5 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential environmental impacts that could result from implementation of the Proposed Action and the No Action Alternative in all relevant environmental impact categories specified in FAA Order 1050.1E. The FAA evaluated both alternatives for conditions in 2014, the first full year aircraft would use the optimized air traffic routes under the Proposed Action, and 2019, five years after expected implementation of the Proposed Action.

5.1 Assessment of Impacts

Neither the Proposed Action nor the No Action Alternative would involve land acquisition, physical disturbance, or construction activities and therefore they would not affect certain environmental impact categories (see Section 4.3). Accordingly, this chapter does not include assessment of those impact categories. Table 22 provides a summary of the environmental impact categories with potential to be affected by the Proposed Action and the findings of the impact assessment. The remainder of this chapter discusses these summary findings in detail, along with consideration of cumulative impacts.

Each subsection of this chapter begins with a brief overview of impacts, followed by a description of the methodology used to determine impacts, and then a more detailed discussion of the potential impacts. However, in summary, there are no significant impacts for any environmental impact category.

Table 22 Summary of Potential Environmental Impacts of Implementing the Proposed Action (2014 and 2019)

Environmental Impact Category	2014	2019
Noise	Proposed Action would not result in a DNL 1.5 dB increase in areas exposed to aircraft noise at or above DNL 65 dB. No significant impact.	Same as 2014
Compatible Land Use	Proposed Action would result in one population centroid being added to the area exposed to DNL 65 dB and higher, but it would experience a significant noise increase (DNL 1.5 dB or greater). No significant impact.	Same as 2014
Department of Transportation Act, Section 4(f)	Proposed Action would not use any resources protected under Section 4(f). No significant impact.	Same as 2014
Historical, Architectural, Archaeological, and Cultural Resources	Proposed Action would not adversely affect the historical or cultural characteristics of Tribal Lands or historic resources. No significant impact.	Same as 2014
Air Quality	The Proposed Action would result in slightly more fuel burned compared to the No Action. However, the Proposed Action is presumed to conform with the State Implementation Plan (SIP). Accordingly, implementation would not cause or contribute to a new violation of the National Ambient Air Quality Standards (NAAQS). Therefore, implementation would not have a significant impact on air quality and a conformity determination is not required.	Same as 2014
Natural Resources and Energy Supply (Aircraft Fuel)	Proposed Action would not have a measurable effect on local supplies of energy. No significant impact.	Same as 2014
Climate	Although fuel burn would increase slightly with the Proposed Action compared to the No Action Alternative, no significant project-related effects on climate are expected.	Same as 2014
Fish, Wildlife, and Plants	Proposed Action would not increase the probability of aircraft strikes to migratory birds, nor would it result in an increase in noise that would have the potential to adversely affect the long-term survival of any species. No significant impact.	Same as 2014
Light Emissions and Visual Impacts	Proposed Action would not cause aircraft to be more visually intrusive to normal activities on the ground surface. No significant impact.	Same as 2014
Environmental Justice	Proposed Action would not affect low income or minority populations at a disproportionately higher level than other population segments, nor would it disproportionately affect children. No significant impact.	Same as 2014

5.2 Noise

This section provides a summary of the NIRS calculations of future noise exposure in 2014 and 2019 resulting from the Proposed Action and the No Action Alternative, as required by FAA Order 1050.1E. The section also identifies the differences in noise exposure between the two alternatives to determine if implementing the Proposed Action would result in significant noise impacts. Appendix G provides additional information on this analysis. Section 4.2.1 presents a discussion of existing aircraft noise exposure in the PSA.

5.2.1 Overview of Impacts

Implementation of the Proposed Action would not result in a DNL increase of 1.5 dB or more in noise sensitive areas exposed to aircraft noise at or above DNL 65 dB. Therefore, there would be no significant impacts.

5.2.2 Methodology

As presented in Section 4.2.1.1, the FAA has developed specific guidance and requirements for the assessment of potential aircraft noise impacts on people. This guidance, described in FAA Order 1050.1E, requires analysis of aircraft noise in terms of the DNL metric. Additionally, the order defines the threshold levels above which the FAA considers a change in aircraft noise causes a significant impact on people. The order defines a significant noise impact as a noise sensitive area (e.g., residences, schools, etc.) experiencing an increase in DNL of 1.5 dB or more at or above DNL 65 dB when compared to the No Action Alternative for the same timeframe.[148]

In accordance with FAA Order 1050.1E, the FAA analyzed community exposure to aircraft noise within the PSA generated by IFR aircraft flights projected to be operating between the surface and 10,000 ft. AGL. The FAA based the number of IFR aircraft flights on a forecast of aircraft activity for the years 2014 and 2019 and modeled them for conditions under both the No Action Alternative and Proposed Action. Appendix G.2, *Noise Modeling Technical Report*, provides detailed technical information regarding the determination of the Study Area, the Analyzed Airports, the modeling process, and the results of the analysis.

In 1990, the FAA issued a noise screening procedure to evaluate whether certain airspace actions above 3,000 ft. AGL might increase DNL levels by 5 dB or more. The procedure served as a response to the FAA's experience that increases in DNL of 5 dB or more at cumulative levels well below DNL 65 dB could be disturbing to people and become a source of public concern. In 1992, the Federal Interagency Committee on Noise (FICON) recommended that in instances where there are DNL increases of 1.5 dB or more at noise sensitive locations at or above DNL 65 dB, that DNL increases of 3 dB or more between DNL 60 dB and 65 dB should also be evaluated. DNL increases of 3 dB below DNL 65 dB are not "significant impacts" but are to receive consideration in the environmental documentation. The FAA has adopted FICON's recommendation in FAA Order 1050.1E.[149] The Order also provides that increases in DNL of 5 dB or greater between DNL 45 dB and 60 dB should be considered for airspace actions.[150] For clarity, this EA uses the term "reportable increase" in referring to DNL increases of 3 dB or more between DNL 60 and 65 dB and DNL increases of 5 dB or more between DNL 45 and 60 dB.

[148] FAA Order 1050.1E, Chg. 1, App. A, sec.14.3.
[149] Ibid., sec. 14.4c.
[150] Ibid., sec. 14.5e.

Table 23 summarizes the criteria used to assess the impact of change in noise exposure attributable to the Proposed Action compared with the No Action Alternative. This section reports noise levels on population, as represented by the 67,184 census block centroids defined in the PSA. Section 5.4 and Section 5.5 discuss potential noise impacts to Section 4(f) resources and historic resources, respectively.

Table 23 Criteria for Determining Impact of Changes in Aircraft Noise

DNL Noise Exposure under Proposed Action	Increase in DNL with Proposed Action	Aircraft Noise Exposure Change Consideration
DNL 65 dB and higher	DNL 1.5 dB or greater[1]	Significant Impact
DNL 60 dB to 65 dB	DNL 3.0 dB or greater[2]	Reportable Increase
DNL 45 dB to 60 dB	DNL 5.0 dB or greater[2]	Reportable Increase

Sources:
1. FAA, Order 1050.1E, App. A, sec. 14.3
2. FAA Order 1050.1E, App. A, sec. 14.5e

Prepared by: Harris Miller Miller & Hanson Inc., October 2012

Following the noise modeling methodology defined by FAA guidance and requirements for compliance with NEPA requirements, the FAA assembled detailed information on IFR aircraft operations for the Analyzed Airports for input into the FAA's noise model, NIRS. The information assembled included:

- Average Annual Day (AAD) IFR operations for 2014 and 2019
- Flight tracks (i.e., the route and altitude profile of an aircraft's flight)
- Runway use

In each forecast year, the Proposed Action and the No Action Alternative have the same number and type of aircraft operations. Therefore, the noise analysis reflects the change in noise exposure due to the proposed changes in aircraft routings (i.e., flight tracks) by the Proposed Action, as compared to the No Action Alternative.[151]

Appendix G provides a detailed discussion of the development of the 2014 and 2019 average annual day operations. The FAA based future year IFR operations on the 2012 Terminal Area Forecast (TAF)[152] for the forecast years, modified with additional detail using previously identified arrival and departure times, aircraft types and origins/destinations.

The FAA based the No Action modeled flight tracks on collaboration with ATC personnel and radar data collected for the existing conditions (i.e., 2012 Base Year) analysis. For the Proposed Action, the FAA developed flight tracks from the new and modified procedures proposed by the Houston OAPM D&I Team. Figure 6 through

[151] For greater detail, see Chapter 3, Appendix F, and Appendix G.2.
[152] The Terminal Area Forecast (TAF) system is the official forecast of aviation activity at FAA facilities. For more information, please see http://aspm.faa.gov/main/taf.asp.

Figure 13 in Chapter 3, *Alternatives*, provide graphic depictions of the procedures and flight tracks under the No Action Alternative and the Proposed Action.

The NIRS model computed DNL values for 2014 and 2019 conditions at three sets of data points throughout the PSA, as discussed in Section 4.2.1:

1. Population census block centroids
2. Points representing certain specific cultural resources and areas potentially protected under Section 4(f) of the Department of Transportation Act
3. A uniform grid throughout the PSA (using 3,000 ft. spacing) and the SSA (using 6,000 ft. spacing) to document aircraft noise levels at potential noise sensitive locations that were not otherwise identified

Section 5.2.3 discusses potential noise impacts to census block centroids for each future year and alternative. Section 5.4 and Section 5.5 discuss potential noise impacts to Section 4(f) resources and historic and other cultural resources, respectively.

5.2.3 Potential Impacts

The noise analysis presented in this section confirms that the Proposed Action would not result in a DNL increase of 1.5 dB in noise-sensitive areas exposed to aircraft noise at or above DNL 65 dB.

Figures 22 and 23 shows the calculated average daily noise exposure levels for 2014 at census block centroids under the No Action Alternative and the Proposed Action, respectively. Table 24 summarizes the estimated affected population from less than DNL 45 dB to greater than DNL 75 dB in 5 dB increments and the percent change from the No Action Alternative to the Proposed Action.

Figure 24 illustrates the increase or decrease in noise exposure levels at each grid point for year 2014 when comparing the Proposed Action to the No Action Alternative and the criteria described in Table 23. Additionally, it illustrates areas where noise levels would increase by less than DNL 1.5 dB but move above or below DNL 65 dB.

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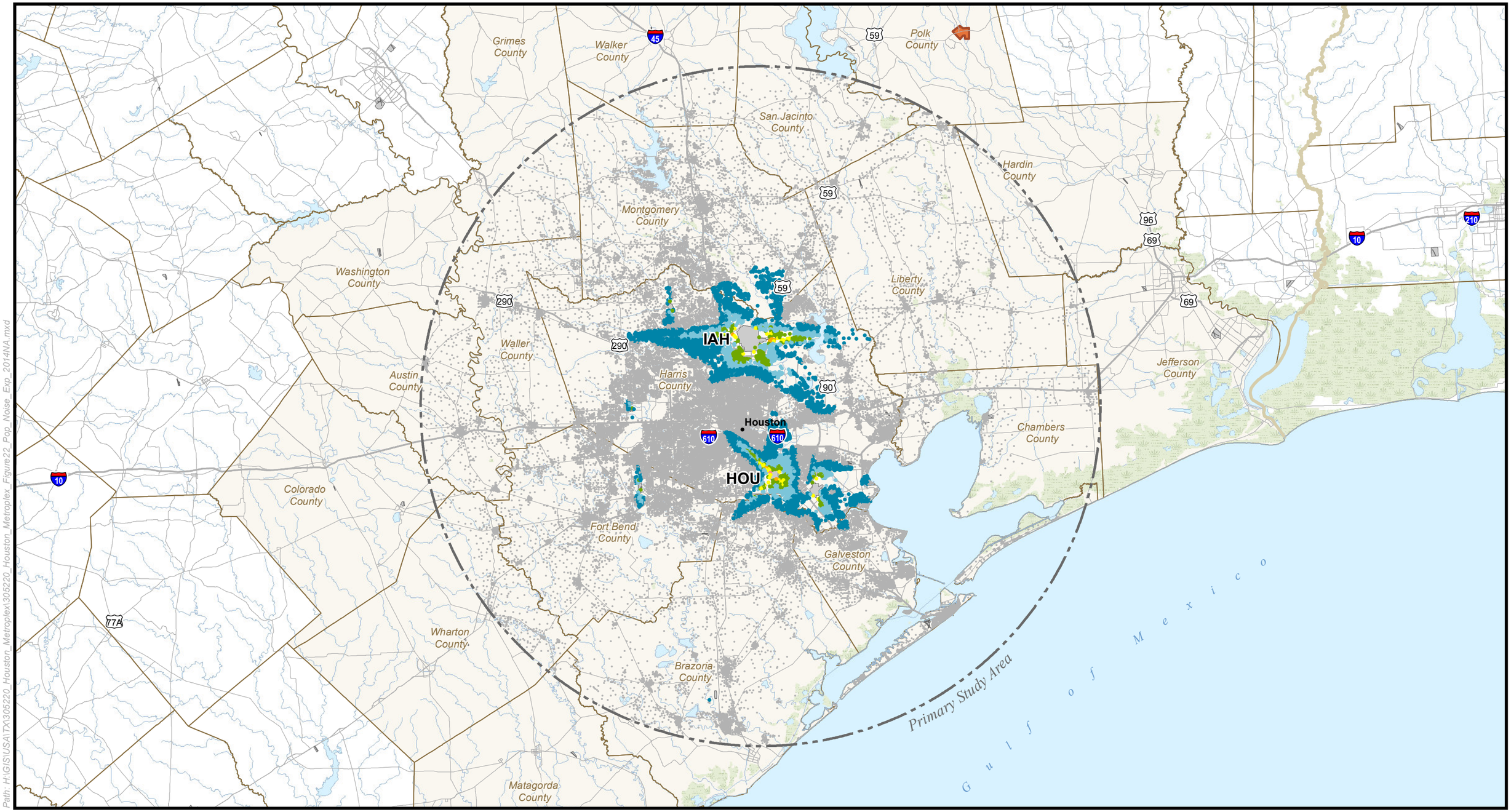

