5 Environmental Consequences

This chapter discusses the potential environmental impacts that could result from implementing the Preferred Alternative and the No Action. Specifically, this EA considers effects on the environmental resource categories identified in FAA Order 1050.1F. Both the Preferred Alternative and the No Action were evaluated under forecasted 2019 conditions, which is the first year the Preferred Alternative could potentially be implemented, and under forecasted 2024 conditions. This evaluation considers the direct, indirect, and cumulative effects associated with the Preferred Alternative and No Action, as required under FAA Order 1050.1F.

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

Table 5-1 identifies the environmental impact categories that the Preferred Alternative could potentially affect, the thresholds of significance used to determine the potential for impacts, and a side-by-side comparative summary of the potential for environmental impacts resulting from implementing the Preferred Alternative under 2019 and 2024 forecast conditions.

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Impact? 2019	Impact? 2024
Noise and Noise Compatible Land Use	A significant noise impact would occur if the proposed action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65dB level due to a DNL 1.5dB or greater increase, when compared to the No Action for the same timeframe.	No	No
Air Quality	A significant impact would occur if the proposed action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.	No	No

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Impact? 2019	Impact? 2024
Wildlife (Avian Species)	A significant impact to federally-listed threatened and endangered species would occur when the United States Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) determines that the proposed action would be likely to jeopardize the continued existence of the species in question, or would result in the destruction or adverse modification of Federally-designated critical habitat. Lesser impacts including impacts on non-listed species could also constitute a significant impact based on consideration factors such as long-term or permanent loss of unlisted wildlife species and adverse impacts to special status species or their habitats. The FAA has not established a significance threshold for non-listed species.	No	No
Climate	The FAA has not established a significance threshold for Climate and has not identified specific factors to consider in making a significance determination.	No	No
Department of Transportation Act, Section 4(f) Resources	A significant impact would occur if the proposed action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately owned land from an historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. Substantial impairment occurs when the activities, features, or attributes of the Section 4(f) resource that contribute to its significance or enjoyment are substantially diminished.	No	No
Historic Properties and Cultural Resources	The FAA has not established a significance threshold for Historical and Cultural Resources.	No	No
Energy Supply (Aircraft Fuel)	The FAA has not established a significance threshold for Energy Supply. However, a significant factor to consider is if the action would have the potential to cause demand to exceed available or future (project year) supplies of these resources.	No	No

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Impact? 2019	Impact? 2024
Environmental Justice	The FAA has not established a significance threshold for Environmental Justice. However, significant factor to consider to determine potential significant impact is if the action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population due to significant impacts in other environmental impact categories, and/or causes impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population	No	No
Visual Effects	The FAA has not established a significance threshold for Visual Resources / Visual Character. Significant factors to consider include potential affect an action has on the nature of the visual character of the area, potential to contrast with the visual resources and/or visual character in the study area, and/or potential to block or obstruct the views of visual resources	No	No

Source: FAA Order 1050.1F, Exhibit 4-1, July 2015.
Prepared By: ATAC Corporation, April 2019.

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

5.1 Noise and Compatible Land Use

This section discusses the analysis of aircraft noise exposure under the Preferred Alternative and the No Action, under both 2019 and 2024 forecast conditions. This discussion includes identifying the differences in noise exposure between the Preferred Alternative and the No Action. This comparison is used to determine if implementing the Preferred Alternative would result in significant noise impacts. Additional information on noise metrics and the basics of noise can be found in **Appendix E**. Detailed information on the noise analysis prepared for the DEN Metroplex Project is included in Appendix I: *Denver Metroplex Aircraft Noise Technical Report*.

5.1.1 Summary of Impacts

Aircraft noise exposure was modeled for both the Preferred Alternative and the No Action under 2019 and 2024 forecast conditions. The noise analysis demonstrates that implementing the Preferred Alternative would not result in a day-night average sound level (DNL) increase of 1.5 dBA or higher in noise- sensitive areas exposed to DNL 65 dB or higher. Therefore, neither the Preferred Alternative nor No Action would result in a significant noise impact.

5.1.2 Methodology

The noise analysis evaluated noise exposure to communities within the General Study Area from aircraft forecasted to be operating under Instrument Flight Rules (IFR) -filed flight plans, at altitudes between ground level up to 10,000 feet above ground level (AGL). IFR-filed aircraft activity was forecasted for the years 2019 and 2024 and used to model conditions under both the Preferred Alternative and the No Action. Noise modeling was conducted using Aviation Environmental Design Tool (AEDT) 2d, the FAA-required noise model for aviation projects, including air traffic changes over large areas and altitudes over 3,000 feet AGL.[60]

If the FAA approves the Preferred Alternative, the agency expects to begin implementation in 2019. Therefore, aircraft noise modeling was conducted for 2019 and five years later (2024), as required by FAA Order 1050.1F. Future year noise exposure levels modeled for the Preferred Alternative and the No Action were compared to determine whether there is a potential for noise impacts. While the overall number and type of aircraft operations will increase between 2019 and 2024, the number and type of aircraft operations are the same under both the Preferred Alternative and No Action in 2019 and 2024. The Preferred Alternative does not include developing or constructing facilities, such as runways or terminal expansions, that would be necessary to accommodate an increase in aviation activity; therefore, no additional growth in operations associated with the Preferred Alternative is anticipated. The noise analysis reflects the change in noise exposure resulting from the proposed changes in aircraft routes (i.e., flight tracks) under the Preferred Alternative compared to the No Action.

Detailed information on IFR-filed aircraft operations within the General Study Area was assembled for input into AEDT, including the following data:

Average Annual Day IFR-Filed Aircraft Flight Schedules: The IFR-filed aircraft flight schedules identify arrival and departure times, aircraft types, and origin/destination information for an average annual day (AAD) in 2019 and in 2024. The AAD represents all the aircraft operations for every day in a study year divided by 365, the number of days in a year. The AAD does not reflect a particular day, but is meant to represent a typical day over a period of a year. The forecast was based on the FAA's 2016 Terminal Area Forecast (TAF),[61] modified for 2019 and 2024 with additional details using previously identified arrival/departure times, aircraft types, and origin/destination information. More detail related to the development of the forecasts is provided in Appendix H: *Denver Metroplex Flight Schedules Technical Report*.

Weather: The AEDT model includes data for multiple meteorological parameters, including temperature, pressure, and humidity. Weather conditions for all Study Airports were defined and used in the noise study. Further discussion on the weather data employed in the AEDT model can be found in Appendix I: *Denver Metroplex Aircraft Noise Technical Report*.

Flight Tracks: The flight tracks used in noise modeling were based on radar data collected for the Existing Conditions (2017) noise analysis and information provided by FAA Air Traffic Control (ATC) personnel. Aircraft routings under both the No Action and Preferred Alternative are depicted on **Exhibit 3-7** through **Exhibit 3-12** in Chapter 3, *Alternatives*. For the Preferred

[60] FAA Order 1050.1F Desk Reference, *Noise and Noise-Compatible Land Use*, Sec. 11.1.3, July 2015.

[61] U.S. Department of Transportation, Federal Aviation Administration, Terminal Area Forecast, 2012 (https://aspm.faa.gov/main/taf.asp; accessed September 2015).

Alternative, flight tracks were developed from the aircraft ATC procedures created by the DEN Metroplex Design & Implementation (D&I) Team using the Terminal Area Route Generation, Evaluation, Traffic and Simulation (TARGETS) program. The majority of the No Action modeled flight tracks are based on the Existing Conditions noise analysis. The remaining No Action flight tracks for amended or new ATC procedures were modeled based on input from the air traffic control experts who developed the ATC procedures. Illustrations depicting Existing Conditions radar tracks and Preferred Alternative ATC procedure designs were developed and shared with the D&I team as part of the consultation process. The consultations were conducted to seek out key model input assumptions such as frequency of Preferred Alternative ATC procedure usage and air traffic control techniques, such as vectoring. The assumptions were then used for refining model track locations, altitude profiles, and utilization.

TARGETS flyability lines, or the lines indicating the actual 3D path of different categories of aircraft ideally flying the ATC procedure for the Preferred Alternative ATC procedures served as the center of the 1 nautical mile and 0.3 nautical mile containment area for RNAVs and RNPs, respectively. The containment area is generally where dispersed tracks are contained, but during the D&I consultation process, air traffic control experts could indicate the need for vectors off of the RNAV with a rejoin of the RNAV at a later point. For those identified cases NIRS model tracks were developed to account for that type of dispersion.

Runway Use: Runway use percentages were identified for all runways at the Study Airports. Forecasted aircraft operations were assigned to particular runways representing operating conditions at the Study Airports under Preferred Alternative and No Action conditions. Runway use patterns did not change under the Preferred Alternative at the Study Airports compared to the No Action.

