Federal Aviation Administration

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

April 2025

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Washington, D.C.

Notice of Availability of the Final 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 Final Supplemental Environmental Assessment (SEA), prepared pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] Sections 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 requires a NEPA review. This Final SEA has been prepared pursuant to NEPA, FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Section 4(f) of the Department of Transportation Act (49 U.S.C. Section 303), and Section 106 of the National Historic Preservation Act (16 U.S.C. Section 470).

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

Responsible FAA Official:

DEREK W HUFTY

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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
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
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
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
SEA	Supplemental Environmental Assessment
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
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

Chapter 1
Purpose and Need

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

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

[2] 49 United States Code (U.S.C.) Section 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. Section 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.

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 (FitBIT) 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 (GeoBIT) 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 requires NEPA review. Wing prepared this Supplemental Environmental Assessment (SEA) under the supervision of the FAA 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)[9].

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. Section 4321 et seq.

[9] On January 20, 2025, President Trump issued Executive Order (EO) No. 14154, *Unleashing American Energy*, which revoked EO 11991, *Relating to Protection and Enhancement of Environmental Quality* (May 24, 1977), and instructed the Chair of the CEQ to rescind its NEPA-implementing regulations. On February 25, 2025, the CEQ issued an interim final rule to remove the existing implementing regulations for NEPA (90 Fed. Reg. 10610 (Feb. 25, 2025)). The Draft SEA was prepared in accordance with CEQ's National Environmental Policy Act Implementing Regulations Revision Phase 2, 89 Fed. Reg. 35442 (May 1, 2024) (Phase 2 final rule), now pending rescission.

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 website[10] 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. The FAA received 9 substantive comments on the Draft SEA. Public comments and FAA responses are provided in Appendix L, *Public Comments and FAA Responses*.

[10] 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

FAA Order 1050.1F, Paragraph 6-1.a(1) requires the FAA 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). 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, offsite package autoload 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,[11] 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.[12]

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. Wing's

[11] 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.

[12] Modification of Wing's operations plan requires approval in accordance with 14 CFR Part 135.

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 area[13] when the nest is located within the controlled surface area of Class B and Class D airspace[14] (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 autoload 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. Wing would avoid early FitBIT operations in locations that might cause disturbance to local noise-sensitive receivers.

[13] 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)).

[14] 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.

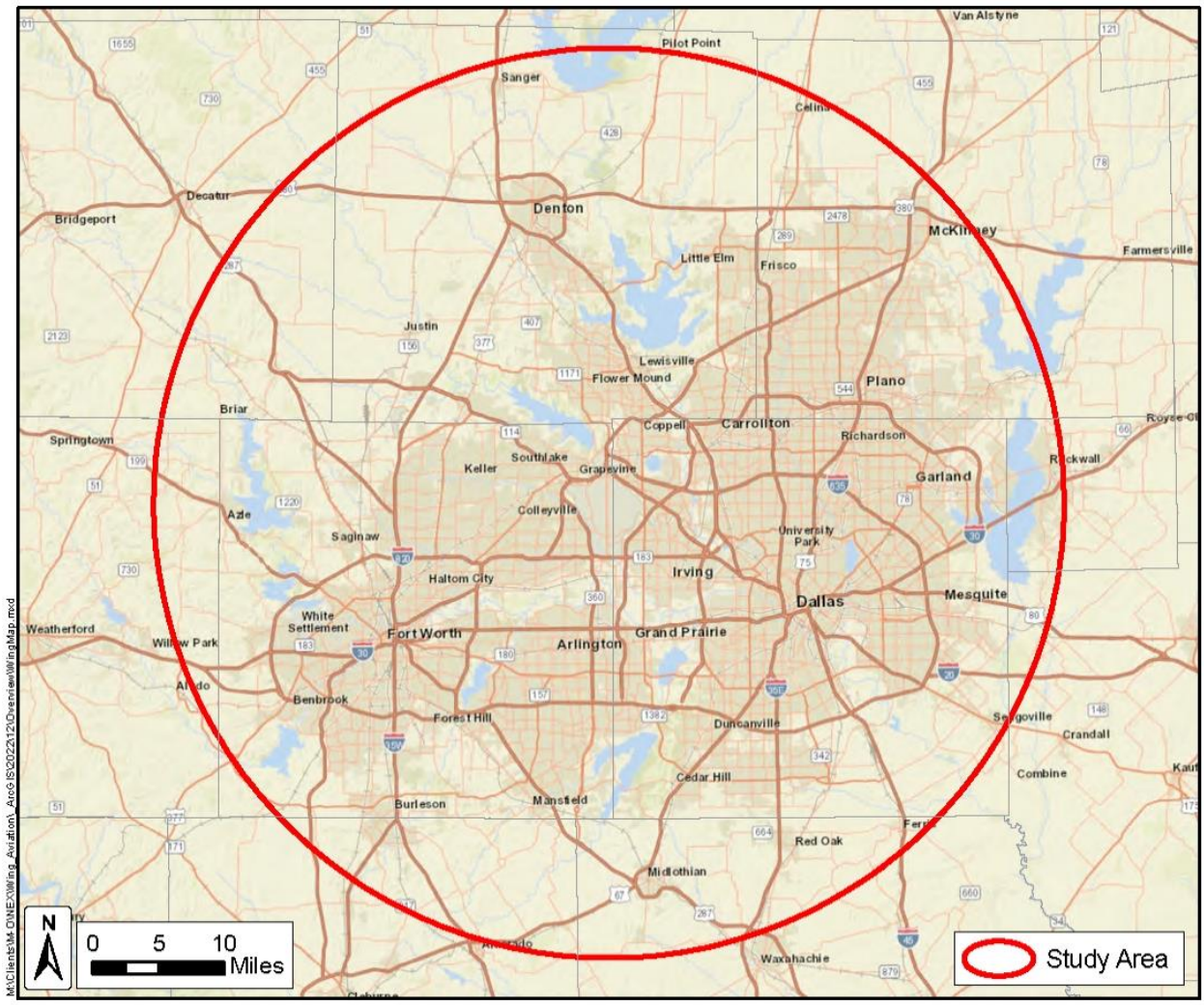


Figure 2.2-1. Wing's Proposed DFW Operating Area

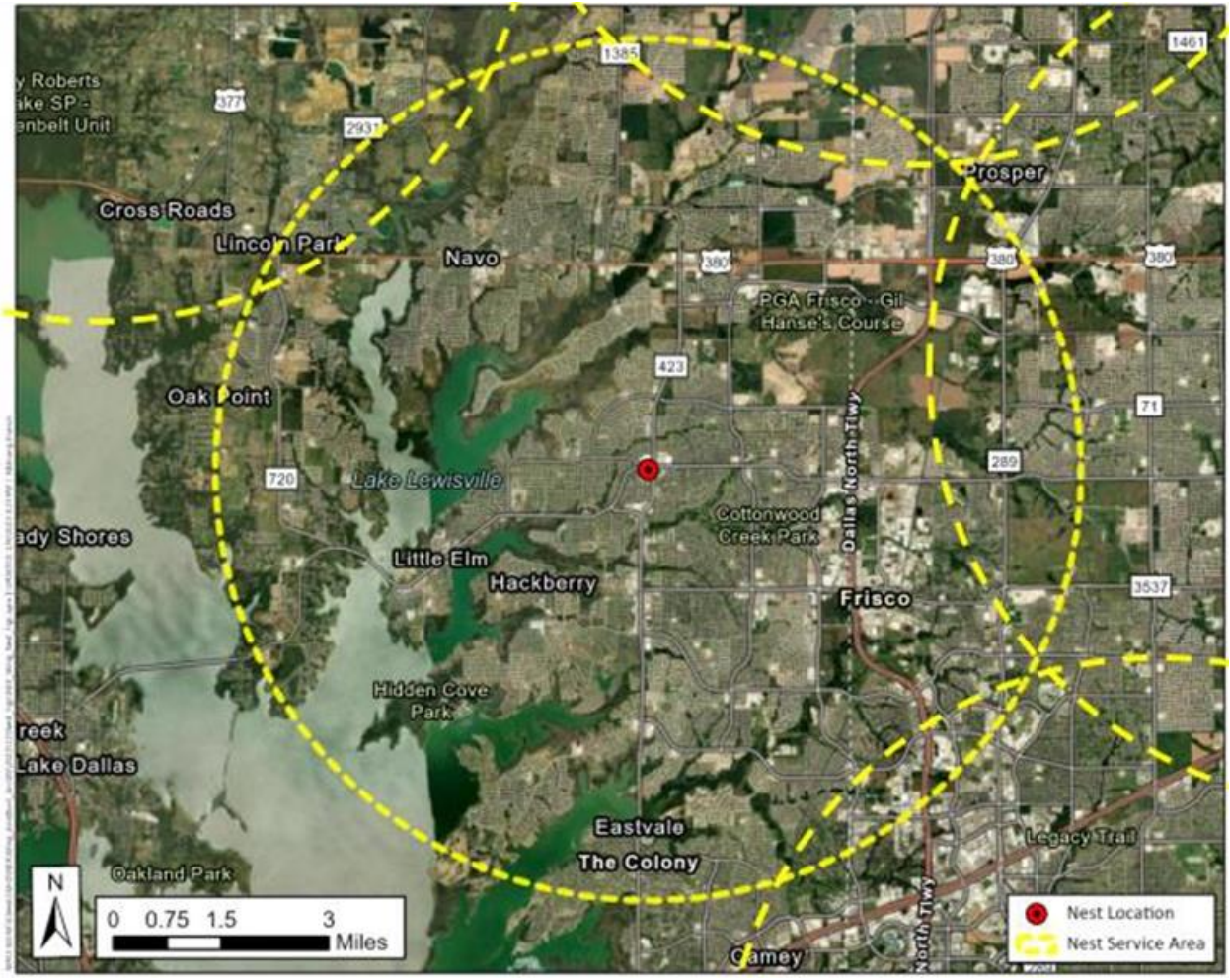


Figure 2.2-2. Example Nest Location and Service Area in Little Elm, Texas

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.[15] Wing has confirmed to the FAA that it will generally not conduct operations over these "fly less"[16] 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.[17]

- Hummingbird 7000W-B.
  - Multi-rotor design with 16 round 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 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.

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

[16] 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.

[17] 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 UA[18] 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 fitness built-in tests or FitBITs 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.

[18] 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 toward 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 Offsite Package Autoload

Offsite package autoload 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. Offsite package autoload 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 offsite package autoload 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.

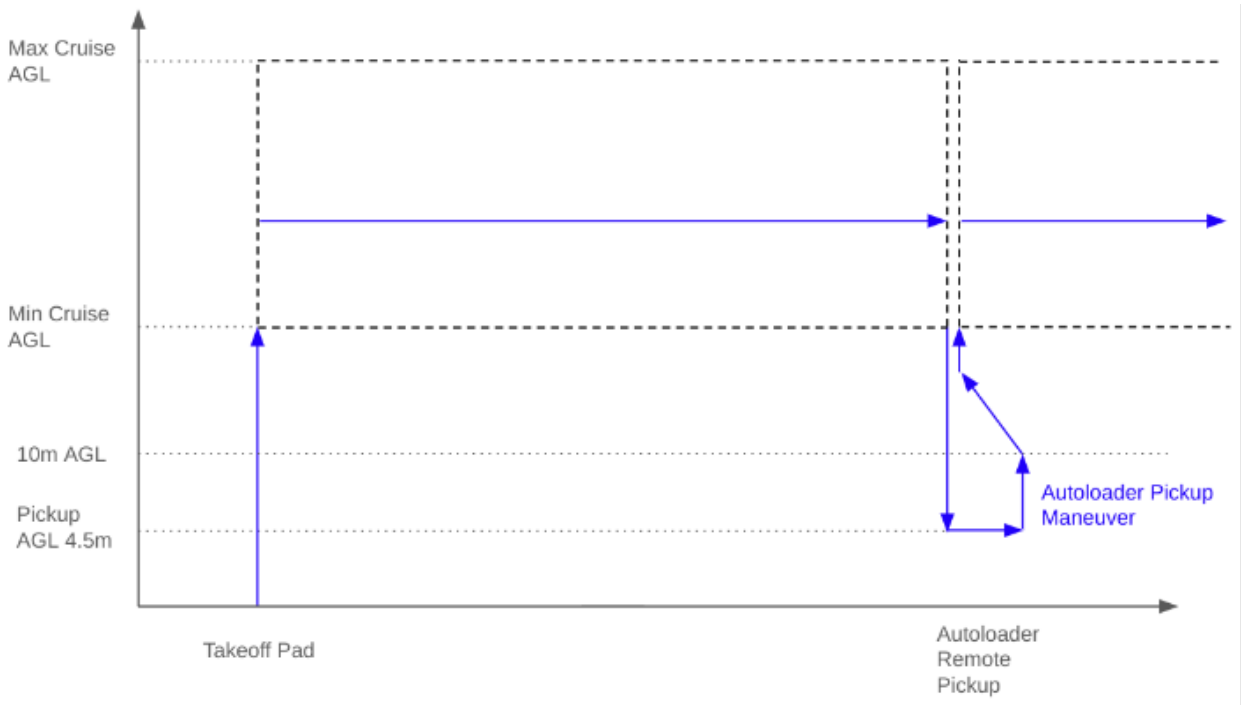


Figure 2.2-6. Wing Hummingbird Remote Pickup Flight Profile

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 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 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)

Pursuant to the issuance of Executive Order (EO) 14148, *Initial Rescission of Harmful Executive Orders and Actions*, and EO 14173, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*, and the implementation of these EOs by the Department of Transportation, the Final SEA does not analyze environmental effects related to environmental justice.

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 (FAA Order 1050.1F, Paragraph 6-2.1). 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., autoloaders) 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, autoloaders, 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 twilight[19] 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-

[19] 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 [PM_{10}] and particulate matter equal to or less than 2.5 microns [$PM_{2.5}$]), ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), 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.

The FAA Order 1050.1F Desk Reference provides guidance for climate considerations under NEPA (FAA 2023). To assess climate impacts, incremental changes in CO_2 emissions during the proposed action should be considered to accomplish an FAA NEPA review. The analysis 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 O_3 and $PM_{2.5}$ and PM_{10} 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 SO_2 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 nonattainment for O_3 (2008 standard) and serious nonattainment for O_3 (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 O_3. Table 3.3-1 includes the O_3 attainment status of the study area counties.

Table 3.3-1. Attainment Status of Study Area Counties

County	Attainment Status for 8-Hour O_3 (2008 Standard)	Attainment Status for 8-Hour O_3 (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)
O_3 = ozone.

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. The FAA has not established a significance threshold for climate. Like criteria pollutants, the existing sources of carbon dioxide (CO_2) and other emissions 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 (CO_2), methane (CH_4), and nitrous oxide (N_2O), with CO_2 accounting for the majority due to fossil fuel combustion (EPA 2023). In the study area, CO_2 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 CO_2 emissions from delivery services, which would have positive effects on climate as the proposed action would replace vehicle miles traveled by CO_2-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.[20]

Direct Emissions

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 nonattainment for O_3 (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: O_3 and Pb. These emissions are then compared to the CAA de minimis thresholds in Table 3.3-3.

O_3 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). 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 O_3-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.

[20] 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.

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; O_3 = 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) O_3 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; O_3 = 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 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 climate 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 affect climate. 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 not significantly impact climate.

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. Section 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. Sections 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 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.-c). 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 (*Scirius carlinensis*).

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 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	*Perimyotis subflavus*	Proposed Endangered	N
Birds	Golden-cheeked warbler	*Setophaga chrysoparia*	Endangered	N
	Piping plover	*Charadrius melodus*	Threatened	N
	Red knot	*Calidris canutus rufa*	Threatened	N
	Whooping crane	*Grus americana*	Endangered	N
Reptiles	Alligator snapping turtle	*Macrochelys temminckii*	Proposed Threatened	N
Clams	Texas fawnsfoot	*Truncilla macrodon*	Proposed Threatened	Y
	Texas heelsplitter	*Potamilus amphichaenus*	Proposed Endangered	N
Insects	Monarch butterfly	*Danaus plexippus*	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.-a). 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.-d).

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.-b).

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 toward 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 (*Mimus polyglottos*)	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 (*Agelaius phoeniceus*) and Common Grackle (*Cyanocitta cristata*)	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 (*Corvus brachyrhynchos*)	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 (*Cyanocitta cristata*)	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 (*Polioptila caerulea*) 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.-b).

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 autoloaders 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.[21]

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 would not touch the ground in any other place than the nest (except during emergency landings)

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

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.-a); 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.-a). 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. On December 3, 2024, the USFWS concurred that the project *may affect, but is not likely to adversely affect* golden-cheeked warbler and whooping crane (Appendix K, *USFWS Section 7 ESA Consultation*).

Species of Greatest Conservation Need[22]

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

[22] 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 iNaturalist[23] 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.

[23] 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. Section 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 impacts[24] "[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.[25]

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 when the protected activities, features, or attributes of the Section 4(f) property that contribute to its

[24] 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.

[25] 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.)

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. 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.[26]

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, offsite package autoload 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

[26] See https://www.christiansburginstitute.com.

at other locations under 14 CFR Part 107,[27] 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 3.8, *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 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.

[27] 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.

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. Section 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.[28] 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. Sections 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."

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

[28] 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.

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 operating 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).

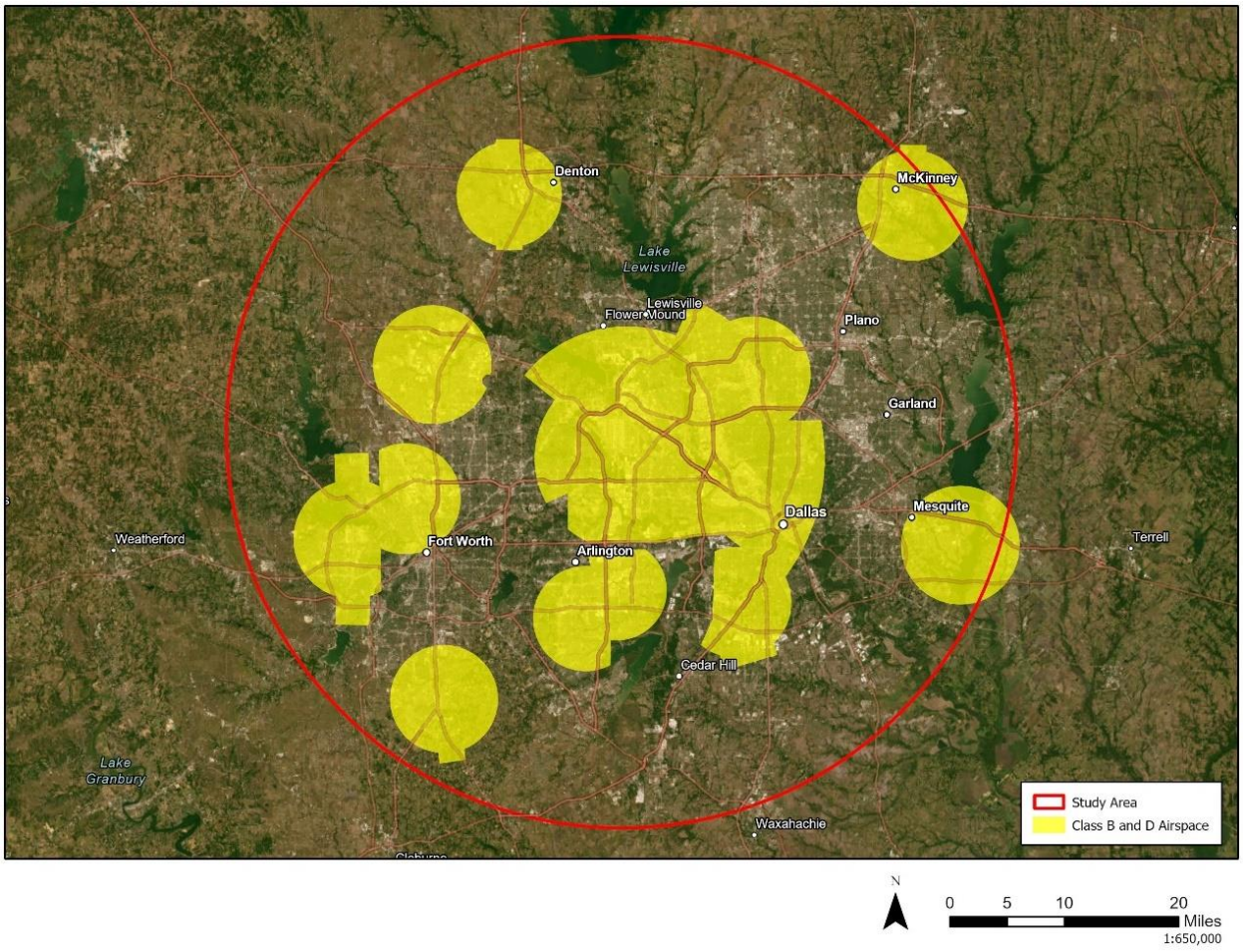


Figure 3.7-1. Class B and Class D Surface Areas

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 autoload, or offsite autoload), 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.

The 2023 EA included conservative assumptions and criteria to evaluate noise impacts at nest operations and to develop setback distances from nests. Based on FAA's experience with, and analysis of, the UA operations of Wing and other operators, the FAA finds that it is appropriate to use slightly less conservative criteria to develop the nest setback distances while still maintaining adequate distances to prevent significant noise impacts to noise-sensitive areas. The analysis in Appendix D employs these criteria to determine the nest setback distances from noise-sensitive areas that are within the controlled surface areas of Class B and Class D airspace, as well as for those that are outside of these areas.

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 Distances at an Offsite Package Autoloading Location

Average Daily Deliveries per Autoloader	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	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 Noise Exposure Distances for Delivery Locations Based on Maximum Deliveries per Location

Average Daily DNL Equivalent Deliveries	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

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. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise-sensitive receivers. In any remaining cases where Wing's nests are near to noise-sensitive receivers, Wing would not include early FitBITs in those locations.

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

3.8 Visual Effects (Visual Resources and Visual Character)

3.8.1 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.

3.8.2 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.[29] 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.

3.8.3 Environmental Consequences

3.8.3.1 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.

3.8.3.2 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.

[29] 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.

Chapter 4
Reasonably Foreseeable Effects in Context of Past, Present, and Future Actions[30]

Reasonably foreseeable effects may include those that interact with baseline conditions caused by other past and present activity as well as reasonably foreseeable environmental trends and planned activity in the affected environment. 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 impact on the noise environment in conjunction with other reasonably foreseeable UA operations.

Wing currently conducts package delivery operations from 16 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 total 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 reasonably foreseeable effects associated with noise and noise-compatible land use would result from UA and manned aircraft operating within an airport DNL 60 dB contour. However, the potential for such additional 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 65 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 additional effects with other

[30] Chapter 4 of the FAA's Draft SEA refers to the impacts discussed in this section as "Cumulative Impacts." This term is used in CEQ's NEPA-implementing regulations. 40 CFR Section 1508(i)(3) (2024). Since the publication of the Draft, however, CEQ issued an interim final rule to remove these regulations in accordance with EO 14154, *Unleashing American Energy*. See n. 1. As explained by CEQ in its February 19, 2025, memorandum, Implementation of the National Environmental Policy Act, NEPA, as amended, "does not employ the term 'cumulative effects[]' (or "cumulative impacts)" and agencies should "consider[] 'reasonably foreseeable' effects, regardless of whether or not those effects might be characterized as 'cumulative[]'" consistent with NEPA. CEQ, Implementation of the National Environmental Policy Act (Feb. 19, 2025), available at https://ceq.doe.gov/docs/ceq-regulations-and-guidance/CEQ-Memo-Implementation-of-NEPA-02.19.2025.pdf [citing 42 U.S.C. Section 4332(2)(C)(i)]. In accordance with this direction, the FAA has removed the term "cumulative effects" and "cumulative impacts" but retains with edits the underlying analysis in Chapter 4 of the Draft SEA. The analysis provided in Appendix J retains the terms cumulative effects or cumulative impacts, as FAA used this analysis with recent Part 135 UAS projects in the DFW area.

existing Part 135 UAS operations, such as the Causey Aviation Unmanned, Inc., Zipline, Inc., DroneUp, Inc., or other Part 107 operations (Appendix J, *Reasonably Foreseeable 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 impact due to another operator's hub by verifying approved locations through NEPA documents and avoiding potential projects and additional impacts by geofencing and proactively sharing airspace. The proposed automated deconfliction network for UA avoidance would help reduce any such 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 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 additional 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 reasonably foreseeable effects are expected on the power grid or from energy sources due to these activities.

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 noise impacts. No other actions are anticipated to interact with the proposed action to result in additional effects; therefore, the proposed action is not expected to result in significant 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 reasonably foreseeable 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. Greater effects are expected to occur where hub locations and delivery routes overlap. The level of total impact would vary depending on the amount of overlap, but FAA's analysis has determined that the combined 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 impacts individually and in total. 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 impact due to another operator's nest[31] by verifying approved locations through NEPA documents and avoiding potential projects and additional impacts by geofencing and proactively sharing airspace.

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

Appendix A
References and Citations

Allmand. n.d. Allmand Maxi-Power 25 Mobile Generator. Available: https://www.allmand.com/na/en_us/product-catalog/generators/maxipower-25.html. Accessed: November 22, 2024.

Chris Jackson's DFW Urban Wildlife. 2005–2022. *DFW Habitats*. Available: https://dfwurbanwildlife.com/the-dallasfort-worth-area/dfw-habitats/.

City of Dallas. 2020. Climate change in Dallas. Dallas Climate Action. Available: https://www.dallasclimateaction.com/climate-change-in-dallas. Accessed: November 11, 2024.

Connecticut Audubon Society. n.d. *Flying Drones Pose Danger to Threatened Birds*. Available: https://ct.audubon.org/news/flying-drones-pose-danger-threatened-birds. Accessed: April 17, 2025

Cornell Lab of Ornithology. n.d. *All About Birds: Bald Eagle*. Available: https://www.allaboutbirds.org/guide/Bald_Eagle/overview. Accessed: April 17, 2025.

Cross Timbers Urban Forestry Council. 2019. *Cross Timbers Ecosystem*. Available: http://ctufc.org/cross-timbers-ecosystem. Accessed: April 17, 2025.

Ednie, G., D. M. Bird, and K. H. Elliott. 2021. Fewer Bat Passes Are Detected During Small, Commercial Drone Flights. *Scientific Reports* 11, 11529. Available: https://doi.org/10.1038/s41598-021-90905-0.

Federal Aviation Administration (FAA). 2015. *Order 1050.1F, Environmental Impacts: Policies and Procedures*. Available: https://www.federalregister.gov/documents/2015/07/24/2015-18084/final-order-10501f-environmental-impact-policies-and-procedures. Accessed: April 17, 2025.

Federal Aviation Administration (FAA). 2022. *Wing Aviation Drone Package Delivery Operations Frisco and Little Elm, Texas, Final Environmental Assessment*. Available: https://www.faa.gov/uas/advanced_operations/nepa_and_drones. Accessed: April 17, 2025.

Federal Aviation Administration (FAA). 2023. *1050.1F Desk Reference*. Available: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref. Accessed: April 17, 2025.

Fu, Y., M. Kinniry, and L. N. Kloepper. 2018. The Chirocopter: A UAV for Recording Sound and Video of Bats at Altitude. *Methods in Ecology and Evolution* 9(6):1531–1535. Available: https://doi.org/10.1111/2041-210x.12992.

iNaturalist. 2023. iNaturalist. Available: https://www.inaturalist.org/. Accessed: April 17, 2025.

ICF. 2024. Technical Noise Study Report: Hummingbird 7000W-B And 8000-A Unmanned Aircraft Package Delivery Operations. Report No. 112024.

Intergovernmental Panel on Climate Change. n.d. 4.2.3.2 Volatile organic compounds (VOC). Available: https://archive.ipcc.ch/ipccreports/tar/wg1/140.htm. Accessed November 22, 2024.

Kalb, N., and C. Randler. 2019. Behavioral Responses to Conspecific Mobbing Calls Are Predator-Specific in Great Tits (*Parus major*). *Ecology and Evolution* 9(16):9207–9213. Available: https://doi.org/10.1002/ece3.5467.

Kuhlmann, K., Fontaine, A., Brisson-Curadeau, E.B., Bird, D.M., and Elliott, K.H. 2022. Miniaturization eliminates detectable impacts of drones on bat activity. *Methods in Ecology and Evolution*. 13(4): 842–851. Available: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.13807. Accessed: August 22, 2024.

Lee, R. J. 2021. Vacant Land, Flood Exposure, and Urbanization: Examining Land Cover Change in the Dallas-Fort Worth Metro Area. *Landscape and Urban Planning* 209:104047. Available: https://doi.org/10.1016/j.landurbplan.2021.104047. Accessed: November 29, 2024.

Lyon-Hill, Sarah, Tilashalski, Melissa, Ellis, Kimberly, and Travis Elli. 2020. *Measuring the Effects of Drone Delivery in the United States.* Virginia Tech Office of Economic Development and the Grado Department of Industrial & Systems Engineering.

McConnell, C. 2021. Identifying, Protecting and Managing Stopover Habitats for Wild Whooping Cranes on U.S. Army Corps of Engineers Lakes. *bioRxiv (Cold Spring Harbor Laboratory)*. Available: https://doi.org/10.1101/2020.12.30.424870. Accessed: November 29, 2024.