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Data Source: Environmental Systems Research Institute, Inc.(ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Houston-Galveston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

Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

North

0 10 20 Nautical Miles

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

2014 No Action DNL Levels

- DNL < 45.0 dB
- DNL 45.0 - 50.0 dB
- DNL 50.0 - 55.0 dB
- DNL 55.0 - 60.0 dB
- DNL 60.0 - 65.0 dB
- DNL 65.0 - 70.0 dB
- DNL 70.0 - 75.0 dB
- DNL > 75.0 dB

Population Exposed to Aircraft Noise - No Action, 2014

Figure 22

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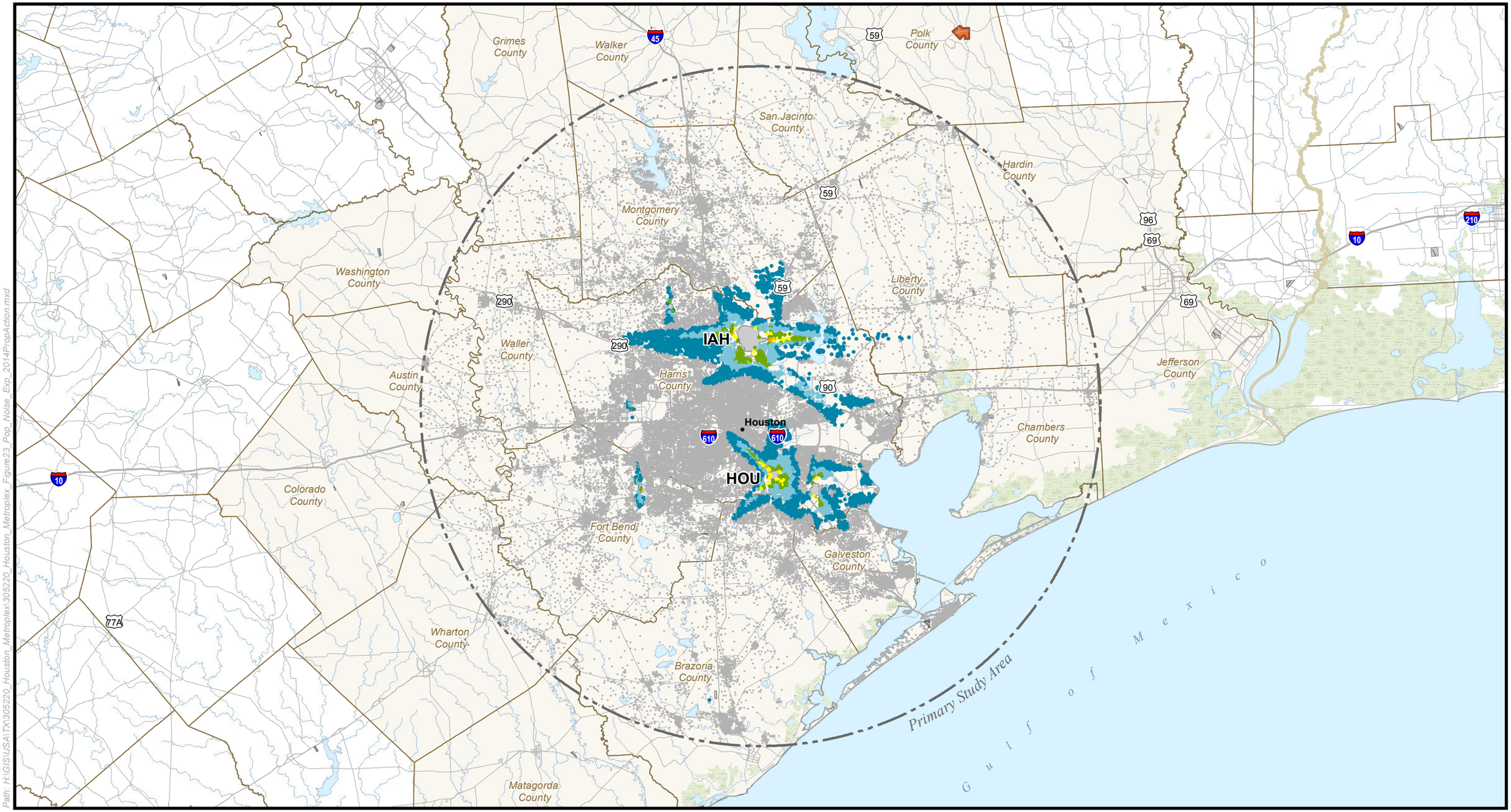

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Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

North

0 10 20 Nautical Miles

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

2014 Proposed Action DNL Levels

- DNL < 45.0 dB
- DNL 45.0 - 50.0 dB
- DNL 50.0 - 55.0 dB
- DNL 55.0 - 60.0 dB
- DNL 60.0 - 65.0 dB
- DNL 65.0 - 70.0 dB
- DNL 70.0 - 75.0 dB
- DNL > 75.0 dB

Population Exposed to Aircraft Noise - Proposed Action, 2014

Figure 23

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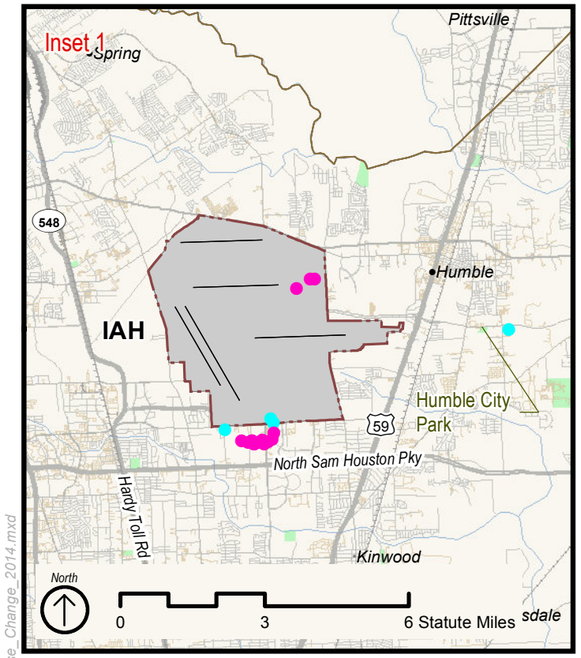

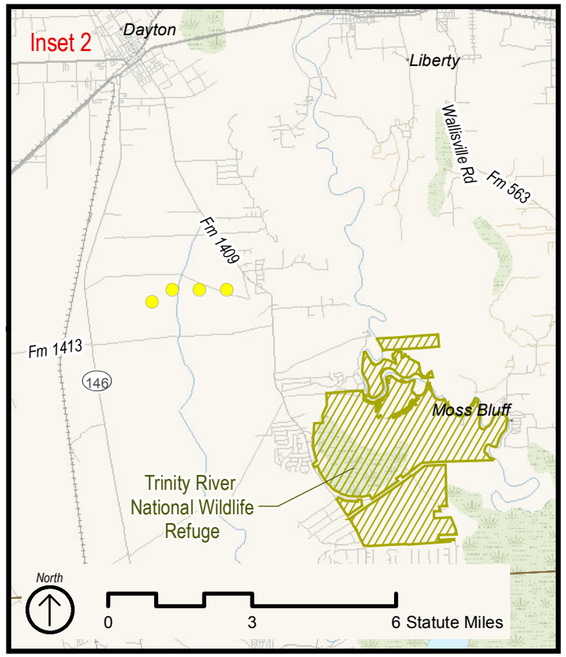

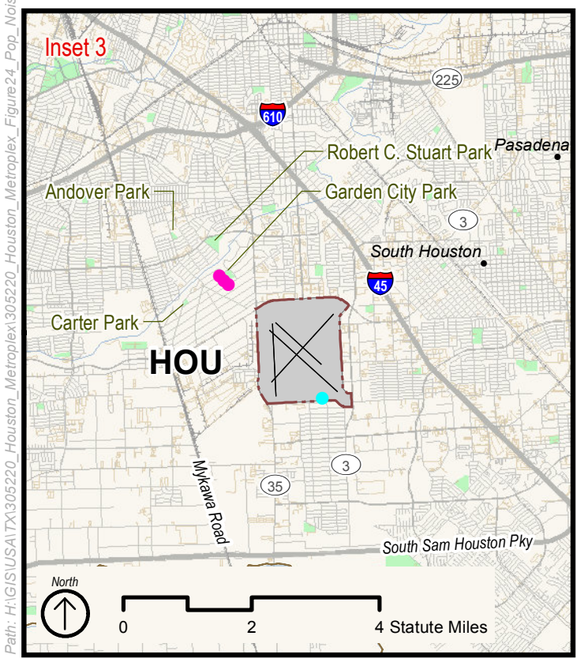

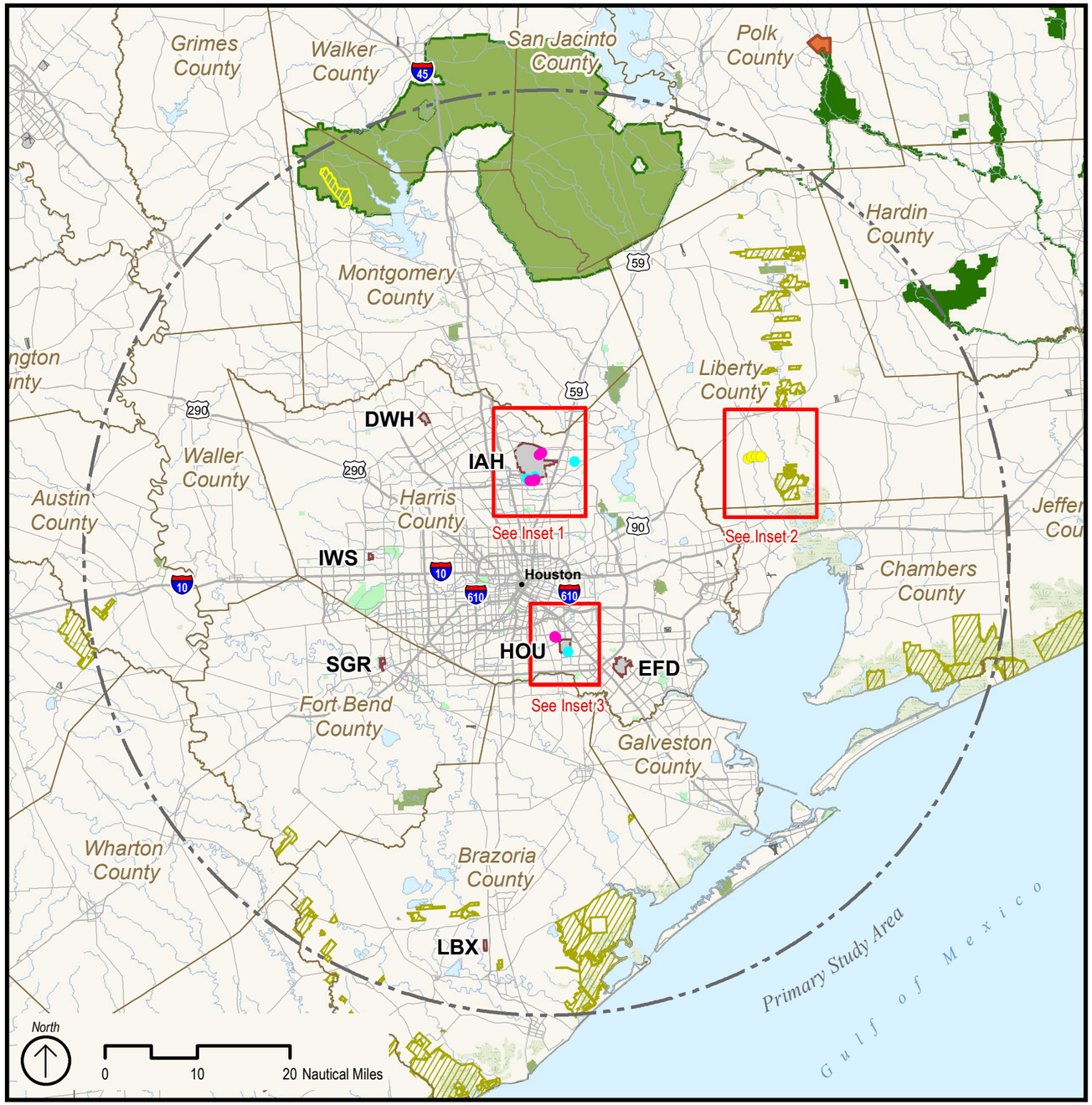

2014 Change in Noise DNL Levels

Noise Increases

- 1.5 dB or greater for location with a Proposed Action DNL >= 65 dB
- 3.0 dB or greater for location with a Proposed Action DNL >= 60 dB and < 65 dB
- 5.0 dB or greater for location with a Proposed Action DNL >= 45 dB and < 60 dB
- New to DNL 65 dB, but no 1.5 dB increase

