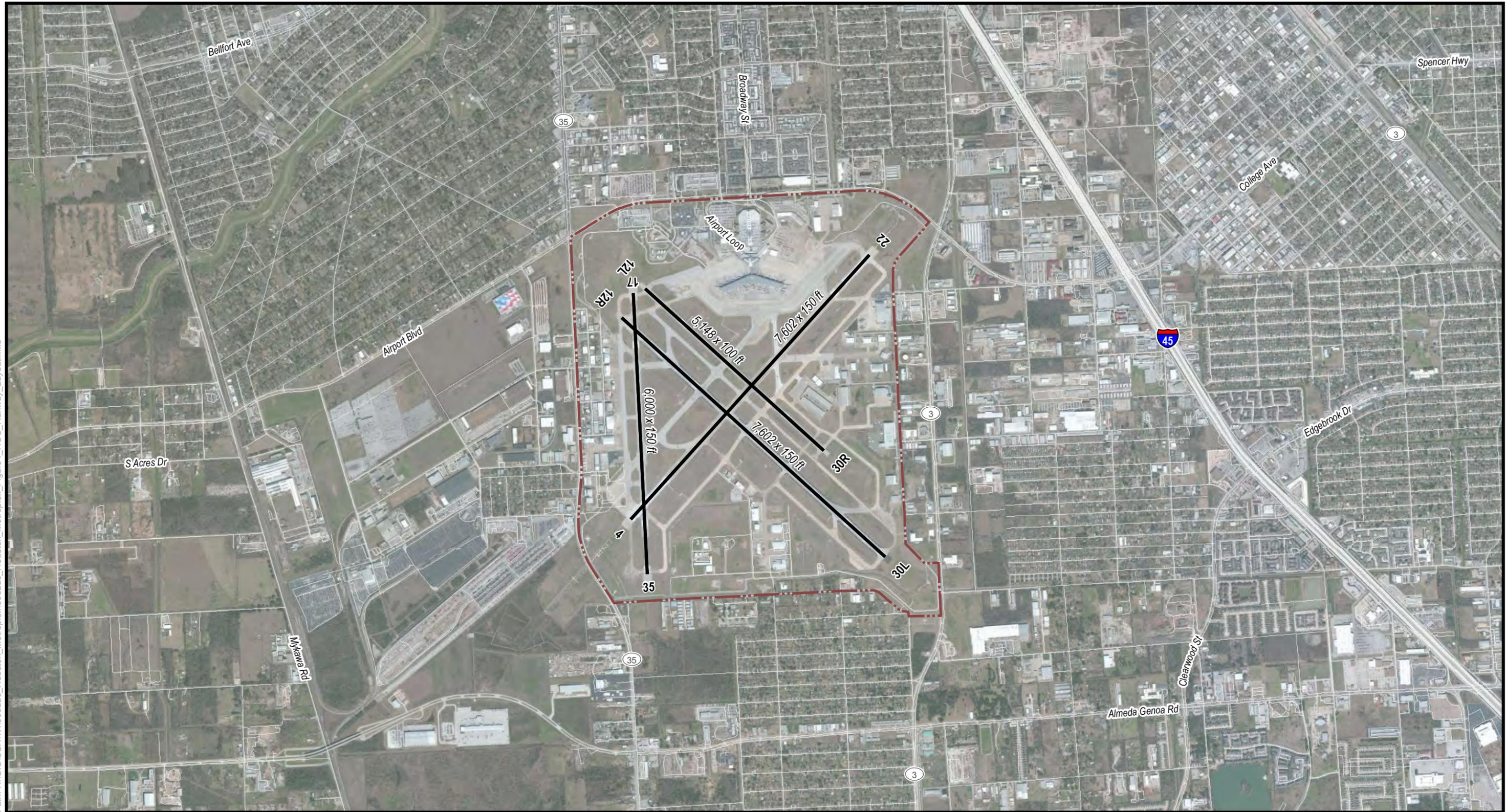
George Bush Intercontinental Airport (IAH) Layout and Runway Configuration

Figure 3



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Data Source: Environmental Systems Research Institute, Inc.(ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Aerial Photography, (Bing Maps for ArcGIS Desktop), 2012

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-  Approximate Airport Boundary
-  Airport Runway
-  Interstate Highway
-  Highways
-  Secondary Roads

William P. Hobby Airport (HOU) Layout and Runway Configuration

Figure 4



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1.2 NEPA Compliance

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to disclose to decision makers and the interested public the potential environmental impacts of proposed Federal actions and alternatives to those actions. Through NEPA, Congress directed Federal agencies to integrate environmental factors into their ongoing planning and decision-making processes. Congress also wished to encourage and facilitate public involvement in decisions that affect the quality of the environment. As part of NEPA, the Council on Environmental Quality (CEQ) was established to develop implementing regulations and monitor ongoing compliance. The CEQ regulations provide specific instruction for Federal agencies on how to comply with NEPA and include procedures for consideration of the purpose and need of proposed actions, alternatives, and environmental impacts.²⁵ They also call for Federal agencies to adopt their own procedures to supplement the CEQ regulations. FAA Order 1050.1E, “Environmental Impacts: Policies and Procedures” provides the FAA’s procedures for NEPA compliance.²⁶ This EA has been prepared in accordance with the CEQ regulations and FAA Order 1050.1E.

