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**SUBJECT: WILDLIFE HAZARD
ASSESSMENT**

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SAFETY REGULATION

1. PURPOSE

- 1.1 This Advisory Circular (AC) provides guidance for aerodrome operators to conduct Wildlife Hazard Assessment at the Aerodrome.

2. REFERENCES

- 2.1 The Civil Aviation Requirements for Certified Aerodromes 2024 (APP 6 Part 4.12).

3. PROCEDURE FOR THE CONDUCT OF A WILDLIFE HAZARD SITE VISIT (SITE VISIT).

3.1 General

- 3.1.1 Wildlife Hazard Site Visits can be beneficial for any airport. A Site Visit has three parts: (1) gathering airport information; (2) field observations; and (3) a final report with recommendations. Airports can use a Site Visit to quickly evaluate and mitigate potential hazards on and near airports. An airport can also use a Site Visit to determine whether an Assessment is necessary.
- 3.1.2 If an airport already has a Plan, airport management can use a Site Visit to investigate wildlife strikes to aircraft or see if the Plan needs to be updated. Airports can also use a Site Visit to decide if a proposed land use in the vicinity of an airport will increase the potential for wildlife hazards at the airport.
- 3.1.3 During the Site Visit, the Wildlife Specialist (WLS) collects and compiles information on the airport's wildlife hazard history, documented and suspected wildlife hazards, habitat attractants, control activities, airport operations and maintenance procedures, communications of hazards through ATC and pilots, aircraft operations and scheduling. A Site Visit is typically conducted over a period of one to three days. A WLS evaluates the habitat on and surrounding the airport, and records direct or indirect wildlife observations. The WLS also reviews the current Plan, current wildlife management activities, and airport wildlife strike data. Appendix A has a checklist that airports can use

to ensure a complete and detailed Site Visit. The checklist can also be used to review the Site Visit procedure and report.

3.1.4 Wildlife Specialist shall conduct the Site Visits.

3.2 Applicable Airport Information.

3.2.1 A WLS may request the following information, if available, from the airport operator to prepare for a site visit:

- 1) Personnel and departments responsible for airport operations
- 2) Number of aircraft operations per year
- 3) Type of operations (i.e., % private, civil, and military)
- 4) Recent airport construction or airfield changes
- 5) Past and present land management practices
- 6) Records of strikes and damage, flight delays, injuries, and fatalities due to strikes. Wildlife strike data may help determine hazardous species on an airport. Airports shall maintain their own local database which can be compared with and supplemented by data available at the GCAA. A Site Visit shall include an analysis of wildlife strike records. If possible, include summaries of strike data by species, time of day, on and off-site airport locations, and weather conditions. At minimum, it is recommended that a wildlife strike analysis include, if available:
 - a) Bird, Reptile and mammal species involved
 - b) Frequency distribution by month and year
 - c) Number per 10,000 aircraft movements
 - d) Location on the airfield
- 7) Any existing wildlife hazard management efforts and related maintenance procedures, if applicable – Records of past management efforts may be helpful during this initial consultation. Attempts to exclude, deter, or remove wildlife from the airport shall be noted. If not already in place, a wildlife log shall be created and maintained by airport operations to document all wildlife activity observed on the airport.
- 8) Description of current wildlife hazard threats or concerns
- 9) Presence / absence of perimeter fence, condition of fence and its effectiveness
- 10) Any current Laws, wildlife control permits and annual permit reports
- 11) Current topographic maps, airport maps, and/ or aerial photographs
- 12) Other pertinent information present in airport records

3.2.1 Airport records may be incomplete or may not exist. Interviews with airport personnel often yield useful information that is missing from written records. It is recommended that the WLS discuss the history of wildlife hazard problems at the airport with the airport manager and staff. The control tower supervisor and chief of operations may also give useful background information on the severity and frequency of the problem.