More detail related to the development of the NIRS model input files is provided in Appendix I: *Denver Metroplex Aircraft Noise Technical Report*.

As discussed in Section 4.3.7.1, the AEDT model was used to compute DNL values for 2019 and 2024 Preferred Alternative and No Action conditions at multiple sets of data points throughout the General Study Area:

- 62,935 2010 Census block centroids;
- 196,197 uniform grid points at 0.5-nautical mile (nm) intervals on a uniform grid covering the General Study Area,
- 64,559 points used to calculate DNL values at potential Department of Transportation Act (DOT), Section 4(f) resources, including 1,686 National Register listed historic Sites; and 7,506 unique points representing other Section 4(f) resources.
- Other unique points evaluated consist of 128 DEN Airport related points representing historic noise monitoring and noise reporting points.

As discussed in Section 4.3.7.1, DNL is the FAA's primary noise metric. **Table 5-2** provides the criteria used to assess the changes in aircraft noise exposure attributable to the Preferred Alternative compared with the No Action. FAA Order 1050.1F defines a significant impact as an increase of DNL 1.5 dB at noise-sensitive land use locations (e.g., residences, schools, etc.) exposed to aircraft noise of DNL 65 dB or higher under the Preferred Alternative. For example, an increase from 63.5 dB to 65 dB is considered a significant impact.

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

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

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

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

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

Source: FAA Order 1050.1F Desk Reference, Ch. 11, *Noise and Noise-Compatible Land Use*, July 2015.
Prepared by: ATAC Corporation, February 2019

5.1.3 Potential Impacts – 2019

Table 5-3 summarizes the results of the noise analysis for 2019 conditions. The results indicate that the Preferred Alternative when compared to the No Action would not result in a DNL 1.5 dB or higher increase in noise in sensitive areas exposed to DNL 65 dB or higher. Furthermore, no population would experience a reportable noise increase in areas exposed to DNL between 60 dB and 65 dB. However, a total of 104 people, associated with four population centroids located west, east, and south of DEN that would experience a DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB. These population centroids are located in three general regions: two of the centroids are located approximately 27 nm west of DEN, in unincorporated Jefferson County; one centroid is located approximately 38 NM south of DEN, in unincorporated Elbert County, CO; and the last centroid is located approximately 27 NM east of DEN, in unincorporated Adams County, CO.

The reportable noise increase for the two population centroids west of DEN can be attributed to aircraft operating on the COORZ3 departure procedure in the 2019 No Action Alternative Scenario shifting to COORZ4 in the 2019 Preferred Alternative Scenario. The noise increase to the south of DEN can be attributed to the shifting of traffic from the STAKR3 departure procedure in the 2019 No Action Alternative Scenario to the SLEEK1 procedure in 2019 Preferred Alternative Scenario. Lastly, the noise increase to the east of DEN can be attributed to aircraft operating on the EMMYS5 departure procedure in the 2019 No Action Alternative Scenario shifting to EMMYS6 in the 2019 Preferred Alternative Scenario.

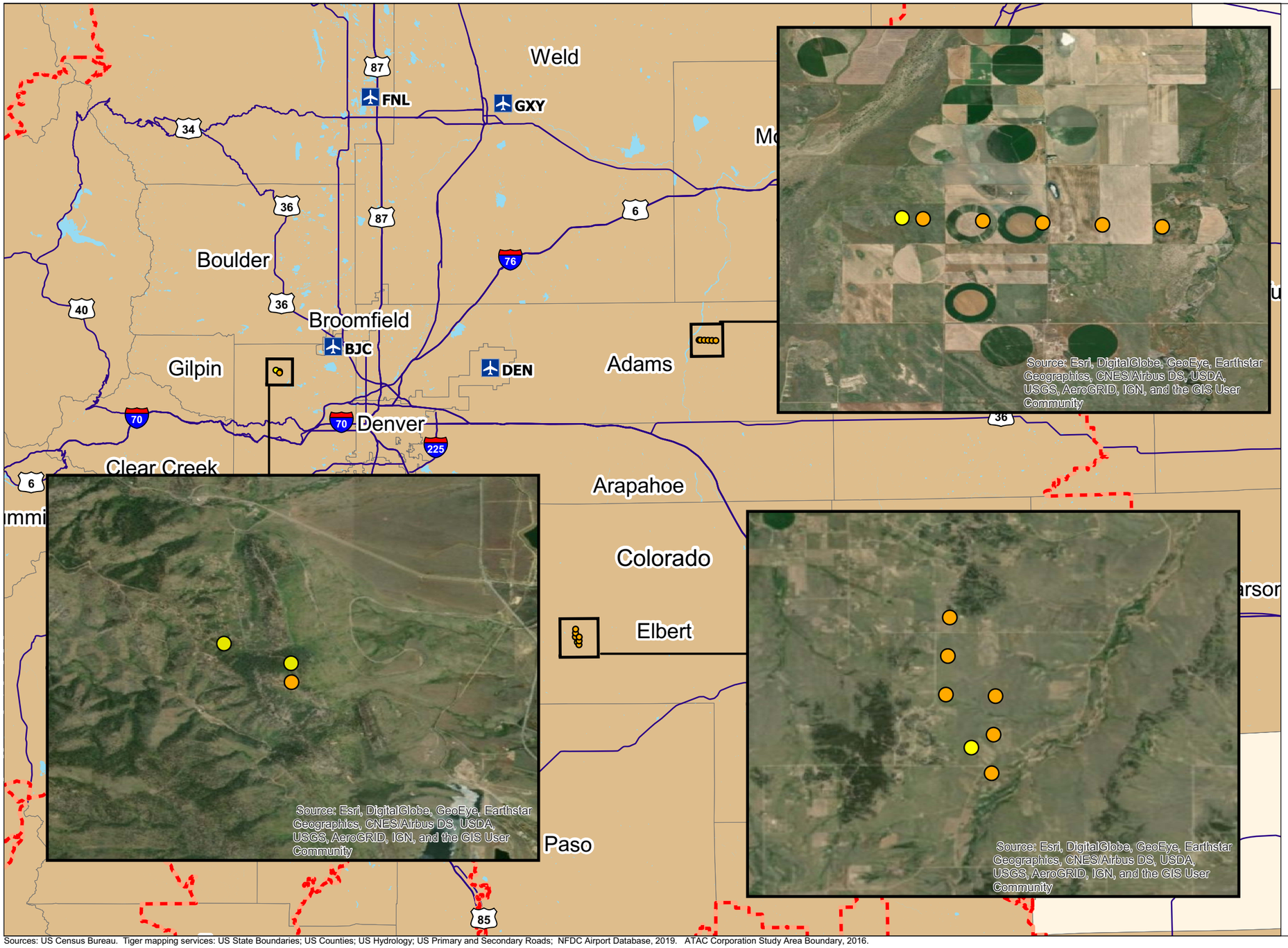
Table 5-3 Change in Potential Population Exposed to Aircraft Noise – 2019

DNL Noise Exposure Level Under the Preferred Alternative	Increase in DNL with the Preferred Alternative	Population Exposed to Noise that Exceeds the Threshold
		Preferred Alternative
DNL 65 and higher	DNL 1.5 dB or greater	0
DNL 60 to 65	DNL 3.0 dB or greater	0
DNL 45 to 60	DNL 5.0 dB or greater	104

Sources: U.S. Census Bureau, 2010 Census (population centroid data), accessed March 2015; ATAC Corporation, April 2019 (AEDT modeling results).
Prepared by: ATAC Corporation, April 2019.

Exhibit 5-1 shows the location of the population centroids that would experience the reportable noise increase under 2019 conditions. Although there is a reportable noise increase in 2019, these results indicate that the Preferred Alternative would not result in a significant noise exposure impact on population exposed to DNL 65 dB or higher levels under the Preferred Alternative. Detailed information on the population centroids can be found in **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report*.

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Census Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- General Study Area Boundary
- Study Airports
- Water
- Highways
- Counties in the General Study Area
- US Counties
- US State Boundaries

Notes:
APA - Centennial Airport
BJC - Rocky Mountain Metropolitan Airport
DEN - Denver International Airport
FNL - Northern Colorado Regional Airport
GXY - Greeley-Weld County Airport

Zoom in for additional detail

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

0 3.75 7.5 15 Miles

N

Sources: US Census Bureau. Tiger mapping services: US State Boundaries; US Counties; US Hydrology; US Primary and Secondary Roads; NFDC Airport Database, 2019. ATAC Corporation Study Area Boundary, 2016.

Prepared by: ATAC Corporation, April 2019.