National Oceanic and Atmospheric Administration National Weather Service. n.d. Twilight Types. Available: https://www.weather.gov/lmk/twilight-types. Accessed: April 17, 2025.

National Park Service. 2024a. National Register Database and Research. Available: https://www.nps.gov/subjects/nationalregister/database-research.htm. Accessed: April 17, 2025.

National Park Service. 2024b. *National Wild and Scenic Rivers System*. Available: https://nps.maps.arcgis.com/apps/MapJournal/index.html?appid=ba6debd907c7431ea765071e9502d5ac#. Accessed April 17, 2025.

National Park Service. 2024c. *Nationwide Rivers Inventory.* Available: https://www.nps.gov/subjects/rivers/nationwide-rivers-inventory.htm. Accessed: April 17, 2025.

National Weather Service. n.d.-a. The Climate of Dallas/Fort Worth. Available: https://www.weather.gov/fwd/dfw_narrative. Accessed: November 11, 2024.

National Weather Service. n.d.-b. Hurricanes and Tropical Storms That Have Affected North Texas. Available: https://www.weather.gov/fwd/texashurricane. Accessed: November 11, 2024.

Rodrigues, T. A., Patrikar, J., Oliveira, N. L., Matthews, H. S., Scherer, S., and Samaras, C. 2022. Drone flight data reveal energy and greenhouse gas emissions savings for very small package delivery. *Patterns* 3(8): 100569, ISSN 2666-3899. Available: https://doi.org/10.1016/j.patter.2022.100569. Accessed: November 11, 2024.

Royal Society for the Protection of Birds. 2023. *What Is Mobbing?* Available: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/birdwatching/bird-behaviour/what-is-mobbing/. Accessed: April 17, 2025.

Texas Coastal Management Program. n.d. *The Texas Coastal Zone*. The Texas General Land Office. Available: https://www.glo.texas.gov/coast/coastal-management/forms/files/CoastalBoundaryMap.pdf. Accessed: April 17, 2025.

Texas Commission on Environmental Quality. 2024. Monitoring operations. Available: https://www.tceq.texas.gov/airquality/monops. Accessed: November 11, 2024.

Texas Comptroller of Public Accounts. 2023. *ERCOT and Texas energy resources*. Available: https://comptroller.texas.gov/economy/economic-data/energy/2023/ercot.php. Accessed: November 22, 2024.

Texas Parks and Wildlife. n.d.-a. *Golden-cheeked Warbler (*Dendroica chrysoparia*)*. Available: https://tpwd.texas.gov/huntwild/wild/species/gcw. Accessed: April 17, 2025.

Texas Parks and Wildlife. n.d.-b. *Introducing Birds to Young Naturalists – Mockingbirds*. Available: https://tpwd.texas.gov/publications/nonpwdpubs/introducing_birds/mockingbirds/. Accessed: April 17, 2025.

Texas Parks and Wildlife. n.d.-c. *Texas Ecoregions — Texas Parks and Wildlife Department*. Available: https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions.

Texas Parks and Wildlife. n.d.-d. *Monarch Butterflies and Other Pollinators*. Available: https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/texas_nature_trackers/monarch/.

Texas Parks and Wildlife. 2020. *Species of Greatest Conservation Need – All Taxa.* Excel Dataset. Available: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Ftpwd.texas.gov%2Fhuntwild%2Fwild%2Fwildlife_diversity%2Fnongame%2Ftcap%2Fmedia%2F2020_SGCN_allspecies_Final.xlsx&wdOrigin=BROWSELINK. Accessed: April 17, 2025.

Texas Parks and Wildlife. 2023. Tricolored Bat (Perimyotis subflavus). Available: https://tpwd.texas.gov/huntwild/wild/species/easpip/. Accessed: April 17, 2025.

U.S. Census Bureau (USCB). 2022. ACS 1-Year Survey Estimates Tables. Available: https://data.census.gov/. Accessed: April 17, 2025.

U.S. Department of the Navy. 2022. *The Air Almanac 2023.* The Nautical Almanac Office United States Naval Observatory. Available: https://aa.usno.navy.mil/publications/aira. Accessed: April 17, 2025.

U.S. Environmental Protection Agency (EPA). 1995. Calculating Potential to Emit (PTE) for Emergency Generators. Available: https://www.epa.gov/sites/default/files/2015-08/documents/emgen.pdf. Accessed: November 11, 2024.

U.S. Environmental Protection Agency (EPA). 2023. Tailpipe Greenhouse Gas Emissions from a Typical Passenger Vehicle. Available: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017FP5.pdf. Accessed: November 11, 2024.

U.S. Environmental Protection Agency (EPA). 2024a. Design Value Interactive Tool. Available: https://www.epa.gov/air-trends/design-value-interactive-tool. Accessed: November 25, 2024.

U.S. Environmental Protection Agency (EPA). 2024b. NAAQS Table. Available: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed: November 11, 2024.

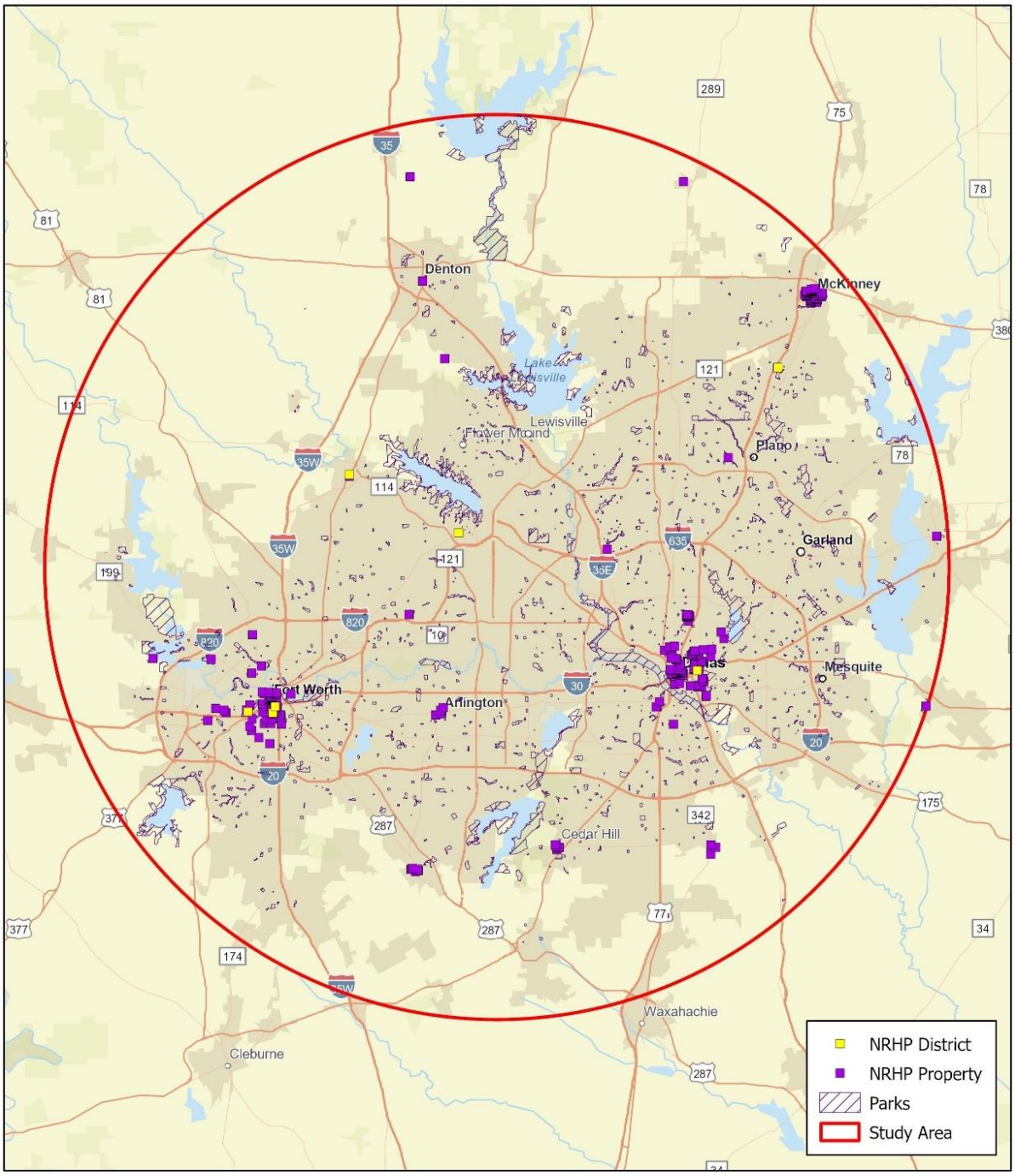
U.S. Environmental Protection Agency (EPA). 2024c. Green Book Nonattainment Areas for Criteria Pollutants: Texas. Available: https://www3.epa.gov/airquality/greenbook/ancl.html#TX. Accessed: November 11, 2024.

U.S. Environmental Protection Agency (EPA). 2024d. De Minimis Tables. Available: https://www.epa.gov/general-conformity/de-minimis-tables. Accessed: November 11, 2024.

U.S. Fish and Wildlife Service (USFWS). n.d.-a. *Perimyotis subflavus | U.S. Fish & Wildlife Service*. Available: https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus.

U.S. Fish and Wildlife Service (USFWS). n.d.-b. *Keeping Wildlife Safe from Drones: Keeping Bald Eagles and Other Wildlife Safe from Drones.* Available: https://www.fws.gov/story/keeping-wildlife-safe-drones. Accessed: April 17, 2025.

U.S. Fish and Wildlife Service (USFWS). 2024. Official Species List. Information for Planning and Conservation (IPaC). Available: https://ipac.ecosphere.fws.gov/. Accessed: October 22, 2024.



Section 4(f) Properties
Wing DFW

Appendix C
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Caddo Nation of Oklahoma	Bobby Gonzalez, Chairman
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Appendix D
Noise

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

November 2024

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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

Chapter 1
Introduction

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, autoload of package at a nest, and takeoff
- Nearfield launch, autoload 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.

Chapter 2
Methods

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 autoload at an offsite location
- Nearfield launch and package autoload 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., Vcruise) 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., Vcruise) 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 SEL[1]	Delivery, dBA SEL[2]	Return to Nest and Landing, dBA SEL[3]
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 SEL[1]	Nearfield Launch and Autoload, dBA SEL[1]
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 autoload, or nearfield autoload (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 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	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 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	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 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	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 Point[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	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 Point[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	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 Point[1]	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
References

AvEnviro Acoustics. 2024a. *Environmental Noise Assessment: Wing Model 7000W-B Revision D.*

AvEnviro Acoustics. 2024b. *Environmental Noise Assessment: Wing Model 8000-A Revision C.*

Code of Federal Regulations (CFR). *Noise Standards: Aircraft Type and Airworthiness Certification.* Available: https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-36. Accessed: July 23, 2024.

Federal Aviation Administration (FAA). 2015. Order 1050.1F. *Environmental Impacts: Policies and Procedures*. Appendix B. Available: https://www.faa.gov/documentLibrary/media/Order/FAA_Order_1050_1F.pdf#page=113 Accessed: July 23, 2024.

Federal Aviation Administration (FAA) Office of Environment and Energy. 2023. Drone Team, AEE-100. *Measuring Drone Noise for Environmental Review Process*. Draft Measurement Protocol for Applications for EA Noise Analysis V05, PowerPoint Presentation, October 2023.

Harris Miller Miller and Hanson. 2023. *Noise Assessment for Wing Aviation Proposed Package Delivery Operations with Hummingbird 7000W-B Unmanned Aircraft*, prepared March 17, 2023.

ICF International. 2024. *Noise Modeling for the Technical Noise Study Report: Hummingbird 7000W-B and 8000-A Unmanned Aircraft Package Delivery Operations.* Dallas-Fort Worth, TX. Prepared for the Federal Aviation Administration.

Wing Aviation LLC. 2024. Description of Proposed Action and Alternatives, Supplemental EA for Package Delivery Operations for Dallas-Fort Worth Metro.

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

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

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

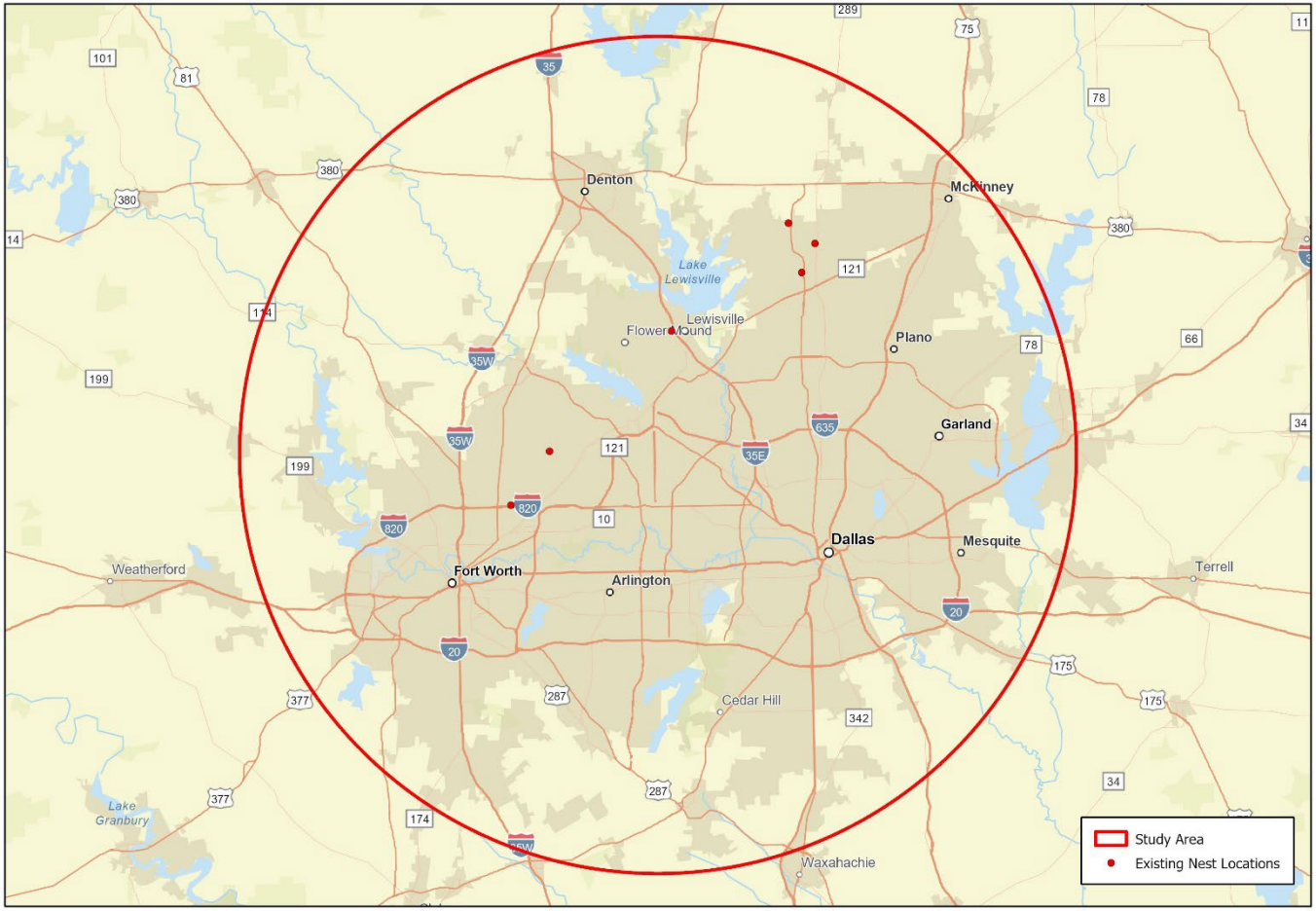
The FAA is soliciting the opinion of the Apache Tribe of Oklahoma concerning any Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your response over the next 30 days will greatly assist us in incorporating your concerns into our environmental 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

Atachment 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.

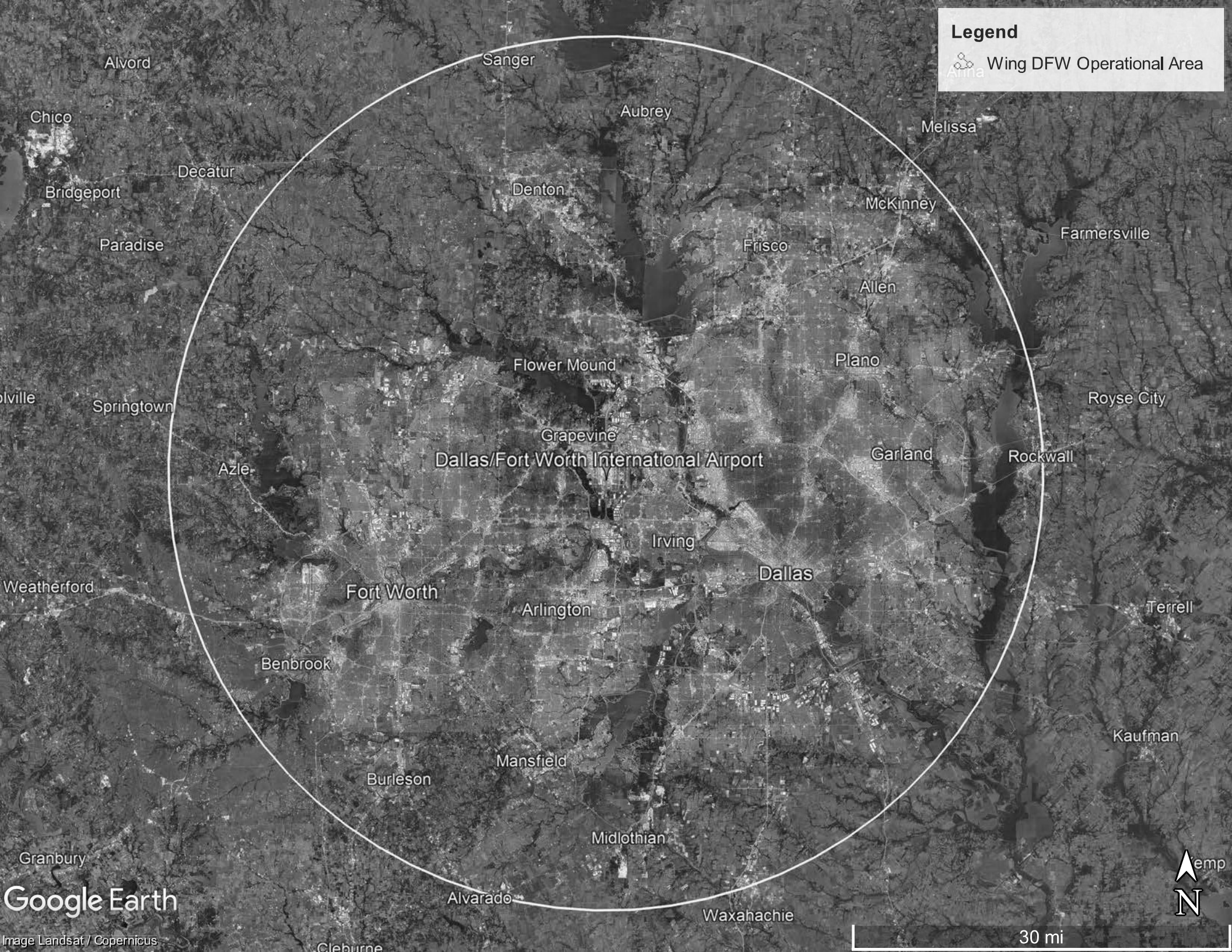
Consultation

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
Alvord
Sanger
Aubrey
Chico
Melissa
Decatur
Bridgeport
Denton
McKinney
Paradise
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Farmersville
Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
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Azle
Irving
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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 leter 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

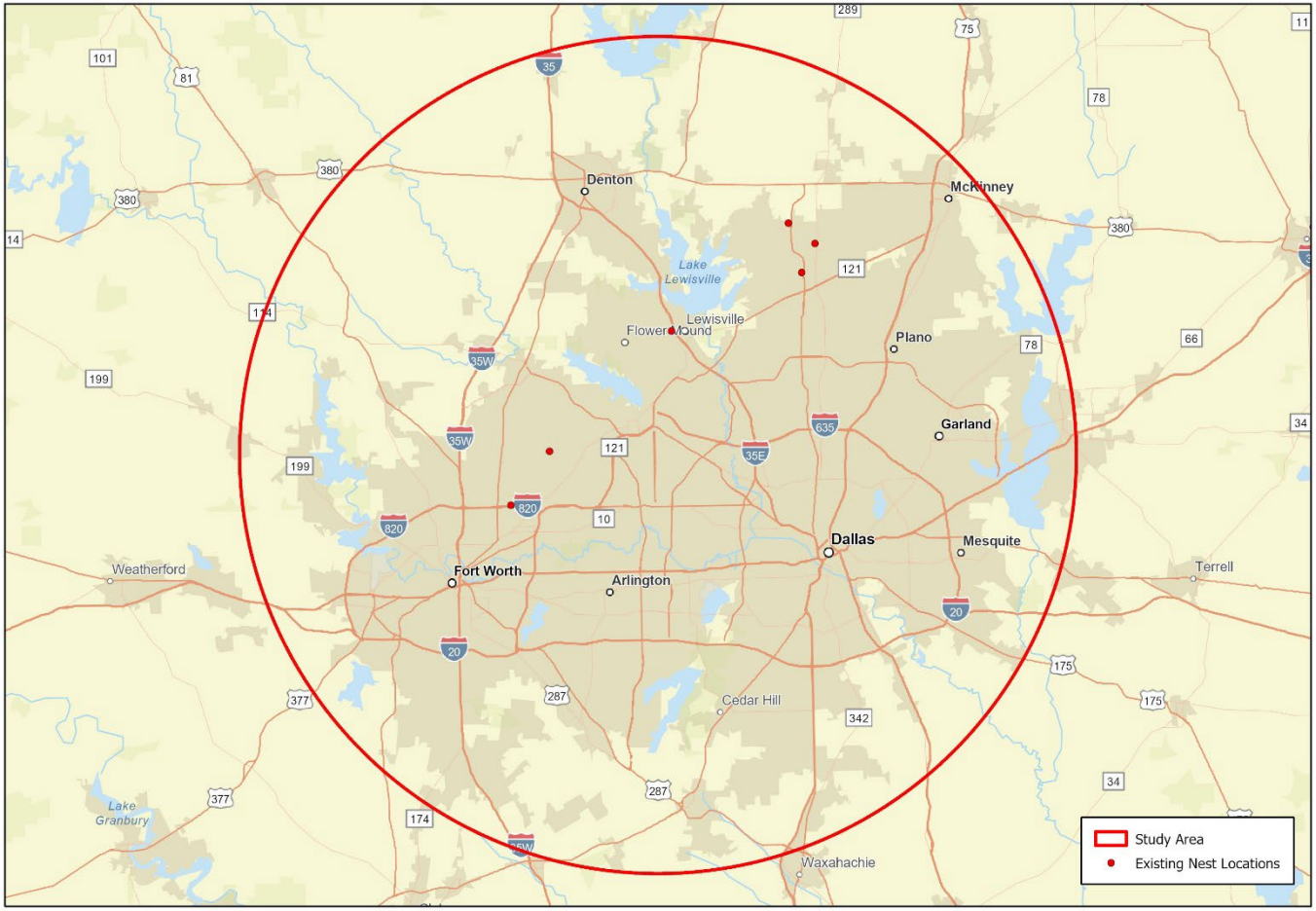
The FAA previously notified Caddo Nation of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of Caddo Nation of Oklahoma concerning any Tribal lands, or sites of religious or cultural significance 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

Atachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latiude	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

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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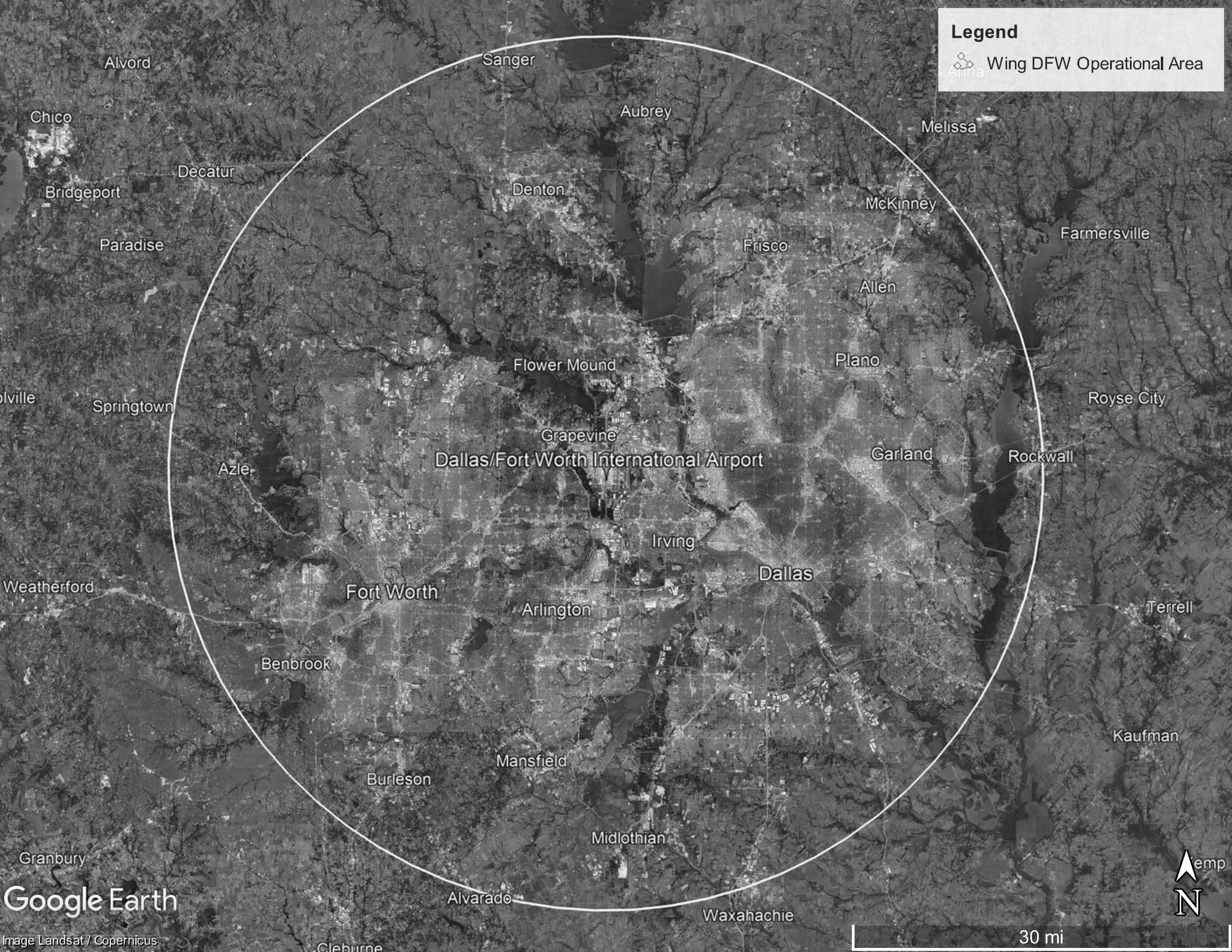
Date: 2023.04.20 07:25:52 -07'00'

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


Legend
Wing DFW Operational Area
Alvord
Sanger
Aubrey
Chico
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Decatur
Bridgeport
Denton
McKinney
Paradise
Frisco
Farmersville
Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
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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

