

Federal Aviation Administration

Draft Environmental Assessment for Zipline International Inc. Proposed Drone Package Delivery Operations in Multiple Arizona Metropolitan Areas

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Washington, D.C.

Notice of Availability, Notice of Public Comment Period, and Request for Comment on the Draft Environmental Assessment for Zipline International Inc. Proposed Drone Package Delivery Operations in Arizona Metropolitan Areas

The Federal Aviation Administration (FAA) provides notice that a draft environmental assessment (EA), prepared pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321–4355), to assess Zipline International Inc. (Zipline), proposed commercial drone delivery service in multiple Arizona metropolitan areas is available for review and comment.

Zipline is seeking to amend its air carrier Operation Specifications (OpSpecs) and other FAA approvals necessary to begin commercial drone package delivery operations in multiple Arizona metro areas. The FAA's approval of the amended OpSpecs is considered a major federal action under NEPA and requires a NEPA review. This Draft EA is submitted for review pursuant to NEPA; FAA Order 1050.1G, *FAA National Environmental Policy Acy Implementing Procedures*; Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303), and Section 106 of the National Historic Preservation Act (16 U.S.C. § 470). The Draft EA will be available for a 30-day public review beginning on Friday, November 6, 2026, and ending on Monday, December 7, 2026.

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

Comments on the Draft EA may be submitted electronically to 9-FAA-Drone-Environmental@faa.gov. Written comments may be submitted via U.S. mail to the address below. Please ensure adequate time for receipt. All comments must be received by 5:00 p.m. Central Time on Monday, December 7, 2026.

Federal Aviation Administration, Suite 802W
C/O AVS Environmental
1200 New Jersey Avenue, SE
Washington, DC 20590

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

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

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

Responsible FAA Official:

_____ Date: _____

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Acronyms and Abbreviations

ACS	American Community Survey
AGL	above ground level
APE	Area of Potential Effects
BVLOS	beyond visual line of sight
CFR	Code of Federal Regulations
dB	decibel
dBA	A-weighted decibel
DNL	day-night average sound level
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
IPaC	Information for Planning and Consultation
LWCF	Land and Water Conservation Fund Act
MBTA	Migratory Bird Treaty Act
metro	metropolitan
MOA	Memorandum of Agreement
mph	miles per hour
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHPR	National Register of Historic Places
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NRHP	National Register of Historic Places
OpSpecs	Operations Specifications
PM	particulate matter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns
PM_{10}	particulate matter equal to or less than 10 microns
ROD	Record of Decision
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer

THPO	Tribal Historic Preservation Officer
U.S.C.	United States Code
UA	unmanned aircraft
UAS	Unmanned Aircraft System
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

Chapter 1
Purpose and Need

1.1 Introduction

Zipline International Inc. (Zipline) holds a Federal Aviation Administration (FAA) standard air carrier certificate under 14 Code of Federal Regulations (CFR) Part 135 (Part 135),[1] which allows holders to conduct on-demand or scheduled (commuter) operations, and a 49 United States Code (U.S.C.) Section 44807 exemption,[2] which allows Zipline to carry the property of another for compensation or hire beyond visual line of sight (BVLOS) using its Zipline Platform 2 Unmanned Aircraft System (referred to as "Zipline UA" throughout). Zipline's Part 135 certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in its Operations Specifications (OpSpecs).[3,4]

Zipline is seeking to amend its OpSpecs to begin unmanned aircraft (UA; also referred to as a drone) commercial package delivery operations in multiple Arizona metropolitan (metro) areas (see Figure 2.2-1).

Zipline is proposing to conduct operations 24 hours a day, seven days per week, including holidays, from two Arizona metro areas using its Zipline UA.[5] Each metro area would have a maximum of 65 Zipline Chargers, a maximum of 1,300 Zipline Dropboxes (i.e., pick up kiosks), and a maximum of 65,000 deliveries per day, depending on the metropolitan area. Each Charger would contain up to a maximum of 72 individual "docks" with charging capability, but most Chargers would have around 36 docks; all docks may not be occupied at any one time. Each Dropbox would have loading capability, where payloads would be dropped off by a person and autonomously picked up by the Zipline UA. Further description of infrastructure and flight operations is provided in Section 2.2, *Proposed Action*.

The FAA's approval of the OpSpecs (including amendments) is considered a major federal action under the National Environmental Policy Act (NEPA)[6] and requires NEPA review. Zipline prepared this draft environmental assessment (Draft EA) under the supervision of the FAA[7] to evaluate the potential environmental impacts that might result from the proposed action. Under NEPA, federal agencies are required to consider the environmental effects of

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

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

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

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

[5] The P2 Zipline UA weighs approximately 63 pounds, including its maximum payload weight of 8 pounds.

[6] See 42 U.S.C. § 4321 et seq.

[7] See 42 U.S.C. § 4336a(f) and FAA Order 1050.1G, §1.3

proposed federal actions and to disclose to decision-makers and the interested public a clear and accurate description of the potential environmental impacts of proposed major federal actions. Additionally, under NEPA, federal agencies are required to consider the environmental effects of a proposed action, the reasonable alternatives to the proposed action, and a no action alternative (assessing the potential environmental effects of not implementing the proposed action). The DOT has established policies and procedures to ensure compliance with the provisions of NEPA through DOT Order 5610.1D, *DOT's Procedures for Considering Environmental Impacts*. The FAA has established policies and procedures to ensure compliance with the provisions of NEPA through FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures* (FAA 2025).

1.2 FAA Role for Proposed Action

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

The FAA has specific statutory and regulatory obligations under 49 U.S.C. § 44705 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." 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." Also included in air carrier certificates is a stipulation that the air carrier's operations must be conducted in accordance with the provisions and limitations specified in the OpSpecs. 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. The regulations implementing 49 U.S.C. § 44705 specify that an air carrier's approved OpSpecs must include, among other things, "authorization and limitations for routes and areas of operations." 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." After making this determination, the FAA must take an action on the OpSpecs amendment.

1.3 Purpose and Need

The federal action subject to review under NEPA is the FAA's decision whether to approve a modification to Zipline's Operations Specifications (OpSpecs) under 14 CFR Part 135. The modification would authorize Zipline to expand its commercial package delivery operations using UAs in multiple Arizona metro areas. Consistent with Order 1050.1G §2.2, when the

FAA is acting on an application for authorization, the purpose and need for the federal action is informed both by FAA's statutory mission and the applicant's goals.

The purpose of Zipline's proposal is to establish UA commercial delivery service throughout Arizona metro areas, which Zipline, in its business judgment, has determined is an appropriate market for expansion. The purpose of the proposed action is related to the FAA's role and responsibility to review applications for safe flight and certification under Part 135.

The need for the proposed action arises from Zipline's application for expanded operating authority to extend its current commercial unmanned aircraft delivery service to multiple Arizona metro areas. The proposed action is needed to meet consumer demand for package deliveries in the Arizona metro areas as identified by Zipline and to implement BVLOS for those drone package delivery operations. Without FAA approval of the requested OpSpecs modification, Zipline would be unable to implement this expansion of its delivery service.

Accordingly, the FAA must determine whether approving the modification to Zipline's OpSpecs is consistent with applicable safety and regulatory requirements, while also fulfilling the agency's obligation under NEPA to evaluate the reasonably foreseeable environmental effects of the decision.

1.4 Public Involvement

The FAA created a Notice of Availability (NOA) with information about this Draft EA and provided it to local, state, and federal officials, interest groups, and federally recognized tribes. The NOA was provided in English and Spanish. The FAA also announced availability of this Draft EA for public review via the FAA's social media and an advertisement in The Arizona Republic and Arizona Daily Star newspapers. The NOA provided information about the proposed action and requested public review and comments on this Draft EA, which is available on the FAA's website[8] for a 30-day comment period. Interested parties are invited to submit comments on any environmental concerns related to the proposed action.

[8] See: https://www.faa.gov/uas/advanced_operations/nepa_and_drones.

Chapter 2
Proposed Action and Alternatives

FAA Order 1050.1G, §1.5(b)(ii) requires the EA to briefly discuss: "The proposed action and alternatives to the extent required by NEPA § 102(2)(H), 42 U.S.C. § 4332(2)(H);" which requires all federal government agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." The FAA has not identified any unresolved conflicts concerning alternative uses of available resources associated with Zipline's proposal. Therefore, this Draft EA only considers the proposed action and the no action alternative.

2.1 No Action Alternative

DOT Order 5610.1D, section 10(b)(3) requires the FAA to consider a no action alternative in their NEPA reviews to compare the environmental effects of not taking action with the effects of the action alternative(s). The no action alternative serves as a baseline to compare the impacts of the proposed action. Under the no action alternative, FAA would not approve an OpSpecs amendment under Part 135 to implement commercial UA package delivery operations in multiple Arizona metro areas. Consumers in the areas not served by UA would be expected to continue to use ground transportation to retrieve small goods and food, assuming that there are viable alternative transportation methods. This action alternative does not fulfill the stated purpose and need.

2.2 Proposed Action

The proposed action is the expansion of Zipline's current area of operations for UA commercial delivery service to include multiple Arizona metro areas. Zipline's proposed Arizona operating areas boundaries are shown in Figure 2.2-1; each metro area would be a separate operating area. Under the proposed action, Zipline would establish Chargers and Dropboxes and would conduct package pick up and delivery operations within each operating area.[9]

The maximum potential number of Chargers, Dropboxes, and deliveries for all metro areas is provided in Table 2.2-1. There could be a maximum of 1,000 deliveries per day from each Charger, but there would be variability in the actual number of flights per day based on customer demand and weather conditions. If, in the future, Zipline wanted to exceed their allocated Chargers, Dropboxes, or daily deliveries in the operating area, additional NEPA reviews would be required.

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

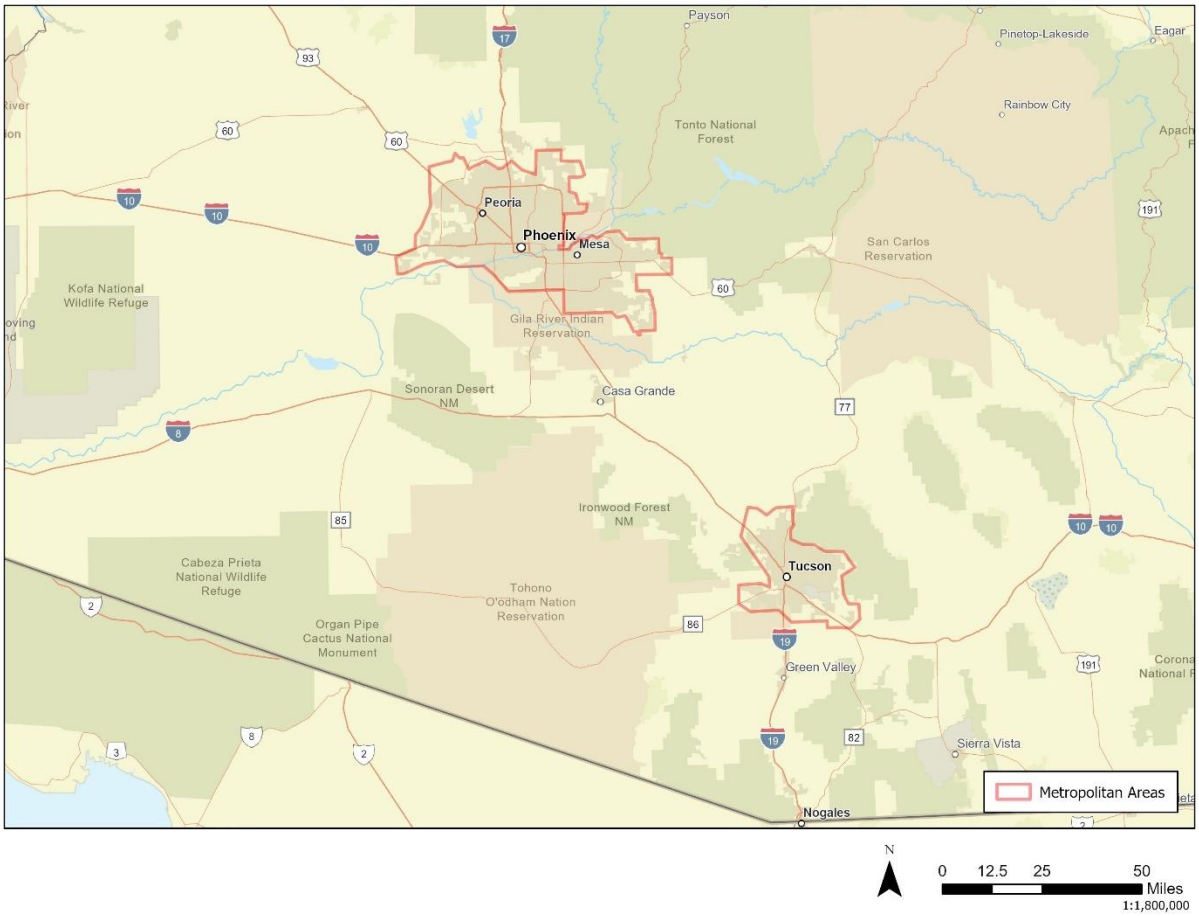


Figure 2.2-1. Zipline's Proposed Arizona Operating Areas

Table 2.2-1. Maximum Number of Zipline Chargers, Dropboxes, and Deliveries per Day by Metro Area

Metropolitan Area	Area (square miles)	Zipline Chargers	Zipline Dropboxes	Maximum Deliveries [a] per day	Maximum Transits [a] per day
Phoenix	1,540.17	65	1,300	65,000	195,000
Tucson	553.72	65	1,300	65,000	195,000
Total	**2,093.89**	**130**	**2,600**	**130,000**	**390,000**

[a] Each delivery includes three transits: 1) flight from Charger to Dropbox, 2) flight from Dropbox to delivery location, and 3) flight from delivery location to ending Charger.

Zipline Chargers and Droboxes are described in detail in Sections 2.2.1 and 2.2.2, respectively. Chargers and Dropboxes would be distributed throughout the Arizona operating areas following a plan to be developed with Zipline's partners and through outreach to local communities (including local officials and wildlife groups, schools, airports, and community groups) and airspace users. Zipline Chargers and Dropboxes would be located in established commercial areas whose use is consistent with local zoning and land use requirements, such as retail stores, warehouses, laboratories, and other locations operated by customers.

The Zipline UA and proposed flight operations are described in detail in Sections 2.2.3 and 2.2.4. Operations would occur 24 hours a day, seven days per week, including holidays. Approximately 95% of flights would take place during 7:00 a.m. to 10:00 p.m. and 5% of flights would take place during 10:00 p.m. to 7:00 a.m. For each delivery, a Zipline UA would undock from a Charger, fly to a Dropbox to pick up a package, make a delivery, and return to a Charger (not necessarily the same Charger from which it undocked). Zipline UAs are capable of flying up to 20 miles between charges, so each round trip (including all three flights) would be no greater than 20 miles. The estimated total distance flown for deliveries would vary depending upon the Charger, Dropbox, and delivery locations. Charger and Dropbox locations would be determined through partner agreements and market demand; deliveries would likely be distributed throughout the service area of individual Chargers and Dropboxes and would remain within the defined operating areas. In the event that Chargers are installed with overlapping service areas, Zipline would not exceed 1,000 total deliveries per day in the area of overlap. Each delivery would include three transits, but for each delivery a maximum of two transits would fly over any one location on the ground; as a result, there would be no greater than 2,000 maximum transits per day over any ground location in the area of overlap.

Zipline UAs would primarily be transporting consumer goods, food & beverages, and pharmaceuticals in partnership with merchants (including pharmacies) in the communities they already serve and would provide an alternative to in-store pick up. Deliveries would be conducted at the time of the customer's choosing and directly to the customer's home in the operating area. Zipline UAs would also transport lab samples from healthcare facilities and hospitals to laboratories as an alternative to a courier service or other ground-based transportation service. Deliveries would also be conducted at the time of the healthcare partner’s choosing. Zipline UAs would also transport items for businesses at the time of a business’ choosing as part of that business’ inventory management.

2.2.1 Chargers

Zipline Charger docking towers would be installed on ballasted foundations or on embedded foundations as freestanding structures constructed on previously disturbed land (e.g., paved parking lots, landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots). When required, Zipline may construct on commercially-zoned, undisturbed land adjacent to a developed area. Development on undisturbed land is outside the scope of this EA and may require supplemental NEPA analysis, including review by a Secretary of the Interior-qualified professional for Section 106 compliance.

The maximum impervious surface created per Charger with installed docks is approximately 500 square feet. Charger operations would require electricity and internet services and, where possible, Zipline would utilize existing utility connections and install related equipment and enclosures. Construction activities would not convert farmland and would not require tree clearing.

Figure 2.2-2 illustrates a potential Charger docking tower configuration. Docks would be housed on vertical towers. Each individual dock would provide the structural interface to house a stationary Zipline UA, charge a Zipline UA and provide thermal management, transfer data from a Zipline UA to and from the cloud, provide visual fiducials for Zipline

UA docking maneuvers, and provide partial weather protection. Zipline UAs would be stored at a dock between flights. The number of docks at each Charger would vary depending on customer need and site characteristics. A typical Charger would consist of 36 docks, which would be filled with Zipline UAs based on market demand in the service area and logistic feasibility and efficiency. Docks may be arranged on multiple towers within a single Charger.



Figure 2.2-2. Zipline Conceptual Freestanding Tower with 12 Dock Configuration[10]

2.2.2 Dropboxes

Most Dropboxes would be ballasted, meaning they would be movable and not require disturbance of the ground or structures (Figure 2.2-3). These Dropboxes would be placed next to businesses and medical buildings for which goods would be transported, and would only be located on existing disturbed land in non-residential areas. Some Dropboxes may be installed as freestanding structures on previously disturbed land (e.g., paved parking lots,

[10] Illustrations are not to scale.

landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots) or attached to an existing building. Installed Dropbox construction would occur only under the following conditions:

- Construction of installed Dropboxes attached to buildings would occur on (a) buildings less than 45 years old or (b) buildings that are greater than 45 years old that have been determined to be ineligible for the National Register of Historic Places (NRHP) within the last 10 years;
- Freestanding installed Dropboxes would be sited to avoid disturbance of documented archaeological resources and would comply with all federal, state, and local laws.

The location of installed Dropboxes outside of these conditions is outside the scope of this EA and may require supplemental NEPA analysis.



Figure 2.2-3. Zipline Dropbox

2.2.3 Unmanned Aircraft Specifications

The Zipline UA is a highly automated, electrically powered vertical takeoff and landing aircraft capable of hover and forward flight (see Figure 2.2-4). The Zipline UA features a multi-rotor design with 5 propellers and weighs approximately 63 pounds when combined with its maximum payload weight of 8 pounds. Tail propellers tilt on a 90 degree axis to toggle between lift/hover and forward flight modes. The Zipline UA has a wingspan of approximately 7.8 feet, a height of approximately 1.8 feet, and a length of approximately 8

feet. Zipline UAs are equipped with high-visibility position and anti-collision strobe lights. These lights run while Zipline UAs are in flight, and are visible for at least 3 statute miles.

Once an order is placed, a package is loaded into the Dropbox, and the Zipline UA transits from a Charger to the Dropbox. Once at the Dropbox, the Zipline UA hovers and lowers a delivery pod (hereafter referred to as "pod"; illustrated at the bottom of Figure 2.2-4) into the Dropbox to retrieve the package. The pod is stored in the Zipline UA payload bay and the Zipline UA flies to the delivery site where it lowers the pod via winch line to a pre-selected delivery site. Figure 2.2-4 illustrates the Zipline UA and pod. All Zipline aircraft use electric power from rechargeable lithium-ion batteries.

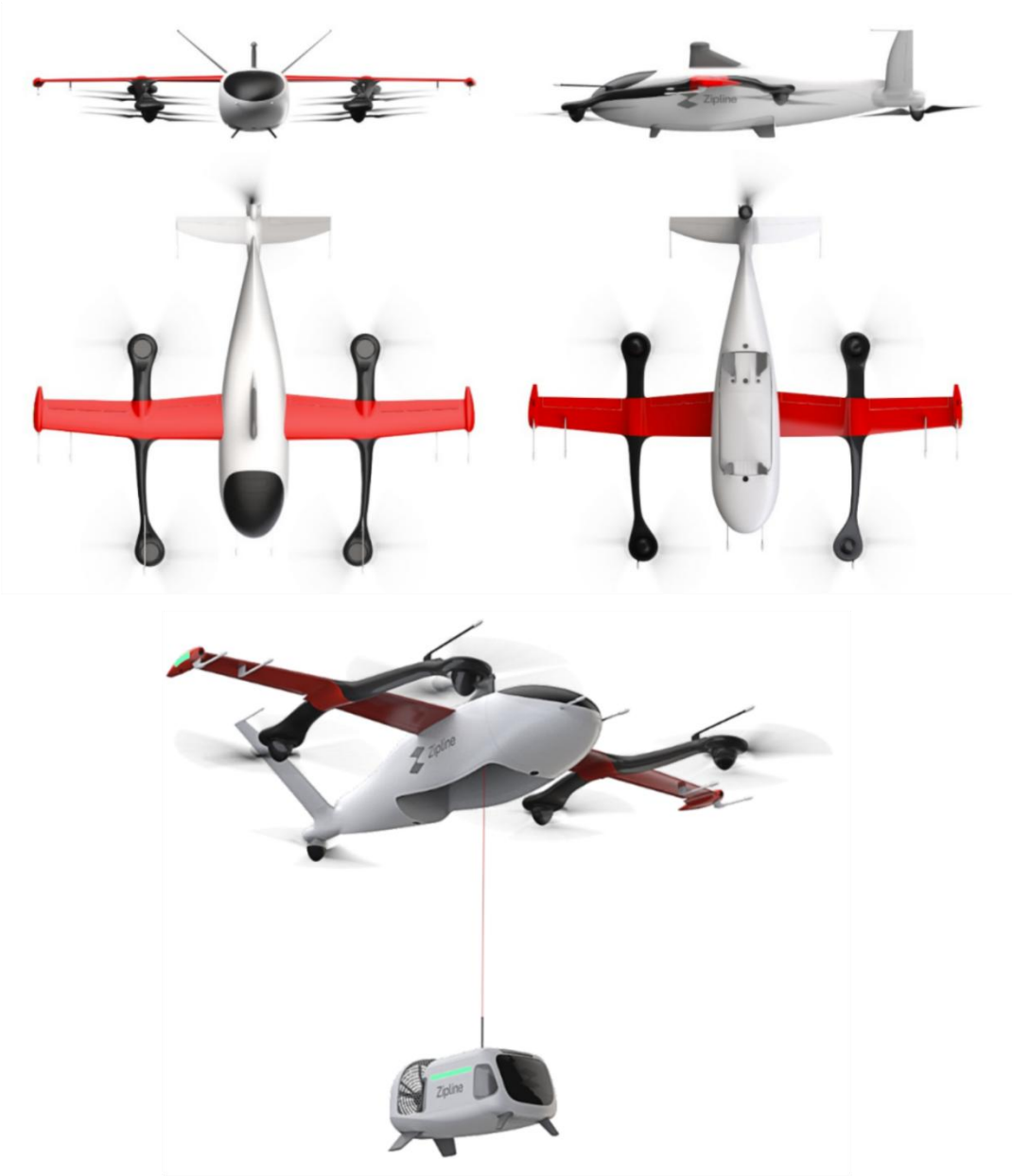


Figure 2.2-4. Zipline UA Profile Views (above) and Delivery Pod (below)

2.2.4 Flight Operations

Zipline UAs fly pre-planned routes developed prior to flight. Routes are generated by software that takes into consideration factors including weather risk, wind direction, and population density. Routes are carefully planned to avoid terrain and obstructions, known areas with high volume of other air traffic, airspace restrictions, and known venues for open-air assemblies of people, and can be regenerated, if needed. Zipline UAs automatically deconflict with each other using a combination of strategic and tactical avoidance measures including generation of predetermined flight paths following specific rules to reduce the overlap of flight paths in different modes and phases of flight. Each Zipline UA communicates directly to other Zipline UAs over radio and cellular networks to share position, velocity, and intent information which is used for each to automatically modify flight plans to maintain separation. Deconfliction occurs even if the Remote Pilot in Command loses communication with Zipline UAs.

To deconflict with other aircraft, including other UAS, Zipline takes a multi-pronged approach. This includes: (1) use of its onboard ADS-B detect and avoid ("DAA") system; (2) use of a FAA-approved Unmanned Aircraft System Traffic Management (UTM) service; (3) use of a third-party solution to notate Zipline areas of operation to inform operators of Zipline's operations; (4) use of Notice to Airmen (NOTAMs) to notify traditional and UA operators of Zipline's flight areas; and (5) proactively building relationships with other local commercial UA operators to identify areas of operational overlap and develop deconfliction procedures as necessary.

The software designs and carefully checks flight paths to ensure Zipline UAs stay safely within the predetermined operational area. The Zipline UA has onboard checks evaluating its position during flight that ensure the Zipline UA remains within the allowed operational area and its intended route. If a Zipline UA departs from the pre-determined operational area, the Zipline UA would automatically take action to terminate the flight immediately or return to the most appropriate location – either docking at the closest available dock or using the hover or paraland function (safe termination of the flight using a parachute) to safely exit the airspace. Additionally, the Remote Pilot in Command has the ability to command flight termination if a Zipline UA flies outside of this pre-determined operational area.

Zipline UAs would generally be operated at an altitude of 330 feet above ground level (AGL) while en route to and from Charger, Dropbox, and delivery locations. At the Dropbox or delivery location, the Zipline UA would maintain stationary hover approximately 330 feet AGL and lower the pod to the Dropbox for pick up of the payload or to the ground for delivery of the payload through bay doors. Once the payload has been released, the UA would then retract the pod, and depart the Dropbox or delivery area en route back to a Charger.[11]

The UA would fly a predefined flight path that is set prior to takeoff. Flight missions are automatically planned by Zipline's flight planning software. A mission originates from a dock, and Zipline's software automatically assigns, deconflicts, and routes each flight to the

[11] See www.flyzipline.com for videos and photographs of Zipline operations.

Dropbox, delivery location, and back to a dock. Docks are built to separate operations from nearby non-participating people and vehicles.

As part of normal operations, the Zipline UA may be assigned one of the following missions:

- Pick up and delivery. The Zipline UA would use a pod to pick up a payload at a Dropbox and then the Zipline UA would use a pod to deliver a payload at a prescribed location.
- Reposition. A Zipline UA moving from one dock to another at the same Charger or from a dock at one Charger to a dock at a different Charger.

Zipline operations begin with order processing followed by flight phases. A typical pick up and delivery flight profile can be broken into the following general flight phases: undocking, transit to Dropbox, pick up, transit to delivery location, delivery, transit to Charger, and docking. Each of these is explained in the following sections. A reposition flight profile would include undocking, transit to new Charger, and docking; any reposition flight operations would take the place of a pick up and delivery flight instead of adding to the total number of flights; since there is only a single transit for these operations, analyzing them as a pick up and delivery operation is a conservative assumption.

2.2.4.1 Pre-Takeoff

During the pre-takeoff process, Zipline's system would complete automated preflight checks of the UA to ensure no unsafe conditions exist.

2.2.4.2 Undocking

Once cleared for takeoff from a dock, the Zipline UA undocks and then maneuvers away from the dock and ascends vertically to the en route altitude (330 feet AGL) on its pre-planned flight path.

2.2.4.3 Transit to Dropbox

The transit phase to a Dropbox is where the Zipline UA would fly from the Charger to a Dropbox to pick up the payload. During this flight phase, the Zipline UA would typically operate using horizontal flight at an altitude of 330 feet AGL and a typical cruise airspeed of 70 miles per hour (mph).

2.2.4.4 Order Processing and Pick Up

The order processing and pick up phase consists of deceleration and hovering over a Dropbox. The Zipline UA maintains its altitude at 330 feet AGL and its position over the Dropbox. The pod is released from the Zipline UA and lowered to the Dropbox via the winch line. During pod descent, the pod automatically controls its position laterally and evaluates the Dropbox. If the Dropbox is clear, the pod would continue to descend and enter the Dropbox. The Dropbox would insert the package into the pod. The pod would then be retracted back into the Zipline UA. The Zipline UA would then proceed to accelerate as it exits the Dropbox area and begins transit to the delivery location. The total hover time for pick up operations would be approximately 120 seconds.

2.2.4.5 Transit to Delivery Location

The transit to delivery location phase is the part of flight in which the loaded Zipline UA transits from the Dropbox to a delivery point on a predefined flight path. During this flight phase, the Zipline UA would typically operate using horizontal flight at an altitude of 330 feet AGL and a typical cruise airspeed of 70 mph.

2.2.4.6 Delivery

The delivery phase consists of deceleration and hovering over a delivery point, such as a residential yard, driveway, parking lot, or common area. The Zipline UA maintains its altitude at 330 feet AGL and its position over the delivery location. The pod is released from the Zipline UA and lowered to the ground via the winch line. During pod descent, the pod automatically controls its position laterally and evaluates the delivery location. If the delivery location is clear, the pod would continue to descend and deliver the payload at the delivery target. The pod would then be retracted back into the Zipline UA. The Zipline UA would then proceed to accelerate as it exits the delivery area and begins transit back to the Charger. The total hover time for delivery operations would be approximately 75 seconds.

2.2.4.7 Transit to Charger

The Zipline UA continues to fly at an altitude of 330 feet AGL and a speed of up to 70 mph toward the dock.

2.2.4.8 Docking

Upon reaching the dock, the Zipline UA decelerates and descends vertically before maneuvering into the dock area. The Zipline UA then attaches to the dock from below using its docking fin. The Zipline UA's motors are disengaged after the Zipline UA has registered secure connection with the dock.

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

This chapter provides a description of the affected environment and potential environmental consequences for the environmental impact categories that have the potential to be affected by the no action alternative and proposed action, as required by FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures* (FAA 2025). As required by FAA Order 1050.1G, this EA presents an evaluation of impacts for the environmental impact categories listed below.

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

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

3.2 Environmental Impact Categories Not Analyzed in Detail

This EA did not analyze potential impacts on the following environmental impact categories in detail because the proposed action would not affect the resources included in the category (see FAA Order FAA Order 1050.1G, § 1.2 (b)(1).

- **Air Emissions and Air Quality:** The UA is battery powered and does not generate emissions that could result in air quality impacts or climate impacts. Electricity consumed for battery charging at the Chargers would be minimal. Electricity consumed for the proposed action would come from the power grid with backup generators on site in the event of an emergency. These emissions would be minimal and are not expected to contribute to any exceedance of National Ambient Air Quality Standards. Based on a 2020 study of drone delivery operations, by year 5 of operations drones were projected to replace between 11.2 percent and 18.7 percent of total delivery miles previously made by automobiles, or between 11.3 million miles and 96 million miles (Lyon-Hill et al. 2020).
- **Coastal Resources:** The proposed action would not directly affect any shorelines or change the use of shoreline zones and be inconsistent with any National Oceanic and Atmospheric Administration–approved state Coastal Zone Management Plan as there are no shorelines in the area of operations. The study area is approximately 130 miles from the nearest shoreline.
- **Section 6(f) of the Land and Water Conservation Fund Act:** Under Section 6(f) of the Land and Water Conservation Fund Act (LWCF) (16 U.S.C. §§ 460*l*-4 through 460*l*-11), it is prohibited to convert property acquired with or developed with LWCF grant money to non-recreational purposes without approval from the National Park Service (NPS). Charger and Dropbox installation would only occur in existing zoned commercial areas and would not occur on any lands acquired or developed with LWCF grant funds. The proposed action would not affect Section 6(f) resources.
- **Farmlands:** The proposed action would not involve the potential to convert any farmland to non-agricultural uses. Chargers and Dropboxes would be installed within existing zoned commercial areas and primarily occur on previously disturbed land. The proposed action would not affect designated prime or unique farmlands.
- **Hazardous Materials, Solid Waste, and Pollution Prevention:** The proposed action would result in limited construction or development primarily in previously disturbed areas. Therefore, the potential for impact in relation to hazardous materials, pollution prevention, and solid waste is not anticipated. Additionally, each Zipline UA is primarily made from recyclable materials and the only hazardous materials used in its manufacture and operation are lithium-ion batteries. Each Zipline UA will be properly managed at the end of its operating life in accordance with 14 CFR Part 43. Any hazardous materials would be disposed of in accordance with all federal, tribal, state, and local laws, including 40 CFR Part 273, *Standards for Universal Waste Management*.
- **Land Use:** The proposed action does not involve any changes to existing, planned, or future land uses within the area of operations. Zipline would primarily construct on

existing infrastructure, such as parking lots or the sides of buildings. Land use and zoning are typically governed by local and state laws. Zipline is responsible for complying with any such applicable laws relevant to establishing its operations (e.g., siting Chargers and Dropboxes and related infrastructure). All Chargers and Dropboxes would be sited in accordance with all local land use ordinances and zoning requirements. Local jurisdictions in the Arizona metro areas may vary in the scope of their review and approval of commercial operations. Further, Section 3.6, *Noise and Noise-Compatible Land Use,* identifies the setback distances from noise-sensitive areas.

- **Natural Resources and Energy Supply:** The proposed action would not require the need for unusual natural resources and materials, or those in scarce supply. Zipline's aircraft would be battery powered and would not consume fossil fuel (e.g., gasoline or aviation fuel) resources. The fuel for operation of generators is expected to be in relatively low quantities that are available from the local supply. Zipline would use a Charger dock to charge the batteries of the UA. In addition, Zipline's electrically powered aircraft is most often used to replace individual personal automobile trips to retrieve small goods and would therefore be expected to reduce consumption of fuel resources; a 2020 study found that by year 5 of drone operations in a single U.S. metropolitan area, drone delivery could avoid up to 294 million miles per year in road use (Lyon-Hill et al. 2020).
- **Socioeconomics and Children's Environmental Health and Safety Risks:** The proposed action would not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community. Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to ensure that children do not suffer disproportionately from environmental or safety risks. The proposed action would not affect products or substances a child would be likely to come into contact with, ingest, use, or be exposed to, and would not result in environmental health and safety risks that could disproportionately affect children. It is not anticipated that the proposed action would pose a greater health and safety risk to children than package delivery by other means (truck, mail, personal automobile trips, etc.). Additionally, Zipline's proposal includes avoiding *fly less* areas during operational hours, which could help avoid or reduce any potential environmental health or safety impacts on children. Zipline's electrically powered aircraft is most often used to replace individual personal automobile trips to retrieve small goods and would therefore reduce noxious emissions and improve road safety, which are both appreciable concerns for children.
- **Water Resources (Wetlands, Floodplains, Surface Water, Groundwater, and Wild and Scenic Rivers):** The proposed action would not result in substantial new ground disturbance and would therefore not encroach upon areas designated as navigable waters, wetlands, or floodplains. Charger and Dropbox construction would at most involve the installation of approximately 500 square feet of impermeable surface and site-specific standoff measures would be initiated to avoid potential affects to navigable waters, wetlands, and floodplains. The proposed action would not affect any waters of the U.S. The proposed action would not result in any substantial changes to existing discharges to

water bodies, or modify a water body. The proposed action would not degrade water quality or contaminate public drinking water supplies. The proposed action does not involve activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to groundwater resources. The closest wild and scenic river to the study area is the Verde, approximately 28 miles northeast of the Phoenix metro study area (NPS 2024a). The closest Nationwide Rivers Inventory river segment is the Sabino Creek, which intersects the northeastern portion of the Tucson metro study area (NPS 2024b). Charger and Dropbox construction does not have the potential to disrupt the free-flowing character of any designated wild and scenic river and operations would not affect a wild and scenic river or river on the Nationwide Rivers Inventory. *Therefore, the proposed action would not affect wetlands, floodplains, surface water, groundwater, or wild and scenic rivers.*

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

3.3.1 Definition of Resource and Regulatory Setting

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

3.3.1.1 Threatened and Endangered Species

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

3.3.1.2 Migratory Birds

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

The Bald and Golden Eagle Protection Act prohibits anyone from "taking" a Bald or Golden Eagle, including their parts, nests, or eggs, without a permit issued by the USFWS. Implementing regulations (50 CFR Part 22), and USFWS guidelines as published in the *National Bald Eagle Management Guidelines*, provide for additional protections against "disturbances." Similar to *take*, *disturb* means to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, injury to an eagle or causes either a decrease in its productivity or nest abandonment due to a substantial interference with breeding, feeding, or sheltering. A permitting process provides limited exceptions to the Bald and Golden Eagle Protection Act's prohibitions. Permits are only needed when avoidance of incidental take is not possible. According to the National Bald Eagle Management Guidelines, if conservation measures can be implemented such that no aircraft are flown within 1,000 feet of an eagle nest, incidental take of bald eagles is unlikely to occur, and no permit is needed. Zipline is responsible for compliance with the Bald and Golden Eagle Protection Act.

3.3.2 Affected Environment

According to the U.S. Environmental Protection Agency, the study area is almost entirely (>99%) within the Sonoran Basin and Raneg level III ecoregion with a small area within the Madrean Archipelago level III ecoregion (EPA 2025). The following is a general description of each of these two ecoregions based on Ruhlman et al. (2012) and Calzia and Wilson (2012); however, note that much of the land surface in the study area is developed or disturbed, as it contains urban and suburban development in and around the Phoenix and Tucson metropolitan areas.

- Madrean Archipelago ecoregion: This ecoregion is regarded as one of the most biologically diverse areas in the world, providing a unique mix of flora and fauna within mountain, woodland, desert and grassland terrain. The Madrean Archipelago ecoregion encompasses Lowlands within this ecoregion experience an average annual minimum and maximum temperatures of 46°F and 78°F with decreases in temperature of 36°F and increases in precipitation of 4–5 inches for every 1,000-foot gain in elevation (Ruhlman et al. 2012).
- Sonoran Basin and Range ecoregion: This ecoregion features scattered mountain ranges divided by broad alluvial plains, with the ranges formed from igneous, sedimentary, and metamorphic rock types. This region is characterized by a warm, arid climate with winter daytime temperatures averaging around 70°F and summer daytime temperatures often exceeding 100°F. The western portion of the Sonoran Basin and Range ecoregion experiences most of its precipitation in the winter while the eastern portion receives most of the precipitation in the summer. This pattern contributes to a diverse range of vegetation that includes more than 2,500 different species within the ecoregion (Calzia and Wilson 2012).