3.3 Observations.

3.3.1 The WLS shall make observations from a variety of locations to ensure complete visual coverage of the airport. Minimum coverage shall include observations of the airport's Aerodrome. These observations may be brief; they are not as rigorous as a full Assessment. At a minimum, the observations shall include:

- i. Birds – Record bird species present and note abundance, activity, and location, type of habitat used, time and date of observations. Note evidence of bird activity such as fecal material and regurgitated pellets (boluses) under structures used for perching.
- ii. Mammals – Document mammals observed and evidence of mammal activity such as scats, tracks, runs, and burrows and include time and date of observations, activity, location, and type of habitat used. Estimate relative abundance, activity, and habitat use.
- iii. Reptiles – Document reptile observed and evidence of reptile activity such as scats, tracks, runs, and burrows and include time and date of observations, activity, location, and type of habitat used. Estimate relative abundance, activity, and habitat use.
- iv. Habitat Attractants – Assess habitats and man-made attractants on and around airport property. Note potential wildlife attractants. Review maps and aerial photographs, noting waste management facilities, wildlife refuges, water bodies, agriculture, stock yards, picnic areas, restaurants, and other features or habitats that may attract wildlife within a five-statute miles radius around the airport. For the protection of the Approach, Departure, and Circling Airspace, the GCAA recommends a distance of 5 statute miles between the farthest edge of the Aerodrome and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.
- v. Wildlife/Habitat Relationship – Observe and record how the wildlife observed is using the habitat on the airport.
- vi. Wildlife Interactions with Aircraft Operations – Assess the potential for wildlife interactions with aircraft operations in the AOA, traffic patterns, approach and departure airspace, and surrounding areas. Evaluate aircraft movements to see if these operations increase the risk of wildlife strikes. Review airport hazard advisories to see if they are specific to the hazards at the airport.

3.4 Site Visit Report.

3.4.1 The WLS shall provide the airport manager with a report summarizing field data and any management recommendations following the Site Visit. The GCAA shall receive a copy of this report from the Airport Manager. The findings in a Site Visit report could lead the

GCAA to require an Assessment. The airport shall retain copies of the report in a suitable filing system. The Site Visit report contain at least:

- i. List of wildlife species or wildlife signs, such as animal tracks observed during the visit or identified as wildlife hazards by other sources
- ii. Conservation status of the species observed
- iii. Habitat features that may encourage wildlife to use the airport
- iv. Natural and artificial wildlife attractants on or near the airport
- v. Strike data analysis
- vi. Recommendations to:
 - (a) Reduce wildlife hazards identified (if data is available to substantiate conclusions)
 - (b) Conduct an Assessment, if needed
 - (c) Modify an existing Plan, if needed
 - (d) Improve communications and hazard advisories between Air Traffic Control, pilots, airlines, airport operations, and other airport users
 - (e) Provide potential short-term alteration of aircraft operations, if feasible, to avoid identified hazardous wildlife concentrations
 - (f) No action required, if applicable.

4. PROCEDURE FOR THE CONDUCT OF A WILDLIFE HAZARD ASSESSMENT (ASSESSMENT)

4.1 General.

4.1.1 The first step in preparing an airport Wild Hazard Plan is to conduct an Assessment. A WLS conducts the Assessment, which gives the scientific basis for developing, implementing, and refining a Plan. Though parts of the Assessment may be incorporated directly into the Plan, they are two separate documents.

4.1.2 The objective of an Assessment is to provide a baseline of data and understanding of wildlife species considered hazardous on or near an airport, and of attractants that provide food, water, and shelter. An Assessment may take a year to complete. The GCAA recommends that assessment methodologies be reproducible. It is also recommended that data collection procedures such as point counts, trapping indices and vehicle routes be set up and used to allow future repetition for consistent, continued monitoring or comparison to previous findings. The Assessment identifies wildlife populations and trends at the airport, such as the location and seasonality of wildlife hazards. It also identifies how these fluctuations in behavior and abundance may affect aviation safety, with particular emphasis on wildlife strikes to aircraft. Assessments promote an integrated approach for wildlife mitigation to effectively:

- i. Modify the environment (e.g., changes in mowing and drainage clearance procedures)
- ii. Exclude wildlife (e.g., installation of fences, netting and perch excluders)
- iii. Implement harassment procedures (e.g., pyrotechnics and propane cannons)

- iv. Remove wildlife (e.g., lethal and capture/relocate methodologies)
- v. Communicate wildlife hazard advisories through Air Traffic Control voice communications, Automatic Terminal Information Service (ATIS), Pilot Report (PIREPS), Notices to Airmen (NOTAMS)
- vi. Direct pilot responses to identified hazards
- vii. Report strikes or hazardous situations
- viii. Potentially alter flight routes, traffic patterns, or schedules to avoid locations and times of identified wildlife hazards.