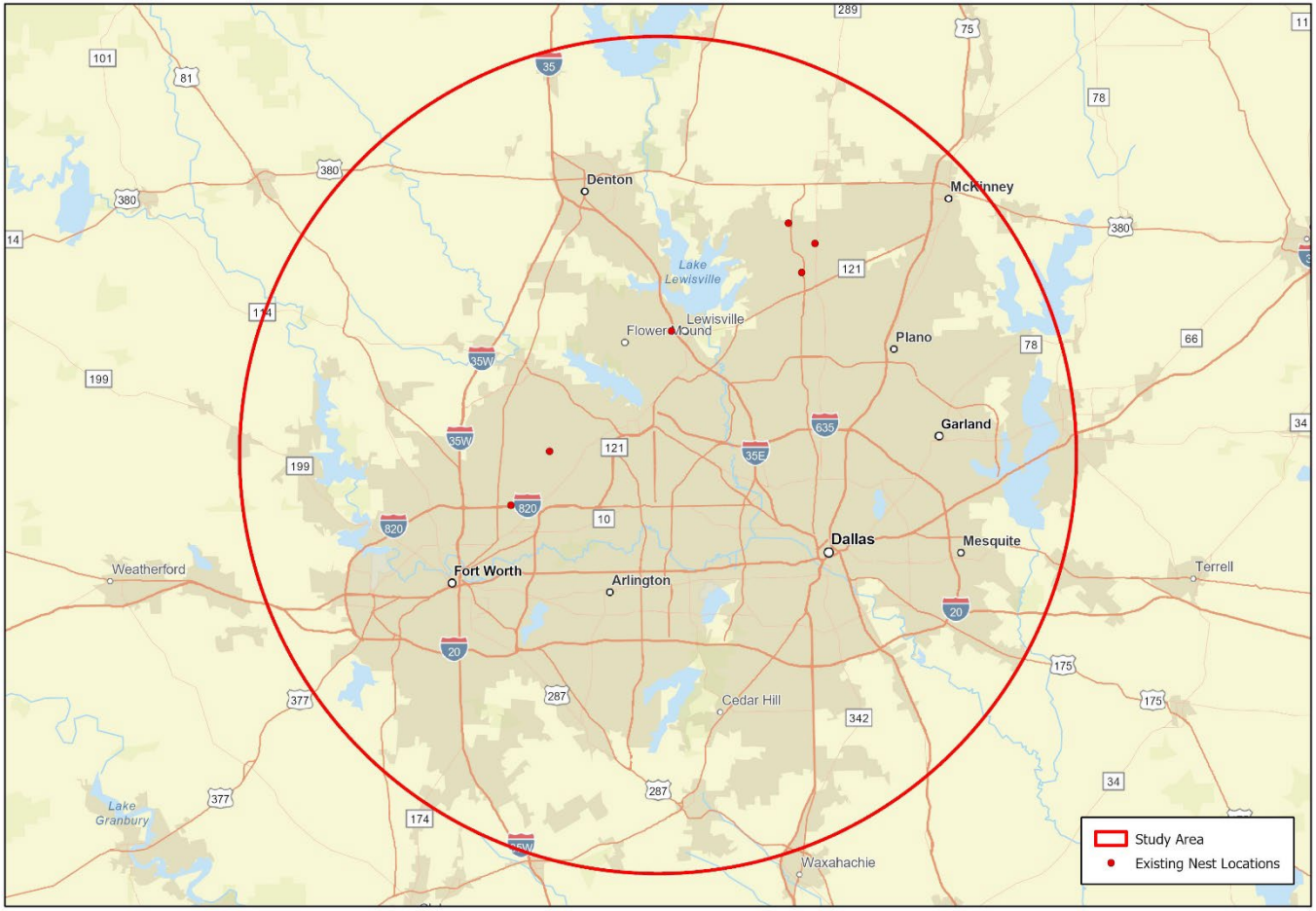
The FAA previously notified the Cherokee Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Cherokee Nation concerning any Tribal lands, or sites of religious or cultural significance 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

Atachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latiude	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

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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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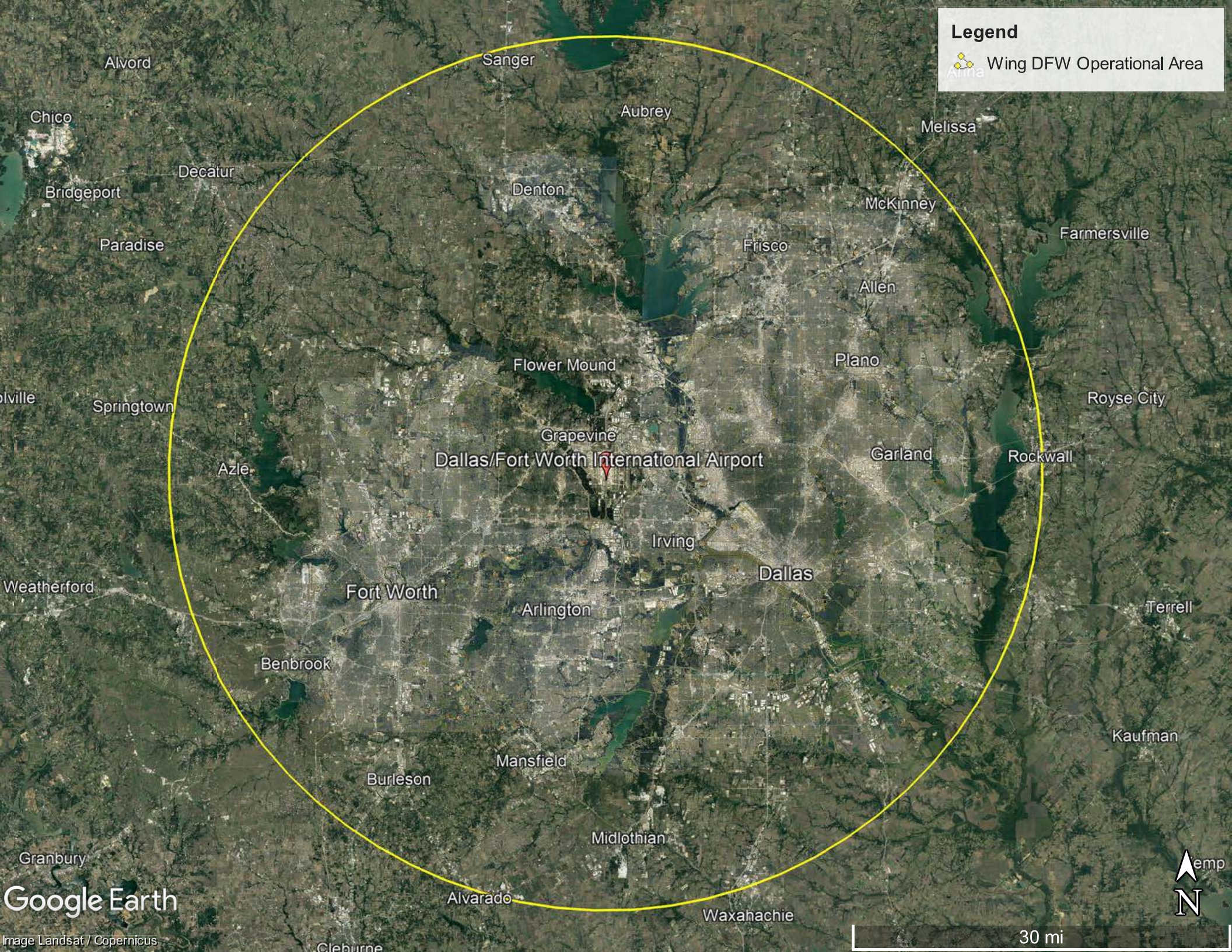
Date: 2023.04.20 07:23:22 -07'00'

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


Legend
Wing DFW Operational Area
Alvord
Sanger
Aubrey
Chico
Melissa
Decatur
Bridgeport
Denton
McKinney
Paradise
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Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
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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.

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 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.

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Area of Potential Effects

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(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

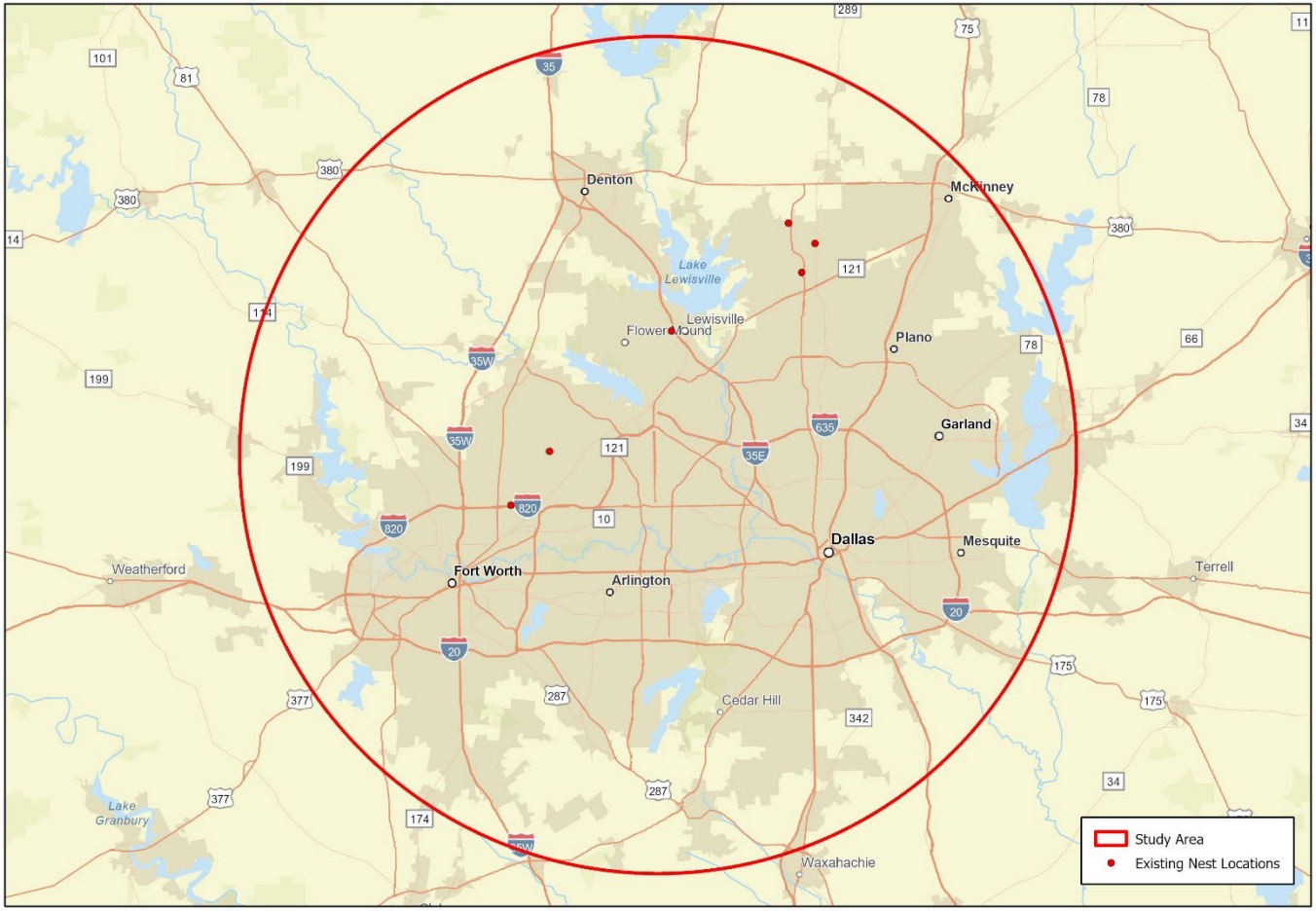
The FAA previously notified the Comanche Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion the Comanche Nation concerning any Tribal lands, or sites of religious or cultural significance that 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	Latiude	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
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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
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 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.

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 drop-off 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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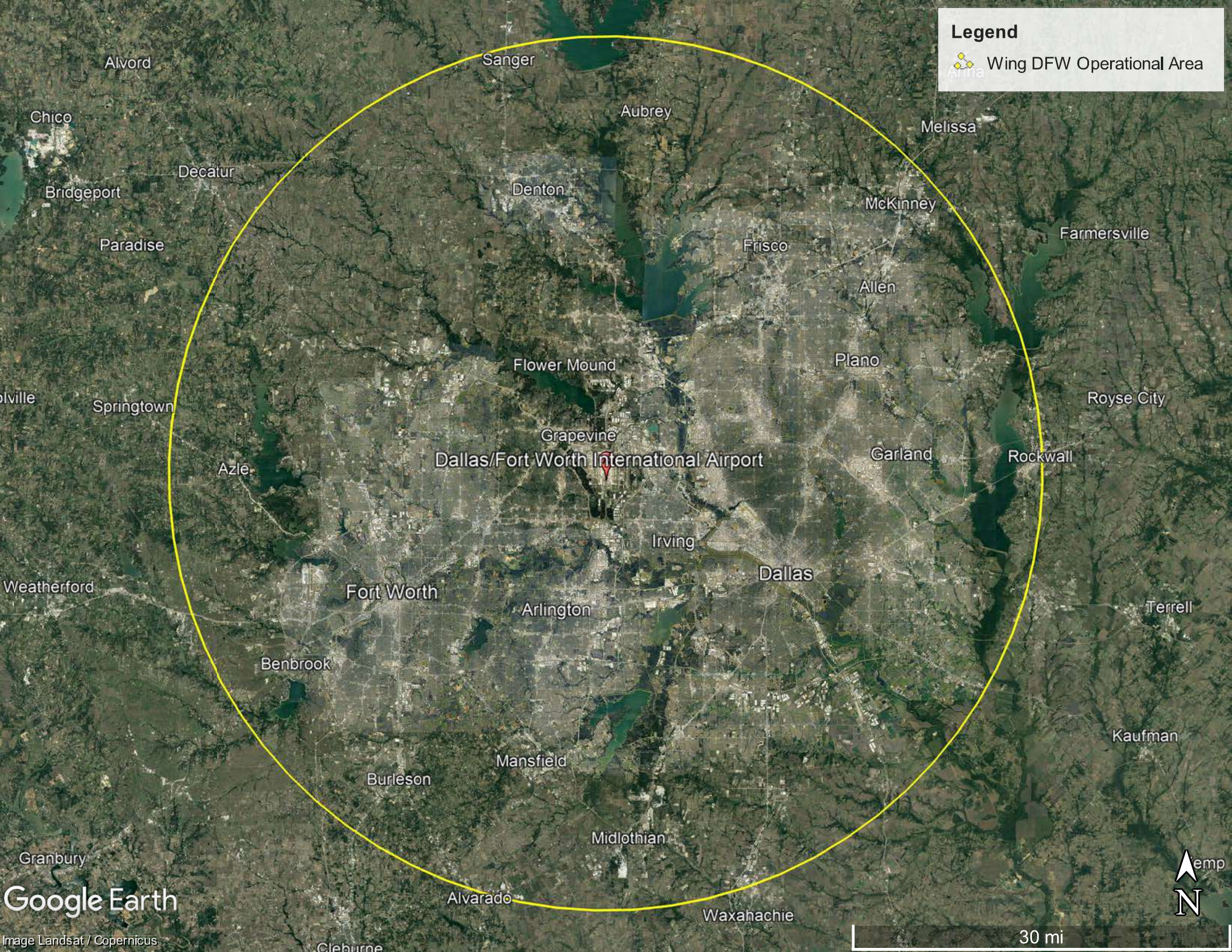
Date: 2023.04.20 07:24:53 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service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Wing DFW Operational Area
Alvord
Sanger
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Chico
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Decatur
Bridgeport
Denton
McKinney
Paradise
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Farmersville
Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
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U.S. Department of Transportation
Federal Aviation Administration

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

May 1, 2024

Chairman Jonathan Cernek
Coushata 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

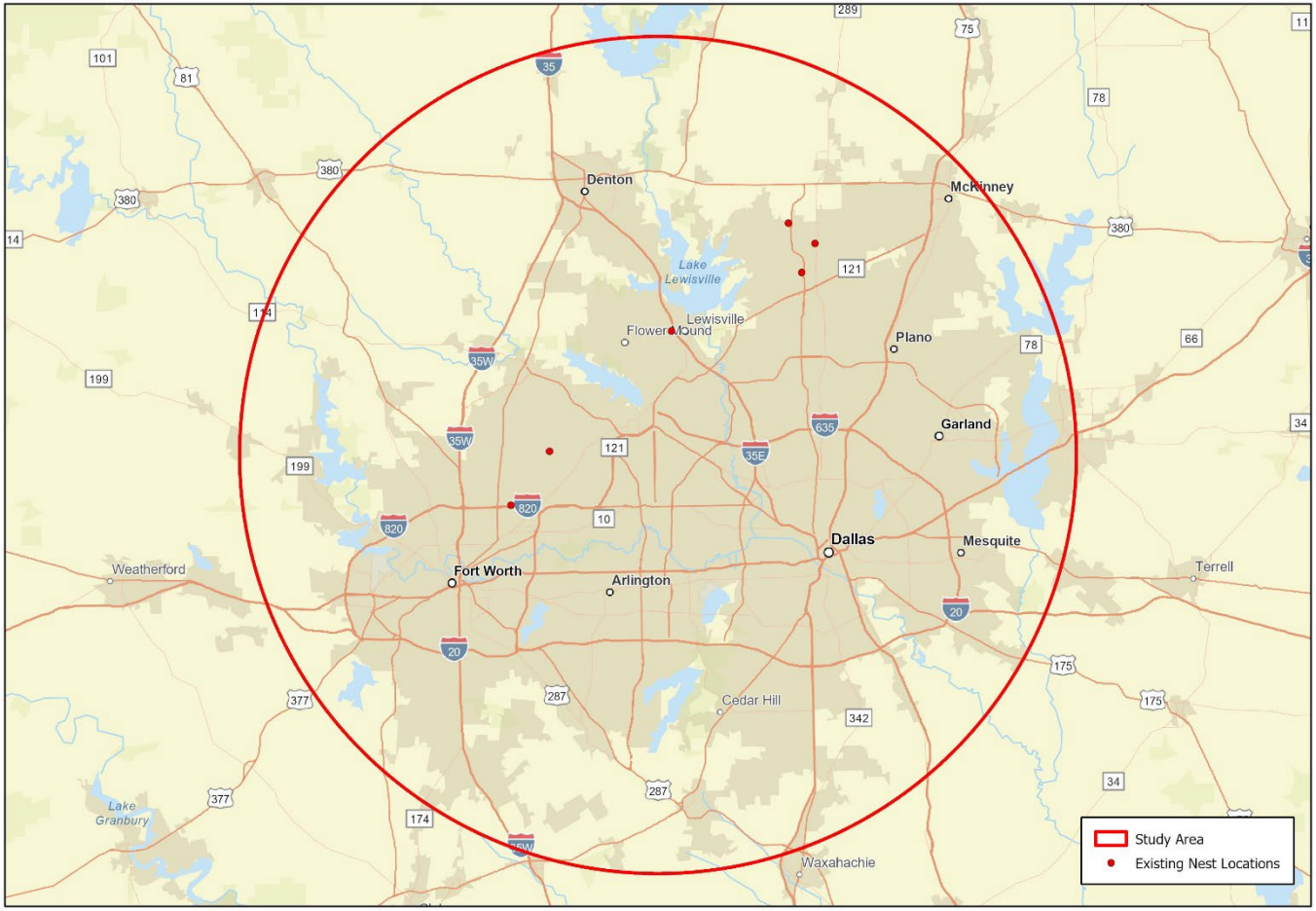
The FAA previously notified the Coushatta Tribe of Louisiana in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Coushatta Tribe of Louisiana concerning any Tribal lands, or sites of religious 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 leter.

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 Consulta on

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latiude	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
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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
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 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.

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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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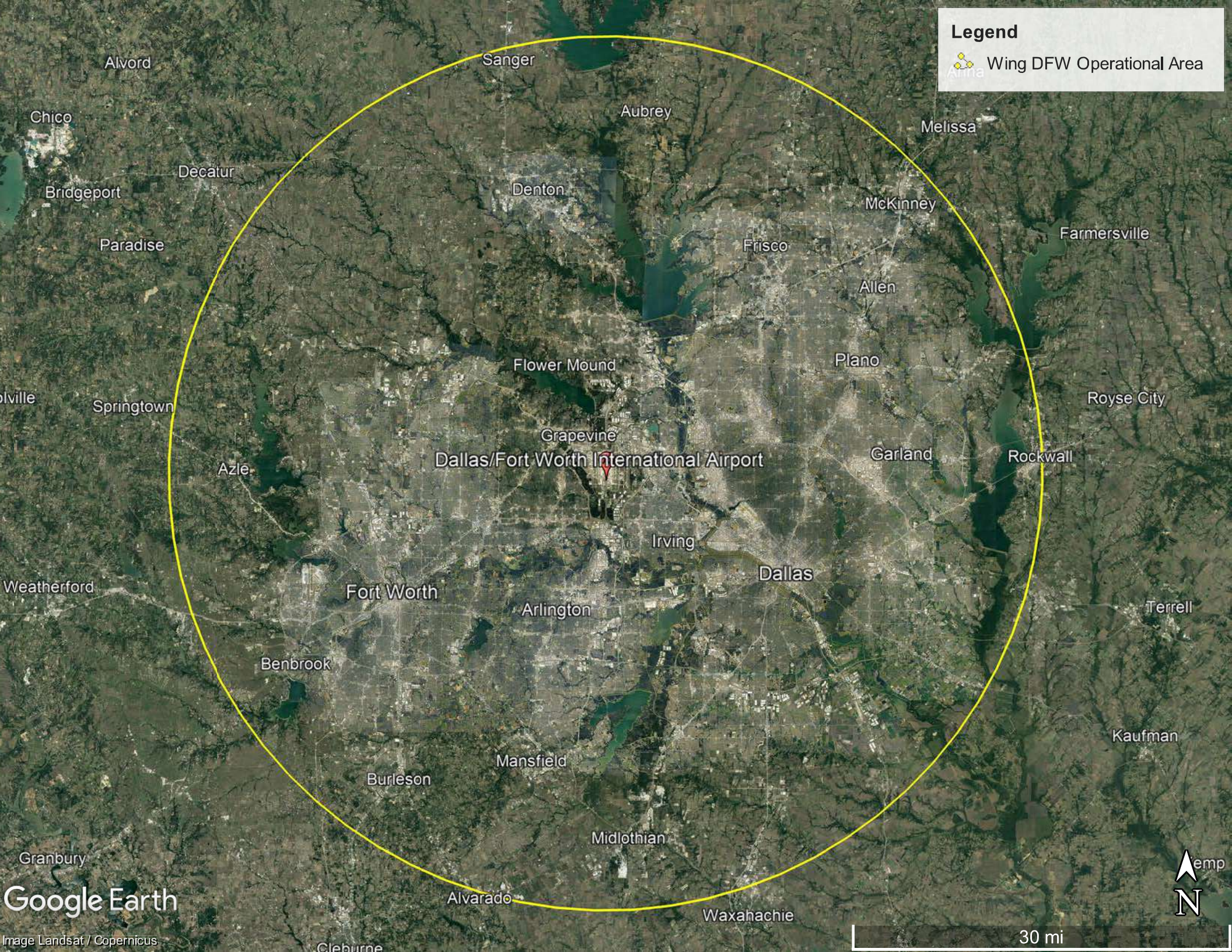
Date: 2023.04.20 07:26:29 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service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Wing DFW Operational Area
Alvord
Sanger
Aubrey
Chico
Melissa
Decatur
Bridgeport
Denton
McKinney
Paradise
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Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
Alvarado
Waxahachie
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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

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 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 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

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 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:

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 Delaware 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

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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.

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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

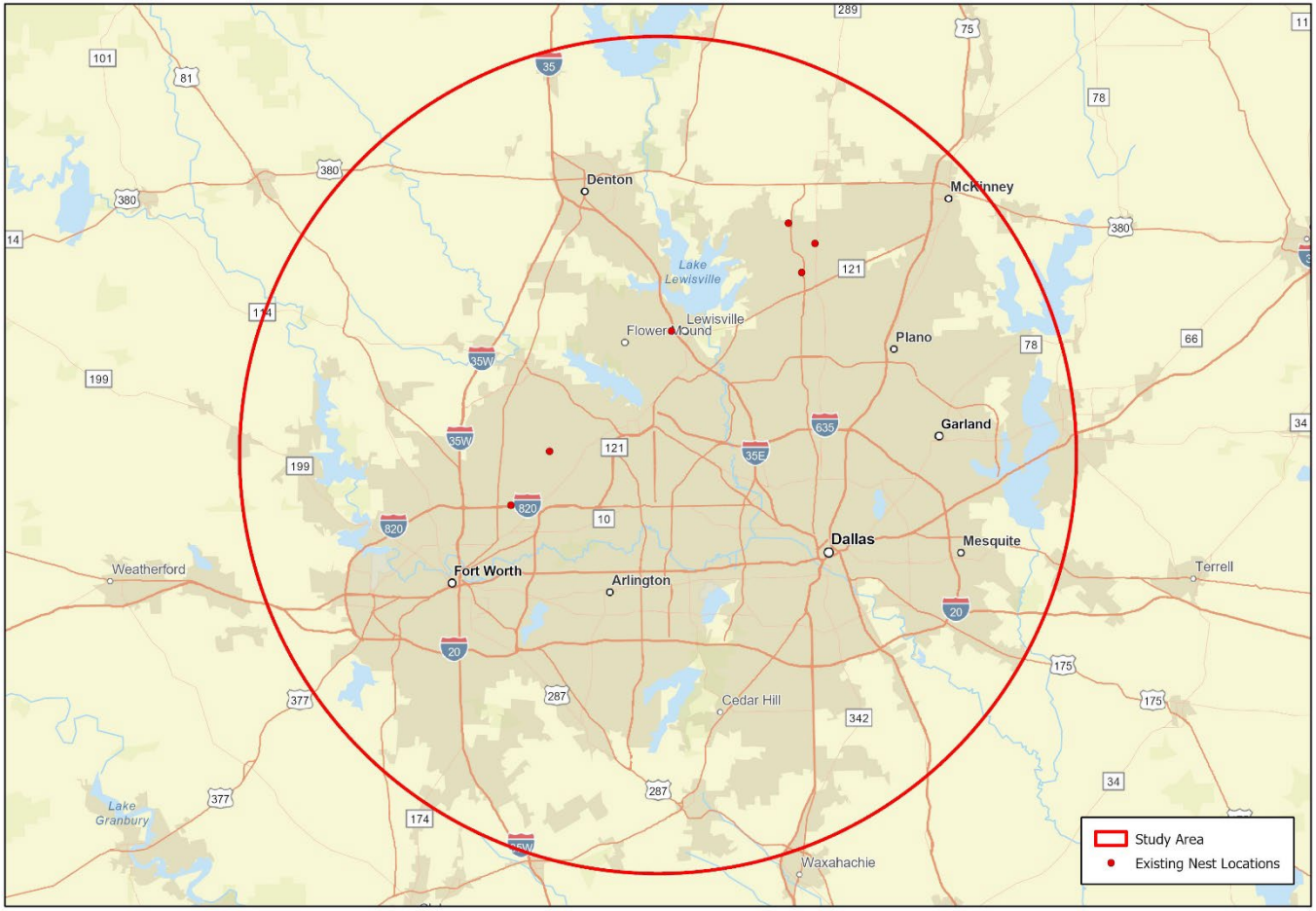
The FAA previously notified the Delaware Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Delaware Nation concerning any Tribal lands, or sites of religious or cultural significance 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	Latiude	Longitude
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U.S. Department of Transportation
Federal Aviation Administration

Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

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

Dear President Dotson,

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 Delaware 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.

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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.