Urban growth and ongoing development continues to spread within and around the Arizona metro operating areas. The urban environment in the study area encompasses agricultural lands; commercial zones (such as business parks, airports, and landfills); established communities; a dense downtown; recreational spaces (including public parks, golf courses, and desert preserves); residential neighborhoods; major thoroughfares (highways, railroads, and public roads); and undeveloped areas (open desert, vacant lots, and scrublands). Washes

and other natural drainages also form part of the landscape. These areas provide habitat for the smaller, more common and/or introduced bird and mammal species including the desert cottontail (*Sylvilagus audubonii*), coyote (*Canis latrans*), Gila woodpecker (*Melanerpes uropygialis*), and mourning dove (*Zenaida macroura*).

3.3.2.1 Special-Status Species

Federally Listed Species

The potential for impacts on federally listed species was assessed using the USFWS Information for Planning and Consultation (IPaC) online system (USFWS 2026). The official species list for the study area is included within Appendix E, *Biological Resources*. Table 3.3-1 lists the federally threatened and endangered species that could be present in the study area. The study area also contains designated critical habitat for the Arizona Eryngo (*Eryngium sparganophyllum*), Gila Chub (*Gila intermedia*), and Mexican spotted owl (*Strix occidentalis lucida*).

Table 3.3-1. ESA-Listed, Proposed, and Candidate Species Potentially Present Within the Study Area

Species	Common Name	Scientific Name	ESA Status	Critical Habitat
Mammals	Jaguar	*Panthera onca*	Endangered	No
	Mexican Wolf	*Canis lupus baileyi*	EXPN	No
	Ocelot	*Leopardus (=Felis) pardalis*	Endangered	No
	Sonoran Pronghorn	*Antilocapra americana sonoriensis*	EXPN	No
Birds	Cactus Ferruginous Pygmy-owl	*Glaucidium brasilianum cactorum*	Threatened	No
	California Least Tern	*Sternula antillarum browni*	Endangered	No
	Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	Yes
	Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered	No
	Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened	No
	Yuma Ridgway's Rail	*Rallus obsoletus yumanensis*	Endangered	No
Reptiles	Northern Mexican Gartersnake	*Thamnophis eques megalops*	Threatened	No
Amphibians	Chiricahua Leopard Frog	*Rana chiricahuensis*	Threatened	No
Fishes	Desert Pupfish	*Cyprinodon macularius*	Endangered	No
	Gila Chub	*Gila intermedia*	Endangered	Yes
	Gila Topminnow (incl. Yaqui)	*Poeciliopsis occidentalis*	Endangered	No
	Gila Trout	*Oncorhynchus gilae*	Threatened	No

Species	Common Name	Scientific Name	ESA Status	Critical Habitat
Insects	Monarch butterfly	*Danaus plexippus*	Proposed Threatened	No
	Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	Proposed Endangered	No
Flowering Plants	Arizona Eryngo	*Eryngium sparganophyllum*	Endangered	Yes
	Huachuca Water-umbel	*Lilaeopsis schaffneriana var. recurva*	Endangered	No
	Pima Pineapple Cactus	*Coryphantha scheeri var. robustispina*	Endangered	No

ESA = Endangered Species Act, EXPN = Experimental Population, Non-Essential.

Based on the IPaC report, there are 8 ESA-listed and proposed species that could be present in the study area and affected by the action: six birds and two insects. Given that the action does not include any habitat modification and the UA would not touch the ground, there is no possible mechanism of effects to the following species, and they are not discussed further in this document: ESA-listed mammals, ESA-listed reptiles, ESA-listed amphibians, ESA-listed fishes, and ESA-listed flowering plants.

Birds

There are six ESA-listed bird species that could be present in the study area: cactus ferruginous pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail.

The cactus ferruginous pygmy-owl inhabits desert rivers, washes, and undisturbed Sonoran Desert areas at elevations under 4,000 feet. They live in the desert habitat of southern Arizona and in northwestern Mexico and favor dense desert scrub, trees, and towering cacti as sites for nesting and roosting. Their diet consists of small rodents, lizards, insects, frogs, earthworms, and other birds (Center for Biological Diversity n.d.).

The California least tern nest in colonies of typically 15 to 300 pairs on sandy beaches, estuaries, and coastal embayments, often near river mouths. They feed by diving into shallow coastal waters to catch small fish, such as anchovies and topsmelt. California least terns are present in the United States during the breeding season, which extends from mid-April to mid-September (USFWS n.d.a).

Mexican spotted owls are generally found in forested mountains and canyonlands throughout the southwestern U.S. and Mexico. Their range encompasses Utah, Colorado, Arizona, New Mexico and the western portions of Texas south into several states of Mexico. Mexican spotted owls feed on small mammals, specifically mice, voles, and woodrats (USFWS n.d.b). The reproductive chronology varies somewhat across their range. In Arizona, courtship begins in March and the female lays 2–4 eggs in late March to early April and hatch in early May (NPS 2010).

Southwestern willow flycatcher is a summer breeder within its range in the United States. Their breeding habitat currently ranges from southern California, through southern Nevada, southern Utah, Arizona, New Mexico, southwestern Colorado, and Texas (NPS 2013). They

require dense riparian thickets and shrubs for nesting. Their diet consists of various species of insects, including flies, beetles, and other small invertebrates. Habitat not suitable for nesting may be used for migration and foraging (USFWS n.d.c).

Yellow-billed cuckoos utilize wooded habitat with dense cover and water nearby, including woodlands with low, scrubby, vegetation, overgrown orchards, abandoned farmland, and dense thickets along streams and marshes. They breed throughout much of the eastern and central United States, winter almost entirely in South America, and migrate through Central America. In the western United States, nests are often placed within willows along streams and rivers, with nearby cottonwoods serving as feeding sites, with caterpillars being their main prey (USFWS n.d.d).

The Yuma Ridgway's rail is a marsh bird that prefers thick, emergent riparian vegetation for both foraging and nesting. Yuma Ridgway's rails do not migrate but have shifting seasonal ranges based on food availability (USFWS n.d.e). They are generally found in the marshes of the lower Colorado River, the Salton Sea in California, the Ciénega de Santa Clara in Sonora, Mexico, and the Gila River in Arizona (National Audubon Society n.d.). Their diet typically consist of crayfish, small fish, frogs, and aquatic invertebrates.

Insects

There are two ESA-listed insect species potentially present in the study area: the monarch butterfly and Suckley's cuckoo bumble bee.

The monarch butterfly and Suckley's cuckoo bumble bee potentially occur in the study area. Monarchs occur throughout the United States during summer months and are proposed for federal listing. The preferred habitat for monarchs is open meadows, fields, and wetland edges with the presence of milkweed and flowering plants where they typically fly close to the ground. Western monarch butterflies, which live west of the Rocky Mountains, migrate toward the California coast in the fall, overwintering in clusters on blue gum eucalyptus, Monterey pine, and Monterey cypress trees (USFWS n.d.f). Suckley's cuckoo bumble bee, a social parasite, that are dependent on the host species for much of their life cycle. They inhabit prairie habitats and can be found in the nests of western bumble bees (Bumble Bee Atlas n.d.). In the western portion of their range, Suckley's cuckoo bumble bee observations extend south to Arizona. As of 2024, there are approximately 250 bumble bee species worldwide, with approximately 50 native bumble bee species in the United States and Canada and have not been observed within the United States since 2016 (USFWS 2024).

State Species of Greatest Conservation Need

In Arizona, native animals or plants designated as a Species of Greatest Conservation Need (SGCN) are generally those that are declining or rare and in need of attention to recover, or to prevent the need to list under state federal regulation (AZGFD 2024). The counties identified in the study area that have been evaluated for SGCN include Maricopa, Pima, and Pinal. The Arizona Game and Fish Department database and The Arizona Wildlife Conservation Strategy (2022–2032), provides a list of all amphibians, birds, fish invertebrates, mammals, and reptiles that are considered SGCN within Arizona.

Migratory Birds

Migratory bird species found within the study area vary throughout the year. The study area is within the Pacific Flyway where each year at least a billion birds migrate along. The birds that inhabit the Pacific Flyway rely on diverse habitat ranging from the Arctic tundra, northwestern rainforest to tropical beaches and mangroves (National Audubon Society 2026).

Bird behavior, in particular mobbing and territorial defense behaviors, on flying and hovering UA is the most important risk consideration for analysis, as these behaviors are the most pertinent to the proposed action. Mobbing behavior includes birds emitting alarm calls, flying at the predator, diverting its attention, and harassing it. Mobbing and aerial attack behaviors typically occur when a raptor, crow, or other aerial predator enters the airspace of breeding habitat or territorial males (Royal Society for the Protection of Birds 2023). Certain species of birds harass, mob, and attack aerial predators that fly into or near their territory, especially during the breeding season when birds are actively nesting. The defending birds will chase, dive bomb, attack the backside, and vocalize to harass the aerial predator until the offender is far enough from the territory that the defending birds cease attacking and return to their nests and foraging activities (Kalb and Randler 2019). Not all bird species exhibit mobbing and territorial defensive behaviors. Some bird species are more aggressive, defensive, and cued on aerial predators, while other species may show no aggression or interest toward an overflying hawk in its territory. Species of birds that exhibit mobbing and territorial defense behaviors that are known to occur in the Arizona metro areas are shown in Table 3.3-2.

Table 3.3-2. Arizona Metro Songbird Species with Mobbing and Territorial Behaviors

Common Name (scientific name)	Habitat Preferences	Notes
Northern Mockingbird (*Mimus polyglottos*)	Habitat generalist occurring in nearly all types of urban development settings.	The most aggressive territorial bird species in North America, the mockingbird is a potential mobbing species during hovering at the nest and delivery location. Mockingbirds are known to nest in parking lot landscaping and areas with high density development. Birds will attack any moving object in territory, including humans and pets.
Red-winged Blackbird (*Agelaius phoeniceus*) and Common Grackle (*Cyanocitta cristata*)	Both species have a strong affinity for wetland habitats and lake shorelines for breeding and nesting.	Relatively aggressive territorial defender known to mob a wide variety of animals who fly over or perch within a male blackbird or grackle's harem territory. Both males and females exhibit mob behaviors during the breeding season but do not mob during the non-breeding season during the fall and winter months when blackbirds and grackles tend to form in flocks.
American Crow (*Corvus brachyrhynchos*)	The American crow is less of a nest defending bird and is more prone to territorial defense and inquisitive behaviors as the bird species with the highest intelligence in the Arizona metro areas.	Little to no concern over mobbing UA vehicles; greater concern over territorial defense and curiosity behaviors. Crows can also attack larger prey items cooperatively.

Common Name (scientific name)	Habitat Preferences	Notes
Small Songbirds	Include several species that exhibit breeding habitat and nest defense behaviors. Typically tree-nesting species.	Smaller bird species like the diminutive blue-grey gnatcatcher (*Polioptila caerulea*) do not defend territories as large as the above-mentioned species, making them unlikely mobbing birds for conflicts with UAs.

Source: iNaturalist 2026.
UA = unmanned aircraft.

The bald eagle (*Haliaeetus leucocephalus*) is not a Bird of Conservation Concern in the study area but warrants attention under the Bald and Golden Eagle Protection Act and is considered a Key Conservation Species within the state. During winter, bald eagles migrate south along the freeze line in search of more abundant prey. Large numbers are common around lakes and rivers near the Mogollon Rim and extending east into the White Mountains. In Arizona, bald eagles usually build their nests within a mile of water sources such as creeks, lakes, or rivers. These nests are most commonly located on cliff ledges, rocky pinnacles, or in cottonwood trees (SWBEMC n.d.). Nests have been documented along the Salt River, Agua Fria River, Danny Lopez Park, and within the Peoria Regional Preserve (iNaturalist 2026).

3.3.3 Environmental Consequences

Potential impacts on biological resources associated with the proposed action were considered in the area where drones may operate (launch, fly, and pick up and delivery packages). Zipline Chargers and Dropboxes would primarily be located in previously disturbed areas such as building sides and parking lots; any disturbance associated with the program would be minimal and would not affect high quality habitat availability for any species. Drones fly at lower speeds and elevations and are smaller than conventional aircraft. For each delivery, a Zipline UA would undock from a Charger, fly to a Dropbox to pick up a package, make a delivery, and return to a Charger (not necessarily the same Charger from which it undocked). The UA would maintain an average speed of 70 mph en route at an altitude of 330 feet AGL and hover for approximately 75 seconds to make a delivery. Then, the UA would ascend and transition back to en route flight mode for a return to the Charger. At a potential maximum of 65,000 flights per day across the Arizona metro areas, the distribution and altitude of the flights are not expected to significantly affect wildlife in the study area. Furthermore, the Zipline UA would only briefly hover in fixed positions at the Charger, Dropbox, and delivery locations.

A significant impact on federally listed threatened and endangered species would occur if the USFWS or NMFS determines the proposed action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would be likely to result in the destruction or adverse modification of federally designated critical habitat. An action need not involve a threat of extinction to federally listed species to meet the NEPA standard of significance. Lesser impacts, including impacts on non-listed or special-status species, could also constitute a significant impact.[12]

[12] See FAA Order 1050.1G, Exhibit A-1, Biological Resources, Factors to Consider, p. A-1.

3.3.3.1 No Action Alternative

Under the no action alternative, Zipline would not implement commercial UA package delivery operations in multiple Arizona metro areas and would continue to conduct UA package delivery operations under Part 135 in locations currently authorized by its OpSpecs. The no action alternative is not expected to result in significant impacts on biological resources.

3.3.3.2 Proposed Action

There would be limited ground construction or habitat modification associated with the proposed action, as the Chargers and Dropboxes would primarily be located in lots that are already developed with commercial uses. Zipline's aircraft would not touch the ground in any place because it remains aerial while conducting pick ups and deliveries and would dock above ground. Zipline's deliveries would initiate from the Charger, approach an en route altitude of 330 feet AGL, and would always occur below 400 feet AGL, to a Dropbox to pick up a package. The UA would maintain altitude at 330 feet AGL and hover for a brief time to make a delivery. Then, the UA would transition back to an en route flight mode for a return to a Charger (not necessarily the same Charger from which it undocked).

Because operations would occur mostly in an urban environment, typically well above the tree line and away from sensitive habitats and given the short duration of increased ambient sound levels, flights are not expected to affect wildlife in the area. Zipline plans to coordinate with the managing entities of state parks and natural areas within multiple Arizona metro areas on the thoughtful placement and use of delivery sites within these areas as necessary.

Special-Status Species

Federally Listed, Proposed, and Candidate Species

The proposed action does not involve ground-disturbing activity outside of existing non-residential areas. Flights would primarily occur in developed areas with low quality wildlife habitat. Minimal indirect or direct effects would occur to aquatic environments or high quality terrestrial habitats as a result of the proposed action. As there is no plausible route of effects to aquatic or terrestrial environments, the FAA has determined that the proposed action would have *"**no effect**"* to all ESA-listed designated critical habitat.

Birds

The cactus ferruginous pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail could potentially be affected by noise, light, and collision risk associated with the proposed action. However, the action does not involve ground disturbance or vegetation removal and therefore would not physically impact any suitable habitat for these birds. If present in the study area, these ESA-listed birds could experience UA noise during the en route and delivery flight phases. Birds resting or foraging at or near the tree line at the time a UA flies by would experience the greatest sound levels. Birds near the ground at the time a UA flies by would experience lower sound levels. Given the estimated sound levels of the UA, the UA's linear flight profile to and from Chargers and delivery locations, the low probability of encountering any one of

these ESA-listed birds in the study area given their specific habitat requirements, and the short period of time the UA would be in any particular location, UA noise is not expected to adversely affect ESA-listed birds. Further, the chances of any one individual experiencing multiple overflights of a UA are low given the mobility of the birds. One study found that, in most instances, drones within 4 meters of birds did not cause a behavioral response (Vas et al. 2015). In another study, drones barely elicited behavioral responses in terrestrial mammals (Mulero-Pázmány et al. 2017).

Operations would occur mostly in an urban environment; the altitude at which the UA flies in the en route phase (330 feet AGL); the expected low sound levels; any increase in ambient sound levels would be short in duration; the probability of these ESA-listed birds occurring in the study area, and; the low likelihood of the UA striking an individual. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated). Therefore, the FAA has determined that the proposed action ***may affect but is not likely to adversely affect*** the cactus ferruginous pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail.

Insects

The monarch butterfly and Suckley's cuckoo bumble bee are proposed for federal listing. The monarch butterfly and Suckley's cuckoo bumble bee could potentially be affected by noise, light, and collision risk associated with the proposed action. The primary threat to these insects are habitat loss, including the loss of breeding, migratory, invasive species, and overwintering habitat. Pesticide use and climate change are also threats. The action would not physically affect monarch butterfly habitat or host plants. Monarch butterflies and Suckley's cuckoo bumble bees could be struck by drones en route to and from delivery; however, strikes are not likely given the species' mobility. Information regarding drone impacts on insects is limited, and there have been no widespread negative impacts identified in the scientific literature. Based on the information available and the limited scale of operations, the action is not expected to adversely affect the monarch butterfly and Suckley's cuckoo bumble bee.

Operations would occur mostly in an urban environment; the altitude at which the UA flies in the en route phase (330 feet AGL); the expected low sound levels experienced by these species; any increase in ambient sound levels would be short in duration; the low probability of encountering these species due to low probability of presence, and; the low likelihood of the UA striking these species. Any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated). Based on the information available and the limited scale of operations, the action is ***not expected to adversely affect*** the monarch butterfly and Suckley's cuckoo bumble bee.

On November 5, 2026, the FAA submitted an informal consultation request to the USFWS in accordance with Section 7 of the ESA and requested concurrence with the FAA's effect determination for the proposed project. Consultation is ongoing and will be completed prior to the issuance of the Final EA.

Species of Greatest Conservation Need[13]

The following bats are SGCN that could be present in the study area: Allen's lappet-browed bat, big brown bat, big free-tailed bat, California leaf-nosed bat, canyon bat, eastern red bat, greater western mastiff bat, hoary bat, lesser long-nosed bat, Mexican free-tailed bat, Mexican long-tongued bat, pale Townsend's big-eared bat, pocketed free-tailed bat, silver-haired bat, spotted bat, Underwood's mastiff bat, western red bat, western yellow bat, and pallid bat (AZGFD 2026). Although these bat species may occur within the study areas, they are unlikely to encounter operating UA as Zipline's proposed operations occur predominantly in the urban environment where bat densities are lower. Bat activity increases as night approaches, and they are most active between dusk and dawn. Drone flights that occur between civil dawn and dusk would overlap with peak periods of activities.

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

Migratory Birds

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

To avoid impacts on nesting bald eagles, Zipline would implement a monitoring plan for bald eagle nests that integrates multiple strategies and resources. This includes periodically checking online tools such as iNaturalist[14] to identify eagle nests that may occur in the operating area, as well as communication with the bird watching community to identify nests. If Zipline identifies a bald eagle nest or is notified of the presence of a nest, Zipline would 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. Zipline would maintain this avoidance area until the end of the breeding season or until a qualified biologist indicates the

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

[14] See https://www.inaturalist.org.

nest has been vacated. Zipline would report monitoring and avoidance measures to Arizona Fish and Game Department and the USFWS Region 2 Migratory Bird Permit Office.

Based on the information available regarding the interaction between drones and birds, the FAA concludes that mobbing and attacking behaviors would be the most relevant interaction to occur. As detailed in Table 3.3-2, some bird species are more likely to exhibit this type of behavior, and these are the species that would potentially interact with the drones, if any.

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

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

3.4.1 Definition of Resource and Regulatory Setting

Section 4(f) of the U.S. Department of Transportation (DOT) Act (codified at 49 U.S.C. § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) states that, subject to exceptions for de minimis impacts[15] "[t]he Secretary may approve a transportation program or project requiring the use of [4(f) resources] … only if—(1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

The term *use* includes both direct or physical and indirect or "constructive" impacts on Section 4(f) resources. *Direct use* is the physical occupation or alteration of a Section 4(f) property or any portion of a Section 4(f) property. *Constructive use* does not require direct physical impacts or occupation of a Section 4(f) resource. A constructive use would occur when a proposed action would result in substantial impairment of a resource to the degree that the protected activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.[16]

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

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

Another type of physical use, known as *temporary occupancy,* results when a transportation project results in activities that require a temporary easement, right-of-entry, project construction, or another short-term arrangement involving a Section 4(f) property. A temporary occupancy is considered a Section 4(f) use unless all the conditions listed the Section 4(f) regulations at 23 CFR 774.13(d) are satisfied.

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

The concept of *constructive use* is that a project that involves no actual physical use of a Section 4(f) property via permanent incorporation or *temporary occupancy*, but may still, by means of noise, air pollution, water pollution, or other proximity-related impacts, substantially impair important features, activities, or attributes associated with the Section 4(f) property. Substantial impairment occurs only when the protected activities, features, or attributes of the Section 4(f) property that contribute to its purpose and significance are substantially diminished. This means that the value of the Section 4(f) property, in terms of its prior purpose and significance, is substantially reduced or lost.

Procedural requirements for complying with Section 4(f) are set forth in DOT Order 5610.1D, *Procedures for Considering Environmental Impacts* and 49 U.S.C. § 303. The NOA process was used to notify Section 4(f) jurisdictional agencies of potential impacts to public parks, recreation areas, wildlife refuges, and historic properties. The FAA also uses Federal Highway Administration (FHWA) regulations (23 CFR Part 774) and FHWA guidance (e.g., Section 4(f) Policy Paper) when assessing potential impacts on Section 4(f) properties. These requirements are not binding on the FAA; however, the FAA may use them as guidance to the extent relevant to FAA projects. More information about DOT Act, Section 4(f) can be found in Chapter 5 of the FAA Order 1050.1 Desk Reference (FAA 2023).

3.4.2 Affected Environment

The FAA used data from federal, state, and other public-access sources to identify potential Section 4(f) resources within the study area (Appendix B, *Section 4(f)*). The FAA identified many properties that meet the definition of a Section 4(f) resource, including public parks administered by state, city, and county authorities, and historic properties identified in the National Register of Historic Places online database (NPS 2025). By count, most of the Section 4(f) resources are local public parks and recreational facilities (ballparks and sports complexes). Appendix B provides an inventory list of local parks in the study area. There are two national forests within the study area, Coronado National Forest and Tonto National Forest, and one national park within the study area, Saguaro National Park.

Wildlife refuges, national forests, and parks are not currently included in Zipline's *fly less* restrictions. However, existing policies in place for these properties would limit Zipline operations within or over Section 4(f) properties. The NPS prohibits launching, landing, or operating UAs from or on lands and water within the boundaries of properties administered by the NPS unless the operator has approval in writing from the NPS superintendent.[17] The U.S. Forest Service prohibits launching UAs within 100 meters of wildlife and overflights of wildlife; requires UAs to stay away from populated and noise-sensitive areas, such as campgrounds, trail heads, and visitor centers; and prohibits overflights of congressionally-designated wilderness and/or primitive areas.[18] Some state agencies prohibit UAS from launching or recovering any UAs from state property without consent or permits, and some municipalities have restrictions for UAs operations within public parks and recreation areas.

There may be instances where the delivery would be to a customer located within a Section 4(f) resource. For example, public delivery zones could be set up for events and community engagement in collaboration with the city parks and recreation department.

As discussed in Section 3.5, *Historical, Architectural, Archaeological, and Cultural Resources*, there are numerous historic properties within the study area as listed on the NPS website, although most of these are considered for architectural or other purposes that would not typically be affected by UA operations. The FAA is currently consulting with the Arizona SHPO to determine whether historic and traditional cultural properties would be affected by the proposed action (see Section 3.5.2, *Affected Environment*).

3.4.3 Environmental Consequences

3.4.3.1 No Action Alternative

Under the no action alternative, Zipline would not implement commercial UA package delivery operations in multiple Arizona metro areas and would continue to conduct UA package delivery operations under Part 135 in locations currently authorized by its OpSpecs and at other locations under 14 CFR Part 107,[19] which limits operations to UA weighing less than 55 pounds and within visual line of sight. Market demand would not be met, and consumers would continue to use personal ground transportation to retrieve small goods. This alternative does not support the stated purpose and need.

3.4.3.2 Proposed Action

Under the proposed action, there would be no physical or constructive use of Section 4(f) resources because Chargers and Dropboxes would not be installed on Section 4(f) properties and occasional flyovers during temporary occupancy of UAs in the study area would not result in substantial impairment of Section 4(f) properties. As discussed in Section 3.6, *Noise and Noise-Compatible Land Use*, the proposed action would not result in significant noise

[17] NPS Reference Manual #60: Aviation Management, dated September 2024.

[18] See: https://www.fs.usda.gov/visit/know-before-you-go/recreational-drone-tips.

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

levels at any location within the study area. As further described in Section 3.7, *Visual Effects*, the short duration of en route flights (approximately 15 seconds) would minimize any potential for significant visual impacts. In addition, Zipline's flight planning software is designed to increase variability in flight paths to minimize overflights of any given location; with the diversification of flight paths, the frequency of overflights would inversely scale as the distance from a site increases. Zipline will communicate directly with Arizona State Parks and Trails to discuss any concerns regarding parkland noise and will carefully coordinate any parkland delivery operations with managing entities as necessary.

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

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

3.5 Historical, Architectural, Archaeological, and Cultural Resources

3.5.1 Definition of Resource and Regulatory Setting

Cultural resources encompass a range of sites, properties, and physical resources relating to human activities, society, and cultural institutions. Such resources include past and present expressions of human culture and history in the physical environment, such as prehistoric and historic archaeological sites, structures, objects, and districts that are considered important to a culture or community. Cultural resources also include aspects of the physical environment, namely natural features and biota that are a part of traditional ways of life and practices and are associated with community values and institutions.

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

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

The FAA has not established a significance threshold for this impact category; however, the FAA has identified a factor to consider when evaluating the context and intensity of potential environmental impacts for historical, architectural, archaeological, and cultural resources. A

factor to consider in assessing a significant impact is when an action would result in a finding of adverse effect through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an Environmental Impact Statement (i.e., a significant impact). If an adverse effect is determined, the Section 106 process will be resolved through a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) to record resolution measures to mitigate or minimize adverse effects.

3.5.2 Affected Environment

The APE for the proposed action is the metro areas where Zipline is planning to conduct UA package deliveries, plus a 3-mile buffer for light visibility at night, as shown in Figure 2.2-1. According to the National Park Service's online database of the NRHP, there are 525 NRHP-listed historic properties within the APE, including 363 buildings (including residences, businesses, schools, churches, social and recreational buildings), 123 historic districts, 17 structures (bridges, water towers, bunkers, and railroad cars), 20 sites (precontact and post-contact archaeological sites, military sites, community development, religious, or agricultural sites), and two objects (a flagpole and a locomotive). These historic properties and districts are listed in Appendix F, *SHPO Consultation*.

3.5.3 Environmental Consequences

3.5.3.1 No Action Alternative

Under the no action alternative, Zipline would not implement commercial UA package delivery operations in multiple Arizona metro areas and would continue to conduct package delivery operations under Part 135 in locations currently authorized by its OpSpecs. Consumers in the areas not served by UA would be expected to continue to use personal ground transportation to retrieve small goods. The no action alternative does not fulfill the stated purpose and need. Therefore, the no action alternative is not expected to result in significant impacts related to historical, architectural, archaeological, and cultural resources.

3.5.3.2 Proposed Action

Zipline Chargers and Dropboxes would be located in commercially zoned areas primarily pre-disturbed areas. Infrastructure for this project would consist almost entirely of pre-existing hardstand and would involve limited ground disturbance. Therefore, the nature of UA effects on historic properties would be limited to non-physical, reversible impacts (i.e., the introduction of audible and/or visual elements). Aboveground Charger and Dropbox structures could incur a minor visual effect on historic properties if those properties are within the viewshed of the autoloaders. However, the required setback distances to avoid noise impacts described in Section 3.6.3.2, *Proposed Action,* would minimize these impacts.

Zipline projects up to 1,000 delivery flights per operating day per Charger and up to 300 pick ups per Dropbox location. All takeoff and pick up operations would be located no closer to any historic property than the setback distances described in Section 3.6.3.2, *Proposed Action*. Pick ups or deliveries at or near historic properties would involve the UA hovering at 330 feet AGL for about 120 or 75 seconds, respectively. In flight, the UA would appear as a

small object moving at twice the speed of bird flight. These rapid and intermittent flight operations would result in minimal visual effects. Additionally, Zipline's flight planning software minimizes overflights of any specific location by varying flight paths (Section 2.2, *Proposed Action*).

The FAA's noise exposure analysis (Section 3.6, *Noise and Noise-Compatible Land Use*, and Appendix D) confirms that noise levels would be below significance thresholds, even in areas of highest exposure. The small size of the UA ensures no vibrations that could affect historic structures or contents within the APE.

Based on the information available, the FAA made a preliminary finding of *no adverse effect* to historic properties. In accordance with 36 CFR Section 800.4(a)(1), the FAA is consulting with the Arizona SHPO to determine effects on historic properties by the proposed action (Appendix F). The Final EA will detail the outcome of this consultation.

The FAA consulted with eleven tribes that may potentially attach religious or cultural significance to resources in the APE: (1) Ak-Chin Indian Community; (2) Colorado River Indian Tribes of the Colorado River Indian Reservation; (3) Fort McDowell Yavapai Nation; (4) Fort Sill Apache Tribe of Oklahoma; (5) Gila River Indian Community of the Gila River Indian Reservation; (6) Hopi Tribe of Arizona; (7) Pascua Yaqui Tribe of Arizona; (8) Salt River Pima-Maricopa Indian Community of the Salt River Reservation; (9) San Carlos Apache Tribe of the San Carlos Reservation; (10) Tohono O'odham Nation of Arizona; (11) White Mountain Apache Tribe of the Fort Apache Reservation.[20] The FAA sent consultation letters to the eleven tribes listed above in November 2026, regarding the entire APE.

Based on the information available, the FAA made a finding of *no adverse effect* in accordance with 36 CFR § 800. The FAA provided the AZ SHPO with a project summary and requested concurrence on the APE, identification of historic properties, and finding of no adverse effect in a letter sent on November 5, 2026.

Therefore, the proposed action would not result in significant impacts on historical, architectural, archaeological, or cultural resources.

3.6 Noise and Noise-Compatible Land Use

3.6.1 Definition of Resource and Regulatory Setting

Noise is considered any unwanted sound that interferes with normal activities (such as sleep, conversation, student learning) and can cause annoyance. Aircraft noise is often the most noticeable environmental effect associated with any aviation project. Several federal laws, including the Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. §§ 47501–47507) regulate aircraft noise and noise-compatible land use. Through 14 CFR Part

[20] 9 of these 11 tribes have THPOs: Colorado River Indian Tribes of the Colorado River Indian Reservation; Fort McDowell Yavapai Nation; Gila River Indian Community of the Gila River Indian Reservation; Hopi Tribe of Arizona; Pascua Yaqui Tribe of Arizona; Salt River Pima-Maricopa Indian Community of the Salt River Reservation; San Carlos Apache Tribe of the San Carlos Reservation; Tohono O'odham Nation of Arizona; White Mountain Apache Tribe of the Fort Apache Reservation.

36, the FAA regulates noise from aircraft. FAA Order 1050.1G, Appendix C, §C-1.3 requires the FAA to identify the location and number of noise-sensitive areas that could be significantly impacted by noise.

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

FAA Order 1050.1G, Appendix A, states noise impacts would be significant if the action would increase the DNL by 1.5 dB or more for a noise sensitive area that is exposed to noise at or above DNL 65 dB, or that will be exposed to DNL values at or above 65 dB due to an increase of DNL 1.5 dB or greater, when compared to the no action alternative for the same timeframe. For example, an increase of the DNL from 65.5 dB to 67 dB is considered a significant impact, as is an increase from 63.5 dB to 65 dB.

For an increase of 1.5 dB or more to occur from an existing DNL of 63.5 dB, the added noise on its own must be at least a DNL 59.7 dB (i.e., 59.7 dB + 63.5 dB = 65 dB). The decibel level of additional noise that is required to result in an increase of 1.5 dB to any existing noise level can be determined by subtracting 3.8 from the value of the existing noise level (e.g., 63.5 - 3.8 = 59.7).

3.6.2 Affected Environment

The approximate land area within the study area is approximately 2,062 square miles, the approximate water area is 33 square miles, and the estimated population within the counties included in the study area is 5,991,153 per 2022 American Community Survey (ACS) estimates (U.S. Census Bureau 2023).

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

3.6.3 Environmental Consequences

3.6.3.1 No Action Alternative

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

3.6.3.2 Proposed Action

Operations would include up to 1,000 deliveries per day from each Charger and would occur up to 365 days per year. Approximately 95% of flights would take place during 7:00 a.m. to 10:00 p.m. and 5% of flights would take place during 10:00 p.m. to 7:00 a.m. The FAA developed a methodology to evaluate the potential noise exposure in the proposed study area that could result from implementation of the proposed action (Appendix D). The noise assessment evaluated noise emissions data for the Zipline UA.

This analysis was used to define the potential significant impacts due to the proposed action. Noise assessments were performed for each of the flight phases as discussed in detail in the following sections (Table 15 to 17 of Appendix D). For the number of daily deliveries analyzed for each phase, 5% were assumed to be nighttime deliveries; Table 3.6-1 shows the total number of daytime and nighttime deliveries per day, as well as the number of DNL equivalent deliveries per day (Table 14 of Appendix D).

Table 3.6-1. Number of Daytime and Nighttime Deliveries for Different Levels of Service

Total Number of Deliveries per Day	Number of Daytime Deliveries per Day	Number of Nighttime Deliveries per Day	Number of DNL Equivalent Deliveries per Day
100	95	5	145
200	190	10	290
400	380	20	580
600	570	30	870
800	760	40	1,160
1,000	950	50	1,450

Noise Exposure for Charger Operations

Table 3.6-2 provides the estimated extent of daily noise exposure for Chargers at different levels of operations up to the total maximum analyzed. The estimated maximum extents of DNLs under the flight path for any single Charger are provided for 45 dB through 65 dB in 5 dB increments, as well as for 59.7 dB, because this is the DNL threshold below which increases of 1.5 dB or more in aviation noise cannot result in significant impacts (see Section 3.6.1, *Definition of Resource and Regulatory Setting*).

Each Charger would be placed at a distance from noise-sensitive areas that would not result in the estimated extent of daily noise exposure exceeding DNL 59.7 dB. The setback distance

for each Charger would be determined by the total daily deliveries planned for that location. For example, a Charger with the maximum 1,000 deliveries per day would be placed at least 170 feet away from noise-sensitive areas. Therefore, there would be no significant noise impacts due to Charger operations.

Table 3.6-2. Estimated Extent of Daily Noise Exposure per Charger

Number of Daytime Deliveries	DNL 65 dB	DNL 60 dB	DNL 59.7 dB	DNL 55 dB	DNL 50 dB	DNL 45 dB
100	<50 feet	<50 feet	<50 feet	<50 feet	160 feet	560 feet
200	<50 feet	<50 feet	<50 feet	125 feet	270 feet	925 feet
400	<50 feet	50 feet	90 feet	185 feet	810 feet	1,305 feet
600	<50 feet	125 feet	125 feet	265 feet	915 feet	En Route
800	<50 feet	145 feet	150 feet	405 feet	1,015	En Route
1,000	<50 feet	160 feet	170 feet	560 feet	1,125	En Route

Source: ICF 2026.
dB = decibel; DNL = day-night average sound level.

Noise Exposure for Dropbox Operations

There would be many more Dropboxes than Chargers (see Section 2.2), meaning fewer pick ups would occur per Dropbox than deliveries per Charger. A maximum of 300 pick ups per day per Dropbox was analyzed to provide a conservative maximum based on anticipated demand (including 5% night operations). Table 3.6-3 provides the estimated extend of daily noise exposure for Dropboxes at different levels of operations up to this total maximum analyzed. Results are provided for 45 dB through 65 dB in 5 dB increments, as well as for 59.7 dB, because this is the DNL threshold below which increases of 1.5 dB or more in aviation noise cannot result in significant impacts (see Section 3.6.1, *Definition of Resource and Regulatory Setting*).

Each Dropbox would be placed at a distance from noise-sensitive areas that would not result in the estimated extent of daily noise exposure exceeding DNL 59.7 dB. For example, a Dropbox with up to 300 deliveries per day would be placed at least 50 feet away from noise-sensitive areas. Therefore, there would be no significant noise impacts due to the Dropbox operations.

Table 3.6-3. Estimated Extent of Daily Noise Exposure per Dropbox

Total Pick Ups per Day	DNL 65 dB	DNL 60 dB	DNL 59.7 dB	DNL 55 dB	DNL 50 dB	DNL 45 dB
100	<50 feet	<50 feet	<50 feet	<50 feet	105 feet	425 feet
200	<50 feet	<50 feet	<50 feet	<50 feet	165 feet	925 feet
300	<50 feet	<50 feet	<50 feet	<50 feet	275 feet	1,115 feet

Source: ICF 2026.
dB = decibel; DNL = day-night average sound level.

Noise Exposure for En Route Operations

Based on the information provided by Zipline, it is expected that UA would generally cruise at or above an altitude of 330 feet AGL and travel at a ground speed of 70 mph during en route flight. The en route noise exposure for a single point exposed to 1,000 round-trip deliveries (2,000 maximum transits) would not exceed 48.4 dB DNL (Appendix D, Table 18). Considering that en route UA noise would not be expected to exceed DNL 1.5 dB at any locations under any delivery scenarios, this was not quantified further.

Noise Exposure for Delivery Operations

The noise exposure for delivery operations includes the noise exposure for the delivery point itself, based on maximum daily deliveries to any one location. Zipline anticipates a maximum of 400 deliveries to any single location; deliveries to single family homes would be much lower, so this maximum represents delivery locations such as a large apartment complex. The noise exposure for a single delivery point is provided for up to 400 deliveries per day in Table 3.6-4 for various DNL levels. At the level of 1,000 average daily deliveries (50 of those at nighttime), significant noise effects would not be expected anywhere beyond the immediate point of delivery.

Table 3.6-4. Estimated Extend of Daily Noise Exposure for Delivery Locations

Total Deliveries per Day	DNL 65 dB	DNL 60 dB	DNL 59.7 dB	DNL 55 dB	DNL 50 dB	DNL 45 dB
15	<50 feet	<50 feet	<50 feet	<50 feet	<50 feet	<50 feet
50	<50 feet	<50 feet	<50 feet	<50 feet	<50 feet	160 feet
100	<50 feet	<50 feet	<50 feet	<50 feet	105 feet	455 feet
200	<50 feet	<50 feet	<50 feet	55 feet	190 feet	915 feet
300	<50 feet	<50 feet	<50 feet	100 feet	405 feet	1,070 feet
400	<50 feet	<50 feet	<50 feet	125 feet	805 feet	1,520 feet

Source: ICF 2026.
DNL = day-night average sound level.