Exhibit 5-1

Change in Potential Population Exposed to Aircraft Noise - 2019

DEN METROPLEX EA

THIS PAGE INTENTIONALLY LEFT BLANK

Under the No Action, no changes to air traffic routes in the Denver Metroplex would occur in 2019 and no effects related to changes in aircraft noise exposure would be anticipated.

5.1.4 Potential Impacts – 2024

Potential impacts were also evaluated under 2024 conditions for both the Preferred Alternative and No Action using the same methodology and criteria employed to analyze impacts under 2019 conditions. **Table 5-4** summarizes the results of the noise change analysis prepared for 2024.

The noise analysis results indicate that the Preferred Alternative when compared to the No Action would not result in a DNL 1.5 dBA or higher increase in sensitive areas exposed to DNL 65 dB or higher. In addition, no population would be exposed to reportable noise increases between DNL 60 dB and 65 dB. However, a total of 138 people associated with five population centroids would experience a DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB. These population population

are located in three general regions: two of the centroids are located approximately 27 nm west of DEN, in unincorporated Jefferson County; two other centroids are located approximately 38 nm south of DEN, in unincorporated Elbert County, CO; and the last centroid is located approximately 27 nm east of DEN, in unincorporated Adams County, CO.

Table 5-4 Change in Potential Population Exposed to Aircraft Noise – 2024

DNL Noise Exposure Level Under the Preferred Alternative	Increase in DNL with the Preferred Alternative	Population Exposed to Noise that Exceeds the Threshold
		Preferred Alternative
DNL 65 and higher	DNL 1.5 dB or greater	0
DNL 60 to 65	DNL 3.0 dB or greater	0
DNL 45 to 60	DNL 5.0 dB or greater	138

Sources: U.S. Census Bureau, 2010 Census (population centroid data), accessed March 2015; ATAC Corporation, April 2019 (AEDT modeling results).
Prepared by: ATAC Corporation, April 2019.

Exhibit 5-2 shows the location of the population centroids that would experience the reportable noise increase. Although there is a reportable noise increase in 2024, these results indicate that the Preferred Alternative would not result in a significant noise exposure impact on population exposed to DNL 65 dB or higher levels under the Preferred Alternative. Detailed information on the population centroids can be found in **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report*.

Under the No Action no changes to air traffic routes in the Denver Metroplex would occur in 2024 and no effects related to changes in aircraft noise exposure would be anticipated.

5.1.5 Noise Sensitive Uses and Areas

In addition to disclosing potential noise impacts to residential population, FAA Order 1050.1F requires the FAA to identify and describe noise sensitive uses and areas in the General Study Area. As defined in Paragraph 11-5b(8) of Order 1050.1F, a noise sensitive area is "[a]n area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites." Potential impacts to residential population are discussed in Sections 5.1.3

and 5.1.4. Potential impacts to recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are discussed in Sections 5.5 and 5.6. Excluding these resources, **Table 4-6** in Chapter 4 lists the locations identified as noise sensitive uses in the General Study Area. The noise analysis results indicate that the Preferred Alternative when compared to the No Action would not result in a DNL 1.5 dBA or higher increase to noise sensitive uses or noise sensitive areas in locations exposed to DNL 65 dB or higher. In addition, these resources would not experience reportable noise increases between DNL 60 dB and 65 dB and DNL 45 and 60 dB.

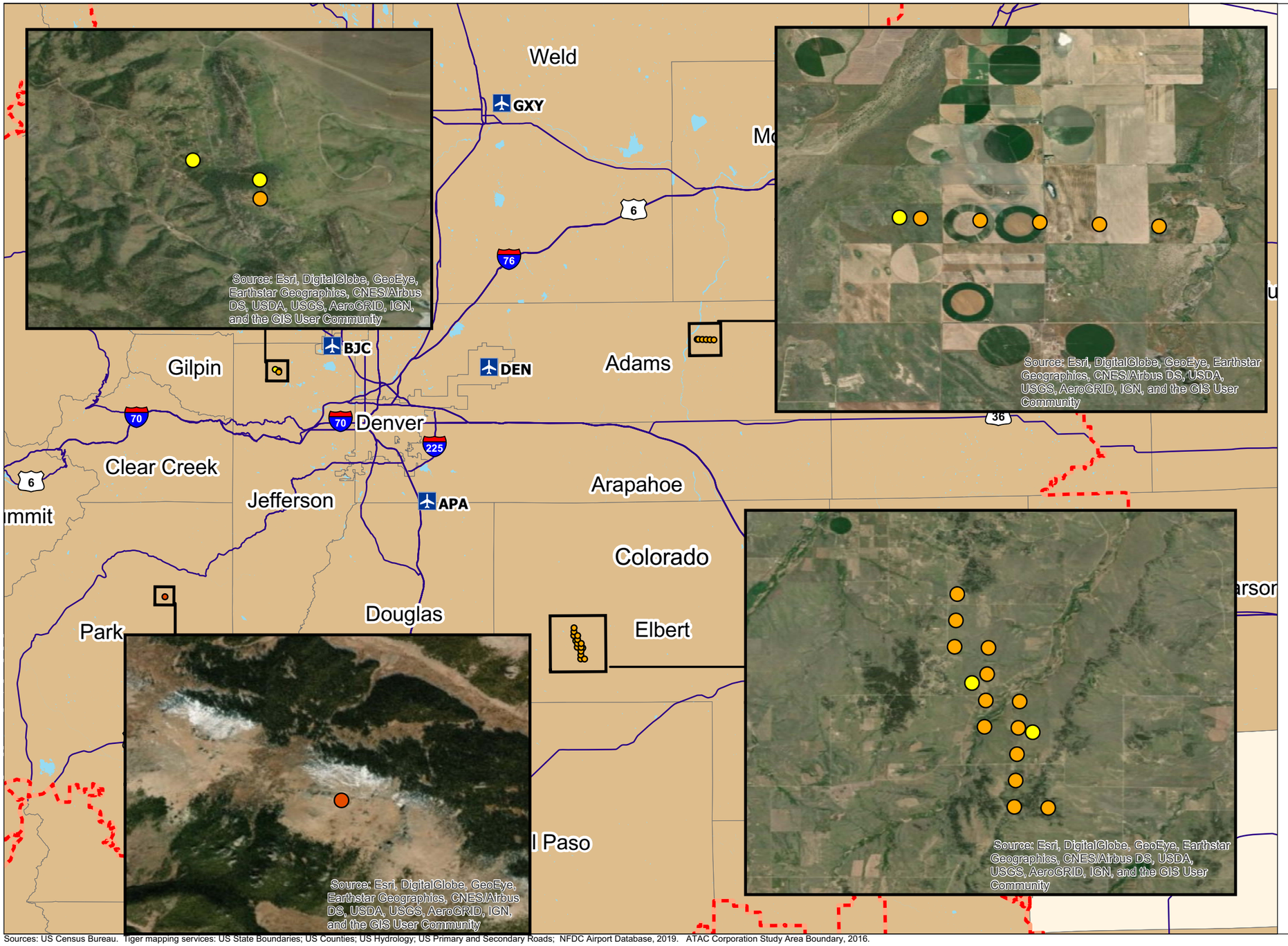
5.1.6 Noise Compatible Land Use

FAA Order 1050.1F requires that EA documents discuss possible conflicts between the proposed action and the objectives of federal, regional, state, local and tribal land use plans, policies and controls for the area concerned. Potential impacts to noise compatible land use were focused on changes in aircraft noise exposure resulting from implementing the Preferred Alternative. FAA Order 1050.1F states, "The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impact. If the noise analysis concludes that there is no significant impact, a similar conclusion usually may be drawn with respect to compatible land use." Air traffic actions like the DEN Metroplex Project do not result in direct impacts to land such as ground disturbance. Accordingly, the compatible land use analysis relies on changes in aircraft noise exposure between the Preferred Alternative and the No Action (discussed in Section 5.1) as the basis for determining compatible land use impacts within the General Study Area.

5.1.6.1 Potential Impacts – 2019 and 2024

As stated in Section 5.1, the Preferred Alternative, when compared with the No Action, would not result in changes in aircraft noise exposure in 2019 or 2024 that would exceed the FAA's significance threshold. Likewise, there are no conflicts with federal, regional, state, local land use plans, policies and controls. Therefore, the Preferred Alternative would not result in significant compatible land use impacts.

