Environmental Assessment

UPS Flight Forward, Inc.
Drone Flight Training Operations at
"The Farm" in Fisherville, KY

August 2022

United States Department of Transportation
Federal Aviation Administration

Washington, D.C.

FAA MISSION STATEMENT

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Cover Image: UPS Flight Forward, Inc.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Finding of No Significant Impact/Record of Decision for Final Environmental Assessment for UPS Flight Forward, Inc. Drone Flight Training Operations at "The Farm" in Fisherville, Kentucky

Introduction

The Federal Aviation Administration (FAA) prepared the attached Environmental Assessment (EA) to analyze the potential environmental impacts that may result from FAA's approval of the Part 135 air carrier Operations Specifications (OpSpecs) amendments requested by UPS Flight Forward, Inc. (UPSFF) to maintain training operations at "the Farm" site in Fisherville, KY, under real-world Part 91 operating conditions (described in more detail in the Proposed Action section below). The requested approval would, among other things, add descriptive language to UPSFF's OpSpecs about the operating area boundaries. This approval would enable UPSFF to begin unmanned aircraft (UA)[1] commercial training operations at the Farm property (operating boundaries are depicted in Figure 1 of the EA). The approval of UPSFF's OpSpec amendments to include this new operating area is considered a major federal action subject to National Environmental Policy Act (NEPA) review requirements.

The FAA prepared the EA in accordance with the National Environmental Policy Act of 1969, as amended (42 United States Code [U.S.C.] § 4321 et seq.); Council on Environmental Quality's (CEQ) NEPA implementing regulations (40 Code of Federal Regulations [CFR] parts 1500 to 1508); FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*; and FAA Order 1050.1F Desk Reference.

After completing the EA and reviewing and analyzing available data and information on existing conditions and potential impacts, the FAA has determined the proposed action will not significantly affect the quality of the human environment. Therefore, the preparation of an Environmental Impact Statement is not required, and the FAA is issuing this Finding of No Significant Impact (FONSI) and Record of Decision (ROD). The FAA has made this determination in accordance with applicable

[1] Drone and UA may be used interchangeably.

environmental laws and regulations. The EA is incorporated by reference into and supports this FONSI/ROD.

Purpose and Need

The FAA has multiple approvals associated with UPSFF's commercial flight training operations at the Farm. However, the FAA amendment of UPSFF's OpSpecs to add a new area of operations (as depicted in Figure 1 of the EA) is the approval that will ultimately enable UA commercial delivery operations in this area. UPSFF's request for OpSpec amendments to add a new area of operations requires FAA review and approval.[2] The FAA has a statutory obligation to review UPSFF's request to approve the OpSpecs and determine whether the issuance would affect safety in air transportation or air commerce and whether the public interest requires the amendment. After making this determination, the FAA must take an action on the OpSpecs amendment.

The purpose of UPSFF's request is to supplement its current training operations at the Farm by allowing real-world flight conditions under Part 91 at the Farm. UPSFF has determined that it needs to expand the types of training it conduct at the Farm in order to safely expand its commercial package delivery operations in the future. UPSFF's requested amendment is needed so UPSFF can begin UA commercial training operations at the Farm.

See Section 1.3 of the EA for further information.

Proposed Action

In order for UPSFF to be issued the amended OpSpecs under its Part 135 air carrier certificate, it must receive a number of approvals from the FAA, such as a waiver of 14 CFR 91.113(b) to enable beyond visual line of sight (BVLOS) operations and a Certificate of Waiver or Authorization (COA). UPSFF has requested that the FAA amend the OpSpecs in its Part 135 air carrier certificate; this is the FAA approval that ultimately would enable Part 91 operations at the Farm. The proposed action is the FAA approval of an amendment to UPSFF's B050 OpSpec, *Authorized Areas of En Route Operations, Limitations, and Provisions*, specifically a reference section titled Limitation, Provisions, and Special Requirements. The approval would include a paragraph with descriptive language about the operating area boundaries (depicted in Figure 1 of the attached EA), including the specific location and operational profile proposed in UPSFF's request. The operating area is also the study area for the EA.

[2] UPSFF's Part 135 air carrier certificate was issued in September 2019.

UPSFF projects operating a maximum of approximately 32 flights per operating day at the Farm for Part 91 UA training operations that may include checking, proving, testing, operational developments, assessments, and validations using its 29-pound Matternet M2 UA. The operating area is 5.42 acres located on property leased by UPSFF. The property is zoned for manufacturing and industrial use. The property is located in a rural area surrounded by farmlands and residences, with more dense residential neighborhoods approximately 1,320 feet to the north and approximately 750 feet to the west. The closest highway is U.S. Route 60 approximately 0.25 miles to the north and Interstate 64 is approximately 0.8 miles to the west.

The proposed operations would occur mostly during daylight hours from 8:00 AM-10:00 PM, with a maximum of typically three flights per hour between sunset and the end of civil twilight, up to seven days per week with no flights on holidays.

The OpSpec amendment will restrict UPSFF to the operating area identified in Figure 1 of the EA. Any future expansion beyond the authorization and limitations for the area of operations described in the B050 OpSpec, or beyond the current 1:1 pilot to aircraft ratio described in UPSFF's A003 OpSpec, *Airplane/Aircraft Authorization*, will require additional OpSpec amendments from the FAA and will receive appropriate NEPA review at that time.

See Section 2.1 of the EA for further information.

Alternatives

Alternatives analyzed in detail in the EA include the proposed action and the no action alternative. Under the no action alternative, the FAA would not issue the approvals necessary, including the amendment to the OpSpecs, to enable UPSFF to conduct UA Part 91 training operations in the operating area. Under the no action alternative, UPSFF could continue to conduct training flights at the Farm under existing operating authorities. This alternative does not support the stated purpose and need.

See Section 2.2 of the EA for further information.

Environmental Impacts

The potential environmental impacts from the proposed action and no action alternative were evaluated in the attached EA for each of the environmental impact categories identified in FAA Order 1050.1.F. Section 3 of the attached EA describes the physical, natural, and human environment within the project study area, and identifies those environmental impact categories that are not analyzed in

detail, explaining why the proposed action would have no potential effects on those environmental impact categories. Those categories are Air Quality; Climate; Coastal Resources; Department of Transportation Act, Section 4(f); Farmlands; Hazardous Materials, Solid Waste, and Pollution Prevention; Historical, Architectural, Archaeological, and Cultural Resources; Land Use; Natural Resources and Energy Supply; Socioeconomic Impacts and Children's Environmental Health and Safety Risks; Visual Effects (Light Emissions Only); Water Resources (Wetlands, Floodplains, Groundwater, and Wild and Scenic Rivers).

Section 3 also provides detailed evaluations of the potential environmental consequences for each of the remaining environmental impact categories and documents the finding that no significant environmental impacts would result from the proposed action. A summary of the documented findings for each category, including requisite findings with respect to relevant special purpose laws, regulations, and executive orders, is presented below:

- **Biological Resources (including Fish, Wildlife, and Plants), EA Section 3.2.** 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. The Endangered Species Act (ESA) of 1973 requires the evaluation of all federal actions to determine whether a proposed action is likely to jeopardize any proposed, threatened, or endangered species or proposed or designated critical habitat. Federal agencies are responsible for determining if an action "may affect" listed species or critical habitat, which determines whether formal or informal consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) is needed. If the FAA determines that the action will have no effect on listed species, consultation is not required. If the FAA determines that the action may affect listed species, consultation with the USFWS must be initiated.

  The Migratory Bird Treaty Act of 1918 protects migratory birds, including their nests, eggs, and parts, from possession, sale, purchase, barter, transport, import, export, and take. The USFWS is the federal agency responsible for the management of migratory birds as they spend time in habitats of the U.S. The Bald and Golden Eagle Protection Act of 1940 prohibits anyone from "taking" a bald or golden eagle, including their parts, nests, or eggs, without a permit issued by the USFWS. The USFWS 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.

Additionally, the Kentucky Department of Fish and Wildlife Resources lists species as endangered, threatened, or of special concern within the State of Kentucky.

The proposed action will not involve ground construction or habitat modification, as the landing and take off location is in a location that is already developed and where flights already occur. The operations will be taking place within airspace, and typically well above the tree line and away from sensitive habitats. The typical number of daily operations and altitude of the flights (generally between 250 to 400 feet above ground level) are not expected to significantly affect wildlife in the area.

Bird species are expected to be most sensitive to disturbance from drones during the breeding season when they are protecting young in nests. The EA identifies several special status bird species that could breed in the study area, including the Bald Eagle (see the U.S. Fish and Wildlife Service Information for Planning and Consultation report, or IPaC report, in Appendix A of the EA). UPSFF has agreed to a monitoring plan for Bald Eagle nests that integrates multiple strategies and resources. If UPSFF identifies a Bald Eagle nest or is notified of the presence of a nest, UPSFF will establish an avoidance area such that there is a 1,000 feet vertical and horizontal separation distance between a vehicle’s flight path and the nest. This avoidance area will be maintained until the end of the breeding season or until a qualified biologist indicates the nest has been vacated.

The Northern Long-eared Bat, a threatened bat species, the Gray Bat, an endangered species, and the Indiana Bat, an endangered species, are mammals that have the potential to occur within the operating area. While these bat species may occur within the operating area, they are unlikely to encounter the aircraft as UPSFF’s proposed operations include up to three flights per hour between sunset and the end of civil twilight. In the event that flights do overlap with evening bat emergence or foraging activities, bats may exhibit disturbance behaviors and change their flight paths to avoid drones. However, research suggests that drones have “minimal impact on bat behavior” and do not appear to be disturbed by drones. UPSFF has

indicated that the likelihood of operations after sunset is very low. Should a bat encounter occur, UPSFF operators would follow their standard procedures for avoiding an air hazard. This could involve holding, reversing course, or choosing to make an expedited landing to avoid the air hazard. In addition, the operating area is small (approximately 5.42 acres, which is less than 0.008 square miles), so the limited flights that could occur after sunset will be limited to a very small area, reducing the likelihood of interactons with bats and increasing their ability to avoid the area. Because of the small geographic scope of this action, and the short duration and limited number of flights after sunset that UPSFF is planning under the proposed action, the FAA has made a finding of no effect for listed bat species under the Endangered Species Act. The FAA has also determined that the proposed action will cause no significant impacts to state-listed bat species.

The proposed action will not involve ground construction or habitat modification and no impacts to fish, reptiles, or terrestrial mammal species are expected. The proposed action would not result in: extirpation of a species from the project area; adverse impacts to special status species or their habitats; substantial impacts to native species' habitats or their populations; or adverse impacts on any species' reproductive success rates, natural mortality rates, non-natural mortality, or ability to sustain the minimum population levels required. The FAA's analysis finds that the proposed action is not expected to cause any significant impacts to biological resources.

- **Noise and Noise-Compatible Land Use, EA Section 3.5 and Appendix C.** The FAA has issued requirements for assessing aircraft noise in FAA Order 1050.1F, Appendix B. The FAA's required noise metric for aviation noise analysis is the yearly Day-Night Average Sound Level (DNL) metric. A significant noise impact is defined in Order 1050.1F as an increase in noise of DNL 1.5 decibel (dB) or more at or above DNL 65 dB DNL noise exposure or a noise exposure at or above the 65 dB level due to a DNL 1.5 dB or greater increase. The compatibility of existing and planned land uses with an aviation proposal is usually associated with noise impacts.
  The proposed action is not anticipated to result in any significant changes in the overall noise environment within the affected area. There is no construction and therefore no construction noise that will result from the proposed action. There are no airstrips and small airports in the study area.

The maximum noise exposure levels within the study area will occur over the Farm property. The estimated noise exposure both on the property and at adjacent properties would not exceed DNL 45 dB at any location.

Based on FAA's noise analysis, the proposed action will not have a significant noise impact.

- **Environmental Justice, EA Section 3.6.** Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, Section 1-101 requires all federal agencies to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

  The low-income population in the study area at the census block group level was compared to the reference community, which is the percentage of low-income individuals residing within Jefferson County. Based on census block data, obtained through the FAA's Aviation Environmental Design Tool (AEDT), the percentage of low-income individuals residing within the study area at the census block group level is approximately zero percent as compared to 14.65 percent in the reference community. The FAA's AEDT analysis data is included in Appendix F of the EA.

  The minority population in the study area at the census block group level was compared to the reference community, which is the percentage of minority individuals residing within Jefferson County. The percentage of minorities residing within the study area at the census block group level, approximately 23.3 percent, is less than the percentages for the reference community, approximately 33.87 percent. Based on the analysis, the FAA determined that there was not a meaningfully greater percentage of minorities residing within the study area census block group.

  The proposed action will not result in adverse impacts in any environmental resource category. In particular, as noted in Section 3.5, *Noise and Noise-Compatible Land Use*, the UA's noise emissions could be perceptible in areas within the operating area, but will stay well below the level determined to constitute a significant impact. For these reasons, the proposed action would not result in a disproportionately high or adverse effect on a low-income or a minority population, nor would the action result in a significant environmental justice impact.

- **Visual Effects (Visual Resources and Visual Character), EA Section 3.7.** Visual resources and visual character impacts deal with the extent to which the proposed action would result in visual impacts to resources in the operating area. Visual impacts can be difficult to define and evaluate because the analysis is generally subjective, but are normally related to the extent that the proposed action would contrast with, or detract from, the visual resources and/or the visual character of the existing environment. Impacts to visual resources are not expected to be significant. The proposed action makes no changes to any landforms, or land uses, thus there would be no effect to the visual character of the area. The proposed action involves airspace operations. The short duration that each UA flight could be seen from any particular resource in the operating area combined with the low number of proposed flights per day minimizes any potential for significant impacts. Accordingly, any potential impacts of the proposed action on visual resources and visual character will not be significant.

- **Water Resources (Surface Waters), EA Section 3.8.** Surface water resources generally consist of oceans, wetlands, lakes, rivers, and streams. The Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) program, which regulates the discharge of point sources of water pollution into waters of the United States and requires a permit under Section 402 of the CWA. Waters of the United States are defined by the CWA and are protected by various regulations and permitting programs administered by the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers.

  The FAA identified no surface waters occur within the operating area. The proposed action would not be expected to result in significant impacts to surface water resources. There are no construction activities occurring under the proposed action that could impact surface waters. The potential likely source of surface water contamination on the UA, the aircraft's Lithium-ion battery packs, are not expected to detach from the aircraft. Further, the UA is not expected to become lost in the event of a water landing as UPSFF is required to locate and secure any downed aircraft. For these reasons, the proposed action would not have the potential to exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or contaminate public drinking water supply such that public health may be adversely affected.

Finding

The FAA finding is based on a comparative examination of environmental impacts for each of the alternatives studied during the environmental review process. The EA discloses the potential environmental impacts for each of the alternatives and provides a full and fair discussion of those impacts. Based on FAA's review and analysis and consideration of comments, it has determined that there would be no significant impacts to the natural environment or surrounding population as a result of the proposed action.

The FAA believes the proposed action best fulfills the purpose and need identified in the EA. In contrast, the no action alternative fails to meet the purpose and need identified in the EA. An FAA decision to take the required actions and approvals is consistent with its statutory mission and policies supported by the findings and conclusions reflected in the environmental documentation and this FONSI.

After careful and thorough consideration of the facts contained herein and following consideration of the environmental impacts described, the undersigned finds that the proposed federal action is consistent with existing national environmental policies and objectives as set forth in section 101(a) of the National Environmental Policy Act of 1969 and other applicable environmental requirements and will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102(2)(C) of NEPA.

Decision and Order

The FAA recognizes its responsibilities under NEPA, CEQ regulations, and its own directives. Recognizing these responsibilities, I have carefully considered the FAA's goals and objectives in reviewing the environmental aspects of the proposed action to approve UPSFF's request to begin its UA commercial flight training operations at the Farm. Based upon the above analysis, the FAA has determined that the proposed action meets the purpose and need.

The environmental review included the purpose and need to be served by the proposed action, alternatives to achieving them, the environmental impacts of these alternatives, and conditions to preserve and enhance the human environment. This decision is based on a comparative examination of the environmental impacts for each of these alternatives. The attached EA provides a fair and full discussion of the impacts of the proposed action. The NEPA process included appropriate consideration

for avoidance and minimization of impacts, as required by NEPA, the CEQ regulations, and other special purpose environmental laws, and appropriate FAA environmental orders and guidance.

The FAA has determined that environmental concerns presented by interested agencies and the general public have been addressed in the EA. The FAA believes that, with respect to the proposed action, the NEPA requirements have been met. FAA approval of this environmental review document indicates that applicable federal requirements for environmental review of the proposed action have been met.

Having carefully considered and being properly advised as to the anticipated environmental impacts of the proposal as described in the EA and the FONSI, under the authority delegated by the Administrator of the FAA, I find the OpSpec amendment to be consistent with existing national environmental policies and objectives as set forth in Section 101 of NEPA and other applicable environmental requirements, and will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102(2)(C) of NEPA. I further find that the action is the type of action that does not require an Environmental Impact Statement under NEPA.

Issued on: August 11, 2022

DAVID M MENZIMER

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Date: 2022.08.11 12:15:29 -07'00'

David Menzimer
Aviation Safety
Manager, General Aviation Operations Branch
General Aviation and Commercial Division
Office of Safety Standards, Flight Standards Service

Right of Appeal

This FONSI/ROD constitutes a final agency action and a final order taken pursuant to 49 U.S.C. §§ 40101 et seq., and constitutes a final order of the FAA Administrator which is subject to exclusive judicial review by the Courts of Appeals of the United States in accordance with the provisions of 49 U.S.C. § 46110. Any party having substantial interest in this order may apply for a review of the decision by filing a petition for review in the appropriate U.S. Court of Appeals no later than 60 days after the order is issued in accordance with the provisions of 49 U.S.C. § 46110.

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1.0 PURPOSE AND NEED

1.1 Introduction

UPS Flight Forward, Inc. (UPSFF) is seeking to amend its air carrier Operations Specifications (OpSpecs) and other Federal Aviation Administration (FAA) approvals necessary to expand unmanned aircraft (UA) flight operations on Fisherville Farm (the Farm) located at 311 Clark Station Road, Fisherville KY. The Farm operating area is 5.42 acres located on property leased by UPSFF. UPSFF currently conducts a maximum of 32 flights per day for UA Part 107 training operations at the Farm. The proposed action would maintain current operations at a maximum of 32 flights per day for UPSFF to conduct Part 91 UA training operations that may include checking, proving, testing, operational developments, assessments, and validations using its 29-pound Matternet M2 UA. Based on the scope of the proposed action, as discussed in Section 2.1., UPSFF projects operating a maximum of 32 flights per operating day at the Farm, combining both the Part 107 training operations and the Part 91 training operations. The proposed operations would occur mostly during daylight hours from 8:00 AM-10:00 PM, with a maximum of typically three flights per hour between sunset and the end of civil twilight, up to seven days per week with no flights on holidays. The approval of UPSFF's OpSpec amendment to cover this operating area is considered a major federal action subject to environmental review requirements.

This Environmental Assessment (EA) is being prepared by the FAA to evaluate the potential environmental impacts that may result from FAA's approval of the proposed action, which would enable Part 91 UA operations at the Farm within a 5.42 acre airspace box located in Fisherville, KY, as depicted in Figure 1 below (the operating area). The FAA has prepared this EA pursuant to the National Environmental Policy Act of 1969 (NEPA) [42 United States Code (U.S.C.) § 4321 et seq.] and its implementing regulations (40 Code of Federal Regulations (CFR) §§1500-1508)). NEPA requires federal agencies to consider the environmental effects of proposed federal actions and to disclose to decision-makers and the interested public a clear and accurate description of the potential environmental impacts of proposed major federal actions. Under NEPA, federal agencies are required to consider the environmental effects of a proposed action, the reasonable alternatives to the proposed action, and a no action alternative (assessing the potential environmental effects of not implementing the proposed action). The FAA has established a process to ensure compliance with the provisions of NEPA through FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and the FAA Order 1050.1F Desk Reference.

1.2 Background and Location

In 2012, Congress first charged the FAA with integrating unmanned aircraft systems (UAS) into the National Airspace System (NAS).[3] The FAA has engaged in a phased, incremental approach to integrating UAS into the NAS and continues to work toward full integration of UAS into the NAS. Part of that approach involves providing safety review and oversight of proposed operations to begin commercial UA delivery in the NAS.

Over the past several years UPSFF has been working under FAA programs, including the UAS Integration Pilot Program (IPP),[4] the Partnership for Safety Plan (PSP) Program,[5] and the BEYOND program,[6] as well

[3] 49 U.S.C. 44802; FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, Sec. 332. 126 Stat. 11, 73 (2012).
[4] The UAS IPP was announced on October 25, 2017 via a Presidential Memorandum, which has the force and effect of law on executive agencies. https://www.faa.gov/uas/programs_partnerships/completed/integration_pilot_program/
[5] https://www.faa.gov/uas/programs_partnerships/psp/
[6] https://www.faa.gov/uas/programs_partnerships/beyond/

as the FAA's established processes to bring certificated commercial UA delivery into practice. Participants in these programs are among the first to prove their concepts, including package delivery by UA, through the use of current regulations and exemptions and waivers from some of these regulatory requirements.

UPSFF obtained a Part 135 certificate from the FAA on September 26, 2019, which allows it to carry the property of another for compensation or hire beyond visual line of sight. UPSFF has a standard Part 135 air carrier certificate and the certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in its OpSpecs. UPSFF's current request for OpSpecs to modify an area of operations, in conjunction with other related FAA approvals, such as a waiver of 14 CFR 91.113(b) to enable beyond visual line of site (BVLOS) operations and a Certificate of Waiver or Authorization (COA), would enable Part 91 training operations in the operating area.

The location is shown in Figure 1 below, with the operating area outlined in red. The operating area should also be considered as the study area for the purposes of this EA.

[7]

Figure 1 Study Area in Fisherville, KY

1.2.1 Operating Area Location

The Farm

The Farm operating area is located on 5.42 acres of private property leased by UPSFF Headquarters approximately 18 miles from downtown Louisville. The property is zoned for manufacturing and industrial use.[8] The property is located in a rural area surrounded by farmlands and residences, with more dense residential neighborhoods approximately 1,320 feet to the north and approximately 750

[7] Image: Google Earth, as modified by the FAA
[8] Available: https://www.lojic.org/zoning. Accessed on June 8, 2022.

feet to the west. The closest highway is U.S. Route 60 approximately 0.25 miles to the north and Interstate 64 is approximately 0.8 miles to the west.

1.3 Purpose and Need

As described in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, the Purpose and Need section of an EA briefly describes the underlying purpose and need for the proposed federal action. It presents the problem being addressed and describes what the FAA is trying to achieve with the proposed action.

1.3.1 FAA Purpose and Need

The FAA has multiple approvals, such as a waiver of 14 CFR 91.113(b) to enable BVLOS operations and a COA associated with the operations at the Farm; however, the FAA issuance of the amended OpSpecs is the approval that will ultimately enable UA commercial delivery training operations in the area. UPSFF's request for an OpSpec amendment requires FAA review and approval.

The FAA has a statutory obligation to review UPSFF's request to issue the OpSpecs and determine whether the amendment would affect safety in air transportation or air commerce and the public interest requires the amendment. In general, Congress has charged FAA to encourage the development of civil aeronautics and the safety of air commerce in the United States. 49 U.S.C. §40104.

In addition, the FAA has specific statutory and regulatory obligations related to its issuance of a Part 135 certificate and the related OpSpecs. 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." 49 U.S.C. §44705. 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." *Id*. 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 OpSpecs. 14 CFR §119.5 (g), (l). The regulations also specify that a Part 135 certificate holder may not operate in a geographical area unless its OpSpecs specifically authorize the certificate holder to operate in that area. 14 CFR 119.5(j). The regulations implementing Section 44705 specify that an air carrier's approved OpSpecs must include, among other things, "authorization and limitations for routes and areas of operations." 14 CFR §119.49(a)(6). 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 CFR §119.51(a); see also 49 U.S.C. §44709. After making this determination, the FAA must take an action on the OpSpec amendment.

1.3.2 UPSFF's Purpose and Need

The purpose of UPSFF's request is to expand the type of UA operations conducted at the Farm, which, in its business judgment, UPSFF has determined is an appropriate area to conduct its training operations. UPSFF's requested OpSpecs are needed so that UPSFF can begin expanded UA operations in the proposed operating area. The approval will offer UPSFF an opportunity to assess the viability of UA commercial delivery under training conditions in order to demonstrate that it can conduct operations safely and meet its compliance obligations.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

In order for UPSFF to conduct Part 91 UA training operations, it must receive a number of approvals from FAA, such as a waiver of 14 CFR 91.113(b) to enable BVLOS operations and a COA. Further, UPSFF has requested the FAA to approve its OpSpecs so that they can begin training operations in conjuction with their Part 135 air carrier certificate. The OpSpec approval is the FAA action that ultimately would enable Part 91 training operations in the operating area, located in Fisherville, KY.

The B050 OpSpec, *Authorized Areas of En Route Operations, Limitations, and Provisions*, includes a reference section titled Limitations, Provisions, and Special Requirements. The amendment to this reference section – to add a new paragraph with descriptive language about the operating area boundaries, including the specific location and operational profile proposed in UPSFF's request – is the proposed federal action for this EA. The OpSpecs will restrict UPSFF to this particular location; any future expansion beyond the authorization and limitations for the area of operations described in the B050 OpSpec, or beyond the current 1:1 pilot to aircraft ratio described in UPSFF's A003 OpSpec, *Airplane/Aircraft Authorization*, will require additional OpSpec amendments from the FAA and will receive appropriate NEPA review at that time.

UPSFF anticipates that training demand could increase the number of flights per day; however, additional regulatory approvals and environmental review would be needed before a substantial expansion in training operations could occur at the Farm. The operations under the proposed action would occur mostly during daylight hours up to seven days per week, with no flights on holidays. The UA is capable of nighttime operations, and some flights may occur after sunset but before the end of evening civil twilight[9] (typically a maximum of three per hour). However, while UPSFF is authorized to conduct flights after civil twilight, they currently have no need to conduct training flights during the nighttime. Additionally, no flights after 10 PM will occur under the proposed action.

The UA has a maximum takeoff weight of 29 pounds, including a payload of 4.4 pounds. It is a quadcopter that uses electric power from rechargeable lithium ion batteries. The aircraft includes a parachute safety system that can be deployed in cases of emergency.

After launch, UPSFF's UA will typically rise to a cruising altitude of 250 feet above ground level (AGL) and follow a preplanned route to its landing area. The aircraft may fly up to 400 feet AGL when needed. The pre-planned route at the Farm is optimized to avoid terrain and object obstructions. UPSFF has identified no avoidance areas or obstructions in the operating area. Aircraft will typically stay at its approximate cruising altitude of 250 AGL except when descending to land.