Overall Noise Exposure Results

The maximum noise exposure levels are associated with Charger operations. For a Charger with the maximum of 1,000 operations per day, DNL 59.7 dB would occur within 170 feet of the Charger. Each Charger would be placed at a setback distance from noise-sensitive areas that would not result in the estimated extend of daily noise exposure exceeding DNL 59.7 dB, as determined by the total daily deliveries planned for that location (see Table 3.6-2).

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

3.7 Visual Effects

3.7.1 Definition of Resource and Regulatory Setting

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

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

3.7.2 Affected Environment

The proposed action would take place over mostly suburban and commercially developed properties. As noted in Section 3.4, *Department of Transportation Act, Section 4(f) Resources*, there are some publicly owned resources that could be valued for aesthetic attributes within the study area. However, Zipline UAs automatically deconflict with each other using a combination of strategic and tactical avoidance measures including generation of predetermined flight paths following specific rules to reduce the overlap of flight paths in different modes and phases of flight. During takeoff, en route, pick up, delivery, and landing, the UA would travel en route at an altitude less than 400 feet AGL (en route travel would generally occur at 330 feet AGL). During pick-up, the UA maintains an altitude of 330 feet AGL and its position over the Dropbox for a total of 120 seconds. The UA would then begin transit to the delivery location. Deliveries would mostly take place at residences, and, in some cases, there may be instances where the delivery would be to a customer located within a Section 4(f) resource (see Section 3.4.2, *Affected Environment,* for more information on Section 4(f) properties). During the delivery phase, the Zipline UA transitions from the en route altitude to a delivery point, such as a residential yard, driveway, parking lot, or common area. The Zipline UA maintains a stationary hover at 330 feet AGL and lowers the pod via the winch line to the ground for delivery of the payload through the bay door. If the pod is unable to automatically identify the delivery target and evaluate its suitability, an image is sent to an operator for real-time evaluation. If the delivery site does not meet Zipline's evaluation criteria[21], delivery would not continue, and the pod is retracted back into the Zipline UA. If the delivery site is identified and clear, the pod would continue to descend

[21] Zipline's evaluation criteria includes visual clearance for obstacles. It may also include additional checks such as pod position tracking errors.

and deliver the payload at the delivery target. The total hover time for delivery operations would be approximately 75 seconds. The duration of delivery from the time the customer approves the delivery to the transition back to en route flight mode is expected to last approximately 75 seconds. The FAA estimates at typical operating altitude and speeds the UA en route would be observable for approximately 6 seconds by an observer on the ground.

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Under the no action alternative, Zipline would not implement commercial UA package delivery operations in multiple Arizona metro areas and would continue to conduct package delivery operations under Part 135 in locations currently authorized by its OpSpecs. Consumers in the areas not served by UA would be expected to continue to use personal ground transportation to retrieve small goods. The no action alternative does not fulfill the stated purpose and need. Therefore, the no action alternative is not expected to result in significant visual effects.

3.7.3.2 Proposed Action

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

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

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

The majority of flights would be conducted during the daytime, when light emissions would not noticeably affect the visual character or ambient light conditions of the study areas. Up to 5% of flights could be conducted at nighttime (10:00 p.m. to 7:00 a.m.). During this time, strobe lights on a Zipline UA could be visible for up to 3 miles. However, these flights would be infrequent and of short duration, although flight cadence in any single area would vary depending on the Charger location and partners served by an individual Dropbox. As a result, the proposed action would not result in significant light emission impacts due to nighttime operations.

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

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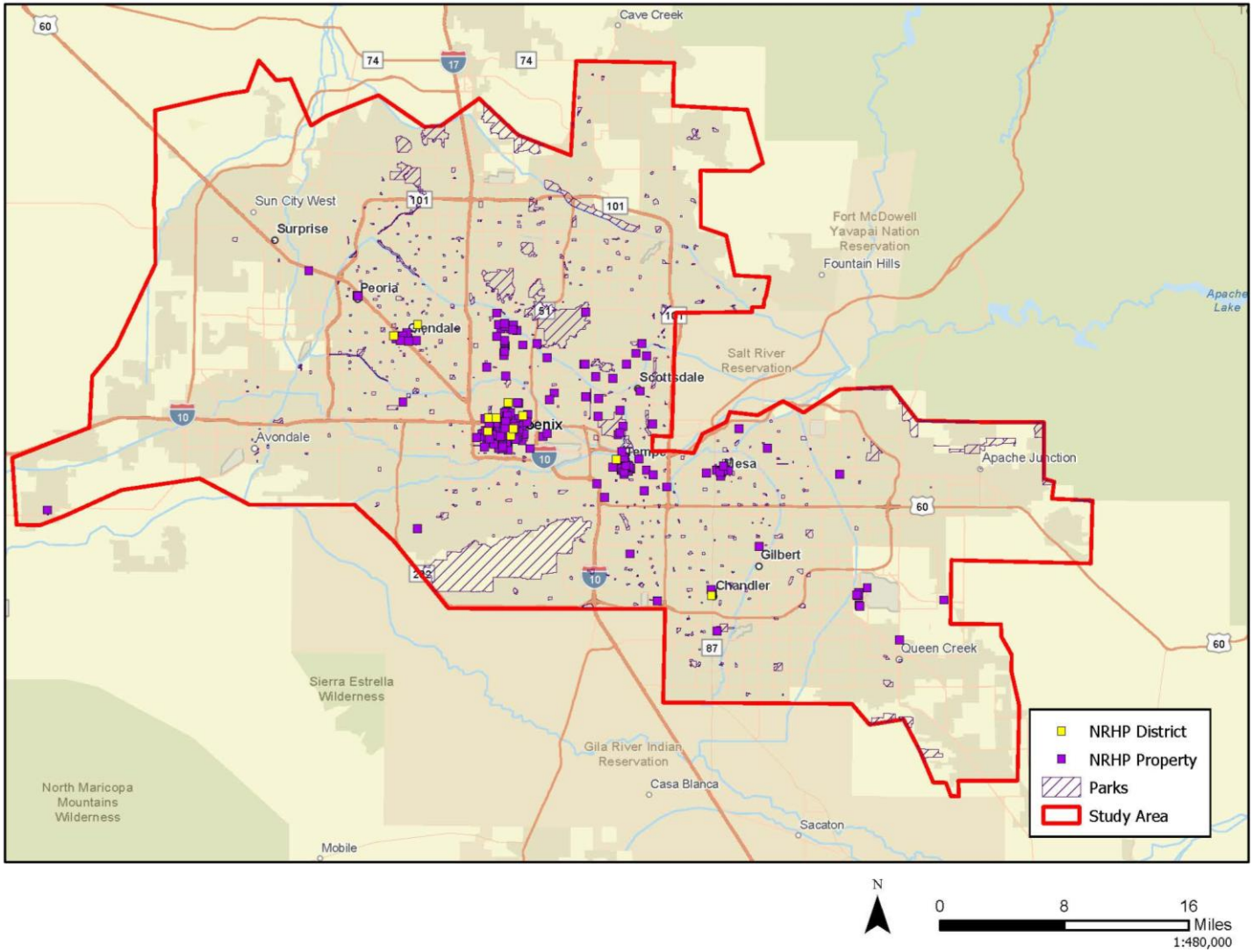
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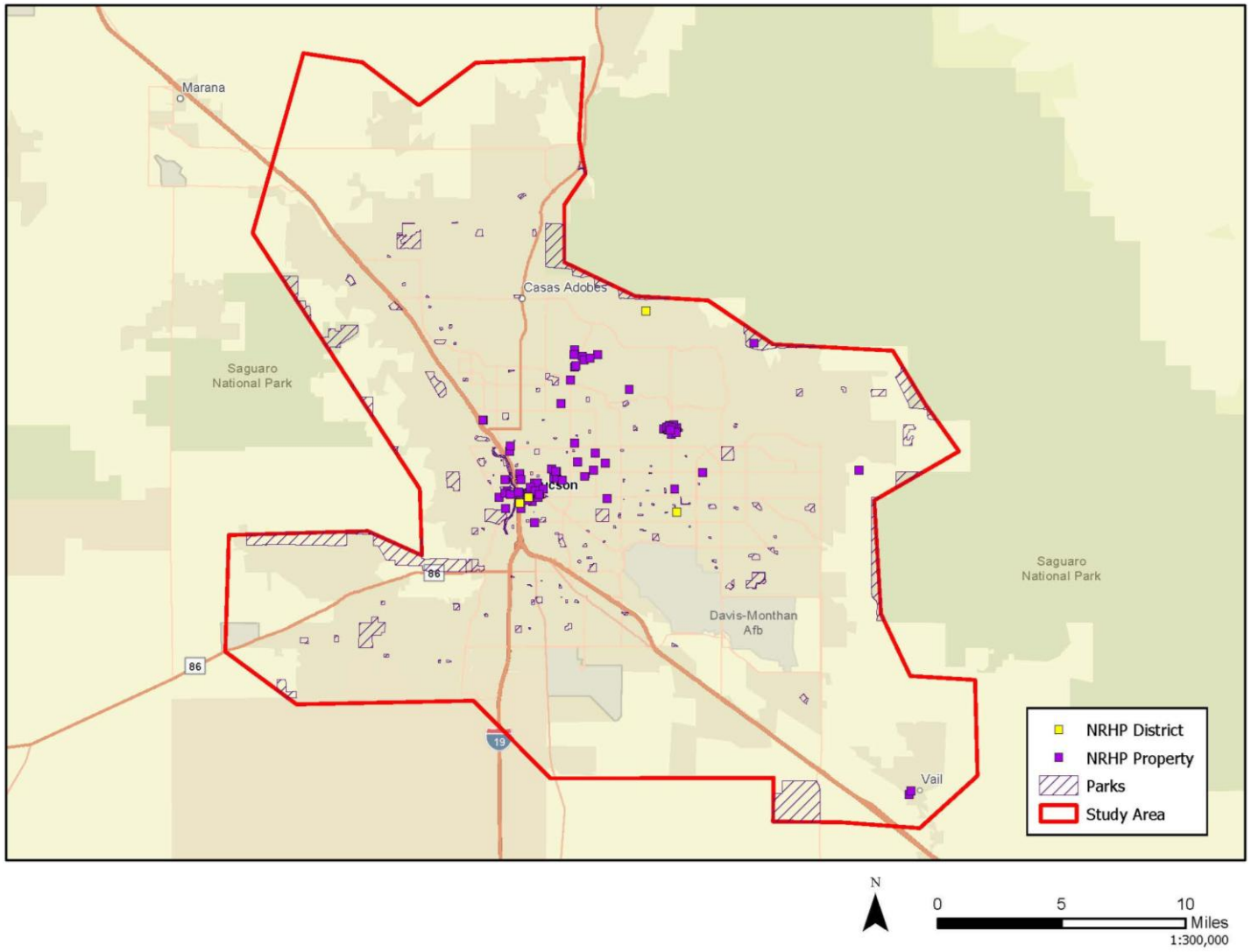
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Cave Creek
Sun City West
Surprise
Peoria
Glendale
Fort McDowell Yavapai Nation Reservation
Fountain Hills
Apache Lake
Salt River Reservation
Scottsdale
Phoenix
Tempe
Mesa
Avondale
Apache Junction
Gilbert
Chandler
Queen Creek
Sierra Estrella Wilderness
Gila River Indian Reservation
Casa Blanca
Sacaton
North Maricopa Mountains Wilderness
Mobile
NRHP District
NRHP Property
Parks
Study Area
N
0
8
16
Miles
1:480,000


Marana
Casas Adobes
Saguaro
National Park
Saguaro
National Park
Davis-Monthan
Afb
Vail
86
86
19
NRHP District
NRHP Property
Parks
Study Area
N
0
5
10
Miles
1:300,000

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Appendix D
Noise

Addendum to

TECHNICAL NOISE STUDY REPORT: ZIPLINE PLATFORM 2 FIXED WING UNMANNED AIRCRAFT PACKAGE DELIVERY OPERATIONS

REPORT NO. 033126

August 2026

Since finalization of the May 2026 noise report, Zipline has updated the terminology for its Unmanned Aircraft (UA) operations. Operations are consistent with those described in the May 2026 noise report.

May 2026 Noise Report Terminology	Updated Terminology
P2 Zip	Zipline UA
Droid	Delivery pod (or pod)
Charging Points	Chargers
Zipping Points	Dropboxes

TECHNICAL NOISE STUDY REPORT: ZIPLINE PLATFORM 2 FIXED WING UNMANNED AIRCRAFT PACKAGE DELIVERY OPERATIONS

REPORT NO. 033126

PREPARED FOR:

Federal Aviation Administration
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ICF

May 2026



ICF. 2026. *Technical Noise Study Report: Zipline Platform 2 Fixed Wing Unmanned Aircraft Package Delivery Operations.* Report No. 033126. May. Seatle, WA. Prepared for the Federal Aviation Administration. Washington, DC.

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Acronyms and Abbreviations

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

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Chapter 1
Introduction

1.1 Purpose

The purpose of this report is to provide calculations of noise exposure for package delivery operations by unmanned aircraft (UA) developed by Zipline International, Inc. Noise exposure estimates are provided for the Platform 2 UA (P2 Zip) based on sound level testing data collected by Zipline (2025, 2026).

A report prepared last year for this UA evaluated noise exposure for the P2 Zip in a non-fixed wing configuration (ICF 2025). This updated report describes noise exposure for the same P2 Zip model revised with a hybrid design utilizing both propellor power and fixed-wing flight. The UA contains an onboard delivery capsule (Droid) for package loading and offloading, which is deployed using a winch line to ground level while the UA hovers in place.

This report introduces the use of intermediate parcel pickup locations, or "zipping points" which are also analyzed for noise exposure levels during UA package loading. The operation of charging infrastructure at docks is also evaluated in relation to charging demands at a docking site.

The analysis in this report provides a methodology of estimating noise levels from UA operation that is specific to the Zipline P2 Zip. Because the methods used in this report are based on collected measurements, they should not be applied to other UA models. The analysis accounts for source levels only and does not include a site-specific geographic component, nor does it account for the presence of structures in urban areas.

The sound level measurements presented in this report are based closely on the concept of operations (CONOPS) for all modes of UA package delivery and associated operations. Passby exposure levels at different distances from an origination or delivery point are based on as-tested conditions, which were intended to simulate all operation types in the P2 Zip. Testing simulations consisted of the following operations:

- Undocking and departure from an origination point (dock)
- Arrival at a zipping point and transfer of a package to a Droid
- Package offloading via Droid at a delivery point using the P2 Zip and departure back to dock
- Returning and landing at a dock
- Hovering in place
- En route (with a package)

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

1.2 Fundamental Concepts

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

- Sound Exposure Level (SEL): SEL represents the total sound energy occurring over a specified period compressed into a one-second time interval. The SEL metric has broad utility in noise prediction and is a primary metric calculated from Leq values collected from sound level testing of UAs.
- Day Night Average Sound Level (DNL): DNL is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 decibel (dB) penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m. The DNL is used in this analysis to describe noise exposure for daily operations from a dock, en route, or a delivery point.
- Equivalent Sound Level (L_{eq}). L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustic energy as the time-varying sound that occurs during the same period. The duration of the measurement is commonly indicated in the metric; for example, a one-hour L_{eq} sound level would be indicated as dBA 1-hour L_{eq}.
- Maximum Sound Level (Lmax): Lmax is the highest sound level measured during a specified period.
- Community Noise Equivalent Level (CNEL): Similar to DNL, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

1.3 Regulatory Context

The noise exposure estimates in this document are intended to be used for environmental assessments of operations involving the Zipline P2 Zip, for compliance with the National Environmental Policy Act, and operational requirements for a commercial carrier under 14 Code of Federal Regulations Part 135. The analysis method used in this report does not apply standard models such as the Aviation Environmental Design Tool but instead applies an estimation method based on collected noise measurements. As such the application of this method is only applicable to the Zipline P2 Zip. The nonstandard methodology was approved by the FAA to inform the environmental decision-making regarding drone noise exposure from the proposed Zipline P2 Zip package delivery operations.

Chapter 2
Methods

2.1 Sound Level Testing of the P2 Zip

The analysis in this report used sound level testing data described in the reports prepared by Zipline: *P2 Zip Noise Assessment Test Plan and Report Revision* (2025) and *P2 Zip Noise Assessment Test Plan and Report, Fixed Wing Flight and Zipping Point* (2026).

Sound level testing was conducted at the Zipline test facility in Esparto, California in November 2025. The testing protocol followed FAA direction given in the document, *Draft Measuring Drone Noise for Environmental Review Process*, dated October 2023 (FAA 2023).

The typical operational profile of the UA can be broken into Undocking, Package Loading at a Zipping Point, En route (outbound), Delivery, En route (inbound) and Docking. The following subsections provide a narrative description of these flight phases.

2.1.1 Undocking

Typical sequence of undocking operation from the dock:

1. Load package into the Droid, if traveling directly to a delivery point.
2. Stow the Droid into the P2 Zip prior to undocking.
3. Complete Automated and visual pre-flight checks.
4. Conduct pre-flight motor start (approximately 25 seconds).
5. Conduct an undocking maneuver and ascend vertically from dock until reaching approximately 330 feet above ground level (AGL) (approximately 100 seconds).
6. Begin horizontal flight at constant acceleration until a speed of 66 knots is reached (approximately 30 seconds).
7. Maintain horizontal flight at constant velocity of 66 knots.

2.1.2 Package Loading at a Zipping Point

For package deliveries, P2 Zips may travel directly from the dock to a delivery point, or travel to a zipping point to pick up a package before traveling to a delivery point. In the latter case, packages will be picked up at a zipping point in an offsite location. Typical sequence of package loading operation at a zipping point:

1. P2 Zip with empty Droid approaches at 330 feet AGL.
2. Decelerate from 66 knots to zero speed (approximately 30 seconds).
3. Maintain hover at 330 feet AGL as Droid is un-stowed from the P2 Zip, Droid is winched down to the zipping point to load a package, and Droid is re-stowed once package loading is complete (approximately 120 seconds).
4. Begin return horizontal flight at constant acceleration until a speed of 66 knots is reached. (approximately 30 seconds).

2.1.3 En route (Outbound)

1. Cruise at a typical speed of approximately 66 knots towards the delivery location, at approximately 330 ft AGL.

2.1.4 Delivery of Package

Typical sequence of delivery operation:

1. P2 Zip with package approaches at 330 feet AGL.
2. Decelerate from 66 knots to zero speed (approximately 30 seconds).
3. Maintain hover at 330 feet AGL as Droid is un-stowed from the P2 Zip, Droid is winched down to the ground at the delivery point, and Droid is re-stowed once delivery is complete (approximately 75 seconds).
4. Begin return horizontal flight at constant acceleration until a speed of 66 knots is reached. (approximately 30 seconds).

2.1.5 Enroute (Inbound)

1. Cruise at a typical speed of approximately 66 knots to the dock, at approximately 330 ft AGL.

2.1.6 Docking

Sequence of docking operation:

1. P2 Zip approaches at approximately 330 feet AGL.
2. Decelerate from approximately 66 knots to zero (approximately 30 seconds).
3. Descend to the dock and complete the docking maneuver (approximately 100 seconds).
4. Shutdown propellers and aircraft systems.

2.1.7 Charge Cycle

1. P2 Zip recharges at the dock following a flight. The charge cycle is expected to be equivalent to flight time, and is estimated to take an average of 15 minutes per cycle.

2.2 Sound Exposure Levels from Sound Level Measurements

A brief summary of sound exposure levels from test results is shown in Table 1. The test results that include en route operation assume a nominal cruise speed of 66 knots (Zipline 2026). All tests were conducted with payload at maximum takeoff weight (MTOW). The total weight of the P2 Zip with payload was 63 pounds (55 pounds of aircraft weight and 8 pounds of payload). No flights without payload were conducted. The test flights were conducted at altitude and speed of planned takeoff and delivery operations. As such, no adjustments for speed or altitude were added to SEL values. Durations of test flights used for calculating SEL are shown in Table 2. The time stamps shown in

Table 2 apply to the whole microphone array for each flight test. The Docking tests were conducted using three microphone array layouts identified as Docking A, Docking B, and Docking C. The Docking A series was conducted using an array of microphones in an undertrack configuration relative to the UA flight track, at 6 inches from the dock (Zero feet), 100 feet, 200, feet, 400 feet, and 800 feet from the dock. The Docking B series used a microphone array lateral to the flight track, at distances of zero feet, 50 feet, 100 feet, 200 feet, and 400 feet. The Docking C series consisted of a single microphone positioned undertrack at 1,800 feet from the dock.

Table 1. Summary of P2 Zip Fixed-Wing Sound Exposure Levels

Test Series	Altitude	Microphone Position	Average SEL (dBA)
Leaving dock with package at MTOW and takeoff	Ascend to 330 feet AGL, then forward flight at 330 feet AGL	Under flight path, 100 feet away from dock	78.4
Arrival with package at MTOW and landing at dock	Arrive at 330 feet AGL and descend to dock	Under flight path, 100 feet away from dock	77.7
Single dock charging cycle (15 minutes)	N/A	50 feet from the dock	73.4
Delivery hover for 75 s with package at MTOW	Hover at 330 feet AGL	UA in port orientation relative to the microphone, 50 feet away from delivery point	74.1
En Route with package at MTOW	330 feet AGL at a forward flight speed of 66 knots	50 feet lateral distance from undertrack line of flight[1]	63.2

Source: Zipline 2026, ICF 2026.

AGL = above ground level

MTOW = maximum takeoff weight

dBA = A-weighted decibel

[1] The maximum SEL was measured at a 50-foot offset position during the en route tests. This should be used to represent the undertrack SEL value for en route overflights.

Table 2. Durations from Sound Level Testing of P2 Zip in Fixed-Wing Configuration used to Derive Sound Exposure Levels

Operation	Test series	Test Number	Start time (seconds)	End time (seconds)	Duration (seconds)
Depart from dock	Docking/Docking A	1	63	214	151
Depart from dock	Docking/Docking A	2	730	879	149
Depart from dock	Docking/Docking A	3	1,983	2,136	153
Depart from dock	Docking/Docking A	4	2,719	2,869	150
Depart from dock	Docking/Docking A	5	3,353	3,505	153
Depart from dock	Docking/Docking A	6	4,059	4,209	151
Depart from dock	Docking/Docking B	1	60	209	150
Depart from dock	Docking/Docking B	2	1,348	1,499	151
Depart from dock	Docking/Docking B	3	3,339	3,489	150
Depart from dock	Docking/Docking B	4	4,722	4,873	151
Depart from dock	Docking/Docking B	5	7,240	7,389	150
Depart from dock	Docking/Docking B	6	8,139	8,291	152

Operation	Test series	Test Number	Start time (seconds)	End time (seconds)	Duration (seconds)
Depart from dock	Docking/Docking C	1	60	210	150
Depart from dock	Docking/Docking C	2	731	879	148
Depart from dock	Docking/Docking C	3	1,433	1,583	150
Depart from dock	Docking/Docking C	4	2,101	2,248	147
Depart from dock	Docking/Docking C	5	2,795	2,944	150
Depart from dock	Docking/Docking C	6	3,479	3,627	148
Arrive at dock	Docking/Docking A	1	450	592	142
Arrive at dock	Docking/Docking A	2	1,108	1,248	141
Arrive at dock	Docking/Docking A	3	2,373	2,514	141
Arrive at dock	Docking/Docking A	4	3,093	3,232	140
Arrive at dock	Docking/Docking A	5	3,742	3,884	142
Arrive at dock	Docking/Docking A	6	4,433	4,573	140
Arrive at dock	Docking/Docking B	1	450	593	142
Arrive at dock	Docking/Docking B	2	1,727	1,868	141
Arrive at dock	Docking/Docking B	3	3,729	3,872	143
Arrive at dock	Docking/Docking B	4	5,110	5,253	143
Arrive at dock	Docking/Docking B	5	7,617	7,756	139
Arrive at dock	Docking/Docking B	6	8,528	8,670	142
Arrive at dock	Docking/Docking C	1	454	598	144
Arrive at dock	Docking/Docking C	2	1,112	1,253	142
Arrive at dock	Docking/Docking C	3	1,822	1,966	144
Arrive at dock	Docking/Docking C	4	2,492	2,632	141
Arrive at dock	Docking/Docking C	5	3,187	3,329	142
Arrive at dock	Docking/Docking C	6	3,859	4,000	141
Transition/Deceleration	Docking/Docking A	1	450	497	47
Transition/Deceleration	Docking/Docking A	2	1,108	1,155	48
Transition/Deceleration	Docking/Docking A	3	2,373	2,419	46
Transition/Deceleration	Docking/Docking A	4	3,093	3,140	47
Transition/Deceleration	Docking/Docking A	5	3,742	3,788	46
Transition/Deceleration	Docking/Docking A	6	4,433	4,480	47
Transition/Deceleration	Docking/Docking B	1	450	497	47
Transition/Deceleration	Docking/Docking B	2	1,727	1,775	48
Transition/Deceleration	Docking/Docking B	3	3,729	3,776	47
Transition/Deceleration	Docking/Docking B	4	5,110	5,158	48
Transition/Deceleration	Docking/Docking B	5	7,617	7,664	47
Transition/Deceleration	Docking/Docking B	6	8,528	8,575	47
Transition/Deceleration	Docking/Docking C	1	454	502	48
Transition/Deceleration	Docking/Docking C	2	1,112	1,159	48
Transition/Deceleration	Docking/Docking C	3	1,822	1,870	48
Transition/Deceleration	Docking/Docking C	4	2,492	2,538	47

Operation	Test series	Test Number	Start time (seconds)	End time (seconds)	Duration (seconds)
Transition/Deceleration	Docking/Docking C	5	3,187	3,234	47
Transition/Deceleration	Docking/Docking C	6	3,859	3,907	47
Transition/Acceleration	Docking/Docking A	1	163	214	51
Transition/Acceleration	Docking/Docking A	2	828	879	50
Transition/Acceleration	Docking/Docking A	3	2,084	2,136	52
Transition/Acceleration	Docking/Docking A	4	2,817	2,869	52
Transition/Acceleration	Docking/Docking A	5	3,453	3,505	52
Transition/Acceleration	Docking/Docking A	6	4,156	4,209	53
Transition/Acceleration	Docking/Docking B	1	161	209	49
Transition/Acceleration	Docking/Docking B	2	1,447	1,499	52
Transition/Acceleration	Docking/Docking B	3	3,440	3,489	50
Transition/Acceleration	Docking/Docking B	4	4,823	4,873	50
Transition/Acceleration	Docking/Docking B	5	7,339	7,389	50
Transition/Acceleration	Docking/Docking B	6	8,239	8,291	52
Transition/Acceleration	Docking/Docking C	1	162	210	48
Transition/Acceleration	Docking/Docking C	2	829	879	50
Transition/Acceleration	Docking/Docking C	3	1,534	1,583	49
Transition/Acceleration	Docking/Docking C	4	2,199	2,248	49
Transition/Acceleration	Docking/Docking C	5	2,895	2,944	50
Transition/Acceleration	Docking/Docking C	6	3,577	3,627	50
Transit southbound	En Route	1	369	420	51
Transit southbound	En Route	2	1,106	1,157	51
Transit southbound	En Route	3	1,863	1,914	51
Transit northbound	En Route	1	7,727	7,778	51
Transit northbound	En Route	2	9,156	9,207	51
Transit northbound	En Route	3	9,999	10,050	51
Delivery Fading away[1]	Delivery	1	185	215	30
Delivery Fading away[1]	Delivery	2	185	215	30
Delivery Fading away[1]	Delivery	3	185	215	30
Delivery Fading away[1]	Delivery	4	180	210	30
Delivery Fading away[1]	Delivery	5	180	210	30
Delivery Fading away[1]	Delivery	6	185	215	30
Delivery Starboard side[1]	Delivery	1	230	260	30
Delivery Starboard side[1]	Delivery	2	230	260	30
Delivery Starboard side[1]	Delivery	3	235	265	30
Delivery Starboard side[1]	Delivery	4	225	255	30
Delivery Starboard side[1]	Delivery	5	225	255	30
Delivery Starboard side[1]	Delivery	6	235	265	30
Delivery Fading toward[1]	Delivery	1	280	310	30
Delivery Fading toward[1]	Delivery	2	280	310	30

Operation	Test series	Test Number	Start time (seconds)	End time (seconds)	Duration (seconds)
Delivery Fading toward[1]	Delivery	3	280	310	30
Delivery Fading toward[1]	Delivery	4	275	305	30
Delivery Fading toward[1]	Delivery	5	275	305	30
Delivery Fading toward[1]	Delivery	6	280	310	30
Delivery Port side[1]	Delivery	1	325	355	30
Delivery Port side[1]	Delivery	2	325	355	30
Delivery Port side[1]	Delivery	3	325	355	30
Delivery Port side[1]	Delivery	4	315	345	30
Delivery Port side[1]	Delivery	5	315	345	30
Delivery Port side[1]	Delivery	6	325	355	30
Zipping Point	Zipping Point	1	-1,558	-1,444	113
Zipping Point	Zipping Point	2	144	272	128
Zipping Point	Zipping Point	3	1,263	1,377	114
Zipping Point	Zipping Point	4	2,705	2,817	112
Zipping Point	Zipping Point	5	4,526	4,639	113
Zipping Point	Zipping Point	6	6,002	6,116	114

Source: Zipline 2025, Zipline 2026, ICF 2026.

Note: Time stamp values are rounded to whole numbers.

All measurements were collected for the 2026 test report except where footnoted.

[1] Delivery hover sound level measurements were collected in the previous round of tests (Zipline 2025).

2.2.1 Dock Sound Exposure Levels

During testing, sound levels were measured continuously for a simulated delivery cycle from the dock (Zipline 2026). Six (6) tests were conducted for each of the microphone orientations. Sound exposure level (SEL) values were then calculated from measured time history data for each of the arrays.

2.2.1.1 Departure from Dock

Undocking SEL calculations include all phases of departure from a dock, including undocking, ascent to cruising altitude, acceleration and transition to cruising speed. All SEL values include payload at MTOW. The results of SEL calculations for each test are shown in Table 3. A plot of SEL values for the three microphone arrays is shown in Figure 1. The maximum adjusted undocking SEL is based on the maximum sound exposure level among the tested microphone arrays at each distance.

Table 3. Sound Exposure Levels for P2 Zip Fixed-Wing Undocking at MTOW

Microphone Position, Distance from Dock (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array Docking A/C – Under flight track							
0	77.2	77.5	78.0	77.9	78.0	77.9	77.7
100	77.1	77.7	78.8	78.8	78.8	79.0	78.4
200	71.7	72.2	72.9	73.3	72.8	73.0	72.6
400	70.6	72.0	70.9	71.7	70.7	71.7	71.3
800	69.4	70.6	70.4	71.1	- [1]	71.3	70.6
1,800	58.9	60.2	63.3	58.1	- [1]	58.9	59.9
Microphone Array Docking B – Lateral to flight track							
0	79.4	- [1]	- [1]	79.0	79.1	80.0	79.4
50	76.8	- [1]	- [1]	76.5	77.0	77.6	77.0
100	75.2	- [1]	- [1]	75.2	75.6	75.9	75.5
200	70.5	- [1]	- [1]	71.2	71.5	71.3	71.1
400	67.1	- [1]	- [1]	68.7	68.2	68.0	68.0

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel
[1] Test excluded from the average SEL due to outlier values.

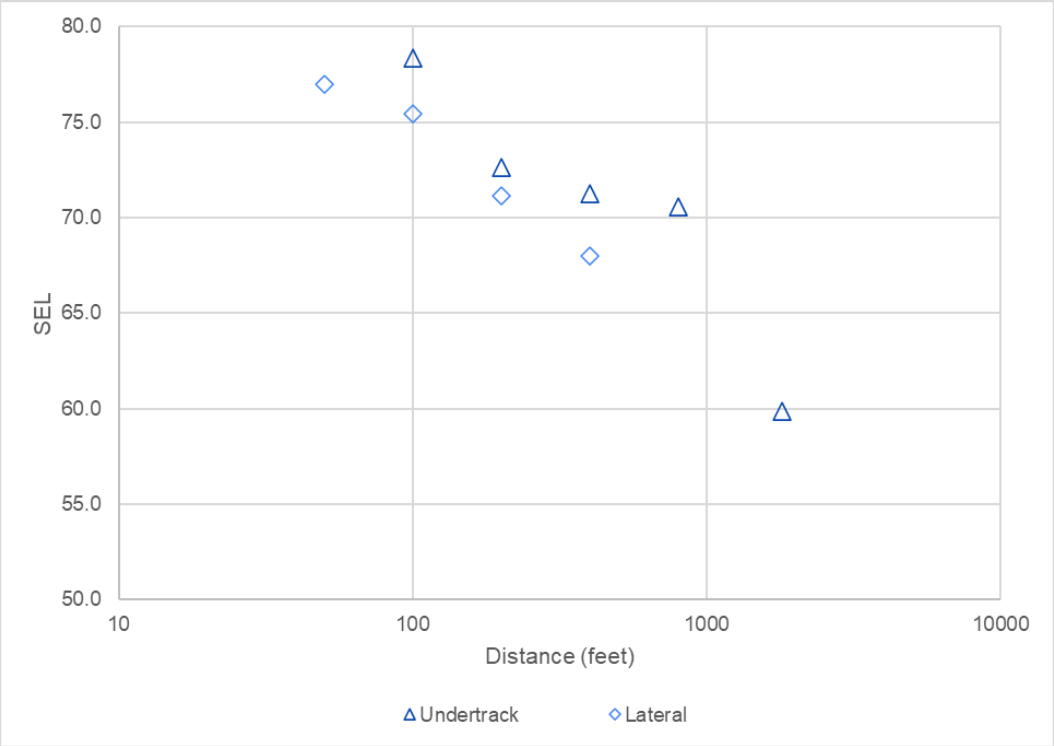


Figure 1. Plot of Average Measured SEL Values for P2 Zip Undocking

The undocking sound exposure levels include the segment of flight where the P2 Zip accelerates away from the dock. The acceleration segment of flight was also calculated separately, for the purpose of including the time history of sound levels during acceleration away from a zipping point or a delivery point in the total SEL calculation for zipping points and delivery points. SEL values for zipping points and delivery points are discussed in Chapter 3. The SEL levels from measurements of the acceleration portion of flight are shown in Table 4. A plot of SEL values for the three microphone arrays is shown in Figure 2.

Table 4. Sound Exposure Levels for P2 Zip Fixed-Wing Undocking, Acceleration Segment

Microphone Position, Distance from Dock (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array Docking A/C – Under flight track							
0	69.0	69.9	70.4	70.7	70.2	70.5	70.1
100	71.4	71.9	73.8	73.8	73.5	73.9	73.1
200	66.4	68.1	67.7	68.3	67.5	68.3	67.7
400	68.9	70.9	68.9	70.3	68.8	70.2	69.7
800	69.1	70.4	70.0	70.8	- [1]	71.0	70.3
1,800	56.6	57.9	58.7	52.9	- [1]	57.0	56.6
Microphone Array Docking B – Lateral to flight track							
0	71.8	- [1]	- [1]	71.1	70.8	70.4	71.0
50	67.8	- [1]	- [1]	69.6	69.3	68.5	68.8
100	65.3	- [1]	- [1]	68.5	68.1	67.2	67.3
200	58.7	- [1]	- [1]	64.4	64.8	63.8	62.9
400	58.0	- [1]	- [1]	64.4	64.2	63.1	62.4

Source: Zipline 2026, ICF 2026.

dBA = A-weighted decibel

[1] Test excluded from the average SEL due to outlier values.

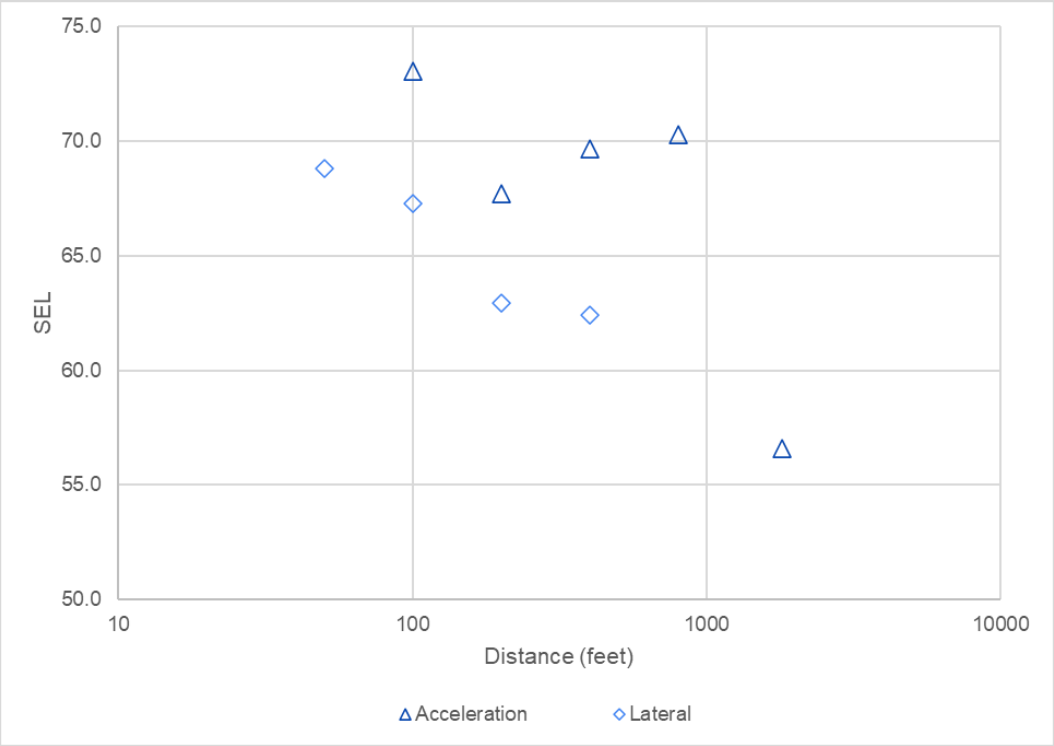


Figure 2. Plot of Average Measured SEL Values for P2 Zip Undocking, Acceleration Segment

2.2.1.2 Arrival at Dock

Docking SEL calculations include all phases of arrival including approach at cruise speed, deceleration, descent, and docking. The results of SEL calculations for each test are shown in Table 5. A plot of SEL values for the three microphone arrays is shown in Figure 3. Similar to the undocking SEL, the adjusted docking SEL is based on the maximum sound exposure level among the tested microphone arrays.

