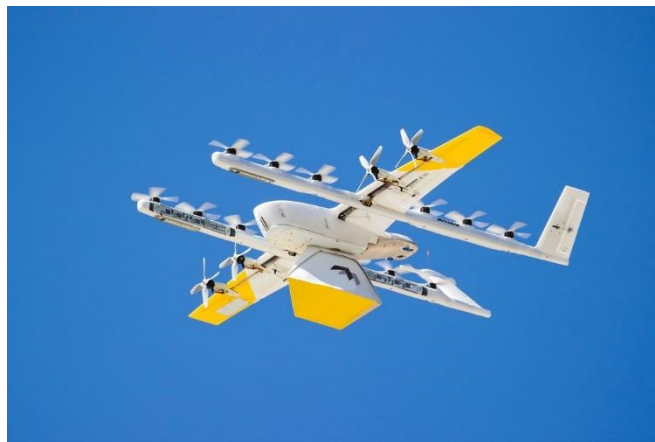




**Federal Aviation
Administration**

Draft Supplemental Environmental Assessment for Wing Aviation, LLC, Proposed Drone Package Delivery Operations in Dallas–Fort Worth, Texas



December 2024

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Washington, D.C.

Notice of Availability, Notice of Public Comment Period, and Request for Comment on the Draft Supplemental Environmental Assessment for Wing Aviation, LLC, Proposed Package Delivery Operations in Dallas–Fort Worth, Texas

The Federal Aviation Administration (FAA) provides notice that a Draft Supplemental Environmental Assessment (SEA), prepared pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321–4355), to assess Wing Aviation, LLC (Wing), proposed commercial drone delivery service in the Dallas-Fort Worth (DFW), Texas, metropolitan area is available for review and comment.

Wing is seeking to amend its air carrier Operation Specifications (OpSpec) and other FAA approvals necessary to expand commercial drone package delivery operations in Texas. The FAA’s approval of the amended OpSpec is considered a major federal action under NEPA and Council on Environmental Quality (CEQ) NEPA–implementing regulations (40 Code of Federal Regulations Parts 1500–1508) and requires a NEPA review. This Draft SEA is submitted for review pursuant to NEPA, CEQ NEPA Implementing Regulations, FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303), and Section 106 of the National Historic Preservation Act (16 U.S.C. § 470). The Draft SEA will be available for a 30-day public review beginning on Tuesday, December 3, 2024, and ending on Friday, January 3, 2025.

The Draft SEA is available for online review at https://www.faa.gov/uas/advanced_operations/nepa_and_drones

Comments on the Draft SEA may be submitted electronically to 9-FAA-Drone-Environmental@faa.gov. Written comments may be submitted via U.S. mail to the address below. Please ensure adequate time for receipt. All comments must be received by 5:00 p.m. Central Time on Friday, January 3, 2025.

Federal Aviation Administration, Suite 802W
C/O AVS Environmental
800 Independence Ave SW
Washington, DC 20591

All substantive comments received will be responded to in the Final SEA.

Privacy Notice: Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

This Draft SEA becomes a federal document when evaluated, signed, and dated by the Responsible FAA Official.

Responsible FAA Official:

_____ Date: _____

Derek Hufty
Manager, General Aviation and Commercial Operations Branch
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Table of Contents

Chapter 1 Purpose and Need	1-1
1.1 Introduction	1-1
1.2 FAA Role for Proposed Action	1-2
1.3 Purpose and Need	1-3
1.4 Public Involvement	1-3
Chapter 2 Proposed Action and Alternatives	2-1
2.1 No Action Alternative	2-1
2.2 Proposed Action	2-1
2.2.1 Unmanned Aircraft Specifications	2-5
2.2.2 Flight Operations	2-7
Chapter 3 Affected Environment and Environmental Consequences	3-1
3.1 Introduction	3-1
3.2 Environmental Impact Categories Not Analyzed in Detail	3-2
3.3 Air Quality and Climate	3-4
3.3.1 Definition of Resource and Regulatory Setting	3-4
3.3.2 Affected Environment	3-4
3.3.3 Environmental Consequences	3-6
3.4 Biological Resources (Including Fish, Wildlife, and Plants)	3-11
3.4.1 Definition of Resource and Regulatory Setting	3-11
3.4.2 Affected Environment	3-12
3.4.3 Environmental Consequences	3-16
3.5 Department of Transportation Act, Section 4(f) Resources	3-20
3.5.1 Definition of Resource and Regulatory Setting	3-20
3.5.2 Affected Environment	3-21
3.5.3 Environmental Consequences	3-21
3.6 Historical, Architectural, Archaeological, and Cultural Resources	3-22
3.6.1 Definition of Resource and Regulatory Setting	3-22
3.6.2 Affected Environment	3-23
3.7 Noise and Noise-Compatible Land Use	3-24
3.7.1 Definition of Resource and Regulatory Setting	3-24
3.7.2 Affected Environment	3-25
3.7.3 Environmental Consequences	3-26
3.8 Environmental Justice	3-29
3.8.1 Definition of Resource and Regulatory Setting	3-29
3.8.2 Affected Environment	3-30
3.8.3 Environmental Consequences	3-33
3.9 Visual Effects (Visual Resources and Visual Character)	3-35
3.9.1 Definition of Resource and Regulatory Setting	3-35
3.9.2 Affected Environment	3-35
3.9.3 Environmental Consequences	3-36
Chapter 4 Cumulative Effects	4-1

Appendices

A	References and Citations
B	Section 4(f)
C	List of Reviewers, Preparers and Agencies Consulted
D	Noise
E	Biological Resources
F	Government-to-Government Consultation with Federally Recognized Tribes
G	SHPO Consultation
H	Dallas-Fort Worth Area Airports
I	Existing Nest Locations
J	Cumulative Effects

Tables and Figures

Table	Page
Table 3.3-1. Attainment Status of Study Area Counties	3-5
Table 3.3-2. No Action Emissions (25 nests at 500 hours per year of emergency power)	3-9
Table 3.3-3. Comparison of Project Emissions to General Conformity De Minimis Thresholds	3-10
Table 3.4-1. ESA-Listed, Proposed, and Candidate Species Potentially Present Within the Study Area	3-13
Table 3.4-2. Dallas–Fort Worth Metro Songbird Species with Mobbing and Territorial Behaviors	3-15
Table 3.7-1. Estimated Extent of Daily Noise Exposure from Nest	3-27
Table 3.7-2. DNL Noise Exposure Contour Distances at an Offsite Package Autoloading Location	3-27
Table 3.7-3. DNL for Delivery Locations Based on Maximum Deliveries per Location	3-28
Table 3.8-1. Selected Demographic Characteristics (Race) by County	3-31
Table 3.8-2. Selected Demographic Characteristic (Poverty) by County	3-32
Table 3.8-3. Areas of EJ Concern.....	3-33

Figure	Page
Figure 2.2-1. Wing’s Proposed DFW Operating Area.....	2-3
Figure 2.2-2. Example Nest Location and Service Area in Little Elm, Texas.....	2-4
Figure 2.2-3. Wing Hummingbird 7000W-B UA	2-6
Figure 2.2-4. Wing Hummingbird 8000-A UA	2-6
Figure 2.2-5. Wing Hummingbird UA Nest Landing.....	2-8
Figure 2.2-6. Wing Hummingbird Remote Pickup Flight Profile	2-9
Figure 2.2-7. Wing Hummingbird and Autoloader	2-10
Figure 3.7-1. Class B and Class D Surface Areas.....	3-26

Acronyms and Abbreviations

ACS	American Community Survey
AGL	above ground level
APE	Area of Potential Effects
BVLOS	beyond visual line of sight
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibel

dba	A-weighted decibel
DFW	Dallas–Fort Worth
DNL	day-night average sound level
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FitBIT	fitness built-in test
FONSI	Finding of No Significant Impact
GeoBIT	geography built-in test
GHG	greenhouse gas
HHS	U.S. Department of Health and Human Services
IPaC	Information for Planning and Consultation
MBTA	Migratory Bird Treaty Act
metro	metropolitan
mph	miles per hour
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbons
NOA	Notice of Availability
NRHP	National Register of Historic Places
NWS	National Weather Service
OpSpec	Operations Specifications
PA	Programmatic Agreement
PM	particulate matter
PM _{2.5}	particulate matter equal to or less than 2.5 microns
PM ₁₀	particulate matter equal to or less than 10 microns
RMP	risk management plan

ROD	Record of Decision
SCC	social cost of carbon
SEA	Supplemental Environmental Assessment
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SEA	Supplemental Environmental Assessment
TAMIS	Texas Air Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
THPO	Tribal Historic Preservation Officer
U.S.C.	United States Code
UA	unmanned aircraft
UAS	Unmanned Aircraft System
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
Wing	Wing Aviation, LLC
WR	Written Re-evaluation

1.1 Introduction

Wing Aviation, LLC (Wing), a subsidiary of Alphabet, Inc., holds a Federal Aviation Administration (FAA) standard air carrier certificate under 14 Code of Federal Regulations (CFR) Part 135 (Part 135),¹ which allows holders to conduct on-demand cargo delivery operations, and a 49 United States Code (U.S.C.) Section 44807 exemption,² which allows Wing to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) using its Hummingbird Unmanned Aircraft System (UAS). Wing's Part 135 certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in its Operations Specifications (OpSpec).^{3,4} Wing is seeking to amend its OpSpec to expand its unmanned aircraft (UA, also referred to as a drone) commercial package delivery operations in the Dallas–Fort Worth (DFW) metropolitan (metro) area (see Figure 2.2-1).

Wing is currently authorized to conduct package delivery operations from 25 “nests”⁵ to communities throughout the DFW area. Each nest houses between 6 and 24 launch pads, and the drones have a delivery range of approximately 6 miles. Operations are currently authorized for up to 400 deliveries per operating day per nest. The FAA prepared an Environmental Assessment (EA) for Wing's operations in Frisco and Little Elm and issued a Finding of No Significant Impact (FONSI) and a Record of Decision (ROD) on February 9, 2022 (FAA 2022). The 2022 EA considered up to 100 deliveries per day in Frisco and Little Elm. After completion of the 2022 EA, Wing requested to add a third nest within the operating area that was previously analyzed as part of that EA. In response to Wing's request, the FAA prepared a Written Re-evaluation (WR) in accordance with FAA Order 1050.1F to determine if a supplemental EA was needed.⁶ In 2023, a second WR was prepared for a replacement location of an existing nest, to be located approximately 2.52 miles northeast of the existing Frisco Station nest location and located entirely within the boundaries of Wing's previously analyzed operating area.⁷ Both WRs concluded that Wing's proposal conformed to the prior environmental documentation, that the data contained in the 2022 EA remained substantially valid, that there were no significant environmental changes, and that all pertinent conditions and requirements were met or would be met in the current action. The FAA prepared an additional EA for Wing's operations in the DFW metro area and issued a FONSI and ROD on November 11, 2023. The 2023 EA considered the establishment of up to 25 nests, expansion of the

¹ See https://www.faa.gov/uas/advanced_operations/package_delivery_drone.

² 49 United States Code (U.S.C.) § 44807 provides the secretary of transportation with authority to determine whether a certificate of waiver, certificate of authorization, or a certificate under 49 U.S.C. § 44703 or 44704 is required for the operation of certain unmanned aircraft system (UAS).

³ An Operations Specification is a document that defines the scope of aircraft operations that the Federal Aviation Administration (FAA) has authorized.

⁴ This is different than a concept of operations, or ConOps, which is generally a description of how a set of capabilities may be employed to achieve desired objectives.

⁵ A ground-based service area where unmanned aircrafts (UAs) are assigned and where flights originate and return.

⁶ Issued May 18, 2022.

⁷ Issued August 15, 2023.

operating area boundaries, and expansion of daily operations from 100 to 400 deliveries per day from each nest.

Wing is now proposing to expand its UA retail package delivery capabilities by extending hours of operations, increasing the number of nest locations, and providing remote pickup and delivery services. Wing's intent is to offer service throughout the DFW area from a network of nests, where each would serve a specific area, thereby avoiding an over-concentration of flights surrounding any given nest. Wing proposes a maximum of 75 nest locations, an increase of 50 above the 25 currently authorized nests, with locations to be determined, within the next two years. Wing's nests would continue to be located in commercially zoned areas, such as shopping centers, large individual retailers, and shopping malls. Wing would maintain its total number of daily operations per nest of 400 deliveries per operational day. Current Wing delivery operations occur between 7:00 a.m. and 7:00 p.m. Wing proposes to extend delivery operations to 7:00 a.m. to 10:00 p.m. In addition, operations would include low altitude (<8ft) in-nest hover checks, or fitness built-in tests (FitBITs) between 6:00 a.m. and 7:00 a.m. in preparation for the normal operational day which would begin no earlier than 7:00 a.m. Additional, higher hover flights (approximately 60 feet) may be performed up to 7 times per nest, per week, where the UA makes a separate hover flight to update the reference map of the nest; these flights are termed geography built-in tests (GeoBITs) because of their similarity to the FitBIT stationary hover flight over the nest.

The FAA's approval of the amended OpSpec is considered a major federal action under the National Environmental Policy Act (NEPA)⁸ and Council on Environmental Quality (CEQ) NEPA-implementing regulations⁹ and requires NEPA review. Wing prepared this Supplemental Environmental Assessment (SEA) under the supervision of the FAA¹⁰ to evaluate the potential environmental impacts that might result from the FAA's proposed action. This SEA is a supplement to the *Final Environmental Assessment and Finding of No Significant Impact and Record of Decision for Wing Aviation, LLC, Proposed Drone Package Delivery Operations in Dallas-Fort Worth, Texas*, dated November 11, 2023. Under NEPA, federal agencies are required to consider the environmental effects of proposed federal actions and to disclose to decision-makers and the interested public a clear and accurate description of the potential environmental impacts of proposed major federal actions. Additionally, under NEPA, federal agencies are required to consider the environmental effects of a proposed action, the reasonable alternatives to the proposed action, and a no action alternative (assessing the potential environmental effects of not implementing the proposed action). The FAA has established a process to ensure compliance with the provisions of NEPA through FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA 2015).

1.2 FAA Role for Proposed Action

In general, Congress has charged the FAA with the safety of air commerce in the United States. The FAA provides multiple approvals associated with package delivery proposals, such as a waiver of 14 CFR Section 91.113(b) to enable BVLOS operations, and a Certificate of Waiver or Authorization; however, the FAA's issuance of an OpSpec (or an amended OpSpec) to include package delivery flights in a specified operating area is the approval that ultimately enables UA operations. In addition, the FAA has specific

⁸ 42 U.S.C. § 4321 et seq.

⁹ 40 Code of Federal Regulations (CFR) Parts 1500–1508.

¹⁰ See 40 CFR § 1506.5(a).

statutory and regulatory obligations related to its issuance of a Part 135 certificate and the related OpSpec. The FAA is required to issue an operating certificate to an air carrier when it “finds, after investigation, that the person properly and adequately is equipped and able to operate safely under this part and regulations and standards prescribed under this part.” An operating certificate also specifies “terms necessary to ensure safety in air transportation; and ... the places to and from which, and the airways of the United States over which, a person may operate as an air carrier.” Also included in air carrier certificates is a stipulation that the air carrier’s operations must be conducted in accordance with the provisions and limitations specified in the OpSpec. In addition, the regulations specify that a Part 135 certificate holder may not operate in a geographical area unless its OpSpec specifically authorizes the certificate holder to operate in that area. The regulations implementing 49 U.S.C. Section 44705 specify that an air carrier’s approved OpSpec must include, among other things, “authorization and limitations for routes and areas of operations.” An air carrier’s OpSpec may be amended at the request of an operator if the FAA “determines that safety in air commerce and the public interest allows the amendment.” After making this determination, the FAA must take an action on the OpSpec amendment.

1.3 Purpose and Need

Wing is proposing to expand its current operations for UA commercial delivery service throughout the DFW metro area, which Wing, in its business judgment, has determined is appropriate given market demand. Wing’s proposal is to expand upon their authorized full-scale commercial UA delivery operations in the DFW metro area, which is further discussed in Section 2.2. Wing’s current operations in the DFW metro area have provided Wing with an opportunity to assess community response to commercial delivery operations. Wing’s findings from these operations were used as a basis for the business case to increase operations further throughout DFW.

The purpose of the Proposed Action is related to the FAA’s role and responsibility to review applications for safe flight and certification under Part 135. The Proposed Action is needed to meet consumer demand for package deliveries in the DFW area as identified by Wing and to expand their existing drone package delivery operations.

1.4 Public Involvement

The FAA created a Notice of Availability (NOA) with information about the Draft SEA and provided it to local, state, and federal officials, interest groups, and federally recognized tribes. The NOA was provided in English and Spanish. The FAA also announced availability of the Draft SEA for public review via the FAA’s social media and an advertisement in the *Dallas Morning News* and *Fort Worth Star-Telegram* newspapers. The NOA provided information about the proposed action and requested public review and comments on the Draft SEA, which was published on the FAA’s website¹¹ for a 30-day- comment period from December 3, 2024, to January 3, 2025. Interested parties were invited to submit comments on any environmental concerns related to the proposed action.

¹¹ See https://www.faa.gov/uas/advanced_operations/nepa_and_drones.

Chapter 2

Proposed Action and Alternatives

FAA Order 1050.1F, Paragraph 6-2.1(d) states that, “[a]n EA may limit the range of alternatives to the proposed action and no action alternative when there are no unresolved conflicts concerning alternative uses of available resources.” The FAA has not identified any unresolved conflicts concerning alternative uses of available resources associated with Wing’s proposal. Therefore, this SEA only considers the proposed action and the no action alternative.

2.1 No Action Alternative

The CEQ NEPA—implementing regulations require agencies to consider a no action alternative in their NEPA reviews to compare the environmental effects of not taking action with the effects of the action alternative(s).¹² Thus, the no action alternative serves as a baseline to compare the impacts of the proposed action. Under the no action alternative, Wing would not increase the number of nest locations, remote pickup operations or extend the operational hours of its authorized commercial UA package delivery operations in DFW. Wing could continue operating its Hummingbird UA (7000W-A or 7000W-B) within DFW under Part 135, which includes up to 400 deliveries per day from 25 nest locations, from 7:00 a.m. to 7:00 p.m., and at other locations under 14 CFR Part 107,¹³ which limits operations to UA weighing less than 55 pounds and within visual line of sight. Market demand would not be met, and consumers would continue to use personal ground transportation to retrieve small goods. This alternative does not support the stated purpose and need.

2.2 Proposed Action

The proposed action is Wing’s expansion of commercial drone package delivery operations in DFW. Under the proposed action, Wing would add additional nest locations and expand operating hours to 6:00 a.m. to 10:00 p.m. with flights only leaving the nest area between 07:00 a.m. and 10:00 p.m. while maintaining the current operational limit of 400 deliveries per nest per operating day. The proposed action would also introduce the use of the 8000-A UA, in addition to the 7000W-B UA, for delivery operations. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions. If, in the future, Wing wanted to exceed 75 nests in the operating area, additional NEPA reviews would be required. Operations, including nest placement and all UA delivery flights, would be confined to the operating area depicted in Figure 2.2-1.¹⁴

Nests would be distributed throughout the DFW metro area following a measured rollout plan to be developed with Wing’s partners and continuing best practices from Wing’s established community

¹² 40 CFR § 1502.14.

¹³ The Operation of Small Unmanned Aircraft Systems Over People rule (codified in 14 CFR Part 107) permits routine operation of small UAs (UAs weighing less than 55 pounds) within visual line of sight at night and over people without a waiver or exemption under certain conditions.

¹⁴ Modification of Wing’s operations plan requires approval in accordance with 14 CFR Part 135.

outreach program, and in compliance with state and local statutory and regulatory requirements. Wing's nests would be located in established parking lots of commercially zoned areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Installation activities are brief and would only involve the placement of fencing around the nest and the delivery of a shipping container for UA storage. Remote pickup infrastructure consisting of an autoloader (Figure 2.2-7) would be installed within existing or proposed nests or at offsite locations, utilized during limited remote pickup and delivery operations, and would also be located within commercial areas. Individual autoloader locations (either within a nest or offsite) would typically include up to three autoloaders within or in the vicinity of most nest sites, with a handful more distributed locations having up to 10 autoloaders, depending on market demand, for a total installation of 100-300 autoloaders distributed throughout the operating area. The autoloaders would consist of "Y"-shaped passive stands designed for automated pick up of packages without landing. Autoloaders would not require ground disturbance for installation and would be anchored through existing pavement, to existing poles, or ballasted for temporary use. The autoloaders would be controlled and operated by Wing and its partners, would be approximately 10 feet tall, 7 feet wide at the mouth, and 6 feet long, and would include a clear zone of approximately 2 parking spaces. Remote pickups are described further in Section 2.2.2.6, *Remote Pickup Operations*.

To avoid the potential for significant noise impacts, Wing would site its nests and autoloaders at least 120 feet away from a noise-sensitive area¹⁵ when the nest is located within the controlled surface area of Class B and Class D airspace¹⁶ (refer to Figure 3.7-1) and at least 65 feet away from a noise-sensitive area in all other areas within the study area, which is defined as Wing's proposed operating area (see Figure 2.2-1). Offsite autoloader and pickup flight paths would not occur within 80 feet from a noise-sensitive area when the autoloader is located within the controlled surface area of Class B and Class D airspace and 45 feet away from noise-sensitive areas in all other areas within the study area.

Each nest would serve an area within a 6-mile radius for package delivery (Figure 2.2-2). Remote package pick-ups would serve an area within a 1-mile radius of the remote package pick-up location due to flight energy constraints. Initially, Wing expects to fly considerably less than 400 deliveries per day from each nest and then gradually increase to 400 deliveries per day as consumer demand rises. Even in the locations where the service areas of nests overlap (see Figure 2.2-2), Wing would not exceed 400 deliveries or overflights in a given location. Proposed delivery and GeoBit operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include FitBITS between 6:00 a.m. and 7:00 a.m.

¹⁵ A *noise-sensitive area* is an area where noise interferes with normal activities associated with its use. Normally, noise-sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites (FAA Order 105.1F, Paragraph 11-5.b(10)).

¹⁶ Class B airspace is generally airspace from the surface to 10,000 feet mean sea level (MSL) surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. Class D airspace is generally airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. For more information, see <https://www.faa.gov/regulationspolicies/handbooksmanuals/aviation/phak/chapter-15-airspace>.

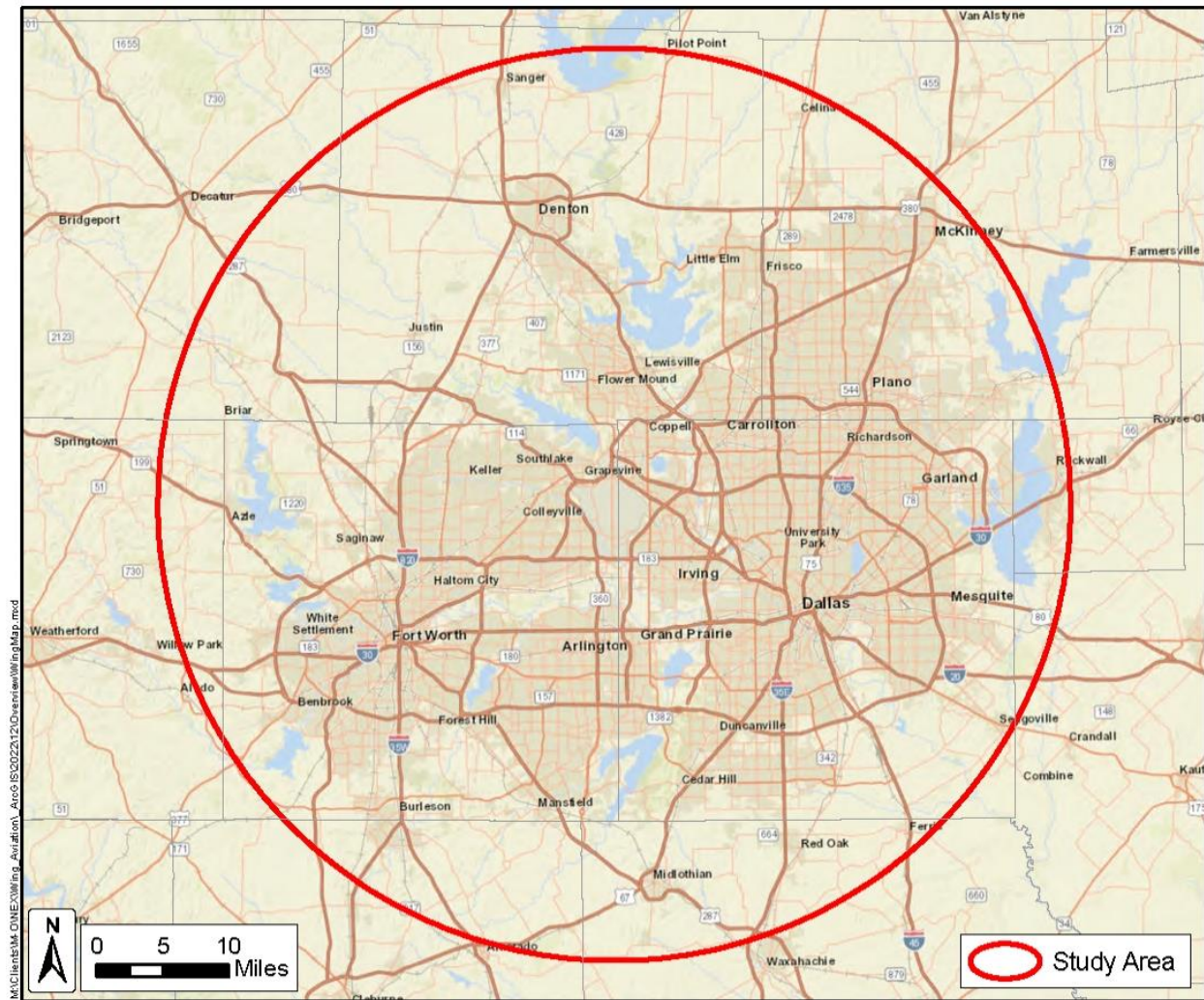


Figure 2.2-1. Wing's Proposed DFW Operating Area

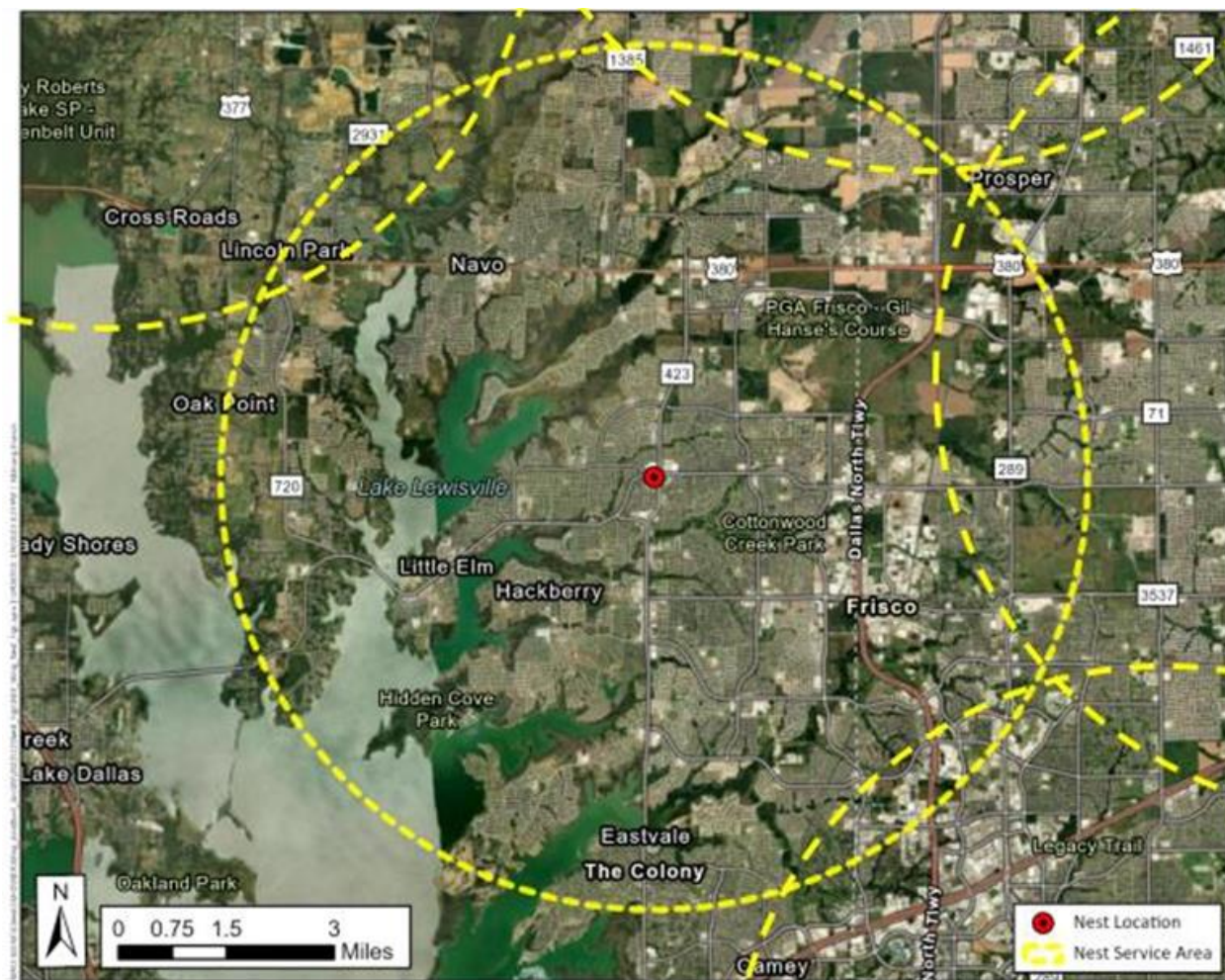


Figure 2.2-2. Example Nest Location and Service Area in Little Elm, Texas

Each nest would contain up to two dozen (24) aircraft on launch pads, and one or more merchants may be partnering with Wing at each nest for drone deliveries. The estimated total distance flown for deliveries would vary depending upon the pickup and drop-off locations in the operating area. The majority of delivery flights would consist of transport of a package from the nest to a customer delivery address before returning to the nest. There would be variability in the number of flights per day based on customer demand and weather conditions.

Wing would also conduct offsite operations of limited remote pickup and delivery flights in which the drone would transit from the nest to an offsite location, pick up a package, then deliver the package to the customer before returning back to the nest. Autoloaders would be installed at remote pickup locations, typically within 1,000 feet of a nest and within the same commercial area and would enable drone package delivery for Wing's commercial partners that are not located in the immediate vicinity of a nest. Remote pickup is expected to be complementary to typical package delivery operations and is anticipated to make up less than 50 percent of total operations. However, based on demand, some dedicated remote pickup nests would also be established in the vicinity of four (4) to 10 partner sites located in areas adequately isolated from noise sensitive receptors.

The UA would be transporting consumer goods in partnership with merchants in the communities they already serve and would provide an alternative to in-store pickup. Deliveries would be conducted at the time of the customer's choosing and directly to the customer's home in the operating area.

Wing's flight planning software can automatically avoid identified schools (elementary, middle, and high school), preschools, or daycares with outdoor facilities based on the type of resource, time of day, and other factors.¹⁷ Wing has confirmed to the FAA that it will generally not conduct operations over these "fly less"¹⁸ areas during the scope of operations covered by this proposed action, including remote pickups, unless there is a specific purpose for Wing to enter one of these areas in coordination with the respective resource authority. Remote pickups would be further limited to continuous commercially zoned areas and corridors without noise sensitive receptors. In addition, Wing's flight planning software is designed to increase variability in flight paths to minimize overflights of any given location; with the diversification of flight paths, the frequency of overflights would inversely scale as the distance from a nest increases.

2.2.1 Unmanned Aircraft Specifications

Two UAs would be primarily used for deliveries: Wing's Hummingbird 7000W-B and 8000-A.¹⁹

- Hummingbird 7000W-B.
 - Multi-rotor design with 16 round diameter propellers (Figure 2.2-3).
 - Weight under 15 pounds when combined with its maximum payload weight of 2.7 pounds.
 - Has a wingspan of approximately 4.9 feet, a height of approximately 1 foot, and a length of 4 feet.
- Hummingbird 8000-A.
 - Multi-rotor design with 12 round diameter propellers (Figure 2.2-4).
 - Weight under 25 pounds when combined with its maximum payload weight of 5 pounds.
 - Has a wingspan of approximately 6 feet, a height of approximately 1 foot, and a length of approximately 6.2 feet.

All Wing aircraft use electric power from rechargeable lithium-ion batteries.

Wing anticipates the updated DFW fleet makeup would be comprised of 70 to 80 percent 7000W-B aircraft and 20 to 30 percent 8000-A aircraft. The fleet mix of individual nests would be variable based on payload, route, and demand characteristics; nests with a wider range of offerings are anticipated to carry higher proportions of 7000W-B Aircraft.

¹⁷ Wing's flight planning software is updated monthly. Wing distributes flight routes to avoid concentrating flights over any one location.

¹⁸ Fly less areas are properties that Wing identifies in its flight planning system, which can be automatically avoided based on the type of resource, time of day, and other factors. Wing has committed in its operational proposal to the FAA that it will generally avoid overflights of these fly less resources in the DFW operating area.

¹⁹ The 7000W-A UA may remain in use for low volume nests or specific use cases in less noise sensitive areas while the current supply of UAs are exhausted.



Figure 2.2-3. Wing Hummingbird 7000W-B UA



Figure 2.2-4. Wing Hummingbird 8000-A UA

2.2.2 Flight Operations

The UA²⁰ would generally be operated at an altitude of 150–300 feet above ground level (AGL) and always below an altitude of 400 feet AGL while en route to and from delivery locations. At a delivery location, the UA would descend vertically to a stationary hover at 23 feet AGL and lower a package to the ground by a retractable line for delivery. Once a package has been lowered to the ground, the UA would then retract the line, ascend vertically to a cruise altitude, and depart the delivery area en route back to a nest.

The UA would fly a predefined flight path that is set prior to takeoff. Flight missions are automatically planned by Wing's flight planning software. A mission originates from a nest location, and Wing's software automatically assigns, deconflicts, and routes each flight to the delivery location and back to a nest. Each nest site would include a controlled area wherein UA flights are launched and recovered.

A typical flight profile can be broken into the following general flight phases: takeoff, en route outbound, delivery, en route inbound, and landing. Remote pickup procedures are described in Section 2.2.2.6.

Note: Each aircraft must complete a daily set of preflight checks before being assigned a delivery mission. These include a brief low height hover flight where the UA exercises various systems. These are termed FitBIT or Fitness Built In Test and are at a height of approximately 6 feet for approximately 1 minute. Additional, higher hover flights (approximately 60 feet) may be occasionally performed, up to 7 times per nest, per week, where the UA makes a separate hover flight to update the reference map of the nest; these flights are termed GeoBITs because of their similarity to the FitBIT stationary hover flight over the nest.

2.2.2.1 Takeoff

Once the UA receives a mission and is cleared for takeoff from a launch pad, the UA takes off from the ground vertically to an altitude of 23 feet AGL and hovers for 30 seconds while the package is loaded. The UA then climbs to the en route altitude (150–300 feet AGL).

2.2.2.2 En Route Outbound

The en route outbound phase is the part of flight in which the fully loaded UA transits from the nest or a remote pickup location to a delivery point on a predefined flight path. During this flight phase, the UA would typically operate at an altitude of 150–300 feet AGL and a typical airspeed of 59 miles per hour (mph). The UA has a single set cruise airspeed, which would not be exceeded.

2.2.2.3 Delivery

The delivery phase consists of descent from the en route altitude to a delivery point, such as a residential yard, driveway, parking lot, or common area. The UA descends vertically to 23 feet AGL while maintaining position over the delivery point. The UA hovers at 23 feet AGL for approximately 30 seconds while lowering its package and then proceeds to climb vertically back to en route altitude. The minimum distance a human should be from the UA during delivery is a 6-foot radius from underneath the center of the UA.

²⁰ The flight profiles of the 7000W-B and the 8000-A would be the same.

2.2.2.4 En Route Inbound

The UA continues to fly at an altitude of 150–300 feet AGL and a speed of 59 mph towards the nest.

2.2.2.5 Landing

Upon reaching the nest, the UA slowly descends over its assigned landing pad and lands on the pad (Figure 2.2-5).



Figure 2.2-5. Wing Hummingbird UA Nest Landing

2.2.2.6 Remote Pickup Operations

Remote pickup operations from each nest would be supported at up to 12 partner establishments depending upon demand and nest capacity. Pickup operations would follow general flight phases and parameters identical to typical delivery operations and would include the addition of a pickup phase. The pickup phase is similar to the delivery phase. The UA descends from its close transit altitude (safe altitude above local terrain and obstacles) to 14.5 feet AGL and lowers the package hook. The UA then passes approximately 10 feet laterally over the autoloader. The autoloader's Y-shaped poles passively guide the package hook to a narrow slot that ensures secure attachment of the package. The package is then retracted to the UA before it proceeds to climb to the en route altitude. Remote pickup operations from descent to finish are expected to take no longer than 1 minute and 30 seconds (90 seconds). Delivery, en route return, and land operations would then

occur as described in Sections 2.2.2.3 through 2.2.2.5. The flight profile of remote pickup operations is illustrated in Figure 2.2-6 and the autoloader is illustrated in Figure 2.2-7.

Note: Manual remote pickups loading may also be performed by a person and without a physical autoloader. The profile would be similar to the Autoloader pickup profile outlined above but would omit the lateral transition for autoloader engagement.

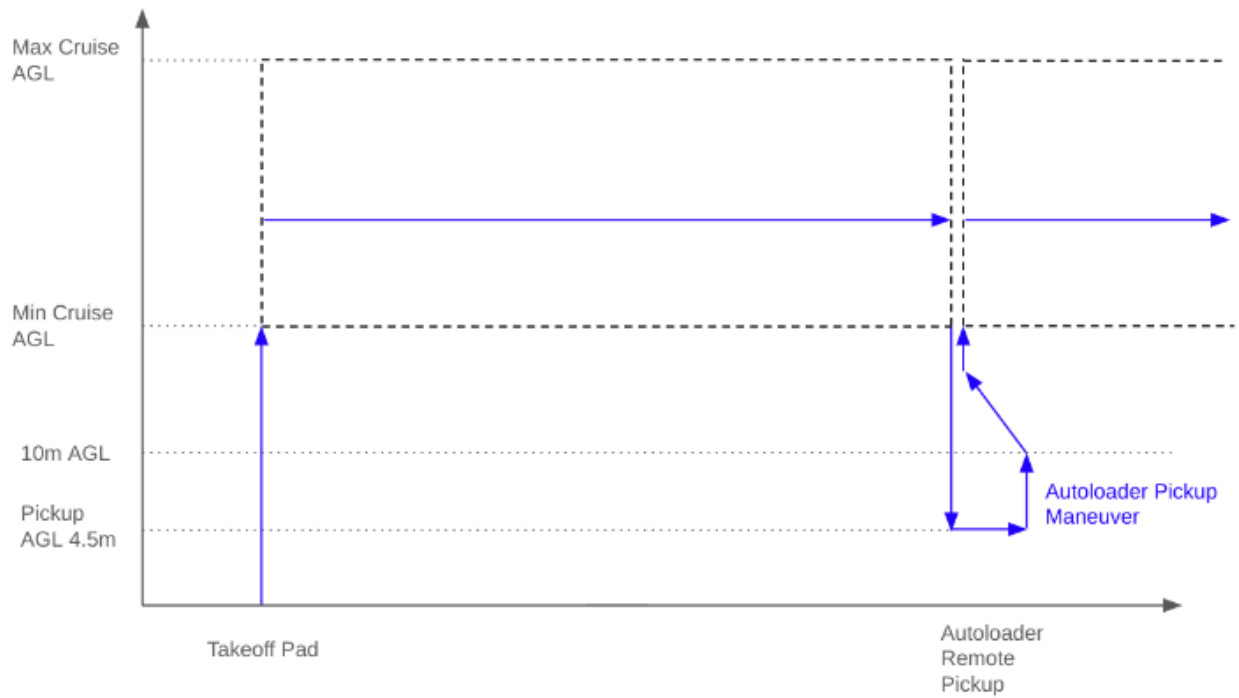


Figure 2.2-6. Wing Hummingbird Remote Pickup Flight Profile



Figure 2.2-7. Wing Hummingbird and Autoloader

Chapter 3

Affected Environment and Environmental Consequences

3.1 Introduction

This chapter provides a description of the affected environment and potential environmental consequences for the environmental impact categories that have the potential to be affected by the no action alternative and proposed action, as required by CEQ's NEPA-implementing regulations and FAA Order 1050.1F, *Environmental Policies and Procedures* (FAA 2015). As required by FAA Order 1050.1F, this SEA presents an evaluation of impacts for the environmental impact categories listed below.

- Air quality
- Biological resources (including fish, wildlife, and plants)
- Climate
- Coastal resources
- Department of Transportation Act, Section 4(f)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archaeological, and cultural resources
- Land use
- Natural resources and energy supply
- Noise and noise-compatible land use
- Socioeconomics, environmental justice, and children's environmental health and safety risks
- Visual effects (including light emissions)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

The study area evaluated for potential impacts is defined as Wing's proposed operating area shown in Figure 2.2-1. The level of detail provided in this chapter is commensurate with the importance of the potential impacts (40 CFR § 1502.15). EAs are intended to be concise documents that focus on aspects of the human environment that may be affected by the proposed action.

3.2 Environmental Impact Categories Not Analyzed in Detail

This SEA did not analyze potential impacts on the following environmental impact categories in detail because the proposed action would not affect the resources included in the category (see FAA Order 1050.1F, Paragraph 4-2.c).

- **Coastal Resources:** The proposed action would not directly affect any shorelines or change the use of shoreline zones and be inconsistent with any National Oceanic and Atmospheric Administration–approved state Coastal Zone Management Plan as there are no shorelines in the area of operations. The study area is approximately 250 miles from the nearest shoreline. The Texas Coastal Zone was reviewed from the Texas Coastal Management Program on August 12, 2024 (Texas Coastal Management Program 2024).
- **Farmlands:** The proposed action would not involve the development or disturbance of any land regardless of use, nor would it have the potential to convert any farmland to non-agricultural uses. Remote pick-up infrastructure (i.e., autoloader) would be installed within existing or proposed nests or at offsite locations and would be located within existing commercial areas. The proposed action would not affect designated prime or unique farmlands.
- **Hazardous Materials, Solid Waste, and Pollution Prevention:** The proposed action would not result in any construction or development or any physical disturbances of the ground. Therefore, the potential for impact in relation to hazardous materials, pollution prevention, and solid waste is not anticipated. Additionally, each Wing UA is primarily made from recyclable materials and the only hazardous materials used in its manufacture and operation are lithium-ion batteries. Each Wing UA will be properly managed at the end of its operating life in accordance with 14 CFR Part 43. Any hazardous materials would be disposed of in accordance with all federal, tribal, state, and local laws, including 40 CFR Part 273, *Standards for Universal Waste Management*.
- **Land Use:** The proposed action does not involve any changes to existing, planned, or future land uses within the area of operations. Wing would use current infrastructure, such as parking lots, to conduct its operations. Land use and zoning are typically governed by local and state laws. Wing is responsible for complying with any such applicable laws relevant to establishing its operations (e.g., siting drone nests, autoloader, and related infrastructure). All nest and autoloader locations would be sited in accordance with all local land use ordinances and zoning requirements. Local jurisdictions in the DFW metro area may vary in the scope of their review and approval of commercial operations. Further, Section 2.2, *Proposed Action*, identifies the stand-off distances from noise-sensitive areas.
- **Natural Resources and Energy Supply:** The proposed action would not require the need for unusual natural resources and materials, or those in scarce supply. Wing's aircraft would be battery powered and would not consume fossil fuel (e.g., gasoline or aviation fuel) resources. The fuel for operation of generators is expected to be in relatively low quantities that are available from the local supply. Wing would use a charging pad (approximately 1 square meter in size) to charge the batteries of the UA. In addition, Wing's electrically powered aircraft is most often used to replace individual personal automobile trips to retrieve small goods and would therefore be expected to reduce consumption of fuel resources; a 2020 study found that by year 5 of drone operations in a single U.S. metropolitan area, drone delivery could avoid up to 294 million miles per year in road use (Lyon-Hill et al. 2020).