Noise Decrease

- 1.5 dB for location with a No Action DNL >= 65 dB
- 3.0 dB for location with a No Action DNL >= 60 dB and < 65 dB
- 5.0 dB for location with a No Action DNL >= 45 dB and < 60 dB
- Removed from DNL 65 dB, but no 1.5 dB decrease

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 (Mountain Peaks), February 28, 2012; ESRI (Roads), March 14, 2012; National Atlas (Tribal Land/Wilderness Areas), February 08, 2012; Texas Natural Resource Information System (TNRIS) (Wildlife Management Areas), February 08, 2012; US Fish & Wildlife Service (National Wildlife Refuge), June 13, 2012; United States Dept of Agriculture (National Forest), May 07, 2012; National Park Service (National Park), February 07, 2012; TNRIS (State Parks or Forest/Local Parks), May 03, 2012; ESRI (Local Parks), May 03, 2012; TNRIS (Department of Defense), February 08, 2012; TNRIS (Railroad), January 2, 2013;

Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

- Primary Study Area
- Study Airports
- Other Airports
- County/Parish Boundary
- Alabama-Coushatta Tribe of Texas Reservation
- Interstate Highway
- Highways
- Secondary Roads
- Railroad
- National Forest
- National Park
- State Park or Forest
- Local Park or Recreation Area
- National Wilderness Area
- National Wildlife Refuge
- State Wildlife Management Area
- Water
- River/Stream

Change of All Modeled Grid Points Exposed to Aircraft Noise, 2014

Figure 24

Houston OAPM EA

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Table 24 Comparison of Potential Population Exposed to Aircraft Noise, 2014

DNL Range (dB)	No Action Alternative	Proposed Action	Percent Change
Less than 45	4,712,877	4,699,857	-0.28%
45 to less than 50	806,553	805,644	-0.11%
50 to less than 55	316,576	332,078	4.90%
55 to less than 60	87,747	85,215	-2.89%
60 to less than 65	12,314	13,286	7.89%
65 to less than 70	821	808	-1.58%
70 to less than 75	10	10	0.00%
Greater than or equal to 75	0	0	0.00%
Total	5,936,898	5,936,898	
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.			

Table 25 presents, for 2014, a summary of the population with potential to experience changes in noise exposure according to the criteria in FAA Order 1050.1E for significant and reportable noise increases. As indicated in the table, no population would experience increases in noise exposure under the Proposed Action that would be considered significant (i.e., an increase in DNL of 1.5 dB or greater in an area exposed to noise of DNL 65 dB or more). Nor would any population be exposed to reportable noise increases between DNL 60 dB and 65 dB because of the Proposed Action. Twenty-two people, represented by a single population centroid would experience a DNL 5 dB increase between DNL 45 to 60 dB in 2014 because of the Proposed Action.[152] Three additional modeling points (not associated with population) would also experience such an increase. As depicted in Figure 24, Inset 2, the aforementioned population centroid and three modeling points are located in Liberty County approximately 5 statute miles south of Dayton center. The points are located between Route 146 and Farm-to-Market (FM) 1409, and north of FM 1413.

Table 25 Change of Estimated Population Exposed to Aircraft Noise, 2014

DNL Noise Exposure Level under Proposed Action	Increase in DNL with Proposed Action	Population Exposed to Threshold Increase
DNL 65 dB and higher	DNL 1.5 dB or greater	None
DNL 60 dB to 65 dB	DNL 3.0 dB or greater	None
DNL 45 dB to 60 dB	DNL 5.0 dB or greater	22
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.		

In areas exposed to aircraft noise of DNL 65 dB and higher, the 2014 changes in noise exposure at census block centroids resulting from implementation of the Proposed Action range from a decrease of DNL 0.1 dB to an increase of DNL 0.2 dB. In areas

[152] This location would be exposed DNL 40.7 dB in the 2014 No Action and DNL 45.7 dB in the 2014 Proposed Action. The coordinates of this population centroid are Latitude 29.972719 N, Longitude 94.884928 W.

exposed to aircraft noise from DNL 60 dB to 65 dB, the changes at census block centroids resulting from implementation of the Proposed Action range from a decrease of DNL 0.9 dB to an increase of DNL 0.5 dB. In areas exposed to aircraft noise from DNL 45 to 60 dB, changes in noise exposure at census block centroids range from a decrease of DNL 3.1 dB to an increase of DNL 5.0 dB.

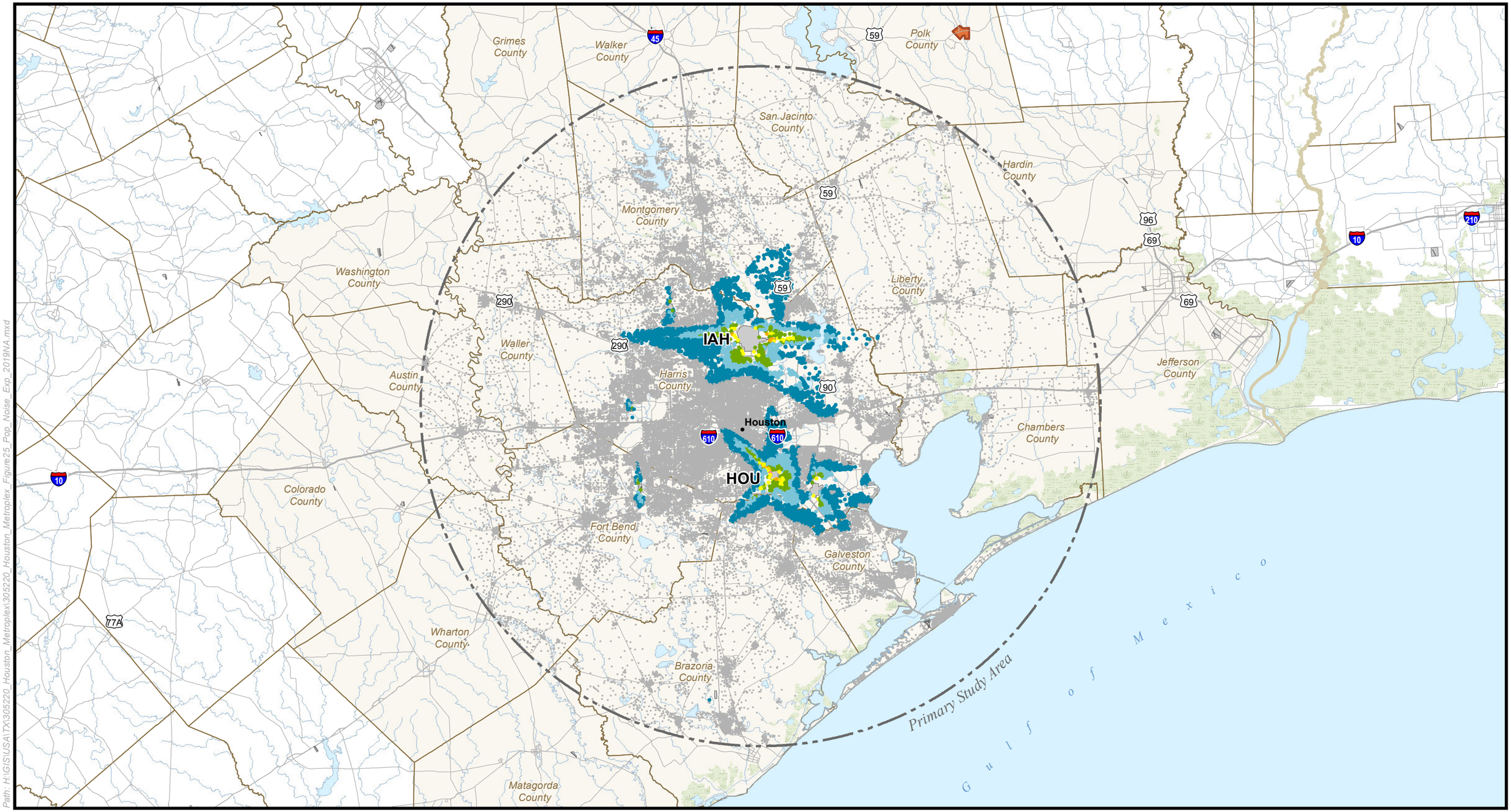
For 2014, a small number of people northwest of HOU, in an area too small to be identified with a specific population centroid, would be newly exposed to DNL 65 dB or greater because of the Proposed Action. However, the noise increase would be well below DNL 1.5 dB[153] and, therefore, would not be significant. Figure 24, Inset 3 depicts this location. Thirteen people, represented by a single census centroid located on the south side of HOU, would have a DNL 0.1 dB decrease as a result of the Proposed Action, also depicted in Figure 24, Inset 3. Figure 24, Inset 1 depicts additional locations around IAH that would move above or below DNL 65 dB. Aerial photography indicates that these locations are commercial, industrial, or vacant (see Figure 3). Moreover, none of these locations would experience a noise increase of DNL 1.5 dB or more.

The FAA's evaluation of potential 2019 impacts employed the same methodology and criteria as used in the potential 2014 impact analysis.

Figure 25 and Figure 26 show the calculated noise exposure levels for 2019 at census block centroids under the No Action Alternative and Proposed Action, respectively. Table 26 presents the estimated affected population from less than DNL 45 to greater than DNL 75 dB in 5 dB increments and the percent change from the No Action Alternative to the Proposed Action.

Figure 27 illustrates the increase or decrease in noise exposure levels at each grid point for 2019 when comparing the Proposed Action to the No Action Alternative and the criteria in Table 23. Additionally, it illustrates areas where noise levels would increase by less than DNL 1.5 dB but move above or below DNL 65 dB.

[153] These three locations have an increase of DNL 0.4 dB to DNL 0.5 dB.



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Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

North

0 10 20 Nautical Miles

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

2019 No Action DNL Levels

- DNL < 45.0 dB
- DNL 45.0 - 50.0 dB
- DNL 50.0 - 55.0 dB
- DNL 55.0 - 60.0 dB
- DNL 60.0 - 65.0 dB
- DNL 65.0 - 70.0 dB
- DNL 70.0 - 75.0 dB
- DNL > 75.0 dB

Population Exposed to Aircraft Noise - No Action, 2019

Figure 25

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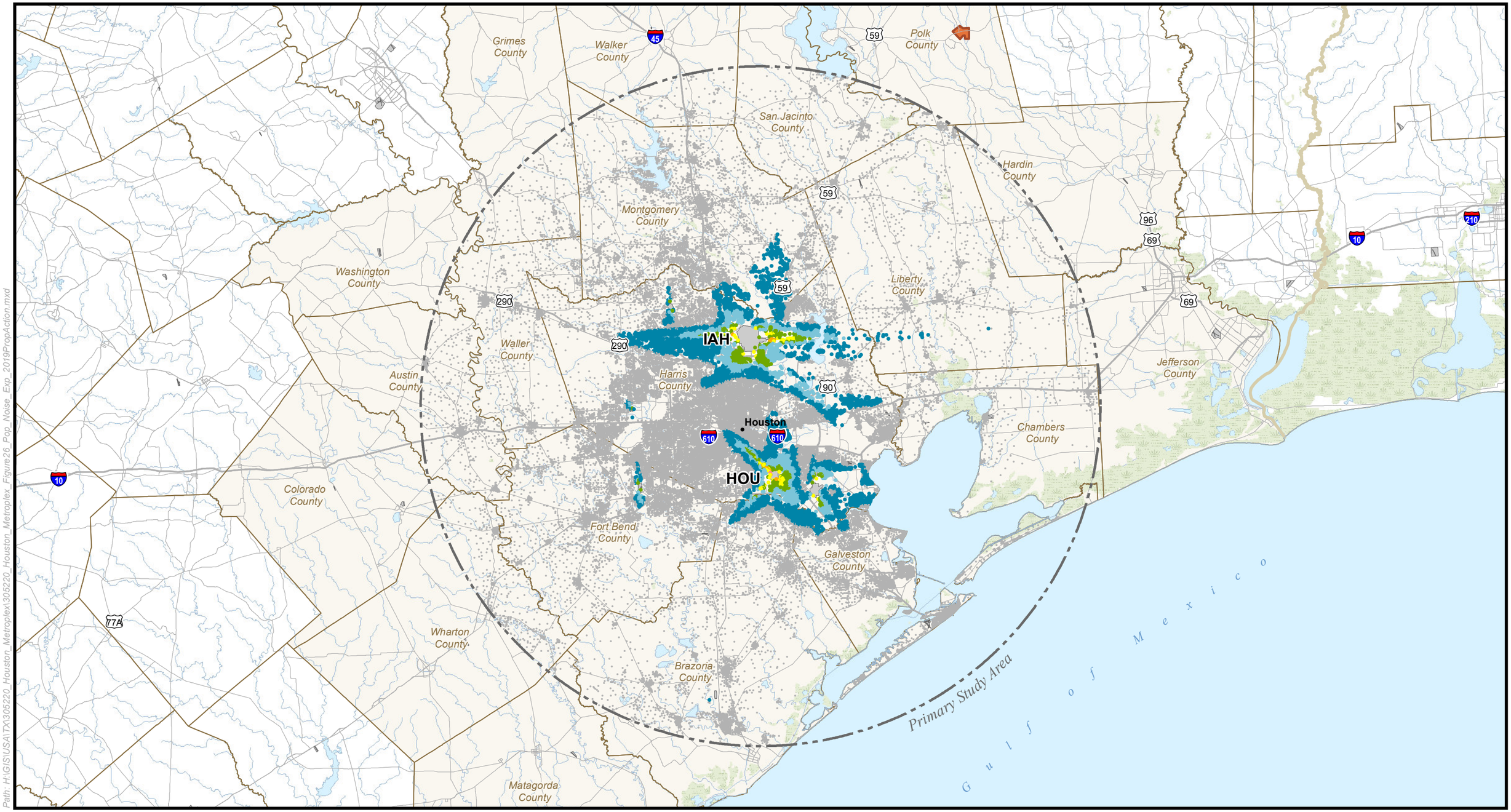