Table 5. Sound Exposure Levels for P2 Zip Fixed-Wing Docking at MTOW

Microphone Position, Distance from Dock (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array Docking A/C – Under flight track							
0	77.2	77.5	77.9	78.2	78.1	- [1]	77.8
100	76.4	76.6	78.4	78.6	78.7	- [1]	77.7
200	70.8	70.8	72.3	72.3	72.6	- [1]	71.7
400	69.2	69.8	69.8	70.2	69.6	- [1]	69.7
800	65.0	66.9	65.8	67.2	65.3	- [1]	66.0
1,800	58.6	55.8	54.2	58.2	54.2	- [1]	56.2

Microphone Position, Distance from Dock (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array Docking B – Lateral to flight track							
0	- [1]	- [1]	78.6	79.2	80.0	79.7	79.4
50	- [1]	- [1]	76.4	76.9	77.8	77.5	77.2
100	- [1]	- [1]	74.3	75.2	75.9	75.5	75.2
200	- [1]	- [1]	68.8	70.5	71.3	70.9	70.4
400	- [1]	- [1]	70.6	68.4	68.4	67.8	68.8

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel
[1] Test excluded from the average SEL due to outlier values.

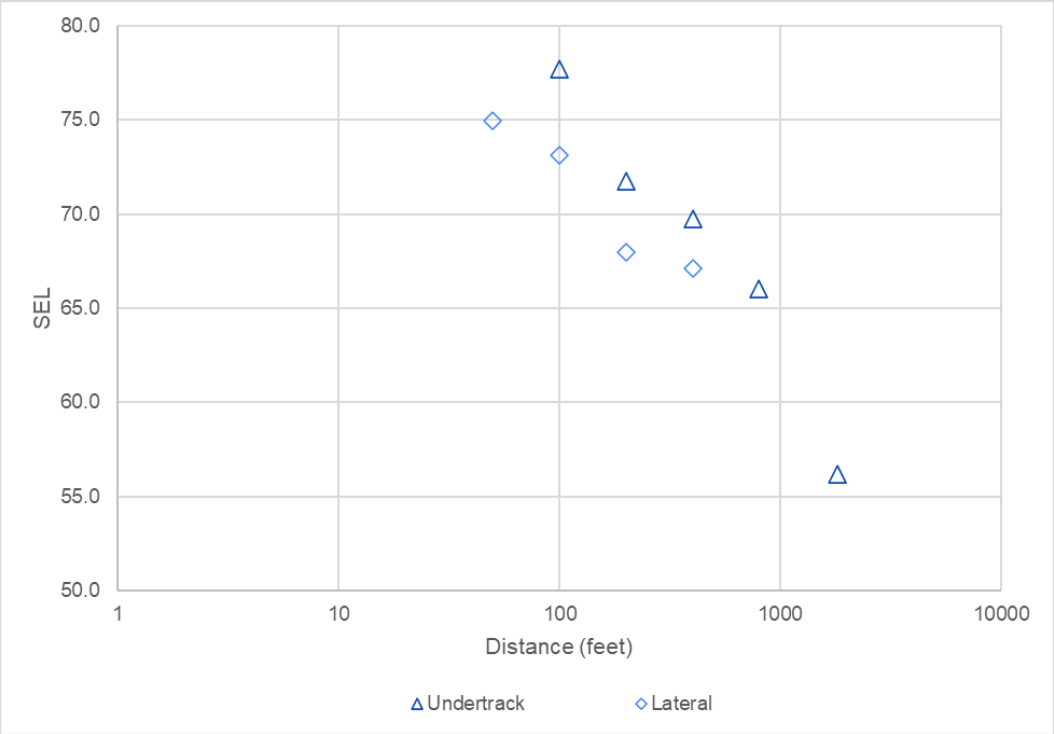


Figure 3. Plot of Average Measured SEL Values for P2 Zip docking

The docking sound exposure levels include the segment of flight where the P2 Zip decelerates as it approaches the dock. The deceleration segment of flight was also calculated separately, for the purpose of including the time history of sound levels during deceleration toward a zipping point or a delivery point in the total SEL calculation. SEL values for zipping points and delivery points are discussed in Chapter 3. The SEL levels from measurements of the deceleration portion of flight are shown in Table 6. A plot of SEL values for the three microphone arrays is shown in Figure 4.

Table 6. Sound Exposure Levels for P2 Zip Fixed-Wing Undocking, Deceleration Segment

Microphone Position, Distance from Dock (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array Docking A/C – Under flight track							
0	69.4	69.9	70.1	70.8	70.4	- [1]	70.1
100	71.1	71.6	73.1	73.6	73.3	- [1]	72.6
200	65.2	66.2	67.1	67.9	66.9	- [1]	66.7
400	66.9	67.9	67.2	68.3	67.0	- [1]	67.5
800	64.2	66.4	64.7	66.5	64.2	- [1]	65.2
1,800	51.7	52.8	50.9	53.0	50.2	- [1]	51.7
Microphone Array Docking B – Lateral to flight track							
0	71.4	70.2	70.1	71.4	71.3	70.9	70.9
50	70.4	68.0	67.9	70.2	70.1	69.5	69.3
100	69.2	66.5	67.2	68.9	68.9	68.0	68.1
200	66.1	61.6	63.5	64.7	65.6	64.6	64.4
400	64.5	63.7	68.9	64.1	64.5	63.2	64.8

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel
[1] Test excluded from the average SEL due to outlier values.

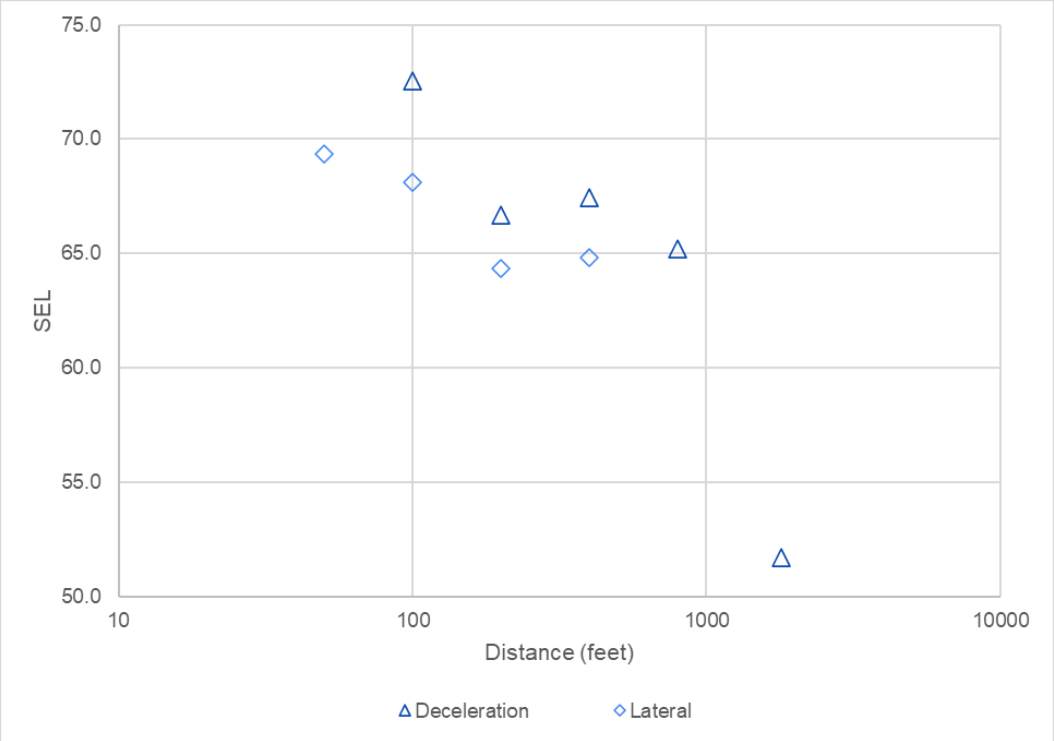


Figure 4. Plot of Average Measured SEL Values for P2 Zip Docking, Deceleration Segment

2.2.1.3 P2 Zip Charging Cycles

As described in the revised P2 Zip test report, each P2 Zip would need to be charged at a Zipline dock after each flight. Each individual dock would function as a charging point with its own cooling fan for thermal management of battery charging system. Individual docks would be grouped together on a Dock Tower, which can contain up to twelve docks. Charging point locations may include up to three Dock Towers, or a total of thirty-six docks. According to the Zipline test report, the amount of recharging time is expected to be equal to the amount of flight time. A typical operation cycle would consist of 15 minutes in flight, followed by 15 minutes of charge cycle at the dock. Sound levels of dock cooling fan operation were collected during flight testing when the P2 Zip was charging between flights. Average sound levels measured during dock charging cycles are shown in Table 7. From average measured sound levels, average SEL values are calculated, assuming a 15-minute charge cycle for a single dock, for one Dock Tower containing twelve docks, and for three Dock Towers containing a total of thirty-six docks. The SEL values assume attenuation from multiple docks as a single point source.

Table 7. Sound Exposure Levels for P2 Zip Fixed-Wing Charging Cycles

Microphone Lateral Position, Distance from Dock (feet)	Average Sound Level, 1 Dock (dBA)	Average SEL, 1 Dock (dBA)	Average SEL, 12 Docks (dBA)	Average SEL, 36 Docks (dBA)
Microphone Array A – Lateral to dock				
0	53.9	83.5	94.3	99.0
50	43.5	73.4	84.2	88.9
100	40.8	70.4	81.2	85.9
200	39.0	68.5	79.3	84.1
400	31.4	60.9	71.7	76.5

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel

2.2.2 Zipping Point Sound Exposure Levels

Sound level testing of the P2 Zip was conducted to simulate package pickup operations at a zipping point. The zipping point tests were conducted for one microphone array using five microphones on a linear track. The microphones were set at distances of zero, 50, 100, 200 and 400 feet from the delivery point (Zipline 2026). During zipping point package pickup, the P2 Zip hovers in place above the zipping point while the Droid is lowered using a winch line to the pickup point, collected the package, then raises the Droid to be re-stowed. The package pickup operation at a zipping point requires the P2 Zip to hover in place for approximately 120 seconds. The Droid is equipped with onboard propeller fans to correct orientation and position as it is lowered or raised. The zipping point sound level tests include operation of the Droid and associated noise emissions from the Droid. The results of SEL calculations for each zipping point test are shown in Table 8. Deceleration and acceleration portions of the P2 flight are not included in the SEL values – only the zipping and package pickup noise levels are shown. A plot of SEL values from measurements for zipping point operations is shown in Figure 5.

Table 8. Sound Exposure Levels for P2 Zip Fixed-Wing Zipping Point Test Series

Microphone Lateral Position, Distance from flight track (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array A – Lateral to zipping point							
0	79.7	79.9	79.4	79.6	79.9	80.2	79.8
50	74.0	73.9	73.9	74.9	75.1	74.9	74.5
100	73.3	74.1	74.2	73.7	74.0	74.2	73.9
200	70.4	71.0	70.9	70.5	71.0	70.7	70.8
400	67.1	67.2	67.3	66.3	66.7	67.5	67.0

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel

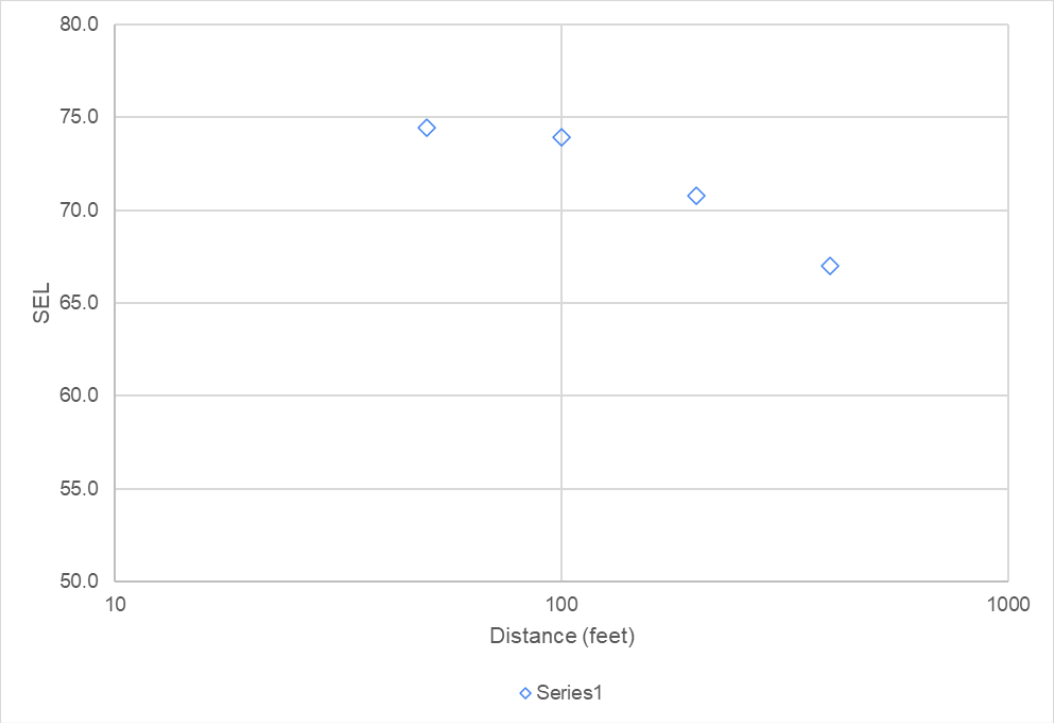


Figure 5. Plot of Average Measured SEL Values for Zipping Point Operation

2.2.3 Delivery Hover Sound Exposure Levels

During testing, sound levels were measured during hover at a simulated delivery point. The hover data used in the analysis is from the previous round of testing of the P2 Zip conducted in November 2024 and analyzed in the P2 Zip Technical Report number 021925 (Zipline 2025, ICF 2025). The acceleration and deceleration data to calculate delivery SEL values are based on data collected for the fixed wing configuration in thi`s report.

The hover tests were conducted for one microphone array using five microphones on a linear track. The microphones were set at distances of zero, 50, 100, 200 and 400 feet from the delivery point (Zipline 2025). Six (6) tests were conducted for four (4) different hover orientations to measure different acoustic directivities from the UA during delivery hover. Hover was tested at 330 feet AGL. SEL values were then calculated from measured time history data for each of the UA orientations. The results of SEL calculations for each hover test are shown in Table 9. According to the data, the loudest average SEL occurs at the 50-foot microphone position for all hover orientations. Among the hover orientations, the port side of the P2 yielded the highest SEL values. A plot of SEL values from measurements for port side hover is shown in Figure 6.

The adjusted delivery SEL shown in Table 9 accounts for hover time during delivery operations, which would occur for a longer time than as-tested conditions. A time correction factor is added to scale up the sound energy to time required for delivery. The correction factor is given by:

$$K_{hover} = 10 * \text{Log}\ (75\ \text{seconds}/30\ \text{seconds}) \quad (1)$$

Sound energy for deceleration upon arrival to the delivery site and acceleration away upon completion of a delivery is included from docking and undocking time history test data. This is discussed further in Section 3.3.

Table 9. Sound Exposure Levels from P2 Zip Fixed-Wing Delivery Hover at MTOW

Microphone Position, Distance from Delivery Point (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Delivery Hover Oriented Toward Microphone Array							
0	72.0	72.4	71.4	71.1	72.0	71.7	71.8
50	74.2	74.6	73.4	73.2	73.8	73.4	73.8
100	70.5	70.1	69.4	68.8	69.2	69.0	69.5
200	68.6	68.2	68.0	67.4	67.2	67.8	67.9
400	61.1	62.1	62.4	62.1	62.2	62.2	62.0
Delivery Hover Oriented Away from Microphone Array							
0	71.5	71.3	72.2	71.0	69.2	69.8	70.8
50	74.0	72.2	72.5	71.2	68.9	70.5	71.5
100	68.3	68.3	69.3	68.1	65.2	67.0	67.7
200	66.9	66.7	67.7	67.0	64.7	66.1	66.5
400	61.4	61.3	62.4	61.8	61.3	61.7	61.7
Delivery Hover Oriented Starboard Toward Microphone Array							
0	72.0	69.4	69.7	69.1	68.8	70.5	69.9
50	74.6	71.4	72.3	70.8	70.7	71.8	71.9
100	70.1	67.4	68.1	66.9	66.8	67.2	67.7
200	68.5	66.6	67.0	66.2	66.0	65.6	66.7
400	62.8	61.0	62.2	61.6	62.0	63.5	62.2

Microphone Position, Distance from Delivery Point (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Delivery Hover Oriented Port Toward Microphone Array							
0	73.3	72.6	72.3	71.2	72.1	72.1	72.3
50	75.5	74.5	74.5	72.5	73.4	74.3	74.1
100	70.8	70.7	70.1	68.6	69.0	70.3	69.9
200	69.0	69.5	68.7	67.0	67.9	68.6	68.4
400	62.8	62.8	63.6	63.8	63.1	64.1	63.4
Maximum Adjusted SEL from Microphone Array (dBA)[1]							
0	77.6						
50	79.5						
100	77.2						
200	74.2						
400	72.9						

Source: Zipline 2025, Zipline 2026, ICF 2025, ICF 2026.

dBA = A-weighted decibel

[1] The delivery hover is adjusted to include deceleration from en route to a delivery site, a time correction for delivery operations (75 seconds) to scale sound energy from as-tested conditions (30 seconds), and acceleration away from a delivery site. Acceleration and deceleration sound energy is from portions of docking and undocking tests at cruising altitude. This is shown in Section 3.3, Table 11.

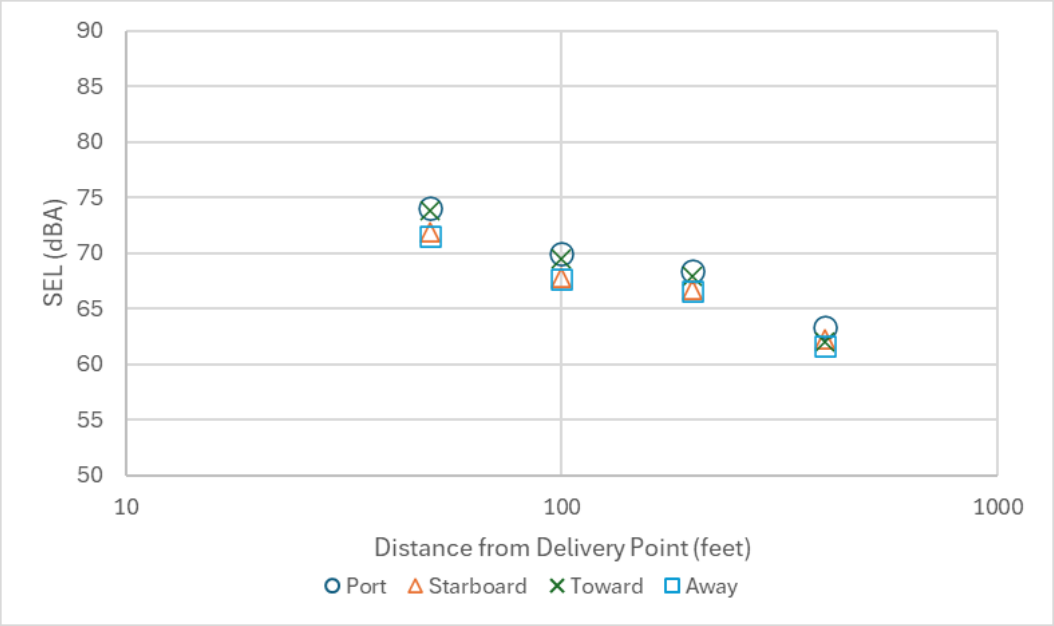


Figure 6. Plot of Average Measured SEL Values for Delivery Hover

2.2.4 En Route Sound Exposure Levels

During testing, sound levels were measured to simulate noise exposure at undertrack locations between dock and delivery points while the UA is at cruising speed. The tests were conducted for one microphone array using five microphones lateral to the flight track. The microphones were set at distances of zero, 50, 100, 200 and 400 feet lateral to the flight track (Zipline 2026). Six (6) tests were conducted for en route operations, three downwind (Tests 1, 2 and 3) and three upwind (Test 4, 5, and 6). SEL values were then calculated from measured time history data for each en route event. The results of SEL calculations for each test are shown in Table 10. According to the data, the loudest average SEL of 63.2 dBA during en route occurs at the 50-foot lateral microphone position to the flight track. It is notable that this value is 5.9 dB lower than the average en route SEL measured for the previously tested non-fixed wing configuration of the P2 Zip (ICF 2025).

Table 10. Sound Exposure Levels from Sound Level Testing for En Route Test Series, P2 Zip

Microphone Lateral Position, Distance from flight track (feet)	Test 1 SEL (dBA)	Test 2 SEL (dBA)	Test 3 SEL (dBA)	Test 4 SEL (dBA)	Test 5 SEL (dBA)	Test 6 SEL (dBA)	Average SEL (dBA)
Microphone Array A – Lateral to flight track							
0	62.4	59.2	59.1	59.2	60.3	63.6	60.7
50	65.6	61.6	61.7	61.9	62.5	66.0	63.2
100	64.6	61.0	60.6	61.4	62.1	66.1	62.7
200	64.5	60.8	60.7	61.5	62.5	66.6	62.7
400	62.0	58.7	58.2	60.7	61.4	66.1	61.2

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel

2.3 Analysis Procedure Methodology

To calculate SEL for receptors located near a dock, zipping point or delivery point, combinations of actions are evaluated to define different types of operations as the P2 Zip transitions between different operating modes. The types of operations evaluated are the following:

- Undocking, docking and charge cycling
- Package pickup at a zipping point
- Package delivery at a delivery point
- En Route inbound and outbound from dock/zipping point/delivery point

The SEL calculation for each of these operation types involves the use of sound level data as measured by an array of microphones during simulation testing of each operation, as described in the noise measurement test report (Zipline 2026). The incident SEL values were used to determine attenuation rates between microphone positions, which were influenced by different degrees of en route and vertical or hover portions of the flight profile depending on the type of operation tested. For distances greater than 400 feet from the delivery point or zipping point locations, the falloff rate from the 200-foot to 400-foot microphone position is used to determine the distance at which UA

sound emission values are equal to en route conditions. This is described further in the data presentation in the next chapter.

DNL values are calculated for four categories of locations: 1) a dock, 2) a zipping point, 3) a delivery point, and 4) the en route inbound and outbound path. The DNL values at a dock are calculated by summing the sound energy for a P2 Zip undocking and departing from the dock, the arrival and return of the P2 Zip to the dock, and a charging cycle of 15 minutes. The DNL value for a single delivery cycle at each of the three types of locations is scaled for multiple P2 Zip operations using a logarithmic multiplier (i.e., log of the number of events multiplied by 10) adjusted by a factor of 49.4 to convert from SEL to DNL. The equation to calculate DNL from SEL is:

$$DNL = 10*\log(10^{(SEL/10)} * [\text{deliveries per day}]) - 49.4 \quad (2)$$

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Chapter 3
Sound Levels of UA Operations

3.1 Dock Sound Exposure Levels

Sound exposure levels at the dock account for several factors: 1) P2 Zip undocking and ascent from the dock to cruising altitude, 2) acceleration to forward flight, 3) departure en route, 4) arrival en route, 5) deceleration toward the dock, 6) descent and landing at the dock and 7) charging cycle following a flight. The forward flight SEL values are based on the maximum value measured among the undertrack and lateral microphone arrays. As shown in Table 1, the average measured level for en route conditions is 63.2 dBA SEL, which occurs at a distance of 1,400 feet for an outbound flight and 1,050 feet for an inbound flight, as shown in Table 11. The flights include the maximum payload on board. The dock SEL values are given by Equation 3, which includes charge cycling between flights:

$$SEL_{dock} = 10 * Log\ (10^{(SEL_{departure}/10)} + 10^{(SEL_{arrival}/10)} + 10^{(SEL_{charging}/10)}) \quad (3)$$

which is the logarithmic sum of departure and arrival sound energy (including acceleration/deceleration transitions and en route conditions), and sound energy from one charging cycle at the dock. Calculated sound levels for P2 Zip undocking and docking at the dock are shown in Table 11.

Table 11. Calculated Dock SEL values for Undocking, Docking and Charge Cycle

Distance between Dock and Receiver	Undocking and Departure, dBA SEL	Arrival and Docking, dBA SEL	Charge Cycle, dBA SEL	Complete Flight and Recharging Cycle, dBA SEL
0	79.4	79.4	83.5	86.0
25	78.1	77.7	76.4	82.2
50	78.2	77.7	73.4	81.7
75	78.3	77.7	71.6	81.5
100	78.4	77.7	70.4	81.4
125	76.5	75.8	69.8	79.7
150	75.0	74.2	69.3	78.2
175	73.7	72.9	68.9	77.1
200	72.6	71.7	68.5	76.1
250	72.2	71.1	66.1	75.3
300	71.8	70.6	64.1	74.7
350	71.5	70.1	62.4	74.2
400	71.3	69.7	60.9	73.8
450	71.1	69.1	59.6	73.4
500	71.0	68.5	58.4	73.1
550	70.9	68.0	57.4	72.9
600	70.8	67.6	56.4	72.6
650	70.8	67.1	55.5	72.4

Distance between Dock and Receiver	Undocking and Departure, dBA SEL	Arrival and Docking, dBA SEL	Charge Cycle, dBA SEL	Complete Flight and Recharging Cycle, dBA SEL
700	70.7	66.7	54.7	72.2
750	70.6	66.4	54.0	72.1
800	70.6	66.0	53.2	71.9
850	69.8	65.3	52.6	71.1
900	69.0	64.6	51.9	70.4
950	68.3	63.9	51.3	69.7
1,000	67.6	63.3	50.8	69.1
1,050	67.0	63.2	50.2	68.6
1,100	66.4	63.2	49.7	68.1
1,150	65.8	63.2	49.2	67.7
1,200	65.2	63.2	48.8	67.4
1,250	64.7	63.2	48.3	67.1
1,300	64.2	63.2	47.9	66.8
1,350	63.7	63.2	47.5	66.5
1,400	63.2	63.2	47.1	66.3
1,450	63.2	63.2	46.7	66.3
1,500	63.2	63.2	46.3	66.3
1,550	63.2	63.2	45.9	66.3
1,600	63.2	63.2	45.6	66.2
1,650	63.2	63.2	45.3	66.2
1,700	63.2	63.2	44.9	66.2
1,750	63.2	63.2	44.6	66.2
1,800	63.2	63.2	44.3	66.2
Greater than 1,800	63.2	63.2	Ambient	66.2

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel; SEL = sound exposure level

3.2 Zipping Point

During package pickup at a zipping point, the P2 Zip hovers in place above the delivery point at its cruising altitude. The onboard empty Droid is lowered to the delivery point via a winch line, loaded with a package from the zipping point, and restowed within the P2 Zip (Zipline 2026). The total noise exposure at a zipping point consists of deceleration on arrival, hover above zipping point, Droid deployment and departure acceleration. SEL values for each of segment of a zipping point is shown in Table 12, with a total SEL exposure for a zipping point cycle in the rightmost column of values. The arrival deceleration and departure acceleration have a minimum value equivalent to the en route SEL value of 63.2 dBA. This occurs at a minimum distance of 900 feet when decelerating toward the zipping point, and at a minimum distance of 1,250 feet when accelerating away from the zipping point.

The zipping point SEL values are given by Equation 4:

$$SEL_{zipping} = 10 * Log\ (10^{(SEL_{deceleration}/10)} + 10^{(SEL_{zipping}/10)} + 10^{(SEL_{acceleration}/10)}) \quad (4)$$

which is the logarithmic sum of sound energy from deceleration to the zipping point, package pickup, and acceleration away from the zipping point.

Table 12. Calculated SEL Values for Zipping Point Operations

Distance from Zipping Point and Along the Flight Path	Arrival Deceleration, dBA SEL	Package Pickup, dBA SEL	Departure Acceleration, dBA SEL	Zipping Point Cycle, dBA SEL
5	70.9	79.8	71.0	80.8
25	71.4	76.1	71.7	78.4
50	72.0	74.5	72.4	77.9
75	72.3	74.1	72.8	77.9
100	72.6	73.9	73.1	78.0
125	70.7	72.9	71.3	76.5
150	69.1	72.1	69.9	75.3
175	67.8	71.4	68.7	74.3
200	66.7	70.8	67.7	73.5
250	66.9	69.6	68.3	73.2
300	67.1	68.6	68.8	73.0
350	67.3	67.7	69.3	73.0
400	67.5	67.0	69.7	73.0
450	67.1	66.4	69.8	72.8
500	66.7	65.8	69.9	72.6
550	66.4	65.3	69.9	72.5
600	66.1	64.8	70.0	72.4
650	65.9	64.4	70.1	72.3
700	65.6	64.0	70.2	72.2
750	65.4	63.6	70.2	72.1
800	65.2	63.2	70.3	72.1
850	64.2	62.9	69.3	71.1
900	63.2	62.6	68.3	70.3
950	63.2	62.3	67.4	69.7
1,000	63.2	62.0	66.5	69.1
1,050	63.2	61.8	65.7	68.6
1,100	63.2	61.5	64.9	68.2
1,150	63.2	61.3	64.2	67.8
1,200	63.2	61.0	63.4	67.5
1,250	63.2	60.8	63.2	67.3
1,300	63.2	60.6	63.2	67.3
1,350	63.2	60.4	63.2	67.2

Distance from Zipping Point and Along the Flight Path	Arrival Deceleration, dBA SEL	Package Pickup, dBA SEL	Departure Acceleration, dBA SEL	Zipping Point Cycle, dBA SEL
1,400	63.2	60.2	63.2	67.2
1,450	63.2	60.0	63.2	67.1
1,500	63.2	59.8	63.2	67.1
1,550	63.2	59.7	63.2	67.1
1,600	63.2	59.5	63.2	67.0
1,650	63.2	59.3	63.2	67.0
1,700	63.2	59.1	63.2	67.0
1,750	63.2	59.0	63.2	67.0
1,800	63.2	58.8	63.2	66.9

Source: Zipline 2026, ICF 2026.
dBA = A-weighted decibel; SEL = sound exposure level

3.3 Delivery Point

During a delivery, the P2 Zip hovers in place above the delivery point at its cruising altitude. The onboard delivery service, referred to as a Droid carrying a payload is lowered to the delivery point via a winch line (Zipline 2025). The noise exposure at a delivery point consists of deceleration on arrival, hover in place, and departure acceleration. As discussed in Chapter 2, a time correction was added to hover sound levels to account for hover time during a delivery (75 seconds) vs. the as-tested condition (30 seconds). The hover SEL levels are based on measurements from hover orientation to the port side, which yielded the highest SEL values from the four orientations tested. SEL values for each of these segments of a delivery cycle are shown in Table 13, with a total SEL exposure for a delivery point cycle in the rightmost column of values. The arrival deceleration and departure acceleration have a minimum value equivalent to the en route SEL value of 63.2 dBA. This occurs at a minimum distance of 900 feet when decelerating toward the delivery point, and at a minimum distance of 1,250 feet when accelerating away from the delivery point.

The delivery SEL values are given by Equation 5:

$$SEL_{delivery} = 10 * Log\ (10\text{^}(SEL_{deceleration}/10) + 10\text{^}(SEL_{hover,port}/10) + K_{hover} + 10\text{^}(SEL_{acceleration}/10)) \quad (5)$$

which is the logarithmic sum of sound energy from deceleration to the delivery point, hover above the delivery point, hover time correction given by K_{hover} in Equation 1, and acceleration away from the delivery point.

Table 13. Calculated SEL Values for Delivery Operations

Distance from Delivery Point along the Flight Path	Arrival Deceleration, dBA SEL	Hover, dBA SEL[1]	Departure Acceleration, dBA SEL	Delivery Cycle, dBA SEL
5	70.9	76.3	71.0	78.3
25	71.4	77.5	71.7	79.3
50	72.0	78.1	72.4	79.9
75	72.3	75.6	72.8	78.6
100	72.6	73.9	73.1	78.0
125	70.7	73.4	71.3	76.7
150	69.1	73.0	69.9	75.8
175	67.8	72.7	68.7	75.1
200	66.7	72.4	67.7	74.5
250	66.9	70.8	68.3	73.7
300	67.1	69.5	68.8	73.4
350	67.3	68.3	69.3	73.2
400	67.5	67.4	69.7	73.1
450	67.1	66.5	69.8	72.8
500	66.7	65.7	69.9	72.6
550	66.4	65.0	69.9	72.4
600	66.1	64.4	70.0	72.3
650	65.9	63.8	70.1	72.2
700	65.6	63.3	70.2	72.1
750	65.4	62.8	70.2	72.0
800	65.2	62.3	70.3	72.0
850	64.2	61.9	69.3	71.0
900	63.2	61.4	68.3	70.1
950	63.2	61.0	67.4	69.5
1,000	63.2	60.7	66.5	68.9
1,050	63.2	60.3	65.7	68.4
1,100	63.2	60.0	64.9	67.9
1,150	63.2	59.7	64.2	67.5
1,200	63.2	59.3	63.4	67.1
1,250	63.2	59.0	63.2	67.0
1,300	63.2	58.8	63.2	66.9
1,350	63.2	58.5	63.2	66.9
1,400	63.2	58.2	63.2	66.9
1,450	63.2	58.0	63.2	66.8
1,500	63.2	57.7	63.2	66.8
1,550	63.2	57.5	63.2	66.8
1,600	63.2	57.2	63.2	66.7
1,650	63.2	57.0	63.2	66.7

Distance from Delivery Point along the Flight Path	Arrival Deceleration, dBA SEL	Hover, dBA SEL[1]	Departure Acceleration, dBA SEL	Delivery Cycle, dBA SEL
1,700	63.2	56.8	63.2	66.7
1,750	63.2	56.6	63.2	66.7
1,800	63.2	56.4	63.2	66.6

Source: Zipline 2025, Zipline 2026, ICF 2025, ICF 2026.

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

[1] Hover sound levels are corrected to a 75 second duration from the as-tested duration of 30 seconds. The 75 second duration is the estimated time required for the droid to deliver a package. Noise from the droid is negligible and as such is not included in the delivery cycle SEL (see Section 5.3 of *P2 Zip Noise Assessment Test Plan and Report* (Zipline 2025).

3.4 En Route

As shown in Table 1, the average en route sound level was calculated to be 63.2 dBA SEL. For inbound and outbound flights occurring along the same trajectory, a single round trip en r-oute SEL would be 66.2 dBA SEL. For a single flight, this level represents the loudest case for areas within 50 feet of an undertrack location relative to a P2 Zip in flight between a dock and a delivery point.

Chapter 4
Noise Exposure from UA Operations

This chapter presents estimated DNL values for package delivery operations for various daily rates of delivery for a P2 Zip operation. This analysis assumes 95% of package deliveries would occur during daytime hours only (7:00 a.m. to 10:00 p.m.), and 5% would be done during night hours (10:00 p.m. to 7:00 a.m.). Night operations include a 10 dB penalty for the purpose of calculating DNL. The analysis assumes there would be at least one night delivery for all scenarios. The number of daytime and nighttime deliveries for different delivery scenarios is shown in Table 14.

Table 14. Number of Daytime and Nighttime Deliveries for Different Levels of Service

Average Number of Daily Deliveries per Charging Point	Number of Daytime Deliveries	Number of Nighttime Deliveries	Number of DNL Equivalent Deliveries per Day
1	0	1	10
5	4	1	14
10	9	1	19
15	14	1	24
20	19	1	29
25	23	2	43
50	47	3	77
75	71	4	111
100	95	5	145
150	142	8	222
200	190	10	290
300	285	15	435
400	380	20	580
600	570	30	870
800	760	40	1,160
1,000	950	50	1,450

4.1 Noise Exposure at a P2 Zip Charging Point

A Charging Point is a location where one or more docks would be located for storage, deployment and charging of P2 Zip UAs. Individual docks would be grouped together on a Dock Tower, which can contain up to twelve docks. Charging point locations may include up to three Dock Towers, or a total of thirty-six docks.

A single delivery operation consists of undocking, departure, return to dock, landing and charging cycles, and the full cycle of these actions are accounted for in noise exposure at a dock location, as discussed in Section 3.1.

Estimated DNL noise exposure distances at a Charging Point operating P2 Zip UAs are shown in Table 15. Noise exposure DNL values are shown at different operational scales: from 1 delivery per day up to 1,000 deliveries per day. The noise exposure values assume a departure and return flight path along a single trajectory over a receiver array with distances of 50 to 1,800 feet from the Charging Point. According to calculations, a Charging Point operating at full capacity would equal or exceed 65 DNL at less than 50 feet, up to a rate of 1,000 flights per day, assuming up to 50 nighttime flights. At a rate of 1,000 flights per day, Charging Point operations would equal or exceed 59.7 DNL up to 170 feet from a Charging Point location.

Table 15. Noise Exposure Distances at a P2 Zip Charging Point for Different Scales of Operation

Average Daily Flights per Charging Point[1]	65 DNL Distance, feet	60 DNL Distance, feet	59.7 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	< 50	< 50	< 50	< 50	< 50	< 50
5	< 50	< 50	< 50	< 50	< 50	< 50
10	< 50	< 50	< 50	< 50	< 50	65
15	< 50	< 50	< 50	< 50	< 50	115
20	< 50	< 50	< 50	< 50	< 50	125
25	< 50	< 50	< 50	< 50	< 50	155
50	< 50	< 50	< 50	< 50	115	220
75	< 50	< 50	< 50	< 50	140	370
100	< 50	< 50	< 50	< 50	160	560
150	< 50	< 50	< 50	110	205	860
200	< 50	< 50	< 50	125	270	925
300	< 50	< 50	< 50	155	515	1,110
400	< 50	50	90	185	810	1,305
600	< 50	125	125	265	915	En Route[2]
800	< 50	145	150	405	1,015	En Route[2]
1,000	< 50	160	170	560	1,125	En Route[2]

Note: [1] Zipline CONOPS assumes 95% of UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. and 5% would be done between 10:00 p.m. and 7:00 a.m. The average number of daily deliveries per dock in this table includes 5% of deliveries occurring between 10:00 p.m. and 7:00 a.m. consistent with CONOPS and Table 14.
[2] Noise exposure could exceed 45 DNL along the flight path for a Charging Point with 600 or more flights per day.
DNL = day/night average sound level

4.2 Noise Exposure at a Zipping Point

Estimated DNL noise exposure distances at a Zipping Point for the P2 Zip are shown in Table 16. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 50 to 1,800 feet. A single delivery operation consists of en route overflight, arrival, package pickup, and departure phases, as described in Section 3.2. According to the calculations, package pickup operations are expected to be less than 60 DNL at 50 feet from a Zipping Point, at up to a rate of 1,000 package loading operations per day, assuming up to 50 nighttime flights. Zipping point operations would equal or exceed 59.7 DNL up to 110 feet from a Zipping Point at a rate of 1,000 package loading operations per day.