- **Socioeconomics and Children’s Environmental Health and Safety Risks:** The proposed action would not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community. Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to ensure that children do not suffer disproportionately from environmental or safety risks. The proposed action would not affect products or substances a child would be likely to come into contact with, ingest, use, or be exposed to, and would not result in environmental health and safety risks that could disproportionately affect children. It is not anticipated that the proposed action would pose a greater health and safety risk to children than package delivery by other means (truck, mail, personal automobile trips, etc.). Additionally, Wing’s proposal includes avoiding fly less areas during operational hours, which could help avoid or reduce any potential environmental health or safety impacts on children. Wing’s electrically powered aircraft is most often used to replace individual personal automobile trips to retrieve small goods and would therefore reduce noxious emissions and improve road safety, which are both appreciable concerns for children.
- **Visual Effects (Light Emissions Only):** The proposed action would not result in significant light emission impacts because the majority of flights are expected to be conducted during the daytime. Light emissions would not noticeably affect the visual character or ambient light conditions of the study area. The small proportion of flights that do occur at night would likely be infrequent and of short duration, although flight cadence would vary depending on the location and partners served by an individual nest. Because of the overall small number of operations likely to be conducted between twilight and 10:00 p.m., the proposed action would not result in significant light emission impacts due to nighttime operations. Night is defined by 14 CFR Section 1.1 as the time between the end of evening civil twilight²¹ and the beginning of morning civil twilight, as published in the *Air Almanac*, converted to local time (U.S. Department of the Navy 2022).
- **Water Resources (Wetlands, Floodplains, Surface Water, Groundwater, and Wild and Scenic Rivers):** The proposed action would not result in the construction of facilities and would therefore not encroach upon areas designated as navigable waters, wetlands, or floodplains. The proposed action would not affect any waters of the U.S. The proposed action would not result in any changes to existing discharges to water bodies, create a new discharge that would result in impacts on surface waters, or modify a water body. The proposed action would not degrade water quality or contaminate public drinking water supplies. The proposed action does not involve activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to groundwater resources through the introduction of new impervious surfaces. The closest wild and scenic river to the study area is the Cassatot River in Arkansas, approximately 150 miles northeast of the study area (National Park Service 2024b). The closest Nationwide Rivers Inventory river segment is the Brazos River approximately 22 miles west of the study area (National Park Service 2024c). Therefore, nest establishment and operations would not affect a wild and scenic river or river on the Nationwide Rivers Inventory. The proposed action does not have the potential to disrupt the free-

²¹ According to the National Oceanic and Atmospheric Administration National Weather Service, civil twilight begins in the morning, or ends in the evening, when the geometric center of the sun is 6 degrees below the horizon. Therefore, morning civil twilight begins when the geometric center of the sun is 6 degrees below the horizon, and ends at sunrise. Evening civil twilight begins at sunset, and ends when the geometric center of the sun is 6 degrees below the horizon (National Oceanic and Atmospheric Administration National Weather Service n.d.).

flowing character of any designated wild and scenic river. *Therefore, the proposed action would not affect wetlands, floodplains, surface water, groundwater, or wild and scenic rivers.*

3.3 Air Quality and Climate

3.3.1 Definition of Resource and Regulatory Setting

This section provides an overview of air quality and climate resources within the study area. Air quality refers to the condition of the atmosphere as it relates to the presence and concentrations of pollutants, which can affect human health, ecosystems, and the climate. The quality of the air is influenced by factors such as the type and number of pollutants emitted into the atmosphere, the physical geography (topography) of the air basin, and meteorological conditions like wind patterns, temperature, and precipitation. Climate pertains to the long-term patterns of temperature, precipitation, and atmospheric conditions that characterize the region. These patterns influence and are influenced by air quality through interactions between pollutants and atmospheric processes.

National Ambient Air Quality Standards (NAAQS) 40 CFR Parts 50–51, Title V of the Clean Air Act (CAA) Part 70, 40 CFR Parts 61 and 63 (National Emission Standards for Hazardous Air Pollutants), and 40 CFR Part 70 (Operating Permits) set standards for pollutants to attempt to control levels that may affect public health and the environment. Pollutants regulated under the CAA that have established NAAQS include six (6) common air pollutants also known as “criteria” air pollutants. These include particulate matter (PM) (further segregated to particulate matter equal to or less than 10 microns [PM₁₀] and particulate matter equal to or less than 2.5 microns [PM_{2.5}]), ozone (O₃), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and lead (Pb).

Section 112(r) of the CAA and 40 CFR Part 68 require preparation of a risk management plan (RMP) if reportable quantities of regulated and extremely hazardous chemicals are used. The regulated substances and threshold quantities are provided in 40 CFR 68.130. However, under 40 CFR Section 68.126, flammable substances listed in Tables 3 and 4 of Section 68.130 are exempt from RMP requirements when used as fuels or held for sale as fuels at retail facilities. The fuel for operation of generators in this project is expected to be in relatively low quantities, sourced from the local supply, and used solely as fuel. Therefore, it is not anticipated that the project would require the preparation of an RMP, as the use and storage of regulated and extremely hazardous chemicals are expected to remain below the reportable threshold quantities outlined in 40 CFR Section 68.130 and would qualify for the fuel use exemption.

FAA Order 1050.1F provides guidance for greenhouse gasses (GHGs) and climate considerations under NEPA. To assess GHGs, incremental changes in CO₂ emissions during the proposed action should be considered to accomplish an FAA NEPA review. Analysis of GHG emissions may be qualitative or quantitative to identify impacts on the overall climate.

3.3.2 Affected Environment

The study area includes 10 counties in the DFW, Texas, region: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise. This region is characterized by its diverse meteorological conditions within a humid subtropical climate zone (National Weather Service [NWS] n.d.-a). Summers in the DFW area are typically hot and humid, with temperatures often exceeding 95°F. Winters are mild,

with daytime temperatures averaging between 50–60°F. January is generally the coldest month. The region is also susceptible to severe weather events, including thunderstorms, tornadoes, and occasional impacts from remnants of hurricanes (National Weather Service n.d.-b).

The ambient pollutant levels in the study area vary and would depend on the uses and activities in the immediate vicinity. Existing emission sources in the study area are primarily anthropogenic and associated with commercial, industrial, transportation (e.g., highways, rail, and air travel), and residential land uses in an urban environment. For example, emissions near major highways or large commercial centers within the study area are generally higher due to consistent vehicle traffic and freight operations, while emissions in more residential or undeveloped areas are typically lower. Thus, ambient emissions in more urban counties within the study area, such as Dallas County, are likely to be higher than ambient emissions in more suburban or rural counties within the study area, such as Parker County.

The NWS and the Texas Commission on Environmental Quality (TCEQ) provide weather monitoring and support, using models that assist in evaluating atmospheric conditions, including temperature, barometric pressure, wind speeds, and potential air quality impacts under various scenarios. TCEQ maintains the Texas Air Monitoring Information System (TAMIS), which makes data from air quality monitoring stations statewide publicly available (Texas Commission on Environmental Quality 2024). Ambient air monitoring records from stations in these counties are used to characterize the existing air quality. Monitoring sites measure pollutants such as O₃ and PM_{2.5} and PM₁₀ to determine compliance with NAAQS standards. There are approximately 40 active monitoring stations in the study area that measure criteria pollutants. The past three years of observations show that concentrations of CO, Pb, PM, and SO₂ are less than the NAAQS (Texas Commission on Environmental Quality 2024). Ozone concentrations exceeded the NAAQS at 14 of 18 ozone monitoring sites in the Dallas region for the most recent three years of observations (EPA 2024a).

Air quality in the study area is assessed at the county level and is regulated by federal and state agencies, including the U.S. Environmental Protection Agency (EPA) and the TCEQ. If the air quality in a geographic area meets or is cleaner than the national standard, it is designated an attainment area; areas that don't meet the national standard are designated nonattainment areas. The study area includes both attainment and nonattainment areas for NAAQS. All but one county in the DFW area is in both severe non-attainment for O₃ (2008 standard) and serious non-attainment for O₃ (2015 standard). Additionally, a portion of Collin County is designated maintenance for Pb, meaning it previously did not meet the NAAQS for Pb but has since achieved compliance and must now follow a maintenance plan. The counties are in attainment for all criteria pollutants other than O₃. Table 3.3-1 includes the O₃ attainment status of the study area counties.

Table 3.3-1. Attainment Status of Study Area Counties

County	Attainment Status for 8-Hour O₃ (2008 Standard)	Attainment Status for 8-Hour O₃ (2015 Standard)
Collin	Nonattainment (Severe)	Nonattainment (Serious)
Dallas	Nonattainment (Severe)	Nonattainment (Serious)
Denton	Nonattainment (Severe)	Nonattainment (Serious)
Ellis	Nonattainment (Severe)	Nonattainment (Serious)
Johnson	Nonattainment (Severe)	Nonattainment (Serious)
Kaufman	Nonattainment (Severe)	Nonattainment (Serious)

County	Attainment Status for 8-Hour O ₃ (2008 Standard)	Attainment Status for 8-Hour O ₃ (2015 Standard)
Parker	Nonattainment (Severe)	Nonattainment (Serious)
Rockwall	Nonattainment (Severe)	Attainment
Tarrant	Nonattainment (Severe)	Nonattainment (Serious)
Wise	Nonattainment (Severe)	Nonattainment (Serious)

Source: NAAQS (EPA 2024b) and EPA Green Book (EPA 2024c)

O₃ = ozone.

GHGs are gas emissions from natural processes and human activities that trap heat in the atmosphere. Increasing global temperatures over the past century have been scientifically correlated to increasing GHG emissions due to human activities (NASA Earth Observatory 2023). Climate change induced by global warming may result in rising sea levels, more severe weather events, loss of habitat and economic and socio-political effects such as reduced food security. The FAA has not established a significance threshold for climate.

The specific climate risks in the study area region include rising temperatures, heatwaves, drought, and flooding (City of Dallas 2020). Rapid urbanization in the area has exacerbated these issues by increasing resource demand and amplifying the urban heat island effect. Water resources are also under pressure from fluctuating precipitation patterns and extended droughts, creating challenges for agriculture, industry, and residential needs.

Like criteria pollutants, existing GHG emission sources in the study area are primarily anthropogenic and associated with commercial, industrial, transportation, and residential land uses in an urban environment. Emissions from these sources consist predominantly of carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), with CO₂ accounting for the majority due to fossil fuel combustion (EPA 2023). In the study area, GHG emissions near nest installation areas (commercially zoned parking lots) would be consistent with typical emissions levels for high-traffic commercial and transportation hubs.

3.3.3 Environmental Consequences

3.3.3.1 No Action Alternative

Under the no action alternative, the analysis completed for the 2023 EA would remain valid. Existing sources of air emissions in the region—such as passenger and freight vehicle traffic, construction activities, and other commercial and industrial operations—would continue to occur. The long-term reduction in emissions from the additional 50 nests for increased drone delivery operations replacing vehicle miles traveled by conventional delivery vehicles, as described in Section 3.3.3.2, *Proposed Action*, would not be realized. Consequently, emissions associated with delivery services would remain at current levels.

3.3.3.2 Proposed Action

Background

Air emissions related to the proposed action could include those associated with the operation of generators; vehicular traffic to and from the sites for installation, maintenance, and package drop-offs; and any incidental emissions from construction or maintenance activities, such as the use of small

equipment or delivery vehicles. The UA is battery powered and does not generate emissions that could result in air quality impacts or climate impacts.

Vehicular traffic and incidental emissions from installation and maintenance are not carried forward for further analysis because they are infrequent, temporary, and minimal. Installation activities are brief and would have negligible impacts on air quality, involving only the placement of fencing around the nest and the delivery of a shipping container for UA storage. While package drop-offs to the nests would not be infrequent, they would likely be over very short distances. These activities align with routine commercial operations in urban areas and are expected to be negligible and not lead to a NAAQS violation. Further, the proposed action is expected to decrease emissions from delivery services that contribute to GHG emissions. The decreased emissions would have positive effects on climate change as the proposed action would replace vehicle miles traveled by GHG-emitting vehicles for package pickup. Based on a 2020 study of drone delivery operations, drones were projected to replace between 11.2 percent and 18.7 percent of total delivery miles previously made by automobiles, or between 11.3 million miles and 96 million miles by year 5 of operations (Lyon-Hill et al. 2020). Therefore, any minor increase in vehicle trips due to the proposed action's installation and maintenance activities would be outweighed by the long-term reduction in trips.

Thus, the focus of this analysis is the generator usage during nest installation. Unlike the 2023 EA, which evaluated generators for emergency power only, this assessment of the proposed action includes the use of generators during the initial phases of site installation, referred to as "transition power." This differs from "emergency power," which provides backup electricity when the primary power source becomes unavailable due to outages. Transition power would serve as a temporary energy source during the lag period between the installation of nests and their connection to the power grid at a rate of up to 1,700 hours of generator operation per year per nest.²²

Direct Emissions

Generator use during the lag period would be infrequent and limited to the duration necessary for site installation and grid connection. Additionally, the 50 proposed nests would not be installed simultaneously but phased in over several years. This gradual implementation minimizes the overall emissions profile during the installation phase, making the following analysis of emissions from generator use for all 50 nests conservative (high).

The emissions are calculated based on the 1,700 annual hours per nest of generator usage during the transitional power period, assuming that the Allmand Maxi-Power 25 generator would be used.

Because the study area counties are in non-attainment for O₃ (Table 3.3-1), and one county is in maintenance for Pb, a general conformity analysis must be conducted. Table 3.3-2 calculates the total estimated emissions from generator usage, focusing on the emissions of concern: O₃ and Pb. These emissions are then compared to the CAA de minimis thresholds in Table 3.3-3.

O₃ is not directly emitted by generators or other combustion sources. Instead, it forms through photochemical reactions involving volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

²² The U.S. Environmental Protection Agency (EPA) provides guidance on calculating the potential to emit for emergency generators, recommending a default assumption of 500 hours per year for estimating maximum operational hours under worst-case conditions (EPA 1995). However, the proposed action anticipates generator use that exceeds the EPA's assumption for emergency generator operations.

Therefore, this analysis focuses on VOCs (also referred to as non-methane hydrocarbons [NMHCs]) and NO_x emissions. NMHCs are a subset of hydrocarbons that exclude methane and are often used as a proxy for VOCs in emissions inventories because they represent the reactive compounds that contribute to ozone formation (Intergovernmental Panel on Climate Change n.d.). For this reason, Table 3.3-2 uses NO_x and NMHC to estimate O₃-related emissions.

Similarly, PM is used as a proxy for Pb emissions in Table 3.3-2 as a conservative measure. This approach assumes all PM contains Pb, which is unlikely with modern diesel engines. However, it ensures potential Pb emissions are not underestimated.

Table 3.3-2. No Action Emissions (25 nests at 500 hours per year of emergency power)

Alternative	Power Output (kW)	Annual Runtime (hrs/yr)	Annual Elec. Gen. (kWh/yr)	Number of Nests	Total Annual Elec. Gen. (kWh/yr)	CO factor (g/kWh)	CO emissions (g/yr)	CO emissions (tons/yr)	NMHC+NOx factor (g/kWh)	NMHC+NOx emissions (g/yr)	NMHC+NOx emissions (tons/yr)	PM factor (g/kWh)	PM emissions (g/yr)	PM emissions (tons/yr)
No Action	20	500	10,000	25	250,000	5.5	1,375,000	1.52	4.7	1,175,000	1.30	0.03	7,500	0.01
Proposed Action (net)	20	1,700	34,000	50	1,700,000	5.5	9,350,000	10.31	4.7	7,990,000	8.81	0.03	51,000	0.06
No Action + Proposed Action	20	—	—	75	1,950,000	5.5	10,725,000	11.82	4.7	9,165,000	10.10	0.03	58,500	0.07

CFR = Code of Federal Regulations; CO = carbon monoxide; EA = Environmental Assessment; EPA = Environmental Protection Agency; g = grams; hrs = hours; kW = kilowatt(s); kWh = kilowatt hour; NMHC = non-methane hydrocarbon; NOx = nitrogen oxides; O₃ = ozone; PM = particulate matter; VOC = volatile organic compound; yr = year(s).

Notes:

- (1) Listed power output for each generator is prime power, not standby power. Standby power for emergency generation is slightly greater (Allmand n.d.).
- (2) CO, NMHC+NOx, and PM emission factors are from EPA Tier 4 engine standards for compression-ignition (diesel) engines 19 < kW < 56. See 40 CFR 1039.101, Table 1.
- (3) O₃ precursor NOx and VOC emissions are conservatively estimated to equal NMHC+NOx emissions. Lead emissions are conservatively estimated to equal PM emissions. (This approach assumes that all non-methane hydrocarbons act as volatile organic compounds, potentially overestimating the contribution to ozone formation. Lead emissions are also conservatively estimated to equal PM emissions, assuming all PM contains lead. While these assumptions simplify calculations, they likely overestimate actual emissions to provide a conservative analysis.)
- (4) The no action alternative assumes 25 nests at 500 hours per year of emergency power in line with the 2023 EA (FAA 2023).

Table 3.3-3. Comparison of Project Emissions to General Conformity De Minimis Thresholds

Pollutant (Nonattainment Classification)	Estimated Net Emissions (tons/year)	De Minimis Threshold (tons/year)	Exceeds Threshold? (Yes/No)
NOx/NMHCs (VOCs) (Serious)	8.81	50	No
NOx/NMHCs (VOCs) (Severe)	8.81	25	No
PM (Pb) (Maintenance)	0.06	25	No

Sources: Table 3.3-2 and EPA's De Minimis Tables (EPA 2024d).

NMHCs = non-methane hydrocarbons; NOx = nitrogen oxides; O3 = ozone; Pb = lead; PM = particulate matter; VOCs = volatile organic compounds.

In conclusion, the emissions associated with the proposed action generators are less than the de minimis thresholds established under the CAA. This indicates that these emissions would not trigger further regulatory review or conformity determinations. Overall, based on this analysis, the generator emissions are anticipated to have a minor impact on air quality in the study area and would not significantly contribute to regional air quality concerns.

Although unlikely, chemicals from fuel use may be used in excess of RMP thresholds. However, fuels are exempt from CAA RMP requirements as discussed in Section 3.3.1, *Definition of Resource and Regulatory Setting*. Therefore, preparation of an RMP will not be required as part of the proposed action.

Indirect Emissions

Increased electricity consumption associated with powering 50 new nests in the DFW region would result in indirect emissions due to the region's reliance on fossil fuel-based energy sources. The Electric Reliability Council of Texas (ERCOT) manages the DFW area's power grid, which, as of 2023, derives approximately 48 percent of its electricity from natural gas, 12 percent from coal, and 8 percent from nuclear energy. Renewable energy sources, including wind and solar, account for about 32 percent (Texas Comptroller of Public Accounts 2023).

However, while electricity use for the nests would indirectly generate emissions due to the DFW region's partial reliance on fossil fuel-based energy sources, these impacts are expected to be outweighed by the emissions reductions achieved through the proposed action, which replaces a substantial number of vehicle miles traveled for conventional delivery services with drone-based deliveries. As previously discussed, research shows that significant vehicle mile reductions are expected as a result of increased availability of delivery drones (Lyon-Hill et al. 2020). Additionally, a 2022 study of 188 delivery-drone flights found that drones can achieve up to 94 percent lower energy consumption per package as compared to conventional delivery vehicles, with medium-duty diesel trucks and small vans producing much higher energy and GHG emissions per kilometer and per package than the UAs (Rodrigues et al. 2022). Therefore, the shift from traditional delivery vehicles to drone-based deliveries from the proposed action would improve energy efficiency and reduce emissions per package delivered.

Climate

The social cost of carbon (SCC) is a metric recommended by CEQ to translate emissions impacts into monetary damages to assist with decision-making (CEQ 2023). However, because generator emissions are minor and temporary, and because the proposed action is expected to reduce long-term emissions by replacing conventional delivery methods with more efficient drones, SCC was not included in this analysis.

The impacts of climate change in the study area discussed in Section 3.3.2 could have long-term impacts on the proposed action through heat stress on electronic equipment or infrastructure damage from flooding or severe storms. However, these risks are not expected to significantly impact the feasibility of the proposed action. Conversely, the proposed action is not expected to contribute to climate change effects. The total emissions from vehicle deliveries to nests, generator use during transitional periods, and power plant emissions from electricity consumption are expected to be outweighed by the reductions in emissions resulting from the replacement of traditional delivery vehicle trips with drone-based deliveries. Therefore, the proposed action is anticipated to result in a net beneficial effect on overall emissions, and the proposed action is consistent with the January 9, 2023, CEQ *NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*.²³

3.4 Biological Resources (Including Fish, Wildlife, and Plants)

3.4.1 Definition of Resource and Regulatory Setting

Biological resources include plant and animal species and their habitats, including special-status species (federally listed or state-listed threatened or endangered species, species proposed for listing, species that are candidates for federal listing, marine mammals, and migratory birds) and environmentally sensitive or critical habitat. Biological resources provide aesthetic, recreational, and economic benefits to society.

3.4.1.1 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.) requires all federal agencies to seek to conserve threatened and endangered species. Section 7(a)(2) of the ESA requires that each federal agency—in consultation with the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)—ensures that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The FAA is required to consult the USFWS or NMFS if an action may affect a federally listed species or critical habitat. If the FAA determines the action would have *no effect* on listed species or critical habitat, consultation is not required.

3.4.1.2 Migratory Birds

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703–712) protects migratory birds by prohibiting the taking, killing, or possessing of migratory birds (including their eggs, nests, and feathers). The MBTA applies to migratory birds identified in 50 CFR Section 10.13 (defined hereafter as “migratory birds”). The USFWS is the federal agency responsible for the management of migratory birds when they occupy habitat in the United States. Wing is responsible for compliance with the MBTA.

The Bald and Golden Eagle Protection Act prohibits anyone from “taking” a Bald or Golden Eagle, including their parts, nests, or eggs, without a permit issued by the USFWS. Implementing regulations (50

²³ 88 *Federal Register* 1196.

CFR Part 22), and USFWS guidelines as published in the *National Bald Eagle Management Guidelines*, provide for additional protections against “disturbances.” Similar to *take*, *disturb* means to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, injury to an eagle or causes either a decrease in its productivity or nest abandonment due to a substantial interference with breeding, feeding, or sheltering. A permitting process provides limited exceptions to the Bald and Golden Eagle Protection Act’s prohibitions. Permits are only needed when avoidance of incidental take is not possible. According to the National Bald Eagle Management Guidelines, if conservation measures can be implemented such that no aircraft are flown within 1,000 feet of an eagle nest, incidental take of Bald Eagles is unlikely to occur, and no permit is needed. Wing is responsible for compliance with the Bald and Golden Eagle Protection Act.

3.4.2 Affected Environment

According to the Texas Parks and Wildlife Department Ecoregions of Texas, the study area overlaps both the Blackland Prairies Ecoregion 29 on the east near Dallas and the Cross Timbers Ecoregion 32 in the western Fort Worth portion of the study area (Texas Parks and Wildlife n.d.-f). Blackland Prairie is known for its productive, rich soils, gentle topography, and lush native grasslands. It is a true prairie grassland community, dominated by a diverse assortment of grasses. The Cross Timbers and Prairies Ecoregions are characterized by high density linear stands of trees with irregular plains and prairies, a vast mosaic of grasslands, and woodlands. The Cross Timbers are the primary ecological region in Northcentral Texas. Post oak and blackjack oak woodlands interspersed with grassland and prairie habitats characterize this community (Cross Timbers Urban Forestry Council 2019).

The majority of the land surface within the study area features urban and suburban development. Therefore, wildlife habitats within the study area predominantly include parks and open spaces, lakes, waterways, riparian buffers, and vacant lands. Urban flora and fauna thrive in such environments and typically are well established and populated.

The DFW metro area is one of the fastest growing areas in the United States (Lee 2021). Development is rapidly encroaching upon existing vacant lands both within and surrounding the project. The urban environment in the DFW area includes agricultural areas; commercial areas (i.e., business parks, airports, landfills); communities; downtown areas; a military base; recreational areas (i.e., public parks, golf courses); residential areas; thoroughfare (i.e., highways, railroads, public roads); undeveloped areas (i.e., open fields, vacant lots, wooded areas); and waterbodies, wetlands, and floodplains (Chris Jackson’s DFW Urban Wildlife n.d.). These areas provide habitat for the smaller and more common bird and mammal species of the southern United States, including mammals such as white-tailed deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and gray squirrels (*Sciurus carolinensis*).

3.4.2.1 Special-Status Species

Federally Listed Species

The potential for impacts on federally listed species was assessed using the USFWS Information for Planning and Consultation (IPaC) online system (October 22, 2024). The official species list for the study area is included within Appendix E, *Biological Resources*. Table 3.4-1 lists the federally threatened and endangered species that could be present in the study area. The study area also contains designated critical habitat for one species, the Texas fawnsfoot (*Truncilla macrodon*).

Table 3.4-1. ESA-Listed, Proposed, and Candidate Species Potentially Present Within the Study Area

Species	Common Name	Scientific Name	ESA Status	Critical Habitat
Mammals	Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered	N
Birds	Golden-cheeked warbler	<i>Setophaga chrysoparia</i>	Endangered	N
	Piping plover	<i>Charadrius melodus</i>	Threatened	N
	Red knot	<i>Calidris canutus rufa</i>	Threatened	N
	Whooping crane	<i>Grus americana</i>	Endangered	N
Reptiles	Alligator snapping turtle	<i>Macrochelys temminckii</i>	Proposed Threatened	N
Clams	Texas fawnsfoot	<i>Truncilla macrodon</i>	Proposed Threatened	Y
	Texas heelsplitter	<i>Potamilus amphichaenus</i>	Proposed Endangered	N
Insects	Monarch butterfly	<i>Danaus plexippus</i>	Candidate	N

ESA = Endangered Species Act.

There are four ESA-listed bird species that could be present in the study area: golden-cheeked warbler (*Setophaga chrysoparia*), an endangered species; piping plover (*Charadrius melodus*), a threatened species; red knot (*Calidris canutus rufa*), a threatened species; and whooping crane (*Grus americana*), an endangered species (USFWS 2024). Within this portion of their range, impacts to Piping Plover and Red Knot are only considered for wind energy projects. Therefore, no further analysis was conducted for those two species.

The golden-cheeked warbler nests exclusively in Texas from March to July in dense woodlands with ashe juniper, oaks, and other hardwood trees that provide them with habitat. However, urban and agricultural development have replaced the majority ashe juniper and oak woodlands in the DFW area (Texas Parks and Wildlife n.d.-a), and there is scant remaining preferred habitat for this species within the study area. The golden-cheeked warbler prefers and is mostly restricted to the Texas Hill Country to the south and west and is not common to the Cross Timbers and Blackland Prairie. The USFWS has not designated critical habitat for this species.

The whooping crane nests much farther north in Canada and there is no risk of nesting disturbance within the study area. However, whooping cranes often migrate through the DFW area to Texas' coastal plains in and around the Aransas National Wildlife Refuge. It is possible that whooping cranes could use wetlands and/or waterbodies within the study area as stopover habitat on their way to wintering grounds along the Gulf Coast. Within the study area, Lake Ray Roberts, Lewisville Lake, Lavon Lake, and Benbrook Lake all have at least partial suitable habitat (McConnell 2021). According to iNaturalist, there have been seven separate observations of the whooping crane from 2013–2023 in the proposed study area (iNaturalist 2023). Three of the most recent observations occurred in 2022, just southwest of Fort Worth. In 2013, seven wandering whooping cranes from the non-migratory Louisiana population spent a few months living at Lewisville Lake (Chris Jackson's DFW Urban Wildlife n.d.). One of these cranes returned in 2014 but has not returned since. Whooping Cranes have not been observed at Lewisville Lake since 2014 and are considered rare in the area of the lake. Two whooping cranes were documented at Lake Ray Hubbard in 2014 (Chris Jackson's DFW Urban Wildlife n.d.) but have not been known to return to the area.

Additionally, the tricolored bat (*Perimyotis subflavus*), a proposed endangered species, may potentially occur within the study area (USFWS 2024). In non-hibernating seasons (spring through fall), tricolored

bats primarily roost among live or recently dead deciduous hardwood trees and forage along forest edges and over ponds and other waterbodies (USFWS n.d.-b). Hibernation is typically 6–9 months per year, occurring in the winter months, where they typically dwell in caves and mines but are also known to occur in abandoned manmade structures (Texas Parks and Wildlife 2023).

The sole ESA-listed reptile in the study area, the alligator snapping turtle (*Macrochelys temminckii*), is confined to river systems that flow into the Gulf of Mexico, extending from the Suwannee River in Florida to the San Antonio River in Texas. In the Gulf Coastal Plain, its range extends from eastern Texas to southern Georgia and northern Florida. Alligator snapping turtles are generally found in deeper water of large rivers and their major tributaries; however, they are also found in a wide variety of habitats, including small streams, bayous, canals, swamps, lakes, reservoirs, ponds, and oxbows (a lake that forms when a meander of a river is cut off).

The Texas fawnfoot and Texas heelsplitter are the only ESA-listed mussel species that potentially occurs within the study area. The Texas fawnfoot is a freshwater mussel that is endemic to Texas and found in three river basins; Colorado, Brazos, and Trinity. The Texas heelsplitter is also endemic to Texas and is only found in the Trinity, Neches, and Sabine River drainages.

The monarch butterfly potentially occurs within milkweed patches located in open areas throughout the study area (USFWS 2024). Monarchs occur throughout the United States during summer months and is a candidate species for federal listing. The preferred habitat for monarchs is open meadows, fields, and wetland edges with the presence of milkweed and flowering plants. Monarchs migrate through Texas in the fall and the spring through two major flyways. Monarchs enter the first flyway during the last days of September and travel from Wichita Falls to Eagle Pass. The second flyway is along the Texas coast and lasts roughly from the third week of October to the middle of November (Texas Parks and Wildlife n.d.-g).

State Species of Greatest Conservation Need

In Texas, native animals or plants designated as a Species of Greatest Conservation Need (SGCN) are generally those that are declining or rare and in need of attention to recover, or to prevent the need to list under state federal regulation (Texas Parks and Wildlife 2020). The counties identified in the study area that have been evaluated for SGCN include Collin, Denton, Dallas, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties. The Texas Parks and Wildlife Department's database of Rare, Threatened, and Endangered Species of Texas lists 86 species of amphibians, birds, fish, mammals, reptiles, insects, crustaceans, mollusks, and plants in these counties considered as SGCN as defined in the 2023 Texas Wildlife Action Plan. Table E-1 in Appendix E provides information on the SGCN in these counties.

Migratory Birds

Migratory bird species found within the study area vary throughout the year. The study area is a part of the Central Migratory Flyway where millions of birds, including songbirds, grassland birds, waterfowl, shorebirds, and raptors migrate north and south during spring and fall migration (Texas Parks and Wildlife n.d.-e).

Bird behavior, in particular mobbing and territorial defense behaviors, on flying and hovering UA is the most important risk consideration for analysis, as these behaviors are the most pertinent to the proposed action. Mobbing behavior includes birds emitting alarm calls, flying at the predator, diverting its attention, and harassing it. Mobbing and aerial attack behaviors typically occur when a raptor, crow,

or other aerial predator enters the airspace of breeding habitat or territorial males (Royal Society for the Protection of Birds 2023). Certain species of birds harass, mob, and attack aerial predators that fly into or near their territory, especially during the breeding season when birds are actively nesting. The defending birds will chase, dive bomb, attack the backside, and vocalize to harass the aerial predator until the offender is far enough from the territory that the defending birds cease attacking and return to their nests and foraging activities (Kalb and Randler 2019). Not all bird species exhibit mobbing and territorial defensive behaviors. Some bird species are more aggressive, defensive, and cued on aerial predators, while other species may show no aggression or interest towards an overflying hawk in its territory. Species of birds that exhibit mobbing and territorial defense behaviors that are known to occur in the DFW area are shown in Table 3.3-2.

Table 3.4-2. Dallas–Fort Worth Metro Songbird Species with Mobbing and Territorial Behaviors

Common Name (scientific name)	Habitat Preferences	Notes
Northern Mockingbird (<i>Mimus polyglottos</i>)	Habitat generalist occurring in nearly all types of urban development settings.	The most aggressive territorial bird species in North America, the mockingbird is a potential mobbing species during hovering at the nest and delivery location. Mockingbirds are known to nest in parking lot landscaping and areas with high density development. Birds will attack any moving object in territory, including humans and pets.
Red-winged Blackbird (<i>Agelaius phoeniceus</i>) and Common Grackle (<i>Cyanocitta cristata</i>)	Both species have a strong affinity for wetland habitats and lake shorelines for breeding and nesting.	Relatively aggressive territorial defender known to mob a wide variety of animals who fly over or perch within a male blackbird or grackle’s harem territory. Both males and females exhibit mob behaviors during the breeding season but do not mob during the non-breeding season during the fall and winter months when blackbirds and grackles tend to form in flocks.
American Crow (<i>Corvus brachyrhynchos</i>)	The American crow is less of a nest defending bird and is more prone to territorial defense and inquisitive behaviors as the bird species with the highest intelligence in the DFW metro area.	Little to no concern over mobbing UA vehicles; greater concern over territorial defense and curiosity behaviors. Crows can also attack larger prey items cooperatively.
Blue Jay (<i>Cyanocitta cristata</i>)	Known for nest defensive mobbing but can also discern predator from non-predator more easily than other species.	Hovering will be the greatest risk point blue jay mobbing attack. Blue jays require mature tree cover and some degree of pervious surfaces in urban areas, making them a less likely risk than mockingbirds.
Small Songbirds	Include several species that exhibit breeding habitat and nest defense behaviors. Typically tree-nesting species.	Smaller bird species like the diminutive blue-grey gnatcatcher (<i>Polioptila caerulea</i>) do not defend territories as large as the above-mentioned species, making them unlikely mobbing birds for conflicts with UAs.

Source: Texas Parks and Wildlife n.d.

DFW = Dallas–Fort Worth; UA = unmanned aircraft.

The bald eagle (*Haliaeetus leucocephalus*) is not a Bird of Conservation Concern in the study area but warrants attention under the Eagle Act. Bald eagles may be year-round throughout Texas as spring and fall migrants, breeders, or winter residents (Cornell Lab of Ornithology n.d.). Bald Eagles typically nest in forested areas adjacent to large bodies of water (Cornell Lab of Ornithology n.d.) and nests have been previously documented in the DFW area around Benbrook Lake, Joe Pool Lake, Lake Arlington, Lake Worth, Lewisville Lake, and Mountain Creek Lake (iNaturalist 2023). Bald eagles and other raptors may exhibit territorial behavior when nesting (USFWS n.d.-c).

3.4.3 Environmental Consequences

Potential impacts on biological resources associated with the proposed action were considered in the area where drones may operate (launch, fly, and drop packages). Wing's nests and autoloader would be located in retail store parking lots; therefore, there would be no ground disturbance or habitat modification associated with the proposed action. Drones fly at lower speeds and elevations and are smaller than conventional aircraft. Wing's deliveries would initiate from the nest or autoloader, approach at an en route altitude less than 400 feet AGL and would generally occur between 150 and 300 feet AGL. The UA would descend to around 23 feet AGL and hover for a brief time to make a delivery. Then, the UA would ascend and transition back to en route flight mode for a return to the nest. At a potential maximum of 30,000 flights per day across the entire DFW metro area, the distribution and altitude of the flights are not expected to significantly affect wildlife in the study area. Furthermore, the Wing UA would only briefly hover in fixed positions at the nest, delivery, and autoloader locations, leaving them only temporarily exposed to a mobbing and attacking bird defending its breeding territory.

A significant impact on federally listed threatened and endangered species would occur when the USFWS or NMFS determines the proposed action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would be likely to result in the destruction or adverse modification of federally designated critical habitat. An action need not involve a threat of extinction to federally listed species to meet the NEPA standard of significance. Lesser impacts, including impacts on non-listed or special-status species, could also constitute a significant impact.²⁴

3.4.3.1 No Action Alternative

Under the no action alternative, Wing could continue to operate its Hummingbird UA (7000W-A or 7000W-B) within the DFW area at the level analyzed in the 2023 EA (FAA 2023). Wing is currently authorized to conduct package delivery operations from 25 nests. Each nest houses between 6 and 24 launch pads, and the drones have a delivery range of approximately 6 miles. Operations consist of up to 400 deliveries per operating day per nest. The primary impacts related to these actions would include noise and visual effects, and potential collisions with wildlife (FAA 2023). As discussed in the 2023 EA (FAA 2023), the no action alternative is not expected to result in significant impacts on biological resources.

3.4.3.2 Proposed Action

There would be no ground construction or habitat modification associated with the proposed action, as the nests would be located in lots that are already developed with commercial uses. Wing's aircraft

²⁴ See FAA Order 1050.1F, Exhibit 4-1, Biological Resources, Factors to Consider, p. 4-4.

would not touch the ground in any other place than the nest (except during emergency landings) because it remains aerial while conducting deliveries. Wing's deliveries would initiate from the nest, approach an en route altitude less than 400 feet AGL, and would generally occur between 150 and 250 feet AGL. The UA would lower to around 23 feet AGL and hover for a brief time to make a delivery. Then, the UA would transition back to an en route flight mode for a return to the nest.

Because operations would occur mostly in an urban environment, typically well above the tree line and away from sensitive habitats and given the short duration of increased ambient sound levels, flights are not expected to significantly influence wildlife in the area. Wing has also established a direct line of communication with Texas Parks and Wildlife to discuss any potential concerns regarding impacts on wildlife or high-quality habitat in the project area (see Table J-1 in Appendix J of the 2023 EA for more information). Wing will continue to coordinate with the managing entities of state parks and natural areas within the DFW area on the thoughtful placement and use of delivery sites within these areas as necessary.

Special-Status Species

Federally Listed, Proposed, and Candidate Species

The proposed action does not involve ground-disturbing activity outside of existing commercial areas and does not include any operations over water. No indirect or direct effects would occur to aquatic environments or habitats as a result of the proposed action.

As there is no plausible route of effects to aquatic environments or taxa, the FAA has determined that the proposed action would have *"no effect"* to alligator snapping turtle, Texas fawnfoot, Texas Heelsplitter, and to the proposed Texas fawnfoot's critical habitat.

Federally endangered whooping cranes could pass through the study area during their annual fall migration in mid-September to wintering grounds along the Gulf Coast, and during their annual spring migration to Canada in late March to early April. Potential suitable habitat has been identified for whooping cranes at several lakes within the DFW area as discussed in detail in Section 3.4.2.1, *Special-Status Species*. However, whooping crane migration flights are usually between 1,000 and 6,000 feet (USFWS n.d.-b); therefore, it is not expected that occasional drone flights at 150–250 feet AGL would impact transitory whooping cranes at these altitudes. Additionally, the USFWS has used drones to survey sandhill cranes, a surrogate species for whooping crane behavior, and reported *"no discernible effect"* observed on the animals (USFWS n.d.-b). If whooping cranes are observed using habitat in the study area in future, Wing would coordinate with the Arlington Ecological Services Field Office of the USFWS, as well as the Texas Parks and Wildlife Department, to determine pertinent avoidance zones or any other best management practices needed to avoid adversely affecting the species.

Therefore, based on operations occurring mostly in an urban environment, the altitude at which the UA flies in the en route phase, the expected low sound levels experienced by whooping cranes, short duration of increased ambient sound levels, the low probability of a whooping crane occurring in the study area, and the low likelihood of a UA striking a whooping crane, the FAA has determined that the proposed action *"may affect, but is not likely to adversely affect,"* the whooping crane.

The federally endangered golden-cheeked warbler nests in the study area; however, their habitat is limited strictly to dense woodlands with ashe juniper, oaks, and other hardwood trees (Texas Parks and Wildlife n.d.-a). The drones would only transit over this habitat type to reach customers. The proposed

action is not expected to frequently encounter the golden-cheeked warbler. As stated in Table J-1 of the 2023 EA, Wing coordinates with parks and preserves in the Balcones Escarpment region in order to minimize effects on high-quality warbler habitat to the extent possible. Therefore, based on operations occurring mostly in an urban environment, the altitude at which the UA flies in the en route phase, the expected low sound levels experienced by Golden-cheeked Warblers, the short duration of increased ambient sound levels, the low probability of a golden-cheeked warbler occurring in the study area, and the low likelihood of a UA striking a golden-cheeked warbler, the FAA determined the proposed action “*may affect, but is not likely to adversely affect,*” the golden-cheeked warbler.

The tricolored bat is listed as proposed endangered and is therefore not protected under the Act; however, conferencing is only necessary if it is determined a federal action is likely to jeopardize the continued existence of a proposed species. Therefore, the FAA determined that conferencing is *not necessary* for the proposed action.

The monarch butterfly is listed as a candidate species and is not afforded protection under the Act, but the species has been included for consideration during project planning for the purpose of reducing impacts.

On November 21, 2024, the FAA submitted an informal consultation request to the USFWS in accordance with Section 7 of the ESA and requested concurrence with the FAA’s effect determination for the proposed project (Appendix J, *Cumulative Effects*). Consultation is ongoing and will be completed prior to the issuance of the Final EA.

Species of Greatest Conservation Need²⁵

The southeastern myotis bat, cave myotis bat, tricolored bat, big brown bat, eastern red bat, hoary bat, and big free-tailed bat are SGCN that could be present in the study area. Although these bat species may occur within the study area, they are unlikely to encounter operating UA as Wing’s proposed operations occur predominantly in the urban environment where bat densities are lower. Bat activity increases as night approaches, and they are most active between dusk and dawn. Drone flights that occur between civil twilight and 10:00 p.m. would overlap with peak periods of activities.

Bats may exhibit disturbance behaviors and change their flight paths to avoid drones in the event that flights overlap with bat activity areas (Ednie et al. 2021). Research suggests that drones have “minimal impact on bat behavior” (Fu et al. 2018) primarily from noise emissions. However, drone disturbance is temporary and bats are expected to return to normal foraging and flight activities shortly after the exposure to drone noise ends (Kuhlmann et al. 2022; Ednie et al. 2021). These temporary disturbance events would not reduce habitat suitability or increase energy expenditure of bats outside the range of natural variability. As a result, the FAA has determined that the proposed action is not expected to have significant impacts on bats.

The American bumblebee (*Bombus pensylvanicus*) is also considered a state SGCN and may be present in the study area. Insects, such as the bumblebee, could be struck by drones en route to or during delivery. Information regarding drone impacts on insects is limited and there have been no widespread negative

²⁵ Species of Greatest Conservation Need are lists of species designated in the 56 State Wildlife Action Plans, which identify the species most in need of conservation action in that state or U.S. territory. See <https://www.usgs.gov/tools/species-greatest-conservation-need-analysis-tool>.

impacts identified in the scientific literature. Therefore, based on the information available, the action is not expected to have significant impacts on insect populations.

Migratory Birds

While there is a well-established repository of literature on bird mobbing and attack behaviors, and on bird strikes with large aircraft, information on drone interactions with birds is not as well documented. Without a baseline of data or pre-existing research on drone interactions with birds, creation of an effective and sensible predictive model is not possible. Therefore, this analysis focused on bird behavior and identified the northern mockingbird, red-winged blackbird, and common grackle as potential species that could mob or attack a drone while defending territory, especially during the early spring to mid-summer breeding period.

With larger scale operations in Australia since 2017, Wing has incurred relatively few conflicts with birds, which have typically involved a handful of mobbing and brief attack behaviors in Canberra, Australia (2021), from Australian ravens in delivery flight. In each instance, the Raven attacked the drone from behind causing damage to foam on the vertical tail and then disengaged from the attack. Additionally, two other instances of birds making contact with drones were recorded in the United States by hobbyists (Connecticut Audubon Society n.d.). These were similar to the Australian instance where ravens made a brief touch to the backside of the drone in flight as a curiosity behavior before flying away from the moving object.

