



Federal Aviation
Administration

Final Environmental Assessment for Wing Aviation, LLC Proposed Drone Package Delivery Operations in Atlanta, Georgia



August 2026

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Washington, D.C.

Notice of Availability of the Final Environmental Assessment for Wing Aviation, LLC, Proposed Package Delivery Operations in Atlanta, Georgia

The Federal Aviation Administration (FAA) provides notice that a Final Environmental Assessment (EA), prepared pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321–4355), to assess Wing Aviation, LLC (Wing), proposed commercial drone delivery service in the Atlanta metro area is available.

Wing is seeking to amend its air carrier Operations Specifications (OpSpecs) and other FAA approvals necessary to expand commercial drone package delivery operations in the Atlanta metro area. The FAA's approval of the amended OpSpecs is considered a major federal action under NEPA and requires a NEPA review. This Final EA is submitted for review pursuant to NEPA, FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*; Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303), Section 7 of the Endangered Species Act (16 U.S.C. § 1531 et seq.) and Section 106 of the National Historic Preservation Act (16 U.S.C. § 470).

The Final EA is available for online review at

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

Declaration Related to Page Limits: The FAA has considered the factors mandated by NEPA, and the EA represents the FAA's good-faith effort to prioritize documentation of the most important considerations required by the statute within the congressionally mandated page limits. This prioritization reflects the FAA's expert judgment, and any considerations addressed briefly or left unaddressed, were, in the FAA's judgment, comparatively not of a substantive nature that meaningfully informed the consideration of environmental effects and the resulting decision on how to proceed.

Declaration Related to Deadline: The EA represents the FAA's good-faith effort to fulfill NEPA's requirements within the Congressional timeline and is substantially complete. In the FAA's expert opinion, the FAA has thoroughly considered the factors mandated by NEPA. In the FAA's judgment, the analysis contained herein is adequate to inform and reasonably explain the FAA's final decision regarding the proposed federal action.

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

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Table of Contents

Chapter 1 Purpose and Need	1-1
1.1 Introduction.....	1-1
1.2 FAA Role and Federal Action	1-2
1.3 Purpose and Need	1-3
1.4 Public Involvement	1-3
Chapter 2 Proposed Action and Alternatives.....	2-1
2.1 No Action Alternative	2-1
2.2 Proposed Action	2-1
2.2.1 Unmanned Aircraft Specifications	2-4
2.2.2 Flight Operations	2-6
Chapter 3 Affected Environment and Environmental Consequences	3-1
3.1 Introduction.....	3-1
3.2 Environmental Impact Categories Not Analyzed in Detail	3-2
3.3 Air Emissions and Air Quality	3-5
3.3.1 Definition of Resource and Regulatory Setting.....	3-5
3.3.2 Affected Environment.....	3-6
3.3.3 Environmental Consequences	3-8
3.4 Biological Resources (Including Fish, Wildlife, and Plants)	3-2
3.4.1 Definition of Resource and Regulatory Setting.....	3-2
3.4.2 Affected Environment.....	3-3
3.4.3 Environmental Consequences	3-8
3.5 Department of Transportation Act, Section 4(f) Resources and Land and Water Conservation Fund Section 6(f) Resources.....	3-12
3.5.1 Definition of Resource and Regulatory Setting.....	3-12
3.5.2 Affected Environment.....	3-13
3.5.3 Environmental Consequences	3-14
3.6 Historical, Architectural, Archaeological, and Cultural Resources	3-15
3.6.1 Definition of Resource and Regulatory Setting.....	3-15
3.6.2 Affected Environment.....	3-16
3.6.3 Environmental Consequences	3-16
3.7 Noise and Noise-Compatible Land Use	3-17
3.7.1 Definition of Resource and Regulatory Setting.....	3-17
3.7.2 Affected Environment.....	3-18
3.7.3 Environmental Consequences	3-19
3.8 Visual Effects	3-23
3.8.1 Definition of Resource and Regulatory Setting.....	3-23
3.8.2 Affected Environment.....	3-23
3.8.3 Environmental Consequences	3-24

Appendices

A	References and Citations
B	Section 4(f)
C	List of Preparers and Agencies Consulted
D	Noise
E	Biological Resources
F	SHPO Consultation
G	Atlanta Area Airports

Tables and Figures

Table	Page
Table 3.3-1. Attainment Status of Study Area Counties	3-7
Table 3.3-2. Calculation of Emissions – No Action Alternative and Proposed Action Alternative.....	3-10
Table 3.3-3. Comparison of Project Emissions to General Conformity De Minimis Thresholds.....	3-1
Table 3.4-1. ESA-Listed, Proposed, and Candidate Species Potentially Present within the Study Area	3-4
Table 3.4-2. Atlanta Metro Songbird Species with Mobbing and Territorial Behaviors	3-7
Table 3.7-1. Estimated Extent of Noise Exposure from Nest.....	3-19
Table 3.7-2. Estimated Extent of Noise Exposure from an Offsite Package Autoloading Location	3-20
Table 3.7-3. Estimated Extent of Noise Exposure for Delivery Locations Based on Maximum Deliveries per Location.....	3-21

Figure	Page
Figure 2.2-1. Wing’s Proposed Atlanta Metro Area Operating Area	2-3
Figure 2.2-3. Wing Hummingbird 7000W-B UA.....	2-5
Figure 2.2-4. Wing Hummingbird 8000-A UA	2-5
Figure 2.2-5. Wing Hummingbird UA Nest Landing.....	2-7
Figure 2.2-6. Wing Hummingbird Remote Pickup Flight Profile	2-8
Figure 2.2-7. Wing Hummingbird and Autoloader	2-9
Figure 3.7-1. Controlled Surface Area of Class B and Class D Airspace	3-18

Acronyms and Abbreviations

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
DNL	Day-Night Average Sound Level
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
MBTA	Migratory Bird Treaty Act
metro	metropolitan
mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
OpSpecs	Operations Specifications
PM	particulate matter
RMP	risk management plan
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
U.S.C.	United States Code
UA	unmanned aircraft
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
Wing	Wing Aviation, LLC

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. 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 (OpSpecs).^{3,4} Wing is seeking to amend its OpSpecs and other FAA approvals necessary to conduct unmanned aircraft (UA, also referred to as a drone) commercial package delivery operations in the Atlanta metropolitan (metro) area (see Figure 2.2-1).

The FAA's approval of the amended OpSpecs is considered a major federal action under the National Environmental Policy Act (NEPA)⁵ and requires NEPA review. Wing prepared this Environmental Assessment (EA) under the supervision of the FAA⁶ to evaluate the potential environmental impacts that might result from the FAA's proposed action.

Wing is proposing to conduct UA retail package delivery operations establishing up to 43 sites in the Atlanta metro area using Wing's Hummingbird 7000W-B and 8000-A UAS. Wing's intent is to offer service throughout the Atlanta metro area from a network of nests,⁷ where each would serve a specific area, thereby avoiding an over-concentration of flights surrounding any given nest. Each nest houses up to 24 aircraft and has a delivery range of approximately 6 miles. Wing proposes a total commercial maximum of 43 nest locations in Atlanta. A list of proposed nest sites is included within Appendix J. Wing's nests would be located in commercial areas, such as shopping centers, large individual retailers, and

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

² 49 U.S.C. § 44807 provides the Secretary of Transportation with authority to determine whether a certificate of waiver, certificate of authorization, or a certificate under 49 U.S.C. §§ 44703 or 44704 is required for the operation of certain Unmanned Aircraft System.

³ Operations Specifications are documents that define the scope of aircraft operations that the 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 42 U.S.C. § 4321 et seq.

⁶ See 42 U.S.C. § 4336a(f) (authorizing agencies to prescribe procedures to allow a project sponsor to prepare Environmental Assessments under the supervision of the agency).

⁷ A ground-based service area where UA are assigned and where flights originate and return.

shopping malls. Wing projects would operate a maximum of 400 delivery flights per operating day from each site, with operations initially occurring between 7:00 a.m. and 7:00 p.m. and then extending 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.

Under NEPA, federal agencies are required to consider the reasonably foreseeable environmental effects of proposed major federal actions and to disclose to decision-makers and the interested public a clear and accurate description of such effects. In addition, under NEPA, federal agencies are required to consider 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 1050.1G, *FAA National Environmental Policy Act Implementing Procedures* (FAA 2025). The FAA also utilizes Department of Transportation (DOT) Order 5610.1D, *Procedures for Considering Environmental Impacts* (DOT 2025), to comply with NEPA.

1.2 FAA Role and Federal Action

In general, Congress has charged the FAA with the safety of air commerce in the United States and to encourage the development of civil aeronautics. 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 OpSpecs (or an amended OpSpec) to include package delivery flights in a specified operating area is the approval that ultimately enables UA operations.

The FAA has specific statutory and regulatory obligations related to its issuance of a Part 135 operating certificate and the related OpSpecs.⁸ 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.”⁹ An operating certificate also specifies “terms necessary to ensure safety in air transportation; and (2)... the places to and from which, and the airways of the United States over which, a person may operate as an air carrier.”¹⁰ Stipulations are included in air carrier operating certificates that the air carrier's operations must be conducted in accordance with the provisions and limitations specified in the OpSpecs.¹¹ 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

⁸ See, e.g., 49 U.S.C. §§ 44705, 44709; 14 CFR parts 119, 135.

⁹ 49 U.S.C. § 44705.

¹⁰ *Id.*

¹¹ 14 CFR § 119.5 (g), (l).

the OpSpecs. The regulations also specify that a Part 135 certificate holder may not operate in a geographical area unless its OpSpecs specifically authorizes the certificate holder to operate in that area.¹² The regulations implementing 49 U.S.C. Section 44705 specify that an air carrier's approved OpSpecs must include, among other things, "authorization and limitations for routes and areas of operations."¹³ An air carrier's OpSpecs 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."¹⁴ After making this determination, the FAA must take an action on the OpSpecs amendment.¹⁵

1.3 Purpose and Need

The Federal action subject to review under NEPA is the FAA's decision whether to approve a modification to Wing's Operations Specifications (OpSpecs) under 14 CFR Part 135. The modification would authorize Wing to expand its commercial package delivery operations using UAS to the Atlanta metro area.

The purpose of the proposed FAA action is to enable the agency to carry out its statutory responsibilities to ensure the safety and efficiency of the National Airspace System (NAS), while considering potential environmental effects consistent with NEPA and FAA Order 1050.1G. Consistent with Order 1050.1G, §1.5 (b)(i), when the FAA is acting on an application for authorization, the purpose and need for the federal action is informed both by FAA's statutory mission and the applicant's goals.

The need for the proposed action arises from Wing's application for expanded operating authority to extend its current commercial UA delivery service to the Atlanta metro area. Wing, in its business judgement, has determined that the Atlanta region is an appropriate market for expansion. Wing's proposal is to begin full-scale commercial UA delivery operations in this region utilizing its Hummingbird 7000W-B and 8000-A flight platforms. Site locations would be selected based on a combination of business case considerations, operational feasibility, installation feasibility, and proximity to other sites within Wing's existing network. Without FAA approval of the requested OpSpecs modification, Wing would be unable to implement this expansion of its delivery service.

1.4 Public Involvement

The FAA created a Notice of Availability (NOA) with information about the Draft EA and provided it to local, state, and federal officials, interest groups, and federally recognized tribes. The NOA and a complete NOA distribution list can be found in Appendix I. The NOA

¹² 14 CFR § 119.5(j).

¹³ 14 CFR § 119.49(a)(6).

¹⁴ 14 CFR § 119.51(a); see also 49 U.S.C. § 44709.

¹⁵ 14 CFR § 119.51(c)(3).

provided information about the proposed action and requested public review and comments on the Draft EA, which was available on the FAA's website¹⁶ for a 30-day comment period from July 2 to August 1, 2026. Interested parties were invited to submit comments on any environmental concerns related to the proposed action. No public comments were received.

¹⁶ See: https://www.faa.gov/uas/advanced_operations/nepa_and_drones.

Chapter 2

Proposed Action and Alternatives

FAA Order 1050.1G, §1.5(b)(ii) requires the EA to briefly discuss: “The proposed action and alternatives to the extent required by NEPA § 102(2)(H), 42 U.S.C. § 4332(2)(H);” which requires all federal government agencies to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves 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 EA only considers the proposed action and the no action alternative.

2.1 No Action Alternative

DOT Order 5610.1D, Paragraph 10(b)(3) 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). The no action alternative serves as a baseline to compare the impacts of the proposed action. Under the no action alternative, the FAA would not approve an OpSpecs amendment under Part 135 to implement Wing package delivery operations in the Atlanta metro area. Consumers in the areas not served by UAs would be expected to continue to use personal ground transportation to retrieve small goods using their automobiles or in some cases with public transportation, if available. This alternative does not support the stated purpose and need.

2.2 Proposed Action

The proposed action is the expansion of Wing’s current area of operations for UA commercial delivery service to include the Atlanta metro area. Wing’s proposed Atlanta operating area boundaries are shown in Figure 2.2-1, which includes the Mode C veil. Under the proposed action, Wing would establish up to 43 nests in the Atlanta metro area. A list of proposed nest sites is included within Appendix J. The exact timing and pace of nest installation is dependent on market conditions. If, in the future, Wing wanted to exceed 43 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 areas depicted in Figure 2.2-1.¹⁷

Nests would be distributed throughout the Atlanta 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 nests would be located in established parking lots of

¹⁷ Modification of Wing’s operations plan requires approval in accordance with 14 CFR Part 135.

commercially zoned areas whose use is consistent with local zoning and land use requirements, such as shopping centers, large individual retailers, and shopping malls. Remote pickup infrastructure consisting of an autoloader (Figure 2.2.7) would be installed within existing or proposed nests or at offsite locations (i.e., partner locations offering Wing delivery services) 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 when the nest and autoloader is located within the controlled surface area of Class B and D airspace¹⁸ (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 nest locations and service area (see Figure 2.2-1). Offsite package autoloader and pickup flight paths would not occur within 80 feet of noise-sensitive areas when the autoloader is located within the controlled surface area of Class B, Class C, 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. Offsite Package Autoloads would serve an area within a 1-mile radius of the Offsite Package Autoloader 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, deliveries would not exceed 400 per day. 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.

¹⁸ 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>.

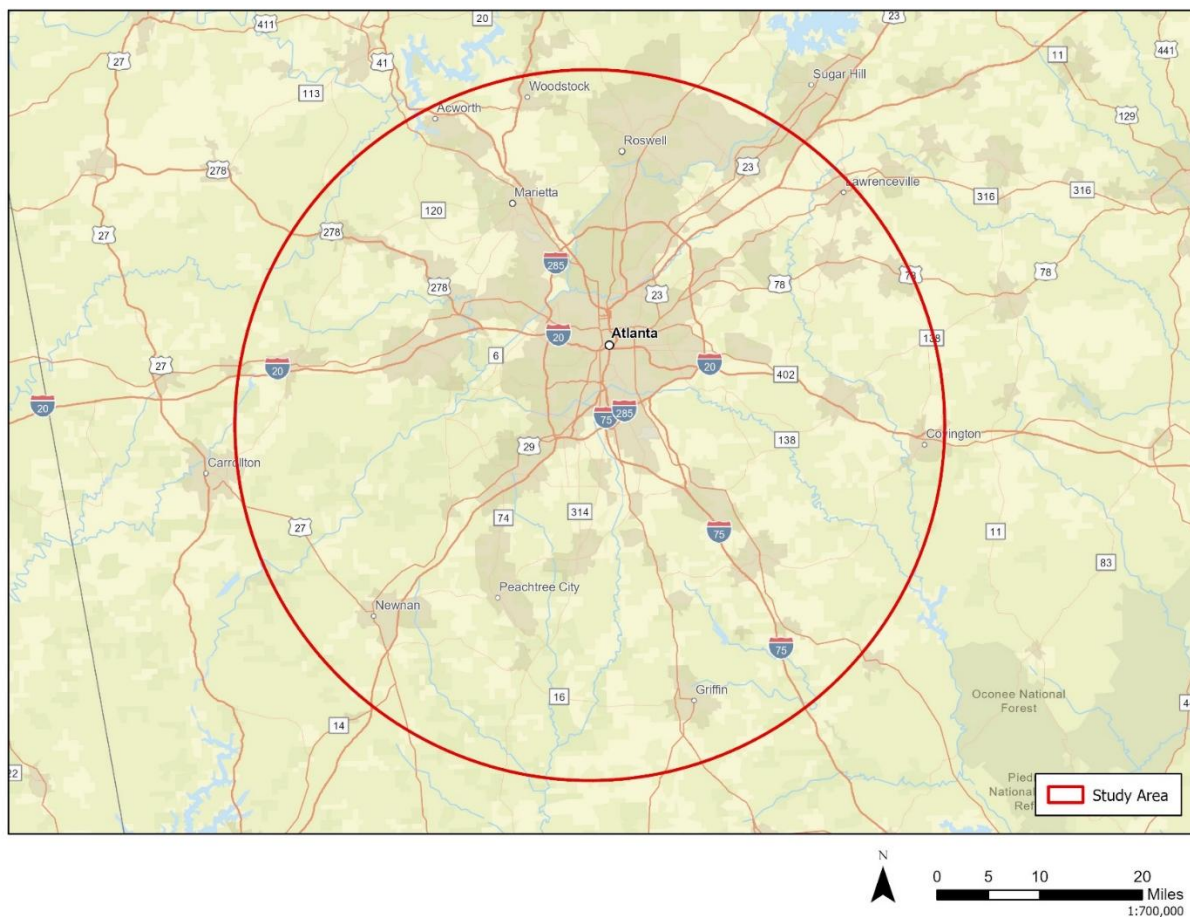


Figure 2.2-1. Wing's Proposed Atlanta Metro Area Operating Area

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. At least 50 percent 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 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 within existing or proposed nests or at offsite locations 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 4 to 10 partner sites located in areas adequately isolated from sensitive noise 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.¹⁹ Wing has confirmed to the FAA that it will generally not conduct operations over these "*fly less*"²⁰ 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 commercial areas and corridors without sensitive noise 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.²¹

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

¹⁹ Wing's flight planning software is updated monthly. Wing distributes flight routes to avoid concentrating flights over any one location.

²⁰ 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 Atlanta operating area.

²¹ 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 is exhausted.



Figure 2.2-2. Wing Hummingbird 7000W-B UA



Figure 2.2-3. Wing Hummingbird 8000-A UA

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

Wing anticipates the Atlanta metro area 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.

2.2.2 Flight Operations

The UA²² 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 enroute 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, enroute outbound, delivery, enroute inbound, and landing. Remote pickup procedures are described in Section 2.2.2.6, *Remote Pickup Operations*.

Note: Each aircraft must complete a daily set of preflight checks before being assigned a delivery mission. These include a brief low height hover flight where the UA exercises various systems. These are termed FitBIT or Fitness Built-In Test and are at a height of approximately 6 feet for approximately 1 minute. Additionally, 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).

²² The flight profiles of the 7000W-B and the 8000-A would be the same.

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 enroute 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.

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 in the same manner described in Section 2.2.2.2.

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 2.2-4. Wing Hummingbird UA Nest Landing

2.2.2.6 Remote Pickup Operations

Remote pickup operations from each nest would be supported at up to 12 partner establishments depending upon demand and nest capacity. Pickup operations would follow general flight phases and parameters identical to typical delivery operations and would include the addition of a pickup phase. The pickup phase is similar to the delivery phase. The UA descends from its en route altitude (safe altitude above local terrain and obstacles) to 14.5 feet AGL and lowers the package hook. The UA then passes approximately 10 feet laterally over the autoloader. The autoloader's Y-shaped poles passively guide the package hook to a narrow slot that ensures secure attachment of the package. The package is then retracted to the UA before it proceeds to climb to the en route altitude. Remote pickup operations from descent to finish are expected to take no longer than 1 minute and 30 seconds (90 seconds). Delivery, en route return, and land operations would then occur as described in Sections 2.2.2.3 through 2.2.2.5. The flight profile of remote pickup operations is illustrated in Figure 2.2-6 and the autoloader is illustrated in Figure 2.2-7.

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

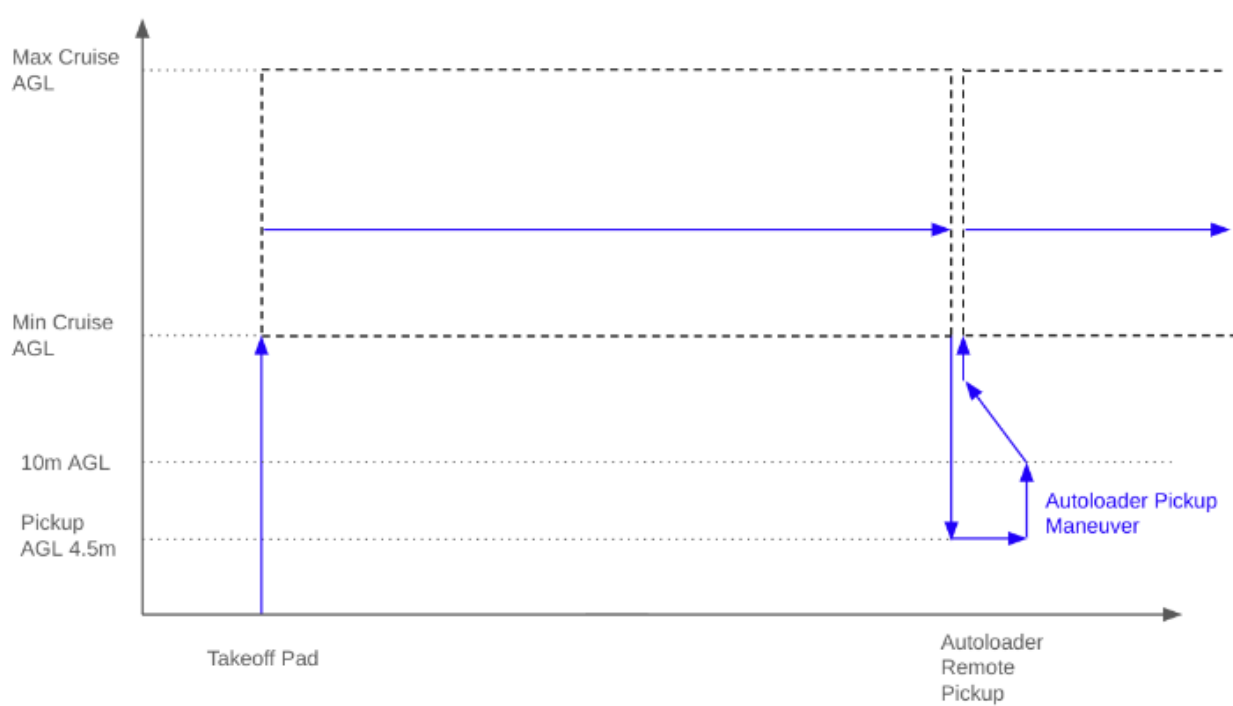


Figure 2.2-5. Wing Hummingbird Remote Pickup Flight Profile



Figure 2.2-6. 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 1050.1G, *FAA National Environmental Policy Act Implementing Procedures* (FAA 2025). As required by FAA Order 1050.1G, this EA presents an evaluation of impacts for the environmental impact categories listed below.

- Aviation emissions and air quality
- Biological resources (including fish, wildlife, and plants)
- Coastal Resources
- Department of Transportation Act Section 303 (referred to as “Section 4(f)” and Land and Water Conservation Fund (referred to as “Section 6(f)”))
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archaeological, and cultural resources
- Land use
- Noise and noise-compatible land use
- Socioeconomics and children’s environmental health and safety risks
- Visual effects (including visual resources and visual character)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

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

Reasonably foreseeable effects may include those that interact with baseline conditions caused by other past and present activity. To the extent it assists in reasoned decision-making, FAA may—but is not required to by NEPA—analyze environmental effects from

other projects separate in time, or separate in place, or that fall outside of FAA's regulatory authority, or that would have to be initiated by a third party.

For example, Wing plans to conduct test operations prior to becoming fully operational at a limited number of nests for a temporary period (no more than 6 months, beginning in mid-September) in order to evaluate the validity of procedures associated with the UA and its flight planning software in this operating area.²³

As most of the proposed action's 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 reasonably foreseeable impacts in the study area would largely be from noise and are discussed solely in Section 3.6, *Noise and Noise-Compatible Land Use*.

3.2 Environmental Impact Categories Not Analyzed in Detail

This EA 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 1050.1G, § 1.2 (b)(1)).

- **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 200 miles from the nearest shoreline.
- **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. 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

²³ Wing's test operations would occur at up to 35 locations and would be limited to 200 operations per day per nest during daytime hours. These operations would take place in a geographically limited area smaller than the areas contemplated in this EA. These test operations are related to the testing and validation of UA package delivery technology and operations and are not part of the proposed action.

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 and related infrastructure), and partners are responsible for complying with any applicable laws for remote pick-up nests and related infrastructure. All nest locations would be sited in accordance with all local land use ordinances and zoning requirements. Local jurisdictions in the Atlanta metro area may vary in the scope of their review and approval of commercial operations. Further, Section 2.2, *Proposed Action*, identifies the standoff 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. Wing would use a charging pad at the nest (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. metro 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 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 from the UA 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 twilight²⁴ 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 Chattooga River in Georgia approximately 90 miles northeast of the study area (National Park Service 2023a). There are four Nationwide Rivers Inventory river segments within the study area: Flint River, Sweetwater Creek, Sope Creek, and South River (National Park Service 2023b). However, UA operations would not occur over water and generally would not occur in the vicinity of these segments at sufficient volume to noticeably affect the visitor experience. 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-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.

²⁴ According to the National Oceanic and Atmospheric Administration (NOAA) 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. 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.).

3.3 Air Emissions and Air Quality

3.3.1 Definition of Resource and Regulatory Setting

This section provides an overview of air quality 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.

The Clean Air Act (CAA), 42 U.S.C. §§ 7401–7671q, establishes a regulatory framework to prevent and control air pollution that may affect public health and the environment. The regulatory framework includes National Ambient Air Quality Standards (NAAQS), implemented under 40 CFR Parts 50–51; National Emission Standards for Hazardous Air Pollutants, implemented under 40 CFR Parts 61 and 63; and permits, implemented under 40 CFR Part 70. Pollutants regulated under the CAA that have established NAAQS include six (6) common air pollutants also known as “criteria” air pollutants. These include particulate matter (PM) (further segregated to particulate matter equal to or less than 10 microns [PM₁₀] and particulate matter equal to or less than 2.5 microns [PM_{2.5}]), ozone (O₃), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and lead (Pb).

Section 112(r) of the CAA and 40 CFR Part 68 require preparation of a risk management plan (RMP) if reportable quantities of regulated and extremely hazardous chemicals are used. The regulated substances and threshold quantities are provided in 40 CFR § 68.130. However, under 40 CFR § 68.126, flammable substances listed in Tables 3 and 4 of § 68.130 are exempt from RMP requirements when used as fuels or held for sale as fuels at retail facilities. There are no bulk quantities of regulated and extremely hazardous chemicals associated with this project. The ultra-low sulfur diesel 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 all diesel fuel constituents are expected to remain below the reportable threshold quantities outlined in 40 CFR § 68.130 and would qualify for the fuel use exemption.

In addition, the CAA requires federal agencies to demonstrate conformity with state implementation plans for federal actions, such as federal financial assistance, licenses, permits, or approvals (42 U.S.C. § 7506(c)(1)). U.S. EPA implements this requirement under the General Conformity Rule, 40 CFR Part 93. Projects that do not emit criteria pollutants or their precursors above the *de minimis* levels in 40 CFR § 93.153(b) are considered too small to adversely affect an area’s air quality status, and the general conformity requirements would be satisfied.

3.3.2 Affected Environment

The study area includes 22 counties in the Atlanta, Georgia, region: Bartow, Butts, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Lamar, Meriwether, Newton, Paulding, Pike, Rockdale, Spalding, and Walton. This region is characterized by its diverse meteorological conditions within a humid subtropical climate zone (Frankson et al. 2022). Summers in the Atlanta metro are typically hot and humid, with temperatures often exceeding 95°F. Winters are mild, with daytime temperatures averaging between 40–50°F. January is generally the coldest month. Thunderstorms are common in the metro area, particularly during spring and summer months, and often lead to severe flooding. Direct landfall of hurricanes is uncommon, but tropical storm system remnants bring heavy rains and winds to the Atlanta metro area (Frankson et al. 2022).

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 and suburban 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 Fulton County, are likely to be higher than ambient emissions in more suburban or rural counties within the study area, such as Lamar County.

The National Weather Service and Georgia Environmental Protection Division (EPD) 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. EPD maintains the Georgia Ambient Air Monitoring Program, which makes data from air quality monitoring stations statewide publicly available (EPD 2025). Ambient air monitoring records from stations in these counties are used to characterize the existing air quality. Monitoring sites measure pollutants such as O₃ and PM_{2.5} and PM₁₀ to determine compliance with NAAQS standards. There are approximately 10 active monitoring stations in the study area that measure criteria pollutants. The past 3 years of observations show that all concentrations of criteria pollutants are less than the NAAQS (EPD 2024).

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 EPD. If the air quality in a geographic area meets or is cleaner than the national standard, it is designated an attainment area; areas that do not meet the national standard are designated nonattainment areas. Areas which moved from nonattainment to attainment must follow maintenance plans. The study area includes is in attainment for all NAAQS, but many counties are in maintenance for O₃ (2008 and 2015 standards). Table 3.3-1 includes the O₃ attainment status of the study area counties.

Table 3.3-1. Attainment Status of Study Area Counties

County	Attainment Status for 8-Hour O₃ (2008 Standard)	Attainment Status for 8-Hour O₃ (2015 Standard)
Bartow	Maintenance	Maintenance
Butts	Attainment	Attainment
Carroll	Attainment	Attainment
Cherokee	Maintenance	Attainment
Clayton	Maintenance	Maintenance
Cobb	Maintenance	Maintenance
Coweta	Maintenance	Attainment
DeKalb	Maintenance	Maintenance
Douglas	Maintenance	Attainment
Fayette	Maintenance	Attainment
Forsyth	Maintenance	Attainment
Fulton	Maintenance	Maintenance
Gwinnett	Maintenance	Maintenance
Henry	Maintenance	Maintenance
Lamar	Attainment	Attainment
Meriwether	Attainment	Attainment
Newton	Maintenance	Attainment
Paulding	Maintenance	Attainment
Pike	Attainment	Attainment
Rockdale	Maintenance	Attainment
Spalding	Attainment	Attainment
Walton	Attainment	Attainment

Source: NAAQS (EPA 2026a) and EPA Green Book (EPA 2026b)

O₃ = ozone.

The specific climate risks in the study area region include rising temperatures, heatwaves, drought, and flooding (EPA 2016). Rapid urbanization in the area has exacerbated these issues by increasing resource demand and amplifying the urban heat island effect. Water resources are also under pressure from fluctuating precipitation patterns and extended droughts, creating challenges for agriculture, industry, and residential needs. Like criteria pollutants, the existing sources of carbon dioxide (CO₂) 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 CO₂, methane (CH₄), and nitrous oxide (N₂O), with CO₂ accounting for the majority due to fossil fuel combustion (EPA 2023). In the study area, CO₂ 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, 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 43 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 CO₂ emissions from delivery services, which would have positive effects on climate as the proposed action would replace vehicle miles traveled by CO₂-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. 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.²⁵ 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.

Direct Emissions

Additionally, the 43 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 43 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. After the transitional power period concludes, the emissions for emergency power would correspond to 500 annual hours per nest of generator usage and would be substantially less than the emissions during the transitional power period.

Because 15 study area counties are in maintenance for O₃ (Table 3.3-1), a general conformity analysis must be conducted. Table 3.3-2 calculates the total estimated emissions from generator usage, focusing on O₃ emissions of concern. These emissions are then compared to the CAA *de minimis* thresholds in Table 3.3-3.

O₃ is not directly emitted by generators or other combustion sources. Instead, it forms through photochemical reactions involving volatile organic compounds (VOC) 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 O₃-related emissions.

²⁵ The 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).

Table 3.3-2. Calculation of Emissions – No Action Alternative and Proposed Action Alternative

Alternative	Power Output (kW)	Annual Runtime (hrs/yr)	Annual Elec. Gen. (kWh/yr)	Number of Nests	Total Annual Elec. Gen. (kWh/yr)	NMHC+ NOx factor (g/kWh)	NMHC+NOx emissions (g/yr)	NMHC+NOx emissions (tons/yr)
No Action	-	-	-	-	-	-	-	-
Proposed Action	20	1,700	34,000	43	1,462,000	4.7	6,871,400	7.57

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

Notes:

(1) Listed power output for each generator is prime power, not standby power. Standby power for emergency generation is slightly greater (Allmand n.d.).

(2) NMHC+NOx, emission factors are from EPA Tier 4 engine standards for compression-ignition (diesel) engines 19 < kW < 56. See 40 CFR 1039.101, Table 1.

(3) O₃ precursor NOx and VOC emissions are conservatively estimated to equal NMHC+NOx emissions. (This approach assumes that all non-methane hydrocarbons act as volatile organic compounds, potentially overestimating the contribution to ozone formation. While these assumptions simplify calculations, they likely overestimate actual emissions to provide a conservative analysis.)

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) (Maintenance)	7.57	100	No

Sources: Table 3.3-2 and EPA's De Minimis Tables (EPA 2025c).

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

In conclusion, the emissions associated with the proposed action generators are less than the *de minimis* thresholds established under the CAA. This indicates that these emissions would not trigger further regulatory review or a general conformity determination. 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.

Indirect Emissions

Increased electricity consumption associated with powering 43 new nests in the Atlanta metro would result in indirect emissions due to the region's reliance on fossil fuel-based energy sources. Georgia Power manages the vast majority of the Atlanta power grid, which, as of 2024, derives approximately 41 percent of its electricity from natural gas, 18 percent from coal, 14 percent from nuclear, and 12 percent from solar (Georgia Power 2024).

However, while electricity use for the nests would indirectly generate emissions due to the Atlanta metro'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.

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

3.4.1 Definition of Resource and Regulatory Setting

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

3.4.1.1 Threatened and Endangered Species

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

3.4.1.2 Migratory Birds

The Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703–712) protects migratory birds by prohibiting the taking, killing, or possessing of migratory birds (including their eggs, nests, and feathers). The MBTA applies to migratory birds identified in 50 CFR § 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 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 EPA, the action area occurs entirely within the Piedmont Level III ecoregion and Southern Outer Piedmont Level IV ecoregion (Griffith 2001). The Piedmont ecoregion comprises a transitional area between the mountainous ecoregions to the northwest and the relatively flat coastal plain to the southeast. Geologically, it is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks with moderately dissected plains and isolated monadnocks (rounded hills). The soils tend to be finer-textured than in the coastal plain ecoregions. Once largely cultivated, much of this region has reverted to pine and hardwood woodlands, and, more recently, to sprawling urban and suburban areas (GA DNR 2015). The Southern Outer Piedmont ecoregion has lower elevations, less relief, and less precipitation than the Southern Inner Piedmont. Loblolly-shortleaf pine is the major forest type, with less oak-hickory and oak-pine than in the Southern Inner Piedmont. Gneiss, schist and granite are the dominant rock types, covered with deep saprolite and mostly red, clayey subsoils. The southern boundary of the ecoregion occurs at the Fall Line, where unconsolidated coastal plain sediments overlay the metamorphic and igneous rocks of the Piedmont. (GA DNR 2015).

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.

Development is rapidly encroaching upon existing vacant lands both within and surrounding the project. The urban environment in the study area includes agricultural areas; commercial areas (i.e., business parks, airports, landfills); communities; downtown areas; 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. These areas provide habitat for the smaller and more common bird and mammal species of the southern United States, including mammals such as white-tailed deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and gray squirrels (*Sciurus carolinensis*).

3.4.2.1 Special-Status Species

Federally Listed Species

The potential for impacts on federally listed species was assessed using USFWS Information for Planning and Consultation online system (July 11, 2025). The official species list for the study area is included within Appendix E. Table 3.4-1 lists the federally threatened and endangered species that could be present in the study area. The action area contains designated critical habitat for the Gulf moccasinshell (*Medionidus penicillatus*), orangeacre

mucket (*Hamiota perovalis*), oval pigtoe (*Pleurobema pyriforme*), purple bankclimber (*Elliptoideus sloatianus*), shinyrayed pocketbook (*Hamiota subangulata*), and proposed critical habitat for the southern elktoe (*Alasmodonta triangulate*).

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

Species	Common Name	Species Name	ESA Status	Critical Habitat
Mammals	Gray Bat	<i>Myotis gresecens</i>	Endangered	N
	Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Endangered	N
	Tricolored Bat	<i>Perimyotis subflavus</i>	Proposed Endangered	N
Reptiles	Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	Proposed Threatened	N
Clams	Finelined pocketbook	<i>Hamiota altilis</i>	Threatened	N
	Gulf moccasainshell	<i>Medionidus penicillatus</i>	Endangered	Y
	Oval pigtoe	<i>Pleurobema pyriforme</i>	Endangered	Y
	Purple bankclimber	<i>Elliptoideus sloatianus</i>	Threatened	Y
	Shinyrayed pocketbook	<i>Hamiota subangulata</i>	Endangered	Y
Insects	Monarch Butterfly	<i>Danaus plexippus</i>	Proposed Threatened	N
Flowering Plants	American chaffseed	<i>Schwalbea americana</i>	Endangered	N
	Georgia rockcress	<i>Arabis georgiana</i>	Threatened	N
	Large-flowered skullcap	<i>Scutellaria montana</i>	Threatened	N
	Little amphianthus	<i>Amphianthus pusillus</i>	Threatened	N
	Michaux's sumac	<i>Rhus michauxii</i>	Endangered	N
	Relict trillium	<i>Trillium reliquum</i>	Endangered	N
	Tennessee yellow-eyed grass	<i>Xyris tennesseensis</i>	Endangered	N
	White fringeless orchid	<i>Platanthera integrilabia</i>	Threatened	N
Ferns and Allies	Black-spored quillwort	<i>Isoetes melanospora</i>	Endangered	N
	Mat-forming quillwort	<i>Isoetes tegetiformans</i>	Endangered	N

Given that the action does not include any ground construction or habitat modification, and the UA would not touch the ground except at the nests, there are no possible mechanisms of effect to ESA-listed reptiles, clams, flowering plants, ferns and allies, and designated or proposed critical habitat. Therefore, these species and habitats are not discussed further in this document.

The gray bat occurs primarily in limestone karst areas of the southeastern United States, with populations occurring in Alabama, northern Arkansas, Kentucky, Missouri, Tennessee, and Georgia (USFWS 1982; USFWS 2009). Their distribution within the range is patchy with seasonal migrations occurring between hibernation and maternity caves. The gray bat is highly restricted to cave habitats and has specific seasonal temperature requirements which greatly limit the availability of suitable summer and hibernation caves. Gray bats forage almost exclusively over water along rivers, streams, lakes, or reservoir edges, often within 5

meters of the surface of the water. Primary threats to the species include human disturbance of cave habitat areas, development, and white-nose syndrome.

The northern long-eared bat occurs throughout North America and typically roosts during summer months underneath bark or in cavities of both live trees and snags (USFWS 2022). The species is not dependent on tree species and will roost singly or in maternity colonies. They are nocturnal foragers and typically fly and forage in the understory for insects during dusk, nighttime, and dawn. Northern long-eared bats overwinter in hibernacula including caves and abandoned mines with relatively constant, cooler temperatures. White-nose syndrome is the greatest current threat to the species, but other factors contributing to their decline include wind-energy mortality, habitat loss, and climate change.