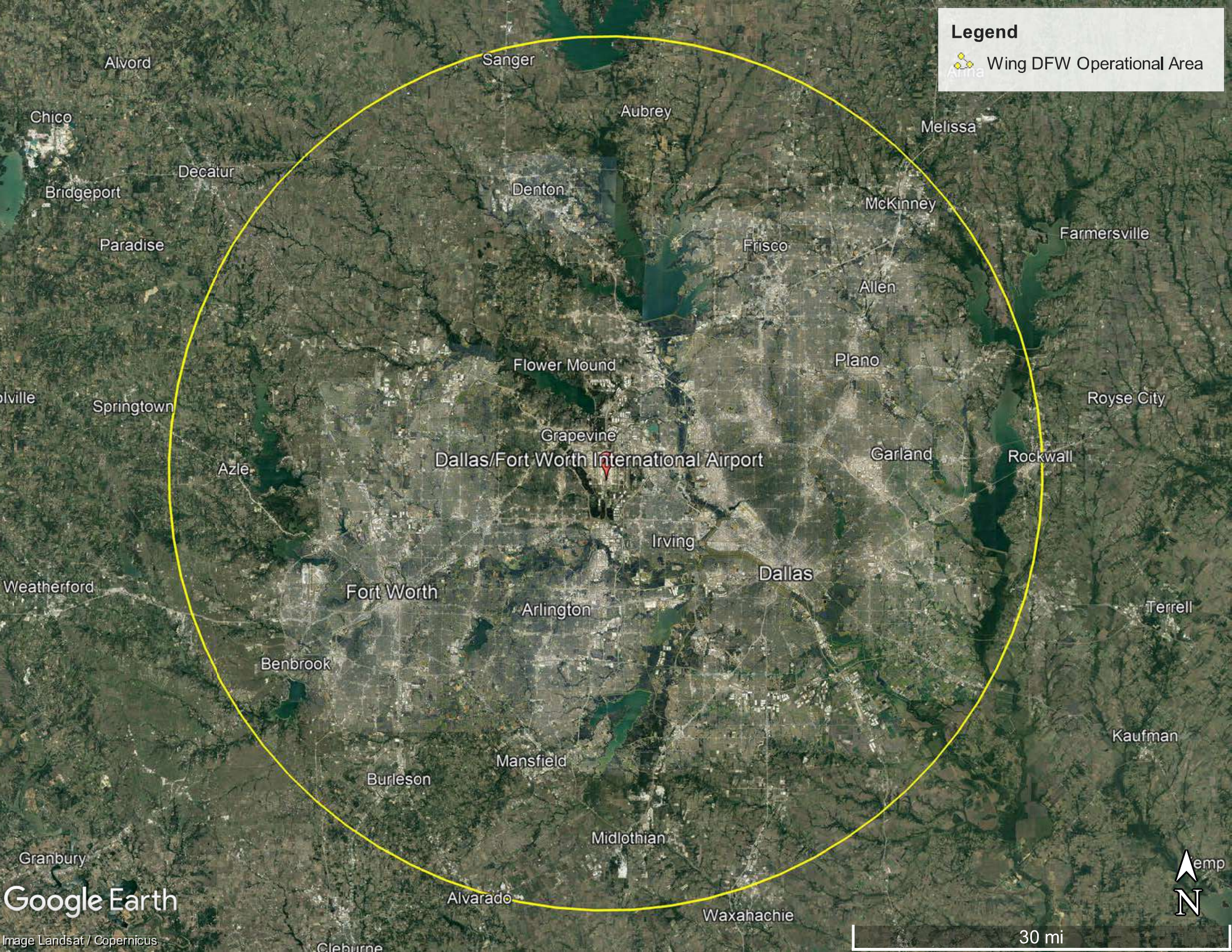
Consultation

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 07:24:23 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service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Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
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U.S. Department of Transportation
Federal Aviation 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:

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 Muscogee (Creek) 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

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 Muscogee (Creek) 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: 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

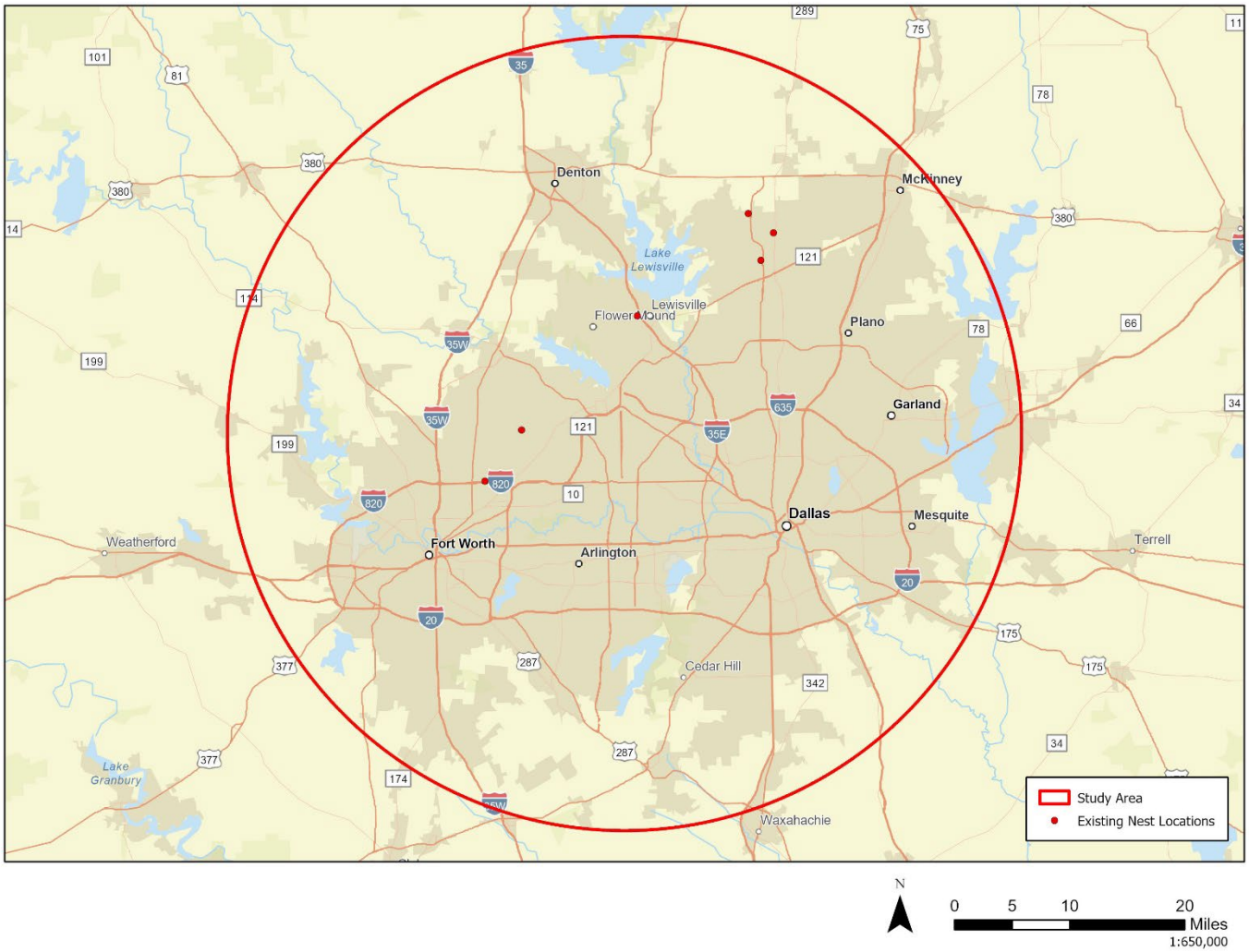
The FAA previously notified the Muscogee (Creek) Nation in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see Attachment B). The FAA is now soliciting the opinion of the Muscogee (Creek) Nation concerning any Tribal lands, or sites of religious or cultural 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	Latiude	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 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.

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.

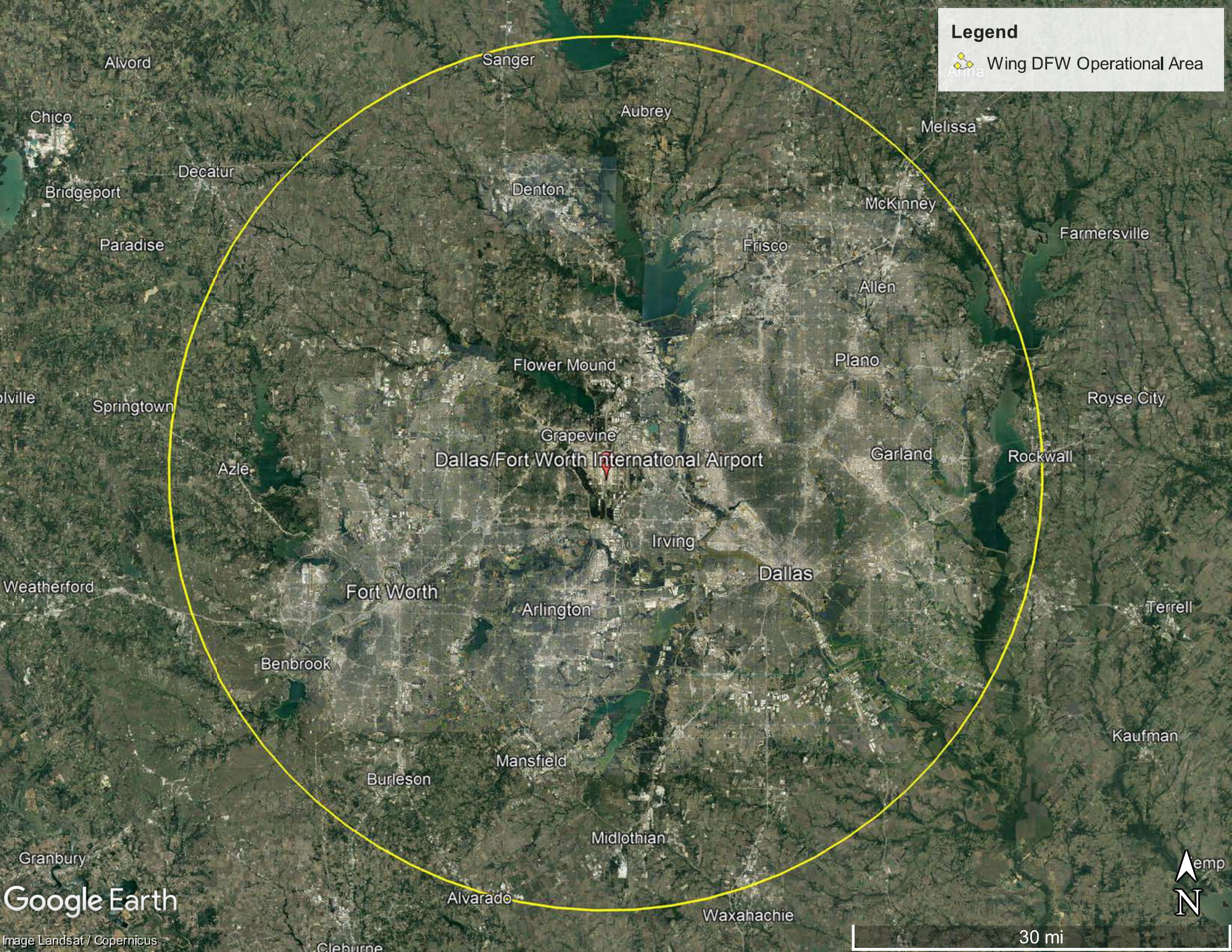
Consultation

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 07:22:21 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service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Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
Alvarado
Waxahachie
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Image Landsat / Copernicus

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

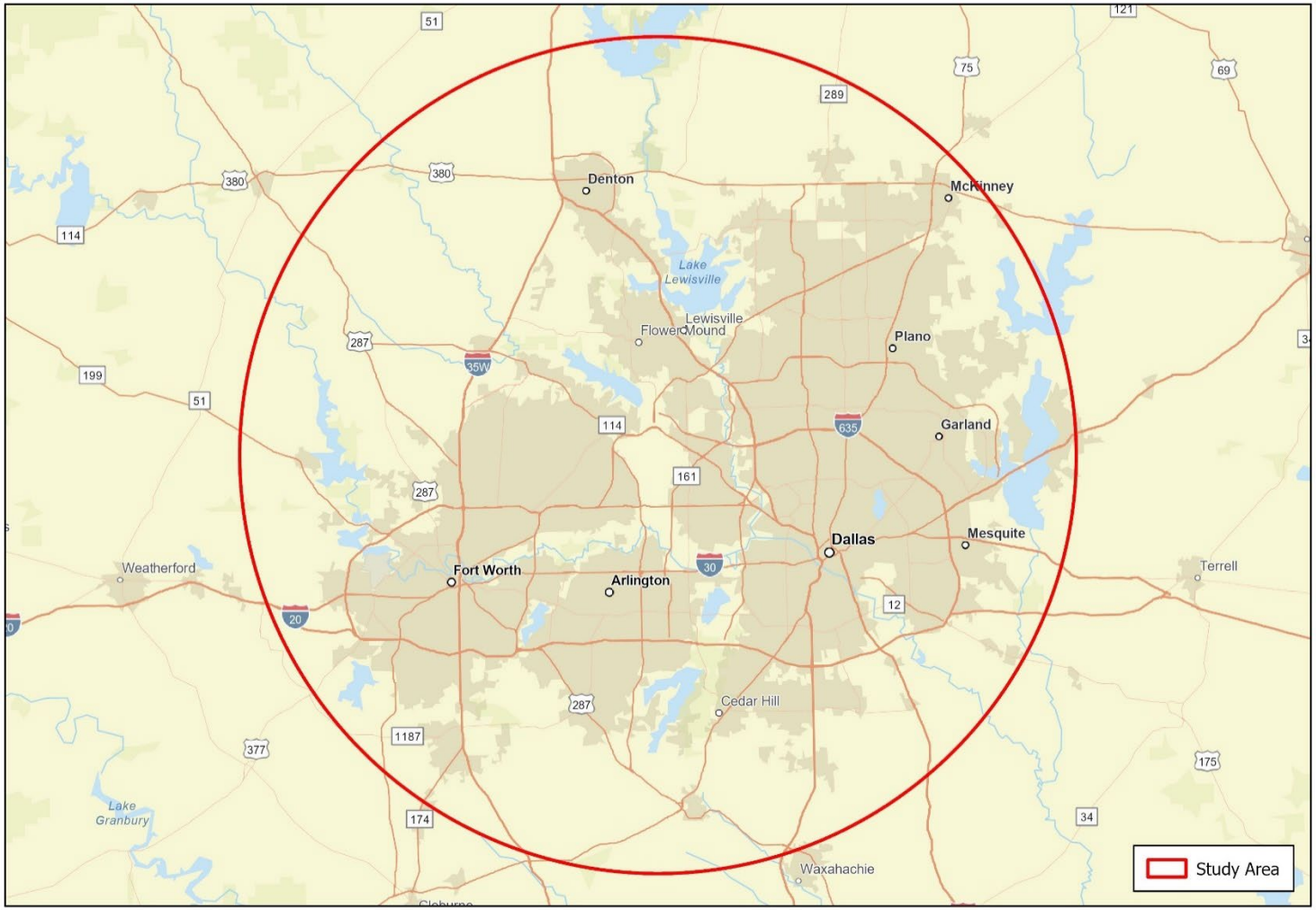
The FAA is soliciting the opinion of the Tonkawa Tribe of Indians of Oklahoma concerning Tribal lands, or sites of religious or cultural significance that may be affected by the proposed operation area. Your timely response over the next 30 days will greatly assist us in incorporating your concerns into 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

Attachment A. Area of Potential Effects



Current Operating Nests

Nest Name	Latiude	Longitude
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Lewisville Main	33° 2'48.87"N	97° 0'46.27"W
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U.S. Department of Transportation
Federal Aviation Administration

Office of Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

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

Dear President Martin:

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 Tonkawa Tribe of Indians 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.

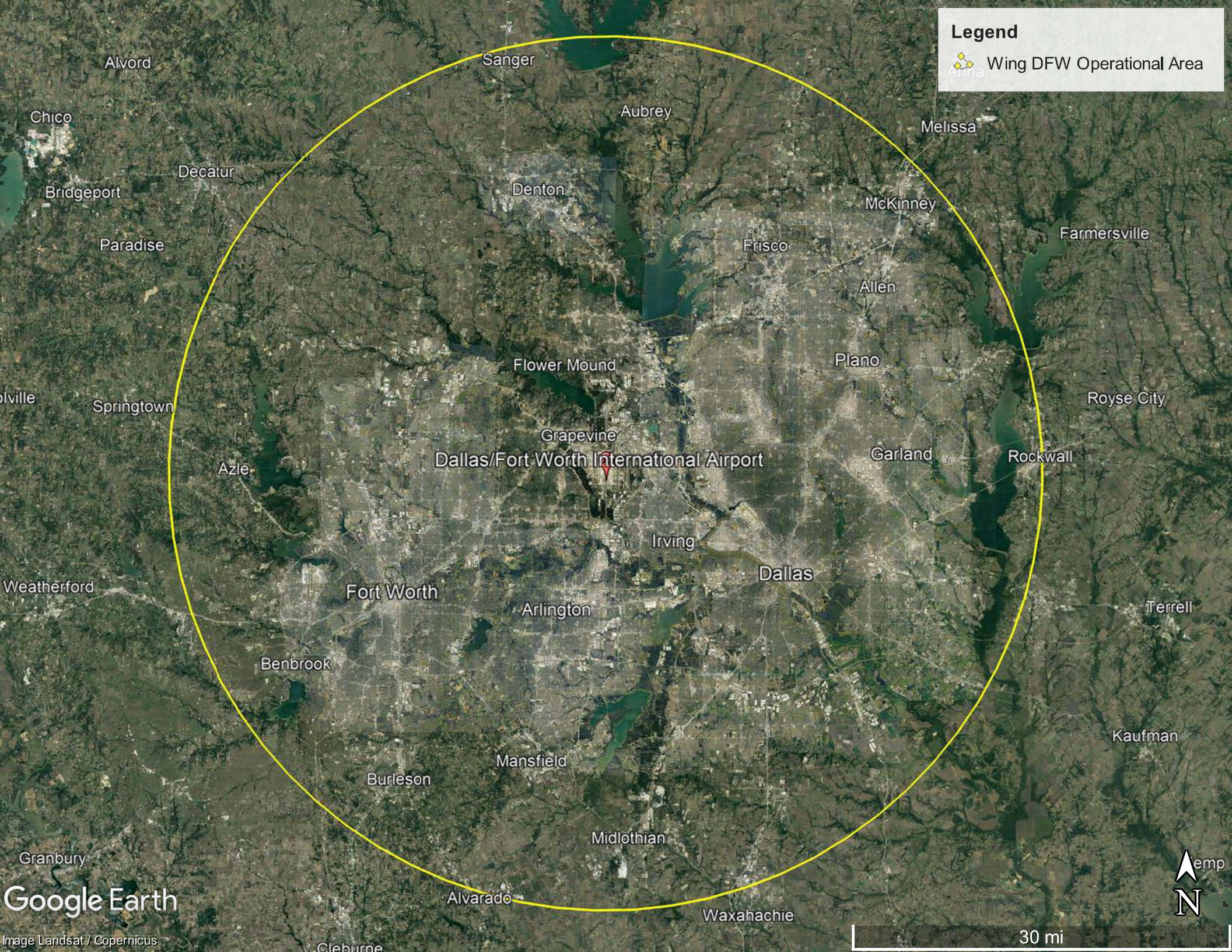
Consultation

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 07:23:52 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
Flight Standards Service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Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
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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.

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 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

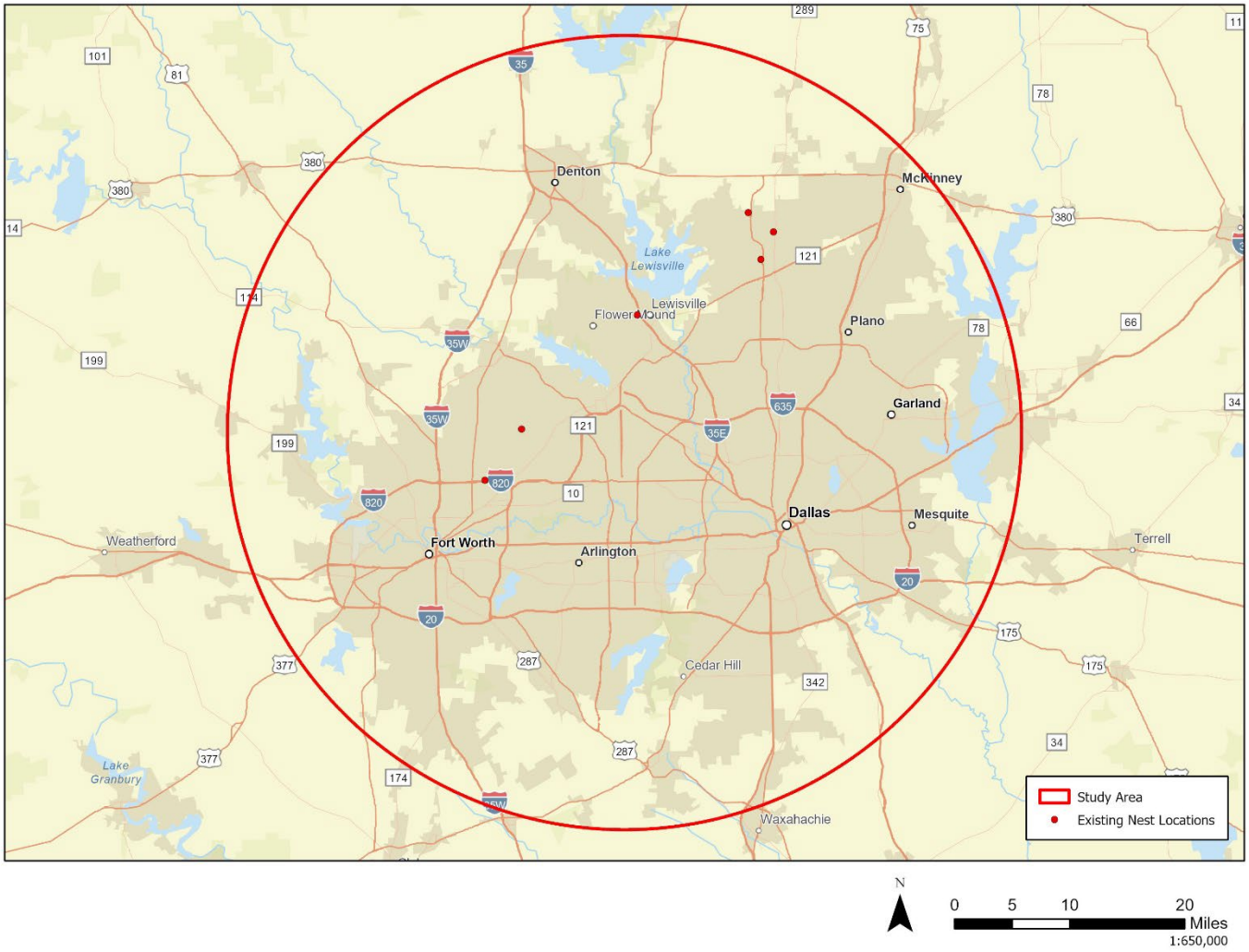
The FAA previously notified Wichita and Affiliated Tribes of Oklahoma in April 2023 for Wing's proposed operations, which were subsequently approved in November 2023 (see **Attachment B**). The FAA is now soliciting the opinion of the Wichita and Affiliated Tribes of Oklahoma concerning any Tribal lands, 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	Latiude	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

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.

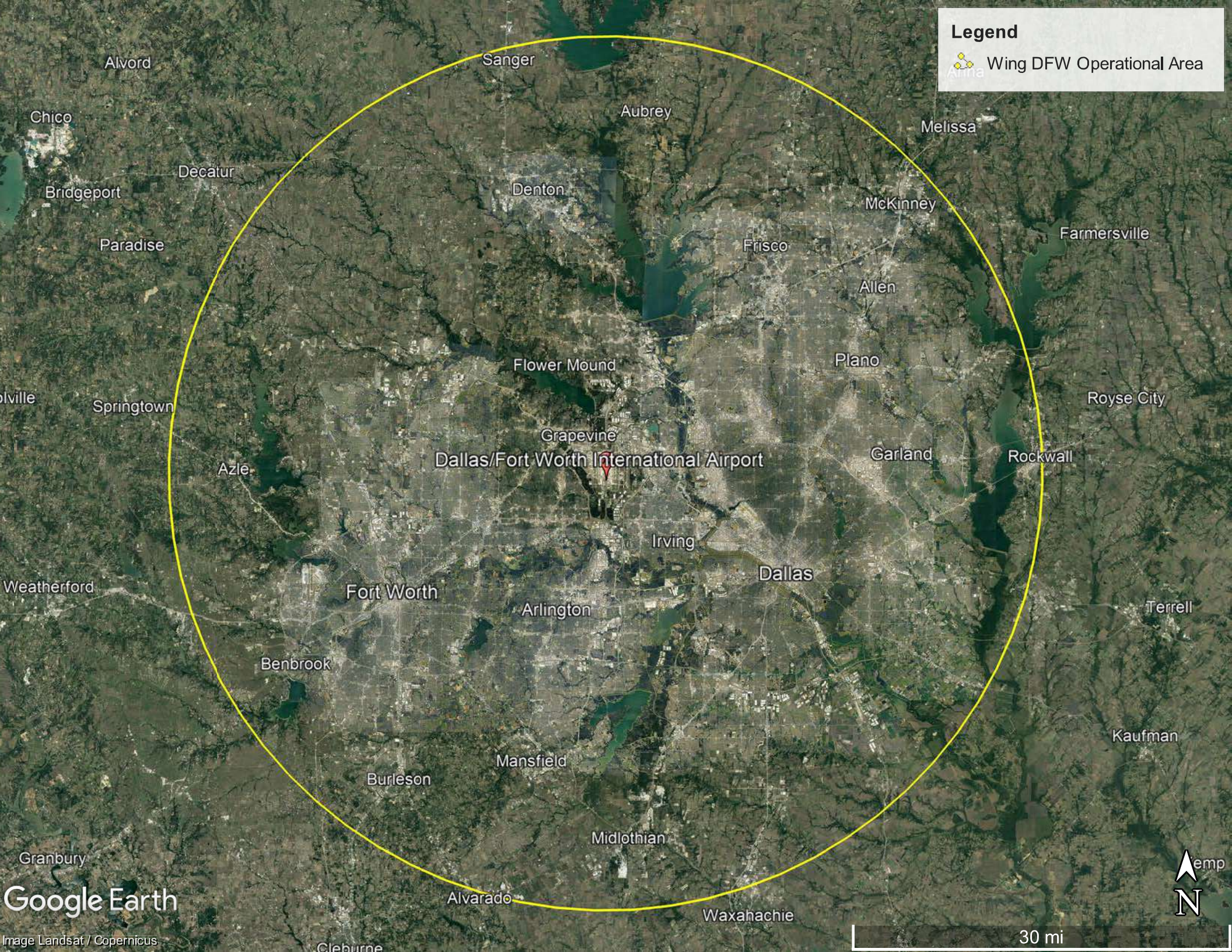
Consultation

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
Alvord
Sanger
Aubrey
Chico
Melissa
Decatur
Bridgeport
Denton
McKinney
Paradise
Frisco
Farmersville
Allen
Flower Mound
Plano
Springtown
Royse City
Grapevine
Dallas/Fort Worth International Airport
Garland
Rockwall
Azle
Irving
Dallas
Weatherford
Fort Worth
Arlington
Terrell
Benbrook
Kaufman
Mansfield
Burleson
Midlothian
Granbury
Alvarado
Waxahachie
Cleburne
N
30 mi
Google Earth
Image Landsat / Copernicus

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 Glady'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	Sangar	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, Ralpd 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

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.

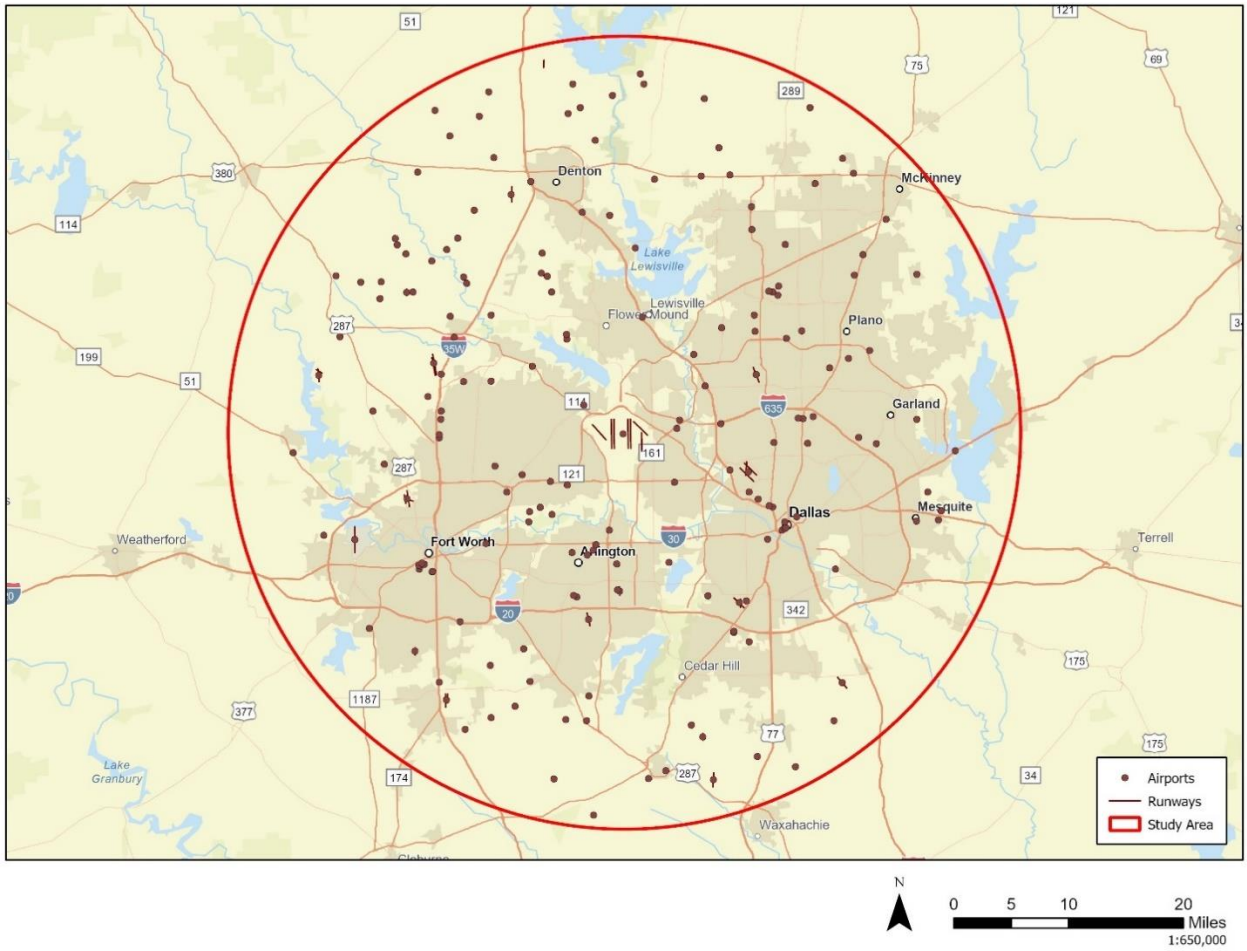
This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit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

Sincerely,

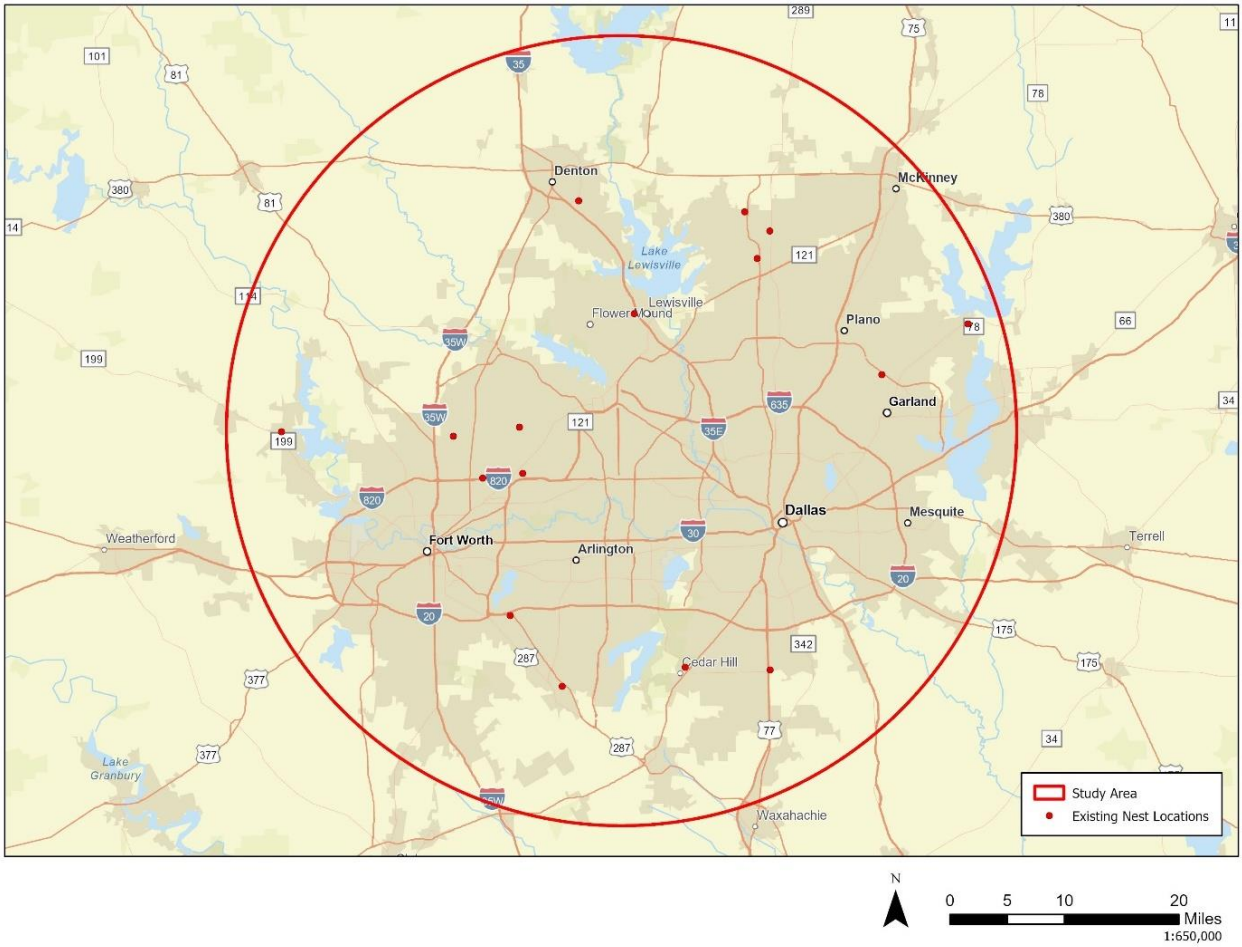
for Bradford Patterson
Chief Deputy State Historic Preservation Officer

Please do not respond to this email.