Table 16. Noise Exposure Distances at a Zipping Point for Different Scales of Operation

Average Daily Pickups at a Zipping Point[1]	65 DNL Distance, feet	60 DNL Distance, feet	59.7 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	< 50	< 50	< 50	< 50	< 50	< 50
5	< 50	< 50	< 50	< 50	< 50	< 50
10	< 50	< 50	< 50	< 50	< 50	< 50
15	< 50	< 50	< 50	< 50	< 50	10
20	< 50	< 50	< 50	< 50	< 50	20
25	< 50	< 50	< 50	< 50	< 50	45
50	< 50	< 50	< 50	< 50	10	150
75	< 50	< 50	< 50	< 50	25	190
100	< 50	< 50	< 50	< 50	105	425
150	< 50	< 50	< 50	< 50	140	860
200	< 50	< 50	< 50	< 50	165	925
300	< 50	< 50	< 50	< 50	275	1,115
400	< 50	< 50	< 50	125	810	En Route[2]
600	< 50	< 50	< 50	160	915	En Route[2]
800	< 50	< 50	< 50	195	1,020	En Route[2]
1,000	< 50	105	110	425	1,155	En Route[2]

Note: [1] The CONOPS assumes 95% of UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. and 5% would be done between 10:00 p.m. and 7:00 a.m. The average number of daily deliveries per dock in this table includes 5% of deliveries occurring between 10:00 p.m. and 7:00 a.m. consistent with CONOPS and Table 14.

[2] Noise exposure would exceed 50 DNL along the flight path for an operation with 1,000 package pickups per day, and 45 DNL along the flight path for an operation with 300 or more package pickups per day.

DNL = day/night average sound level

4.3 Noise Exposure at a Delivery Point

Estimated DNL noise exposure distances at a delivery point for the P2 Zip are shown in Table 17. The DNL exposures assume an arrival and departure flight path restricted to a single trajectory over a receiver array with distances of 25 to 1,800 feet. A single delivery operation consists of en route overflight, arrival, package delivery, and departure phases, as described in Section 3.3. According to the calculations, package delivery operations are expected to be less than 65 DNL at 50 feet from a delivery point, at up to a rate of 1,000 package deliveries per day. Deliveries would equal or exceed 59.7 DNL up to 115 feet from a Delivery Point at a rate of 1,000 package loading operations per day.

Table 17. Noise Exposure Distances at a P2 Zip Delivery Point for Different Scales of Operation

Average Daily Deliveries at a Delivery Point[1]	65 DNL Distance, feet	60 DNL Distance, feet	59.7 DNL Distance, feet	55 DNL Distance, feet	50 DNL Distance, feet	45 DNL Distance, feet
1	< 50	< 50	< 50	< 50	< 50	< 50
5	< 50	< 50	< 50	< 50	< 50	< 50
10	< 50	< 50	< 50	< 50	< 50	< 50
15	< 50	< 50	< 50	< 50	< 50	< 50
20	< 50	< 50	< 50	< 50	< 50	55
25	< 50	< 50	< 50	< 50	< 50	100
50	< 50	< 50	< 50	< 50	< 50	160
75	< 50	< 50	< 50	< 50	70	220
100	< 50	< 50	< 50	< 50	105	455
150	< 50	< 50	< 50	< 50	150	855
200	< 50	< 50	< 50	55	190	915
300	< 50	< 50	< 50	100	405	1,070
400	< 50	< 50	< 50	125	805	1,520
600	< 50	< 50	55	180	905	En Route[2]
800	< 50	75	85	225	1,010	En Route[2]
1,000	< 50	105	115	455	1,110	En Route[2]

Note: [1] The CONOPS assumes 95% of UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. and 5% would be done between 10:00 p.m. and 7:00 a.m. The average number of daily deliveries per dock in this table includes 5% of deliveries occurring between 10:00 p.m. and 7:00 a.m. consistent with CONOPS and Table 14.

[2] Noise exposure would exceed 50 DNL along the flight path for an operation with 1,000 or more deliveries per day, and 45 DNL along the flight path for an operation with 300 or more deliveries per day.

DNL = day/night average sound level

4.4 En Route Noise Exposure

Noise exposure from UA en route trajectories would be loudest within 50 feet of the flight path, as described in Chapter 2. In practice, UAs would serve many delivery points from a point of origin, however in areas where there is a high demand for deliveries, en route UA noise may be intermittently noticeable depending on the level of existing ambient noise. In addition, an undertrack location would receive noise exposure from two en route events representing both outbound and inbound portions of a round trip for a delivery cycle. Along a single flight trajectory, en route noise levels would exceed 45 DNL at 600 or more deliveries per day, as shown in Table 18. Since test flights were conducted at the operating altitude of 330 feet AGL with MTOW, no altitude correction factors were used.

Table 18. P2 Zip Fixed Wing En Route Noise Exposure Levels

Average Daily Deliveries per Dock[1]	En Route DNL
1	26.8
5	28.3
10	29.6
15	30.6
20	31.4
25	33.1
50	35.7
75	37.3
100	38.4
150	40.3
200	41.4
300	43.2
400	44.4
600	46.2
800	47.4
1,000	48.4

Note: [1] The CONOPS assumes 95% of UA operations would be done between the hours of 7:00 a.m. and 10:00 p.m. and 5% would be done between 10:00 p.m. and 7:00 a.m. The average number of daily deliveries per dock in this table includes 5% of deliveries occurring between 10:00 p.m. and 7:00 a.m. consistent with CONOPS and Table 12.
DNL = day/night average sound level

4.5 Total Noise Exposure

Criteria for significance of impacts and changes in noise exposure are defined in FAA Order 1050.1G *National Environmental Policy Act Implementing Procedures* (FAA 2025). Order 1050.1G Exhibit A-1 states the following with respect to threshold of significance for a proposed action:

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

A total increase in noise from a proposed action can be calculated using the difference between the additional noise exposure introduced by a proposed action and the no action alternative. The total DNL increase associated with different values of the proposed action is shown in Table 19.

Table 19. Total Increase in DNL due to a Proposed Action

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

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

Chapter 5
References

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Appendix E
Biological Resources

U.S. Department of Transportation
Federal Aviation Administration

Aviation Safety

1200 New Jersey Avenue, SE
Washington, DC 20590

Field Office Supervisor
U.S. Fish and Wildlife Service
Arizona Ecological Services Field Office
9828 North 31st Ave
Suite C3
Phoenix, Arizona 85051-2517
Submitted to: incomingazcorr@fws.gov

SUBJECT: **Endangered Species Act Section 7 Consultation for Zipline Unmanned Aircraft Commercial Package Delivery Operations in Multiple Arizona Metropolitan Areas**

USFWS Project Code: 2026-0067928

In accordance with Section 7 of the Endangered Species Act (ESA), the Federal Aviation Administration (FAA) is requesting U.S. Fish and Wildlife Service (USFWS) concurrence that the FAA's action of authorizing Zipline International Inc. (Zipline) to begin unmanned aircraft (UA or drone) package delivery operations in multiple Arizona metropolitan (metro) areas ***may affect, but is not likely to adversely affect***, the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), California least tern (*Sternula antillarum browni*), Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), and Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) and is ***not likely to jeopardize the continued existence of*** the monarch butterfly (*Danaus plexippus*) and Suckley's cuckoo bumble bee (*Bombus suckleyi*). Our biological evaluation is provided below, including a brief background, project description, identification of the study area, and a discussion of potential effects to ESA-listed species.

Background

Zipline holds a 14 Code of Federal Regulations (CFR) Part 135 Standard Air Carrier Operating Certificate from the FAA, which allows it to carry the property of another for compensation or hire beyond visual line of sight (BVLOS). The certificate contains a stipulation that operations must be conducted in accordance with the provisions and limitations specified in the carrier's Operations Specifications (OpSpecs).[1] Zipline has requested the FAA amend Zipline's OpSpecs to authorize commercial drone package delivery operations in the Arizona metropolitan areas.

Project Description

Zipline proposes to expand their current area of operations for its Zipline Platform 2 UA (referred to as "Zipline UA" throughout) commercial delivery service to include multiple Arizona metro areas. Zipline's proposed Arizona operating areas boundaries are shown in **Figure 1**; each metro area would

[1] An Operations Specifications is a document that defines the scope of aircraft operations that the FAA has authorized. This is different than a concept of operations, or ConOps, which is generally a description of how a set of capabilities may be employed to achieve desired objectives.

be a separate operating area. Under the proposed action, Zipline would establish Zipline Chargers and Zipline Dropboxes and would conduct package pickup and delivery operations within each operating area.[2]

The maximum potential number of Chargers, Dropboxes, and deliveries for all metro areas is provided in **Table 1**. There could be a maximum of 1,000 deliveries per day from each Charger, but there would be variability in the actual number of flights per day based on customer demand and weather conditions. If, in the future, Zipline wanted to exceed their allocated Chargers, Dropboxes, or daily deliveries in the operating area, additional NEPA reviews would be required.

Table 1. Maximum number of charging sites, Dropboxes, and deliveries per day by metro area

Metropolitan Area	Area (square miles)	Zipline Chargers	Zipline Dropboxes	Maximum Deliveries[a] per Day	Maximum Transits[a] per Day
Phoenix	1,540.17	65	1,300	65,000	195,000
Tucson	553.72	65	1,300	65,000	195,000
Total	**2,093.89**	**130**	**2,600**	**130,000**	**390,000**

[a] Each delivery includes three transits: 1) flight from Charger to Dropbox, 2) flight from Dropbox to delivery location, and 3) flight from delivery location to ending Charger.

Zipline Charger and Dropbox would be distributed throughout the Arizona operating areas following a plan to be developed with Zipline's partners and through outreach to local communities (including local officials and wildlife groups, schools, airports, and community groups) and airspace users. Chargers and Dropboxes would be located in established commercial areas whose use is consistent with local zoning and land use requirements, such as retail stores, warehouses, laboratories, and other locations operated by customers.

Operations would occur 24 hours a day, seven days per week, including holidays. Approximately 95% of flights would take place during 7:00 am to 10:00 pm and 5% of flights would take place during 10:00 pm to 7:00 am. For each delivery, a Zipline UA would undock from a Charger, fly to a Dropbox to pick up a package, make a delivery, and return to a Charger (not necessarily the same Charger from which it undocked). Zipline UAs are capable of flying up to 20 miles between charges, so each round trip (including all three flights) would be no greater than 20 miles. The estimated total distance flown for deliveries would vary depending upon the Charger, Dropbox, and delivery locations. Charger and Dropbox locations would be determined through partner agreements and market demand; deliveries would likely be distributed throughout the service area of individual Charger and Dropbox and would remain within the defined operating areas. In the event that Chargers are installed with overlapping service areas, Zipline would not exceed 1,000 total deliveries per day in the area of overlap. Each delivery would include three transits, but for each delivery a maximum of two transits would fly over any one location on the ground; as a result, there would be no greater than 2,000 maximum transits per day over any ground location in the area of overlap.

Zipline UAs would primarily be transporting consumer goods, food & beverages, and pharmaceuticals in partnership with merchants (including pharmacies) in the communities they already serve and

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

would provide an alternative to in-store pick up. Deliveries would be conducted at the time of the customer's choosing and directly to the customer's home in the operating area. Zipline UAs would also transport lab samples from healthcare facilities and hospitals to laboratories as an alternative to a courier service or other ground-based transportation service. Deliveries would also be conducted at the time of the healthcare partner's choosing. Zipline UAs would also transport items for businesses at the time of a business' choosing as part of that business' inventory management.

Chargers

Zipline Charger docking towers would be installed on ballasted foundations or on embedded foundations as freestanding structures, constructed on previously disturbed land (e.g., paved parking lots, landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots). When required, Zipline may construct on zoned, undisturbed land adjacent to a developed area. Development on undisturbed land is outside the scope of this EA and may require supplemental NEPA analysis, including review by a Secretary of the Interior-qualified professional for Section 106 compliance.

The maximum impervious surface created per Charger with installed docks is approximately 500 square feet. Charger operations would require electricity and internet services and, where possible, Zipline would utilize existing utility connections and install related equipment and enclosures. Construction activities would not convert farmland and would not require tree clearing.

Docks would be housed on vertical towers. Each individual dock would provide the structural interface to house stationary Zipline UAs, charge Zipline UAs and provide thermal management, transfer data from Zipline UAs to and from the cloud, provide visual fiducials for Zipline UA docking maneuvers, and provide partial weather protection. Zipline UAs would be stored at a dock between flights. The number of docks at each Charger would vary depending on customer need and site characteristics. A typical Charger would consist of 36 docks, which would be filled with Zipline UAs based on market demand in the service area and logistical feasibility and efficiency. Docks may be arranged in multiple towers within a single Charger.

Dropboxes

Most Dropboxes would be ballasted, meaning they would be movable and not require disturbance of the ground or structures. These Dropboxes would be placed next to businesses and medical buildings for which goods would be transported and would only be located on existing disturbed land in non-residential areas. Some Dropboxes may be installed. Installed Dropboxes would be constructed primarily as freestanding structures on previously disturbed land (e.g., paved parking lots, landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots) or attached to an existing building. Installed Dropbox construction would occur only under the following conditions:

- Construction of installed Dropboxes attached to buildings would occur on (a) buildings less than 45 years old or (b) buildings that are greater than 45 years old that have been determined to be ineligible for the National Register of Historic Places (NRHP) within the last 10 years;
- Freestanding installed Dropboxes would be sited to avoid disturbance of documented archaeological resources and would comply with all federal, state, and local laws.

The location of installed Dropboxes outside of these conditions is outside the scope of this EA and may require supplemental NEPA analysis.

Unmanned Aircraft

The Zipline UA is a highly automated, electrically powered vertical takeoff and landing aircraft capable of hover and forward flight. The Zipline UA features a multi-rotor design with 5 motors and weighs under 63 pounds when combined with its maximum payload weight of 8 pounds.

Once an order is placed, a package is loaded into the Dropbox, and the Zipline UA transits from a Charger to the Dropbox. Once at the Dropbox, the Zipline UA hovers and lowers a delivery pod (hereafter referred to as "pod") into the Dropbox to retrieve the package. The pod is stored in the Zipline UA payload bay and the Zipline UA flies to the delivery site where it lowers the pod via winch line to a pre-selected delivery site. The Zipline UA has a wingspan of approximately 7.8 feet, a height of approximately 1.8 feet, and a length of approximately 8 feet. Zipline UAs are equipped with high-visibility position and anti-collision strobe lights. These lights run while Zipline UAs are in flight and are visible for at least three statute miles. **Figure 2** illustrates the Zipline UA and pod.

The Zipline UA builds upon Zipline's first generation vehicle, the P1. The Zipline UA offers hyper-precise delivery and a larger allowable payload size and introduces the ability of Zips to take off and dock automatically. All Zipline aircraft use electric power from rechargeable lithium-ion batteries.

Flight Operations

Zipline UAs fly pre-planned routes developed prior to flight. Routes are generated by software that takes into consideration factors including weather risk, wind direction, and population density. Routes are carefully planned to avoid terrain and obstructions, known areas with high volume of other air traffic, airspace restrictions, and known venues for open-air assemblies of people, and can be regenerated, if needed. Zipline UAs automatically deconflict with each other using a combination of strategic and tactical avoidance measures including generation of predetermined flight paths following specific rules to reduce the overlap of flight paths in different modes and phases of flight. Each Zipline UA communicates directly to other Zipline UAs over radio and cellular networks to share position, velocity, and intent information which is used for each to automatically modify flight plans to maintain separation. Deconfliction occurs even if the Remote Pilot in Command (RPIC) loses communication with Zipline UAs.

To deconflict with other aircraft, including other UAS, Zipline takes a multi-pronged approach. This includes: (1) use of its onboard ADS-B detect and avoid ("DAA") system; (2) use of a FAA-approved Unmanned Aircraft System Traffic Management (UTM) service; (3) use of a third-party solution to notate Zipline areas of operation to inform operators of Zipline's operations; (4) use of Notice to Air Men (NOTAMs) to notify traditional and UA operators of Zipline's flight areas; and (5) proactively building relationships with other local commercial UA operators to identify areas of operational overlap and develop deconfliction procedures as necessary.

The software designs and carefully checks flight paths to ensure Zipline UAs stay safely within the predetermined operational area. The Zipline UAs has onboard checks evaluating its position during flight that ensure the Zipline UA remains within the allowed operational area and its intended route. If a Zipline UA departs from the pre-determined operational area, the Zipline would automatically take action to terminate the flight immediately or return to the most appropriate location – either

docking at the closest available dock or using the hover or paraland function (safe termination of the flight using a parachute) to safely exit the airspace. Additionally, the RPIC has the ability to command flight termination if a Zipline UA flies outside of this pre-determined operational area.

Zipline UAs would generally be operated at an altitude of 330 feet above ground level (AGL) while en route to and from Charger, Dropbox, and delivery locations. At the Dropbox or delivery location, the Zipline UA would maintain stationary hover approximately 330 feet AGL and lower the pod to the Dropbox for pickup of the payload or to the ground for delivery of the payload through bay doors. Once the payload has been released, the UA would then retract the pod, and depart the Dropbox or delivery area en route back to a Charger.[3]

The UA would fly a predefined flight path that is set prior to takeoff. Flight missions are automatically planned by Zipline's flight planning software. A mission originates from a dock, and Zipline's software automatically assigns, deconflicts, and routes each flight to the Dropbox, delivery location, and back to a dock. Docks are built to separate operations from nearby non-participating people and vehicles.

As part of normal operations, the Zipline UA may be assigned one of the following missions:

- Pickup and delivery. The Zipline UA would use a pod to pick up a payload at a Dropbox and then the Zipline would use a pod to deliver a payload at a prescribed location.
- Reposition. A Zipline UA moving from one Charger to another at the same Charger or from a dock at one Charger to a dock at a different Charger.

Zipline operations begin with order processing followed by flight phases. A typical pick up and delivery flight profile can be broken into the following general flight phases: undocking, transit to Dropbox, pick up, transit to delivery location, delivery, transit to Charger, and docking. Each of these is explained in the following sections. A reposition flight profile would include undocking, transit to new Charger, and docking; any reposition flight operations would take the place of a pick up and delivery flight instead of adding to the total number of flights; since there is only a single transit for these operations, analyzing them as a pick up and delivery operation is a conservative assumption.

Pre-Takeoff

During the pre-takeoff process, Zipline's system would complete automated preflight checks of the UAS to ensure no unsafe conditions exist.

Undocking

Once cleared for takeoff from a dock, the Zipline UA undocks and then maneuvers away from the dock and ascends vertically to the en route altitude (330 feet AGL) on its pre-planned flight path.

Transit to Dropbox

The transit phase to a zipping point is where the Zipline UA would fly from the Charger to a Dropbox to pick up the payload. During this flight phase, the Zipline UA would typically operate using horizontal flight at an altitude of 330 feet AGL and a typical cruise airspeed of 70 mph.

Order Processing and Pick Up

The order processing and pick up phase consists of deceleration and hovering over a Dropbox. The

[3] See www.flyzipline.com for videos and photographs of Zipline operations.

Zipline UA maintains its altitude at 330 feet AGL and its position over the Dropbox. The pod is released from the Zipline UA and lowered to the Dropbox via the winch line. During pod descent, the pod automatically controls its position laterally and evaluates the Dropbox. If the Dropbox is clear, the pod would continue to descend and enter the Dropbox. The Dropbox would insert the package into the pod. The pod would then be retracted back into the Zipline UA. The Zipline UA would then proceed to accelerate as it exits the Dropbox area and begins transit to the delivery location. The total hover time for pick up operations would be approximately 120 seconds.

Transit to Delivery Location

The transit to delivery location phase is the part of flight in which the loaded Zipline UA transits from the Dropbox to a delivery point on a predefined flight path. During this flight phase, the Zipline UA would typically operate using horizontal flight at an altitude of 330 feet AGL and a typical cruise airspeed of 70 mph.

Delivery

The delivery phase consists of deceleration and hovering over a delivery point, such as a residential yard, driveway, parking lot, or common area. The Zipline UA maintains its altitude at 330 feet AGL and its position over the delivery location. The pod is released from the Zipline and lowered to the ground via the winch line. During pod descent, the pod automatically controls its position laterally and evaluates the delivery location. If the delivery location is clear, the pod would continue to descend and deliver the payload at the delivery target. The pod would then be retracted back into the Zipline UA. The Zipline UA would then proceed to accelerate as it exits the delivery area and begins transit back to the Charger. The total hover time for delivery operations would be approximately 75 seconds.

Transit to Charger

The Zipline UA continues to fly at an altitude of 330 feet AGL and a speed of up to 70 mph towards the dock.

Docking

Upon reaching the dock, the Zipline UA decelerates and descends vertically before maneuvering into the dock area. The Zipline UA then attaches to the dock from below using its docking fin. The Zipline UA's motors are disengaged after the Zipline UA has registered secure connection with the dock.

Predicted Sound Levels

ICF conducted a noise analysis for the FAA using sound level measurement data for the Zipline UA. The estimated maximum sound exposure level (SEL) for the takeoff, landing, and charging phases of flight of the Zipline UA, at 50 feet from the Charger, would be approximately 78.4 A-weighted decibels (dBA) (Table 11 in **Attachment B**). During pick up at a Dropbox, the SEL at 50 feet from the Dropbox would be 77.9 dBA (Table 12 in **Attachment B**). At delivery, the Zipline UA and pod generate 79.9 dBA SEL (Table 13 in **Attachment B**) at 50 feet from the delivery point. The average SEL for the en route phase of the Zipline UA is approximately 63.2 dBA (66.2 dBA for outbound and inbound flights occurring along the same trajectory) Section 3.4 in **Attachment B**). Predicted sound levels decrease as distances from the drone increase.

Study Area

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

According to the U.S. Environmental Protection Agency, the study area is almost entirely (>99%) within the Sonoran Basin and Range level III ecoregion with a small area within the Madrean Archipelago level III ecoregion (EPA 2025). The following is a general description of each of these two ecoregions based on Ruhlman et al. (2012) and Calzia and Wilson (2012); however, note that much of the land surface in the study area is developed or disturbed, as it contains urban and suburban development in and around the Phoenix and Tucson metropolitan areas.

- Madrean Archipelago ecoregion: This ecoregion is regarded as one of the most biologically diverse areas in the world, providing a unique mix of flora and fauna within mountain, woodland, desert and grassland terrain. The Madrean Archipelago ecoregion encompasses Lowlands within this ecoregion experience an average annual minimum and maximum temperatures of 46°F and 78°F with decreases in temperature of 36°F and increases in precipitation of 4 – 5 inches for every 1,000 ft gain in elevation (Ruhlman et al. 2012).
- Sonoran Basin and Range ecoregion: This ecoregion features scattered mountain ranges divided by broad alluvial plains, with the ranges formed from igneous, sedimentary, and metamorphic rock types. This region is characterized by a warm, arid climate with winter daytime temperatures averaging around 70°F and summer daytime temperatures often exceeding 100°F. The western portion of the Sonoran Basin and Range ecoregion experiences most of its precipitation in the winter while the eastern portion receives most of the precipitation in the summer. This pattern contributes to a diverse range of vegetation that includes more than 2,500 different species within the ecoregion (Calzia and Wilson 2012).

Urban growth and ongoing development continues to spread within and around the Arizona metro operating areas. The urban environment in the study area encompasses agricultural lands; commercial zones (such as business parks, airports, and landfills); established communities; a dense downtown; recreational spaces (including public parks, golf courses, and desert preserves); residential neighborhoods; major thoroughfares (highways, railroads, and public roads); and undeveloped areas (open desert, vacant lots, and scrublands). Washes and other natural drainages also form part of the landscape. These areas provide habitat for the smaller, more common and/or introduced bird and mammal species including the desert cottontail (*Sylvilagus audubonii*), coyote (*Canis latrans*), Gila woodpecker (*Melanerpes uropygialis*), and mourning dove (*Zenaida macroura*).

ESA-Listed Species and Critical Habitat in the Study Area

The FAA acquired the Official Species List (see **Attachment A**) from the USFWS Information for Planning and Conservation (IPaC) online system to identify ESA-listed species and designated critical habitat in the study area (**Table 2**) (USFWS 2026). The study area contains designated critical habitat for the Arizona eryngo (*Eryngium sparganophyllum*), Gila chub (*Gila intermedia*), and Mexican spotted owl (*Strix occidentalis lucida*).

Table 2. ESA-Listed and Candidate Species Potentially Present in the Study Area

Common Name	Scientific Name	ESA Status
Mammals		
Jaguar	*Panthera onca*	Endangered
Mexican Wolf	*Canis lupus baileyi*	Experimental Population, Non-Essential
Ocelot	*Leopardus (=Felis) pardalis*	Endangered
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	Experimental Population, Non-Essential
Birds		
Cactus Ferruginous Pygmy-owl	*Glaucidium brasilianum cactorum*	Threatened
California Least Tern	*Sternula antillarum browni*	Endangered
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered
Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened
Yuma Ridgway's Rail	*Rallus obsoletus yumanensis*	Endangered
Reptiles		
Northern Mexican Gartersnake	*Thamnophis eques megalops*	Threatened
Amphibians		
Chiricahua Leopard Frog	*Rana chiricahuensis*	Threatened
Fishes		
Desert Pupfish	*Cyprinodon macularius*	Endangered
Gila Chub	*Gila intermedia*	Endangered
Gila Topminnow (incl. Yaqui)	*Poeciliopsis occidentalis*	Endangered
Gila Trout	*Oncorhynchus gilae*	Threatened
Insects		
Monarch Butterfly	*Danaus plexippus*	Proposed Threatened
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	Proposed Endangered
Flowering Plants		
Arizona Eryngo	*Eryngium sparganophyllum*	Endangered
Huachuca Water-umbel	*Lilaeopsis schaffneriana var. recurva*	Endangered
Pima Pineapple Cactus	*Coryphantha scheeri var. robustispina*	Endangered

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

Zipline docks would be constructed primarily on previously disturbed land, such as a paved parking lot. The action does not include any habitat modification. During nominal operations, the UA would not touch the ground, and its dock would be located in commercial areas, such as shopping centers. The action would not result in any physical disturbance to high-quality habitat; all disturbance associated with site installation would occur in previously disturbed locations. As such, the action would not result in any physical disturbance to habitat. Therefore, the proposed action does not have the potential to affect any habitat or designated critical habitat within the study area. The FAA has determined the action would have ***no effect*** on Arizona eryngo, Gila chub, and Mexican spotted owl designated critical habitat.

UA noise and the potential for airborne strikes with flying species are the action's potential stressors or threats to ESA-listed species. Flight operations would take place mostly in an urban environment,

within airspace, and typically remain well above the tree line while en route to and from a site. The duration of exposure by wildlife on the ground to visual or noise impacts from the UA would be of very short duration (approximately 75 seconds during takeoff/landing and delivery and a few seconds during the en route phase).

As noted above and shown in **Attachment B**, the highest estimated average SEL associated with Zipline's proposed operations is 81.4 dBA at 100 feet from a Charger, which would occur during takeoff, landing, and charging operations. The highest SEL on the ground during the en route phase is estimated to be around 63.2 dBA.

A noise descriptor for noise effects on wildlife has not been universally adopted, but some research indicates SEL is the most useful predictor of responses. Characteristic of the bulk of research to date has been lack of systematic documentation of the source noise event. Many studies report "sound levels" without specifying the frequency spectrum or duration. A notable exception is a study sponsored by U.S. Air Force that identifies SEL as the best descriptor for response of domestic turkey poults to low-altitude aircraft overflights (Bradley et al. 1990). This study identified a threshold of response for disturbance of domestic turkeys ("100 percent rate of crowding") as SEL 100 dB. None of the predicted sound levels for the different flight phases exceed SEL 80 dBA.

The following paragraphs describe the anticipated effects of the action on the ESA-listed species listed in Table 2.

Mammals

Jaguar, Mexican wolf, ocelot, and Sonoran pronghorn

The jaguar, Mexican wolf, ocelot, and Sonoran pronghorn are not susceptible to disturbance from UA noise, collision risk, or light emissions because the action does not involve any low altitude operations, ground-disturbing activities, or activities within suitable habitat for these species. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the jaguar, Mexican wolf, ocelot, and Sonoran pronghorn.

Birds

Cactus ferruginous Pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Rideway's rail

The cactus ferruginous pygmy-owl inhabits desert rivers, washes, and undisturbed Sonoran Desert areas at elevations under 4,000 feet. They live in the desert habitat of southern Arizona and in northwestern Mexico and favor dense desert scrub, trees, and towering cacti as sites for nesting and roosting. Their diet consists of small rodents, lizards, insects, frogs, earthworms, and other birds (Center for Biological Diversity n.d).

The California least tern nest in colonies of typically 15 to 300 pairs on sandy beaches, estuaries, and coastal embayments, often near river mouths. They feed by diving into shallow coastal waters to catch small fish, such as anchovies and topsmelt. California least terns are present in the United States during the breeding season, which extends from mid-April to mid-September (USFWS n.d.a).

Mexican spotted owls are generally found in forested mountains and canyonlands throughout the southwestern U.S. and Mexico. Their range encompasses Utah, Colorado, Arizona, New Mexico and the western portions of Texas south into several states of Mexico. Mexican spotted owls feed on

small mammals, specifically mice, voles, and woodrats (USFWS n.d.b). The reproductive chronology varies somewhat across their range. In Arizona, courtship begins in March and the female lays 2-4 eggs in late March to early April and hatch in early May (NPS 2010).

Southwestern willow flycatcher is a summer breeder within its range in the United States. Their breeding habitat currently ranges from southern California, through southern Nevada, southern Utah, Arizona, New Mexico, southwestern Colorado, and Texas (NPS 2013). They require dense riparian thickets and shrubs for nesting. Their diet consists of various species of insects, including flies, beetles, and other small invertebrates. Habitat not suitable for nesting may be used for migration and foraging (USFWS n.d.c).

Yellow-billed cuckoos utilize wooded habitat with dense cover and water nearby, including woodlands with low, scrubby, vegetation, overgrown orchards, abandoned farmland, and dense thickets along streams and marshes. They breed throughout much of the eastern and central United States, winter almost entirely in South America, and migrate through Central America. In the western United States, nests are often placed within willows along streams and rivers, with nearby cottonwoods serving as feeding sites, with caterpillars being their main prey (USFWS n.d.d).

The Yuma Ridgway's rail is a marsh bird that prefers thick, emergent riparian vegetation for both foraging and nesting. Yuma Ridgway's rails do not migrate but have shifting seasonal ranges based on food availability (USFWS n.d.e). They are generally found in the marshes of the lower Colorado River, the Salton Sea in California, the Ciénega de Santa Clara in Sonora, Mexico, and the Gila River in Arizona (National Audubon Society n.d.). Their diet typically consist of crayfish, small fish, frogs, and aquatic invertebrates.

The cactus ferruginous pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail could potentially be affected by noise, light, and collision risk associated with the proposed action. However, the action does not involve ground disturbance or vegetation removal and therefore would not physically impact any suitable habitat for these birds. If present in the study area, these ESA-listed birds could experience UA noise during the en route and delivery flight phases. Birds resting or foraging at or near the tree line at the time a UA flies by would experience the greatest sound levels. Birds near the ground at the time a UA flies by would experience lower sound levels. Given the estimated sound levels of the UA, the UA's linear flight profile to and from nests and delivery locations, the height of en route travel, the low probability of encountering any one of these ESA-listed birds in the study area given their specific habitat requirements, and the short period of time the UA would be in any particular location, UA noise is not expected to adversely affect ESA-listed birds. Further, the chances of any one individual experiencing multiple overflights of a UA are low given the mobility of the birds. One study found that, in most instances, drones within 4 meters of birds did not cause a behavioral response (Vas et al. 2015). In another study, drones barely elicited behavioral responses in terrestrial mammals (Mulero-Pázmány et al. 2017).

Birds could also be struck by a drone during delivery operations. Given birds' ability to avoid flying into objects, the short period of time the UA would be in any one place, the height of en route travel, and the low probability of encountering these species during operations, the likelihood of the UA striking an ESA-listed bird is discountable.

Operations would occur mostly in an urban environment. Based on the altitude at which the UA flies

in the en route phase (330 feet AGL), the expected low sound levels produced, the fact that any increase in ambient sound levels would be short in duration, the low probability of these ESA-listed birds occurring in the study area, and the low likelihood of the UA striking an individual; any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated). Therefore, the FAA has determined that the proposed action ***may affect but is not likely to adversely affect*** the cactus ferruginous pygmy-owl, California least tern, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail.

Reptiles

Northern Mexican gartersnake

The northern Mexican gartersnake is not susceptible to disturbance from the Zipline UA noise because the action does not involve any ground-disturbing activities, or activities (i.e., Charger or Dropbox installation or deliveries) within suitable habitat for this species. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the northern Mexican gartersnake.

Amphibians

Chiricahua leopard frog

The Chiricahua leopard frog is not susceptible to disturbance from UA noise, collision risk, or light emissions because the action does not involve any vegetation removal, ground-disturbing activities, or activities within aquatic or moist microhabitats. As there is no plausible route of effect to this species, the FAA determined the action would have ***no effect*** on the Chiricahua leopard frog.

Fishes

Desert pupfish, Gila chub, Gila topminnow, and Gila trout

The desert pupfish, Gila chub, Gila topminnow, and Gila trout are not susceptible to disturbance from the Zipline UA noise, because the action does not involve any ground-disturbing activities or activities (i.e., Charger or Dropbox installation or deliveries) that cause changes in hydrology. As there is no plausible route of effect to these species, the FAA determined the action would have ***no effect*** on the desert pupfish, Gila chub, Gila topminnow, and Gila trout.

Insects

Monarch butterfly and Suckley's cuckoo bumble bee

The monarch butterfly and Suckley's cuckoo bumble bee potentially occur in the study area. Monarchs occur throughout the United States during summer months and are proposed for federal listing. The preferred habitat for monarchs is open meadows, fields, and wetland edges with the presence of milkweed and flowering plants where they typically fly close to the ground. Western monarch butterflies, which live west of the Rocky Mountains, migrate towards the California coast in the fall, overwintering in clusters on blue gum eucalyptus, Monterey pine, and Monterey cypress trees (USFWS n.d.f). Suckley's cuckoo bumble bee is an obligate social parasite that is dependent on its host species for much of its life cycle. Hosts include the Western bumble bee (*Bombus occidentalis*) and Nevada bumble bee (*Bombus nevadensis*), with other potential hosts in the subgenus *Bombus* throughout its range. They inhabit prairie habitats and can be found in the nests of

western bumble bees (Bumble Bee Atlas n.d.). In the western portion of their range, Suckley's cuckoo bumble bee observations extend south to Arizona. As of 2024, there are approximately 250 bumble bee species worldwide, with approximately 50 native bumble bee species in the United States and Canada and have not been observed within the United States since 2016 (USFWS 2024).

The monarch butterfly and Suckley's cuckoo bumble bee are proposed for federal listing. The monarch butterfly and Suckley's cuckoo bumble bee could potentially be affected by noise, light, and collision risk associated with the proposed action. The primary threat to these insects are habitat loss, including the loss of breeding, migratory, invasive species, and overwintering habitat. Pesticide use and climate change are also threats. The action would not physically affect monarch butterfly habitat or host plants. Monarch butterflies and Suckley's cuckoo bumble bees could be struck by drones en route to and from delivery; however, strikes are not likely given the species' mobility. Information regarding drone impacts on insects is limited, and there have been no widespread negative impacts identified in the scientific literature. Based on the information available and the limited scale of operations, the action is not expected to adversely affect the monarch butterfly and Suckley's cuckoo bumble bee.

Operations would occur mostly in an urban environment. Based on the altitude at which the UA flies in the en route phase (330 feet AGL), the expected low sound levels produced, that fact that any increase in ambient sound levels would be short in duration, the low probability of encountering these species due to low probability of presence, and the low likelihood of the UA striking these species; any effects would be discountable (extremely unlikely to occur) or insignificant (not able to be meaningfully measured, detected, or evaluated). Based on the information available and the limited scale of operations, the action is ***not likely to jeopardize the continued existence of*** the monarch butterfly and Suckley's cuckoo bumble bee.

<u>Flowering Plants</u>

Arizona eryngo, Huachuca water-umbel, and Pima pineapple cactus

Flowering plants, ferns and allies, and lichens, such as the Arizona eryngo, Huachuca water-umbel, and Pima pineapple cactus are not susceptible to disturbance from UA noise, collision risk, or light emissions. Many of the federally listed plant species occur within natural areas. The study area is comprised of highly urbanized and developed residential, commercial and industrial areas; and therefore, the probability of occurrence for most of these plant species is low. The action does not involve any ground-disturbing activities or activities within suitable habitat for these species. As there is no plausible route of effect to these species, the FAA determined the action would have *no effect* on the Arizona eryngo, Huachuca water-umbel, and Pima pineapple cactus.

Conclusion

Based on the analysis above, the FAA has determined the action ***may affect, but is not likely to adversely affect***, the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), California least tern (*Sternula antillarum browni*), Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), and Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) and ***not likely to jeopardize the continued existence of*** the monarch butterfly (*Danaus plexippus*) and Suckley's cuckoo bumble bee (*Bombus suckleyi*). The FAA appreciates your review of the proposed project and requests your concurrence with our effects

determinations for these three species within 30 days if possible. If you have any questions, please contact 9-faa-drone-environmental@faa.gov.