2.2 No Action Alternative

The alternative to the proposed action is the no action alternative, in which the FAA would not issue the approvals necessary, including the amendment to the OpSpecs, to enable UPSFF to conduct UA Part 91 training operations in the operating area. Under the no action alternative, UPSFF could continue to conduct training flights at the Farm under existing operating authorities. This alternative does not

[9] Evening civil twilight begins at sunset and ends when the geometric center of the sun reaches 6° below the horizon. See Chapter 10 of Airplane Flying Handbook (FAA-H-8083-3B), available at: https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/media/12_afh_ch10.pdf. Accessed August 9, 2022.

support the stated purpose and need. However, it was retained as required by the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14(c)).

3.0 AFFECTED ENVIRONMENT and ENVIRONMENTAL CONSEQUENCES

This section provides a description of the environmental resources that would be affected by the proposed action, as required by the CEQ regulations and FAA Order 1050.1F. The level of detail provided in this section is commensurate with the importance of the impact on these resources (40 CFR § 1502.15). The general study area for each resource is the entire area within the yellow-lined boundary of Figure 2 in this report. As required by FAA Order 1050.1F, this EA presents an evaluation of impacts for the environmental impact categories listed below.

- Air Quality
- Biological Resources (including Fish, Wildlife, and Plants)
- Climate
- Coastal Resources
- Department of Transportation Act, Section 4(f) Resources
- Farmlands
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Historical, Architectural, Archaeological, and Cultural Resources
- Land Use
- Natural Resources and Energy Supply
- Noise and Compatible Land Use
- Socioeconomic, Environmental Justice, and Children's Environmental Health and Safety Risks
- Visual Effects (Light Emissions)
- Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)

For each of the resources covered in this section, the following information is provided:

- Regulatory Setting
- Affected Environment
- Environmental Consequences

3.1 Resources Not Analyzed in Detail

This EA does not analyze potential impacts on the following environmental impact categories in detail, for the reasons explained below:

- **Air Quality and Climate** – The UA is battery-powered and will not generate emissions that could result in air quality impacts or climate impacts. Electricity consumed for battery charging will be minimal, especially for the limited scope of these operations.

- **Coastal Resources** –The proposed action would not directly affect any shorelines, change the use of shoreline zones, or be inconsistent with any National Oceanic and Atmospheric Administration (NOAA)-approved state Coastal Zone Management Plan (CZMP) since there are no coastal zones or shorelines in the area of operations.

- **Department of Transportation Act, Section 4(f) Resources** –The FAA worked to identify all potential Section 4(f) resources, including public parks and historic sites that could meet the definition of a Section 4(f) resource. The closest Section 4(f) resource identified is a historic building, Eastwood Rosenwald School, and is approximately 1.84 miles from the operating area boundary. Since there were no Section 4(f) resources identified in close proximity to the operating area boundary, no impacts to these resources are expected.

- **Farmlands** –The proposed action will 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.

- **Hazardous Materials, Solid Waste, and Pollution Prevention** –The proposed action will 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 UA is made from recoverable materials and will be properly managed at the end of its operating life in accordance with 14 CFR Part 43. There were no Environmental Protection Agency (EPA) Superfund sites identified within the vicinity of the study area.

- **Historical, Architectural, Archaeological, and Cultural Resources** –The FAA has determined that these types of infrequent UA operations have no potential to cause effects to historic properties. In conducting the area review for this EA, the FAA identified some historic sites that are located outside the operating area. The closest historic site identified is a historic building, Eastwood Rosenwald School, and is approximately 1.84 miles from the operating area boundary. Since the proposed action has no potential to cause effects, and since there are no historic properties near the study area, the FAA has determined that there will be no impacts to resources in this category.

- **Land Use** – The proposed action will not involve any changes to existing, planned, or future land uses within the area of operations.

- **Natural Resources and Energy Supply –** The proposed action will not require the need for unusual natural resources and materials, or those in short supply. UPSFF's aircraft will be battery powered and will not consume fuel resources.

- **Socioeconomic Impacts and Children's Environmental Health and Safety Risks** – The proposed action will not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community. Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to ensure that children do not suffer disproportionately from environmental or safety risks. The proposed action will not affect products or substances that 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. Additionally, UPSFF's operating area is not near schools or

playgrounds. The closest school is Stopher Elementary School, approximately 4.24 miles away; therefore, there is no potential for environmental health or safety impacts to children.

- **Visual Effects (Light Emissions Only)** – The proposed action will not result in significant light emission impacts because most flights will be conducted during the daytime. While some flights may by conducted after sunset and before the end of evening civil twilight (typically a maximum of three flights per hour), UPSFF has indicated that they are unlikely to conduct flights after civil twilight. UPSFF has stated that, while they have the operating authority to conduct flights after civil twilight, they do not have any training requirements for night flying to support Part 135 operations and therefore night operations will not be conducted under the scope of the proposed action.

- **Water Resources (Wetlands, Floodplains, Groundwater, and Wild and Scenic Rivers)** –The proposed action will not result in the construction of facilities and would therefore not encroach upon areas designated as navigable waters or directly impact wetlands. The proposed operation will not encroach upon areas designated as a 100-year flood event area as described by the Federal Emergency Management Agency (FEMA). The proposed action will not result in any changes to existing discharges to water bodies, create a new discharge that would result in impacts to surface waters, or modify a water body. The proposed action does not involve land acquisition or ground disturbing activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to ground water resources through the introduction of new impervious surfaces. The proposed action would not foreclose or downgrade the Wild, Scenic, or Recreational river status of a river or river segment included in the Wild and Scenic River System. There are no listed river segments within the operating area. The nearest segment list in the Nationwide Rivers Inventory (NRI) is the Floyds Fork of the Salt River, which is roughly 2.3 miles west of the operating area boundary. The proposed action will not affect this NRI segment.

3.2 Biological Resources (Including Fish, Wildlife and Plants)

3.2.1 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.

Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 [16 U.S.C. § 1531 et seq.] requires the evaluation of all federal actions to determine whether a proposed action is likely to jeopardize any proposed, threatened, or endangered species or proposed or designated critical habitat. Critical habitat includes areas that will contribute to the recovery or survival of a listed species. Federal agencies are responsible for determining if an action "may affect" listed species, which determines whether formal or informal consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) is needed. If the FAA determines that the action will have no effect on listed species, consultation is not required. If the FAA determines that the action may affect listed species, consultation with the USFWS must be initiated.

A significant impact to federally-listed threatened and endangered species would occur when the USFWS or NMFS determines that 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.

Migratory Birds

The Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) protects migratory birds, including their nests, eggs, and parts, from possession, sale, purchase, barter, transport, import, export, and take. The USFWS is the federal agency responsible for the management of migratory birds as they spend time in habitats of the U.S. For purposes of the Migratory Bird Treaty Act, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR § 10.12). The Migratory Bird Treaty Act applies to migratory birds identified in 50 CFR § 10.13 (defined hereafter as "migratory birds").

Bald and Golden Eagles

The Bald and Golden Eagle Protection Act prohibits anyone from "taking" a bald or golden eagle, including their parts, nests, or eggs, without a permit issued by the USFWS. Implementing regulations (50 CFR § 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. The USFWS has issued regulations for the permitting process in 50 CFR Part 22, which include permits for the incidental take of Bald Eagles. Such permits are only needed when avoidance of incidental take is not possible. According to federal and state guidelines, if

conservation measures can be implemented such that no aircraft are flown within 1,000 feet of a nest, incidental take of Bald Eagles is unlikely to occur and no permit is needed.[10]

3.2.2 Affected Environment

This section describes the existing biological environment of the operating area. The operating area is in the Outer Bluegrass ecoregion of Kentucky, characterized by sinkholes, springs, rivers, and perennial streams. Today, the landscape is largely pastureland and cropland interspersed with areas of woodlands.[11] The proposed action would take place entirely over the Farm property. This rural areas provides habitat for many of the more common and ubiquitous bird and mammal species of the eastern U.S., including mammals such as mice, groundhogs, raccoons, opossums, shrews, moles, and squirrels, and volant organisms including bats, songbirds, waterfowl and insects.

Special Status Species

Federally Listed Species

The potential for impacts to federally-listed species was assessed using the USFWS Information for Planning and Consultation (IPaC) map tool and reports. The study area covered the entire operating area, outlined in red in Figure 1 of this EA.

Based on the Kentucky Ecological Services Field Office's Offical Species List generated by IPaC, there are three listed bat species, one candidate insect species, and no ESA-listed bird species in the study area. The Gray Bat (*Myotis grisescens),* an endangered species, Indiana Bat (*Myotis sodalis),* an endangered species, and Northern Long-eared Bat, (*Myotis septentrionalis*) a threatened species, are listed in the official species list report as potentially occuring in the operating area. The Monarch Butterfly (*Danaus plexippus*) is a candidate for federal listing and could occur in the operating area. There is no critical habitat within the operating area for any species identified in the official species list report. The official species list report is included as Appendix A.

State Species of Concern

The Kentucky Department of Fish and Wildlife Resources lists 380 species of birds, fish, mammals, reptiles, molluscs, crustaceans and snails as endangered, threatened, or of special concern within the State of Kentucky.[12] The majority of these species do not occur in the operating area because it is located outside their range and/or suitable habitat is not present in the operating area. Of the 380 species listed by the Department, the FAA identified 51 species of birds and mammals in Jefferson County, Kentucky that could have the potential to occur within the operating area for at least part of the year. These species are identified in Table 3-1 below.

Table 3-1 Kentucky State-Listed Species

Status	**Species Name**
State Endangered (Birds)	Spotted Sandpiper*(Actitis macularius)*
	Short-eared Owl *(Asio flammeus)*
	Long-eared Owl *(Asio otus)*

[10] U.S. Fish and Wildlife Service. 2007. National Bald Eagle Management guidelines. Available: https://fws.gov/migratorybirds/pdf/management/nationalbaldeaglenanagementguidelines.pdf. Accessed: February 4, 2022.
[11]USGS. Ecoregions of Kentucky. Available: https://store.usgs.gov/product/113780. Accessed: June 9, 2022.
[12] Kentucky Department of Fish and Wildlife. Species Information. Available: http://app.fw.ky.gov/speciesinfo/speciesinfo.asp. Accessed: June 8, 2022.

	Little Blue Heron *(Egretta caerulea)*
	Snowy Egret *(Egretta thula)*
	Least Flycatcher (*Empidonax minimus)*
	Peregrine Falcon *(Falco peregrinus)*
	Bachman's Sparrow *(Peucaea aestivalis)*
	Pied-billed Grebe *(Podilymbus podiceps)*
	Vesper Sparrow *(Pooecetes gramineus)*
	King Rail *(Rallus elegans)*
	Interior Least Tern *(Sternula antillarum athalassos)*
	Golden-winged Warbler (Vermivora chrysoptera)
State Threatened (Birds)	Brown Creeper (Certhia Americana)
	Northern Harrier (*Circus hudsonius)*
	Least Bittern (*Ixobrychus exilis)*
	Hooded Merganser (*Lophodytes cucullatus)*
	Yellow-crowned Night-heron (*Nyctanassa violacea)*
	Black-crowned Night-heron *(Nycticorax nycticorax)*
	Blackburnian Warbler *(Setophaga fusca)*
	Striped Whitelip *(Webbhelix multilineata)*
State Special Concern (Birds)	Sharp-shinned Hawk (*Accipiter striatus)*
	Cattle Egret (*Bubulcus ibis)*
	Canada Warbler *Cardellina Canadensis)*
	Henslow's Sparrow (*Centronyx henslowii)*
	Lark Sparrow (*Chondestes grammacus)*
	Sedge Wren(*Cistothorus platensis)*
	Bobolink (*Dolichonyx oryzivorus)*
	Bald Eagle (*Haliaeetus leucocephalus)*
	Mississippi Kite(*Ictinia mississippiensis)*
	Dark-eyed Junco (*Junco hyemalis)*
	Loggerhead Shrike (*Lanius ludovicianus)*
	Osprey (*Pandion haliaetus)*
	Savannah Sparrow(*Passerculus sandwichensis)*
	Double-crested Cormorant (*Phalacrocorax auritus)*
	Rose-breasted Grosbeak (*Pheucticus ludovicianus)*
	Bank Swallow (*Riparia riparia)*
	Northern Hairstreak (*Satyrium favonius Ontario)*
	Barn Owl (*Tyto alba)*
State Endangered (Mammal)	Northern Myotis (*Myotis septentrionalis*)
	Indiana Bat (*Myotis sodalist)*
State Threatened (Mammal)	Gray Bat (*Myotis grisescens*)
	Little Brown Bat (Myotis lucifugus)
	Eastern Pipistrelle (*Perimyotis subflavus*)
State Special Concern	Least Weasel (*Mustela nivalis)*

Migratory Birds

Migratory bird species found within the operating area will vary throughout the year. During certain weeks in the spring and fall, hundreds of species of songbirds, raptors, and waterfowl may potentially pass through the operating area. Additionally, several dozen species of birds may potentially nest in the operating area at certain times of the year.

The IPaC report identifies ten Birds of Conservation Concern (BCC) that could occur in the operating area, along with information on the likelihood that they may be nesting in the area (see Appendix A).

The Bald Eagle (*Haliaeetus leucocephalus)* is not listed by USFWS as a BCC in the operating area; however, it is listed by the Kentucky Department of Fish and Wildlife as a state special concern species and they are protected under the Bald and Golden Eagle Protection Act. It is possible that Bald Eagles could nest in the operating area, near South Long Run. The National Bald Eagle Management Guidelines state that aircraft should stay at least 1,000 feet from Bald Eagle nests during the breeding season unless the aircraft is operated by a trained wildlife biologist.[13]

The Red-headed Woodpecker (*Melanerpes erythrocephalus*) is a BCC within the operating area. Red-headed Woodpeckers typically nest in tall, dead trees near marshes and open bodies of water. It is possible that Red-headed Woodpeckers may nest within the operating area.

3.2.3 Environmental Consequences

There will be no ground construction or habitat modification associated with the proposed action. The aircraft's takeoff and landing locations are in already developed locations. UPSFF's aircraft will not touch the ground in any other place than the takeoff and landing locations (except during emergency landings), since it remains aerial while conducting training operations

The operations will take place typically well above the tree line and away from sensitive habitats. After launch, UPSFF's UA will rise to a cruising altitude that is typically 250 feet AGL. The aircraft may fly up to 400 feet AGL when needed. Aircraft will stay at its cruising altitude of roughly 250 AGL except when descending to land the aircraft. When the aircraft starts its initial descent, it will transition to hover and descend to approximately 165 AGL and wait up to 90 seconds for an approval to land. After landing is approved, the aircraft will continue it's decent to land for approximately 22 seconds. The low number of daily operations and nature of the flights are not expected to significantly impact wildlife in the area.

Special Status Species

The federally endangered Gray Bat, federally endangered Indiana Bat, and federally threatened Northern Long-eared Bat, as well as several state bat species of concern, have the potential to occur within the operating area. These bat species have the potential to encounter the aircraft as UPSFF's proposed operations include up to three flights per hour between sunset and the end of civil twilight. In the event that flights do overlap with evening bat emergence or foraging activities, bats may exhibit disturbance behaviors and change their flight paths to avoid drones.[14] However, research also suggests

[13] U.S. Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. Available: https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines.pdf. Accessed: October 19, 2021.

[14] Fewer bat passes are detected during small, commercial drone flights. Available: https://www.nature.com/articles/s41598-021-90905-0. Accessed: October 21, 2021

that drones have "minimal impact on bat behavior" and do not appear to be disturbed by drones.[15] UPSFF has indicated that the likelihood of operations after sunset is very low. Should a bat encounter occur, UPSFF operators would follow their standard procedures for avoiding an air hazard. This could involve holding, reversing course, or choosing to make an expedited landing to avoid the air hazard. In addition, the operating area is small (approximately 5.42 acres, which is less than 0.008 square miles), so the limited flights that could occur after sunset will be limited to a very small area, reducing the likelihood of interactons with bats and increasing their ability to avoid the area. Because of the small geographic scope of this action, and the short duration and limited number of flights after sunset that UPSFF is planning under the proposed action, the FAA has made a finding of *no effect* for listed bat species under the Endangered Species Act. The FAA has also determined that the proposed action will cause no significant impacts to state-listed bat species.

The Monarch Butterfly, a candidate for federal listing, has the potential to occur in the operating area. Insects could be struck by drones en route to delivery. Information regarding drone impacts on insects is limited and there have been no widespread negative impacts identified in the scientific literature. Therefore, based on the information available and the limited scale of operations, the action is not expected to have significant impacts to insect populations.

State protected bird species may display disturbance behaviors towards drones, such as fleeing or attack maneuvers; however, due to the limited scale of operations and the altitude of overflights, no impacts to state protected bird species are expected.

Migratory Birds

UPSFF has stated to the FAA that it will monitor the operating area for any active Bald Eagle nests that may occur. Bald Eagle nests are typically very conspicuous, usually five to nine feet in diameter, with a vertical depth up to eight feet, and UPSFF should be able to visually identify any nests that may be present in the area.[16] Online resources such as iNaturalist may also be used to identify Bald and Golden Eagle nests that may be active in the operating area. If UPSFF identifies a Bald Eagle nest or is notified of the presence of a nest by a state regulator or naturalist group, UPSFF 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. This avoidance area will be maintained until the end of the breeding season (September 1 through July 31 in Kentucky) or a qualified biologist indicates the nest has been vacated.[17]

Red-headed Woodpecker nest locations should not be disturbed during the breeding period (May 10 to September 10)[18] so as to avoid any potential impacts to the nest activity, such as nest abandonment. If UPSFF learns of any active Red-headed Woodpecker nests within the operating area, it has indicated it would avoid identified nest sites during the breeding season or until a qualified biologist indicates the nest has been vacated.

Due to the limited operating area and proposed number of daily operations, occasional drone overflights 250 feet AGL are not expected to impact critical lifecycles of wildlife species or their ability to survive.

[15] Autonomous drones are a viable tool for acoustic bat surveys. Available: https://www.biorxiv.org/content/10.1101/673772v1.full.pdf Accessed: October 21, 2021

[16] USFWS Midwest Region: Identification of Large Nests. Available: https://www.fws.gov/midwest/eagle/Nhistory/nest_id.html. Accessed: December 13, 2021

[17] See IPaC report in Appendix A for Bald Eagle breeding dates in the study area.

[18] See IPaC Report in Appendix A for Red-Headed Woodpecker breeding dates in the study area.

Our analysis finds that the proposed action is not expected to cause any of the following impacts:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area;
- Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats;
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required.

3.3 Noise and Noise-Compatible Land Use

3.3.1 Regulatory Setting

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. Through 14 CFR Part 36, the FAA regulates noise from aircraft.

FAA Order 1050.1F, Appendix B, Paragraph B-1.3 requires the FAA to identify the location and number of noise sensitive areas that could be significantly impacted by noise. As defined in Paragraph 11-5b of Order 1050.1F, page 11-3, a noise sensitive area is "[a]n area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites."

Sound is measured in terms of the decibel (dB), which is the ratio between the sound pressure of the sound source and 20 micropascals, which is nominally the threshold of human hearing. Various weighting schemes have been developed to collapse a frequency spectrum into a single dB value. The A-weighted decibel, or dBA, corresponds to human hearing accounting for the higher sensitivity in the mid-range frequencies.

To comply with NEPA requirements, the FAA has issued requirements for assessing aircraft noise in FAA Order 1050.1F, Appendix B. FAA's primary 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 average aircraft sound level at a location over a 24-hour period, with a 10 dB adjustment added to thoise noise events occuring from 10:00 p.m. and up to 7:00 a.m. the following morning. A significant noise impact is defined in Order 1050.1F as an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure or a noise exposure at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase.

3.3.2 Affected Environment

The study area is approximately 5.42 acres. The five buildings located inside the operating area are occupied by UPSFF employees. There are residential houses near the study area with the closest house approximately 280 feet from the operating area boundary.

3.3.3 Environmental Consequences

Human perception of noise depends on a number of factors, including overall noise level, number of noise events, the extent of audibility above the background ambient noise level, and acoustic frequency content (pitch). UA noise generally has high acoustic frequency content, which can often be more discernable from other typical noise sources.

To ensure that noise would not cause a significant impact to any residential land use or noise sensitive resource within the study area, the FAA initiated an analysis of the potential noise exposure in the area that could result from implementation of the proposed action. Away from the actual Farm property, the residential home approximately 280 feet from the property boundary is likely to experience the highest potential noise levels as a result of the proposed action. However, the noise exposure is expected to be minimal.

Noise Exposure Results

Utilizing the operational projections defined in Sections 1 and 2, the noise analysis methodology detailed in Appendix B was then used to the estimate DNL levels for the proposed UPSFF Farm operations. Due to the inherent uncertainty of the exact flight operations over the Farm property, the noise analysis assumes that all flights will occur at a single location within each operating area in order to provide a conservative estimate of potential noise exposure. Assuming UPSFF's projected maximum number of 32 flight operations per day (11,300 annual operations), the noise analysis shows that delivery noise levels would not exceed DNL 45 dB at any noise sensitive resource outside of the Farm property where UPSFF will be conducting operations.

3.4 Environmental Justice

3.4.1 Regulatory Setting

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, Section 1-101 requires all federal agencies to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

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

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

FAA Order 1050.1F provides guidance for the preparation of environmental justice analysis in support of an EA. Section 4-3.3, Exhibit 4-1 of the Order indicates that FAA should consider whether the action would have the potential to lead to a disproportionately high and adverse impact, i.e., a low-income or minority population, due to: significant impacts in other environmental impact categories; or impacts on

the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population. If a significant impact would affect low income or minority populations at a disproportionately higher level than it would other population segments, an environmental justice issue is likely.

A disproportionately high and adverse effect on minority or low-income populations means an adverse effect that:

1. Is predominately borne by a minority population and/or a low-income population; or
2. Will be suffered by the minority population and/or low-income population and is appreciable more severe or greater in magnitude than adverse effects that will be suffered by the non-minority population and/or low-income population.

The FAA has not established a significance threshold for environmental justice. In assessing significance, FAA considers the following factors: (1) significant impacts in other environmental impact categories; or (2) impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population.

3.4.2 Affected Environment

Minority and low-income populations were mapped at the Census Block Group level using 2020 American Community Survey (ACS) 5-year estimates from the U.S. Census Bureau. The analysis was performed using the Aviation Environmental Design Tool (AEDT). The FAA utilized a combination of the *fifty-percent analysis* and *meaningfully greater analysis* to complete the analysis for the study area. Low-income populations in the study area were identified by using *the low-income threshold criteria* analysis.

Minority Population Fifty-Percent Analysis

There was one census block group identified in the study area. The percentage of minority individuals residing within the study area at the census block level is below 50 percent at approximately 23.9 percent.

Minority Population Meaningfully Greater Analysis

The minority population in the study area at the census block group level was compared to the reference community, which is the percentage of minority individuals residing within Jefferson County. Because the entire study area is within Jefferson County, the FAA determined that it would be an appropriate geographical region for comparison.

The percentage of minorities residing within the study area at the census block group level, approximately 23.3 percent, is less than the percentages for the reference community, approximately 33.87 percent. Therefore, there was not a meaningfully greater percentage of minorities residing within the study area census block group.

Low-Income Threshold Criteria Analysis

The low-income population in the study area at the census block group level was compared to the reference community, which is the percentage of low-income individuals residing within Jefferson County. Because the entire study area is within Jefferson County, the FAA determined that it would be an appropriate geographical region for comparison.

The percentage of low-income individuals residing within the study area at the census block group level is approximately 0 percent as compared to 14.65 percent in the reference community. The FAA's AEDT analysis data is included in Appendix D.

3.4.3 Environmental Consequences

The proposed action would not result in adverse impacts in any environmental resource category. As noted in Section 3.5, *Noise and Noise-Compatible Land Use*, and the Noise Analysis Report in Appendix B, the drone's noise emissions could be perceptible in areas within the study area, but will stay well below the level determined to constitute a significant impact. Since the percentage of low-income individuals and minority populations was lower in the study area's census block group than the reference community, the FAA determined there was not a significant low-income environmental justice community present. Since the proposed action would not result in effects that would be predominately born by an environmental justice population, the FAA determined it would not result in an adverse effect on a low-income or a minority population.

3.5 Visual Effects (Visual Resources and Visual Character)

3.5.1 Regulatory Setting

Visual resources and visual character impacts deal with the extent to which the proposed action would result in visual impacts to resources in the operating area. Visual impacts can be difficult to define and evaluate because the analysis is generally subjective, but are normally related to the extent that the proposed action would contrast with, or detract from, the visual resources and/or the visual character of the existing environment. In this case, visual effects would be limited to the introduction of a visual intrusion – a UA in flight – which could be out of character with the suburban or natural landscapes.

The FAA has not developed a visual effects threshold of significance similar to noise impacts. Factors 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.

3.5.2 Affected Environment

The proposed action would take place in a rural area. As noted in Section 3.3, *DOT Act Section 4(f) Resources*, there are no properties that could be uniquely valued for aesthetic attributes within the study area. The Farm operating area is on private property and takeoff and landing sites are in already developed locations. The FAA estimates that at typical operating altitude and speeds the UA en-route would be observable for approximately six seconds by an observer on the ground.

3.5.3 Environmental Consequences

The proposed action makes no changes to any landforms, or land uses, thus there would be no effect to the visual character of the area. Additionally, the short duration that each drone flight could be seen from any resource in the operating area, approximately six seconds in total, and the low number of proposed flights per day, would minimize any potential for significant visual impacts. Any visual effects are expected to be similar to existing air traffic in the vicinity of the operating area.

3.6 Water Resources (Surface Waters)

3.6.1 Regulatory Setting

Surface water resources generally consist of oceans, wetlands, lakes, rivers, and streams. Surface water is important for its contribution to the economic, ecological, recreational, and human health of a community. The Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) program, which regulates the discharge of point sources of water pollution into waters of the United States and requires a permit under Section 402 of the CWA. Waters of the United States are defined by the CWA and are protected by various regulations and permitting programs administered by the EPA and the U.S. Army Corps of Engineers. An action would be considered significant to surface waters when it would: (1) exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or (2) contaminate public drinking water supply such that public health may be adversely affected.

3.6.2 Affected Environment

There are no surface waters that occur within the operating area. The closest surface water is South Long Run, which is approximately 300 feet from the operating area boundary to the south.

3.6.3 Environmental Consequences

UPSFF has conducted thousands of UAS flight operations, and the FAA does not anticipate any accidents or incidents under the proposed action. While it is highly unlikely for one of UPSFF's aircraft to crash, and even less likely for a crash to happen within a surface water (and there are no surface waters in the study area), this EA considers the potential effects of a drone crashing into surface waters covered by the Clean Water Act.