To avoid impacts on nesting bald eagles, Wing implements a monitoring plan for bald eagle nests that integrates multiple strategies and resources. This includes periodically checking online tools such as iNaturalist²⁶ to identify eagle nests that may occur in the operating area, as well as communication with the bird watching community to identify nests. Wing personnel are also educated in the visual identification of bald eagle nests, which are typically very conspicuous. When Wing identifies a bald eagle nest or is notified of the presence of a nest, Wing establishes an avoidance area such that there is a 1,000 feet vertical and horizontal separation distance between the vehicle's flight path and the nest. Wing maintains this avoidance area until the end of the breeding season or until a qualified biologist indicates the nest has been vacated. Wing regularly reports monitoring and avoidance measures to Texas Parks and Wildlife and the USFWS Region 2 Migratory Bird Permit Office.

Based on the information available regarding the interaction between drones and birds, the FAA concludes that mobbing and attacking behaviors would be the most relevant interaction to occur. As detailed in Table 3.4-2, some bird species are more likely to exhibit this type of behavior, and these are the species that would be expected to interact with the drones, if any.

The proposed action would *not be expected to result in significant impacts* on migratory birds because it would not result in long-term or permanent loss of wildlife species, would not result in substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or populations, *and would not have adverse impacts* on reproductive success rates, natural mortality rates, non-natural mortality, or ability to sustain the minimum population levels.

²⁶ See <https://www.inaturalist.org>.

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

3.5.1 Definition of Resource and Regulatory Setting

Section 4(f) of the U.S. Department of Transportation (DOT) Act (codified at 49 U.S.C. § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) states that, subject to exceptions for de minimis impacts²⁷ “[t]he Secretary may approve a transportation program or project requiring the use of [4(f) resources] ... only if—(1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.”

The term *use* includes both direct or physical and indirect or “constructive” impacts on Section 4(f) resources. *Direct use* is the physical occupation or alteration of a Section 4(f) property or any portion of a Section 4(f) property. *Constructive use* does not require direct physical impacts or occupation of a Section 4(f) resource. A constructive use would occur when a proposed action would result in substantial impairment of a resource to the degree that the protected activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.²⁸

Another type of physical use, known as *temporary occupancy*, results when a transportation project results in activities that require a temporary easement, right-of-entry, project construction, or another short-term arrangement involving a Section 4(f) property. A temporary occupancy is considered a Section 4(f) use unless all the conditions listed in Appendix B, Paragraph 2.2.1 of FAA Order 1050.1F and the Section 4(f) regulations at 23 CFR 773.13(d) are satisfied.

A physical *use* may be considered de minimis if, after considering avoidance, minimization, mitigation, and enhancement measures, the result is either (1) a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or wildlife or waterfowl refuge for protection under Section 4(f); or (2) a Section 106 *finding of no adverse effect* or *no historic properties affected*. Before the FAA may finalize a determination that a physical use is de minimis, the official(s) with jurisdiction must concur in writing that the project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

The concept of *constructive use* is that a project that involves no actual physical use of a Section 4(f) property via permanent incorporation or *temporary occupancy*, but may still, by means of noise, air pollution, water pollution, or other proximity-related impacts, substantially impair important features, activities, or attributes associated with the Section 4(f) property. Substantial impairment occurs only

²⁷ The FAA may make a de minimis impact determination with respect to a physical use of Section 4(f) property if, after taking into account any measures to minimize harm, the result is either (1) a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or wildlife or waterfowl refuge for protection under Section 4(f); or (2) a Section 106 finding of no adverse effect or no historic properties affected. See 1050.1F Desk Reference, Paragraph 5.3.3.

²⁸ Federal Highway Administration (FHWA) Section 4(f) Policy Paper (<https://www.environment.fhwa.dot.gov/legislation/section4f/4fpolicy.pdf>). (Note: FHWA regulations are not binding on the FAA; however, the FAA may use them as guidance to the extent relevant to aviation projects.)

when the protected activities, features, or attributes of the Section 4(f) property that contribute to its purpose and significance are substantially diminished. This means that the value of the Section 4(f) property, in terms of its prior purpose and significance, is substantially reduced or lost.

Procedural requirements for complying with Section 4(f) are set forth in DOT Order 5610.1C, *Procedures for Considering Environmental Impacts*. The NOA process was used to notify Section 4(f) jurisdictional agencies of potential impacts to public parks, recreation areas, wildlife refuges, and historic properties. The FAA also uses Federal Highway Administration (FHWA) regulations (23 CFR Part 774) and FHWA guidance (e.g., Section 4(f) Policy Paper) when assessing potential impacts on Section 4(f) properties. These requirements are not binding on the FAA; however, the FAA may use them as guidance to the extent relevant to FAA projects. More information about DOT Act, Section 4(f) can be found in Chapter 5 of the FAA Order 1050.1F Desk Reference (FAA 2023) and 1050.1F Desk Reference: Federal Aviation Administration Office of Environment and Energy; Version 2 (February 2020).

3.5.2 Affected Environment

The FAA used data from federal, state, and other public-access sources to identify potential Section 4(f) resources within the study area (Appendix B, *Section 4(f)*). The FAA identified many properties that meet the definition of a Section 4(f) resource, including public parks administered by state, city, and county authorities, and historic properties identified on the Texas State Historic Preservation Officer (SHPO) website. By count, most of the Section 4(f) resources are local public parks, trails, and ballfields. Appendix B provides an inventory list of local parks in the study area (Texas Parks and Wildlife 2024). There are no wildlife refuges within the study area. Wildlife refuges and parks are not currently included in Wing's fly less restrictions, which include schools (elementary, middle, high school), preschools and daycares with outdoor facilities, and churches.

There may be instances where the delivery would be to a customer located within a Section 4(f) resource. Wing validation activities with the FAA often include deliveries to sites in parks. For example, public delivery zones have been set up for events and community engagement in collaboration with the city parks and recreation department in Frisco, Texas, and Christiansburg, Virginia. Wing was also invited to provide deliveries to a historic site in Christiansburg, Virginia, as part of their youth programs.²⁹

As discussed in Section 3.6, *Historical, Architectural, Archaeological, and Cultural Resources*, there are numerous historic properties within the study area as listed on the Texas SHPO website, although most of these are considered for architectural or other purposes that would not typically be affected by UA operations. The FAA also consulted with the Texas SHPO in August 2024 to determine whether historic and traditional cultural properties would be affected by the proposed action (see Section 3.6.2, *Affected Environment*).

3.5.3 Environmental Consequences

3.5.3.1 No Action Alternative

Under the no action alternative, Wing would not increase the number of nest locations, remote pickup operations or extend the operational hours of its authorized commercial UA package delivery operations in DFW. Wing could continue operating its Hummingbird UA (7000W-A or 7000W-B) within DFW under

²⁹ See <https://www.christiansburginstitute.com>.

Part 135, which includes up to 400 deliveries per day from 25 nest locations, from 7:00 a.m. to 7:00 p.m., and at other locations under 14 CFR Part 107,³⁰ which limits operations to UA weighing less than 55 pounds and within visual line of sight. Operations would not result in a physical use of Section 4(f) properties. The FAA determined in the 2023 EA that infrequent UA overflights would not cause substantial impairment to any of the Section 4(f) resources in the study area and are not considered a constructive use of any Section 4(f) resource. During the scope of the no action alternative operations, Wing identified fly less properties and confirmed with the FAA that they will generally not conduct operations over these areas. The no action alternative is not expected to result in significant impacts on Section 4(f) properties from drone use because noise and visual effects from Wing's occasional overflights are not expected to diminish the activities, features, or attributes of the resources that contribute to their significance or enjoyment.

3.5.3.2 Proposed Action

There would be no physical use of Section 4(f) resources because occasional flyovers in the study area would not result in substantial impairment of Section 4(f) properties. As discussed in Section 3.7, *Noise and Noise-Compatible Land Use*, and Appendix D, *Noise*, the proposed action would not result in significant noise levels at any location within the study area. As further described in Section 3.9, *Visual Effects*, the short duration of en route flights (approximately 15 seconds) would minimize any potential for significant visual impacts. In addition, Wing's flight planning software is designed to increase variability in flight paths to minimize overflights of any given location; with the diversification of flight paths, the frequency of overflights would inversely scale as the distance from a nest increases. As discussed in Table J-1 of the 2023 EA, Wing has established a direct line of communication with Texas Parks and Wildlife to discuss any concerns regarding parkland noise and will carefully coordinate any parkland delivery operations with managing entities as necessary.

The FAA has determined that UA overflights as described in the proposed action would not cause substantial impairment to any of the Section 4(f) resources in the study area and are therefore not considered a constructive use of any Section 4(f) resource.

Therefore, the proposed action is not expected to cause significant impacts to Section 4(f) resources.

3.6 Historical, Architectural, Archaeological, and Cultural Resources

3.6.1 Definition of Resource and Regulatory Setting

Cultural resources encompass a range of sites, properties, and physical resources relating to human activities, society, and cultural institutions. Such resources include past and present expressions of human culture and history in the physical environment, such as prehistoric and historic archaeological sites, structures, objects, and districts that are considered important to a culture or community. Cultural

³⁰ The Operation of Small Unmanned Aircraft Systems Over People rule (codified in 14 CFR Part 107) permits routine operation of small UAs (UAs weighing less than 55 pounds) within visual line of sight at night and over people without a waiver or exemption under certain conditions.

resources also include aspects of the physical environment, namely natural features and biota that are a part of traditional ways of life and practices and are associated with community values and institutions.

The major law that protects cultural resources is the National Historic Preservation Act (NHPA). Section 106 of the NHPA of 1966 (54 U.S.C. § 306108) requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the National Register of Historic Places (NRHP). This includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization that meets the NRHP criteria. Regulations related to this process are contained in 36 CFR Part 800, Protection of Historic Properties. Compliance with Section 106 requires consultation with the SHPO and applicable other parties, including Indian tribes.

Major steps in the Section 106 process include identifying the Area of Potential Effects (APE), identifying historic and cultural resources within the APE, consulting with the SHPO and Tribal Historic Preservation Officers (THPOs) for tribes that are identified as potentially having traditional cultural interests in the area, and determining the potential effects on historic properties as a result of the action.

The FAA has not established a significance threshold for this impact category; however, the FAA has identified a factor to consider when evaluating the context and intensity of potential environmental impacts for historical, architectural, archaeological, and cultural resources. A factor to consider in assessing a significant impact is when an action would result in a finding of adverse effect through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an Environmental Impact Statement (i.e., a significant impact). If an adverse effect is determined, the Section 106 process will be resolved through a Memorandum of Agreement (MOU) or Programmatic Agreement (PA) to record resolution measures to mitigate or minimize adverse effects.

3.6.2 Affected Environment

The APE for the proposed action is the entire study area where Wing is planning to conduct UA package deliveries, as shown in Figure 2.2-1. According to the National Park Service's online database of the NRHP, a total of 224 historic properties and 145 historic districts occur within the APE (National Park Service 2024a). These historic properties and districts are listed in Appendix G, *SHPO Consultation*.

3.6.2.1 No Action Alternative

Under the no action alternative, Wing could continue to operate its Hummingbird UA (7000W-A or 7000W-B) within DFW under Part 135, which includes up to 400 deliveries per day from 25 nest locations, from 7:00 a.m. to 7:00 p.m., and at other locations under 14 CFR Part 107. Effects from UA operations on historic properties are limited to non-physical, reversible impacts. The number of daily flights that Wing is projecting from 25 nests—up to approximately 400 operations spreading in all directions from a nest—means that any historic or cultural resource would be subject to only a small number of overflights per day, if any. In the 2023 EA, the SHPO concurred that no historic properties would be affected and indicated that no cultural resources are present or would be affected. Therefore, the no action alternative is not expected to result in significant impacts related to historical, architectural, archaeological, and cultural resources.

3.6.2.2 Proposed Action

The nature of UA effects on historic properties is limited to non-physical, reversible impacts (i.e., the introduction of audible and/or visual elements). Although the proposed action would increase the

number of nest locations from 25 to 75, thereby increasing the total number of flights per day in the operating area, any historic or cultural resource would still be subject to only a small number of overflights per day, if any. (See Chapter 4 for the analysis of cumulative overflights.) Additionally, the FAA conducted a noise exposure analysis for the proposed action—as described in Section 3.7, *Noise and Noise-Compatible Land Use*—and concluded that noise levels would be below the FAA’s threshold for significance, even in areas with the highest noise exposure.

In accordance with 36 CFR Section 800.4(a)(1), the FAA consulted with the Texas SHPO in August 2024 and received concurrence on September 6, 2024, that there would be *no adverse effect* on historic properties by the proposed action (Appendix J).

The FAA also consulted with nine tribes that may potentially attach religious or cultural significance to resources in the APE: (1) Apache Tribe of Oklahoma; (2) Comanche Nation Oklahoma; (3) Coushatta Tribe of Louisiana; (4) Delaware Nation, Oklahoma; (5) Muscogee (Creek) Nation; (6) Tonkawa Tribe of Indians of Oklahoma; and (7) Wichita and Affiliated Tribes (Wichita, Keechi, Waco, and Tawakonie), Oklahoma; (8) Cherokee Nation, Oklahoma; and (9) Caddo Nation of Oklahoma.³¹ The FAA sent consultation letters to the nine tribes listed above on May 2, 2024, regarding the entire APE and did not receive any responses or objections.

Based on the information available, the FAA made a finding of *no adverse effect* in accordance with 36 CFR Part 800. The FAA received concurrence from the SHPO on September 6, 2024, that there would be *no adverse effect* on historic properties by the proposed action (see Section 3.6.2). Therefore, the proposed action would not result in significant impacts on historical, architectural, archaeological, or cultural resources. The FAA’s tribal and historic outreach letters are included as Appendices F and G, respectively.

3.7 Noise and Noise-Compatible Land Use

3.7.1 Definition of Resource and Regulatory Setting

Noise is considered any unwanted sound that interferes with normal activities (such as sleep, conversation, student learning) and can cause annoyance. Aircraft noise is often the most noticeable environmental effect associated with any aviation project. Several federal laws, including the Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. §§ 47501–47507) regulate aircraft noise and noise-compatible land use. Through 14 CFR Part 36, the FAA regulates noise from aircraft. FAA Order 1050.1F, Appendix B, Paragraph B-1.3 requires the FAA to identify the location and number of noise-sensitive areas that could be significantly impacted by noise. As defined in Paragraph 11-5b of Order 1050.1F, page 11-3, a noise-sensitive area is “an area where noise interferes with normal activities associated with its use. Normally, noise-sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites.”

³¹ Seven of these nine tribes have THPOs: Comanche Nation, Oklahoma; Coushatta Tribe of Louisiana; Delaware Nation, Oklahoma; Muscogee (Creek) Nation; Wichita and Affiliated Tribes (Wichita, Keechi, Waco, and Tawakonie), Oklahoma; Cherokee Nation, Oklahoma; and Caddo of Oklahoma.

Sound is measured in terms of the decibel (dB), which is the ratio between the sound pressure of the sound source and 20 micropascals, which is nominally the threshold of human hearing. Various weighting schemes have been developed to collapse a frequency spectrum into a single dB value. The A-weighted decibel, or dBA, corresponds to human hearing accounting for the higher sensitivity in the mid-range frequencies. To comply with NEPA requirements, the FAA has issued requirements for assessing aircraft noise in FAA Order 1050.1F, Appendix B. The FAA's required noise metric for aviation noise analysis is the yearly day-night average sound level (DNL) metric. The DNL metric is a single value representing the logarithmically averaged aircraft sound level at a location over a 24-hour period, with a 10 dB adjustment added to those noise events occurring from 10:00 p.m. to 7:00 a.m. the following morning. A significant noise impact is defined in FAA Order 1050.1F as an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure or a noise exposure at or above the DNL 65 dB due to a DNL 1.5 dB or greater increase.

3.7.2 Affected Environment

The approximate land area within the study area is 3,510 square miles, the approximate water area is 237 square miles, and the estimated population within the counties included in the study area is 6,574,000 per 2022 American Community Survey (ACS) estimates (U.S. Census Bureau 2022).

The ambient (or background) sound level in the operations area varies and depends on the uses in the immediate vicinity. For example, the ambient sound level along a major highway is higher than the ambient sound level within a residential neighborhood. Existing sound sources in the operating area are primarily those from anthropogenic sources associated with commercial, industrial, transportation (e.g., highways, rail, and air travel), and residential land uses in an urban and city environment (e.g., vehicles, construction equipment, aircraft). Except for areas proximate to airports, existing aviation noise levels in the DFW study area are expected to be well below the FAA's threshold for significant noise exposure to residential land use (DNL 65 dB).

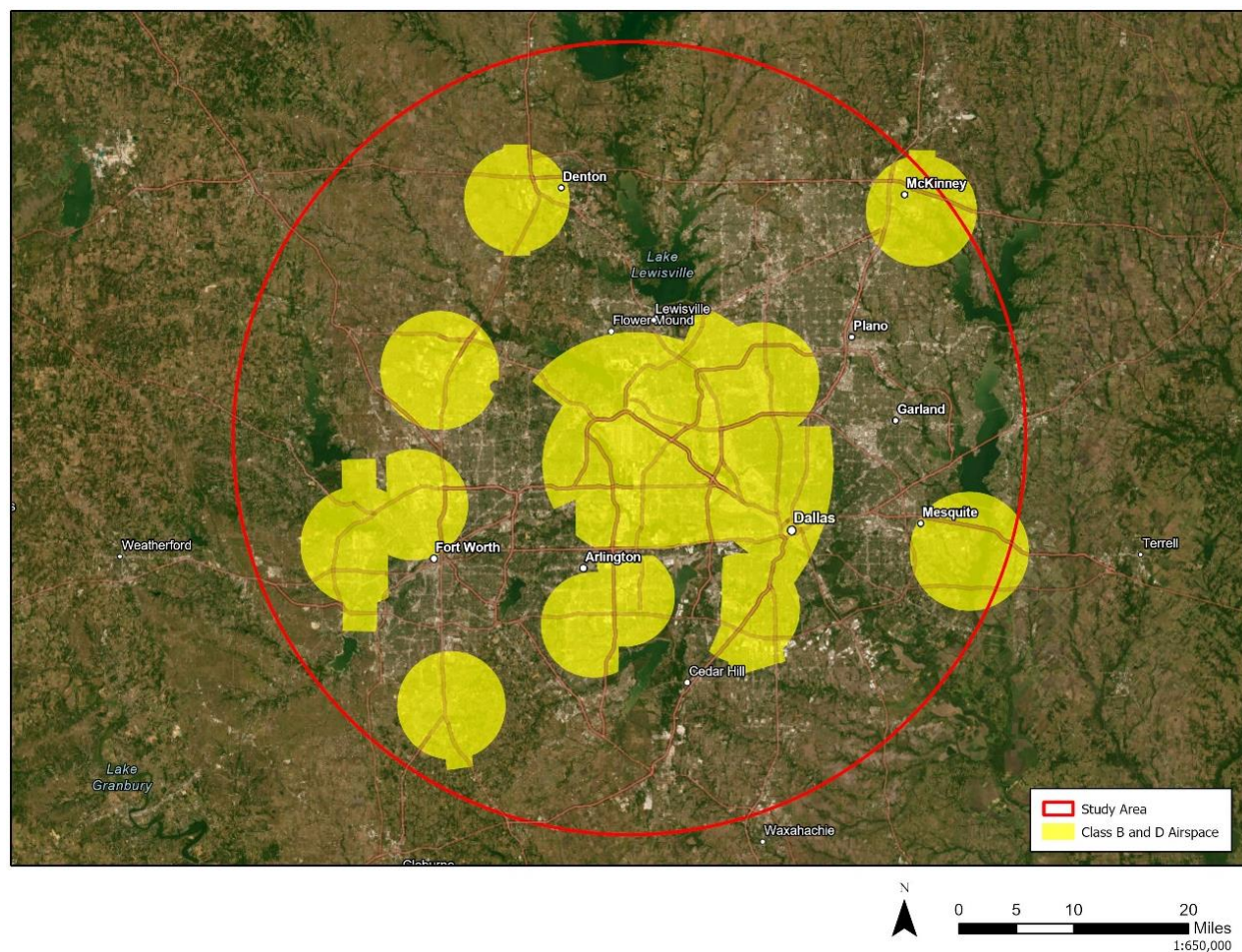


Figure 3.7-1. Class B and Class D Surface Areas

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Under the no action alternative, Wing could continue to operate its Hummingbird UA (7000W-A or 7000W-B) within the DFW area at the level analyzed in the 2023 EA (FAA 2023). Noise impacts are expected to be similar to those discussed in the 2023 EA, which concluded impacts would not be significant. Therefore, the no action alternative is not expected to cause a significant impact on any noise-sensitive areas within the study area.

3.7.3.2 Proposed Action

Operations would include up to 400 deliveries from each nest and would occur up to 365 days per year. The FAA developed a methodology to evaluate the potential noise exposure in the proposed study area that could result from implementation of the proposed action (Appendix D). The noise assessment evaluated noise emissions data for the Hummingbird 7000W-B and 8000-A.

Due to the unknown fleet mix and operational profile(s) that would be used (i.e. manual load, nearfield autoloader, or offsite autoloader), this analysis assumes the most conservative scenario with the farthest

setback distances presented in Tables 9 to 16 of Appendix D. This analysis was used to define the potential significant impacts due to the proposed action. Noise assessments were performed for each of the flight phases as discussed in detail in the following sections.

Noise Exposure for Nest Operations

Based on a daily maximum of 400 deliveries per nest, 24 FitBIT operations before 7 a.m., 1 GeoBIT operation, and 365 operating days per year, Table 3.7-1 provides the most conservative extent of daily noise exposure for nest operations.

Table 3.7-1. Estimated Extent of Daily Noise Exposure from Nest

DNL Equivalent Deliveries	DNL Equivalent FitBit Operations	DNL Equivalent GeoBit Operations	DNL 65 dB	DNL 60 dB	DNL 55 dB	DNL 50 dB
400	240	1	35 feet	65 feet	120 feet	235 feet

Source: ICF 2024.

Note: Distances are the worst-case noise scenario (longest set back distances) based on Tables 9 through 12 of Appendix D. dB = decibel; DNL = day-night average sound level; FitBIT = fitness built-in test; GeoBIT = geography built-in test.

As described in Section 2.2, *Proposed Action*, nests would be placed at least 120 feet away from noise-sensitive areas within the controlled surface areas of Class B and Class D airspace. In addition, nests would be placed at least 65 feet away from noise-sensitive areas when they are outside of the controlled surface areas of Class B and Class D airspace. Based on the above distances, the increase in noise would not be expected to exceed DNL 1.5 dB within areas with an existing noise exposure of DNL 65 dB or result in a noise exposure of DNL 65 dB because DNL 60 and 65dB contours would not exceed the controlled surface areas of Class B and Class D airspace. Therefore, there would be no significant impact due to the nest operations.

Noise Exposure for Offsite Package Autoload Operations

As stated in 2.2.3, offsite package autoload operations consist of UA descent from its close transit altitude (safe altitude above local terrain and obstacles) to 22 feet AGL and lowers the package hook. The UA then passes approximately 10 feet laterally over the autoloader. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. A single delivery operation consists of arrival, package autoload, and departure phases. As shown in Table 3.7-2, package delivery operations would exceed 65 DNL at less than 25 feet from an offsite autoloading location at a rate of 400 deliveries per day.

Table 3.7-2. DNL Noise Exposure Contour Distances at an Offsite Package Autoloading Location

Average Daily Deliveries per Autoloader	65 DNL Contour Distance (feet)	60 DNL Contour Distance (feet)	55 DNL Contour Distance (feet)	50 DNL Contour Distance (feet)	45 DNL Contour Distance (feet)
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25
10	<25	<25	<25	<25	40
15	<25	<25	<25	<25	50
20	<25	<25	<25	30	55

Average Daily Deliveries per Autoloader	65 DNL Contour Distance (feet)	60 DNL Contour Distance (feet)	55 DNL Contour Distance (feet)	50 DNL Contour Distance (feet)	45 DNL Contour Distance (feet)
25	<25	<25	<25	35	65
50	<25	<25	<25	50	95
75	<25	<25	35	60	135
100	<25	<25	40	70	170
150	<25	<25	50	95	230
200	<25	30	55	115	275
300	<25	40	70	165	355
400	<25	45	80	205	430

Note: Distances are the worst case noise scenario (longest set back distances) based on Tables 13 and 14 of Appendix D. DNL = day-night average sound level.

Noise Exposure for En Route Operations

Based on the information provided by Wing, it is expected that UA would generally cruise at or above an altitude of 165 feet AGL and travel at a ground speed of 59 mph (51 knots) during en route flight. The en route noise exposure for a single point exposed to 400 delivery and return flights (800 flights total) would be 40.7 dBA DNL. Considering that en route UA noise would not exceed 41 dBA DNL under any delivery scenarios, this was not quantified further.

Noise Exposure for Delivery Operations

The noise exposure for delivery operations includes the noise exposure for the delivery point itself, based on maximum daily deliveries to any one location. The DNL delivery exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. The noise exposure for any one delivery point is provided in Table 14 of Appendix D and summarized in Table 3.7-3 for various DNL levels. At the level of five daily DNL equivalent deliveries, significant noise effects would not be expected anywhere beyond the immediate point of delivery.

Table 3.7-3. DNL for Delivery Locations Based on Maximum Deliveries per Location

Average Daily DNL Equivalent Deliveries	65 DNL Contour Distance (feet)	60 DNL Contour Distance (feet)	55 DNL Contour Distance (feet)	50 DNL Contour Distance (feet)	45 DNL Contour Distance (feet)
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	35

Source: ICF 2024.

Note: Distances are the worst case noise scenario (longest set back distances) based on Tables 15 and 16 of Appendix D. DNL = day-night average sound level.

Overall Noise Exposure Results

The maximum noise exposure levels are associated with nest operations, where DNL 65 dB occurs within 35 feet of a nest perimeter and DNL 60 dB occurs within 65 feet. As described in Section 2.2, nests would be located at least 65 feet away from noise-sensitive areas. In addition, when nests are planned to be

within the controlled surface areas of Class B and Class D airspaces, nest would be placed 120 feet away from noise-sensitive areas.

Based on the noise analysis, and the above project restrictions, *the proposed action would not have a significant noise impact.*

3.8 Environmental Justice

3.8.1 Definition of Resource and Regulatory Setting

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. Meaningful involvement means that people have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public's contribution can influence the regulatory agency's decision; their concerns will be considered in the decision-making process; and the decision makers seek out and facilitate the involvement of those potentially affected.

EO 12898 directs each federal agency to “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” Subsequent orders at the federal level—including DOT Order 5610.2C—have reinforced the directives outlined in EO 12898. CEQ also developed guidelines (CEQ 1997) to assist federal agencies in incorporating the goals of EO 12898 into the NEPA process.

EO 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, was enacted on April 21, 2023. EO 14096 on EJ does not rescind EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which has been in effect since February 11, 1994, and is currently implemented through DOT Order 5610.2C, *U.S. Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This implementation will continue until further guidance is provided regarding the implementation of the new EO 14096 on EJ.

DOT Order 5610.2C defines a minority person as a person who is Black, Hispanic or Latino, Asian American, American Indian or Alaska Native, or Native Hawaiian or Other Pacific Islander. The DOT Order defines a minority population as any readily identifiable group of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity.

DOT Order 5610.2C defines a low-income person as a person whose median household income is at or below the U.S. Department of Health and Human Services (HHS) poverty guidelines. It defines a low-income population as any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed DOT program, policy, or activity.

More information about this environmental impact category is presented in Chapter 14 of the FAA Order 1050.1F Desk Reference (FAA 2023).

3.8.2 Affected Environment

The study area includes 10 counties: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, Wise.

DOT Order 5610.2C accounts for both race and ethnicity in addressing EJ impacts. The FAA identified minority populations, classified by both race and ethnicity³², using the Decennial Census down to the county level. Separate data is provided for racial minority and Hispanic populations; therefore, this analysis identifies these populations by both classifications. The FAA identified low-income populations using 2022 ACS 5-year estimates from the U.S. Census Bureau. The FAA compared the ACS 5-year estimates to the 2022 HHS Poverty Guidelines for the 48 contiguous states and the District of Columbia to calculate the percentage of households below the poverty threshold for each county.

The FAA selected a “Reference Community” to provide a benchmark by which the individual counties could be compared to identify areas of EJ concern within the study area. Due to the size and population of the study area, the FAA used the aggregate of the 10 counties as the Reference Community for this analysis.³³ This regional Reference Community allows the demographics of localized populations (i.e., counties) to be compared to the total population within the overall study area.³⁴

Tables 3.7-1 and 3.7-2 show the demographic information of each county within the study area, the Reference Community, and the state of Texas. The percentage of racial minorities, collected by the Census as “All Other Races,” residing within the Reference Community is approximately 28.14 percent.³⁵ This is slightly higher than that of the state of Texas. The percentage of ethnic minorities, those identifying as Hispanic, residing in the Reference Community is 29.39 percent, which is slightly lower than the state average. For purposes of identifying a “meaningfully greater” threshold, the FAA identified any county whose percentage of “All Other Races” equals or exceeds 28.14 percent and/or whose percentage of Hispanic population equals or exceeds 29.39 percent as an area of EJ concern.

The FAA also considered communities where EJ populations predominate (i.e., the minority population is equal to or greater than 50 percent) as areas of EJ concern.

³² As defined by the U.S. Census Bureau.

³³ Per the Federal Interagency Working Group on Environmental Justice’s *Promising Practices for EJ Methodologies in NEPA Reviews* (Federal Interagency Working Group on Environmental Justice 2016), a larger scale reference community (e.g., municipal, state, or regional) may be required under this circumstance to obtain results that accurately reflect the existence of a minority population in the geographic unit of analysis (e.g., census block) being analyzed.

³⁴ See the Federal Interagency Working Group on Environmental Justice’s *Community Guide to Environmental Justice and NEPA Methods* (Federal Interagency Working Group on Environmental Justice 2019), for more information on the importance of selecting an appropriate Reference Community and its use in meaningfully greater analyses.

³⁵ This data is defined by the U.S. Census Bureau. For the purposes of this analysis, the FAA uses the racial categories defined by the U.S. Census Bureau.

Table 3.8-1. Selected Demographic Characteristics (Race) by County

Geographic Area	Total Population	White Alone	% White Alone	All Other Races	% All Other Races	% Hispanic	Meaningfully Greater by Race?	Meaningfully Greater by Ethnicity?
Collin County	1,064,465	542,472	50.96%	352,835	33.15%	15.89%	Yes	No
Dallas County	2,613,539	724,987	27.74%	830,717	31.79%	40.48%	Yes	Yes
Denton County	906,422	485,646	53.58%	237,998	26.26%	20.16%	No	No
Ellis County	192,455	106,495	55.34%	33,928	17.63%	27.04%	No	No
Johnson County	179,927	119,226	66.26%	18,088	10.05%	23.68%	No	No
Kaufman County	145,310	78,626	54.11%	30,519	21.00%	24.89%	No	No
Parker County	148,222	117,747	79.44%	10,656	7.19%	13.37%	No	No
Rockwall County	107,819	70,198	65.11%	17,061	15.82%	19.07%	No	No
Tarrant County	2,110,640	904,884	42.87%	584,849	27.71%	29.42%	No	Yes
Wise County	68,632	50,495	73.57%	4,443	6.47%	19.95%	No	No
Reference Community	7,537,431	3,200,776	42.47%	2,121,094	28.14%	29.39%	N/A	N/A
Texas	29,145,505	11,584,597	39.75%	6,119,191	21.00%	39.26%	N/A	N/A

Source: U.S. Census Bureau 2022.

N/A = not applicable.

Table 3.8-2. Selected Demographic Characteristic (Poverty) by County

Geographic Area	Number of Households	Average Household Size	2022 HHS Poverty Guideline	% of Households Below Poverty	Meaningfully Greater?
Collin County	414,601	2.77	\$21,944.40	7.00%	No
Dallas County	992,995	2.59	\$21,094.80	15.20%	Yes
Denton County	361,770	2.67	\$21,472.40	9.20%	No
Ellis County	73,227	2.87	\$22,416.40	9.40%	No
Johnson County	66,686	2.89	\$22,510.80	13.00%	No
Kaufman County	50,855	3.36	\$24,729.20	8.90%	No
Parker County	55,761	2.95	\$22,794.00	10.20%	No
Rockwall County	41,956	2.92	\$22,652.40	7.50%	No
Tarrant County	787,083	2.70	\$21,614.00	12.80%	No
Wise County	25,430	2.90	\$22,558.00	10.60%	No
Reference Community	2,455,763	2.87	\$22,378.64	14.07%	N/A
Texas	11,087,708	2.65	\$21,378.00	15.70%	N/A

Sources: U.S. Census Bureau 2022.

HHS = U.S. Department of Health and Human Services; N/A = not applicable.

Table 3.8-2 presents the income and poverty data for each geography, along with the HHS Poverty Guidelines. The poverty threshold is proportional to the household size, which is also presented in Table 3.8-2. Overall, the Reference Community has a poverty level of 14.07 percent, a value marginally lower than the state. Similar to what was done for race and ethnicity, the FAA applied a zero percent threshold. Therefore, the FAA identified any county whose percentage of households below poverty equals or exceeds 30.0 percent as an area of EJ concern. Table 3.8-3 shows the counties identified as areas of EJ concern compared to the Reference Community.

Table 3.8-3. Areas of EJ Concern

County	% All Other Races	% Hispanic	% Households Below Poverty
Collin County	33.15	X	X
Dallas County	31.79	40.48	15.02
Denton County	X	X	X
Ellis County	X	X	X
Johnson County	X	X	X
Kaufman County	X	X	X
Parker County	X	X	X
Rockwall County	X	X	X
Tarrant County	X	29.42	X
Wise County	X	X	X
Reference Community	28.14	29.39	14.07

Sources: U.S. Census Bureau 2022; U.S. Department of Health and Human Services 2022.

EJ = environmental justice; X = Does not meet the threshold for consideration as an environmental justice community of concern.

In summary, of the 10 counties, two counties (Collin County and Dallas County) are considered areas of EJ concern with respect to race because they have higher percentages of racial minorities compared to the Reference Community. None of those counties, however, are predominately minority (greater than 50 percent). Two counties (Dallas County and Tarrant County) are considered areas of EJ concern with respect to ethnicity because they have higher percentages of ethnic minorities than the Reference Community. Dallas County is also considered an areas of EJ concern with respect to poverty because it has a higher percentages of households below poverty than the Reference Community.

3.8.3 Environmental Consequences

The FAA has not established a significance threshold for EJ. FAA Order 1050.1F includes factors to consider when assessing the significance of potential EJ impacts, including whether the action would have the potential to lead to a disproportionately high and adverse impact to an EJ population (i.e., a low-income or minority population) due to (1) significant impacts in other environmental impact categories or (2) impacts on the physical or natural environment that affect an EJ population in a way that the FAA determines is unique to the EJ population and significant to that population. If a significant impact would adversely affect a low-income or minority population at a disproportionately higher level than other populations, then an EJ issue is likely.

A disproportionately high and adverse effect on a minority or low-income population means an adverse effect that is 1) predominately borne by a minority population and/or a low-income population or 2) will

be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than adverse effects that will be suffered by the non-minority population and/or low-income population.

EJ populations can also receive positive benefits from a proposed action, which should be considered in conducting an EJ analysis.

3.8.3.1 No Action Alternative

The no action alternative assumes UA operators would continue to operate under the existing Part 135 approvals listed in Section 2.1, as well as Part 107 approvals which require operations to remain within visual line of sight. The previous EAs for Part 135 commercial drone package delivery in DFW results in FONSIs (see Section 2.1). Under the no action alternative, Wing would continue operating its Hummingbird UA (7000W-A or 7000W-B) within DFW under Part 135, which includes up to 400 deliveries per day from 25 nest locations, from 7:00 a.m. to 7:00 p.m., and at other locations under 14 CFR Part 107, which limits operations to UA weighing less than 55 pounds and within visual line of sight. Wing would not increase the number of nest locations, remote pickup operations or extend the operational hours of its authorized commercial UA package delivery operations in DFW. Existing and new operations would not result in adverse effects on low-income or minority populations as noise levels from these operations would be below levels considered to constitute a significant impact (HMMH 2023). Drone operators would be able to provide on-demand access to small goods, including medicine and groceries, so that recipients would not be dependent on personal vehicles or other modes of transportation to obtain these items, which is a benefit of drone package deliveries. This additional access to small goods could result in decreased traffic congestion and greenhouse gas emissions, which would represent positive impacts to EJ communities. For these reasons, the no action alternative is not expected to result in significant impacts on EJ communities.

3.8.3.2 Proposed Action

As described in the sections above, the proposed action would not result in significant impacts in any other environmental impact category. As noted in Section 3.7, *Noise and Noise-Compatible Land Use*, the UA's noise emissions could be perceptible in areas within the study area but would stay well below the level determined to constitute a significant impact (DNL 65 dB). As part of the environmental review of individual nest locations, the FAA will review the applicant's proposal to ensure the proposal would not result in land use compatibility issues with respect to noise. If the FAA identifies concerns, the FAA will work with the applicant to avoid the issue (see Section 3.7).

Drone package deliveries would provide additional access to small goods, such as groceries and medicine, which could present a positive effect on low-income and minority communities where individuals may not have reliable access to personal vehicles and/or other modes of transportation. For these reasons, the proposed action may result in a benefit to low-income and minority communities by providing additional and on-demand access to small goods.

The proposed action *would not create impacts that exceed thresholds of significance* in other environmental impacts, nor would it generate impacts on the physical or natural environment that affect an EJ population in a way that the FAA determines are unique to the EJ population and significant to that population.

Therefore, the proposed action *would not result in significant EJ impacts*, including disproportionately high and adverse effects on minority and/or low-income populations.

3.9 Visual Effects (Visual Resources and Visual Character)

3.9.1 Definition of Resource and Regulatory Setting

Visual resources and visual character impacts deal broadly with the extent to which the project would either (1) produce light emissions that create annoyance or interfere with activities; or (2) contrast with, or detract from, the visual resources and/or the visual character of the existing environment. Visual effects can be difficult to define and assess because they involve subjectivity. In this case, visual effects would be limited to the introduction of a visual intrusion—a UA in flight—which could be out of character with the suburban or natural landscapes.

The FAA has not developed a visual effects significance threshold. Factors the FAA considers in assessing significant impacts include the degree to which the action would have the potential to (1) affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources; (2) contrast with the visual resources and/or visual character in the study area; or (3) block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations.

3.9.2 Affected Environment

The proposed action would take place over mostly suburban and commercially developed properties. As noted in Section 3.5, *Department of Transportation Act, Section 4(f) Resources*, there are some publicly owned resources that could be valued for aesthetic attributes within the study area. However, Wing's flight planning software is designed to increase variability in flight paths to minimize overflights of any given location; with the diversification of flight paths, the frequency of overflights would inversely scale as the distance from a nest increases. During takeoff, remote pickup, and delivery, the UA would depart from a nest and travel en route at an altitude less than 400 feet AGL (en route travel would generally occur between 150 and 250 feet AGL). Deliveries would mostly take place at residences, and, in some cases, there may be instances where the delivery would be to a customer located within a Section 4(f) resource (see Section 3.5.2, *Affected Environment*, for more information on 4(f) properties). A 6-foot-radius clear space is required for delivery, such as a driveway, parking lot, field, common area, patio, or clear spaces surrounding multi-family dwellings, as determined during the delivery request process.³⁶ The duration of delivery from the time the customer approves the delivery to the transition back to en route flight mode is expected to last approximately 15 seconds. The FAA estimates at typical operating altitude and speeds the UA en route would be observable for approximately 6 seconds by an observer on the ground.

³⁶ In the event that the clear space contains obstructions such as trees or cars, the UA would abort the delivery and return to the nest.

3.9.3 Environmental Consequences

3.9.3.1 No Action Alternative

Under the no action alternative, Wing could continue to operate its Hummingbird UA (7000W-A or 7000W-B) within DFW at the level analyzed in the 2023 EA (FAA 2023). Wing's drone operations would not alter any landforms or land uses, as discussed in the 2023 EA. Therefore, there will continue to be no effect on the visual character of the area from existing operations. Although the no action alternative involves drone airspace operations that could result in visual impacts on sensitive areas, such as Section 4(f) areas, where visual setting is a vital resource of the property, given the short flight durations and low number of proposed flights per day under the no action alternative, no significant impacts on visual resources and visual character are anticipated. Therefore, the no action alternative is not expected to result in significant visual effects.

3.9.3.2 Proposed Action

The proposed action would make no changes to any landforms or land uses; thus, there would be no effect on the visual character of the area, as the nests would be located in established commercial areas as further described in Section 2.2, *Proposed Action*. The proposed action involves airspace operations that could result in visual impacts on sensitive areas such as Section 4(f) properties where the visual setting is an important resource of the property. The short duration when each UA flight could be seen from any resource in the study area and the low number of overflights within any given location would minimize any potential for significant visual impacts.

The proposed action does not have the potential to do the following:

- Create annoyance or interfere with normal activities from light emissions;
- Affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources;
- Affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources;
- Contrast with the visual resources and/or visual character in the study area; and
- Block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations.

Therefore, the proposed action is not expected to cause significant impacts to visual resources.

Chapter 4

Cumulative Effects

Consideration of cumulative impacts applies to the impacts resulting from implementing the proposed action along with other actions. The CEQ regulations define cumulative impacts as “effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR § 1508.1(g)(3)).

As most of the impacts discussed in Chapter 3, *Affected Environment and Environmental Consequences*, were found to be minimal and given that the drone flight is limited in its ability to interact with other outside actions due to its short duration, the proposed action’s contribution to cumulative impacts in the study area would largely be from noise. Additionally, Wing is developing an automated deconfliction network for UA avoidance across participating operators that is expected to be enacted in early 2024. Thus, this section will focus on the proposed action’s potential cumulative impact on the noise environment.

Wing currently conducts package delivery operations from 15 nests located throughout the operating area (Appendix I, *Existing Nest Locations*); the 75 nests proposed as part of this UA expansion would include the 15 currently operating nests, for a maximum of 75 operating nests.

Because UA operations would occur in areas subject to other aviation noise sources, it is necessary to evaluate the cumulative noise exposure that would result from the other aviation noise sources present. Examples of such scenarios are Wing operations occurring in the vicinity of an airport where Wing flight activity may overlap with those other UA package delivery operators. Aviation noise sources are most likely to be the dominant contribution to noise impacts near airports. By comparison, other sources of noise would not appreciably contribute to overall noise levels at these locations.

There are 35 airports within the DFW metro area (see Appendix H, *Dallas–Fort Worth Area Airports*). The potential for noise and compatible land use cumulative effects would result from UA and manned aircraft operating within an airport DNL 60 dB contour. As such, the potential for cumulative effects would be minimized because Wing has elected to require that all nests would be placed at least 230 feet away from noise-sensitive areas within the controlled surface areas of Class B and Class D airspace. In addition, nests would be placed at least 70 feet away from noise-sensitive areas when they are outside of the controlled surface areas of Class B and Class D airspace. The expansion of Wing’s commercial delivery service is not expected to result in cumulative effects with other existing Part 135 UAS operations, such as the Causey Aviation Unmanned, Inc., Zipline, Inc., DroneUp, Inc., or other Part 107 operations (Appendix J, *Cumulative Effects*).

Wing will communicate and coordinate with other operators to limit operations occurring concurrently in the same area to avoid any significant impacts. When considering new nest locations, Wing will confirm a new nest does not cause a significant cumulative impact due to another operator’s hub by verifying approved locations through NEPA documents and avoiding potential projects and cumulative impacts by geofencing and proactively sharing airspace. The proposed automated deconfliction network for UA avoidance would help reduce any such cumulative effects by limiting drone flight path overlap.