Sincerely,

_____

Derek Hufty

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

Emerging Technologies Division

Office of Safety Standards, Flight Standards Service

Attachments:

Figure 1. Study Area

Figure 2. Zipline UA and Pod

Attachment A. USFWS Official Species List

Attachment B. Noise Assessment Report

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Figure 1. Study Area

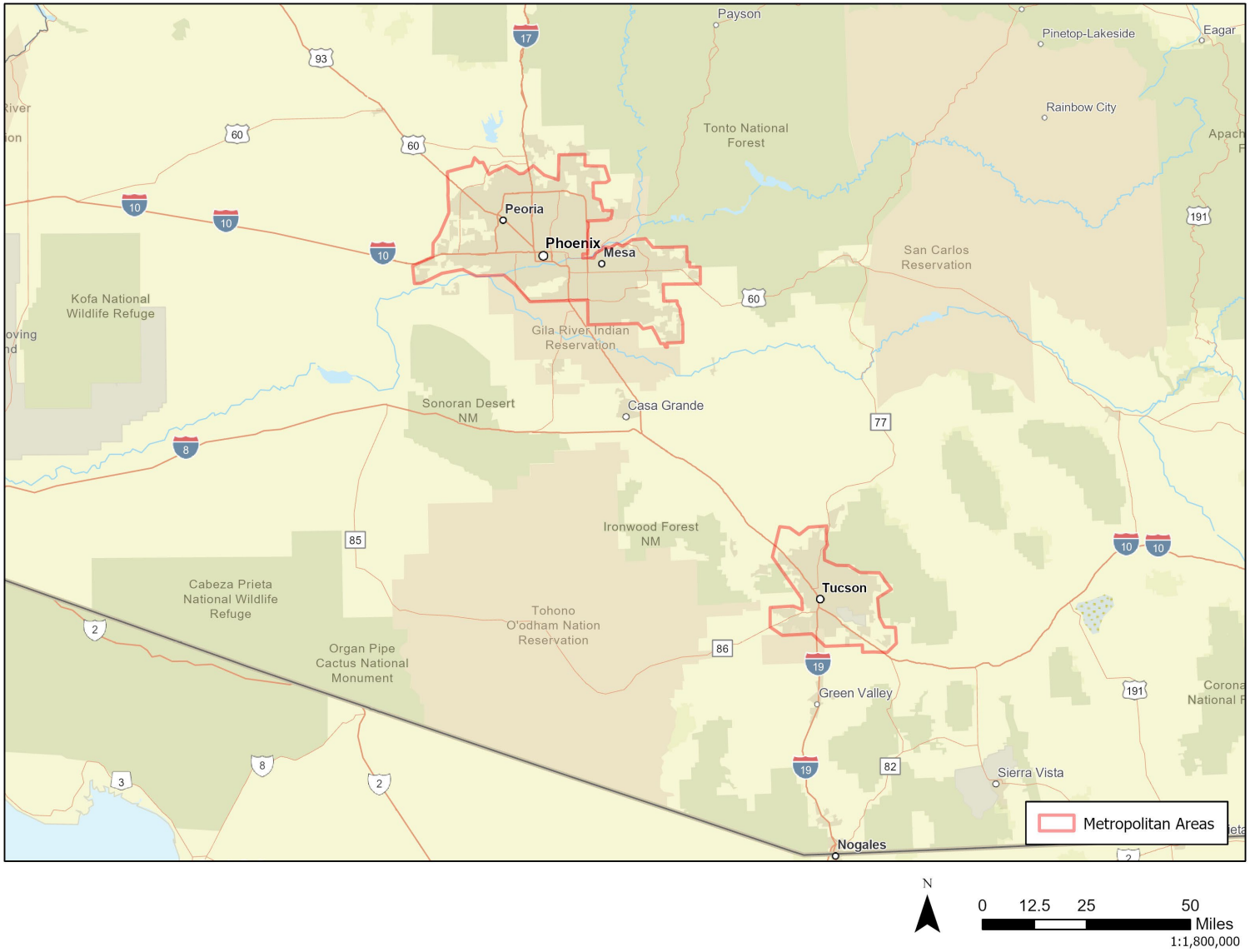
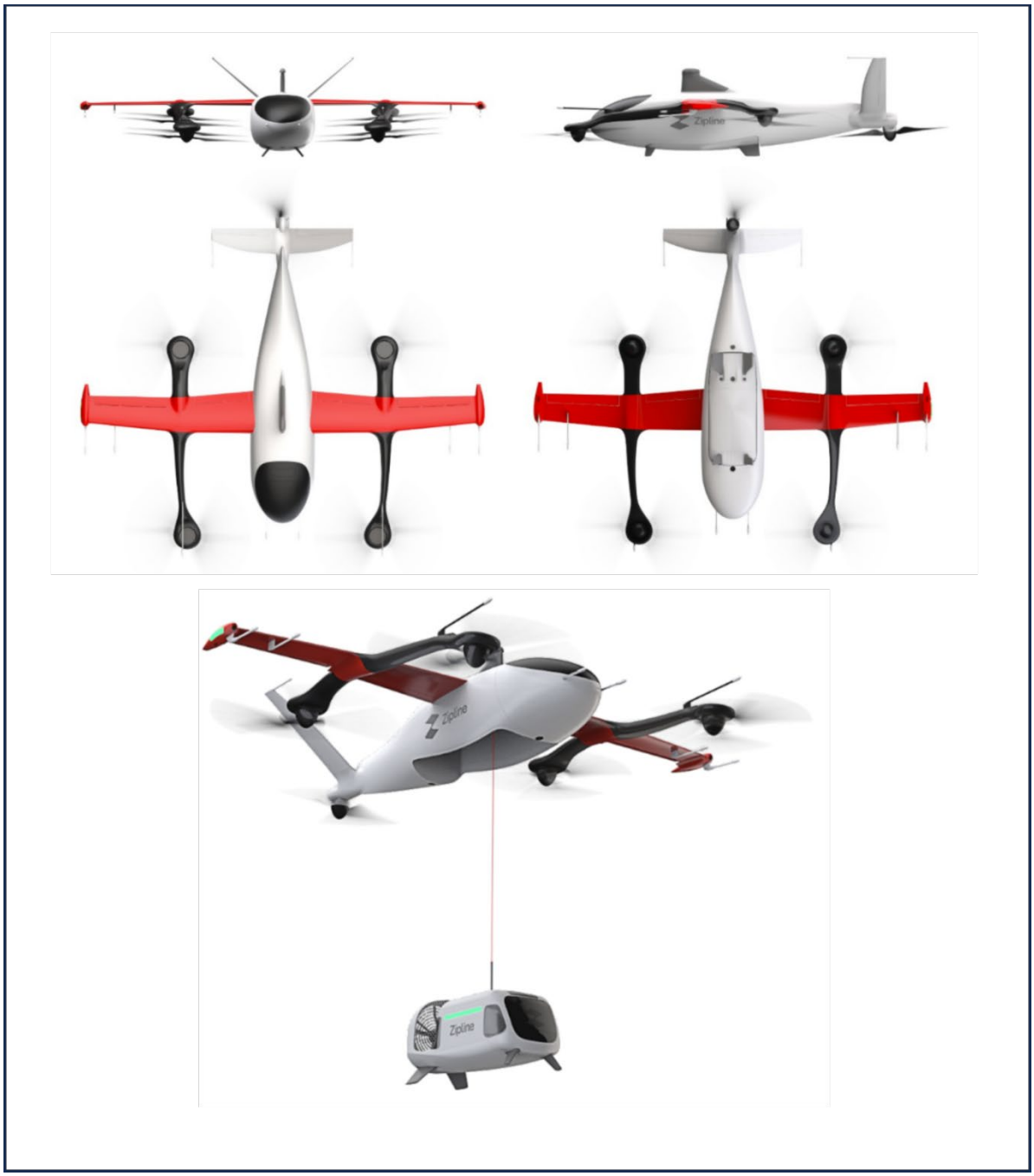


Figure 2. Zipline UA Profile Views (above) and Pod(below)



Attachment A. USFWS Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer To: 08/31/2026 20:15:08 UTC
Project Code: 2026-0067928
Project Name: Zipline International Inc. Drone Package Delivery Operations in Multiple Arizona Metro Areas

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 Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that *may* occur within the One-Range that has been delineated for the species (candidate, proposed, or listed) and it's critical habitat (designated or proposed) with which your project polygon intersects. These range delineations are based on biological metrics, and do not necessarily represent exactly where the species is located. Please refer to the species information found on ECOS to determine if suitable habitat for the species on your list occurs in your project area.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats 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 Federal trust resources and to determine whether projects may affect federally listed 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 the Federal action agency determines that listed species or critical habitat *may be affected* by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and

that may be beneficial, insignificant, or discountable. An effect exists even if only one individual or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint." For example, projects that involve streams and river systems should consider downstream affects. If the Federal action agency determines that the action may jeopardize a *proposed* species or may adversely modify *proposed* critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.

Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 *et seq.*). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1,026 species of birds are protected by the MBTA, including the western burrowing owl (*Athene cunicularia hypugaea*). Protected western burrowing owls can be found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle or golden eagle nest occurs in or near the proposed project area, our office should be contacted for Technical Assistance. An evaluation must be performed to determine whether the project is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles (see https://www.fws.gov/law/bald-and-golden-eagle-protection-act and https://www.fws.gov/program/eagle-management).

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following web site: https://www.fws.gov/program/migratory-bird-permit. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation.

The U.S. Army Corps of Engineers (Corps) may regulate activities that involve streams (including some intermittent streams) and/or wetlands. We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information

about refuge resources, please visit this link or visit https://www.fws.gov/program/national-wildlife-refuge-system to locate the refuge you would be working in or around.

If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated. For more information, please contact our Tribal Coordinator, John Nystedt, at 928/556-2160 or John_Nystedt@fws.gov.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (*Gopherus morafkai*) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program (https://www.azgfd.com/wildlife-conservation/planning-for-wildlife/project-evaluation-program/).

We appreciate your concern for threatened and endangered species. 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. If we may be of further assistance, please contact our Flagstaff office at 928/556-2118 for projects in northern Arizona, our general Phoenix number 602/242-0210 for central Arizona, or 520/670-6144 for projects in southern Arizona.

Sincerely,
/s/

Heather Whitlaw
Field Supervisor
Attachment

Attachment(s):

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

OFFICIAL SPECIES LIST

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

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

PROJECT SUMMARY

Project Code: 2026-0067928

Project Name: Zipline International Inc. Drone Package Delivery Operations in Multiple Arizona Metro Areas

Project Type: Drones - Use/Operation of Unmanned Aerial Systems

Project Description: The proposed action is the expansion of Zipline's current area of operations for UA commercial delivery service to include multiple Arizona metro areas. Under the proposed action, Zipline would establish charging points and zipping points and would conduct package pickup and delivery operations within each operating area. There could be a maximum of 1,000 deliveries per day from each charging point, but there would be variability in the actual number of flights per day based on customer demand and weather conditions. Operations would occur 24 hours a day, seven days per week, including holidays. Approximately 95% of flights would take place during 7:00 am to 10:00 pm and 5% of flights would take place during 10:00 pm to 7:00 am. For each delivery, a P2 UA would undock from a charging point, fly to a zipping point to pick up a package, make a delivery, and return to a charging point (not necessarily the same charging point from which it undocked). P2 UAs would primarily be transporting consumer goods, food & beverages, and pharmaceuticals in partnership with merchants (including pharmacies) in the communities they already serve and would provide an alternative to in-store pick up. Deliveries would be conducted at the time of the customer's choosing and directly to the customer's home in the operating area.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@33.45836715,-112.21022455384066,14z



Counties: Maricopa , Pima , and Pinal counties, Arizona

ENDANGERED SPECIES ACT SPECIES

There is a total of 21 threatened, endangered, or candidate species on this species list.

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

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

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

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

MAMMALS

NAME	STATUS
Jaguar *Panthera onca* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3944	Endangered
Mexican wolf *Canis lupus baileyi* Population: U.S.A. (portions of AZ and NM)see 17.84(k) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3916	Experimental Population, Non-Essential
Ocelot *Leopardus (=Felis) pardalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4474	Endangered
Sonoran pronghorn *Antilocapra americana sonoriensis* Population: U.S.A. (AZ), Mexico No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4750	Experimental Population, Non-Essential

BIRDS

NAME	STATUS
Cactus ferruginous pygmy-owl *Glaucidium brasilianum cactorum* There is **final** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1225	Threatened
California least tern *Sternula antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Mexican spotted owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Southwestern willow flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened
Yuma Ridgway's rail *Rallus obsoletus yumanensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3505	Endangered

REPTILES

NAME	STATUS
Northern Mexican gartersnake *Thamnophis eques megalops* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7655	Threatened

AMPHIBIANS

NAME	STATUS
Chiricahua leopard frog *Rana chiricahuensis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1516	Threatened

FISHES

NAME	STATUS
Desert pupfish *Cyprinodon macularius* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7003	Endangered
Gila chub *Gila intermedia* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/51	Endangered
Gila topminnow (incl. Yaqui) *Poeciliopsis occidentalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1116	Endangered
Gila trout *Oncorhynchus gilae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/781	Threatened

INSECTS

NAME	STATUS
Monarch butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Suckley's cuckoo bumble bee *Bombus suckleyi* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10885	Proposed Endangered

FLOWERING PLANTS

NAME	STATUS
Arizona eryngo *Eryngium sparganophyllum* Population: There is **final** critical habitat for this species. Your location overlaps the critical habitat.	Endangered

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/10705	
Huachuca water-umbel *Lilaeopsis schaffneriana var. recurva* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1201	Endangered
Pima pineapple cactus *Coryphantha scheeri var. robustispina* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4919	Endangered

CRITICAL HABITATS

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Arizona eryngo *Eryngium sparganophyllum* https://ecos.fws.gov/ecp/species/10705#crithab	Final
Gila chub *Gila intermedia* https://ecos.fws.gov/ecp/species/51#crithab	Final
Mexican spotted owl *Strix occidentalis lucida* https://ecos.fws.gov/ecp/species/8196#crithab	Final

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

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

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

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

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/ activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

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

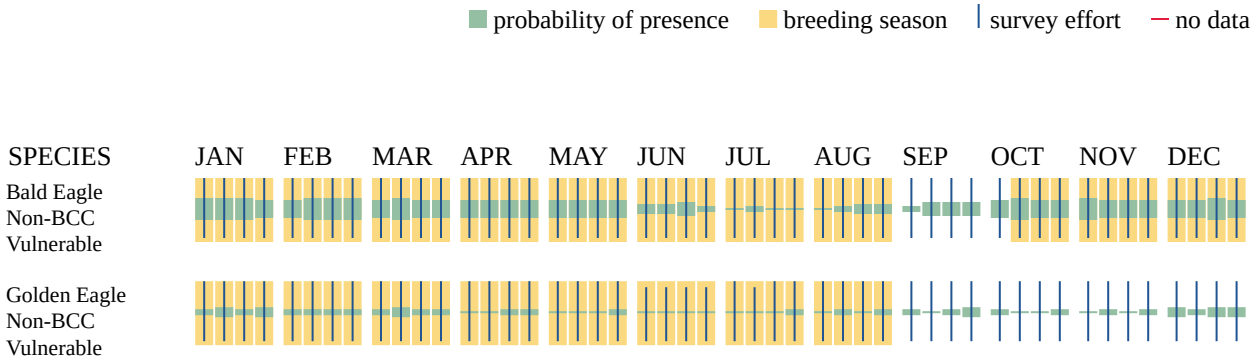
Probability of Presence (■)

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

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

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

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



Additional information can be found using the following links:

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

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

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

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Avocet *Recurvirostra americana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11927	Breeds Apr 21 to Aug 10
Arizona Woodpecker *Dryobates arizonae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9673	Breeds Apr 10 to Jun 30
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 Oct 15 to Aug 31
Bendire's Thrasher *Toxostoma bendirei* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9435	Breeds Mar 15 to Jul 31
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-chinned Sparrow *Spizella atrogularis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31

NAME	BREEDING SEASON
Black-throated Gray Warbler *Setophaga nigrescens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9584	Breeds May 1 to Jul 20
Broad-tailed Hummingbird *Selasphorus platycercus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11935	Breeds May 25 to Aug 21
Chestnut-collared Longspur *Calcarius ornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9437	Breeds elsewhere
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10575	Breeds Jun 1 to Aug 31
Cordilleran Flycatcher *Empidonax occidentalis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11949	Breeds Apr 25 to Jul 25
Costa's Hummingbird *Calypte costae* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10
Elegant Trogon *Trogon elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9624	Breeds Apr 1 to Aug 31
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10
Flammulated Owl *Psiloscops flammeolus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7728	Breeds May 10 to Aug 15
Gila Woodpecker *Melanerpes uropygialis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5960	Breeds Apr 1 to Aug 31

NAME	BREEDING SEASON
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Grace's Warbler *Setophaga graciae* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9514	Breeds May 20 to Jul 20
Lawrence's Goldfinch *Spinus lawrencei* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
LeContes Thrasher *Toxostoma lecontei* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8969	Breeds Feb 15 to Jun 20
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Mexican Whip-poor-will *Antrostomus arizonae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10680	Breeds May 1 to Aug 20
Mountain Plover *Charadrius montanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3638	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31

NAME	BREEDING SEASON
Phainopepla *Phainopepla nitens lepida* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11973	Breeds Mar 1 to Aug 20
Plumbeous Vireo *Vireo plumbeus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11933	Breeds May 10 to Aug 5
Red-faced Warbler *Cardellina rubrifrons* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9578	Breeds May 10 to Jul 15
Scott's Oriole *Icterus parisorum* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11968	Breeds May 21 to Aug 15
Sprague's pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Varied Bunting *Passerina versicolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9725	Breeds Apr 25 to Sep 30
Virginia's Warbler *Leiothlypis virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
Western Grebe *Aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Whiskered Screech-Owl *Megascops trichopsis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10569	Breeds Apr 15 to Jul 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

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

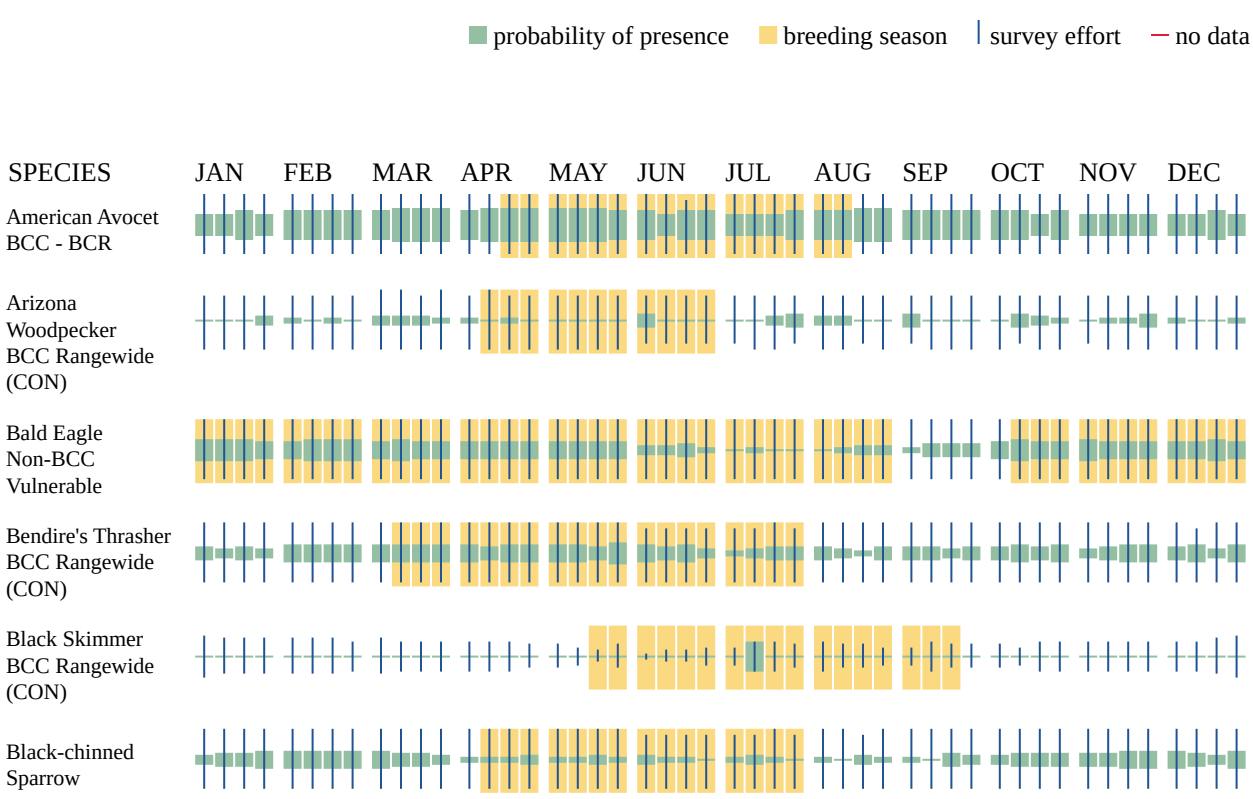
Probability of Presence (■)

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

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

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

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




BCC Rangewide (CON)
Black-throated Gray Warbler BCC - BCR
Broad-tailed Hummingbird BCC Rangewide (CON)
Chestnut-collared Longspur BCC Rangewide (CON)
Clark's Grebe BCC Rangewide (CON)
Cordilleran Flycatcher BCC - BCR
Costa's Hummingbird BCC - BCR
SPECIES
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Elegant Trogon BCC Rangewide (CON)
Evening Grosbeak BCC Rangewide (CON)
Flammulated Owl BCC Rangewide (CON)
Gila Woodpecker BCC - BCR
Golden Eagle Non-BCC Vulnerable
Grace's Warbler BCC - BCR
Lawrence's Goldfinch BCC Rangewide (CON)
LeContes Thrasher BCC Rangewide (CON)


Lewis's Woodpecker BCC Rangewide (CON)
Long-eared Owl BCC Rangewide (CON)
Marbled Godwit BCC Rangewide (CON)
Mexican Whip-poor-will BCC Rangewide (CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Mountain Plover BCC Rangewide (CON)
Olive-sided Flycatcher BCC Rangewide (CON)
Phainopepla BCC - BCR
Plumbeous Vireo BCC - BCR
Red-faced Warbler BCC Rangewide (CON)
Scott's Oriole BCC - BCR
Sprague's pipit BCC Rangewide (CON)
Varied Bunting BCC Rangewide (CON)
Virginia's Warbler BCC Rangewide (CON)
Western Grebe BCC Rangewide (CON)
Whiskered Screech-Owl BCC Rangewide (CON)

Willet
BCC Rangewide
(CON)



Additional information can be found using the following links:

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

WETLANDS

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

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

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

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

LAKE

- L1UBH
- L2UBH
- L2USC

FRESHWATER FORESTED/SHRUB WETLAND

- PFOC
- PSSC

FRESHWATER POND

- PABHx
- PUBF
- PUB

FRESHWATER EMERGENT WETLAND

- PEM1C

- PEM1Cx

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Jimmy Zaccagnino
Address: 1902 Reston Metro Plaza
City: Reston
State: VA
Zip: 20190
Email jimmy.zaccagnino@icf.com
Phone: 7164748326

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

Attachment B. Noise Assessment Report

Please see Appendix D of this EA.

Appendix F
SHPO Consultation

U.S. Department of Transportation
Federal Aviation Administration

Aviation Safety

1200 New Jersey Avenue, SE
Washington, DC 20590

State Historic Preservation Office
Arizona State Parks & Trails
1110 W Washington St, Suite 100
Phoenix, AZ, 85007

Transmitted via e-mail: azshpo@azstateparks.gov

Dear Arizona SHPO,

The Federal Aviation Administration (FAA) is currently evaluating Zipline International Inc.'s (Zipline's) proposal to conduct unmanned aircraft (UA; also referred to as a drone) small package delivery operations in two Arizona metropolitan (metro) areas: Phoenix and Tucson. These metro areas include portions of Maricopa, Pima, and Pinal Counties. Zipline must obtain approval necessary to enable expanded operations, is an undertaking as defined under the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR § 800.16(y)). The purpose of this letter is to initiate Section 106 consultation with the SHPO and request concurrence on the definition of the Area of Potential Effects (APE) and assessment of effects.

Project Background and Description

For this consultation the project is divided into two components: installation of Zipline Infrastructure of Zipline Chargers and Zipline Dropboxes (pick up locations), and flight operations, which details the Zipline UA model, UA flight, and delivery. The effects of each component are different in degree and scale, with the effects of installation of Zipline infrastructure being more permanent but impacting a much smaller area, while Flight Operations will involve only very brief, temporary effects but impacting a much greater area.

Infrastructure

Zipline is proposing to establish up to 130 Chargers and 2,600 Ddropboxes throughout the Arizona metro operating areas (see **Attachment A.1**). Chargers and Dropboxes would be sited on previously disturbed land (e.g. paved parking lots, landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots). The maximum impervious surface created per Charger with installed docks would be approximately 500 square feet. Within each Charger, docks would be housed on vertical towers, and each individual dock will provide the structural interface to house, charge, and partially shelter Zipline UAs (see **Attachment A.2**).

Most Dropboxes (see **Attachment A.3**) would be ballasted, meaning they would be moveable and not require ground disturbance. Some Dropboxes would be constructed primarily as freestanding structures on previously disturbed land (e.g. paved parking lots, landscaped areas within the limits of disturbance of the property, previously disturbed vacant lots). These installed Dropboxes will only be constructed under the following conditions:

- Construction of installed Dropboxes attached to buildings would occur on (a) buildings less than 45 years old or (b) buildings that are greater than 45 years old that have been determined to be ineligible for the National Register of Historic Places (NRHP) within the last 10 years;
- Freestanding installed Dropboxes would be sited to avoid disturbance of documented archaeological resources and would comply with all federal, state, and local laws.

Flight Operations

The primary UA used for the proposed Arizona metro region operations is the Zipline UA model (see **Attachment A.4**). Specifications for this model are as follows:

- Multi-rotor design with 5 propellers.
- Weight approximately 63 pounds when combined with its maximum payload weight of 8 pounds.
- Tail propellers tilt on a 90-degree axis to toggle between lift/hover and forward flight modes.
- Wingspan of approximately 7.8 feet, a height of approximately 1.8 feet, and a length of approximately 8 feet.
- Equipped with high-visibility position and anti-collision strobe lights which are activated while in-flight and are visible at a distance of at least 3 statute miles.

All Zipline aircraft use electric power from rechargeable lithium-ion batteries. Aircraft batteries would be charged wirelessly from Chargers where aircraft sit between deliveries. Chargers would be connected to onsite utilities.

Delivery flight operations would start when an order is placed and a package loaded into a Dropbox. A typical flight profile can be broken into the following general flight phases: *pre-takeoff*, *undocking*, *transit to Dropbox*, *order processing and pick up, transit to delivery location, delivery, transit to Charger,* and *docking.*

Pre-Takeoff

The UA flies a predefined flight path set prior to takeoff. Flight missions are automatically planned by Zipline's flight planning software. A mission originates from a Charger, and Zipline's software automatically assigns, deconflicts, and routes each flight to the Dropbox, delivery location, and back to a dock at the same or another Charger. Chargers are built to separate operations from nearby non-participating people and vehicles.

Undocking from Charger

Once cleared for takeoff from a Charger, the Zipline UA undocks and then maneuvers away from the dock and ascends vertically to the en route altitude (330 feet AGL [above ground level]) on its pre-planned flight path.

Transit to Dropbox

The Zipline UA flies from the Charger to a Dropbox to pick up the payload. During this flight phase, the Zipline UA typically operates at an altitude of 330 feet AGL and a typical cruise airspeed of 70 miles per hour (mph).

Order processing and pick up

The Zipline UA decelerates and hovers over a Dropbox, maintaining its altitude at 330 feet AGL and its position over the Dropbox. The Zipline UA releases and lowers its delivery pod (hereafter referred to as "pod"; see Attachment A.4) to the Dropbox via the winch line and enters the Dropbox. The Dropbox inserts the package into the pod. The Zipline UA then retracts the pod would then be retracted back into its payload bay. The Zipline UA then accelerates as it exits the Dropbox area and begins transit to the delivery location. The total hover time for pick up operations is approximately 120 seconds.

Transit to delivery location

The loaded Zipline UA transits from the Dropbox to a delivery location on a predefined flight path. During this flight phase, the Zipline UA typically operates at an altitude of 330 feet AGL and a typical cruise airspeed of 70 miles per hour (mph).

Delivery

The Zipline UA decelerates and hovers over a delivery point, such as a residential yard, driveway, parking lot, or common area. The Zipline UA maintains its altitude at 330 feet AGL and its position over the delivery location. The Zipline UA lowers the pod to the ground via the winch line (**see Attachment A.4**) and delivers the payload. The Zipline UA then retracts the pod back into its payload bay. The Zipline UA then accelerates as it exits the delivery area and begins transit back to the Charger. The total hover time for delivery operations is approximately 75 seconds.

Transit to Charger

The Zipline UA continues to fly at an altitude of 330 feet AGL and a speed of up to 70 mph towards the Charger.

Docking

Upon reaching the Charger, the Zipline UA decelerates and descends vertically before maneuvering into the dock area. The Zipline UA then attaches to the dock from below using its docking fin. The Zipline UA's motors are disengaged after the Zipline UA has registered secure connection with the dock.

<u>Predicted Sound Levels</u>

ICF conducted a noise analysis for the FAA using sound level measurement data for the Zipline UA. Noise levels at a charging site (for docking and undocking and charging), would not exceed 81.4 A-weighted decibels (dBA) sound exposure level (SEL) at 50 feet from a dock in use. Noise levels at a Dropbox would not exceed 77.9A dB SEL at 50 feet from the Dropbox. Noise levels during a delivery would not exceed 79.9 dBA SEL at 50 feet from the point of delivery. In-flight noise for the Zipline UA at 330 feet AGL is 63.2 dBA SEL (66.2 dBA Sel for outbound and inbound flights occurring along the same trajectory). Audible effects of flight operations would be intermittent.

DNL values at or above 65 dB due to an increase of DNL 1.5 dB or greater, when compared to the no action alternative for the same timeframe. For example, an increase of the DNL from 65.5 dB to 67 dB is

considered a significant impact, as is an increase from 63.5 dB to 65 dB. For an increase of 1.5 dB or more to occur from an existing DNL of 63.5 dB, the added noise on its own must be at least a DNL 59.7 dB (i.e., 59.7 dB + 63.5 dB = 65 dB). The decibel level of additional noise that is required to result in an increase of 1.5 dB to any existing noise level can be determined by subtracting 3.8 from the value of the existing noise level (e.g., 63.5 - 3.8 = 59.7).

Each Charger and Dropbox would be placed at a distance from noise-sensitive areas that would not result in the estimated extent of daily noise exposure exceeding DNL 59.7 dB. For example, a Charger with the maximum analyzed 1,000 deliveries per day would be placed at least 170 feet away from noise-sensitive areas, including historic properties. A Dropbox with the maximum analyzed 300 deliveries per day would be placed at least 50 feet away from noise-sensitive areas. En route noise exposure, for a location exposed to a maximum of 1,000 deliveries per day (2,000 outbound and inbound flights combined), would not exceed 48.4 dBA. Deliveries could occur at historic properties intermittently for about 75 seconds per operation, but are not likely to be frequent.

Area of Potential Effects

In accordance with 36 CFR § 800.4(a)(1), the FAA has defined the Area of Potential Effects (APE) in consideration of the undertaking's potential direct and indirect effects. The proposed APE includes the entire metro areas where Zipline is planning to conduct UA package deliveries, plus a 3-mile buffer for light visibility at night. The proposed APE would be located in all or portions of Maricopa, Pima, and Pinal Counties within the Phoenix and Tucson metro areas in the state of Arizona. The enclosed maps (see **Attachment A.1**) shows the proposed APE in detail.

Identification of Historic Properties

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

The FAA is taking into account the magnitude and nature of the undertaking and the nature and extent of potential effects on historic properties in this identification effort pursuant to 36 CFR § 800.4(b)(1). Given the large geographic area of the project (the entirety or portions of three counties in Arizona), its light infrastructure footprint, and intermittent, short-term, minor visual and audible effects, the FAA has determined that a reasonable and good faith effort for identification will consist of a review of existing information on historic properties within the APE utilizing the National Park Service (NPS) National Register of Historic Places (NRHP) online database. According to the NPS database, there are 402 historic properties and 123 historic districts located in the APE (see **Attachments C and D**). Additional properties in the APE may be otherwise recognized for historic significance by the SHPO. Most of the historic properties in the APE are residences and businesses, but also include churches, public buildings (such as city halls, schools, courthouses), bridges, bunkers, archaeological sites and districts, cemeteries, sports facilities, and locomotives.

Assessment of Effects

Pursuant to 36 CFR § 800.5(a), the FAA applied the criteria of adverse effects to historic properties in the APE. Establishment of Chargers and Dropboxes would involve no ground disturbance and would have no effect on subsurface historic properties. The Chargers and Dropboxes themselves will utilize extant previously disturbed sites. With a Charger and Dropbox height of 26 feet, 6 inches and 14 feet tall,

respectively, this would incur only a minor visual effect should a historic property be within viewshed of Charger or Dropbox. There are potential minor visual effects to aboveground historic properties through installation of Chargers and Dropboxes if historic properties are within the viewshed of the autoloaders. However, the required setback distances to avoid noise impacts would minimize these impacts.

All takeoff and pick up operations would be located no closer to any historic property than a setback distance of 160 to 560 feet. Pick ups or deliveries at or more historic properties would involve the UA hovering at 330 feet AGL for about 120 or 75 seconds, respectively. In flight, the UA would appear as a small object moving at twice the speed of bird flight. These rapid and intermittent flight operations would result in minimal visual effects. Additionally, Zipline's flight planning software minimizes overflights of any specific location by varying flight paths. A small percent of deliveries could be conducted at night, resulting in light emissions, but these would be temporary and infrequent and therefore minor.

Given the small size of the UA and predicted sound levels, UA operations would not produce vibrations that could impact the architectural structure or contents of any structure in the APE. While the UA is not expected to generate significant noise levels at or within any historic property, the FAA considered UA delivery noise and potential visual effects on historic properties where a quiet setting or visually unimpaired sky might be a key attribute of the property's significance. However, any visual or audible effects that may occur within a flight path would be negligible and temporary.

Taking into account the minimal infrastructure required for the project, consideration of historic properties in the OpSpecs as noise-sensitive areas, and the temporary nature of potential audible and visual effects, the FAA determined that the undertaking's effects do not meet the criteria of adverse effect listed in 36 CFR § 800.5(a)(1). Therefore, the FAA has made a finding of *no adverse effect* to historic properties pending consultation with the SHPO and other consulting parties.

Consultation

In August 2026, the FAA initiated government-to-government consultation regarding the proposed undertaking with the following tribes: Ak-Chin Indian Community; Colorado River Indian Tribes of the Colorado River Indian Reservation; Fort McDowell Yavapai Nation; Fort Sill Apache Tribe of Oklahoma; Gila River Indian Community of the Gila River Indian Reservation; Hopi Tribe of Arizona; Pascua Yaqui Tribe of Arizona; Salt River Pima-Maricopa Indian Community of the Salt River Reservation; San Carlos Apache Tribe of the San Carlos Reservation; Tohono O'odham Nation of Arizona; White Mountain Apache Tribe of the Fort Apache Reservation. The FAA invited the Tribes to provide input to inform the NEPA and Section 106 review and consultation processes, including information about any Tribal lands or site of religious or cultural significance that may be affected by the proposed undertaking.

The FAA will utilize the NEPA process to invite comment from both the public and local governments within the APE on the FAA's Section 106 finding of *no adverse effect* for this project. The FAA welcomes input from the SHPO on additional consulting parties that may be invited to consult under Section 106.

In accordance with 36 CFR § 800.10, should an undertaking incur direct and adverse effects on an NHL, the FAA must notify the National Park Service (NPS) of any consultation regarding an NHL, and request Advisory Council on Historic Preservation (Council) participation in consultation to resolve adverse effects. However, because the FAA has determined that this project will result in no adverse effect to any NHLs, the FAA is not extending consultation invitations to either the NPS or the Council at this time.

Conclusion

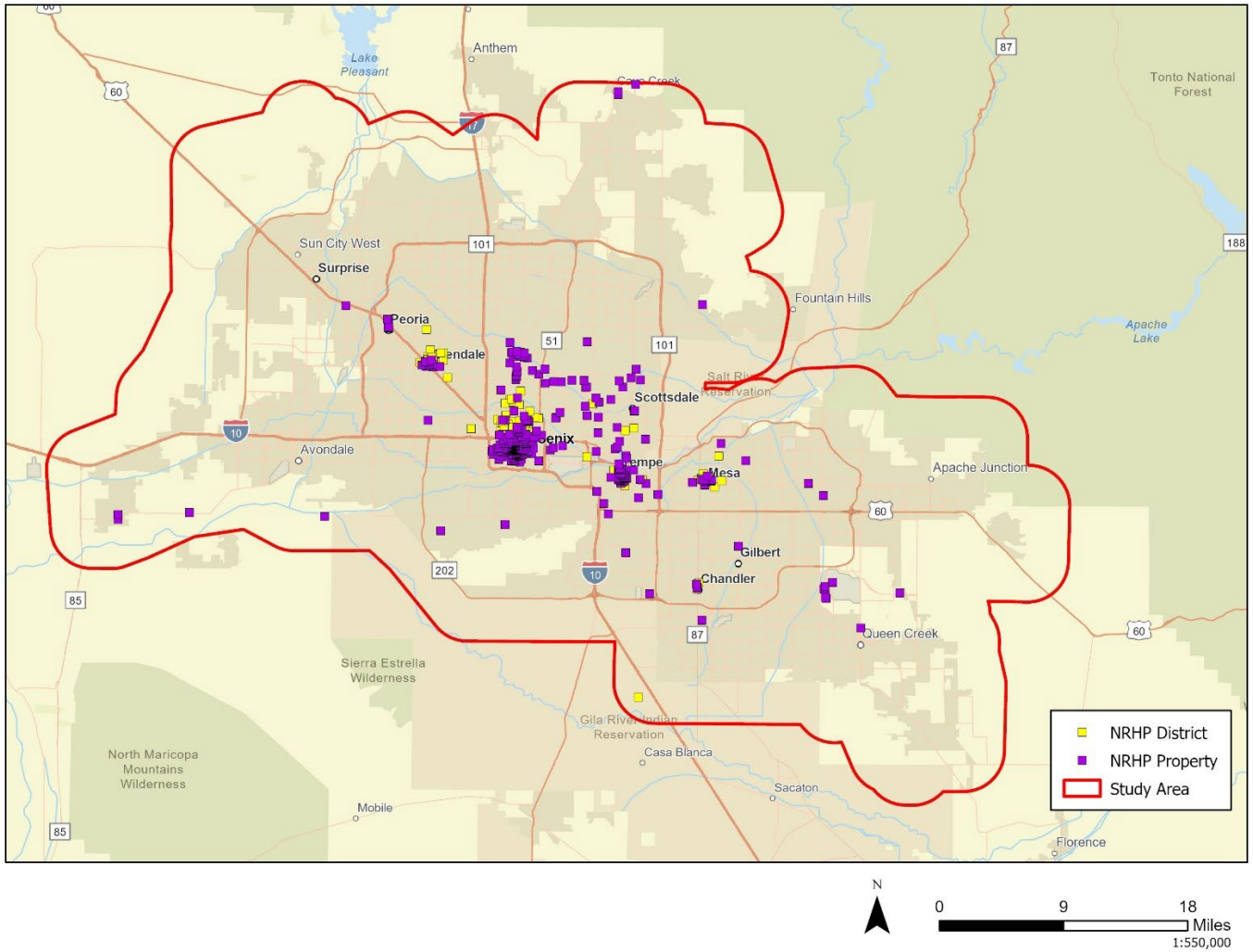
The FAA requests your concurrence on the definition of the APE and finding of *no adverse effect.* Your response within the next 30 days will greatly assist us in our environmental review process.