UPSFF is a certificated air carrier and complies with all applicable regulatory requirements. This includes compliance with requirements to notify the FAA and/or National Transportation Safety Board (NTSB) in accordance with regulatory requirements in the event of an aircraft accident. UPSFF's FAA-accepted checklists include procedures to notify local emergency services in the event of an accident or incident. In accordance with 14 CFR Part 135.23(d), UPSFF is required to locate and secure any downed aircraft pending guidance from the FAA or NTSB.

In the event of an in-flight malfunction or deviation, the Remote Pilot in Command (RPIC) can initiate three commands: initiate a hold pattern, return to take off location , or terminate the flight via the emergency parachute system, which may also automatically deploy if the UA detects a critical failure necessitating a flight termination. In addition, the Lithium-ion battery packs are well-secured within the aircraft, and are not expected to detach from the aircraft or become lost in the event of an incident.

There will be no construction activities associated with the proposed action. The proposed action would not have the potential to adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values, or to adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated. Therefore, the potential for impacts to surface waters is not significant.

4.0 LIST OF PREPARERS and CONTRIBUTORS

Table 4-1 lists the principal preparers, reviewers, and contributors to this EA.

Table 4-1. List of Preparers and Contributors

Name and Affiliation	Years of Industry Experience	EA Responsibility
Mike Millard, Flight Standards, FAA Aviation Safety	41	Flight Standards Environmental Specialist and Document Review
Christopher Couture, FAA Aviation Safety	16	Program Management, Environmental Science, and Document Review
Shawna Barry, FAA Office of Environment and Energy	16	NEPA SME, Biological Resources, and Document Review
Sean Doyle, FAA Office of Environment and Energy	16	Noise Analysis and Document Review
Adam Scholten, FAA Office of Environment and Energy	11	Noise Analysis and Document Review
Contractor Contributors		
Jodi Jones, FAA Aviation Safety, Primcorp, LLC	12	NEPA SME, Research, and Document Review
Brad Thompson, FAA Aviation Safety, Science Applications International Corporation (SAIC)	7	NEPA SME, Research, and Document Review

Appendix A

IPaC Report and Official Species List

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Jefferson County, Kentucky

Local office

Kentucky Ecological Services Field Office

(502) 695-0468
(502) 695-1024

J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. 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.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens* Wherever found This species only needs to be considered if the following condition applies: • The project area includes potential gray bat habitat. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* Wherever found This species only needs to be considered if the following condition applies: • The project area includes 'potential' habitat. All activities in this location should consider possible effects to this species. There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* Wherever found This species only needs to be considered if the following condition applies: • The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS

Monarch Butterfly Danaus plexippus Candidate
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9743

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

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

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- 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

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date

range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

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

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Black-billed Cuckoo *Coccyzus erythropthalmus* 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
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31

Cerulean Warbler Dendroica cerulea — Breeds Apr 23 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Kentucky Warbler Oporornis formosus — Breeds Apr 20 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

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 and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

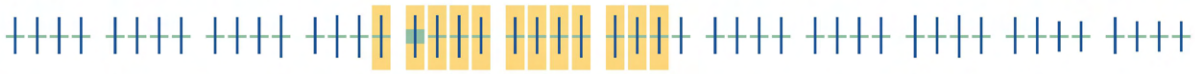
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

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

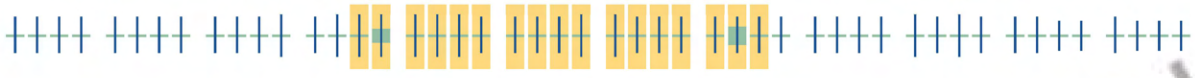
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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

Cerulean Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Kentucky Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Lesser Yellowlegs BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Red-headed Woodpecker BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Rusty Blackbird BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation

measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

THERE ARE NO KNOWN COASTAL BARRIERS AT THIS LOCATION.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

National Wildlife Refuge lands

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

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

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.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also

been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
Phone: (502) 695-0468 Fax: (502) 695-1024

In Reply Refer To:
Project Code: 2022-0052072
Project Name: The Farm- Fisherville, KY

June 08, 2022

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

To Whom It May Concern:

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

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

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

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:

Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

Project Summary

Project Code: 2022-0052072
Event Code: None
Project Name: The Farm- Fisherville, KY
Project Type: Drones - Use/Operation of Unmanned Aerial Systems
Project Description: UAS operations
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.230968399999995,-85.42403309607957,14z

Counties: Jefferson County, Kentucky

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions.

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

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

---

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 *Myotis grisescens*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The project area includes potential gray bat habitat.

Species profile: https://ecos.fws.gov/ecp/species/6329
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/7OAGEN65SZDSXASVXJYCKH6BN4/documents/generated/6422.pdf

Indiana Bat *Myotis sodalis*	Endangered

There is **final** critical habitat for this species. The location of the critical habitat is not available.
This species only needs to be considered under the following conditions:

- The project area includes 'potential' habitat. All activities in this location should consider possible effects to this species.

Species profile: https://ecos.fws.gov/ecp/species/5949
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/7OAGEN65SZDSXASVXJYCKH6BN4/documents/generated/6422.pdf

Northern Long-eared Bat *Myotis septentrionalis*	Threatened

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species.

Species profile: https://ecos.fws.gov/ecp/species/9045
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/7OAGEN65SZDSXASVXJYCKH6BN4/documents/generated/6422.pdf

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

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

Critical habitats

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

IPaC User Contact Information

Agency: Federal Aviation Administration
Name: Jodi Jones
Address: 800 Independence Ave SW
City: Washington
State: DC
Zip: 20591
Email jodi.a-ctr.jones@faa.gov
Phone: 2022670509

Appendix B

Noise Analysis Report

Noise Assessment for UPS Flight Forward Inc. Proposed Package Delivery Operations with Matternet Model M2 Unmanned Aircraft

In support of U.S. Code of Federal Regulations Title 14, Part 135

Final

HMMH Report No. 309990.003-6

May 18, 2022

Prepared for:

JD RoVolus, LLC
121 Pearl Street
Ypsilanti, MI 48197

Federal Aviation Administration
Aviation Safety, Flight Standards Service
Office of Environment and Energy
Policy, Engineering, Analysis, and Research (PEARS II)
693KA9-18-D-00005

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Noise Assessment for UPS Flight Forward Inc. Proposed Package Delivery Operations with Matternet Model M2 Unmanned Aircraft

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693KA9-18-D-00005

Prepared by:

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Contents

Figures

Tables

1 Introduction and Background

This document presents the methodology and estimation of noise exposure related to proposed Unmanned Aircraft (UA) package delivery operations conducted by UPS Flight Forward (UPS-FF), a wholly owned subsidiary of United Parcel Service, as a commercial operator under the provisions of 14 CFR Part 135. UPS-FF is proposing to perform small package delivery operations at multiple potential locations in the continental United States.

UPS-FF is proposing operations with the Matternet Model M2 UA. This UA features a multi-rotor design with four propellers mounted on equally spaced arms extending horizontally from a center frame. The system's computers and package containers are located on the underside of the airframe. According to data provided by UPS-FF, the maximum allowable takeoff weight of the UA is 29.1 pounds, an empty weight (including battery) of 24.7 pounds, and the maximum allowable package weight is 4.4 pounds.

Figure 1 depicts the UA considered in this report.

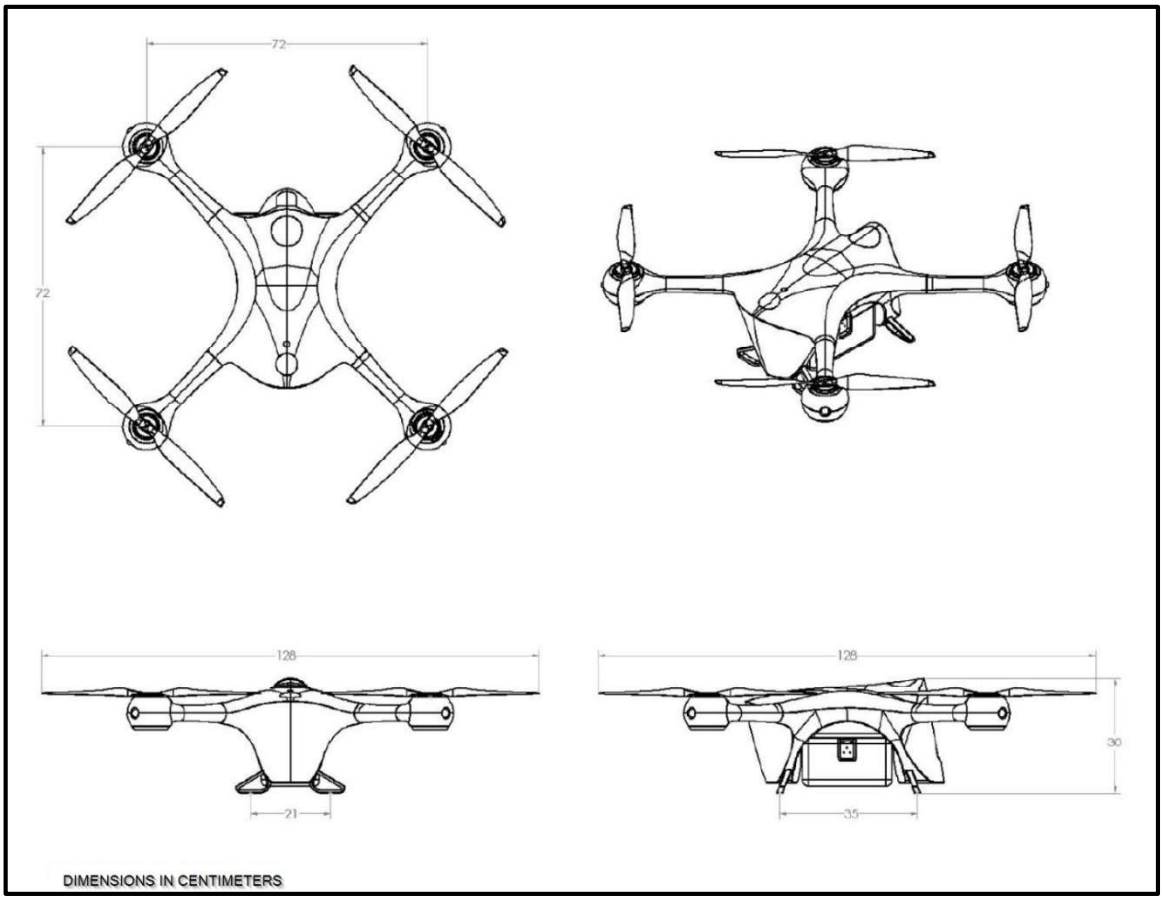

Figure 1: Matternet Model M2 Unmanned Aircraft

Source: UPS-FF

UPS-FF's takeoff/landing sites and distribution sites are largely determined by working collaboratively with UPS-FF customers to identify potential use cases. UPS-FF has internal procedures for developing routes that consider various factors such as obstructions, contingency landings sites, population density, and other aviation facilities.[1]

With a multirotor design, the UA can takeoff and descend vertically as well as hover. Airspeeds during normal cruise are expected to be approximately 31 knots. Typical flights begin with the UA ascending vertically from a landing pad at ground level to cruise altitude of 250 feet Above Ground Level (AGL). The UA then flies a pre-assigned route at 250 feet AGL and 31 knots to a selected delivery point where it performs a series of vertical and horizontal flight segments to descend to the ground. When it reaches the ground, it powers off and an operator removes and/or attaches a package. The UA's return flight departs using the same departure procedure as before and follows a predefined track to return to its original landing pad. When the UA arrives back at the landing pad, it performs a series of vertical and horizontal flight segments to descend to the ground, lands on the landing pad and then powers off and is unloaded (if carrying a package on the return trip). It is then either serviced or prepared for the next delivery.

The methodology proposed in this document provides quantitative guidance to FAA Environmental Specialists to inform environmental decision making on UA noise exposure from proposed UPS-FF package delivery operations. The methods presented here are suitable for review of Federal actions under the requirements of the National Environmental Policy Act (NEPA) and other applicable environmental special purpose laws or other federal environmental review requirements at the discretion and approval of the FAA. In particular, this report is intended to function as a non-standard equivalent methodology under FAA Order 1050.1F, and as such, would require prior written approval from FAA's Office of Environment and Energy (AEE) for each individual project for which a NEPA determination is sought. [2]

The methodology has been developed with data provided by UPS-FF and FAA to date and therefore is limited to UPS-FF operations with the Matternet Model M2 UA and the flight phases and maneuvers described herein. The noise analysis methodology and estimated noise levels of the proposed activity levels are based upon noise measurement data provided by the FAA.[3] Results of the noise analysis are presented in terms of the Day-Night Average Sound Level (DNL) based on varying levels of operations for areas at ground level below each phase of the flight.[4]

Section 2 of this document describes the relevant noise and operations data provided by UPS-FF and FAA. Section 3 describes the methodology to develop noise exposure estimates for the various UA flight phases associated with typical operations using available data. Section 4 presents the estimated DNL levels for various flight phases based on varying levels of typical operations as described by UPS-FF to date.

---

[1] Summary examples of UPS-FF materials dated February 15, 2022. Further discussion provided in Section 2.1.2.

[2] Discussion of the use of "another equivalent methodology" is discussed in FAA Order 1050.1F, July 16, 2015, Appendix B, Section B-1.2, available online at https://www.faa.gov/documentlibrary/media/order/faa_order_1050_1f.pdf#page=113

[3] FAA's Memorandum, "Estimated Noise Levels for Matternet Model M2 UA," dated May 13, 2022.

[4] Discussion of modification of this process for use of the Community Noise Equivalent Level metric (CNEL) is discussed in Section 3.1.

2 Unmanned Aircraft Delivery Operations and Noise Measurement Data Set Descriptions

Five data sets form the basis of the noise assessment for the proposed UPS-FF delivery operations. The data sets include three UPS-FF provided documents titled "Winston-Salem, NC Environmental RFI, rev. 2", "The Villages, FL Environmental RFI, rev.2", and "Columbus, OH Environmental RFI, rev. 2", all dated February 15, 2022. UPS-FF provided emails dated March 15, 2022 and May 13, 2022, with supplementary information. The FAA's Memorandum, "Estimated Noise Levels for Matternet Model M2 UA," dated May 13, 2022, was also used in support of the noise assessment and is provided with this report as Attachment A.[5]

2.1 Operations, Flight Paths, and Flight Profile Data

Operations and flight profile data for the UA provided by UPS-FF and FAA were reviewed to determine the characteristics of typical operations for a proposed operating area. Based on this review, the following subsections describe the assumptions made about the operations and flight profiles that were used to inform the development of the estimated noise exposure and the methodology for the noise analysis.

2.1.1 Operations

The methodology presented in this report can be used to assess UA noise over a range of proposed activity levels; however, FAA review and approval of its use at specified activity levels is required. The activity ranges shown below in Section 4 represent what FAA considers low to moderate activity levels and anticipates as being appropriate for consideration with this methodology. At higher activity levels, this methodology may not be sufficient to inform an environmental determination and further consideration or refinements at the discretion of the FAA may be needed.

Note that DNL noise levels presented in this report are all shown consistent with effective daytime (7 AM to 10 PM) operations levels. For consideration of nighttime (10 PM to 7 AM) noise levels, a ten times operational weighting (equivalent to DNL 10 dB increase) should be applied. Section 3.1 provides techniques to apply the operational weighting necessary to calculate effective operations for analysis with the DNL metric.

2.1.2 Flight Paths and Profiles

The UA will fly a predefined flight path between sites chosen by UPS-FF. UPS-FF's takeoff/landing sites and distribution sites are largely determined by working collaboratively with UPS-FF customers to identify potential use cases. Route delivery locations are entirely customer driven. UPS-FF has internal procedures for developing routes that consider various factors such as obstructions (examples of

[5] Most of these documents have various markings indicating that the contents are "Confidential & Proprietary". Only elements required to support the noise analysis methodology have been disclosed in this report.

obstructions include trees, power lines, light poles, buildings), contingency landings sites, population density, and other aviation facilities. Routes and operating locations may change over time due to factors such as construction projects or the presence of endangered species, especially during breeding season.[6]

The UA takeoff and landing sites consist of a square pad with dimensions of 39.7 inches by 39.7 inches[7] surrounded by a safety radius of 20 feet, which will be coned off to keep non-participants out. The UA will take off and land from this single pad. Figure 2 presents a diagram of the landing pad. Figure 3 presents a landing pad with the alternate landing area located as close as possible to the landing pad. The alternate landing area will be used in the event of multiple unsuccessful landing attempts at the landing pad.

Figure 4 shows an example of a proposed route.

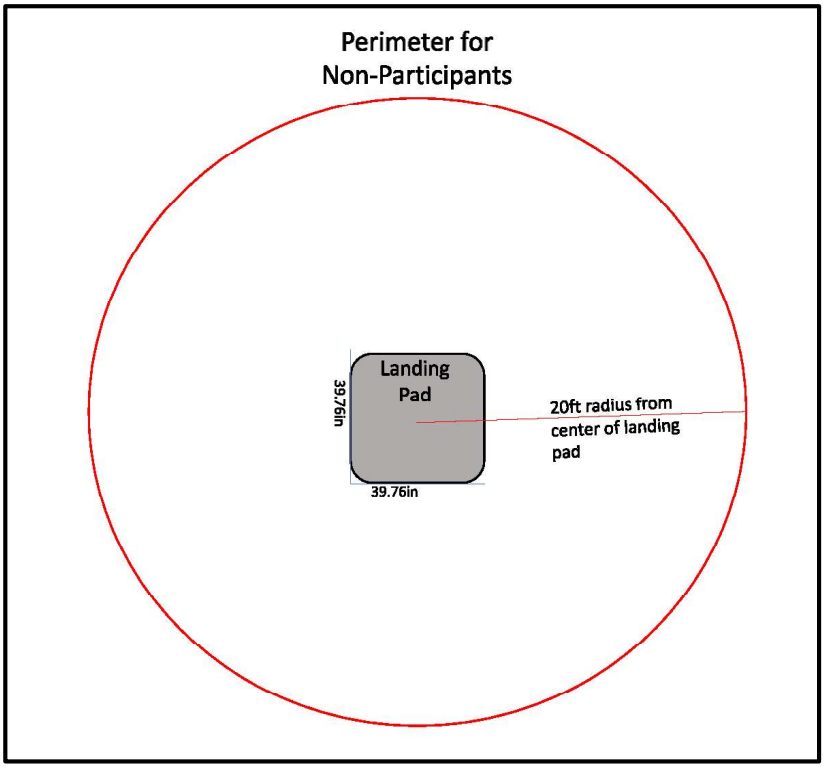

Figure 2: Takeoff and Landing Site Plan for the Proposed Operations.

Source: UPS-FF email dated March 15, 2022

[6] Summary examples of UPS-FF materials dated February 15, 2022.

[7] The dimensions of the landing pad are provided as a 1-meter square.

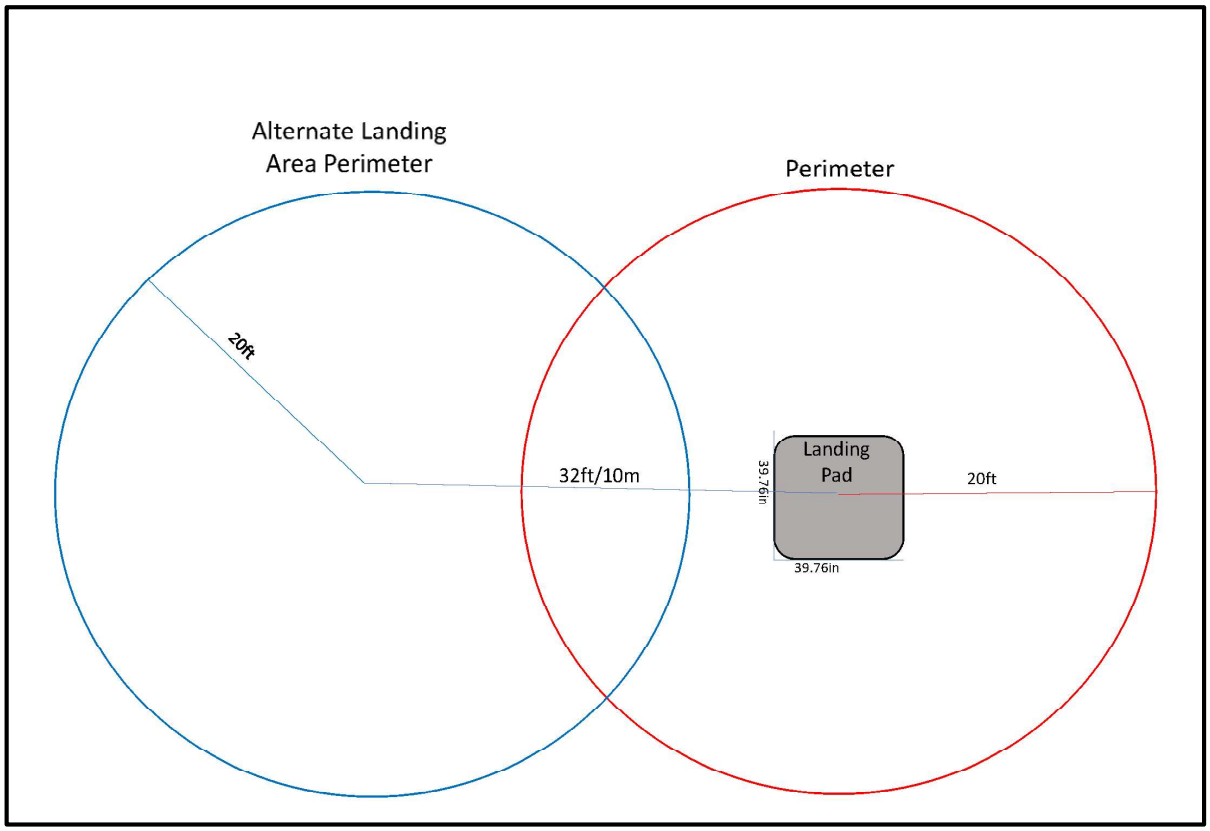

Figure 3: Takeoff Area and Landing Site Plan with Alternate Landing Area for Proposed Operations.

Source: UPS-FF email dated March 15, 2022

Figure 4: Visualization of a Route System

Source: UPS-FF, February 15, 2022

Analysis of flight profile data provided by UPS-FF and the FAA describes that a typical operation profile of the UA can be broken into four discrete flight phases:

1. Takeoff and Climb
2. En Route Outbound
3. Descent, Landing, and Delivery
4. En Route Inbound

These phases are shown in Figure 5 and Table 1 and are representative of the typical flight profile that UPS-FF is expected to use for delivery operations. The subsections that follow provide a narrative description of each of the four flight phases.

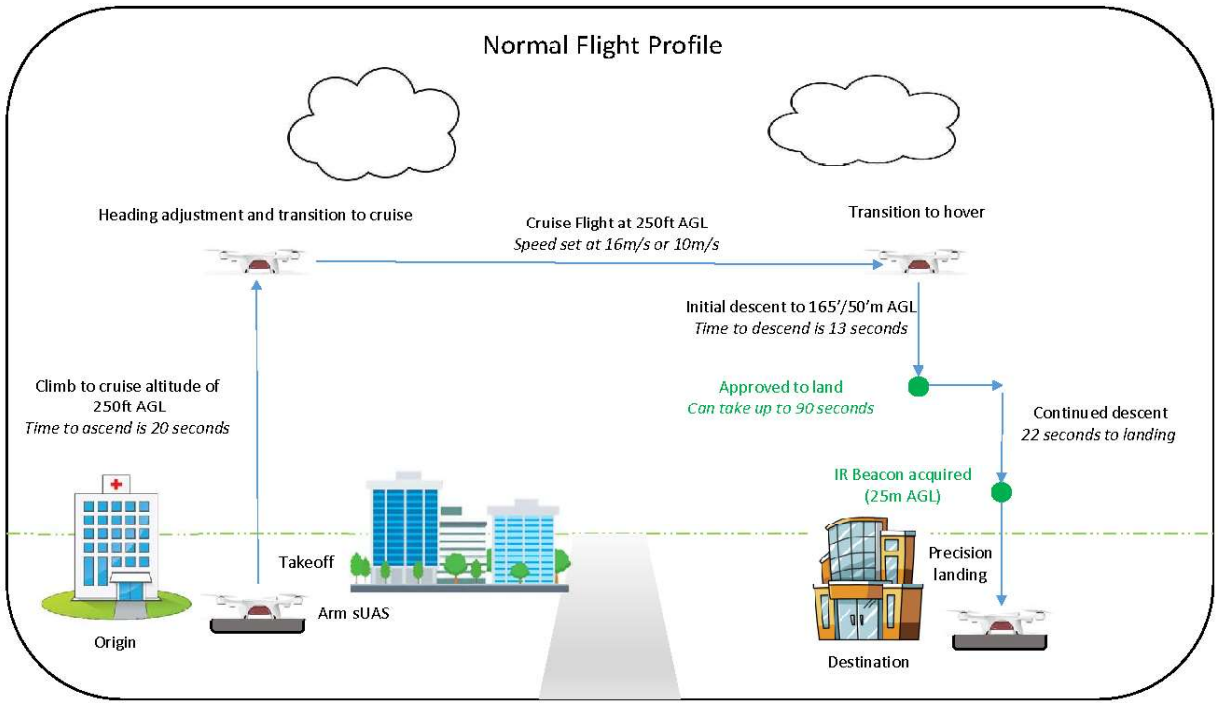

Figure 5: Graphical Depiction of the Proposed Matternet Model M2 Flight Profile to a Destination

Source: UPS-FF, May 13, 2022

Table 1. Matternet Model M2 Typical Flight Profiles

Source: FAA May 13, 2022 (Attachment A)

Phase	Description	Altitude (ft AGL)	Duration (s)
Takeoff and Climb	Vertical ascent to cruise altitude	Ascend from 0 to 250'	20
En Route Outbound	Flying at operational altitude (250 feet AGL) and speed (31 kts) to delivery point	250'	Variable
Descent, Landing, and Delivery	Vertical descent to 165'	Descend from 250' to 165'	13
	Hover for approval to land	Hover at 165'	Up to 90
	Move to center of landing pad	Move 16' feet laterally	3
	Vertical descent to 33'	Descend from 165' to 33'	18
	Vertical descent to land	Descend from 33' to 0'	25
	UA powered off for unloading the delivery package. After unloading, the UA is prepared for its next trip.	0'	Variable
En Route Inbound	Flying at operational altitude (250 feet AGL) and speed (31 kts) to landing pad	250'	Variable

2.1.2.1 Takeoff and Climb

The takeoff and climb phase is defined as the portion of flight in which the UA takes off from its pad and climbs vertically to 250 feet AGL over 20 seconds. Since some of the cases involve two-way package delivery, we will assume that the UA is always at maximum weight of 29.1 pounds when taking off.