4.1.3 A properly conducted Assessment can help a WLS quantify wildlife hazards to aviation and understand the risk presented by each species for a particular airport. In this context, the most hazardous wildlife species are those which are most likely to cause aircraft damage when struck. Risk is the product of hazard level and abundance in the critical airspace, and is thus defined as the probability of a damaging strike with a given species.

4.1.4 The Assessment provides baseline data for an airport to prepare a Plan, and evaluate the efficacy of its existing wildlife hazard management program. For example, an Assessment could help an airport with an existing Plan determine the recurrence of species-specific wildlife hazards, monitor reduction of onsite damaging strikes, monitor wildlife program communication and response efficiency, and improve the overall wildlife program through annual review. Better information regarding wildlife hazards and their attractants should result in better use of resources. Appendix B has a checklist that WLSs and airports can use to ensure the Assessment and report meet the requirements of the GCAA.

4.2 **Requirements for Wildlife Hazard Assessments.**

4.2.1 Civil Aviation Requirements for Certified aerodromes 2024 (APP 4.12), requires the aerodrome operator to make arrangements for assessing wildlife hazards. This assessment must be conducted when any of the events listed below occurs at and in the vicinity of the aerodrome:

- i. An air carrier aircraft experiences multiple wildlife strikes
- ii. An air carrier aircraft experiences substantial damage from striking wildlife
- iii. An air carrier aircraft experiences an engine ingestion of wildlife
- iv. Wildlife of a size, or in numbers, capable of causing an event described in (i), (ii), or (iii) above is observed to have access to any airport flight pattern or aircraft movement area.

4.3 **Necessary Elements of a Wildlife Hazard Assessment.**

4.3.1 The following provides guidance on the required elements in a Wildlife Hazard Assessment.

The Wildlife Hazard Assessment shall be conducted by a Wildlife Specialist, having training or experience in wildlife hazard management or an individual working under the direct supervision of such an individual.

At a minimum, the Wildlife Hazard Assessment shall contain:

- i. Analysis of the event or circumstances that prompted the assessment. (Who, what, when, where, and why of the situation prompting the Assessment.)
- ii. Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences. (What wildlife species have access to the airport? What are their movement and seasonal patterns? Data should cover 12 consecutive months. What is the protective status of notable wildlife?)
- iii. Identification and location of features on and near the airport that attract wildlife. (Wildlife are attracted to an airport because something exists on or near the airport that they desire. Forested areas near the Aerodrome and large open areas provide relatively safe loafing, nesting and feeding locations. Food and water sources can vary seasonally or temporarily. These attractants and others, such as easily accessible travel corridors, should be analyzed.
- iv. A description of wildlife hazards to air carrier operations (Consider the types of wildlife observed. Also consider wildlife documented in the strike database and the severity of damage they caused.)
- v. Recommended actions for reducing identified wildlife hazards to air carrier operations. (Prioritize recommendations for mitigating hazardous wildlife and their attractants. Also recommend operational and maintenance changes in response to wildlife hazards (e.g., airport operations personnel, Air Traffic Control (ATC), air carriers, and pilots).

4.4 Necessary Elements of a Wildlife Hazard Assessment Report.

4.4.1 The final Assessment report must discuss elements given in Section 4.3.1 above. If there was no triggering event or circumstance that prompted the Assessment, then the discussion of triggering event Section 4.3.1 (i) may be omitted. Although there are many acceptable formats to present the findings of an Assessment, it must include those key components listed Section 4.3.1 above. The required components include sections summarizing methodologies, results, and any recommendations. The report should be submitted to the GCAA within 90 days following completion of field work and must contain the name of the WLS who conducted the Assessment.

4.4.2 The details of the assessment procedures, such as point counts, trapping indices, vehicle routes, avian radar, etc, which were used shall be described to allow for the duplication of the procedures for consistent, continued monitoring or comparison to previous findings. The report shall include any maps, imagery and/or detailed descriptions whenever location information is necessary, such as assessment techniques, wildlife hazard attractants, or airport layout. The report shall cite the presence or absence of protected species identified during the Assessment. If enough data is available, it is recommended that the discussion include whether the species is resident on or near the airport or is considered transient to the location observed. The report should contain an evaluation of all available wildlife strike data for the airport. When available, key strike data such as species, number struck, phase of flight, altitude, time of day, time of year, and damage (if any) shall be summarized in the report.