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 fly and forage at treetop level or above but may fly 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 2023). This species spends 6 to 9 months per year hibernating in caves or mines (USFWS 2023). The USFWS has proposed to list the tricolored bat as an endangered species, primarily due to white-nose syndrome. Other factors that influence the tricolored bat's viability include wind-energy-related mortality, habitat loss, and effects from climate change.

The monarch butterfly potentially occurs in the study area (USFWS 2025). Monarchs occur throughout the United States during summer months and are proposed for federal listing. The preferred habitat for monarchs is open meadows, fields, and wetland edges with the presence of milkweed and flowering plants where they typically fly close to the ground. Monarchs migrate across the state of Georgia during the fall and spring seasons and occur in preferred habitat areas throughout the state and fly at altitudes upward of 10,000 feet (USFWS n.d.).

State Species of Greatest Conservation Need

In Georgia, 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 (GA DNR 2015). The counties identified in the study area that have been evaluated for SGCN include Bartow, Butts, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Lamar, Meriwether, Newton, Paulding, Pike, Rockdale, Spalding, and Walton Counties. The Georgia Department of Natural Resources database of Rare, Threatened, and Endangered Species lists 140 species of amphibians, birds, fish, mammals, reptiles, insects, crustaceans, mollusks, and plants in these counties considered as SGCN as defined in the 2015 Georgia State 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 Atlantic Migratory Flyway where millions of birds, including songbirds, grassland birds, waterfowl, shorebirds, and raptors migrate north and south during spring and fall migration.

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 (The 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 predators. Species of birds that exhibit mobbing and territorial defense behaviors that are known to occur in the Atlanta area are shown in Table 3.4-2.

Table 3.4-2. Atlanta Metro Songbird Species with Mobbing and Territorial Behaviors

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

Source: Cornell Lab n.d.

Multiple factors result in the Northern Mockingbird being considered the most aggressive bird in North America (Mass Audubon 2023). During the breeding season, Mockingbirds are known to attack any moving object that enters their territory, including pedestrians, bicycles, and the occasional passing vehicle. Mockingbirds occupy a wide range of urban habitats, including industrial and highly commercialized areas such as parking lots with landscaping trees. Mockingbirds are abundant throughout Georgia (Cornell lab n.d.).

While also abundant, the Red-winged Blackbird and Common Grackle show strong affinity to open herbaceous wetland habitats during the breeding season. The probability of a mobbing attack by these two species is likely lower than the Northern Mockingbird.

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 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, 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 Atlanta 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 both the nest and delivery 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 USFWS or the National Marine Fisheries Service 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.

3.4.3.1 No Action Alternative

Under the no action alternative, Wing would not implement commercial UA package delivery operations in the Atlanta metro area. 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) 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 will

establish a direct line of communication with Georgia Department of Natural Resources (Georgia DNR) to discuss any potential concerns regarding impacts on wildlife or high-quality habitat in the project area. Wing will also specifically coordinate with the managing entities of state parks and natural areas within the study area on the thoughtful placement and use of delivery sites within these areas as necessary.

Special-Status Species

Federally Listed and Proposed Species

The proposed action could affect ESA-listed species through the emission of light, noise, and risk of collision. The proposed action does not involve ground-disturbing activity outside of existing commercial areas and does not include any operations over water. 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).

Suitable habitat for ESA-listed bat species 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 ESA-listed 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 high-quality roosting or foraging habitats.

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 (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 ESA-listed 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 an ESA-listed bat during operations, the likelihood of the UA striking a bat is discountable.

The monarch butterfly is proposed 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. 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.

The FAA conducted informal consultation with USFWS in accordance with Section 7 of the ESA and requested concurrence with the FAA's determination that the proposed action *may affect, but is not likely to adversely affect* the gray bat, the northern long-eared bat, the tricolored bat, and the monarch butterfly. On August 6, 2025, the USFWS concurred with these determinations. The concurrence letter is included as Appendix H.

Species of Greatest Conservation Need

As with ESA-listed species, the proposed action poses the largest potential to affect flying SGCN at risk for collision during delivery operations. While other species would also be affected by noise and light emissions, these temporary disturbances are not expected to measurably affect the reproduction or survival of any given individuals and would not result in population level changes to any particular species. SGCN at greatest risk include birds, bats, and insects. However, the risk of collision is very low and species most likely would be able to avoid UAs due to the same disturbance factors listed previously. As such, the proposed action is not expected to have significant adverse effects on any SGCN within the study area.

SGCN insects could be struck by drones en route to or during delivery. Information regarding drone impacts on insects is limited; but what scientific literature there is addressing drone impacts on insects does not report widespread negative impacts. 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 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 will implement a monitoring plan for Bald Eagle nests that integrates multiple strategies and resources. This includes periodically checking online tools such as iNaturalist²⁶ to identify eagle nests that may occur in the operating area, as well as communication with the bird watching community to identify nests. Wing personnel will also be educated in the visual identification of Bald Eagle nests, which are typically very conspicuous. If Wing identifies a Bald Eagle nest or is notified of the presence of a nest, Wing will establish 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 will maintain this avoidance area until the end of the breeding season or until a qualified biologist indicates the nest has been vacated. Wing will regularly report monitoring and avoidance measures to Georgia DNR and USFWS Regional Migratory Bird Permit Office.

Based on the information available regarding the interaction between drones and birds, the FAA concludes that mobbing and attacking behaviors would be the most relevant interaction to occur. As detailed in Table 3.4-2, some bird species are more likely to exhibit this type of behavior, and these are the species that would be expected to interact with the drones, if any. The proposed action would not be expected to result in significant impacts on migratory birds because it would not result in long-term or permanent loss of wildlife species, would not result in substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or populations, and would not have adverse impacts on reproductive success rates, natural mortality rates, non-natural mortality, or ability to sustain the minimum population levels.

²⁶ <https://www.inaturalist.org/>.

3.5 Department of Transportation Act, Section 4(f) Resources and Land and Water Conservation Fund Section 6(f) Resources

3.5.1 Definition of Resource and Regulatory Setting

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

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

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 may be considered a Section 4(f) use.

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

²⁷ The FAA may make a *de minimis* impact determination with respect to a physical use of Section 4(f) property if, after taking into account any measures to minimize harm, the result is either (1) a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or wildlife or waterfowl refuge for protection under Section 4(f); or (2) a Section 106 finding of no adverse effect or no historic properties affected. See 1050.1G, Appendix A Exhibit A-1. Significance Determination for FAA Actions and Section 4(f) regulations at 23 CFR 774.17 *De minimis impact*.

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

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 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 5610.1D, *Procedures for Considering Environmental Impacts* and 49 U.S.C § 303. 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 1050.1 Desk Reference (FAA 2023).

Section 6(f) of the Land and Water Conservation Fund, 54 U.S.C. § 200305(f)(3), requires properties funded through the program remain available for public outdoor recreation use or be replaced by lands of equal value, location, and recreation usefulness. National Park Service approval is required to convert Section 6(f) properties in whole or in part to uses other than public outdoor recreation.

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). The FAA identified many properties that meet the definition of a Section 4(f) resource, including public parks administered by state, city, and local authorities, and historic properties identified on the Georgia State Historic Preservation Officer (SHPO) website. By count, most of the Section 4(f) resources are local public parks, trails, and ballfields. Appendix B provides a map of county parks and recreation departments in the study area which have jurisdiction over Section 4(f) properties. There are no wildlife refuges within the study area. Panola Mountain State Park and Joe Kurz Wildlife Management Area are wildlife resources located within the study area. These resources are not currently included in Wing's fly less restrictions, which

include schools (elementary, middle, high school), preschools and daycares with outdoor facilities, and churches.

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

As discussed in Section 3.5, *Historical, Architectural, Archaeological, and Cultural Resources*, there are numerous historic properties within the study area as listed on the Georgia 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 Georgia SHPO 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 implement commercial UA package delivery operations in the Atlanta metro area. 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.

3.5.3.2 Proposed Action

Under the proposed action, there would be no physical or constructive use of Section 4(f) resources because nests and autoloaders would be sited in commercially zoned areas outside of Section 4(f) property boundaries and occasional flyovers in the study area would not result in substantial impairment of Section 4(f) properties. No physical occupancy of Section 4(f) resources would occur as a result of the proposed action. As discussed in Section 3.6, *Noise and Noise-Compatible Land Use*, and Appendix D, 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 above, Wing will establish a direct line of communication with the Georgia DNR to discuss any concerns regarding parkland noise and will carefully coordinate any parkland delivery operations with managing entities as necessary. The only aboveground structures would consist of autoloaders no more

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

than 10 feet in height and 7 feet wide, which could incur a minor visual effect on historic properties if those properties are within the viewshed of the autoloader. Similarly, nests are located in commercially zoned area and would not appreciably change the viewshed or result in substantial visual effects to Section 4(f) resources. Therefore, the FAA has determined that UA overflights and nest and autoloader siting 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.

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.

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

Major steps in the Section 106 process include identifying the Area of Potential Effects (APE), identifying historic and cultural resources within the APE, consulting with the SHPO and Tribal Historic Preservation Officers 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 finding of adverse effect on historic properties through the Section 106 process as a factor to consider when evaluating the context and intensity of potential environmental impacts for historical, architectural, archaeological, and cultural resources. However, an adverse effect finding does not automatically trigger the 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 execution of a Memorandum of

Agreement (MOA) or Programmatic Agreement (PA) 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 385 NRHP-listed historic properties and 191 NRHP historic districts occur within the APE (National Park Service 2026). Historic properties and districts are listed in the attached SHPO letter (Appendices F and G, respectively).

3.6.3 Environmental Consequences

3.6.3.1 No Action Alternative

Under the no action alternative, Wing would not implement commercial UA package delivery options in the Atlanta metro area and surrounding areas. The no action alternative is not expected to result in significant impacts related to historical, architectural, archaeological, and cultural resources.

3.6.3.2 Proposed Action

Nests would be located in commercially zoned areas within parking lots of shopping centers and large retailers. Infrastructure for this project would consist almost entirely of pre-existing hardstand and would involve no ground disturbance. The only aboveground structures would consist of autoloaders no more than 10 feet in height and 7 feet wide, which could incur a minor visual effect on historic properties if those properties are within the viewshed of the autoloaders. However, required standoff distances of 45–80 feet, depending on airspace classification as described in Appendix G, would minimize these impacts.

Wing projects up to 400 delivery flights per operating day per nest, meaning any historic or cultural resource would experience few overflights per day, if any. All takeoff and loading operations would occur at least 45 feet away from any historic properties, adhering to standoff requirements for noise-sensitive areas. Deliveries at or near historic properties would involve the UA hovering at 23 feet AGL for about 30 seconds. In flight, the UA would appear as a small object moving at twice the speed of bird flight. These rapid and intermittent flight operations would result in minimal visual effects. Additionally, Wing's flight planning software minimizes overflights of any specific location by varying flight paths (Section 2.2, Proposed Action).

Noise levels for takeoff and delivery would remain below 84 dB SEL for 30 seconds, similar to a freight train 100 feet away. In-flight noise for the 7000W-B model at 165 feet AGL is 56.5 dBA SEL, comparable to the sound inside an urban residence, while the 8000-A model produces 62.0 dBA, akin to a conversation at a 3-foot distance. The FAA's noise exposure analysis (Section 3.6, Noise and Noise-Compatible Land Use, and Appendix G) confirms

that noise levels would be below significance thresholds, even in areas of highest exposure. The small size of the UA ensures no vibrations that could affect historic structures or contents within the APE.

In conclusion, Wing UA operations would only incur intermittent and minor visual and audible effects on historic properties. While delivery noise and potential visual impacts were considered for properties where a quiet setting or an unobstructed sky contributes to significance, any effects would be negligible and temporary. In accordance with 36 CFR § 800.4(a)(1), the FAA transmitted a letter on June 30, 2026, to the Georgia SHPO that there would be *no adverse effect* on historic properties by the proposed action based on the minimal infrastructure required for the project, consideration of historic properties in the OpSpecs as noise-sensitive areas, and the temporary nature of potential audible and visual effects (Appendix F).

FAA's consultation with the Georgia SHPO is provided in Appendix F. FAA received concurrence from the SHPO on August 3, 2026 of its determination of *no adverse effect* by the proposed action. As currently analyzed, 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 in Appendix F. The FAA did not receive a response from any of the tribes.

3.7 Noise and Noise-Compatible Land Use

3.7.1 Definition of Resource and Regulatory Setting

Noise is considered any unwanted sound that interferes with normal activities (such as sleep, conversation, student learning) and can cause annoyance. Aircraft noise is often the most noticeable environmental effect associated with any aviation project. Several federal laws, including the Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. §§ 47501-47507) regulate aircraft noise and noise-compatible land use. Through 14 CFR Part 36, the FAA regulates noise from aircraft. FAA Order 1050.1G, Appendix C, §C-1.3 requires the FAA to identify the location and number of noise-sensitive areas that could be significantly impacted by noise.

Sound is measured in terms of the decibel (dB), which is the ratio between the sound pressure of the sound source and 20 microPascals, which is nominally the threshold of human hearing. Various weighting schemes have been developed to collapse a frequency spectrum into a single dB value. The A-weighted decibel, or dBA, corresponds to human hearing accounting for the higher sensitivity in the mid-range frequencies. To comply with NEPA requirements, the FAA has issued requirements for assessing aircraft noise in FAA Order 1050.1G, Appendix C. 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 Order 1050.1G 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 3,532 square miles, the approximate water area is 223 square miles, and the estimated population within the counties included in the study area is 5,870,280 per 2022 estimates.

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

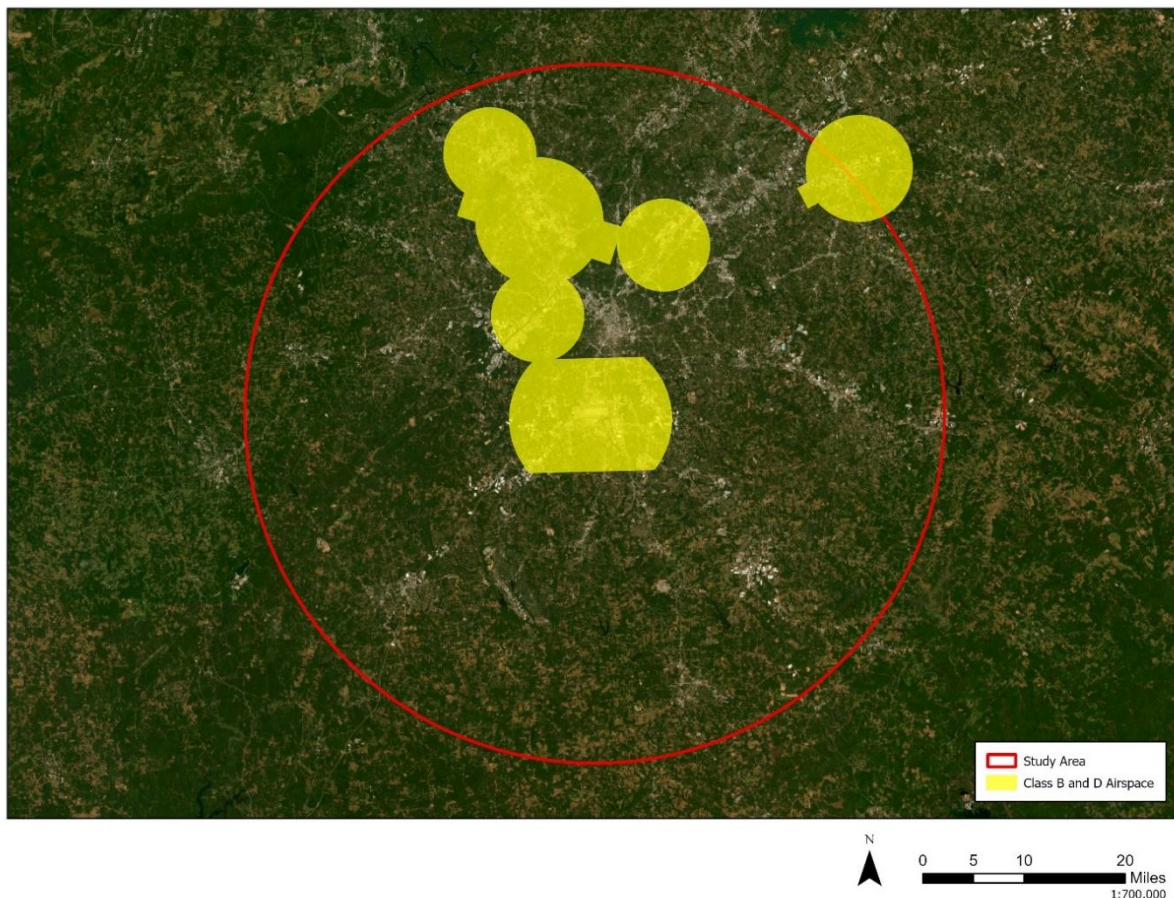


Figure 3.7-1. Controlled Surface Area of Class B and Class D Airspace

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Under the no action alternative, Wing would not implement commercial UA package delivery operations in the Atlanta metro area. Wing would continue to conduct UA package delivery operations under Part 135 in locations currently authorized by its OpSpecs and at other locations under 14 CFR Part 107. Therefore, the no action alternative is not expected to cause a significant impact on any noise-sensitive resources within the study area.

3.7.3.2 Proposed Action

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

Due to the unknown fleet mix and operational profile(s) that would be used (i.e., manual load, nearfield autoloader, or offsite autoloader), this analysis assumes the most conservative scenario with the farthest setback distances presented in Tables 9 to 16 of Appendix D. This analysis was used to define the potential significant impacts due to the proposed action. Noise assessments were performed for each of the flight phases as discussed in detail in the following sections.

Noise Exposure for Nest Operations

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

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

Annual Average Daily 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, Class C, 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, Class C, and Class D airspace. Based on the above distances, the increase of noise would not be expected to exceed DNL 1.5 dB within DNL 65 dB of existing aviation noise exposure or become DNL

65 dB with the increase of DNL 1.5 dB because DNL 60- and 65-dB of existing aviation noise exposure would not exceed the controlled surface areas of Class B, Class C, 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 offsite package autoload operation consists of arrival, package autoload, and departure phases. As shown in Table 3.7-2, offsite package autoload operations would not exceed 65 DNL at 25 feet from an offsite autoloading location at a rate of 400 deliveries per day.

Table 3.7-2. Estimated Extent of Noise Exposure from an Offsite Package Autoloading Location

Average Daily Deliveries per Autoloader	DNL 65 dB (ft)	DNL 60 dB (ft)	DNL 55 dB (ft)	DNL 50 dB (ft)	DNL 45 dB (ft)
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.

Offsite package autoload and pickup flight paths would not occur within 80 feet of noise-sensitive areas when the autoloader is located within the controlled surface area of Class B, Class C, and Class D airspace and 45 feet away from noise-sensitive areas in all other areas within the study area. Based on the above distances, the increase of noise would not be expected to exceed DNL 1.5 dB within DNL 65 dB of existing aviation noise exposure or become DNL 65 dB with the increase of DNL 1.5 dB because DNL 60- and 65-dB of existing aviation noise exposure would not exceed the controlled surface areas of Class B,

Class C, and Class D airspace. Therefore, there would be no significant impact due to autoland operations. See Appendix D for a detailed explanation of setback distances.

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 DNL 40.7 dBA. Considering that en route UA noise would be significantly lower 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 noise 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 Tables 15 and 16 of Appendix D and summarized in Table 3.7-3 for various DNL levels. At the level of 5 daily DNL equivalent deliveries, significant noise effects would not be expected anywhere beyond the immediate point of delivery.

Table 3.7-3. Estimated Extent of Noise Exposure for Delivery Locations Based on Maximum Deliveries per Location

Average Daily DNL Equivalent Deliveries	DNL 65 dB (ft)	DNL 60 dB (ft)	DNL 55 dB (ft)	DNL 50 dB (ft)	DNL 45 dB (ft)
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25

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.

Reasonably Foreseeable Effects

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 113 airports within the Atlanta metro area (see Appendix H). The potential for noise and compatible land use effects would result from UA and manned aircraft operating within DNL 60 dB noise exposure areas of existing airports. As such, the potential for additional effects would be minimized because 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, Class C, 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, Class C, and Class D airspace. No other Part 135 UA operations currently occur in the Atlanta metro area. 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 additive 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 noise effects are properly analyzed and disclosed.

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 effects are expected on the power grid or from energy sources.

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. 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. Wing will communicate and coordinate with other operators to limit operations occurring concurrently in the same area to avoid any significant impacts.

Overall Noise Exposure Results

The maximum noise exposure levels are associated with nest operations, where DNL 65 dB occurs within 45 feet of a nest perimeter and DNL 60 dB occurs within 65 feet. As described in Section 2.2, *Proposed Action*, 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, Class C, and Class D airspace, nests would be placed 120 feet away from noise-sensitive areas. Offsite package autoloader and pickup flight paths would not occur within 80 feet of noise-sensitive areas when the autoloader is located within the controlled surface area of Class B, Class C, and Class D airspace and 45 feet away from noise-sensitive areas in all other areas within the study area. Wing understands the potential for future operators to enter into the proposed operations area and would work with future operators and the FAA to avoid the contribution of significant noise effects.

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

3.8 Visual Effects

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, the detailed analysis of visual effects is 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 3.4, *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 3.4.2 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.³⁰ 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.

³⁰ In the event that the clear space contains obstructions such as trees or cars, the UA would abort the delivery and return to the nest.

3.8.3 Environmental Consequences

3.8.3.1 No Action Alternative

Under the no action alternative, Wing would not implement commercial UA package delivery operations in the Atlanta metro and surrounding areas. 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 minimal effect on the visual character of the area, as the nests and autoloaders would be located in established commercial areas as further described in Section 2.2, *Proposed Action*. At most, visual effects from stationary equipment would be minor in magnitude and would not substantially affect the viewshed of sensitive visual resources, such as historic properties. 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.

Appendix A

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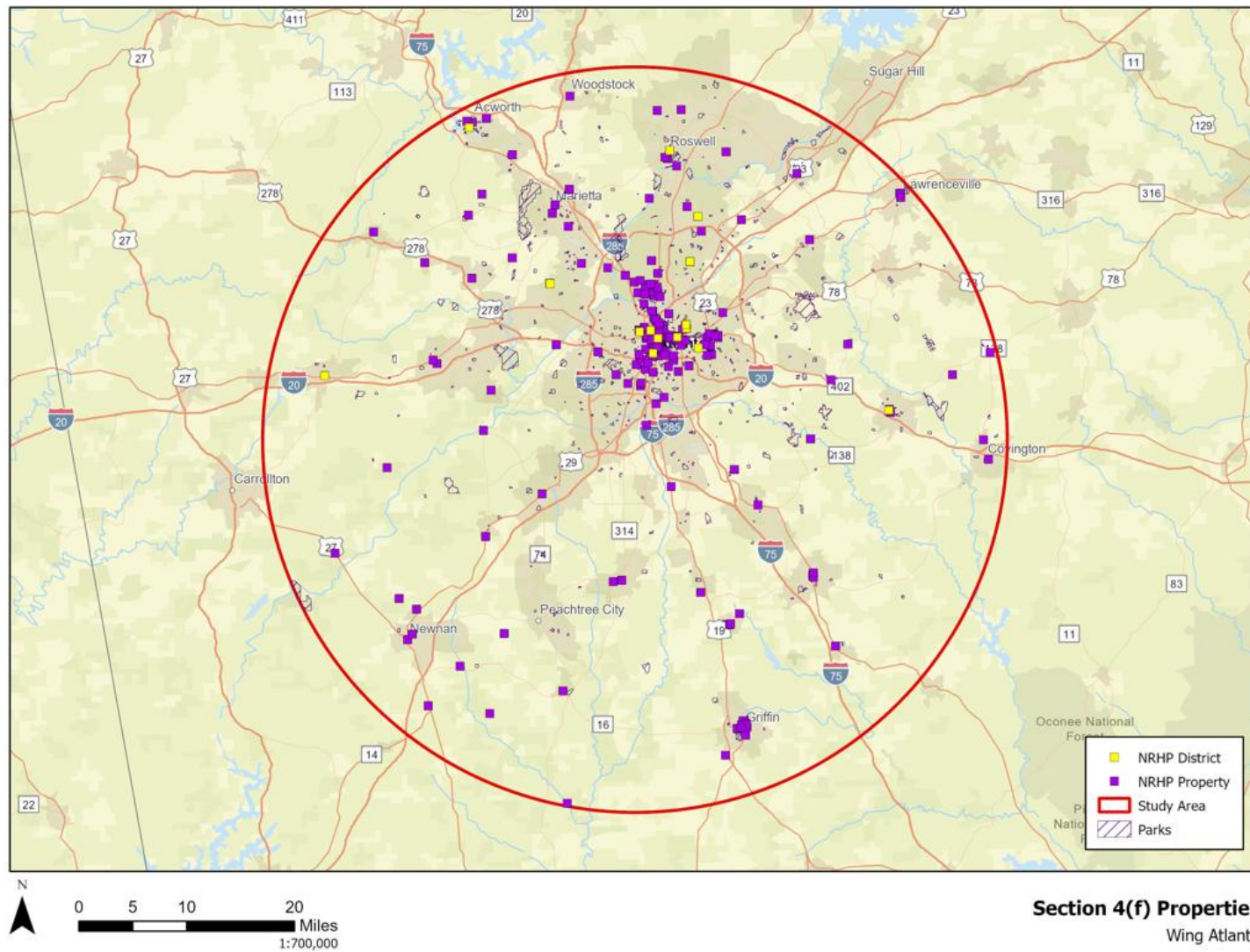
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Appendix B

Section 4(f)



Appendix C

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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

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November 2024



Contents

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

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

List of Tables

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

List of Figures

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

Acronyms and Abbreviations

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

1.1 Purpose

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

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

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

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

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

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

1.2 Fundamental Concepts

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

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

1.3 Regulatory Context

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

2.1 Sound Level Measurements

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

2.1.1 Wing Model 7000W-B Sound Level Measurements

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

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



Figure 1. Hummingbird Wing Model 7000W-B.

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

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

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

Source: AvEnviro Acoustics 2024a.

AGL = above ground level

dBA = A-weighted decibel

2.1.2 Wing Model 8000-A Sound Level Measurements

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

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



Figure 2. Wing Hummingbird 8000-A UA

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

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

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

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

Source: AvEnviro Acoustics 2024b.

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

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

2.2 Analysis Procedure Methodology

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

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

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

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

Chapter 3

Testing Procedure for Wing Operations

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

3.1 Manual Load and Takeoff

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

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

3.2 Delivery

Sequence of package delivery operation to a delivery point:

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

3.2.1 Landing

Sequence of landing operation at nest:

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

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

3.2.2 Offsite Package Autoload

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

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

3.2.3 Nearfield Launch and Autoload

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

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

3.2.4 Fitbit Operation

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

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

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

3.2.5 Geobit Operation

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

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

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Chapter 4

Sound Levels of UA Operations

4.1 Sound Levels for Wing Model 7000W-B

4.1.1 Manual Loading, Delivery and Landing

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

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

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

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

Source: AvEnviro 2024a, ICF 2024.

¹ Assumes one en route trip with package on board.

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

³ Assumes one en route trip without a package.

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

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

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

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

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

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

Source: AvEnviro 2024a, ICF 2024.

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

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

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

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

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

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

Source: AvEnviro 2024a, ICF 2024.

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

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

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

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

4.2 Sound Levels for Wing Model 8000-A

4.2.1 Manual Loading, Delivery and Landing

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

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

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

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

Source: AvEnviro 2024b, ICF 2024.

¹ Assumes one en route trip with package on board.

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

³ Assumes one en route trip without a package.

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

4.2.2 Sound Levels for Wing Model 8000-A Autoload Actions

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

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

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

Distance between Launch Point and Receiver	Offsite Autoload, dBA 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 autoloader, or nearfield autoloader (up to 400 events)
- Landings at nest post-delivery (up to 400 events)
- FitBit (240 DNL equivalent events)
- GeoBit (1 DNL equivalent event)

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

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

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

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

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

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

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

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

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

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

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

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

DNL = day/night average sound level

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

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

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

DNL = day/night average sound level

5.2 Noise Exposure from Offsite Package Autoloading

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

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

Average Daily Deliveries per Nest¹	65 DNL Distance, feet	60 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	<25	<25	<25	<25	<25
5	<25	<25	<25	<25	<25
10	<25	<25	<25	<25	40
15	<25	<25	<25	<25	50
20	<25	<25	<25	30	55
25	<25	<25	<25	35	65
50	<25	<25	<25	50	95
75	<25	<25	35	60	115
100	<25	<25	40	70	140
150	<25	<25	50	90	175
200	<25	30	55	105	205
300	<25	40	70	135	245
400	<25	45	80	160	280

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

DNL = day/night average sound level

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

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

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

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

DNL = day/night average sound level

5.3 En Route Noise Exposure

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

5.4 Noise Exposure from a Delivery Site

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

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

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

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

DNL = day/night average sound level

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

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

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

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

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

DNL = day/night average sound level

5.5 Cumulative Noise Exposure

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

The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.

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

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

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

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

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Chapter 6

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Appendix E

Biological Resources

Table E-1. State Species of Greatest Conservation Need in Bartow, Butts, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Lamar, Meriwether, Newton, Paulding, Pike, Rockdale, Spalding, Walton Counties, Georgia

Scientific Name	Common Name	State Status	ESA Status
<i>Acipenser fulvescens</i>	Lake Sturgeon		
<i>Aesculus glabra</i>	Ohio Buckeye		
<i>Alasmidonta arcula</i>	Altamaha Arcmussel	T	
<i>Alasmidonta triangulata</i>	Southern Elktoe	E	PE
<i>Alburnops hypsilepis</i>	Highscale Shiner		
<i>Allium speculae</i>	Flatrock Onion	T	
<i>Alnus maritima ssp. georgiensis</i>	Georgia Alder	T	
<i>Amblyscirtes alternata</i>	Dusky Roadside-Skipper		
<i>Amblyscirtes belli</i>	Bell's Roadside-Skipper		
<i>Amblyscirtes carolina</i>	Carolina Roadside-Skipper		
<i>Amblyscirtes reversa</i>	Reversed Roadside-Skipper		
<i>Ambystoma tigrinum</i>	Eastern Tiger Salamander		
<i>Amorpha nitens</i>	Shining Indigo-bush		
<i>Amorpha schwerinii</i>	Schwerin's Indigo-bush		
<i>Amphianthus pusillus</i>	Pool Sprite (Snorkelwort)	T	LT
<i>Amsonia sp. 2</i>	Lithonia Bluestar		
<i>Anemone berlandieri</i>	Glade Windflower		
<i>Argynnis diana</i>	Diana Fritillary		
<i>Asclepias rubra</i>	Red Milkweed		
<i>Aureolaria patula</i>	Spreading Yellow Foxglove	T	
<i>Berberis canadensis</i>	American Barberry	E	
<i>Boechera missouriensis</i>	Missouri Rockcress		
<i>Bombus affinis</i>	Rusty-patched bumblebee	E	LE
<i>Buchnera americana</i>	American Bluehearts		
<i>Callophrys irus</i>	Frosted Elfin		
<i>Cambarunio nebulosus</i>	Alabama Rainbow		
<i>Cambarus englishi</i>	Tallapoosa Crayfish		
<i>Cambarus fasciatus</i>	Etowah Crayfish	T	
<i>Cambarus harti</i>	Piedmont Blue Burrower	E	
<i>Cambarus howardi</i>	Chattahoochee Crayfish	T	
<i>Campeloma regulare</i>	Cylinder campeloma		

Scientific Name	Common Name	State Status	ESA Status
<i>Carex acidicola</i>	Acid-Loving Sedge		
<i>Centronyx henslowii</i>	Henslow's Sparrow	R	
<i>Chlosyne gorgone</i>	Gorgone Checkerspot		
<i>Crataegus triflora</i>	Three-flower Hawthorn	T	
<i>Cyprinella callitaenia</i>	Bluestripe Shiner	R	
<i>Cyprinella gibbsi</i>	Tallapoosa Shiner		
<i>Cyprinella xaenura</i>	Altamaha Shiner	T	
<i>Danthonia epilis</i>	Bog Oatgrass		
<i>Draba aprica</i>	Sun-loving Draba	E	
<i>Dryobates borealis</i>	Red-cockaded Woodpecker	E	LE
<i>Eleocharis wolfii</i>	Spikerush		
<i>Elimia mutabilis</i>	Oak Elimia		
<i>Elimia ornata</i>	Ornate Elimia		
<i>Elliptio arca</i>	Alabama Spike	E	
<i>Elliptio arctata</i>	Delicate Spike	E	
<i>Elliptio purpurella</i>	Inflated Spike	T	
<i>Elliptoideus sloatianus</i>	Purple Bankclimber	T	LT
<i>Eriocaulon koernickianum</i>	Dwarf Hatpins	E	
<i>Erynnis martialis</i>	Mottled Duskywing		
<i>Etheostoma ditrema</i>	Coldwater Darter	E	
<i>Etheostoma parvipinne</i>	Goldstripe Darter		
<i>Etheostoma rupestre</i>	Rock Darter		
<i>Etheostoma scotti</i>	Cherokee Darter	T	LT
<i>Euphydryas phaeton</i>	Baltimore Checkerspot		
<i>Eurybia avita</i>	Alexander Rock Aster		
<i>Eurybia jonesiae</i>	Piedmont Bigleaf Aster		
<i>Eurycea aquatica</i>	Brown-backed Salamander		
<i>Eurycea hillisi</i>	Hillis's Dwarf Salamander		
<i>Falco peregrinus</i>	Peregrine Falcon		
<i>Fimbristylis brevivaginata</i>	Flatrock Fimbry		
<i>Fothergilla major</i>	Large Witch-alder	T	
<i>Fundulus bifax</i>	Stippled Studfish	E	
<i>Graptemys barbouri</i>	Barbour's Map Turtle	T	
<i>Habronattus sabulosus</i>	Heggie's Rock Jumping Spider		
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	
<i>Hamiota altilis</i>	Finelined Pocketbook	T	LT
<i>Hamiota subangulata</i>	Shinyrayed Pocketbook	E	LE
<i>Helianthus smithii</i>	Smith's Sunflower		
<i>Hesperia meskei</i>	Meske's Skipper		

Scientific Name	Common Name	State Status	ESA Status
<i>Heterodon simus</i>	Southern Hognose Snake	T	
<i>Hiodon tergisus</i>	Mooneye		
<i>Hybopsis lineapunctata</i>	Lined Chub		
<i>Hydrastis canadensis</i>	Goldenseal	E	
<i>Isoetes melanospora</i>	Black-spored Quillwort	E	LE
<i>Jamesianthus alabamensis</i>	Alabama Warbonnet	E	
<i>Leaunio umbrans</i>	Coosa Creekshell		
<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
<i>Liparis loeselii</i>	Fen Orchid		
<i>Ludwigia spathulata</i>	Creeping Smallflower Seedbox		
<i>Lysimachia fraseri</i>	Fraser's Loosestrife		
<i>Lythrurus lirus</i>	Mountain Shiner		
<i>Macrhybopsis etnieri</i>	Coosa Chub	E	
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	T	PT
<i>Medionidus penicillatus</i>	Gulf Moccasinshell	E	LE
<i>Micropterus cataractae</i>	Shoal Bass		
<i>Micropterus chattahoochae</i>	Chattahoochee Bass		
<i>Micropterus sp. 2 (Altamaha)</i>	Altamaha Bass		
<i>Monotropsis odorata</i>	Sweet Pinesap	T	
<i>Moxostoma robustum</i>	Robust Redhorse	E	
<i>Myotis grisescens</i>	Gray Bat	E	LE
<i>Myotis lucifugus</i>	Eastern Little Brown Bat		
<i>Myotis septentrionalis</i>	Northern Long-eared Bat	E	LE
<i>Myotis sodalis</i>	Indiana Bat	E	LE
<i>Nestronia umbellula</i>	Indian Olive		
<i>Nothonotus chuckwachatte</i>	Lipstick Darter	E	
<i>Nothonotus etowahae</i>	Etowah Darter	E	LE
<i>Noturus munitus</i>	Frecklebelly Madtom	E	LT
<i>Ophiogomphus incurvatus</i>	Appalachian Snaketail		
<i>Panax quinquefolius</i>	American Ginseng		
<i>Percina antesella</i>	Amber Darter	E	LE
<i>Percina crypta</i>	Halloween Darter	T	
<i>Percina lenticula</i>	Freckled Darter	E	
<i>Percina smithvanizi</i>	Muscadine Darter	R	
<i>Perimyotis subflavus</i>	Tricolored Bat		
<i>Peucaea aestivalis</i>	Bachman's Sparrow	R	
<i>Photinus acuminatus</i>	Pointy-lobed Firefly		
<i>Photuris forrestii</i>	Loopy Five Firefly		
<i>Pieris virginiensis</i>	West Virginia White		

Scientific Name	Common Name	State Status	ESA Status
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pine Snake		
<i>Platanthera integrilabia</i>	Monkeyface Orchid	T	LT
<i>Pleurobema pyriforme</i>	Oval Pigtoe	E	LE
<i>Portulaca umbraticola ssp. coronata</i>	Wingpod Purslane		
<i>Rhus michauxii</i>	Dwarf Sumac	E	LE
<i>Rhynchospora thornei</i>	Thorne's Beakrush		
<i>Rudbeckia heliopsisidis</i>	Little River Black-eyed Susan	T	
<i>Sabatia capitata</i>	Cumberland Rose-gentian	R	
<i>Satyrrium edwardsii</i>	Edwards' Hairstreak		
<i>Satyrrium kingi</i>	King's Hairstreak		
<i>Schisandra glabra</i>	Bay Star-vine	T	
<i>Schwalbea americana</i>	Chaffseed	E	LE
<i>Sedum nevii</i>	Nevius Stonecrop	T	
<i>Sedum pusillum</i>	Puck's Orpine	T	
<i>Somatogyryus alcoviensis</i>	Reverse Pebblesnail		
<i>Somatogyryus rheophilus</i>	Flint Pebblesnail		
<i>Spilogale putorius</i>	Eastern Spotted Skunk		
<i>Stewartia malacodendron</i>	Silky Camellia		
<i>Strophitus radiatus</i>	Rayed Creekshell	T	
<i>Symphyotrichum georgianum</i>	Georgia Aster	T	
<i>Telegonus cellus</i>	Golden-banded Skipper		
<i>Thalictrum debile</i>	Trailing Meadowrue	T	
<i>Toxolasma pullus</i>	Savannah Lilliput	T	
<i>Trimerotropis saxatilis</i>	Lichen or Rock Grasshopper		
<i>Triphora trianthophora</i>	Three-birds Orchid		
<i>Tyto alba</i>	Barn owl		
<i>Veratrum woodii</i>	Ozark Bunchflower		
<i>Waldsteinia lobata</i>	Piedmont Barren Strawberry		
<i>Xerophyllum asphodeloides</i>	Eastern Turkeybeard		
<i>Xyris scabrifolia</i>	Harper's Yellow-eyed Grass		
<i>Xyris tennesseensis</i>	Tennessee Yellow-eyed Grass	E	LE

Source: GA DNR 2015.