Wing's flight planning software is designed to increase variability in flight paths to minimize overflights of any given location, thereby reducing the potential for cumulative effects when combined with other operations in the study area. Additionally, Part 135 operators would be required to complete an environmental review before beginning operations, ensuring that any potential cumulative effects are properly analyzed and disclosed.

Wing acknowledges that future operators may propose locating operations within this proposed action's study area. Should that occur, Wing understands the potential for impacts may increase due to a future operator's project and would work with that operator and the FAA to mitigate potential impacts. Wing also understands that any future operators would be required to perform their own NEPA analysis to identify the potential for any noise impacts due to their operations.

Nest sites would be in areas zoned for commercial activities and away from noise-sensitive areas. Nests would be powered using available electric outlets for recharging batteries. *No cumulative effects are expected on the power grid or from energy sources.*

As discussed in Chapter 3, the proposed action is not expected to significantly impact the environmental impact categories (see Section 3.2, *Environmental Impact Categories Not Analyzed in Detail*). Areas of existing aviation noise sources within the study area would be avoided; thus, the proposed action would not contribute to significant cumulative noise impacts. No other actions are anticipated to interact with the proposed action to result in cumulative effects; therefore, the proposed action is not expected to result in significant cumulative effects.

The FAA's analysis of prospective hub siting areas concluded that siting 100 percent of the existing and proposed hub locations is not feasible without overlap in the land area accessible from the hub locations (i.e., the delivery ranges of the proposed UA). More information regarding the number of proposed hubs, delivery ranges, and other assumptions relative to cumulative effects that could occur from Part 135 drone package deliveries in the DFW metro area can be found in Appendix J of this EA.

It should be noted that overlap does not necessarily mean that there will be adverse impacts to environmental resource categories. Cumulative effects are expected to occur where hub locations and delivery routes overlap. The level of cumulative impacts would vary depending on the amount of overlap, but FAA's analysis has determined that the cumulative impacts are not expected to exceed thresholds for significance in any environmental resource categories (Appendix J).

The degree to which all of the different operators would operate within areas of shared airspace is dependent on the operators, their specific business use cases, and their ability to deconflict with one another in those overlapping areas. Each operator is responsible for coordinating with other operators in the same geographic area to avoid significant cumulative impacts. Wing will communicate and coordinate with other operators to limit operations occurring concurrently in the same area to avoid any significant impacts. When considering new nest locations, Wing will confirm a new hub would not cause a significant cumulative impact due to another operator's nest³⁷ by verifying approved locations through NEPA documents and avoiding potential projects and cumulative impacts by geofencing and proactively sharing airspace.

³⁷ Wing's operations are conducted from a nest, but other operators may use differing terminologies.

Appendix A

References and Citations

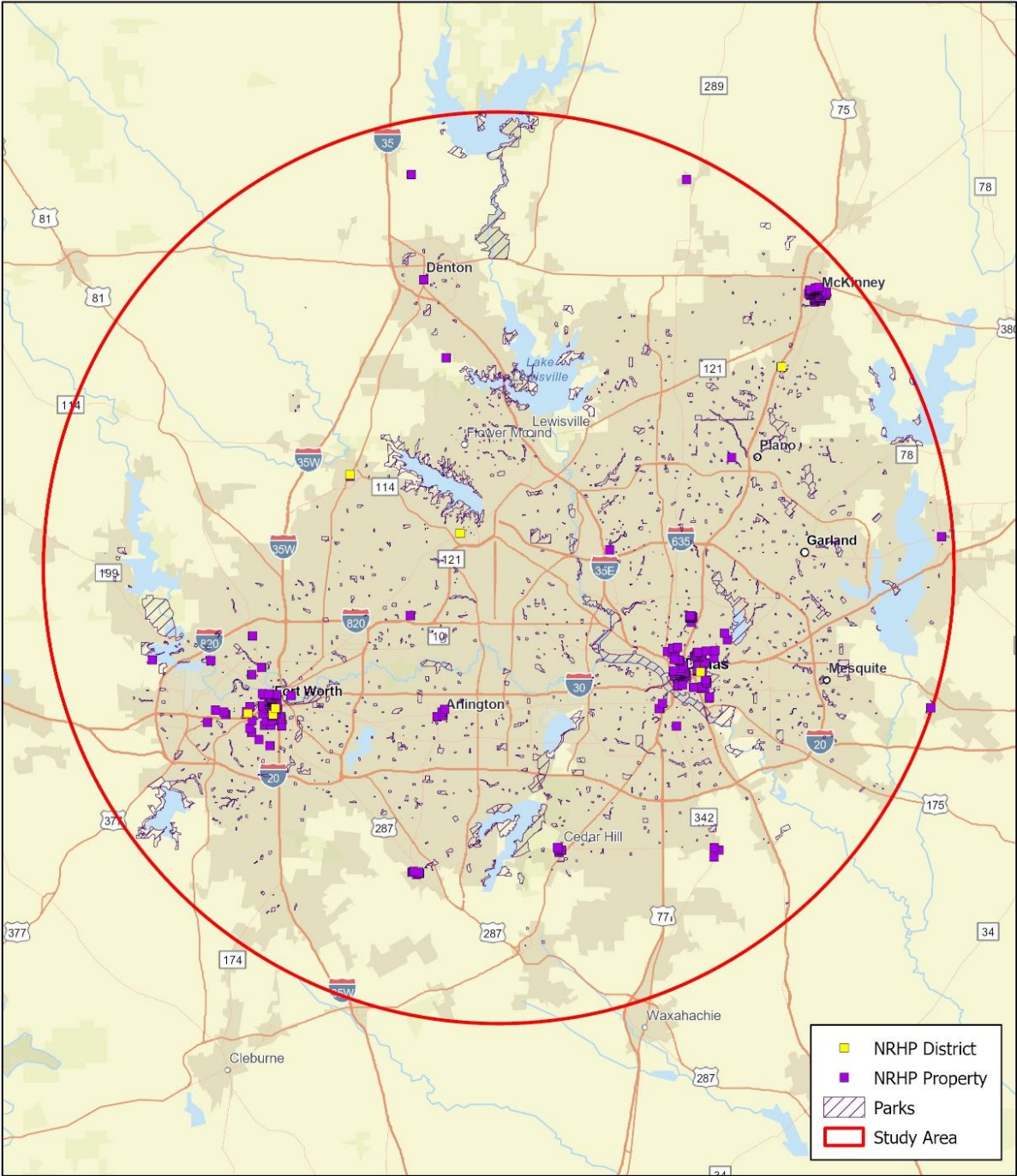
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Appendix B
Section 4(f)



Section 4(f) Properties
Wing DFW

List of Agencies Consulted, Preparers, and Reviewers

Consulting Agency / Tribal Government	Representative
U.S. Fish and Wildlife Service	Omar Bocanegra, Field Supervisor
Texas Historical Commission	Bradford Patterson, Chief Deputy State Historic Preservation Officer
Apache Tribe of Oklahoma	Durell Cooper, Chairman
Caddo Nation of Oklahoma	Bobby Gonzalez, Chairman
Cherokee Nation	Chuck Hoskin, Chairman
Comanche Nation, Oklahoma	Mark Woommavovah, Chairman
Coushatta Tribe of Louisiana	Jonathan Cernek, Chairman
Delaware Nation, Oklahoma	Deborah Dotson, President
Muscogee Nation	David Hill, Principal Chief
Tonkawa Tribe of Indians of Oklahoma	Russell Martin, President
Wichita and Affiliated Tribes, Oklahoma	Terri Parton, President

Name and Affiliation	Years of Industry Experience	EA Responsibility
FAA Evaluators		
Shelia Neumann Ph.D., P.E.; FAA AFS (Office of Safety Standards, Flight Standards Service) General Aviation and Commercial Branch, AFS-752	30	Environmental Protection Specialist, FAA NEPA project lead and Document Review
Christopher Hurst REM, CEA, CESCO; FAA AFS (Office of Safety Standards, Flight Standards Service) General and Commercial Aviation Branch, AFS-752	20	Environmental Protection Specialist, Document Review
Christopher Couture, FAA AQS (Aviation Safety, Quality, Integration, and Executive Services)	17	Environmental Protection Specialist, Document Review
Adam Scholten, FAA AEE (Office of Environment and Energy, Noise Division [AEE-100])	13	Environmental Protection Specialist, Noise Analysis and Document Review
Susumu Shirayama, FAA AEE (Office of Environment and Energy, Noise Division [AEE-100])	22	Environmental Protection Specialist, Noise Analysis and Document Review
Preparers		
Rob Greene, ICF	14	NEPA SME, Research, and Document Preparation
Robbie Baldwin, ICF	5	Biologist, Research, and Document Preparation
Jimmy Zaccagnino, ICF	5	Research and Document Preparation
Elisabeth Mahoney, ICF	6	Research and Document Preparation
Emma Cwalinski, ICF	2	Research and Document Preparation



Federal Aviation Administration

Memorandum

Date: November 5, 2024

To: David Senzig (Acting), Noise Division Manager, Office of Environment and Energy (AEE-100)

From: Shelia S. Neumann, Ph.D., P.E., Flight Standards (AFS), General Aviation and Commercial Operations Branch, AFS-752

Subject: Environmental Assessment (EA) Noise Methodology Approval Request for Amending Wing Aviation LLC's Operations Specifications for Drone Operations in Dallas-Fort Worth, Texas

AFS requests AEE approval of the noise methodology to be used for the Environmental Assessment (EA) for Wing Aviation LLC (Wing) operations using Hummingbird 7000W-B Unmanned Aircraft and Hummingbird 8000-A (UAs) (commonly referred to as drones) in Dallas-Fort Worth (DFW) and an associated operating area to provide package delivery services as a Title 14, Code of Federal Regulations (14 CFR) Part 135 operator as described below.

As required under the National Environmental Policy Act (NEPA), the FAA must consider the potential for environmental impacts in informing the agency's decision to approve proposed Federal actions, including the potential for noise impacts as detailed in FAA Order 1050.1F.

As the FAA does not currently have a standard approved noise model for UA, this memo serves as a request for written approval from AEE-100 to use the methodology proposed in the following sections to support the noise analysis for this EA.

Description of Aircraft and Proposed Operations

AFS is evaluating Wing's request to amend its B050 Operations Specifications (OpSpec), *Authorized Areas of En Route Operations, Limitations, and Provisions*, specifically to a reference section titled Limitations, Provisions, and Special Requirements, dated March 17, 2022. The amendment would add a new paragraph with descriptive language about the DFW operating area boundaries and would allow Wing to expand the geographic scope of new nest locations as well as increase their number of daily operations from 100 to 400 deliveries per day. Wing is projecting to establish up to 50 additional nests in the DFW operating area under the scope of the proposed action. FAA's approval of an amendment is required before these operations can occur.

Wing is proposing to use the Hummingbird 7000W-B, which features a multi-rotor design with 16 round diameter propellers. The Hummingbird 7000W-B drone system consists of three main components: the launch pads (contained in “nests”), the drone, and the software. Flight missions are automatically planned by Wing’s flight planning software. A mission originates from a nest location, and Wing’s software automatically assigns, deconflicts, and routes each flight to the delivery location and back to a nest. Each nest site would include a controlled area wherein UA flights are launched and recovered. Wing is proposing to use the Hummingbird 7000W-B and 8000-A to conduct full-scale commercial UA delivery operations in the DFW metro area. Each drone flight would vary in duration, depending on the location of the delivery point. Hummingbird 8000-A is a multi-rotor design with 12 round diameter propellers. Its weight is under 25 pounds when combined with its maximum payload weight of 5 pounds and has a wingspan of approximately 6 feet, a height of approximately 1 foot, and a length of approximately 6.2 feet.

Remote pickup operations from each nest would be supported at up to 12 partner establishments depending upon demand and nest capacity. Pickup operations would follow general flight phases and parameters identical to typical delivery operations and would include the addition of a pickup phase. The pickup phase is similar to the delivery phase.

Wing anticipates the updated DFW fleet makeup would be comprised of 70 to 80 percent 7000W-B aircraft and 20 to 30 percent 8000-A aircraft. The fleet mix of individual nests would be variable based on payload, route, and demand characteristics; nests with a wider range of offerings are anticipated to carry higher proportions of 7000W-B Aircraft.

Wing is projecting to establish up to 75 nests in the DFW operating area which is adding 50 additional nests from the previous DFW EA. Proposed operations would include approximately 400 deliveries per day, per nest, and would occur only during daylight hours, approximately 7:00 a.m. to 7:00 p.m., to include holidays. Wing is not proposing to conduct night operations (defined as 10:00 p.m. to 7:00 a.m.) and would not typically operate over water. However, operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m.

Noise Analysis Methodology

AFS requests the use of the noise analysis methodology described in Report No. 112024 for “Technical Noise Study Report: Hummingbird 7000W-B and 8000-A Unmanned Aircraft Package Delivery Operations,” dated November 4, 2024.

TECHNICAL NOISE STUDY REPORT: HUMMINGBIRD 7000W-B AND 8000-A UNMANNED AIRCRAFT PACKAGE DELIVERY OPERATIONS

REPORT No. 112024

PREPARED FOR:

Federal Aviation Administration
Unmanned Aircraft Systems Integration Office (AUS)
950 L'Enfant Plaza SW, Suite 500
Washington, D.C. 20024

PREPARED BY:

ICF

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Contents

	Page
List of Tables	iii
List of Figures.....	iv
Acronyms and Abbreviations	iv
Chapter 1 Introduction.....	1-1
1.1 Purpose.....	1-1
1.2 Fundamental Concepts.....	1-2
1.3 Regulatory Context.....	1-2
Chapter 2 Methods	2-1
2.1 Sound Level Measurements	2-1
2.1.1 Wing Model 7000W-B Sound Level Measurements.....	2-1
2.1.2 Wing Model 8000-A Sound Level Measurements	2-2
2.2 Analysis Procedure Methodology	2-4
Chapter 3 Testing Procedure for Wing Operations.....	3-1
3.1 Manual Load and Takeoff.....	3-1
3.2 Delivery.....	3-1
3.2.1 Landing.....	3-1
3.2.2 Offsite Package Autoload.....	3-2
3.2.3 Nearfield Launch and Autoload	3-2
3.2.4 Fitbit Operation.....	3-2
3.2.5 Geobit Operation	3-3
Chapter 4 Sound Levels of UA Operations	4-1
4.1 Sound Levels for Wing Model 7000W-B.....	4-1
4.1.1 Manual Loading, Delivery and Landing.....	4-1
4.1.2 Sound Levels for Wing Model 7000W-B Autoload Actions	4-2
4.1.3 Sound Levels for Wing Model 7000W-B FitBit and GeoBit Actions	4-3
4.1.4 En Route Sound Levels for Wing Model 7000W-B.....	4-4
4.2 Sound Levels for Wing Model 8000-A.....	4-5
4.2.1 Manual Loading, Delivery and Landing.....	4-5
4.2.2 Sound Levels for Wing Model 8000-A Autoload Actions.....	4-6
4.2.3 Sound Levels for Wing Model 8000-A FitBit and GeoBit Actions	4-8
4.2.4 En Route Sound Levels for Wing Model 8000-A.....	4-9

Chapter 5 Noise Exposure from UA Operations	5-1
5.1 Noise Exposure from a Nest	5-1
5.2 Noise Exposure from Offsite Package Autoloading.....	5-4
5.3 En Route Noise Exposure	5-5
5.4 Noise Exposure from a Delivery Site	5-5
5.5 Cumulative Noise Exposure.....	5-7
Chapter 6 References	6-1

List of Tables

	Page
Table 1. Summary of Sound Level Testing, Model 7000W-B.....	2-2
Table 2. Summary of Sound Level Testing, Model 8000-A	2-3
Table 3. Model 7000W-B: Estimate of SEL for Manual Launch, Delivery and Landing at Nest	4-1
Table 4. Model 7000W-B: Estimate of SEL for Offsite Autoload and Nearfield Launch and Autoload Actions.....	4-2
Table 5. Model 7000W-B: Estimate of SEL for FitBit and GeoBit Actions.....	4-3
Table 6. Model 8000-A: Estimate of SEL for Manual Launch, Delivery and Landing at Nest.....	4-5
Table 7. Model 8000-A: Estimate of SEL for Offsite Autoload and Nearfield Launch and Autoload Actions.....	4-6
Table 8. Model 8000-A: Estimate of SEL for FitBit and GeoBit Actions	4-8
Table 9. DNL Noise Exposure Distances at Nest for Model 7000W-B for Different Scales of Operation, Manual Launch Option	5-1
Table 10. DNL Noise Exposure Distances at Nest for Model 7000W-B for Different Scales of Operation, Nearfield Launch Option.....	5-2
Table 11. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Manual Launch Option	5-3
Table 12. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Nearfield Launch Option.....	5-3
Table 13. DNL Noise Exposure Distances at an Offsite Package Autoloading Location for Model 7000W-B, for Different Scales of Operation.....	5-4
Table 14. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Remote Launch Option.....	5-5
Table 15. DNL Noise Exposure Distances at a Delivery Point for Model 7000W-B for Different Scales of Operation.....	5-6
Table 16. DNL Noise Exposure Distances at a Delivery Point for Model 8000-A for Different Scales of Operation.....	5-6
Table 17. Cumulative Increase in DNL due to a Proposed Action.....	5-7

List of Figures

	Page
Figure 1. Hummingbird Wing Model 7000W-B.....	2-1
Figure 2. Wing Hummingbird 8000-A UA.....	2-3

Acronyms and Abbreviations

AGL	above ground level
CONOPS	Concept of operations
dB	decibel
dBA	A-weighted decibel
DNL	day/night level
FAA	Federal Aviation Administration
Lmax	maximum sound level
SEL	sound exposure level
UA	unmanned aircraft

1.1 Purpose

The purpose of this report is to provide calculations of noise exposure for package delivery operations by Hummingbird unmanned aircraft (UA) developed by Wing Aviation LLC, a subsidiary of Alphabet, Inc. Noise exposure estimates are provided for two Hummingbird models: the Model 7000W-B and the Model 8000-A based on sound level testing data collected by AvEnviro Acoustics (2024a, 2024b).

The analysis in this report provides a methodology of estimating noise levels from UA operation that is limited to these specific UA models. Because the methods used in this report are based on collected measurements, they should not be applied to other UA models. The analysis does not include a geographic component, nor does it account for the presence of structures in urban areas.

Passby exposure levels at different distances from a nest or delivery point are based on as-tested conditions, which were intended to simulate all operation types for each UA model. Testing simulations consisted of the following operations:

- Manual package loading at a nest and takeoff toward delivery point
- Package offloading at a delivery point and departure back to nest
- Landing at a nest
- Remote launch, autoloading of package at a nest, and takeoff
- Nearfield launch, autoloading of package at a nest, and takeoff
- Hover in place
- En route (with and without a package)
- Preflight warmup (a.k.a. “Fitbit” operation)
- Nest homebase survey (a.k.a. “Geobit” operation)

Total DNL noise exposures are calculated based on various scales of package delivery and associated activities using passby exposure levels for the types of operation applicable to nests, delivery points and en route locations.

It is important to note that the results presented in this report shall supersede the results presented in the previous report, *Noise Assessment for Wing Aviation Proposed Package Delivery Operations with Hummingbird 7000W-B Unmanned Aircraft*, prepared March 17, 2023 by Harris Miller Miller and Hanson Inc (2023). The results in the previous Model 7000W-B report relied on certification measurements for en route and hover of a surrogate UA model. This is because sound level measurements had not yet been conducted for simulation of package delivery operations using the Model 7000W-B at the time the previous report was written. In contrast, the sound level measurements presented in this report are based closely on the concept of operations (CONOPS) for all modes of UA package delivery and associated operations.

1.2 Fundamental Concepts

Various noise descriptors or metrics have been developed to describe time-varying noise levels. The following metrics are used in this evaluation.

- Sound Exposure Level (SEL): SEL represents the total sound energy occurring over a specified period compressed into a one-second time interval. The SEL metric has broad utility in noise prediction and is a primary measurement collected for sound level testing of the two UA models.
- Day Night Average Sound Level (DNL): DNL is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 decibel (dB) penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m. The DNL is used in this analysis to describe noise exposure for daily operations from a nest, en route, or delivery point.
- Maximum Sound Level (Lmax): Lmax is the highest instantaneous sound level measured during a specified period.
- Community Noise Equivalent Level (CNEL): Similar to DNL, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

1.3 Regulatory Context

The noise exposure estimates in this document are intended to be used for environmental assessments of operations involving the Models 7000W-B and 8000-A, for compliance with the National Environmental Policy Act and operational requirements for a commercial carrier under 14 Code of Federal Regulations Part 135. The analysis method used in this report does not apply standard models such as the Aviation Environmental Design Tool, but instead applies an estimation method based on collected noise measurements. As such the application of this method is only applicable to the Model 7000W-B and 8000-A UAs.

2.1 Sound Level Measurements

The analysis in this report used sound level testing data from two reports: *Noise Measurement Results: Wing Model 7000W-B Revision D*, dated November 4, 2024, prepared by AvEnviro Acoustics (2024a), and *Noise Measurement Results: Wing Model 8000-A Revision C*, dated October 28, 2024 also prepared by AvEnviro Acoustics (2024b).

2.1.1 Wing Model 7000W-B Sound Level Measurements

The Hummingbird 7000W-B is a hybrid UA featuring a multi-rotor design with sixteen round diameter propellers. This UA has fixed wing elements, including four motors for forward flight, while also using rotors to provide vertical lift and the capability to hover during packing loading and delivery operations. Packages are loaded or unloaded to the UA during hover by a retractable cord.

The 7000W-B UA weighs 14 pounds when combined with its maximum payload weight of 2.3 pounds. It has a wingspan of approximately 4.9 feet, a height of approximately 1 foot, and a length of approximately 3 feet. Model 7000W-B is shown in Figure 1.

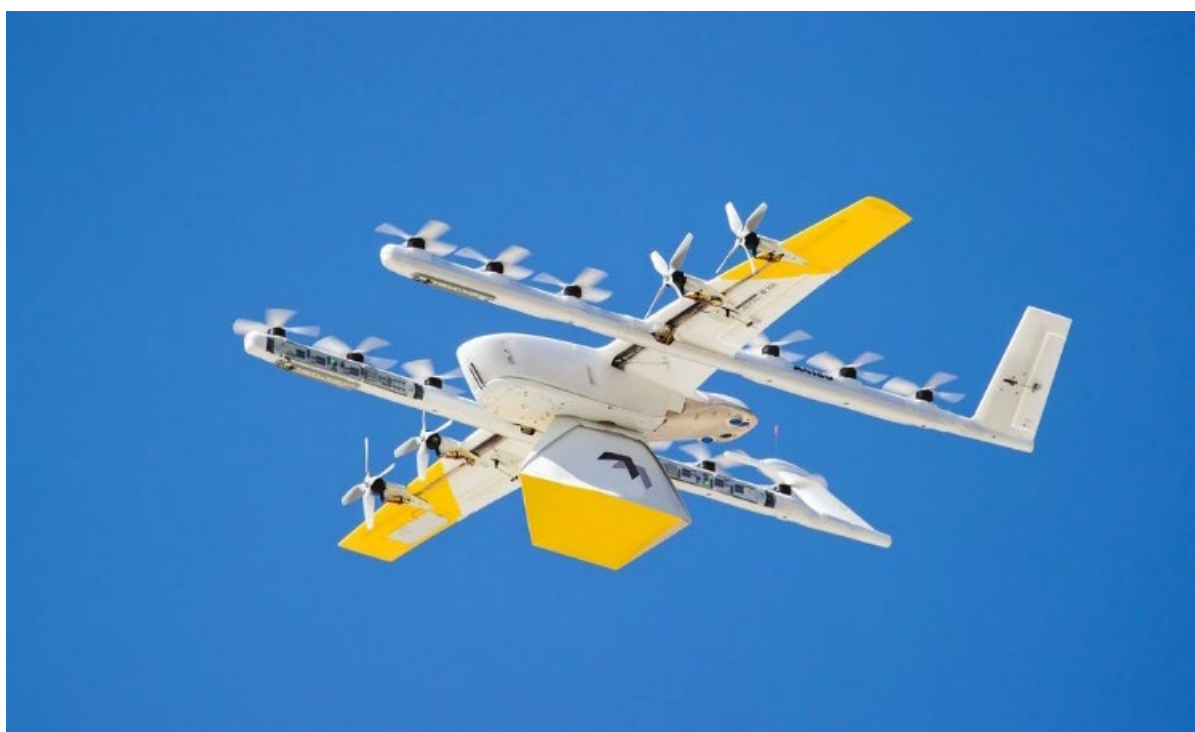


Figure 1. Hummingbird Wing Model 7000W-B.

Sound level testing was conducted at the Wing flight test center in Hollister, California in March 2024. The testing protocol followed FAA direction given in the document, *Measuring Drone Noise for Environmental Review Process*, dated October 2023 (FAA 2023). A brief summary of test results is shown in Table 1. The test results that include forward flight assume a nominal cruise speed of 50.5 knots (AvEnviro Acoustics 2024a).

Table 1. Summary of Sound Level Testing, Model 7000W-B

Test Series	Altitude	Microphone Position	Average SEL (dBA)	Average Lmax (dBA)
En Route with Package	100 feet AGL	Under flight path	59.2	54.3
En Route without Package	100 feet AGL	Under flight path	55.5	50.3
Nest: Manual Loading and Takeoff	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	80.6	66.8
Delivery Point: Arrival, Delivery, Departure	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	83.4	71.9
Nest: Arrival, Landing	Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	78.1	68.2
Offsite Package Autoload	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	81.7	68.9
Nest: Nearfield launch, Autoload and Takeoff	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	82.1	68.6
Nest: Preflight warmup (a.k.a. “Fitbit”)	7 feet AGL	50 feet away from nest	80.3	64.0
Nest: Homebase survey (a.k.a. “Geobit”)	66 feet AGL	50 feet away from nest	81.0	66.2

Source: AvEnviro Acoustics 2024a.

AGL = above ground level

dBA = A-weighted decibel

2.1.2 Wing Model 8000-A Sound Level Measurements

The Hummingbird 8000-A is a hybrid UA featuring a multi-rotor design with twelve round diameter propellers. This UA has fixed wing elements, including four motors for forward flight, while also using rotors to provide vertical lift and the capability to hover during packing loading and delivery operations. Packages are loaded or unloaded to the UA during hover by a retractable cord.

The 8000-A UA weighs 24.3 pounds when combined with its maximum payload weight of 6.6 pounds. It has a wingspan of approximately 6 feet, a height of approximately 1 foot, and a length of approximately 6.2 feet. Model 8000-A is shown in Figure 2.



Figure 2. Wing Hummingbird 8000-A UA

Sound level testing was conducted at the Wing flight test center in Hollister, California in April 2024. The testing protocol followed FAA direction given in the document, *Measuring Drone Noise for Environmental Review Process*, dated October 2023 (FAA 2023). A brief summary of key test results is shown in Table 2. The test results that include forward flight assume a nominal cruise speed of 50.5 knots (AvEnviro Acoustics 2024b).

Table 2. Summary of Sound Level Testing, Model 8000-A

Test Series	Altitude	Microphone Position	Average SEL (dBA)	Average Lmax (dBA)
En Route with Package	100 feet AGL	Under flight path	64.7	58.7
En Route without Package ¹	100 feet AGL	Under flight path	62.7	55.5
Nest: Manual Loading and Takeoff	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	79.0	65.8
Delivery Point: Arrival, Delivery, Departure	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	83.6	71.5
Nest: Arrival, Landing	Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	77.7	66.3
Offsite Package Autoload	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	80.9	66.8
Nest: Nearfield launch, Autoload and Takeoff	Hover: 13 feet AGL, Flight: 165 feet AGL	Under flight path, 50 feet away from takeoff point	81.6	66.8
Nest: Preflight warmup (a.k.a. "Fitbit")	7 feet AGL	50 feet away from nest	77.1	63.2

Test Series	Altitude	Microphone Position	Average SEL (dBA)	Average Lmax (dBA)
Nest: Homebase survey (a.k.a. “Geobit”)	66 feet AGL	50 feet away from nest	79.4	66.7

Source: AvEnviro Acoustics 2024b.

¹ Based on guidance from the test report, data for en route without a package is not used. This item uses the same sound level as en route with a package.

AGL = above ground level; dBA = A-weighted decibel

2.2 Analysis Procedure Methodology

To calculate SEL for receptors located near a nest or delivery point, a combination of actions are evaluated to define different types of operations, as a UA transitions between different operating modes of takeoff, hover, ascend, descend, and en route. The types of operations evaluated are the following:

- Manual package loading at nest
- Package delivery at a delivery point
- Landing at nest
- Package autoloader at an offsite location
- Nearfield launch and package autoloader at nest
- Preflight warmup (a.k.a. “Fitbit”)
- Homebase survey (a.k.a. “Geobit”)

The SEL calculation for each of these operation types involves the use of sound level data as measured by an array of microphones during simulation testing of each operation, as described in the noise measurement test reports (AvEnviro 2024a, AvEnviro 2024b). Microphones placed on a linear path relative to the UA launch point collected sound level data at distances of 25 feet, 50 feet, 100 feet, 200 feet, 400 feet and 800 feet. The incident SEL sound levels were used to determine attenuation rates between microphone positions, which were influenced by different degrees of en route and hover noise depending on the type of operation tested. However, as described in the noise measurement test reports, ambient noise from other sources heavily influenced data collected at the 400-foot and 800-foot positions (AvEnviro 2024a, 2024b). For this reason, the data collected at the 400-foot and 800-foot positions is not used in this analysis. At 800 feet, the SEL is equivalent to en route noise as measured during testing. As such, for the distances greater than 200 feet from the UA launch point, attenuation would assume a falloff rate consistent with an en route SEL level at 800 feet. At distances greater than 800 feet, the en route level is used.

DNL values are calculated for four types of locations: 1) a nest, 2) a delivery point, 3) an offsite autoloader, and 4) directly under the en route path. The DNL values at a nest are calculated by summing the sound energy for a launch and package loading operation with a return to land at the nest to describe sound levels for a single delivery cycle. UA noise from FitBit and GeoBit operations are also accounted for in DNL values from a nest. The DNL value for a single delivery cycle at each of the four locations is scaled for multiple UA operations using a logarithmic multiplier (i.e., log of the number of events multiplied by 10). adjusted by a factor of 49.4 to convert from SEL to DNL.

Chapter 3

Testing Procedure for Wing Operations

Sound level testing included a simulation of different UA operations to account for different activities that would take place at nest and delivery points. Each operation type includes a specific sequence of actions, described in the following subsections.

3.1 Manual Load and Takeoff

Sequence of manual package loading and takeoff operation from the launch point (e.g., nest):

1. Ascend from launch pad until reaching 33 feet above ground level AGL, then descend slightly to 22 feet AGL (about 9 seconds for 7000W-B, 11 seconds for 8000-A)
2. Hover at 22 feet AGL during package pickup (about 20 seconds for both models)
3. Aircraft with package ascends from 22 feet AGL to 165 feet AGL (about 14 seconds for both models)
4. Begin horizontal flight at constant acceleration until a speed of 50.5 knots is reached (about 13 seconds for 7000W-B, 15 seconds for 8000-A)
5. Maintain horizontal flight at constant velocity of 50.5 knots over microphone array

3.2 Delivery

Sequence of package delivery operation to a delivery point:

1. Aircraft with package approaches at 165 feet AGL above microphone array
2. Decelerate from 50.5 knots to zero (about 15 seconds for 7000W-B, 13 seconds for 8000-A)
3. Descend from 165 feet AGL to 22 feet AGL (about 20 seconds for 7000W-B, 28 seconds for 8000-A)
4. Hover at 22 feet AGL during package drop (about 12 seconds for both models)
5. Empty aircraft ascends from 22 feet AGL to 165 feet AGL (about 15 seconds for 7000W-B, 16 seconds for 8000-A)
6. Begin horizontal flight at constant acceleration until a speed of 50.5 knots (i.e., V_{cruise}) is reached (about 14 seconds for 7000W-B, 18 seconds for 8000-A)
7. Maintain horizontal flight at constant velocity of 50.5 knots over microphone array

3.2.1 Landing

Sequence of landing operation at nest:

1. Empty aircraft approaches at 165 feet AGL above microphone array
2. Decelerate from 50.5 knots to zero (about 14 seconds for both models)

3. Descend from 165 feet AGL to ground (for 7000W-B, the UA descends to 20 feet AGL in about 15 seconds and from 20 feet AGL to ground in about 13 seconds; for 8000-A, the UA descends to 20 feet AGL in about 24 seconds and from 20 feet AGL to ground in about 12 seconds)

3.2.2 Offsite Package Autoload

For offsite package autoload operation, the UA takes off from a distant nest location and approaches the offsite package loading point.

1. Empty aircraft approaches at 165 feet AGL above microphone array
2. Decelerate from 50.5 knots to zero (about 17 seconds for both models)
3. Descend from 165 feet AGL to 22 feet AGL (about 15 seconds for 7000W-B, 25 seconds for 8000-A)
4. Hover at 22 feet AGL during package pickup (about 22 seconds for both models)
5. Aircraft with package ascends from 22 feet AGL to 165 feet AGL (about 15 seconds for both models) Begin horizontal flight at constant acceleration until a speed of 50.5 knots (i.e., V_{cruise}) is reached (about 14 seconds for both models)
6. Maintain horizontal flight at constant velocity of 50.5 knots over microphone array

3.2.3 Nearfield Launch and Autoload

For nearfield launch, the UA takes off and approaches the package loading point from a nearby nest.

1. Empty aircraft ascends from nest 50 feet away to 165 feet AGL (about 15 seconds for 7000W-B, 16 seconds for 8000-A)
2. Transit to nearby autoloader (about 8 seconds for 7000W-B, 12 seconds for 8000-A)
3. Descend from 165 feet AGL to 14 feet AGL at constant velocity of (about 15 seconds for 7000W-B, 26 seconds for 8000-A)
4. Hover at 14 feet AGL during package pickup (about 22 seconds for both models)
5. Aircraft with package ascends from 14 feet AGL to 165 feet AGL (about 15 seconds for both models)
6. Begin horizontal flight at constant acceleration until a speed of 50.5 knots (i.e., V_{cruise}) is reached (about 14 seconds for both models)
7. Maintain horizontal flight at constant velocity of 50.5 knots over microphone array

3.2.4 Fitbit Operation

The Fitbit operation is a brief hover operation to warm up the battery and conduct preflight tests at the beginning of each day of flight operation. This would be done for each individual UA at the nest. Testing time varies but generally would be less than two minutes.

1. Climb to 7 feet AGL (about 3 seconds for both models)
2. Hover in place (assumes 118 seconds for 7000W-B, 49 seconds for 8000-A)

3. Descend from 7 feet AGL to ground (about 6 seconds for both models)

3.2.5 Geobit Operation

The Geobit operation is a brief hover operation above the nest to verify geolocation of ground-based infrastructure.

1. Climb to 66 feet AGL (about 8 seconds for both models)
2. Hover in place (about 25 seconds for both models)
3. Descend from 66 feet AGL to ground (about 40 seconds for both models)

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Chapter 4

Sound Levels of UA Operations

4.1 Sound Levels for Wing Model 7000W-B

4.1.1 Manual Loading, Delivery and Landing

Calculated sound levels for Wing Model 7000W-B manual loading, delivery, and landing at the launch point are shown in Table 3.

Table 3. Model 7000W-B: Estimate of SEL for Manual Launch, Delivery and Landing at Nest

Distance between Launch Point and Receiver	Manual Load and Takeoff, dBA SEL ¹	Delivery, dBA SEL ²	Return to Nest and Landing, dBA SEL ³
25	86.6	88.4	83.2
50	80.6	83.5	78.1
75	76.8	79.9	75.0
100	74.1	77.3	72.8
125	72.6	75.5	71.1
150	71.4	74.0	69.6
175	70.3	72.7	68.4
200	69.4	71.6	67.4
225	68.3	70.4	66.2
250	67.3	69.4	65.0
275	66.4	68.5	64.0
300	65.6	67.6	63.1
325	64.9	66.8	62.3
350	64.2	66.1	61.5
375	63.5	65.4	60.8
400	62.9	64.8	60.1
425	62.4	64.2	59.5
450	61.8	63.7	58.8
475	61.3	63.1	58.3
500	60.9	62.6	57.7
525	60.4	62.1	57.2
550	60.0	61.7	56.7
575	59.6	61.3	56.3
600	59.2	60.8	55.8
625	58.8	60.4	55.4
650	58.4	60.1	55.0
675	58.1	59.7	54.6
700	57.7	59.3	54.2

Distance between Launch Point and Receiver	Manual Load and Takeoff, dBA SEL ¹	Delivery, dBA SEL ²	Return to Nest and Landing, dBA SEL ³
725	57.4	59.0	53.8
750	57.1	58.7	53.5
775	56.8	58.3	53.1
800	56.5	58.0	52.8
825	56.5	58.0	52.8
850	56.5	58.0	52.8
875	56.5	58.0	52.8
900	56.5	58.0	52.8
925	56.5	58.0	52.8
950	56.5	58.0	52.8
975	56.5	58.0	52.8
1000	56.5	58.0	52.8

Source: AvEnviro 2024a, ICF 2024.

¹ Assumes one en route trip with package on board.

² Assumes one en route trip with package on board plus one en route trip without a package.

³ Assumes one en route trip without a package.

dBA = A-weighted decibel; SEL = sound exposure level

4.1.2 Sound Levels for Wing Model 7000W-B Autoload Actions

Calculated sound levels for offsite autoload, and nearfield launch and autoload for Model 7000W-B are shown in Table 4.

Table 4. Model 7000W-B: Estimate of SEL for Offsite Autoload and Nearfield Launch and Autoload Actions

Distance between Launch Point and Receiver	Offsite Autoload, dBA SEL ¹	Nearfield Launch and Autoload, dBA SEL ¹
25	87.1	87.1
50	81.7	82.1
75	78.7	79.2
100	76.6	77.1
125	75.0	75.3
150	73.6	73.9
175	72.5	72.7
200	71.5	71.6
225	70.4	70.3
250	69.3	69.2
275	68.4	68.1
300	67.6	67.2
325	66.8	66.3
350	66.1	65.5

Distance between Launch Point and Receiver	Offsite Autoload, dBA SEL ¹	Nearfield Launch and Autoload, dBA SEL ¹
375	65.4	64.7
400	64.8	64.0
425	64.2	63.4
450	63.6	62.8
475	63.1	62.2
500	62.6	61.6
525	62.1	61.1
550	61.7	60.6
575	61.2	60.1
600	60.8	59.6
625	60.4	59.2
650	60.0	58.7
675	59.7	58.3
700	59.3	57.9
725	59.0	57.6
750	58.7	57.2
775	58.3	56.8
800	58.0	56.5
825	58.0	56.5
850	58.0	56.5
875	58.0	56.5
900	58.0	56.5
925	58.0	56.5
950	58.0	56.5
975	58.0	56.5
1000	58.0	56.5

Source: AvEnviro 2024a, ICF 2024.

¹ Assumes one incoming en route trip without a package plus one outgoing en route trip with package on board.
dBA = A-weighted decibel; SEL = sound exposure level

4.1.3 Sound Levels for Wing Model 7000W-B FitBit and GeoBit Actions

Calculated sound levels for Fitbit and Geobit operations for Model 7000W-B are shown in Table 5.

Table 5. Model 7000W-B: Estimate of SEL for FitBit and GeoBit Actions

Distance between Launch Point and Receiver	FitBit, dBA SEL	GeoBit, dBA SEL
25	87.3	85.3
50	80.3	81.0
75	76.5	78.0
100	73.8	75.9

Distance between Launch Point and Receiver	FitBit, dBA SEL	GeoBit, dBA SEL
125	72.2	74.0
150	70.9	72.4
175	69.8	71.1
200	68.8	69.9
225	68.0	68.9
250	67.2	68.0
275	66.5	67.1
300	65.9	66.4
325	65.3	65.7
350	64.8	65.1
375	64.3	64.5
400	63.8	63.9
425	63.4	63.4
450	63.0	62.9
475	62.6	62.4
500	62.2	62.0
525	61.8	61.5
550	61.5	61.1
575	61.2	60.8
600	60.9	60.4
625	60.6	60.0
650	60.3	59.7
675	60.0	59.4
700	59.8	59.1
725	59.5	58.8
750	59.3	58.5
775	59.0	58.2
800	58.8	57.9
825	58.6	57.6
850	58.4	57.4
875	58.2	57.1
900	58.0	56.9
925	57.8	56.6
950	57.6	56.4
975	57.4	56.2
1000	57.2	56.0

Source: AvEnviro 2024a, ICF 2024.

dBA = A-weighted decibel; SEL = sound exposure level

4.1.4 En Route Sound Levels for Wing Model 7000W-B

The SEL for an en route overflight with a package loaded on the Model 7000W-B was measured to be 59.2 dBA. The en route overflight SEL for a Model 7000W-B with no package was measured to be 55.5 dBA (AvEnviro 2024a). During testing, en route measurements were taken with UA in forward

flight at an altitude of 100 feet AGL, which is lower than the expected operating altitude of 165 feet AGL. To adjust the measured en route sound level to the operating altitude of 165 feet AGL, a data correction factor using the logarithm of the ratio of altitudes multiplied by 12.5 was added to the en route SEL, consistent with procedures described in 14 CFR Part 36. The corrected SEL values were calculated to be 56.5 dBA with a package and 52.8 dBA without a package. These corrected en route sound levels were used for distances 800 feet or greater from the nest or delivery site.

4.2 Sound Levels for Wing Model 8000-A

4.2.1 Manual Loading, Delivery and Landing

Calculated sound levels for Wing Model 8000-A manual loading, delivery and landing at the launch point are shown in Table 6.

Table 6. Model 8000-A: Estimate of SEL for Manual Launch, Delivery and Landing at Nest

Distance between Launch Point and Receiver	Manual Load and Takeoff, dBA SEL¹	Delivery, dBA SEL²	Return to Nest and Landing, dBA SEL³
25	84.4	87.3	81.8
50	79.0	83.6	77.7
75	76.9	80.7	75.4
100	75.4	78.6	73.7
125	74.4	77.0	71.6
150	73.6	75.7	70.0
175	72.9	74.6	68.5
200	72.3	73.7	67.3
225	71.4	72.9	66.7
250	70.6	72.2	66.1
275	69.9	71.5	65.6
300	69.3	70.9	65.2
325	68.7	70.3	64.7
350	68.1	69.8	64.3
375	67.6	69.3	64.0
400	67.1	68.9	63.6
425	66.7	68.5	63.3
450	66.3	68.1	63.0
475	65.9	67.7	62.7
500	65.5	67.4	62.5
525	65.1	67.0	62.2
550	64.8	66.7	62.0
575	64.4	66.4	61.7
600	64.1	66.1	61.5
625	63.8	65.8	61.3
650	63.5	65.5	61.1

Distance between Launch Point and Receiver	Manual Load and Takeoff, dBA SEL ¹	Delivery, dBA SEL ²	Return to Nest and Landing, dBA SEL ³
675	63.2	65.3	60.9
700	63.0	65.0	60.7
725	62.7	64.8	60.5
750	62.5	64.6	60.3
775	62.2	64.3	60.1
800	62.0	64.1	60.0
825	62.0	64.1	60.0
850	62.0	64.1	60.0
875	62.0	64.1	60.0
900	62.0	64.1	60.0
925	62.0	64.1	60.0
950	62.0	64.1	60.0
975	62.0	64.1	60.0
1000	62.0	64.1	60.0

Source: AvEnviro 2024b, ICF 2024.

¹ Assumes one en route trip with package on board.

² Assumes one en route trip with package on board plus one en route trip without a package.

³ Assumes one en route trip without a package.

dBA = A-weighted decibel; SEL = sound exposure level

4.2.2 Sound Levels for Wing Model 8000-A Autoload Actions

Calculated sound levels for offsite autoload, and nearfield launch and autoload for Model 8000-A are shown in Table 7.