1.3 National Airspace System

The Federal Aviation Act of 1958 delegates to the FAA the responsibility for managing the use of the nation’s navigable airspace and for regulating civil and military operations in that airspace, in the interest of the safety and efficiency of both of those operations.²⁷ The National Airspace System (NAS) is comprised of the navigable airspace itself, along with the communications, navigational, and surveillance (CNS) infrastructure necessary to facilitate operations within the airspace.²⁸

Within the NAS, the FAA manages aircraft movements at airports and the flow of aircraft between airports through an integrated system comprised of ATC facilities, people (e.g., air traffic controllers, maintenance and support personnel), technology (e.g., radar and communications equipment), and supporting policies and procedures. The FAA’s continuing mission is to provide the safest, most efficient aerospace system in the world.²⁹

1.3.1 Relevant NextGen Technologies and Procedural Changes

NextGen is the FAA’s plan to modernize the NAS through evolution from a ground-based system of air traffic control to a satellite-based system. As a means of achieving NextGen goals, the FAA is leveraging new technologies and aircraft navigation capabilities that are becoming more readily available by implementing PBN technologies and procedures. PBN is a framework that provides a basis for design and

²⁵ *Code of Federal Regulations*, Title 40, Parts 1500-1508.

²⁶ FAA Order 1050.1E, Chg. 1, “Environmental Impacts: Policies and Procedures,” March 20, 2006.

²⁷ *U.S. Code*, Title 49, sec. 40103(b).

²⁸ For more information, refer to Appendix D.

²⁹ FAA, “Mission”: <http://www.faa.gov/about/mission/>.

implementation of increased automation in the air traffic management (ATM) system. PBN employs Area Navigation (RNAV)³⁰, as well as aircraft-to-aircraft sensing and data communications technologies, to reduce voice communications requirements and associated CNS infrastructure.³¹

RNAV is a PBN technique that enables aircraft traveling through terminal³² and en route airspace³³ to follow any desired flight route within the coverage of a network of ground- or spaced-based NAVAIDs rather than flying a point-to-point route over static, ground-based NAVAIDs following a conventional procedure³⁴. (For detail, see Appendix D: *National Airspace System Guidebook*.) In contrast, the conventional system defines routes as lines between ground-based navigation transmitters. These routes generally have bends in accordance with the installation locations of these transmitters.

RNAV can provide pilots the ability to choose a direct route for their flight, and air traffic controllers can assign a predictable, flexible, and more accurate set of RNAV procedures to RNAV-equipped aircraft, operated by RNAV-authorized pilots. RNAV procedures facilitate a more efficient design of the air traffic system. These procedures collectively result in maintained or improved safety, and enhanced access, predictability, and operational efficiency, with reduced use of NAS resources. The predictability of routes following RNAV procedures can reduce the need for controllers to employ traffic management tools, such as extensive radar vectoring³⁵ or holding, and therefore reduces workload.

The FAA OAPM initiative provides a systematic, integrated, and expedited approach to implementing PBN procedures in Metroplexes.

1.4 Document Content and Organization

This EA conforms to the requirements of FAA Order 1050.1E, and the requirements for an EA established in the CEQ regulations. See the list below for a summary of all chapters and appendices:

Chapter 1, *Background & Introduction*: Provides background information related to the Houston OAPM and the scope of this EA, an introduction to NEPA and FAA

³⁰ See footnote #1 for information on PBN, RNAV, and RNP.

³¹ Reducing the need for voice communications results in fewer read and hear-back errors and reduces pilot-controller task complexity, enhancing flight safety.

³² Terminal (Airspace) Area: A general term used to describe airspace in which approach control service or airport traffic control service is provided. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

³³ En Route Air Traffic Control Services (Airspace): A general term used to describe airspace in which air traffic control service is provided when aircraft are operating between departure and destination terminal areas. (Paraphrased from FAA, *Pilot Controller Glossary*, July 26, 2012.)

³⁴ A conventional procedure is an instrument flight procedure (IFP) that relies upon ground-based navigation transmitters for course guidance, as contrasted with RNAV procedures.

³⁵ Radar Vectoring: Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar. (FAA, *Pilot Controller Glossary*, July 26, 2012.)

compliance responsibilities, a brief overview of the NAS and NextGen PBN technologies, and document content and organization.

Chapter 2, Purpose & Need: Provides a discussion of the existing problem (i.e., need), objectives to resolve the need (i.e., purpose), and the proposed timeframe for implementation.

Chapter 3, Alternatives: Provides a discussion of the alternatives analyzed by the FAA for the Houston OAPM project, including the Proposed Action and the No Action Alternative.

Chapter 4, Affected Environment: Provides a discussion of existing environmental conditions of the potentially affected geographic area, and documents present and reasonably foreseeable Federal and non-Federal actions.

Chapter 5, Environmental Consequences: Provides a comparison of the potential environmental impacts, including cumulative impacts, associated with the Proposed Action and the No Action Alternative.

Chapter 6, Agency and Public Coordination: Provides a summary of the consultation, coordination, and public involvement opportunities associated with the EA process. This chapter lists all Federal, state, and local agencies, and other interested parties, consulted during the EA process.

Appendices: Contain documentation related to technical information, coordination, and other reference materials.

Appendix A, Acronyms, Abbreviations, and Glossary of Terms

Appendix B, References

Appendix C, List of Preparers

Appendix D, National Airspace System Guidebook: Provides a description of the NAS, including legislated responsibilities, ATC fundamentals, advanced navigation technologies, and the concept of airspace efficiency.

Appendix E, Houston OAPM Study Team Documents

Appendix F, Houston OAPM Design and Implementation Team Documents

Appendix G, Aircraft Noise Analysis: Presents the basic concepts of noise analysis, a detailed description of the methodology followed, assumptions used, and the results of aircraft noise analysis for this EA.

Appendix H, Inventory of Potential Department of Transportation Act, Section 4(f) Resources and Noise Exposure

Appendix I, Inventory of Historic Resources and Noise Exposure

Appendix J, *Coordination and Consultation*

Appendix K, *List of Receiving Parties*