- 4.4.3 The analysis of strike data may include different methodologies that can provide a key component for a comprehensive risk analysis and assessment. Beyond descriptive statistics that summarize strike characteristics at an airport, it is recommended that a WLS determine the number of overall strikes and damaging strikes per number of operations or during a six-month period. Another useful alternative for analysis may include determining the amount of biomass struck equated to number of operations or strikes. These analyses can provide a better understanding of risk and as a metric to evaluate the effectiveness of an airport's wildlife program.
- 4.4.4 Recommended actions for reducing identified wildlife hazards shall include detailed, task-specific objectives or general measures. Pay attention to both proactive mitigation such as habitat modification and exclusion techniques, and reactive measures that involve harassment, dispersal and removal procedures. When applicable, airports are encouraged to maintain all relevant wildlife permits. The Guyana wildlife Conservation and Management Commission can be contacted for guidance on this matter.
- 4.5 **Minimum Number of Wildlife Surveys Required and Duration of Wildlife Hazard Assessment.**
- 4.5.1 In conducting an Assessment, Section 4.3.1(ii) requires the "identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences." The following procedures meet the requirements for this assessment. Alternative procedures may be proposed to the GCAA for their review and acceptance. In most cases, conducting a 12-month Assessment would meet this requirement so the seasonal patterns of birds and other wildlife using the airport and surrounding area can be documented.
- 4.5.2 To adequately identify wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences, the WLS may choose from several objective standardized procedures. These standardized survey procedures ensure that WLSs consistently collect quality, representative data for hazardous wildlife species in the airport environment. These procedures can then be repeated in future years for comparison.
- 4.5.3 Various wildlife species are active throughout all hours of the day and night. Inventory and monitoring techniques should account for these movement dynamics. Daytime surveys in the morning, midday, and evening should account for the daily patterns for most birds, and nocturnal surveys or tracking indices should account for the daily patterns of mammals and reptiles.
- 4.5.3.1 Avian Surveys.
- Minimum of twelve months data collection
 - Minimum of two data collection trips/month
 - Minimum of two survey samples/month for each of the survey points during the diurnal periods of morning, midday and evening

- Minimum of one sampling trip/quarter (four total sampling trips) for off-site survey points to sample avian use of significant attractants out to five statute miles, including general observations of sign (tracks, scat, nests, etc.)

4.5.3.2 Mammalian Surveys.

- Minimum of one sampling trip per month (12 total over twelve months), including general observations of sign such as tracks, scat, etc.

4.5.3.3 Reptilian Surveys.

- Minimum of one sampling trip per month (12 total over twelve months), including general observations of sign such as tracks, nests, etc.

4.5.3.4 Data from Other Sources.

- Published data
- University studies
- National, Basin and Regional studies
- National Environmental Act
- Radar studies
- ATC and airport “event logs” or wildlife management, patrol, monitoring logs
- Other acceptable data sources

4.6 **Basic Wildlife Survey Techniques for Wildlife Hazard Assessments.**

4.6.1 Not all species are equally detectable. However, an Assessment should assess the presence or absence of known or suspected hazardous species on or near the airport. This is especially important for those species documented within the facility’s strike data. Hazardous avian species on or near airports are typically medium to large birds or small birds that congregate in large flocks.

4.6.2 Avian Survey.

4.6.2.1 Any standardized survey may be used provided it is designed to comprehensively identify wildlife on or near the airport. One objective procedure for assessing bird populations, is creating standardized survey points about half a mile apart throughout the airport. The number of observation points required to obtain adequate coverage of the sample area will depend on the size, complexity, and physical features of the airport. This is one example of a specific type of survey, however, and this particular survey is not required.

4.6.2.2 Using a standardized survey methodology gives a baseline estimate of bird species and numbers on the airport that can be compared with other airports and the same airport in the future. Data on species and numbers are collected from established observation points along a survey route. A survey is defined as one visit to all observation points along a survey route. A survey-day consists of one or more independent surveys conducted during one day (i.e., morning, midday, evening).