Table 7. Model 8000-A: Estimate of SEL for Offsite Autoload and Nearfield Launch and Autoload Actions

Distance between Launch Point and Receiver	Offsite Autoload, dBA SEL ¹	Nearfield Launch and Autoload, dBA SEL ¹
25	85.2	85.4
50	80.9	81.6
75	78.6	79.1
100	77.0	77.4
125	75.9	76.0
150	75.0	74.9
175	74.2	73.9
200	73.5	73.1
225	72.7	72.2
250	72.0	71.3
275	71.3	70.5
300	70.8	69.8
325	70.2	69.2

Distance between Launch Point and Receiver	Offsite Autoload, dBA SEL¹	Nearfield Launch and Autoload, dBA SEL¹
350	69.7	68.6
375	69.2	68.1
400	68.8	67.5
425	68.4	67.1
450	68.0	66.6
475	67.6	66.2
500	67.3	65.8
525	67.0	65.4
550	66.6	65.0
575	66.3	64.6
600	66.1	64.3
625	65.8	64.0
650	65.5	63.6
675	65.3	63.3
700	65.0	63.1
725	64.8	62.8
750	64.5	62.5
775	64.3	62.2
800	64.1	62.0
825	64.1	62.0
850	64.1	62.0
875	64.1	62.0
900	64.1	62.0
925	64.1	62.0
950	64.1	62.0
975	64.1	62.0
1000	64.1	62.0

Source: AvEnviro 2024b, ICF 2024.

¹ Assumes one incoming en route trip without a package plus one outgoing en route trip with package on board.
dBA = A-weighted decibel; SEL = sound exposure level

4.2.3 Sound Levels for Wing Model 8000-A FitBit and GeoBit Actions

Calculated sound levels for Fitbit and Geobit operations for Model 8000-A are shown in Table 8.

Table 8. Model 8000-A: Estimate of SEL for FitBit and GeoBit Actions

Distance between Launch Point and Receiver	FitBit, dBA SEL	GeoBit, dBA SEL
25	84.1	84.4
50	77.1	79.4
75	73.6	75.3
100	71.1 ¹	72.5 ¹
125	69.1	70.2
150	67.5	68.4
175	66.2	66.8
200	65.0	65.5
225	64.0	64.3
250	63.1	63.3
275	62.2	62.3
300	61.5	61.4
325	60.8	60.6
350	60.1	59.9
375	59.5	59.2
400	59.0	58.6
425	58.4	57.9
450	57.9	57.4
475	57.5	56.8
500	57.0	56.3
525	56.6	55.8
550	56.2	55.4
575	55.8	54.9
600	55.4	54.5
625	55.1	54.1
650	54.7	53.7
675	54.4	53.3
700	54.1	52.9
725	53.8	52.6
750	53.5	52.2
775	53.2	51.9
800	52.9	51.6
825	52.6	51.3
850	52.4	51.0
875	52.1	50.7
900	51.9	50.4

Distance between Launch Point and Receiver	FitBit, dBA SEL	GeoBit, dBA SEL
925	51.6	50.1
950	51.4	49.9
975	51.2	49.6
1000	51.0	49.4

Source: AvEnviro 2024b, ICF 2024.

¹ The SEL value for FitBit and GeoBit operations at 100 feet was adjusted from the test report to use a falloff rate from the 50 foot to the 200 foot value due to no valid passes during testing.

dBA = A-weighted decibel; SEL = sound exposure level

4.2.4 En Route Sound Levels for Wing Model 8000-A

The SEL for an en route overflight with a package loaded on the Model 8000-A was measured to be 64.7 dBA. The en route overflight SEL for a Model 8000-A with no package was measured to be 62.7 dBA (AvEnviro 2024b). During testing, en route measurements were taken with UA in forward flight at an altitude of 100 feet AGL, which is lower than the expected operating altitude of 165 feet AGL. To adjust the measured en route sound level to the operating altitude of 165 feet AGL, a data correction factor using the logarithm of the ratio of altitudes multiplied by 12.5 was added to the en route SEL, consistent with procedures described in 14 CFR Part 36. The corrected SEL values were calculated to be 62.0 dBA with a package and 60.0 dBA without a package. These corrected en route sound levels were used for distances 800 feet or greater from the nest or delivery site.

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Chapter 5

Noise Exposure from UA Operations

This chapter presents estimated DNL values for package delivery operations assuming different rates of delivery for a nest. This analysis assumes all package deliveries would occur during daytime hours only (i.e., 7:00 a.m. to 10:00 p.m.), so no nighttime penalties are applied to package deliveries. Fitbit operations would be done before package delivery operations each day, and are assumed to be done before 7:00 a.m. As such nighttime penalties would apply to Fitbit operations. Geobit operations would be conducted on an intermittent basis at the rate of about one event per week. To simulate a loudest case, Geobit operations are included in the DNL analysis.

5.1 Noise Exposure from a Nest

A single delivery operation consists of launch, package load, departure, return and landing phases, and the full cycle of these actions are accounted for in noise exposure at a nest. In addition to package deliveries, the noise exposure values include up to 24 nighttime Fitbit operations and one Geobit operation. Therefore, the DNL value at a nest accounts for the following:

- Package loading operations: manual, offsite package autoloader, or nearfield autoloader (up to 400 events)
- Landings at nest post-delivery (up to 400 events)
- FitBit (240 DNL equivalent events)
- GeoBit (1 DNL equivalent event)

Estimated DNL noise exposure distances at a nest operating Model 7000W-B UAs are shown in Table 9 for Manual loading and Table 10 for Nearfield Autoloading. Noise exposure DNL values are shown at different scales: from 1 delivery per day to 400 deliveries per day. The noise exposure values assume a departure and return flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet from the nest. According to the calculations, package loading operations would exceed 65 DNL at 35 feet from a nest location, at a rate of 400 package loading operations per day for both loading scenarios.

Table 9. DNL Noise Exposure Distances at Nest for Model 7000W-B for Different Scales of Operation, Manual Launch Option

Average Daily Deliveries per Nest ¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	35	50	85	160
5	<25	35	50	90	165
10	<25	35	55	90	165
15	<25	35	55	90	170
20	<25	35	55	90	175
25	<25	35	55	95	175
50	<25	40	60	100	195

Average Daily Deliveries per Nest ¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
75	<25	40	65	105	210
100	<25	40	65	115	220
150	<25	45	70	125	245
200	<25	45	75	140	265
300	30	50	85	165	295
400	35	55	95	185	325

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. except for Fitbit, which would be done before 7:00 a.m. DNL = day/night average sound level

Table 10. DNL Noise Exposure Distances at Nest for Model 7000W-B for Different Scales of Operation, Nearfield Launch Option

Average Daily Deliveries per Nest ¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	35	50	85	160
5	<25	35	50	90	165
10	<25	35	55	90	170
15	<25	35	55	95	175
20	<25	35	55	95	180
25	<25	35	55	95	185
50	<25	40	60	105	205
75	<25	40	65	120	220
100	<25	40	70	125	235
150	<25	45	80	145	260
200	<25	50	85	160	285
300	30	55	100	190	320
400	35	65	115	215	350

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. except for Fitbit, which would be done before 7:00 a.m. DNL = day/night average sound level

Estimated DNL noise exposure distances at a nest operating Model 8000-A UAs are shown in Table 11 for Manual loading and Table 12 for Nearfield Autoloading. Noise exposure DNL values are shown at different scales: from 1 delivery per day to 400 deliveries per day. The noise exposure values assume a departure and return flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet from the nest. According to the calculations, package loading operations would exceed 65 DNL at less than 25 feet from a nest location, at a rate of 400 package loading operations per day for both loading scenarios.

Table 11. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Manual Launch Option

Average Daily Deliveries per Nest¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	40	65	110
5	<25	<25	40	65	115
10	<25	<25	40	65	120
15	<25	<25	40	70	125
20	<25	<25	45	70	130
25	<25	<25	45	75	135
50	<25	<25	45	85	160
75	<25	30	50	95	190
100	<25	30	50	105	215
150	<25	35	60	125	255
200	<25	40	70	145	300
300	<25	45	85	180	375
400	<25	45	100	215	440

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. except for Fitbit, which would be done before 7:00 a.m.

DNL = day/night average sound level

Table 12. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Nearfield Launch Option

Average Daily Deliveries per Nest¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	40	65	110
5	<25	<25	40	65	115
10	<25	<25	40	70	120
15	<25	<25	45	70	130
20	<25	<25	45	75	135
25	<25	<25	45	75	140
50	<25	<25	50	90	170
75	<25	30	55	105	200
100	<25	35	60	115	225
150	<25	35	70	140	270
200	<25	40	80	160	315
300	<25	50	100	200	390
400	<25	55	120	235	455

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. except for Fitbit, which would be done before 7:00 a.m.

DNL = day/night average sound level

5.2 Noise Exposure from Offsite Package Autoloading

Estimated DNL noise exposure distances at an offsite package autoloader location for the Model 7000W-B are shown in Table 13. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. A single delivery operation consists of arrival, package autoload, and departure phases. According to calculations, package delivery operations would exceed 65 DNL at less than 25 feet from an offsite autoloading location at a rate of 400 deliveries per day to a single delivery site.

Table 13. DNL Noise Exposure Distances at an Offsite Package Autoloading Location for Model 7000W-B, for Different Scales of Operation

Average Daily Deliveries per Nest ¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25
10	<25	<25	<25	<25	40
15	<25	<25	<25	<25	50
20	<25	<25	<25	30	55
25	<25	<25	<25	35	65
50	<25	<25	<25	50	95
75	<25	<25	35	60	115
100	<25	<25	40	70	140
150	<25	<25	50	90	175
200	<25	30	55	105	205
300	<25	40	70	135	245
400	<25	45	80	160	280

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m.

DNL = day/night average sound level

Estimated DNL noise exposure distances at an offsite package autoloader location for the Model 8000-A are shown in Table 14. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. A single delivery operation consists of arrival, package autoload, and departure phases. According to calculations, package delivery operations would exceed 65 DNL at less than 25 feet from an offsite autoloading location at a rate of 400 deliveries per day to a single delivery site.

Table 14. DNL Noise Exposure Distances at Nest for Model 8000-A for Different Scales of Operation, Remote Launch Option

Average Daily Deliveries per Nest¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25
10	<25	<25	<25	<25	30
15	<25	<25	<25	<25	40
20	<25	<25	<25	<25	50
25	<25	<25	<25	<25	60
50	<25	<25	<25	45	95
75	<25	<25	<25	55	135
100	<25	<25	30	70	170
150	<25	<25	40	95	230
200	<25	<25	50	115	275
300	<25	30	65	165	355
400	<25	40	80	205	430

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m.

DNL = day/night average sound level

5.3 En Route Noise Exposure

Noise exposure from UA en route trajectories would be loudest directly under the flight path. In practice, UAs would serve many delivery points from a given nest, however in areas where there is a high demand for deliveries, en route UA noise may be intermittently audible depending on the level of existing ambient noise. Based on calculations however, even if the louder of the two Hummingbird UA models (Model 8000-A) under en route conditions used the same en route trajectory for delivery service to surrounding areas, the noise exposure level accounting for both the delivery and return paths would be no higher than 40.7 DNL at a rate of up to 400 deliveries per day. Considering that en route UA noise would not exceed 45 DNL under any delivery scenarios, this was not quantified further.

5.4 Noise Exposure from a Delivery Site

Estimated DNL noise exposure distances at a delivery point for the Model 7000W-B are shown in Table 15. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. A single delivery operation consists of arrival, package delivery, and departure phases. According to calculations, package delivery operations would exceed 65 DNL at 30 feet from a nest location at a rate of 400 deliveries per day to a single delivery site.

Table 15. DNL Noise Exposure Distances at a Delivery Point for Model 7000W-B for Different Scales of Operation

Average Daily Deliveries at Delivery Point¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	35
10	<25	<25	<25	<25	50
15	<25	<25	<25	30	60
20	<25	<25	<25	40	65
25	<25	<25	<25	45	75
50	<25	<25	35	60	100
75	<25	<25	40	70	125
100	<25	<25	50	80	145
150	<25	30	60	100	180
200	<25	40	65	115	205
300	<25	45	80	140	245
400	30	55	90	165	280

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m.

DNL = day/night average sound level

Estimated DNL noise exposure distances at a delivery point for the Model 8000-A are shown in Table 16. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,000 feet. A single delivery operation consists of arrival, package delivery, and departure phases. According to calculations, package delivery operations would exceed 65 DNL at less than 25 feet from a nest location at a rate of 400 deliveries per day to a single delivery site.

Table 16. DNL Noise Exposure Distances at a Delivery Point for Model 8000-A for Different Scales of Operation

Average Daily Deliveries at Delivery Point¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25
10	<25	<25	<25	<25	45
15	<25	<25	<25	<25	60
20	<25	<25	<25	35	70
25	<25	<25	<25	40	80
50	<25	<25	<25	65	120
75	<25	<25	40	80	155
100	<25	<25	45	95	185
150	<25	<25	60	120	235

Average Daily Deliveries at Delivery Point¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
200	<25	35	70	140	280
300	<25	45	90	180	365
400	<25	55	105	210	435

Note: ¹ Average daily deliveries are shown in terms of DNL equivalent. The CONOPS assumes all UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m.

DNL = day/night average sound level

5.5 Cumulative Noise Exposure

Criteria for significance of impacts and changes in noise exposure are defined in FAA Order 1050.1F *Environmental Impacts: Policies and Procedures* (FAA 2015). Order 1050.1F Exhibit 4-1 states the following with respect to threshold of significance for a proposed action:

The 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 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.

A cumulative increase in noise from a proposed action can be calculated using the difference between the additional noise exposure introduced by a proposed action and the no action alternative. The cumulative DNL increase associated with different values of the proposed action is shown in Table 17.

Table 17. Cumulative Increase in DNL due to a Proposed Action

Proposed Action minus No Action (x)	Cumulative Increase in DNL (Δ)
$x < -3.8$ dB	$\Delta < 1.5$ dB
-3.8 dB $< x < 0.0$ dB	1.5 dB $< \Delta < 3$ dB
0.0 dB $< x < 3.3$ dB	3 dB $< \Delta < 5$ dB
3.3 dB $< x$	5 dB $< \Delta$

For air traffic airspace and procedure actions where the study area is larger than the immediate vicinity of an airport, Order 1050.1F specifies the following change-of-exposure criteria to identify locations where noise exposure levels will increase by a magnitude considered reportable. An action that would increase noise exposure by 3 dB where no action is between 60 and 65 DNL, or by 5 dB where no action is between 45 and 60 DNL would be considered reportable.

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Chapter 6

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Appendix E

Biological Resources

Table E-1. State Species of Greatest Conservation Need in Denton, Collin, Tarrant, Dallas, Johnson, Ellis, Parker, Kaufman, Rockwall, and Wise Counties, Texas

Taxon	Scientific Name	Common Name	ESA Status	State Status
Amphibians				
	<i>Ambystoma tigrinum</i>	Eastern tiger salamander	—	—
	<i>Desmognathus conanti</i>	Spotted dusky salamander	—	—
	<i>Anaxyrus woodhousii</i>	Woodhouse's toad	—	—
	<i>Pseudacris streckeri</i>	Strecker's chorus frog	—	—
	<i>Lithobates areolatus</i>	Southern crawfish frog	—	—
Birds				
	<i>Plegadis chihi</i>	White-faced ibis	—	T
	<i>Mycteria americana</i>	Wood stork	—	T
	<i>Haliaeetus leucocephalus</i>	Bald eagle	—	—
	<i>Laterallus jamaicensis</i>	Black rail	LT	T
	<i>Grus americana</i>	Whooping crane	LE	E
	<i>Charadrius melodus</i>	Piping plover	LT	T
	<i>Charadrius montanus</i>	Mountain plover	—	—
	<i>Calidris canutus rufa</i>	Rufa red knot	LT	T
	<i>Leucophaeus pipixcan</i>	Franklin's gull	—	—
	<i>Athene cunicularia hypugaea</i>	Western burrowing owl	—	—
	<i>Anthus spragueii</i>	Sprague's pipit	—	—
	<i>Vireo atricapilla</i>	Black-capped vireo	—	—
	<i>Setophaga chrysoparia</i>	Golden-cheeked warbler	LE	E
	<i>Calamospiza melanocorys</i>	Lark bunting	—	—
	<i>Calcarius ornatus</i>	Chestnut-collared longspur	—	—
Fish				
	<i>Anguilla rostrata</i>	American eel	—	—
	<i>Hybognathus nuchalis</i>	Mississippi silvery minnow	—	—
Mammals				
	<i>Myotis austroriparius</i>	Southeastern myotis bat	—	—
	<i>Myotis velifer</i>	Cave myotis bat	—	—
	<i>Perimyotis subflavus</i>	Tricolored bat	—	—
	<i>Eptesicus fuscus</i>	Big brown bat	—	—
	<i>Lasiurus borealis</i>	Eastern red bat	—	—
	<i>Lasiurus cinereus</i>	Hoary bat	—	—
	<i>Nyctinomops macrotis</i>	Big free-tailed bat	—	—
	<i>Sylvilagus aquaticus</i>	Swamp rabbit	—	—

Taxon	Scientific Name	Common Name	ESA Status	State Status
	<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	—	—
	<i>Ondatra zibethicus</i>	Muskrat	—	—
	<i>Ursus americanus</i>	Black bear	—	T
	<i>Mustela frenata</i>	Long-tailed weasel	—	—
	<i>Spilogale putorius</i>	Eastern spotted skunk	—	—
	<i>Conepatus leuconotus</i>	Western hog-nosed skunk	—	—
	<i>Puma concolor</i>	Mountain lion	—	—
Reptiles				
	<i>Macrochelys temminckii</i>	Alligator snapping turtle	—	T
	<i>Deirochelys reticularia miaria</i>	Western chicken turtle	—	—
	<i>Terrapene carolina</i>	Eastern box turtle	—	—
	<i>Terrapene ornata</i>	Western box turtle	—	—
	<i>Apalone mutica</i>	Smooth softshell	—	—
	<i>Ophisaurus attenuatus</i>	Slender glass lizard	—	—
	<i>Phrynosoma cornutum</i>	Texas horned lizard	—	T
	<i>Plestiodon septentrionalis</i>	Prairie skink	—	—
	<i>Heterodon nasicus</i>	Western hognose snake	—	—
	<i>Nerodia harteri</i>	Brazos water snake	—	T
	<i>Thamnophis sirtalis annectens</i>	Texas garter snake	—	—
	<i>Crotalus horridus</i>	Timber (canebrake) rattlesnake	—	—
	<i>Crotalus viridis</i>	Western rattlesnake	—	—
	<i>Sistrurus tergeminus</i>	Western massasauga	—	—
	<i>Sistrurus miliarius</i>	Pygmy rattlesnake	—	—
Crustaceans				
	<i>Caecidotea bilineata</i>	None	—	—
	<i>Procambarus steigmani</i>	Parkhill Prairie crayfish	—	—
Insects				
	<i>Bombus pensylvanicus</i>	American bumblebee	—	—
	<i>Pogonomyrmex comanche</i>	Comanche harvester ant	—	—
	<i>Amblycorypha uhleri</i>	None	—	—
	<i>Arethaea ambulator</i>	None	—	—
	<i>Neotrichia juani</i>	None	—	—
Mollusks				
	<i>Lampsilis satura</i>	Sandbank pocketbook	—	T
	<i>Pleurobema riddellii</i>	Louisiana pigtoe	—	T
	<i>Potamilus amphichaenus</i>	Texas heelsplitter	—	T
	<i>Potamilus streckersoni</i>	Brazos heelsplitter	—	T
	<i>Fusconaia chunii</i>	Trinity pigtoe	—	T
	<i>Truncilla macrodon</i>	Texas fawnsfoot	PT	T

Taxon	Scientific Name	Common Name	ESA Status	State Status
Plants				
	<i>Matelea edwardsensis</i>	Plateau milkvine	—	—
	<i>Echinacea atrorubens</i>	Topeka purple-coneflower	—	—
	<i>Liatris glandulosa</i>	Glandular gay-feather	—	—
	<i>Senecio quaylei</i>	Quayle's butterweed	—	—
	<i>Geocarpum minimum</i>	Earth fruit	LT	T
	<i>Cuscuta exaltata</i>	Tree dodder	—	—
	<i>Astragalus reflexus</i>	Texas milk vetch	—	—
	<i>Dalea hallii</i>	Hall's prairie clover	—	—
	<i>Dalea reverchonii</i>	Comanche Peak prairie clover	—	—
	<i>Pedimelum cyphocalyx</i>	Turnip-root scurfpea	—	—
	<i>Pedimelum reverchonii</i>	Reverchon's scurfpea	—	—
	<i>Phlox oklahomensis</i>	Oklahoma phlox	—	—
	<i>Crataegus viridis</i> var. <i>glabriuscula</i>	Sutherland hawthorn	—	—
	<i>Agalinis auriculata</i>	Earleaf false foxglove	—	—
	<i>Agalinis densiflora</i>	Osage Plains false foxglove	—	—
	<i>Yucca necopina</i>	Glen Rose yucca	—	—
	<i>Carex shinnensis</i>	Shinner's sedge	—	—
	<i>Cyperus grayioides</i>	Mohlenbrock's sedge	—	—
	<i>Schoenoplectus hallii</i>	Hall's baby bulrush	—	—
	<i>Hexalectris nitida</i>	Glass Mountains coral-root	—	—
	<i>Hexalectris warnockii</i>	Warnock's coral-root	—	—

Source: Texas Parks and Wildlife 2020.

E: Endangered; LE: Federally endangered; LT: Federally threatened; PT: Proposed threatened; T: Threatened.

Appendix F

**Government-to-Government Consultation with
Federally Recognized Tribes**



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Chairman Durell Cooper
Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005

Transmitted via mail and email to durell.cooper@apachetribe.org.

RE: Invitation for Government-to-Government Tribal Consultation and Initiation of Section 106 Consultation for Wing Aviation, LLC Package Delivery Operations in DFW Texas

Dear Chairman Cooper:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

In addition, the FAA has determined that its proposed action, which would encompass all the FAA approvals necessary to enable Wing's expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). This letter initiates Section 106 consultation with the Apache Tribe of Oklahoma regarding potential effects on historic properties and cultural resources in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that may uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*; Presidential Memorandum, *Uniform Standards for Tribal Consultation*; DOT Order 5301.1A, *Department of Transportation Tribal Consultation Policy and Procedures*; and FAA Order 1210.20, *American Indian and Alaska Native Tribal Consultation Policy and Procedures*.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of Wing's commercial package delivery operations using drones in the DFW area under 14 Code of Federal Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so that operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Apache Tribe of Oklahoma in April 2023 (Attachment B) for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process.

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas–Fort Worth metro area.

Wing is proposing the expansion of their existing commercial drone package delivery operations in DFW. Under the proposed action, Wing would add additional nest locations, expand operating hours to 6:00 a.m. to 10:00 p.m. with flights only leaving the nest area between 07:00 a.m. and 10:00 p.m., and would maintain the current operational limit of 400 flights per nest per operating day. The proposed action would also introduce the use of the 8000-A UA, in addition to the Hummingbird 7000W-B UA, for delivery operations. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the Texas State Historic Preservation Office (SHPO) showed the APE would be within a 30 nautical mile (nm) radius of the DFW airport, and Wing's current proposal would continue to operate within this area. An enclosed map (Attachment A) shows the APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could

result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

The FAA is soliciting the opinion of the Apache Tribe of Oklahoma concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that the Apache Tribe of Oklahoma would like to consult with the FAA, please contact Dr. Shelia Neumann via email a 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation..

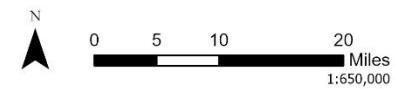
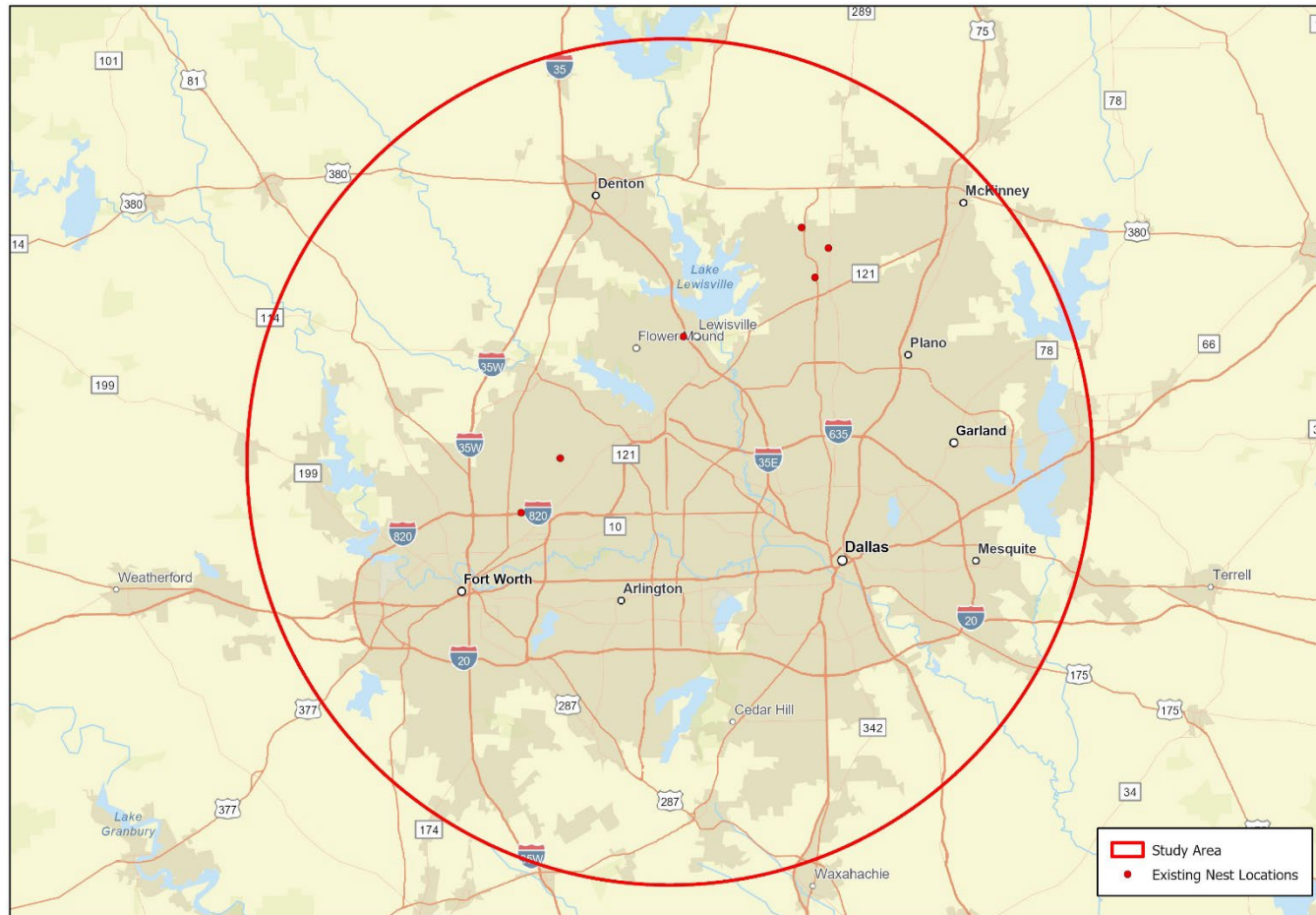
Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:

Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
Frisco Preston Rd	33° 8'52.77"N	96°48'24.06"W
Frisco Eldorado	33°10'22.14"N	96°50'36.88"W
Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
North Richland Hills 2	32°54'19.59"N	97°11'19.86"W



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Chairman Durell Cooper
Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005

Dear Chairman Cooper:

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Apache Tribe of Oklahoma and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the TX SHPO showed the APE would be limited to areas near Frisco and Allen, TX with a follow-on assessment for two larger areas on either side of Lewisville Lake. This expansion extends through the more densely populated or congested regions of the DFW metro area remaining within a 30 nautical mile (nm) radius of the DFW airport. An enclosed map shows the larger APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

**DAVID M
MENZIMER**

Digitally signed by
DAVID M MENZIMER
Date: 2023.04.20
07:22:54 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area



Granbury

Google Earth

Image Landsat / Copernicus



30 mi



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Chairman Bobby Gonzalez
Caddo Nation of Oklahoma
P.O. Box 487
Binger, Oklahoma 73009

Transmitted via mail and email to bgonzalez@mycaddonation.com.

**RE: Invitation for Government-to-Government Tribal Consultation for Drone Package
Delivery Operations in Texas**

Dear Chairman Gonzalez:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of Wing commercial package delivery operations in the DFW area under 14 Code of Federal Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so that

operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Caddo Nation of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that Caddo Nation of Oklahoma would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

CC: Mr. Jonathan Rohrer
Tribal Historic Preservation Officer

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Mr. Jonathan Rohrer, Tribal Historic Preservation Officer
Caddo Nation of Oklahoma
P.O. Box 487
Binger, Oklahoma 730009

Transmitted via e-mail and mail: jrohrer@mycaddonation.com

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Mr. Rohrer,

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Caddo Nation of Oklahoma and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process.

Project Description

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas-Fort Worth metro area.

Wing is proposing to continue transporting consumer goods via drone delivery in the communities they already serve and expand these services to the larger operational area using the new Hummingbird 7000W-B and 8000-A drones. The Hummingbird 7000W-B and 8000-A drones would take off from Wing's nest locations and quickly rise to a cruising altitude of 150 to 300 feet above ground level (AGL). The Hummingbird 7000W-B drone weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds while the 8000-A drone weighs under 25 pounds when combined with its

maximum payload weight of 5 pounds. The Hummingbird 7000W-B and 8000-A drones have an approximate 6-mile service radius. Once at the delivery site, the Hummingbird 7000W-B and 8000-A, drones hover in place at about 23 feet AGL and drop the package to the ground. Once the package has been delivered, the drone flies back to the launch/landing site at roughly the same altitude.

Wing is proposing up to 400 drone flights per day from each nest, with each flight taking a package to a customer delivery address before returning. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from the launch/landing site and gradually ramp up to the proposed level as consumer demand increases. Delivery operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed operation APE would be a 30-nautical mile radius around the DFW international airport. The enclosed map (Attachment A) shows the proposed APE in detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

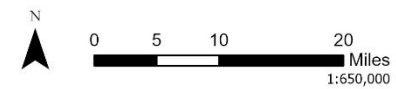
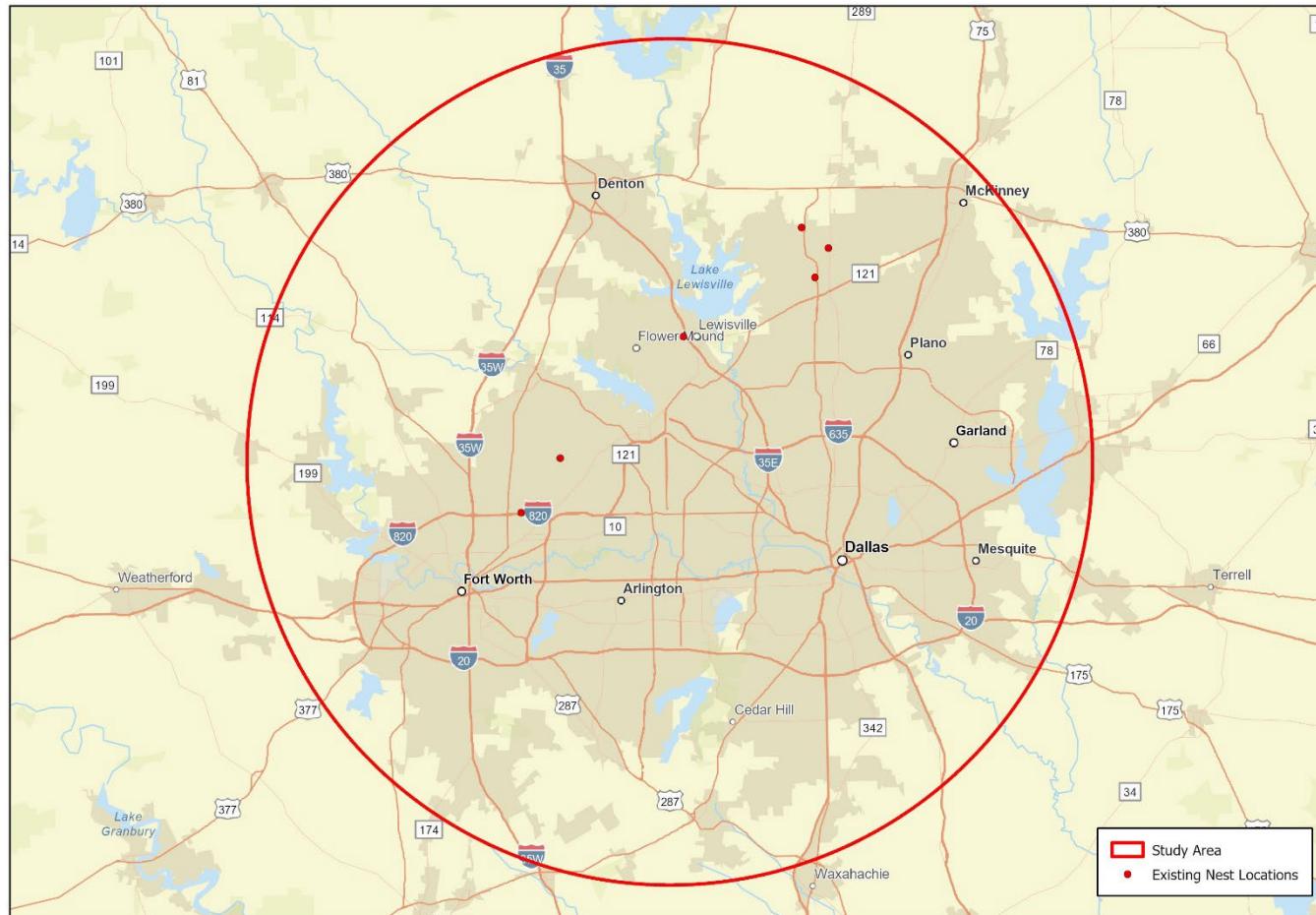
The FAA previously notified Caddo Nation of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of Caddo Nation of Oklahoma concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operations area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov within 30 days of receipt of this letter.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
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Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
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U.S. Department
of Transportation
**Federal Aviation
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Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Chairperson Bobby Gonzalez
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairperson Gonzalez

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Caddo Nation of Oklahoma and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the TX SHPO showed the APE would be limited to areas near Frisco and Allen, TX with a follow-on assessment for two larger areas on either side of Lewisville Lake. This expansion extends through the more densely populated or congested regions of the DFW metro area remaining within a 30 nautical mile (nm) radius of the DFW airport. An enclosed map shows the larger APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

**DAVID M
MENZIMER**

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Date: 2023.04.20
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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area



Granbury

Google Earth

Image Landsat / Copernicus



30 mi



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Principal Chief Chuck Hoskin, Jr.
Cherokee Nation
P.O. Box 948
Tahlequah, OK 74465

Transmitted via mail and email to chuck-hoskin@cherokee.org.

**RE: Invitation for Government-to-Government Tribal Consultation and Initiation of Section 106
Consultation for Wing Aviation, LLC Package Delivery Operations in DFW Texas**

Dear Principal Chief Hoskin:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of Wing commercial package delivery operations using drones in the DFW area under 14 Code of Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so that

operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Cherokee Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that the Cherokee Nation would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service
CC: Ms. Elizabeth Toombs
Tribal Historic Preservation Officer

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Ms. Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation
P.O. Box 948
Tahlequah, Oklahoma 74465

Transmitted via e-mail and mail: Elizabeth-toombs@cherokee.org

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Ms. Toombs:

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Cherokee Nation and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the NHPA concurrently with the NEPA process.

Project Description

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas-Fort Worth metro area.

Wing is proposing to continue transporting consumer goods via drone delivery in the communities they already serve and expand these services to the larger operational area using the new Hummingbird 7000W-B and 8000-A drones. The Hummingbird 7000W-B and 8000-A drones would take off from Wing's nest locations and quickly rise to a cruising altitude of 150 to 300 feet above ground level (AGL). The Hummingbird 7000W-B drone weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds while the 8000-A drone weighs under 25 pounds when combined with its maximum payload weight of 5 pounds. The Hummingbird 7000W-B and 8000-A drones have an

approximate 6-mile service radius. Once at the delivery site, the Hummingbird 7000W-B and 8000-A, drones hover in place at about 23 feet AGL and drop the package to the ground. Once the package has been delivered, the drone flies back to the launch/landing site at roughly the same altitude.

Wing is proposing up to 400 drone flights per day from each nest, with each flight taking a package to a customer delivery address before returning. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from the launch/landing site and gradually ramp up to the proposed level as consumer demand increases. Delivery operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed operation APE would be a 30-nautical mile radius around the DFW international airport. The enclosed map (Attachment A) shows the proposed APE in detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

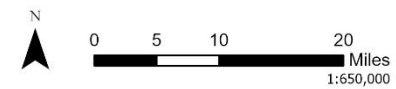
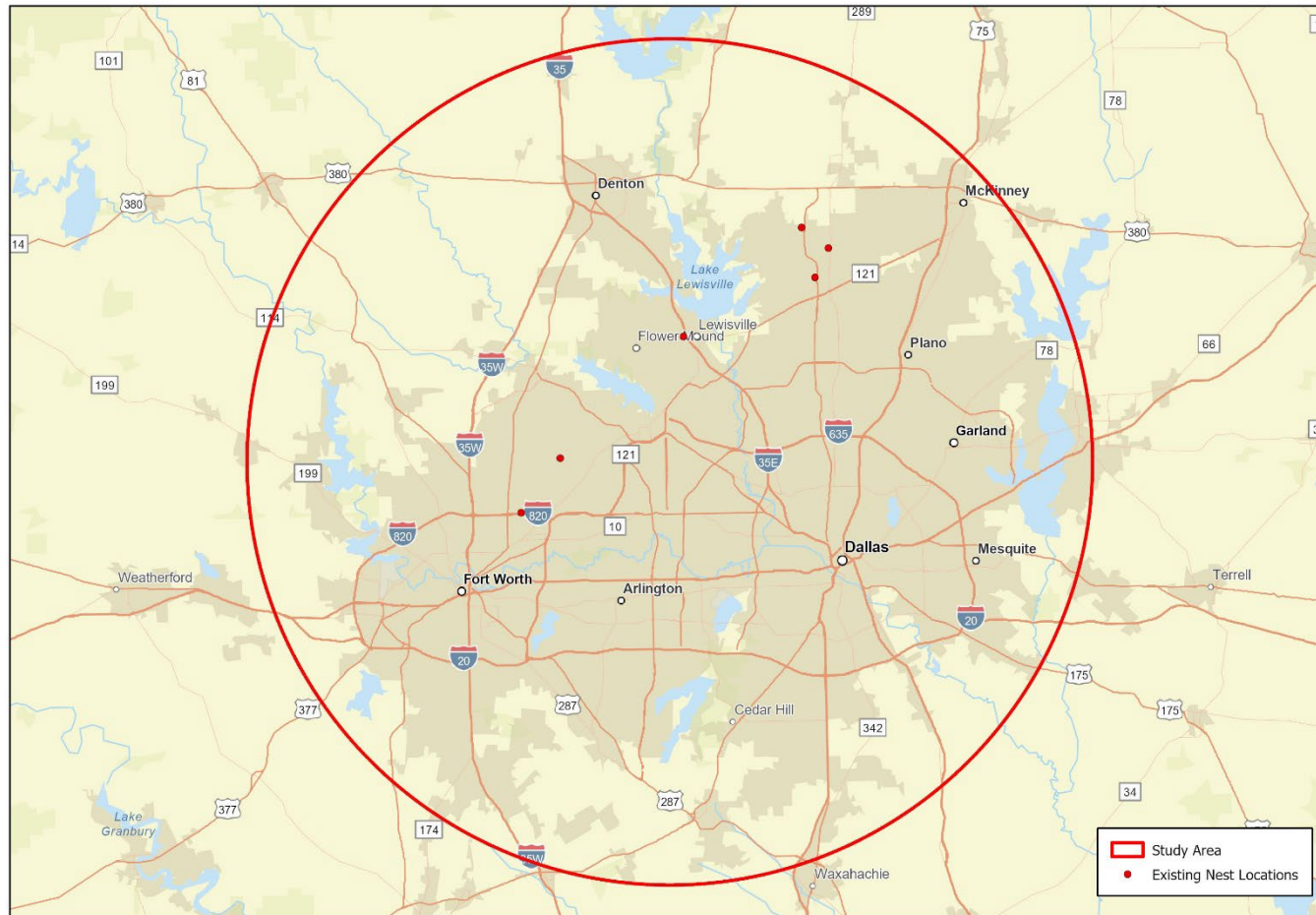
The FAA previously notified the Cherokee Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Cherokee Nation concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov within 30 days of receipt of this letter.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
Frisco Preston Rd	33° 8'52.77"N	96°48'24.06"W
Frisco Eldorado	33°10'22.14"N	96°50'36.88"W
Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
North Richland Hills 2	32°54'19.59"N	97°11'19.86"W



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Principal Chief Chuck Hoskin
Cherokee Nation
P.O. Box 948
Tahlequah, OK 74465

Dear Principal Chief Hoskin:

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Cherokee Nation and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the TX SHPO showed the APE would be limited to areas near Frisco and Allen, TX with a follow-on assessment for two larger areas on either side of Lewisville Lake. This expansion extends through the more densely populated or congested regions of the DFW metro area remaining within a 30 nautical mile (nm) radius of the DFW airport. An enclosed map shows the larger APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

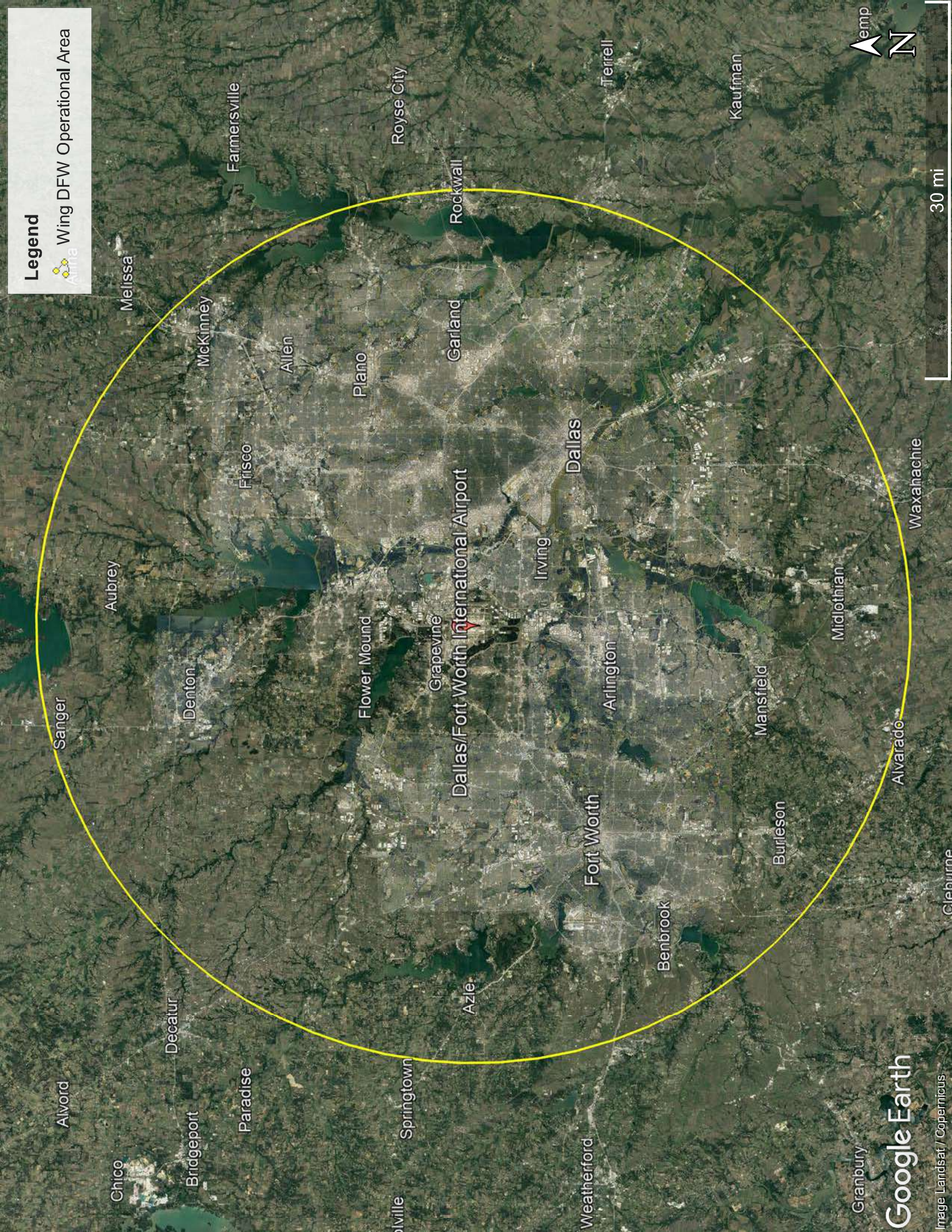
**DAVID M
MENZIMER**

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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area



Granbury

Google Earth

Image Landsat / Copernicus

30 mi





U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Chairman Mark Woommavovah
Comanche Nation
P.O. Box 908
Lawton, OK 73502

Transmitted via mail and email to mark.woommavovah@comanchenation.com

RE: Invitation for Government-to-Government Tribal Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Chairman Woommavovah:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of Wing commercial package delivery operations using drones in the DFW area under 14 Code of Federal Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so

that operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Comanche Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that Comanche Nation would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

CC: Ms. Martina Minthorn
Tribal Historic Preservation Officer

Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Ms. Martina Minthorn, Tribal Historic Preservation Officer
Comanche Nation
P.O. Box 908
Lawton, Oklahoma 73502

Transmitted via e-mail: martina.minthorn@comanchenation.com

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Ms. Minthorn:

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Comanche Nation and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the NHPA concurrently with the NEPA process.