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Data Source: Environmental Systems Research Institute, Inc.(ESRI) (Airport/Airport Runways), March 14, 2012; ESRI (State Boundaries/County Boundaries), February 14, 2012; ESRI (Cities), February 8, 2012; ESRI (Roads), March 14, 2012; Houston-Galveston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

Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

North

0 10 20 Nautical Miles

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

2019 Proposed Action DNL Levels

- DNL < 45.0 dB
- DNL 45.0 - 50.0 dB
- DNL 50.0 - 55.0 dB
- DNL 55.0 - 60.0 dB
- DNL 60.0 - 65.0 dB
- DNL 65.0 - 70.0 dB
- DNL 70.0 - 75.0 dB
- DNL > 75.0 dB

Population Exposed to Aircraft Noise - Proposed Action, 2019

Figure 26

Houston OAPM EA

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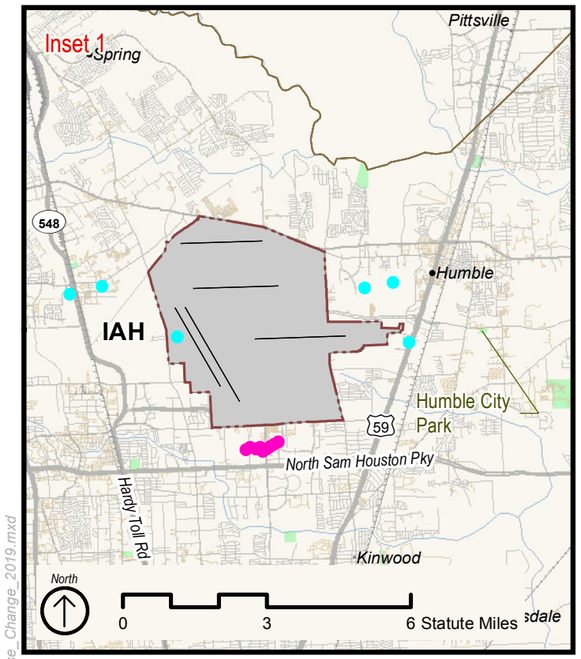

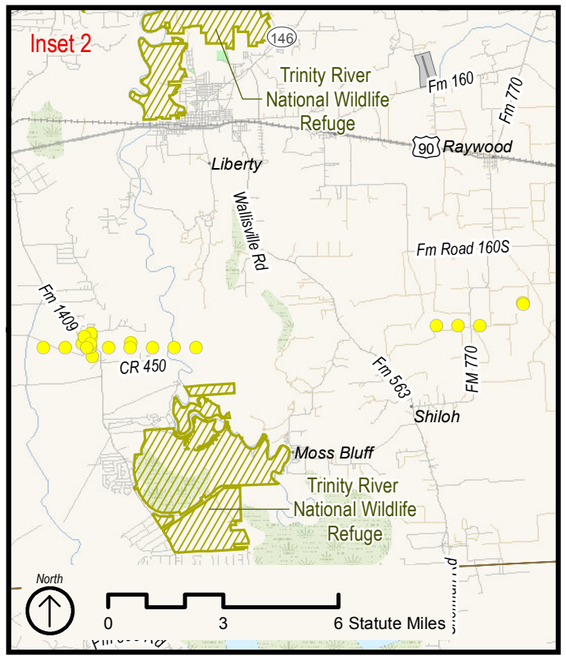

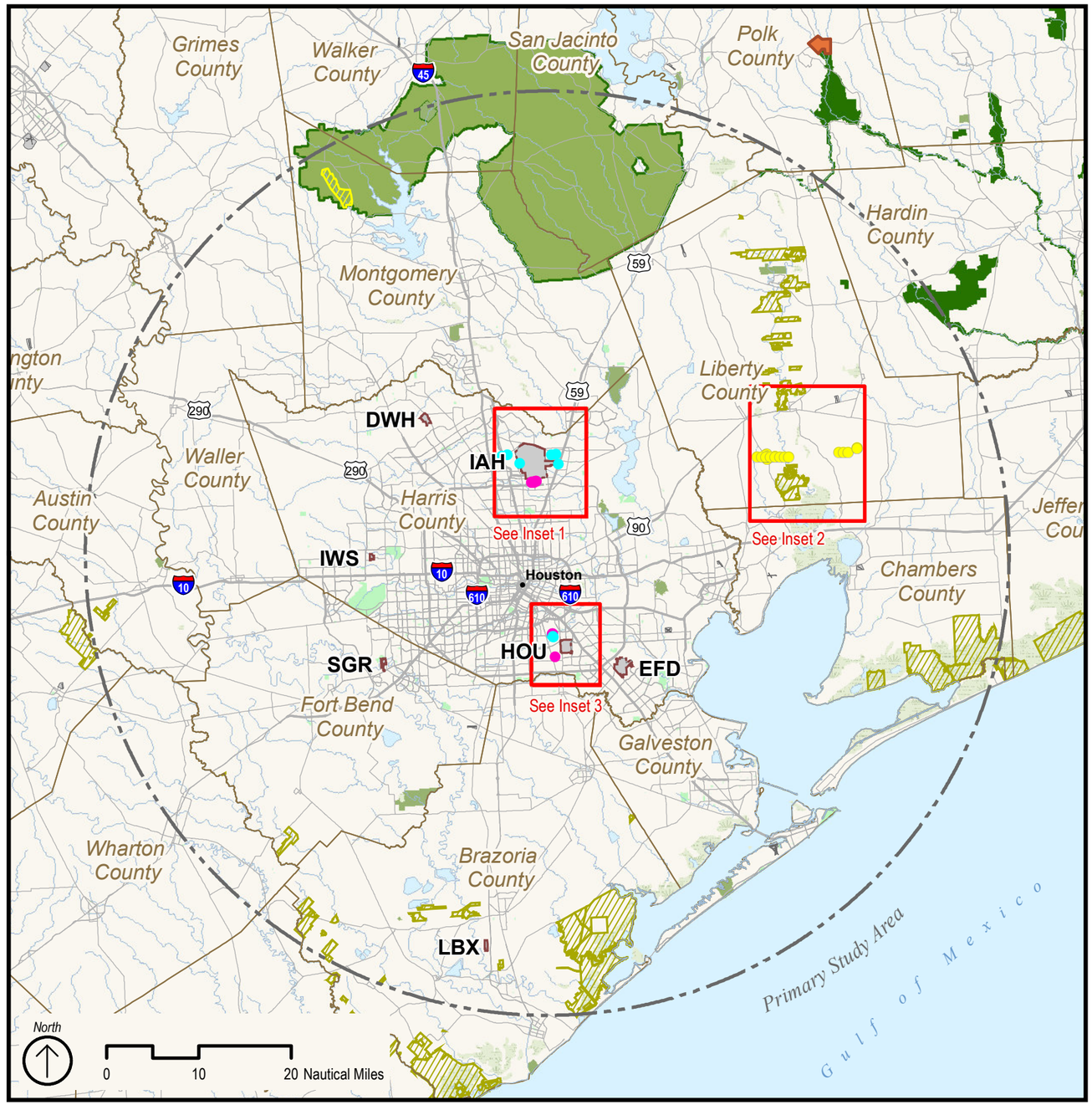

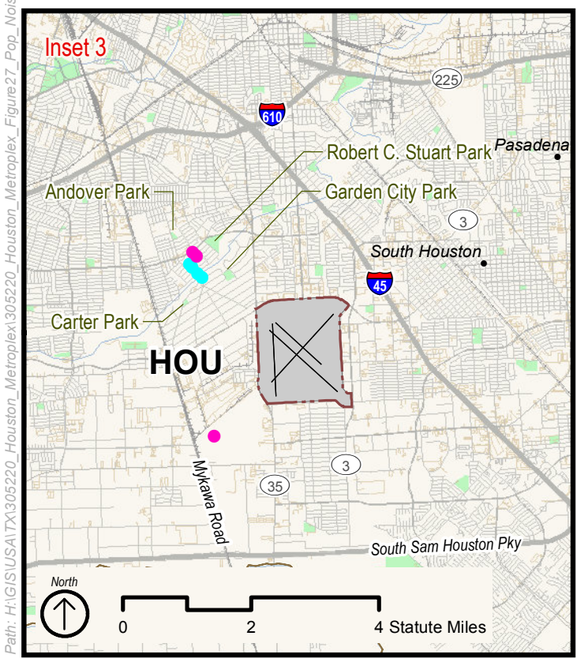

2019 Change in Noise DNL Levels

Noise Increases

- 1.5 dB or greater for location with a Proposed Action DNL >= 65 dB
- 3.0 dB or greater for location with a Proposed Action DNL >= 60 dB and < 65 dB
- 5.0 dB or greater for location with a Proposed Action DNL >= 45 dB and < 60 dB
- New to DNL 65 dB, but no 1.5 dB increase

Noise Decrease

- 1.5 dB for location with a No Action DNL >= 65 dB
- 3.0 dB for location with a No Action DNL >= 60 dB and < 65 dB
- 5.0 dB for location with a No Action DNL >= 45 dB and < 60 dB
- Removed from DNL 65 dB, but no 1.5 dB decrease

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 (Mountain Peaks), February 28, 2012; ESRI (Roads), March 14, 2012; National Atlas (Tribal Land/Wilderness Areas), February 08, 2012; Texas Natural Resource Information System (TNRIS) (Wildlife Management Areas), February 08, 2012; US Fish & Wildlife Service (National Wildlife Refuge), June 13, 2012; United States Dept of Agriculture (National Forest), May 07, 2012; National Park Service (National Park), February 07, 2012; TNRIS (State Parks or Forest/Local Parks), May 03, 2012; ESRI (Local Parks), May 03, 2012; TNRIS (Department of Defense), February 08, 2012; TNRIS (Railroad), January 2, 2013;

Prepared By: Harris Miller Miller & Hanson Inc., January, 2013

- Primary Study Area
- Study Airports
- Other Airports
- County/Parish Boundary
- Alabama-Coushatta Tribe of Texas Reservation
- Interstate Highway
- Highways
- Secondary Roads
- Railroad
- National Forest
- National Park
- State Park or Forest
- Local Park or Recreation Area
- National Wilderness Area
- National Wildlife Refuge
- State Wildlife Management Area
- Water
- River/Stream

Change of All Modeled Grid Points Exposed to Aircraft Noise, 2019

Figure 27

Houston OAPM EA

Path: H:\GIS\USA\TX\305220_Houston_Metroplex\305220_Houston_Metroplex_Figure27_Pop_Noise_Change_2019.mxd

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Table 26 Comparison of Estimated Population Exposed to Aircraft Noise, 2019

DNL Range (dB)	No Action Alternative	Proposed Action	Percent Change
Less than 45	4,570,480	4,562,565	-0.13%
45 to less than 50	871,244	868,797	-0.04%
50 to less than 55	365,703	377,201	0.19%
55 to less than 60	111,095	110,393	-0.01%
60 to less than 65	16,028	16,417	0.01%
65 to less than 70	2,338	1,515	-0.01%
70 to less than 75	10	10	0.00%
Greater than or equal to 75	0	0	0.00%
Total	5,936,898	5,936,898	
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.			

Table 27 presents, for 2019, a summary of the population that would experience changes in noise exposure meeting the criteria in FAA Order 1050.1E for significant and reportable noise increases. As indicated in the table, no population would experience changes in noise exposure under the Proposed Action that would be considered significant (i.e., a change in DNL of 1.5 dB or greater in an area exposed to noise of DNL 65 dB or more). Nor would any population be exposed to reportable noise increases between DNL 60-65 dB because of the Proposed Action. Four hundred five people would experience a DNL 5 dB or greater increase between DNL 45 to 60 dB in 2019 because of the Proposed Action. The locations of these increases are depicted in Figure 27, Inset 2. Additional model grid points indicate that the noise change occurs over a region approximately 13 statute miles long, south of U.S. Highway (US) 90. Depicted in Figure 27 Inset 2, this location is 6-10 mi. south of Liberty, extending from FM 1409 in the southwest to FM 770 in the southeast. Most of the affected population centroids are slightly north of the intersection of FM 1409 and County Road (CR) 450.

Table 27 Change of Estimated Population Exposed to Aircraft Noise, 2019

DNL Noise Exposure Level under Proposed Action	Increase in DNL with Proposed Action	Population Exposed to Threshold Increase
DNL 65 dB and higher	DNL 1.5 dB or greater	None
DNL 60 dB to 65 dB	DNL 3.0 dB or greater	None
DNL 45 dB to 60 dB	DNL 5.0 dB or greater	405
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.		