Appendix H
Dallas–Fort Worth Area Airports



Appendix I
Existing Nest Locations



Appendix J

Reasonably Foreseeable Effects (Cumulative Effects)

DFW Part 135 Operations – Reasonably Foreseeable Effects (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 operations[1] 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.

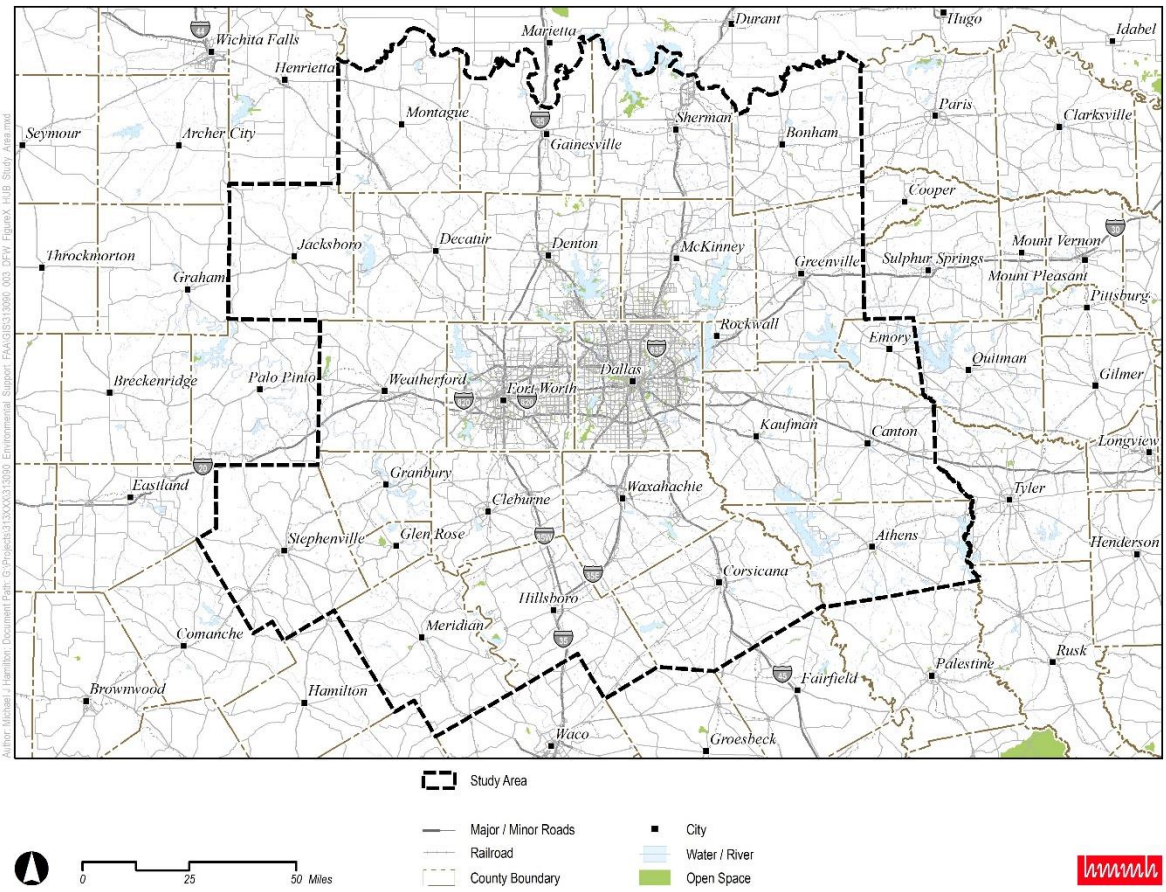


Figure 1. Geographic Study Area for Cumulative Effects in DFW Metro Area

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.

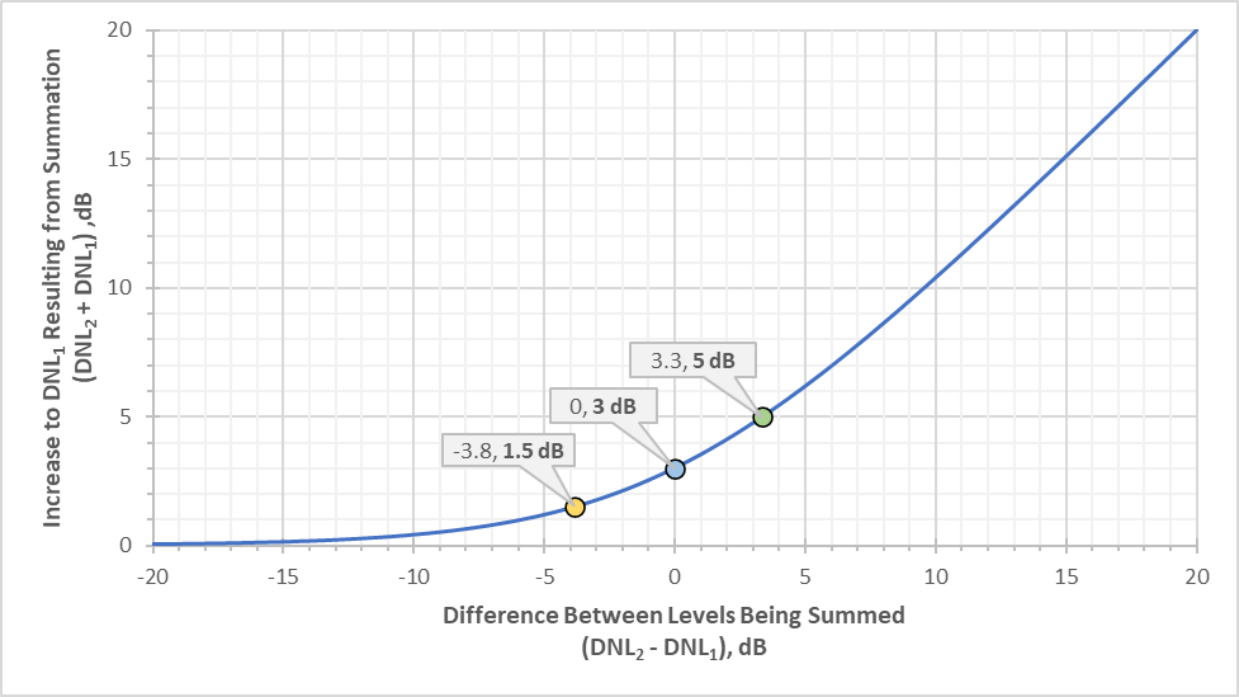


Figure 2. dB Increase Resulting from DNL Summation

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 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.

Appendix K

USFWS Section 7 ESA Consultation

U.S. Department of Transportation
Federal Aviation Administration

Aviation Safety

800 Independence Ave., SW.
Washington, DC 20591

Field Office Supervisor
U.S. Fish and Wildlife Service
Arlington Ecological Services Field Office
2005 NE Green Oaks Boulevard
Suite 140
Arlington, Texas 76006-6247
Submitted to: arles@fws.gov

SUBJECT: **Endangered Species Act Section 7 Consultation for Unmanned Aircraft Commercial Package Delivery Operations in Dallas-Fort Worth, Texas Area**

In accordance with Section 7 of the Endangered Species Act (ESA), the Federal Aviation Administration (FAA) is requesting U.S. Fish and Wildlife Service (USFWS) concurrence that the FAA's action of authorizing Wing Aviation LLC (Wing) to expand its unmanned aircraft (UA or drone) small package delivery operations in the Dallas-Fort Worth (DFW) metropolitan area ***may affect, but is not likely to adversely affect***, the tricolored bat (*Perimyotis subflavus*), golden-cheeked warbler (*Setophaga chrysoparia*), and whooping crane (*Grus americana*). Our biological evaluation is provided below, including a brief background, project description, identification of the action area, and a discussion of potential effects to ESA-listed species.

The FAA conducted Section 7 consultation with the USFWS for a similar undertaking in late 2023 when evaluating Wing's initial proposed operations in DFW Metro and surrounding area (**Reference: USFWS #2023-0022477)**. The USFWS concurred with the FAA's finding of ***may affect, but is not likely to adversely affect***, the golden-cheeked warbler (*Setophaga chrysoparia*) and whooping crane (*Grus americana*) for DFW operations by letter dated May 8, 2023.

Background

Wing currently operates under 14 Code of Federal Regulations (CFR) Part 135 from the DFW metro area, 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 applying to the FAA to add nest sites and expand operating hours included in its OpSpecs for Texas.

Project Description

Wing has requested the FAA amend the OpSpecs in Wing's Part 135 air carrier certificate to enable expansion of its commercial drone package delivery operations in the DFW metropolitan area (see **Figure 1**). Wing projects operating a maximum of 400 flights per operating day from each nest, 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 healthcare products and other 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 much less than 400 flights per day from each nest, and gradually ramp up to no more than 400 flights per day as consumer demand increases. The maximum potential number of total eventual operations per day would be 30,000[1]. 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 18 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 Test (GeoBITs) because of their similarity to the FitBIT stationary hover flight over the nest.

Wing is proposing to disperse nests throughout the operational area (**Figure 1**), each located in a commercial area, such as a shopping center, large retailer, shopping mall, etc. Each nest would house up to two dozen aircraft on charging 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 developed with Wing's partners and continuing best practices from Wing's established community outreach program. The proposed operations would occur from 6:00am to 10:00pm for 7 days of the week, including holidays. The first hour of the operating window is reserved for flight capability checks and UAs would only leave the nest from 7:00am to 10:00pm

Unmanned Aircraft

The primary UAs used for the proposed operations are Wing's Hummingbird 7000W-B and 8000-A models. Specifications of these models are as follows:

- Hummingbird 7000W-B.
    - Multi-rotor design with 16 round diameter propellers (**Figure 1**).
    - 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.
- 8000-A.
    - Multi-rotor design with 12 round diameter propellers (**Figure 2**).
    - 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.

Flight Operations

[1] 400 Ops*75 Nests per day

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 and lower a package to the ground by 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 is associated with a nest location, and Wing's software automatically assigns, deconflicts, and routes each flight. Each nest site would have access to 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 is cleared for takeoff at 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 to a delivery point on a predefined flight path. During this flight phase, the UA will typically operate at an altitude of 150–300 feet AGL and a typical airspeed of 51 knots.

Delivery

The delivery phase consists of descent from the en route altitude to a delivery point to deliver a package. 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 dropping the package and then proceeds to climb vertically back to en route altitude.

En Route Inbound

The UA continues to fly at an altitude of 150–300 feet AGL and a speed of 51 knots 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 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 above.

Predicted Sound Levels

The FAA conducted a noise analysis using sound level measurement data for the UA— the Hummingbird 7000W-B and 8000-A. Generally, the 7000W-B generates larger sound levels during takeoff and landing but lower sound levels during transit than the 8000-A. The estimated maximum sound exposure level (SEL) for the takeoff and landing phases of flight of the 7000W-B is approximately 80.6 A-weighted decibels (dBA) at about 50 feet from the drone whereas the estimated maximum SEL for the same flight phases of the 8000-A is 79.0 dBA as shown in Tables 1–2 in the noise report (see **Attachment B** for the noise report). Both platforms generate similar noise at delivery, with the 7000W-B generating 83.4 dBA SEL and 8000-A generating 83.6 dBA (Tables 1-2, **Attachment B**). The maximum SEL for the en route phase of the 8000-A is approximately 62.0 dBA when the drone is flying 50 knots at 165 feet AGL and the maximum SEL for the en route phase of the 7000W-B with the same flight parameters is 56.5 dBA (Sections 4.1.4 and 4.2.4 in **Attachment B**). Predicted sound levels decrease as distances from the drone increase. The majority of en route flight operations will be conducted with the quieter 7000W-B platform, although the specific of distribution of operations between platforms would be variable based on payload, route, and demand characteristics.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area is defined as Wing's proposed operating area (see **Figure 1**). This area captures all possible flight routes to the delivery areas and where potential effects (e.g., visual, auditory, physical) to listed species could occur.

According to the Texas Parks and Wildlife Department (TPWD), the action area overlaps two natural regions or ecoregions: Cross Timbers (on the western portion of the action area) and Blackland Prairie (on the eastern portion of the action area) (TPWD 2023a). The following is a general description of each of these ecoregions in Texas; however, note that much of the land surface in the action area is highly urbanized, as it contains the cities of Dallas, Fort Worth, Arlington, Garland, Plano, Frisco, and Denton. Outside these cities, much of the land has been converted to agricultural fields. There are forest patches interspersed throughout the action area, particularly along drainages and near waterbodies.

- The Cross Timbers region in north and central Texas includes areas with high density of trees and irregular plains and prairies. Soils are primarily sandy to loamy. Rainfall can be moderate, but somewhat erratic, therefore moisture is often limiting during part of the growing season. Also known as the Osage Plains, it is the southernmost of three tallgrass prairies. It varies from savannah and woodland to the east and south, into shorter mixed-grass prairie to the west. As in the rest of the Great Plains, fire, topography, and drought-maintained prairie and established the location of woodlands (TPWD 2023b).
- The Blackland Prairies region is named for the deep, fertile black soils that characterize the area. Blackland Prairie soils once supported a tallgrass prairie dominated by tall-growing grasses such as big bluestem, little bluestem, Indiangrass, and switchgrass. Because of the fertile soils, much of the original prairie has been plowed to produce food and forage crops. The landscape is gently rolling to nearly level, and elevations range from 300 to 800 feet above sea level. Crop production and cattle ranching are the primary agricultural industries (TPWD 2023b).

ESA-Listed Species and Critical Habitat in the Action Area

The FAA acquired the Official Species List (see **Attachment A**) from the USFWS Information for Planning and Conservation (IPaC) online system to identify ESA-listed species and designated critical habitat in the action area (**Table 1**). The action area contains proposed designated critical habitat for the Texas

fawnsfoot (*Truncilla macrodon*).

Table 1. ESA-Listed and Candidate Species Potentially Present in the Action Area

Common Name	Scientific Name	ESA Status
Mammals		
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered
Birds		
Golden-cheeked warbler	*Setophaga chrysoparia*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Whooping crane	*Grus americana*	Endangered
Reptiles		
Alligator Snapping Turtle	*Macrochelys temminckii*	Proposed Threatened
Clams		
Texas fawnsfoot	*Truncilla macrodon*	Proposed Threatened
Texas heelsplitter	*Potamilus amphichaenus*	Proposed Endangered
Insects		
Monarch butterfly	*Danaus plexippus*	Candidate

The Official Species List states that the piping plover and red knot only need to be considered for wind energy projects. Since the action is not a wind energy project, these two species are not considered further.

Potential Effects of the Action on ESA-Listed Species and Critical Habitat

The action does not include any ground construction or habitat modification. During nominal operations, the UA would not touch the ground except at the nests, which would be located in commercial areas, such as shopping centers. The action would not result in any physical disturbance to habitat. Therefore, the proposed action does not have the potential to affect the Texas fawnsfoot critical habitat. The FAA has determined the action would have *no effect* on Texas fawnsfoot critical habitat.

UA noise and the potential for airborne strikes with flying species are the action's potential stressors or threats to ESA-listed species. Flight operations would take place mostly in an urban environment, within airspace, and typically remain well above the tree line while en route to and from a nest. The duration of exposure by wildlife on the ground to visual or noise impacts from the UA would be of very short duration (approximately 30 seconds during takeoff/landing and delivery and a few seconds during the en route phase).

As noted above and shown in **Attachment B**, the highest estimated average SEL associated with Wing's proposed operations is 83.6 dBA, which would occur during delivery operations. For reference, the sound level of a diesel truck at 50 feet or a noisy urban environment during the day is approximately 80 to 90 dBA. The highest SEL on the ground when either UA is flying in the en route phase at an altitude of 165 feet AGL is estimated to be around 62.0 dBA, which is comparable to the sound of an air conditioning unit at 100 feet (60 dB).

A noise descriptor for noise effects on wildlife has not been universally adopted, but some research indicates SEL is the most useful predictor of responses. Characteristic of the bulk of research to date has been lack of systematic documentation of the source noise event. Many studies report "sound levels" without specifying the frequency spectrum or duration. A notable exception is a study sponsored by U.S. Air Force that identifies SEL as the best descriptor for response of domestic turkey poults to low-altitude

aircraft overflights (Bradley et al. 1990). This study identified a threshold of response for disturbance of domestic turkeys ("100 percent rate of crowding") as SEL 100 dB. None of the predicted sound levels for the different flight phases exceed SEL 83.6 dB.

The following paragraphs describe the anticipated effects of the action on the ESA-listed species listed in Table 13

Tricolored Bat

The tricolored bat typically uses trees, caves, or manmade structures for roosting and forages for insects during dusk, nighttime, and dawn time periods. Tricolored bats emerge early in the evening and forage at treetop level or above but may forage closer to ground later in the evening. This species exhibits slow, erratic, fluttery flight while foraging and are known to forage most commonly over waterways and forest edges (USFWS 2023a). This species spends six to nine months per year hibernating in caves or mines (TPWD 2023c). The USFWS has proposed to list the tricolored bat as an endangered species, primarily due to white-nose syndrome.[2] Other factors that influence the tricolored bat's viability include wind-energy-related mortality, habitat loss, and effects from climate change.

Suitable habitat for tricolored bat roosting and feeding in the action area includes wooded areas, open water habitat, and manmade structures. Based on current data from the North American Bat Monitoring Program (USGS 2023), there is a low probability of a tricolored bats occurring in the action area, particularly in the urban environment where nests would be located and deliveries would occur (see **Figure 3**). Nests would be located in commercial areas and therefore not within suitable habitat for tricolored bats.

Tricolored bats at roost or in flight could experience UA noise during the en route and delivery flight phases. Bats foraging at or near the tree line at the time a UA flies by would experience the greatest sound levels. Roosting bats or bats foraging near the ground at the time a UA flies by would experience lower sound levels. 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). Given the estimated sound levels of the UA, the UA's linear flight profile to and from nests and delivery locations, the short period of time the UA would be in any particular location, and the low probability of encountering an individual tricolored bat in the action area, UA noise is not expected to adversely affect tricolored bats. Any increase in ambient sound levels caused by the UA's flight would only last a few seconds during the en route phase and approximately 30 seconds during a delivery.

Bats could also be struck by a drone, particularly during nighttime delivery operations while bats are foraging. Given the bat's ability to avoid flying into objects, the short period of time the UA would be in any one place, and the low probability of encountering a tricolored bat during operations, the likelihood of the UA striking a bat is discountable.

Based on 1) operations occurring mostly in an urban environment, 2) the altitude at which the UA flies in the en route phase (150–300 feet AGL), 3) the expected low sound levels experienced by a bat, 4) any increase in ambient sound levels would be short in duration, 5) the low probability of a tricolored bat occurring in the action area, and 6) the low likelihood of the UA striking a bat, the FAA has determined the action ***may affect, but is not likely to adversely affect,*** the tricolored bat. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated).

Golden-cheeked Warbler

Golden-cheeked warblers are insectivores that typically forage in forest habitats. Its entire nesting range is currently confined to habitat in 33 counties in central Texas; a portion of one of these counties (Johnson County) is located in the southwest section of the action area. Golden-cheeked warblers prefer mature ashe juniper (*Juniperus ashei*) trees mixed with hardwood trees as nesting and foraging sites (preferring forested tracts greater than 12 acres). Many woodlands that were once present in the action have been cleared for urbanization and agriculture. The golden-cheeked warbler is listed under the ESA primarily due to habitat loss and fragmentation, since they have specific nesting habitat requirements (USFWS 2023b; TPWD 2023d).

The action does not involve ground disturbance or vegetation removal and therefore would not physically impact any golden-cheeked warbler suitable habitat. If present in the action area, golden-cheeked warblers could experience UA noise during the en route and delivery flight phases. Birds resting or foraging at or near the tree line at the time a UA flies by would experience the greatest sound levels. Birds near the ground at the time a UA flies by would experience lower sound levels. Given the estimated sound levels of the UA, the UA's linear flight profile to and from nests and delivery locations, the low probability of encountering an individual warbler in the action area based on the counties they nest in, and the short period of time the UA would be in any particular location, UA noise is not expected to adversely affect golden-cheeked warblers. Further, the chances of any one individual experiencing multiple overflights of a UA are low given the mobility of the birds. One study found that, in most instances, drones within 4 meters of birds did not cause a behavioral response (Vas et al. 2015). In another study, drones barely elicited behavioral responses in terrestrial mammals (Mulero-Pázmány et al. 2017).

Golden-cheeked warblers could be struck by a UA in flight when foraging above treetops or in flight between foraging sites or during migration. The risk of a strike is low given the species' ability to fly and avoid the UA, as well as the low probability of encountering a golden-cheeked warbler during drone deliveries. Additionally, Wing has reported that there has never been a bird strike with its drones in the United States.

Based on 1) operations occurring mostly in an urban environment, 2) the altitude at which the UA flies in the en route phase (150–300 feet AGL); 3) the expected low sound levels experienced by a golden-cheeked warbler, 4) any increase in ambient sound levels would be short in duration, 5) the low probability of a golden-cheeked warbler occurring in the action area, and 6) the low likelihood of the UA striking a warbler, the FAA has determined that the action ***may affect, but is not likely to adversely affect,*** the golden-cheeked warbler. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated).

Whooping Crane

Whooping cranes use a variety of habitats, including wetlands, estuaries, pastures, agricultural fields, and shallow areas of open water habitats. They are omnivores that eat a variety of food including insects, reptiles, rodents, fish, small birds, mollusks, crustaceans, and berries. Whooping cranes breed in northwest Canada and migrate south and winter in Texas, primarily in the Aransas National Wildlife Refuge located on the Gulf coast (TPWD 2023e). The whooping crane is listed under the ESA primarily due to hunting pressures and habitat loss (USFWS 2023c; Cornell 2023). Suitable foraging habitat in the action area includes shallow areas of open water habitats, marshes, pastures, and agricultural fields.

The whooping crane may occur in the action area in the spring or fall months as it migrates to and from its breeding grounds in Canada and wintering grounds at the Aransas National Wildlife Refuge. The

majority of migrant crane observations in Texas occur in the spring from March 19 – April 30 and fall from October 20 – November 24 (Pearse et al. 2020). The crane may use habitat (e.g., agricultural fields) in the action area as a stopover site to feed or rest during migration.

The action does not include ground disturbance and therefore would not physically impact potential foraging or resting habitat. If present in the action area during operations, whooping cranes could experience en route noise. Given the estimated sound levels of the UA, the UA's linear flight profile to and from nests and delivery locations, the low probability of encountering an individual whooping crane during operations, and the short period of time the UA would be in any particular location, UA noise is not expected to adversely affect whooping cranes. Further, the chances of any one individual experiencing multiple overflights of a UA are low given the mobility of the birds. One study found that, in most instances, drones within 4 meters of birds did not cause a behavioral response (Vas et al. 2015).

Whooping cranes could be struck by a drone when in flight. The risk of a strike is low given the crane's limited occurrence in the action area and the crane's ability to fly and avoid the UA. Additionally, Wing has reported that there has never been a bird strike with its drones in the United States.

Based on 1) operations occurring mostly in an urban environment, 2) the altitude at which the UA flies in the en route phase (150–300 feet AGL); 3) the expected low sound levels experienced by a whooping crane, 4) any increase in ambient sound levels would be short in duration, 5) the low probability of a whooping crane occurring in the action area, and 6) the low likelihood of the UA striking a whooping crane, the FAA has determined that the action ***may affect, but is not likely to adversely affect,*** the whooping crane. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated).

Texas fawnsfoot

The Texas fawnsfoot is a freshwater mussel that is endemic to Texas and found in the three river drainages: Colorado, Brazos, and Trinity. The action does not involve any ground-disturbing activities or activities within Texas fawnsfoot habitat. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the Texas fawnsfoot.

Texas heelsplitter

The Texas heelsplitter is a freshwater mussel that is endemic to Texas and found in the three river drainagess: Trinity, Neches, and Sabine. The action does not involve any ground-disturbing activities or activities within Texas heelsplitter habitat. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the Texas heelsplitter.

Alligator Snapping Turtle

The alligator snapping turtle 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 action does not involve any ground-disturbing activities or activities within alligator snapping turtle habitat. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the alligator snapping turtle.

Monarch Butterfly

The monarch butterfly is a candidate for federal listing. The primary threat to monarch butterflies is habitat loss, including the loss of breeding, migratory, and overwintering habitat. Pesticide use and climate change are also threats. While portions of the action area may contain potential summer breeding habitat, the entirety of Texas is within the migration path of monarch butterflies flying back and forth to wintering grounds in Mexico (TPWD 2023f).

The action would not physically affect monarch butterfly habitat or host plants. Monarch butterflies could be struck by drones en route to and from delivery; however, strikes are not likely given the species' mobility. Information regarding drone impacts on insects is limited, and there have been no widespread negative impacts identified in the scientific literature. Based on the information available and the limited scale of operations, the action is not expected to adversely affect the monarch butterfly.

Conclusion

Based on the analysis above, the FAA has determined the action ***may affect, but is not likely to adversely affect***, the tricolored bat, golden-cheeked warbler, and whooping crane. The FAA appreciates your review of the proposed project and requests your concurrence with our effects determinations for these three species within 30 days if possible. If you have any questions, please contact Dr. Shelia Neumann at 9-faa-drone-environmental@faa.gov.

Sincerely,

_____

Derek Hufty

Manager, General Aviation and Commercial Branch (AFS-750)

Emerging Technologies Division

Office of Safety Standards, Flight Standards Service

Attachments: Figure 1. Action Area
Figure 2. Hummingbird Unmanned Aircraft
Figure 3. Tricolored Bat Mean Occupancy Probabilities
Attachment A. USFWS Official Species List
Attachment B. Noise Assessment Report

References

Bradley, F., C. Book, and A.E. Bowles. 1990. Effects of Low-Altitude Aircraft Overflights on Domestic Turkey Poults. Report No. HSD-TR-90-034, U.S. Air Force Systems Command, Noise and Sonic Boom Impact Technology Program, June.

Cornell University. 2023. Whooping Crane Life History. The Cornell Lab – All About Birds. Available: https://www.allaboutbirds.org/guide/Whooping_Crane/lifehistory#nesting. Accessed: March 14, 2023.

Pearse, A.T., K.L. Metzger, D.A. Brandt, M.T. Bidwell, M.J. Harner, D.M.Baasch, and W. Harrell. 2020. Heterogeneity in migration strategies of whooping cranes. *The Condor* 122:1–15.

TPWD (Texas Parks and Wildlife Department). 2023a. Ecoregions of Texas – Map. Available: https://tpwd.texas.gov/publications/pwdpubs/pwd_pl_w7000_1187a/media/1.pdf. Accessed: March 14, 2023.