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Identification of Historic Properties

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Consultation

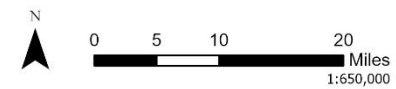
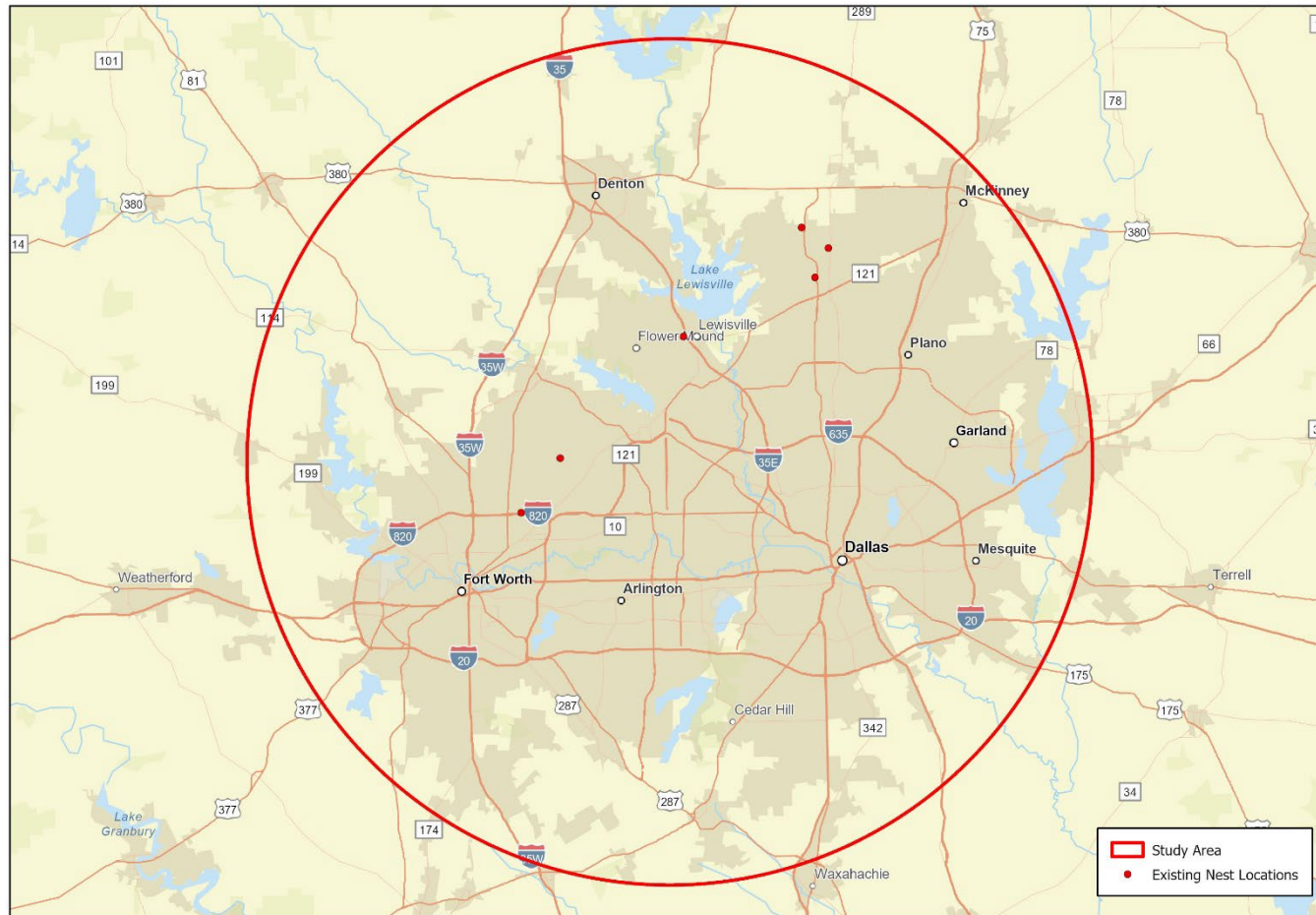
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Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch
(AFS-750) Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
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Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Chairman Mark Woommavovah
Comanche Nation, Oklahoma
P.O. Box 908
Lawton, OK 73502

Dear Chairman Woommavovah:

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Comanche Nation and to solicit your views regarding potential effects on tribal interests in the area.

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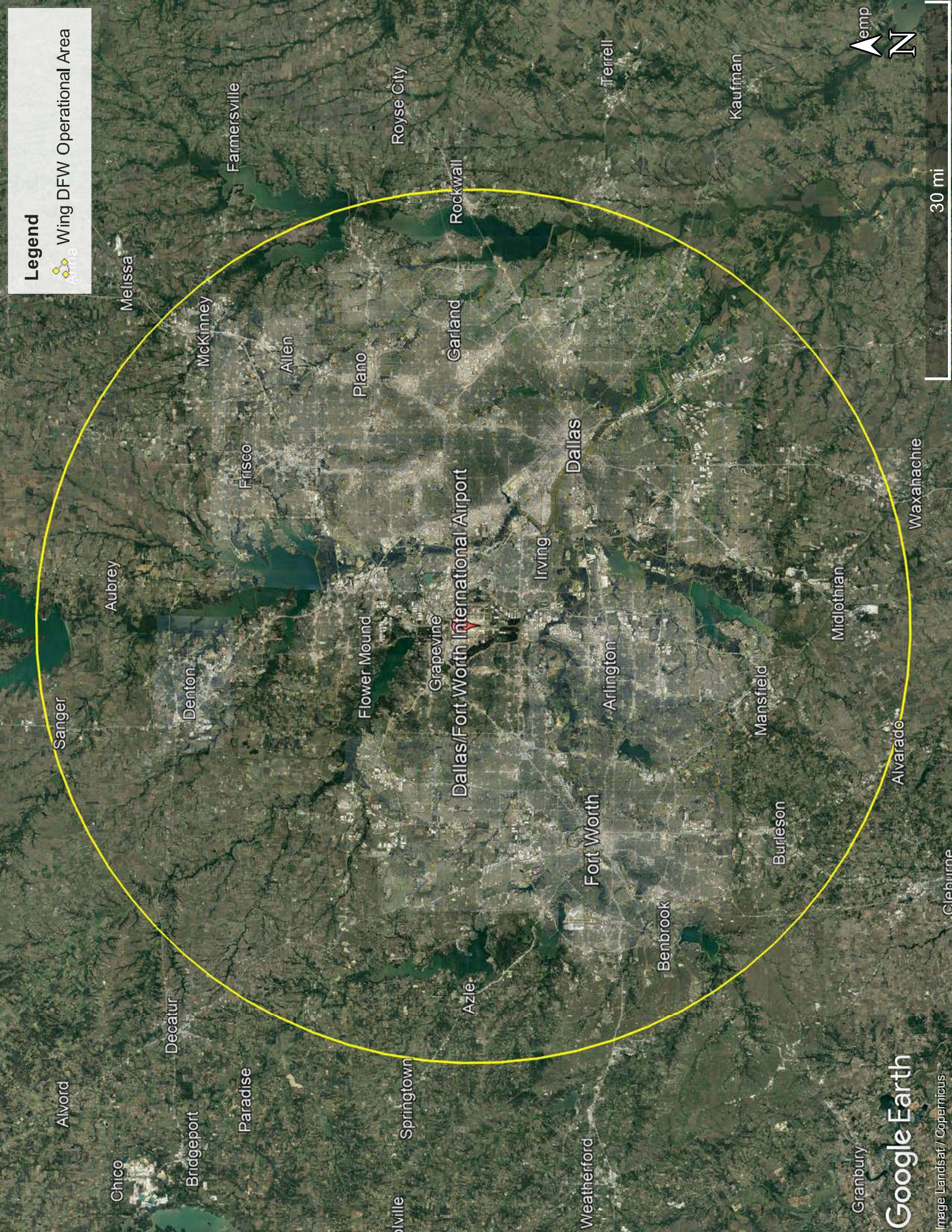
**DAVID M
MENZIMER**

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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area





U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Chairman Jonathan Cernek
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Transmitted via mail and email to Mbell@coushatta.org

RE: Invitation for Government-to-Government Tribal Consultation for Wing, LLC Package Delivery Operations in Texas

Dear Chairman Cernek:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of Wing commercial package delivery operations in the DFW area under 14 Code of Federal Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so that

operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Coushatta Tribe of Louisiana in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that Coushatta Tribe of Louisiana would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

CC: Mr. Dakota John
Tribal Historic Preservation Officer

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Mr. Dakota John, Tribal Historic Preservation Officer
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, Louisiana 70532

Transmitted via e-mail: dakotajohn@coushatta.org

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Mr. John:

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Coushatta Tribe of Louisiana and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the NHPA concurrently with the NEPA process.

Project Description

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas-Fort Worth metro area.

Wing is proposing to continue transporting consumer goods via drone delivery in the communities they already serve and expand these services to the larger operational area using the new Hummingbird 7000W-B and 8000-A drones. The Hummingbird 7000W-B and 8000-A drones would take off from Wing's nest locations and quickly rise to a cruising altitude of 150 to 300 feet above ground level (AGL). The Hummingbird 7000W-B drone weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds while the 8000-A drone weighs under 25 pounds when combined with its

maximum payload weight of 5 pounds. The Hummingbird 7000W-B and 8000-A drones have an approximate 6-mile service radius. Once at the delivery site, the Hummingbird 7000W-B and 8000-A, drones hovers in place at about 23 feet AGL and drops the package to the ground. Once the package has been delivered, the drone flies back to the launch/landing site at roughly the same altitude.

Wing is proposing up to 400 drone flights per day from each nest, with each flight taking a package to a customer delivery address before returning. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from the launch/landing site and gradually ramp up to the proposed level as consumer demand increases. Delivery operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed operation APE would be a 30-nautical mile radius around the DFW international airport. The enclosed map (Attachment A) shows the proposed APE in detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archaeological resources because the undertaking will only result in disturbance to previously disturbed land but could result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

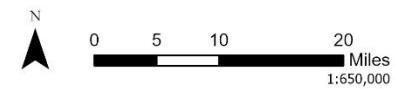
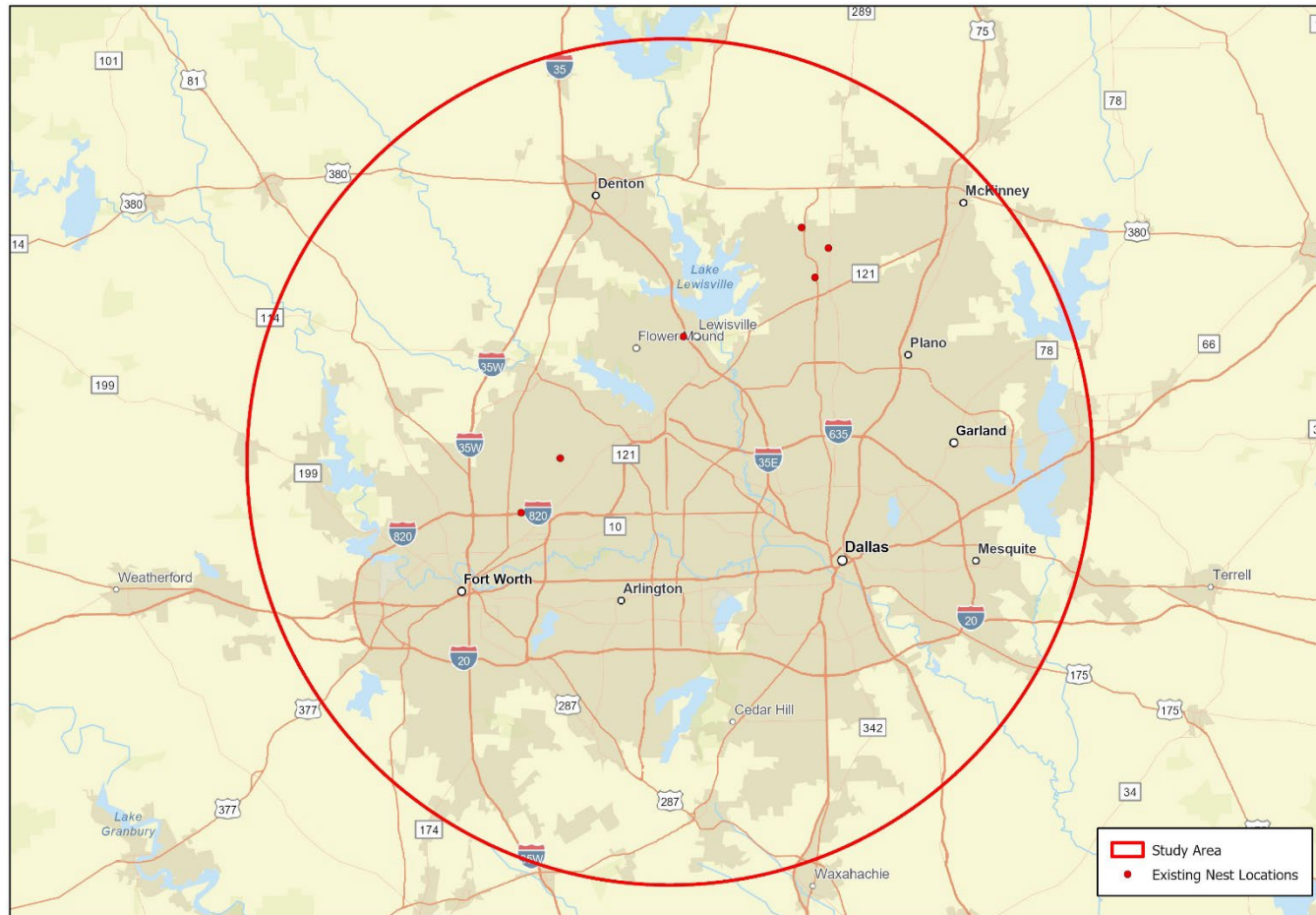
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Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
Frisco Preston Rd	33° 8'52.77"N	96°48'24.06"W
Frisco Eldorado	33°10'22.14"N	96°50'36.88"W
Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
North Richland Hills 2	32°54'19.59"N	97°11'19.86"W



Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Chairman Jonathan Cernek
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chairman Cernek,

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Coushatta Tribe of Louisiana and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the TX SHPO showed the APE would be limited to areas near Frisco and Allen, TX with a follow-on assessment for two larger areas on either side of Lewisville Lake. This expansion extends through the more densely populated or congested regions of the DFW metro area remaining within a 30 nautical mile (nm) radius of the DFW airport. An enclosed map shows the larger APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

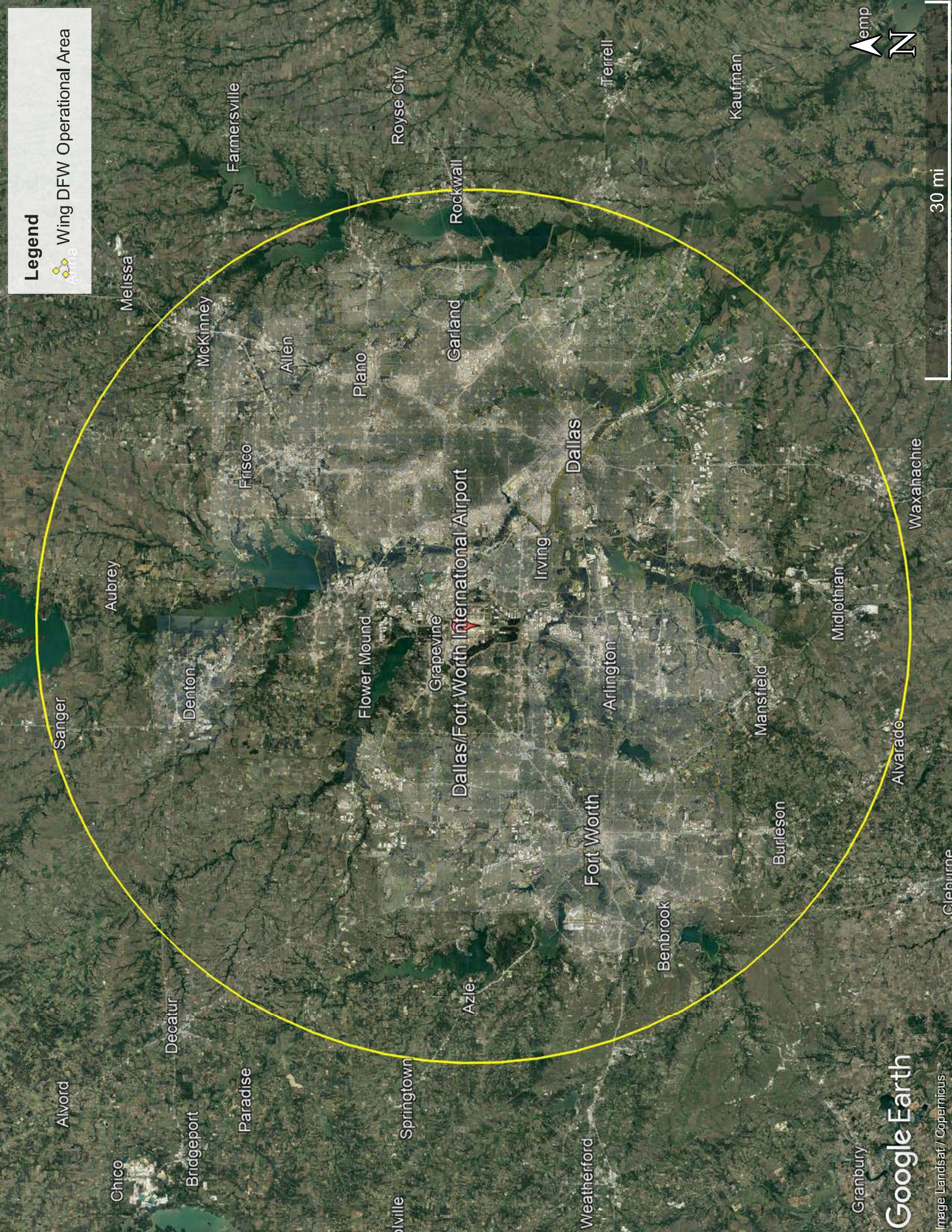
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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
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Legend

Wing DFW Operational Area





U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

President Deborah Dotson
Delaware Nation
P.O. Box 825
Anadarko, Oklahoma 73005

Transmitted via mail and email to ddotson@delawarenation-nsn.gov.

RE: Invitation for Government-to-Government Tribal Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear President Dotson:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

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operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Delaware Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. FAA intends to complete consultation for

Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

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FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that the Delaware Nation would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service
CC: Ms. Carissa Speck
Director of Historic Preservation

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Ms. Carissa Speck, Director of Historic Preservation
Delaware Nation
P.O. Box 825
Anadarko, Oklahoma 73005

Transmitted via e-mail and mail: cspeck@delawarenation-nsn.gov

RE: Initiation of Section 106 Consultation for Wing Package Delivery Operations in DFW Texas

Dear Ms. Speck:

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Consultation

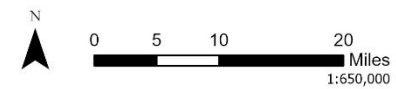
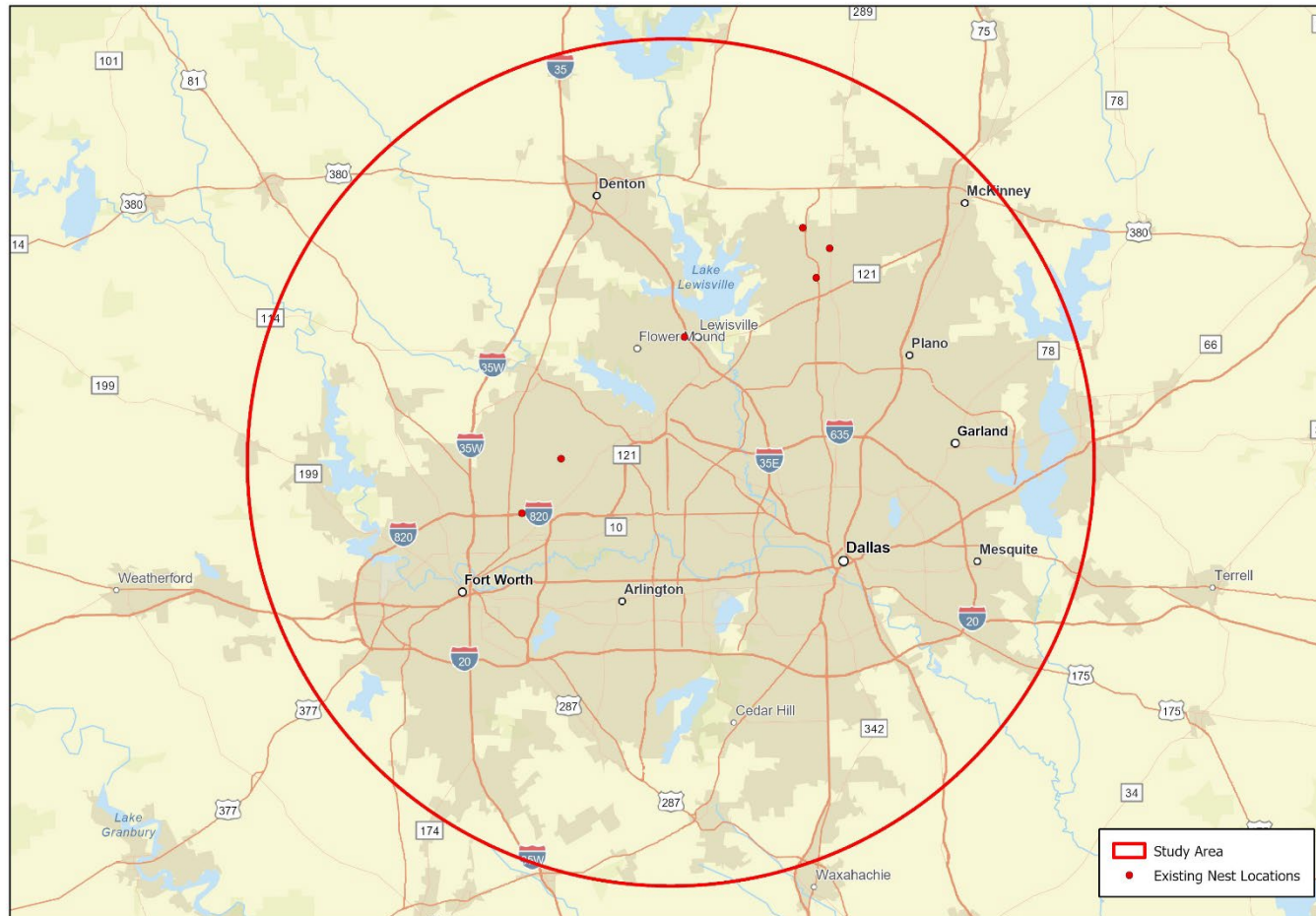
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Manager, General Aviation and Commercial Branch
(AFS-750) Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
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Office of Aviation Safety

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President Deborah Dotson
Delaware Nation, Oklahoma
P.O. Box 825
Anadarko, OK 73005

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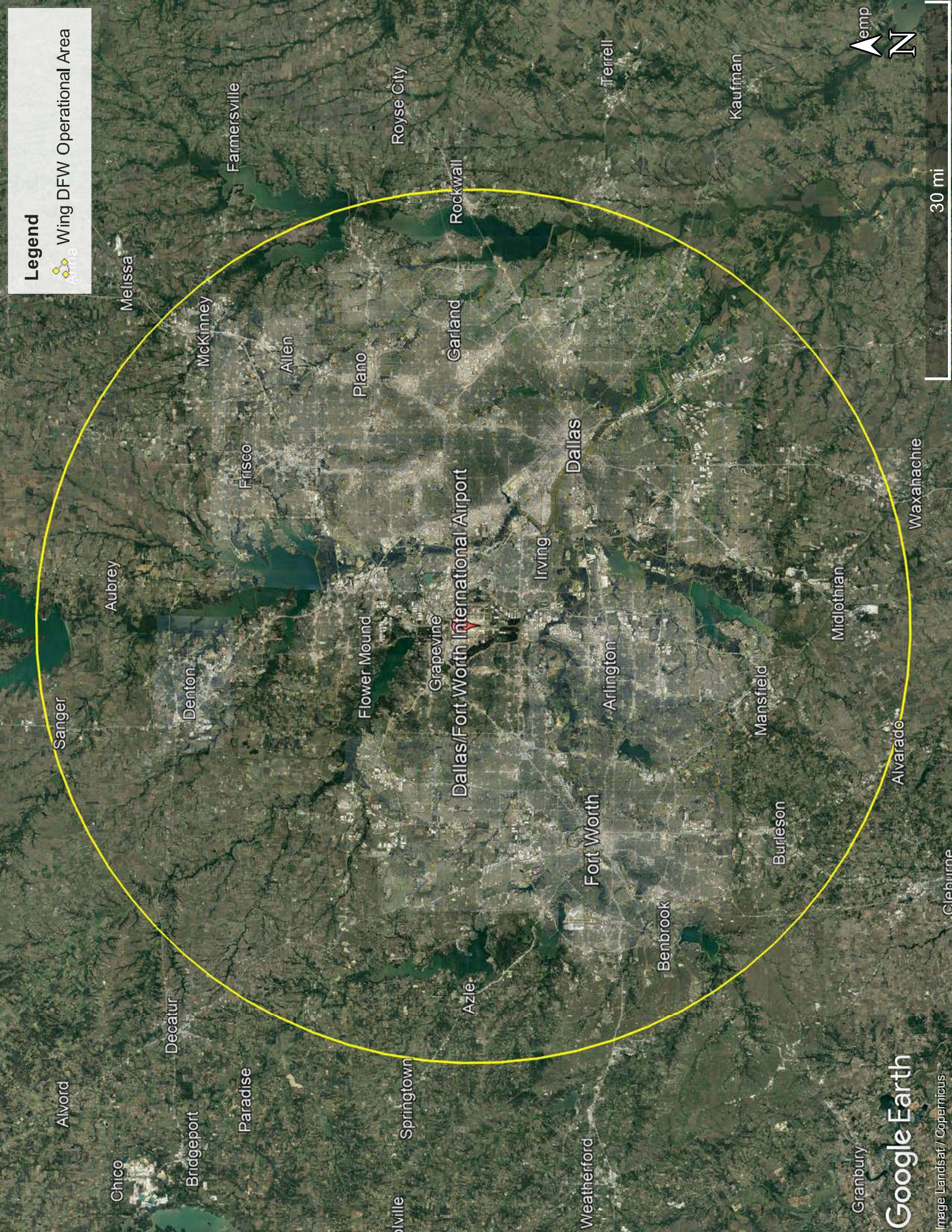
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MENZIMER**

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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
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Wing DFW Operational Area





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Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Principal Chief David Hill
Muscogee (Creek) Nation
P.O. Box 580
Okmulgee, OK 74447

Transmitted via mail and email to dhill@mcn-nsn.gov.

RE: Invitation for Government-to-Government Tribal Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Principal Chief Hill:

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Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

CC: Mr. Turner Hunt
Tribal Historic Preservation Officer

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Mr. Turner Hunt, Tribal Historic Preservation Officer
Muscogee (Creek) Nation
P.O. Box 580
Okmulgee, Oklahoma 74447

Transmitted via e-mail and mail: thunt@muscogeenation.com

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFW Texas

Dear Mr. Hunt:

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Muscogee (Creek) Nation and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the NHPA concurrently with the NEPA process.

Project Description

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas-Fort Worth metro area.

Wing is proposing to continue transporting consumer goods via drone delivery in the communities they already serve and expand these services to the larger operational area using the new Hummingbird 7000W-B and 8000-A drones. The Hummingbird 7000W-B and 8000-A drones would take off from Wing's nest locations and quickly rise to a cruising altitude of 150 to 300 feet above ground level (AGL). The Hummingbird 7000W-B drone weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds while the 8000-A drone weighs under 25 pounds when combined with its

maximum payload weight of 5 pounds. The Hummingbird 7000W-B and 8000-A drones have an approximate 6-mile service radius. Once at the delivery site, the Hummingbird 7000W-B and 8000-A, drones hovers in place at about 23 feet AGL and drops the package to the ground. Once the package has been delivered, the drone flies back to the launch/landing site at roughly the same altitude.

Wing is proposing up to 400 drone flights per day from each nest, with each flight taking a package to a customer delivery address before returning. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from the launch/landing site and gradually ramp up to the proposed level as consumer demand increases. Delivery operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed operation APE would be a 30-nautical mile radius around the DFW international airport. The enclosed map (Attachment A) shows the proposed APE in detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA previously notified the Muscogee (Creek) Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Muscogee (Creek) Nation concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operations area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov within 30 days of receipt of this letter.

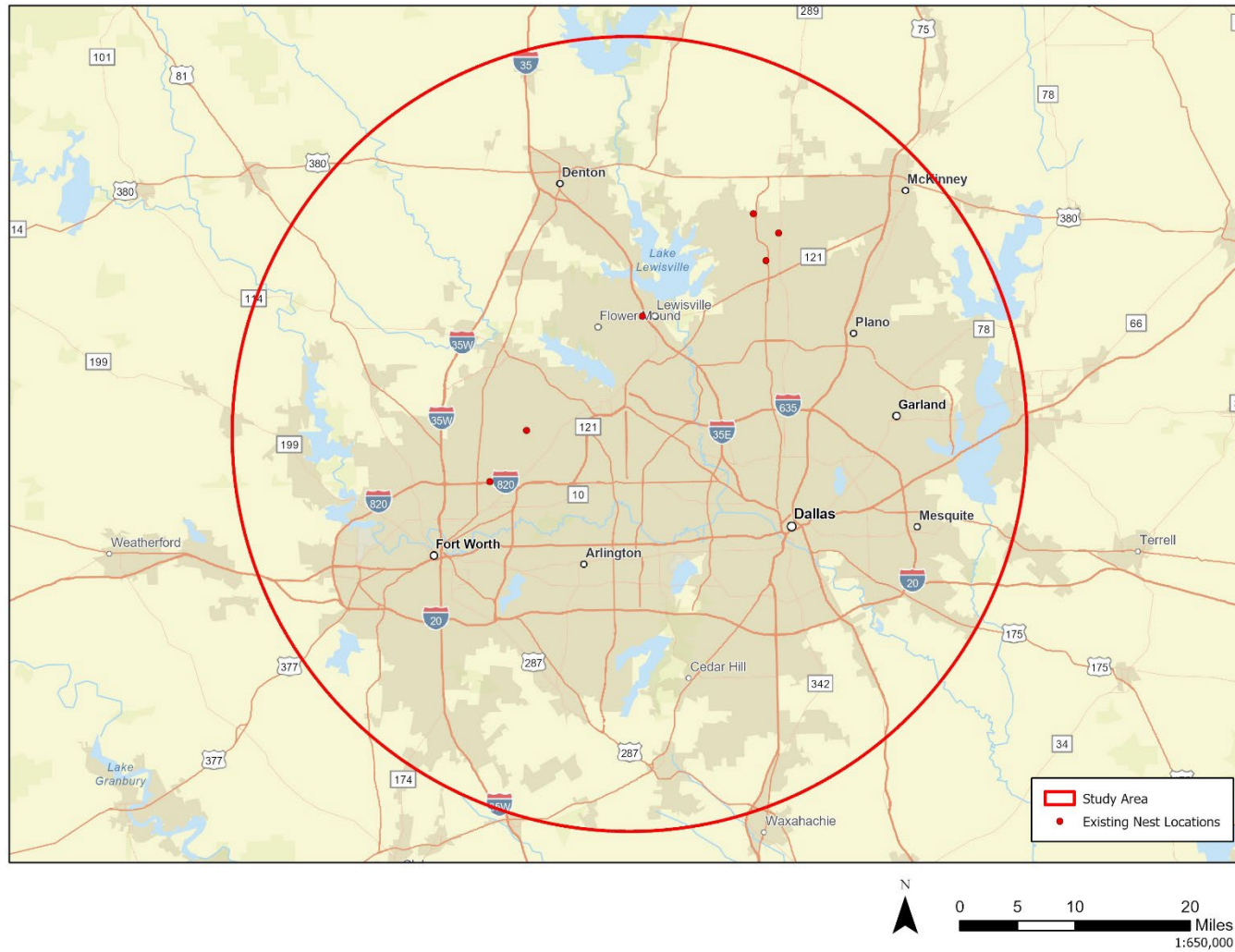
Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:

Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
Frisco Preston Rd	33° 8'52.77"N	96°48'24.06"W
Frisco Eldorado	33°10'22.14"N	96°50'36.88"W
Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
North Richland Hills 2	32°54'19.59"N	97°11'19.86"W



Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Principal Chief David Hill
Muscogee Nation
P.O. Box 580
Okmulgee, OK 74447

Dear Chief Hill,

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Muscogee Nation and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

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The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

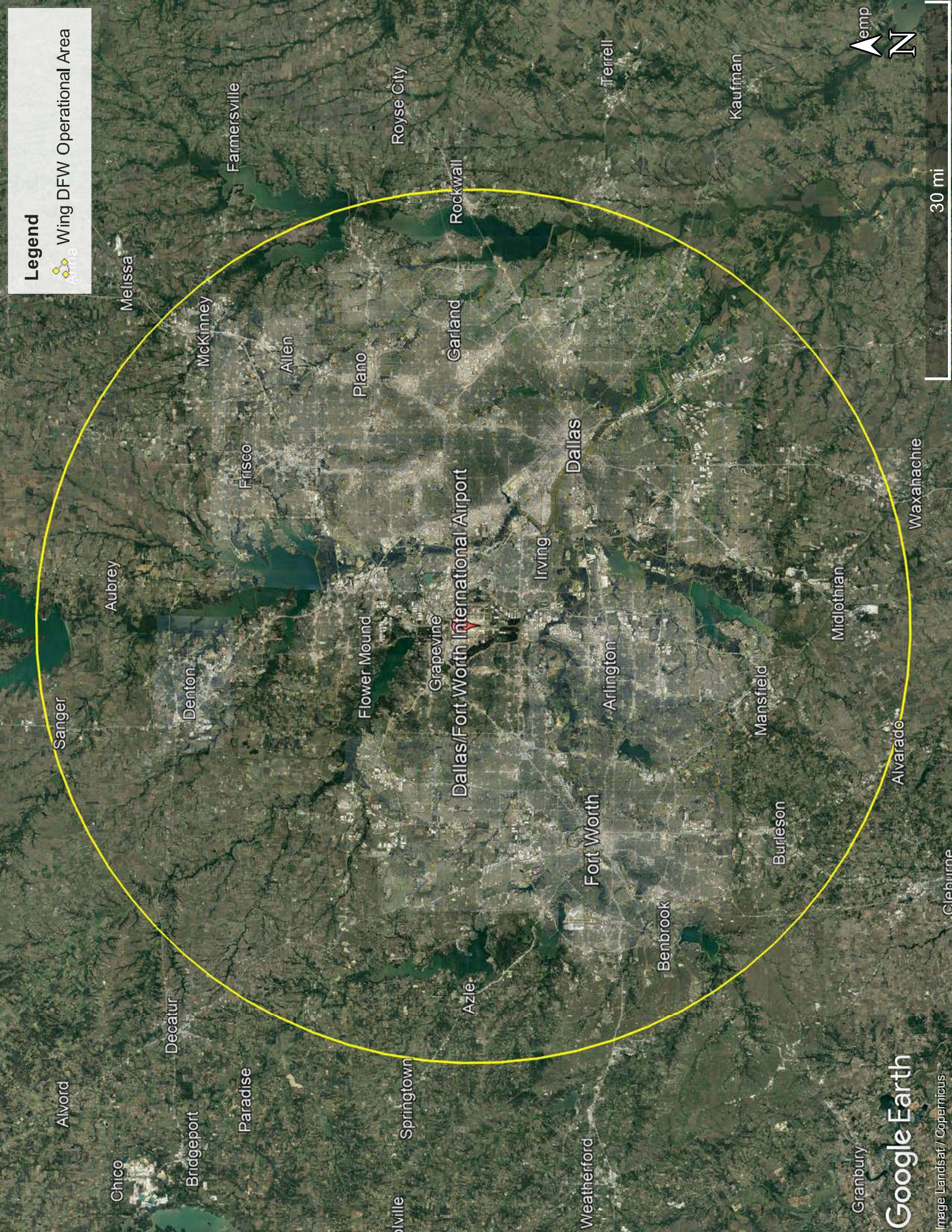
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MENZIMER

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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area





U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

President Russell Martin
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, Oklahoma 74653

Transmitted via mail and email to rmartin@tonkawatribe.com.

**RE: Invitation for Government-to-Government Tribal Consultation and Initiation of Section 106
Consultation for Wing, LLC Package Delivery Operations in DFW Texas**

Dear President Martin:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

In addition, the FAA has determined that its proposed action, which would encompass all the FAA approvals necessary to enable Wing's expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). This letter initiates Section 106 consultation with the Tonkawa Tribe of Indians of Oklahoma regarding potential effects on historic properties and cultural resources in the area.

The primary purpose of government-to-government consultation is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect the Tribes. This policy is provided in Federal Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; Presidential Memorandum, Uniform Standards for Tribal Consultation; DOT Order 5301.1A, Department of Transportation Tribal Consultation Policy and Procedures; and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures.

Consultation Initiation

With this letter, FAA is seeking input concerning any Tribal lands or sites of religious or cultural significance that may be affected by the proposed operations. Early identification of Tribal concerns, or known properties of traditional, religious, and cultural importance, will allow the FAA to consider ways to avoid or minimize potential impacts to Tribal resources. We are available to discuss the details of the proposed project with you.

Proposed Activity Description

The FAA is preparing a Supplemental Environmental Assessment under the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of commercial package delivery operations using drones in the DFW area under 14 Code of Federal Regulations Part 135 (Part 135). Since 2019, the FAA has been issuing air carrier certificates to UAS operators in accordance with Part 135 so that operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified the Tonkawa Tribe of Indians of Oklahoma in April 2023 (Attachment B) for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. The FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process.

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas–Fort Worth metro area.

Wing is proposing the expansion of their existing commercial drone package delivery operations in DFW. Under the proposed action, Wing would add additional nest locations, expand operating hours to 6:00 a.m. to 10:00 p.m. with flights only leaving the nest area between 07:00 a.m. and 10:00 p.m., and would maintain the current operational limit of 400 flights per nest per operating day. The proposed action would also introduce the use of the 8000-A UA, in addition to the Hummingbird 7000W-B UA, for delivery operations. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the Texas State Historic Preservation Office (SHPO) showed the APE would be within a 30 nautical mile (nm) radius of the DFW airport, and Wing's current proposal would continue to operate within this area. An enclosed map (Attachment A) shows the APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could

result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

The FAA is soliciting the opinion of the Tonkawa Tribe of Indians of Oklahoma concerning Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your timely response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that the Tonkawa Tribe of Indians of Oklahoma would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

A map of the Dallas-Fort Worth metropolitan area and surrounding regions. A large red circle is drawn around the central part of the map, indicating the 'Study Area'. The map shows major highways (Interstates 20, 30, 35, 40, 67, 75, 820, 51, 114, 12, 161, 287, 377, 174, 1187, 199, 69, 121, 34, 175, 3, 10, 104, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892,



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Office of Aviation Safety

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President Russell Martin
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653

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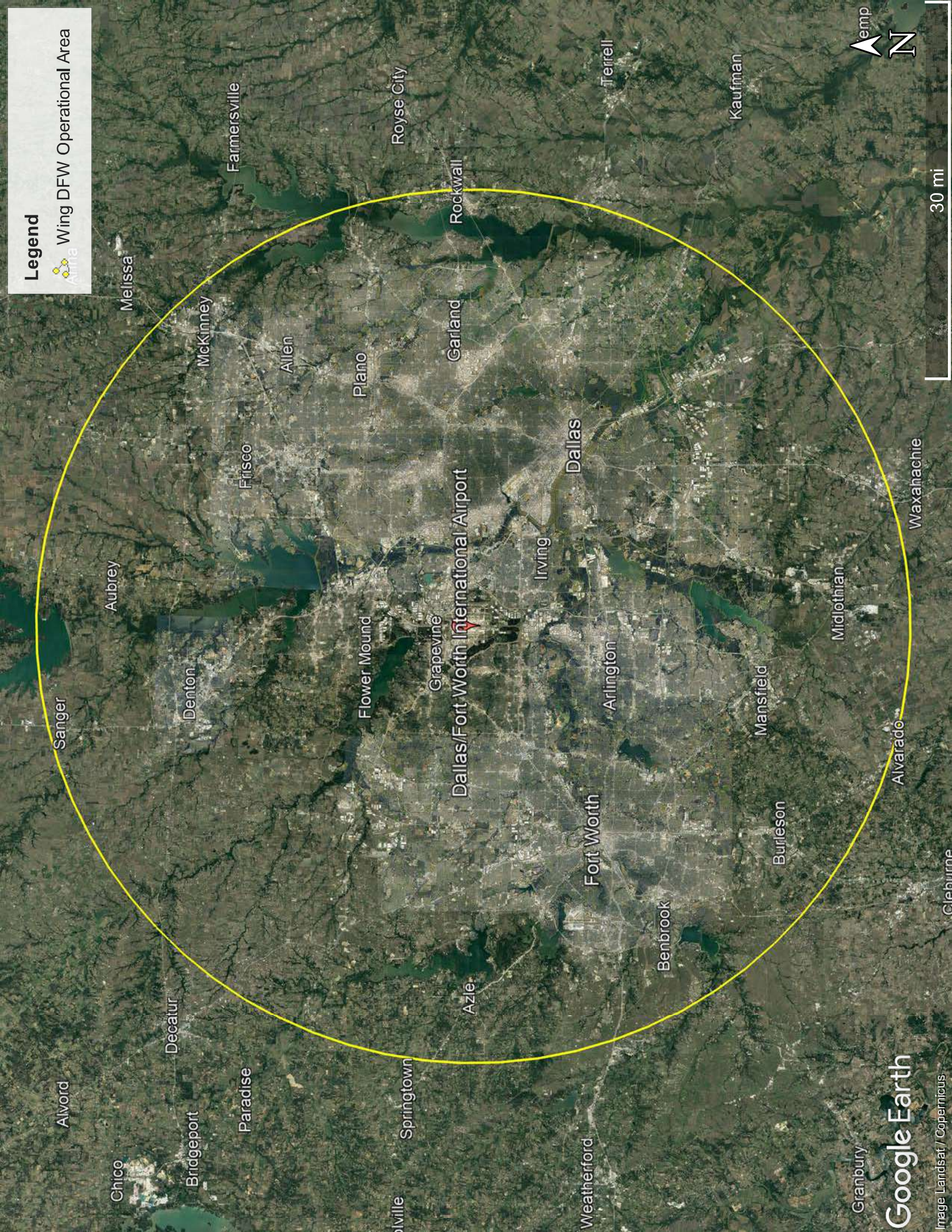
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David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area





U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

President Terri Parton
Wichita and Affiliated Tribes of Oklahoma
P.O. Box 729
Anadarko, OK 73005

Transmitted via mail and email to terri.parton@wichitatribe.com

RE: Invitation for Government-to-Government Tribal Consultation for Wing, LLC Package Delivery Operations in Texas

Dear President Parton:

The purpose of this letter is to initiate formal government-to-government consultation regarding a proposal under consideration by the Federal Aviation Administration (FAA) to authorize Wing, LLC (Wing) to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), Texas metropolitan area. The FAA is the lead federal agency for government-to-government consultation for the proposed project. We wish to solicit your views regarding potential effects on tribal interests in the area.