2.1.2.2 En Route Outbound

The en route phase is the part of flight in which the UA transits from the takeoff/landing site to a distribution site on a pre-defined network of flight paths. During this flight phase, the UA will typically operate at an altitude of 250 feet AGL and a typical airspeed of 31 knots.[8] The UA is expected to have a package on the outbound flight.

2.1.2.3 Descent, Landing, and Delivery

When the aircraft nears the landing pad, it descends vertically from the en route altitude to 165 feet AGL. The UA then hovers at 165 feet AGL and waits for up to 90 seconds for approval to land. Upon approval, the UA moves sideways until it's centered over the landing pad. Once the UA is over the landing pad, it descends vertically to 33 feet AGL over 18 seconds, then reduces speed and descends the final 33 feet vertically over 25 seconds. When the UA powers down, an attendant collects its package and potentially attaches a new one. The UA then departs following the takeoff and climb profile described in Section 2.1.2.1.

[8] UPS-FF has specified the speed as "31 kts (16 m/s)." Speed in this memorandum is converted to knots.

2.1.2.4 En Route Inbound

En route inbound follows the same procedure as en route outbound. In some cases, the UA will be loaded with another package to return to its starting point. For the purpose of noise analysis, the UA will be loaded for en route inbound unless otherwise noted.

2.2 Acoustical Data

Noise measurements of the Matternet Model M2 UA were collected at Ells Field Airport near Willits, California in June 2021. The FAA then processed and analyzed the measurement data to calculate estimated noise levels for each of the four flight phases (takeoff and climb, en route outbound, descent, landing, and delivery, and en route inbound) described in Section 2.1.2. FAA analyzed the measurement data and summarized the acoustical data used in this report, which is included as Attachment A. The following tables show the A-weighted Sound Exposure Levels (SELs) used for this analysis as detailed in Attachment A, which can be matched to each flight phase detailed in Table 1.

Table 2 presents the estimated SELs at takeoff and landing areas as a function of distance from the landing pad to the receiver. The noise levels presented in Table 2 include all activity where the Phase in Table 1 is noted as "Takeoff and Climb" and "Descent, Landing, and Delivery". As such, the levels in Table 2 represent the combined noise resulting from the UA ascending vertically off the landing pad on the ground to en route altitude, as well as descending vertically from en route altitude to 165 ft AGL, hovering, moving horizontally to the center of the landing pad, and descending vertically to the ground. It should be noted that the noise estimates presented in Table 2 represent the UA at the maximum weights since the UA may carry a package for both inbound and outbound phases. Therefore, the levels in Table 2 are also applicable to both takeoff/landing sites and distribution sites, as the takeoff and landing procedures performed by the UA are identical at both ends of the route.

The levels presented in Table 2 exclude noise generated by the UA during inbound or outbound en route flight.

Table 3 presents the en route sound exposure levels for maximum weight and empty weight. The maximum weight SEL is applicable for the UA carrying a package while the empty weight SEL is applicable when the UA is not carrying a package. For the purpose of this noise analysis, the maximum weight SEL value will be used for en route outbound and inbound since the UA may pick up a package at a distribution site and fly back to the takeoff/landing site. This will be a conservative assumption since the maximum weight generates more noise. The estimates are based on measurements of the UA passing 250 feet above the microphone. FAA recommends that while the parameters for en route operation of the UA are typically at a speed of 31 knots and altitude of 250 feet AGL, the estimates derived from measurements at 250 feet AGL suggest that they should be used as is for the basis of any calculations.

Table 2. Estimate of SEL for "Takeoff and Climb" and "Descent, Landing, and Delivery" Operations

Source: FAA, May 13, 2022 (Attachment A)

Distance between Landing Pad and Receiver (ft) [a]	SEL (dB)	Distance between Landing Pad and Receiver (ft) [a]	SEL (dB)	Distance between Landing Pad and Receiver (ft) [a]	SEL (dB)	Distance between Landing Pad and Receiver (ft) [a]	SEL (dB)
20	90.1	900	65.6	1800	59.6	2700	56.1
50	84.7	950	65.2	1850	59.4	2750	56.0
100	81.1	1000	64.7	1900	59.2	2800	55.8
150	79.0	1050	64.3	1950	59.0	2850	55.7
200	77.3	1100	63.9	2000	58.7	2900	55.5
250	75.8	1150	63.5	2050	58.5	2950	55.4
300	74.5	1200	63.2	2100	58.3	3000	55.2
350	73.4	1250	62.8	2150	58.1	3050	55.1
400	72.3	1300	62.5	2200	57.9	3100	54.9
450	71.4	1350	62.1	2250	57.7	3150	54.8
500	70.5	1400	61.8	2300	57.5	3200	54.6
550	69.8	1450	61.5	2350	57.3	3250	54.5
600	69.0	1500	61.2	2400	57.1	3300	54.4
650	68.4	1550	60.9	2450	57.0	3350	54.2
700	67.8	1600	60.7	2500	56.8	3400	54.1
750	67.2	1650	60.4	2550	56.6	3450	54.0
800	66.6	1700	60.1	2600	56.5	3500	53.9
850	66.1	1750	59.9	2650	56.3		

Notes:
a) Takeoff starts at the landing pad. Distance is along ground from landing pad to receiver.

Table 3. Estimates of En Route SEL

Source: FAA May 13, 2022 (Attachment A)

Aircraft Config	Reference air speed (KTS)	Reference Altitude (ft AGL)	SEL (dB)
Max Weight	35.1	250	67.8
Empty Weight	35.1	250	65.3

3 Methodology for Data Analysis

The previously described data sets were used to develop a method to estimate community noise exposure that could result from UPS-FF delivery operations. These would be operations originating at a single location within each proposed area of operations and occurring weekdays (Monday through Friday) between the hours of 7:00 AM and 10:00 PM. Numbers of daily and equivalent annual delivery operations would vary for different operating areas. There are currently no standardized tools or processes in place to conduct a noise assessment for the proposed operational scenario and UA. HMMH, with detailed technical guidance from the FAA Office of Environment and Energy, developed a customized noise exposure prediction process based on the available data to conduct this analysis. The process was developed around FAA's understanding of typical use of the UA by UPS-FF. The following subsections describe the noise analysis methodology.

3.1 Application of Operations

The DNL metric applies a 10 dB weighting for operations between 10 PM and 7 AM. The 10 dB weighing is mathematically equivalent to 10 times the number of operations. Therefore, the operations near point *i* can be weighted to develop a daytime equivalent number of operations ($N_{equiv,i}$). The generalized form is expressed in Equation (1).[9]

$$N_{Equiv,i} = W_{Day} \times N_{Day,i} + W_{Eve} \times N_{Eve,i} + W_{Night} \times N_{Night,i} \quad (1)$$

Where:

- $N_{Day,i}$ is the number of user-specified operations between 7 AM and 7 PM local time
- $N_{Eve,i}$ is the number of user-specified operations between 7 PM and 10 PM local time
- $N_{Night,i}$ is the number of user-specified operations between 10 PM and 7 AM local time
- W_{Day} is the day-time weighting factor, which is 1 operation for DNL
- W_{Eve} is the evening weighting factor, which is 1 operation for DNL
- W_{Night} is the night-time weighting factor, which is 10 operations for DNL

For the DNL metric, the number of DNL daytime equivalent operations, $N_{DNL,i}$ simplifies to

$$N_{DNL,i} = N_{Day,i} + N_{Eve,i} + 10 \times N_{Night,i} \quad (2)$$

In practice, Equation (2) can be further simplified by defining the user-defined operations between 7 AM and 10 PM as a single value, rather than tracking $N_{Day,i}$ and $N_{Eve,i}$ separately.

[9] Equation (1) includes the three time periods of day, evening, night for consistency with other FAA documents that discuss the development of time averaging metrics such as DNL from individual SELs. Presentation of Equation (1) also allows the practitioner to modify this process for the CNEL metric for use in California.

For the Community Noise Equivalent Level (CNEL) metric, which may be used in California, the number of CNEL daytime equivalent operations, $N_{CNEL,i}$ simplifies to:

$$N_{CNEL,i} = N_{Day,i} + 3 \times N_{Eve,i} + 10 \times N_{Night,i} \quad (3)$$

3.2 Landing pad Infrastructure

As noted in Section 1 and Section 2.1.2, UPS-FF operates UAs from a central landing pad. This landing pad shall be a square with side lengths of 39.7 inches and have a protective radius of at least 20 feet extending out from its center. 34.2 feet away from the landing pad will be an alternate landing site. This landing site will have a 20-foot circle extending out from its center, like the landing pad. For the purpose of this noise analysis methodology, the landing pad extents depicted in Figure 2 and Figure 3 refer to the portion of the property in which the takeoff and landing pads could be positioned depending on the frequency of UA operations, as appropriate. The landing pad extents for the noise analysis shall be a rectangle, circle, or other polygon that includes all the possible locations for the takeoff and landing pads.

3.3 Application of Acoustical Data

The Day-Night Average Sound Levels (DNLs) can be estimated with a summation of the SELs. SEL values for the UA and UPS-FF operations covered in this report are detailed in FAA's May 13, 2022 Memorandum and provided with this report as Attachment A.

For calculating SEL, three specific activities are considered:

- The UA taking off from the landing pad;
- En route travel of the UA between the landing pad and the distribution site; and
- The UA landing at the landing pad.

3.3.1 General Assumptions

This analysis is based on the tables presented in Section 2.2. Table 2 and Table 3 present noise exposure values at discrete 50-foot increments relative to the UA's vertical profile from 20 to 3,500 feet. If additional values between 20 to 3,500 feet are needed, then SEL values at intermediary distances can be approximated by linear interpolation. In most cases, this should yield more conservative values compared to tested results. SEL values at distances less than 20 feet for takeoff or landing should not be extrapolated from the values in the tables because the deviation of the method of estimation from the linearly extrapolated value increases closer to the source and tends to infinity at the source.

3.3.2 Takeoff and Climb and Descent, Landing, and Delivery

The measured sound exposure levels for a takeoff, climb, descent, landing, and delivery combination as described in Section 2.1.2.1 and Section 2.1.2.3 are presented in Section 2.2 and specifically in Table 2. Since the proposed delivery operations include a descent and landing and power down, and then later a

separate takeoff and climb, the discussion here is applicable to both takeoff/landing sites and distribution sites.

The SEL values provided only include the maneuvers associated with takeoff from the ground through climb to en route altitude, and descent from en route altitude to the landing on the ground. The SEL values provided do not include horizontal en route movement before the descent, or after the ascent associated with en route flight. As noted in Section 3.1, the values in Table 2 should only be used for distances between the landing pad and the receiver for distances of 20 feet to 3,500 feet. As noted in Section 3.3.1, the values in Table 2 should only be used for estimating sound levels between 20 and 3,500 feet from the landing pad.

Application of the SEL should be based on the position of the landing pad. If the exact location of the landing pad is not known, then using an outer boundary of the landing pad would be slightly conservative.

3.3.3 En Route

Flight of the aircraft in still air is anticipated to be typically 31 knots, with a typical cruise altitude of 250 feet AGL. Sound exposure level for a given point i (SEL_i) with the aircraft flying directly overhead at altitude (Alt_i) in feet and a ground speed (V_i) in knots, will be calculated based on the guidance in *14 CFR Part 36 Appendix J, Section J36.205 Detailed Data Correction Procedures*.[10] It should be noted that the equations presented in this section are only applicable for an aircraft that is moving relative to a stationary receptor. The discussion of the variables are presented in the context of the application of this methodology.

In particular, the sound exposure level adjustment for the altitude of a moving aircraft, is presented here as Equation (4).

$$\Delta J_1 = 12.5 \times \log_{10}\left(\frac{H_A}{H_T}\right), dB \quad (4)$$

where ΔJ_1 is the quantity in decibels that must be algebraically added to the measured SEL in order to estimate the SEL for a level flight path at an altitude differing from the altitude corresponding to the measured SEL; H_A is the reference height, in feet, corresponding to the measured SEL; H_T is the altitude at which an estimate of the SEL is being made, and the constant (12.5) accounts for the effects on spherical spreading and duration from the off-reference altitude. The value of ΔJ_1 is 0 if H_T is equal to H_A and can be negative if H_T is greater than (higher altitude) than H_A.

The sound exposure level adjustment for speed is presented here as Equation (5).

$$\Delta J_3 = 10 \times \log_{10}\left(\frac{V_R}{V_{RA}}\right), dB \quad (5)$$

Where ΔJ_3 is the quantity in decibels that must be algebraically added to the measured SEL noise level to estimate the SEL of the vehicle at speed V_{RA} when the measured SEL corresponds to the vehicle

[10] 14 CFR Part 36 Noise Standards: Aircraft Type and Airworthiness Certification available at https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-36

traveling at a reference speed V_R. This adjustment represents the influence of the different speed on the duration of the overflight at the stationary receptor. If the vehicle is to be estimated at a speed V_{RA} that is greater than the reference speed V_R of the measured SEL, then the correction ΔJ_3 will be negative. The value of ΔJ_3 is 0 if V_R is equal to V_{RA}. Conversely, if the estimated speed is less than the reference speed, the estimated SEL will be greater than the measured SEL. This stands to reason because a slower moving aircraft will result in a greater time exposure of its emitted noise at a stationary receptor on the ground.

As shown in Table 3, the SEL is 67.8 dB when the vehicle is at maximum weight, at 250 feet from the ground receiver and traveling at approximately 35.1 knots; therefore, adapting that to the maximum weight (outbound) en route condition when the UA is flying at an altitude of Alt_i feet AGL and ground speed of V_i knots can be made using Equation (6) to arrive at an estimate $SEL_{maximum\ weight}$ dB for that respective phase of flight.

$$SEL_{maximum\ weight} = 67.8 + 12.5 \times \log_{10}\left(\frac{250}{Alt_i}\right) + 10 \times \log_{10}\left(\frac{35.1}{V_i}\right),\ dB \quad (6)$$

As noted in Section 2.1.2.2 and Section 2.1.2.4, the UA could be carrying a package at any time, and Table 3 indicates that the UA is louder at maximum weight. Therefore, for the purpose of noise analysis, it should be assumed that Equation (6) is applicable for all en route activity. This will be a conservative assumption since the UA would generate louder noise with the maximum weight.

Equation (7) presents the calculation for en route conditions at empty weight calculated using the values in Table 3 for instances in which dedicated empty en route paths are identified.

$$SEL_{empty\ weight} = 65.3 + 12.5 \times \log_{10}\left(\frac{250}{Alt_i}\right) + 10 \times \log_{10}\left(\frac{35.1}{V_i}\right),\ dB \quad (7)$$

3.4 Proposed DNL Estimation Methodology

The number of operations overflying a particular receiver's location on the ground will vary based on the proposed operating area and demand. For a given receiver location *i*, and a single instance of sound source *A*, the SEL for that sound source SEL_{iA} is (energy) summed for the average annual daily number of DNL daytime equivalent operations ($N_{DNL,iA}$) to compute the DNL, or equivalently, by Equation (8).

$$DNL_{iA} = SEL_{iA} + 10 \times \log_{10}\left(N_{DNL,iA}\right) - 49.4,\ (dB) \quad (8)$$

The above equation applies to an SEL value representing one noise source such as a UA takeoff or a UA landing. For cases where a particular receiver would be exposed to multiple sound sources (A through Z), the complete DNL at that point would be calculated with Equation (9).

$$DNL_i = 10 \times \log_{10}\left(10^{\left(\frac{DNL_{iA}}{10}\right)} + 10^{\left(\frac{DNL_{iB}}{10}\right)} + \cdots + 10^{\left(\frac{DNL_{iZ}}{10}\right)}\right),\ (dB) \quad (9)$$

For each of the conditions presented below, results will be presented in tabular format with the estimated DNL.

3.4.1 DNL for Landing Pad

The takeoff and landing operations are anticipated to occur at the same location. Therefore, the results for both will be calculated for a single set of receptors.

The noise around the landing pad will be represented by three sound levels. The first is the Takeoff-landing noise. The other two elements are the en route inbound noise and en route outbound noise at the landing pad. These sources will be added together with Equation (9).

3.4.2 DNL for En Route

En route includes the UA flying to and from the landing pad to destinations as discussed in Sections 2.1.2.2 and 2.1.2.4. A representative receiver will be positioned directly under the flight path, and the DNL will be calculated based on the altitude and speed-adjusted delivery SEL calculated in Section 3.3.3. Operations will be based on representative numbers defined in relevant materials and assume that a receiver under the flight path will be overflown by the UA at maximum weight for both outbound and inbound for a single delivery. The en route outbound noise level and the en route inbound noise level will be added together with Equation (9).

3.4.3 DNL for Delivery Points

Delivery operations will be represented by a single sound level consisting of the UA descending from en route altitude to the ground using the descent procedure described in Table 1, and then ascending vertically over the delivery point returning to en route altitude.

Use of the DNL Delivery, by itself, does not include the en route horizontal flight as the UA approaches the delivery point with the package or the horizontal flight as the UA leaves the delivery point after releasing the package. The FAA envisions that the user will add the DNL Delivery to the appropriate en route DNL values with Equation (9). To assist simple conservative analyses, the results of DNL Delivery will also be presented with conservative en route approaches and departures from the delivery point.

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4 Noise Exposure Estimate Results

This section presents the estimated noise exposure for UPS-FF's proposed operations for a given set of average annual day (AAD) deliveries. The values presented are in tabular format and use of the table requires estimating the number of DNL Equivalent deliveries associated with the landing pad. One delivery includes the outbound takeoff and inbound landing and is representative of two operations. The DNL Equivalent deliveries, $N_{DNL,i}$ as described in 3.1, is presented below as Equation (10).

$$Deliveries_{DNL,i} = Deliveries_{Day} + 10 \times Deliveries_{Night} \quad (10)$$

$Deliveries_{Day}$ are between 7 AM and 10 PM and $Deliveries_{Night}$ are between 10 PM and 7 AM.[11] If a portion of a delivery occurs in the nighttime hours (either takeoff or landing) then it should be counted within $Deliveries_{Night}$.

For estimating noise exposure, the noise levels for each flight phase should be considered separate based on the level of proposed operations for a given location. If a particular location is at the transition of different flight phases, the cumulative noise should then be determined by adding the noise from each phase. For example, a typical mission profile will include noise from multiple flight phases:

1. UA departure from and return to a landing pad
2. En route flight at a defined altitude to and from a landing pad to a delivery point and
3. Descent from en route flight to complete a delivery at the delivery point and ascent back to en route altitude for return to the landing pad.

The cumulative noise from the UA is then determined by adding the noise from each of these phases.

4.1 Noise Exposure for Operations at the Landing pad

For operations at the landing pad, the UA-related noises include the takeoff and landing. To provide a conservative view, all operations are assumed to be on the same flight path operating in opposite directions.

Table 4 presents data for a given number of daily average DNL Equivalent deliveries (including the takeoff and climb, en route outbound, en route inbound, and descent and landing as detailed in Section 2.1.2), the estimated extent of DNL 45 dB, 50 dB, 55 dB, 60 dB, and 65 dB contours under the flight path for a landing pad extents as described in Section 3.2. The analyses presented in Table 4 were rounded up conservatively to the nearest interval available from the data from Section 2.2, out to 3,500 feet. The actual noise levels, should they be calculated with greater precision or measured, are anticipated to be within the estimated extents depicted.[12]

[11] Discussion of modification of this process for use in California with the CNEL metric is discussed in Section 3.1.

[12] The calculation of the equations presented in Section 3 require that distance is provided. The DNL levels were calculated at 20 feet and then 50-foot intervals from 50 to 3,500 ft as provided in Section 2.2. The intervals were the same as those intervals in which measurement data was available for the UA.

Table 4. Estimated Extent of Noise Exposure from Landing pad per Number of Deliveries

Number of DNL Equivalent Deliveries Served by landing pad		Estimated Extents, feet, for				
Average Daily	Annual	DNL 45 dB	DNL 50 dB	DNL 55 dB	DNL 60 dB	DNL 65 dB
<= 1	<= 365	20	20	20	20	20
<= 5	<= 1,825	50	20	20	20	20
<= 10	<= 3,650	100	50	20	20	20
<= 15	<= 5,475	100	50	20	20	20
<= 20	<= 7,300	150	50	20	20	20
<= 40	<= 14,600	200	100	50	20	20
<= 60	<= 21,900	300	100	50	20	20
<= 80	<= 29,200	400	150	50	20	20
<= 100	<= 36,500	500	200	100	50	20
<= 120	<= 43,800	600	200	100	50	20
<= 140	<= 51,100	750	250	100	50	20
<= 160	<= 58,400	950	250	100	50	20
<= 180	<= 65,700	1400	300	100	50	20
<= 200	<= 73,000	Note c	300	150	50	20
<= 220	<= 80,300	Note c	350	150	50	20
<= 240	<= 87,600	Note c	350	150	50	20
<= 260	<= 94,900	Note c	400	150	50	20
<= 280	<= 102,200	Note c	400	150	100	50
<= 300	<= 109,500	Note c	450	200	100	50
<= 340	<= 124,100	Note c	500	200	100	50
<= 360	<= 131,400	Note c	550	200	100	50
<= 380	<= 138,700	Note c	600	200	100	50
<= 400	<= 146,000	Note c	600	200	100	50
<= 420	<= 153,300	Note c	650	250	100	50
<= 440	<= 160,600	Note c	750	250	100	50
<= 460	<= 167,900	Note c	800	250	100	50
<= 480	<= 175,200	Note c	850	250	100	50
<= 500	<= 182,500	Note c	900	250	100	50

Notes:
a) One delivery includes the outbound takeoff and inbound landing and is representative of two operations.
b) If a value for deliveries is not specifically defined in this table, use the next highest value. For example, if there are 50 average daily DNL Equivalent deliveries, use the entry for 60 average daily DNL Equivalent deliveries.
c) The DNL noise level noted extends more than 3,150 feet from the landing pad based on the level of operations specified as the aircraft continues along its en route flight path. En route results in Section 4.2 may be more applicable in these instances for determining noise levels.

4.2 Noise Exposure under En Route Paths

For en route conditions, the UA is expected to fly the same outbound flight path between the landing pad and the delivery point and inbound flight path back to the landing pad (Section 3.4.3). Therefore, each location under the en route path would be overflown twice for each delivery served by the respective overhead en route path.

Table 5 provides the estimated DNL for a location on the ground directly under an en route path for various counts of daily average DNL Equivalent deliveries. The en route noise calculated for each delivery includes both the inbound and outbound traversal of the en route path.

Table 5. Estimated DNL Directly Under En Route Flight Paths

Number of DNL Equivalent Deliveries Served by Route		DNL
Average Daily	Annual	
<= 1	<= 365	22.0
<= 5	<= 1,825	29.0
<= 10	<= 3,650	32.0
<= 15	<= 5,475	33.7
<= 20	<= 7,300	35.0
<= 40	<= 14,600	38.0
<= 60	<= 21,900	39.8
<= 80	<= 29,200	41.0
<= 100	<= 36,500	42.0
<= 120	<= 43,800	42.8
<= 140	<= 51,100	43.4
<= 160	<= 58,400	44.0
<= 180	<= 65,700	44.5
<= 200	<= 73,000	45.0
<= 220	<= 80,300	45.4
<= 240	<= 87,600	45.8
<= 260	<= 94,900	46.1
<= 280	<= 102,200	46.5
<= 300	<= 109,500	46.8
<= 340	<= 124,100	47.3
<= 360	<= 131,400	47.5
<= 380	<= 138,700	47.8
<= 400	<= 146,000	48.0
<= 420	<= 153,300	48.2
<= 440	<= 160,600	48.4
<= 460	<= 167,900	48.6
<= 480	<= 175,200	48.8
<= 500	<= 182,500	49.0

In some instances, the UA may overfly locations at operations levels that may differ from both an inbound and outbound traversal of the en route path by the UA as described above and presented in Table 5. For these circumstances, Table 6 presents the equations for calculating the estimated DNL for a receiver directly under a specified given number of DNL Equivalent average daily individual overflights, defined as N_o.

Table 6. Estimates DNL Directly Under Overflights, Maximum and Empty Weight

Altitude and configuration of Overflight and of Delivery		SEL for 1 Overflight (dB)	DNL for 1 Overflight between 7 AM and 10 PM (dB)	DNL equation for the number of DNL Equivalent Overflights
Altitude	Weight			
250 feet AGL	Empty	65.8	16.5	$10 \times \log_{10}(N_o) + 16.5$
250 feet AGL	Maximum	68.3	19.0	$10 \times \log_{10}(N_o) + 19.0$

Notes:
a) The DNL value for a given number of average DNL Equivalent Operations, N_o, can be found by using the equations associated with operation of the UA at a specified altitude and speed interval. In this case, one operation represents a single overflight.
b) All values in this table are for level flight at 31 knots

4.3 Noise Exposure for Operations at Delivery Point

Table 7 presents the estimated DNL values for a range of potential daily average DNL Equivalent delivery counts at a delivery point. Also included in Table 7 is the equation for calculating the estimated DNL for a specific number of daily average DNL Equivalent delivery counts at a delivery point, defined as N_d, for instances where the number of deliveries may fall between the range of presented delivery count intervals.

Figure 6 presents the minimum listener distance used for the development of Table 7. The minimum listener distance is 20 feet from the landing pad at the delivery point and corresponds to the "Perimeter for Non-Participants" identified by UPS-FF and reproduced in this report as Figure 2 and Figure 3.

Only the partial DNL values associated with the delivery vertical flight maneuvers are presented. In anticipated use, the value from Table 7 would be added using Equation (9) to the appropriate values for a UA flying to and from the delivery point at en route altitude, along with any other nearby en route operations.