TPWD. 2023b. Texas Ecoregions. Available: https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions. Accessed: March 14, 2023.

TPWD. 2023c. Tricolored Bat (*Perimyotis subflavus*). Available at: https://tpwd.texas.gov/huntwild/wild/species/easpip/. Accessed: March 14, 2023.

TPWD. 2023d. Golden-cheeked Warbler. Available: https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_w7000_0013_golden_cheeked_warbler.pdf. Accessed: March 14, 2023.

TPWD. 2023e. Whooping Crane (*Grus americana*). Available: https://tpwd.texas.gov/huntwild/wild/species/whooper/. Accessed: March 14, 2023.

TPWD. 2023f. The Monarch Butterfly & Other Insect Pollinators. Available at: https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/texas_nature_trackers/monarch/. Accessed: March 14, 2023.

USFWS (U.S. Fish and Wildlife Service). 2023a. Tricolored Bat. Available at: https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus. Accessed on March 14, 2023.

USFWS. 2023b. Golden-cheeked Warbler (*Setophaga chrysoparia*). Environmental Conservation Online System. Available: https://ecos.fws.gov/ecp/species/33. Accessed: March 14, 2023.

USFWS. 2023c. Whooping Crane. Available: https://www.fws.gov/species/whooping-crane-grus-americana. Accessed: March 14, 2023.

USGS (U.S. Geological Survey). 2023. NABat Status and Trends. 2019 Occupancy Map for Tricolored Bat (*Perimyotis subflavus*). Available: https://sciencebase.usgs.gov/nabat/#/results. Accessed: March 14, 2023.

Vas, E., A. Lescroel, O. Duriez, G. Boguszewski, and D. Gremillet. 2015. Approaching Birds with Drones: First Experiments and Ethical Guidelines. Biology Letters (The Royal Society).

Mulero-Pázmány, M., S. Jenni-Eiermann, N. Strebel, T. Sattler, J. José Negro, and Z. Tablado. 2017. Unmanned Aircraft Systems as a New Source of Disturbance for Wildlife: A Systematic Review. *PloS One* 12 (6).

Figure 1. Action Area

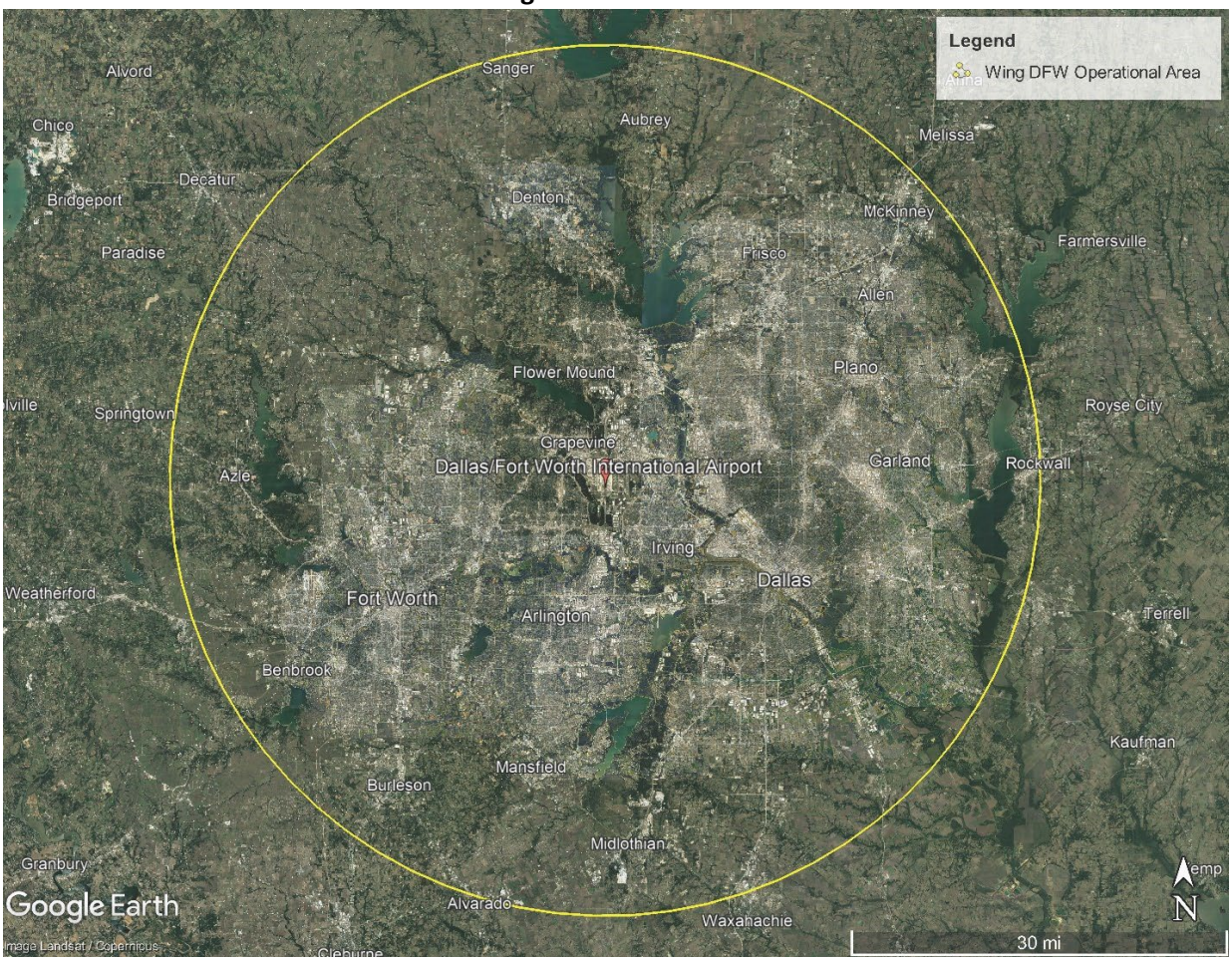
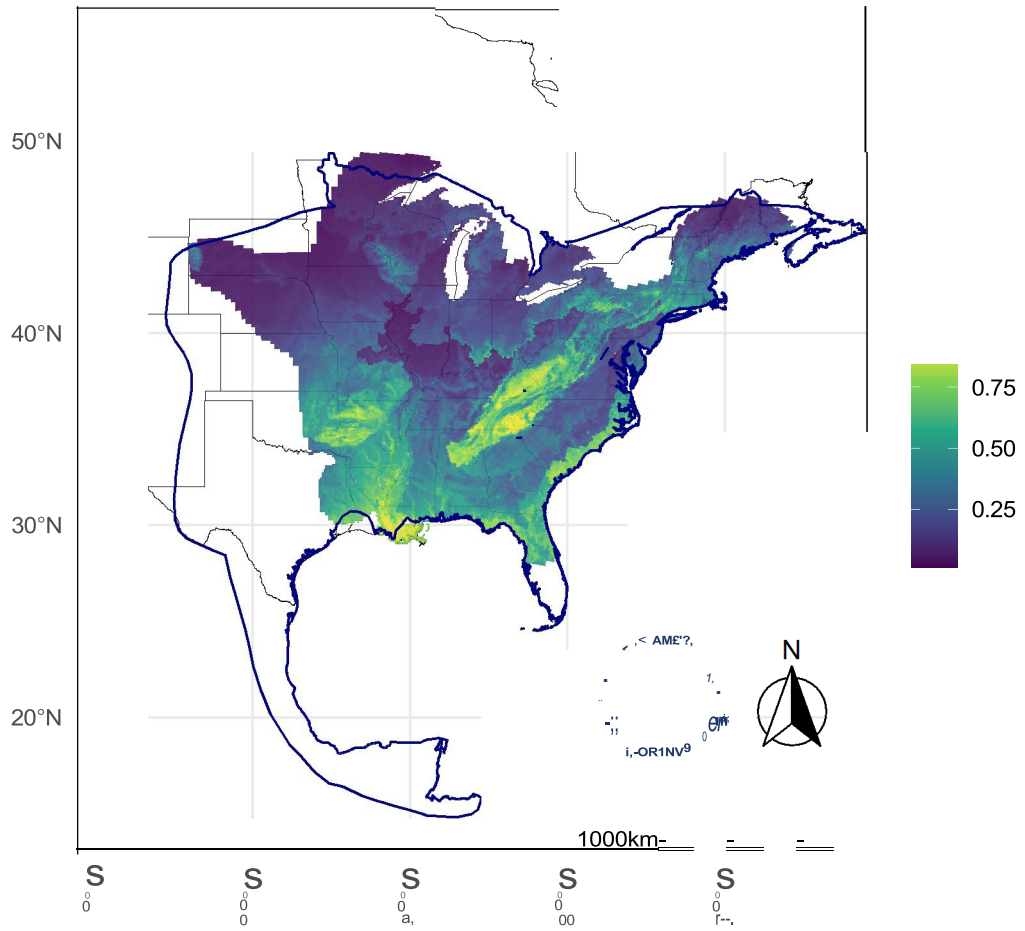


Figure 2. Wing Hummingbird Unmanned Aircraft with Package Attached

Figure 3. Tricolored Bat Mean Occupancy Probabilities



Perimyotis subflavus (PESU) mean occupancy probabilities (color bar) predicted in each NABat grid cell in the modeled species range for 2019. Probabilities are depicted against the reference range map (blue polygon; M. Turner written communication, August 20, 2021) and borders of U.S. states and Canadian provinces/territories.

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Attachment A. USFWS Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arlington Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
Phone: (817) 277-1100 Fax: (817) 277-1129
Email Address: arles@fws.gov

In Reply Refer To: 10/22/2024 21:38:41 UTC
Project Code: 2024-0103189
Project Name: Wing, Inc. DFW Supplemental EA

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, which may occur within the boundary of your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under section 7(a)(1) of the Act, Federal agencies are directed to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Under and 7(a)(2) and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether their actions may affect threatened and endangered species and/or designated critical habitat. A Federal action is an activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency (50 CFR 402.02).

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For Federal actions other than major construction activities, the Service suggests that a biological evaluation (similar to a Biological Assessment) be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

After evaluating the potential effects of a proposed action on federally listed species, one of the following determinations should be made by the Federal agency:

1. *No effect* - the appropriate determination when a project, as proposed, is anticipated to have no effects to listed species or critical habitat. A "no effect" determination does not require section 7 consultation and no coordination or contact with the Service is necessary. However, the action agency should maintain a complete record of their evaluation, including the steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information.
2. *May affect, but is not likely to adversely affect* - the appropriate determination when a proposed action’s anticipated effects to listed species or critical habitat are insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and should never reach the scale where "take" of a listed species occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable effects to occur. This determination requires written concurrence from the Service. A biological evaluation or other supporting information justifying this determination should be submitted with a request for written concurrence.
3. *May affect, is likely to adversely affect* - the appropriate determination if any adverse effect to listed species or critical habitat may occur as a consequence of the proposed action, and

the effect is not discountable or insignificant. This determination requires formal section 7 consultation.

The Service has performed up-front analysis for certain project types and species in your project area. These analyses have been compiled into *determination keys*, which allows an action agency, or its designated non-federal representative, to initiate a streamlined process for determining a proposed project's potential effects on federally listed species. The determination keys can be accessed through IPaC.

The Service recommends that candidate species, proposed species, and proposed critical habitat be addressed should consultation be necessary. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found at: https://www.fws.gov/service/section-7-consultations

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (https://www.fws.gov/library/collections/bald-and-golden-eagle-management). Additionally, wind energy projects should follow the wind energy guidelines (https://www.fws.gov/media/land-based-wind-energy-guidelines) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation. The Federal Aviation Administration (FAA) released specifications for and made mandatory flashing L-810 lights on new towers 150-350 feet AGL, and the elimination of L-810 steady-burning side lights on towers above 350 feet AGL. While the FAA made these changes to reduce the number of migratory bird collisions (by as much as 70%), extinguishing steady-burning side lights also reduces maintenance costs to tower owners. For additional information concerning migratory birds and eagle conservation plans, please contact the Service's Migratory Bird Office at 505-248-7882.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in

the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
(817) 277-1100

PROJECT SUMMARY

Project Code: 2024-0103189
Project Name: Wing, Inc. DFW Supplemental EA
Project Type: Drones - Use/Operation of Unmanned Aerial Systems
Project Description: 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), which allows holders to conduct on-demand cargo delivery operations, and a 49 United States Code (U.S.C.) Section 44807 exemption, 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). 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. Wing is currently authorized to conduct package delivery operations from 25 "nests" 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.

Wing is 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 total commercial 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 commercial areas, such as shopping centers, large individual retailers, and shopping malls. Wing would maintain its total number of daily operations per nest of 400 flights 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 (referred to as 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.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@32.89817435,-97.03547863604336,14z

Counties: Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Golden-cheeked Warbler *Setophaga chrysoparia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/33	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

REPTILES

NAME	STATUS
Alligator Snapping Turtle *Macrochelys temminckii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4658	Proposed Threatened

CLAMS

NAME	STATUS
Texas Fawnsfoot *Truncilla macrodon* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8965	Threatened
Texas Heelsplitter *Potamilus amphichaenus*	Proposed Endangered

NAME	STATUS

There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/299

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

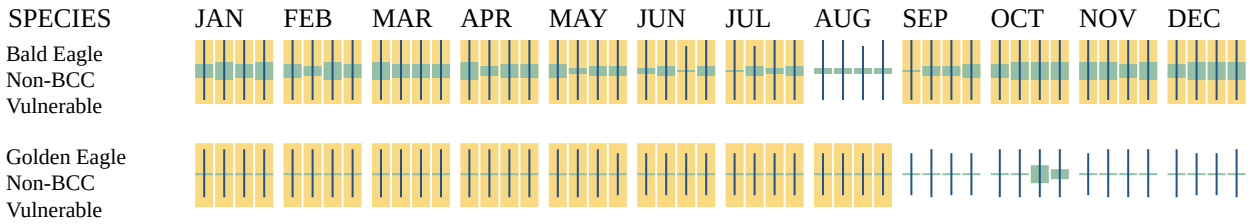
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort – no data



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10561	Breeds elsewhere
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Henslow's Sparrow *Centronyx henslowii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds elsewhere
Kentucky Warbler *Geothlypis formosa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Least Tern *Sternula antillarum antillarum* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11919	Breeds Apr 25 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Little Blue Heron *Egretta caerulea* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9477	Breeds Mar 10 to Oct 15
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere

NAME	BREEDING SEASON
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

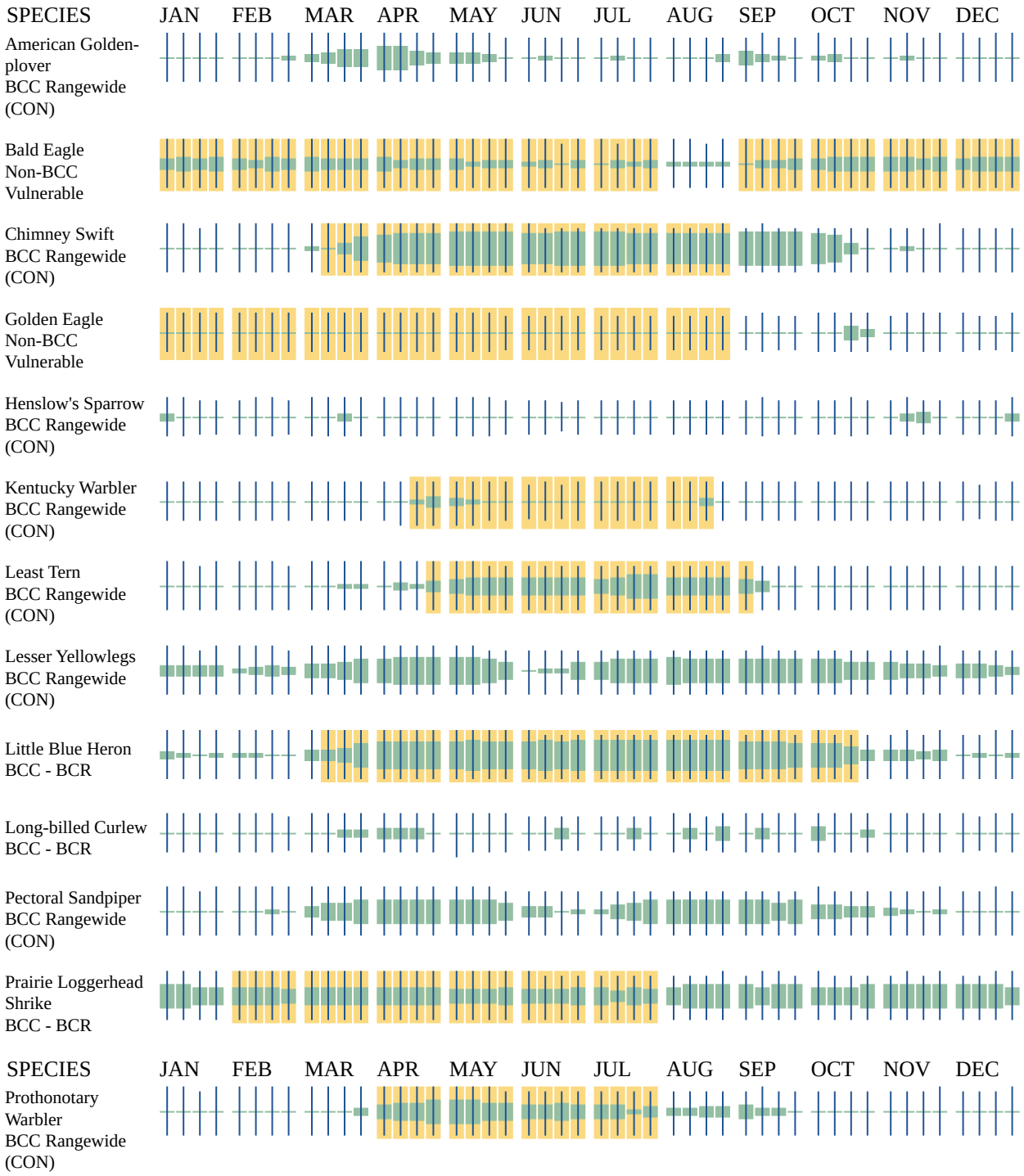
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

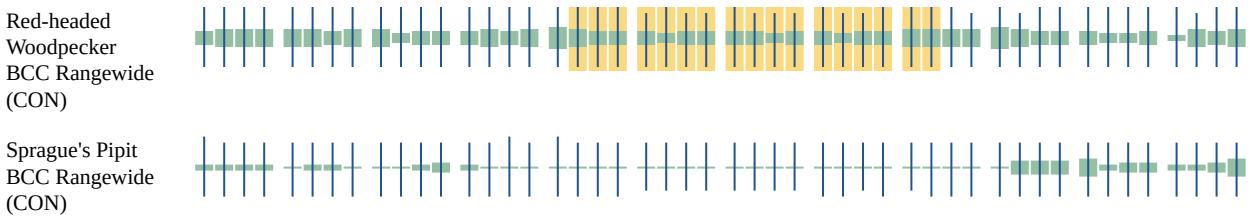
Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

probability of presence | breeding season | survey effort | no data





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

FRESHWATER EMERGENT WETLAND

- PEM1/SS1Fh
- PEM1/UBFh
- PEM1/AB4Fx
- PEM1/SS1A
- PEM1/FO1A
- PEM1/FO1Ch
- PEM1/AB3Fx
- PEM1/FO1Ah

- PEM1/FO1Cx
- PEM1/SS1Ah
- PEM1A
- PEM1/AB3Fh
- PEM1/UBFx
- PEM1/SS1C
- PEM1/SS1Ch
- PEM1/UBF
- PEM1/FO1C
- PEM1/AB4Fh
- PEM1/ABFx
- PEM1/SS1Cx

FRESHWATER POND

- PAB4/SS1Fh
- PAB4Hh
- PAB4H
- PAB4Fh
- PAB4/UBFh
- PAB4Fx
- PAB4F
- PABHh
- PAB4Hx
- PAB4/FO1F
- PAB3Fx
- PAB3/EM1F
- PAB3/UBHh
- PAB/UBFh
- PAB3/SS1Fh
- PAB/UBFx
- PAB4/EM1Fh
- PAB3Fh
- PAB/UBKx
- PAB4/EM1F
- PAB3/EM1Fh
- PAB3/EM1Fx
- PAB3F

- PAB3Hh

LAKE

- L2USCx
- L2USAh
- L1UBH
- L1UBHh
- L1UBHx
- L2AB4Fh
- L2UBHx
- L2USA
- L2UBFh
- L2UBFx
- L2UBHh
- L2AB4Hh
- L2USC
- L2UBKx
- L2AB/UBFh
- L1AB4Hh
- L2AB3Fh
- L2USCh

IPAC USER CONTACT INFORMATION

Agency: Federal Aviation Administration
Name: Robert Baldwin
Address: 1902 Reston Metro Plaza
City: Reston
State: VA
Zip: 20190
Email robert.baldwin@icf.com
Phone: 3123167050

Attachment B. Noise Assessment Report

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

November 2024

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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

Chapter 1
Introduction

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, autoload of package at a nest, and takeoff
- Nearfield launch, autoload 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.

Chapter 2
Methods

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 autoload at an offsite location
- Nearfield launch and package autoload 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., Vcruise) 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., Vcruise) 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 SEL[1]	Delivery, dBA SEL[2]	Return to Nest and Landing, dBA SEL[3]
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 SEL[1]	Nearfield Launch and Autoload, dBA SEL[1]
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 autoload, or nearfield autoload (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 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	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 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	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 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	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 Point[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	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 Point[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	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 Point[1]	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
References

AvEnviro Acoustics. 2024a. *Environmental Noise Assessment: Wing Model 7000W-B Revision D.*

AvEnviro Acoustics. 2024b. *Environmental Noise Assessment: Wing Model 8000-A Revision C.*

Code of Federal Regulations (CFR). *Noise Standards: Aircraft Type and Airworthiness Certification.* Available: https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-36. Accessed: July 23, 2024.

Federal Aviation Administration (FAA). 2015. Order 1050.1F. *Environmental Impacts: Policies and Procedures*. Appendix B. Available: https://www.faa.gov/documentLibrary/media/Order/FAA_Order_1050_1F.pdf#page=113 Accessed: July 23, 2024.

Federal Aviation Administration (FAA) Office of Environment and Energy. 2023. Drone Team, AEE-100. *Measuring Drone Noise for Environmental Review Process*. Draft Measurement Protocol for Applications for EA Noise Analysis V05, PowerPoint Presentation, October 2023.

Harris Miller Miller and Hanson. 2023. *Noise Assessment for Wing Aviation Proposed Package Delivery Operations with Hummingbird 7000W-B Unmanned Aircraft*, prepared March 17, 2023.

ICF International. 2024. *Noise Modeling for the Technical Noise Study Report: Hummingbird 7000W-B and 8000-A Unmanned Aircraft Package Delivery Operations.* Dallas-Fort Worth, TX. Prepared for the Federal Aviation Administration.

Wing Aviation LLC. 2024. Description of Proposed Action and Alternatives, Supplemental EA for Package Delivery Operations for Dallas-Fort Worth Metro.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal and Central Plains Ecological Services Office
Fort Worth Sub-Office
3233 Curtis Drive
Fort Worth, Texas 76116
PHONE: 817/277-1100

In Reply Refer To:
2024-0103189

December 3, 2024

Derek Hufty
Manager, General and Commercial Branch (AFS-750)
Emerging Technologies Division
Office of Safety Standards, Flight Standards Service
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

RE: Endangered Species Act Section 7 Consultation for Unmanned Aircraft Commercial Package Delivery Operations in Dallas-Fort Worth, Texas Area

Dear Mr. Hufty:

Thank you for your November 21, 2024 letter requesting consultation pursuant to section 7 of the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1544) (Act). Your letter includes a Biological Evaluation (BE) of the proposed expansion to unmanned aircraft (UA) commercial package delivery operations conducted by Wing Aviation LLC (Wing) in the Dallas-Fort Worth (DFW) metropolitan area. The original project was submitted for consultation on April 20, 2023 and a concurrence letter was issued May 8, 2023 (#2023-0022477). The BE concluded that the proposed action would have no effect on the Texas fawnsfoot (*Truncilla macrodon*), Texas heelsplitter (*Potamilus amphichaenus*), and alligator snapping turtle (*Macrochelys temminckii*), and may affect, but is not likely to adversely affect the tricolored bat (*Perimyotis subflavus*), golden-cheeked warbler (*Setophaga chrysoparia*), and whooping crane (*Grus americana*).

The purpose of the proposed action is to expand drone package delivery operations from up to 25 nests located in the DFW operating area to up to 75 nests (with up to 400 flights per day originating from each nest), and to expand the current operating hours. Each nest is to be located in a commercial area, such as a shopping center, large retailer, shopping mall, etc., and would house up to two dozen UAs on charging pads. Initially, Wing expects to fly much less than 400

flights per day from each nest, and gradually ramp up to no more than 400 flights per day as consumer demand increases. The maximum potential number of operations per day can eventually reach 30,000 flights (an increase of 20,000 flights). In addition, operations would include low altitude (<8 ft) in-nest hover checks 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 18 times per nest, per week, where the UA makes a separate hover flight to update the reference map of the nest. The new proposed operations would occur from 6:00 am to 10:00 pm seven days per week, including holidays, expanding the previous schedule of 7:00 am to 7:00 pm on primarily weekdays and generally excluding holidays. As such this schedule expands current operations to include nighttime flights (after the end of evening civil twilight).

The specific UA models to be used include Wing's Hummingbird 7000W-B and 8000-A. Both of these UAs have multi-rotor designs with wingspans of approximately 4.9 and 6 feet, respectively. The entire UA fleet for the DFW metroplex would likely be compromised of 70 to 80% 7000W-B models and 20 to 30% 8000-A. UAs use electric power from rechargeable lithium-ion batteries. Actions included in the proposed project that could affect listed species include the following:

- Unmanned aircraft flight operations within the DFW metropolitan area between nest and delivery sites, which include:
    - Takeoff
    - En route outbound
    - Delivery
    - En route inbound
    - Landing

UA would generally be operated at an altitude of 150 – 300 ft above ground level (AGL), and always below an altitude of 400 feet AGL while en route. At a delivery location, the UA would descend vertically to a stationary hover and lower a package to the ground by 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. Flights are automatically planned by Wing's flight planning software.

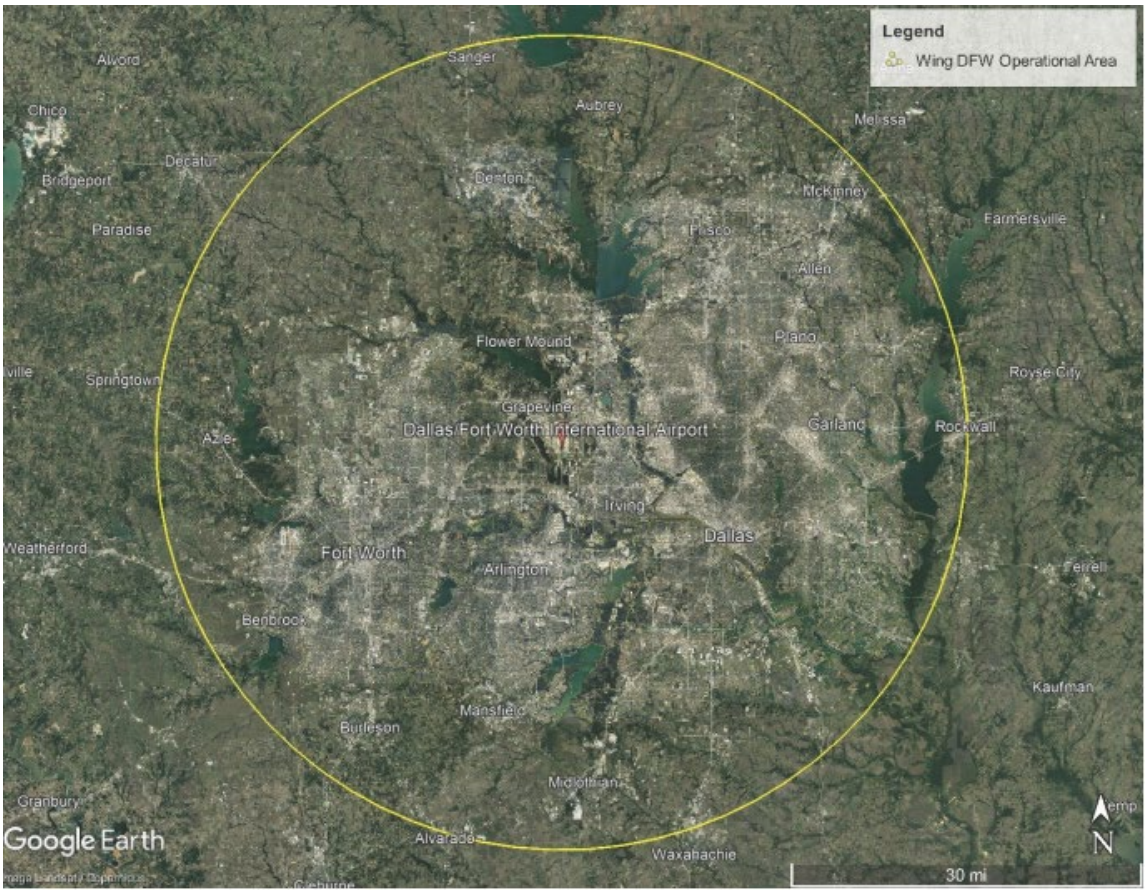

Figure 1. Wing DFW Operational Area, or the action area of the proposed project.