Under the No Action, there would be no changes to air traffic routing in the General Study Area and no changes in aircraft noise exposure expected to occur in either 2019 or 2024. Therefore, the No Action would not result in significant compatible land use impacts



LEGEND

- Census Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Section 4(f) Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- General Study Area Boundary
- Study
- Water
- Highways
- Counties in the General Study
- US Counties
- US State Boundaries

Notes:
APA - Centennial Airport
BJC - Rocky Mountain Metropolitan Airport
DEN - Denver International Airport
FNL - Northern Colorado Regional Airport
GXY - Greeley-Weld County Airport

Zoom in for additional detail

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

0 3.75 7.5 15 Miles

N

Sources: US Census Bureau. Tiger mapping services: US State Boundaries; US Counties; US Hydrology; US Primary and Secondary Roads; NFDC Airport Database, 2019. ATAC Corporation Study Area Boundary, 2016.

Prepared by: ATAC Corporation, April 2019.

DEN METROPLEX EA

Exhibit 5-2

Change in Potential Population Exposed to Aircraft Noise - 2024

THIS PAGE INTENTIONALLY LEFT BLANK

5.2 Air Quality

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

5.2.1 Summary of Impacts

The Preferred Alternative would result in a slight increase in emissions when compared to the No Action. However, changes to flight paths under the Preferred Alternative would occur at or above 3,000 feet AGL and are presumed to conform with the applicable state implementation plans (SIPs). Furthermore, changes to flight paths below the mixing height are also presumed to conform when modifications to ATC procedures are designed to enhance operational airspace efficiency. The slight increase in emissions is expected to have little if any effect on emissions or ground concentrations. Therefore, no significant impacts to air quality would be anticipated.

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

5.2.2 Methodology

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

[62] FAA Order 1050.1F Desk Reference, Section 1, July 2015.

[63] 40 C.F.R. § 93.153(b).

[64] FAA Order 1050.1F Desk Reference, Section 1, July 2015.

[65] *Id*. at 93.153(f).

[66] Federal Presumed to Conform Actions under General Conformity, 72 Fed. Reg. 41565 (July 30, 2007).

[67] *Id.*

mixing height are also presumed to conform when modifications to routes and ATC procedures are designed to enhance operational efficiency (i.e., to reduce delay)."[68]

5.2.3 Potential Impacts – 2019 and 2024

Under the Preferred Alternative there would be a slight increase in fuel burn (1.83 percent in 2019 and 1.85 percent in 2024) when compared to the No Action. While increased fuel burn corresponds with an increase in emissions, operational changes that could result in an increase in fuel burn would occur at 3,000 feet AGL or above and would not result in an increase in emissions and ground concentrations. Any operational changes that could result in an increase in fuel burn would occur at or above 3,000 feet AGL. Procedures above 3,000 feet AGL are considered a *de minimis* action, would have little if any effect on emissions and ground concentrations, and are presumed to conform to all SIPs for criteria pollutants. Therefore, no further air quality analysis is necessary, a conformity determination is not required, and the Preferred Alternative would not result in a significant impact to air quality. The No Action would not result in a change in the number of aircraft operations or air traffic routes; therefore, no impacts to air quality would be anticipated.

5.3 Wildlife (Avian and Bat Species) and Migratory Birds

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

5.3.1 Summary of Impacts

The greatest potential for impacts to wildlife species would result from wildlife strikes on avian and bat species at altitudes below 3,000 feet AGL. Changes to flight paths under the Preferred Alternative would primarily occur at or above 3,000 feet AGL. Therefore, the Preferred Alternative would not result in significant impacts to avian and bat species when compared with the No Action.

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

5.3.2 Methodology

The FAA's *Wildlife Strike Database*[69] and an accompanying annual wildlife strike compendium[70] is the best information available for assessing potential impacts of aircraft on wildlife. Strike reports over the past 27 years aggregated nationally as well as for individual airports are available from the database and compendium to understand existing conditions. Strike reports are comparable to known information on the presence of specific species of concern to corroborate the reports.

---

[68] *Id.*

[69] U.S. Department of Transportation, Federal Aviation Administration, *FAA Wildlife Strike Database* (http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx) accessed April 2019.

[70] U.S. Department of Transportation, Federal Aviation Administration, and U.S. Department of Agriculture Wildlife Services. *Wildlife Strikes to Civil Aircraft in the United States 1990-2017*. January 2019.

This analysis involved a review of wildlife strike reports[71] for the Study Airports under both the Preferred Alternative and the No Action, and an evaluation of the potential for the presence of federal- and state-listed threatened and endangered species (i.e., special-status species) within the General Study Area. The FAA compared modifications in flight ATC procedures to the occurrence of special-status species to qualitatively assess the likelihood of whether wildlife strikes might change under the Preferred Alternative.

5.3.3 Potential Impacts – 2019 and 2024

A significant impact would be likely to occur if the Preferred Alternative were to jeopardize the existence of special-status species or result in destroying or adversely modifying critical habitat in the General Study Area. Changes to flight paths under the Preferred Alternative would primarily occur at or above 3,000 feet AGL, so there is no potential for these effects in the General Study Area. Accordingly, the analysis is focused on the potential for significant impacts to species resulting from increased wildlife strikes with aircraft.

Since 1990, the FAA has compiled pilot and airport reports of wildlife strikes with aircraft. Between the most recent comprehensive reporting period of 1990 and 2017, 197,833 wildlife strikes were reported nationally.[72] Of the records that identify the type of animal involved in the strike incident, birds represent 95.0 percent of all strikes.[73] Of those records, for commercial and GA aircraft, 71 and 73 percent of the bird strikes, respectively, occurred at or below 500 feet AGL and declined by 34 percent for every 1,000-foot gain in height for commercial aircraft and 44 percent for GA aircraft. The Wildlife Strike Database reports that of identified species, waterfowl, gulls, and raptors are the species groups of birds with the most damaging strikes.[74]

Table 5-5 provides a summary of wildlife strikes reported for the Study Airports between January 1, 1990 and April 14, 2019. In total, 7,011 reported strikes (97.78 percent of all strike records) occurred at altitudes below 3,000 feet AGL. A total of 4,676 strikes reported below 3,000 feet AGL at the Study Airports included species identification.

The *Migratory Bird Treaty Act (MBTA) of 1918* (16 U.S.C. §§ 703–712) protects all the bird species identified in these reports. Furthermore, federal and state laws protect listed endangered and threatened species. In Chapter 4, **Table 4-3** identifies the federally-listed bird species believed to occur or known to occur in counties in the General Study Area. None of the bird strike reports at the Study Airports included the species listed in **Table 4-3**.

The number of aircraft operations under the Preferred Alternative and No Action would be the same. Therefore, the assessment of the potential impacts focuses on changes to flight paths and the potential for impact due to wildlife strikes. As shown in **Table 5-5**, only 2.22 percent of bird/bat strikes (159 of 7,170 total records) occurred at altitudes above 3,000 feet AGL. The substantial decline in the number of strikes reported above 3,000 feet AGL indicates that there is less likelihood of bird/bat strikes at these altitudes. Under the Preferred Alternative, changes to proposed flight paths would primarily occur at or above 3,000 feet AGL and no

71 U.S. Department of Transportation, Federal Aviation Administration, *FAA Wildlife Strike Database* (http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx) accessed April 2019.

72 U.S. Department of Transportation, Federal Aviation Administration, and U.S. Department of Agriculture Wildlife Services. *Wildlife Strikes to Civil Aircraft in the United States 1990-2017*. January 2019.

73 *Id.*

74 *Id.*

significant changes to arrival and departure corridors below 3,000 feet AGL would be expected. Therefore, no significant impacts to bird or bat species would be anticipated.

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

Table 5-5 FAA Wildlife Strike Database Records for Study Airports by Altitude (1990 – 2019)

Type of Strike	Airport	3,000 ft. AGL or less	>3,000 ft. AGL to ≤ 10,000 ft. AGL	Greater than 10,000 ft. AGL	Total
Identified Bird and Bat Species	APA	230	2	0	232
	BJC	181	0	0	181
	DEN	4,225	16	3	4,244
	FNL	27	0	0	27
	GXY	13	1	0	14
Total		4,676	19	3	4,698
Unknown Bird and Bat Species	APA	75	6	0	81
	BJC	29	3	0	32
	DEN	2,219	100	27	2,346
	FNL	8	0	0	8
	GXY	4	1	0	5
Total		2,335	110	27	2,472
Grand Total		7,011	129	30	7,170
Percentage		97.78%	1.80%	0.42%	100%

APA – Centennial Airport *BJC – Rocky Mountain Metropolitan Airport* *DEN – Denver International Airport*
FNL – Northern Colorado Regional Airport *GXY – Greeley-Weld County Airport*

NOTE: DEN totals only include the current airport location beginning February 28, 1995 and exclude the former Stapleton International Airport (also having used the "DEN" Identifier) location results that ended February 27, 1995.
NOTE: Unknown altitudes (left blank in database) were assumed at or below 3,000 feet AGL except where relevant data indicated otherwise.
NOTE: Terrestrial mammals and reptiles were excluded from the above counts where reported.