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

Appendix F

SHPO Consultation

Georgia Department of Community Affairs, Historic Preservation Division
Stacy Rieke
Program Manager
Environmental Review & Preservation Planning
60 Executive Park South, NE
Atlanta, GA 30329

Via electronic submission to er@dca.ga.gov, Olivia.Kendrick@dca.ga.gov, Noah.Bryant@dca.ga.gov

RE: Continuing Section 106 Consultation on Proposed Wing Project, Atlanta Metro Area; Project Number HP-240717-006

Dear Ms. Rieke,

This correspondence regards Project Number HP-240717-006, with the FAA evaluating unmanned aircraft small package delivery in the Atlanta metro area. The project applicant, Wing Aviation, LLC (Wing), is proposing operations specifically within Butts, Carroll, Cherokee, Clayton, Cobb, Covington, Coweta, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, Newton, Rockdale, Spalding, and Walton Counties. Wing must obtain approval from the FAA prior to conducting operations in Atlanta metro 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 (NHPA) (36 CFR § 800.16(y)).

FAA previously provided the Georgia State Historic Preservation Officer (SHPO) with a project summary and requested concurrence on the area of potential effects (APE) in a letter sent on July 17, 2024. Your office sent a response on August 27, 2024, concurring with the proposed APE and recommending using publicly available online resources such as Georgia's Natural, Archaeological, and Historic Resources GIS (GNAHRGIS), to identify historic properties.

The purpose of this letter is to continue Section 106 consultation with the SHPO, provide the results of the preliminary identification of historic properties, and provide a provisional finding of effect for this undertaking.

Results of Preliminary Identification of Historic Properties

FAA identified 272 potential historic properties within one-half mile of the proposed 43 nest sites, none are within the viewshed of recorded sites in GNAHRGIS and NRHP data or historic districts (see Attachment A.2). Of those 272 properties, none are listed on the National Register of Historic Places.

Assessment of Effects

Nests would be distributed throughout the Atlanta 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 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. Remote pickup infrastructure consisting of an autoloader (Attachment A.1) would be installed within existing or proposed nests or at offsite locations (i.e., partner locations offering Wing delivery services) 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.

To avoid the potential for significant noise impacts, Wing would site its nests and autoloaders at least 120 feet away from noise-sensitive areas when the nest and autoloader is located within the controlled surface area of Class B and D airspace¹ 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 nest locations and service area.

Each nest would serve an area within a 6-mile radius for package delivery. Offsite Package Autoloads would serve an area within a 1-mile radius of the Offsite Package Autoload 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, deliveries would not exceed 400 per day.

Conclusion

The FAA requests your concurrence on the 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 Jonathan (Zack) DeLaune via email at 9-faa-drone-environmental@faa.gov.

Sincerely,

DEREK W
HUFTY

Digitally signed by
DEREK W HUFTY
Date: 2026.06.30
13:41:45 -04'00'

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

Enclosures:

Attachment A.1 Wing Hummingbird and Autoloader
Attachment A.2 Proposed Wing nest sites

¹ Class B airspace is generally airspace surrounding the nation’s busiest airports in terms of airport operations or passenger enplanements. Class D airspace is generally airspace surrounding those airports that have an operational control tower. For more information. See:

<https://www.faa.gov/regulationspolicies/handbooksmanuals/aviation/phak/chapter-15-airspace>.

Attachment A.1 Wing Hummingbird and Autoloader

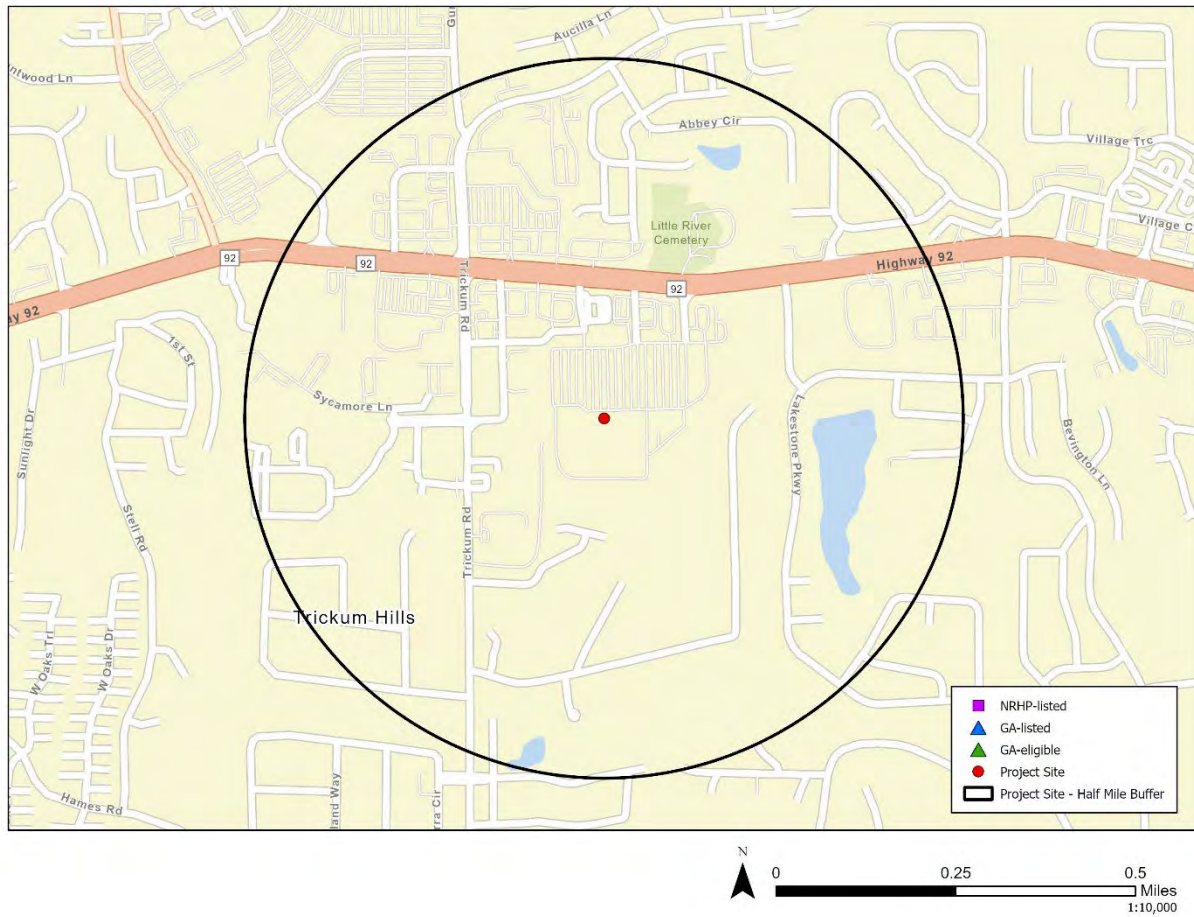


Attachment A.2 Proposed Wing Nest Sites

Wing proposes to establish up to 43 nest locations in the Atlanta metro area. A map and representative viewsheds of each site are included in this attachment. Refer to the below table for a list of site addresses and coordinates, as well as the number of identified historic properties and/or districts identified within 0.50 miles of the proposed site.

Address	Coordinates	Potential historic properties within 0.50 miles	National Register listed properties
12182 Hwy 92, Woodstock	-84.481243, 34.084582	0	0
5401 Fairington Rd, Lithonia	-84.166914, 33.700657	0	0
970 Mansell Rd, Roswell	-84.333537, 34.045168	0	0
3100 Johnson Ferry Rd, Marietta	-84.422436, 34.023211	0	0
2635 Pleasant Hill Rd, Duluth	-84.150447, 33.970152	0	0
1436 Dogwood Dr SE, Conyers	-83.996816, 33.652822	0	0
4375 Lawrenceville Hwy, Tucker	-84.204499, 33.856118	0	0
5200 Windward Pkwy, Alpharetta	-84.275008, 34.093612	1	0
5935 Memorial Dr, Stone Mountain	-84.195063, 33.79928	4	0
2427 Gresham Rd S E, Atlanta	-84.312908, 33.719107	5	0
3580 Memorial Dr, Decatur	-84.268405, 33.757213	125	0
8424 Mall Parkway, Lithonia	-84.084528, 33.694773	0	0
4221 Atlanta Hwy, Loganville	-83.911167, 33.840953	6	0
6435 Bells Ferry Rd, Woodstock	-84.583989, 34.112953	2	0
1025 GA-34, Newnan	-84.743604, 33.39353	0	0
4166 Jimmy Lee Smith Pkwy, Hiram	-84.758824, 33.890814	0	0
5600 N Henry Blvd, Stockbridge	-84.255436, 33.553137	0	0
4004 Lawrenceville Hwy, Lilburn	-84.110549, 33.903011	0	0
1550 Scenic Hwy N, Snellville	-84.00756, 33.886517	0	0
135 Willow Ln, McDonough	-84.184925, 33.432854	0	0
3435 Centerville Hwy, Snellville	-84.046784, 33.807971	1	0
1400 Hudson Bridge Rd, Stockbridge	-84.235584, 33.507176	0	0
3615 Marietta Hwy, Dallas	-84.730406, 33.935139	0	0
2940 Anvilblock Rd, Ellenwood	-84.292994, 33.636358	0	0
6520 Earnest, Marietta	-84.636244, 33.867335	0	0
3826 Cobb Pkwy NW, Acworth	-84.696641, 34.046586	0	0
4200 Salem Rd, Covington	-83.959626, 33.577062	2	0
11465 Tara Blvd, Hampton	-84.32566, 33.442479	0	0
1000 Tanger Dr, Locust Grove	-84.121973, 33.347882	1	0
2059 Scenic Hwy N, Snellville	-84.018305, 33.863741	0	0

4501 North Point Pkwy, Alpharetta	-84.267168, 34.060062	0	0
7330 North Point Pkwy, Alpharetta	-84.301982, 34.041975	0	0
11770 Haynes Bridge, Alpharetta	-84.29495, 34.06948	45	0
2460 Park Center Blvd, Decatur	-84.171113, 33.715912	3	0
610 Holcomb Bridge, Roswell	-84.340563, 34.036655	58	0
1250 Scenic Hwy S, Lawrenceville	-84.005199, 33.898857	0	0
230 Scientific Dr, Peachtree Corners	-84.222225, 33.964165	0	0
5360 Snapfinger Woods Dr, Decatur	-84.170102, 33.710273	1	0
4861 Memorial Dr, Stone Mountain	-84.231424, 33.787869	5	0
10955 Jones Bridge Rd, Alpharetta	-84.220593, 34.04704	3	0
4140 Lawrenceville Hwy, Liburn	-84.119076, 33.903135	0	0
981 N Burnt Hickory Rd, Douglasville	-84.707969, 33.77724	10	0
1630-1380 Dogwood Dr SE, Conyers	-83.992153, 33.646837	0	0



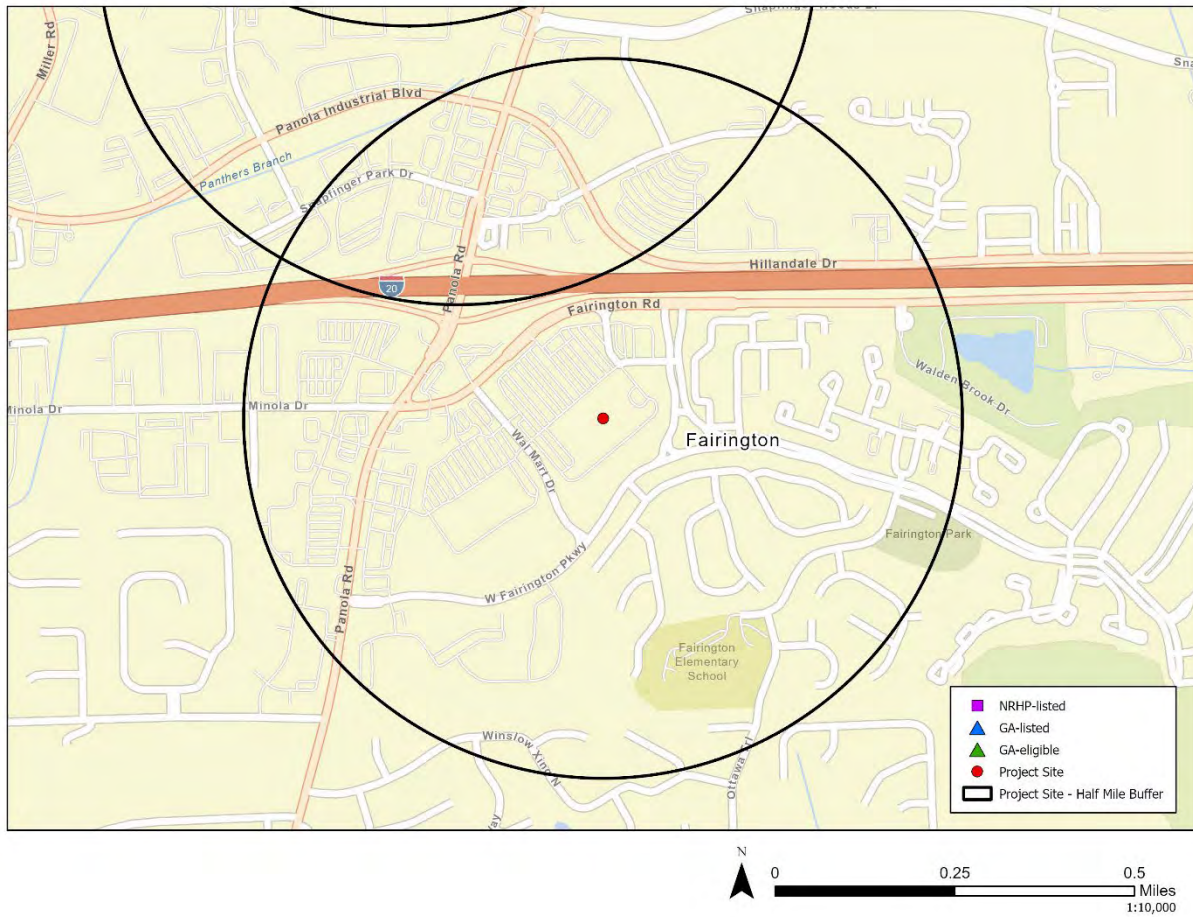
Proposed nest site and buffer at 12182 Hwy 92, Woodstock, GA 30188



12182 Hwy 92, Woodstock, GA 30188 nest site, view to south. Google Street View, 2018.



12182 Hwy 92, Woodstock, GA 30188 nest site, view to north. Google Street View, 2018.



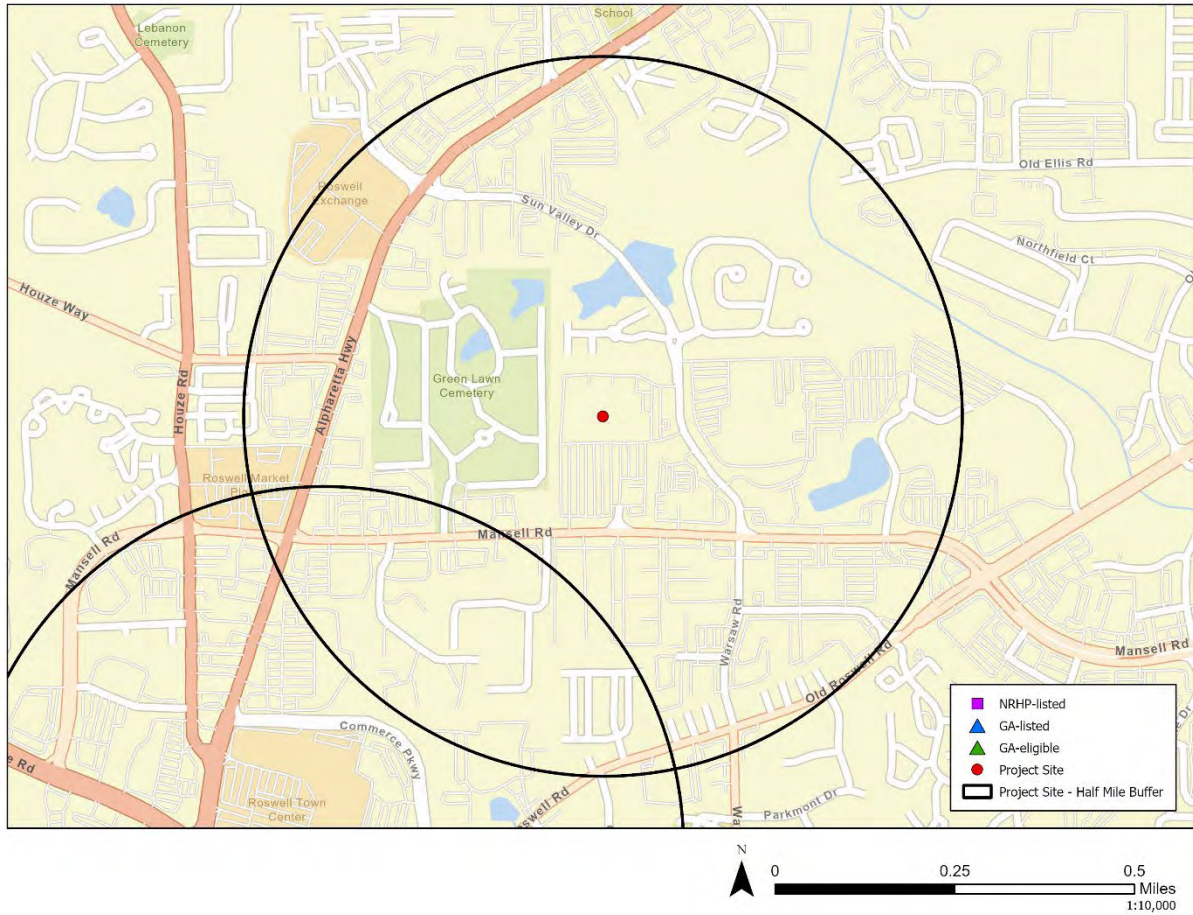
Proposed nest site and buffer at 5401 Fairington Rd, Lithonia, GA 30038



5401 Fairington Rd, Lithonia, GA 30038 nest site, view to southeast. Google Street View, 2019.



5401 Fairington Rd, Lithonia, GA 30038 nest site, view to northwest. Google Street View, 2019.



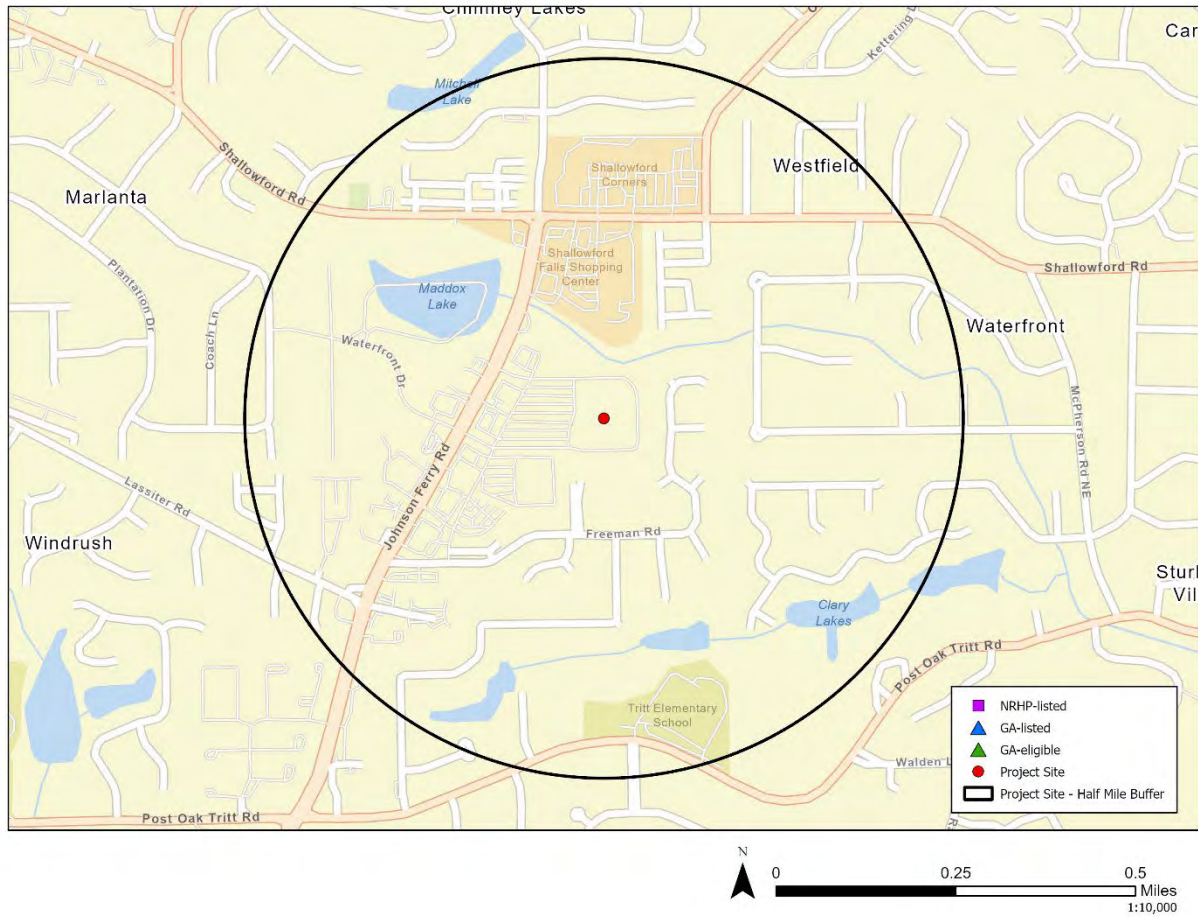
Proposed nest site and buffer at 970 Mansell Rd, Roswell, GA 30076



970 Mansell Rd, Roswell, GA 30076 nest site, view to north. Google Street View, 2022.



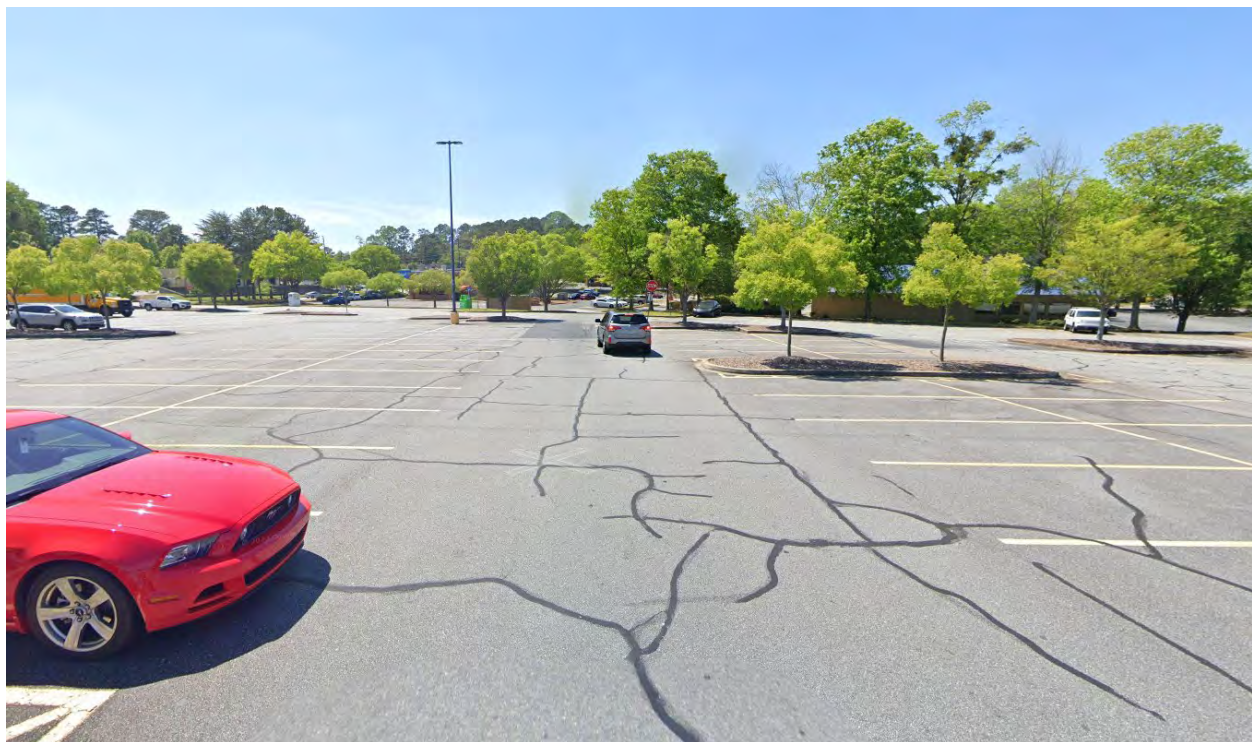
970 Mansell Rd, Roswell, GA 30076 nest site, view to south. Google Street View, 2022.



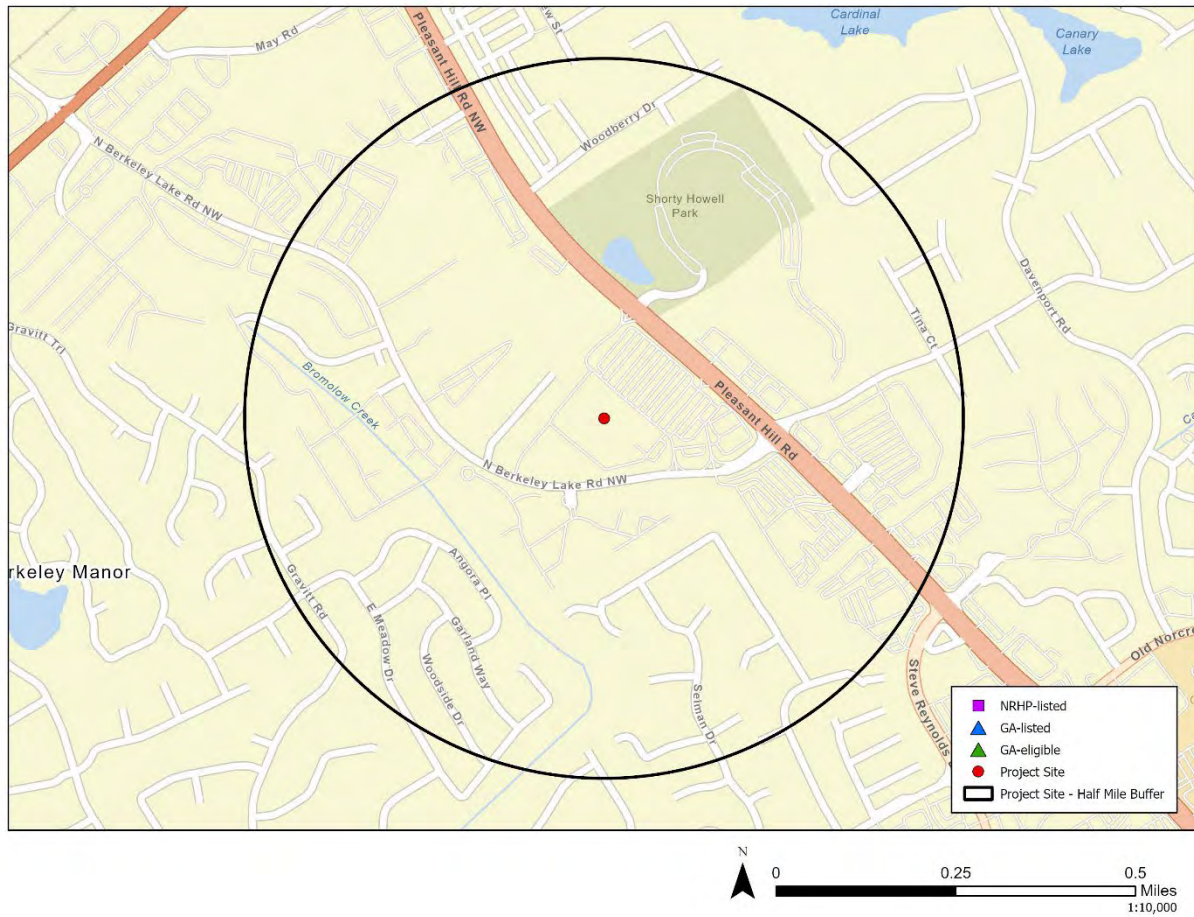
Proposed nest site and buffer at 3100 Johnson Ferry Rd, Marietta, GA 30062



3100 Johnson Ferry Rd, Marietta, GA 30062 nest site, view to east. Google Street View, 2023.



3100 Johnson Ferry Rd, Marietta, GA 30062 nest site, view to west. Google Street View, 2023.



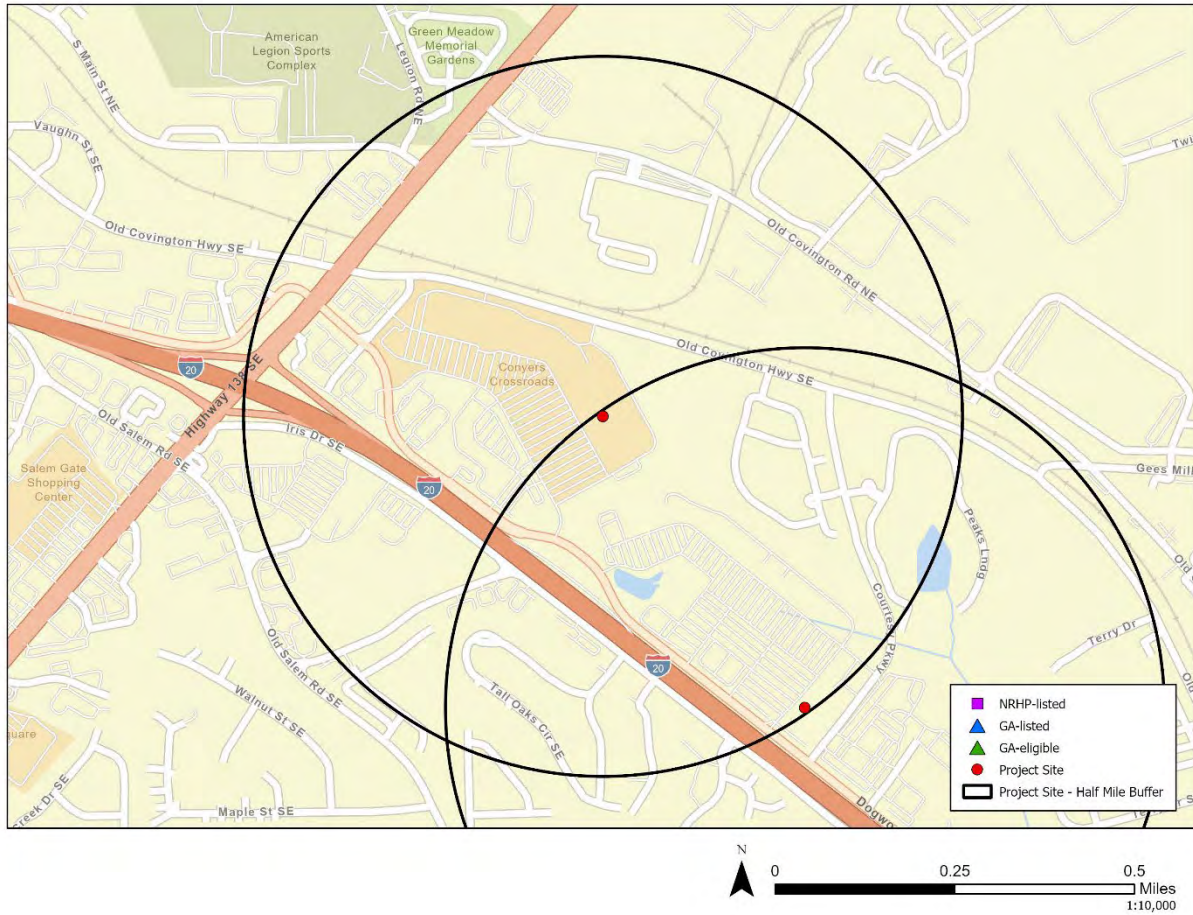
Proposed nest site and buffer at 2635 Pleasant Hill Rd, Duluth, GA 30096



2635 Pleasant Hill Rd, Duluth, GA 30096 nest site, view to southwest. Google Street View, 2018.



2635 Pleasant Hill Rd, Duluth, GA 30096 nest site, view to northeast. Google Street View, 2018.



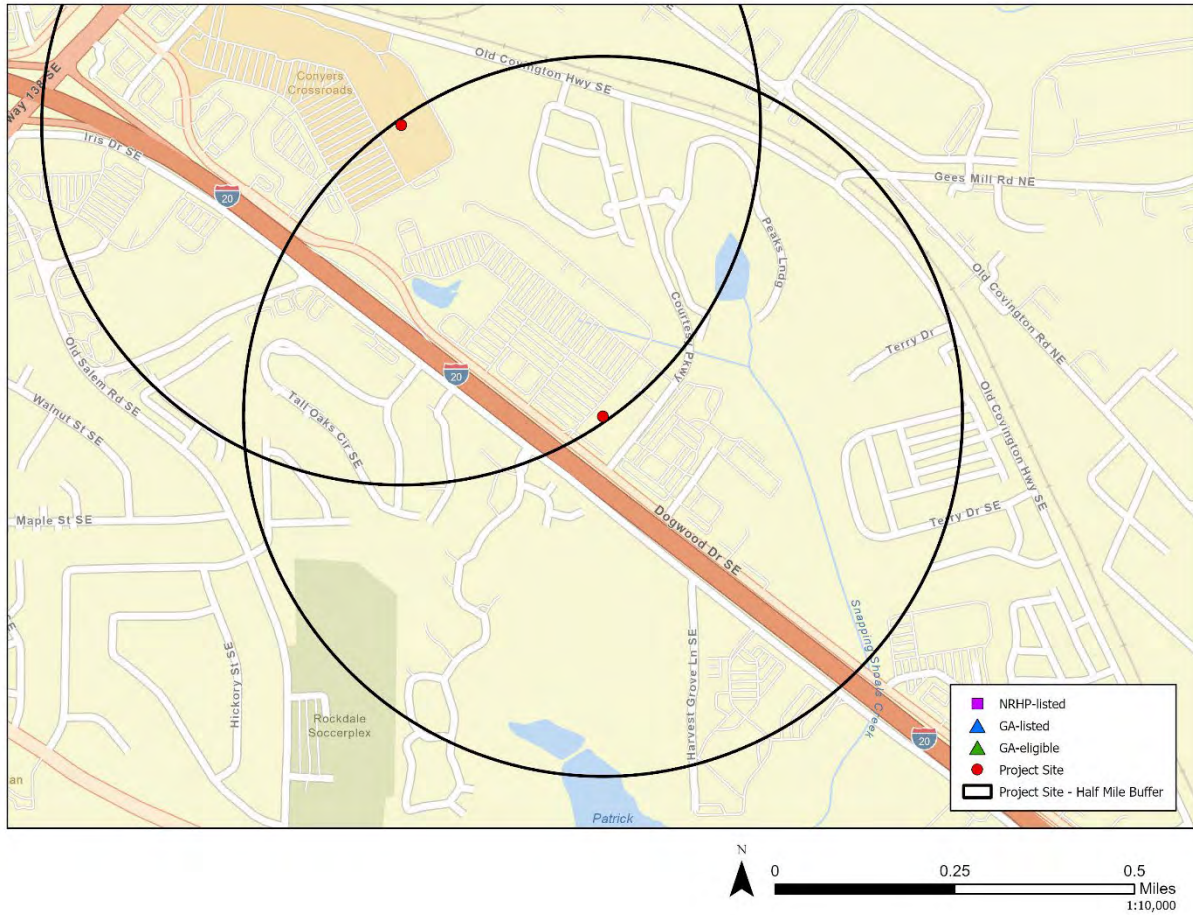
Proposed nest site and buffer at 1436 Dogwood Dr SE, Conyers, GA 30013



1436 Dogwood Dr SE, Conyers, GA 30013 nest site, view to northeast. Google Street View, 2018.



1436 Dogwood Dr SE, Conyers, GA 30013 nest site, view to southwest. Google Street View, 2018.



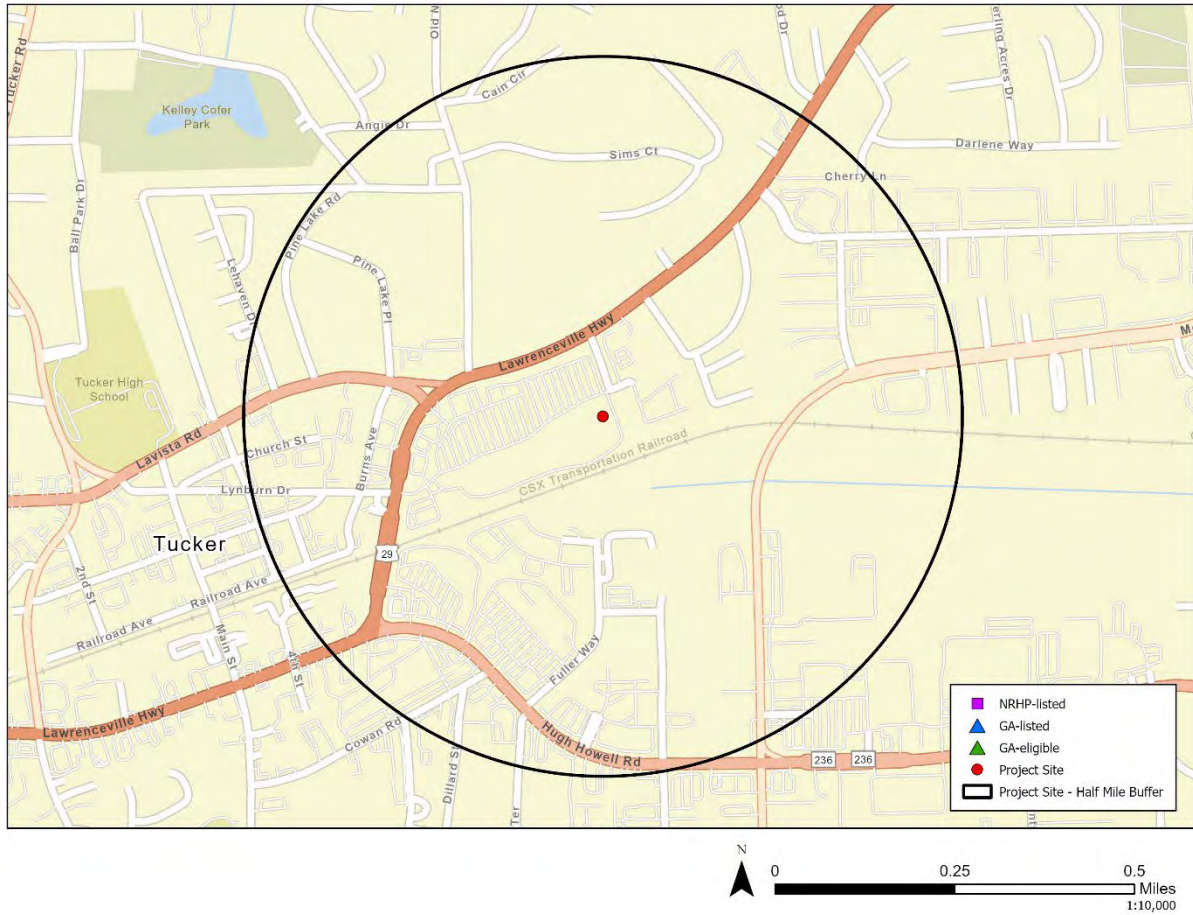
Proposed nest site and buffer at 1630-1380 Dogwood Dr SE, Conyers, GA 30013



1630-1380 Dogwood Dr SE, Conyers, GA 30013 nest site, view to southeast. Google Street View, 2011.