- 4.6.2.3 Although forested areas can provide attractive perching or roosting locations for hazardous avian species such as raptors, woodland interior birds are usually of limited concern unless they frequent open habitats which will be surveyed. In many cases, observation points in forested areas are more important for the systematic or ancillary identification of animals and less critical for identifying hazardous avian species. Data relating to forested areas may also be collected by general observations.
- 4.6.2.4 In addition, it is recommended that observation points also be considered at selected areas within five statute miles of the Aerodrome if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace. Examples of such attractants include, but are not limited to large water impoundments, reservoirs, roosting sites, feedlots, landfills, and agriculture such as rice. The observation points at these areas within the five statute miles do not need to be surveyed during every data collection trip, but it is recommended that they be surveyed at least quarterly.
- 4.6.2.5 One method used to conduct a survey would be to start at one end of the survey route and stop the vehicle at each observation point. Record the numbers and species of all birds heard at any distance and all birds detected visually (with or without binoculars) within a quarter-mile radius for 3-5 minutes. During the survey, significant birds (e.g., a flock of large to medium birds, an endangered species, etc) observed outside the quarter-mile radii around observation points or outside the 3-5 minute periods (e.g., while driving between stops) should be noted on a separate data form and reported under general observations.
- 4.6.2.6 The WLS may choose to develop a coding procedure to record birds observed actually on or over a runway during the 3-5 minute observation periods. By knowing the percent of total airport runway area covered by the observation points, you can estimate the number of birds on or crossing the runways per hour. For example, if ten observation points on an airport survey route cover 25% of the runway area, and you recorded an average of 1.5 birds per 3-5 minute observation on or over a runway, then you would estimate that the airport averaged 120 birds on or crossing runways per hour. Assigning each bird or bird flock observed during a point count to a grid location can be useful in further refining spatial distributions of birds on the airport.
- 4.6.2.7 For the area within a ¼ mi. radius of each avian observation point, make a visual estimate of the proportion of each major habitat type [e.g., pavement, short (< 8 in.) grass, tall grass (>8 in.), water, shrub]. It may be useful to analyze data for certain species by observation point to associate that species with a certain habitat type or location on the airport. For example, if waterfowl are consistently observed at one observation point that has aquatic habitat, this should be stated in the analysis and presentation of results.
- 4.6.2.8 Ultimately, the overall survey design (i.e., number and location of survey points, frequency of survey counts per month, time between visits to airport) and analysis of data will vary between airports and depend on the individual airport's wishes. The focus of this AC is to provide minimum standards for data collection and identify limited examples of acceptable data collection techniques. Airports and WLSs may choose to collect additional data or use more rigorous data collection techniques.

4.6.3 General Observations.

4.6.3.1 In addition to the standardized survey, it is important to make general wildlife observations in areas outside the survey points. These observations can provide important information on significant bird hazards and/or zero tolerance species and issues (e.g., endangered species) not fully covered by a standardized survey. Record observations of wildlife use and movements around and within structures and other unique areas of the airport environment not covered in the standardized bird survey.

4.6.3.2 The WLS may choose to perform additional analysis. Each airport is different and may require special analysis to document bird activity. For example, if a certain flocking species is present in large numbers, the WLS may want to present an analysis of mean flock size. If a large number of birds migrate through the airport area over a two-week period, a graphic presentation showing numbers at two-week intervals instead of monthly or seasonal intervals might be appropriate. In addition, the general bird observations made outside of the standardized survey should be incorporated in the report. For example, tables might list the number of Parrots flocks recorded on the airport by month, the mean number of Cattle Egret seen per observation by month at a trash transfer facility within two miles from the airport, or the mean number of pigeons seen in a hangar per observation by season. The report may include descriptive summaries of general observations about flight patterns of a certain species over the airport or the habitat use by another species on the airport.

4.6.4 Data Recording.

Encoding data helps data analysis and database entry. Using bird species codes is recommended.

4.6.5 Data Analysis and Descriptive Statistics.

4.6.5.1 Appropriate data analysis and interpretation helps accurately assess hazards and make management recommendations. Data also serves as a baseline from which the effectiveness of management actions can be measured.

4.6.5.2 For each survey, calculate the total and average number of birds observed per species and the number of observation points recording the species (frequency of sightings on the airport). The number of birds observed gives a measure of species density on the airport. The frequency of sightings at each location shows the distribution of the species on the airport. Surveys can then be grouped to calculate mean number and frequency of birds by species seen per survey by time of day, month, and season.