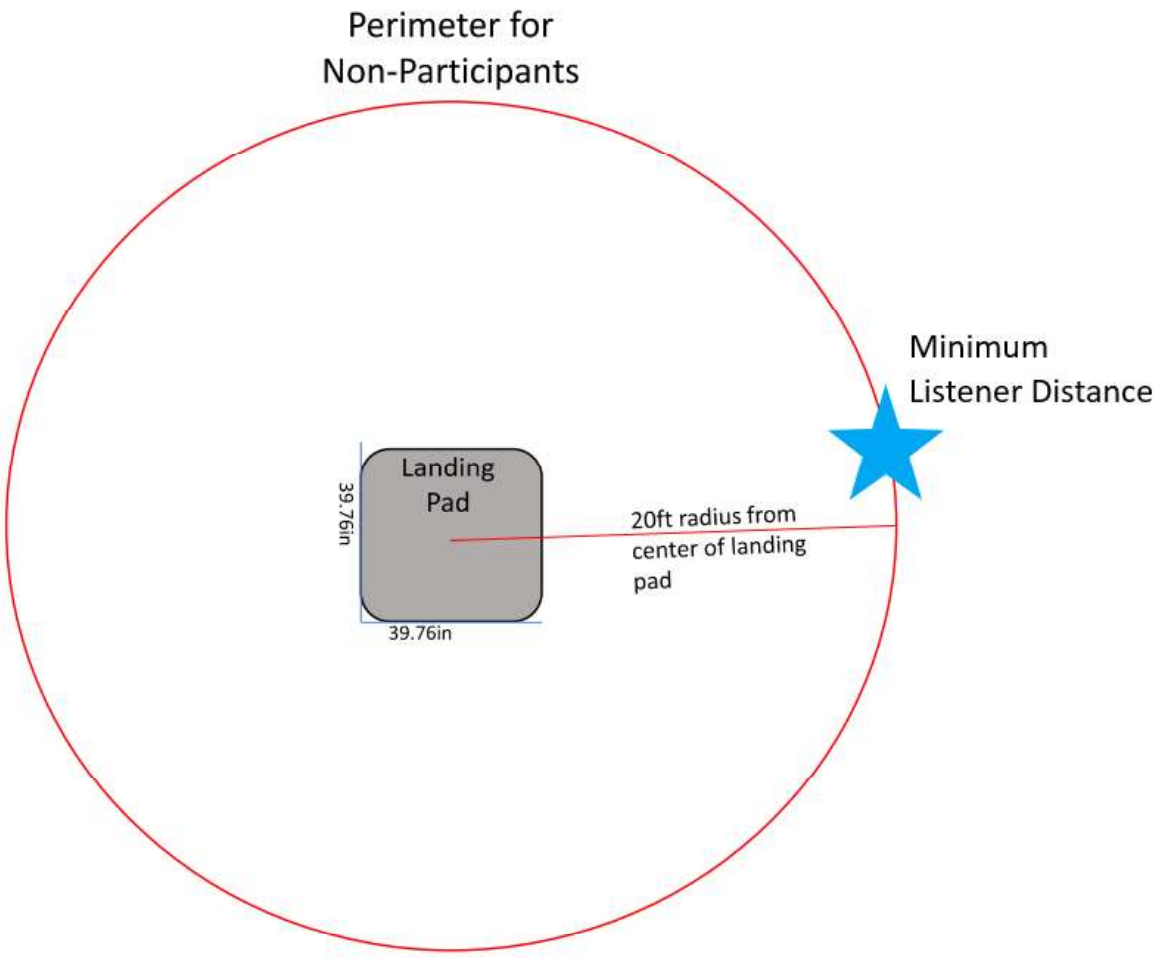

Figure 6: Representative Minimum Listener Distance Location Used for Table 7

Table 7. DNL at Delivery Point for Vertical Maneuvers

Number of DNL Equivalent Deliveries		Partial Estimated Delivery DNL of Vertical Maneuvers at Minimum Listener Distance
Average Daily	Annual	
<= 1	<= 365	40.7
<= 5	<= 1,825	47.7
<= 10	<= 3,650	50.7
<= 15	<= 5,475	52.5
<= 20	<= 7,300	53.7
<= 40	<= 14,600	56.8
<= 60	<= 21,900	58.5
<= 80	<= 29,200	59.8
<= 100	<= 36,500	60.7
<= 120	<= 43,800	61.5
<= 140	<= 51,100	62.2
<= 160	<= 58,400	62.8
<= 180	<= 65,700	63.3
<= 200	<= 73,000	63.7
<= 220	<= 80,300	64.2
<= 240	<= 87,600	64.5
<= 260	<= 94,900	64.9
<= 280	<= 102,200	65.2
<= 300	<= 109,500	65.5
<= 340	<= 124,100	66.0
<= 360	<= 131,400	66.3
<= 380	<= 138,700	66.5
<= 400	<= 146,000	66.8
<= 420	<= 153,300	67.0
<= 440	<= 160,600	67.2
<= 460	<= 167,900	67.4
<= 480	<= 175,200	67.5
<= 500	<= 182,500	67.7
N_d	N_d x 365	$10 \times \log_{10}(N_d) + 40.7$

Notes:
a) The DNL values presented in this table only reflect the UA conducting descent and climb flight maneuvers associated with a delivery. DNL values associated with en route flight to and from a landing pad to a delivery point associated with a delivery, or nearby en route overflights, should be added to these values utilizing the DNL levels presented in Table 5.
b) If a value for deliveries is not specifically defined in this table, use the next highest value. For example, if there are 50 average daily DNL Equivalent deliveries, use the entry for 60 average daily DNL Equivalent deliveries.
c) Partial Estimate DNL based on an assumed minimum listener distance of 20 feet from the landing pad. See Figure 6.

Attachment A

Federal Aviation Administration

Memorandum

Date: May 13, 2022

To: Donald Scata, Manager, Noise Division, Office of Environment and Energy (AEE-100)

From: Susumu Shirayama and Chris Hobbs, Noise Division, Office of Environment and Energy (AEE-100)

Subject: Estimated Noise Levels for Matternet Model M2 UA

This document presents an analysis of noise measurements of the Matternet Model M2 Unmanned Aircraft (UA) by J R Engineering (JRE), measured on June 2021 at Ells Field Airport near Willits, California. The purpose of the analysis is to provide estimates of expected sound exposure levels resulting from typical operations of the Model M2 UA[1] by Matternet, Inc. and provides the methods used to create the noise estimates.

1. Flight Profile and Segment Noise

The phases of a typical flight profile from takeoff to landing with an included delivery are listed in Table 1 for the Model M2 UA. Because the noise level of the UA for a given speed varies with weight, the aircraft configuration lists the vehicle weight for each phase of flight. The noise measurements at Willits were made with the UA at its maximum takeoff weight (29.1 lbs/13.2 kg) and empty weight (24.7 lbs/11.2 kg) while in level flyover. The vehicle was only measured hovering at maximum takeoff weight. The measurements showed that noise from the vehicle was greatest at maximum takeoff weight during level flyover; thus, using the maximum weight for all phases of flight where the UA is carrying a package is a conservative estimate of the vehicle noise as compared to the same flight phases with the UA carrying a lighter package.

As shown below, the takeoff and landing area at the UA's point of origin and delivery location will have the same estimated noise as a function of distance from the landing pads (LPs).

Table 1. Phases of Flight for Typical Flight Profile of Model M2 UA

Phase of Flight	Description	Configuration
Takeoff	Launch from ground to operational altitude (250 ft)	Max weight (carrying package for delivery)
En Route Outbound	Flying at operational altitude and cruise speed (31 kts)	Max weight
Descent, Landing, and Delivery	Vertical descent from operational altitude to the ground; Full stop to deliver a package; Vertical ascent to operational altitude	Max weight on descent/empty weight on ascent
En Route Inbound	Flying at operational altitude and cruise speed	Empty weight
Landing	Land by vertical descent from operational altitude	Empty weight

The method used to estimate the noise on the ground during each phase of flight is listed below followed by suggestions on how to combine noise levels to represent noise for the entire flight. The methodology presented for estimating the noise for each flight phase uses the best available information from the certification data for the Model M2 UA and represents a conservative estimate of the noise levels resulting from operations of this UA.

1.1. Takeoff and Landing Area Noise

There are two flight activities that generate noise in the vicinity of the takeoff and landing areas. The Model M2 will climb from the ground vertically to an operational altitude of 250 feet above ground level (AGL) in 20 seconds, then begin transit to the delivery location. After completing delivery, the UA returns from the delivery location at 250 feet AGL and descends vertically to the ground at the LP. During landing, the UA approaches to the edge of LP approximately 16 feet from the center of the LP, descends vertically to 165 feet AGL in 13 seconds and waits for approval to land. Once landing approval is received, the UA moves horizontally to the center of LP at 165 feet AGL descends vertically from 165 feet to 33 feet AGL in 18 seconds, and lands on the ground from 33 feet AGL in 25 seconds. Table 2 details the complete takeoff and landing procedures.

Table 2. Model M2 UA Takeoff and Landing Profile Details

Flight Segment	Flight Description	Altitude (ft AGL)	Ground Speed (kts)	Duration (s)
Takeoff	Ascent to cruise altitude	0 ascend to 250	0	20
Landing	Descent for landing	250 descend to 165	0	13
Landing	Holding for approval to land	Hover at 165	0	Up to 90
Landing	Move to the center of LP	Lateral move of 16 ft	<4	3
Landing	Descent	165 descent to 33	0	18
Landing	Descent to land	33 descent to 0	0	25

To estimate the sound exposure level (L_{AE}) at takeoff and landing areas, measurements of the noise emissions of the Model M2 UA were made when it was at maximum weight and hovering at 16.5 feet

AGL and 20 feet laterally from the microphone positions shown in Fig. 1. Each recording lasted for approximately 30 seconds and began after the UA was in a steady condition.

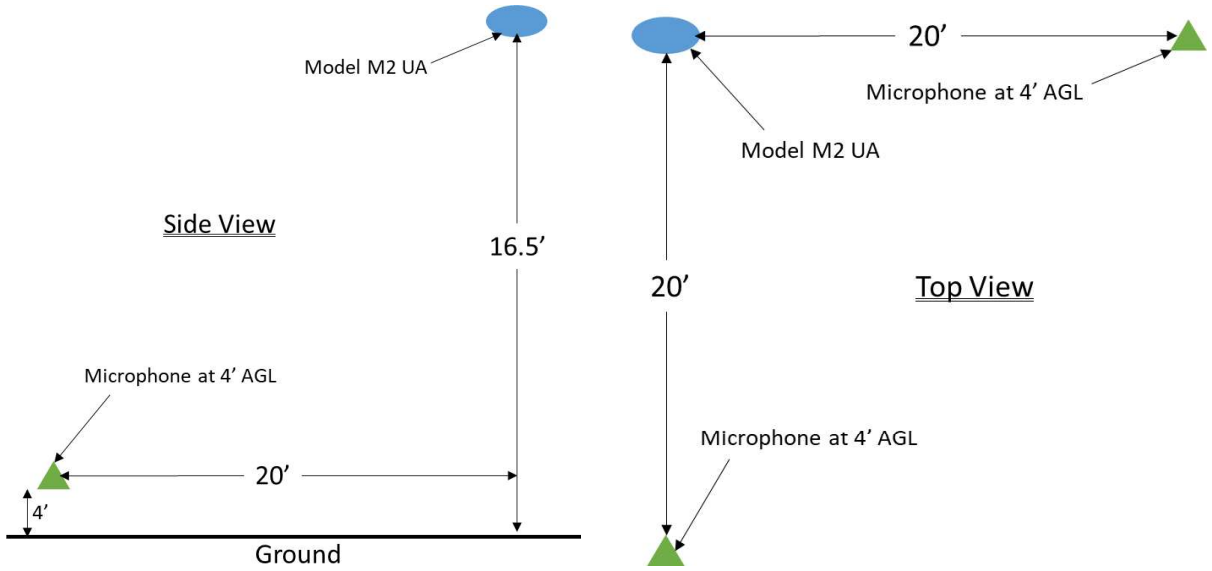

Figure 1. Microphone locations for hover measurements shown in green when Model M2 UA hovered above the ground

The average sound pressure level was calculated at the microphone for two separate recordings. The Model M2 UA rotated by 180 degrees between the recordings so that the two microphones captured the noise emissions from the cardinal points around the vehicle (0 and 90 degrees for the first recording; 180 and 270 degrees for the second recording). The average sound pressure level was normalized to a distance of 70.7 ft using spherical spreading from the actual distances from the Model M2 UA to each microphone for each recording. The results from the four recordings were averaged together to generate the result presented in Table 3. It is important to note that these measurements are all at the same relative angle from the bottom of the UA. It is expected that this is a conservative estimate of the noise due to the fact that broadband noise from the rotors is being captured; whereas, the noise emitted closer to the plane of the rotors would be dominated by blade passage frequency which is lower than the broadband frequency range and would consequently have a lower A-weighted sound level.

Table 3. Average Sound Pressure Level of Model M2 UA while Hovering

Sound Pressure Level (dBA)	Distance (ft)	Aircraft Configuration
65.3	70.7	Maximum Weight

In order to estimate the noise levels from the UA, the following assumptions have been made.

Sound transmission between the noise source and the receiver is solely a function of distance with no additional atmospheric attenuation or ground effects.

In this analysis, the level in Table 3 represents a reference sound pressure level calculated for the reference distance based on an average of the measurements. This reference level will be adjusted for spherical spreading to develop the levels at other distances for each configuration of the UA. For a

stationary point source, the spherical spreading relationship of the sound pressure level (L_i) at distance D_i from the reference sound pressure level (L_R) measured at a reference distance D_R is given by Equation 1.

$$L_i = L_R + 20 \log_{10}\left(\frac{D_R}{D_i}\right), \; dB \tag{1}$$

Sound transmits equally in all directions.

The level in Table 3 is based on the measurement locations depicted in Figure 1 while the UA was hovering at approximately 16.5 ft AGL. The assumption that the UA is an omnidirectional sound source implies that the same sound levels would have been measured at any point on the surface of a sphere centered on the UA.

To estimate the sound exposure level at the takeoff and landing areas including the takeoff and landing for a single flight, each vertical segment is evenly divided into stations (blue ovals) as illustrated in Figure 2. The hover noise level noted in Table 3 is spherically spread from each station to a point on the ground a fixed distance from the LP. Using the appropriate durations from Table 2, the sound exposure level is calculated assuming the UA spent equal amounts of time at each station (blue oval) along the segment. The translation at 165 ft AGL of the UA during delivery from the offset (16 feet) to directly above the LP was represented by a single station midway on the horizontal segment with a duration of 3 seconds.

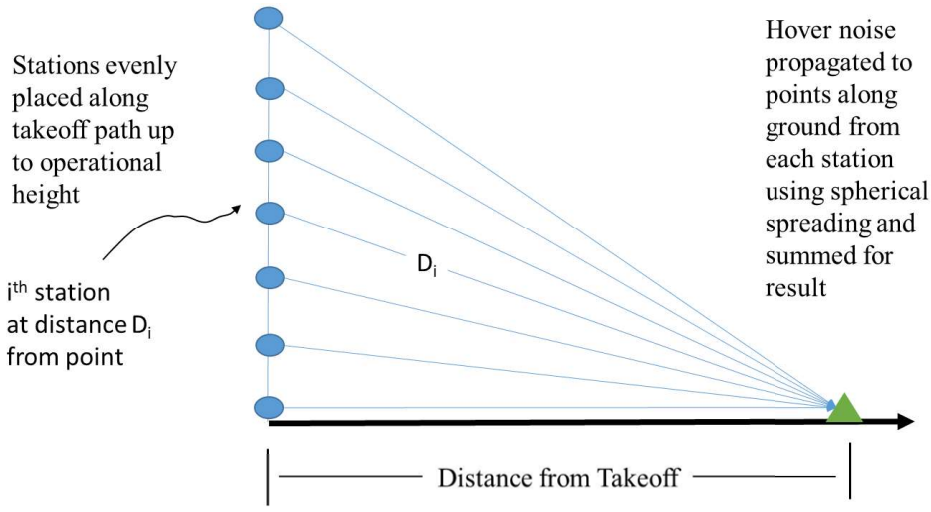

Figure 2. Graphical representation of how hover noise is used to simulate takeoff noise.

The estimates of the sound exposure level for the landing assumes the initial descent by the UA occurred when the UA arrives at the edge of the LP, which is 16 feet from the center of the LP as shown in Figure 3. Note that the UA will be 16 feet closer to the receiver for the initial descent. Estimating the noise levels in this manner is conservative as the entire flight segment will be closer to representative receiver points on the ground.

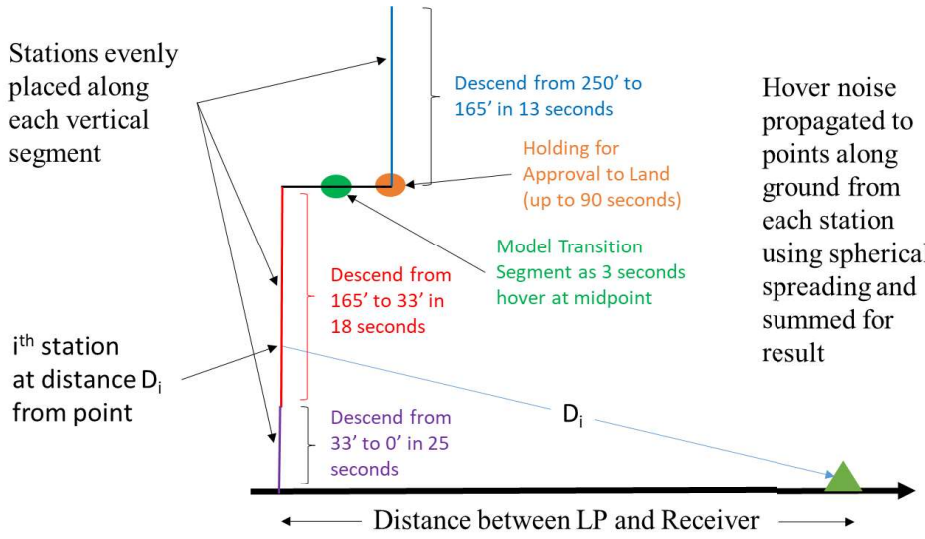

Figure 3. Graphical representation of how hover noise is used to simulate landing noise

The sound exposure level ($L_{AEi}(D_i)$) as a function of distance (D_i), from the UA at the ith station shown in Fig. 2 is the product of the Sound Pressure Level (L_i) spherically spread to a distance D_i and the time the UA was at the ith station (dt) using Equation 2:

$$L_{AEi}(D_i) = 10\log_{10}\left(10^{(.1L_i)}dt\right),\ dB \tag{2}$$

To calculate the sound exposure level for the flight activities at the takeoff and landing areas, at the distance r as the distance between LP and receiver, one needs only sum the levels calculated from each station according to Equation 3.

$$L_{AE}(r) = 10\log_{10}\left(\sum_{i}^{n} 10^{.1L_{AEi}(r)}\right),\ dB \tag{3}$$

Where n = number of stations used to simulate the vertical segments.

The UA landing and takeoff profiles are the same at both the delivery location and the point of origin; furthermore, the noise estimate being used is independent of whether the UA is at maximum or empty weight. As such, the noise estimate at distances from the takeoff and landing phases of the flight profile are the same at both origin and delivery locations. Table 4 contains the combined noise estimates of takeoff and landing phases of the flight profile as a function of distance from the landing pad.

Table 4. Estimate of Sound Exposure Level at the Takeoff and Landing areas for Matternet Model M2 UA

Distance from Takeoff (ft)	L_{AE} (dBA)	Distance from Takeoff (ft)	L_{AE} (dBA)	Distance from Takeoff (ft)	L_{AE} (dBA)	Distance from Takeoff (ft)	L_{AE} (dBA)
20	90.1	900	65.6	1800	59.6	2700	56.1
50	84.7	950	65.2	1850	59.4	2750	56.0
100	81.1	1000	64.7	1900	59.2	2800	55.8
150	79.0	1050	64.3	1950	59.0	2850	55.7
200	77.3	1100	63.9	2000	58.7	2900	55.5
250	75.8	1150	63.5	2050	58.5	2950	55.4
300	74.5	1200	63.2	2100	58.3	3000	55.2
350	73.4	1250	62.8	2150	58.1	3050	55.1
400	72.3	1300	62.5	2200	57.9	3100	54.9
450	71.4	1350	62.1	2250	57.7	3150	54.8
500	70.5	1400	61.8	2300	57.5	3200	54.6
550	69.8	1450	61.5	2350	57.3	3250	54.5
600	69.0	1500	61.2	2400	57.1	3300	54.4
650	68.4	1550	60.9	2450	57.0	3350	54.2
700	67.8	1600	60.7	2500	56.8	3400	54.1
750	67.2	1650	60.4	2550	56.6	3450	54.0
800	66.6	1700	60.1	2600	56.5	3500	53.9
850	66.1	1750	59.9	2650	56.3		

Note:
The distance of 20 feet represents a minimum clearance distance at a landing site.

1.2. En Route Noise at Maximum and Empty Weights

The Model M2 UA was measured in level overflights at max weight and empty weight over a microphone. The L_{AE} for each pass was normalized to the reference altitude and airspeed listed in Table 5. In particular, the sound exposure level adjustment for the altitude defined in 14 CFR Part 36 for a moving aircraft, is presented here as Equation 4.

$$\Delta J_1 = 12.5 \times \log_{10}\left(\frac{H_A}{H_T}\right), dB \quad (4)$$

Where ΔJ_1 is the quantity in decibels that must be algebraically added to the measured L_{AE} to adjust for a level flight path at an altitude differing from the measured altitude; H_A is the height, in feet, of the vehicle when directly over the noise measurement point; H_T is reference height; and the constant (12.5) accounts for the effects on spherical spreading and duration from the off-reference altitude.

The sound exposure level adjustment for speed, as defined in 14 CFR Part 36, is presented here as Equation 5.

$$\Delta J_3 = 10 \times \log_{10}\left(\frac{V_{RA}}{V_R}\right),\ dB \quad (5)$$

Where ΔJ_3 is the quantity in decibels that must be algebraically added to the measured L_{AE} noise level to correct for the influence of the adjustment to the reference speed on the duration of the measured flyover event as perceived at the microphone, V_R is the reference speed, and V_{RA} is the measured speed.

Table 5. Estimates of En Route Noise of Model M2 UA

Aircraft Configuration	Reference Air Speed (kts)	Reference Altitude (ft AGL)	L_{AE} (dBA)
Max Weight	35.1	250	67.8
Empty Weight	35.1	250	65.3

1.3. Delivery Noise

The parameters for the delivery portion of a typical flight profile for the Model M2 UA are the same as the flight profiles presented in Table 2. The difference would be the landing profile comes first and the takeoff profile to follow. The sound exposure levels presented in Table 4 would be applicable to delivery noise.

2. Conclusion

The information and noise levels presented in this document represent conservative estimates of the noise made by the Matternet Model M2 UA during each segment of typical flight profiles. In order to estimate the sound exposure level at any point on the ground, a calculation of the contributions from each flight segment should be combined to arrive at a final estimate of cumulative noise exposure. In order to calculate the maximum sound level from the takeoff, delivery, or landing portions of the flight profile, it is recommended that the sound pressure level from the appropriate aircraft configuration be used at the lowest altitude of the flight segment. Due to the directivity of the UA source noise and the excessive attenuation of ground to ground propagation, this estimate of the sound exposure level will most likely be an over estimate. However, it is FAA's position that this approach is conservative and appropriate for use in estimating noise exposure to inform Federal actions related to UA operations where relatively low levels of UA operations are expected.