1630-1380 Dogwood Dr SE, Conyers, GA 30013 nest site, view to northwest. Google Street View, 2011.



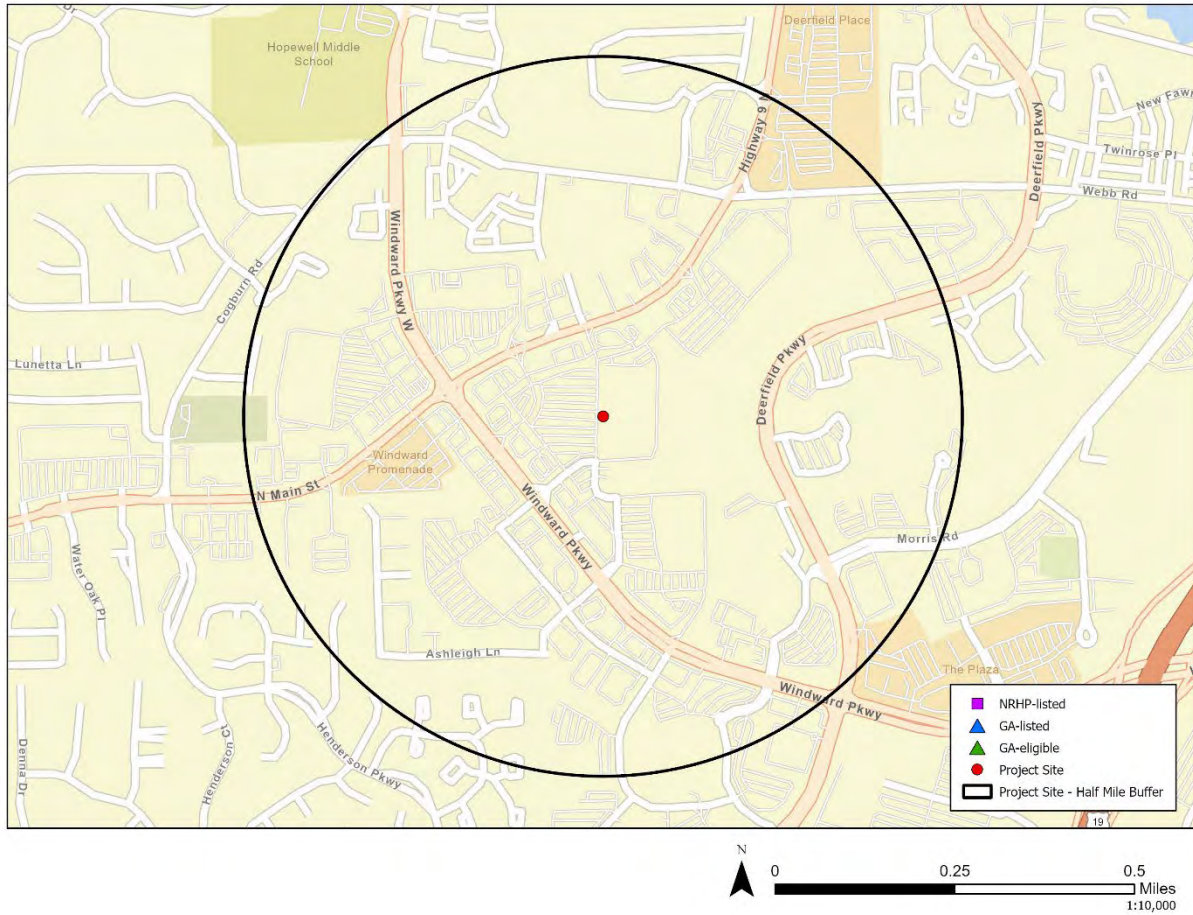
Proposed nest site and buffer at 4375 Lawrenceville Hwy, Tucker, GA 30084



4375 Lawrenceville Hwy, Tucker, GA 30084 nest site, view to south. Google Street View, 2023.



4375 Lawrenceville Hwy, Tucker, GA 30084 nest site, view to north. Google Street View, 2023.



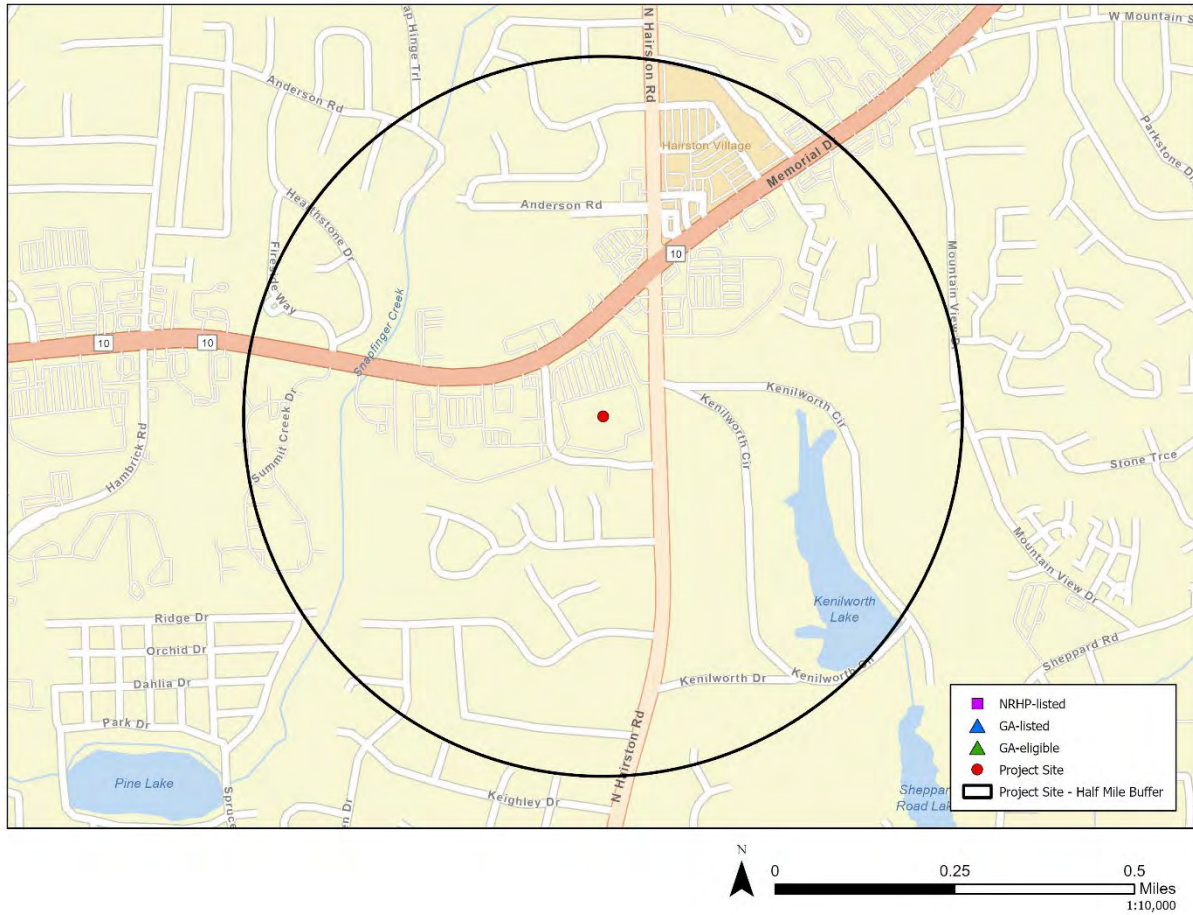
Proposed nest site and buffer at 5200 Windward Pkwy, Alpharetta, GA 30004



5200 Windward Pkwy, Alpharetta, GA 30004 nest site, view to east. Google Street View, 2023.



5200 Windward Pkwy, Alpharetta, GA 30004 nest site, view to west. Google Street View, 2023.



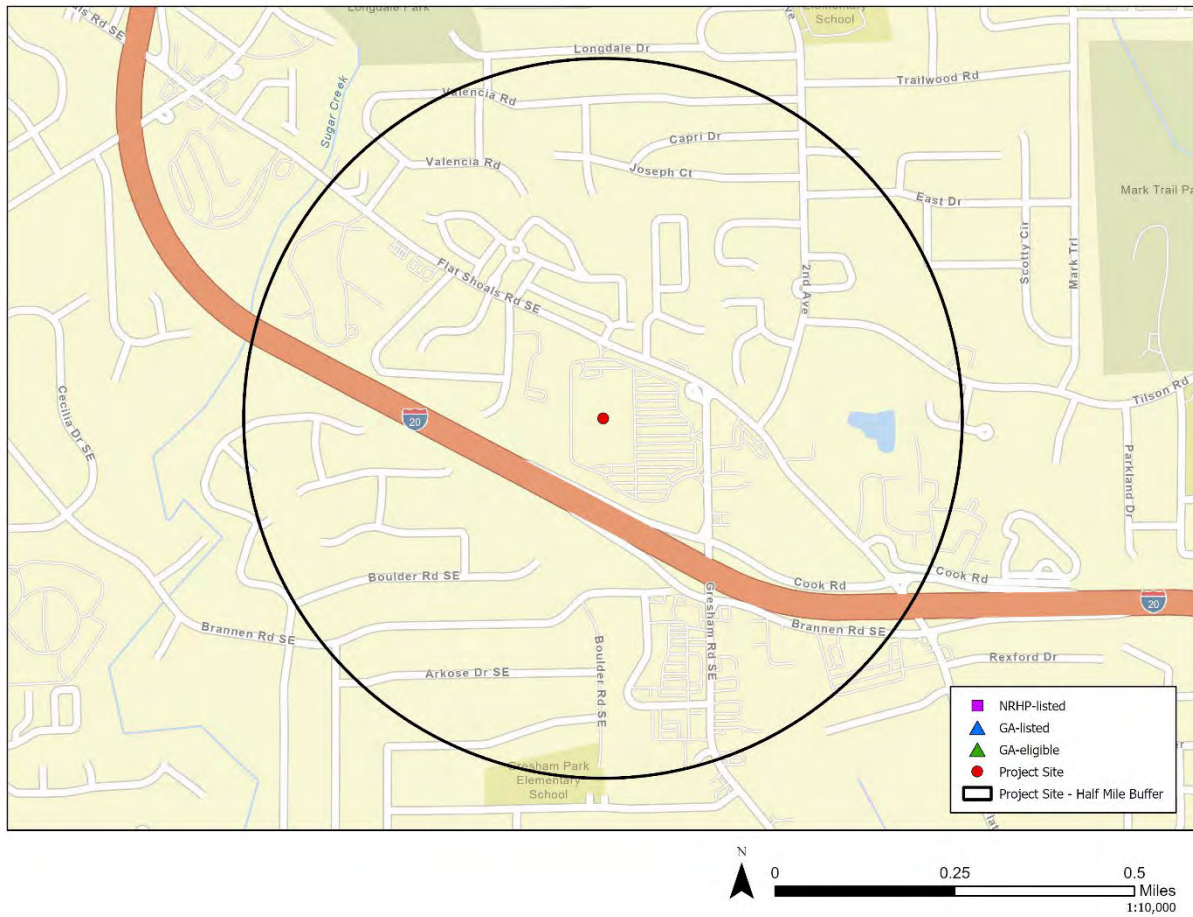
Proposed nest site and buffer at 5935 Memorial Dr, Stone Mountain, GA 30083



5935 Memorial Dr, Stone Mountain, GA 30083 nest site, view to south. Google Street View, 2019.



5935 Memorial Dr, Stone Mountain, GA 30083 nest site, view to north. Google Street View, 2019.



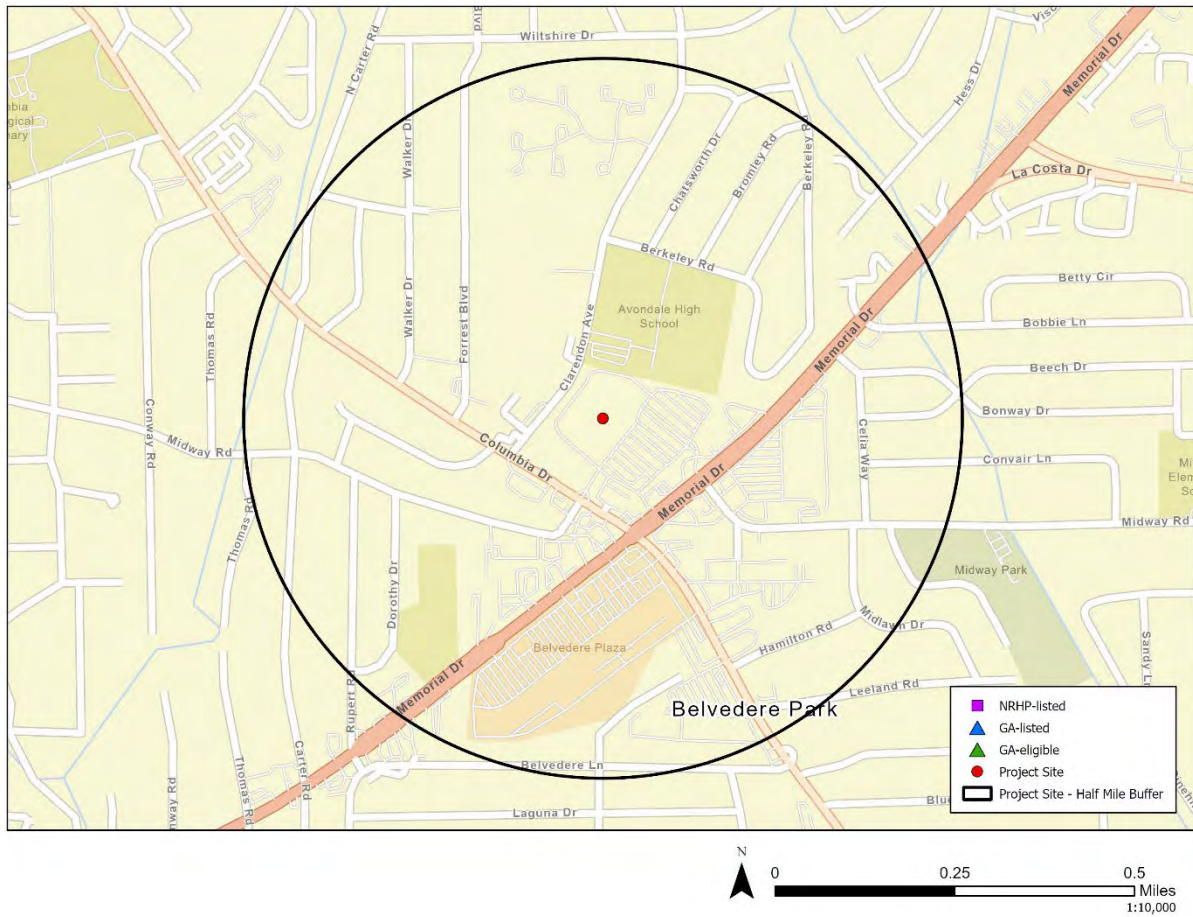
Proposed nest site and buffer at 2427 Gresham Rd, Atlanta, GA 30316



2427 Gresham Rd S E, Atlanta, GA 30316 nest site, view to west. Google Street View, 2021.



2427 Gresham Rd S E, Atlanta, GA 30316 nest site, view to east. Google Street View, 2021.



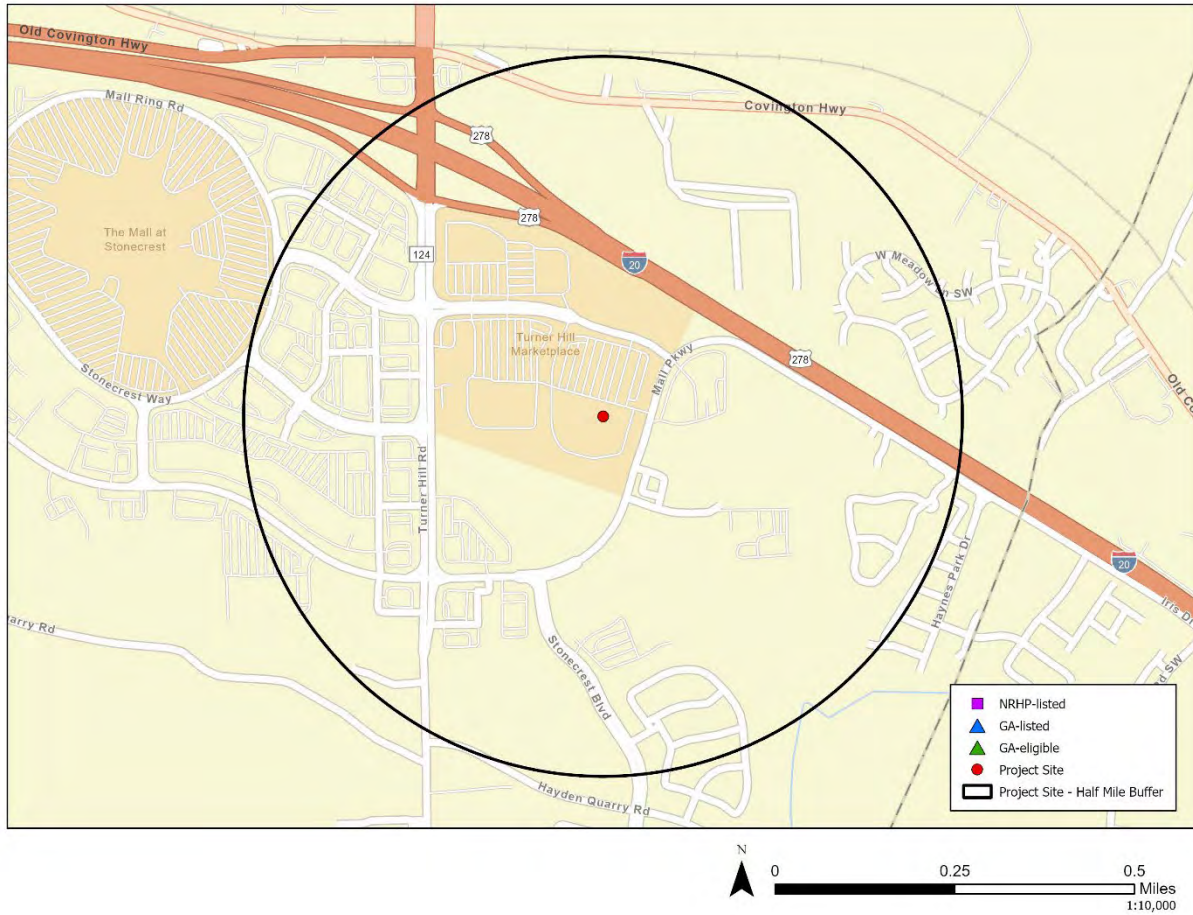
Proposed nest site and buffer at 3580 Memorial Dr, Decatur, GA 30032



3580 Memorial Dr, Decatur, GA 30032 nest site, view to northwest. Google Street View, 2018.



3580 Memorial Dr, Decatur, GA 30032 nest site, view to southeast. Google Street View, 2018.



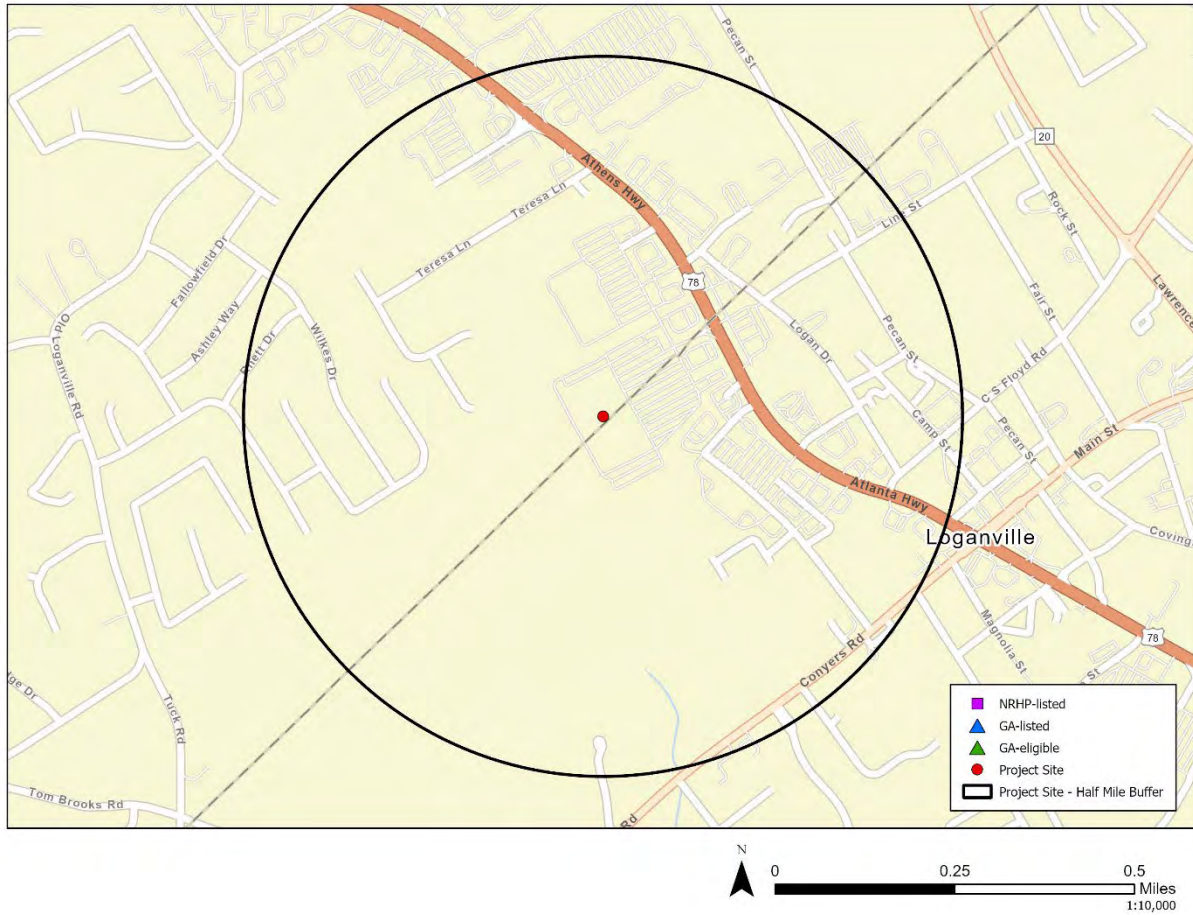
Proposed nest site and buffer at 8424 Mall Pkwy, Lithonia, GA 30038



8424 Mall Parkway, Lithonia, GA 30038 nest site, view to south. Google Street View, 2023.



8424 Mall Parkway, Lithonia, GA 30038 nest site, view to north. Google Street View, 2023.



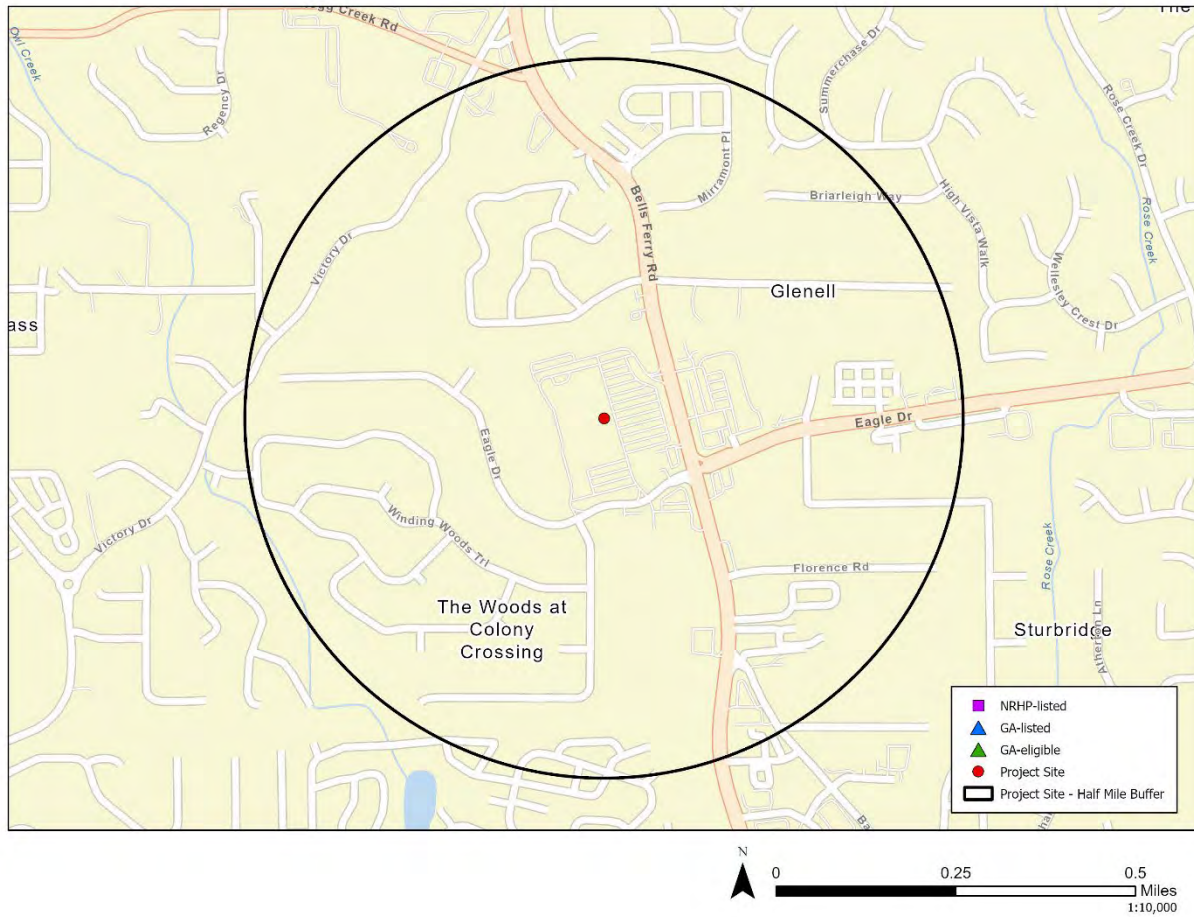
Proposed nest site and buffer at 4221 Atlanta, GA 30052



4221 Atlanta Hwy, Loganville, GA 30052 nest site, view southwest. Google Street View, 2019.



4221 Atlanta Hwy, Loganville, GA 30052 nest site, view northeast. Google Street View, 2019.



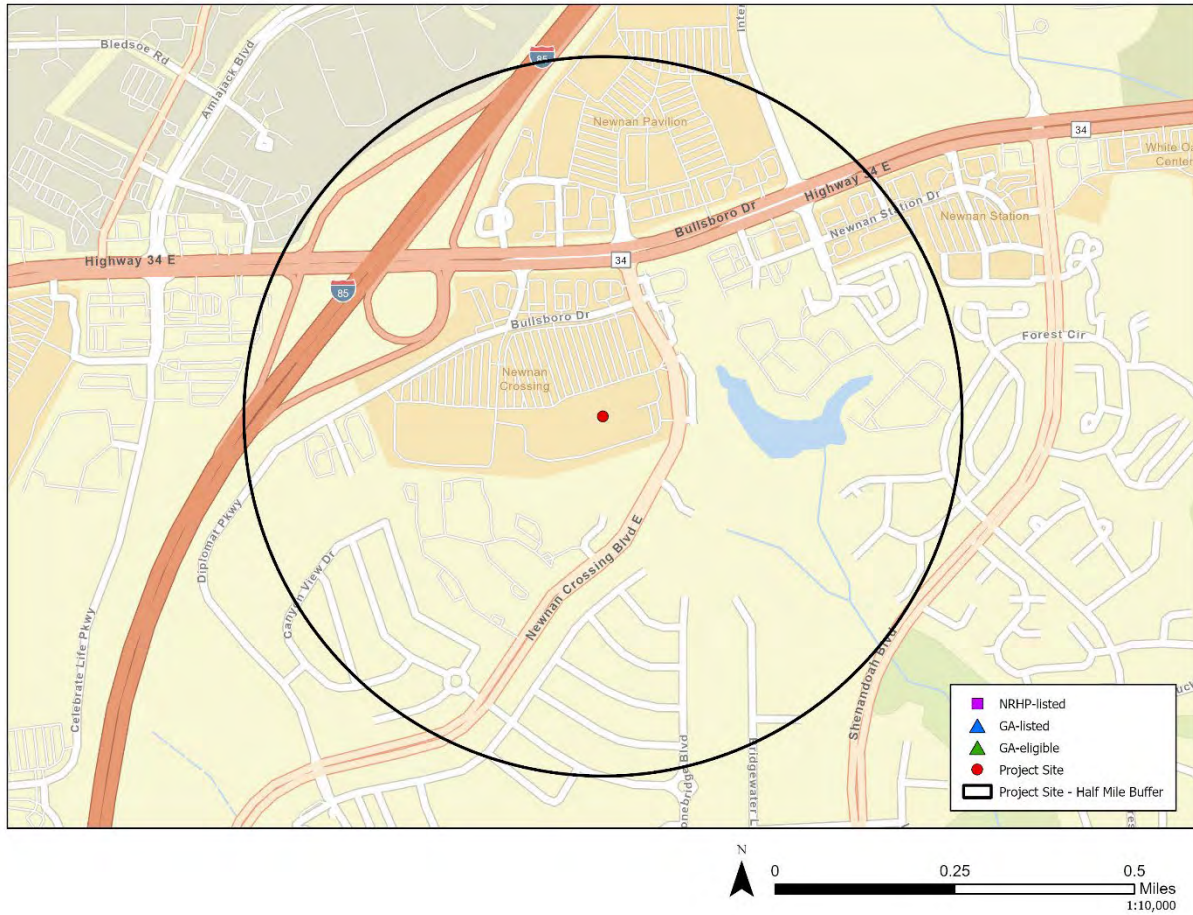
Proposed nest site and buffer at 6435 Bells Ferry Rd, Woodstock, GA 30189



6435 Bells Ferry Rd, Woodstock, GA 30189 nest site, view west. Google Street View, 2026.



6435 Bells Ferry Rd, Woodstock, GA 30189 nest site, view east. Google Street View, 2026.



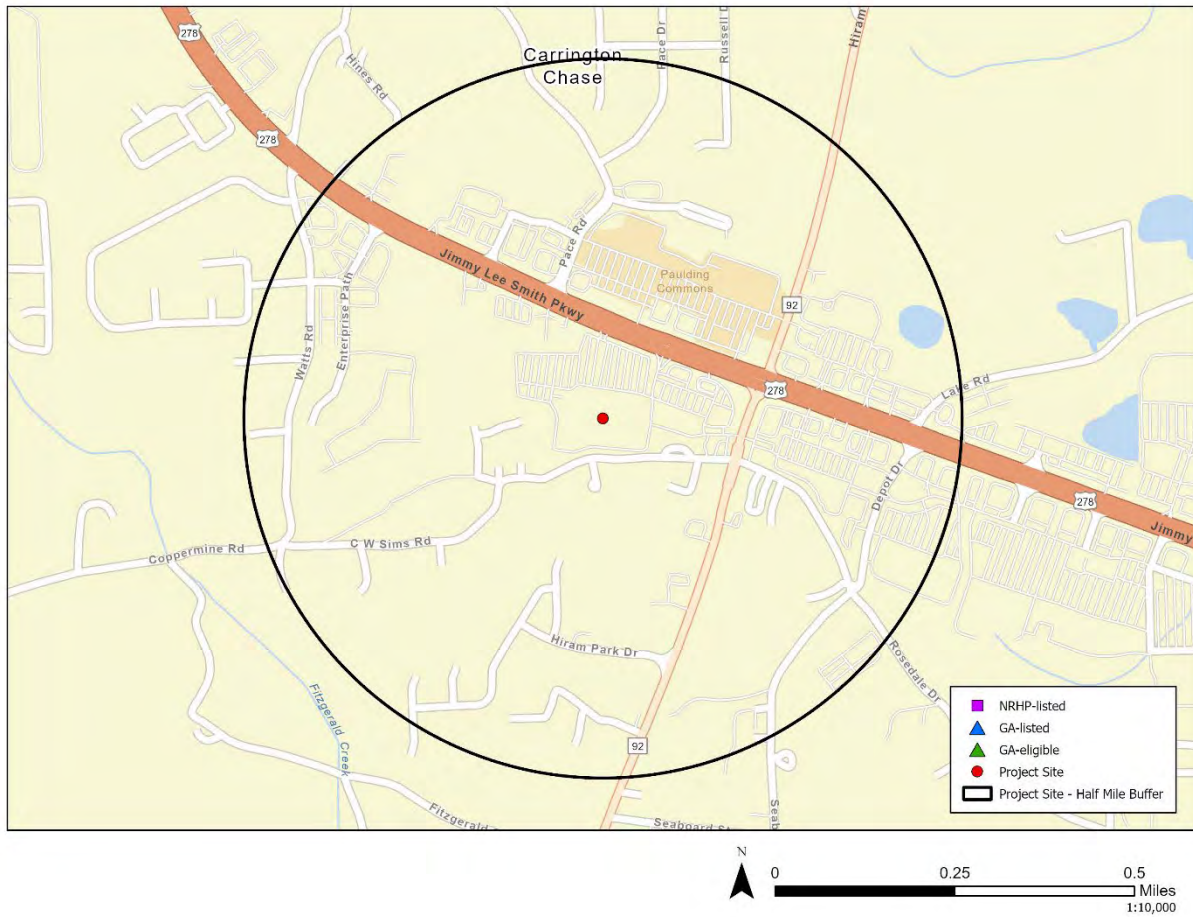
Proposed nest site and buffer at 1025 GA-34 Newnan, GA 30265



1025 GA-34 Newnan GA 30265 nest site, view south. Google Street View, 2022.



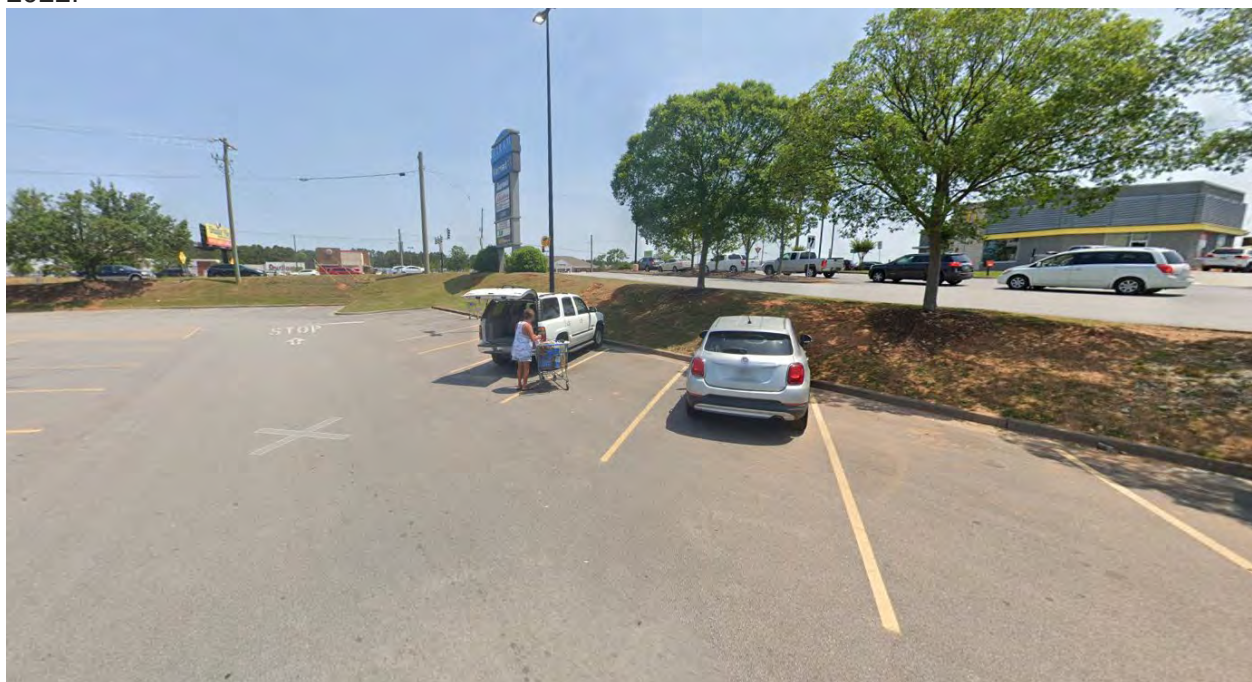
1025 GA-34 Newnan GA 30265 nest site, view north. Google Street View, 2022.