The Federal Aviation Administration (FAA) conducted a noise analysis using sound level measurement data for both UAs. Generally, the 7000W-B generates larger sound levels during takeoff and landing but lower sound levels during transit than the 8000-A. The estimated maximum sound exposure level (SEL) for the en route phase of the 8000-A is approximately 62.0 dBA when the drone is flying 50 knots at 165 feet AGL and the maximum SEL for the en route phase of the 7000W-B with the same flight parameters is 56.5 dBA. Both models generate similar noise at takeoff, landing, and delivery, approximately 80 dBA, a SEL similar to that of a "diesel truck at 50 feet or a noisy urban environment during the day." Predicted sound levels decrease as distances from the drone increase. The majority of en route flight operations will be conducted with the quieter 7000W-B platform, although the specific distribution of operations between platforms would be variable based on payload, route, and demand characteristics.

The endangered, threatened, proposed, and candidate species known to occur in the action area (Figure 1) are provided in Table 1. The piping plover (*Charadrius melodus*) and red knot (*Calidris canutus rufa*) were not considered, as consultation is only recommended for wind energy projects for these species. The action area contains designated critical habitat for the Texas fawnsfoot (*Truncilla macrodon*); however, the FAA determined the project would have no effect on the species because the action does not involve any ground-disturbing activities on or in the critical habitat area. The FAA also determined the action would have no effect on the

proposed endangered Texas heelsplitter and proposed threatened alligator snapping turtle. The evaluation of the action on the proposed endangered tricolor bat indicate any potential effects would be insignificant and discountable. Proposed species are not currently protected under the Act; however, conferencing is necessary if it is determined a federal action is likely to jeopardize the continued existence of a proposed species. Your BE does not indicate the need for conference on the proposed species. Candidate species are not afforded protection under the Act, but we suggest consideration of candidate species in project planning for the purpose of reducing impacts.

Table 1. ESA-listed and at-risk species potentially present in the Action Area.

Common Name	Scientific Name	ESA Status
Mammals		
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered
Birds		
Golden-cheeked warbler	*Setophaga chrysoparia*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Whooping crane	*Grus americana*	Endangered
Reptiles		
Alligator Snapping Turtle	*Macrochelys temminckii*	Proposed Threatened
Clams		
Texas fawnsfoot	*Truncilla macrodon*	Threatened
Texas heelsplitter	*Potamilus amphichaenus*	Proposed Endangered
Insects		
Monarch butterfly	*Danaus plexippus*	Candidate

We should note that there is currently a lack of information available on the potential effects of drone flights on the tricolored bat. While the proposed action is not expected to directly affect roosting habitat for the species and the majority of flight time would occur when bats are roosting, there are times when active/feeding tricolored bats, if present in the action area, could be exposed to drone activity. It is possible that the increased volume of flights per day may present an impact to the species. Should the tricolored bat be listed, you should re-evaluate the project to determine the extent of effects on the species. This evaluation should use the most current research and other information available regarding tricolored bats. If that evaluation indicates adverse effects would or are occurring on the species to an extent not previously considered, consultation should be reinitiated (as per re-initiation conditions #2 and 3 below). Additionally, measures should be implemented to avoid incidental take until consultation can be completed. The following measures should be considered to avoid incidental take:

- Determining the extent of tricolored bat presence in the action through acoustic surveys
- Restricting flight hours to daylight hours during non-hibernating season

For more information on tricolored bat acoustic surveys, please see the USFWS Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines at

https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

We would also like to take this opportunity to remind the FAA of its responsibilities under section 7(a)(1) of the Act, in which federal agencies shall, "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." Advancements in drone technology has led to the rise of commercial drone projects that present new challenges in evaluating potential impacts to at-risk species. The FAA has the opportunity to use its section 7(a)(1) responsibility to develop and implement long term procedures for monitoring and reporting potential effects of drone activity on tricolored bats. This could include a process for reporting survey data, detection of collisions, contingency planning in the event that adverse effects are reported, and developing agreements with research institutions to investigate the potential impacts of this emerging technology on at-risk species such as the tricolored bat. Our office would be happy to provide technical assistance in such efforts.

The golden-cheeked warbler is a small, insectivorous neo-tropical songbird. The breeding range for the species encompasses areas in North central Texas through the eastern and south-central portions of the Edwards Plateau. The breeding range for the species encompasses 35 counties in Texas, with Dallas and Johnson Counties as the only counties in the Action Area. A small number of golden-cheeked warblers have been reported during the breeding season in 2023 in Dallas County (Curtis 2023, entire). Golden-cheeked warblers breed exclusively in the mixed Ashe juniper/deciduous woodlands. These songbirds require the shredding bark produced by mature Ashe junipers (*Juniperus ashei*) for nest material. Breeding habitat has diminished due to juniper eradication programs and continuing urbanization in central Texas. The species suffers from cowbird parasitism, which may be increasing as habitat becomes fragmented. Human presence may deter warblers from utilizing adjacent habitat, cause them to abandon habitat, or otherwise disrupt normal breeding, feeding, or sheltering activities during the breeding season, thereby degrading suitable habitat. A recent study found no evidence that golden-cheeked warbler territory placement, productivity, song characteristics, or behavior was affected by highway construction or traffic noise in Austin, Texas (Long et al. 2017, p. 385). Based on "1) operations occurring mostly in an urban environment, 2) the altitude at which the UA flies in the en route phase (150–300 feet AGL); 3) the expected low sound levels experienced by a golden-cheeked warbler, 4) any increase in ambient sound levels would be short in duration, 5) the low probability of a golden-cheeked warbler occurring in the action area, and 6) the low likelihood of the UA striking a warbler," the FAA has determined that the action may affect, but is not likely to adversely affect, the golden-cheeked warbler. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated).

Whooping cranes currently exist in three wild populations and in captivity at 12 sites. There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas. The migratory corridor runs in an approximately straight line from northwest Canada through the Great Plains to overwinter on the Gulf Coast. The whooping crane breeds, migrates, winters, and forages in a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural

fields. Whooping cranes could be encountered at suitable stopover sites within the corridor during spring and fall migration. Although whooping crane migratory flights are generally at altitudes of between 1,000 and 6,000 feet, they fly at lower altitudes when seeking stop-over habitats such as reservoirs, large ponds, rivers, and wetlands. While cranes generally avoid areas with human activity present (e.g., roads, neighborhoods, etc.), suitable stopover habitat for the species may be present in the proposed project areas. Based on "1) operations occurring mostly in an urban environment, 2) the altitude at which the UA flies in the en route phase (150–300 feet AGL); 3) the expected low sound levels experienced by a whooping crane, 4) any increase in ambient sound levels would be short in duration, 5) the low probability of a whooping crane occurring in the action area, and 6) the low likelihood of the UA striking a whooping crane," the FAA has determined that the action may affect, but is not likely to adversely affect, the whooping crane. Any effects would be discountable or insignificant.

Based on the information provided within the BE, we concur with the determination that the project, as proposed may affect, but is not likely to adversely affect the golden-cheeked warbler and whooping crane pursuant to section 7 of the Act. Therefore, no further section 7 consultation will be required unless: 1) the identified action is subsequently modified in a manner that causes an effect on a listed species or designated critical habitat; 2) new information reveals the identified action may affect federally listed species or designated critical habitat in a manner or to an extent not previously considered; or 3) a new species is listed or a critical habitat is designated under the Act that may be affected by the identified action. If new effects are identified in the future, section 7 consultation may need to be reinitiated.

Please note that this guidance does not authorize bird mortality for species that are protected under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. sec.703-712). If you believe migratory birds will be affected by this activity, we recommend you contact our Migratory Bird Permit Office at P.O. Box 709, Albuquerque, NM 87103, (505) 248-7882.

Thank you for the opportunity to review and provide information on the proposed project. If you have any questions, please contact Melissa Althouse of my staff at melissa_althouse@fws.gov.

Sincerely,

Omar Bocanegra
Deputy Field Supervisor

S:\Correspondence\FY 2024\Project Files\2024-0103189 Wing, Inc DFW Supplemental EA\2024-0103189 Draft Concurrence Ltr 20241203.docx

Literature Cited

Curtis, B. 2023, May 3. Endangered Birds Native to Texas Return to Cedar Hill. NBC 5 Dallas-Fort Worth. https://www.nbcdfw.com/news/local/endangered-birds-native-to-texas-return-to-cedar-hill/3248898/

Long, A. M., Colón, M. R., Bosman, J. L., Robinson, D. H., Pruett, H. L., McFarland, T. M., Mathewson, H. A., Szewczak, J. M., Newnam, J. C., & Morrison, M. L. 2017. A before–after control–impact assessment to understand the potential impacts of highway construction noise and activity on an endangered songbird. Ecology and Evolution, 7(1), 379–389. https://doi.org/10.1002/ece3.2608

Appendix L

Public Comments and FAA Responses

Comment #1, Anna Dietrich, Policy Advisor, AUVSI

December 30, 2024

Federal Aviation Administration, Suite 802W
C/O AVS Environmental
800 Independence Ave SW
Washington, DC 20591
Attn: 9-faa-drone-environmental@faa.gov

RE: **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**

Association for Uncrewed Vehicle Systems International (AUVSI) Comment

The Association for Uncrewed Vehicle Systems International (AUVSI), the world's largest non-profit devoted exclusively to advancing the uncrewed systems and robotics community, supports the amendment by Wing Aviation, LLC (Wing) to its Part 135 Air Carrier Operation Specifications (OpSpec) to expand its package delivery operations to additional communities in the Dallas-Fort Worth (DFW) Metropolitan area. Having demonstrated over two years of successful, safe, and steadily expanding operations, Wing's request to increase its ability to serve communities in the Dallas-Fort Worth, TX area is in keeping with both the FAA's stated desire to be building a foundation for a nationwide approach to environmental assessments (EA) and the need to provide flexibility in an innovation-rich and highly beneficial UAS application.

Wing's operations to-date have been met with overwhelmingly positive feedback from the local residents and communities they serve. Representative of the cutting-edge technology and beneficial, innovative operations that characterize the UAS sector, these operations have previously received a Finding of No Significant Impact and continue to provide value to the communities they serve that far outweigh any potential adverse impacts, even in their expanded form. By adding "nests" and expanding the operating hours at these nests, service areas and hours can be increased and the (minimal) impact of operations can be aligned with the communities benefiting from those operations. Granting Wing's request results in expanded benefits and meeting the real community market demand for rapid delivery of both convenience and necessity items.

AUVSI supports the FAA's proposed action of amending Wing's Part 135 OpSpec to expand its package delivery operations. It is essential that the flexibility to grow based on successful operational experience be built into the FAA's process and that new information is allowed to supersede prior assumptions. Continued operational expansion allows for increased social, environmental, and commercial benefits within the DFW Metropolitan area. Thank you for the opportunity to comment.

Sincerely,

Anna Dietrich, Policy Advisor, AUVSI

FAA Response to Comment #1

Thank you for your comments.

Comment #2, John Glover

From: John Glover <johnfglover@gmail.com>
Sent: Saturday, December 14, 2024 11:53 AM
To: 9-FAA-Drone-Environmental (FAA) <9-FAA-Drone-Environmental@faa.gov>
Subject: Wing DFW Draft SEA – Public Comment on Noise, Environmental Impact, and Residential Disruption

Dear FAA Review Team,

I am writing to formally express my concerns about Wing Aviation's proposed expansion of drone operations in the Dallas-Fort Worth area, as outlined in the Draft Supplemental Environmental Assessment (SEA). These operations have already caused significant disruption to my household, my property, and the surrounding environment, which includes critical habitats for native bird populations; located at: 903 Shiprock Road, Frisco TX 75033.

Personal and Community Impacts

1. **Noise and Repeated Disruption**:
   Repeated drone flights over my residential property have had a considerable impact on my quality of life. The noise levels from these flights, often passing directly overhead, have disrupted my family's peace and, more importantly, disturbed my infant child's sleep patterns on multiple occasions. Our yard is our refuge in the big city. It's where we garden and find peace.
2. **Compounding Noise and Traffic Issues**:
   These drone operations contribute to an already burdensome level of air traffic in our area due to DFW Airport and Love Field. The additional noise from drones creates an asymmetrical impact, compounding the stress and disturbance for local residents. The increase in operational frequency will only intensify these cumulative effects.
3. **Privacy Concerns**:
   The low-altitude, predictable flight paths raise concerns about intrusion into my family's privacy. The persistent presence of drones flying over our property creates a sense of surveillance and disrupts our sense of security.

Environmental and Ecological Concerns

1. **Displacement of Protected Birds**:
   Our property is situated between creeks and greenbelt areas that serve as critical hunting grounds for native hawks and other birds of prey. These birds, protected under the **Migratory Bird Treaty Act (MBTA)**, are vital to maintaining ecological balance by controlling the local rodent population. However, the increased drone activity has noticeably disrupted their patterns, displacing them from these natural habitats. I have video of air traffic flying into their path.
2. **Rodent Population Imbalance**:
   As a result of the disruption to the hawk population, we have observed an increase in rodent activity on and around our property. This creates additional challenges for property maintenance and poses potential health and safety risks to residents.

Request for Immediate Mitigation

I respectfully urge the FAA and Wing Aviation to consider the following actions to mitigate the impact of these operations:

1. **Adjust Flight Paths**:
   Reroute drone operations away from my personal airspace and residential neighborhoods located in-between and around sensitive ecological areas such as greenbelts and creeks, which are critical for wildlife.
2. **Restrict Operational Hours**:
   Limit flight hours and number of trips over the same paths to minimize disruption to residential life. The deliveries seem to go and return the exact same way.
3. **Conduct Thorough Environmental Reviews**:
   The current Draft SEA does not sufficiently address the impact of drone operations on protected bird populations, cumulative noise levels, and the resulting ecological imbalance. I request that these impacts be evaluated more comprehensively.

Request for Non-Retaliation

I kindly request that no actions be taken by Wing Aviation, its partners, or any affiliated parties that could be construed as retaliatory in nature due to this communication. This includes maintaining or increasing the frequency of flights over my property or intensifying operations in my area. I am raising these concerns in good faith, and I trust the FAA and Wing Aviation will address them responsibly and collaboratively.

Further Action

I trust the FAA and Wing Aviation will consider these concerns thoughtfully and collaboratively. However, if these issues persist unaddressed, I will explore additional avenues, including:

- **Involving Local Authorities**: Advocating for zoning changes or ordinances to restrict drone operations over residential areas.
- **Environmental Reporting**: Filing formal complaints with the U.S. Fish and Wildlife Service to address disruptions to protected bird populations.
- **Legal Remedies**: Exploring legal options to mitigate nuisance and environmental impact on my property.

I urge the FAA to prioritize the well-being of affected residents and ecosystems in its decision-making process. Allowing such operations to proceed unchecked risks long-term harm to communities, wildlife, and the environment.

Thank you for considering my concerns. I look forward to your response and seeing meaningful actions to address these issues.

Sincerely,
John Glover
903 Shiprock Road, Frisco TX 75033
214.537.6185 (cell)
johnfglover@gmail.com

FAA Response to Comment #1

Thank you for your comments.

Personal and Community Impacts

- Associations between aviation noise and disruption to normal activity are key components in the establishment of FAA's residential noise impact thresholds defined in FAA Order 1050.1F. Use of the DNL 65 dB as the threshold for significant noise exposure is mandated by FAA Order 1050.1F and designed to account for sleep disturbance, speech interference, and annoyance among other factors (EPA 1974)[1]. As detailed in Section 3.7 of the Supplemental EA, the FAA has determined that the noise exposure levels resulting from the Proposed Action would not exceed the threshold of significance. See Appendix D for additional information on the noise methodology used to support the noise analysis.

  As stated in Section 3.7, 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 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. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise sensitive receivers. The FAA encourages commenters to reach out to Wing regarding concerns related to potential noise disturbances.

  The concept of quality of life is frequently associated with several environmental resource categories addressed in NEPA documents, including noise and socioeconomics. The Proposed Action is not expected to generate significant impacts or adverse effects. In accordance with the requirements of NEPA, the purpose of the Supplemental EA is to assess and disclose the environmental impacts of the Proposed Action and make a determination as to the significance of the impact(s). While some of the environmental resource categories could have project-related environmental effects (e.g., noise), these effects would not be significant, as described above. Chapter 3 of the Supplemental EA discusses the effects of the Proposed Action on each environmental resource category, including noise and socioeconomic impacts, which are most frequently associated with quality of life effects.

  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 aviation noise from drone overflights and delivery locations in the Proposed Action is well below the DNL 65dB threshold of significance, thus the Proposed Action is not expected to exceed the threshold at the nearest noise sensitive location.

[1] U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety. Available: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF.

- As discussed in Chapter 4, the potential for additional reasonably foreseeable noise effects would result from UA and manned aircraft operating within an airport DNL 60 dB contour. Wing has elected to require that all 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 to mitigate additional reasonably foreseeable noise impacts. 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. See Chapter 4 and Appendix J for additional discussion on reasonably foreseeable effects.

  As described in Appendix J, 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.

- The FAA's mission is to provide the safest, most efficient airspace system in the world, but that does not include regulating privacy. Although the FAA is not authorized to impose regulations based on privacy concerns, it intends to continue collaborating with stakeholders, including the public and other agencies with authority and expertise in privacy law and policy[2]. The FAA's lack of jurisdiction over privacy, however, does not relieve Wing from complying with other laws and regulations of general applicability, including those related to privacy, that may be applicable to Wing's operations in Dallas-Fort Worth, Texas. The Hummingbird 7000W-B and Hummingbird 8000-A drones do not transmit imagery from their set of low-resolution cameras underneath; the onboard cameras are only used for onboard navigation and there is no ability to transmit video while in flight. Recorded video is retained for a short period and is only accessed for troubleshooting by limited authorized personnel. During the delivery phase, the drone descends above the property of a customer who has opted into the service offering and hovers, looking down to ensure the delivery area is clear of obstacles and the delivery can be made safely. The cameras and sensors on the drones are operational to aid in flight navigation and safety. They are not built or operated as surveillance drones. They store only critical mission data to improve systems and flight planning[3].

  Video describing lower quality cameras used for navigation as compared to cameras intended for high quality image capture which are not used by Wing[4].

Environmental and Ecological Concerns

- On December 3, 2024, the USFWS provided concurrence with the FAA determination that the proposed action "*may affect, but is not likely to adversely affect* "the golden-cheeked

[2] "Additional information on the FAA's Privacy Impact Assessments is available here: https://www.transportation.gov/individuals/privacy/privacy-impact-assessments
[3] https://wing.com/news/do-delivery-drones-have-cameras
[4] https://www.youtube.com/watch?v=x0jBqdR_T70

warbler and whooping crane, thus no further section 7 consultation is required. Table 3.4-1 provides a list of ESA-listed, Proposed, and Candidate Species identified as potentially present within the study area. See Section 3.4.2 for additional information on impacts to special status species. Wing has incurred few conflicts with birds in areas with larger scale operations.

In addition, the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) protects migratory birds, including their nests, eggs, and parts, from possession, sale, purchase, barter, transport, import, export, and take. The Migratory Bird Treaty Act applies to migratory birds identified in 50 CFR § 10.13. Wing has established a direct line of communication with Texas Parks and Wildlife to discuss any potential concerns regarding impacts on wildlife or habitat in the project area, including impacts to migratory birds. Wing also implements a monitoring plan for bald eagle (see Section 3.4.2). Wing regularly reports monitoring and avoidance measures to Texas Parks and Wildlife and the USFWS Region 2 Migratory Bird Permit Office.

See Supplemental EA Section 3.4 for additional analysis on impacts to biological resources

- No impacts on hawk species have been identified (see Section 3.4.2).

Request for Immediate Mitigation

- See **Environmental and Ecological Concerns.**
- The Proposed Action, including the identified hours of operation between 7:00 AM – 10:00 is needed to meet consumer demand for package deliveries. See Section 1.3 Purpose and Need for more information.

  The proposed action maintains current operational limits of 400 deliveries per nest per day, but does include an increase in nest locations, leading to potential nest service area overlap. Even in the locations where the service areas of nests overlap, Wing would not exceed 400 deliveries or overflights in a given location. 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 and is updated monthly. 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.

- According to FAA Order 1050.1F, the FAA is responsible for determining the appropriate level of review for a NEPA proposed action. An Environmental Assessment is suitable when the proposed action has the potential to significantly affect the human environment. Additionally, supplemental EA is suitable when there are changes to the proposed action that are relevant to environmental concerns, i.e., the expansion of operations to more nests and extended hours of operation. Because the Supplemental EA determined the proposed action would not result in significant impacts in any environmental impact category (i.e., significance thresholds as estimated in Order 1050.1F are not exceeded), further NEPA analysis, such as an EIS, is not required.

Comment #3, Lisa Ellman, Executive Director, Commercial Drone Alliance

December 31, 2024

Submitted electronically via Email to 9-FAA-Drone-Environmental@faa.gov

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

Re: 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

To Whom It May Concern:

The Commercial Drone Alliance ("CDA")[1] appreciates the opportunity to submit comments on the Federal Aviation Administration's ("FAA") "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" (hereafter the "Draft Supplemental EA"). This is a supplement to the FAA's November 2023 Final Environmental Assessment and Finding of No Significant Impact and Record of Decision for Wing Aviation, LLC ("Wing") for the same metroplex area.[2] For the reasons set forth below, the CDA strongly supports the FAA's efforts to authorize an expansion of uncrewed aircraft systems ("UAS") commercial package delivery operations by Wing in Dallas-Fort Worth, Texas. The FAA's approval of Wing's UAS operations supports the federal government's ongoing efforts to implement its congressional mandate to fully integrate UAS into the National Airspace System ("NAS"). Moreover, Wing's existing authorized operations in the Dallas-Fort Worth metroplex demonstrate both its commitment to safe UAS operations and its ability to operate with no significant environmental impact to the community.[3] Further, approval will help normalize safe, scalable, economically viable, and environmentally advantageous commercial UAS package delivery operations in the United States.

[1] The CDA is an independent non-profit organization led by key leaders in the commercial drone industry. The CDA has actively participated in rulemakings and policy efforts to facilitate the safe and secure development and expansion of commercial drone operations. The CDA works with all levels of government to collaborate on policies for industry growth and seeks to educate the public on the safe and responsible use of commercial drones to achieve economic benefits and humanitarian gains. We bring together commercial drone end-users, manufacturers, service providers, advanced air mobility companies, drone security companies, and vertical markets including oil and gas, precision agriculture, construction, security, communications technology, infrastructure, newsgathering, filmmaking, and more. Learn more at https://www.commercialdronealliance.org/.

[2] *See* Federal Aviation Administration, *Final Environmental Assessment and Finding of No Significant Impact/ Record of Decision for Wing Aviation, LLC Proposed Drone Package Delivery Operations in Dallas–Fort Worth, Texas* (Nov. 2023), https://www.faa.gov/uas/advanced_operations/nepa_and_drones/Final_EA_for_Wing_at_DFW_Nov23_ADA_Signed.pdf.

[3] *Id.*

The CDA recognizes that environmental review is a critical piece of the regulatory framework enabling UAS package delivery operations to scale commercially in the U.S. and commends the FAA for its analysis. Indeed, as the FAA has acknowledged in the EA process, drone delivery at scale has the potential to result in numerous societal benefits, including improving the environment, enhancing the economy, and serving a broader range of people in different socioeconomic strata or with limited mobility options.[4] A wide variety of industries are counting on UAS to help decarbonize their operations, particularly those that currently rely on larger, louder gas-powered vehicles. Using drones for delivery can potentially replace tens of millions of car trips, which would not only eliminate hundreds of thousands of tons of vehicular CO_2 emissions but also reduce traffic congestion and accidents caused by surface transportation. Existing commercial drone deployments have already demonstrated a net positive impact on the environment. Relative to decarbonization, two 2021 studies found that drone-based delivery reduced delivery carbon emissions and energy usage by 96-98% compared to cars, a significantly larger reduction than switching to electric vehicles.[5] A study of the Dallas-Fort Worth Metroplex, the area in which Wing seeks to expand its operations, estimated that drones could remove the equivalent of 11,000 cars from the road, which would avoid approximately 190 road accidents each year and eliminate 49,000 tons of annual CO2 emissions.[6] Similarly, a September 2020 economic report published by the Virginia Tech Office of Economic Development found that enabling drone delivery in a single metropolitan area could avoid up to 294 million miles in road use and 580 car crashes per year.[7] This reduction in vehicle mileage would also reduce carbon emissions by 113,900 tons annually, equivalent to planting 46,000 acres per year of new forest.[8]

We support the FAA's efforts to approve amendments to Wing's air carrier Operations Specifications (OpsSpecs) to allow expanded commercial drone delivery operations in the Dallas-Fort Worth metropolitan area using Wing's Hummingbird 7000W-B aircraft. Wing's requested amendment to its OpSpec is based upon community responses from its previous delivery operations in Dallas-Fort Worth and represents a carefully developed approach to scaling its current services for the benefit of the metroplex to meet existing and anticipated demand. Wing proposes to extend its hours of operations, increase the number of drone launch and recovery areas, and provide remote pick-up and delivery services, as described in the Draft Supplemental EA.

The FAA's evaluation is important for the public's acceptance of commercial drone operations in the United States—operations that provide extensive benefits and essential services to the American public. For example, among other use cases commercial drone operations can deliver critical supplies, life-saving medicines, and commercial products and more efficiently serve isolated, quarantined, and homebound people

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[4] *See generally* Federal Aviation Administration, *Programmatic Environmental Assessment ("PEA") for Drone Package Delivery in North Carolina* (Jul. 2024), https://www.faa.gov/uas/advanced_operations/nepa_and_drones/FONSI_ROD_Final_PEA_for_Drone_Package_Delivery_in_NC.pdf.

[5] Rodrigues et al., *Drone flight data reveal energy and greenhouse gas emissions savings for small package delivery* (Nov. 2021), https://arxiv.org/abs/2111.11463; Edward Fu, *The Sustainability of Zipline's Autonomous Aerial Logistics* (Nov. 2021), https://assets.ctfassets.net/pbn2i2zbvp41/1LywKrs46rMBI1ip03MXT0/0194f92a3f02b82630eb0ea2ecc3b19f/The_Sustainability_of_Zipline___s_Autonomous_Aerial_Logistics__Nov_2020_.pdf.

[6] Accenture, *Faster, Safer and Greener: The Potential Impact of Delivery Drones in the Dallas-Fort Worth Metroplex* 5 (Feb. 2021), https://storage.googleapis.com/wing-static-us/us/Dallas%20Impact%20Report.pdf.

[7] Virginia Tech Office of Economic Development, *Measuring the Effects of Drone Delivery in the United States* vi (Sept. 2020), https://cece.vt.edu/content/dam/econdev_vt_edu/projects/technology/Virginia%20Tech%20%20Measuring%20the%20Effects%20of%20Drone%20Delivery%20in%20the%20United%20States_September%202020.pdf.

[8] *Id.*

than other delivery means. Importantly, commercial drones can provide these enormous benefits in an environmentally responsible, efficient, and cost-effective manner.

As UAS technology continues to evolve and drone delivery companies like Wing continue to expand across the United States, we commend the FAA for leveraging its prior environmental review of Wing's package delivery operations in this community. We further urge the FAA to take a programmatic approach to its environmental reviews where appropriate to facilitate operations for a broader geographic region. Such an approach is consistent with Congress' recent mandate in the FAA Reauthorization Act of 2024, wherein Congress directed the FAA to "examine and integrate programmatic-level approaches to the requirements of the National Environmental Policy Act" and "leverage an environmental review for unmanned aircraft operations within a defined geographic region" as well as "leverage an environmental assessment or environmental impact statement for nationwide programmatic approaches for large scale distributed unmanned aircraft operations."[9] The CDA also emphasizes the importance of expeditiously rolling out a scalable process that could support the pace of industry's deployment of commercial drone operations across all states and applauds the FAA for the release of its October 2024 UAS NEPA Desk Reference. Each of these efforts will support the successful deployment of these technologies and the realization of the countless public benefits of UAS operations for Americans, American businesses, and American communities.

The FAA has carried out a thorough evaluation and robust analysis of various environmental impacts and the CDA agrees with the FAA's conclusions in the draft EA regarding Wing's operations. The FAA analyzed various environmental categories in the draft EA, including (1) air quality and climate; (2) biological resources; (3) DOT Section 4(f) Resources; (4) historical, architectural, archaeological, and cultural resources; (5) noise and noise-compatible land use; (6) environmental justice; and (7) visual effects. For each of these categories, the FAA determined that the environmental effects of the proposed UAS operations would not meet the FAA's significance thresholds (where one has been established) or otherwise result in adverse impacts or significant cumulative impacts. We agree with the FAA's conclusions and therefore urge the FAA to finalize its preliminary determination that Wing's operations will not significantly affect the quality of the human environment (individually or cumulatively) and issue a Finding of No Significant Impact.

Throughout its time operating in the Dallas-Fort Worth metroplex and in other communities across the United States, Wing consistently demonstrates its commitment to safety and community engagement, which are critical to the success of commercial drone delivery operations. By enabling expanded drone delivery operations such as those proposed by Wing, the FAA is taking important steps to support the UAS industry's viability and enabling safe, efficient, and environmentally friendly commercial UAS operations that will benefit all members of the American public.