In areas exposed to aircraft noise of DNL 65 dB and higher, the changes in noise exposure at census block centroids resulting from implementation of the Proposed Action are DNL 0.4 dB or less. In areas exposed to aircraft noise from DNL 60 dB to 65 dB, the changes at census block centroids resulting from implementation of the Proposed Action range from a decrease of DNL 0.8 dB to an increase of DNL 0.8 dB. In areas exposed to aircraft noise from DNL 45 dB to 60 dB, changes in noise exposure at census block centroids range from a decrease of DNL 1.7 dB to an increase of DNL 8.7 dB.

For 2019, 58 people (represented by one population centroid) would be newly exposed to DNL 65 dB or greater because of the Proposed Action. This point is located just southwest of the Robert C. Stuart Park to the northwest of HOU. However, these noise increases would be well below DNL 1.5 dB and therefore would not be significant. The maximum increase in DNL attributable to the Proposed Action at this location would be only 0.2 dB. Such changes are extremely small and unlikely be noticed. Two centroids just to the west, representing 95 people, would be exposed to DNL 65 dB or greater under the No Action Alternative and would reduce to less than DNL 65 dB in the Proposed Action. A separate area to the southwest of HOU would be newly exposed to DNL 65 dB or greater, although aerial photography indicates this area is commercial, industrial, or vacant (see Figure 4). The three previously described locations are all depicted in Figure 27, Inset 3. Figure 27, Inset 1 depicts locations around IAH that would move above or below DNL 65 dB. Two population centroids would move below DNL 65 dB as a result of the Proposed Action – one to the west of the airport and east of Rt. 548, representing 83 people, and the second to the east of the airport and approximately three-quarters of a mile west of Rt. 59, representing 703 people. Aerial photography indicates that the other locations in Figure 27, Inset 1 with noise changes are commercial, industrial, or vacant (see Figure 3). Moreover, none of these locations would experience a noise increase of DNL 1.5 dB or more.

5.3 Compatible Land Use

This section presents a summary of the potential impacts to compatible land use under the Proposed Action, as compared to the No Action Alternative.

5.3.1 Overview of Impacts

The Proposed Action would not directly affect land use within the PSA in 2014 or 2019, and would not result in aircraft noise exposure exceeding the FAA's significance threshold for noise impacts in 2014 or 2019. Therefore, no significant impacts to compatible land use are expected.

5.3.2 Methodology

FAA Order 1050.1E 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

impacts…. If the noise analysis … concludes that there is no significant impact, a similar conclusion usually may be drawn with respect to compatible land use."[155]

As stated previously, neither the Proposed Action nor the No Action Alternative would involve land acquisition, construction, or other ground disturbance activities. Thus, the compatible land use analysis for this EA relies on the changes in aircraft noise exposure between the Proposed Action and the No Action Alternative (see Section 5.2) as the basis for determining compatible land use impacts within the PSA.

5.3.3 Potential Impacts

No land acquisition, construction, or other ground disturbance activities would occur under the Proposed Action or the No Action Alternative; therefore, neither alternative would directly affect land uses within the PSA in 2014 and 2019.

As stated in Section 5.2 , the Proposed Action, when compared with the No Action Alternative, would not result in changes in aircraft noise exposure that would exceed the FAA's significance threshold in 2014 or 2019. As noted in Section 5.2 , some population centroids would be added to the area exposed to DNL 65 dB and higher (these centroids are identified in Figures 24 and 27) but none would experience a significant noise increase (i.e., DNL 1.5 dB or greater). Therefore, the Proposed Action would not cause significant compatible land use impacts.

Under the No Action Alternative, there would be no changes to air traffic routing in the PSA, so changes in aircraft noise exposure would not occur in either 2014 or 2019. Therefore, the No Action Alternative would not cause significant compatible land use impacts.

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

This section presents a summary of the analysis of impacts on Section 4(f) resources under the Proposed Action and No Action Alternative. Section 4.2.3 provides information on potential Section 4(f) resources within the PSA and SSA, as depicted in Figure 18.

5.4.1 Overview of Impacts

The Proposed Action would not result in the use of any potential Section 4(f) property. No potential Section 4(f) properties would experience a DNL increase of 1.5 dB or more that would result in a noise exposure level at or above DNL 65 dB. Nor would the Proposed Action cause any reportable increases in noise exposure to potential Section 4(f) resources below DNL 65 dB. Therefore, the Proposed Action would not cause substantial impairment to any of these resources.

[155] FAA Order 1050.1E, Chg. 1, App. A, sec. 4, p. A-13.

5.4.2 Methodology

As noted in Section 4.2.3.1, the FAA evaluates potential effects on Section 4(f) resources in terms of both physical taking and constructive use. A physical taking would occur as a result of land acquisition, construction, or other ground disturbance activities on all or a portion of the potential Section 4(f) property. No such land acquisition, construction, or other ground disturbance activities would occur under either the Proposed Action or the No Action Alternative. Therefore, neither alternative would have the potential to cause a physical taking of any Section 4(f) resources. For this reason, the focus of the evaluation of potential Section 4(f) resources is on effects with a potential to cause a constructive use to occur. A constructive use would occur when impacts would substantially impair the Section 4(f) resources. Substantial impairment occurs only when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. With respect to aircraft noise, for example, to cause a constructive use the noise would have to be at levels high enough to have negative consequences of a substantial nature that would amount to a taking of the Section 4(f) resource for transportation purposes. Generally, constructive use associated with air traffic actions would only occur as the result of noise impacts or visual intrusion.

Section 4.2.3 identifies properties within the PSA for which conditions indicate that the property may constitute a resource protected by the provisions of DOT Act, Section 4(f). The FAA evaluated the potential Section 4(f) resources to determine if a constructive use would occur from implementation of the Proposed Action.

If recreation lands aided by the Department of Interior's Land and Water Conservation Fund (known as "Section 6(f) resources") are "used" by a transportation project, replacement satisfactory to the Secretary of the Interior is required. This analysis considers these resources as a part of the Section 4(f) impact analysis process. (See Appendix H for a listing of Section 6(f) resources.)

Within the PSA and SSA, the FAA calculated noise exposure levels for grid points with a uniform spacing of 3,000 ft. and 6,000 ft., respectively. As a result, this spacing generally places grid points throughout the larger Section 4(f) properties for which changes to predicted noise exposure are calculated. For those Section 4(f) properties that were not covered by the uniform grid interval (i.e., smaller parks, historic sites, and monuments), noise exposure was calculated as a single point located in the center of the property.

If the analysis showed that a potential Section 4(f) property would experience a significant noise increase (i.e., DNL increase of 1.5 dB or more at or above DNL 65 dB) or a reportable noise increase (i.e., DNL increase of 3 dB or more between DNL 60 dB and 65 dB or DNL increase of 5 dB or more between DNL 45 dB and 60 dB), the FAA further evaluated the potential Section 4(f) resource to determine whether the effects from implementation of the Proposed Action would rise to a level of being a constructive use.

To evaluate the potential for constructive use resulting from visual effects of changes in aircraft flight tracks under the Proposed Action, the FAA examined the general altitudes at which aircraft route changes would occur beyond the immediate environs of the Houston OAPM Airports to determine the potential for light emissions and other visual impacts. Section 5.10 provides further discussion of Light Emissions and Visual Impacts.

5.4.3 Potential Impacts

The FAA conducted noise modeling for the potential Section 4(f) resources discussed in Section 4.2.3. The modeling showed that the Proposed Action would not result in a significant noise increase (i.e., a DNL increase of 1.5 dB or more at or above DNL 65 dB) at any potential Section 4(f) resource. In addition, there are no potential Section 4(f) resources that would experience reportable noise increases (i.e., a DNL increase of 5 dB or more DNL 45 dB and 60 dB, or a DNL increase of 3 dB or more between DNL 60 dB and 65 dB). Appendix H lists those potential Section 4(f) resources that the FAA modeled for noise analysis and provides a comparison of noise exposure between the No Action Alternative and Proposed Action grid points associated with potential Section 4(f) resources.

Of the 3,799 grid points associated with potential Section 4(f) resources, the FAA found no reportable increases in noise in 2014 or 2019. Selected potential Section 4(f) resources are identified in Figure 24 and Figure 27 for reference purposes, but again, do not have a reportable increase.

The No Action Alternative would not change air traffic routes in the Houston area and the FAA anticipates no effects related to changes in aircraft noise exposure or visual intrusion. Therefore, the No Action Alternative would not result in a use of potential Section 4(f) resources.

As described in Section 5.10 , the Proposed Action would not involve changes to ground-based light sources and the potential visual effects would be substantially the same as any aircraft overflight, i.e., visual sight of aircraft, contrails, or aircraft lights at night. These effects would not materially differ from those occurring under the No Action Alternative, and therefore would not result in a constructive use of potential Section 4(f) resources in 2014 or 2019.

5.5 Historical, Architectural, and Cultural Resources

This section presents a summary of the analysis of impacts to Tribal Lands and historical resources under the Proposed Action and the No Action Alternative. Section 4.2.4 provides information on Tribal Lands and historical resources within the PSA. The FAA, in accordance with Section 106 of the *National Historic Preservation Act of 1966* and implementing regulations *Code of Federal Regulations,* Title 36, Part 800, has initiated consultation with the appropriate State Historic Preservation Officer (SHPO).

5.5.1 Overview of Impacts

There are no historically, architecturally, or culturally significant properties that would experience a DNL change of 1.5 dB resulting in a noise exposure level greater than or equal to DNL 65 dB. The Proposed Action would not cause reportable increases in noise at any of the resources studied and therefore the Proposed Action would not have an "adverse effect" under *Code of Federal Regulations,* Title 36, sec. 800.5(a). The FAA is consulting with the Texas Historical Commission (THC) to obtain concurrence with this finding. The FAA sent an initial outreach letter outlining the Proposed Action to the THC in August 2012, and the FAA sent a copy of this EA to the THC for review and comment.

5.5.2 Methodology

The *National Historic Preservation Act of 1966* requires the FAA to consider the effects of its undertakings on properties listed or eligible for listing in the National Register of Historic Places (NRHP). The FAA defined an area of potential effect (APE) to assess the potential effects of the Proposed Action on historic properties. Federal regulations define the APE as the geographic area or areas within which an undertaking may cause alterations in the character or use of historic properties directly or indirectly, if any such properties exist. The scale and nature of an undertaking influence the APE and may be different for different kinds of effects caused by the undertaking.[156]

Section 4.2.4 describes the process used for identifying potential Historic, Architectural, and Cultural resources. The FAA identified historic districts and historic sites within the PSA and calculated predicted changes in noise exposure that would result from implementation of the Proposed Action.

As discussed in Section 5.10 , the FAA does not expect the Proposed Action to result in significant visual effects. Therefore, the FAA defined the APE based on potential noise effects on historic properties. The analysis calculated noise exposure levels at points within the PSA representing these properties. The FAA then defined the APE for historic properties as the specific areas encompassing the historic properties within the PSA that would be exposed to DNL 45 dB and higher under the Proposed Action (in either 2014 or 2019).The analysis of historic properties considered whether such properties would experience a significant noise increase (i.e., DNL increase of 1.5 dB or more at or above DNL 65 dB) or a reportable noise increase (i.e., DNL increase of 3 dB or more between DNL 60 dB and 65 dB or DNL increase of 5 dB or more between DNL 45 dB and 60 dB). If a reportable noise increase were to occur, the FAA would consider further whether that increase would result in an adverse effect on historic properties.

The analysis of potential noise impacts to Tribal Lands were considered within both the PSA and the SSA. The assessment of noise effects on tribal resources considered the same changes in noise exposure levels considered for historic properties when comparing the Proposed Action and No Action Alternative.

[156] *Code of Federal Regulations,* Title 36, sec. 800.16(d).

5.5.3 Potential Impacts

Neither the Proposed Action nor the No Action Alternative would include any ground disturbance, construction, or land acquisition; therefore, neither would physically destroy nor alter any historic, architectural, or cultural resources, including any on Tribal Lands.

The FAA assessed noise levels at historic properties in the APE to determine if the Proposed Action would result in any noise increases that would diminish the integrity of a property's setting for those properties for which setting contributes to historical significance. Of the 363 historic and cultural properties analyzed, 51 would be exposed to DNL 45 dB or higher under the Proposed Action in either 2014 or 2019 and are considered in the APE. The analysis indicates that none would be exposed to Proposed Action noise levels of greater than DNL 52 dB. All but two sites identified in the APE would have a change (increase or decrease) in noise exposure of DNL 1 dB or less. The two sites with the greatest predicted change in noise exposure are the San Jacinto Battlefield and the U.S.S. Texas.[157] These two sites are located next to each other; in addition they both are potential Section 4(f) properties and are depicted and labeled on Figure 18. The increase in noise exposure under the Proposed Action compared to the No Action is in the range of DNL 4.2 dB and DNL 4 dB for both sites and both forecast years. The highest Proposed Action noise level at either site for either forecast year is DNL 47.1 dB. These changes are below the reportable levels identified in Section 5.5.2.

The noise levels at the Alabama-Coushatta Tribe of Texas Reservation for both the No Action and the Proposed Action, and both forecast years, are below DNL 40 dB. Noise level changes associated with the Proposed Action at these locations are less than DNL 1 dB.

The FAA found no noise increases that would diminish the integrity of a property's setting for those properties for which setting contributes to historical significance. Therefore, no adverse effect arising from aircraft noise exposure on historic properties would result from implementation of the Proposed Action.