4.6.5.3 If desired, statistical tests used to identify significant differences among months or seasons can be conducted using analysis of variance (ANOVA) and chi-square calculations.

4.6.6 Seasonal Patterns.

Seasonal patterns or trends for species can be represented by graphing the mean number of birds and mean frequency of sightings per month or season. The graph gives a visual representation of obvious seasonal trends or patterns for each bird species observed in all habitat types (i.e., the entire airport). In many cases it will be useful to simplify presentations by combining species into groups/guilds (e.g., birds of prey, waterfowl) in these summary graphs, presenting the detailed data for individual species in a table or appendix.

4.6.7 Mammalian Surveys.

4.6.7.1 The collection of data pertaining to mammal populations is often time consuming and labour intensive. However, these data are an important and necessary part of an Assessment and wildlife hazard analysis, and should be collected to determine the presence or absence of large mammals and predators. Whether to collect data for all or for selected mammal species found on an airport depends on past and present wildlife hazards and the initial observations of the WLS. The WLS should collect data related to identified and suspected hazardous mammal species, including ungulates (i.e., sheep, goat), canids (i.e., domestic and feral dogs and cats, etc), lagomorphs (i.e., rabbits, hares, etc), and if necessary, rodents.

4.6.7.2 A number of survey designs developed for mammal species rely upon trapping and marking animals (e.g., mark-recapture studies). Mark-recapture studies are usually time consuming, labour intensive, and costly. The GCAA recommends that the WLS consider a combination of data collection procedures that best identify a specific airport's hazardous species. Systematic vehicle surveys, tracking indices, catch-per-unit-effort survey, and spot mapping are commonly used techniques. Vehicle surveys should provide adequate data on large mammals such as ungulates, canids, and lagomorphs. Various tracking methods can be used to assess relative abundance or to help identify mammals beyond the scope of vehicle surveys which have varying degrees of success dependent on method (e.g., spotlight, night vision or Forward-Looking Infra-Red [FLIR]). Relative abundance data for small mammals are collected by catch-per-unit-effort sampling (snap traps). Data related to miscellaneous mammals can also be collected by spot mapping.

4.6.7.3 Vehicle Surveys.

4.6.7.3.1 Vehicle surveys at night using a spotlight, night vision equipment, or a FLIR unit are performed along predetermined routes. The survey can be one continuous route around the airport or several routes covering different areas. The GCAA recommends that survey routes include areas near runways, if feasible, and habitat types where ungulates, predators, or other target species are suspected or known to occur. Satellite imagery, aerial photographs, topographic maps, and maps that contain airport roadway systems can help in establishing survey routes. Preliminary examinations will be helpful to establish appropriate night time survey routes without excessive obstructions that limit viewing. It is recommended that survey routes be established carefully and remain constant throughout the study. Coordination with Air Traffic Control is essential during spotlight surveys to ensure no aircraft are in the Aerodrome operation area or traffic

pattern in the line of spotlight beams. Additionally, The GCAA recommends spotlight surveys ideally be scheduled at times when aircraft operations are limited or not present. Spotlights must not be pointed at aircraft, other vehicles, or the airport tower. It is recommended that the survey be conducted at least quarterly for the duration of the study.

4.6.7.3.2 Observations may be performed starting one half hour after sunset and ending after two to three hours, or delayed, dependent on times of limited scheduled aircraft operations. In general, the survey route(s) should be run once per night, but multiple runs may be made if time permits. All mammals, reptiles and birds observed should be recorded by species and location. It is recommended that the start and end time of each survey and total distance driven be recorded so that numbers seen per hour and distance can be calculated. The GCAA recommends that wildlife surveys be conducted in most types of weather according to schedule, but it may sometimes be necessary to postpone survey periods during severe weather. The GCAA further recommends that surveys not be conducted in excessive wind or heavy rain as mammal activity may be significantly affected by weather.

4.6.7.4 Catch-Per-Unit-Effort (small mammals).

4.6.7.4.1 Small mammal populations may be measured if birds of prey or mammalian predators occur in the strike record or if direct observations or alternative data suggest high predator densities. The number of transects and traps will depend on the size of the habitat being surveyed. Traps are generally set in daylight hours and checked within 24 hours. The GCAA recommends that transects be run for two to four consecutive nights in spring and again in autumn.