Appendix C
AEDT Block Group Data

Appendix C: AEDT Block Group Data

The Farm Operating Area Block Group ACS 2020 5-Year Estimate Data

STATE	COUNTY	NAME	Population Total	Population Minority	Percent Minority	Population Low Income	Percent Low income
KY	Jefferson County	Block Group 4, Census Tract 116.05, Jefferson County, Kentucky	1439	344	23.9	0	0

Jefferson County (Reference Community) Block Group ACS 2020 5-Year Estimate Data

STATE	COUNTY	NAME	Population Total	Population Minority	Percent Minority	Population Low Income	Percent Low income
KY	Jefferson County	Block Group 1, Census Tract 98, Jefferson County, Kentucky	1020	42	4.1	75	7.4
KY	Jefferson County	Block Group 1, Census Tract 65, Jefferson County, Kentucky	927	641	69.1	492	53.9
KY	Jefferson County	Block Group 1, Census Tract 110.08, Jefferson County, Kentucky	816	429	52.6	75	9.2
KY	Jefferson County	Block Group 3, Census Tract 38, Jefferson County, Kentucky	600	109	18.2	0	0
KY	Jefferson County	Block Group 1, Census Tract 103.23, Jefferson County, Kentucky	1360	277	20.4	74	5.4
KY	Jefferson County	Block Group 4, Census Tract 97, Jefferson County, Kentucky	696	13	1.9	11	1.6
KY	Jefferson County	Block Group 1, Census Tract 18, Jefferson County, Kentucky	1207	1190	98.6	829	68.7
KY	Jefferson County	Block Group 4, Census Tract 36, Jefferson County, Kentucky	2131	1632	76.6	1462	68.6
KY	Jefferson County	Block Group 1, Census Tract 16, Jefferson County, Kentucky	936	853	91.1	301	32.2
KY	Jefferson County	Block Group 4, Census Tract 44, Jefferson County, Kentucky	565	287	50.8	47	8.3
KY	Jefferson County	Block Group 1, Census Tract 119.08, Jefferson County, Kentucky	1812	1280	70.6	343	18.9
KY	Jefferson County	Block Group 4, Census Tract 116.05, Jefferson County, Kentucky	1439	344	23.9	0	0
KY	Jefferson County	Block Group 3, Census Tract 109.01, Jefferson County, Kentucky	539	167	31	0	0
KY	Jefferson County	Block Group 2, Census Tract 69, Jefferson County, Kentucky	1033	83	8	55	7
KY	Jefferson County	Block Group 3, Census Tract 93, Jefferson County, Kentucky	1215	195	16	73	6
KY	Jefferson County	Block Group 3, Census Tract 124.09, Jefferson County, Kentucky	857	194	22.6	60	7
KY	Jefferson County	Block Group 1, Census Tract 90.01, Jefferson County, Kentucky	841	682	81.1	231	27.5
KY	Jefferson County	Block Group 1, Census Tract 12, Jefferson County, Kentucky	1420	1420	100	379	26.7
KY	Jefferson County	Block Group 1, Census Tract 24.02, Jefferson County, Kentucky	1087	440	40.5	180	16.6
KY	Jefferson County	Block Group 3, Census Tract 125.03, Jefferson County, Kentucky	1026	456	44.4	512	49.9
KY	Jefferson County	Block Group 4, Census Tract 114.05, Jefferson County, Kentucky	743	544	73.2	348	46.8
KY	Jefferson County	Block Group 1, Census Tract 62, Jefferson County, Kentucky	787	462	58.7	55	7
KY	Jefferson County	Block Group 3, Census Tract 105, Jefferson County, Kentucky	1517	220	14.5	153	10.1
KY	Jefferson County	Block Group 2, Census Tract 85, Jefferson County, Kentucky	753	67	8.9	91	12.1
KY	Jefferson County	Block Group 3, Census Tract 49, Jefferson County, Kentucky	3271	1438	44	196	22.7
KY	Jefferson County	Block Group 1, Census Tract 100.04, Jefferson County, Kentucky	807	120	14.9	16	2.1
KY	Jefferson County	Block Group 2, Census Tract 113.01, Jefferson County, Kentucky	1181	1094	92.6	182	15.4
KY	Jefferson County	Block Group 5, Census Tract 121.09, Jefferson County, Kentucky	1638	388	23.7	296	18.1
KY	Jefferson County	Block Group 3, Census Tract 103.19, Jefferson County, Kentucky	1216	421	34.6	74	6.1
KY	Jefferson County	Block Group 3, Census Tract 23, Jefferson County, Kentucky	536	229	42.7	140	26.2
KY	Jefferson County	Block Group 3, Census Tract 100.08, Jefferson County, Kentucky	1432	671	46.9	87	6.1
KY	Jefferson County	Block Group 4, Census Tract 124.07, Jefferson County, Kentucky	1919	649	33.8	53	2.8
KY	Jefferson County	Block Group 2, Census Tract 106.02, Jefferson County, Kentucky	1052	692	65.8	301	28.6
KY	Jefferson County	Block Group 4, Census Tract 38, Jefferson County, Kentucky	1169	309	26.4	228	19.5
KY	Jefferson County	Block Group 2, Census Tract 103.23, Jefferson County, Kentucky	1298	158	12.2	54	4.2
KY	Jefferson County	Block Group 4, Census Tract 100.01, Jefferson County, Kentucky	560	111	19.8	24	4.3
KY	Jefferson County	Block Group 2, Census Tract 16, Jefferson County, Kentucky	1083	999	92.2	154	14.2
KY	Jefferson County	Block Group 3, Census Tract 76.03, Jefferson County, Kentucky	469	65	13.9	8	1.7
KY	Jefferson County	Block Group 5, Census Tract 71.02, Jefferson County, Kentucky	1375	461	33.5	172	12.5
KY	Jefferson County	Block Group 2, Census Tract 6, Jefferson County, Kentucky	706	680	96.3	206	29.2
KY	Jefferson County	Block Group 2, Census Tract 88, Jefferson County, Kentucky	874	96	11	56	6.5
KY	Jefferson County	Block Group 1, Census Tract 45, Jefferson County, Kentucky	1546	825	53.4	269	17.5
KY	Jefferson County	Block Group 1, Census Tract 2.02, Jefferson County, Kentucky	974	190	19.5	223	28.8
KY	Jefferson County	Block Group 2, Census Tract 98, Jefferson County, Kentucky	977	18	1.8	90	9.2
KY	Jefferson County	Block Group 5, Census Tract 36, Jefferson County, Kentucky	628	311	49.5	94	15
KY	Jefferson County	Block Group 2, Census Tract 101.03, Jefferson County, Kentucky	541	12	2.2	39	7.2
KY	Jefferson County	Block Group 2, Census Tract 124.06, Jefferson County, Kentucky	1830	389	21.3	99	5.4
KY	Jefferson County	Block Group 2, Census Tract 103.14, Jefferson County, Kentucky	2576	348	13.5	207	8.1
KY	Jefferson County	Block Group 1, Census Tract 91.03, Jefferson County, Kentucky	1426	674	47.3	292	20.5
KY	Jefferson County	Block Group 1, Census Tract 119.07, Jefferson County, Kentucky	1355	270	19.9	84	6.2
KY	Jefferson County	Block Group 1, Census Tract 70, Jefferson County, Kentucky	1171	86	7.3	62	5.3
KY	Jefferson County	Block Group 1, Census Tract 116.06, Jefferson County, Kentucky	1258	137	10.9	102	8.1
KY	Jefferson County	Block Group 1, Census Tract 9, Jefferson County, Kentucky	997	994	99.7	462	46.3
KY	Jefferson County	Block Group 5, Census Tract 109.01, Jefferson County, Kentucky	1482	1004	67.7	313	21.1
KY	Jefferson County	Block Group 3, Census Tract 41, Jefferson County, Kentucky	747	315	42.2	112	15
KY	Jefferson County	Block Group 4, Census Tract 109.01, Jefferson County, Kentucky	1004	277	27.6	195	19.8
KY	Jefferson County	Block Group 2, Census Tract 118, Jefferson County, Kentucky	765	398	52	350	45.8
KY	Jefferson County	Block Group 5, Census Tract 114.05, Jefferson County, Kentucky	1922	1020	53.1	77	4.1
KY	Jefferson County	Block Group 1, Census Tract 53, Jefferson County, Kentucky	2708	769	28.4	578	46.5

KY	Jefferson County	Block Group 3, Census Tract 27, Jefferson County, Kentucky	1611	1556	96.6	847	52.6
KY	Jefferson County	Block Group 2, Census Tract 24.02, Jefferson County, Kentucky	1669	1573	94.2	623	37.3
KY	Jefferson County	Block Group 1, Census Tract 108, Jefferson County, Kentucky	694	21	3	35	5.1
KY	Jefferson County	Block Group 1, Census Tract 126.03, Jefferson County, Kentucky	1544	1046	67.7	316	20.5
KY	Jefferson County	Block Group 1, Census Tract 82.01, Jefferson County, Kentucky	862	52	6	38	4.4
KY	Jefferson County	Block Group 1, Census Tract 115.16, Jefferson County, Kentucky	1992	553	27.8	162	8.1
KY	Jefferson County	Block Group 2, Census Tract 62, Jefferson County, Kentucky	1859	1298	69.8	685	37.4
KY	Jefferson County	Block Group 1, Census Tract 51, Jefferson County, Kentucky	809	483	59.7	210	26
KY	Jefferson County	Block Group 2, Census Tract 36, Jefferson County, Kentucky	333	305	91.6	48	14.4
KY	Jefferson County	Block Group 1, Census Tract 106.01, Jefferson County, Kentucky	1848	108	5.8	124	6.7
KY	Jefferson County	Block Group 1, Census Tract 121.08, Jefferson County, Kentucky	1872	453	24.2	151	8.2
KY	Jefferson County	Block Group 4, Census Tract 117.07, Jefferson County, Kentucky	666	166	24.9	19	2.9
KY	Jefferson County	Block Group 1, Census Tract 111.14, Jefferson County, Kentucky	1137	494	43.4	130	11.4
KY	Jefferson County	Block Group 3, Census Tract 111.18, Jefferson County, Kentucky	998	348	34.9	13	1.3
KY	Jefferson County	Block Group 4, Census Tract 115.08, Jefferson County, Kentucky	2526	1615	63.9	92	4
KY	Jefferson County	Block Group 2, Census Tract 121.05, Jefferson County, Kentucky	1430	137	9.6	2	0.1
KY	Jefferson County	Block Group 2, Census Tract 122.03, Jefferson County, Kentucky	1001	33	3.3	16	1.8
KY	Jefferson County	Block Group 1, Census Tract 21, Jefferson County, Kentucky	933	341	36.5	336	36.6
KY	Jefferson County	Block Group 2, Census Tract 79, Jefferson County, Kentucky	929	50	5.4	68	7.3
KY	Jefferson County	Block Group 3, Census Tract 83, Jefferson County, Kentucky	1077	54	5	80	7.6
KY	Jefferson County	Block Group 1, Census Tract 122.05, Jefferson County, Kentucky	2629	923	35.1	1178	44.9
KY	Jefferson County	Block Group 3, Census Tract 59.02, Jefferson County, Kentucky	546	394	72.2	176	32.2
KY	Jefferson County	Block Group 3, Census Tract 103.20, Jefferson County, Kentucky	1108	502	45.3	36	3.2
KY	Jefferson County	Block Group 3, Census Tract 94.02, Jefferson County, Kentucky	743	13	1.7	0	0
KY	Jefferson County	Block Group 2, Census Tract 17, Jefferson County, Kentucky	435	387	89	171	39.3
KY	Jefferson County	Block Group 1, Census Tract 38, Jefferson County, Kentucky	748	208	27.8	154	20.8
KY	Jefferson County	Block Group 1, Census Tract 103.22, Jefferson County, Kentucky	586	108	18.4	0	0
KY	Jefferson County	Block Group 2, Census Tract 71.02, Jefferson County, Kentucky	503	10	2	204	40.6
KY	Jefferson County	Block Group 3, Census Tract 7, Jefferson County, Kentucky	921	760	82.5	530	57.5
KY	Jefferson County	Block Group 3, Census Tract 100.07, Jefferson County, Kentucky	2085	251	12	138	6.7
KY	Jefferson County	Block Group 2, Census Tract 101.02, Jefferson County, Kentucky	1788	156	8.7	4	0.2
KY	Jefferson County	Block Group 2, Census Tract 99, Jefferson County, Kentucky	764	94	12.3	51	6.7
KY	Jefferson County	Block Group 1, Census Tract 126.05, Jefferson County, Kentucky	1675	1259	75.2	301	18
KY	Jefferson County	Block Group 1, Census Tract 46, Jefferson County, Kentucky	952	413	43.4	66	7
KY	Jefferson County	Block Group 3, Census Tract 103.18, Jefferson County, Kentucky	1231	103	8.4	29	2.4
KY	Jefferson County	Block Group 4, Census Tract 4, Jefferson County, Kentucky	919	872	94.9	237	25.8
KY	Jefferson County	Block Group 4, Census Tract 100.06, Jefferson County, Kentucky	772	63	8.2	52	6.7
KY	Jefferson County	Block Group 2, Census Tract 68, Jefferson County, Kentucky	668	35	5.2	79	12.3
KY	Jefferson County	Block Group 2, Census Tract 15, Jefferson County, Kentucky	896	896	100	156	17.4
KY	Jefferson County	Block Group 3, Census Tract 109.02, Jefferson County, Kentucky	970	191	19.7	168	17.3
KY	Jefferson County	Block Group 1, Census Tract 107.08, Jefferson County, Kentucky	990	114	11.5	39	3.9
KY	Jefferson County	Block Group 2, Census Tract 89, Jefferson County, Kentucky	1459	41	2.8	83	5.7
KY	Jefferson County	Block Group 2, Census Tract 44, Jefferson County, Kentucky	1267	371	29.3	301	23.8
KY	Jefferson County	Block Group 2, Census Tract 116.05, Jefferson County, Kentucky	1878	160	8.5	33	1.8
KY	Jefferson County	Block Group 1, Census Tract 124.07, Jefferson County, Kentucky	923	172	18.6	91	9.9
KY	Jefferson County	Block Group 2, Census Tract 119.04, Jefferson County, Kentucky	1308	261	20	175	13.5
KY	Jefferson County	Block Group 1, Census Tract 110.07, Jefferson County, Kentucky	1460	1038	71.1	567	41.6
KY	Jefferson County	Block Group 1, Census Tract 91.06, Jefferson County, Kentucky	1685	361	21.4	235	13.9
KY	Jefferson County	Block Group 1, Census Tract 124.09, Jefferson County, Kentucky	1038	143	13.8	132	12.7
KY	Jefferson County	Block Group 2, Census Tract 10, Jefferson County, Kentucky	633	619	97.8	154	24.3
KY	Jefferson County	Block Group 1, Census Tract 112.02, Jefferson County, Kentucky	1670	1216	72.8	344	22.4
KY	Jefferson County	Block Group 1, Census Tract 109.01, Jefferson County, Kentucky	691	23	3.3	35	5.5
KY	Jefferson County	Block Group 1, Census Tract 111.12, Jefferson County, Kentucky	1754	411	23.4	76	4.3
KY	Jefferson County	Block Group 3, Census Tract 43.01, Jefferson County, Kentucky	1102	1045	94.8	437	39.7
KY	Jefferson County	Block Group 1, Census Tract 30, Jefferson County, Kentucky	1514	1345	88.8	1205	84.9
KY	Jefferson County	Block Group 3, Census Tract 114.06, Jefferson County, Kentucky	2408	1328	55.1	348	14.5
KY	Jefferson County	Block Group 2, Census Tract 114.05, Jefferson County, Kentucky	783	783	100	91	11.6
KY	Jefferson County	Block Group 2, Census Tract 115.17, Jefferson County, Kentucky	868	282	32.5	10	1.2
KY	Jefferson County	Block Group 1, Census Tract 115.15, Jefferson County, Kentucky	726	0	0	70	9.6
KY	Jefferson County	Block Group 1, Census Tract 117.09, Jefferson County, Kentucky	1082	55	5.1	13	1.2
KY	Jefferson County	Block Group 1, Census Tract 24.01, Jefferson County, Kentucky	1001	865	86.4	533	53.2
KY	Jefferson County	Block Group 3, Census Tract 115.17, Jefferson County, Kentucky	1054	74	7	8	0.8
KY	Jefferson County	Block Group 2, Census Tract 111.09, Jefferson County, Kentucky	1147	560	48.8	26	2.3
KY	Jefferson County	Block Group 4, Census Tract 111.14, Jefferson County, Kentucky	1411	546	38.7	103	7.3
KY	Jefferson County	Block Group 2, Census Tract 126.04, Jefferson County, Kentucky	1129	486	43	28	2.5
KY	Jefferson County	Block Group 1, Census Tract 117.07, Jefferson County, Kentucky	2104	1084	51.5	261	12.4
KY	Jefferson County	Block Group 3, Census Tract 121.09, Jefferson County, Kentucky	1098	166	15.1	164	15.1
KY	Jefferson County	Block Group 2, Census Tract 100.01, Jefferson County, Kentucky	956	76	7.9	38	4
KY	Jefferson County	Block Group 2, Census Tract 78, Jefferson County, Kentucky	936	132	14.1	121	12.9
KY	Jefferson County	Block Group 2, Census Tract 56, Jefferson County, Kentucky	1061	904	85.2	440	41.5

KY	Jefferson County	Block Group 3, Census Tract 69, Jefferson County, Kentucky	255	12	4.7	14	5.5
KY	Jefferson County	Block Group 1, Census Tract 105, Jefferson County, Kentucky	967	0	0	9	0.9
KY	Jefferson County	Block Group 3, Census Tract 116.03, Jefferson County, Kentucky	937	138	14.7	16	1.7
KY	Jefferson County	Block Group 3, Census Tract 122.06, Jefferson County, Kentucky	1791	538	30	434	25.5
KY	Jefferson County	Block Group 3, Census Tract 81, Jefferson County, Kentucky	1178	104	8.8	154	13.1
KY	Jefferson County	Block Group 1, Census Tract 52, Jefferson County, Kentucky	1204	162	13.5	280	23.3
KY	Jefferson County	Block Group 1, Census Tract 115.09, Jefferson County, Kentucky	587	218	37.1	92	16.1
KY	Jefferson County	Block Group 1, Census Tract 76.03, Jefferson County, Kentucky	1223	445	36.4	163	13.3
KY	Jefferson County	Block Group 1, Census Tract 111.16, Jefferson County, Kentucky	1158	431	37.2	44	4.1
KY	Jefferson County	Block Group 2, Census Tract 65, Jefferson County, Kentucky	615	196	31.9	253	41.1
KY	Jefferson County	Block Group 4, Census Tract 113.02, Jefferson County, Kentucky	747	323	43.2	17	2.3
KY	Jefferson County	Block Group 1, Census Tract 49, Jefferson County, Kentucky	1106	463	41.9	285	25.8
KY	Jefferson County	Block Group 2, Census Tract 110.08, Jefferson County, Kentucky	1634	481	29.4	91	5.6
KY	Jefferson County	Block Group 3, Census Tract 71.02, Jefferson County, Kentucky	1470	676	46	188	13
KY	Jefferson County	Block Group 1, Census Tract 8, Jefferson County, Kentucky	1098	1077	98.1	241	21.9
KY	Jefferson County	Block Group 3, Census Tract 97, Jefferson County, Kentucky	764	15	2	6	0.8
KY	Jefferson County	Block Group 3, Census Tract 110.03, Jefferson County, Kentucky	824	354	43	280	34
KY	Jefferson County	Block Group 2, Census Tract 103.16, Jefferson County, Kentucky	704	114	16.2	38	5.4
KY	Jefferson County	Block Group 1, Census Tract 100.08, Jefferson County, Kentucky	668	106	15.9	85	12.7
KY	Jefferson County	Block Group 1, Census Tract 2.01, Jefferson County, Kentucky	868	175	20.2	425	49
KY	Jefferson County	Block Group 2, Census Tract 97, Jefferson County, Kentucky	531	22	4.1	19	4.4
KY	Jefferson County	Block Group 2, Census Tract 107.02, Jefferson County, Kentucky	999	547	54.8	52	5.2
KY	Jefferson County	Block Group 2, Census Tract 126.05, Jefferson County, Kentucky	723	417	57.7	139	22.2
KY	Jefferson County	Block Group 5, Census Tract 4, Jefferson County, Kentucky	879	734	83.5	298	34.9
KY	Jefferson County	Block Group 3, Census Tract 110.05, Jefferson County, Kentucky	1319	843	63.9	263	19.9
KY	Jefferson County	Block Group 3, Census Tract 15, Jefferson County, Kentucky	1552	1485	95.7	703	45.3
KY	Jefferson County	Block Group 3, Census Tract 116.05, Jefferson County, Kentucky	2632	351	13.3	146	5.5
KY	Jefferson County	Block Group 1, Census Tract 115.14, Jefferson County, Kentucky	1365	237	17.4	141	10.3
KY	Jefferson County	Block Group 3, Census Tract 75.02, Jefferson County, Kentucky	2126	129	6.1	164	8
KY	Jefferson County	Block Group 2, Census Tract 107.08, Jefferson County, Kentucky	1395	358	25.7	180	13.1
KY	Jefferson County	Block Group 1, Census Tract 69, Jefferson County, Kentucky	1063	303	28.5	135	12.7
KY	Jefferson County	Block Group 3, Census Tract 44, Jefferson County, Kentucky	1075	456	42.4	320	29.8
KY	Jefferson County	Block Group 1, Census Tract 124.10, Jefferson County, Kentucky	2958	690	23.3	376	12.7
KY	Jefferson County	Block Group 4, Census Tract 93, Jefferson County, Kentucky	718	24	3.3	29	4.1
KY	Jefferson County	Block Group 3, Census Tract 117.11, Jefferson County, Kentucky	2071	1045	50.5	117	5.6
KY	Jefferson County	Block Group 3, Census Tract 89, Jefferson County, Kentucky	767	90	11.7	49	6.4
KY	Jefferson County	Block Group 2, Census Tract 119.08, Jefferson County, Kentucky	1913	926	48.4	194	10.1
KY	Jefferson County	Block Group 2, Census Tract 124.07, Jefferson County, Kentucky	714	186	26.1	26	3.6
KY	Jefferson County	Block Group 2, Census Tract 11, Jefferson County, Kentucky	1902	1846	97.1	986	51.8
KY	Jefferson County	Block Group 2, Census Tract 109.01, Jefferson County, Kentucky	954	125	13.1	51	5.3
KY	Jefferson County	Block Group 3, Census Tract 117.13, Jefferson County, Kentucky	898	463	51.6	74	8.2
KY	Jefferson County	Block Group 5, Census Tract 93, Jefferson County, Kentucky	674	0	0	16	2.4
KY	Jefferson County	Block Group 1, Census Tract 41, Jefferson County, Kentucky	404	181	44.8	93	23.8
KY	Jefferson County	Block Group 3, Census Tract 103.13, Jefferson County, Kentucky	2566	141	5.5	0	0
KY	Jefferson County	Block Group 2, Census Tract 104.05, Jefferson County, Kentucky	1356	194	14.3	30	2.4
KY	Jefferson County	Block Group 2, Census Tract 112.02, Jefferson County, Kentucky	536	185	34.5	152	28.4
KY	Jefferson County	Block Group 2, Census Tract 111.12, Jefferson County, Kentucky	1827	652	35.7	319	17.5
KY	Jefferson County	Block Group 1, Census Tract 131, Jefferson County, Kentucky	1170	45	3.8	47	4
KY	Jefferson County	Block Group 2, Census Tract 3, Jefferson County, Kentucky	683	494	72.3	228	33.4
KY	Jefferson County	Block Group 1, Census Tract 107.07, Jefferson County, Kentucky	1945	163	8.4	15	0.8
KY	Jefferson County	Block Group 1, Census Tract 43.02, Jefferson County, Kentucky	1358	649	47.8	539	40.1
KY	Jefferson County	Block Group 2, Census Tract 90.01, Jefferson County, Kentucky	680	412	60.6	28	5.3
KY	Jefferson County	Block Group 2, Census Tract 12, Jefferson County, Kentucky	401	401	100	134	33.4
KY	Jefferson County	Block Group 1, Census Tract 123.01, Jefferson County, Kentucky	1344	750	55.8	84	6.2
KY	Jefferson County	Block Group 2, Census Tract 115.15, Jefferson County, Kentucky	1418	191	13.5	39	2.8
KY	Jefferson County	Block Group 4, Census Tract 123.02, Jefferson County, Kentucky	1326	484	36.5	109	8.4
KY	Jefferson County	Block Group 2, Census Tract 30, Jefferson County, Kentucky	872	765	87.7	353	45.4
KY	Jefferson County	Block Group 5, Census Tract 111.10, Jefferson County, Kentucky	1760	250	14.2	0	0
KY	Jefferson County	Block Group 2, Census Tract 117.10, Jefferson County, Kentucky	1211	236	19.5	91	7.6
KY	Jefferson County	Block Group 2, Census Tract 104.07, Jefferson County, Kentucky	2006	299	14.9	108	5.4
KY	Jefferson County	Block Group 2, Census Tract 120.03, Jefferson County, Kentucky	879	31	3.5	0	0
KY	Jefferson County	Block Group 2, Census Tract 125.03, Jefferson County, Kentucky	1831	416	22.7	201	11
KY	Jefferson County	Block Group 3, Census Tract 114.05, Jefferson County, Kentucky	912	782	85.7	12	1.3
KY	Jefferson County	Block Group 3, Census Tract 78, Jefferson County, Kentucky	702	78	11.1	4	0.6
KY	Jefferson County	Block Group 5, Census Tract 103.18, Jefferson County, Kentucky	843	335	39.7	34	4
KY	Jefferson County	Block Group 2, Census Tract 105, Jefferson County, Kentucky	695	50	7.2	24	3.5
KY	Jefferson County	Block Group 1, Census Tract 111.18, Jefferson County, Kentucky	685	108	15.8	0	0
KY	Jefferson County	Block Group 1, Census Tract 111.10, Jefferson County, Kentucky	996	13	1.3	16	1.6
KY	Jefferson County	Block Group 1, Census Tract 50, Jefferson County, Kentucky	412	266	64.6	131	31.8
KY	Jefferson County	Block Group 1, Census Tract 124.12, Jefferson County, Kentucky	1897	865	45.6	60	3.2