Appendix I provides the predicted noise exposure information for both the Proposed Action and the No Action Alternative for the Alabama-Coushatta Tribe of Texas Reservation and all historic resources identified in the PSA.

As described in Section 5.10 , the Proposed Action would not involve changes to ground-based light sources. Therefore, it would not have an adverse effect on a historical, architectural, or cultural resource through introduction of a visual feature to the area that would diminish the integrity of the setting for those properties where setting contributes to the property's historic, architectural, or cultural significance. The

[157] The San Jacinto Battlefield is listed as a Historic District. The names listed here are as they appear in the National Register of Historic Places and as they are listed by the Texas Historic Commission. These sites are also known as San Jacinto Battlefield State Historic Site and Battleship Texas (BB-35), respectively.

FAA initiated consultation with the THC in August 2012. With the publication of this EA, the FAA is seeking concurrence from that agency with this finding.

Under the No Action Alternative, air traffic routes in the Houston area would not change. Therefore, there would be no effects related to changes in aircraft noise exposure or visual effects.

5.6 Air Quality

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

5.6.1 Overview of Impacts

Implementation of the Proposed Action would result in slightly more fuel burned compared to the No Action. However, the Proposed Action is presumed to conform with the State Implementation Plna (SIP). Accordingly, implementation would not cause or contribute to a new violation of the National Ambient Air Quality Standards (NAAQS). Therefore, implementation would not have a significant impact on air quality and a conformity determination is not required.

5.6.2 Methodology

Under FAA Order 1050.1E, significant air quality impacts would occur if an action would exceed one or more of the NAAQS for any of the time periods analyzed.[158] Section 176(c) of the Clean Air Act (CAA) requires that Federal actions conform to the appropriate State Implementation Plan (SIP) in order to attain the CAA's air quality goals. Section 176(c) states: "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an implementation plan." A conformity determination is not required if the emissions caused by a Federal action would be less than *de minimis* levels established in regulations issued by EPA.[159]

FAA Order 1050.1E provides that further analysis for NEPA purposes is normally not required where emissions do not exceed EPA's *de minimis* thresholds.[160] The EPA regulations identify certain actions that would not exceed these thresholds, including ATC activities and adopting approach, departure, and en route procedures for aircraft operations above the mixing height specified in the applicable SIP (or 3,000 ft. AGL in places without an established mixing height).[161] In addition, the EPA regulations allow Federal agencies to identify specific actions as "presumed to conform" (PTC) to the applicable SIP.[162] 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 are

[158] FAA Order 1050.1E, Chg.1, App. A, sec. 2.3.
[159] *Code of Federal Regulations*, Title 40, sec. 93.153(b).
[160] FAA Order 1050.1E, Chg. 1, App. A, sec. 2.1c.
[161] *Code of Federal Regulations*, Title 40, sec. 93.153(c)(2)(xxii).
[162] Ibid., sec. 93.153(f).

therefore presumed to conform, including ATC activities and adopting approach, departure, and en route procedures for air operations.[163] The FAA's presumed to conform notice explains that aircraft emissions above the mixing height do not have an effect on pollution concentrations at ground level.[164] The notice also specifically notes 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."[165]

As described in Section5.7 , the FAA analyzed the fuel burn resulting from the Proposed Action and the No Action Alternative.

5.6.3 Potential Impacts

Implementing the Proposed Action would result in a slight increase in fuel burn (e.g., 0.21 percent increase for 2014 and 0.28, percent increase for 2019) in an area with a 95 NM radius from the study center, as compared to the No Action Alternative. Increased fuel burn corresponds with an increase in air emissions. However, the Proposed Action would not affect any procedures below 1,500 ft. AGL that would cause an increase in fuel or emissions compared to the No Action Alternative. Any operational changes that could result in an increase in fuel burn would occur above 1,500 ft. AGL, with the majority of procedural changes expected to occur above 3,000 ft. AGL.

The Proposed Action would result in slightly more fuel burn and air emissions above 1,500 ft. AGL, as compared to the No Action Alternative. NIRS modeling of the alternatives for each design year substantiated this finding, showing a slight increase in fuel consumption and emissions compared to the No Action Alternative (see Section 5.7.3). There are no procedure changes associated with the Proposed Action that are expected to occur below 1,500 ft. AGL that would cause an increase in emissions, as compared to the No Action Alternative. Therefore, no further air quality analysis is necessary and a conformity determination is not required.

The Proposed Action would not affect ground vehicles. Therefore, no increase in ground vehicle use or emissions is expected.

Based on the above analysis, no further air quality analysis is necessary, a conformity determination is not required, and the Proposed Action would not have a significant impact on air quality.

Under the No Action Alternative, the FAA would not implement the Proposed Action. Therefore, no significant changes to the affected environment for air quality, previously described in Section 4.2.5 would occur from an FAA action.

[163] U.S. National Archives and Records Administration, "Federal Presumed to Conform Actions Under General Conformity," *Federal Register* 72, no. 145 (July 20, 2007): 41565-41580.
[164] Id. at 41578.

[165] Id.

5.7 Natural Resources and Energy Supply

This section addresses the potential impacts of the Proposed Action with respect to natural resources and energy supply as compared with the No Action Alternative.

5.7.1 Overview of Impacts

The Proposed Action would result in relatively small increases (0.21 percent in 2014 and 0.28 percent in 2019) in aircraft fuel burned. These increases would not be expected to adversely affect local supplies of energy compared to the No Action Alternative. Therefore, the effects of the Proposed Action on natural resources and energy supply would not be significant.

5.7.2 Methodology

The FAA's NIRS model calculates aircraft-related fuel burn as an output along with calculating aircraft noise exposure. The inputs to NIRS to estimate aircraft-related fuel burn are the same as those used in the noise analysis, such as the average annual day flight schedules, flight tracks, and runway use. Refer to Sections 4.2.1, 5.2 , and Appendix G for discussions of noise exposure calculation methodology, inputs, and assumptions, which are also applicable to the fuel burn calculation methodology. This analysis uses changes in fuel burn as an indicator of changes in fuel consumption resulting from implementation of the Proposed Action compared with the No Action Alternative.

According to FAA Order 1050.1E: "For most actions, changes in energy demands or other natural resource consumption will not result in significant impacts. If an EA identifies problems such as demands exceeding supplies, additional analysis may be required in an EIS. Otherwise, it may be assumed that impacts are not significant."[168]

5.7.3 Potential Impacts

Table 28 presents the results of the fuel burn analysis for the Proposed Action and No Action Alternative. As shown in Table 28, compared with the No Action Alternative, the Proposed Action would result in 1,183 MT (0.21 percent) more fuel burned in 2014 and 2,013 MT (0.28 percent) more fuel burned in 2019. Given these relatively small increases, the FAA expects that the Proposed Action would not adversely affect local fuel supplies when compared with the No Action Alternative. Therefore, the effects of the Proposed Action on natural resources and energy supply would not be significant.

[168] FAA Order 1050.1E, Chg. 1, App. A, sec. 13.2b.

Table 28 Comparison of Energy Consumption, 2014 and 2019

	2014		2019	
	No Action Alternative	Proposed Action	No Action Alternative	Proposed Action
Fuel Burn (MT)	561,065	562,248	722,228	724,241
Volume Change (MT)	0	1,183	0	2,013
Percent Change (Proposed Action minus No Action / Divided by No Action) (MT)	0.00%	0.21%	0.00%	0.28%
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.				

5.8 Climate

This section presents a summary discussion of greenhouse gas (GHG) emissions and Climate, as they relate to the Proposed Action and the No Action Alternative.

5.8.1 Overview of Impacts

Although fuel burn would increase slightly with the Proposed Action compared to the No Action Alternative (see Section 5.7), no significant project-related effects on climate are expected.

5.8.2 Methodology

In accordance with FAA guidance,[169] estimated CO_2 emissions were calculated from the amount of fuel burned under the No Action Alternative and the increased fuel burn projected for the Proposed Action in 2014 and 2019 (see Section 5.7). The resulting increases in CO_2 emissions were then calculated as a percentage of national and global CO_2e totals from all GHG sources.

5.8.3 Potential Impacts

Table 29 shows the project-related CO_2e emissions.[170] CO_2 emissions under the Proposed Action would be 3,732 MT of CO_2e, or less than one-third of a percent more than the No Action Alternative in 2014 and 6,352 MT of CO_2e, or less than one-third of a percent, more in 2019. These increases would comprise less than 0.000129 (1.29^{E-04}) percent and 0.000219 (2.19^{E-04}) percent, respectively for 2014 and 2019, of U.S.-based GHG emissions[171] and less than 0.00000762 (7.62^{E-06}) percent and 0.0000130 (1.30 $^{E-}$

[169] FAA Order 1050.1E, Chg. 1, Guidance Memo #3.
[170] As discussed in Section 4.2.7.1 CO_2 emissions are equivalent to CO_2e emissions for this analysis.
[171] The EPA reports national CO_2e emission totals of 3.2 billion tons CO_2e for 2010. EPA, "Greenhouse Gas Reporting Program (GHGRP) 2010: Reported Data": http://www.epa.gov/ghgreporting/ghgdata/reported/index.html

^{05}) percent of global GHG emissions.[172] Therefore, the FAA does not expect the Proposed Action to have a significant effect on climate.

Table 29 Comparison of CO_2e Emissions, 2014 and 2019

	2014		2019	
	No Action Alternative	Proposed Action	No Action Alternative	Proposed Action
CO_2 Emissions (MT of CO_2e)	1,770,160	1,773,892	2,278,630	2,284,982
Proposed Action minus No Action (MT of CO_2e)	--	3,732	--	6,352
Percentage Change	--	0.21%	--	0.28%
Source: Harris Miller Miller & Hanson Inc., December 2012. Prepared by: Harris Miller Miller & Hanson Inc., December 2012.				

5.9 Fish, Wildlife, and Plants

This section presents a summary of the analysis of potential avian and bat species impacts under the Proposed Action and the No Action Alternative.

5.9.1 Overview of Impacts

The Proposed Action would not affect fish, plants, terrestrial wildlife, or their habitats because the Proposed Action does not involve land disturbing activities. The Proposed Action would not be expected to result in increased wildlife strikes when compared with the No Action Alternative because the proposed changes would cover a similar geographic area and duration as existing conditions and would occur primarily above 2,500 ft. AGL, where the FAA's Wildlife Strike Database has reported only a small proportion of strikes. Furthermore, the Houston OAPM Airports has reported only three strikes of threatened and endangered species in over 20 years and, as proposed changes are similar to existing conditions, the Proposed Action would not appreciably increase the risk of impact on threatened and endangered species. Therefore, the Proposed Action is not likely to adversely affect listed species or critical habitat. The FAA initiated informal consultation with the U.S. Fish and Wildlife Service (FWS) in August 2012 and is seeking concurrence with the FAA's finding.

5.9.2 Methodology

The FAA's Wildlife Strike Database is the best information available for assessing potential impacts of aircraft on wildlife. Strike reports over the past 22 years aggregated nationally as well as for individual airports are available from the database to understand existing conditions. Strike reports are comparable to known information on the presence of specific species of concern to corroborate the reports.

[172] The Intergovernmental Panel on Climate Change (IPCC) estimates global GHGs in 2004 at 49 Gigatonnes CO_2e, with CO_2 being the single largest source. IPCC, Working Group III, "Summary for Policymakers," 9th Session, Bangkok, Thailand, April 30 – May 4, 2007.

This analysis involved a review of arrival and departure flight tracks for the Houston OAPM Airports for the Proposed Action and No Action Alternative. Additionally, the altitude of flight tracks above and below 2,500 ft. AGL were reviewed, because research has documented that 88 percent of all wildlife strikes nationwide occur below 2,500 ft. AGL.[173] The FAA compared modifications in flight procedures to the occurrence of species and populations of concern to assess if existing wildlife strike reports might change under the Proposed Action.

5.9.3 Potential Impacts

The Proposed Action would not involve acquisition, construction, or other land disturbing activities. Therefore, impacts to fish, plants, terrestrial wildlife, or their habitats would not occur. The FAA considered the potential impacts of the Proposed Action relative to existing wildlife strikes and changes in strikes based on modified flight procedures.

Wildlife Strikes

Since 1990, the FAA has compiled reports of wildlife strikes with aircraft. The information is available to the public through the National Wildlife Strikes Database[174] and through analysis prepared in an annual report.[175] The Wildlife Strike Database reported 119,917 wildlife strikes nationally over a 22-year period between 1990 and 2011. Birds represent 97.1 percent of all strikes. Of those, 88 percent of strikes affecting commercial civil aircraft have occurred below 2,500 ft. AGL and 92 percent occurred below 3,500 ft. AGL. The Wildlife Strike Database reports that gulls have the highest occurrence of strikes (16%), followed by doves/pigeons (15%).

The Wildlife Strike Database enables research and information collection for strikes, reportable by airport, including species struck, height of strike, and type and extent of aircraft damage, although not all reports provide complete information. The Wildlife Strike Database reports 1,947 strikes at Houston OAPM Airports. One of the limitations of the data is that not all reports provide the full complement of available information. For example, 68 percent of the recorded bird strikes for the Houston OAPM Airports from 1990 through June 2012 did not identify the affected species. However, there are 623 reports at the Houston OAPM Airports that include species identification and are available for analysis. Table 30 provides information on wildlife strikes reported by the Houston OAPM Airports for data available from 1990 through June 30, 2012.[176]

[173] FAA, "FAA Wildlife Strike Database": http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx (accessed June 22, 2012).
[174] Ibid.
[175] FAA, "Wildlife Strikes to Civil Aircraft in the United States 1990-2011," *Federal Aviation Administration National Wildlife Strike Database Serial Report, no. 18*, July 2012.
[176] FAA, "FAA Wildlife Strike Database": http://wildlife-mitigation.tc.faa.gov/wildlife/database.aspx. (At the time data of download for this EA, the database included 136,648 Strike Reports from 1/1/1990 through 6/30/2012.)