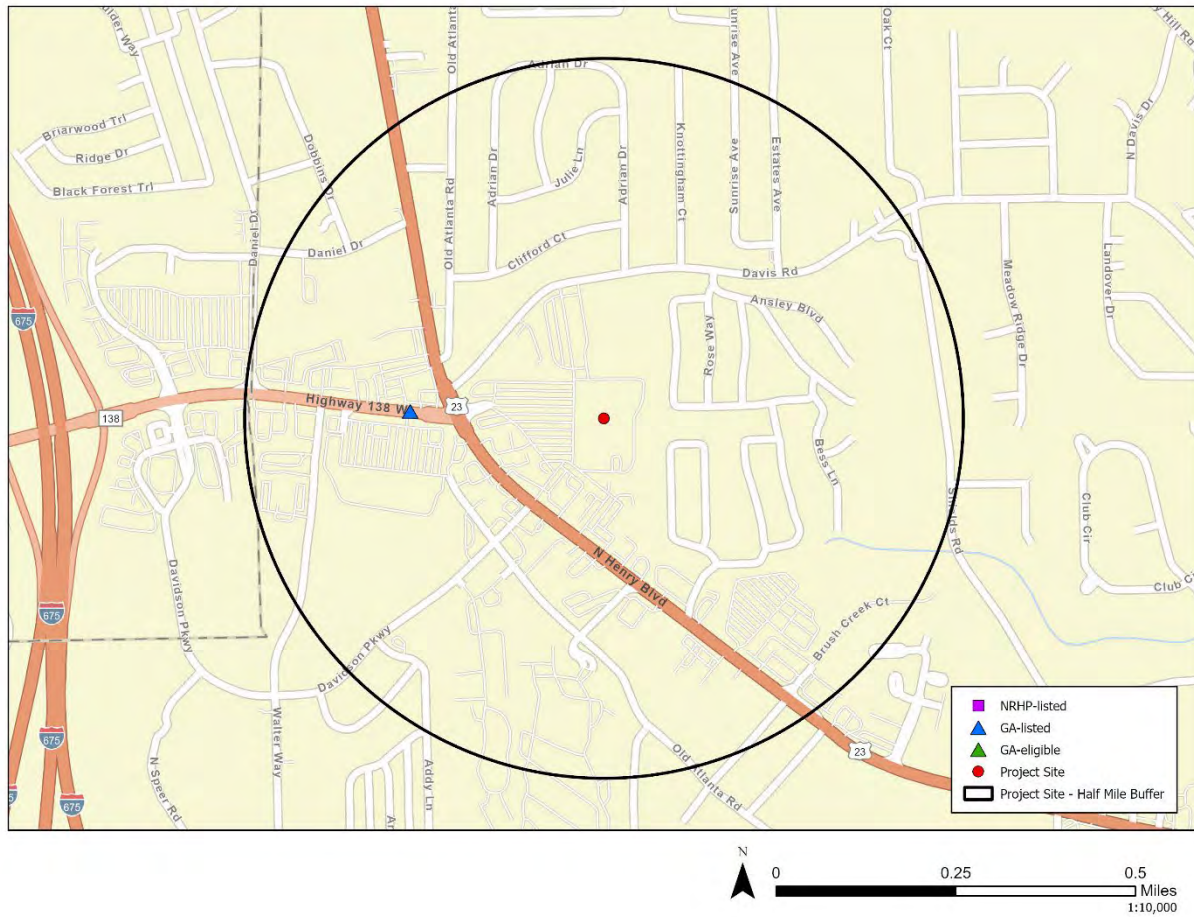
Proposed nest site and buffer at 4166 Jimmy Lee Smith Pkwy, Hiram, GA 30141



4166 Jimmy Lee Smith Pkwy Hiram GA 30141 nest site, view southwest. Google Street View, 2022.



4166 Jimmy Lee Smith Pkwy Hiram GA 30141 nest site, view northeast. Google Street View, 2022.



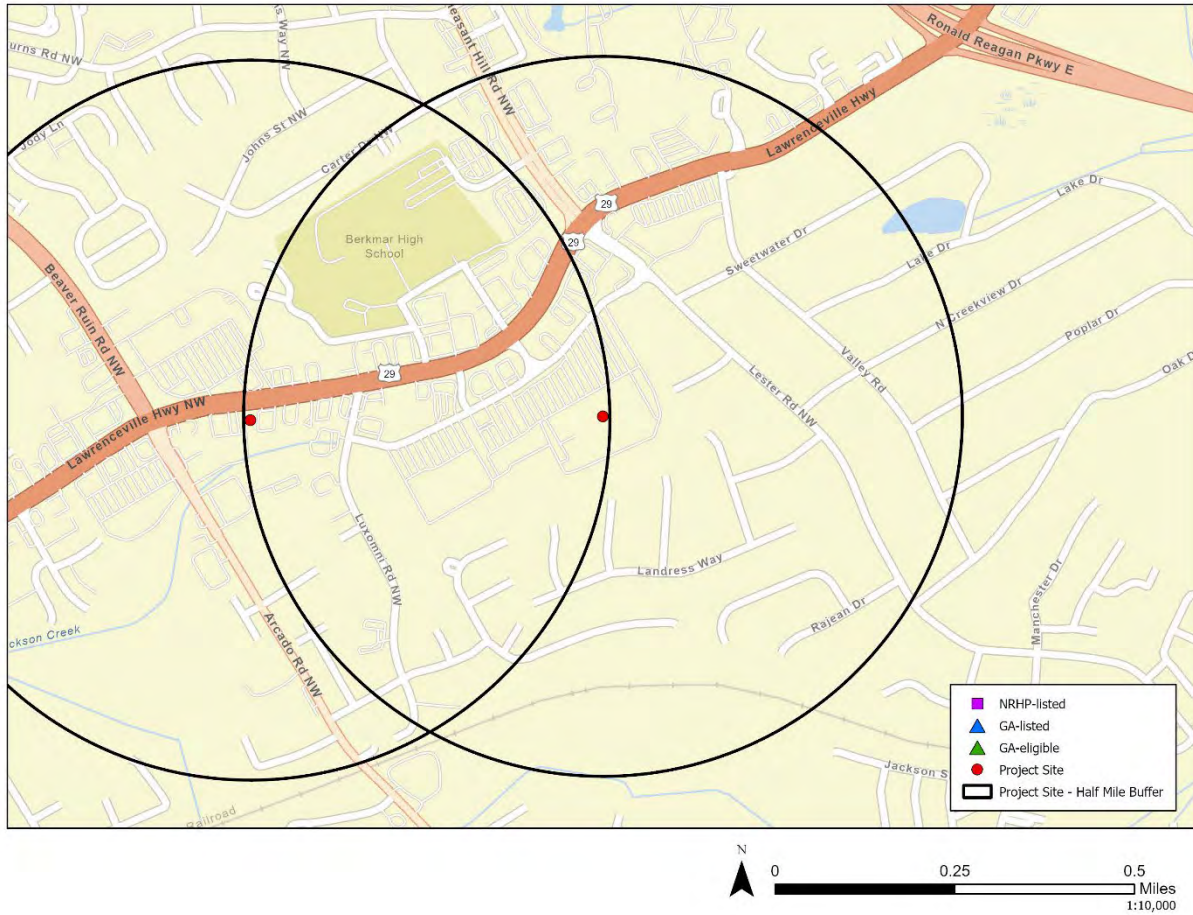
Proposed nest site and buffer at 5600 N Henry Blvd, Stockbridge, GA 30281



5600 N Henry Blvd Stockbridge GA 30281 nest site, view east. Google Street View, 2022.



5600 N Henry Blvd Stockbridge GA 30281 nest site, view west. Google Street View, 2022.



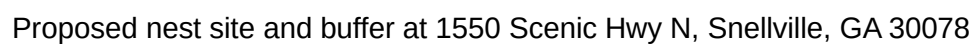
Proposed nest site and buffer at 4004 Lawrenceville Hwy, Lilburn, GA 30047



4004 Lawrenceville Hwy Lilburn GA 30047 nest site, view southeast. Google Street View, 2023.



4004 Lawrenceville Hwy Lilburn GA 30047 nest site, view northwest. Google Street View, 2023.

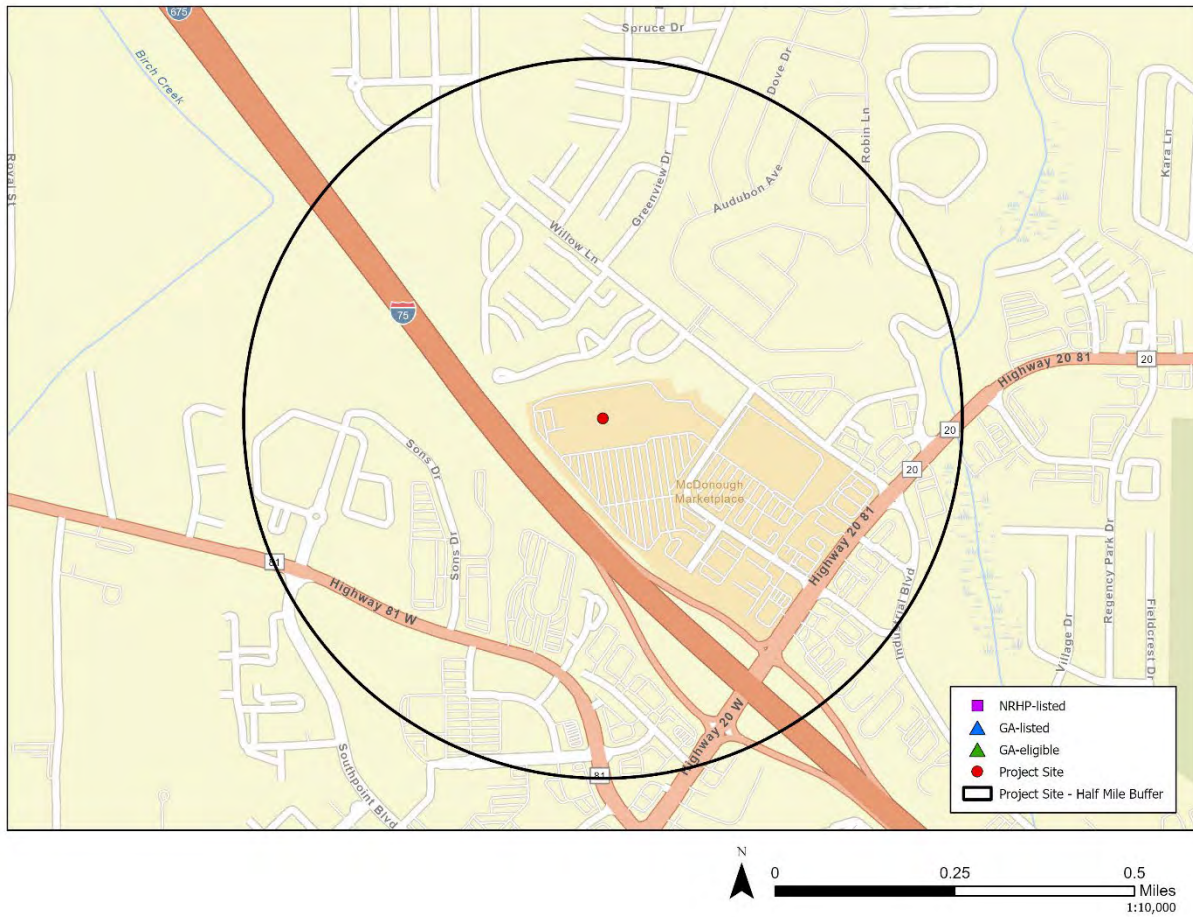




1550 Scenic Hwy N Snellville GA 30078 nest site, view east. Google Street View, 2019.



1550 Scenic Hwy N Snellville GA 30078 nest site, view west. Google Street View, 2019.



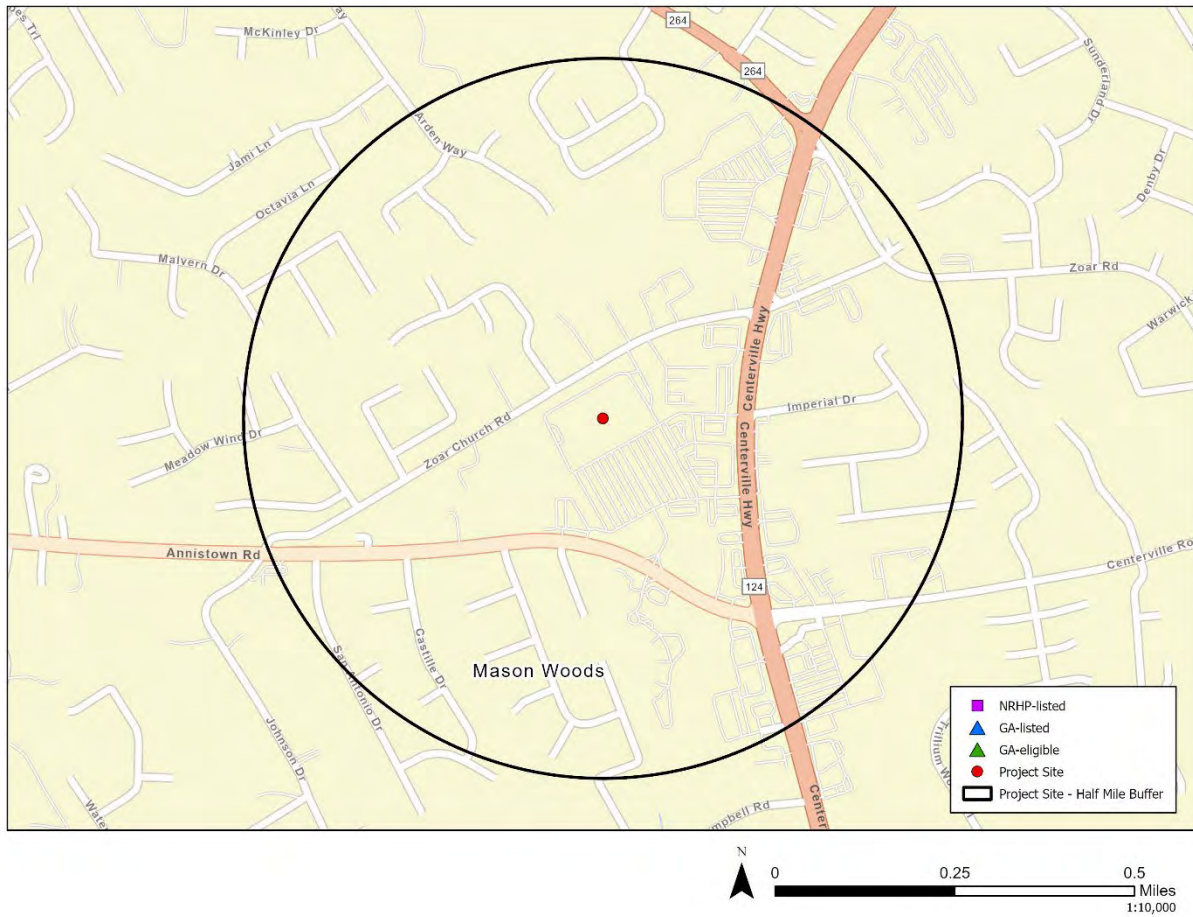
Proposed nest site and buffer at 135 Willow Lane, McDonough, GA 30253



135 Willow Ln McDonough GA 30253 nest site, view north. Google Street View, 2019.



135 Willow Ln McDonough GA 30253 nest site, view south. Google Street View, 2019.



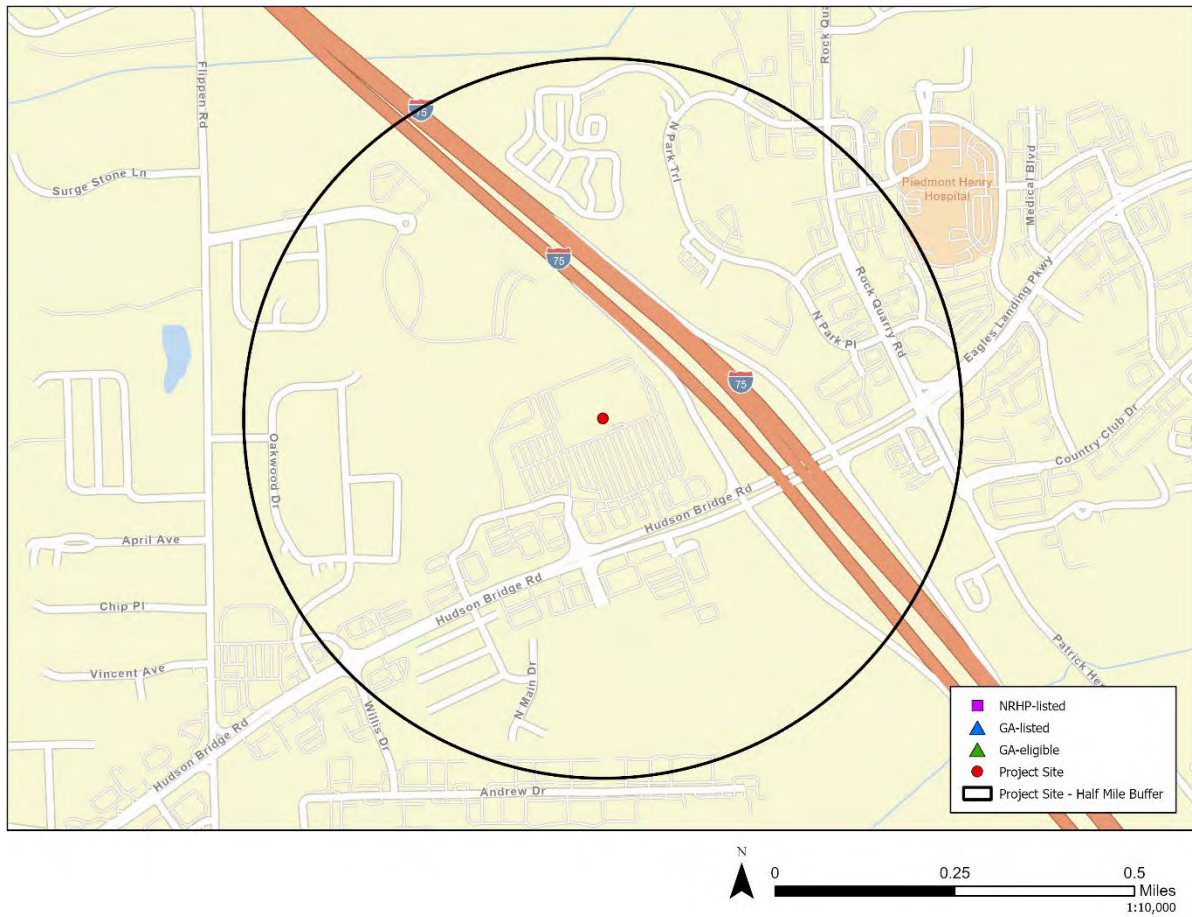
Proposed nest site and buffer at 3435 Centerville Hwy, Snellville, GA 30039



3435 Centerville Hwy Snellville GA 30039 nest site, view north. Google Street View, 2022.



3435 Centerville Hwy Snellville GA 30039 nest site, view south. Google Street View, 2022.



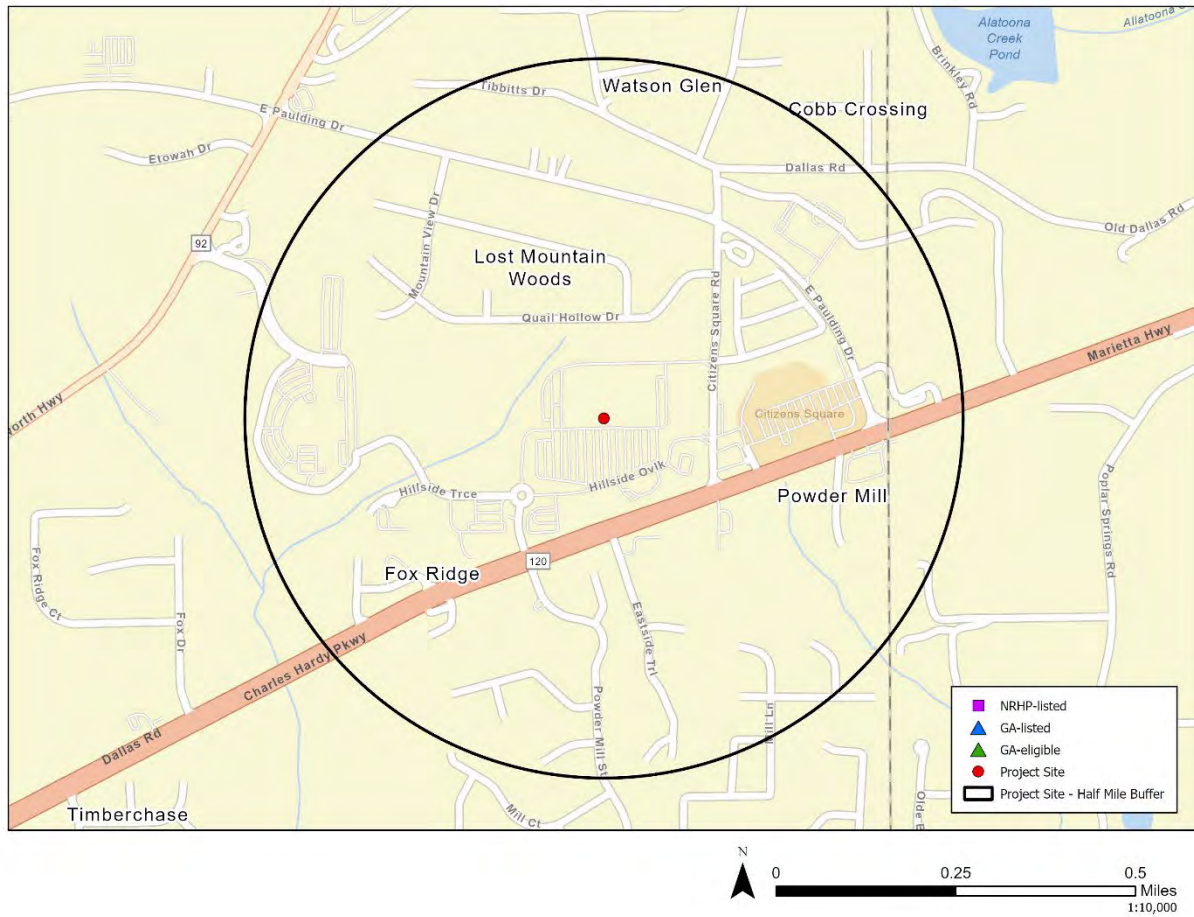
Proposed nest site and buffer at 1400 Hudson Bridge Rd, Stockbridge, GA 30281



1400 Hudson Bridge Rd Stockbridge GA 30281 nest site, view north. Google Street View, 2021.



1400 Hudson Bridge Rd Stockbridge GA 30281 nest site, view south. Google Street View, 2021.



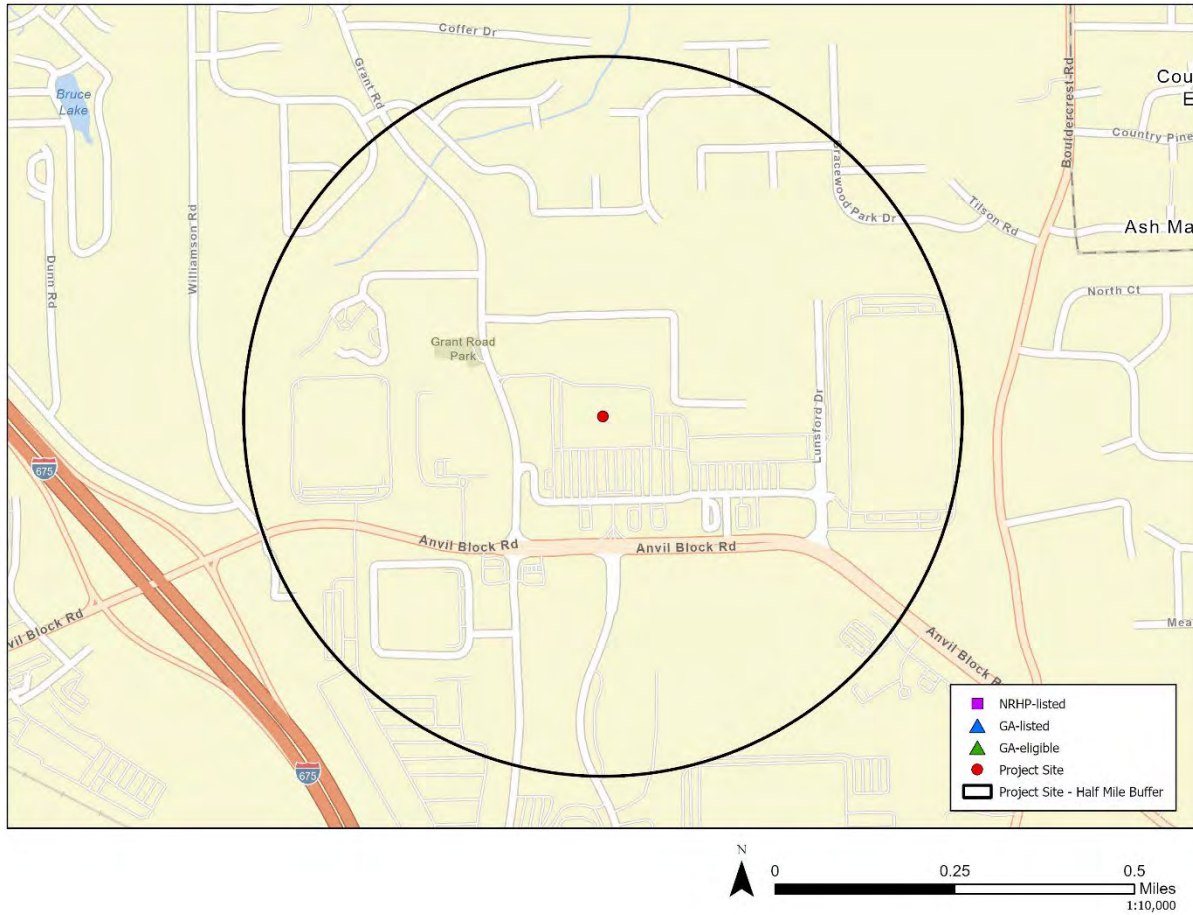
Proposed nest site and buffer at 3615 Marietta Hwy, Dallas, GA 30157



3615 Marietta Hwy Dallas GA 30157 nest site, view north. Google Street View, 2021.



3615 Marietta Hwy Dallas GA 30157 nest site, view south. Google Street View, 2021.



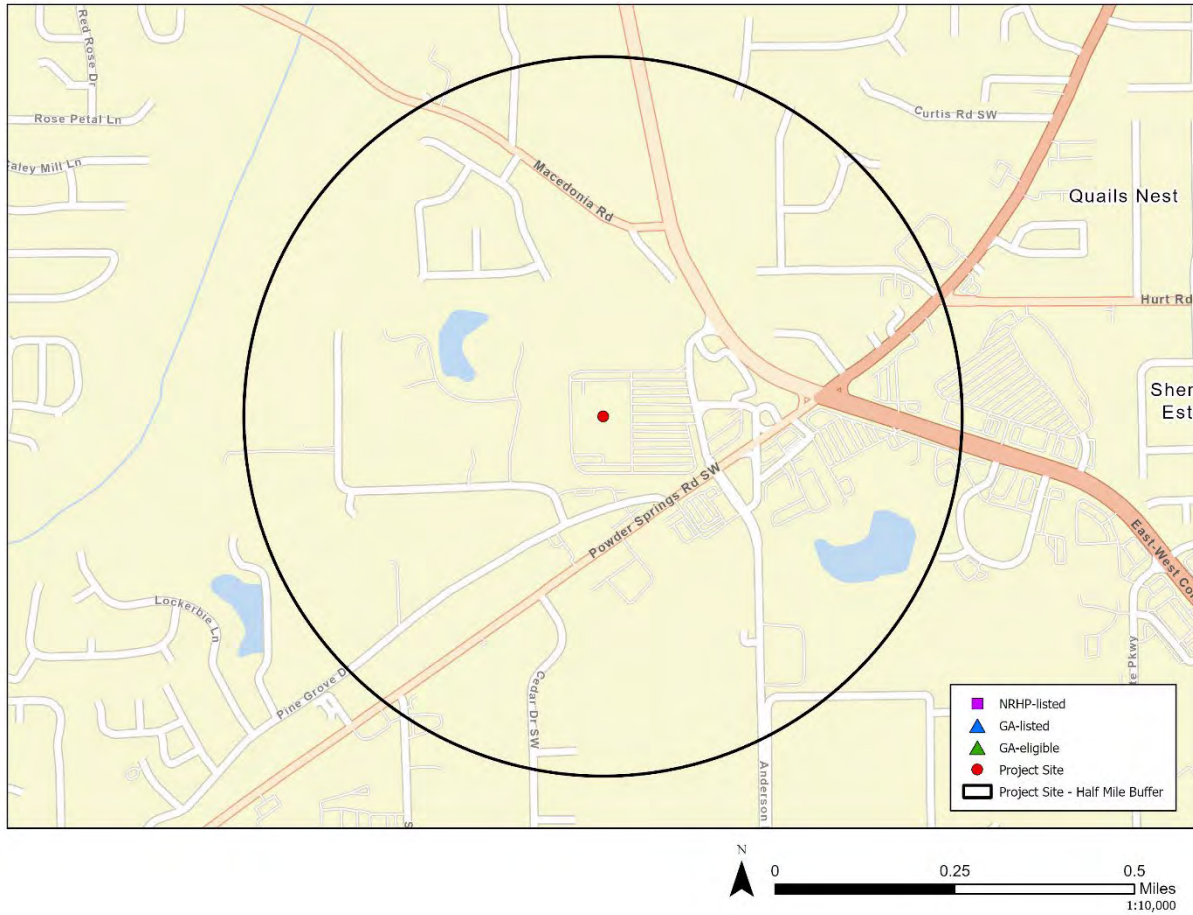
Proposed nest site and buffer at 2940 Anvilblock Rd, Ellenwood GA 30294



2940 Anvilblock Rd Ellenwood GA 30294 nest site, view north. Google Street View, 2022.



2940 Anvilblock Rd Ellenwood GA 30294 nest site, view south. Google Street View, 2022.



Proposed nest site and buffer at 6520 Earnest Marietta, GA 30066



6520 Earnest Marietta GA 30066 nest site, view west. Google Street View, 2022.



6520 Earnest Marietta GA 30066 nest site, view east. Google Street View, 2022.



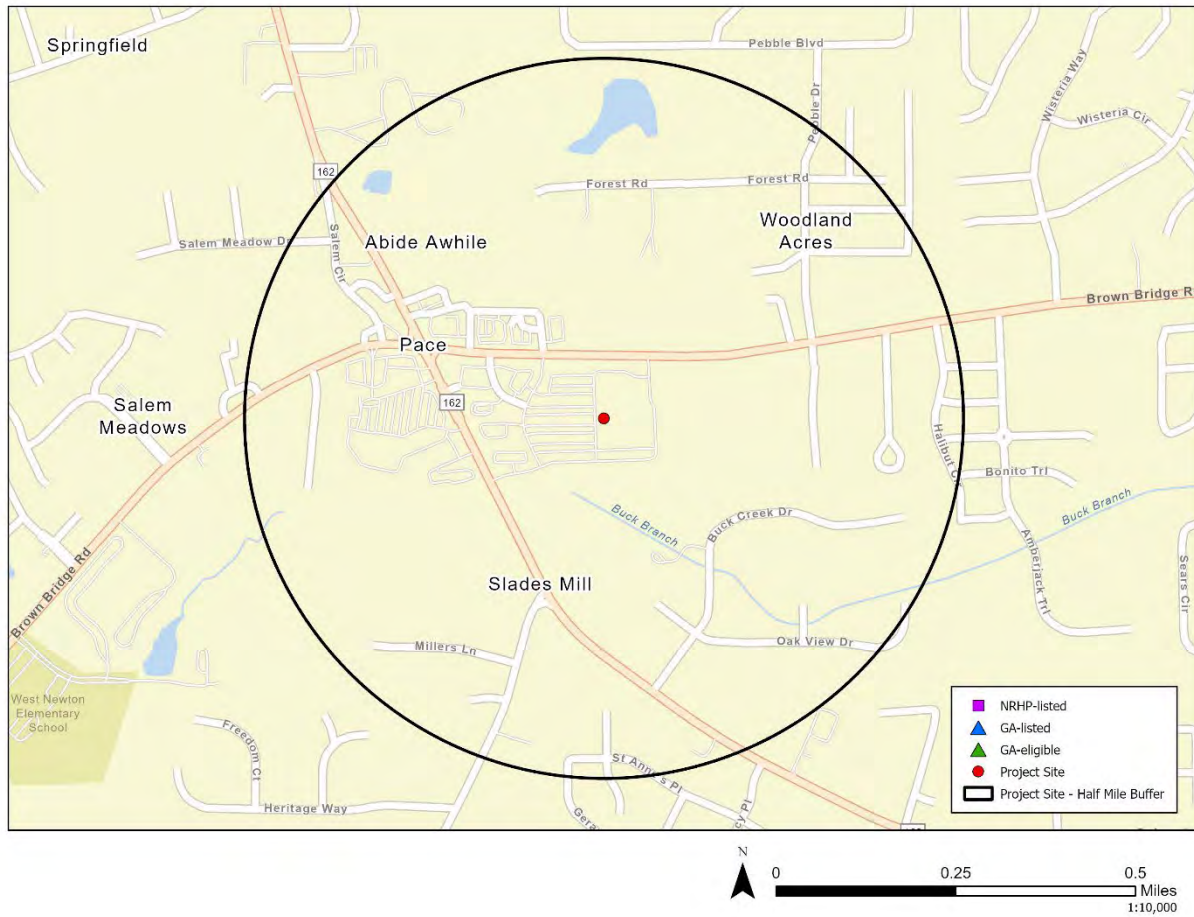
Proposed nest site and buffer at 3826 Cobb Pkwy NW, Acworth, GA 30101



3826 Cobb Pkwy NW Acworth GA 30101 nest site, view north. Google Street View, 2021.



3826 Cobb Pkwy NW Acworth GA 30101 nest site, view south. Google Street View, 2021.



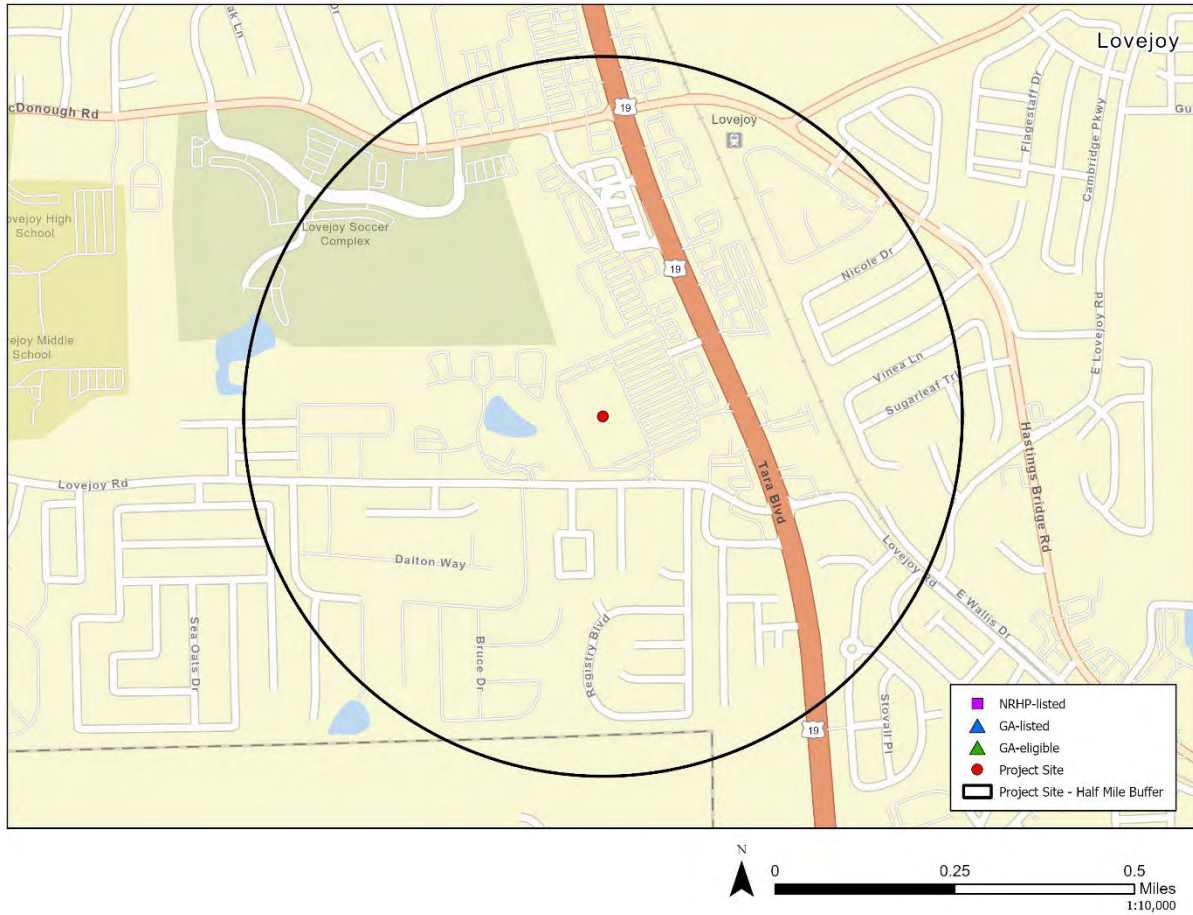
Proposed nest site and buffer at 4200 Salem Rd, Covington, GA 30016



4200 Salem Rd Covington GA 30016 nest site, view east. Google Street View, 2026.



4200 Salem Rd Covington GA 30016 nest site, view west. Google Street View, 2026.



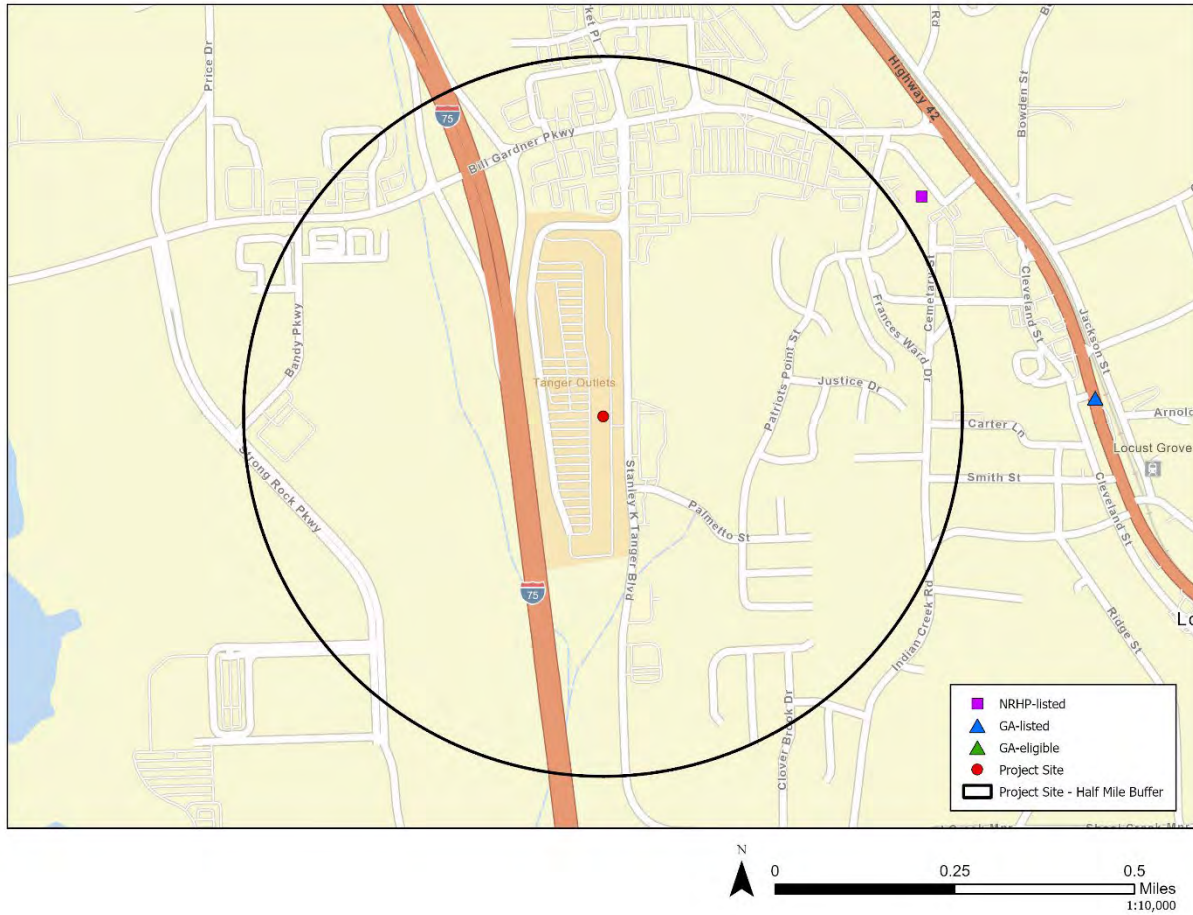
Proposed nest site and buffer at 11465 Tara Blvd, Hampton, GA 30228