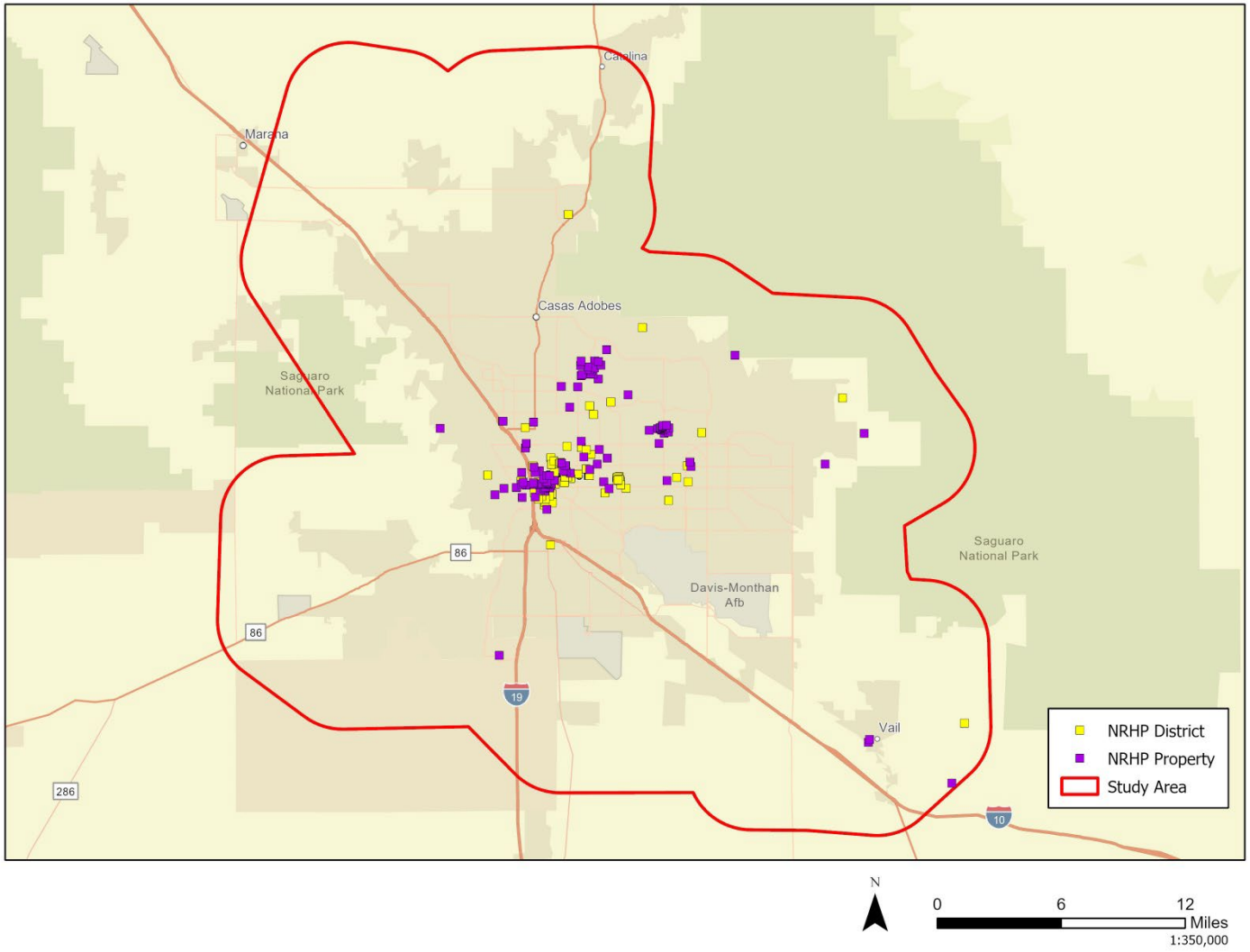
If you have any questions or need additional information, please contact Jonathan DeLaune via email at 9-faa-drone-environmental@faa.gov.

Sincerely,

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

Attachment A.1
Proposed Areas of Potential Effects




Catalina
Marana
Casas Adobes
Saguaro National Park
Saguaro National Park
Davis-Monthan Afb
Vail
86
86
19
286
10
NRHP District
NRHP Property
Study Area
N
0
6
12
Miles
1:350,000

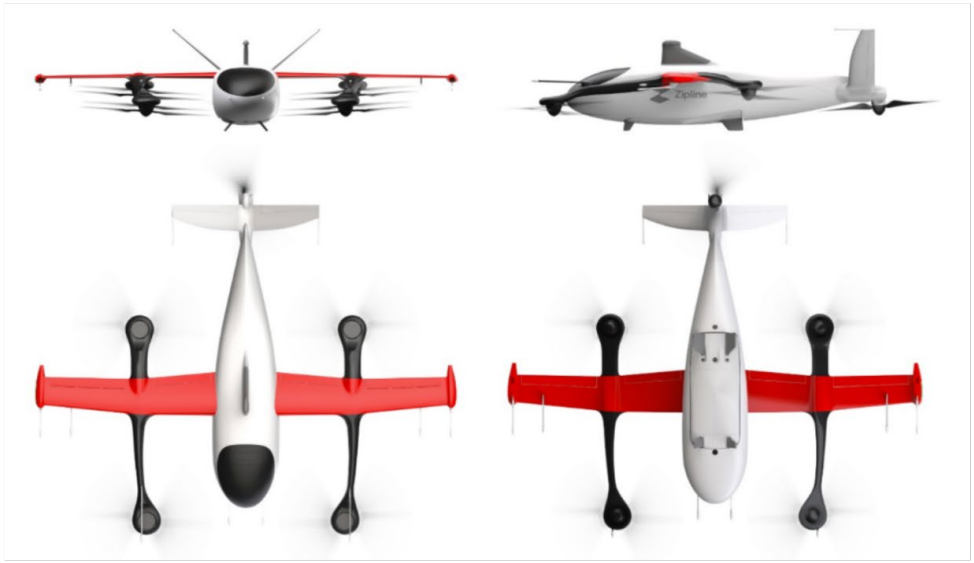
Attachment A.2
Zipline Charger with a 12-dock configuration



Attachment A.3
Zipline Dropbox



Attachment A.4
Zipline UA





Attachment B. Historic Districts

Reference Number	Historic District Name	Street & Number	Type	City	County
00001127	Chandler Commercial Historic District	Roughly bounded Boston, Oregon, Buffalo, and Washington Sts.	District	Chandler	Maricopa
11000567	Silk Stocking Neighborhood Historic District	290 N Washington St.	District	Chandler	Maricopa
05001505	Floralcroft Historic District	Roughly bounded by State St., 59th Ave., Myrtle St., Grand Ave. and 61st Ave.	District	Glendale	Maricopa
05001506	Glendale Tract Historic District	51st Ave. and Northern Ave.	District	Glendale	Maricopa
06000767	59th Avenue Residential Historic District	West side 59th Ave. bet. Orangewood Ave. and Frier Dr.	District	Glendale	Maricopa
07001088	Glendale Townsite-Catlin Court Historic District (Boundary Increase)	Generally bounded by 55th Ave., 59th Ave., Palmaire Ave. and Orangewood Ave.	District	Glendale	Maricopa
08001345	Myrtle Avenue Residential Historic District	6305-6423 W. Myrtle Ave.	District	Glendale	Maricopa
10000234	Northfield Historic District	Bounded by W. State Ave (S), N. 59th Ave (E), W. Orangewood Ave (N), and N. 59th Lane (W)	District	Glendale	Maricopa
10000235	Thunderbird Estates and The McDonald Addition Historic District	Bounded by W. Northern Ave (S), N. 59th Ave (W), and W. Royal Palm Rd (N), and including lots facing both sides of N.57	District	Glendale	Maricopa
11000192	Sands Estate Historic District	Roughly bounded by W Belmont Ave, W Morten Ave, Orangewood Ave, and W Vista Ave	District	Glendale	Maricopa
11001073	Glendale Gardens Historic District	5002-5038 W. Gardenia Ave., 5007-5038 W. State Ave., & 7251-7321 N. 50th Dr.	District	Glendale	Maricopa
11001074	Sage Acres Historic District	6021-62-51 N. 48th Ave. & 4736 W. Bethany Home Rd.	District	Glendale	Maricopa
80000763	Sahuaro Ranch	N. 58th Dr.	District	Glendale	Maricopa
92000680	Glendale Townsite-Catlin Court Historic District	Roughly bounded by Gardenia, 58th, Myrtle, 57th, Palmaire and 59th Aves. and 58th Dr.	District	Glendale	Maricopa
98000322	Manistee Ranch	5127 W. Northern Ave.	District	Glendale	Maricopa
00001321	Temple Historic District	Roughly bet. Mesa Dr., Broadway Rd., Hobson and Main Sts.	District	Mesa	Maricopa
03000530	Robson Historic District	Roughly bounded by Country Club Dr., Robson and 2nd Sts.	District	Mesa	Maricopa
03000531	West Second Street Historic District (Boundary Revision)	Roughly bounded by Robson St., University Dr. and MacDonald St.	District	Mesa	Maricopa

Reference Number	Historic District Name	Street & Number	Type	City	County
10000534	West Side-Clark Addition Historic District	Date Drive to Country Club Drive (West to East), 2nd Place to Pepper Street (North to South)	District	Mesa	Maricopa
10000535	Fraser Fields Historic District (Additional Documentation)	Fraser Dr W to Fraser Dr E; Third Pl to Pepper Pl	District	Mesa	Maricopa
75000350	Park of the Canals	Along Horne Rd. N from Utah Ditch S to Mesa-Consolidated Canal	District	Mesa	Maricopa
99000706	Evergreen Historic District	456 N Robson St. & 463 N Macdonald	District	Mesa	Maricopa
99000707	West Second Street Historic District	Roughly between Robson St. and Center St., from 1st St. to 3rd St.	District	Mesa	Maricopa
99000708	Wilbur Street Historic District	Roughly between Pasadena St. and Pomeroy St., 1st St. to 3rd St.	District	Mesa	Maricopa
00000102	East Alvarado Historic District	E. Alvarado Rd. bet. 3rd and 7th Sts.	District	Phoenix	Maricopa
00001499	Windsor Square Historic District	Roughly bounded by 7th St., Camelback Rd., Central St., and Oregon Ave.	District	Phoenix	Maricopa
01000164	Oakland Historic District	Roughly bounded by 19th Ave. Fillmore St., Grand Ave., and Van Buren St.	District	Phoenix	Maricopa
01000521	Phoenix Indian School Historic District	300 E. Indian School Rd.	District	Phoenix	Maricopa
06000434	Medlock Place Historic District (Additional Documentation)	Roughly bounded by Missouri Ave., Camelback Rd., 7th Ave., and Central Ave.	District	Phoenix	Maricopa
06000468	Earll Place Historic District	1620-1722 E. Pinchot Ave., 1617-1731 and 1736 E. Earll Dr.	District	Phoenix	Maricopa
06001262	North Encanto Historic District	Roughly bounded by 15th and 18th Aves., Thomas to Osborn Rds.	District	Phoenix	Maricopa
07000279	Margarita Place Historic District (Additional Documentation)	Bounded by Thomas Rd., Windsor Ave., 15th And 16th Ave.	District	Phoenix	Maricopa
09000002	La Hacienda Historic District	Bounded by N. 3rd St. to the W., N. 7th St. to the E., E. Catalina Dr. to the N., E. Thomas Rd. to the S.	District	Phoenix	Maricopa
09000221	Burgess Lateral Historic District	Adjacent to Arcadia Dr. between the Arizona Canal and Lafayette Blvd., between 47th Pl. and 47th St.	District	Phoenix	Maricopa
10000320	Brentwood Historic District	Roughly bounded by Brill St to the N, 20th St to the E, Culver St tot he S, 16th St to the W	District	Phoenix	Maricopa
10000321	Campus Vista Historic District	923 W. Catalina Dr.	District	Phoenix	Maricopa

Reference Number	Historic District Name	Street & Number	Type	City	County
10000322	East Evergreen Historic District	Roughly bounded by McDowell Rd, 3rd St, 7th St, and Willetta St.	District	Phoenix	Maricopa
10000324	Encanto Vista Historic District	Roughly bounded by 7th Ave, Encanto Blvd, Windsor Ave, and Encanto Park Municipal Golf Course	District	Phoenix	Maricopa
10000325	Garfield Historic District (Additional Documentation)	Roughly bounded by 7th, 16th, Roosevelt, and Van Buren Sts.	District	Phoenix	Maricopa
10000326	Los Olivos Historic District	The 300 block of E Monte Vista Rd	District	Phoenix	Maricopa
10000327	North Garfield Historic District	Roughly bounded by 7th St on the W, 16th St on the E, Roosevelt St on the S, and Interstate 10 on the N	District	Phoenix	Maricopa
10000328	Villa Verde Plat A and Villa Verde Plat B Historic District	Roughly bounded by Monte Vista Rd, Granada Rd, 19th Ave, and 20th Ave	District	Phoenix	Maricopa
10000329	Woodlea Historic District	Roughly bounded by Glenrosa Ave and Mackenzie Dr on the N and S, and 9th Ave on the E and W	District	Phoenix	Maricopa
10000330	Yaple Park Historic District	Roughly bounded by 3rd and 7th Aves and Turney and Minnezona Aves	District	Phoenix	Maricopa
66000185	Pueblo Grande Ruin	4619 E. Washington Ave.	District	Phoenix	Maricopa
78000550	Phoenix Townsite	Bounded by 6th, 7th, Monroe, and Adams Sts.	District	Phoenix	Maricopa
82002085	Phoenix Union High School Historic District	512 E. Van Buren	District	Phoenix	Maricopa
83003452	Chelsea Place Historic District	Roughly bounded by W. Lynwood and W. Willetta Sts. between Central and 3rd Aves.	District	Phoenix	Maricopa
83003478	Kenilworth Historic District	Roughly bounded by W. Lynwood and W. Willetta Sts. between 3rd and 7th Aves., and W. Culver between 5th and 7th Aves.	District	Phoenix	Maricopa
83003490	Roosevelt Historic District	Roughly bounded by Portland and Fillmore Sts., Central and 7th Aves.	District	Phoenix	Maricopa
83003491	Portland Street Historic District (Additional Documentation)	Portland St. between 3rd and 7th Aves.	District	Phoenix	Maricopa
84000696	Encanto-Palmcroft Historic District	Roughly bounded by N. 7th and 15th Aves., McDowell and Thomas Rds.	District	Phoenix	Maricopa
86000206	Coronado Neighborhood Historic District (Additional Documentation)	942 and 946 East Coronado Rd. and 1650 North 10th St.	District	Phoenix	Maricopa

Reference Number	Historic District Name	Street & Number	Type	City	County
86000265	Blount Addition Historic District	N side of W. Culver St. between Central and Third Aves.	District	Phoenix	Maricopa
87001430	Phoenix Homesteads Historic District	Roughly bounded by Flower & Twenty-eight Sts., Pinchot Ave., & Twenty-sixth Sts.	District	Phoenix	Maricopa
88000212	Story, F. Q., Neighborhood Historic District (Additional Documentation)	McDowell Rd., 7th Ave., Roosevelt St., and 16th Ave.	District	Phoenix	Maricopa
88000384	Victoria Place Historic District	700 blk. E. McKinley St.	District	Phoenix	Maricopa
90002099	Willo Historic District (Additional Documentation)	Roughly bounded by Central Ave., McDowell Rd., 7th Ave., and Thomas Rd.	District	Phoenix	Maricopa
91002029	Coronado Neighborhood Historic District (Boundary Increase)	Roughly bounded by 13th St., Coronado Rd., 14th St. and Monte Vista Rd., and W side 13th St. between Monte Vista and Oak	District	Phoenix	Maricopa
92000670	Encanto-Palmcroft Historic District (Boundary Increase)	Holly St. from 15th Ave. to 12th Ave. and 12th from Holly to Encanto Blvd.	District	Phoenix	Maricopa
92000839	Woodland Historic District	Roughly bounded by Van Buren St., Seventh Ave., Adams St. and 15th Ave.	District	Phoenix	Maricopa
92000847	Oakland Historic District	Roughly bounded by Fillmore St., 19th Ave., Van Buren St. and Grand Ave.	District	Phoenix	Maricopa
94000461	Encanto-Palmcroft Historic District (Boundary Increase II)	Roughly bounded by Encanto Blvd., Coronado Rd., 7th Ave. and 15th Ave.	District	Phoenix	Maricopa
94001481	Alvarado Historic District	Roughly bounded by Central Ave., Oak St., 3rd St. and Palm Ln.	District	Phoenix	Maricopa
94001482	Del Norte Place Historic District	Virginia Ave. to Encanto Blvd. and 15th to 17th Aves.	District	Phoenix	Maricopa
94001483	Fairview Place Historic District	Encanto Blvd. to McDowell Rd., 15th Ave. to the alley W of 17th Ave.	District	Phoenix	Maricopa
94001484	Country Club Park Historic Subdivision	Thomas Rd. to Virginia Ave. and 7th St. to Dayton St.	District	Phoenix	Maricopa
94001485	Cheery Lynn Historic District	16th St. to Randolph Rd. and Earll Dr. to Flower St.	District	Phoenix	Maricopa
94001486	Ashland Place Historic District	Roughly bounded by Central Ave., Vernon Ave., 3rd St. and Oak St.	District	Phoenix	Maricopa
96001497	Willo Historic District (Additional Documentation)	Roughly bounded by Edgemont and Cambridge Rds., and 7th and 3rd Aves.	District	Phoenix	Maricopa

Reference Number	Historic District Name	Street & Number	Type	City	County
98000054	Idylwilde Park Historic District	Roughly bounded by 11th and 12th Sts., Weldon, and Fairmont Aves.	District	Phoenix	Maricopa
100007472	Casa Del Northern	300 East Northern Ave.	District	Phoenix	Maricopa
09000694	Town and Country Scottsdale Residential Historic District	2218 N. 72nd Pl. & 7307 E. Cypress St.	District	Scottsdale	Maricopa
10000236	Village Grove 1-6 Historic District	Bounded by the canal at 66th St. to the W, 69th to the E, Oak St to the N, Almeria Rd to the S	District	Scottsdale	Maricopa
07001174	University Park Historic District	Bounded by 13th St., Forest Ave, alley between Apache Blvd. & 14th St., Mc Allister Ave., Union Pacific RR & Mill Ave.	District	Tempe	Maricopa
09000959	Roosevelt Addition Historic District	600 block of W. 3rd St.	District	Tempe	Maricopa
11001072	Borden Homes Historic District (Additional Documentation)	1118 South Butte St.	District	Tempe	Maricopa
09000668	Steam Pump Ranch	10901 Oracle Rd.	District	Oro Valley	Pima
00001362	El Montevideo Neighborhood Residential Historic District (Boundary Increase)	3700, 3800 Blocks of Camino Del Norte	District	Tucson	Pima
00001363	Sam Hughes Neighborhood Historic District (Boundary Increase)	Roughly bounded by Speedway Blvd., Country Club Blvd., Broadway Blvd., and Campbell Ave.	District	Tucson	Pima
01001173	Indian House Community Residential Historic District	Roughly bounded by 5th St., E. Wash, Kane Estates, and Sahura St.	District	Tucson	Pima
03000316	Binghampton Rural Historic Landscape	approx. jct. of N. Dodge Blvd. and E. River Rd.	District	Tucson	Pima
03000317	Catalina Vista Historic District	2110 and 2114 East Grant Rd.	District	Tucson	Pima
03000318	Blenman-Elm Historic District	2820 East Adams St.	District	Tucson	Pima
04001156	San Clemente Historic District	3934 S. Calle de Jardin	District	Tucson	Pima
04001246	Agua Caliente Ranch Rural Historic Landscape	12325 E. Roger Rd.	District	Tucson	Pima
05001466	Winterhaven Historic District (Additional Documentation)	3518 N. Fox Ave.	District	Tucson	Pima
06000932	DeGrazia Gallery in the Sun Historic District	6300 N. Swan Rd.	District	Tucson	Pima
07001335	El Montevideo Historic District (Boundary Increase)	Roughly bounded by 5th St., Broadway Blvd., Alvernon Way & Ridge Dr.	District	Tucson	Pima

Reference Number	Historic District Name	Street & Number	Type	City	County
08000752	Feldman's Historic District (Boundary Increase)	Generally N. of E. Speedway Blvd.; W. of N. Park Ave.; S. of E. Lee St.; E. of N. 7th St.	District	Tucson	Pima
08000763	Barrio El Hoyo Historic District (Additional Documentation)	508 W. 18th St.	District	Tucson	Pima
09000371	Aldea Linda Residential Historic District	4700-5000 block E. Calle Jabali, E. 22nd St., 1100 block S. Swan Rd.	District	Tucson	Pima
09000583	Barrio El Membrillo Historic District	Bounded by W. Granada St. on the N., W. Simpson St. on the S., the right-of-way of the former EP&SW Railroad on the E.	District	Tucson	Pima
10000109	Tumamoc Hill Archeological District, The	1675 W. Anklam Rd/NE corner Greasewood Rd & 22nd St.	District	Tucson	Pima
10000201	Menlo Park Historic District	13 Subdivisions irregulary bounded around Grande Ave. and W. Congress St. intersection	District	Tucson	Pima
10000467	Indian Ridge Historic District	2648 N. Indian Ridge Dr.	District	Tucson	Pima
11000082	Wright, Harold Bell, Estates	Roughly bounded by N Wilmot Rd on the W, E Speedway Blvd on N, El Dorado Hills subdivision on the E	District	Tucson	Pima
11000480	Valley of the Moon	2544 E. Allen Rd.	District	Tucson	Pima
11000682	Barrio Anita	Roughly bounded by W. Speedway Blvd., UPRR, N. Granada Ave., St. Mary's Rd. & I-10.	District	Tucson	Pima
11000683	Barrio Santa Rosa	Roughly bounded by W. 18th St., S. Russell Ave., W. 22nd St., S. 9th Ave., & S. Meyer Ave.	District	Tucson	Pima
11000760	Marist College Historic District	72 W. Ochoa St.	District	Tucson	Pima
12000296	Ghost Ranch Lodge	801 W. Miracle Mile Rd.	District	Tucson	Pima
12000548	Tucson Veterans Administration Hospital Historic District	3601 S. 6th Ave.	District	Tucson	Pima
12001189	San Rafael Estates	NE. corner of Broadway Blvd. & Wilmont Rd.	District	Tucson	Pima
12001190	Rincon Heights Historic District (Additional Documentation)	Roughly bounded by 6th St., Broadway Blvd., Campbell & Fremont Aves.	District	Tucson	Pima
15000569	Tucson Community Center Historic District	180-260 S. Church Ave.	District	Tucson	Pima
76000378	Armory Park Historic Residential District (Additional Documentation)	803-807 South 4th Ave. (rear)	District	Tucson	Pima
76000379	El Presidio Historic District	Roughly bounded by W. 6th, W. Alameda Sts., N. Stone and Granada Aves.	District	Tucson	Pima

Reference Number	Historic District Name	Street & Number	Type	City	County
78000565	Barrio Libre (Additional Documentation)	Roughly bounded by 14th, 19th, Stone, and Osborne Sts.	District	Tucson	Pima
80004240	West University Historic District (Additional Documentation)	Roughly bounded by Speedway Blvd., 6th St., Park and Stone Aves.	District	Tucson	Pima
86001254	University of Arizona Campus Historic District	Roughly bounded by E. Second St., N. Cherry Ave., E. Fourth St., and Park Ave.	District	Tucson	Pima
86001347	Iron Horse Expansion Historic District (Additional Documentation)	601 East 10th St.	District	Tucson	Pima
87002284	El Encanto Estates Residential Historic District (Additional Documentation)	Roughly bounded by Country Club Rd., Broadway Blvd., Fifth St., & Jones St.	District	Tucson	Pima
88002963	Colonia Solana Residential Historic District (Additional Documentation)	Roughly bounded by Broadway Blvd., S. Randolph Way, Camino Campestre, and S. Country Club	District	Tucson	Pima
89001460	Feldman's Historic District (Additional Documentation)	1330 North Tyndall Ave.	District	Tucson	Pima
94001070	El Montevideo Historic District (Additional Documentation)	3700 and 3800 blocks of streets between Broadway & 5th St.	District	Tucson	Pima
94001164	Sam Hughes Neighborhood Historic District (Boundary Increase)	Roughly bounded by East Speedway Blvd., North Campbell Ave., East 7th St. and North Bentley Ave.	District	Tucson	Pima
95001466	Jefferson Park Historic District (Additional Documentation)	Roughly bounded by NW. 23rd St., N. Walker Ave., NW. 30th St. and I-235	District	Tucson	Pima
96000648	Pie Allen Historic District	Roughly bounded by N. Euclid Ave., E. 6th St., N. Park Ave., and E. 10th St.	District	Tucson	Pima
96000754	Armory Park Historic Residential District (Boundary Increase)	Roughly, 19th, 20th, and 21st Sts. from Stone Ave. to Jacobs Ave.	District	Tucson	Pima
97000886	Tucson Warehouse Historic District	Roughly bounded by 6th St., Fourth and Toole Aves.	District	Tucson	Pima
92000850	Colossal Cave Preservation Park Historic District	Jct. of Old Spanish Trail and Colossal Cave Rd.	District	Vail	Pima
74002221	Hohokam-Pima National Monument	20 mi. S of Phoenix on Interstate 10	District	Gila River Indian Reservation	Pinal

Attachment C. Historic Properties

Reference Number	Historic Property Name	Street & Number	Type	City	County
02001137	Initial Point of the Gila and Salt River Base Line and Meridian	Summit of Monument Hill at 115th Ave. and Baseline Rd.	Site	Avondale	Maricopa
09001160	Buckeye Union High School School A-Wing	902 E. Eason Ave.	Building	Buckeye	Maricopa
100006596	Buckeye Woman's Club	845 Monroe Ave.	Building	Buckeye	Maricopa
100001752	Liberty Methodist Episcopal Church, South	19912 W. US 85	Building	Buckeye	Maricopa
00001126	Cave Creek Service Station	6141 Cave Creek Rd.	Building	Cave Creek	Maricopa
01001172	Tubercular Cabin	6140 Skyline Dr.	Building	Cave Creek	Maricopa
100002208	Dome House	7199 E. Grapevine Rd.	Building	Cave Creek	Maricopa
07000836	Chandler High School	350 N. Arizona Ave.	Building	Chandler	Maricopa
09000311	McCullough-Price House	300 S. Chandler Village Dr.	Building	Chandler	Maricopa
82002078	San Marcos Hotel	1 San Marcos Pl.	Building	Chandler	Maricopa
94000575	Suhwaro Hotel	58 W. Buffalo St.	Building	Chandler	Maricopa
07001301	Railroad Steam Wrecking Crane and Tool Car	330 E Ryan Rd.	Structure	Chandler	Maricopa
09000511	Southern Pacific Railroad Locomotive No. SP 2562 and Tender No. 8365	330 E. Ryan Rd.	Structure	Chandler	Maricopa
80000762	Gilbert Elementary School	Elliot and Gilbert Rds.	Building	Gilbert	Maricopa
05001502	First Methodist Episcopal Church of Glendale Sanctuary	7102 N. 58th Dr.	Building	Glendale	Maricopa
05001503	Glendale Grammar School One-room Class Building	7301 N. 58th Dr.	Building	Glendale	Maricopa
05001504	Tinker, C.H., House	6838 N. 59th Dr.	Building	Glendale	Maricopa
05001505	Adobe House, Glendale Historic Entryway	Roughly bounded by State St., 59th Ave., Myrtle St., Grand Ave. and 61st Ave.	Building	Glendale	Maricopa
05001505	Service Station, Glendale Historic Entryway	Roughly bounded by State St., 59th Ave., Myrtle St., Grand Ave. and 61st Ave.	Building	Glendale	Maricopa
06000326	Glendale High School Auditorium	6216 W. Myrtle Ave.	Building	Glendale	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
06000768	McNair, Jonas, House	5919 W. Myrtle Ave.	Building	Glendale	Maricopa
08000123	Bunch, E.C., House	5602 W. Lamar Rd.	Building	GLendale	Maricopa
09000246	Dowdy, George O., Rental Cottage	6818 N. 60th Ave.	Building	Glendale	Maricopa
78000548	Beet Sugar Factory	5243 W. Glendale Ave.	Building	Glendale	Maricopa
83002991	First National Bank of Glendale Building	6838 N. 58th Dr.	Building	Glendale	Maricopa
89001003	Glendale Woman's Club Clubhouse	7032 N. 56th Ave.	Building	Glendale	Maricopa
96000040	Laveen School Auditorium	5001 W. Dobbins Rd.	Building	Laveen	Maricopa
00001266	Angulo-Hostetter House	150 North Wilbur	Building	Mesa	Maricopa
00001323	Irving School	155 N. Center St.	Building	Mesa	Maricopa
01000906	Lehi School	2345 No. Home	Building	Mesa	Maricopa
05000421	Buckhorn Baths Motel	5900 E. Main St.	Building	Mesa	Maricopa
05001198	Alma Ward Meeting House	809 W. Main St.	Building	Mesa	Maricopa
12000240	Alston, Dr. Lucius Charles, House	453 N. Pima St.	Building	Mesa	Maricopa
82002079	Scott, Robert, House	2230 E. Grandview St.	Building	Mesa	Maricopa
88003056	Mesa Journal-Tribune FHA Demonstration Home	238 W. 2nd Street.	Building	Mesa	Maricopa
91000982	Alhambra Hotel	43 S. Macdonald	Building	Mesa	Maricopa
91000983	Strauch House	148 N. Macdonald	Building	Mesa	Maricopa
91000995	Mesa Woman's Club	200 N. Macdonald	Building	Mesa	Maricopa
93001141	Spangler-Wilbur House	128 N. MacDonald St.	Building	Mesa	Maricopa
95000746	Housing Storage Supply Warehouse	Jct. of 11th and A Sts., NW corner, Williams AFB	Building	Mesa	Maricopa
95000747	Civil Engineering Maintenance Shop	Jct. of 11th and A Sts., NE corner, Williams AFB	Building	Mesa	Maricopa
95001082	Sirrine House	160 N. Center St.	Building	Mesa	Maricopa
100002146	Ponderosa II	602 S. Edgewater Dr.	Building	Mesa	Maricopa
95000744	Flagpole	10 St. between D and E Sts., Williams AFB	Object	Mesa	Maricopa
95000743	Demountable Hangar	North Apron, Williams AFB	Structure	Mesa	Maricopa
95000745	Water Pump Station and Water Tower	Jct. of 12th and B Sts., NE corner, Williams AFB	Structure	Mesa	Maricopa
95000748	Ammo Bunker (S-1007)	SW of Alaska Dr., Williams AFB	Structure	Mesa	Maricopa
95000759	Ammo Bunker (S-1008)	SW of Alaska Dr., Williams AFB	Structure	Mesa	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
96001474	Jones, Edward L., House	5555 N. Casa Blanca Dr.	Building	Paradise Valley	Maricopa
100006706	Glaus House	6330 East McDonald Dr.	Building	Paradise Valley	Maricopa
100008908	Connor-Harold House	5729 North Palo Cristi Rd.	Building	Paradise Valley	Maricopa
10000849	Central School	306 SW 2nd Ave	Building	Peoria	Maricopa
12000493	First Presbyterian Church of Peoria	10236 N. 83rd Ave.	Building	Peoria	Maricopa
100000551	Peoria High School Old Main	11200 N. 83rd Ave.	Building	Peoria	Maricopa
100004993	Peoria Jail House	8322 West Washington St.	Building	Peoria	Maricopa
00000145	Ross, John M., House	6722 N. Central Ave.	Building	Phoenix	Maricopa
01000479	Smurthwaite House	1317 W. Jefferson	Building	Phoenix	Maricopa
01001191	Cavness, William Edward, House	606 N. 4th Ave.	Building	Phoenix	Maricopa
02000032	Sacred Heart Church	592 East Safford St.	Building	Phoenix	Maricopa
02000420	Palmer, E. Payne, House	6012 N. Central Ave.	Building	Phoenix	Maricopa
02000800	915 E. Pierce Street/Grand Pyramid House	915 E. Pierce St.	Building	Phoenix	Maricopa
02001723	Hunt Bass Hatchery Caretaker's House	Phoenix Zoo Grounds, 455 N. Galvin Pkwy.	Building	Phoenix	Maricopa
03000901	Rancho Arroyo	6737 N. 20th St.	Building	Phoenix	Maricopa
05001548	Sacred Heart Home for the Aged	1110 N. 16th St.	Building	Phoenix	Maricopa
07001334	Phoenix Towers	2201 N Central Ave.	Building	Phoenix	Maricopa
08001313	Bragg's Pies Building	1301 Grand Ave.	Building	Phoenix	Maricopa
09000510	Arizona State Hospital Building	2500 E. Van Buren St.	Building	Phoenix	Maricopa
09000609	Bennitt Mansion	126 E. County Club Dr.	Building	Phoenix	Maricopa
09000953	Hubbard, L. Ron, House	5501 N. 44th St.	Building	Phoenix	Maricopa
09001112	Palm Lane Gardens	101-115 E. Palm La.	Building	Phoenix	Maricopa
09001113	Villa del Coronado	100-190 E. Coronado Rd.	Building	Phoenix	Maricopa
10000108	Arizona Army National Guard Arsenal	5636 E. McDowell Rd., M5320	Building	Phoenix	Maricopa
10000152	Harelson, Sarah and Jack, House	4437 E. Arlington Rd.	Building	Phoenix	Maricopa
10000153	Converse, Ralph, House	6617 N. Central Ave.	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
10000154	Asbury, Cline R. / Riney B. Salmon House	7801 N. Central Ave.	Building	Phoenix	Maricopa
10000155	Olney, George A/Everett E. Ellinwood House	6810 N. Central Ave	Building	Phoenix	Maricopa
10000156	Vradenburg, George H., House	1600 W. Colter St.	Building	Phoenix	Maricopa
10000323	Encanto Manor Historic District	Roughly bounded by 7th and 15th Aves and Thomas Rd and Edgemont Ave	Building	Phoenix	Maricopa
10001161	Halm, George M. and Howard, Mary Alverda, House	6850 North Central Ave	Building	Phoenix	Maricopa
10001162	England, Abner Elliot-Lawrence, Guy Hidden, House	6234 N Central Ave	Building	Phoenix	Maricopa
10001163	Diller, Adam, House	8702 N 7th Ave	Building	Phoenix	Maricopa
10001164	Conway, Colonel Edward Power, House	7625 N 10th St	Building	Phoenix	Maricopa
10001165	Bohn, Louis J. and Lee, Gertrude, House	750 E Northern Ave	Building	Phoenix	Maricopa
10001166	Stubbs, Courtney and Hilda, House	1245 E Ocotillo Rd	Building	Phoenix	Maricopa
10001167	Smith, Walter Lee, House	7202 N 7th Ave	Building	Phoenix	Maricopa
10001168	Morgan, David-Bronson, Earl A., House	8030 N Central Ave	Building	Phoenix	Maricopa
10001169	Jacobs, Judge Fred C., House	6224 N Central Ave	Building	Phoenix	Maricopa
11000463	Koontz, Kinter K.	7620 N. 7th St.	Building	Phoenix	Maricopa
11000631	el chaparral	4935 E. Lafayette Blvd.	Building	Phoenix	Maricopa
13000019	Stephens, C.P., DeSoto Six Motorcars	915 N. Central Ave.	Building	Phoenix	Maricopa
16000071	Boomer, Jorgine, House	5808 N. 30th St.	Building	Phoenix	Maricopa
16000490	Welnick Arcade Market and Liefgreen Seed Company Building	341-345 W. Van Buren St.	Building	Phoenix	Maricopa
16000630	Regency House	2323 N. Central Ave.	Building	Phoenix	Maricopa
16000681	General Sales Company Warehouse	515 E. Grant St.	Building	Phoenix	Maricopa
16000700	Hilvert, Fred G., House	106 E. Country Club Dr.	Building	Phoenix	Maricopa
16000723	U.S. Courthouse and Federal Office Building	1929-1961 Stout St.	Building	Phoenix	Maricopa
16000782	Cook, Neil and Louise, House	5725 North 20th Pl.	Building	Phoenix	Maricopa
71000112	Rosson, Dr. Roland Lee, House	139 N. 6th St.	Building	Phoenix	Maricopa