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that operators can conduct package delivery flights. Generally, these approvals are associated with issuing a new or amended Part 135 air carrier Operations Specifications. The FAA previously notified Wichita and Affiliated Tribes of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023. Wing is now proposing to expand their operations. FAA intends to complete consultation for Section 106 of the National Historic Preservation Act concurrently with the NEPA process. For your reference, the project description used for consultation under Section 106 is enclosed with this letter.

Confidentiality

We understand that you may have concerns about the confidentiality of information on areas or resources of traditional, religious, and cultural importance to your Tribe. We are available to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. In the event that the Wichita and Affiliate Tribes of Oklahoma would like to consult with the FAA, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov to confirm your intent to participate in this government-to-government consultation.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

CC: Ms. Robin Williams
Tribal Historic Preservation Officer

Enclosure:
Attachment A – Section 106 Consultation Package



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Ms. Robin Williams, Tribal Historic Preservation Officer
Wichita and Affiliated Tribes of Oklahoma
P.O. Box 729
Anadarko, Oklahoma 73005

Transmitted via e-mail and mail: robin.williams@wichitatribe.com

RE: Initiation of Section 106 Consultation for Wing, LLC Package Delivery Operations in DFWTexas

Dear Ms. Williams:

The Federal Aviation Administration (FAA) is currently evaluating Wing's proposal to conduct expanded delivery drone operations in the Dallas-Fort Worth (DFW), Texas (TX) area. Wing must obtain approval from the FAA prior to expanding its operations by operating the Hummingbird 7000W-B and 8000-A drones in DFW, TX. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Wichita and Affiliated Tribes of Oklahoma and to solicit your views regarding potential effects on tribal interests in the area. The FAA has begun a Supplemental Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to analyze the proposed action. FAA intends to complete consultation for Section 106 of the NHPA concurrently with the NEPA process.

Project Description

Wing currently operates under Part 135 in the DFW, Texas metropolitan area. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs). Wing is seeking to amend its OpSpecs to expand its Unmanned Aircraft (UA) commercial package delivery operations in the Dallas-Fort Worth metro area.

Wing is proposing to continue transporting consumer goods via drone delivery in the communities they already serve and expand these services to the larger operational area using the new Hummingbird 7000W-B and 8000-A drones. The Hummingbird 7000W-B and 8000-A drones would take off from Wing's nest locations and quickly rise to a cruising altitude of 150 to 300 feet above ground level (AGL). The Hummingbird 7000W-B drone weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds while the 8000-A drone weighs under 25 pounds when combined with its

maximum payload weight of 5 pounds. The Hummingbird 7000W-B and 8000-A drones have an approximate 6-mile service radius. Once at the delivery site, the Hummingbird 7000W-B and 8000-A, drones hovers in place at about 23 feet AGL and drops the package to the ground. Once the package has been delivered, the drone flies back to the launch/landing site at roughly the same altitude.

Wing is proposing up to 400 drone flights per day from each nest, with each flight taking a package to a customer delivery address before returning. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from the launch/landing site and gradually ramp up to the proposed level as consumer demand increases. Delivery operations would occur from approximately 7:00 a.m. to 10:00 p.m., 7 days of the week, including holidays. Operating hours would also include in-nest checkout flights between 6:00 a.m. and 7:00 a.m. Wing is projecting to establish up to 75 total nests in the DFW operating area under the scope of the proposed action. The exact timing and pace of nest installation is dependent on market conditions.

Wing is proposing to disperse nests throughout the operating area. Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metropolitan area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed operation APE would be a 30-nautical mile radius around the DFW international airport. The enclosed map (**Attachment A**) shows the proposed APE in detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archeological resources because the undertaking will only result in disturbance to previously disturbed land but could result in auditory or visual effects. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

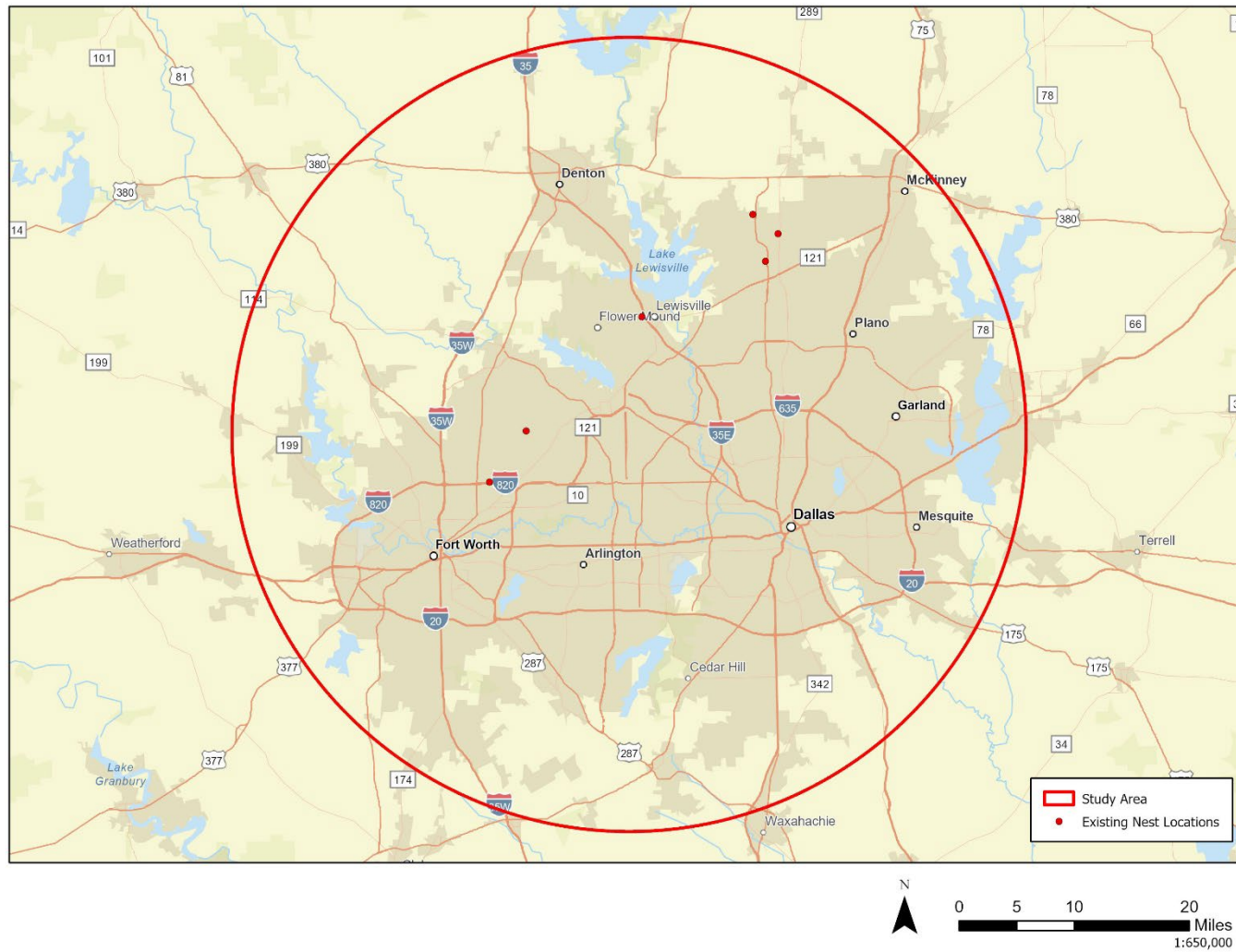
The FAA previously notified Wichita and Affiliated Tribes of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see **Attachment B**). The FAA is now soliciting the opinion of the Wichita and Affiliated Tribes of Oklahoma concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operations area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov within 30 days of receipt of this letter.

Sincerely,

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:
Attachment A – Proposed Area of Potential Effects
Attachment B – Previous Tribal Consultation

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latitude	Longitude
Frisco – Frisco Station	33° 6'48.50"N	96°49'34.81"W
Frisco Preston Rd	33° 8'52.77"N	96°48'24.06"W
Frisco Eldorado	33°10'22.14"N	96°50'36.88"W
Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
North Richland Hills 1	32°50'30.65"N	97°14'42.32"W
North Richland Hills 2	32°54'19.59"N	97°11'19.86"W



Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

President Terri Parton
Wichita and Affiliated Tribes, Oklahoma
P.O. Box 729
Anadarko, OK 73005

Dear President Parton:

The Federal Aviation Administration (FAA) is currently evaluating Wing Aviation LLC's (Wing) proposal to conduct expanded Unmanned Aircraft System (UAS) operations in the Dallas-Fort Worth (DFW), TX metro area. Wing must obtain approval from the FAA prior to expanding operations of its Hummingbird UAS in DFW. The FAA has determined that its proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the Wichita and Affiliated Tribes of Oklahoma and to solicit your views regarding potential effects on tribal interests in the area.

Project Description

Wing is proposing to continue transporting pharmaceutical and consumer goods via its Hummingbird UAS in partnership with merchants in the communities they already serve and expand these services to the larger operation area (see attached). The Hummingbird aircraft would takeoff from one of Wing's "nests" located in a parking lot at an existing merchant in the DFW metro area and quickly rise to a cruising altitude of 65–300 feet above ground level. Each aircraft weighs approximately 12 pounds and can transport a small package up to about 2.3 pounds. Once at the delivery site, the Hummingbird hovers in place while a retractable cord lowers the package to the ground. The cord then retracts back to the aircraft, and the aircraft flies back to the nest.

Each nest would house a number of aircraft on charging pads and one or more merchants may use each nest for drone deliveries. The estimated total distance flown would vary depending upon the pickup and dropoff locations in the operating area. Wing is proposing up to 400 flights per day from each nest, with each flight taking a package to a customer delivery address before returning to the nest. There is variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly much less than 400 flights per day from each nest and gradually ramp up to the proposed level as consumer demand increases.

While each site has an approximate 6 mile service radius, Wing is seeking flexibility to provide delivery operations from sites based on partner and customer service demands. Sites are envisioned to be located at large retailers or shopping centers and placed to best supplement existing delivery methods and minimize potential effects on local housing. Wing anticipates minimal overlap in service areas.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The current operation that was coordinated with the TX SHPO showed the APE would be limited to areas near Frisco and Allen, TX with a follow-on assessment for two larger areas on either side of Lewisville Lake. This expansion extends through the more densely populated or congested regions of the DFW metro area remaining within a 30 nautical mile (nm) radius of the DFW airport. An enclosed map shows the larger APE in greater detail.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below-ground or archeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

Consultation

The FAA is soliciting the opinion of the tribe(s) concerning any tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental review of the operation. If you have any questions or need additional information, please contact Mr. Mike Millard at (202) 267-7906 or via email at 9-AWA-AVS-AFS-ENVIRONMENTAL@faa.gov.

Sincerely,

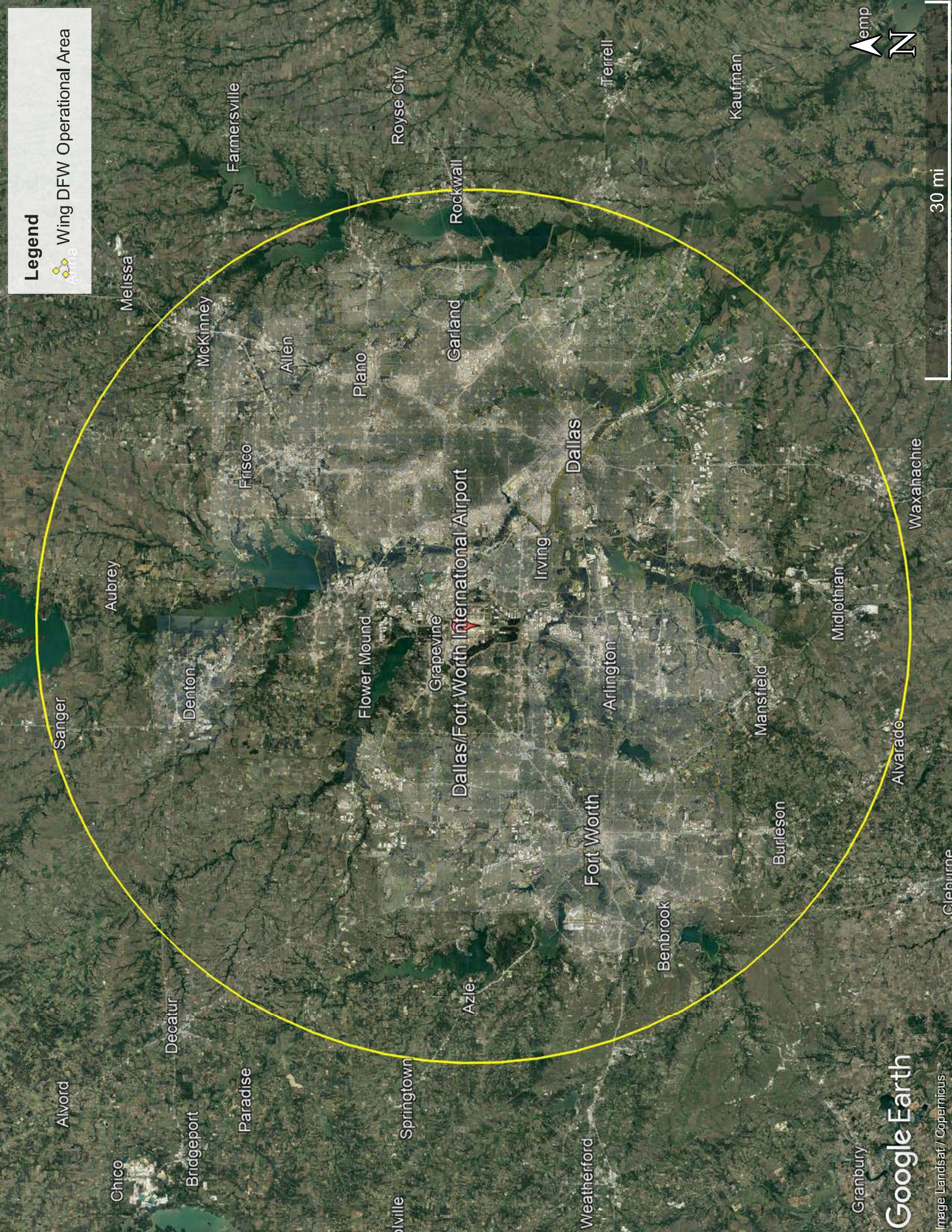
**DAVID M
MENZIMER**

Digitally signed by
DAVID M MENZIMER
Date: 2023.04.20
07:25:23 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service

Legend

Wing DFW Operational Area



Appendix G
SHPO Consultation



U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Bradford Patterson
Chief Deputy State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Via electronic submission to <https://xapps.thc.state.tx.us/106Review/>

Dear Mr. Patterson:

The Federal Aviation Administration (FAA) is currently evaluating a proposal from Wing to expand its unmanned aircraft (UA; also referred to as a drone) small package delivery operations in the Dallas-Fort Worth (DFW) metropolitan area. Wing must obtain approval from the FAA prior to expanding operations in DFW, where it is already conducting drone deliveries in the Dallas-Fort Worth (DFW) metropolitan (metro) area using its Hummingbird 7000W-B and 8000-A UAs. The FAA has determined the proposed action, which would encompass all FAA approvals necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the State Historic Preservation Officer (SHPO) and request concurrence on the definition of the Area of Potential Effects (APE), identification of historic properties, and assessment of effects.

The FAA conducted Section 106 consultation with the SHPO for a similar undertaking in early 2021 when evaluating Wing's initial proposed operations in Frisco and Little Elm (**THC Tracking #202105336**). The SHPO concurred with the FAA's finding of *no historic properties affected* on February 2, 2021. The FAA again consulted with the SHPO for a similar undertaking in early 2023 when evaluating Wing's proposed expansion of operations in the DFW metro area (**THC Tracking #202307198**). The SHPO concurred with the FAA's finding of *no historic properties affected* on May 1, 2023.

Project Description

Wing currently operates under 14 Code of Federal Regulations (CFR) Part 135 in the DFW metro area of Texas. Wing has a Part 135 Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) in those areas of Texas. The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs).¹ Wing is seeking

¹ An Operations Specifications is a document that defines the scope of aircraft operations that the FAA has authorized.

to amend its OpSpecs to expand its UA commercial package delivery operations in the Dallas–Fort Worth metro area.

Wing projects operating a maximum of 400 flights per operating day per nest, expanding operating hours to 6:00 am to 10:00 pm with flights only leaving the nest area between 7:00 am and 10:00 pm, with each flight taking a package to a customer delivery address before returning to a nest. Wing projects establishing up to 75 nests in the DFW operating area. The UA would be transporting consumer goods in partnership with merchants in the community. There would be variability in the number of flights per day based on customer demand and weather conditions. Initially, Wing expects to fly less than 400 flights per day from each nest and then gradually increase to 400 deliveries per day as consumer demand rises.

Wing is proposing to disperse nests throughout the operating area (see **Attachment A**). Wing's nests would be located in established parking lots of commercial areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Each nest would house up to two dozen (24) aircraft (UA) on launch pads and one or more merchants may use each nest for drone deliveries. Nests would be distributed throughout the DFW metro area following a measured rollout plan to be developed with Wing's partners and continuing best practices from Wing's established community outreach program, and in compliance with state and local statutory and regulatory requirements. The proposed operations would occur during the hours of 6:00 am to 10:00 pm with flights only leaving the nest area between 07:00 am and 10:00 pm, seven (7) days of the week (including weekends), and on holidays. Wing is not proposing to conduct operations from 10:00 pm to 6:00 am.

Unmanned Aircraft

The primary UAs used for the proposed operations is Wing's Hummingbird 7000W-B and 8000-A UAs. The Hummingbird 7000W-B features a multi-rotor design with sixteen round diameter propellers and the 8000-A features a multi-rotor design with sixteen round diameter propellers (see **Attachment B**). The Hummingbird 7000W-B UA weighs under 15 pounds when combined with its maximum payload weight of 2.7 pounds. It has a wingspan of approximately 4.9 feet, a height of approximately 1 foot, and a length of approximately 3 feet. The 8000-A UA weighs under 25 pounds when combined with its maximum payload weight of 5 pounds. It has a wingspan of approximately 6 feet, a height of approximately 1 foot, and a length of approximately 6.2 feet. To avoid the potential for significant noise impacts, Wing would site its nests and autoloaders at least 300 feet away from a noise-sensitive area when the nest is located within the controlled surface area of Class B and Class D airspace and at least 45 feet away from a noise-sensitive area in all other areas within the study area, which is defined as Wing's proposed operating area. Remote pickups and pickup flight paths would not occur within 45 feet of noise-sensitive areas. All of Wing's aircraft use electric power from rechargeable lithium-ion batteries.

Flight Operations

The UA would generally be operated at an altitude of 150–300 feet above ground level (AGL) and always below an altitude of 400 feet AGL while en route to and from delivery locations. At a delivery location, the UA would descend vertically to a stationary hover at 23 feet AGL and lower a package to the ground by a retractable line for delivery. Once a package has been lowered to the ground, the UA would then retract the line, ascend vertically to a cruise altitude, and depart the delivery area en route back to a nest.

The UA would fly a predefined flight path that is set prior to takeoff. Flight missions are automatically planned by Wing's flight planning software. A mission originates from a nest location, and Wing's

software automatically assigns, deconflicts, and routes each flight to the delivery location and back to a nest. Each nest site would include a controlled area wherein UA flights are launched and recovered.

A typical flight profile can be broken into the following general flight phases: takeoff, en route outbound, delivery, en route inbound, and landing.

Takeoff

Once the UA receives a mission and is cleared for takeoff from a launch pad, the UA takes off from the ground vertically to an altitude of 23 feet AGL and hovers for 30 seconds while the package is loaded. The UA then climbs to the en route altitude (150–300 feet AGL).

En Route Outbound

The en route outbound phase is the part of flight in which the fully loaded UA transits from the nest or a remote pickup location to a delivery point on a predefined flight path. During this flight phase, the UA would typically operate at an altitude of 150–300 feet AGL and a typical airspeed of 59 miles per hour (mph). The UA has a single set cruise airspeed, which would not be exceeded.

Delivery

The delivery phase consists of descent from the en route altitude to a delivery point, such as a residential yard, driveway, parking lot, or common area. The UA descends vertically to 23 feet AGL while maintaining position over the delivery point. The UA hovers at 23 feet AGL for approximately 30 seconds while lowering its package and then proceeds to climb vertically back to en route altitude. The minimum distance a human should be from the UA during delivery is a 6-foot radius from underneath the center of the UA.

En Route Inbound

The UA continues to fly at an altitude of 150–300 feet AGL and a speed of 59 mph towards the nest.

Landing

Upon reaching the nest, the UA slowly descends over its assigned landing pad and lands on the pad.

Remote Pickup Operations

Remote pickup operations from each nest would be supported at up to 12 partner establishments depending upon demand and nest capacity. Pickup operations would follow general flight phases and parameters identical to typical delivery operations and would include the addition of a pickup phase. The pickup phase is similar to the delivery phase. The UA descends from its close transit altitude (safe altitude above local terrain and obstacles) to 14.5 feet AGL and lowers the package hook. The UA then passes approximately 10 feet laterally over the autoloader. The autoloader's Y-shaped poles passively guide the package hook to a narrow slot that ensures secure attachment of the package. The package is then retracted to the UA before it proceeds to climb to the enroute altitude. Remote pickup operations from descent to finish are expected to take no longer than 1 minute and 30 seconds (90 seconds). Delivery, en route return, and landing operations would then occur as described above.

Predicted Sound Levels

The FAA conducted a noise analysis using sound level measurement data for the UA—the Hummingbird 7000W-B. The estimated maximum sound exposure level (SEL)² for the takeoff, delivery, and landing

² Sound exposure level (SEL) is a single event metric that considers both the noise level and duration of the event, referenced to a standard duration of one second.

phases of flight is approximately 82.2 decibels (dB) at about 75 feet from the drone. Predicted sound levels decrease as distances from the drone increase. The average maximum SEL for the en route phase is approximately 64 dB when the drone is flying 56 knots at 200 feet AGL.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The APE is the operating area outlined in red in **Attachment A**. This area encompasses much of the DFW metro area within a 30-nautical mile radius around the DFW international airport. This area captures all potential noise and visual effects.

Identification of Historic Properties

The proposed undertaking does not have the potential to affect below ground or archaeological resources because the undertaking does not include ground disturbance. Therefore, the FAA focused its identification efforts on above-ground historic properties.

According to the National Park Service's online database of the National Register of Historic Places (NRHP), a total of 224 historic properties and 145 historic districts are located in the APE (see **Attachments C and D**). Additional properties in the APE may be otherwise recognized for historical significance by the SHPO.

Most of the historic properties in the APE are residences and businesses, but also include churches, government buildings, schools, and courthouses. Additional historic properties include a steam locomotive, railway, two bridges, and a pump station. Most of the historic properties in the APE are included on the NRHP because of their historic architectural features.

Assessment of Effects

Given the small size of the UA and predicted sound levels, UA operations would not produce vibrations that could impact the architectural structure or contents of any structure in the APE. While the UA is not expected to generate significant noise levels at or within any historic property, the FAA considered drone delivery noise and potential visual effects on historic properties where a quiet setting or visually unimpaired sky might be a key attribute of the property's significance. The FAA has not identified any properties in the APE that would be adversely affected by the UA's sound levels or visual effects, which are not anticipated to be significant at any locations along the drone's flight path, including delivery locations. Therefore, the FAA has made a finding of ***no adverse effect***.

Conclusion

The FAA requests your concurrence on the definition of the APE, identification of historic properties, and finding of ***no adverse effect***. Your response within the next 30 days will greatly assist us in our environmental review process.

If you have any questions or need additional information, please contact Dr. Shelia Neumann via email at 9-faa-drone-environmental@faa.gov.

Sincerely,

Joseph K. Hemler Jr.
Manager, AFS-752
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service

Enclosures:

Attachment A – Area of Potential Effects

Attachment B – Wing's Hummingbird 7000W-B and 8000-A Unmanned Aircraft

Attachment C -- Historic Properties

Attachment D -- Historic Districts

Attachment A. Area of Potential Effects



Attachment B. Wing's Hummingbird 7000W-B and 8000-A Unmanned Aircraft



Figure 1. Wing Hummingbird 7000W-B UA



Figure 2. Wing Hummingbird 8000-A UA

Attachment C. Historic Properties

Reference Number	Name	Address	City	County
100001378	Fountain G. and Mary Oxsheer House	1119 Pennsylvania Avenue	Fort Worth	Tarrant
99001624	Riverside Public School	2629 LaSalle St.	Fort Worth	Tarrant
99001499	Texas Farm and Ranch Building	3300 Main St.	Dallas	Dallas
99001451	Tabernacle Baptist Church	1801 Evans Ave.	Fort Worth	Tarrant
99001292	Dallas Tent and Awning Building	3401 Commerce St.	Dallas	Dallas
99001049	Morning Chapel Colored Methodist Episcopal Church	901 E. 3rd St.	Fort Worth	Tarrant
99000883	Saint James Second Street Baptist Church	210 Harding St.	Fort Worth	Tarrant
99000882	Our Mother of Mercy Catholic Church and Parsonage	1100 and 1104 Evans Ave.	Fort Worth	Tarrant
99000723	Botts--Fowler House	115 N. Fourth Ave.	Mansfield	Tarrant
98001415	Montgomery Ward and Company Building	801 Grove St.	Fort Worth	Tarrant
98000102	Fort Worth Club Building - 1916	608-610 Main St.	Fort Worth	Tarrant
97001187	Stanard-Tilton Flour Mill	2400 S. Ervay St.	Dallas	Dallas
97000851	Bedford School	2400 School Ln.	Bedford	Tarrant
97000478	Santa Fe Terminal Building No. 1 and No. 2	1114 Commerce St. and 1118 Jackson St.	Dallas	Dallas
97000363	Dallas Fire Station No. 16	5501 Columbia Ave.	Dallas	Dallas
96001563	Greer, George C. House	5439 Swiss Ave.	Dallas	Dallas
96001015	Busch--Kirby Building (Boundary Increase)	1501--1509 Main St.	Dallas	Dallas
96000586	Titche--Goettinger Department Store	1901 Main St.	Dallas	Dallas
95001365	Estes House	903 N. College St.	McKinney	Collin
95001029	Shaw, Thomas and Marjorie, House	2404 Medford Ct. E.	Fort Worth	Tarrant
95000325	Silberstein, Ascher, School	2425 Pine St.	Dallas	Dallas
95000323	Ellis, James H. and Molly, House	2426 Pine	Dallas	Dallas
95000321	Rush--Crabb House	2718 Pennsylvania	Dallas	Dallas
95000319	Trinity English Lutheran Church	3100 Martin Luther King, Jr. Blvd.	Dallas	Dallas
95000318	Forest Avenue High school, Old	3000 Martin Luther King, Jr. Blvd.	Dallas	Dallas
95000317	Levi-Topletz House	2603 Martin Luther King, Jr. Blvd.	Dallas	Dallas
95000316	Levi-Moses House	2433 Martin Luther King, Jr. Blvd.	Dallas	Dallas
95000315	Emanuel Lutheran Church	4301 San Jacinto	Dallas	Dallas
95000314	Fannin, James W. Elementary School	4800 Ross Ave.	Dallas	Dallas
95000312	Shiels, Thomas, House	4602 Reiger Ave.	Dallas	Dallas
95000311	Bianchi, Didaco and Ida, House	4503 Reiger Ave.	Dallas	Dallas

Reference Number	Name	Address	City	County
95000310	Mary Apartments	4524 Live Oak	Dallas	Dallas
95000309	Mrs. Baird's Bread Company Building	1401 N. Carroll	Dallas	Dallas
95000307	Central Congregational Church	1530 N. Carroll	Dallas	Dallas
95000048	Electric Building	410 W. 7th St.	Fort Worth	Tarrant
94001627	North Fort Worth High School	600 Park St.	Fort Worth	Tarrant
94001359	Woolworth, F. W., Building	501 Houston St.	Fort Worth	Tarrant
94000542	Sanger Brothers Building	410--412 Houston St.	Fort Worth	Tarrant
93000566	Brooks, William and Blanche, House	500 S. Center St.	Forney	Kaufman
92000021	Interstate Forwarding Company Warehouse	3200 Main St.	Dallas	Dallas
91001913	Sinclair Building	512 Main St.	Fort Worth	Tarrant
91000118	Mitchell, John E., Company Plant	3800 Commerce St.	Dallas	Dallas
88002709	Westover Manor	8 Westover Rd.	Westover Hills	Tarrant
88002063	Gilbert, Samuel and Julia, House	2540 Farmers Branch Ln.	Farmers Branch	Dallas
88000979	Old Alton Bridge	Copper Canyon Rd.	Copper Canyon	Denton
88000176	Oak Lawn Methodist Episcopal Church, South	3014 Oak Lawn Ave.	Dallas	Dallas
87001757	Wilson, A. G., House	417 N. Waddill	McKinney	Collin
87001756	Wiley, Thomas W., House	105 S. Church	McKinney	Collin
87001755	Waddill, R. L., House	302 W. Lamar	McKinney	Collin
87001754	Thompson House	1207 W. Louisiana	McKinney	Collin
87001753	Taylor, J. H., House	211 N. Waddill	McKinney	Collin
87001752	Smith, W. D., House	703 N. College	McKinney	Collin
87001751	Scott, L. A., House	513 W. Louisiana	McKinney	Collin
87001750	Scott, A. M., House	1109 W. Louisiana	McKinney	Collin
87001749	Rhea, John C., House	801 N. College	McKinney	Collin
87001748	Newsome--King House	401 W. Louisiana	McKinney	Collin
87001747	Newsome, R. F., House	609 Tucker	McKinney	Collin
87001746	Nenney, J. P., House	601 N. Church	McKinney	Collin
87001745	Neathery, Sam, House	215 N. Waddill	McKinney	Collin
87001743	McKinney Hospital, Old	700-800 S. College	McKinney	Collin
87001739	McKinney Cotton Compress Plant	300 blk. Throckmorton	McKinney	Collin
87001738	Kirkpatrick, E. W. House and Barn	903 Parker	McKinney	Collin
87001737	King, Mrs. J. C., House	405 W. Louisiana	McKinney	Collin
87001724	Johnson, Thomas, House	312 S. Tennessee	McKinney	Collin
87001723	Johnson, John, House	302 Anthony	McKinney	Collin
87001722	Houses at 406 and 408 Heard	406 & 408 Heard	McKinney	Collin

Reference Number	Name	Address	City	County
87001721	House at 704 Parker	704 Parker	McKinney	Collin
87001717	House at 1303 W. Louisiana	1303 W. Louisiana	McKinney	Collin
87001716	Hill--Webb Grain Elevator	400 E. Louisiana	McKinney	Collin
87001715	Hill, W. R., House	601 N. College	McKinney	Collin
87001714	Hill, Moran, House	203 N. Waddill	McKinney	Collin
87001713	Hill, John B., House	605 N. College	McKinney	Collin
87001712	Hill, Ben, House	509 Tucker	McKinney	Collin
87001711	Heard--Craig House	205 W. Hunt	McKinney	Collin
87001710	Gough--Hughston House	1206 W. Louisiana	McKinney	Collin
87001709	Fox, S. H., House	808 Tucker	McKinney	Collin
87001708	Foote--Crouch House	401 N. Benge	McKinney	Collin
87001707	Ferguson, John H., House	607 N. Church	McKinney	Collin
87001706	Faires--Bell House	S side Chestnut Sq.	McKinney	Collin
87001705	Faires, F. C., House	505 S. Chestnut	McKinney	Collin
87001704	Dulaney, Joe E., House	311 S. Chestnut	McKinney	Collin
87001702	Dulaney, Joseph Field, House	315 S. Chestnut	McKinney	Collin
87001699	Dowell, J. S., House	608 Parker	McKinney	Collin
87001697	Davis--Hill House	710 N. Church	McKinney	Collin
87001695	Davis, H. L., House	705 N. College	McKinney	Collin
87001691	Crouch--Perkins House	205 N. Church	McKinney	Collin
87001688	Goodner, Jim B., House	302 S. Tennessee	McKinney	Collin
87001685	Collin County Mill and Elevator Company	407 E. Louisiana	McKinney	Collin
87001682	Coggins, J. R., House	805 Howell	McKinney	Collin
87001681	Cline--Bass House	804 Tucker	McKinney	Collin
87001679	Clardy, U. P., House	315 Oak	McKinney	Collin
87001671	Burrus--Finch House	405 N. Waddill	McKinney	Collin
87001666	Brown, John R., House	509 N. Church	McKinney	Collin
87001663	Board--Everett House	507 N. Bradley	McKinney	Collin
87001662	Bingham, John H., House	800 S. Chestnut	McKinney	Collin
87001661	Beverly--Harris House	604 Parker	McKinney	Collin
86001939	Old Continental State Bank	312 Oak St.	Roanoke	Denton
85003092	Hilton Hotel	1933 Main St.	Dallas	Dallas
85002912	Spake, Jacob and Eliza, House	2600 State St.	Dallas	Dallas
85001495	Straus House	400 Cedar	Cedar Hill	Dallas
85001484	Rogers-O'Daniel House	2230 Warner Rd.	Fort Worth	Tarrant
85000855	US Post Office	Lancaster and Jennings Ave.	Fort Worth	Tarrant
85000713	Roberts, Dr. Rufus A., House	210 S. Broad St.	Cedar Hill	Dallas
85000712	Hawkes, Z. T. (Tip), House	132 N. Potter St.	Cedar Hill	Dallas
85000711	Bryant, William, Jr., House	S. Broad and Cooper	Cedar Hill	Dallas
85000710	Angle, D. M., House	800 Beltline	Cedar Hill	Dallas
85000074	St. Patrick Cathedral Complex	1206 Throckmorton St.	Fort Worth	Tarrant

Reference Number	Name	Address	City	County
84001998	St. Mary of the Assumption Church	501 W. Magnolia Ave.	Fort Worth	Tarrant
84001996	Johnson-Elliott House	3 Chase Ct.	Fort Worth	Tarrant
84001993	Hutcheson-Smith House	312 N. Oak St.	Arlington	Tarrant
84001981	Fort Worth Public Market	1400 Henderson St.	Fort Worth	Tarrant
84001969	Fort Worth Elks Lodge 124	512 W. 4th St.	Fort Worth	Tarrant
84001965	Bryce, William J., House	4900 Bryce Ave.	Fort Worth	Tarrant
84001963	Bryce Building	909 Throckmorton St.	Fort Worth	Tarrant
84001961	Blackstone Hotel	601 Main St.	Fort Worth	Tarrant
84001643	Viola Courts Apartments	4845 Swiss Ave.	Dallas	Dallas
84000169	Allen Chapel AME Church	116 Elm St.	Fort Worth	Tarrant
83003812	First Christian Church	612 Throckorton St.	Fort Worth	Tarrant
83003162	Sanguinet, Marshall R., House	4729 Collinwood Ave.	Fort Worth	Tarrant
83003160	Austin, Stephen F., Elementary School	319 Lipscomb St.	Fort Worth	Tarrant
83003135	McIntosh, Roger D., House	1518 Abrams Rd.	Dallas	Dallas
83003134	Continental Gin Company	3301-3333 Elm St., 212 and 232 Trunk Ave.	Dallas	Dallas
83003133	Hotel Adolphus	1315 Commerce St.	Dallas	Dallas
82001736	Grace Methodist Episcopal Church	4105 Junius St.	Dallas	Dallas
81000627	Number 4 Hook and Ladder Company	Cedar Springs Rd. and Reagan St.	Dallas	Dallas
80004489	Busch Building	1501--1509 Main St.	Dallas	Dallas
80004151	Burnett, Burk, Building	500--502 Main St.	Fort Worth	Tarrant
80004097	Virginia Hall	3325 Dyer St.	Dallas	Dallas
80004096	Snider Hall	3305 Dyer St.	Dallas	Dallas
80004095	Perkins Hall of Administration	6425 Hillcrest Rd.	Dallas	Dallas
80004094	Patterson, Stanley, Hall	3128 Dyer St.	Dallas	Dallas
80004092	Miller, John Hickman, House	3506 Cedar Springs	Dallas	Dallas
80004091	McFarlin Memorial Auditorium	6405 Hillcrest Rd.	Dallas	Dallas
80004090	Hyer Hall	6424 Hill Lane	Dallas	Dallas
80004089	Florence, Fred, Hall	3330 University Blvd.	Dallas	Dallas
80004088	Dallas Scottish Rite Temple	Harwood and Young Sts.	Dallas	Dallas
80004087	Clements Hall	3200 Dyer St.	Dallas	Dallas
79003012	Waggoner, W. T. Building	810 Houston St.	Fort Worth	Tarrant
79003011	Hotel Texas	815 Main St.	Fort Worth	Tarrant
79003009	Eddleman-McFarland House	1110 Penn St.	Fort Worth	Tarrant
79002931	Wilson Building	1621-1623 Main St.	Dallas	Dallas
78002982	Benton, M. A., House	1730 6th Ave.	Fort Worth	Tarrant
78002981	Anderson, Neil P., Building	411 W. 7th St.	Fort Worth	Tarrant
78002922	Strain, W. A., House	400 E. Pecan St.	Lancaster	Dallas
78002921	Rawlins, Capt. R. A., House	2219 Dowling St.	Lancaster	Dallas

Reference Number	Name	Address	City	County
78002920	Randlett House	401 S. Centre St.	Lancaster	Dallas
78002917	Waples-Platter Buildings	2200--2211 N. Lamar St.	Dallas	Dallas
78002915	Magnolia Building	108 S. Akard St.	Dallas	Dallas
78002913	Dallas Hall	Southern Methodist University campus	Dallas	Dallas
78002906	Wilson, Ammie House	1900 W. 15th St.	Plano	Collin
77001477	Texas & Pacific Steam Locomotive No. 610	Now at Texas State Railroad, Palestine	Fort Worth	Tarrant
77001438	Denton County Courthouse	Public Sq.	Denton	Denton
77001437	Majestic Theatre	1925 Elm St.	Dallas	Dallas
76002068	Paddock Viaduct	Main St.	Fort Worth	Tarrant
76002019	Dallas County Courthouse	Houston and Commerce Sts.	Dallas	Dallas
75002003	Wharton-Scott House	1509 Pennsylvania Ave.	Fort Worth	Tarrant
75001967	Sanger Brothers Complex	Block 32, bounded by Elm, Lamar, Main and Austin Sts.	Dallas	Dallas
75001965	Belo, Alfred Horatio, House	2115 Ross Ave.	Dallas	Dallas
72001372	Pollock-Capps House	1120 Penn St.	Fort Worth	Tarrant
71000964	Flatiron Building	1000 Houston St.	Fort Worth	Tarrant
70000762	Tarrant County Courthouse	Bounded by Houston, Belknap, Weatherford, and Commerce Sts.	Fort Worth	Tarrant
70000761	Knights of Pythias Building	315 Main St.	Fort Worth	Tarrant
70000760	Gulf, Colorado and Sante Fe Railroad Passenger Station	1601 Jones St.	Fort Worth	Tarrant
16000916	St. Paul Methodist Episcopal Church	1816 Routh Street	Dallas	Dallas
14000105	Inspiration Point Shelter House	Roughly 250 yds S. of 2400 blk. Of Roberts Cut Off Rd.	Fort Worth	Tarrant
14000103	511 Akard Building	511 N. Akard St.	Dallas	Dallas
13000612	J. L. Sealy Building	801 South Main Street	Fort Worth	Tarrant
13000126	Fort Worth Warehouse and Transfer Company Building	201 S. Calhoun St.	Fort Worth	Tarrant
12001005	Van Zandt Cottage	2900 Crestline Road	Fort Worth	Tarrant
12001004	Farmers and Mechanics National Bank	714 Main Street	Fort Worth	Tarrant
12000589	Eldred W. Foster House	9608 Heron Drive	Fort Worth	Tarrant
12000350	Dallas Coffin Company	1325 S. Lamar	Dallas	Dallas
11000982	Ridglea Theatre Building	6025-6033 Camp Bowie Blvd. & 3309 Winthrop Ave.	Fort Worth	Tarrant
11000344	Santa Fe Terminal Building No. 4	1033 Young St.	Dallas	Dallas
11000343	Adamson High School	201 East Ninth Street	Dallas	Dallas
11000136	Texas Garden Clubs, Inc., Headquarters	3111 Old Garden Road	Fort Worth	Tarrant
11000128	Henderson Street Bridge	Henderson Street at the Clear Fork of the Trinity River	Fort Worth	Tarrant

Reference Number	Name	Address	City	County
10000865	Miller Manufacturing Company Building	311 Bryan Avenue	Fort Worth	Tarrant
10000500	Vandergriff Building	100 E. Division St.	Arlington	Tarrant
10000249	Parkland Hospital	3819 Maple Avenue	Dallas	Dallas
9000982	Petroleum Building	210 West Sixth Street	Fort Worth	Tarrant
9000981	First National Bank Building	711 Houston Street	Fort Worth	Tarrant
9000839	Celina Public School	205 S. Colorado St.	Celina	Collin
9000306	Fidelity Union Life Insurance Building	1511 Bryan/1507 Pacific Ave.	Dallas	Dallas
8001300	Roy A. and Gladys's Westbrook House	2232 Winton Terrace West	Fort Worth	Tarrant
8000658	Alfred and Juanita Bromberg House			
8000539	4928 Bryan Street Apartments	4928 Bryan Street	Dallas	Dallas
8000475	Building @ 3525 Turtle Creek Boulevard	3525 Turtle Creek Boulevard	Dallas	Dallas
8000317	American Airways Hangar and Administration Building	Meacham Airport, 201 Aviation Way, Hangar 11N	Fort Worth	Tarrant
7000989	Stoneleigh Court Hotel	2927 Maple Avenue	Dallas	Dallas
7000691	First Methodist Church of Rockwall	303 East Rusk	Rockwall	Rockwall
7000266	Kress Building	604 Main Street	Fort Worth	Tarrant
7000130	Monroe Shops	2111 South Corinth Street	Dallas	Dallas
6001085	Dr. Arvel and Faye Ponton House	1208 Mistletoe Drive	Fort Worth	Tarrant
6000819	Dallas Times Herald Pasadena Perfect Home	6938 Wildgrove Avenue	Dallas	Dallas
6000651	Bluitt Sanitarium	2036 Commerce Street	Dallas	Dallas
6000513	Mark & Maybelle Lemmon House	3211 Mockingbird Lane	Highland Park	Dallas
6000510	Our Mother of Mercy School	801 Verbena Street	Fort Worth	Tarrant
5001543	1926 Republic National Bank	1309 Main Street1309 Main Street	Dallas	Dallas
5001541	Purvin-Hexter Building	2038 Commerce Street	Dallas	Dallas
5000864	Vaught House	718 West Abram Street	Arlington	Tarrant
5000856	Plano Station/Texas Electric Railway	901 E. 15th Street	Plano	Collin
5000419	Dallas National Bank	1530 Main and 1511 Commerce St.	Dallas	Dallas
5000243	Republic National Bank	300 N. Ervay/325 N. St. Paul St.	Dallas	Dallas
4000886	Our Lady of Victory Academy	801 W. Shaw St.	Fort Worth	Tarrant
4000102	Harlan Building	2018 Cadiz St.	Dallas	Dallas
3001418	Rector Road Bridge at Clear Creek	Moved to Guyer HS from approx. 2.5 mi SE of Sanger	Sanger	Denton
3000436	Wallace-Hall House	210 S. Main St.	Mansfield	Tarrant