Source: U.S. Department of Transportation, Federal Aviation Administration, *FAA Wildlife Strike Database* (http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx) accessed April 2019.
Prepared by: ATAC Corporation, April 2019.

5.4 Climate

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

5.4.1 Summary of Impacts

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

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

5.4.2 Methodology

In accordance with FAA guidance, estimated CO_2 emissions were calculated from the amount of fuel burned under the No Action and the Preferred Alternative in 2019 and 2024 (see Section 5.7). The resulting CO_2 emissions were then reported as CO_2e.

5.4.3 Potential Impacts – 2019 and 2024

Table 5-6 shows project-related CO_2e emissions. In 2019, the Preferred Alternative would produce approximately 3,862.52 MT of CO2e and the No Action would produce approximately 3,793.19 MT of CO2e. This represents a slight increase of approximately 69.32 MT of CO2e or 1.83% percent under the Preferred Alternative when compared to the No Action. The 2024 Preferred Alternative amount of 4,373.23 MT would compromise less than .000000829 percent of U.S.-based greenhouse gas emissions as reported for 2017.[75] Similarly, in 2024, the No Action would produce approximately 4,293.73 MT of CO2e and the Preferred Alternative would produce approximately 4,373.23 MT of CO2e. This represents a slight increase of approximately 79.5 MT of CO2e or 1.85% percent under the Preferred Alternative when compared to the No Action. This would compromise less than .000000829 percent of U.S.-based greenhouse gas emissions as reported for 2017.

Table 5-6 CO_2e Emissions – 2019 and 2024

	2019		2024	
	No Action	**Preferred Alternative**	**No Action**	**Preferred Alternative**
CO_2e Emissions (MT)	3,793.19	3,862.52	4,293.73	4,373.23
Volume Change (MT)		69.32		79.5
(Preferred Alternative – No Action)		1.83%		1.85%

Note: CO_2e = Carbon Dioxide Equivalent

Source: ATAC Corporation, April 2019 (AEDT modeling results).
Prepared by: ATAC Corporation, April 2019.

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

This section discusses potential impacts to Department of Transportation (DOT) Act, Section 4(f) Resources. **Exhibit 4-2** depicts Section 4(f) resources within the General Study Area as described in Section 4.3.4.

5.5.1 Summary of Impacts

Evaluating potential impacts to Section 4(f) resources focuses on changes in aircraft noise exposure resulting from implementing the Preferred Alternative. The FAA's aircraft noise exposure analysis indicates that the Preferred Alternative would not substantially change the noise environment at any Section 4(f) resource identified within the General Study Area when compared with the No Action. Furthermore, any changes in aircraft traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of Section 4(f) resources. Therefore, no constructive use of a Section 4(f) resource associated with the Preferred Alternative would occur and no impacts would be anticipated.

[75] U.S. Environmental Protection Agency (EPA), *Fast Facts 1990-2017 National Level U.S. Greenhouse Gas Inventory*. April 2019.

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

5.5.2 Methodology

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

Noise exposure levels were calculated for grid points placed at Section 4(f) properties. A list of the resources evaluated is provided in **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report*. The analysis of potential impacts to Section 4(f) resources considered whether these properties would experience a significant noise increase, when comparing the Preferred Alternative with the No Action, using the applicable thresholds shown in **Table 5-2**.

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

In cases where Land and Water Conservation Fund Act (LWCF)[76] resources are "used" by a transportation project, FAA Order 1050.1F stipulates that replacement satisfactory to the Secretary of the Interior is required for recreation lands aided by the Department of Interior's LWCF. Therefore, these resources are considered as part of the Section 4(f) impact analysis process.

5.5.3 Potential Impacts – 2019 and 2024

As stated in Section 5.1, the Preferred Alternative, when compared with the No Action, would not result in changes in aircraft noise exposure in 2019 or 2024 that would exceed the FAA's significance threshold. Noise analysis results for Section 4(f) properties located within the General Study Area can be found in **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report*. As stated in Section 5.9, the Preferred Alternative, when compared with the No Action, would not cause a significant visual impact in 2019 or 2024. Any changes in aircraft

[76] 16 U.S.C. §§ 460l-4, et seq.

traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of the Section 4(f) resources. Therefore, the Preferred Alternative would not result in potential impacts to Section 4(f) resources from a visual impact perspective.

For the 4(f), Historic, and Cultural Resource areas in 2019, the Preferred Alternative would not result in a DNL 1.5 dB increase or decrease in areas exposed to DNL of 65 dB and higher, nor would it result in a reportable noise increase or decrease of DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB compared with the 2019 No Action. Additionally, the Preferred Alternative would not result in a DNL 5 dB increase or decrease in areas exposed to DNL between 45 dB and 60 dB compared with the 2019 No Action.

For the 4(f), Historic, and Cultural Resources areas in 2024, the Preferred Alternative would not result in a DNL 1.5 dB increase or decrease in areas exposed to DNL of 65 dB and higher, nor would it result in a reportable noise increase or decrease of DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB compared with the 2019 No Action. However, one 4(f) point would experience a DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB (a reportable increase in noise).

The single reportable 4(f) point is located in the Kenosha Mountains on a ridgeline south of Shawnee Peak at approximately 12,000 feet MSL. This location has been and remains the primary southwest arrival gate, or corner post, for the DEN arrivals and arrivals to all airports using the en route transition to Denver TRACON arrival procedures through this southwest arrival gate. Radar track data analysis from the existing condition data (2017) and additional radar track analysis indicated aircraft have been present over this point historically since the opening of the DEN airport. From an air traffic perspective, the point is just outside the Denver TRACON boundary, between the SSKII and BGDEE fixes on the Preferred Alternative SSKII1 procedure. From a geographic perspective, the point is approximately 6.5 statute miles west-southwest of Bailey, Colorado and 4.1 statute miles south-southwest of Shawnee, Colorado and is contained in the Pike National Forest, also within the Lost Creek Wilderness Area. The reportable 4(f) point is 1.5 statute miles north of vehicle accessible and travelled County Road 56, also known as Lost Park Road that leads to the Lost Creek Campground. The reportable 4(f) point is bound on the north by the Craig Park/Craig Creek (hiking/biking) Trail, on the south by the Colorado (hiking/biking) Trail, the Ben Tyler (hiking/biking) Trail on the west, and the Brookside McCurdy (hiking/biking) Trail on the east.

The Lost Creek Wilderness Area[77] was designated a wilderness area on December 22, 1980. The Congressional “Wilderness Area” designation carries the expectation that human activities are restricted to scientific study and non-mechanized recreation; horses are permitted but motorized vehicles and equipment are not. Despite this Congressional Wilderness area designation, recent and historic aircraft overflight activity have occurred in a similar fashion to the Preferred Alternative over this Wilderness area since at least 1995 and potentially as far back as the mid 1950’s.

[77] In 1963, the 15,120 acre Lost Creek Scenic Area was created under the precursor of the Wilderness Act, the "U-Regulations" of 1939. In 1966, the Scenic Area was also designated a National Natural Landmark. During the first U.S. Forest Service RARE process, Lost Creek received more comments recommending its wilderness designation than any other Colorado area. In 1980 the 105,000 acre Lost Creek Wilderness was created under the Colorado Wilderness Act of 1980. Approximately 14,700 additional acres were later added to the west end of the Wilderness under the Colorado Wilderness Act of 1993. https://www.wilderness.net/printFactSheet.cfm?WID=331 accessed April 2019.

The reportable noise increase in the 2024 Preferred Alternative can be attributed to aircraft operating on the TELLR2 and CREDE3 arrival procedures in the 2024 No Action shifting to SSKII1 in the 2024 Preferred Alternative. In the 2024 No Action, there were 37,168 (approximately 102 flights per day) DEN arrival operations using this southwest arrival gate of which 36,315 (97.7%, approximately 99 flights per day) are within ±1.5 nautical miles of the Preferred Alternative procedure (SSKII1) center-line. Flights range from 15,500 feet MSL (3,500' feet AGL) to 22,000 feet (10,000 feet AGL) in this region. In the 2024 Preferred Alternative, there were 37,255 (approximately 102 flights per day) DEN arrival operations using this southwest arrival gate of which 36,535 (98.0% or approximately 100 flights per day) are within ±1.5Nm of the Preferred Alternative (SSKII1) procedure center-line. Flights also range from 15,500 feet MSL (3,500 feet AGL) to 22,000 feet MSL (10,000 feet AGL) in this region. The FAA Aeronautics Information Manual (AIM) specifies a minimum altitude of "…2,000 feet above the surface…" for "…Wilderness…" properties[78] and is reiterated in FAA Advisory Circular 91-36D for Visual Flight Rules (VFR) flights.[79] The aircraft altitudes are historically and proposed at approximately 3,500 feet AGL or greater for the general area of the reported 4(f) point. The basis for this occurrence is the PFD in the Preferred Alternative moved the CREDE waypoint on CREDE3 STAR 0.743 nautical miles to the northwest (on a heading 339) to become the SSKII waypoint on the Preferred Alternative SSKII1 STAR.