Table 30 FAA Wildlife Strike Database Summary Records for Houston OAPM Airports (1990 – June 2012)

Airport[1]	Strikes[2]	Species[3] (common name)	Height (ft. AGL)
George Bush Intercontinental/Houston (IAH)	824	Bald Eagle, Swallows, Blackbirds, Geese, Cattle Egret, Snowy Egret, Cedar Waxwing, Nighthawks, Doves, Meadowlark, Starling, Finches, Grackles, Gulls, Killdeer, Sparrows, Purple Martin, Red-tailed Hawk, Upland Sandpiper, Flycatchers	0-15,500
William P. Hobby (HOU)	951	Least Tern, Crows, Kestrel, Plover, Redstart, Robin, Barn Owl, Burrowing Owl, Swallows, Blackbirds, Cattle Egret, Great Egret, Snowy Egret, Tri-colored Heron, Swifts, Nighthawks, Doves, Ducks, Starlings, Grackles, Catbirds, Gulls, Red-tailed Hawk, Swainson's Hawk, Killdeer, Tern, Shrike, Merlin, Mockingbird, Orioles, Sanderlings, Upland Sandpiper, Yellow-crowned Night Heron, Brazilian Free-tailed Bat, Fruit Bat, Vesper Bats	0-12,000
Houston Southwest (AXH)	2	Unknown bird – Medium	0 -2,000
Lone Star Executive (CXO)	3	Turkey Vulture, Unknown bird – small	0 -1,000
David Wayne Hooks Memorial (DWH)	24	Doves, Sparrows, Crows, Vulture	10-5,500
Ellington Field (EFD)	100	Kestrel, Anhinga, Barn Owl, Swallows, Cattle Egret, Flycatcher, Doves, Ducks, Gulls, Hawks, Horned Larks, Killdeer, Meadowlark, Nighthawk, Sparrow, Vulture, Yellow-crowned Night Heron, Bats	0-3,500
Scholes International (GLS)	14	Least Tern, Gulls (various), Brown Pelican, Rock Pigeon	0-10,000
West Houston (IWS)	1	Unknown bird – Medium	2,500
Texas Gulf Coast Regional (LBX)	2	Vulture	900-1,000
Pearland Regional (LVJ)	1	American Crow	500
Sugar Land Regional (SGR)	12	Doves, Sparrows, Yellow-crowned Night Heron	0-800
Houston Executive (TME)	13	Barn Swallow, Cliff Swallow, Eastern Meadowlark, Northern Yellow Bat, Savannah Sparrow, Scissor-tailed Flycatcher	n/a[4]
Weiser Air Park (EYQ)	0	no reported strikes	n/a
Baytown (HPY)	0	no reported strikes	n/a
Chambers County (T00)	0	no reported strikes	n/a
La Porte Municipal (T41)	0	no reported strikes	n/a
RWJ Airpark (54T)	0	no reported strikes	n/a

Notes:

1. Data used for IAH, HOU, AXH, CXO, DWH, EFD, GLS, IWS, LBX, LVJ, SGR, and TME. No strikes reported for EYQ, HPY, T00, T41, and 54T. This table presents strike data for all 17 airports affected by the Proposed Action.
2. Total number of strikes, even if species or altitude were unknown or not reported
3. Summary list of the most common avian and bat species found in the database
4. For TME, only one incident included altitude information. That strike occurred as the aircraft landed on the runway.

Source: http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx (accessed August 30, 2012; last reported incident June 29, 2012)

The altitude of the strike was included on 71 percent of all wildlife strike reports. Table 31 provides a summary of wildlife strikes by altitude for the Houston OAPM Airports for data available from 1990 through 2012 (as available in June). Eighty-one (81) percent of the strikes associated with Houston OAPM Airports occurred below 2,500 ft.

Table 31 FAA Wildlife Strike Database Records for Houston OAPM Airports by Altitude (1990 – June 2012)

Type of Strike[1]	2,500 AGL or less	>2,500 AGL to <= 10,000 AGL	Greater than 10,000 AGL	Total
Identified Bird	394	28	0	422
Bats	9	0	0	9
Unknown Bird (avian)	39	3	1	43
Unknown Bird (avian) – Large	21	9	2	32
Unknown Bird (avian) – Medium	247	115	10	372
Unknown Bird (avian) – Small	393	93	5	491
Identified Non Avian	18	0	0	18
Total[2]	1,121	248	18	1,387
Percent[3]	81%	18%	1%	100%

Notes:

1. Includes total number of strikes, even if species was unknown. Uses data for IAH, HOU, AXH, CXO, DWH, EFD, GLS, IWS, LBX, LVJ, SGR, and TME. No strikes reported for EYQ, HPY, T00, T41, and 54T. This table presents strike data for all 17 airports affected by the Proposed Action.
2. Five-hundred sixty (560) reported strikes did not include altitude information and are not included in this table.
3. Percentages may not add to 100% due to rounding.

Source: http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx (accessed August 30, 2012; last reported incident June 29, 2012)

As discussed above, 623 of the strikes from Houston OAPM Airports included species identification. The Migratory Bird Treaty Act protects all the bird species identified in these reports. The only species identified in the database that are listed for protection under Federal or state endangered species laws are the Bald Eagle (one report) and the Least Tern (two reports).

Impact Assessment

The number of aircraft operations between 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.

The changes to the arrival and departure corridors below 2,500 ft. AGL would not substantially alter flight paths. Therefore, the Proposed Action would not be expected to result in increased impacts to avian and bat wildlife, including listed species, compared with the No Action Alternative. Furthermore, for the majority of reported wildlife strikes at the Houston OAPM Airports, the FAA anticipates narrower arrival and departure corridors with implementation of the Proposed Action given the predictability associated with RNAV procedures. Based on the strikes of known species (623 reports), the Proposed Action is not likely to adversely affect avian and bat wildlife compared with the No Action Alternative.

The Proposed Action would not increase the number of aircraft operations in the Houston OAPM Airports compared with the No Action Alternative. Changes to air traffic flows would primarily occur above 2,500 ft. AGL. Thus, the FAA would not expect any adverse changes in impacts to avian and bat species under the Proposed Action as compared with the No Action Alternative because risk of avian and bat strikes occurs mainly below this altitude.

Changes to air traffic flows below 2,500 ft. AGL are unlikely to adversely affect avian and bat species (including listed species) as compared with the No Action Alternative because proposed changes are limited and similar to existing conditions.

The No Action Alternative would not involve changes to air traffic flows, land acquisition, construction, or other ground disturbance activities; therefore, no impacts to fish, wildlife, or plants would occur.

Therefore, the Proposed Action is not likely to adversely affect listed species or critical habitat. The FAA initiated informal consultation with the FWS in August 2012. The FAA sent a copy of this EA to the FWS for review and comment and to request concurrence with the FAA's finding.

5.10 Light Emissions and Visual Impacts

This section presents a summary of the analysis of light emissions and visual impacts under the Proposed Action and the No Action Alternative.

5.10.1 Overview of Impacts

Implementation of the Proposed Action would have no potential for impact from light emissions, as changing IFPs would not involve any land disturbing activities or construction of navigational facilities, airport improvements, or similar stationary objects. With respect to visual or aesthetic effects, the potential effects arising from changes to IFPs would be substantially the same as any aircraft overflight: visual sight of aircraft, contrails, or aircraft lights at night. These effects would not materially differ from those occurring under the No Action Alternative, and therefore would not be adverse.

5.10.2 Methodology

FAA Order 1050.1E treats light emissions separately from visual impacts. The former are the result of lighting on aviation facilities (e.g., airfields, terminal buildings, access roads, navigational facilities including those located away from an airport). In comparison, an assessment of visual (or aesthetic) impacts considers the extent that the Proposed Action (typically construction) would create a contrast with the existing visual or aesthetic setting and the extent to which such contrast would be objectionable.

According to FAA Order 1050.1E, "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."[177] Visual, or aesthetic, impacts are more difficult to define and evaluate than light emissions from facilities construction because the former are less readily measured and their effects on a visual landscape are inherently subjective. Visual or aesthetic impacts deal more broadly with the extent that the project contrasts with the existing environment and whether the community's jurisdictional agency considers this contrast objectionable. 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 aircraft routings and visual intrusion, the general altitudes at which aircraft route changes occur beyond the immediate airport environs, which experiences overflights on a routine basis, are considered to evaluate the potential for light emissions and visual impacts.

5.10.3 Potential Impacts

The Proposed Action and the No Action Alternative do not include development, construction, or demolition of facilities. Therefore, the Proposed Action would not disturb the aesthetic integrity of an area or result in a visual contrast with the existing environment because of land disturbing or construction activities. The Proposed Action and the No Action Alternative would not involve changes to ground-based light sources, thus they would not cause adverse effects from light emissions that would result in annoyance or interference with normal human activities.

Changes in aircraft routes associated with the Proposed Action would generally, but not always, occur at altitudes above 3,000 ft. AGL. Those changes occurring below 3,000 ft. AGL would be near airports where aircraft operations are commonplace. No aspect of the Proposed Action would alter the visual quality or nature of aircraft silhouettes, contrails, or lighting systems. Therefore, the FAA does not expect the visual sight of aircraft and aircraft lights from aircraft overflying above 3,000 ft. AGL to be intrusive. Effects from aircraft flying at lower altitudes would generally be similar to operations already occurring in the general vicinity of airports. Further, below 3,000 ft. AGL, no aspect of the Proposed Action would alter the setting generally found in the generally urbanized or suburban setting within which the existing airports are located. Consequently, the Proposed Action would not result in adverse visual impacts.

Air traffic routes under the No Action Alternative would not change, and therefore, would not result in changes in light emissions to people on the ground, so no adverse impacts relating to light emissions would occur.

5.11 Environmental Justice

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

[177] FAA Order 1050.1E, Chg. 1, App. A, sec. 12.2b.

5.11.1 Overview of Impacts

The Proposed Action would not result in disproportionately high and adverse human health or environmental effects on minority and low income populations, and there would be no environmental justice impacts.

5.11.2 Methodology

Under FAA Order 1050.1E, "When FAA determines that a project has significant effects pursuant to NEPA, the potential for disproportionately high and adverse effects pursuant to environmental justice must be analyzed."[178] The FAA examines environmental justice during evaluation of other impact categories, such as noise, air quality, water, hazardous materials, and cultural resources.

5.11.3 Potential Impacts

As explained elsewhere in this chapter and shown in Table 22, the FAA has determined that neither the Proposed Action nor the No Action Alternative would have a significant impact in any environmental impact category. Therefore, neither alternative would result in disproportionately high and adverse human health or environmental effects on minority and low income populations, and there would be no environmental justice impact.

5.12 Cumulative Impacts

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Proposed Action with other actions. CEQ regulations state:"'Cumulative impact' is the 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[179]

5.12.1 Overview 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.

5.12.2 Methodology

For the purpose of assessing cumulative effects, the incremental direct and indirect impacts associated with the Proposed Action were considered in conjunction with the direct and indirect effects of other past, present, or reasonably foreseeable future projects, to determine whether they would cause significant effects.

[178] FAA Order 1050.1E, Chg. 1, App. A, sec. 16.2a.
[179] *Code of Federal Regulations*, Council on Environmental Quality Regulations, Title 40, sec. 1508.7.

Reasonably, foreseeable future actions refer to those projects with implementation likely in the year 2013 or later. They would be actions that a proponent would likely complete and for which plans have been developed with enough specificity to provide meaningful information to a decision maker and the interested public.

In determining the significance of the cumulative effects, the same thresholds of significance used to identify impacts that apply individually to the Proposed Action would also apply. Environmental impact categories that are not affected by the Proposed Action (see Section 4.3) are not examined for cumulative impacts because there would be no potential for the Proposed Action to cumulatively affect those environmental impact categories. Similarly, where FAA analysis of the Proposed Action indicates a neutral effect, or lack of an adverse effect, on an environmental impact category (i.e. Fish, Wildlife and Plants; Light Emissions and Visual Impacts; Environmental Justice) compared to the No Action alternative, that impact category is also not examined for cumulative impacts

The FAA reviewed projects within the vicinity of the Houston OAPM Airports to evaluate the potential for cumulative impacts. Table 21 provides a summary of potential projects proposed on or near the Houston OAPM Airports (see Section 4.4).

This analysis considers potential cumulative impacts related to implementation of the Proposed Action in four categories: (1) Noise (including potential impacts on populations in the PSA, Tribal Lands, compatible land use, potential Section 4(f) resources, and historic properties); (2) Air Quality; (3) Natural Resources and Energy Supply; and (4) Climate. The FAA evaluated the projects identified in Table 32 to determine the potential for cumulative impacts in these categories.

5.12.3 Potential Impacts

For each of the relevant past, present, and reasonably foreseeable future projects identified by the FAA, Table 32 presents a summary of the potential for cumulative effects. Additional discussion of potential cumulative impacts, by environmental resource category, follows the table.