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74000455	Arizona State Capitol Building	1700 W. Washington St.	Building	Phoenix	Maricopa
74000456	Phoenix Carnegie Library And Library Park	1101 W. Washington St.	Building	Phoenix	Maricopa
74001690	First Presbyterian Church	216 S. 3rd St.	Building	Phoenix	Maricopa
75001595	Union Station	NW 6th Ave.	Building	Phoenix	Maricopa
76000375	Evans House	1108 W. Washington St.	Building	Phoenix	Maricopa
77000237	Monroe School	215 N. 7th St.	Building	Phoenix	Maricopa
78000551	St. Mary's Church	231 N. 3rd St.	Building	Phoenix	Maricopa
79000418	Adams School	800 W. Adams St	Building	Phoenix	Maricopa
79002066	First Baptist Church	241 Hargadine St.	Building	Phoenix	Maricopa
79002141	Temple Beth Israel	1931 NW Flanders St.	Building	Phoenix	Maricopa
79002143	U.S. Post Office	511 NW Broadway	Building	Phoenix	Maricopa
82000200	Franklin School	5007 Franklin Rd.	Building	Phoenix	Maricopa
82002082	Hotel Westward Ho	618 N. Central Ave.	Building	Phoenix	Maricopa
82002083	Kenilworth Elementary School	1210 N. 5th Ave.	Building	Phoenix	Maricopa
82002084	Ong's, Jim, Market	1110 E. Washington St.	Building	Phoenix	Maricopa
83002992	Gibbes, Carter W., House	2233 N. Alvarado	Building	Phoenix	Maricopa
83003449	Anderson, Helen, House	149 W. McDowell Rd.	Building	Phoenix	Maricopa
83003451	Celora Stoddard/Lon Harmon House	801 N. 1st Ave.	Building	Phoenix	Maricopa
83003456	Concrete Block House	640 N. 6th Ave.	Building	Phoenix	Maricopa
83003466	Dunlap, Charles H., House	650 N. 1st Ave.	Building	Phoenix	Maricopa
83003472	Elizabeth Seargeant-Emery Oldaker House	649 N. 3rd Ave.	Building	Phoenix	Maricopa
83003475	Ellis-Shackelford House	1242 N. Central Ave.	Building	Phoenix	Maricopa
83003476	Humbert, William K., House	2238 N. Alvarado Rd.	Building	Phoenix	Maricopa
83003492	Phoenix LDS Second Ward Church	1120 N. 3rd Ave.	Building	Phoenix	Maricopa
83003493	Pierce, Harry E., House	632 N. 3rd Ave.	Building	Phoenix	Maricopa
83003500	Pieri-Elliot House	767 E. Moreland St.	Building	Phoenix	Maricopa
84000754	San Carlos Hotel	106 1st St.	Building	Phoenix	Maricopa
84000786	Rancho Joaquina House	4630 E. Cheery Lynn Rd.	Building	Phoenix	Maricopa
85000188	Douglas, Lewis, House	815 E. Orangewood Ave.	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
85001475	Stoughton, Ralph H., Estate	805 W. South Mountain Ave.	Building	Phoenix	Maricopa
85002041	6th Avenue Hotel-Windsor Hotel	546 W. Adams	Building	Phoenix	Maricopa
85002042	Anchor Manufacturing Co.	551 S. Central	Building	Phoenix	Maricopa
85002043	Arizona Citrus Growers Association Warehouse	601 E. Jackson	Building	Phoenix	Maricopa
85002044	Arizona Compress & Warehouse Co. Warehouse	215 S. 13th St.	Building	Phoenix	Maricopa
85002046	Arvizu's El Fresnal Grocery Store	310 E. Buchanon	Building	Phoenix	Maricopa
85002047	Baird, F. S., Machine Shop	623 E. Adams	Building	Phoenix	Maricopa
85002048	Bayless, J. B., Store No. 7	825 N. 7th St.	Building	Phoenix	Maricopa
85002049	Brown's Pharmacy	1000 E. Pierce	Building	Phoenix	Maricopa
85002051	Chambers Transfer & Storage Co.-Central Warehouse	15--39 E. Jackson	Building	Phoenix	Maricopa
85002052	Chambers Transfer & Storage Co.	309 S. 4th Ave.	Building	Phoenix	Maricopa
85002054	Copeland & Tracht Service Station	1702 W. Van Buren	Building	Phoenix	Maricopa
85002056	Fry Building-Baxter Block	146 E. Washington	Building	Phoenix	Maricopa
85002057	Gerardo's Building	421 S. 3rd St.	Building	Phoenix	Maricopa
85002058	Hanny's	44 N. 1st St.	Building	Phoenix	Maricopa
85002059	Heard Building	112 N. Central	Building	Phoenix	Maricopa
85002061	Hotel St. James	21 E. Madison	Building	Phoenix	Maricopa
85002062	Hurley Building	536, 544--548 W. McDowell & 1601 N. 7th Ave.	Building	Phoenix	Maricopa
85002063	Knights of Pythias Building	829 N. 1st Ave.	Building	Phoenix	Maricopa
85002064	Lightning Delivery Co. Warehouse	425 E. Jackson	Building	Phoenix	Maricopa
85002065	Grunow, Lois, Memorial Clinic	926 E. McDowell	Building	Phoenix	Maricopa
85002066	Ong Yut Geong Wholesale Market	502 S. 2nd St.	Building	Phoenix	Maricopa
85002067	Orpheum Theater	209 W. Adams	Building	Phoenix	Maricopa
85002068	Pay'n Takit #13	1402 E. Van Buren	Building	Phoenix	Maricopa
85002069	Pay'n Takit #5	1012 N. 7th Ave.	Building	Phoenix	Maricopa
85002070	Pay'n Takit #25	1753--1755 W. Van Buren	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
85002071	Phoenix Seed & Feed Company	411 S. 2nd St.	Building	Phoenix	Maricopa
85002073	Shell Oil Co.	425 S. 16th Ave.	Building	Phoenix	Maricopa
85002074	Storage Warehouse	429 W. Jackson	Building	Phoenix	Maricopa
85002075	Sun Mercantile Building	232 S. 3rd St.	Building	Phoenix	Maricopa
85002076	Title and Trust Building	112 N. 1st Ave.	Building	Phoenix	Maricopa
85002077	Walker, J. W., Building-Central Arizona Light & Power	10 N. 3rd Ave. & 300 W. Washington	Building	Phoenix	Maricopa
85002078	Western Wholesale Drug Co. Warehouse	101 E. Jackson	Building	Phoenix	Maricopa
85002079	Whitney, J. T., Funeral Home	330 N. 2nd Ave.	Building	Phoenix	Maricopa
85002081	Security Building	234 N. Central	Building	Phoenix	Maricopa
85002891	Durand Grocery	901 Grand Ave.	Building	Phoenix	Maricopa
85002892	Firestone	302 W. Van Buren	Building	Phoenix	Maricopa
85002893	Higuera Grocery	923 S. Second Ave.	Building	Phoenix	Maricopa
85002894	Valley Plumbing & Sheet Metal	530 W. Adams	Building	Phoenix	Maricopa
85002895	Rehbein Grocery	1231 Grand Ave.	Building	Phoenix	Maricopa
85002896	Overland Arizona Co.	12 N. Fourth Ave.	Building	Phoenix	Maricopa
85003563	Professional Building	137 N. Central	Building	Phoenix	Maricopa
86001369	Steinegger Lodging House	27 East Monroe St.	Building	Phoenix	Maricopa
86001553	Yaun Ah Gim Groceries	1002 S. Fourth Ave.	Building	Phoenix	Maricopa
86002646	Gates, Neil H., House	4602 N. Elsie Ave.	Building	Phoenix	Maricopa
87000775	Tweed, Judge Charles Austin, House	1611 W. Fillmore Ave.	Building	Phoenix	Maricopa
87001882	King's Rest Hotel Motor Court	801 S. Seventeenth Ave.	Building	Phoenix	Maricopa
88003237	Maricopa County Courthouse	125 W. Washington St.	Building	Phoenix	Maricopa
89000168	El Zaribah Shrine Auditorium	1502 W. Washington St.	Building	Phoenix	Maricopa
89000977	Jefferson Hotel	907 Louisiana Ave.	Building	Phoenix	Maricopa
89001045	Wrigley, William, Jr., Winter Cottage	2501 E. Telawa Trail	Building	Phoenix	Maricopa
90000823	Webster Auditorium	1201 N. Galvin Pkwy.	Building	Phoenix	Maricopa
90001525	McClintock, James H., House	323 E. Willetta St.	Building	Phoenix	Maricopa
91000543	Phoenix Union Colored High School	415 E. Grant St.	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
91000544	Osborn, William Lewis, House	1266 W. Pierce Ave.	Building	Phoenix	Maricopa
92001013	Craig Mansion	131 E. Country Club Dr.	Building	Phoenix	Maricopa
92001686	Kaler House	301 W. Frier Dr.	Building	Phoenix	Maricopa
92001834	Story, F. Q., Neighborhood Historic District (Additional Documentation)	Roughly bounded by 17th Ave., Culver St., 15th Ave. and Lynwood St., also lots on Roosevelt St. and McDowell Rd.	Building	Phoenix	Maricopa
93000739	Cartwright School	5833 W. Thomas Rd.	Building	Phoenix	Maricopa
93000740	Dunbar School	707 W. Grant	Building	Phoenix	Maricopa
93000741	Whittier, John G., School	2004 N. 16th St.	Building	Phoenix	Maricopa
93000742	Immaculate Heart of Mary	909 E. Washington St.	Building	Phoenix	Maricopa
93000743	Garfield Methodist Church	1302 E. Roosevelt St.	Building	Phoenix	Maricopa
93000744	Bethlehem Baptist Church	1402 E. Adams St.	Building	Phoenix	Maricopa
93000747	Brophy College Chapel	4701 N. Central Ave.	Building	Phoenix	Maricopa
93000813	Arizona Academy-North Hall and South Hall	1325 N. 14th St.	Building	Phoenix	Maricopa
93000835	Grace Lutheran Church	1124 N. 3rd St.	Building	Phoenix	Maricopa
93001505	First Church of Christ Scientist	1904 Pacifica Ave.	Building	Phoenix	Maricopa
94000448	Kitchell, Denison, House	2912 E. Sherran Ln.	Building	Phoenix	Maricopa
94000574	Ackel, Salim, House	94 E. Monte Vista Rd.	Building	Phoenix	Maricopa
94001520	DeMund, Lester D., House	363 E. Monte Vista	Building	Phoenix	Maricopa
94001524	Adams, W. E., House	1014 S. 1st Ave.	Building	Phoenix	Maricopa
94001525	Anderson-Johannes House	127 N. 10th Ave.	Building	Phoenix	Maricopa
94001526	Campbell, Clinton, House	361 N. 4th Ave.	Building	Phoenix	Maricopa
94001527	Cisney, C. W., House	2011 W. Madison St.	Building	Phoenix	Maricopa
94001528	Cisney, George E., House	916 E. McKinley St.	Building	Phoenix	Maricopa
94001529	Coe, H. M., House	365 N. 4th Ave.	Building	Phoenix	Maricopa
94001530	Eyrich-Kohl House	1015 Woodland Ave.	Building	Phoenix	Maricopa
94001531	Hadsell, Burgess A., House	1001 E. Fillmore St.	Building	Phoenix	Maricopa
94001532	Hidden, George, House	763 E. Moreland St.	Building	Phoenix	Maricopa
94001533	Larson, C. A., House	710 S. 1st Ave.	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
94001534	Phoenix Building and Loan House	1138--1140 E. Taylor St.	Building	Phoenix	Maricopa
94001535	Sharp, M. J., House	1012 S. 1st Ave.	Building	Phoenix	Maricopa
94001536	Skinner, E. W., House	917 E. Roosevelt St.	Building	Phoenix	Maricopa
94001537	Stillwell, Judge W. H., House	2039 W. Monroe St.	Building	Phoenix	Maricopa
94001538	House at 818 South 1st Avenue	818 S. 1st Ave.	Building	Phoenix	Maricopa
94001540	Doughterty, J. B., and C. W. Peterson House	2141--2143 W. Washington St.	Building	Phoenix	Maricopa
94001605	Elder-Moffitt House	1336 W. Taylor St.	Building	Phoenix	Maricopa
95001076	Phoenix Elementary School District No. 1 Administration Building	331 N. First Ave.	Building	Phoenix	Maricopa
95001078	Verde Park Pumphouse	Jct. of 9th St. and Van Buren Ave.	Building	Phoenix	Maricopa
95001081	Swindall Tourist Inn	1021 E. Washington St.	Building	Phoenix	Maricopa
96000309	Tovrea Castle	5041 E. Van Buren	Building	Phoenix	Maricopa
96000760	Squaw Peak Inn	4425 E. Horseshoe Rd.	Building	Phoenix	Maricopa
96001057	Bartlett, Samuel L., House	325 W. Northern Ave.	Building	Phoenix	Maricopa
96001274	Pratt, Charles H., House	4979 E. Camelback Rd.	Building	Phoenix	Maricopa
97001602	Pierce, N. Clyde, House	4505 E. Osborn Rd.	Building	Phoenix	Maricopa
100000455	Executive Towers	207 W. Clarendon	Building	Phoenix	Maricopa
100001229	Hilgeman, Franklin, House	333 W. Loma Ln.	Building	Phoenix	Maricopa
100001557	Pemberton, Sarah H., House	1121 N. 2nd St.	Building	Phoenix	Maricopa
100001786	Beadle House No. 11	4323 E. McDonald Dr.	Building	Phoenix	Maricopa
100002209	Borah House	72 East Country Club Dr.	Building	Phoenix	Maricopa
100003064	Phoenix Motor Company	401 W Van Buren St.	Building	Phoenix	Maricopa
100003124	Roman Roads	1691 E Maryland Ave.	Building	Phoenix	Maricopa
100003323	Celebrity Theatre	440 N 32nd St.	Building	Phoenix	Maricopa
100005074	McCornack, Colonel Willard H., House	85 North Country Club Dr.	Building	Phoenix	Maricopa
100005297	Avery, Frank and Emma, House	4203 North 44th St.	Building	Phoenix	Maricopa
100007156	Wright, David and Gladys, House	405 North Rubicon Ave. (formally 5212 East Exeter Blvd.)	Building	Phoenix	Maricopa
100007157	Valley National Bank Branch No. 10	1845 East McDowell Rd.	Building	Phoenix	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
100008580	Knorpp, Walter Wesley, House	77 East Country Club Dr.	Building	Phoenix	Maricopa
100008909	Ainsworth, Eliza and Charles, House	9 East Country Club Dr.	Building	Phoenix	Maricopa
06001317	Pioneer Military and Memorial Park	13th to 15th Aves., Jefferson to Harrison Aves.	Site	Phoenix	Maricopa
10000844	Phoenix Homesteads Historic District Boundary Increase	Roughly bounded by Pinchot and Flower Sts, 26th to 28th Sts	Site	Phoenix	Maricopa
08000526	Hunt's Tomb	625 N. Galvin Pkwy	Structure	Phoenix	Maricopa
98000053	Rittenhouse Elementary School	Ellsworth Rd., 1 mi. N of Rittenhouse Rd.	Building	Queen Creek	Maricopa
08001405	Valley Field Riding and Polo Club	2530 N. 64th St.	Building	Scottsdale	Maricopa
10000173	Kerr, Louise Lincoln, House and Studio	6110 N. Scottsdale Rd.	Building	Scottsdale	Maricopa
74000457	Taliesin West	N of jct. of Shea Blvd. and 108th St.	Building	Scottsdale	Maricopa
82002086	Titus, Frank, House	1310 N. Hayden Rd.	Building	Scottsdale	Maricopa
94000571	Scottsdale Grammar School	7333 E. Scottsdale Mall	Building	Scottsdale	Maricopa
99001065	Ellis, George, House	105 Cattle Track	Building	Scottsdale	Maricopa
100002979	Our Lady of Perpetual Help Mission Church	3817 N Brown Ave.	Building	Scottsdale	Maricopa
09000582	Roald Amundsen Pullman Private Railroad Car	7301 Indian Bend Rd.	Structure	Scottsdale	Maricopa
15000022	Sun City DEVCO Model No.1	10801 W. Oakmont Dr.	Building	Sun City	Maricopa
00000461	Tempe Woman's Club	1290 S. Mill Ave.	Building	Tempe	Maricopa
05001058	Elliott House	2022 N. Williamette Blvd.	Building	Tempe	Maricopa
05001197	Selleh House	1104 S. Mill AVe.	Building	Tempe	Maricopa
11000206	Eisendrath, Rose, House	1400 N College Ave	Building	Tempe	Maricopa
12000295	Moeur, Gov. Benjamin B., House	34 E. 7th St.	Building	Tempe	Maricopa
72000197	Farmer-Goodwin House	820 Farmer Ave.	Building	Tempe	Maricopa
74000458	Hackett, Roy, House	401 and 405 Maple St.	Building	Tempe	Maricopa
78000552	St. Mary's Church-Our Lady of Mount Carmel Catholic Church	College and University Ave.	Building	Tempe	Maricopa
78000553	Petersen, Niels, House	Southern Ave. and Priest St.	Building	Tempe	Maricopa
79000419	Andre Building	401--403 S. Mill Ave.	Building	Tempe	Maricopa
80000764	Vienna Bakery	415 S. Mill Ave.	Building	Tempe	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
80000765	Long, Samuel C., House	27 E. 6th St.	Building	Tempe	Maricopa
80000767	Tempe Hardware Building	520 S. Mill Ave.	Building	Tempe	Maricopa
81000138	Frankenberg House	129 E. University Dr.	Building	Tempe	Maricopa
84000171	Borden Milk Co. Creamery and Ice Factory	1300-1360 E. Eigth St.	Building	Tempe	Maricopa
84000173	Hayden, C. T., House	3 W. 1st St.	Building	Tempe	Maricopa
84000176	White, E. M., Dairy Barn	1810 E. Apache	Building	Tempe	Maricopa
84000684	Elias-Rodriguez House	927 E. 8th St.	Building	Tempe	Maricopa
84000708	Gonzales-Martinez House	320 W. 1st St.	Building	Tempe	Maricopa
84000710	Goodwin Building	512-518 S. Mill Ave.	Building	Tempe	Maricopa
84000716	Harrington-Birchett House	202 E. 7th St.	Building	Tempe	Maricopa
84000720	Hiatt House	1104 Ash Ave.	Building	Tempe	Maricopa
84000726	Laird, Hugh, House	821 S. Farmer	Building	Tempe	Maricopa
84000730	Moeur, W. A., House	850 Ash Ave.	Building	Tempe	Maricopa
84000733	Morrow-Hudson House	1203 E. Alameda Dr.	Building	Tempe	Maricopa
84000734	Mullen, C. P., House	918 Mill Ave.	Building	Tempe	Maricopa
84000738	Redden, Byron, House	948 Ash Ave.	Building	Tempe	Maricopa
84000740	Scudder, B. H., Rental House	919 S. Maple Ave.	Building	Tempe	Maricopa
84000745	Walker, Harry, House	118 E. 7th St.	Building	Tempe	Maricopa
85000052	Main Building, Tempe Normal School	ASU campus	Building	Tempe	Maricopa
85000053	Matthews Hall	ASU Campus (Bldg. 172)	Building	Tempe	Maricopa
85000054	President's House	ASU campus	Building	Tempe	Maricopa
85000407	Redden, Lowell, House	333 Carver St.	Building	Tempe	Maricopa
85002168	Industrial Arts Building	ASU Campus (Bldg. 4)	Building	Tempe	Maricopa
85002169	Administration/Science Building	ASU Campus (Bldg. 11)	Building	Tempe	Maricopa
85002170	Grady Gammage Memorial Auditorium	NE Corner of Mill and Apache	Building	Tempe	Maricopa
85002171	B. B. Moeur Activity Building	ASU Campus (Bldg. 37)	Building	Tempe	Maricopa
100004185	O'Connor, Sandra Day, House	1230 N. College Ave.	Building	Tempe	Maricopa
11000175	Tempe Butte	Bounded on N by Tempe Town Lake, on the W by Mill Ave District, on S by Arizona State University	Site	Tempe	Maricopa

Reference Number	Historic Property Name	Street & Number	Type	City	County
13000020	Tempe Double Butte Cemetery Pioneer Section	2505 W. Broadway Rd.	Site	Tempe	Maricopa
100008342	Guadalupe Cemetery	4649 South Beck Ave.	Site	Tempe	Maricopa
81000137	1931 Tempe Bridge	Mill Ave.	Structure	Tempe	Maricopa
84000743	Tempe Concrete Arch Highway Bridge	Mill Ave. and Salt River	Structure	Tempe	Maricopa
85000055	Tempe Beach Stadium	Ash at 1st St.	Structure	Tempe	Maricopa
00001673	Todd, Charles S., House	11511 E. Speedway Blvd.	Building	Tucson	Pima
02000033	Arizona Daily Star Building	30 N. Church Ave.	Building	Tucson	Pima
03000902	Arizona Hotel	31-47 N. Sixth Ave., 135 E. Tenth St.	Building	Tucson	Pima
03000903	El Paso and Southwestern Railroad Depot	419 W. Congress St.	Building	Tucson	Pima
03000904	First Hittinger Block	116 E. Congress St.	Building	Tucson	Pima
03000905	Fox Theatre	17 W. Congress St.	Building	Tucson	Pima
03000906	Hotel Congress	303-311 E. Congress St.	Building	Tucson	Pima
03000907	J. C. Penney-Chicago Store	130 E. Congress St.	Building	Tucson	Pima
03000910	Rebeil Block	72 E. Congress	Building	Tucson	Pima
03000911	Valley National Bank Building	27 S. Stone Ave.	Building	Tucson	Pima
04000258	Fox Commercial Building	27 W. Congress St.	Building	Tucson	Pima
04001072	Deep Well Ranch	13001 E. Redington Rd.	Building	Tucson	Pima
04001347	St. Philip's in the Hills Episcopal Church	4440 N. Campbell Ave.	Building	Tucson	Pima
06000832	Ramada House	2801 E Camino Norberto	Building	Tucson	Pima
08000430	Catalina American Baptist Church	1900 N. Country Club Rd.	Building	Tucson	Pima
09000960	Gist Residence	5626 E. Burns St.	Building	Tucson	Pima
09001114	Villa Catalina	3000-3034 E. 6th St. & 521-525 N. Country Club Rd.	Building	Tucson	Pima
10000741	First Joesler House	3408 E. Fairmount St	Building	Tucson	Pima
10000743	Haynes Building	312-314 E. Sixth St	Building	Tucson	Pima
10000745	Type A at 2101 E. Water St	2101 E. Water St	Building	Tucson	Pima
10000748	Don Martin Apartment House	605 E 9th St	Building	Tucson	Pima
10001108	Rialto Building	116 New Montgomery St	Building	Tucson	Pima
11000568	Adams, James P. and Sarah, House	5201 N. Camino Escuela	Building	Tucson	Pima

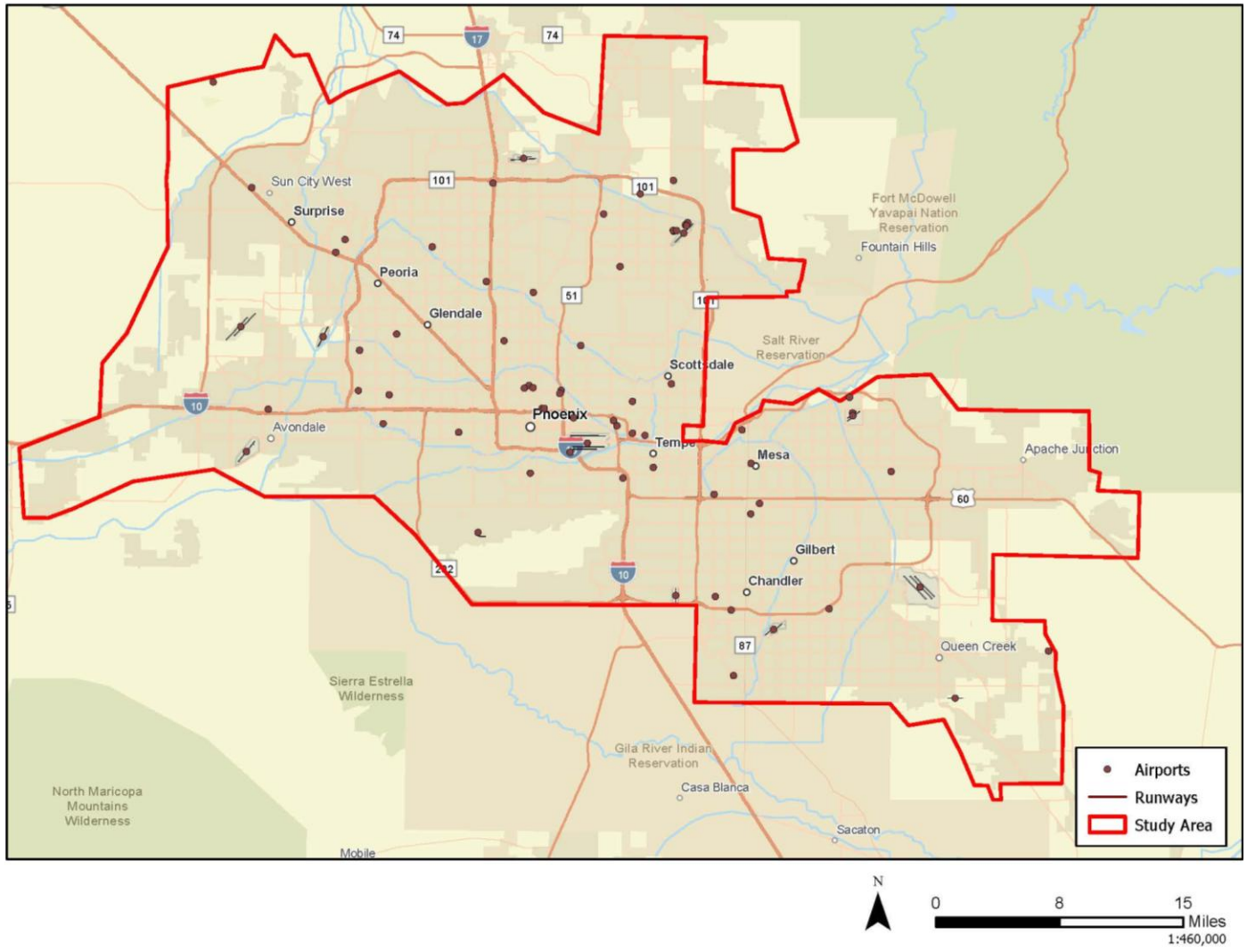
Reference Number	Historic Property Name	Street & Number	Type	City	County
11000569	Corcoran, John P. and Helena S., House	2200 E. Calle Lustre	Building	Tucson	Pima
11000570	Fletcher, P.W., House	4850 N. Campbell Ave.	Building	Tucson	Pima
11000571	Hall, Arthur C. and Helen Neel, House	4875 N. Campbell Ave.	Building	Tucson	Pima
11000572	Hall, Lewis D.W., House	3160 E. Via Celeste	Building	Tucson	Pima
11000573	McFadden, Phillip G. House	5130 Camino Real	Building	Tucson	Pima
11000575	Van Schaick, Nellie Mae Kellogg, House	4141 N. Pontatoc Rd.	Building	Tucson	Pima
12001142	Owen Homesite	1415 E. Prince Rd.	Building	Tucson	Pima
12001143	Tucson Medical Center	5301 East Grant Rd.	Building	Tucson	Pima
13000545	Casa Juan Paisano	3300 E. Camino Juan Paisano	Building	Tucson	Pima
16000024	Wilson, Betty-Jean, House	2322 E. Calle Lustre	Building	Tucson	Pima
66000190	Desert Laboratory	W of Tucson off W. Anklam Rd. on Tumamoc Hill	Building	Tucson	Pima
66000191	San Xavier del Bac	9 mi. S of Tucson via Mission Rd.	Building	Tucson	Pima
71000116	Sosa-Carrillo-Fremont House	145--153 S. Main St.	Building	Tucson	Pima
71000117	Old Adobe Patio	40 W. Broadway	Building	Tucson	Pima
72000198	Cordova House	173--177 N. Meyer Ave.	Building	Tucson	Pima
72000199	Old Main, University of Arizona	University of Arizona campus	Building	Tucson	Pima
74000460	Velasco House	471--475--477 S. Stone Ave. and 522 S. Russell St.	Building	Tucson	Pima
76000380	Warner, Solomon, House and Mill	350 S. Grand Ave.	Building	Tucson	Pima
78000566	Pima County Courthouse	115 N. Church St.	Building	Tucson	Pima
78000700	Rialto Theatre	1019--1023 Fair Oaks Ave.	Building	Tucson	Pima
78003366	Officer's Quarters	N. Craycroft Blvd.	Building	Tucson	Pima
78003367	Post Trader's Store and Riallito House	5425 E. Fort Lowell Rd.	Building	Tucson	Pima
78003368	Post Trader's Storehouse	5354 E. Fort Lowell Rd.	Building	Tucson	Pima
78003369	Quartermaster Storehouse	5479 E. Fort Lowell Rd.	Building	Tucson	Pima
78003375	Site Nos. HD 12-4/12-8	E. Fort Lowell Rd.	Building	Tucson	Pima
78003376	Site No. HD 13-4	N. Craycroft Blvd.	Building	Tucson	Pima
79000421	Manning, Levi H., House	9 Paseo Redondo	Building	Tucson	Pima
79000422	Old Library Building	University of Arizona campus	Building	Tucson	Pima
79000423	Ronstadt House	607 N. 6th Ave.	Building	Tucson	Pima

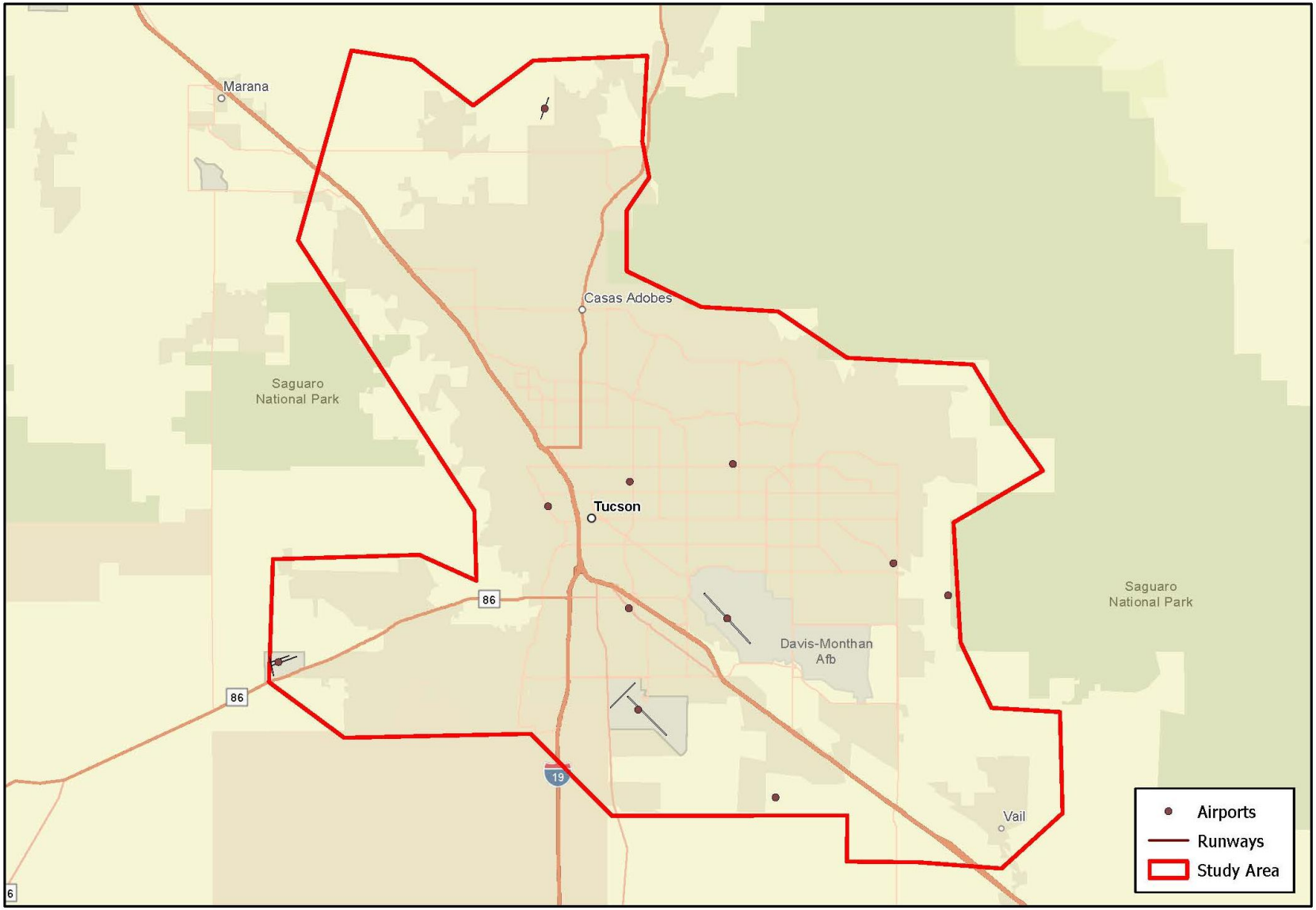
Reference Number	Historic Property Name	Street & Number	Type	City	County
79002073	U.S. Post Office and Courthouse	310 W. 6th St.	Building	Tucson	Pima
82001622	Coronado Hotel	410 E. 9th St.	Building	Tucson	Pima
82001663	Cannon, Dr. William Austin, House	1189 E. Speedway	Building	Tucson	Pima
82002090	Smith, Professor George E. P., House	1195 E. Speedway	Building	Tucson	Pima
83003494	University Heights Elementary School	1201 N. Park Ave.	Building	Tucson	Pima
85000081	Wright, Harold Bell, Estate	850 N. Barbara Worth	Building	Tucson	Pima
88000240	Arizona Inn	2200 E. Elm St.	Building	Tucson	Pima
88002131	Spring, John, Neighborhood Historic District	Roughly bounded by W. Speedway Blvd., N. Ninth Ave., W. Fifth St., N. Main Ave., W. Second St., and N. Tenth St.	Building	Tucson	Pima
88002132	Sabedra-Huerta House	1036--1038 N. 13th Ave.	Building	Tucson	Pima
88002133	Ronstadt-Sims Adobe Warehouse	911 N. 13th Ave.	Building	Tucson	Pima
90001526	Men's Gymnasium, University of Arizona	E. Fourth St., University of Arizona campus	Building	Tucson	Pima
91000900	Matus, Antonio, House and Property	856 W. Calle Santa Ana	Building	Tucson	Pima
92000250	Schwalen-Gomez House	217 N. Melwood Ave.	Building	Tucson	Pima
92000251	Blixt-Avitia House	830 W. Alameda St.	Building	Tucson	Pima
92000252	Dodson-Esquivel House	1004 W. Alameda St.	Building	Tucson	Pima
92000253	Boudreaux-Robison House	101 N. Bella Vista Dr.	Building	Tucson	Pima
92000254	Copper Bell Bed and Breakfast	25 N. Westmoreland Ave.	Building	Tucson	Pima
92000255	Bray-Valenzuela House	203 N. Grande Ave.	Building	Tucson	Pima
93000306	San Pedro Chapel	5230 E. Ft. Lowell Rd.	Building	Tucson	Pima
93000529	Lowell Ranger Station	Off Sabino Canyon Rd. NE of Tucson, Coronado NF	Building	Tucson	Pima
94001181	El Encanto Apartments	2820 E. Sixth St.	Building	Tucson	Pima
94001196	Santa Cruz Catholic Church	1220 S. Sixth Ave.	Building	Tucson	Pima
96000306	Julian-Drew Building	182 E. Broadway	Building	Tucson	Pima
97000592	USDA Tucson Plant Materials Center	3241 N. Romero Rd.	Building	Tucson	Pima
100000705	Catalina Foothills Estates Job 265 House	5276 N. Camino Real	Building	Tucson	Pima
100001231	Drexel House	5535 N. Camino Real	Building	Tucson	Pima
100001661	Bauder, Jean and Paul, House	4775 N. Camino Antonio	Building	Tucson	Pima

Reference Number	Historic Property Name	Street & Number	Type	City	County
100001956	Congdon, Stephen and Persis Hart Browne, House	2928 N. Orlando St.	Building	Tucson	Pima
100003013	Dunbar, Paul Laurence, School	300 W 2nd St.	Building	Tucson	Pima
100003014	Johnson, Donald S. and Elizabeth E., House	5165 N Camino St.	Building	Tucson	Pima
100003145	Catalina Foothills Estates Job No. 399 House	4950 N Calle Colmado	Building	Tucson	Pima
100004292	Harrenstein, Dr. Howard Paul, House	6450 North Calle De Estevan	Building	Tucson	Pima
100006082	Viewpoint	2840 North Sunrock Ln.	Building	Tucson	Pima
91001918	Southern Pacific Railroad Locomotive No. 1673	Himmel Park	Object	Tucson	Pima
04001032	Pascua Cultural Plaza	785 W. Sahuaro St.	Site	Tucson	Pima
71000115	El Tiradito	221 S. Main St.	Site	Tucson	Pima
78003358	Fort Lowell Park	N. Craycroft Blvd.	Site	Tucson	Pima
78003359	Cavalry Corrals	N. Craycroft Blvd.	Site	Tucson	Pima
78003360	Site No. HD 5-26	5495 E. Fort Lowell Rd.	Site	Tucson	Pima
78003361	Site No. HD 7-0A	5429 E. Fort Lowell Rd.	Site	Tucson	Pima
78003362	Site Nos. HD 9-11/9-2	5651 E. Fort Lowell Rd.	Site	Tucson	Pima
78003363	Site No. HD 9-28	5668 E. Fort Lowell Rd.	Site	Tucson	Pima
78003364	Site Nos. HD 5-28/5-25	3031 N. Craycroft Blvd.	Site	Tucson	Pima
78003365	Site No. HD 7-13	5531 E. Fort Lowell Rd.	Site	Tucson	Pima
78003370	Quartermaster's Corrals	N. Craycroft Rd.	Site	Tucson	Pima
78003372	Site No. HD 13-13	E. Fort Lowell Rd.	Site	Tucson	Pima
78003373	Site No. HD 13-11	E. Fort Lowell Rd.	Site	Tucson	Pima
78003374	Site No. HD 4-8A	E. Fort Lowell Rd.	Site	Tucson	Pima
80000771	El Conquistador Water Tower	Broadway and Randolph Way	Structure	Tucson	Pima
86001322	Rillito Racetrack-Chute	4502 N. First Ave.	Structure	Tucson	Pima
88001654	Fourth Avenue Underpass	Fourth Ave.	Structure	Tucson	Pima
88001655	Sixth Avenue Underpass	Sixth Ave.	Structure	Tucson	Pima
88001656	Stone Avenue Underpass	Stone Ave.	Structure	Tucson	Pima

Reference Number	Historic Property Name	Street & Number	Type	City	County
11000044	Vail Post Office, Old	13105 E Colossal Cave Rd	Building	Vail	Pima
14001231	Shrine of Santa Rita in the Desert	13260 E. Colossal Cave Rd.	Building	Vail	Pima
88001642	Cienega Bridge	5.3 mi. SE of Vail on Marsh Station Rd.	Structure	Vail	Pima

Appendix G
Arizona Metro Areas Airports




Marana
Casas Adobes
Saguaro
National Park
Tucson
86
86
Davis-Monthan
Afb
Saguaro
National Park
19
Vail
6
Airports
Runways
Study Area
N
0
5
10
Miles
1:300,000