Although this would result in a reportable aircraft noise exposure DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB, the project does not physically incorporate the resource nor is it close enough, frequent enough, or of a severity to impact important features, activities, or attributes associated with it, or to substantially impair it. Due to the historic presence of aircraft in this vicinity, no impairment to the view or setting of Section 4(f) resources would be anticipated. Therefore, the Preferred Alternative would not result in potential impacts to Section 4(f) resources.

5.6 Historic and Cultural Resources

This section discusses the analysis of impacts to historic properties under the Preferred Alternative and the No Action. Section 4.3.5 provides information on historic properties within the General Study Area. The FAA initiated consultation with the State Historic Preservation Officer (SHPOs) for the State of Colorado on April 9, 2019, in accordance with Section 106 of the *National Historic Preservation Act of 1966* (16 U.S.C. § 470 *et seq*.) and the implementing regulations at 36 C.F.R. Part 800. Although there are no on-tribal or off-tribal[80] lands located within the General Study Area based on readily available data and there are no historically recognized lands within the General Study Area, Tribal Historic Preservation Officers (THPOs) were contacted as part of the Section 106 process as a means of initiating government to government consultation regarding any concerns that uniquely or significantly affect Tribal interests related to the DEN Metroplex Project.

[78] U.S. Department of Transportation. Federal Aviation Administration. Airman Information Manual, Section 4.7-4-6b Flights Over Charted U.S. Wildlife Refuges, Parks, and Forest Service Areas.

[79] US Department of Transportation. Federal Aviation Administration. Advisory Circular 91-36D. *Visual Flight Rules (VFR) Near Noise Sensitive Areas*. September 17, 2004.

[80] "Off-Tribal" lands may include Protected Tribal Resources or Native American sacred sites.

5.6.1 Summary of Impacts

The aircraft noise exposure analysis indicates that there would be no significant impact to the noise environment at any historic properties under the Preferred Alternative compared with the No Action. The aircraft noise exposure analysis indicates there would be reportable noise increases (see **Table 5-3 and Table 5-4**) in the unincorporated Elbert County, unincorporated Adams County, and unincorporated Jefferson County areas (south, east, and west of DEN, respectively) of the General Study Area. Changes in historic and current aircraft traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of historic properties or those properties potentially eligible for NRHP listing. The Preferred Alternative would not directly or indirectly change the characteristics qualifying or potentially qualifying a historic resource for inclusion in or its eligibility for the NRHP. Therefore, no adverse effects to historic properties under the Preferred Alternative would be anticipated for 2019 or 2024.

Under the No Action, no changes to air traffic routes in the DEN Metroplex would occur in either 2019 or 2024 and no changes to aircraft noise exposure or changes in aircraft overflight patterns over historic properties would be anticipated. Therefore, no historic properties would be affected by aircraft noise, nor would there be any visual impacts at historic properties under the No Action.

5.6.2 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 (i.e., National Register). In assessing whether an undertaking, such as the Preferred Alternative, affects a property listed or eligible for listing on the National Register, FAA must consider both direct and indirect effects. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Federal regulations define an area of potential effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[81] Direct effects generally occur at the time and place of the proposed action. An APE has been defined for the DEN Metroplex Project to assess the potential direct and indirect effects of the Preferred Alternative on historic properties.

For purposes of this analysis, the APE is the same geographic area and boundary as the General Study Area. **Exhibit 4-3** in Section 4.3.4 shows analysis points for cultural and historic properties listed and eligible for listing on the National Register that are found within the General Study Area. These analysis points are combined with the 4(f) resource points on **Exhibit 4-3**.

All historic properties identified within the APE require further evaluation by the FAA to determine if the property may experience a potential adverse effect. Therefore, noise exposure levels at points representing historic properties listed on the National Register were

[81] 36 CFR 800.16(d)

calculated for purposes of determining potential adverse effects. A list of the resources evaluated is provided in **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report*. In addition, noise exposure results for the uniform grid points (located at 0.5 nm intervals throughout the General Study Area) were evaluated to identify potential adverse effects to historic properties that are eligible but may not be listed on the National Register. If a significant or reportable noise increase were identified at one of these grid points, the surrounding area would be examined for the presence of eligible-to-be-listed historic properties. **Table 5-7** shows those properties identified as greater than 50 years of age via the respective County building records in the immediate vicinity of reportable noise points derived from the EA noise analysis.

Table 5-7 Reportable Noise for Potentially Eligible Structures by Location

Address	City	State	Zipcode	Year Built	Reportable Noise Increase in Immediate Vicinity?
12796 County Rd. 118	Kiowa	CO	80117	1923	40.17dBA to 45.32dBA = +5.16dBA
12400 Price Rd.	Byers	CO	80103	1932	45.08dBA to 50.14dBA = +5.05dBA
12400 Price Rd.	Byers	CO	80103	1933	45.08dBA to 50.14dBA = +5.05dBA

Source: Adams County Assessor, http://gisapp.adcogov.org/quicksearch/ Accessed April, 2019. Elbert County Assessor, http://services.elbertcounty-co.gov/assessor/taxweb/search.jsp Accessed April, 2019
Prepared by: ATAC Corporation, April 2019.

The analysis of potential impacts to historic properties considers whether these properties would experience a significant noise increase, when comparing the Preferred Alternative with the No Action, using the applicable thresholds shown in **Table 5-2**. Properties exposed to DNL 65 dB or higher under the Preferred Alternative and an increase of DNL 1.5 dB or higher may be considered to be potentially adversely effected by the project. Reportable increases in noise were detected for properties potentially eligible for NRHP listing (based on an age of 50 years or greater) and exposed to DNL between DNL 45 dB and lower than 65 dB, thus the FAA considered further whether the increase would result in an adverse effect on properties over 50 years in age. The noise analysis indicated a reportable change for two properties consisting of three structure greater than 50 years of age and thus potentially eligible for NRHP listing. Aircraft overflight and visual presence have been documented in the General Study Area since approximately 1956. Historic jet traffic from military and civilian sources in the Denver area have served the region and exposed properties to jet aircraft overflight including the Elbert, Jefferson, and Adams County areas since the mid-1950s. Further research on the subject properties determined the reportable increase would not diminish the integrity of the applicable property's setting for which the setting potentially contributes to historical or cultural significance.

5.6.3 Potential Impacts – 2019 and 2024

As stated in Section 5.1, when compared with the No Action, the Preferred Alternative would not result in changes in aircraft noise exposure in 2019 or 2024 that would exceed FAA's significance threshold for noise. While reportable noise increases to residential population were identified, none of these increases occur at NRHP listed historic properties. The three structures in the immediate vicinity of the reportable noise increases would experience no

effect in their continuing potential eligibility for NRHP listing from implementation of the Preferred Alternative due to the historic and continuing overflight presence since the mid-1950s. Therefore, the Preferred Alternative would not result in an adverse effect to historic properties. Noise analysis results for historic properties located within the General Study Area can be found in the **Appendix I**: *Denver Metroplex Aircraft Noise Technical Report.*

Under the No Action no changes to air traffic routes in the Denver Metroplex would occur in either 2019 or 2024 and no adverse effects related to changes in aircraft noise exposure would be anticipated. Therefore, the No Action would not result in impacts to historic or cultural resources.

5.7 Energy Supply (Aircraft Fuel)

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

5.7.1 Summary of Impacts

In comparison to the No Action, the Preferred Alternative would result in a relatively small increase in aircraft fuel burned: 1.83 percent increase in 2019 and 1.85 percent increase in 2024. These increases would not be expected to affect local aircraft fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

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

5.7.2 Methodology

The Preferred Alternative would not change the number of aircraft operations relative to the No Action, but it would involve changes to air traffic flows during the departure, descent, and approach phases of flight. These changes affect both the route an aircraft may follow as well as its climb-out and descent profiles. This in turn may directly affect aircraft fuel burn (or fuel expended). Aircraft fuel burn is considered a proxy for determining whether the Preferred Alternative would have a measurable effect on local energy supplies when compared with the No Action.