KY	Jefferson County	Block Group 1, Census Tract 114.03, Jefferson County, Kentucky	909	56	6.2	121	13.5
KY	Jefferson County	Block Group 2, Census Tract 115.19, Jefferson County, Kentucky	2060	525	25.5	241	11.7
KY	Jefferson County	Block Group 2, Census Tract 117.07, Jefferson County, Kentucky	777	54	6.9	55	7.1
KY	Jefferson County	Block Group 1, Census Tract 27, Jefferson County, Kentucky	765	515	67.3	427	61.9
KY	Jefferson County	Block Group 4, Census Tract 121.09, Jefferson County, Kentucky	417	101	24.2	155	37.2
KY	Jefferson County	Block Group 2, Census Tract 100.04, Jefferson County, Kentucky	950	182	19.2	153	16.1
KY	Jefferson County	Block Group 1, Census Tract 59.02, Jefferson County, Kentucky	730	148	20.3	119	18.4
KY	Jefferson County	Block Group 2, Census Tract 52, Jefferson County, Kentucky	956	680	71.1	239	25
KY	Jefferson County	Block Group 2, Census Tract 127.03, Jefferson County, Kentucky	2365	426	18	66	2.8
KY	Jefferson County	Block Group 4, Census Tract 121.07, Jefferson County, Kentucky	1130	80	7.1	677	59.9
KY	Jefferson County	Block Group 1, Census Tract 116.04, Jefferson County, Kentucky	1113	19	1.7	8	0.7
KY	Jefferson County	Block Group 1, Census Tract 113.02, Jefferson County, Kentucky	1632	1423	87.2	236	14.5
KY	Jefferson County	Block Group 6, Census Tract 110.03, Jefferson County, Kentucky	1138	659	57.9	46	4
KY	Jefferson County	Block Group 1, Census Tract 71.01, Jefferson County, Kentucky	94	9	9.6	72	76.6
KY	Jefferson County	Block Group 1, Census Tract 7, Jefferson County, Kentucky	519	484	93.3	343	66.1
KY	Jefferson County	Block Group 1, Census Tract 77, Jefferson County, Kentucky	1994	422	21.2	292	14.8
KY	Jefferson County	Block Group 2, Census Tract 76.01, Jefferson County, Kentucky	697	203	29.1	42	6.4
KY	Jefferson County	Block Group 1, Census Tract 37, Jefferson County, Kentucky	726	341	47	173	23.8
KY	Jefferson County	Block Group 3, Census Tract 115.19, Jefferson County, Kentucky	1570	265	16.9	7	0.5
KY	Jefferson County	Block Group 2, Census Tract 115.22, Jefferson County, Kentucky	1558	338	21.7	17	1.1
KY	Jefferson County	Block Group 1, Census Tract 87, Jefferson County, Kentucky	697	56	8	18	2.6
KY	Jefferson County	Block Group 3, Census Tract 88, Jefferson County, Kentucky	726	61	8.4	68	9.4
KY	Jefferson County	Block Group 4, Census Tract 120.03, Jefferson County, Kentucky	1026	251	24.5	336	32.7
KY	Jefferson County	Block Group 3, Census Tract 121.05, Jefferson County, Kentucky	1105	28	2.5	141	12.8
KY	Jefferson County	Block Group 3, Census Tract 16, Jefferson County, Kentucky	352	320	90.9	109	31
KY	Jefferson County	Block Group 3, Census Tract 98, Jefferson County, Kentucky	636	22	3.5	24	3.8
KY	Jefferson County	Block Group 2, Census Tract 126.06, Jefferson County, Kentucky	1512	1202	79.5	0	0
KY	Jefferson County	Block Group 1, Census Tract 64, Jefferson County, Kentucky	861	119	13.8	109	13.4
KY	Jefferson County	Block Group 3, Census Tract 8, Jefferson County, Kentucky	720	709	98.5	194	26.9
KY	Jefferson County	Block Group 1, Census Tract 103.15, Jefferson County, Kentucky	2247	232	10.3	0	0
KY	Jefferson County	Block Group 3, Census Tract 124.06, Jefferson County, Kentucky	458	0	0	0	0
KY	Jefferson County	Block Group 3, Census Tract 39, Jefferson County, Kentucky	1841	1251	68	785	42.6
KY	Jefferson County	Block Group 2, Census Tract 107.06, Jefferson County, Kentucky	1317	93	7.1	18	1.4
KY	Jefferson County	Block Group 2, Census Tract 110.09, Jefferson County, Kentucky	1218	64	5.3	248	20.4
KY	Jefferson County	Block Group 3, Census Tract 96, Jefferson County, Kentucky	1405	148	10.5	29	2.1
KY	Jefferson County	Block Group 3, Census Tract 117.12, Jefferson County, Kentucky	902	357	39.6	161	17.8
KY	Jefferson County	Block Group 2, Census Tract 66, Jefferson County, Kentucky	691	201	29.1	180	26
KY	Jefferson County	Block Group 2, Census Tract 125.01, Jefferson County, Kentucky	2021	747	37	441	22.9
KY	Jefferson County	Block Group 2, Census Tract 101.04, Jefferson County, Kentucky	1159	239	20.6	153	13.3
KY	Jefferson County	Block Group 5, Census Tract 117.07, Jefferson County, Kentucky	920	384	41.7	238	25.9
KY	Jefferson County	Block Group 1, Census Tract 115.13, Jefferson County, Kentucky	411	28	6.8	62	15.1
KY	Jefferson County	Block Group 1, Census Tract 94.02, Jefferson County, Kentucky	886	13	1.5	31	3.5
KY	Jefferson County	Block Group 2, Census Tract 90.02, Jefferson County, Kentucky	1415	89	6.3	96	6.8
KY	Jefferson County	Block Group 1, Census Tract 93, Jefferson County, Kentucky	1553	384	24.7	93	6.9
KY	Jefferson County	Block Group 1, Census Tract 119.01, Jefferson County, Kentucky	1201	749	62.4	512	42.6
KY	Jefferson County	Block Group 2, Census Tract 70, Jefferson County, Kentucky	760	99	13	107	14.1
KY	Jefferson County	Block Group 1, Census Tract 123.02, Jefferson County, Kentucky	854	196	23	243	28.5
KY	Jefferson County	Block Group 1, Census Tract 28, Jefferson County, Kentucky	1253	1230	98.2	518	43.1
KY	Jefferson County	Block Group 4, Census Tract 105, Jefferson County, Kentucky	651	76	11.7	139	21.4
KY	Jefferson County	Block Group 1, Census Tract 43.01, Jefferson County, Kentucky	1379	706	51.2	576	41.8
KY	Jefferson County	Block Group 1, Census Tract 114.06, Jefferson County, Kentucky	1306	1099	84.2	68	5.2
KY	Jefferson County	Block Group 3, Census Tract 125.02, Jefferson County, Kentucky	629	182	28.9	105	16.7
KY	Jefferson County	Block Group 2, Census Tract 108, Jefferson County, Kentucky	1518	301	19.8	169	11.1
KY	Jefferson County	Block Group 2, Census Tract 53, Jefferson County, Kentucky	671	168	25	0	0
KY	Jefferson County	Block Group 4, Census Tract 43.01, Jefferson County, Kentucky	1038	849	81.8	420	40.5
KY	Jefferson County	Block Group 3, Census Tract 101.04, Jefferson County, Kentucky	725	100	13.8	44	6.1
KY	Jefferson County	Block Group 2, Census Tract 121.03, Jefferson County, Kentucky	1684	177	10.5	104	6.2
KY	Jefferson County	Block Group 2, Census Tract 82.02, Jefferson County, Kentucky	1247	313	25.1	68	5.5
KY	Jefferson County	Block Group 2, Census Tract 14, Jefferson County, Kentucky	546	546	100	44	8.1
KY	Jefferson County	Block Group 2, Census Tract 4, Jefferson County, Kentucky	534	412	77.2	8	1.5
KY	Jefferson County	Block Group 3, Census Tract 36, Jefferson County, Kentucky	164	45	27.4	37	22.6
KY	Jefferson County	Block Group 1, Census Tract 23, Jefferson County, Kentucky	655	365	55.7	209	33.2
KY	Jefferson County	Block Group 2, Census Tract 126.03, Jefferson County, Kentucky	1670	867	51.9	96	5.7
KY	Jefferson County	Block Group 2, Census Tract 114.04, Jefferson County, Kentucky	2321	923	39.8	954	41.1
KY	Jefferson County	Block Group 3, Census Tract 103.24, Jefferson County, Kentucky	1509	842	55.8	445	29.5
KY	Jefferson County	Block Group 2, Census Tract 124.13, Jefferson County, Kentucky	2214	442	20	1196	54.5
KY	Jefferson County	Block Group 2, Census Tract 128.01, Jefferson County, Kentucky	1442	1353	93.8	324	22.5
KY	Jefferson County	Block Group 1, Census Tract 100.07, Jefferson County, Kentucky	659	82	12.4	14	2.1
KY	Jefferson County	Block Group 2, Census Tract 104.03, Jefferson County, Kentucky	1252	170	13.6	75	6.4
KY	Jefferson County	Block Group 1, Census Tract 111.17, Jefferson County, Kentucky	1480	476	32.2	147	12.7

KY	Jefferson County	Block Group 3, Census Tract 84, Jefferson County, Kentucky	850	93	10.9	59	8.2
KY	Jefferson County	Block Group 1, Census Tract 121.09, Jefferson County, Kentucky	1513	516	34.1	104	6.9
KY	Jefferson County	Block Group 1, Census Tract 103.21, Jefferson County, Kentucky	1990	335	16.8	102	5.1
KY	Jefferson County	Block Group 3, Census Tract 103.16, Jefferson County, Kentucky	2143	413	19.3	492	23
KY	Jefferson County	Block Group 1, Census Tract 81, Jefferson County, Kentucky	1467	292	19.9	203	15.3
KY	Jefferson County	Block Group 1, Census Tract 121.07, Jefferson County, Kentucky	2661	142	5.3	487	18.3
KY	Jefferson County	Block Group 2, Census Tract 117.06, Jefferson County, Kentucky	1431	227	15.9	15	1
KY	Jefferson County	Block Group 4, Census Tract 65, Jefferson County, Kentucky	660	325	49.2	71	10.8
KY	Jefferson County	Block Group 2, Census Tract 51, Jefferson County, Kentucky	1132	302	26.7	390	36.2
KY	Jefferson County	Block Group 2, Census Tract 104.06, Jefferson County, Kentucky	2555	189	7.4	0	0
KY	Jefferson County	Block Group 4, Census Tract 111.18, Jefferson County, Kentucky	1187	216	18.2	25	2.1
KY	Jefferson County	Block Group 2, Census Tract 38, Jefferson County, Kentucky	1118	167	14.9	485	43.4
KY	Jefferson County	Block Group 2, Census Tract 103.22, Jefferson County, Kentucky	2140	424	19.8	41	1.9
KY	Jefferson County	Block Group 2, Census Tract 110.07, Jefferson County, Kentucky	1354	795	58.7	545	40.3
KY	Jefferson County	Block Group 2, Census Tract 46, Jefferson County, Kentucky	1586	830	52.3	217	13.7
KY	Jefferson County	Block Group 3, Census Tract 17, Jefferson County, Kentucky	1048	1043	99.5	250	23.9
KY	Jefferson County	Block Group 2, Census Tract 87, Jefferson County, Kentucky	1058	23	2.2	77	7.3
KY	Jefferson County	Block Group 1, Census Tract 120.04, Jefferson County, Kentucky	760	269	35.4	201	26.4
KY	Jefferson County	Block Group 1, Census Tract 103.19, Jefferson County, Kentucky	2217	1014	45.7	13	0.6
KY	Jefferson County	Block Group 3, Census Tract 101.02, Jefferson County, Kentucky	2060	243	11.8	72	3.5
KY	Jefferson County	Block Group 4, Census Tract 96, Jefferson County, Kentucky	898	48	5.3	26	2.9
KY	Jefferson County	Block Group 5, Census Tract 125.02, Jefferson County, Kentucky	1051	64	6.1	25	2.4
KY	Jefferson County	Block Group 1, Census Tract 111.15, Jefferson County, Kentucky	2079	369	17.7	476	24.2
KY	Jefferson County	Block Group 1, Census Tract 110.05, Jefferson County, Kentucky	1033	188	18.2	29	2.8
KY	Jefferson County	Block Group 2, Census Tract 64, Jefferson County, Kentucky	929	28	3	23	2.5
KY	Jefferson County	Block Group 4, Census Tract 107.01, Jefferson County, Kentucky	672	241	35.9	56	8.5
KY	Jefferson County	Block Group 1, Census Tract 76.02, Jefferson County, Kentucky	2396	872	36.4	279	12.1
KY	Jefferson County	Block Group 3, Census Tract 115.20, Jefferson County, Kentucky	1476	145	9.8	31	2.1
KY	Jefferson County	Block Group 1, Census Tract 40, Jefferson County, Kentucky	796	487	61.2	222	27.9
KY	Jefferson County	Block Group 3, Census Tract 110.09, Jefferson County, Kentucky	1254	436	34.8	11	0.9
KY	Jefferson County	Block Group 1, Census Tract 110.03, Jefferson County, Kentucky	1141	475	41.6	30	2.6
KY	Jefferson County	Block Group 1, Census Tract 68, Jefferson County, Kentucky	883	168	19	149	16.9
KY	Jefferson County	Block Group 1, Census Tract 119.06, Jefferson County, Kentucky	1452	1076	74.1	272	18.7
KY	Jefferson County	Block Group 1, Census Tract 116.05, Jefferson County, Kentucky	1103	103	9.3	40	4
KY	Jefferson County	Block Group 3, Census Tract 107.06, Jefferson County, Kentucky	1285	65	5.1	10	0.8
KY	Jefferson County	Block Group 1, Census Tract 75.02, Jefferson County, Kentucky	1385	69	5	27	2.1
KY	Jefferson County	Block Group 1, Census Tract 115.06, Jefferson County, Kentucky	966	461	47.7	179	18.5
KY	Jefferson County	Block Group 2, Census Tract 115.13, Jefferson County, Kentucky	1578	214	13.6	66	4.2
KY	Jefferson County	Block Group 4, Census Tract 119.07, Jefferson County, Kentucky	1196	193	16.1	0	0
KY	Jefferson County	Block Group 2, Census Tract 124.09, Jefferson County, Kentucky	1138	70	6.2	299	26.5
KY	Jefferson County	Block Group 2, Census Tract 93, Jefferson County, Kentucky	902	21	2.3	57	6.3
KY	Jefferson County	Block Group 1, Census Tract 117.13, Jefferson County, Kentucky	932	171	18.3	321	35.3
KY	Jefferson County	Block Group 3, Census Tract 90.02, Jefferson County, Kentucky	533	354	66.4	137	25.7
KY	Jefferson County	Block Group 3, Census Tract 10, Jefferson County, Kentucky	1289	971	75.3	482	37.5
KY	Jefferson County	Block Group 2, Census Tract 115.08, Jefferson County, Kentucky	1880	116	6.2	80	4.3
KY	Jefferson County	Block Group 2, Census Tract 91.06, Jefferson County, Kentucky	1424	802	56.3	330	23.2
KY	Jefferson County	Block Group 3, Census Tract 106.02, Jefferson County, Kentucky	1125	419	37.2	134	12.2
KY	Jefferson County	Block Group 1, Census Tract 83, Jefferson County, Kentucky	980	79	8.1	46	4.7
KY	Jefferson County	Block Group 2, Census Tract 43.01, Jefferson County, Kentucky	564	508	90.1	214	39.5
KY	Jefferson County	Block Group 4, Census Tract 125.02, Jefferson County, Kentucky	1053	613	58.2	144	14.1
KY	Jefferson County	Block Group 3, Census Tract 117.09, Jefferson County, Kentucky	1434	682	47.6	0	0
KY	Jefferson County	Block Group 4, Census Tract 88, Jefferson County, Kentucky	1105	57	5.2	15	1.4
KY	Jefferson County	Block Group 3, Census Tract 11, Jefferson County, Kentucky	894	894	100	84	9.4
KY	Jefferson County	Block Group 2, Census Tract 28, Jefferson County, Kentucky	989	759	76.7	221	23.1
KY	Jefferson County	Block Group 1, Census Tract 115.18, Jefferson County, Kentucky	2364	296	12.5	30	1.3
KY	Jefferson County	Block Group 3, Census Tract 103.09, Jefferson County, Kentucky	704	71	10.1	7	1
KY	Jefferson County	Block Group 2, Census Tract 24.01, Jefferson County, Kentucky	1154	1141	98.9	425	36.8
KY	Jefferson County	Block Group 1, Census Tract 114.05, Jefferson County, Kentucky	727	532	73.2	402	55.3
KY	Jefferson County	Block Group 1, Census Tract 15, Jefferson County, Kentucky	631	569	90.2	120	19
KY	Jefferson County	Block Group 2, Census Tract 123.02, Jefferson County, Kentucky	1926	326	16.9	113	6.2
KY	Jefferson County	Block Group 2, Census Tract 117.09, Jefferson County, Kentucky	1583	82	5.2	54	3.4
KY	Jefferson County	Block Group 3, Census Tract 4, Jefferson County, Kentucky	1192	1141	95.7	162	13.6
KY	Jefferson County	Block Group 4, Census Tract 104.06, Jefferson County, Kentucky	1830	764	41.7	570	31.1
KY	Jefferson County	Block Group 1, Census Tract 85, Jefferson County, Kentucky	1249	73	5.8	57	4.6
KY	Jefferson County	Block Group 4, Census Tract 115.17, Jefferson County, Kentucky	1375	293	21.3	0	0
KY	Jefferson County	Block Group 3, Census Tract 121.03, Jefferson County, Kentucky	1552	123	7.9	229	14.8
KY	Jefferson County	Block Group 3, Census Tract 100.01, Jefferson County, Kentucky	766	51	6.7	27	3.5
KY	Jefferson County	Block Group 2, Census Tract 111.17, Jefferson County, Kentucky	929	243	26.2	82	8.8
KY	Jefferson County	Block Group 3, Census Tract 56, Jefferson County, Kentucky	1060	463	43.7	74	7
KY	Jefferson County	Block Group 1, Census Tract 78, Jefferson County, Kentucky	786	62	7.9	38	4.8

KY	Jefferson County	Block Group 1, Census Tract 128.02, Jefferson County, Kentucky	618	407	65.9	223	36.1
KY	Jefferson County	Block Group 3, Census Tract 126.04, Jefferson County, Kentucky	845	465	55	156	18.5
KY	Jefferson County	Block Group 3, Census Tract 104.03, Jefferson County, Kentucky	1421	205	14.4	84	6.1
KY	Jefferson County	Block Group 2, Census Tract 116.03, Jefferson County, Kentucky	1705	29	1.7	107	6.3
KY	Jefferson County	Block Group 1, Census Tract 59.01, Jefferson County, Kentucky	2376	1698	71.5	1554	77.1
KY	Jefferson County	Block Group 3, Census Tract 68, Jefferson County, Kentucky	736	129	17.5	115	15.6
KY	Jefferson County	Block Group 4, Census Tract 122.06, Jefferson County, Kentucky	321	88	27.4	79	24.6
KY	Jefferson County	Block Group 3, Census Tract 100.05, Jefferson County, Kentucky	1118	48	4.3	53	4.7
KY	Jefferson County	Block Group 1, Census Tract 113.01, Jefferson County, Kentucky	954	537	56.3	282	29.9
KY	Jefferson County	Block Group 3, Census Tract 51, Jefferson County, Kentucky	1050	555	52.9	266	25.3
KY	Jefferson County	Block Group 2, Census Tract 127.02, Jefferson County, Kentucky	728	183	25.1	155	21.3
KY	Jefferson County	Block Group 2, Census Tract 23, Jefferson County, Kentucky	712	361	50.7	429	60.3
KY	Jefferson County	Block Group 1, Census Tract 103.18, Jefferson County, Kentucky	578	46	8	30	5.2
KY	Jefferson County	Block Group 1, Census Tract 88, Jefferson County, Kentucky	1008	16	1.6	106	11.3
KY	Jefferson County	Block Group 2, Census Tract 116.04, Jefferson County, Kentucky	1133	22	1.9	8	0.7
KY	Jefferson County	Block Group 1, Census Tract 124.08, Jefferson County, Kentucky	991	319	32.2	157	15.8
KY	Jefferson County	Block Group 2, Census Tract 120.05, Jefferson County, Kentucky	2265	196	8.7	324	14.3
KY	Jefferson County	Block Group 1, Census Tract 107.01, Jefferson County, Kentucky	934	639	68.4	0	0
KY	Jefferson County	Block Group 1, Census Tract 127.01, Jefferson County, Kentucky	3167	2241	70.8	1474	47
KY	Jefferson County	Block Group 2, Census Tract 115.09, Jefferson County, Kentucky	1554	762	49	42	2.8
KY	Jefferson County	Block Group 3, Census Tract 115.21, Jefferson County, Kentucky	747	502	67.2	23	3.1
KY	Jefferson County	Block Group 2, Census Tract 76.03, Jefferson County, Kentucky	748	106	14.2	159	21.5
KY	Jefferson County	Block Group 2, Census Tract 111.16, Jefferson County, Kentucky	1385	659	47.6	62	4.5
KY	Jefferson County	Block Group 4, Census Tract 110.03, Jefferson County, Kentucky	910	187	20.5	27	3
KY	Jefferson County	Block Group 3, Census Tract 65, Jefferson County, Kentucky	568	121	21.3	227	40
KY	Jefferson County	Block Group 5, Census Tract 113.02, Jefferson County, Kentucky	918	645	70.3	189	20.6
KY	Jefferson County	Block Group 2, Census Tract 49, Jefferson County, Kentucky	467	330	70.7	258	55.8
KY	Jefferson County	Block Group 3, Census Tract 110.08, Jefferson County, Kentucky	974	205	21	166	17
KY	Jefferson County	Block Group 1, Census Tract 103.24, Jefferson County, Kentucky	1462	554	37.9	42	2.9
KY	Jefferson County	Block Group 4, Census Tract 100.04, Jefferson County, Kentucky	920	151	16.4	53	6.2
KY	Jefferson County	Block Group 1, Census Tract 6, Jefferson County, Kentucky	893	797	89.2	284	32.7
KY	Jefferson County	Block Group 5, Census Tract 75.02, Jefferson County, Kentucky	714	54	7.6	6	0.8
KY	Jefferson County	Block Group 1, Census Tract 63, Jefferson County, Kentucky	1103	156	14.1	233	22
KY	Jefferson County	Block Group 1, Census Tract 111.09, Jefferson County, Kentucky	1268	234	18.5	9	0.7
KY	Jefferson County	Block Group 4, Census Tract 100.08, Jefferson County, Kentucky	896	184	20.5	122	13.6
KY	Jefferson County	Block Group 3, Census Tract 126.05, Jefferson County, Kentucky	745	699	93.8	137	18.4
KY	Jefferson County	Block Group 2, Census Tract 45, Jefferson County, Kentucky	782	101	12.9	262	33.5
KY	Jefferson County	Block Group 2, Census Tract 124.10, Jefferson County, Kentucky	1546	239	15.5	53	3.4
KY	Jefferson County	Block Group 1, Census Tract 119.09, Jefferson County, Kentucky	1724	645	37.4	186	10.8
KY	Jefferson County	Block Group 3, Census Tract 107.02, Jefferson County, Kentucky	2332	187	8	204	8.8
KY	Jefferson County	Block Group 4, Census Tract 115.06, Jefferson County, Kentucky	1420	263	18.5	47	3.3
KY	Jefferson County	Block Group 4, Census Tract 75.02, Jefferson County, Kentucky	813	30	3.7	0	0
KY	Jefferson County	Block Group 2, Census Tract 119.07, Jefferson County, Kentucky	619	44	7.1	46	7.4
KY	Jefferson County	Block Group 3, Census Tract 101.03, Jefferson County, Kentucky	837	372	44.4	202	24.6
KY	Jefferson County	Block Group 1, Census Tract 96, Jefferson County, Kentucky	800	23	2.9	22	2.8
KY	Jefferson County	Block Group 1, Census Tract 117.12, Jefferson County, Kentucky	1833	552	30.1	80	4.4
KY	Jefferson County	Block Group 2, Census Tract 41, Jefferson County, Kentucky	1190	232	19.5	247	20.8
KY	Jefferson County	Block Group 1, Census Tract 39, Jefferson County, Kentucky	1189	674	56.7	454	38.2
KY	Jefferson County	Block Group 1, Census Tract 91.05, Jefferson County, Kentucky	1084	427	39.4	131	12.1
KY	Jefferson County	Block Group 1, Census Tract 103.14, Jefferson County, Kentucky	1944	319	16.4	64	3.3
KY	Jefferson County	Block Group 1, Census Tract 109.02, Jefferson County, Kentucky	1622	135	8.3	80	5
KY	Jefferson County	Block Group 1, Census Tract 94.01, Jefferson County, Kentucky	854	39	4.6	83	9.7
KY	Jefferson County	Block Group 2, Census Tract 9, Jefferson County, Kentucky	1047	998	95.3	543	52.3
KY	Jefferson County	Block Group 1, Census Tract 110.06, Jefferson County, Kentucky	2046	1510	73.8	248	12.1
KY	Jefferson County	Block Group 3, Census Tract 104.05, Jefferson County, Kentucky	1500	306	20.4	57	3.8
KY	Jefferson County	Block Group 2, Census Tract 115.16, Jefferson County, Kentucky	690	79	11.4	23	3.3
KY	Jefferson County	Block Group 1, Census Tract 75.01, Jefferson County, Kentucky	2191	53	2.4	26	1.2
KY	Jefferson County	Block Group 3, Census Tract 90.01, Jefferson County, Kentucky	1486	887	59.7	275	19
KY	Jefferson County	Block Group 3, Census Tract 12, Jefferson County, Kentucky	1422	1422	100	501	35.2
KY	Jefferson County	Block Group 1, Census Tract 35.01, Jefferson County, Kentucky	3181	928	29.2	956	59.2
KY	Jefferson County	Block Group 4, Census Tract 103.13, Jefferson County, Kentucky	601	79	13.1	26	4.3
KY	Jefferson County	Block Group 1, Census Tract 104.08, Jefferson County, Kentucky	1686	91	5.4	35	2.1
KY	Jefferson County	Block Group 1, Census Tract 125.02, Jefferson County, Kentucky	1228	517	42.1	398	32.4
KY	Jefferson County	Block Group 2, Census Tract 123.01, Jefferson County, Kentucky	1767	637	36	135	7.6
KY	Jefferson County	Block Group 1, Census Tract 117.08, Jefferson County, Kentucky	2070	319	15.4	156	7.6
KY	Jefferson County	Block Group 1, Census Tract 124.06, Jefferson County, Kentucky	1092	321	29.4	186	17
KY	Jefferson County	Block Group 1, Census Tract 117.11, Jefferson County, Kentucky	1598	111	6.9	33	2.1
KY	Jefferson County	Block Group 3, Census Tract 3, Jefferson County, Kentucky	578	531	91.9	111	19.7
KY	Jefferson County	Block Group 2, Census Tract 82.01, Jefferson County, Kentucky	940	6	0.6	155	16.5
KY	Jefferson County	Block Group 3, Census Tract 120.03, Jefferson County, Kentucky	372	110	29.6	109	29.7