Reference Number	Name	Address	City	County
3000435	Ralph Sandiford and Julia Boisseau Man House	604 West Broad Street	Mansfield	Tarrant
3000434	Chorn, Lester H. and Maybel Bryant, House	303 E. Broad St.	Mansfield	Tarrant
3000433	Buchanan-Hayter-Witherspoon House	306 E. Broad St.	Mansfield	Tarrant
3000432	Bratton, Andrew "Cap" and Emma Doughty, House	310 E. Broad St.	Mansfield	Tarrant
3000277	Chevrolet Motor Company Building	3221 Commerce	Dallas	Dallas
3000187	Texas Theatre	231 W. Jefferson Blvd.	Dallas	Dallas
2001515	Fort Worth High School	1015 S. Jennings Ave.	Fort Worth	Tarrant
2001512	Hogg, Alexander, School	900 St. Louis Ave.	Fort Worth	Tarrant
2000992	G & J Manufacturing	3912 Willow St.	Dallas	Dallas
2000730	Lincoln Paint and Color Company Building	3210 Main	Dallas	Dallas
2000009	Goodyear Tire and Rubber Company Building and B.F. Goodrich Building	3809 Parry Ave. & 4140 Commerce St.	Dallas	Dallas
1000470	Markeen Apartments	210--14 St. Louis Ave. and 406--10 W. Daggett Ave.	Fort Worth	Tarrant
1000437	Fort Worth US Courthouse	501 W. 10th St.	Fort Worth	Tarrant
1000103	Turtle Creek Pump Station	3630 Harry Hines Blvd.	Dallas	Dallas
1537	Medical Dental Building	300 Blk. of West Jefferson Blvd.	Dallas	Dallas
188	Arlington Post Office	200 W. Main St.	Arlington	Tarrant

Attachment D. Historic Districts

Reference Number	Name	Address	City	County
100008197	Fort Worth National Bank	115 West 7th Street	Fort Worth	Tarrant
100007423	Gospel Lighthouse Church	1900 South Ewing Avenue	Dallas	Dallas
100007403	Farrington Field and Public Schools Gymnasium	1501 University Drive and 1400 Foch Street	Fort Worth	Tarrant
100006549	Wedgwood Apartments	2511 Wedglea Drive	Dallas	Dallas
100006521	Elizabeth and Jack Knight House	2811 Simondale Drive	Fort Worth	Tarrant
100006219	Braniff International Hostess College	2801 Wycliff Avenue	Dallas	Dallas
100005603	Riverside Baptist Church	3111 Race Street	Fort Worth	Tarrant
100005459	West Denton Residential Historic District	Roughly bounded by West Hickory Street, Panhandle Street, Carroll Boulevard and Ponder Avenue	Denton	Denton
100005350	Fair Building	307 West 7th Street	Fort Worth	Tarrant
100004969	Katy Freight Depot	100 South Jones Street	Fort Worth	Tarrant
100004752	Forest Theatre	1904 Martin Luther King Jr. Boulevard	Dallas	Dallas
100004431	Fairhaven Retirement Home	2400 North Bell Avenue	Denton	Denton
100004371	Bella Villa Apartments	5506 Miller Avenue	Dallas	Dallas
100004249	McGaugh Hosiery Mills / Airmaid Hosiery Mills Building	4408 2nd Avenue	Dallas	Dallas
100003923	Cabana Motel Hotel	899 North Stemmons Freeway	Dallas	Dallas
100003599	Ambassador Hotel	1312 South Ervay	Dallas	Dallas
100003598	Texas Pool	901 Springbrook Drive	Plano	Collin
100002850	Hamilton Apartments	2837 Hemphill Street	Fort Worth	Tarrant
100002699	Shannon's Funeral Home	2717 Avenue B	Fort Worth	Tarrant
100002473	Oakwood Cemetery Historic District	701 Grand Ave.	Fort Worth	Tarrant
100002434	Saigling House	902 East 16th Street	Plano	Collin
100002347	Pioneer Woman Monument	Pioneer Circle, Texas Women's University	Denton	Denton
100001764	First National Bank Tower	1401 Elm Street	Dallas	Dallas
100001373	Garland Downtown Historic District (Boundary Increase for Alston House)	212 North 7th Street	Garland	Dallas
100001372	Plano Downtown Historic District	1000 block & 1112 East 15th Street, 1020 East 15th Place, 1410-1416 J Avenue, & 1416-1430 K Avenue	Plano	Collin
100001227	Masonic Temple	1100 Henderson Street	Fort Worth	Tarrant
100000862	The Woman's Club of Fort Worth	North side 1300 block of Pennsylvania Avenue	Fort Worth	Tarrant

Reference Number	Name	Address	City	County
100000861	Garland Downtown Historic District	Roughly bounded by W. State Street on the north, Santa Fe Rail Line on the east, West Avenue A on the south and Glenbroo	Garland	Dallas
100000674	Jennings-Vickery Historic District	W. Vickery Boulevard, St. Louis Avenue, West Daggett Avenue and Hemphill Street, plus Jennings Avenue Underpass	Fort Worth	Tarrant
100000672	Travis College Hill Historic District	300-400 blocks of South 11th Street	Garland	Dallas
100000671	Grand Lodge of the Colored Knights of Pythias, Texas	2551 Elm Street	Dallas	Dallas
100000504	Lily B. Clayton Elementary School	2000 Park Place Avenue	Fort Worth	Tarrant
99001139	Lawrence, Stephen Decatur, Farmstead	701 E. Kearney St.	Mesquite	Dallas
99000882	Our Mother of Mercy Catholic Church and Parsonage	1100 and 1104 Evans Ave.	Fort Worth	Tarrant
99000565	Fairmount--Southside Historic District (Boundary Increase)	Roughly bounded by Magnolia, Hemphill, Allen, Travis and Morphy St.	Fort Worth	Tarrant
99000565	Fairmount--Southside Historic District (Boundary Increase)	Roughly bounded by Magnolia, Hemphill, Allen, Travis and Morphy St.	Fort Worth	Tarrant
98000736	Original Town Residential Historic District	Roughly bounded by Texas, Austin, Hudgins and Jenkins Sts.	Grapevine	Tarrant
98000429	Guinn, James E., School	1200 South Freeway	Fort Worth	Tarrant
97001393	Highland Park Shopping Village	Jct. of Preston Rd. and Mockingbird Ln.	Highpark	Dallas
97001109	Cotton Belt Railroad Industrial Historic District	Along RR tracks, roughly bounded by Hudgins, Dooley, and Dallas Sts.	Grapevine	Tarrant
97000851	Bedford School	2400 School Ln	Bedford	Tarrant
97000478	Santa Fe Terminal Buildings No.1 and No. 2	1114 Commerce St. and 1118 Jackson St.	Dallas	Dallas
97000444	Grapevine Commercial Historic District (Boundary Increase)	300 and 400 blocks of S. Main St.	Grapevine	Tarrant
96000035	Dallas High School Historic District	2218 Bryan St.	Dallas	Dallas
95001087	Kessler Park Historic District (Boundary Increase)	Bounded by Turner, Colorado, Sylvan and Salmon	Dallas	Dallas
95000334	Colonial Hill Historic District	Bounded by Pennsylvania Ave., I-45, US 75 and Hatcher	Dallas	Dallas
95000333	Romine Avenue Historic District	2300--2400 blocks of Romine Ave., N side	Dallas	Dallas

Reference Number	Name	Address	City	County
95000332	Queen City Heights Historic District	Roughly bounded by Eugene, Cooper, Latimer, Kynard and Dildock	Dallas	Dallas
95000331	Wheatley Place Historic District	Bounded by Warren, Atlanta, McDermott, Meadow, Oakland and Dathe	Dallas	Dallas
95000330	Alcalde Street--Crockett School Historic District	200--500 Alcalde, 421--421A N. Carroll and 4315 Victor	Dallas	Dallas
95000328	Peak's Suburban Addition Historic District	Roughly bounded by Sycamore, Peak, Worth and Fitzhugh	Dallas	Dallas
95000327	Bryan--Peak Commercial Historic District	4214--4311 Bryan Ave. and 1325--1408 N. Peak	Dallas	Dallas
95000314	Fannin, James W., Elementary School	4800 Ross Ave.	Dallas	Dallas
94001627	North Fort Worth High School	600 Park St.	Fort Worth	Tarrant
94001473	Magnolia Petroleum Company City Sales and Warehouse	1607 Lyte St.	Dallas	Dallas
94000611	Miller and Stemmons Historic District	Roughly bounded by W. Davis St., Woodlawn Ave., Neches and Elsbeth	Dallas	Dallas
94000610	Rosemont Crest Historic District	Roughly bounded by 10th St., Oak Cliff Blvd., W. Davis St., N. Brighton Ave., W. 8th St. and Rosemont Ave.	Dallas	Dallas
94000609	Lake Cliff Historic District	Roughly bounded by E. 6th St., Beckley Ave., Zangs Blvd. and Marsalis Ave.	Dallas	Dallas
94000608	North Bishop Avenue Commercial Historic District	Roughly bounded by 9th St., Davis St., Adams and Madison	Dallas	Dallas
94000607	Kessler Park Historic District	Roughly bounded by Kidd Springs, Stewart, Oak Cliff, Plymouth, I-30, Turner, Colorado and Sylvan	Dallas	Dallas
94000606	King's Highway Historic District	900--1500 Blocks of King's Highway between W. Davis St. and Montclair Ave.	Dallas	Dallas
94000605	Lancaster Avenue Commercial Historic District	Roughly bounded by E. Jefferson Blvd., S. Marsalis, E. 10th St., E. 9th St. and N. Lancaster Ave.	Dallas	Dallas
94000604	Tenth Street Historic District	Roughly bounded by E. Clarendon Dr., S. Fleming Ave., I-35E, E. 8th St. and the E end of Church, E. 9th and Plum Sts.	Dallas	Dallas
93001607	Dealey Plaza Historic District	Roughly bounded by Pacific Ave., Market St., Jackson St. and right of way of Dallas Right of Way Management Company	Dallas	Dallas

Reference Number	Name	Address	City	County
93001607	Dealey Plaza Historic District	Roughly bounded by Pacific Ave., Market St., Jackson St. and right of way of Dallas Right of Way Management Company	Dallas	Dallas
92000097	Grapevine Commercial Historic District	404--432 S. Main St.	Grapevine	Tarrant
91002022	Masonic Widows and Orphans Home Historic District	Roughly bounded by E. Berry St., Mitchell Blvd., Vaughn St., Wichita St. and Glen Garden Dr.	Fort Worth	Tarrant
91001901	Cedar Springs Place	2531 Lucas Dr.	Dallas	Dallas
90000490	Fairmount--Southside Historic District	Roughly bounded by Magnolia, Hemphill, Eighth, and Jessamine	Fort Worth	Tarrant
90000490	Fairmount--Southside Historic District	Roughly bounded by Magnolia, Hemphill, Eighth, and Jessamine	Fort Worth	Tarrant
90000337	Grand Avenue Historic District	Roughly Grand Ave. from Northside to Park	Fort Worth	Tarrant
87001744	McKinney Residential Historic District	Roughly bounded by W. Lamar, N. Benge, W. Louisiana, & N. Oak	McKinney	Collin
87001743	McKinney Hospital, Old	700--800 S. College	McKinney	Collin
87001740	McKinney Cotton Mill Historic District	Roughly bounded by Elm, RR tracks, Burrus, Fowler, & Amscott	McKinney	Collin
87001739	McKinney Cotton Compress Plant	300 blk. Throckmorton	McKinney	Collin
87001738	Kirkpatrick, E. W., House and Barn	903 Parker	McKinney	Collin
87001716	Hill--Webb Grain Elevator	400 E. Louisiana	McKinney	Collin
87001685	Collin County Mill and Elevator Company	407 E. Louisiana	McKinney	Collin
86003488	Texas Centennial Exposition Buildings (1936--1937)	Bounded by Texas and Pacific RR, Pennsylvania, Second, and Parry Aves.	Dallas	Dallas
85000074	St. Patrick Cathedral Complex	1206 Throckmorton	Fort Worth	Tarrant
84001641	Houston Street Viaduct	Houston St. roughly between Arlington St. and Lancaster Ave.	Dallas	Dallas
83003758	Winnetka Heights Historic District	Roughly bounded by Davis and 12th Sts., and Rosemont and Willomet Aves.	Dallas	Dallas
83003134	Continental Gin Company	3301-3333 Elm St., 212 and 232 Trunk Ave.	Dallas	Dallas
83003132	McKinney Commercial Historic District	Roughly bounded by Herndon, Wood, Cloyd, Davis, Louisiana, MacDonald, and Virginia Sts.	McKinney	Collin
79003010	Elizabeth Boulevard Historic District	1001--1616 Elizabeth Blvd.	Fort Worth	Tarrant
79002930	South Boulevard-Park Row Historic District	South Blvd. and Park Row from Central	Dallas	Dallas

Reference Number	Name	Address	City	County
78002983	Texas and Pacific Terminal Complex	Lancaster and Throckmorton Sts.	Fort Worth	Tarrant
78002919	Wilson Block	2902, 2906, 2910 and 2922 Swiss Ave.	Dallas	Dallas
78002918	Westend Historic District	Bounded by Lamar, Griffin, Wood, Market, and Commerce Sts.	Dallas	Dallas
78002918	Westend Historic District	Bounded by Lamar, Griffin, Wood, Market, and Commerce Sts.	Dallas	Dallas
78002916	Munger Place Historic District	Roughly bounded by Henderson, Junius, Prairie, and Reiger Sts.	Dallas	Dallas
78002914	DeGolyer Estate	8525 Garland Rd.	Dallas	Dallas
78002906	Wilson, Ammie, House	1900 W. 15th St.	Plano	Collin
76002067	Fort Worth Stockyards Historic District	Roughly bounded by 23rd, Houston, and 28th Sts., and railroad	Fort Worth	Tarrant
75001966	Dallas Union Terminal	400 S. Houston St.	Dallas	Dallas
74002068	Swiss Avenue Historic District	Swiss Ave. between Fitzhugh and LaVista	Dallas	Dallas
16000915	Hughes Brother's Manufacturing Company Building	1401 South Ervay Street	Dallas	Dallas
16000353	Fortune Arms Apartments	601 West 1st Street	Fort Worth	Tarrant
16000122	Will Rogers Memorial Center	3401 West Lancaster Avenue	Fort Worth	Tarrant
15000877	Everard-Sharrock Jr. Farmstead	6900 Grady Niblo Road	Dallas	Dallas
15000708	Lamar-McKinney Bridge	Spanning the Trinity River at Continental Avenue	Dallas	Dallas
15000337	Parker-Browne Company Building	1212 East Lancaster Avenue	Fort Worth	Tarrant
15000245	One Main Place	1201 Main Street	Dallas	Dallas
14001227	Mayflower Building	411 North Akard Street	Dallas	Dallas
14001035	Sanger Brothers Building (1925)	515 Houston Street	Fort Worth	Tarrant
14000966	Hotel Texas (Boundary Increase)	815 Main Street/815 Commerce Street	Fort Worth	Tarrant
14000963	Paine House	2515 West 5th Street	Irving	Dallas
14000962	Johnson Rooming House	1026 North Beckley Avenue	Dallas	Dallas
14000473	Joffre-Gilbert House	309 S. O'Connor Road	Irving	Dallas
14000343	Fort Worth Recreation Building	215 West Vickery Boulevard	Fort Worth	Tarrant
14000105	Inspiration Point	Roughly 250 yards south of 2400 block of Roberts Cut off Road in Marion Sansom Park	Fort Worth	Tarrant
14000103	511 Akard Building	511 North Akard	Dallas	Dallas
13000126	Fort Worth Warehouse & Transfer Company Building	201 South Calhoun Street	Fort Worth	Tarrant

Reference Number	Name	Address	City	County
11000982	Ridglea Theatre and Annex Building	6025-6033 Camp Bowie Boulevard and 3309 Winthrop Avenue	Fort Worth	Tarrant
11000514	Butler Place Historic District	Roughly bounded by Luella St., I.M. Terrell Way Cir. M., 19th St. & I 35W	Fort Worth	Tarrant
11000344	Santa Fe Terminal Building No. 4	1033 Young Street	Dallas	Dallas
10000866	Thomas J. & Elizabeth Nash Farm	626 Ball Street	Grapevine	Tarrant
10000500	Vandergriff Building	100 East Division Street	Arlington	Tarrant
10000253	Heritage Plaza	West Bluff Street at Main Street	Fort Worth	Tarrant
10000247	Fairview H&TC Railroad Historic District	About 1/4 mile west of State Highway 5 on Sloan Creek & the old Houston & Texas Central Railroad tracks	Fairview	Collin
10000144	Gulf Oil Distribution Facility	501 Second Avenue	Dallas	Dallas
10000051	Oakhurst Historic District	Roughly bounded by Yucca Avenue, Sylvania Avenue, Watauga Avenue and Oakhurst Scenic Drive	Fort Worth	Tarrant
9000984	South Main Street Historic District	104, 108, 126 7 200 blocks of South Main Street	Fort Worth	Tarrant
9000980	Allen Water Station	North of Exchange Parkway on Cottonwood Creek	Allen	Collin
9000839	Celina Public School	205 South Colorado Street	Celina	Collin
9000306	Fidelity Union Life Insurance Building	1511 Bryan / 1507 Pacific Avenue	Dallas	Dallas
8001400	Fort Worth Botanic Garden	3220 Botanic Garden Boulevard	Fort Worth	Tarrant
8001299	Dallas Downtown Historic District (Boundary Increase)	Roughly bounded by Jackson, North Harwood, Commerce, north-south line between South Pearl Expressway and South Harwood,	Dallas	Dallas
8000658	Alfred and Juanita Bromberg House	3201 Wendover Road	Dallas	Dallas
8000476	Central Roanoke Historic District	100 and 200 blocks of North Oak Street	Roanoke	Denton
7001383	Greenway Parks Historic District	Bounded by W. Mockingbird Lane, West University Boulevard, Inwood, North Dallas Tollway	Dallas	Dallas
6001065	Eighth Avenue Historic District	Bounded by 8th Ave., Pennsylvania Ave., 9th Ave., and Pruitt St.	Fort Worth	Tarrant
5000240	Leuda-May Historic District	301-311 W. Leuda and 805-807 May Sts.	Fort Worth	Tarrant

Reference Number	Name	Address	City	County
4000894	Dallas Downtown Historic District	Roughly bounded by Federal, N. St. Paul, Pacific, Harwood, S. Pearl, Commerce, S Ervay, Akard, Commerce and Field	Dallas	Dallas
4000886	Our Lady of Victory Academy	801 W. Shaw St.	Fort Worth	Tarrant
3000435	Man, Ralph Sandiford and Julia Boisseau, House	604 W. Broad St.	Mansfield	Tarrant
3000334	South Center Street Historic District	500-600 blks of S. Center St.	Arlington	Tarrant
2001569	Grapevine Commercial Historic District (Boundary Increase II)	500-530 S. Main St.	Grapevine	Tarrant
2000405	Near Southeast Historic District	Roughly bounded by New York Ave., E. Terrell Ave., former I&GN Railway, Verbena St., and N side of E. Terrell Ave,	Fort Worth	Tarrant
2000009	Goodyear Tire and Rubber Company Building and B.F. Goodrich Building	2809 Parry Ave. and 4136-40 Commerce St.	Dallas	Dallas
1001472	Central Handley Historic District	Roughly bounded by E. Lancaster Ave., Forest Ave., Kerr St., and Handley Dr.	Fort Worth	Tarrant
1001002	Strain Farm--Strain, W.A., House (Boundary Increase)	400 Lancaster-Hutchins Rd.	Lancaster	Dallas
1000102	Marine Commercial Historic District	Roughly defined by N. Main St., bet. N. Side Dr. and N. 14th St.	Fort Worth	Tarrant
1582	Denton County Courthouse Square Historic District	Area bounded by Pecan, Austin, Walnut, and Cedar Sts.	Denton	Denton
247	Old Town Historic District	Roughly bounded by Sanford, Elm, North, Prairie and Oak Sts.	Arlington	Tarrant

From: noreply@thc.state.tx.us
To: [Neumann, Shelia S \(FAA\)](#); reviews@thc.state.tx.us
Subject: FAA-Wing Part 135 UAS Package Delivery DFW
Date: Friday, September 6, 2024 4:17:27 PM

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.



Re: Project Review under Section 106 of the National Historic Preservation Act
THC Tracking #202413269

Date: 09/06/2024

FAA-Wing Part 135 UAS Package Delivery DFW
Dallas-Fort Worth Metro Area
Dallas, TX 75201, multi

Description: This project is expanded UAS package delivery within DFW (30-mi) radius and does not have potential for any ground disturbance or construction proposed as part of this project-attached detailed letter

Dear Shelia Neumann:

Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff, led by Justin Kockritz and Rebecca Shelton, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: justin.kockritz@thc.texas.gov, rebecca.shelton@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit <http://thc.texas.gov/etrac-system>.

Sincerely,

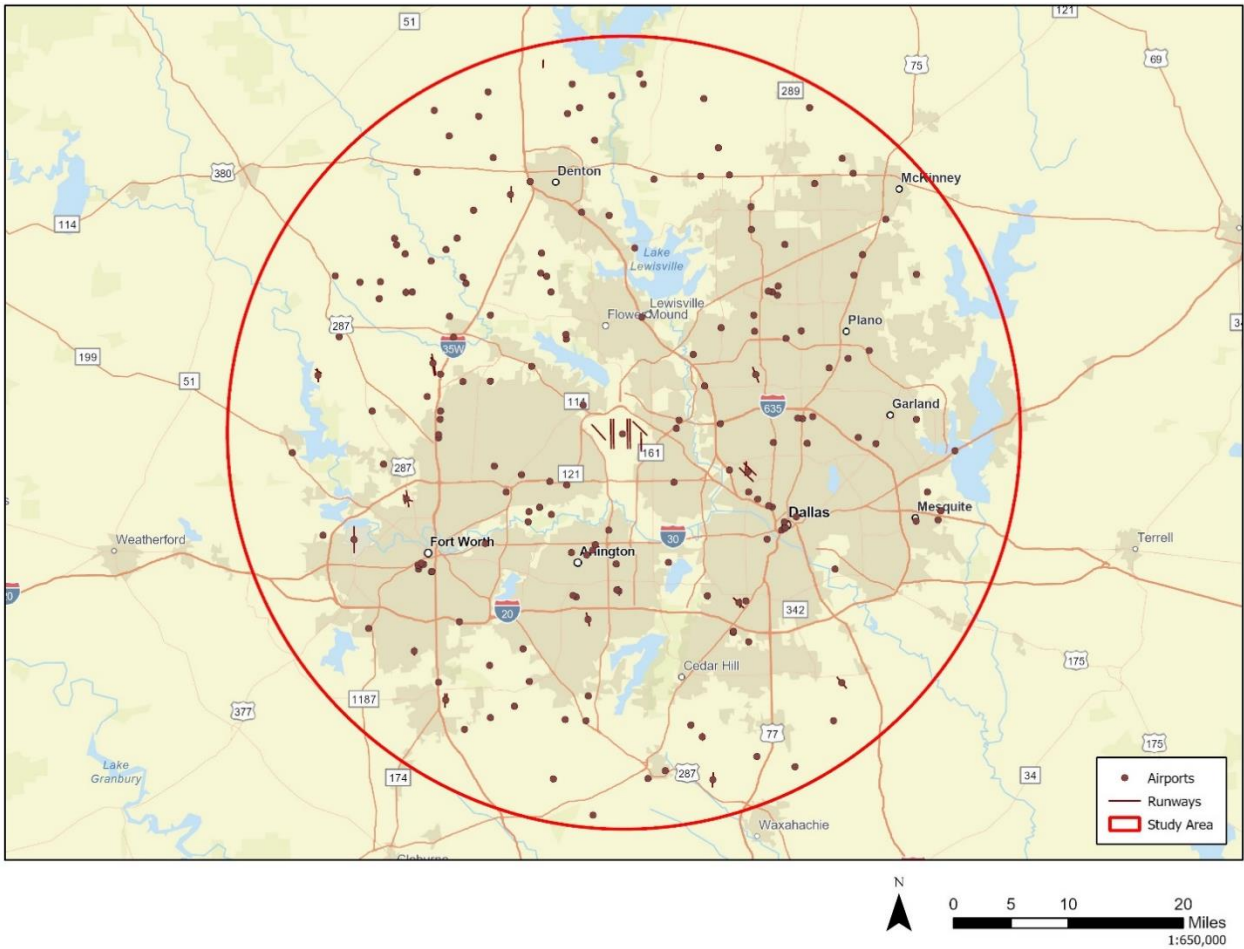


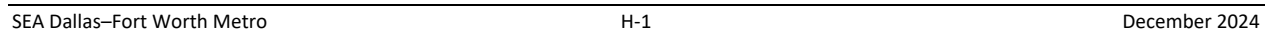
for Bradford Patterson
Chief Deputy State Historic Preservation Officer

Please do not respond to this email.

Appendix H

Dallas–Fort Worth Area Airports





Appendix J

Cumulative Effects

DFW Part 135 Operations - Cumulative Impacts

The purpose of this memo is to provide a summary of information available to the FAA as related to proposed Part 135 drone package delivery operations¹ for various operators within the DFW metro area. This information should be used by the FAA and individual operators/applicants to inform their cumulative impacts analysis conducted as part of the development of their NEPA documents. This information serves as the basis for the past, present, and reasonably foreseeable future actions. This memo also includes a figure that displays the study area considered for cumulative impacts in each NEPA document for the DFW metro area and the timeframe considered for reasonably foreseeable future actions.

Definition of Effects/Impacts

The Council on Environmental Quality defines effects or impacts as “changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and include the following: (1) Direct effects, which are caused by the action and occur at the same time and place. (2) Indirect effects, which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (3) Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. (4) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial.”²

FAA Order 1050.1F states that an EA or EIS must address cumulative impacts by evaluating the “incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, whether Federal or non-Federal. If the proposed action would cause significant incremental additions to cumulative impacts, an EIS is required.”³ The FAA defines

¹ It is anticipated that Part 107 operations currently underway will transition to Part 135 operations in the future. Therefore, the Part 135 operations described in this document include existing Part 107 operations

² See 40 CFR § 1508.1

³ See Section 4-2.d(3) of FAA Order 1050.1F

past, present, and reasonably foreseeable future actions in Section 15.1 of the FAA 1050.1F Desk Reference.^{4, 5}

“Past actions are actions that occurred in the past and may warrant consideration in determining the environmental impacts of an action. The FAA has discretion to determine whether, and to what extent, information about the specific nature, design, or present impacts of a past action are useful for the analysis of the impacts of the proposed action and alternative(s). Present impacts of past actions that are relevant and useful are those that may have a significant cause-and-effect relationship with the direct and indirect impacts of the proposed action and alternative(s).

Present actions are any other actions that are occurring in the same general time frame as the proposal...Such actions may have traffic, noise, or other environmental concerns that should be considered in conjunction with those that would be generated by the proposed action and alternative(s) under consideration.

Reasonably foreseeable future actions are actions that may affect projected impacts of a proposal and are not remote or speculative...An action may be reasonably foreseeable even in the absence of a specific proposal.”

The CEQ defines “reasonably foreseeable” actions as “sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision.”⁶

Past, Present, and Reasonably Foreseeable Future Actions

Past actions include Part 107 small UAS operations which limit activities to occur within visual line of sight (VLOS). It should be noted that Part 107 operations would include those operations conducted under a waiver to the Part 107 regulations, including beyond visual line of sight (BVLOS) operations.

Present actions include approved Part 135 operations, which include 27 approved hubs operating at up to 400 daily operations per hub.

Reasonably foreseeable actions include proposed actions for multiple operators that have applied for approvals to conduct drone package deliveries in the DFW metro area and expansion of one operator. The timeframe to be considered in evaluating cumulative effects should extend through 2027 since the operators have provided projections for the next 30 to 36 months. As proposed by other operators, reasonably foreseeable actions include up to 185 additional hubs operating between 400 and 500 operations per day per hub.

⁴ See Section 15.1 of FAA 1050.1F Desk Reference (v2), February 2020

⁵ See also CEQ Guidance on *Considering Cumulative Effects Under the National Environmental Policy Act*, January 1997

⁶ See 40 CFR § 1508.1(ii)

Together, the past, present, and reasonably foreseeable actions total a maximum of 212 hubs in the study area, which would generate up to an annual average daily (AAD) total of 88,840 package deliveries within the study area. The geographic footprint of the study area to be evaluated for cumulative impacts is shown in **Figure 1**. Out of the 212 proposed hub locations, 50 specific sites are either currently in operation or have been identified as prospective hub locations by the various Part 135 applicants.

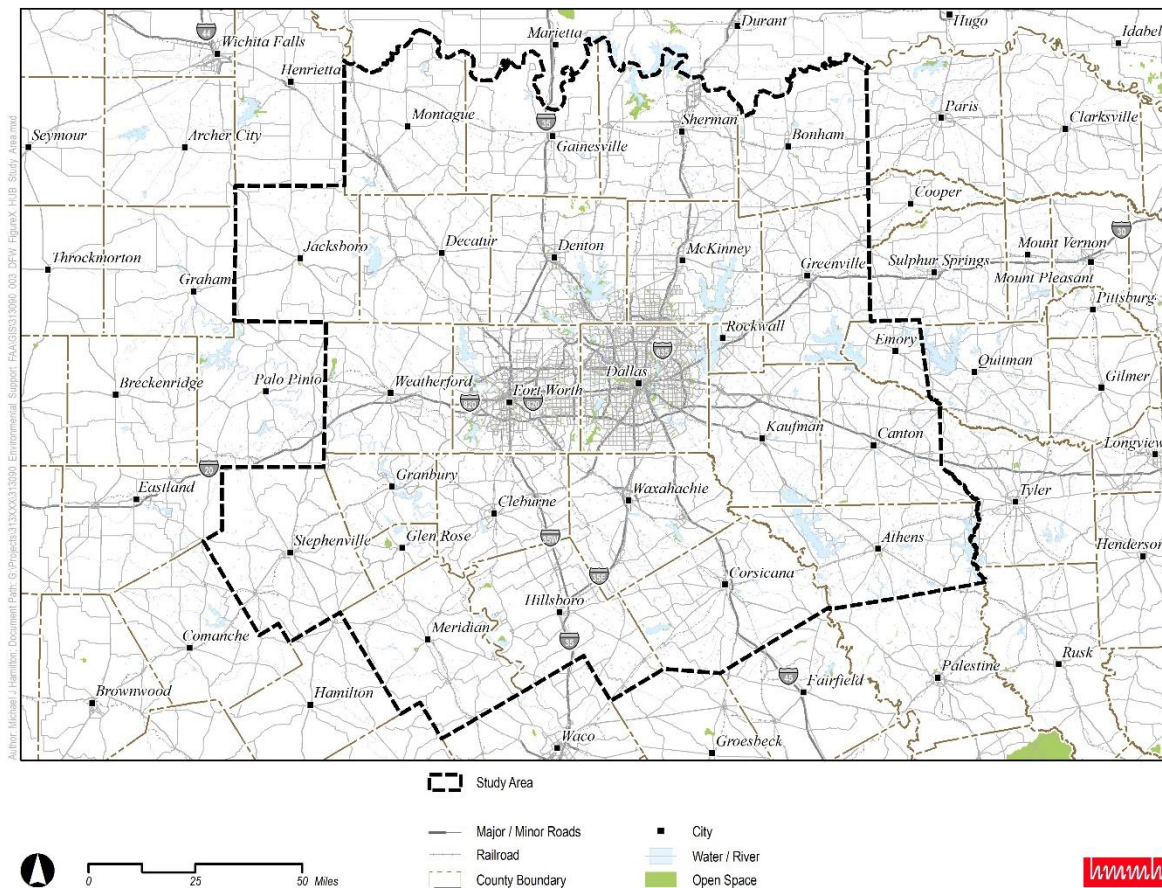


Figure 1. Geographic Study Area for Cumulative Effects in DFW Metro Area

FAA analysis of prospective hub siting areas concluded that siting 100% of the existing and proposed hub locations is not feasible without overlap in the land area accessible from the hub locations (i.e., the delivery ranges of the proposed UA). It should be noted that overlap does not necessarily mean that there will be adverse impacts to environmental resource categories. The degree to which all of the different operators would operate within areas of shared airspace is entirely dependent on the operators, their specific business use cases, and their ability to deconflict with one another in the overlapping delivery areas with shared customers.

Information shared by various operators indicates that some would try to minimize overlap in their own hubs' delivery ranges while others plan to allow for inter-hub flights and therefore may plan for overlap within their own operations. In cases where a single operator's hubs would have overlapping delivery ranges, most operators have stated they do not expect such circumstances to have additive effects that would result in increased package deliveries to those areas. The primary reason given for this is that the services provided by different hubs would generally be redundant, or at least similar, and, as such, customer demand for those services would be unaffected by the number of hubs within delivery range of the same area. In cases where different operators' hubs would have overlapping delivery ranges, some additive effect could occur within those areas depending on customer demand for the various types of package delivery services being provided by each operator. From a business perspective, it is anticipated that operators would make every effort to minimize overlapping operations with other operators to the extent practicable.

Based on input provided by the various operators, the FAA does not anticipate AAD deliveries within any contiguous area of airspace accessible from multiple hubs to exceed the sum of each individual operator's proposed AAD deliveries from a single hub. The sum of the proposed single hub AAD deliveries for all current DFW area Part 135 operators and applicants is 1,728.

Cumulative Noise Exposure

For instances where the proposed drone package delivery operations would occur in areas subject to other aviation noise sources, it is necessary to evaluate the cumulative noise exposure that would result from the other aviation noise sources present. Examples of such scenarios are drone package delivery operations occurring in the vicinity of an airport and where one drone operator's flight activity areas may overlap with those of other drone operators.

FAA Order 1050.1F *Environmental Impacts: Policies and Procedures* and the associated 1050.1F Desk Reference defines the criteria for changes in noise exposure resulting from a proposed action and cumulative effects that are considered reportable and/or significant. Order 1050.1F Section 4-3.3 *Significance Thresholds* states that an increase in noise would be considered significant if the following conditions are met:

The 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 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.

Additionally, Order 1050.1F Appendix B Section B-1.4 *Environmental Consequences* requires reporting for air traffic airspace and procedure actions where the study area is larger than the

immediate vicinity of an airport. In such cases, noise exposure assessments should identify where noise will change by the following specified amounts:

1. For DNL 65 dB and higher: +1.5 dB
2. For DNL 60 dB to <65 dB: +3 dB
3. For DNL 45 dB to <60 dB: +5 dB

The FAA refers to noise changes meeting criteria 1 as “significant” and those meeting criteria 2 and 3 as “reportable.” It should also be noted that these criteria apply only to cases where the noise level changes occur over land uses that are considered noise sensitive. **Figure 2** presents the relationship between the dB difference in two noise sources and the increase resulting from the summation of those noise sources. The FAA’s change criteria of plus 1.5, 3, and 5 dB are also plotted on the curve for reference.

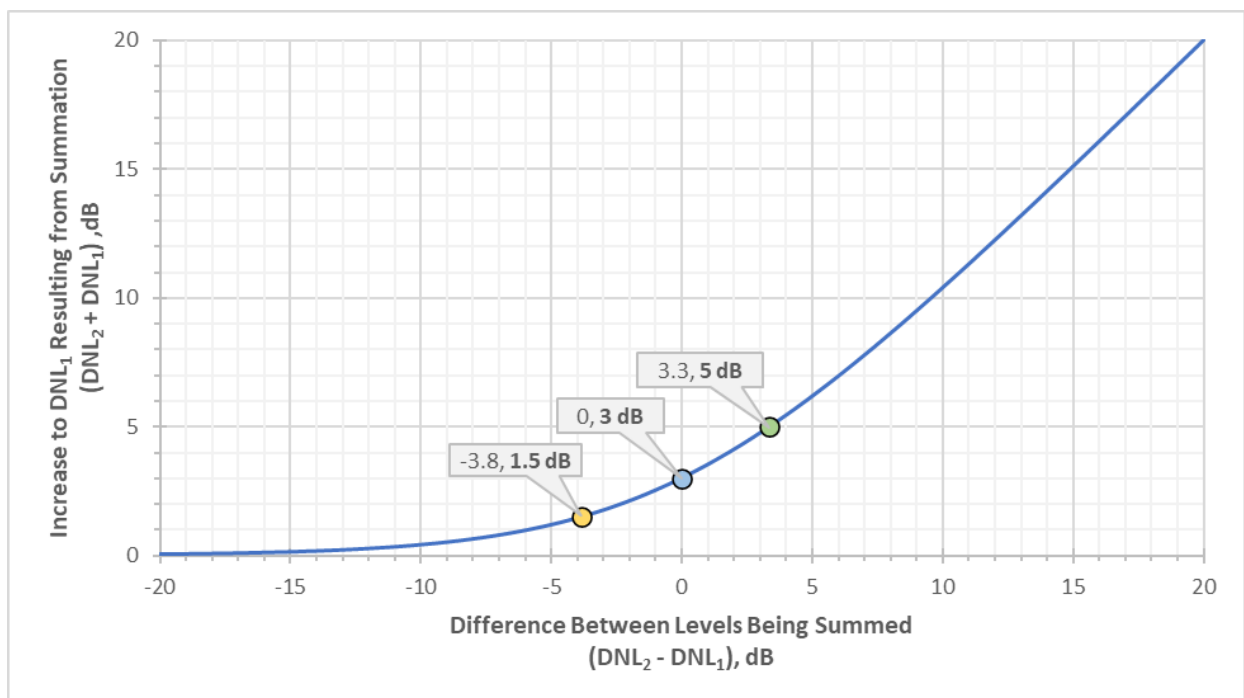


Figure 2. dB Increase Resulting from DNL Summation

Potential increases to DNL resulting from cumulative aviation noise effects can be evaluated with **Figure 2** by considering the proposed action noise exposure as DNL_2 and the sum of all other aviation noise sources at the same location as DNL_1 . If the difference between DNL_2 and DNL_1 is:

- Less than -3.8 dB, the increase in DNL would be less than 1.5 dB
- From -3.8 dB up to but not including 0 dB, the increase in DNL would range from 1.5 dB up to but not including 3 dB
- From 0 dB up to but not including 3.3 dB, the increase in DNL would range from 3 dB up to but not including 5 dB
- 3.3 dB or greater, the increase in DNL would be 5 dB or greater

Beyond differences of +/- 15 dB the curve becomes asymptotic to a slope of 1 and 0, illustrating that the addition of noise levels with differences greater than that results in effectively no increase from the higher of the two noise source levels being summed.

DFW Metro Area Cumulative Noise Evaluation

The FAA has evaluated whether significant cumulative noise impacts would occur from the proposed package delivery operations. This evaluation is based on the minimum cumulative drone package delivery noise level that could result in a +1.5 dB change when combined with existing airport noise to generate new areas of 65 dB DNL (i.e., an increase from 63.5 dB DNL to 65 dB DNL). As indicated in Figure 3, when a noise level that is equal to or greater than -3.8 dB from the existing noise level is combined with the existing noise, the resultant increase is 1.5 dB or more. This gives a drone noise threshold of 59.7 dB DNL for significant cumulative noise impact when considering drone package delivery operations in proximity to airports where the airport associated DNL is 63.5 dB. If total drone noise is less than the 59.7 dB DNL, then cumulative noise increases would be less than +1.5 dB DNL and no significant noise impacts would occur.

Because the exact location of the 63.5 dB DNL contour from an airport will generally not be identifiable without conducting an airport noise study, the FAA has undertaken a review of available airport noise data to identify generalized characteristics regarding airport DNL extents. Through this review, the FAA concluded that airport noise levels outside of the surface areas of airport-controlled airspace are less than 60 dB DNL. Based on this, the threshold of 59.7 dB DNL would apply only when drone package delivery activity occurs within the surface areas of airport-controlled airspace, as the airport noise level of 63.5 dB DNL would only be encountered when within that airspace. Outside of the surface areas of airport-controlled airspace, airport noise would be less than 60 dB DNL, and drone noise levels could be somewhat higher before any potential for significant impacts could exist.

En route flight, in which the drone is transiting between the hub and delivery location, is the phase of package delivery operations where there is the greatest potential for cumulative noise exposure from multiple drone operators. It is expected that for air traffic deconfliction, hubs would generally be sited at least 1,000 ft from another, at which point hub noise would dissipate to a level where only the associated en route noise is of concern. If hubs are sited within less than 1,000 feet from one another, it's unlikely that any noise sensitive land use would exist in between them since hubs would typically be sited within commercially zoned areas. Delivery noise is expected to be limited by individual customer demand, as any particular residential customer location is expected to receive, at most, only a very small portion of any hub's daily capacity. Exceptions to this may occur in cases where a drone operator is delivering packages exclusively to a small number of locations on a recurring basis, such as with lab samples and medical supplies on a medical campus, but those cases would generally not occur over land use types where levels below 65 dB DNL are required to be considered compatible with aviation noise.

Based on the available drone noise data for current DFW area Part 135 applicants, the FAA projects that en route DNL for 1,728 AAD deliveries would be in the range of 56-58 dB DNL. Final drone noise data for some applicants is being collected and evaluated, so only an approximate projection for cumulative en route DNL can be made at this time. Based on the projected en route noise range being less than 59.7 dB DNL, the FAA does not anticipate that significant cumulative noise impacts would result from the proposed Part 135 drone package delivery operations occurring within the study area. Furthermore, the projected en route DNL is based on all 1,728 deliveries passing over the same point on the ground. As this is an unlikely real-world occurrence, the projected cumulative en route DNL should be considered a conservative estimate of potential noise exposure.

To avoid the potential for cumulative impacts to result from sitting hubs within the vicinity of airports, operators would adhere to the following guidelines:

- When siting hubs within the surface area of airport-controlled airspace, operators would maintain a standoff distance from any noise sensitive land use that is at least equivalent to the extent of the hub's 55 dB DNL.
- When siting hubs outside the surface area of airport-controlled airspace, operators would maintain a standoff distance from any noise sensitive land use that is at least equivalent to the extent of the hub's 60 dB DNL.

These standoff distances would ensure any noise increases resulting from combined airport and hub noise would remain less than +1.5 dB.

Summary and Conclusions

Based upon the FAA's analysis of areas where hubs would likely be sited, locating 100% of the existing and proposed hub locations is not feasible without overlap in the land area accessible from the hub locations (i.e., the delivery ranges of the proposed UA). It should be noted that overlap does not necessarily mean that there will be adverse impacts to environmental resource categories. However, cumulative effects are expected to occur where delivery routes overlap. The resource categories anticipated to experience cumulative effects include noise, visual, and biological resources, with noise being the primary concern based on overlap in delivery routes. The level of cumulative effects would vary depending on the amount of overlap.

The degree to which all of the different operators would operate within areas of shared airspace is dependent on the operators, their specific business use cases, and their ability to deconflict with one another in overlapping areas. Each operator is responsible for coordinating with other operators in the same geographic area to avoid significant cumulative effects.

FAA's analysis has determined that the cumulative impacts are not expected to exceed thresholds for significance in any environmental resource categories.