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

5.7.3 Potential Impacts – 2019 and 2024

Table 5-8 presents the results of the fuel burn analysis for the Preferred Alternative and No Action. In comparison to the No Action, the Preferred Alternative would result in approximately 22 metric tons (MT) more fuel burned in 2019 (1.83% percent increase) and approximately 25 MT more fuel burned in 2024 (1.85% percent increase). Given these relatively small increases, the FAA expects that when compared with the No Action, the Preferred Alternative

would not adversely affect local fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

Table 5-8 Energy Consumption Comparison

	2019		2024	
	No Action	**Preferred Alternative**	**No Action**	**Preferred Alternative**
Fuel Burn (MT)	1,207.04	1,229.10	1,366.32	1,391.62
Volume Change (MT) (Preferred Alternative – No Action)		22.06		25.3
Percent Change from No Action		1.83%		1.85%

Note: MT = Metric Ton

Source: ATAC Corporation, April 2019 (AEDT modeling results).
Prepared by: ATAC Corporation, April 2019.

5.8 Environmental Justice

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

5.8.1 Summary of Impacts

Neither the Preferred Alternative nor the No Action would displace people or businesses; therefore, implementing the Preferred Alternative or No Action would not result in direct impacts in this category. No areas within the General Study Area would experience significant impacts to air quality or noise. While some areas would be exposed to reportable noise increases of DNL 5 dB within areas exposed to DNL 45 to 60 dB, these would not constitute a significant impact related to a change in DNL exposure to people, including members of minority and/or low-income populations (see Section 5.1 and Section 5.8). Therefore, no disproportionately high and adverse effects to minority populations or low-income populations would occur under either the Preferred Alternative or the No Action.

5.8.2 Methodology

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

5.8.3 Potential Impacts – 2019 and 2024

Under the Preferred Alternative, neither people nor businesses would be displaced. As discussed in Section 5.1, under the Preferred Alternative, no census block centroids in the General Study Area would experience a significant noise impact in either 2019 or 2024. The Preferred Alternative would not have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority

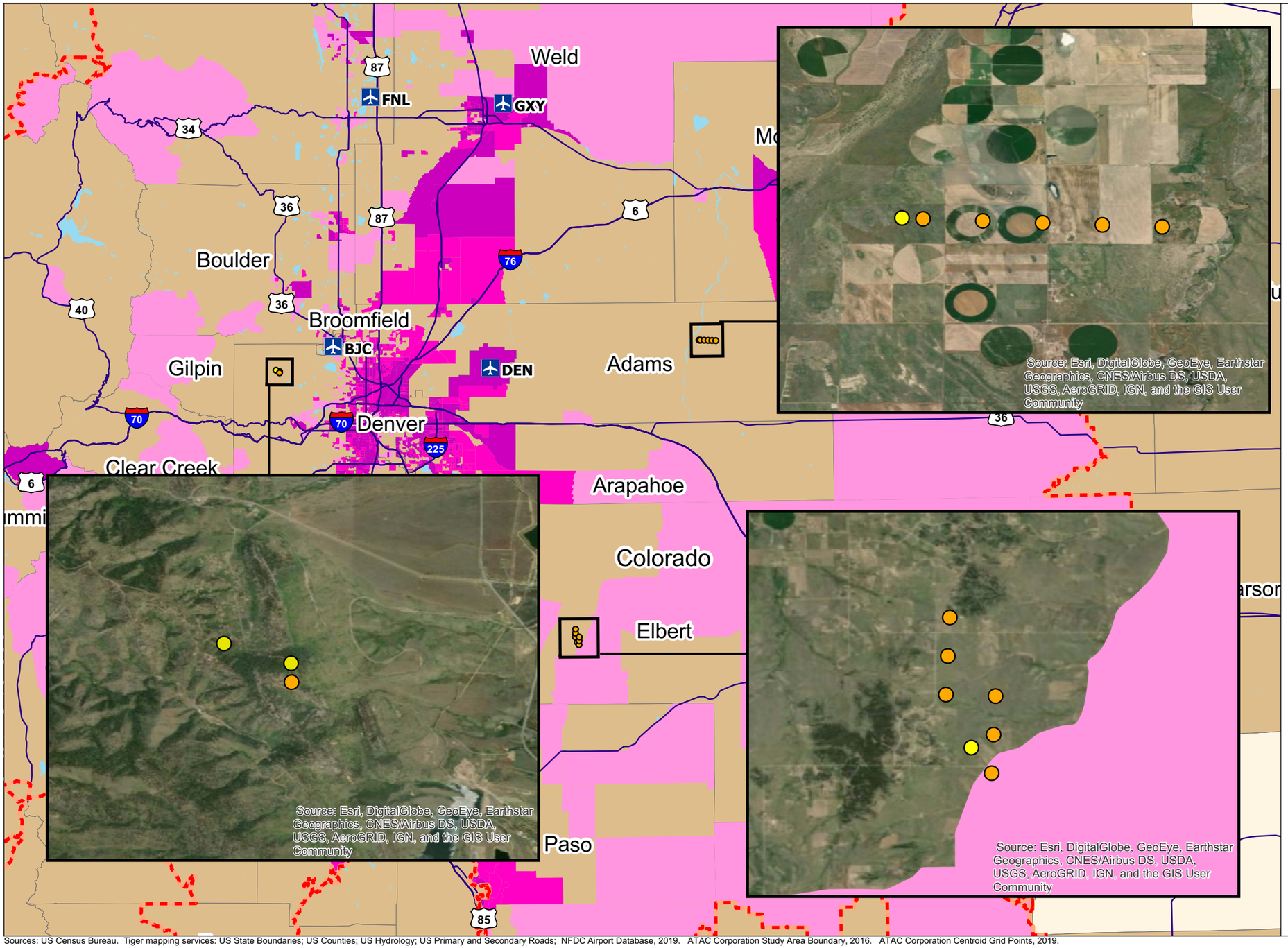
population, due to an absence of significant impacts in other environmental impact categories; and a lack of significant impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA has determined are unique to the environmental justice population and significant to that population. Under 2019 conditions, there are no population centroids (thus representing zero persons) located in areas identified as environmental justice communities that experience reportable noise increases of DNL 5 dB in areas exposed to DNL 45 to 60 dB. One 0.5nm grid point is on the edge of an area identified as an environmental justice community that experience reportable noise increases of DNL 5 dB in areas exposed to DNL 45 to 60 dB. The 0.5nm grid point affected by reportable noise is depicted in **Exhibit 5-3**.

At the location of the 2019 0.5nm grid point experiencing a reportable noise increase located in the area of Environmental Justice, two ranch/farm residences with multiple outbuildings are located in the immediate vicinity. One ranch/farm residence is immediately north of the 0.5nm grid point, and the second ranch/farm residence is immediately south of the 0.5nm grid point for a total of two ranch/farm residences in the immediate vicinity. A total of 9,623 housing units are reported in Elbert County as of 2017.[82] The two ranch/farm residences in the immediate vicinity of the 0.5nm grid point for reportable noise represent .021% of the total residences in Elbert County and thus do not represent a disproportionately high number of total residences affected by reportable noise exposure.

Under 2024 conditions, there is one population centroid representing 34 persons and eight 0.5nm grid points located in areas identified as environmental justice communities that experience reportable noise increases of DNL 5 dB in areas exposed to DNL 45 to 60 dB. This census centroid and the 0.5nm grid points are depicted in **Exhibit 5-4**. Approximately 3,917,842 persons reside in the General Study Area and of this total, one census centroid located in Elbert County represents .000087% of the total noise exposed population are exposed to a reportable noise increase. The reportable noise does not represent significant noise impacts, nor do they reflect disproportionately high or adverse impacts to minority or low-income communities relative to the General Study Area or Elbert County as whole. Therefore, no adverse direct or indirect effects would occur to any environmental justice populations within the General Study Area under the Preferred Alternative for 2019 and 2024.

Under the No Action, neither people nor businesses would be displaced. Furthermore, air traffic routes would not change and there would be no change in aircraft noise exposure in 2019 or 2024 that could result in an indirect impact. Therefore, the No Action would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.

82 U.S. Census Bureau. *Quick Facts Elbert County, Colorado v2017*. https://www.census.gov/quickfacts/fact/table/elbertcountycolorado/AFN120212. Accessed April 2019.



LEGEND

- Census Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- General Study Area
- Study
- Water

Areas of Environmental Justice Concern

- Low Income Population
- Minority Population
- Low Income/Minority Population
- Highways
- Counties in the General Study
- US Counties
- US State Boundaries

Notes:
APA - Centennial Airport
BJC - Rocky Mountain Metropolitan Airport
DEN - Denver International Airport
FNL - Northern Colorado Regional Airport
GXY - Greeley-Weld County Airport

Zoom in for additional detail

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

0 0.35 0.7 1.4 Miles

N

Sources: US Census Bureau. Tiger mapping services: US State Boundaries; US Counties; US Hydrology; US Primary and Secondary Roads; NFDC Airport Database, 2019. ATAC Corporation Study Area Boundary, 2016. ATAC Corporation Centroid Grid Points, 2019.