4.6.7.4.2 When checking traps, it is recommended that the following data be collected for each trap: status of trap (sprung or unsprung) and species, if any, captured. Trapping results are recorded, by species, as the number of animals caught per 100 adjusted trap nights. Small mammal trapping is not required. It is optional depending on the hazardous wildlife present at the airport.

4.6.7.5 Spot Mapping.

Spot mapping consists of plotting on a grid map the location, date, and time of mammal observations and provides a general overview of mammal activity on the airport. Often airport operations officers, who are required to perform runway sweeps, can assist in collection of this data, as can pilots or other airport personnel. Additionally, mammal observations made while performing designated bird, reptile and mammal surveys can be mapped and used to augment spot observations. Spot mapping is not required. However, any general observations of mammals and/or their sign should be reported and described in the Assessment report.

4.6.8 Reptilian Surveys

- 4.6.8.1 The collection of data pertaining to the reptile populations in and around an aerodrome is important, although not as much strike risk as mammals and birds are. Due to their limited mobility, when compared with mammals and birds, surveys for reptiles may be done on the aerodrome and its immediate surroundings.
- 4.6.8.2 Reptiles are ectothermic, in that they require an external 'boost' to their body temperature to become fully active. Reptiles achieve this effect by positioning themselves in places of increased warmth. This can involve 'basking' on a heat gathering surface in the sunshine (in the open or amongst some vegetation) or under objects (refugia) that absorb heat. Much of this behaviour occurs during the morning and late afternoon but potentially at any time of the day depending on season and weather patterns. This presents us with an opportunity to lead to their discovery.
- 4.6.8.3 The most common survey methods for reptiles include searching for basking animals on banks, piles of wood and edges of woodland, or laying out artificial refuges like corrugated iron sheets and carpet tiles or roofing felt, which are bedded down well into the vegetation. Corrugated reptile refugia are often used in reptile surveys as they absorb heat and provide shelter from predators, making them an ideal basking spot. The refugia are made from corrugated roofing material which is lightweight and waterproof.
- 4.6.8.4 Surveys are essentially snapshots of biodiversity over a short time span, and need to be scheduled with care, taking into account the phenology of the group being sampled and pre-existing knowledge of their activities. Behaviour and activity periods, both diel and seasonal, may be different, especially in seasonally dry-wet and/or hot-cool areas, and it becomes imperative to choose periods when the greatest number of species are active to obtain realistic estimates of species richness. A majority of reptiles are nocturnal or crepuscular, however, some are diurnal, so surveys should be carried out with this in mind. Most sit-and-wait predatory reptiles may be encountered at any time of the day or night.
- 4.6.8.5 Field sampling
- 4.6.8.5.1 Community questionnaire surveys

Structured questionnaire often proves useful for investigators, and arguably are the most cost-efficient techniques to gain new knowledge. The questionnaire should include a series of questions addressing observed species in an area, seasons of observation, impressions of abundance, exploitation, habitat use and distinctive behaviour. The list of questions should be relatively brief. The knowledge of tenants on the aerodrome understandably varies according to years of service, location of their office, profession, among other factors. This information should also be captured in the questionnaire. Descriptions of morphology and distinctive behaviour of reptiles should be gathered from interviewees. In the absence of established vernacular names, images of species likely to occur in the area can be shown to respondents in order to avoid introducing bias into the reporting. It is also recommended that questionnaires should be sequentially numbered

and cross-linked to georeferenced maps that include information on elevation, habitat/vegetation, wetland areas, land cover, etc.

4.6.8.5.2 Visual encounter survey

Perhaps the easiest survey technique for reptiles is the visual encounter survey (VES). A VES comprises time-constrained searches along pre-established transects for visually or acoustically locating animals from the target group. Techniques include using rakes or sticks to turn over leaf litter and logs, looking inside tree holes and rock crevices, and netting streams and other water bodies. Transect location and position are important in the planning phase. The objective of the survey is to record as many species as possible, hence representative habitats should be covered. For quick comparisons of species richness among sites or habitats, the effort expended in different habitats needs to be equivalent to permit standardization. Every individual is accurately identified to species and georeferenced to the point of observation; each data sheet should contain a record of individuals, description of the habitat, time of survey, and number of field personnel employed in order to estimate survey effort. Sites for assessment need to be selected carefully based on available maps and transects established during daylight hours.