Table 32 Potential for Cumulative Impacts from the Proposed Action and Other Past, Present, and Reasonably Foreseeable Future Actions

Project	Description	Potential for Cumulative Effects
Projects at Houston OAPM Airports		
Houston Intercontinental (IAH)Terminal B Improvements	Phase one of this project – scheduled for completion in 2013 – will create a new Terminal B concourse dedicated to domestic regional jet operations. Plans for the entire three-phase redevelopment project are over seven to 10 years, based on demand.	Construction began in 2012 and is expected to be ongoing after phase one in 2013. Projected flight operations activity levels for the Houston OAPM Proposed Action and No Action were modeled using TAF data, which included best available information on future planned flight operations levels. There is no indication that this project would alter aircraft operation levels in the TAF. No significant cumulative impacts are expected with the Proposed Action.

Project	Description	Potential for Cumulative Effects
Revision to IAH SIAPs serving Runways 26L /26R / 27	Revised altitudes on approaches	Revised SIAPs published in February 2012. These changes occurred at altitudes above 1,500 ft AGL and are sufficiently far from the airport that noise levels are (and would be) below DNL 65 dB. No potential for significant cumulative impact with the Proposed Action.
Revision to IAH SIAPs serving Runways 8L/ 8R/9	Revised altitudes on Runway 9 approaches (no change for the 8L/8R approaches that would affect aircraft altitudes)	Revised SIAPs published in May 2012. These changes occurred at altitudes above 1,500 ft AGL and are sufficiently far from the airport that noise levels are (and would be) below DNL 65 dB.. No potential for significant cumulative impact with the Proposed Action.
Houston Hobby (HOU) Terminal Building and other Facilities Expansion for Planned International Operations	Construction of five additional gates for international flights and construction of a Federal Inspection Services facility at HOU	The Proposed Action and No Action were modeled using TAF data, with additional HOU operations in the 2019 forecast based on information available about this project. No significant cumulative impacts are expected with the Proposed Action.
IAH Potential New Cross-field Taxiway and Terminal Improvements	Houston Airport System (HAS) is taking steps to upgrade terminal D to accommodate Airbus A-380 and Boeing B748 aircraft between 2012 and 2018. HAS is also discussing a cross-field taxiway.	Projected flight operations activity levels for the Houston OAPM Proposed Action and No Action were modeled using TAF data, which included best available information on future planned flight operations levels. There is no indication that this project would alter aircraft operation levels in the TAF. No significant cumulative impacts are expected with the Proposed Action.
Runway Extension at Lonestar Executive Airport (CXO)	Texas Department of Transportation (TxDOT) is considering extending Runway 14/32. The project is currently in the planning phase.	TxDOT would undertake separate environmental analysis to characterize impacts arising from facilities construction. This airport has too few operations to warrant noise analysis for this EA, as discussed in Section 4.1.4. No significant cumulative impacts are expected with the Proposed Action.
Potential Improvements to Facilities at Ellington Field (EFD)	Various GA facility development plans are planned for EFD.	Projected flight operations activity levels for the Houston OAPM Proposed Action and No Action were modeled using TAF data, which included best available information on future planned flight operations levels. There is no indication that this project would alter aircraft operation levels in the TAF. No significant cumulative impacts are expected with the Proposed Action.
Regional Airspace Projects		
Gulf of Mexico Lateral Separation Reduction / RNAV Routes	Publication and implementation of new RNAV routes across the Gulf of Mexico	CATEX approved September 2012. Procedures to be charted and implemented in January 2013. No significant cumulative impacts are expected with the Proposed Action.
BAZBL STAR STROS STAR ROYOH STAR COACH STAR	Changes to HOU arrival procedures, west of the airport	Procedure changes were published effective May 2012. The changes occurred outside of noise levels of DNL 45 dB as presented in Figure 26. The Proposed Action would cancel these four procedures and aircraft would use

Project	Description	Potential for Cumulative Effects
		new procedures that are included in the Proposed Action. No significant cumulative impacts are expected with the Proposed Action.
North Texas OAPM	The North Texas OAPM project would optimize air traffic operations in the Dallas – Fort Worth area.	FAA is undertaking separate NEPA analysis to characterize impacts arising from implementation. Points of boundary interface where potential North Texas OAPM changes to IFPs abut or coincide with Houston OAPM IFP changes were included in modeling for noise and air quality impacts for the Houston OAPM. No significant cumulative impacts are expected with the Proposed Action.
Surface Transportation Projects		
US 290 Corridor	Proposal to Construct Roadway Improvements from Farm-to-Market (FM) 2920 to Interstate Highway 610 (IH-610), Harris County, TX	Separate NEPA analysis would be undertaken by TxDOT and the Federal Highway Administration FHWA) to characterize impacts arising from construction and roadway use activities. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (State Highway 99 [SH-99]) Segment B	Construction from SH-288 to IH-45, Brazoria and Galveston Counties, TX	Separate NEPA analysis would be undertaken by TxDOT and FHWA to characterize impacts arising from construction and roadway use activities. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (SH-99) Segment E	Improvement Project, IH-10 to US-290, Harris County, TX	Segment E Revised Record of Decision (ROD) was issued on June 9, 2009 by FHWA. The Segment E FEIS Re-evaluation was approved by FHWA on June 9, 2009. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (SH-99) Segment F-1	Highway Construction, US-290 to SH-249, Harris, Montgomery, Fort Bend, Liberty, Brazoria, Galveston and Chambers Counties, TX	The Second Segment F-1 FEIS Re-evaluation was approved by FHWA on May 22, 2012. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (SH-99) Segment F-2	From SH-249 to IH-45, a new four-lane, controlled access divided highway. This segment borders David Wayne Hooks Airport (DWH).	The Segment F-2 Final Environmental Impact Statement (FEIS) Re-evaluation was approved FHWA on May 22, 2012. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (SH-99) Segment G	From Interstate Highway IH-45 to U.S. Highway 59 (US-59), Harris and Montgomery Counties, TX	The Segment G FEIS Re-evaluation was approved by FHWA on May 22, 2012. No significant cumulative impacts are expected with the Proposed Action.
Grand Parkway (SH-99) Segments H and I-1	From US-59 (N) to Interstate Highway IH-10 (E), Transportation Improvement, Montgomery, Harris, Liberty and Chambers Counties, TX	TxDOT and FHWA would undertake separate NEPA analysis to characterize impacts arising from construction and roadway use activities. Public Hearings were held on August 9, 2011 and August 11, 2011 to inform the public and stakeholders of the proposed roadway improvements for Grand Parkway (SH-99) Segments H & I-1. No significant cumulative impacts are expected with the Proposed Action.

Project	Description	Potential for Cumulative Effects
Light Rail - North Corridor Fixed Guideway Project	Proposed Transit Improvements from University of Houston (UH)-Downtown Station to Northline Mall, Harris County, TX	Expected Completion in 2014. Separate NEPA analysis would be undertaken by TxDOT and FTA to characterize impacts arising from construction and operational activities. No significant cumulative impacts are expected with the Proposed Action.
Light Rail - Southwest Corridor Project	Proposed Fixed-Guideway Transit System, Houston, Harris County, TX	Public meetings concluded on June 12, 2012. TxDOT and FTA would undertake separate NEPA analysis to characterize impacts arising from construction and operational activities. No significant cumulative impacts are expected with the Proposed Action.

5.12.3.1 Potential for Cumulative Noise Impacts

Noise and noise-related impacts include changes in noise exposure for populations, Tribal Lands, compatible land use, potential Section 4(f) resources, and historic properties.

Implementation of the Proposed Action would not result in significant changes in noise exposure, as discussed in this chapter. Three of the categories of past, present, and reasonably foreseeable projects have the potential to contribute cumulatively to the noise impacts of the Proposed Action:

- **Projects at Houston OAPM Airports:** As discussed in Table 32, these projects would not be expected to have a significant cumulative noise impact.
- **Regional Airspace Projects:** Since the grid points having a value of DNL 65 dB or greater are concentrated in the vicinity of the study airports, the combination of the regional airspace actions with the Proposed Action would not be expected to have significant cumulative noise impacts. Project-specific analysis is presented in Table 32.
- **Surface Transportation Projects:** In general and when viewed in aggregate, the proposed surface transportation project corridor rights-of-way are typically at sufficient distances from airports such that the noise from the linear corridors and the noise in the vicinity of airports ordinarily would not overlap. Thus, no significant cumulative noise impacts are expected.
- The proposed US 290 corridor improvements are near David Wayne Hooks Memorial (DWH), one of the Analyzed Airports. The Proposed Action would not cause noise changes in the immediate vicinity of the airport. Therefore, when considered with the US 290 project, there is no potential for significant impact.

In summary, based on the review of past, present, and reasonably foreseeable projects, the FAA does not expect the Proposed Action to contribute to changes in noise exposure that would cumulatively result in significant impacts.

5.12.3.2 Potential for Cumulative Air Quality Impacts

As discussed in Sections 4.2.5.2 and 5.6.3, the Houston Metroplex spans a broad area. Within this area, much development has occurred, both in the vicinity of the OAPM airports, and away from the immediate environs of those airports as indicated by the geographical extent of the past, present, and reasonably foreseeable actions listed in Section 4.4. The application of federal and state air quality regulations along with significant technological improvements aimed at reducing impacts on air quality have acted to offset emission increases caused by regional population and development growth.

As discussed in Section 4.2.5.2 and presented in Table 17, the EPA has designated parts of the PSA as non-attainment areas for the 8-hour ozone NAAQS. As discussed in Section 5.6.1, Air Quality, the Proposed Action would not have a significant impact on air quality as compared to the No Action Alternative and is presumed to conform to the SIP; therefore, it would not have the potential to cause significant cumulative impacts. Moreover, given the cumulative nature of air quality, which examines effects from multiple emissions sources over extended geographical and temporal extents and which employs a regulatory scheme of inventorying permitted emissions and comparing those to NAAQS; it is anticipated that the cumulative impacts of all projects in the greater Houston metropolitan region, including the implementation of the Proposed Action would not result in any change to the attainment status for the various criteria air pollutants.

Based on the review of past, present, and reasonably foreseeable projects, the FAA does not expect the Proposed Action to contribute to changes in air quality that would cumulatively result in significant impacts.

5.12.3.3 Potential for Cumulative Impacts on Natural Resources and Energy Supply

As discussed in Section 5.7.3, implementation of the Proposed Action would not be expected to adversely affect local energy supplies. As noted in Section 4.3, with the exception of aviation fuel, implementation of the Proposed Action would not involve the use of local energy supplies or natural resources since there is no construction or land disturbing activities proposed. Past, present, and future actions in the Houston OAPM study area have consumed energy and would continue to consume energy and natural resources during their construction and operation.

In the vicinity of the OAPM airports, the aviation fuel distribution infrastructure is well developed and robust enough to support the proposed development projects (terminal building expansions, forecasted growth in aviation operations). As it relates to fuel distribution infrastructure capacity for aviation users, the Proposed Action is not expected to cumulatively affect local supplies of natural resources. The possibility of a significant cumulative impact is remote.

Although some of the other past, present, and reasonably foreseeable future actions would lead to increases in the amount of energy and resources consumed; none of these projects in combination with the Proposed Action is likely to cause increases in

fuel consumption that would exceed the capacity of the region to serve its energy needs. Although the Proposed Action would involve a small increase in fuel consumption, the change compared to the No Action is of such a small magnitude (0.28% increase) that its effect upon local energy supplies would not be measurable.

Therefore, based on the review of past, present, and reasonably foreseeable actions, the FAA does not expect the Proposed Action to have a significant cumulative impact on natural resources and energy supply. Action would not be expected to have significant cumulative noise impacts.

5.12.3.4 Potential for Cumulative Impacts on Climate

As discussed in Section 5.8.3, the slight increase in fuel burn caused by the Proposed Action would cause a corresponding increase in greenhouse gas (GHG) emissions. This increase would constitute an extremely small contribution to national and global GHG emissions (in 2019, less than 0.000219 percent of national GHG emissions and less than 0.0000130 percent of global GHG emissions).

The cumulative impact of this proposed action on the global climate when added to other past, present, and reasonably foreseeable future actions is not currently scientifically predictable. Aviation has been calculated to contribute approximately 3 percent of global carbon dioxide (CO_2) emissions; this contribution may grow to 5 percent by 2050. Actions are underway within the U.S. and by other nations to reduce aviation's contribution through such measures as new aircraft technologies to reduce emissions and improve fuel efficiency, renewable alternative fuels with lower carbon footprints, more efficient air traffic management, market-based measures and environmental regulations including an aircraft CO_2 standard. The U.S. has ambitious goals to achieve carbon-neutral growth for aviation by 2020 compared to a 2005 baseline, and to gain absolute reductions in GHG emissions by 2050. At present there are no calculations of the extent to which measures individually or cumulatively may affect aviation's CO_2 emissions. Moreover, there are large uncertainties regarding aviation's impact on climate. The FAA, with support from the U.S. Global Change Research Program and its participating federal agencies (e. g., NASA, NOAA, EPA, and DOE), has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions, with quantified uncertainties for current and projected aviation scenarios under changing atmospheric conditions.[180]

[180] Nathan Brown, et. al. The U.S. Strategy for Tackling Aviation Climate Impacts, (2010). 27th International Congress of the Aeronautical Sciences.