Sincerely,

Lisa Ellman

Lisa Ellman
Executive Director
Commercial Drone Alliance

[9] FAA Reauthorization Act of 2024, Pub. L. No. 118-63, tit. IX, § 909(c) (2024).

FAA Response to Comment #3

Thank you for your comments.

Comment #4, Sean Aucoin, Planner & Assistant to the City Manager, City of Frisco, Texas

FRISCO
PROGRESS IN MOTION

Development Services Department
City of Frisco, Texas

Memorandum

To: **Shelia S. Neumann, Ph.D., P.E., Environmental Protection Specialist, Federal Aviation Administration**

Cc: **Wes Pierson, City Manager**
Ken Schmidt, AICP, Director of Special Projects
Jonathan Hubbard, AICP, Assistant Director of Development Services

From: **Sean Aucoin, Planner & Assistant to the City Manager**

Date: **January 3, 2025**

Subject: **The City of Frisco (COF) Review of the Draft Supplemental Environmental Assessment (EA) for Wing Aviation LLC**

Dear Ms. Neumann,

The City of Frisco (COF) has reviewed the Draft Supplemental Environmental Assessment (EA) for Wing Aviation LLC and wishes to provide comments based on the proposed activities.

Proximity to Residential Neighborhood

COF is situated outside the controlled surface areas of Class B and Class D airspace. Based on the proposed operations, nests and autoloaders are planned to be located at least 65 feet from noise-sensitive areas, while offsite autoload and pickup flight paths are expected to occur at least 45 feet away from such areas. These proximities pose challenges in maintaining the quality of life for nearby residents.

The maximum noise exposure levels cited in the EA are based on the average activity related to delivery operations over a 24-hour period, including times of zero activity (10:00 PM–7:00 AM). However, certain activities, though brief, produce significantly louder noise. COF finds the distinct noise generated by drones to be potentially disruptive and anticipates complaints from residents living near the 65-foot threshold.

Fitness Built-In Tests (FitBITs)

The report indicates that FitBITs are planned to occur between 6:00 AM and 7:00 AM. COF understands that all 6–24 drones at each nest location may undergo testing

simultaneously during this period. Since these operating hours fall within COF's designated quiet hours (10:00 PM–7:00 AM), this could create noise disturbances for nearby residential properties, particularly those near the 65-foot distance.

Given that FitBITs are brief (less than two minutes), COF requests that these tests be conducted within the proposed delivery operation hours of 7:00 AM–10:00 PM. Adjusting FitBIT testing to these hours would help minimize disturbances in residential neighborhoods and align with COF's Noise Ordinance, while ensuring no disruption to operational activities.

Conclusion

The City of Frisco recognizes the benefits of drone technology and supports its innovative applications. However, it is essential to balance innovation with the well-being of our community. COF respectfully requests that the concerns outlined above be addressed and that appropriate measures be implemented to mitigate the identified impacts.

We appreciate the opportunity to review this initiative and provide feedback to support a harmonious integration of drone operations within our community. Should you have any questions or require further information, please contact Sean Aucoin at 972-292-5363.

Thank you for your attention to this matter.

FAA Response to Comment #4

Thank you for your comments. Associations between aviation noise and disruption to normal activity are key components in the establishment of FAA's residential noise impact thresholds defined in FAA Order 1050.1F. Use of the DNL 65 dB as the threshold for significant noise exposure is mandated by FAA Order 1050.1F and designed to account for sleep disturbance, speech interference, and annoyance among other factors (EPA 1974)[5]. As detailed in Section 3.7 and Appendix D of the Supplemental EA, the FAA has determined that the noise exposure levels resulting from the Proposed Action would not exceed the threshold of significance.

Supplemental EA Section 3.7 states that 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 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. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise sensitive receivers. The FAA encourages commenters to reach out to Wing regarding concerns related to potential noise disturbances.

The Proposed Action, including the identified hours of operation between 7:00 AM – 10:00 PM is needed to meet consumer demand for package deliveries. The inclusion of the low height FitBITs in the hour of 6:00 AM-7:00 AM allows for a brief period of preflight checks and then UA recharge before service hours commence. Wing would avoid these early operations in locations that might cause disturbance to local noise sensitive receivers. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise sensitive receivers. In any remaining cases where Wing's nests are near to noise sensitive receivers and may have an adverse effect, Wing would not include these early FitBITs in those operations. See Section 1.3 Purpose and Need for more information.

Wing is responsible for complying with applicable state and local laws relevant to establishing and conducting its operations.

[5] U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety. Available: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF.

Comment #5, Julie Walsh

From: Julie Walsh <walsh.julie@outlook.com>
Sent: Thursday, December 26, 2024 4:04 PM
To: 9-FAA-Drone-Environmental (FAA) <9-FAA-Drone-Environmental@faa.gov>
Subject: Public Comment on Wing Aviation

As a resident in a community close the current Wing Aviation nest at Walgreens on 423 in Little Elm, I along with a large number of residents in our HOA are against the proposed increased of the network nests by 300% (25 to 75) and the expansion of operating hours.

The noise the drone delivery vehicles make is disruptive to the quiet environment of the neighborhood. We residents purposely chose to live in an area of the metroplex that is not impacted by aviation noise pollution. As a board member of the HOA, I can attest to the multiple reports from residents asking if the HOA can ban them from entering or operating over our community.

Please do not approve increasing the presence of these delivery drones.

Julie Walsh
11130 Monarch Drive
Frisco TX 75033

FAA Response to Comment #5

Thank you for your comments. Associations between aviation noise and disruption to normal activity are key components in the establishment of FAA's residential noise impact thresholds defined in FAA Order 1050.1F. Use of the DNL 65 dB as the threshold for significant noise exposure is designed to account for sleep disturbance, speech interference, and annoyance among other factors. As detailed in Section 3.7 and Appendix D of the Supplemental EA, the FAA has determined that the noise exposure levels resulting from the Proposed Action would not exceed the threshold of significance.

Supplemental EA Section 3.7 states that 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 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. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise sensitive receivers. The FAA encourages commenters to reach out to Wing regarding concerns related to potential noise disturbances.

As described in Appendix J, 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.

The Proposed Action, including the identified hours of operation between 7:00 AM – 10:00 PM and expansion of nest locations, is needed to meet consumer demand for package deliveries. See Section 1.3 Purpose and Need for more information.

Comment #6, Kathleen M. Richter

From: Kathleen Richter <kathleenrichter@hotmail.com>
Sent: Tuesday, December 24, 2024 1:47 PM
To: 9-FAA-Drone-Environmental (FAA) <9-FAA-Drone-Environmental@faa.gov>
Subject: Wing Aviation DFW Draft SEA

Dear FAA Review Team,

I am writing to express my concerns about and opposition to the proposed expansion of Wing Aviation's drone delivery operations in the Dallas–Fort Worth area as outlined in the Draft Supplemental Environmental Assessment (SEA). As the Vice Chair of the Natural Resources Advisory Board to the Frisco City Council and a longtime volunteer for the DFW Wildlife Coalition, I am concerned about the potential impacts on local wildlife and the environment, as well as on residents' privacy and the community's quality of life.

Support for the "No Action" Alternative
The No Action alternative is the most responsible choice to avoid the significant risks posed by the Proposed Action. By maintaining the current operational scope, the No Action alternative prevents the increased noise pollution, potential harm to wildlife, and privacy and community concerns that are inadequately addressed in the SEA. Additionally, this alternative allows time for more thorough evaluation of long-term impacts and further consultation with affected communities before committing to such a substantial and rapid expansion.

Wildlife and Ecosystem Concerns
Urban areas like DFW are still home to a wide diversity of wildlife, from songbirds to foxes to amphibians. Regular drone operations can add a new layer of stress in an already challenging urban habitat and exacerbate the effects of other urban pressures, such as light pollution, noise pollution, and habitat loss. For instance, increased drone activity has the potential to disrupt bird and insect populations:

- Birds: Noise and proximity from drones flying at low altitudes can interfere with bird habitats, especially during nesting and migration seasons. For example, birds may perceive drones as predators, causing stress and leading to behavioral changes such as abandoning nests or migratory routes. Repeated disturbances can lead to population declines.
- Insects: Pollinators like bees, butterflies, and moths are vital to both natural ecosystems and agriculture. Many species rely on undisturbed airspace to navigate, forage, and reproduce, and the presence of drones could displace these insects from critical areas in urban-fringe zones. The SEA does not sufficiently assess how low-altitude drone flights might disrupt these species.

As someone dedicated to preserving and enhancing Frisco's natural resources, I find it troubling that the SEA does not address these impacts in meaningful detail. Without strong safeguards, the Proposed Action could undermine efforts to protect and restore local biodiversity.

Environmental and Social Concerns
In addition to wildlife, the Proposed Action raises broader concerns:

1. Noise Pollution: While the SEA suggests noise impacts will be minimal, the extension of operations to 10 p.m. significantly increases the likelihood of disturbances to both human and animal residents in noise-sensitive areas. The noise mitigation measures the SEA describes are not adequate to prevent harm to local bird species as well as the community's quality of life.
2. Air Quality and Climate: The SEA claims that drone operations will reduce greenhouse gas emissions, but does not sufficiently analyze indirect emissions from increased electricity use and generator operations. Furthermore, transitioning to 75 nests in a sprawling urban area may not achieve the desired reductions in vehicle miles traveled if drones supplement rather than replace ground deliveries.

Privacy Concerns and Community Impact
While the SEA focuses primarily on environmental impacts, the proposed expansion raises privacy concerns, which are tied to public acceptance of the project. Expanded drone operations pose significant risks to personal privacy, as onboard sensors and cameras could unintentionally capture private information. Additionally, many residents, including me, have invested significant time and money to create private, peaceful spaces in our homes and backyards. I am deeply concerned about the intrusion caused by drones flying overhead. The constant noise, presence, and potential for surveillance disrupt the enjoyment of my personal space, and the Proposed Action exacerbates this issue by dramatically increasing drone activity and extending operational hours. Privacy is a fundamental right, and it is unacceptable for these operations to compromise it without sufficient safeguards or public consent.

Social and Economic Concerns

1. Equity Issues: The SEA asserts that no disproportionate burdens will be placed on low-income communities, but the placement of nests and flight paths in commercial zones near residential areas may have unintended consequences for vulnerable populations.
2. Public Safety Risks: Increased drone operations raise concerns about safety, including collisions with manned aircraft, cybersecurity vulnerabilities, and potential for crashes in densely populated urban areas. These risks are not adequately mitigated in the SEA.

Recommendations
If the FAA decides to proceed with the Proposed Action despite these concerns, I urge the following measures:

- Limited Expansion: Instead of rapidly expanding to 75 nests, conduct a pilot study to assess the environmental, privacy, and social impacts of increased drone operations.
- Stricter Noise and Wildlife Protections: Nests should be placed farther from noise-sensitive areas, and independent monitoring should be conducted to evaluate impacts on wildlife.
- Clear and Enforceable Privacy Protections: Guidelines should be developed to protect residents' privacy, such as ensuring drones do not collect or store data unnecessarily and avoiding residential areas whenever possible.
- Comprehensive Study: A comprehensive study should be conducted to evaluate the impacts of drone operations on birds, insects, and other wildlife.
- Transparency and Public Engagement: Future assessments should involve more detailed analyses of community feedback and environmental justice concerns to ensure all stakeholders are adequately represented.

In conclusion, the Proposed Action prioritizes corporate interests over community well-being and environmental stewardship. The potential benefits to consumers (e.g., the possibility of slightly faster deliveries) fail to outweigh the costs to communities, the environment, and personal privacy. I urge the FAA to adopt the No Action alternative, protecting the DFW area's rich natural resources and addressing the concerns of its residents.

Sincerely,

Kathleen M. Richter

FAA Response to Comment #6

Thank you for your comments

Wildlife and Ecosystem Concerns

- On December 3, 2024, the USFWS provided concurrence with the FAA determination that the proposed action may affect, but is not likely to adversely affect the golden-cheeked warbler and whooping crane, thus no further section 7 consultation is required. Table 3.4-1 provides a list of ESA-listed, Proposed, and Candidate Species identified as potentially present within the study area. See Section 3.4.2 for additional information on impacts to special status species. Wing has incurred few conflicts with birds in areas with larger scale operations.
- In addition, the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) protects migratory birds, including their nests, eggs, and parts, from possession, sale, purchase, barter, transport, import, export, and take. The Migratory Bird Treaty Act applies to migratory birds identified in 50 CFR § 10.13. Wing has established a direct line of communication with Texas Parks and Wildlife to discuss any potential concerns regarding impacts on wildlife or habitat in the project area, including impacts to migratory birds. Wing also implements a monitoring plan for bald eagles (see Section 3.4.2). Wing regularly reports monitoring and avoidance measures to Texas Parks and Wildlife and the USFWS Region 2 Migratory Bird Permit Office.
- As stated in Section 3.4, the American bumblebee (*Bombus pensylvanicus*) is considered a state Species of Greatest Conservation Need and may be present in the study area. While the USFWS information regarding drone impacts on insects is limited and there have been no widespread negative impacts identified in the scientific literature, based on the information available, the action is not expected to have significant impacts on insect populations. As stated in the USFWS Consultation, future consultation with USFWS may be required if new information determines the proposed action may affect federally listed species to an extent not previously considered. The monarch butterfly is listed as a proposed threatened 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 December 10, 2024, the USFWS proposed the monarch butterfly as threatened under Section 4(d) of the ESA. A USFWS determination whether to list the monarch butterfly has yet to occur.

Environmental and Social Concerns

- Associations between aviation noise and disruption to normal activity are key components in the establishment of FAA's residential noise impact thresholds defined in FAA Order 1050.1F. Use of the DNL 65 dB as the threshold for significant noise exposure is designed to account for sleep disturbance, speech interference, and annoyance among other factors. As detailed in Section 3.7 and Appendix D of the Supplemental EA, the FAA has determined that the noise exposure levels resulting from the Proposed Action would not exceed the threshold of significance. As stated above, the USFWS provided concurrence with the FAA

determination that the proposed action may affect, but is not likely to adversely affect, special status species.

Section 3.7 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. The FAA encourages commenters to reach out to Wing regarding concerns related to potential noise disturbances.

The Proposed Action, including the identified hours of operation between 7:00 AM – 10:00 PM and expansion of nest location is needed to meet consumer demand for package deliveries. See Section 1.3 Purpose and Need for more information.

The concept of quality of life is frequently associated with several environmental resource categories addressed in NEPA documents, including noise and socioeconomics. The Proposed Action is not expected to generate significant impacts or adverse effects. In accordance with the requirements of NEPA, the purpose of the Supplemental EA is to assess and disclose the environmental impacts of the Proposed Action and make a determination as to the significance of the impact(s). While some of the environmental resource categories could have project-related environmental effects (e.g., noise), these effects would not be significant. Chapter 3 of the Supplemental EA discusses the effects of the Proposed Action on each environmental resource category, including noise and socioeconomic impacts, which are most frequently associated with quality-of-life effects.

- The emissions associated with the proposed action generators are less than the de minimis thresholds established under the Clean Air Act, thus 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 (See Section 3.3).

  As stated in Section 3.3, 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). 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 (Rodrigues et al. 2022).

Privacy Concerns and Community Impact:

The FAA's mission is to provide the safest, most efficient airspace system in the world, but that does not include regulating privacy. Although the FAA is not authorized to impose regulations based on privacy concerns, it intends to continue collaborating with stakeholders, including the public and other agencies with authority and expertise in privacy law and policy[6]. The FAA's

[6] Additional information on the FAA's Privacy Impact Assessments is available here: https://www.transportation.gov/individuals/privacy/privacy-impact-assessments.

lack of jurisdiction over privacy, however, does not relieve Wing from complying with other laws and regulations of general applicability including those related to privacy, that may be applicable to Wing's operations in Dallas-Fort Worth, Texas. The Hummingbird 7000W-B and Hummingbird 8000-A drones do not capture imagery from underneath and the camera is only forward looking to ensure safe flight, and there is no live feed broadcasted. During the delivery phase, the drone descends into the backyard of the customer that has opted into the delivery service and hovers, looking down to ensure the delivery area is clear of obstacles and the delivery can be made safely. The cameras and sensors on the drones are operational to see what's around them to aid in flight navigation and safety. They are not built or operated to be surveillance drones. They store only critical mission data to improve systems and flight planning with access to such data limited to only appropriate personnel.

Social and Economic Concerns

- [Regarding equity issues] On January 20, 2025, President Trump issued Executive Order (E.O.) No. 14148, *Initial Rescissions of Harmful Executive Orders and Actions*, which revoked E.O. 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). On January 21, 2025, President Trump issued Executive Order (E.O.) No. 14173, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*, which revoked E.O. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (Feb. 11, 1994). With the issuance of E.O. 14148 and E.O. 14173, and the implementation of these Executive Orders by the Department of Transportation, this EA does not analyze environmental effects related to environmental justice.

- 49 U.S.C 44807(b) instructs the Secretary to base their determination on which types of UAS do not create a hazard to users of the National Airspace System (NAS) or the public. The Secretary delegated this authority to the Administrator on October 1, 2021. In accordance with the statutory criteria provided in 49 U.S.C. § 44807, and in consideration of the size, weight, speed, and operational capability, proximity to airports and populated areas, and specific operations, as part of the Record of Decision (ROD), the FAA determined that Wing's drones and operations do not create a hazard to users of the NAS or the public. As with all operations authorized to be conducted under a § 44807 exemption, the FAA set appropriate conditions and limitations to minimize risk and maintain an equivalent level of safety to that provided and intended by the rules that would otherwise apply to the operation.

  The FAA Hotline accepts reports via webform, mail, and telephone related to the safety of the National Airspace System, violations of Federal Aviation Regulations, aviation safety issues, and reports related to FAA employees or FAA facilities.[7] The FAA Hotline provides a single venue for FAA employees, the aviation community, and the public to file their reports.

Recommendations

- [Regarding limited expansion] The Proposed Action, including the extending hours of operation between 7:00 AM – 10:00 PM and additional nest locations, is needed to meet

[7] https://www.faa.gov/about/office_org/headquarters_offices/aae/programs_services/faa_hotlines .

consumer demand for package deliveries. See Section 1.3 Purpose and Need for more information.

- [Regarding stricter noise and wildlife protections] See **Wildlife and Ecosystem Concerns** regarding wildlife protections and **Environmental and Social Concerns** regarding noise protections.
- [Regarding clear and enforceable privacy protections] See **Privacy Concerns and Community Impact**
- [Regarding comprehensive study] According to FAA Order 1050.1F, the FAA is responsible for determining the appropriate level of review for a NEPA proposed action. An Environmental Assessment is suitable when the proposed action has the potential to significantly affect the human environment. Additionally, a supplemental EA is suitable when there are changes to the proposed action that are relevant to environmental concerns, i.e., the expansion of operations to more nests and extended hours of operation. Because the Supplemental EA determined the proposed action would not result in significant impacts in any environmental impact category (i.e., significance thresholds as estimated in Order 1050.1F are not exceeded), further NEPA analysis, such as an EIS, is not required.
- [Regarding transparency and public engagement] As required by FAA Order 1050.1F, the FAA initiated a number of actions to inform and engage the public and potentially interested regulatory agencies about the Proposed Action, which include, agency coordination/consultation, Tribal Government consultation, and a public review and comment period.

  The FAA provided a NOA of the Draft Supplemental EA on December 1, 2024, to local, state, and federal officials, interest groups, and federally recognized tribes, and the general public The NOA was published in the Dallas Morning News and Forth Worth Star-Telegram newspaper and on the FAA website. All communications and consultations between the FAA and the abovementioned stakeholders are documented in the following appendices of the Supplemental EA:

  - Appendix F – Government-to-Government Consultation with Federally Recognized Tribes
  - Appendix G – SHPO Consultation
  - Appendix K – USFWS Section 7 ESA Consultation

  While the timing and pace of nest installation is dependent on market conditions, nests would be distributed following a measured rollout plan developed with Wing's partners and continuing best practices as identified in the Community Outreach Program.

Comment #7, Ryan Vise, Texas Commission on Environmental Quality

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 20, 2024

Shelia S. Neumann, Ph.D., P.E
Environmental Protection Specialist
Unmanned Aircraft Systems (UAS)/NEPA
Federal Aviation Administration
Washington, D.C

Via: **E-mail**

Re: **TCEQ NEPA Request #2025-056. DRONE PACKAGE DELIVERY OPERATIONS IN DALLAS–FORT WORTH, TEXAS. Dallas and Tarrant County.**

Dear Ms. Neumann,

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

The proposed action is located in Dallas and Tarrant County, which is designated nonattainment for the 2008 eight-hour ozone National Ambient Air Quality Standard (NAAQS) with a classification of severe and designated nonattainment for the 2015 eight-hour ozone NAAQS with a classification of serious; therefore, federal Clean Air Act, §176(c) general conformity requirements apply. Per federal general conformity regulations at 40 CFR §93.153, a conformity demonstration may be required when the total projected direct and indirect volatile organic compounds (VOC) and nitrogen oxides (NOX) emissions—precursor pollutants that lead to the formation of ozone—from an applicable federal action are equal to or exceed the de minimis emissions level of 50 tons per year (tpy) for ozone NAAQS serious nonattainment areas and 25 tpy for severe nonattainment areas.

For emissions analyses conducted to determine general conformity applicability, the TCEQ recommends using a methodology consistent with the requirements at 40 CFR §93.159. According to the information provided, emissions from this proposed action are expected to be de minimis.

The Office of Water does not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. We recommend that the applicant take necessary steps to ensure that best management practices are used to control runoff from construction sites to prevent detrimental impact to surface and ground water.

Any debris or waste disposal should be at an appropriately authorized disposal facility.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA coordinator at (512) 239-5538 or NEPA@tceq.texas.gov

Sincerely,

Ryan Vise,
Division Director
External Relations

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-0010 • tceq.texas.gov

FAA Response to Comment #7

Thank you for your comments. As described in Supplemental EA Section 3.2, Wing is responsible for complying with applicable federal, state, and local regulations, including any construction and waste disposal activities. Wing intends to adhere to best management practices to mitigate stormwater and soil erosion impacts.

Comment #8, Gregory S. Walden, Aviation Counsel, Small UAV Coalition

SMALL UAV COALITION
A Partnership for Safety & Innovation

Draft Supplemental Environmental Assessment – Wing Aviation, LLC

Drone Package Delivery Operations in DFW Metro Area

Comments of Small UAV Coalition

January 3, 2025

filed with 9-FAA-Drone-Environmental@faa.gov

The Small UAV Coalition ("Coalition") is pleased to provide comments in support of the FAA's draft Supplemental Environmental Assessment ("Supplemental EA") for drone package delivery operations by Wing Aviation, LLC ("Wing") in the Dallas-Ft. Worth, Texas metropolitan area. The "major federal action" triggering review under the National Environmental Policy Act ("NEPA") is the FAA's amendment of Wing's Part 135 Operations Specifications ("OpSpecs").

On February 9, 2022, and November 11, 2023, the FAA previously issued Records of Decision ("RODs") and Findings of No Significant Impact ("FONSIs") to Wing for operations in the DFW metro area from up to 25 nests, each of which has from 6 to 24 launching pads, with up 400 total operations per day from each nest. Operating under these earlier approvals, Wing has provided over two years of successful, safe, and steadily expanding operations to the benefit of communities in the DFW metro area. Wing's request to increase operations in these communities provides the FAA the opportunity to act on its intention to continue building the foundation for a nationwide approach to environmental assessments (EA). A truly programmatic approach will provide operators the flexibility to meet demand in communities across the United States while moving away from more rigid approaches that may not keep pace with the innovation occurring in this technology sector.

This draft Supplemental EA addresses the following changes to meet consumer demand in the metro area: (1) extending hours from 7 a.m. to 7 p.m. to 7 a.m. to 10 p.m.; (2) increasing the number of nests to 75 (while not exceeding the 400 operations per nest previously considered); (3) adding remote pickup areas offsite; and (4) adding the Hummingbird model 8000-A, which has a greater maximum payload of 5 pounds.

Wing will operate its drone delivery operations at least 120 feet from "noise-sensitive areas" in Class B and D airspace, and at least 65 feet from such areas in other airspace. Nests will be located in parking lots in areas zoned for commercial use, such as shopping centers, shopping malls, and large retail stores, except for offsite autoload operations.

The Coalition supports the FAA's conclusion in this draft EA as well as in other previous environmental assessments authorizing drone package delivery operations that no detailed analysis is necessary for eight of the 17 environmental review areas:

- coastal resources
- farmlands
- hazardous materials, solid waste, and pollution prevention
- land use
- natural resources and energy supply
- socioeconomic impacts and children's environmental health and safety risks
- water resources (wetlands, floodplains, surface waters, and groundwater)
- waters (wild & scenic rivers)

Drone package delivery will reduce greenhouse gas emissions and energy use, as well as enhance the economy, and serve a broader range of people in different socioeconomic strata or with limited mobility options. Using drones for delivery can potentially replace millions of car trips, which would not only eliminate hundreds of thousands of tons of vehicular CO2 emissions but also reduce traffic congestion and accidents caused by surface transportation. As the FAA found, at page 3-10, "the shift from traditional delivery vehicles to drone-based deliveries . . . would improve energy efficiency and reduce emissions per package delivered." Beyond delivery, drones already offer a safer alternative to critical business and

government activities like infrastructure inspection, precision agriculture, and emergency response.

Given these benefits, it is not surprising that an increasing number of counties and localities, including in the Dallas-Ft Worth metropolitan area, have been receptive to drone delivery.

The Coalition supports the FAA's determination that drone delivery operations do not result in a significant impact on air quality, noise, visual effects, historic, architectural, archeological, and cultural resources, DOT section 4(f) resources, biological resources (wildlife), environmental justice, and cumulative impacts from noise and to biological resources.

With respect to air quality and emissions, the FAA has determined, at page 3-10, that "the emissions associated with the proposed action are less than the de minimis thresholds established under the [Clean Air Act]."

The Coalition has reviewed the noise impacts analysis in the draft Supplemental EA and supporting information and agrees the noise impacts at Wing's proposed setback distances are below the DNL 65 threshold of significance . For any operations at a nest that may approach DNL 65, it is worth noting that nests are intentionally located in parking lots and Wing's commitment to locate its nests away from noise sensitive areas and results in noise impacts well under DNL 65. The noise impacts during en route and delivery operations are considerably lower. For autoloader operations offsite the noise metric would exceed 65 DNL but only within 25 feet of the location.

The Coalition agrees with the FAA's finding of no significant impacts to visual resources. See page 3-36:

> 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. . . . 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.

With respect to biological resources (wildlife), the FAA concluded that operations are not expected to significantly influence wildlife in the area "[b]ecause operations would occur mostly in the urban environment, typically well above the tree line and

away from sensitive habitats and given the short duration of increased ambient sound levels." Page 3-17.

The Coalition also notes the FAA's conclusion at page 3-22 that "[t]here 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."

The Coalition agrees with the draft Supplemental EA's statement, at page 3-34 (emphasis in original), that drone operations will bring benefits over operations that require a car or truck to pick up a package from a store.

> 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.

Accordingly, the Coalition supports the FAA's draft Supplemental EA and urges the FAA to issue a FONSI.

Respectfully submitted,

Gregory S. Walden
Aviation Counsel
Small UAV Coalition
gregory.walden@dgagroup.com
202-403-9904

FAA Response to Comment #8

Thank you for your comments.

Comment #9, Daniel D. Coborn

From: Daniel Coborn <coborndaniel2@gmail.com>
Sent: Friday, December 20, 2024 9:52 PM
To: 9-FAA-Drone-Environmental (FAA) <9-FAA-Drone-Environmental@faa.gov>
Subject: Expanded hours of drone package delivery in residential neighborhoods

To Whom It May Concern:

My wife and I live in an active senior (55+) adult community called Frisco Lakes in Frisco, Texas. The neighborhood where we live has been receiving package delivery by drone for several months. The drones can be heard from inside our homes. Although I am a late-to-bed-late-to-rise person, most of the residents are early-to-bed people who could be affected by the intrusive buzzing of drone delivery in the evening. With all due consideration of people who retire at night as early as 8:00 p.m., it is my belief that package delivery before 8:00 a.m. and after 8:00 p.m. would be inappropriate in residential communities.

Sincerely,
Daniel D. Coborn
1876 Port Royal Ln,
Frisco, TX 75036
(972) 248-7842

FAA Response to Comment #9

Thank you for your comments. Associations between aviation noise and disruption to normal activity are key components in the establishment of FAA's residential noise impact thresholds defined in FAA Order 1050.1F. Use of the DNL 65 dB as the threshold for significant noise exposure is designed to account for sleep disturbance, speech interference, and annoyance among other factors. As detailed in Section 3.7 and Appendix D of the Supplemental EA, the FAA has determined that the noise exposure levels resulting from the Proposed Action would not exceed the threshold of significance.

Section 3.7 states that 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 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. In nearly all cases, Wing's nests would not be located at the minimal distances included in the simplified analysis and would instead be well separated with lateral distance or shielding to not have an effect on noise sensitive receivers. The FAA encourages commenters to reach out to Wing regarding concerns related to potential noise disturbances on their website (https://wing.com/contact).

The Proposed Action, including the identified hours of operation between 7:00 AM – 10:00 PM is needed to meet consumer demand for package deliveries. See Section 1.3 Purpose and Need for more information.