KY	Jefferson County	Block Group 4, Census Tract 100.07, Jefferson County, Kentucky	1035	207	20	11	1.1
KY	Jefferson County	Block Group 6, Census Tract 111.10, Jefferson County, Kentucky	948	0	0	50	5.3
KY	Jefferson County	Block Group 1, Census Tract 115.20, Jefferson County, Kentucky	935	175	18.7	17	1.8
KY	Jefferson County	Block Group 2, Census Tract 103.20, Jefferson County, Kentucky	968	675	69.7	139	14.4
KY	Jefferson County	Block Group 2, Census Tract 50, Jefferson County, Kentucky	1435	748	52.1	596	52.8
KY	Jefferson County	Block Group 3, Census Tract 127.03, Jefferson County, Kentucky	1446	624	43.2	251	17.4
KY	Jefferson County	Block Group 2, Census Tract 100.06, Jefferson County, Kentucky	1075	209	19.4	37	3.4
KY	Jefferson County	Block Group 3, Census Tract 99, Jefferson County, Kentucky	812	58	7.1	49	6
KY	Jefferson County	Block Group 2, Census Tract 111.14, Jefferson County, Kentucky	2027	388	19.1	52	2.6
KY	Jefferson County	Block Group 2, Census Tract 114.03, Jefferson County, Kentucky	760	143	18.8	84	11.1
KY	Jefferson County	Block Group 1, Census Tract 121.05, Jefferson County, Kentucky	1208	209	17.3	89	8
KY	Jefferson County	Block Group 2, Census Tract 106.01, Jefferson County, Kentucky	1478	140	9.5	54	4
KY	Jefferson County	Block Group 4, Census Tract 115.15, Jefferson County, Kentucky	1603	261	16.3	145	9
KY	Jefferson County	Block Group 2, Census Tract 124.12, Jefferson County, Kentucky	1108	87	7.9	37	3.3
KY	Jefferson County	Block Group 1, Census Tract 84, Jefferson County, Kentucky	1089	32	2.9	38	3.5
KY	Jefferson County	Block Group 3, Census Tract 122.03, Jefferson County, Kentucky	1613	281	17.4	95	5.9
KY	Jefferson County	Block Group 2, Census Tract 27, Jefferson County, Kentucky	636	636	100	380	59.7
KY	Jefferson County	Block Group 2, Census Tract 21, Jefferson County, Kentucky	932	186	20	424	45.5
KY	Jefferson County	Block Group 3, Census Tract 100.04, Jefferson County, Kentucky	1885	912	48.4	192	11
KY	Jefferson County	Block Group 2, Census Tract 111.18, Jefferson County, Kentucky	650	217	33.4	102	15.7
KY	Jefferson County	Block Group 2, Census Tract 113.02, Jefferson County, Kentucky	1976	1858	94	105	5.3
KY	Jefferson County	Block Group 2, Census Tract 59.02, Jefferson County, Kentucky	669	594	88.8	367	54.9
KY	Jefferson County	Block Group 1, Census Tract 122.06, Jefferson County, Kentucky	1378	650	47.2	136	9.9
KY	Jefferson County	Block Group 3, Census Tract 103.17, Jefferson County, Kentucky	1748	99	5.7	3	0.2
KY	Jefferson County	Block Group 2, Census Tract 122.04, Jefferson County, Kentucky	1648	384	23.3	45	2.7
KY	Jefferson County	Block Group 2, Census Tract 120.01, Jefferson County, Kentucky	1859	345	18.6	523	28.1
KY	Jefferson County	Block Group 2, Census Tract 103.12, Jefferson County, Kentucky	823	82	10	15	1.8
KY	Jefferson County	Block Group 1, Census Tract 103.09, Jefferson County, Kentucky	1205	151	12.5	22	1.9
KY	Jefferson County	Block Group 2, Census Tract 100.05, Jefferson County, Kentucky	860	141	16.4	0	0
KY	Jefferson County	Block Group 1, Census Tract 127.02, Jefferson County, Kentucky	1349	453	33.6	383	28.5
KY	Jefferson County	Block Group 1, Census Tract 116.03, Jefferson County, Kentucky	2190	422	19.3	12	0.5
KY	Jefferson County	Block Group 2, Census Tract 111.11, Jefferson County, Kentucky	2269	480	21.2	89	3.9
KY	Jefferson County	Block Group 1, Census Tract 115.08, Jefferson County, Kentucky	1516	243	16	5	0.3
KY	Jefferson County	Block Group 3, Census Tract 107.01, Jefferson County, Kentucky	1030	126	12.2	0	0
KY	Jefferson County	Block Group 1, Census Tract 100.06, Jefferson County, Kentucky	1159	270	23.3	70	6
KY	Jefferson County	Block Group 2, Census Tract 121.04, Jefferson County, Kentucky	1211	312	25.8	86	7.2
KY	Jefferson County	Block Group 1, Census Tract 103.20, Jefferson County, Kentucky	1676	619	36.9	237	14.1
KY	Jefferson County	Block Group 1, Census Tract 103.12, Jefferson County, Kentucky	2478	481	19.4	6	0.2
KY	Jefferson County	Block Group 2, Census Tract 103.13, Jefferson County, Kentucky	854	70	8.2	0	0
KY	Jefferson County	Block Group 3, Census Tract 128.02, Jefferson County, Kentucky	1187	710	59.8	195	19.5
KY	Jefferson County	Block Group 1, Census Tract 120.05, Jefferson County, Kentucky	1848	843	45.6	105	5.7
KY	Jefferson County	Block Group 4, Census Tract 87, Jefferson County, Kentucky	1699	361	21.2	244	21.8
KY	Jefferson County	Block Group 2, Census Tract 115.21, Jefferson County, Kentucky	1679	683	40.7	14	0.8
KY	Jefferson County	Block Group 4, Census Tract 100.05, Jefferson County, Kentucky	992	61	6.1	27	2.8
KY	Jefferson County	Block Group 4, Census Tract 103.18, Jefferson County, Kentucky	1188	85	7.2	14	1.2
KY	Jefferson County	Block Group 1, Census Tract 122.04, Jefferson County, Kentucky	1274	499	39.2	125	9.8
KY	Jefferson County	Block Group 3, Census Tract 111.17, Jefferson County, Kentucky	1138	524	46	325	28.6
KY	Jefferson County	Block Group 1, Census Tract 121.04, Jefferson County, Kentucky	1646	462	28.1	258	15.7
KY	Jefferson County	Block Group 3, Census Tract 123.02, Jefferson County, Kentucky	1005	564	56.1	106	10.5
KY	Jefferson County	Block Group 1, Census Tract 125.03, Jefferson County, Kentucky	793	404	50.9	162	20.4
KY	Jefferson County	Block Group 1, Census Tract 120.01, Jefferson County, Kentucky	1927	75	3.9	211	11.1
KY	Jefferson County	Block Group 2, Census Tract 128.02, Jefferson County, Kentucky	847	730	86.2	418	49.4
KY	Jefferson County	Block Group 1, Census Tract 104.05, Jefferson County, Kentucky	1634	959	58.7	59	3.6
KY	Jefferson County	Block Group 5, Census Tract 107.01, Jefferson County, Kentucky	1043	23	2.2	34	3.3
KY	Jefferson County	Block Group 1, Census Tract 103.13, Jefferson County, Kentucky	1608	533	33.1	0	0
KY	Jefferson County	Block Group 4, Census Tract 117.08, Jefferson County, Kentucky	623	289	46.4	41	6.6
KY	Jefferson County	Block Group 4, Census Tract 117.11, Jefferson County, Kentucky	2488	656	26.4	31	1.2
KY	Jefferson County	Block Group 2, Census Tract 117.13, Jefferson County, Kentucky	933	102	10.9	86	9.2
KY	Jefferson County	Block Group 3, Census Tract 75.01, Jefferson County, Kentucky	2815	182	6.5	44	1.6
KY	Jefferson County	Block Group 3, Census Tract 115.13, Jefferson County, Kentucky	1960	593	30.3	139	7.1
KY	Jefferson County	Block Group 1, Census Tract 103.16, Jefferson County, Kentucky	3364	530	15.8	82	2.5
KY	Jefferson County	Block Group 4, Census Tract 111.10, Jefferson County, Kentucky	652	0	0	15	2.3
KY	Jefferson County	Block Group 4, Census Tract 91.06, Jefferson County, Kentucky	1128	293	26	92	8.2
KY	Jefferson County	Block Group 2, Census Tract 111.13, Jefferson County, Kentucky	1474	321	21.8	118	8
KY	Jefferson County	Block Group 2, Census Tract 76.02, Jefferson County, Kentucky	1402	710	50.6	153	10.9
KY	Jefferson County	Block Group 2, Census Tract 120.04, Jefferson County, Kentucky	904	0	0	0	0
KY	Jefferson County	Block Group 3, Census Tract 87, Jefferson County, Kentucky	750	23	3.1	56	7.5
KY	Jefferson County	Block Group 4, Census Tract 127.03, Jefferson County, Kentucky	1383	544	39.3	153	11.4
KY	Jefferson County	Block Group 1, Census Tract 97, Jefferson County, Kentucky	752	57	7.6	6	0.8
KY	Jefferson County	Block Group 2, Census Tract 110.05, Jefferson County, Kentucky	850	272	32	67	7.9

KY	Jefferson County	Block Group 1, Census Tract 117.06, Jefferson County, Kentucky	871	150	17.2	0	0
KY	Jefferson County	Block Group 1, Census Tract 104.06, Jefferson County, Kentucky	841	43	5.1	6	0.7
KY	Jefferson County	Block Group 1, Census Tract 128.01, Jefferson County, Kentucky	1467	1201	81.9	394	26.9
KY	Jefferson County	Block Group 1, Census Tract 114.04, Jefferson County, Kentucky	1209	990	81.9	291	24.1
KY	Jefferson County	Block Group 3, Census Tract 100.06, Jefferson County, Kentucky	656	306	46.6	224	35.1
KY	Jefferson County	Block Group 1, Census Tract 111.11, Jefferson County, Kentucky	1740	582	33.4	159	9.3
KY	Jefferson County	Block Group 2, Census Tract 104.08, Jefferson County, Kentucky	1433	221	15.4	12	0.8
KY	Jefferson County	Block Group 1, Census Tract 14, Jefferson County, Kentucky	825	825	100	283	34.3
KY	Jefferson County	Block Group 3, Census Tract 111.10, Jefferson County, Kentucky	966	38	3.9	58	6
KY	Jefferson County	Block Group 3, Census Tract 103.14, Jefferson County, Kentucky	1628	337	20.7	147	9.3
KY	Jefferson County	Block Group 2, Census Tract 125.02, Jefferson County, Kentucky	546	134	24.5	279	52.1
KY	Jefferson County	Block Group 2, Census Tract 74, Jefferson County, Kentucky	766	88	11.5	37	5.1
KY	Jefferson County	Block Group 3, Census Tract 115.09, Jefferson County, Kentucky	2160	1343	62.2	491	22.9
KY	Jefferson County	Block Group 1, Census Tract 90.02, Jefferson County, Kentucky	1829	933	51	1120	61.2
KY	Jefferson County	Block Group 2, Census Tract 94.01, Jefferson County, Kentucky	1555	86	5.5	71	4.6
KY	Jefferson County	Block Group 2, Census Tract 117.12, Jefferson County, Kentucky	1605	178	11.1	244	15.8
KY	Jefferson County	Block Group 2, Census Tract 96, Jefferson County, Kentucky	1775	176	9.9	193	10.9
KY	Jefferson County	Block Group 1, Census Tract 107.06, Jefferson County, Kentucky	699	21	3	8	1.1
KY	Jefferson County	Block Group 3, Census Tract 115.06, Jefferson County, Kentucky	699	28	4	76	10.9
KY	Jefferson County	Block Group 1, Census Tract 126.06, Jefferson County, Kentucky	1298	674	51.9	253	19.5
KY	Jefferson County	Block Group 3, Census Tract 121.04, Jefferson County, Kentucky	1059	264	24.9	214	20.2
KY	Jefferson County	Block Group 1, Census Tract 115.22, Jefferson County, Kentucky	1112	400	36	83	7.6
KY	Jefferson County	Block Group 1, Census Tract 66, Jefferson County, Kentucky	1065	273	25.6	165	15.6
KY	Jefferson County	Block Group 5, Census Tract 126.04, Jefferson County, Kentucky	844	351	41.6	183	21.7
KY	Jefferson County	Block Group 2, Census Tract 103.17, Jefferson County, Kentucky	989	204	20.6	12	1.2
KY	Jefferson County	Block Group 3, Census Tract 121.07, Jefferson County, Kentucky	571	23	4	141	24.7
KY	Jefferson County	Block Group 1, Census Tract 127.03, Jefferson County, Kentucky	1243	434	34.9	86	6.9
KY	Jefferson County	Block Group 1, Census Tract 122.03, Jefferson County, Kentucky	835	166	19.9	55	6.6
KY	Jefferson County	Block Group 2, Census Tract 83, Jefferson County, Kentucky	516	35	6.8	35	6.8
KY	Jefferson County	Block Group 3, Census Tract 124.08, Jefferson County, Kentucky	631	94	14.9	40	6.3
KY	Jefferson County	Block Group 3, Census Tract 112.02, Jefferson County, Kentucky	1181	694	58.8	78	6.6
KY	Jefferson County	Block Group 2, Census Tract 59.01, Jefferson County, Kentucky	506	468	92.5	71	14
KY	Jefferson County	Block Group 6, Census Tract 113.02, Jefferson County, Kentucky	984	959	97.5	83	8.4
KY	Jefferson County	Block Group 3, Census Tract 122.04, Jefferson County, Kentucky	2460	1555	63.2	178	7.3
KY	Jefferson County	Block Group 3, Census Tract 117.07, Jefferson County, Kentucky	1936	640	33.1	69	3.6
KY	Jefferson County	Block Group 1, Census Tract 115.19, Jefferson County, Kentucky	1929	487	25.2	98	5.1
KY	Jefferson County	Block Group 1, Census Tract 36, Jefferson County, Kentucky	805	97	12	102	12.7
KY	Jefferson County	Block Group 1, Census Tract 79, Jefferson County, Kentucky	992	136	13.7	49	5
KY	Jefferson County	Block Group 4, Census Tract 78, Jefferson County, Kentucky	814	14	1.7	47	5.8
KY	Jefferson County	Block Group 1, Census Tract 117.10, Jefferson County, Kentucky	1433	468	32.7	290	20.2
KY	Jefferson County	Block Group 3, Census Tract 115.15, Jefferson County, Kentucky	915	300	32.8	27	3
KY	Jefferson County	Block Group 1, Census Tract 104.07, Jefferson County, Kentucky	1143	134	11.7	0	0
KY	Jefferson County	Block Group 2, Census Tract 111.10, Jefferson County, Kentucky	1042	245	23.5	15	1.4
KY	Jefferson County	Block Group 1, Census Tract 111.13, Jefferson County, Kentucky	1380	362	26.2	7	0.5
KY	Jefferson County	Block Group 1, Census Tract 3, Jefferson County, Kentucky	962	209	21.7	436	45.8
KY	Jefferson County	Block Group 4, Census Tract 103.09, Jefferson County, Kentucky	766	113	14.8	5	0.7
KY	Jefferson County	Block Group 2, Census Tract 103.09, Jefferson County, Kentucky	1820	572	31.4	12	0.7
KY	Jefferson County	Block Group 3, Census Tract 52, Jefferson County, Kentucky	1013	341	33.7	186	18.4
KY	Jefferson County	Block Group 1, Census Tract 120.03, Jefferson County, Kentucky	639	57	8.9	52	8.1
KY	Jefferson County	Block Group 3, Census Tract 115.08, Jefferson County, Kentucky	1198	837	69.9	0	0
KY	Jefferson County	Block Group 2, Census Tract 40, Jefferson County, Kentucky	856	280	32.7	83	9.7
KY	Jefferson County	Block Group 1, Census Tract 11, Jefferson County, Kentucky	385	385	100	159	41.3
KY	Jefferson County	Block Group 2, Census Tract 110.03, Jefferson County, Kentucky	1421	482	33.9	74	5.2
KY	Jefferson County	Block Group 4, Census Tract 89, Jefferson County, Kentucky	2020	204	10.1	190	17.7
KY	Jefferson County	Block Group 2, Census Tract 115.06, Jefferson County, Kentucky	1087	466	42.9	290	30.5
KY	Jefferson County	Block Group 2, Census Tract 75.02, Jefferson County, Kentucky	858	159	18.5	61	7.1
KY	Jefferson County	Block Group 2, Census Tract 115.14, Jefferson County, Kentucky	2529	433	17.1	269	10.6
KY	Jefferson County	Block Group 1, Census Tract 101.03, Jefferson County, Kentucky	1752	515	29.4	25	1.4
KY	Jefferson County	Block Group 4, Census Tract 108, Jefferson County, Kentucky	773	46	6	40	5.2
KY	Jefferson County	Block Group 2, Census Tract 119.06, Jefferson County, Kentucky	1594	455	28.5	54	3.4
KY	Jefferson County	Block Group 1, Census Tract 115.21, Jefferson County, Kentucky	1328	698	52.6	69	5.2
KY	Jefferson County	Block Group 1, Census Tract 107.02, Jefferson County, Kentucky	2269	647	28.5	72	3.2
KY	Jefferson County	Block Group 2, Census Tract 103.19, Jefferson County, Kentucky	1352	338	25	15	1.1
KY	Jefferson County	Block Group 2, Census Tract 2.01, Jefferson County, Kentucky	526	67	12.7	331	62.9
KY	Jefferson County	Block Group 4, Census Tract 71.02, Jefferson County, Kentucky	443	75	16.9	187	42.2
KY	Jefferson County	Block Group 4, Census Tract 126.04, Jefferson County, Kentucky	997	601	60.3	39	4
KY	Jefferson County	Block Group 1, Census Tract 106.02, Jefferson County, Kentucky	1652	274	16.6	92	5.6
KY	Jefferson County	Block Group 3, Census Tract 124.07, Jefferson County, Kentucky	1477	427	28.9	65	4.4
KY	Jefferson County	Block Group 1, Census Tract 103.17, Jefferson County, Kentucky	2037	265	13	34	1.7
KY	Jefferson County	Block Group 3, Census Tract 46, Jefferson County, Kentucky	1684	644	38.2	411	24.5

KY	Jefferson County	Block Group 2, Census Tract 100.08, Jefferson County, Kentucky	1573	236	15	67	4.3
KY	Jefferson County	Block Group 2, Census Tract 121.07, Jefferson County, Kentucky	897	0	0	191	22.4
KY	Jefferson County	Block Group 1, Census Tract 118, Jefferson County, Kentucky	1567	577	36.8	231	14.8
KY	Jefferson County	Block Group 3, Census Tract 113.02, Jefferson County, Kentucky	1896	1470	77.5	463	25.7
KY	Jefferson County	Block Group 2, Census Tract 111.15, Jefferson County, Kentucky	1484	349	23.5	73	4.9
KY	Jefferson County	Block Group 2, Census Tract 122.06, Jefferson County, Kentucky	787	270	34.3	62	7.9
KY	Jefferson County	Block Group 1, Census Tract 112.01, Jefferson County, Kentucky	1785	624	35	234	14.3
KY	Jefferson County	Block Group 3, Census Tract 104.06, Jefferson County, Kentucky	448	237	52.9	4	0.9
KY	Jefferson County	Block Group 2, Census Tract 103.21, Jefferson County, Kentucky	2739	507	18.5	21	0.8
KY	Jefferson County	Block Group 2, Census Tract 81, Jefferson County, Kentucky	953	155	16.3	144	15.1
KY	Jefferson County	Block Group 3, Census Tract 117.06, Jefferson County, Kentucky	1397	320	22.9	23	1.6
KY	Jefferson County	Block Group 1, Census Tract 56, Jefferson County, Kentucky	1871	1429	76.4	362	19.3
KY	Jefferson County	Block Group 2, Census Tract 121.09, Jefferson County, Kentucky	751	29	3.9	59	7.9
KY	Jefferson County	Block Group 1, Census Tract 124.13, Jefferson County, Kentucky	1597	425	26.6	145	9.1
KY	Jefferson County	Block Group 3, Census Tract 115.16, Jefferson County, Kentucky	1160	154	13.3	30	2.6
KY	Jefferson County	Block Group 2, Census Tract 100.07, Jefferson County, Kentucky	997	221	22.2	127	15
KY	Jefferson County	Block Group 2, Census Tract 103.24, Jefferson County, Kentucky	2103	1103	52.4	123	5.9
KY	Jefferson County	Block Group 2, Census Tract 84, Jefferson County, Kentucky	1009	74	7.3	55	5.5
KY	Jefferson County	Block Group 2, Census Tract 115.20, Jefferson County, Kentucky	2099	196	9.3	36	1.7
KY	Jefferson County	Block Group 1, Census Tract 104.03, Jefferson County, Kentucky	1687	270	16	60	3.6
KY	Jefferson County	Block Group 3, Census Tract 21, Jefferson County, Kentucky	772	353	45.7	386	50
KY	Jefferson County	Block Group 4, Census Tract 122.03, Jefferson County, Kentucky	2562	464	18.1	0	0
KY	Jefferson County	Block Group 1, Census Tract 126.04, Jefferson County, Kentucky	3376	3151	93.3	150	4.4
KY	Jefferson County	Block Group 3, Census Tract 111.14, Jefferson County, Kentucky	894	238	26.6	16	1.8
KY	Jefferson County	Block Group 1, Census Tract 100.01, Jefferson County, Kentucky	2020	151	7.5	136	6.7
KY	Jefferson County	Block Group 3, Census Tract 14, Jefferson County, Kentucky	993	993	100	488	49.7
KY	Jefferson County	Block Group 4, Census Tract 101.03, Jefferson County, Kentucky	770	44	5.7	56	7.4
KY	Jefferson County	Block Group 1, Census Tract 115.17, Jefferson County, Kentucky	1099	760	69.2	63	5.7
KY	Jefferson County	Block Group 1, Census Tract 4, Jefferson County, Kentucky	641	222	34.6	214	33.4
KY	Jefferson County	Block Group 2, Census Tract 117.11, Jefferson County, Kentucky	684	32	4.7	53	7.7
KY	Jefferson County	Block Group 2, Census Tract 117.08, Jefferson County, Kentucky	1492	576	38.6	23	1.5
KY	Jefferson County	Block Group 2, Census Tract 114.06, Jefferson County, Kentucky	1031	682	66.1	223	21.6
KY	Jefferson County	Block Group 1, Census Tract 121.03, Jefferson County, Kentucky	1015	54	5.3	17	1.7
KY	Jefferson County	Block Group 3, Census Tract 119.07, Jefferson County, Kentucky	1227	245	20	15	1.4
KY	Jefferson County	Block Group 1, Census Tract 82.02, Jefferson County, Kentucky	1031	131	12.7	49	4.9
KY	Jefferson County	Block Group 1, Census Tract 35.02, Jefferson County, Kentucky	1784	1403	78.6	1306	77.6
KY	Jefferson County	Block Group 3, Census Tract 123.01, Jefferson County, Kentucky	719	460	64	128	17.8
KY	Jefferson County	Block Group 3, Census Tract 108, Jefferson County, Kentucky	692	109	15.8	31	8
KY	Jefferson County	Block Group 3, Census Tract 111.11, Jefferson County, Kentucky	1488	502	33.7	38	2.6
KY	Jefferson County	Block Group 1, Census Tract 100.05, Jefferson County, Kentucky	1150	332	28.9	29	2.5
KY	Jefferson County	Block Group 3, Census Tract 91.06, Jefferson County, Kentucky	954	393	41.2	384	40.3
KY	Jefferson County	Block Group 2, Census Tract 110.06, Jefferson County, Kentucky	777	308	39.6	195	25.1
KY	Jefferson County	Block Group 1, Census Tract 74, Jefferson County, Kentucky	1435	260	18.1	157	11.6
KY	Jefferson County	Block Group 2, Census Tract 124.08, Jefferson County, Kentucky	569	97	17	26	4.6
KY	Jefferson County	Block Group 4, Census Tract 117.09, Jefferson County, Kentucky	2135	198	9.3	16	0.7
KY	Jefferson County	Block Group 3, Census Tract 117.08, Jefferson County, Kentucky	1318	367	27.8	77	5.8
KY	Jefferson County	Block Group 2, Census Tract 91.05, Jefferson County, Kentucky	1007	214	21.3	68	6.8
KY	Jefferson County	Block Group 5, Census Tract 115.06, Jefferson County, Kentucky	1011	220	21.8	22	2.2
KY	Jefferson County	Block Group 2, Census Tract 75.01, Jefferson County, Kentucky	1788	277	15.5	58	3.2
KY	Jefferson County	Block Group 1, Census Tract 119.04, Jefferson County, Kentucky	1446	958	66.3	327	22.6
KY	Jefferson County	Block Group 1, Census Tract 44, Jefferson County, Kentucky	1237	628	50.8	110	8.9
KY	Jefferson County	Block Group 1, Census Tract 110.09, Jefferson County, Kentucky	1129	501	44.4	71	7.5
KY	Jefferson County	Block Group 1, Census Tract 101.04, Jefferson County, Kentucky	797	115	14.4	16	2
KY	Jefferson County	Block Group 2, Census Tract 107.07, Jefferson County, Kentucky	1885	596	31.6	0	0
KY	Jefferson County	Block Group 4, Census Tract 124.06, Jefferson County, Kentucky	1878	279	14.9	142	7.6
KY	Jefferson County	Block Group 2, Census Tract 119.09, Jefferson County, Kentucky	1598	189	11.8	213	13.3
KY	Jefferson County	Block Group 1, Census Tract 125.01, Jefferson County, Kentucky	471	244	51.8	205	43.5
KY	Jefferson County	Block Group 2, Census Tract 39, Jefferson County, Kentucky	851	457	53.7	19	2.3
KY	Jefferson County	Block Group 2, Census Tract 103.15, Jefferson County, Kentucky	1392	390	28	189	13.6
KY	Jefferson County	Block Group 5, Census Tract 100.05, Jefferson County, Kentucky	940	413	43.9	116	12.3
KY	Jefferson County	Block Group 1, Census Tract 10, Jefferson County, Kentucky	1058	1025	96.9	224	21.2
KY	Jefferson County	Block Group 2, Census Tract 109.02, Jefferson County, Kentucky	1254	345	27.5	146	11.6
KY	Jefferson County	Block Group 3, Census Tract 45, Jefferson County, Kentucky	973	264	27.1	39	4
KY	Jefferson County	Block Group 1, Census Tract 101.02, Jefferson County, Kentucky	973	89	9.1	63	6.5
KY	Jefferson County	Block Group 2, Census Tract 37, Jefferson County, Kentucky	894	515	57.6	241	27.2
KY	Jefferson County	Block Group 2, Census Tract 103.18, Jefferson County, Kentucky	1187	166	14	157	13.4
KY	Jefferson County	Block Group 4, Census Tract 121.05, Jefferson County, Kentucky	783	418	53.4	10	1.3
KY	Jefferson County	Block Group 1, Census Tract 89, Jefferson County, Kentucky	1031	12	1.2	51	4.9
KY	Jefferson County	Block Group 5, Census Tract 115.17, Jefferson County, Kentucky	1123	403	35.9	0	0
KY	Jefferson County	Block Group 1, Census Tract 76.01, Jefferson County, Kentucky	1289	59	4.6	71	5.5

KY	Jefferson County	Block Group 3, Census Tract 126.06, Jefferson County, Kentucky	1141	837	73.4	114	10.1
KY	Jefferson County	Block Group 2, Census Tract 63, Jefferson County, Kentucky	659	51	7.7	143	21.7
KY	Jefferson County	Block Group 3, Census Tract 111.16, Jefferson County, Kentucky	1367	45	3.3	61	4.5
KY	Jefferson County	Block Group 1, Census Tract 99, Jefferson County, Kentucky	1218	222	18.2	63	5.2
KY	Jefferson County	Block Group 1, Census Tract 17, Jefferson County, Kentucky	831	781	94	99	11.9
KY	Jefferson County	Block Group 2, Census Tract 127.01, Jefferson County, Kentucky	454	405	89.2	237	52.2
KY	Jefferson County	Block Group 2, Census Tract 94.02, Jefferson County, Kentucky	1184	125	10.6	385	32.5
KY	Jefferson County	Block Group 2, Census Tract 107.01, Jefferson County, Kentucky	1527	551	36.1	45	2.9
KY	Jefferson County	Block Group 2, Census Tract 7, Jefferson County, Kentucky	1337	1327	99.3	259	19.4
KY	Jefferson County	Block Group 1, Census Tract 71.02, Jefferson County, Kentucky	1128	39	3.5	37	3.3
KY	Jefferson County	Block Group 5, Census Tract 110.03, Jefferson County, Kentucky	676	298	44.1	0	0
			768419	256522	33.87365079	103083	14.64968254

Appendix D

Acronyms and Abbreviation

Appendix D: Acronyms and Abbreviations

ACS - American Community Survey

AEDT - Aviation Environmental Design Tool

AGL - Above Ground Level

BCC - Birds of Conservation Concern

BVLOS - Beyond Visual Line of Sight

CEQ - Council on Environmental Quality

CFR - Code of Federal Regulations

COA - Certificate of Waiver or Authorization

CWA - Clean Water Act

CZMP - Coastal Zone Management Plan

dB - Decibel

DNL - Day-Night Average Sound Level

DOT - Department of Transportation

EA - Environmental Assessment

EO - Executive Order

ESA - Endangered Species Act

FAA - Federal Aviation Administration

The Farm - Fisherville Farm

FEMA - Federal Emergency Management Agency

FONSI - Finding of No Significant Impact

IPaC - Information for Planning and Consultation

IPP - UAS Integration Pilot Program

NAS - National Airspace System

NEPA - National Environmental Policy Act

NMFS - National Marine Fisheries Service

NOAA - National Oceanic and Atmospheric Administration

NPDES - National Pollutant Discharge Elimination System

NRI - Nationwide Rivers Inventory

NTSB - National Transportation Safety Board

OpSpecs - Operations Specifications

PSP - Partnership for Safety Program

ROD - Record of Decision

RPIC - Remote Pilot in Command

U.S.C - United States Code

UA - Unmanned Aircraft

UAS - Unmanned Aircraft Systems

UPSFF - UPS Flight Forward, Inc.

USFWS - United States Fish and Wildlife Service