11465 Tara Blvd Hampton GA 30228 nest site, view west. Google Street View, 2025.



11465 Tara Blvd Hampton GA 30228 nest site, view east. Google Street View, 2025.



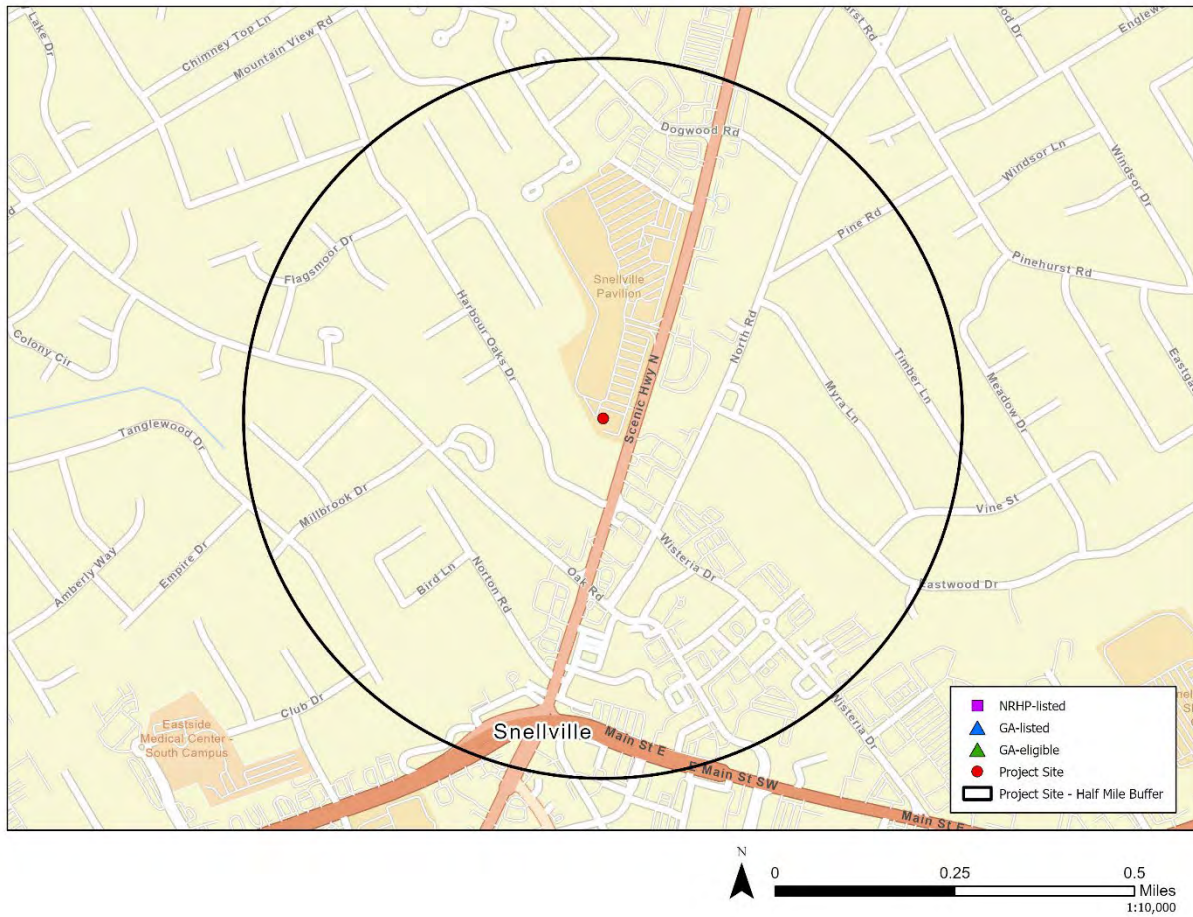
Proposed nest site and buffer at 1000 Tanger Dr, Locust Grove, GA 30248



1000 Tanger Dr, Locust Grove GA 30248 nest site, view east. Google Street View, 2023.



1000 Tanger Dr, Locust Grove GA 30248 nest site, view west. Google Street View, 2023.



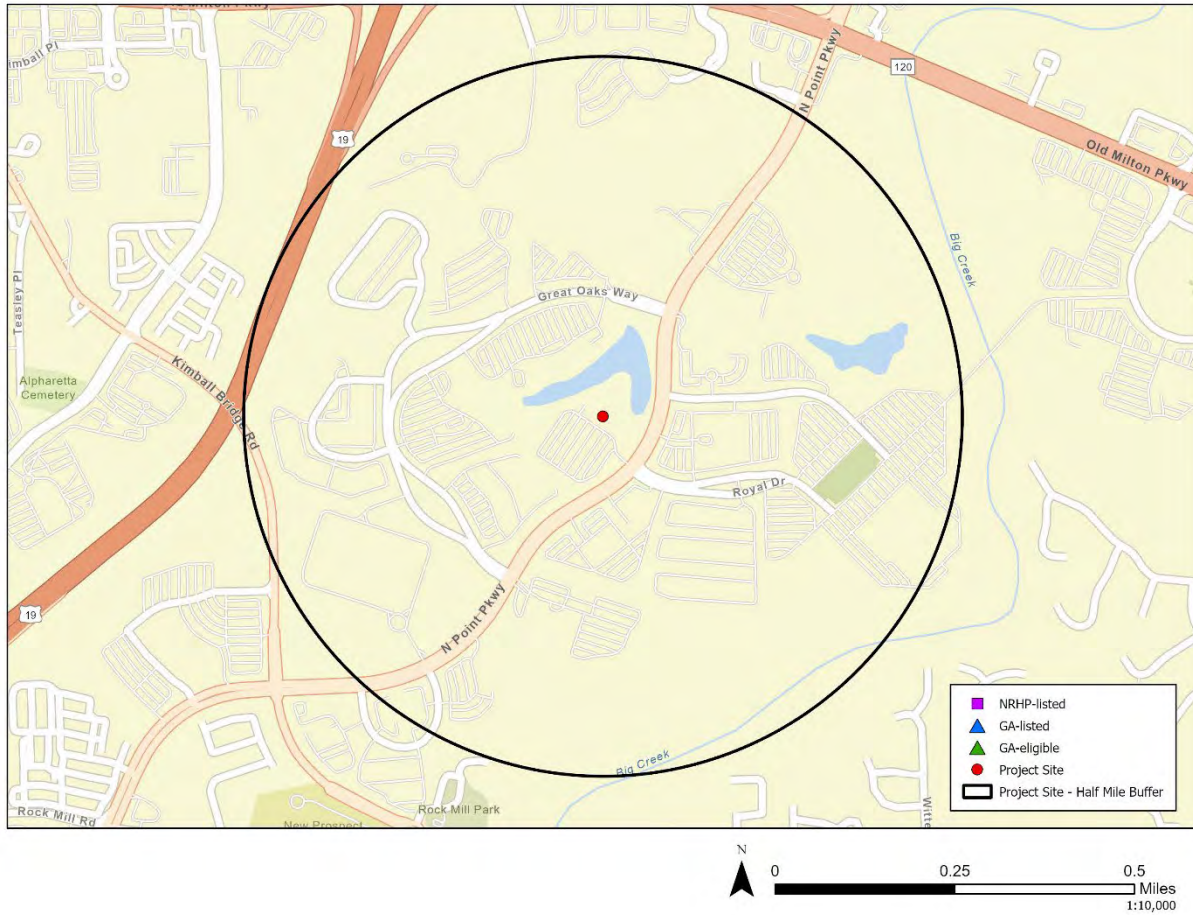
Proposed nest site and buffer at 2059 Scenic Hwy N, Snellville, GA 30078



2059 Scenic Hwy N, Snellville, GA 30078 nest site, view west. Google Street View, 2023.



2059 Scenic Hwy N, Snellville, GA 30078 nest site, view east. Google Street View, 2023.



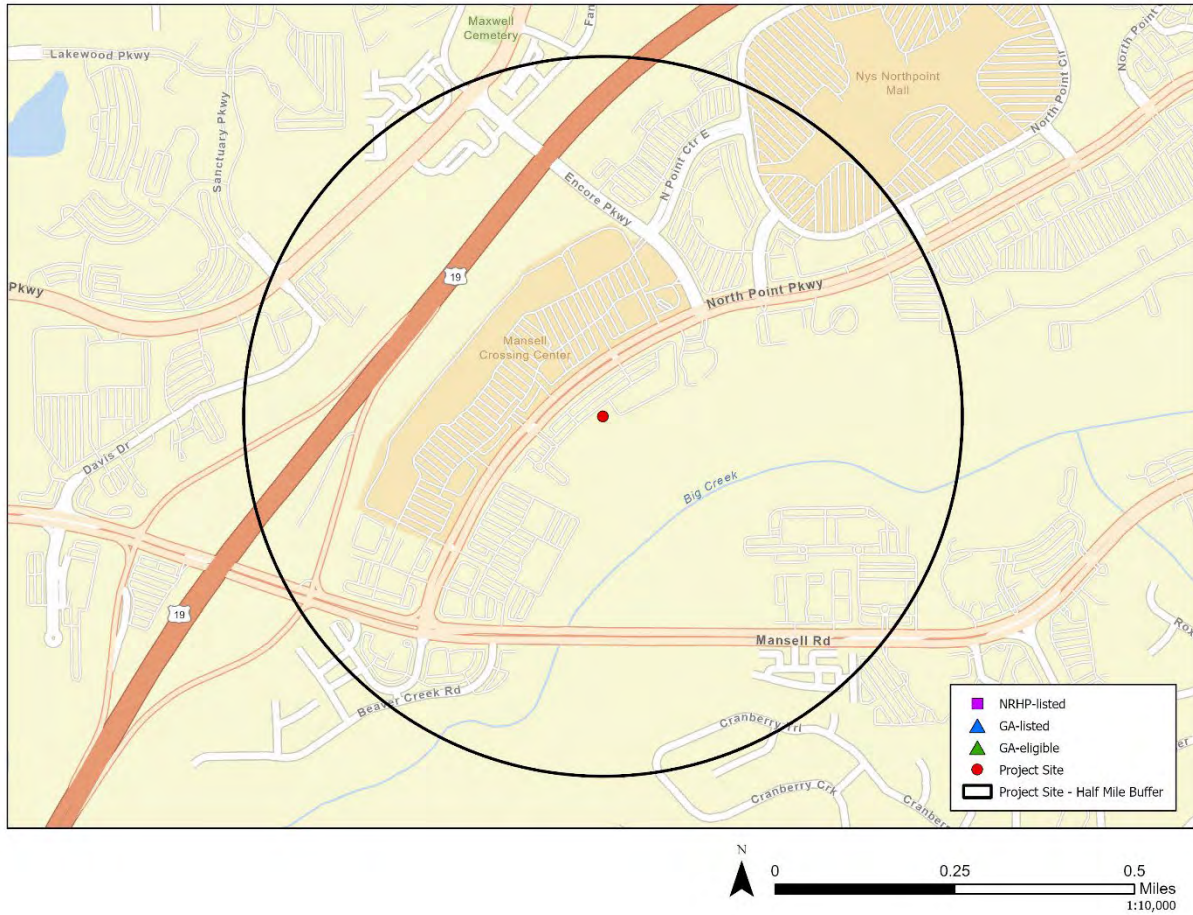
Proposed nest site and buffer at 4501 North Point Pkwy, Alpharetta, GA 30022



4501 North Point parkway, Alpharetta, GA 30022 nest site, view north. Google Street View, 2021.



4501 North Point parkway, Alpharetta, GA 30022 nest site, view south. Google Street View, 2021.



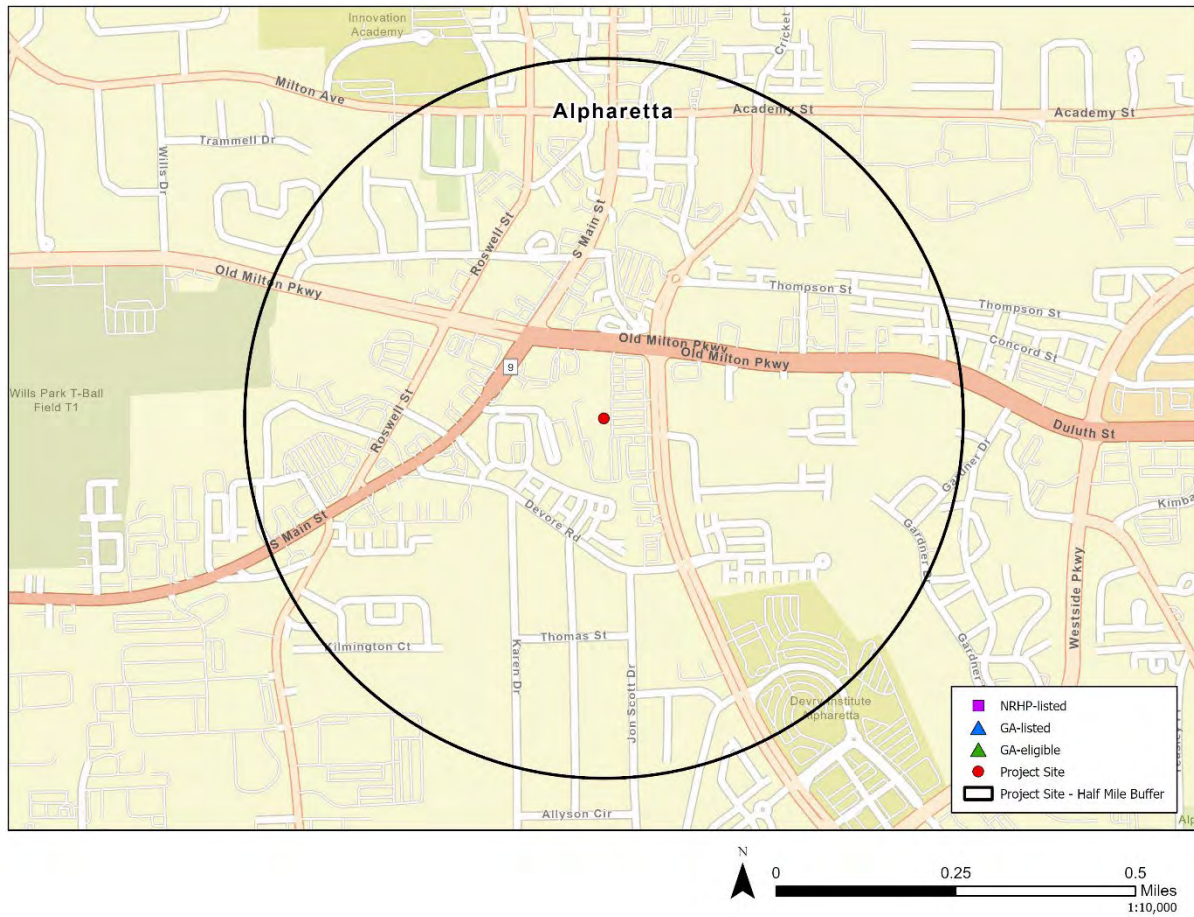
Proposed nest site and buffer at 7330 North Point Pkwy, Alpharetta, GA 30009



7330 North Point parkway, Alpharetta, GA 30009 nest site, view southeast. Google Street View, 2023.



7330 North Point parkway, Alpharetta, GA 30009 nest site, view northwest. Google Street View, 2023.



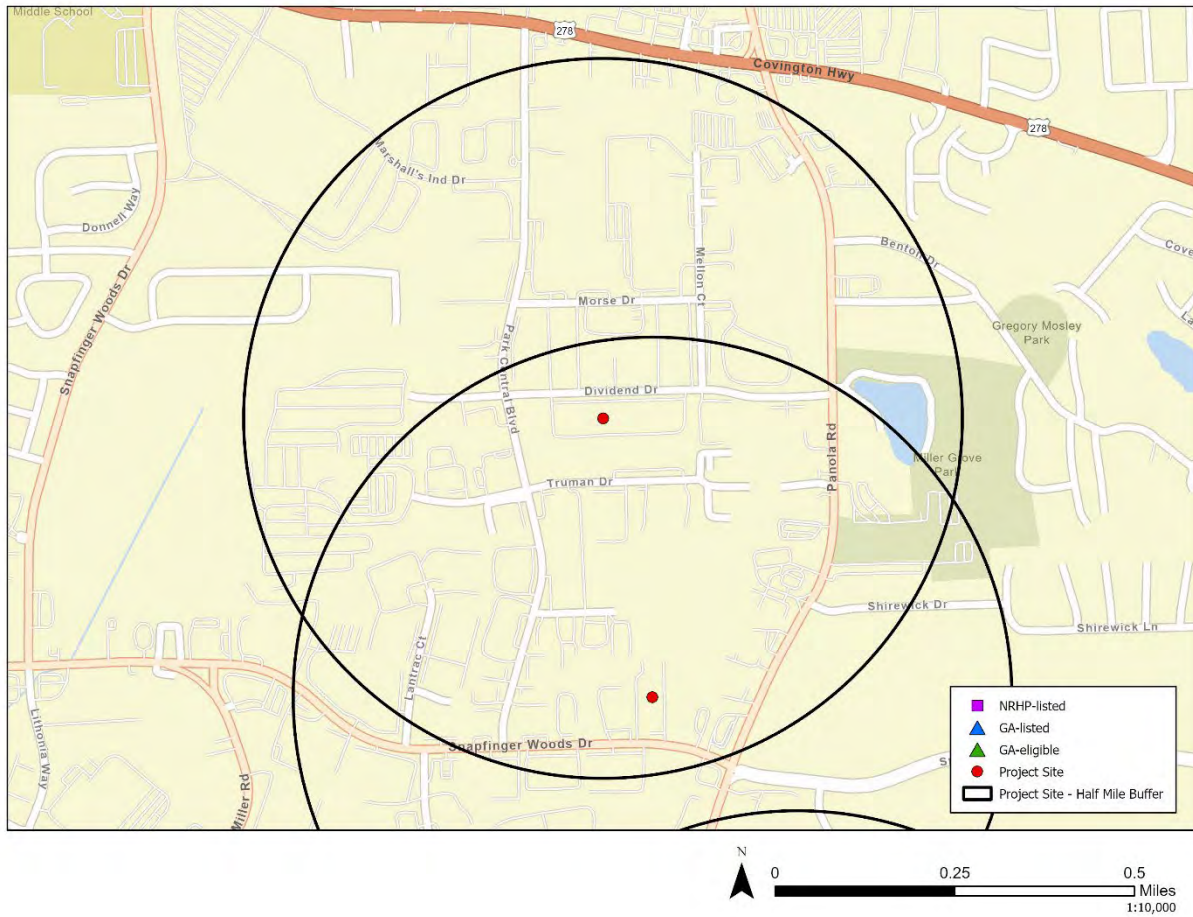
Proposed nest site and buffer at 11770 Haynes Bridge, Alpharetta, GA 30009



11770 Haynes Bridge, Alpharetta, GA 30009 nest site, view west. Google Street View, 2023.



11770 Haynes Bridge, Alpharetta, GA 30009 nest site, view east. Google Street View, 2023.



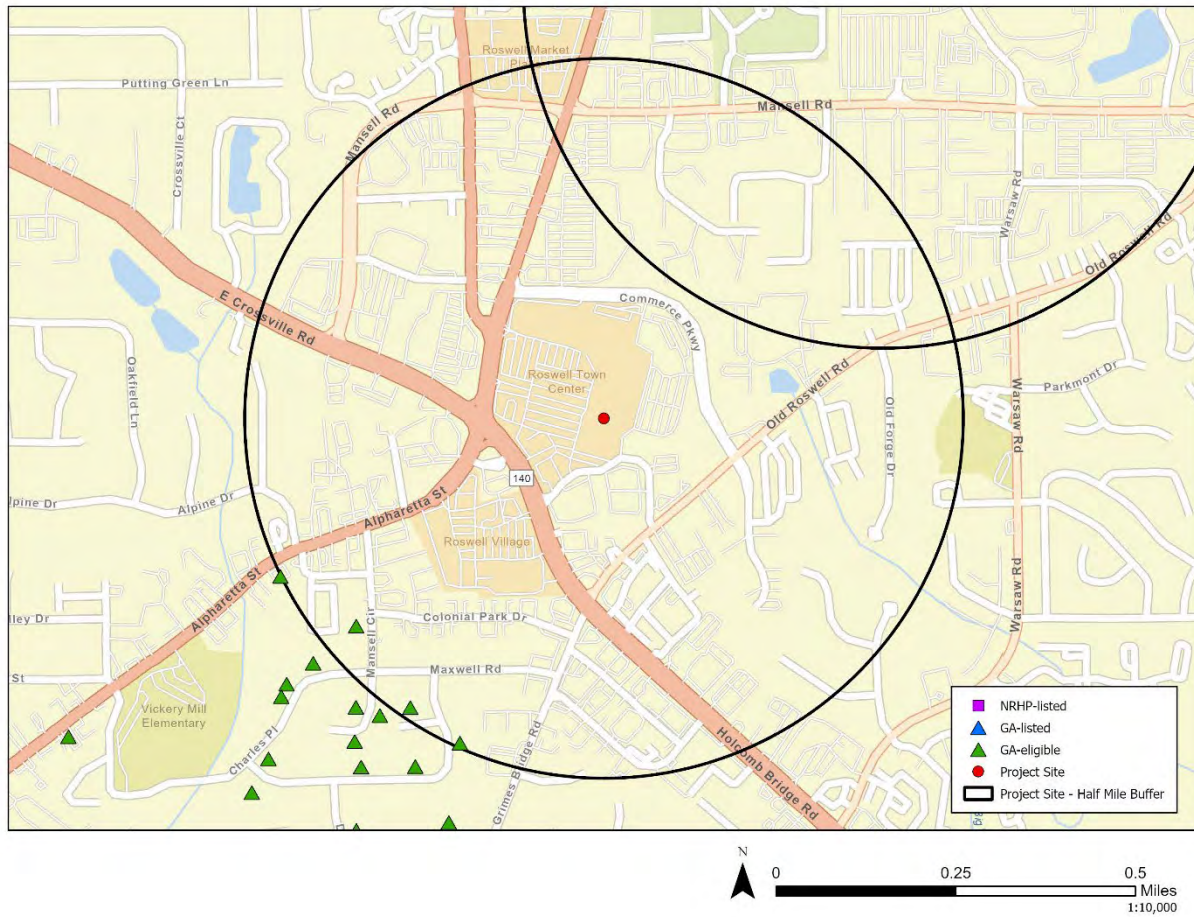
Proposed nest site and buffer at 2460 Park Center Blvd, Decatur, GA 30035



2460 Park Center Blvd, Decatur, GA 30035 nest site, view northeast. Google Street View, 2023.



2460 Park Center Blvd, Decatur, GA 30035 nest site, view southwest. Google Street View, 2023.



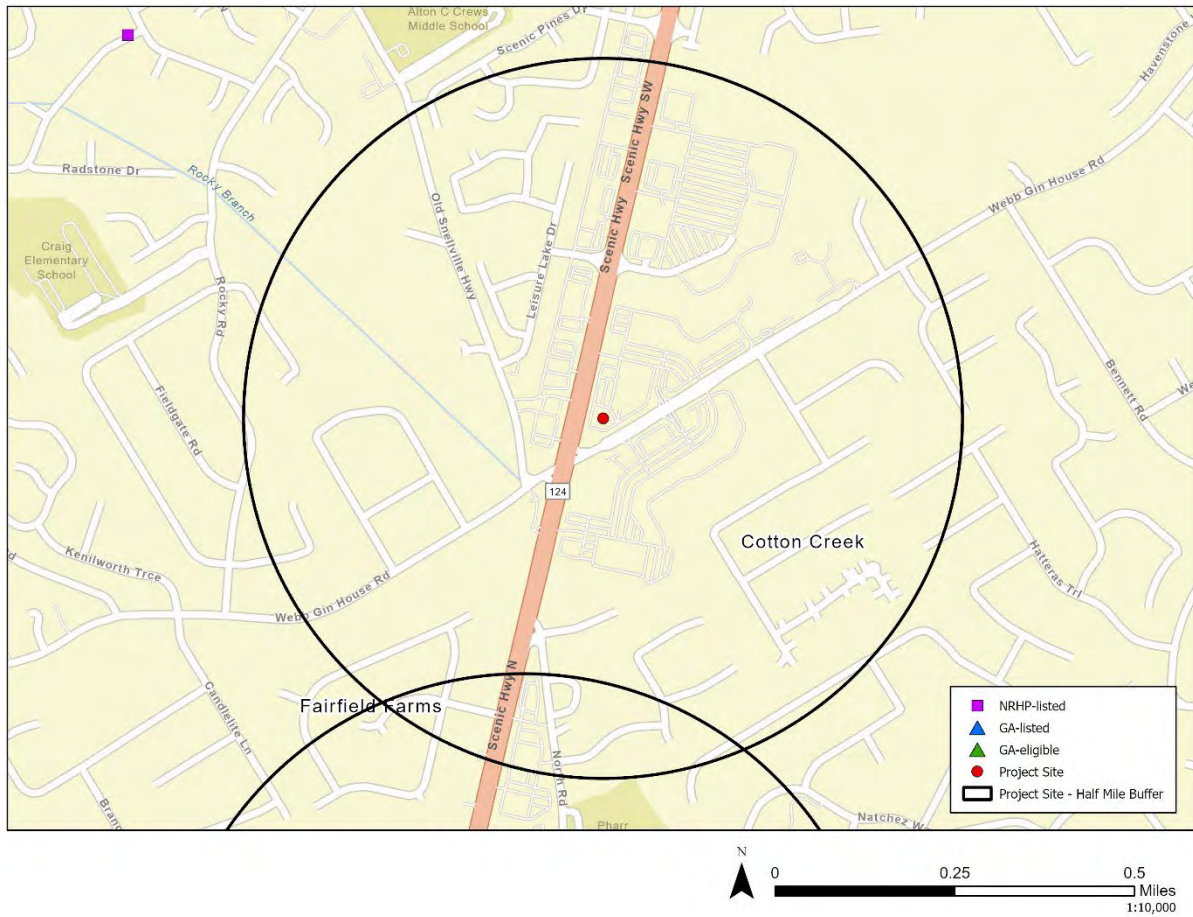
Proposed nest site and buffer at 610 Holcomb Bridge, Roswell, GA 30076



610 Holcomb Bridge, Roswell, GA 30076 nest site, view east. Google Street View, 2023.



610 Holcomb Bridge, Roswell, GA 30076 nest site, view west. Google Street View, 2023.



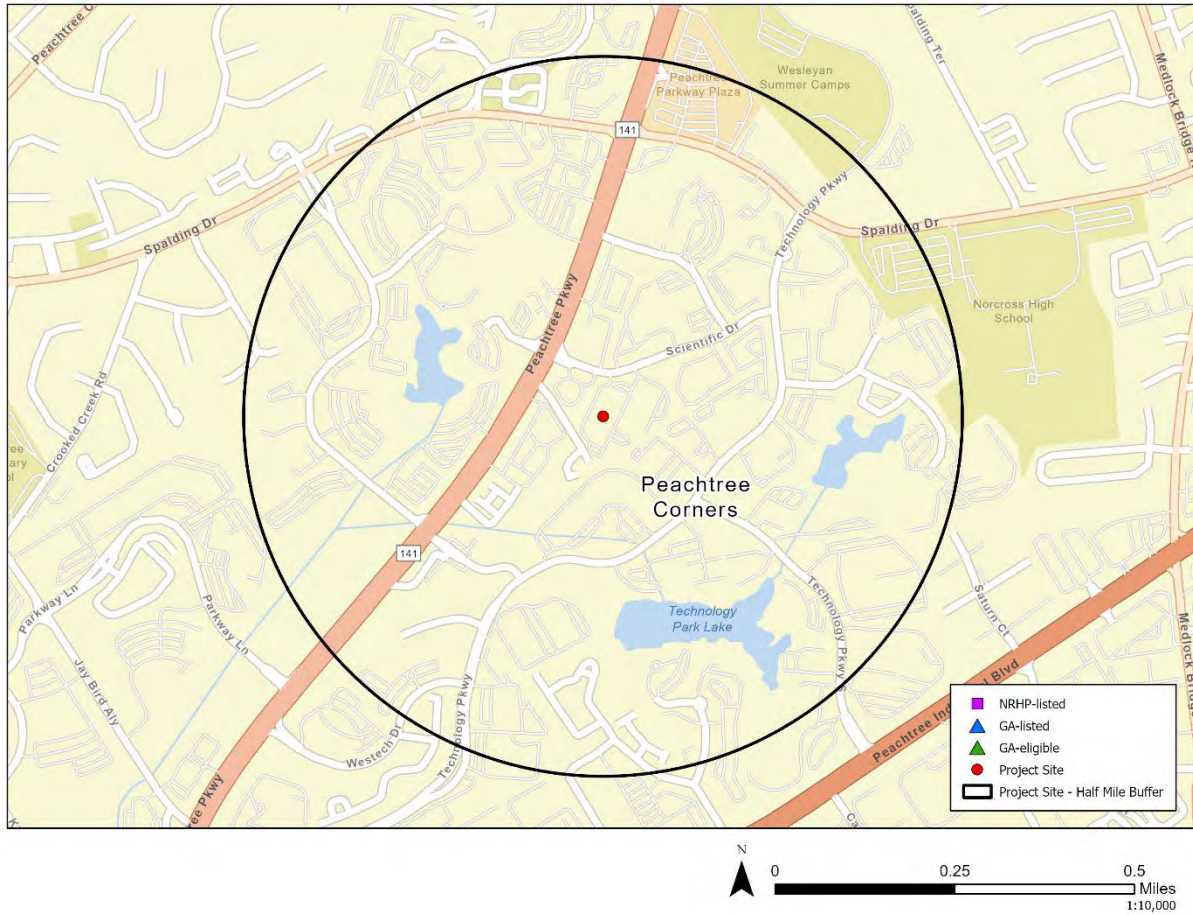
Proposed nest site and buffer at 1250 Scenic Hwy S, Lawrenceville, GA 30045



1250 Scenic Hwy S, Lawrenceville, GA 30045 nest site, view west. Google Street View, 2022.



1250 Scenic Hwy S, Lawrenceville, GA 30045 nest site, view east. Google Street View, 2022.



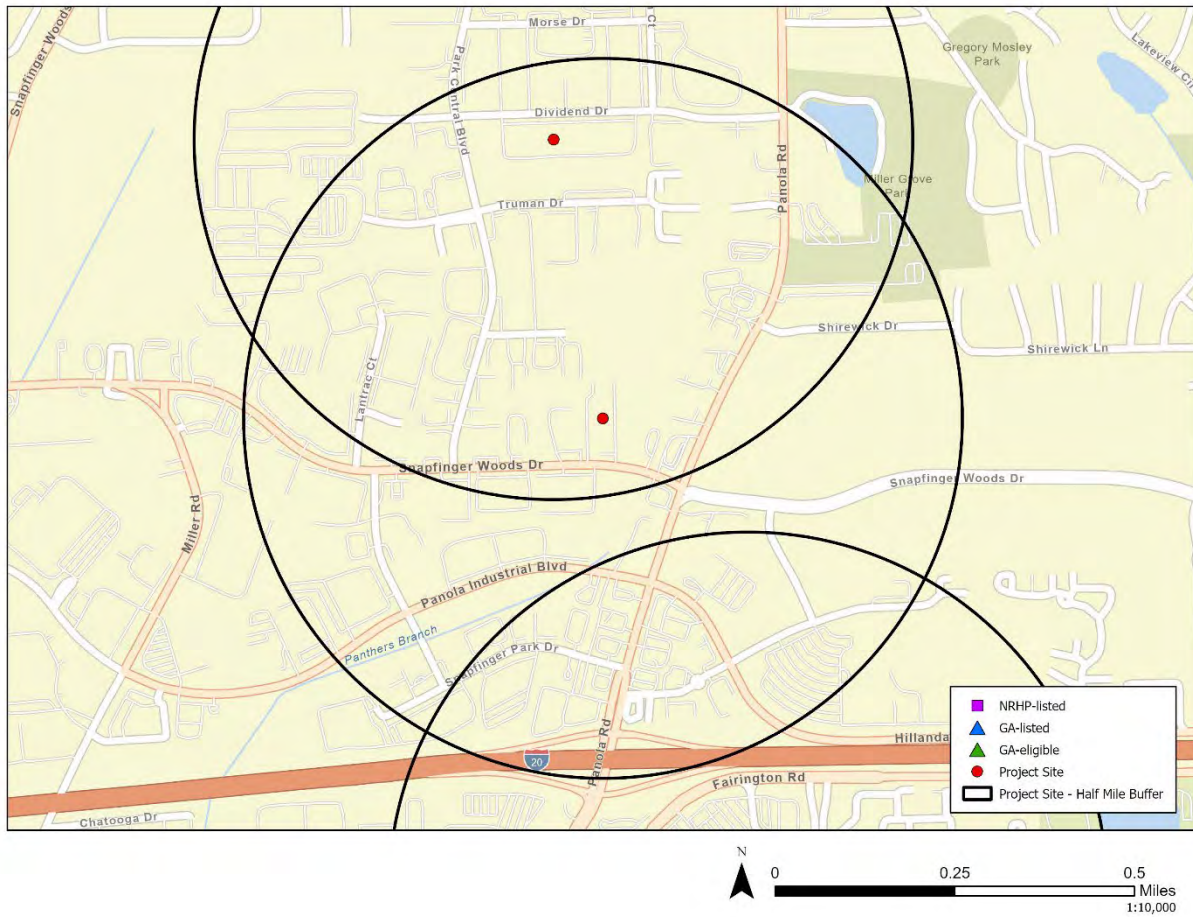
Proposed nest site and buffer at 230 Scientific Dr, Peachtree Corners, GA 30092



230 Scientific Dr., Peachtree Corners, GA 30092 nest site, view south. Google Street View, 2025.



230 Scientific Dr., Peachtree Corners, GA 30092 nest site, view north. Google Street View, 2025.



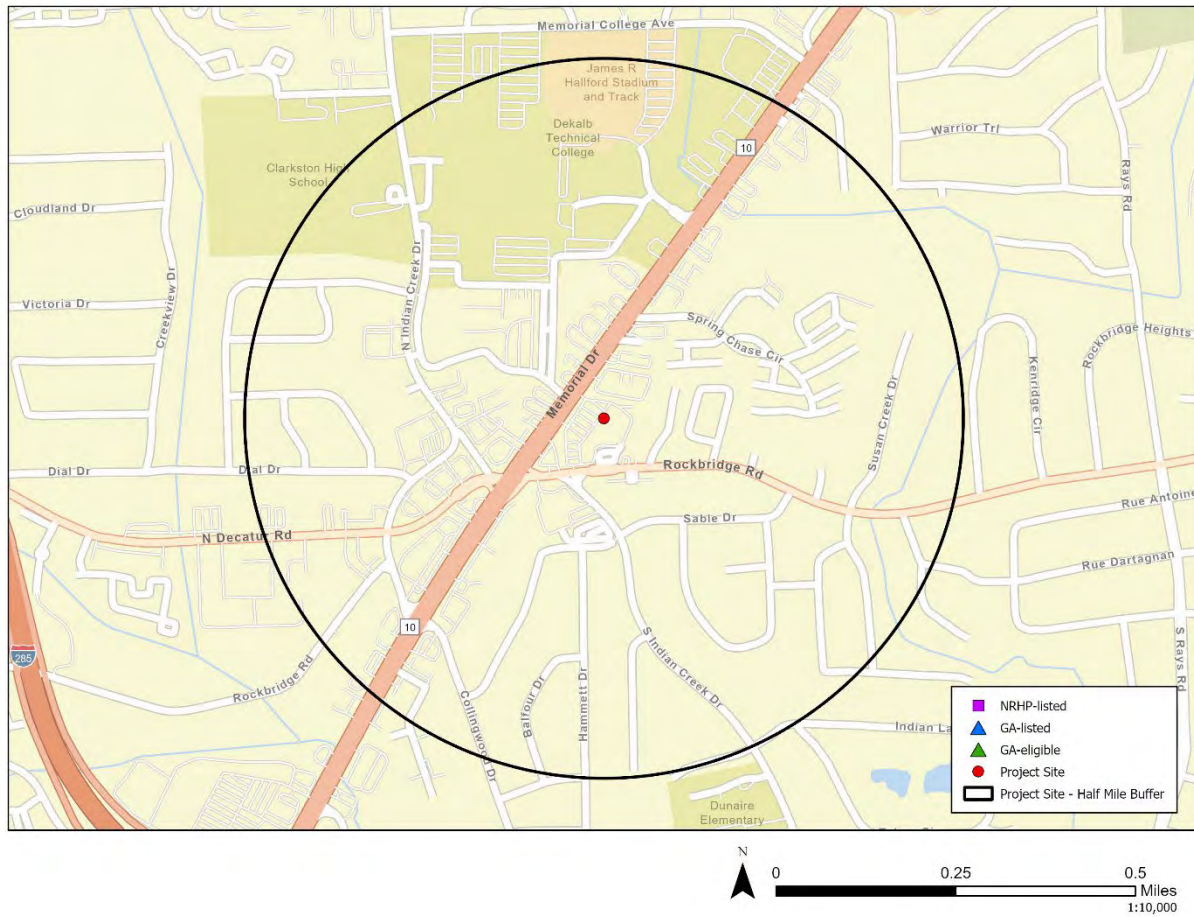
Proposed nest site and buffer at 5360 Snapfinger Woods Dr, Decatur, GA 30035



5360 Snapfinger Woods Dr, Decatur, GA 30035 nest site, view northeast. Google Street View, 2023.



5360 Snapfinger Woods Dr, Decatur, GA 30035 nest site, view southwest. Google Street View, 2023.



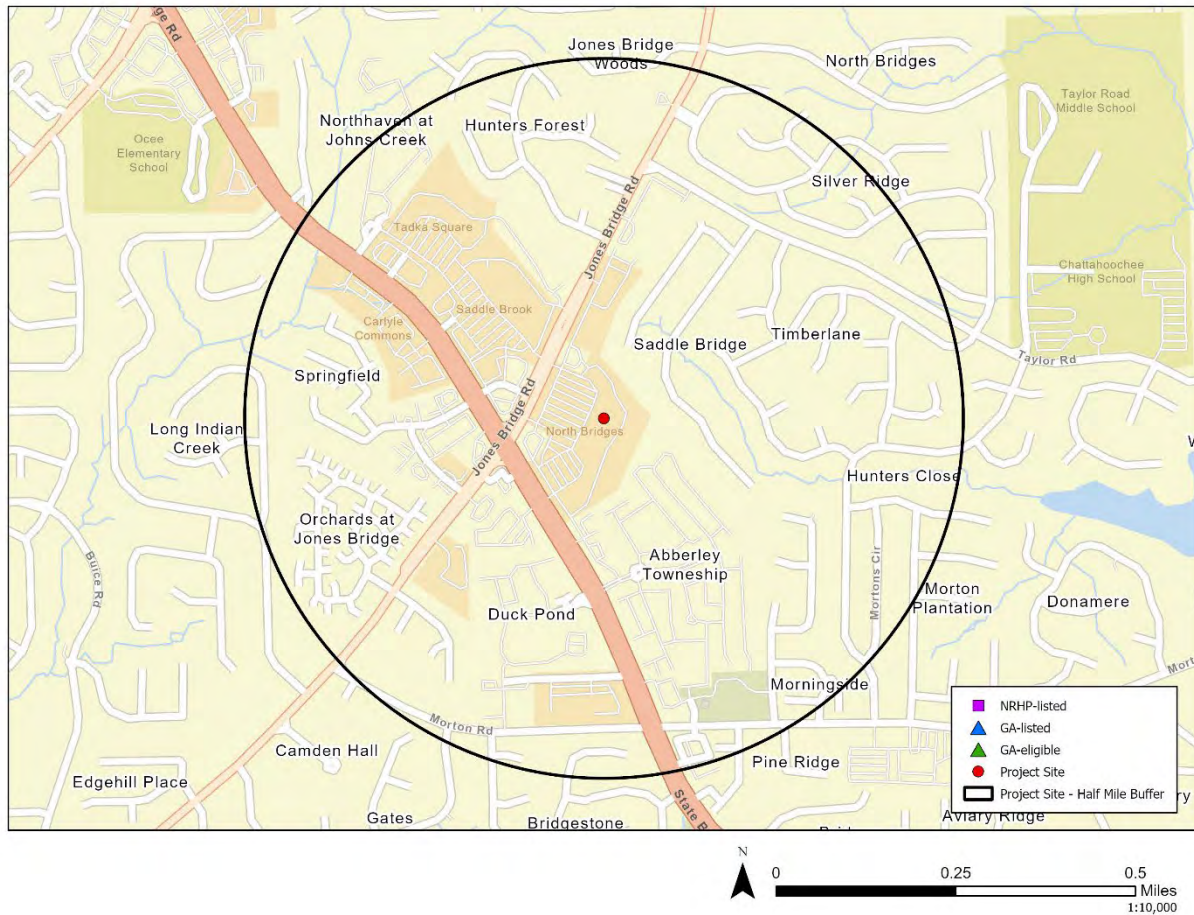
Proposed nest site and buffer at 4861 Memorial Dr, Stone Mountain, GA 30083