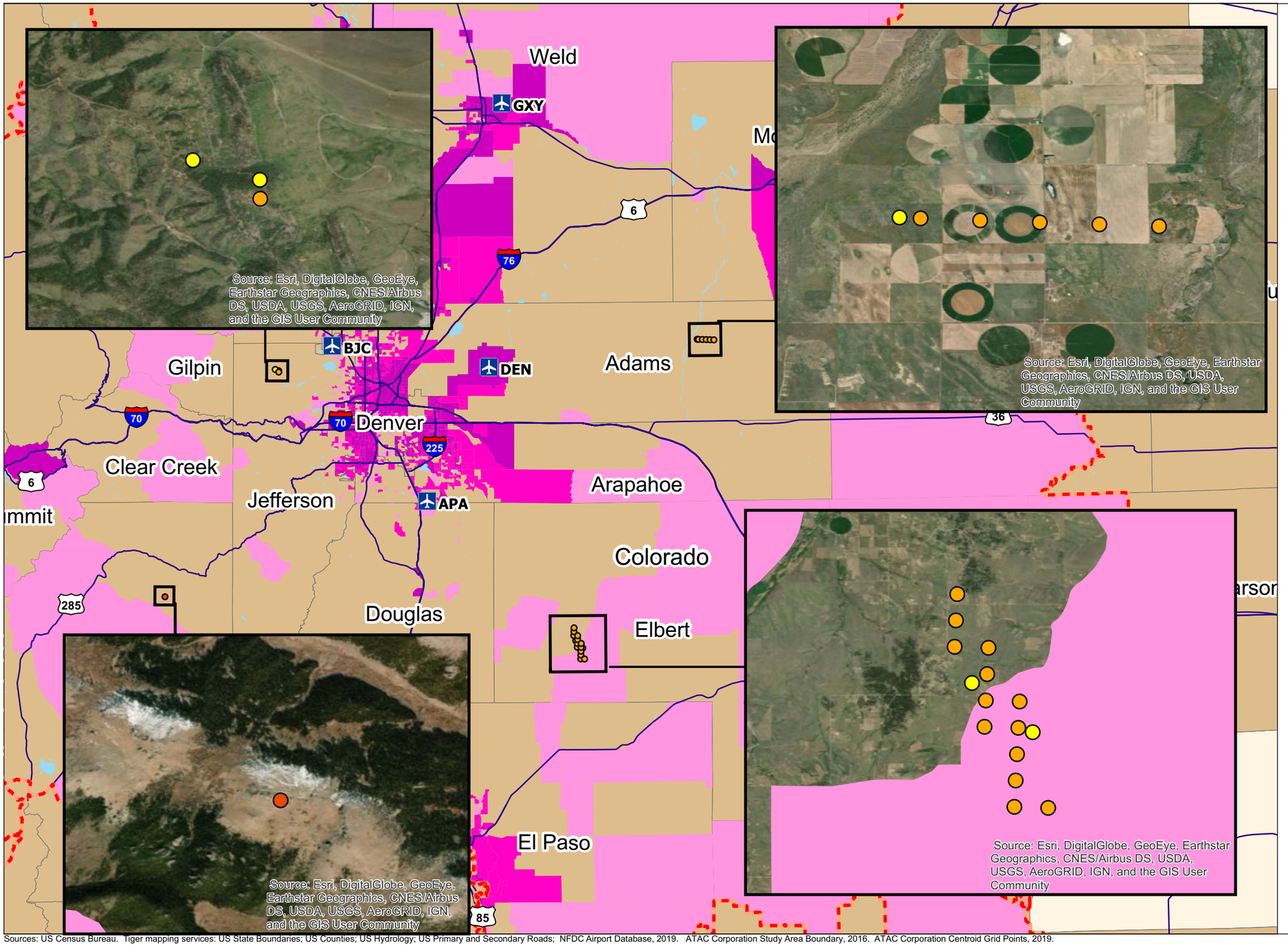
Prepared by: ATAC Corporation, April 2019.

Exhibit 5-3

DEN METROPLEX EA

Change in Potential Population Exposed to Aircraft Noise in Environmental Justice Areas - 2019

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Census Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Section 4(f) Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- General Study Area
- Study
- Water

Areas of Environmental Concerns

- Low Income Population
- Minority Population
- Low Income/Minority Population
- Highways
- Counties in the General Study
- US Counties
- US State Boundaries

Notes:
APA - Centennial Airport
BJC - Rocky Mountain Metropolitan Airport
DEN - Denver International Airport
FNL - Northern Colorado Regional Airport
GXY - Greeley-Weld County Airport

Zoom in for additional detail

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

0 0.5 1 2 Miles

N

Sources: US Census Bureau. Tiger mapping services: US State Boundaries; US Counties; US Hydrology; US Primary and Secondary Roads; NFDC Airport Database, 2019. ATAC Corporation Study Area Boundary, 2016. ATAC Corporation Centroid Grid Points, 2019.

Prepared by: ATAC Corporation, April 2019.

Exhibit 5-4

DEN METROPLEX EA

Change in Potential Population Exposed to Aircraft Noise in Environmental Justice Areas - 2024

THIS PAGE INTENTIONALLY LEFT BLANK

5.9 Visual Impacts

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

5.9.1 Summary of Impacts

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

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

5.9.2 Methodology

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

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

5.9.3 Potential Impacts – 2019 and 2024

According to FAA Order 1050.1F, the visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact. Changes in aircraft routes associated with the Preferred Alternative would generally occur at altitudes above 3,000 feet AGL; therefore, the visual sight of aircraft and aircraft lights would not be considered intrusive. Consequently, the Preferred Alternative would not result in significant visual impacts. Accordingly, significant visual impacts resulting from the Preferred Alternative or the No Action would not be anticipated.

5.10 Cumulative Impacts

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Preferred Alternative with other actions. CEQ regulations define a cumulative impact as “an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.”[83] The regulations also state that cumulative impacts can result from individually minor, but collectively significant actions that take place over a period of time.

[83] 40 C.F.R § 1508.7

5.10.1 Summary of Impacts

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

The No Action does not involve a proposed project or action that could contribute to the effects of past, present, and reasonably foreseeable projects that would cumulatively result in significant impacts and would not result in a change in the number of aircraft operations or air traffic routes; therefore, no cumulative impacts would be anticipated.

5.10.2 Methodology

Research was conducted to identify planned airport improvement projects at all Study Airports that in combination with the Preferred Alternative might result in cumulative environmental impacts. A robust examination was made of the potential resources affected by the Preferred Alternative, and only past, present, and reasonably foreseeable future actions that would have direct or indirect effects on aircraft flight patterns within the General Study Area were to be considered. Therefore, the type of projects that would be considered under the cumulative impact analysis were primarily limited to airfield projects, specifically projects that directly affect or involve runways and modifications to parallel taxiways. “Reasonably foreseeable future actions” refers to projects that would likely be completed before 2024. A comprehensive search of the FAA Airport Capital Improvement Programs for the identified Study Airports yielded no substantive runway endpoint or elevation changes within the timeline horizons of this EA.

The same significance thresholds used to determine impacts associated with the Preferred Alternative are applied to determine significant cumulative impacts. Because there is no potential for impact, those environmental resource categories that are not affected by the Preferred Alternative (listed in Section 4.2) are not further evaluated for cumulative impacts. Similarly, if no impacts to an environmental resource category were identified under the Preferred Alternative when compared to the No Action, then no further analysis for cumulative impacts was required. Resource categories in which no impacts were identified that would warrant further analysis for cumulative impacts from this Project or the past, present, and reasonably foreseeable future actions include Noise, Compatible Land Use, Department of Transportation Act, Section 4(f) Resources, Historic and Cultural Resources, Wildlife (Avian and Bat Species) and Migratory Birds, and Environmental Justice.

5.10.3 Potential Impacts – 2019 and 2024

As stated in Section 5.10.2, extensive research was conducted to identify relevant airport improvement projects related to runway changes in a vertical or horizontal manner. Sources reviewed included FAA, state, and local Capital Improvement Project lists and websites for all airports and associated state, county, and local planning, public works, and transportation agencies. No identified documents included information on past, present, and reasonably foreseeable future actions with the potential for direct or indirect effects on aircraft flight patterns within the General Study Area. Accordingly, no cumulative impacts would be anticipated for the Preferred Alternative when compared to the No Action for either 2019 or 2024.

THIS PAGE INTENTIONALLY LEFT BLANK