4861 Memorial Dr, Stone Mountain, GA 30083 nest site, view east. Google Street View, 2018.



4861 Memorial Dr, Stone Mountain, GA 30083 nest site, view west. Google Street View, 2018.



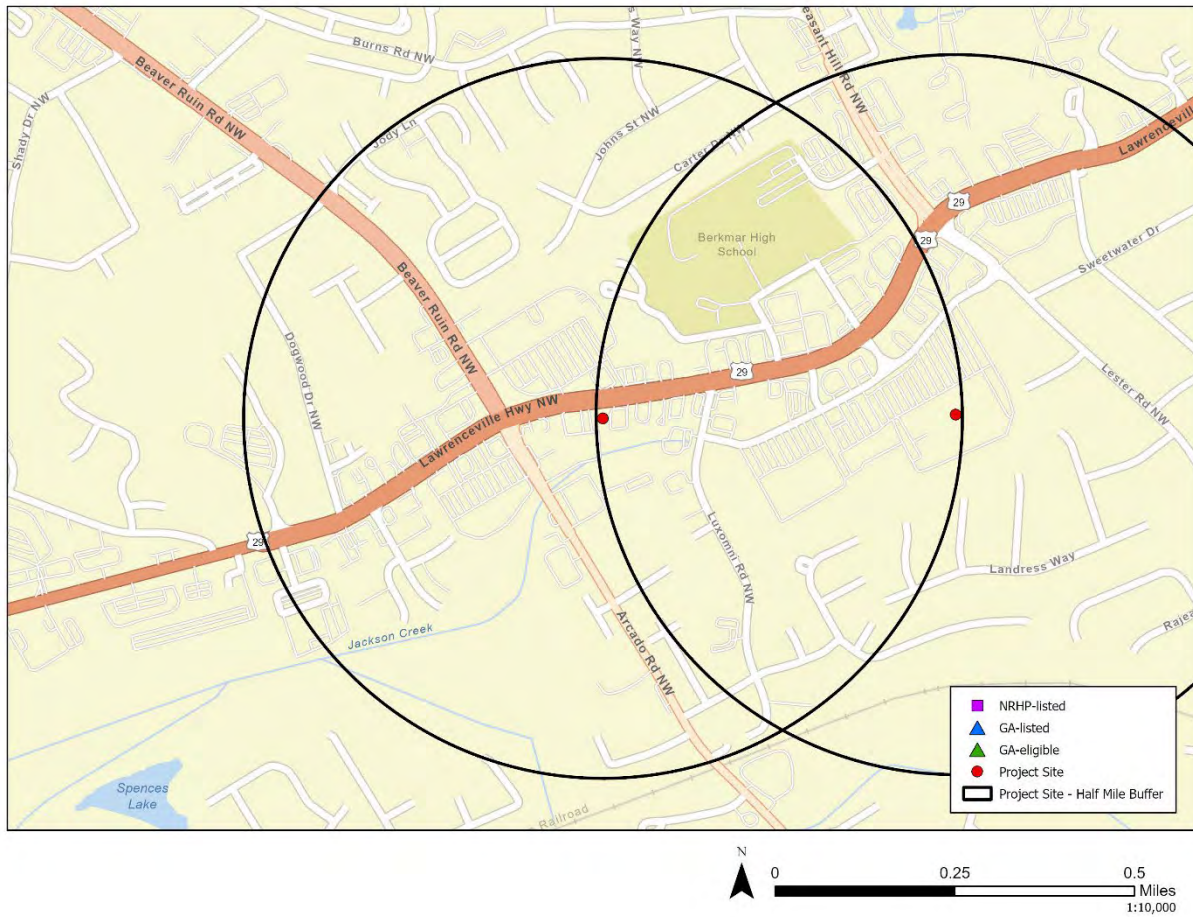
Proposed nest site and buffer at 10955 Jones Bridge Rd, Alpharetta, GA 30022



10955 Jones Bridge Rd, Alpharetta, GA 30022 nest site, view east. Google Street View, 2018.



10955 Jones Bridge Rd, Alpharetta, GA 30022 nest site, view west. Google Street View, 2018.



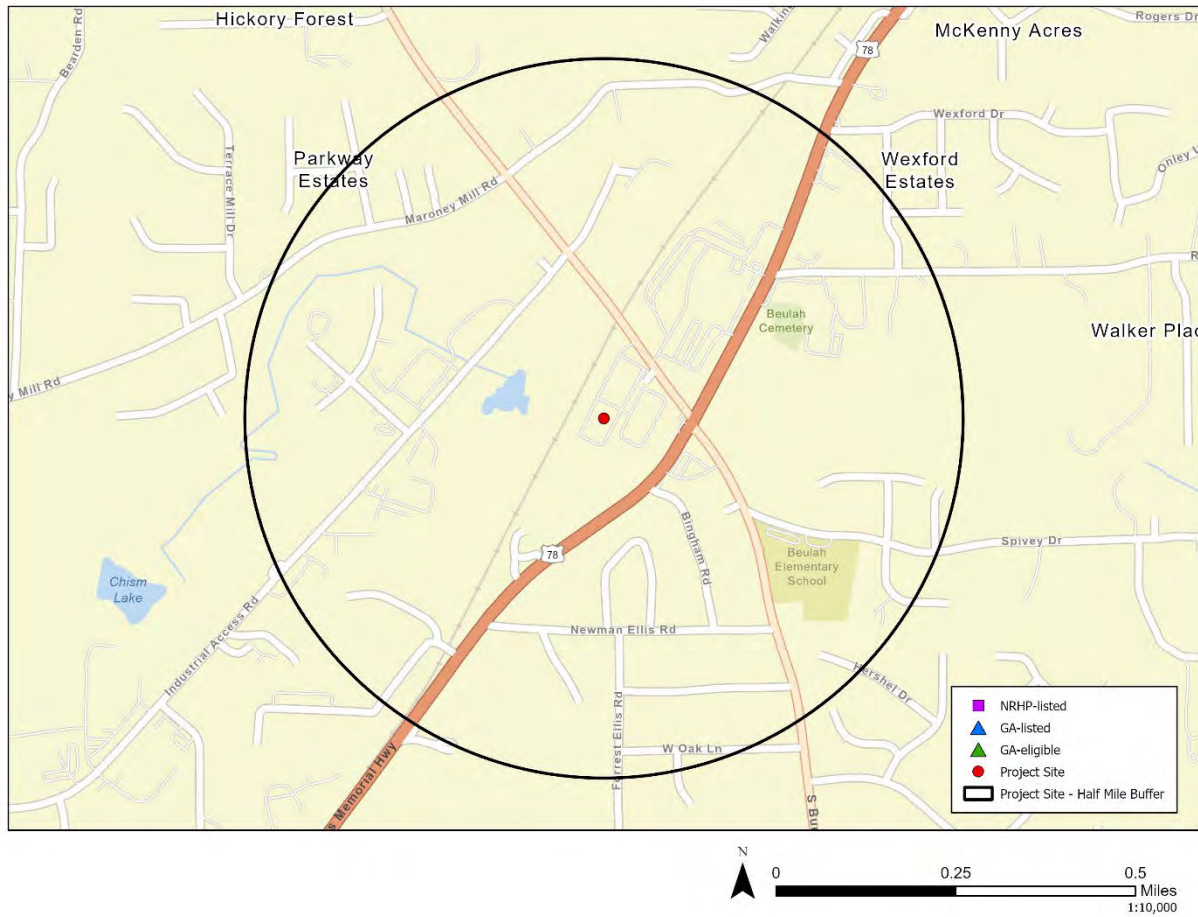
Proposed nest site and buffer at 4140 Lawrenceville Hwy, Lilburn, GA 30047



4140 Lawrenceville Hwy, Lilburn, GA 30047 nest site, view south. Google Street View, 2025.



4140 Lawrenceville Hwy, Lilburn, GA 30047 nest site, view north. Google Street View, 2025.



Proposed nest site and buffer at 981 N Burnt Hickory Rd, Douglasville, GA 30134



981 N Burnt Hickory Rd, Douglasville, GA 30134 nest site, view southeast. Google Street View 2024.



981 N Burnt Hickory Rd, Douglasville, GA 30134 nest site, view northwest. Google Street View 2024.



GEORGIA DEPARTMENT
of COMMUNITY AFFAIRS

July 30, 2026

Derek Hufty
Manager, General Aviation and Commercial Branch (AFS-750)
Federal Aviation Administration
800 Independence Avenue, Southwest
Washington, D.C. 20591
Attn: Chris Hurst, Environmental Protection Specialist

**RE: Construct Drone Package Delivery Nest Sites, Various Locations, Atlanta
Cherokee, Clayton, Cobb, Douglas, Dekalb, Fulton Forsyth, Fayette, Gwinnett, Henry, Rockdale,
Spalding Counties, Georgia
HP-240717-006**

Dear Mr. Hufty:

The Historic Preservation Division (HPD) has received the additional information submitted concerning the above-referenced project. Our comments are offered to assist the Federal Aviation Administration (FAA) in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

The subject project consists of installing multiple drone package delivery “nest” sites in multiple unknown pre-existing commercial and/or industrial paved parking lot locations throughout the metropolitan Atlanta area. HPD understands that the project’s scope of work (SOW) will include installing an unknown number of autoloaders at each nest site from which commercial packages can be picked up by a drone. HPD’s also understands that the autoloaders are Y-shaped stands approximately 10-feet (ft.) in height, 7-ft. wide, and 6-ft. long, that each nest site includes a clear zone around each autoloader the size of approximately two parking spaces, and that each autoloader will either be anchored to the existing pavement with no ground disturbance, to existing utility poles, or ballasted for temporary use. As noted in our letter dated September 11, 2025, HPD requested additional location details for each nest site, representative viewshed photographic documentation to/from each nest site and details outlining the auditory impact of the drone flights at each site.

The current submitted information consists of nest locations, photographs of the viewshed for the nest sites, and details outlining the auditory impact of the drone flights. HPD understands nest sites will be located in existing paved parking areas (Appendix A). Based on the information provided and desktop research, HPD concurs that the subject project, as proposed, will have **no adverse effect** to historic properties within its area of potential effect (APE), as defined in 36 CFR Part 800.5(d)(1), due to the scope of work.

Please refer to project number **HP-240717-006** in any future correspondence regarding this project. If we may be of further assistance, please contact Olivia Kendrick, Environmental Review Historian, at (404) 486-6425 or Olivia.Kendrick@dca.ga.gov, or Grant Sherwood, Compliance Review Archaeologist, at (404) 486-6396 or Grant.Sherwood@dca.ga.gov.



Sincerely,



Stacy Rieke, MHP
Program Manager
Environmental Review & Preservation Planning

SMR/olk

cc: Keri Stevens, Atlanta Regional Commission
Paul Jarrell, Three Rivers Regional Commission
Joe Rothwell, Georgia Mountains Regional Commission
Kathy Papa, DCA Regional Services, Region 2
Tracie Sanchez, DCA Regional Services, Region 3
Corinne Thornton, DCA Regional Services, Region 4

Appendix A

- 3826 Cobb Parkway NW, Acworth
- 2427 Gresham Road S, Atlanta
- 11770 Haynes Bridge Road, Alpharetta
- 10955 Jones Bridge Road, Alpharetta
- 4501 North Point Parkway, Alpharetta
- 7330 North Point Parkway, Alpharetta
- 5200 Windward Parkway, Alpharetta
- 1436 Dogwood Drive SE, Conyers
- 1630-1380 Dogwood Drive SE, Conyers
- 4200 Salem Road, Covington
- 3615 Marietta Highway, Dallas
- 2460 Park Center Boulevard, Decatur
- 3580 Memorial Drive, Decatur
- 5360 Snapfinger Woods Drive, Decatur
- 981 N Burnt Hickory Road, Douglasville
- 2635 Pleasant Hill Road, Duluth
- 2940 Anvilblock Road, Ellenwood
- 11465 Tara Boulevard, Hampton
- 4166 Jimmy Lee Smith Parkway, Hiram
- 1250 Scenic Highway S, Lawrenceville
- 5401 Fairington Road, Lithonia
- 8424 Mall Parkway, Lithonia
- 1000 Tanger Drive, Locust Grove
- 4221 Atlanta Highway, Loganville
- 4004 Lawrenceville Highway, Lilburn
- 4140 Lawrenceville Highway, Lilburn
- 3100 Johnson Ferry Road, Marietta
- 6520 Earnest W Barrett Parkway SW, Marietta
- 135 Willow Lane, McDonough
- 1025 GA-34, Newnan
- 230 Scientific Drive, Peachtree Corners
- 970 Mansell Road, Roswell
- 610 Holcomb Bridge Road, Roswell
- 1550 Scenic Highway N, Snellville
- 3435 Centerville Highway, Snellville
- 2059 Scenic Highway N, Snellville
- 1400 Hudson Bridge Road, Stockbridge
- 5600 N Henry Boulevard, Stockbridge
- 4861 Memorial Drive, Stone Mountain
- 5935 Memorial Drive, Stone Mountain
- 4375 Lawrenceville Highway, Tucker
- 12182 Highway 92, Woodstock
- 6435 Bells Ferry Road, Woodstock

Appendix H

USFWS 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
Georgia Ecological Services Field Office
355 East Hancock Avenue
Room 320
Athens, GA 30601-2523
Submitted to:
GAES_Assistance@FWS.gov

**SUBJECT: Endangered Species Act Section 7 Consultation for Unmanned Aircraft Commercial
Package Delivery Operations in Atlanta, Georgia Metropolitan 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 into the Atlanta (ATL) metropolitan area ***may affect, but is not likely to adversely affect*** the gray bat (*Myotis grisescens*), northern long-eared bat (*Myotis septentrionalis*), and tricolored bat (*Perimyotis subflavus*). 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 2024 when evaluating Wing's initial proposed operations in DFW Metro and surrounding area (**Reference: USFWS #2024-0103189**). 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 December 3, 2024.

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). 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 applying to the FAA to include the Atlanta metro area by adding launch and staging sites (hereafter drone nests) and expanding operating hours included in its OpSpecs.

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 to the ATL metropolitan area (see **Figure 1**). Wing projects operating a maximum of 400 flights per operating day from each drone nest, with each flight taking a package to a customer delivery address before returning to a drone nest. Wing

projects establishing up to 75 drone nests in the ATL 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 drone 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 30,000¹. 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 drone nest, per week, where the UA makes a separate hover flight to update the reference map of the drone nest; these flights are termed Geography Built In Test (GeoBITs) because of their similarity to the FitBIT stationary hover flight over the drone nest.

Wing is proposing to disperse drone nests throughout the operational area (**Figure 1**), each located in a commercial area, such as a shopping center, large retailer, shopping mall, etc. Each drone nest would house up to two dozen aircraft on charging pads and one or more merchants may use each drone nest for drone deliveries. Drone nests would be distributed throughout the ATL 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 drone nest from 7:00am to 10:00pm. 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 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 propellers.
 - 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 propellers.
 - 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 ATL 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 drone nests would be variable based on payload,

¹ 400 Ops*75 Drone nests per day

route, and demand characteristics; drone nests with a wider range of offerings are anticipated to carry higher proportions of 7000W-B Aircraft.

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 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 drone 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 drone nest location, and Wing's software automatically assigns, deconflicts, and routes each flight. Each drone 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 drone 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 59 miles per hour (mph).

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 59 mph towards the drone nest.

Landing

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

Remote Pickup Operations

Remote pickup operations from each drone nest would be supported at up to 12 partner establishments depending upon demand and drone 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 59 mph 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 deliveries 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 Environmental Protection Agency, the action area occurs entirely within the Piedmont Level III ecoregion and Southern Outer Piedmont Level IV ecoregion (Griffith 2001). The following is a general description of these ecoregions in Georgia; however, note that much of the land surface in the action area is highly urbanized, as it contains the Atlanta metro area and surrounding incorporated and unincorporated communities. Outside these developed areas, 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 Piedmont ecoregion is a transitional area between the mountainous ecoregions to the northwest and the relatively flat Coastal Plain to the southeast. Geologically, it is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks with moderately dissected plains and isolated monadnocks (rounded hills). The soils tend to be finer-textured than in the coastal plain ecoregions. Once largely cultivated, much of this region has reverted to pine and hardwood woodlands, and, more recently, to sprawling urban and suburban areas (GA DNR 2015).
- The Southern Outer Piedmont ecoregion has lower elevations, less relief, and less precipitation than the Southern Inner Piedmont. Loblolly-shortleaf pine is the major forest type, with less oak-hickory and oak-pine than in the Southern Inner Piedmont. Gneiss, schist and granite are the dominant rock types, covered with deep saprolite and mostly red, clayey subsoils. The southern boundary of the ecoregion occurs at the Fall Line, where unconsolidated coastal plain sediments overlay the metamorphic and igneous rocks of the Piedmont. (GA DNR 2015).

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 designated critical habitat for the Gulf moccasinshell (*Medionidus penicillatus*), oval pigtoe (*Pleurobema pyriforme*), purple bankclimber (*Elliptioideus sloatianus*), shinyrayed pocketbook (*Hamiota subangulata*), and proposed critical habitat for the southern elktoe (*Alasmidonta triangulata*).

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

Common Name	Scientific Name	ESA Status
Mammals		
Gray bat	<i>Myotis gresecens</i>	Endangered
Northern long-eared bat	<i>Myotis septentrionalis</i>	Endangered
Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered
Reptiles		
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	Proposed Threatened
Fishes		
Cherokee darter	<i>Etheostoma scotti</i>	Threatened
Etowah darter	<i>Etheostoma etowahae</i>	Endangered
Clams		
Finelined pocketbook	<i>Hamiota altilis</i>	Threatened
Gulf moccasainshell	<i>Medionidus penicillatus</i>	Endangered
Oval pigtoe	<i>Pleurobema pyriforme</i>	Endangered
Purple bankclimber	<i>Elliptioideus sloatianus</i>	Threatened
Shinyrayed pocketbook	<i>Hamiota subangulata</i>	Endangered
Southern elktoe	<i>Alasmidonta triangulata</i>	Proposed Endangered
Insects		
Monarch butterfly	<i>Danaus plexippus</i>	Candidate
Flowering Plants		
American chaffseed	<i>Schwalbea americana</i>	Endangered
Georgia rockcress	<i>Arabis georgiana</i>	Threatened
Large-flowered skullcap	<i>Scutellaria montana</i>	Threatened
Little amphianthus	<i>Amphianthus pusillus</i>	Threatened
Michaux's sumac	<i>Rhus michauxii</i>	Endangered
Relict trillium	<i>Trillium reliquum</i>	Endangered
Tennessee yellow-eyed grass	<i>Xyris tennesseensis</i>	Endangered
White fringeless orchid	<i>Platanthera integrilabia</i>	Threatened
Ferns and Allies		
Black spored quillwort	<i>Isoetes melanospora</i>	Endangered
Mat-forming quillwort	<i>Isoetes tegetiformans</i>	Endangered

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 drone 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 any habitat or designated critical habitat within the action area. The FAA has determined the action would have *no effect* on Gulf

moccasinshell, oval pigtoe, purple bankclimber, and shinyrayed pocketbook designated critical habitat or proposed critical habitat for the southern elktoe.

UA noise, light emissions, 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 drone 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 1.

Mammals

The gray bat occurs primarily in limestone karst areas of the southeastern United States, with populations occurring in Alabama, northern Arkansas, Kentucky, Missouri, Tennessee, and Georgia (USFWS 1982; USFWS 2009). Their distribution within the range is patchy with seasonal migrations occurring between hibernation and maternity caves. The gray bat is highly restricted to cave habitats and has specific seasonal temperature requirements which greatly limit the availability of suitable summer and hibernation caves. Gray bats forage almost exclusively over water along rivers, streams, lakes, or reservoir edges, often within 5 meters of the surface of the water. Primary threats to the species include human disturbance of cave habitat areas, development, and white-nose syndrome.

The northern long-eared bat occurs throughout North America and typically roosts during summer months underneath bark or in cavities of both live trees and snags (USFWS 2022). The species is not dependent on tree species and will roost singly or in maternity colonies. They are nocturnal foragers and typically forage in the understory for insects during dusk, nighttime, and dawn. Northern long-eared bats overwinter in hibernacula including caves and abandoned mines with relatively constant, cooler temperatures. White-nose syndrome is the greatest current threat to the species, but other factors contributing to their decline include wind-energy mortality, habitat loss, and climate change.

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 2023). This species spends six to nine months per year hibernating in caves or mines (TPWD 2023). The USFWS has proposed to list the tricolored bat as an endangered species, primarily due to white-nose syndrome. Other factors that influence the tricolored bat's viability include wind-energy-related mortality, habitat loss, and effects from climate change.

Suitable habitat for ESA-listed bat species 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 ESA-listed bats occurring in the action area, particularly in the urban environment where drone nests would be located and deliveries would occur (see **Figure 3**). Drone nests would be located in commercial areas and therefore not within high-quality roosting or foraging habitats.

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 drone nests and delivery locations, the short period of time the UA would be in any particular location, and the low probability of encountering a bat in the action area, UA noise is not expected to adversely affect ESA-listed 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 an ESA-listed 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 ESA-listed bats 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 gray bat, northern long-eared bat, and tricolored bat. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated).

Alligator Snapping Turtle

Alligator snapping turtle are not susceptible to disturbance from UA noise, collision risk, or light emissions. The action does not involve any flights over water, ground-disturbing activities, or activities within suitable habitat for this species. As there is no plausible route of effect to this species, the FAA determined the action would have **no effect** on alligator snapping turtle.

Fish

Cherokee and Etowah darters are not susceptible to disturbance from UA noise, collision risk, or light emissions. The action does not involve any flights over water, ground-disturbing activities, or activities within suitable habitat for these species. As there is no plausible route of effect to these species, the FAA determined the action would have **no effect** on Cherokee and Etowah darters.

Clams

Finelined pocketbook, Gulf moccasinshell, oval pigtoe, purple bankclimber, shinyrayed pocketbook, and southern elktote are not susceptible to disturbance from UA noise, collision risk, or light emissions. The action does not involve any flights over water, ground-disturbing activities, or activities within suitable habitat for these species. As there is no plausible route of effect to these species, the FAA determined the action would have **no effect** on finelined pocketbook, Gulf moccasinshell, oval pigtoe, purple bankclimber, shinyrayed pocketbook, and southern elktote.

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. 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.

Flowering Plants, Ferns and Allies, and Lichens

Flowering plants, ferns and allies, and lichens are not susceptible to disturbance from UA noise, collision risk, or light emissions. The action does not involve any ground-disturbing activities or activities within suitable habitat for these species. As there is no plausible route of effect to these species, the FAA determined the action would have **no effect** on all flowering plants, ferns and allies, and lichens potentially present within the action area.

Conclusion

Based on the analysis above, the FAA has determined the action **may affect, but is not likely to adversely affect**, the gray bat, northern long-eared bat, and tricolored bat. 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 Mr. Jonathan "Zack" DeLaune at 9-faa-drone-environmental@faa.gov.

Sincerely,

**DEREK W
HUFTY**

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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

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Figure 1. Action Area

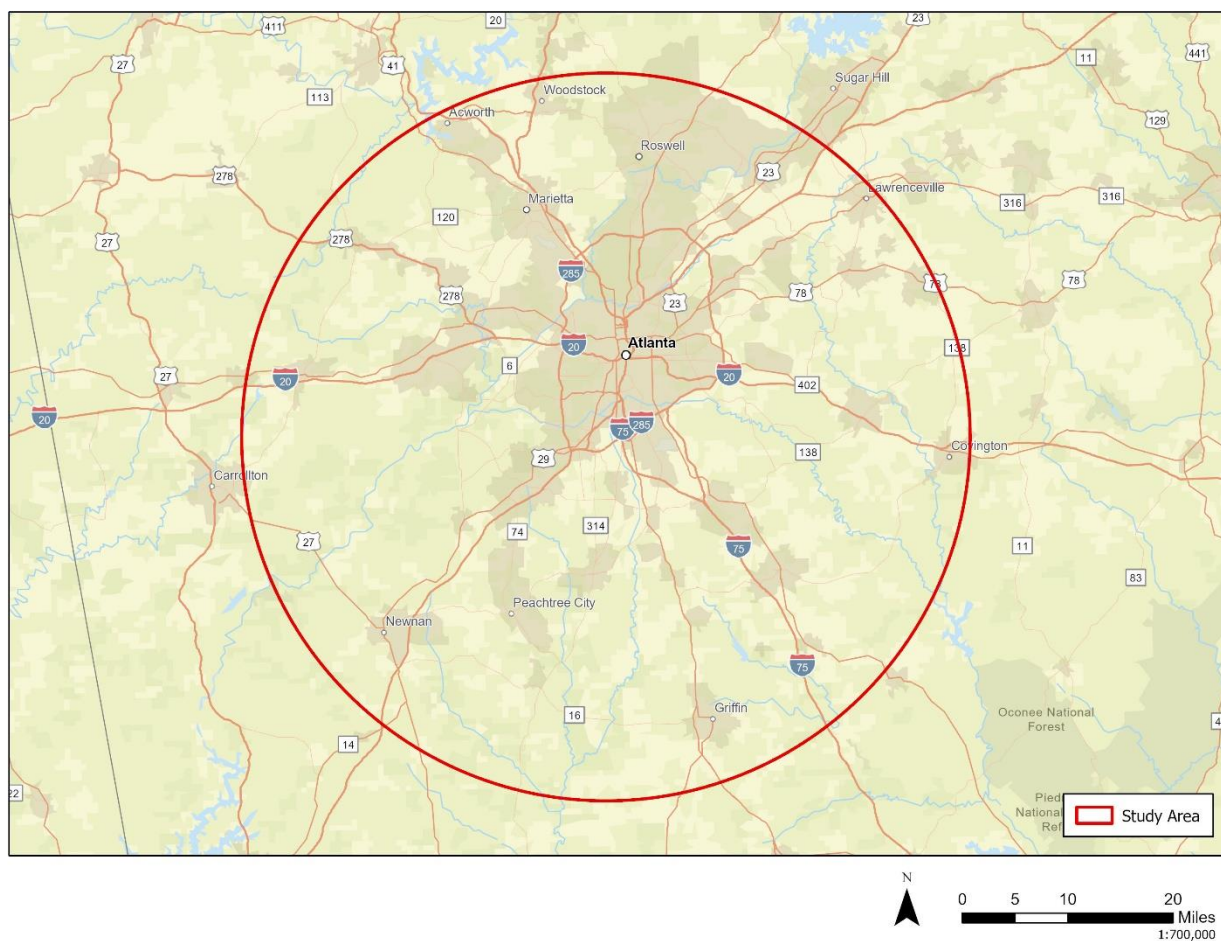
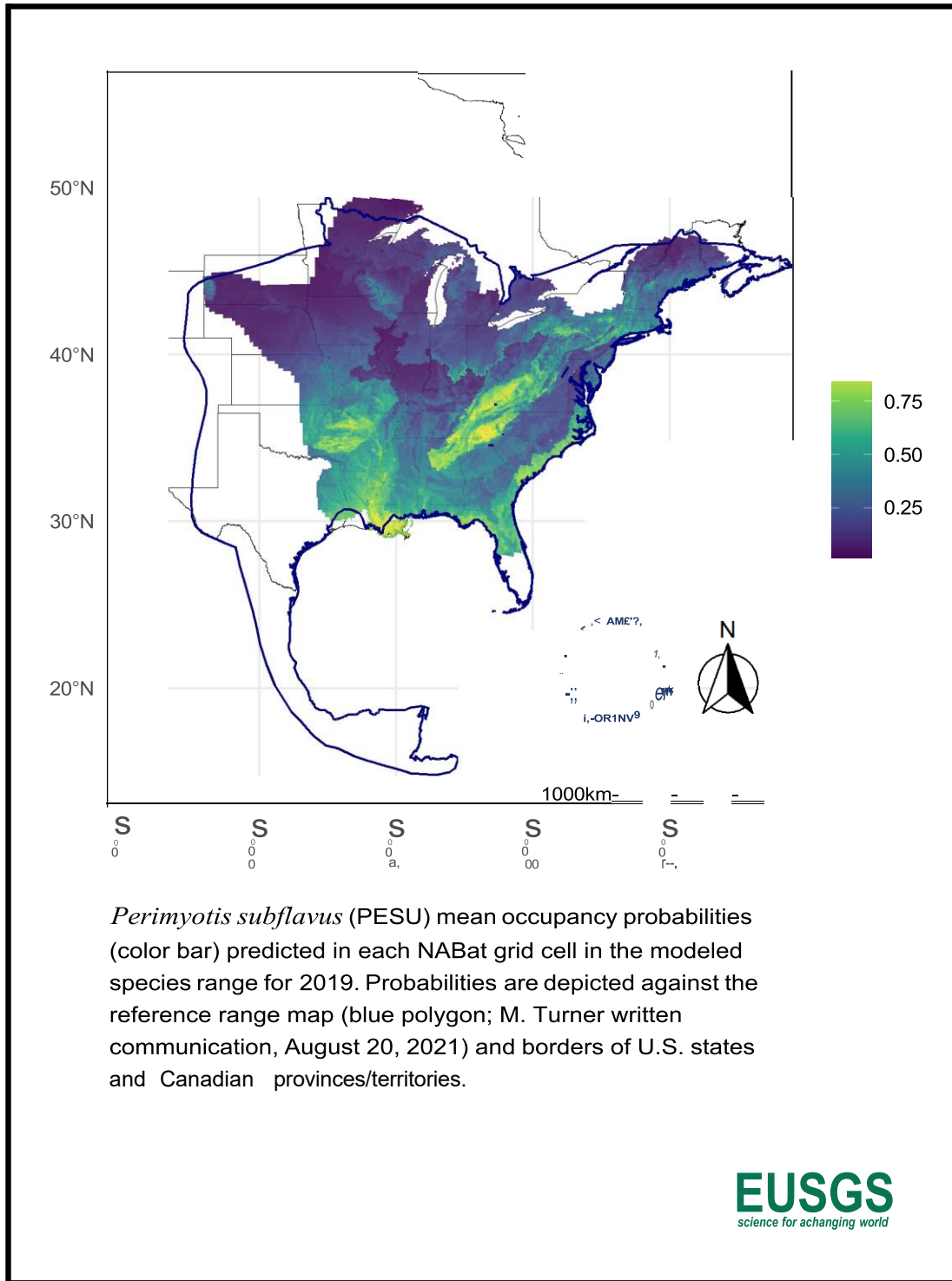


Figure 2. Wing Hummingbird Unmanned Aircraft with Package Attached



Figure 3. Tricolored Bat Mean Occupancy Probabilities



Attachment A. USFWS Official Species List



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Georgia Ecological Services Field Office
355 East Hancock Avenue
Room 320
Athens, GA 30601-2523
Phone: (706) 460-7161 Fax: (706) 613-6059



In Reply Refer To:

12/10/2024 18:45:46 UTC

Project Code: 2025-0029661

Project Name: Wing Atlanta Unmanned Aerial Package Delivery

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:

Thank you for requesting information on federally listed species and important wildlife habitats that may occur in your project area. The U.S. Fish and Wildlife Service (Service) has responsibility for certain species of wildlife under the Endangered Species Act (ESA) of 1973 as amended (16 USC 1531 et seq.), the Migratory Bird Treaty Act as amended (16 USC 701-715), Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Bald and Golden Eagle Protection Act as amended (16 USC 668-668c). We provide the following guidance for determining which federally imperiled species may occur within your project area and to recommend conservation measures to consider for your project if you determine those species or designated critical habitats may be affected by the project activities.

FEDERALLY-LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

Attached is a list of endangered, threatened, and proposed species that may occur in your project area. Your project area may not necessarily include all or any of these species. Under the ESA, it is the responsibility of the Federal action agency, their designated non-Federal representative, or a project proponent to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with the Service further. Similarly, it is the responsibility of the Federal action agency or project proponent, not the Service, to make "no effect" determinations. If you determine that your proposed action will have "no effect" on threatened or endangered species or their respective critical habitat, you do not need to seek concurrence with the Service. Nevertheless, it is a violation of Federal law to harm or harass any federally listed threatened or endangered fish or wildlife species without the appropriate permit. If you need additional guidance to inform your effect determination, please contact the Service.

If you determine that your proposed action may affect federally listed species, please consult with the Service. Through the consultation (for projects seeking Federal funding or permitting) or technical assistance (for non-Federal projects) process, we will work with you to evaluate information contained in a biological assessment or equivalent documents that you provide. If your proposed action is associated with Federal funding or permitting, consultation will occur with the Federal agency under section 7(a)(2) of the ESA. Otherwise, an incidental take permit pursuant to section 10(a) (1)(B) of the ESA (also known as a Habitat Conservation Plan) may be necessary to exempt "take" of federally listed threatened or endangered fish or wildlife species when it cannot be avoided. For more information regarding formal consultation and HCPs, please see the Service's [Section 7 Consultation Library](#) and [Habitat Conservation Plans Library](#).

Action Area. The scope of ESA compliance includes direct and indirect effects of project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations). The "action area" is the spatial extent of an action's direct and indirect modifications or impacts to the land, water, or air (50 CFR 402.02). Large projects may have effects to land, water, or air outside the immediate footprint of the project, and these areas should be included as part of the action area. Effects to land, water, or air outside of a project footprint could include things like lighting, dust, smoke, and noise. To obtain a complete list of species, the action area should be uploaded or drawn in IPaC rather than just the project footprint. Please note that a lead federal agency may consider an action area that excludes portions of the project footprint. In these cases, further coordination with our office may be required to ensure compliance with the ESA. It is the responsibility of the project proponent to coordinate with the lead federal agency to understand the action and action area being reviewed as part of ESA Section 7 consultation.

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 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. An updated list may be requested through IPaC.

HOW TO SUBMIT A PROJECT REVIEW PACKAGE

IF YOUR ACTION MAY AFFECT ANY FEDERALLY LISTED SPECIES AND YOU WOULD LIKE TECHNICAL ASSISTANCE FROM OUR OFFICE, PLEASE SEND US A COMPLETE PROJECT REVIEW PACKAGE. A STEP-BY-STEP GUIDE IS AVAILABLE BELOW AND SUPPLEMENTAL GUIDANCE IS AVAILABLE AT THE GEORGIA ECOLOGICAL SERVICES [PROJECT PLANNING AND REVIEW](https://www.fws.gov/office/georgia-ecological-services/project-planning-review) PAGE ([HTTPS://WWW.FWS.GOV/OFFICE/GEORGIA-ECOLOGICAL-SERVICES/PROJECT-PLANNING-REVIEW](https://www.fws.gov/office/georgia-ecological-services/project-planning-review)).

REQUESTS FOR THREATENED AND ENDANGERED SPECIES PROJECT REVIEWS MUST BE SUBMITTED TO OUR OFFICE USING THE PROCESS DESCRIBED BELOW. ALL STEPS MUST BE COMPLETED TO ENSURE YOUR

PROJECT IS REVIEWED BY A BIOLOGIST IN OUR OFFICE AND YOU RECEIVE A TIMELY RESPONSE.

STEP 1. REQUEST AN OFFICIAL SPECIES LIST FOR YOUR PROJECT THROUGH IPAC. YOU HAVE JUST COMPLETED THIS STEP.

STEP 2. COMPLETE APPLICABLE DETERMINATION KEYS (DKEY'S, FOR SHORT)

STEP 3. SEND YOUR COMPLETE PROJECT REVIEW PACKAGE TO GAES_ASSISTANCE@FWS.GOV FOR REVIEW IF NO DKEY IS APPLICABLE OR CERTAIN PROJECT COMPONENTS HAVE NOT BEEN ADDRESSED (I.E. A SPECIES RETURNED BY IPAC DOES NOT HAVE A DKEY). A COMPLETE PROJECT REVIEW PACKAGE SHOULD INCLUDE:

- 1. A DESCRIPTION OF THE PROPOSED ACTION, INCLUDING ANY MEASURES INTENDED TO AVOID, MINIMIZE, OR OFFSET EFFECTS OF THE ACTION. THE DESCRIPTION SHALL PROVIDE SUFFICIENT DETAIL TO ASSESS THE EFFECTS OF THE ACTION ON LISTED SPECIES AND CRITICAL HABITAT, SUCH AS THE PURPOSE OF THE ACTION; DURATION AND TIMING OF THE ACTION; LOCATION (LATITUDE AND LONGITUDE); SPECIFIC ACTIVITIES INVOLVING DISTURBANCE TO LAND, WATER, AND AIR, AND HOW THEY WILL BE CARRIED OUT; CURRENT DESCRIPTION OF AREAS TO BE AFFECTED DIRECTLY OR INDIRECTLY BY THE ACTION; AND MAPS, DRAWINGS, OR SIMILAR SCHEMATICS OF THE ACTION. PLEASE SUBMIT ALL AREAS OF A PROJECT AS ONE SINGLE SUBMISSION AND DO NOT SEPARATE INTO SMALLER COMPONENTS/SUBMISSIONS.**
- 2. AN UPDATED OFFICIAL SPECIES LIST AND DETERMINATION KEY RESULTS**
- 3. BIOLOGICAL ASSESSMENTS (MAY INCLUDE HABITAT ASSESSMENTS AND INFORMATION ON THE PRESENCE OF LISTED SPECIES IN THE ACTION AREA);**
- 4. DESCRIPTION OF EFFECTS OF THE ACTION ON SPECIES IN THE ACTION AREA AND, IF RELEVANT, EFFECT DETERMINATIONS FOR SPECIES AND CRITICAL HABITAT;**
- 5. CONSERVATION MEASURES AND ANY OTHER AVAILABLE INFORMATION RELATED TO THE NATURE AND SCOPE OF THE PROPOSED ACTION RELEVANT TO ITS EFFECTS ON LISTED SPECIES OR DESIGNATED CRITICAL HABITAT (E.G., MANAGEMENT PLANS RELATED TO STORMWATER, VEGETATION, EROSION AND SEDIMENT PLANS). VISIT THE [GEORGIA CONSERVATION PLANNING TOOLBOX \(HTTPS://WWW.FWS.GOV/STORY/CONSERVATION-TOOLS-GEORGIA\)](https://www.fws.gov/story/conservation-tools-georgia) FOR INFORMATION ABOUT CONSERVATION MEASURES.**

6. IN THE EMAIL SUBJECT LINE, USE THE FOLLOWING FORMAT TO INCLUDE THE PROJECT CODE FROM YOUR IPAC SPECIES LIST AND THE COUNTY IN WHICH THE PROJECT IS LOCATED (EXAMPLE: PROJECT CODE: 2023-0049730 GWINNETT CO.). FOR GEORGIA DEPARTMENT OF TRANSPORTATION RELATED PROJECTS, PLEASE WORK WITH THE OFFICE OF ENVIRONMENTAL SERVICES ECOLOGIST TO DETERMINE THE APPROPRIATE USFWS TRANSPORTATION LIAISON.

THE GEORGIA ECOLOGICAL SERVICES FIELD OFFICE WILL SEND A RESPONSE EMAIL WITHIN APPROXIMATELY 30 DAYS OF RECEIPT WITH TECHNICAL ASSISTANCE OR FURTHER RECOMMENDATIONS FOR SPECIFIC SPECIES.

WETLANDS AND FLOODPLAINS

UNDER EXECUTIVE ORDERS 11988 AND 11990, FEDERAL AGENCIES ARE REQUIRED TO MINIMIZE THE DESTRUCTION, LOSS, OR DEGRADATION OF WETLANDS AND FLOODPLAINS, AND PRESERVE AND ENHANCE THEIR NATURAL AND BENEFICIAL VALUES. THESE HABITATS SHOULD BE CONSERVED THROUGH AVOIDANCE, OR MITIGATED TO ENSURE THAT THERE WOULD BE NO NET LOSS OF WETLANDS FUNCTION AND VALUE. WE ENCOURAGE YOU TO USE THE NATIONAL WETLAND INVENTORY (NWI) MAPS IN CONJUNCTION WITH GROUND-TRUTHING TO IDENTIFY WETLANDS OCCURRING IN YOUR PROJECT AREA. THE SERVICE'S [NWI PROGRAM WEBSITE \(HTTPS://WWW.FWS.GOV/PROGRAM/NATIONAL-WETLANDS-INVENTORY\)](https://www.fws.gov/program/national-wetlands-inventory) INTEGRATES DIGITAL MAP DATA WITH OTHER RESOURCE INFORMATION. WE ALSO RECOMMEND YOU CONTACT THE U.S. ARMY CORPS OF ENGINEERS FOR PERMITTING REQUIREMENTS UNDER SECTION 404 OF THE CLEAN WATER ACT IF YOUR PROPOSED ACTION COULD IMPACT FLOODPLAINS OR WETLANDS.

MIGRATORY BIRDS

THE MBTA PROHIBITS THE TAKING OF MIGRATORY BIRDS, NESTS, AND EGGS, EXCEPT AS PERMITTED BY THE SERVICE'S [MIGRATORY BIRDS PROGRAM \(HTTPS://FWS.GOV/PROGRAM/MIGRATORY-BIRDS\)](https://fws.gov/program/migratory-birds). TO MINIMIZE THE LIKELIHOOD OF ADVERSE IMPACTS TO MIGRATORY BIRDS, WE RECOMMEND CONSTRUCTION ACTIVITIES OCCUR OUTSIDE THE GENERAL BIRD NESTING SEASON FROM MARCH THROUGH AUGUST, OR THAT AREAS PROPOSED FOR CONSTRUCTION DURING THE NESTING SEASON BE SURVEYED, AND WHEN OCCUPIED, AVOIDED UNTIL THE YOUNG HAVE FLEDGED.

WE RECOMMEND REVIEW OF BIRDS OF CONSERVATION CONCERN TO FULLY EVALUATE THE EFFECTS TO THE BIRDS AT YOUR SITE. THIS LIST IDENTIFIES BIRDS THAT ARE POTENTIALLY THREATENED BY DISTURBANCE AND CONSTRUCTION. IT CAN BE FOUND AT THE SERVICE'S [MIGRATORY BIRDS](#)

CONSERVATION LIBRARY COLLECTION ([HTTPS://FWS.GOV/LIBRARY/COLLECTIONS/MIGRATORY-BIRD-CONSERVATION-DOCUMENTS](https://fws.gov/library/collections/migratory-bird-conservation-documents)).

INFORMATION RELATED TO BEST PRACTICES AND MIGRATORY BIRDS CAN BE FOUND AT THE SERVICE'S **AVOIDING AND MINIMIZING INCIDENTAL TAKE OF MIGRATORY BIRDS LIBRARY COLLECTION ([HTTPS://FWS.GOV/LIBRARY/COLLECTIONS/AVOIDING-AND-MINIMIZING-INCIDENTAL-TAKE-MIGRATORY-BIRDS](https://fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds))**.

BALD AND GOLDEN EAGLES

THE BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*) WAS DELISTED UNDER THE ESA ON AUGUST 9, 2007. BOTH THE BALD EAGLE AND GOLDEN EAGLE (*AQUILA CHRYSAETOS*) ARE STILL PROTECTED UNDER THE MIGRATORY BIRD TREATY ACT (MBTA) AND BALD AND GOLDEN EAGLE PROTECTION ACT (BGEPA). THE BGEPA AFFORDS BOTH EAGLES PROTECTION IN ADDITION TO THAT PROVIDED BY THE MBTA, IN PARTICULAR, BY MAKING IT UNLAWFUL TO “DISTURB” EAGLES. UNDER THE BGEPA, THE SERVICE MAY ISSUE LIMITED PERMITS TO INCIDENTALLY “TAKE” EAGLES (E.G., INJURY, INTERFERING WITH NORMAL BREEDING, FEEDING, OR SHELTERING BEHAVIOR NEST ABANDONMENT). FOR INFORMATION ON BALD AND GOLDEN EAGLE MANAGEMENT GUIDELINES, WE RECOMMEND YOU REVIEW INFORMATION PROVIDED AT THE SERVICE'S **BALD AND GOLDEN EAGLE MANAGEMENT LIBRARY COLLECTION**.

NATIVE BATS

IF YOUR SPECIES LIST INCLUDES INDIANA BAT (*MYOTIS SODALIS*), NORTHERN LONG-EARED BAT (*M. SEPTENTRIONALIS*), OR TRICOLORED BAT (*PERIMYOTIS SUBFLAVUS*) AND THE PROJECT IS EXPECTED TO IMPACT FORESTED HABITAT, TREE CLEARING SHOULD OCCUR OUTSIDE OF THE PERIODS WHEN BATS MAY BE PRESENT AND MOST VULNERABLE. FEDERALLY LISTED BATS COULD BE ACTIVELY PRESENT IN FORESTED LANDSCAPES FROM SPRING THROUGH FALL OF ANY YEAR. IN MUCH OF GEORGIA, OUR WINTERS ARE MILD ENOUGH THAT TRICOLORED BATS ARE LIKELY ACTIVE ON THE LANDSCAPE TO SOME EXTENT YEAR-ROUND. PUPS ARE INCAPABLE OF FLIGHT AND VULNERABLE TO DISTURBANCE FROM THE SPRING TO SUMMER. OUR RECOMMENDED SEASONAL CLEARING RESTRICTION WINDOWS DEPEND ON SPECIES AND REGION IN GEORGIA. PLEASE REACH OUT TO US FOR GUIDANCE.

INDIANA, NORTHERN LONG-EARED, TRICOLORED, AND GRAY (*M. GRISCESENS*) BATS ARE ALL KNOWN TO UTILIZE BRIDGES AND CULVERTS IN GEORGIA. IF YOUR PROJECT INCLUDES MAINTENANCE, CONSTRUCTION, OR ANY OTHER MODIFICATION OR DEMOLITION TO TRANSPORTATION STRUCTURES, A QUALIFIED INDIVIDUAL SHOULD COMPLETE A SURVEY OF THESE STRUCTURES FOR BATS AND SUBMIT YOUR FINDINGS VIA THE

“GADNR BATS IN BRIDGES” FORM IN THE SURVEY123 APP, FREE ON APPLE AND ANDROID DEVICES. PLEASE INCLUDE THESE FINDINGS IN ANY BIOLOGICAL ASSESSMENT(S) OR OTHER DOCUMENTATION THAT IS SUBMITTED TO OUR OFFICE FOR TECHNICAL ASSISTANCE OR CONSULTATION.

ADDITIONAL INFORMATION CAN BE FOUND AT GEORGIA ECOLOGICAL SERVICES' [CONSERVATION PLANNING TOOLBOX](#) AND [BAT CONSERVATION IN GEORGIA](#) PAGES.

MONARCH BUTTERFLY

ON DECEMBER 20, 2020, THE SERVICE DETERMINED THAT LISTING THE MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*) UNDER THE ENDANGERED SPECIES ACT IS WARRANTED BUT PRECLUDED AT THIS TIME BY HIGHER PRIORITY LISTING ACTIONS. WITH THIS FINDING, THE MONARCH BUTTERFLY BECOMES A CANDIDATE FOR LISTING. THE SERVICE WILL REVIEW ITS STATUS EACH YEAR UNTIL WE ARE ABLE TO BEGIN DEVELOPING A PROPOSAL TO LIST THE MONARCH.

AS IT IS A CANDIDATE FOR LISTING, THE SERVICE WELCOMES CONSERVATION MEASURES FOR THIS SPECIES. RECOMMENDED, AND VOLUNTARY, CONSERVATION MEASURES FOR PROJECTS IN GEORGIA CAN BE FOUND AT THE [MONARCH CONSERVATION IN GEORGIA](#) PAGE.

EASTERN INDIGO SNAKE

OUR OFFICE HAS PUBLISHED GUIDANCE DOCUMENTS TO ASSIST PROJECT PROPONENTS IN AVOIDING AND MINIMIZING POTENTIAL IMPACT TO THE EASTERN INDIGO SNAKE. THE [VISUAL ENCOUNTER SURVEY PROTOCOL FOR THE EASTERN INDIGO SNAKE \(*DRYMARCHON COUPERI*\) IN GEORGIA](#) IS RECOMMENDED FOR PROJECT PROPONENTS OR THEIR DESIGNEES TO EVALUATE THE POSSIBLE PRESENCE OF THE EASTERN INDIGO SNAKE AT A PROPOSED PROJECT SITE. THE [STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE \(*DRYMARCHON COUPERI*\)](#) INCLUDE EDUCATIONAL MATERIALS AND TRAINING THAT CAN HELP PROTECT THE SPECIES BY MAKING STAFF WORKING ON A PROJECT SITE AWARE OF THEIR PRESENCE AND TRAITS. IN GEORGIA, INDIGO SNAKES ARE CLOSELY ASSOCIATED WITH THE STATE-LISTED GOPHER TORTOISE (*GOPHERUS POLYPHEMUS*), A REPTILE THAT EXCAVATES EXTENSIVE UNDERGROUND BURROWS THAT PROVIDE THE SNAKE SHELTER FROM WINTER COLD AND SUMMER DESICCATION.

SOLAR ENERGY DEVELOPMENT

THE [RECOMMENDED PRACTICES FOR THE RESPONSIBLE SITING AND DESIGN OF SOLAR DEVELOPMENT IN GEORGIA, VERSION 2.0](#) (PUBLISHED IN MAY 2024)

ARE INTENDED TO PROVIDE VOLUNTARY GUIDANCE TO SUPPORT CONSIDERATION OF NATURAL RESOURCES DURING THE DEVELOPMENT OF PHOTOVOLTAIC SOLAR IN GEORGIA. FURTHERMORE, THE [GEORGIA LOW IMPACT SOLAR SITING TOOL \(LISST\)](#) IS ALSO AVAILABLE AS A MAP LAYER IN IPAC (FIND IT IN THE "LAYERS" BOX > "ENVIRONMENTAL DATA") TO PROVIDE PROJECT MANAGERS WITH THE DATA TO IDENTIFY AREAS THAT MAY BE PREFERRED FOR LOW-IMPACT DEVELOPMENT. THE TOOL SEEKS TO SUPPORT THE ACCELERATION OF LARGE-SCALE SOLAR DEVELOPMENT IN AREAS WITH LESS IMPACT TO THE ENVIRONMENT.

STATE AGENCY COORDINATION

ADDITIONAL INFORMATION THAT ADDRESSES AT-RISK OR HIGH PRIORITY NATURAL RESOURCES CAN BE FOUND IN THE STATE WILDLIFE ACTION PLAN ([HTTPS://GEORGIAWILDLIFE.COM/WILDLIFEACTIONPLAN](https://georgiawildlife.com/wildlifeactionplan)), AT GEORGIA DEPARTMENT OF NATURAL RESOURCES, WILDLIFE RESOURCES DIVISION BIODIVERSITY PORTAL ([HTTPS://GEORGIAWILDLIFE.COM/CONSERVATION/SPECIES-OF-CONCERN](https://georgiawildlife.com/conservation/species-of-concern)), GEORGIA'S NATURAL, ARCHAEOLOGICAL, AND HISTORIC RESOURCES GIS PORTAL ([HTTPS://WWW.GNAHRGIS.ORG/GNAHRGIS/INDEX.DO](https://www.gnahrgis.org/gnahrgis/index.do)) PAGES.

THANK YOU FOR YOUR CONCERN FOR ENDANGERED AND THREATENED SPECIES. WE APPRECIATE YOUR EFFORTS TO IDENTIFY AND AVOID IMPACTS TO LISTED AND SENSITIVE SPECIES IN YOUR PROJECT AREA. FOR FURTHER CONSULTATION ON YOUR PROPOSED ACTIVITY, PLEASE EMAIL GAES_ASSISTANCE@FWS.GOV AND REFERENCE THE PROJECT COUNTY AND YOUR SERVICE PROJECT TRACKING NUMBER.

THIS LETTER CONSTITUTES GEORGIA ECOLOGICAL SERVICES' GENERAL COMMENTS UNDER THE AUTHORITY OF THE ENDANGERED SPECIES ACT.

Attachment(s):

- Official Species List
- 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:

Georgia Ecological Services Field Office

355 East Hancock Avenue

Room 320

Athens, GA 30601-2523

(706) 460-7161

PROJECT SUMMARY

Project Code: 2025-0029661
Project Name: Wing Atlanta Unmanned Aerial Package Delivery
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 or scheduled (commuter) 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).

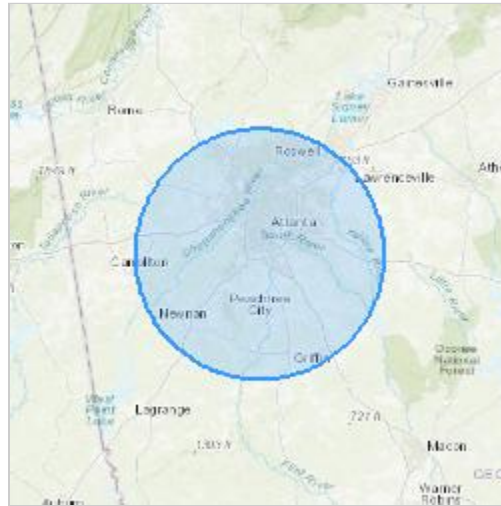
Wing is proposing to conduct UA retail package delivery operations from up to 75 sites in the Atlanta metro and surrounding areas using Wing's Hummingbird 7000W-B and 8000-A. Wing's intent is to offer service throughout the Atlanta metro and surrounding areas from a network of nests, where each would serve a specific area, thereby avoiding an over-concentration of flights surrounding any given nest. Each nest houses up to 24 aircraft and each has a delivery range of approximately 6 miles. Wing proposes a maximum of 75 nest locations within the Atlanta metro and surrounding areas. Wing's nests would be located in commercially zoned areas, such as shopping centers, large individual retailers, and shopping malls. Wing projects operating a maximum of 400 delivery flights per operating day from each nest, with operations initially occurring between 7:00 a.m. and 7:00 p.m. and then extending 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.

Nests would be distributed throughout the Atlanta metro and surrounding areas 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 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. Remote pickup infrastructure consisting of an autoloader 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 commercially zoned 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 150-200 autoloaders distributed throughout the operating area.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@33.6367019,-84.427864,14z>



Counties: Georgia

ENDANGERED SPECIES ACT SPECIES

There is a total of 23 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.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, 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
Gray Bat <i>Myotis grisescens</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Whooping Crane <i>Grus americana</i> Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non- Essential

REPTILES

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

FISHES

NAME	STATUS
Cherokee Darter <i>Etheostoma scotti</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2553	Threatened
Etowah Darter <i>Etheostoma etowahae</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4123	Endangered

CLAMS

NAME	STATUS
Finelined Pocketbook <i>Hamiota altilis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1393	Threatened

NAME	STATUS
Gulf Moccasinshell <i>Medionidus penicillatus</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7663	Endangered
Oval Pigtoe <i>Pleurobema pyriforme</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4132	Endangered
Purple Bankclimber (mussel) <i>Elliptoideus sloatianus</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7660	Threatened
Shinyrayed Pocketbook <i>Hamiota subangulata</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6517	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
American Chaffseed <i>Schwalbea americana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1286	Endangered
Georgia Rockcress <i>Arabis georgiana</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4535	Threatened
Large-flowered Skullcap <i>Scutellaria montana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4721	Threatened
Little Amphianthus <i>Amphianthus pusillus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6445	Threatened
Michaux's Sumac <i>Rhus michauxii</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5217	Endangered
Relict Trillium <i>Trillium reliquum</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8489	Endangered
Tennessee Yellow-eyed Grass <i>Xyris tennesseensis</i>	Endangered

NAME	STATUS
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6010	
White Fringeless Orchid <i>Platanthera integrilabia</i> Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1889	Threatened

FERNS AND ALLIES

NAME	STATUS
Black Spored Quillwort <i>Isoetes melanospora</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6315	Endangered
Mat-forming Quillwort <i>Isoetes tegetiformans</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/887	Endangered

CRITICAL HABITATS

There are 6 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Gulf Moccasinshell <i>Medionidus penicillatus</i> https://ecos.fws.gov/ecp/species/7663#crithab	Final
Orangenacre Mucket <i>Hamiota perovalis</i> For information on why this critical habitat appears for your project, even though Orangenacre Mucket is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/1980#crithab	Final
Oval Pigtoe <i>Pleurobema pyriforme</i> https://ecos.fws.gov/ecp/species/4132#crithab	Final
Purple Bankclimber (mussel) <i>Elliptoideus sloatianus</i> https://ecos.fws.gov/ecp/species/7660#crithab	Final
Shinyrayed Pocketbook <i>Hamiota subangulata</i> https://ecos.fws.gov/ecp/species/6517#crithab	Final
Southern Elktoe <i>Alasmidonta triangulata</i> For information on why this critical habitat appears for your project, even though Southern Elktoe is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/9871#crithab	Proposed

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, 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 <i>Haliaeetus leucocephalus</i> 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 <i>Aquila chrysaetos</i> 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 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 (■)

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
Bald Eagle <i>Haliaeetus leucocephalus</i> 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
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Cerulean Warbler <i>Setophaga cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 28 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> 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
Chuck-will's-widow <i>Antrostomus carolinensis</i> 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/9604	Breeds May 10 to Jul 10
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Golden Eagle <i>Aquila chrysaetos</i> 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 elsewhere

NAME	BREEDING SEASON
Grasshopper Sparrow <i>Ammodramus savannarum perpallidus</i> 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/8329	Breeds Jun 1 to Aug 20
Kentucky Warbler <i>Geothlypis formosa</i> 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
King Rail <i>Rallus elegans</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Prairie Warbler <i>Setophaga discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> 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 <i>Melanerpes erythrocephalus</i> 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
Rusty Blackbird <i>Euphagus carolinus</i> 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/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 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.

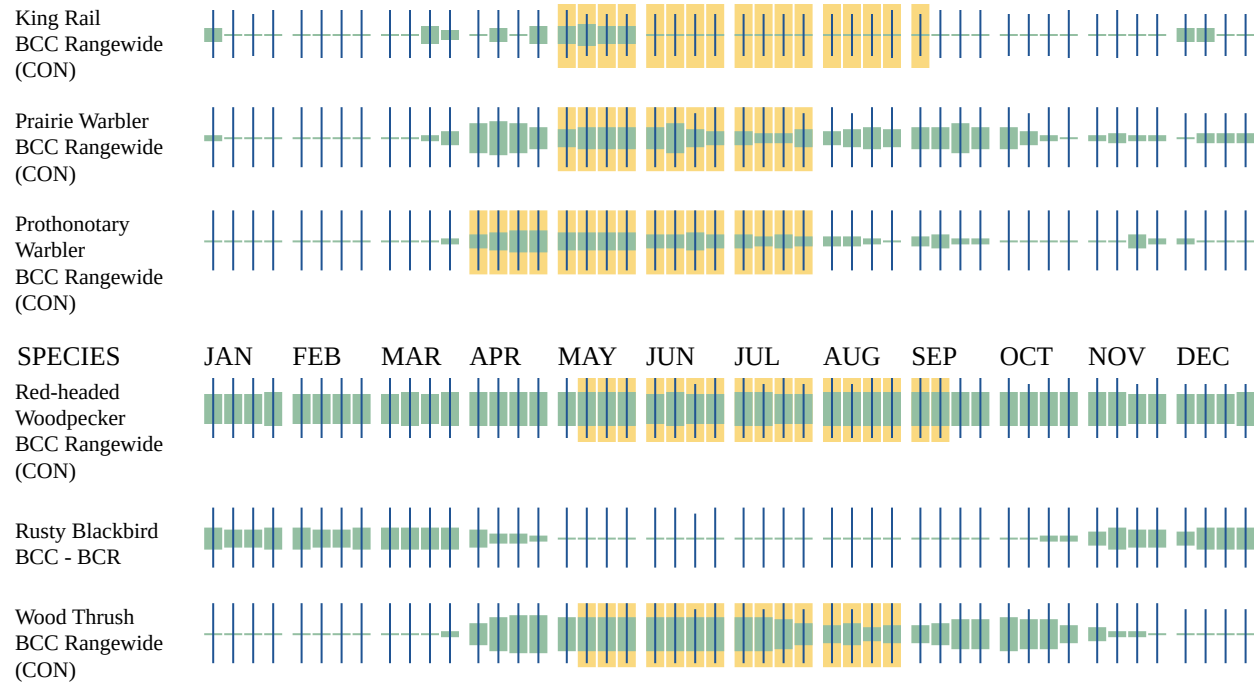
Survey Effort (|)

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.





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 POND

- PAB4H
- PAB4Gx
- PAB3Fh
- PAB3F
- PAB4Hx
- PAB4Hh
- PAB3Hh
- PAB3H

FRESHWATER EMERGENT WETLAND

- PEM1Ax
- PEM1/SS1F
- PEM1Ad
- PEM1Ah
- PEM1Ch
- PEM1A
- PEM1Cx
- PEM1Cb
- PEM1Fb
- PEM1B
- PEM1C
- PEM1Cd
- PEM1Fh
- PEM1/SS1C
- PEM1Fx
- PEM1Fd
- PEM1F

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1/EM1A
- PFO1/SS3A
- PFO1/SS3Ad
- PFO1/3A
- PFO1/SS3C

- PFO1/4C
- PFO1/3B
- PFO1/4A
- PFO1/5Fh
- PFO1/EM1F
- PFO1A
- PFO1/SS1A
- PFO1/4Ad
- PFO1/3C
- PFO1/SS1Fh
- PFO1/SS1C
- PFO1/SS3B

LAKE

- L2UBHh
- L2AB3H
- L2AB3Hh
- L1UBHh
- L2USCh
- L2UBH
- L2USAh
- L1UBHx
- L2UBGx
- L2UBFh

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
Please see Appendix D, Noise, of this EA



United States Department of the Interior

Fish and Wildlife Service Georgia Ecological Services

FWS.gov/office/Georgia-Ecological-Services/
GAES_Assistance@FWS.gov

RG Stephens, Jr. Federal Building
355 East Hancock Avenue, Room 320
Athens, Georgia 30601



August 6, 2025

Derek Hufty
Federal Aviation Administration
800 Independence Avenue SW
Washington, D.C. 20591
ATTN: Zack DeLaune

RE: Wing Aviation LLC's Unmanned Aircraft Commercial Package Delivery Operations in Atlanta, Georgia Metropolitan Area; IPaC Code 2025-0130355

Dear Zack DeLaune:

Thank you for your July 25, 2025, electronic mail regarding Wing Aviation LLC's Unmanned Aircraft Commercial Package Delivery Operations in Metropolitan Atlanta, Georgia. As the lead federal agency, the Federal Aviation Administration (FAA) provided a biological evaluation and is requesting informal consultation for the northern long-eared bat (*Myotis septentrionalis*) and gray bat (*M. grisescens*), and conference for the tricolored bat (*Perimyotis subflavus*). The U.S. Fish and Wildlife Service (Service) provides the following comments under the purview of Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

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. Wing currently operates in Metropolitan Dallas Fort Worth, Texas, and has requested FAA to amend their Operations Specifications to enable expansion to the Atlanta area with additional launch and staging sites. Wing is proposing to disperse drone nests throughout the operational area, each located in a commercial area, such as a shopping center, large retailer, shopping mall, or similar. Each drone nest would house up to two dozen aircrafts on charging pads and one or more merchants may use each drone nest for drone deliveries. The proposed operations would occur from 6:00 am to 10:00 pm each day, including weekends and holidays. The first hour of the operating window is reserved for flight capability checks, so unmanned aircrafts would only leave the drone nest from 7:00 am to 10:00 pm. Wing is not proposing to conduct operations from 10:00 pm to 6:00 am.

The proposed project does not include any ground construction or habitat modification. During nominal operations, the unmanned aircrafts would not touch the ground except at the drone nests. The action would not result in any physical disturbance to habitat. The FAA has determined the action would have no effect to alligator snapping turtle (*Macrochelys temminckii*), Cherokee darter (*Etheostoma scotti*), Etowah darter (*E. etowahae*), finelined pocketbook (*Hamiota altilis*) and its critical habitat (CH), gulf moccasinshell (*Medionidus penicillatus*) and its CH, oval pigtoe (*Pleurobema pyriforme*) and its CH, purple bankclimber (*Elliptioideus sloatianus*) and its CH, shinyrayed pocketbook (*Hamiota subangulata*) and its CH, CH for Orangeacre mucket (*Hamiota penicillatus*), proposed CH for southern elktoe

August 6, 2025
RE: 2025-0130355

(*Alasmodonta triangulate*), American chaffseed (*Schwalbea americana*), Georgia rockcress (*Arabis georgiana*), Large-flowered Skullcap (*Scutellaria montana*), Little Amphianthus (*Amphianthus pusillus*), Michaux's sumac (*Rhus michauxii*), relict trillium (*Trillium reliquum*), Tennessee yellow-eyed grass (*Xyris tennesseensis*), white fringeless orchid (*Platanthera integrilabia*), black spored quillwort (*Isoetes melanospora*), mat-forming quillwort (*Isoetes tegetiformans*). FAA has also stated that the project will not have adverse effects to monarch butterfly (*Danaus plexippus*).

Unmanned aircraft noise, light emissions, and the potential for airborne strikes pose threats to listed bat species. Flight operations would take place mostly in an urban environment, within airspace, and would typically remain well above the tree line while in route to and from a drone nest. The duration of exposure by wildlife on or near the ground to visual or noise impacts from the unmanned aircrafts would be of very short duration at approximately 30 seconds during takeoff, landing, and delivery. Suitable habitat for roosting and foraging is present within the proposed action area for tricolored bats, gray bats, and northern long-eared bats, and their presence within the action area is assumed based on known and historic locations. Bats that are roosting or foraging near the flight path of an unmanned aircraft could experience disturbance from light or noise or may be struck during foraging at night. However, bats can echolocate to avoid objects during flight, and the probability of encountering a listed bat during the short period that a drone would be in any given location is low. Based on the information provided, the Service concurs that the proposed project **“may affect, is not likely to adversely affect”** the northern long-eared bat or the gray bat. We agree that **“may affect, is not likely to adversely affect”** is an appropriate effect determinate for the tricolored bat. Concurrence with this determination may be requested at the time of a final listing determination if the Service lists the tricolored bat under the Act.

Obligations of section 7(a)(2) of the ESA have been satisfied, and formal consultation is not required. However, obligations under the ESA must be reconsidered if: (1) the project is modified in a manner not considered by this assessment; (2) a new species is listed or critical habitat is determined that may be affected by the project; or (3) new information indicates that the project may affect listed species or critical habitat in a manner not previously considered. If you have any questions or require further information, please contact staff biologist Laci Pattavina at laci_pattavina@fws.gov.

Sincerely,

PETER

MAHOLLAND

Peter Maholland
Field Supervisor

Digitally signed by PETER
MAHOLLAND
Date: 2025.08.06 11:27:11
-04'00'

NOA Distribution and Distribution List

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Washington, D.C.

Notice of Availability, Notice of Public Comment Period, and Request for Comment on the Draft Environmental Assessment for Wing Aviation, LLC, Proposed Package Delivery Operations in Atlanta, Georgia

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

Wing is seeking to amend its air carrier Operations Specifications (OpSpecs) and other FAA approvals necessary to expand commercial drone package delivery operations in the Atlanta metro area. The FAA's approval of the amended OpSpecs is considered a major federal action under NEPA and requires a NEPA review. This Draft EA is submitted for review pursuant to NEPA, FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*; Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303), Section 7 of the Endangered Species Act (16 U.S.C. § 1531 et seq.) and Section 106 of the National Historic Preservation Act (16 U.S.C. § 470). The Draft EA will be available for a 30-day public review beginning on 2 July, 2026, and ending on 1 August, 2026.

The Draft EA is available for online review at

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

Comments on the Draft EA may be submitted electronically to 9-FAA-Drone-Environmental@faa.gov. Written comments may be submitted via U.S. mail to the address below. Please ensure adequate time for receipt. All comments must be received by 5:00 p.m. Central Time on 1, August, 2026.

Federal Aviation Administration, Suite 802W
C/O AVS Environmental
1200 New Jersey Avenue, SE
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All substantive comments received will be responded to in the Final EA.

Declaration Related to Page Limits: The FAA has considered the factors mandated by NEPA, and the EA represents the FAA's good-faith effort to prioritize documentation of the most important considerations required by the statute within the congressionally mandated page limits. This prioritization reflects the FAA's expert judgment, and any considerations addressed briefly or left unaddressed, were, in the FAA's judgment, comparatively not of a substantive nature that meaningfully informed the consideration of environmental effects and the resulting decision on how to proceed.

Declaration Related to Deadline: The EA represents the FAA’s good-faith effort to fulfill NEPA’s requirements within the Congressional timeline and is substantially complete. In the FAA’s expert opinion, the FAA has thoroughly considered the factors mandated by NEPA. In the FAA’s judgment, the analysis contained herein is adequate to inform and reasonably explain the FAA’s final decision regarding the proposed federal action.

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

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

Responsible FAA Official:

_____ Date: _____

Derek Hufty
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Ternard Turner	Parks and Recreation Director	County Parks and Recreation	Fulton County	Ternard.Turner@cityofsouthfultonga.gov
General Inquires	Fulton County Sheriff's Office	County Police	Fulton County	FCSO.Communications@fultoncountyga.gov
General Inquires	Fulton County External Affairs	County Communications	Fulton County	fulton.communication@fultoncountyga.gov
David Clark	Assistant Administrator	County Planning	Fulton County	david.clark@fultoncountyga.gov
Nicole Love Hendrickson	Chairwoman	County Commissioner	Gwinnett County	Nicole.Hendrickson@GwinnettCounty.com
Chris Minor	Director	County Parks and Recreation	Gwinnett County	Chris.Minor@GwinnettCounty.com
General Inquires	Public Information Office (Media)	County Police	Gwinnett County	pdpio@gwinnettcounty.com
Joe Sorenson	Communications Director	County Communications	Gwinnett County	Joe.Sorenson@GwinnettCounty.com
Yang Chen	Planning Division Director	County Planning	Gwinnett County	Yang.Chen@GwinnettCounty.com
Carlotta Harrell	Chair	County Commissioner	Henry County	charrell@co.henry.ga.us
Jonathon Penn	Executive Director, Leisure & Public Services	County Parks and Recreation	Henry County	jpenn@henrycountyga.gov
Mike Ireland	Chief of Police	County Police	Henry County	mireland@henrycountyga.gov
Meredith Butler	Deputy Director	County Communications	Henry County	mbutler@henrycountyga.gov
Toussaint Kirk	Planning and Economic Development Director	County Planning	Henry County	tkirk@henrycountyga.gov
General Inquires	Board of Commissioners	County Commissioner	Lamar County	commissionersoffice@lamarcountyga.com
Tiffany Lowe	Director	County Parks and Recreation	Lamar County	lamarcorec@yahoo.com
General Inquires	Lamar County Sheriff's Office	County Police	Lamar County	general@lamarcountysheriff.com
Sean Townsend	County Administrator	County Communications	Lamar County	stownsend@lamarcountyga.com
Anita Buice	Director of Planning & Community Development	County Planning	Lamar County	abuice@lamarcountyga.com
Emmett Collins	Chairman - District 3 Commissioner	County Commissioner	Meriwether County	e.collins@meriwethercountyga.gov
Jumaane Brawner	Director	County Parks and Recreation	Meriwether County	mmcrd@meriwethercountyga.gov

Name	Title	Department	Location	Email
Brin Jones	E911 Director	County Police	Meriwether County	b.jones@meriwethercount yga.gov
John Gorton	County Administrator	County Communications	Meriwether County	j.gorton@meriwethercoun tyga.gov
Cassandra Jones	Director	County Planning	Meriwether County	c.jones@meriwethercount yga.gov
LaTonja Threats-Hamp	Executive Administrative Assistant, Chairman	County Commissioner	Newton County	lhamp@co.newton.ga.us
Matt Taylor	Recreation Administrator	County Parks and Recreation	Newton County	mtaylor@co.newton.ga.us
Stacey Malcom	Administrator	Civil Division & Administration	Newton County	smalcom@newtonsheriffg a.org
Bryan Fazio	Public Information Officer	County Communications	Newton County	bfazio@co.newton.ga.us
General Inquires	Newton County Planning & Zoning Department	County Planning	Newton County	pnz@co.newton.ga.us
Tim Estes	Commission Chairman	County Commissioner	Paulding County	commissioners@paulding. gov
Michael Justus	Director	County Parks and Recreation	Paulding County	Michael.Justus@paulding.g ov
Sheriff Ashley	Sheriff	County Police	Paulding County	ahenson@paulding.gov
John Grant	Communications Director	County Communications	Paulding County	John.Grant@paulding.gov
Christopher G. Robinson	Planning and Zoning Division Manager	County Planning	Paulding County	crobinson@paulding.gov
Briar Johnson	Chairman	County Commissioner	Pike County	bjohnson@pikecoga.com
Heather Miller	Director	County Parks and Recreation	Pike County	hmiller@pikecoga.com
Jimmy Thomas	Sheriff	County Police	Pike County	sheriff_pikeco@bellsouth. net
Rob Morton	Interim County Manager	County Communications	Pike County	countymanager@pikecoga. gov
Jeremy Gilbert	Director	County Planning	Pike County	jgilbert@pikecoga.gov
JaNice Van Ness	Chair & CEO	County Commissioner	Rockdale County	JaNice.VanNess@Rockdale CountyGA.gov
Christine Carney	Director, Parks & Recreation	County Parks and Recreation	Rockdale County	Christine.Carney@Rockdal eCountyGA.gov
Eric Levett	Sheriff	County Police	Rockdale County	eric.levett@rockdalecount yga.gov
General Inquires	Public Relations	County Communications	Rockdale County	Publicrelations@rockdalec ountyga.gov

Name	Title	Department	Location	Email
Brandon White	Director of Planning & Development	County Planning	Rockdale County	Brandon.White@rockdalecountyga.gov
Ryan Bowlden	District 1 Commissioner	County Commissioner	Spalding County	rbowlden@spaldingcounty.com
T.J. Imberger	Parks & Public Grounds Director	County Parks and Recreation	Spalding County	timberger@spaldingcounty.com
General Inquires	Sheriff's Office	County Police	Spalding County	spaldingsheriff@spaldingcounty.com
Steve Ledbetter	Spalding County Manager	County Communications	Spalding County	sledbetter@spaldingcounty.com
David Allen	Community Development Director	County Planning	Spalding County	buildingofficial@spaldingcounty.com
Thompson, David	Chairman	County Commissioner	Walton County	davidg.thompson@co.walton.ga.us
Jody Johnson	Director	County Parks and Recreation	Walton County	jejohnson@co.walton.ga.us
General Inquires	General Inquires	County Police	Walton County	info@co.walton.ga.us
John A. Ward	County Manager	County Communications	Walton County	john.ward@co.walton.ga.us
Kristi Parr	Director	County Planning	Walton County	kparr@co.walton.ga.us

Appendix J

Proposed Nest Sites

Street and Number	City	Zip code
12182 Hwy 92, Woodstock	Woodstock	30188
5401 Fairington Rd	Lithonia	30038
970 Mansell Rd	Roswell	30076
3100 Johnson Ferry Rd	Marietta	30062
2635 Pleasant Hill Rd	Duluth	30096
1436 Dogwood Dr SE	Conyers	30013
4375 Lawrenceville Hwy	Tucker	30084
5200 Windward Pkwy	Alpharetta	30004
5935 Memorial Dr	Stone Mountain	30083
2427 Gresham Rd S E	Atlanta	30316
3580 Memorial Dr	Decatur	30032
8424 Mall Parkway	Lithonia	30038
4221 Atlanta Hwy	Loganville	30052
6435 Bells Ferry Rd	Woodstock	30189
1025 GA-34	Newnan	30265
4166 Jimmy Lee Smith Pkwy	Hiram	30141
5600 N Henry Blvd	Stockbridge	30281
4004 Lawrenceville Hwy	Lilburn	30047
1550 Scenic Hwy N	Snellville	30078
135 Willow Ln	McDonough	30253
3435 Centerville Hwy	Snellville	30039
1400 Hudson Bridge Rd	Stockbridge	30281
3615 Marietta Hwy	Dallas	30157
2940 Anvilblock Rd	Ellenwood	30294
6520 Earnest	Marietta	30066
3826 Cobb Pkwy NW	Acworth	30101
4200 Salem Rd	Covington	30016
11465 Tara Blvd	Hampton	30228
1000 Tanger Dr	Locust Grove	30248
2059 Scenic Hwy N	Snellville	30078
4501 North Point Parkway	Alpharetta	30022
7330 North Point Parkway	Alpharetta	30009
11770 Haynes Bridge	Alpharetta	30009
2460 Park Center Blvd	Decatur	30035
610 Holcomb Bridge	Roswell	30076
1250 Scenic Hwy S	Lawrenceville	30045
230 Scientific Dr	Peachtree Corners	30092

Street and Number	City	Zip code
5360 Snapfinger Woods Dr	Decatur	30035
4861 Memorial Dr	Stone Mountain	30083
10955 Jones Bridge Rd	Alpharetta	30022
4140 Lawrenceville Hwy	Lilburn	30047
981 N Burnt Hickory Rd	Douglasville	30134
1630-1380 Dogwood Dr SE	Conyers	30013