4.6.8.5.3 Trapping

A variety of trapping techniques is utilized for sampling reptiles, and while a majority are suitable for long-term studies, a few may be employed during sampling periods that last a fortnight or less. Traps typically sample species that are not encountered during Visual Encounter Surveys, and result in data on presence (but not absence) in addition to valuable life history information and perhaps relative abundance. Traps often capture species not otherwise encountered, making the technique appropriate for reptile surveys.

4.7 Basic Habitat Surveys for Wildlife Hazard Assessments.

4.7.1 Habitat evaluation is an essential part of an Assessment. Many natural and artificial habitats are attractive to wildlife, and evaluation of these should provide the WLS with information about the quantity, quality, and seasonal nature of their use. Wildlife exploits these habitats for food, water or cover, which may vary seasonally and/or throughout an animal's life cycle. Although they may be considered either a direct or indirect attractant, it remains essential for safe air traffic operations to fully understand their influence.

4.7.2 Land-use practices that attract or sustain hazardous wildlife populations on or near airports, specifically landfill sites, fish-processing plant, etc, can significantly increase the potential for wildlife strikes. These attractants include land uses that can cause the movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or aerodrome operation area.

4.7.3 The GCAA recommends the minimum separation criteria, defined in Aerodrome 005, for land-use practices that attract hazardous wildlife to the vicinity of airports. This separation criterion provides predetermined boundaries of concern around airports to be

considered while conducting comprehensive, detailed studies and evaluations of wildlife populations and attractants.

4.7.3.1 Pre-existing Habitat Data.

Pre-existing habitat inventory and geospatial information can prove useful regarding soils, vegetative species, topography, geography, habitat type, location and size. This data may be found in various locations or with various agencies such as:

- Airport Layout Plan
- Airport Master Plan
- Airport Environmental Impact Assessment
- National Parks Commission
- World Wildlife Federation
- Conservation International
- Ministry of Natural Resources
- Etc

4.7.3.2 Descriptive Habitat Data.

4.7.3.2.1 The Assessment should include a general description of the study area and describe natural and artificial attractants both on-site and off-site within the separation criteria recommended in Aerodrome 005.

4.7.3.2.2 Natural Habitat Data.

This may include characteristics such as geographic location, topography, soils, climate, vegetation, agriculture, and wetlands/water features, such as drainages, ponds, lakes, rivers, and water impoundments.

4.7.3.2.3 Artificial Environment Data.

This may include items such as airport buildings, jet bridges, towers, antennas, runways, taxiways, ramp, hangars, waste disposal operations and waste containers.

4.7.3.3 Food.

4.7.3.3.1 Naturally occurring wildlife foods such as insect and other invertebrate populations should be noted with descriptions, time of year, weather conditions, and environmental factors such as soil type, vegetative cover, and drainage conditions. In addition, GCAA recommends that management practices that enhance the production of these natural foods be documented. An evaluation of small mammal populations as a food source for predators can be addressed in the sampling strategy discussed previously.

4.7.3.3.2 Plant seeds, fruits, and berries are other food attractants on airports for birds and mammals. Seasonal wildlife hazards may develop when seeds or fruits are abundant. Documentation of these food sources is an important component of the habitat analysis.

4.7.3.3.3 Review environments within five statute miles from the airport's aerodrome and record food sources that attract wildlife. Agricultural fields, food product industries, fast food restaurants, livestock operations, wildlife refuges and sanctuaries, and waste handling facilities may attract significant numbers of birds and/or mammals, increasing the hazard to human safety and aircraft. It is recommended that a Wildlife Hazard Assessment contain information relative to identified notable sites such as the names and locations, and a description of the attractant and the potential hazard.

4.7.3.4 Vegetation.

Vegetation and cover requirements vary by species and time of year. Relationships between wildlife species and cover types provide information necessary to develop appropriate wildlife management strategies. In reviewing vegetative areas on an airport, it is important to record observations of species, management practices, seasonal growth, density, percent cover, and any noted wildlife associations. Use of specific areas by animals in the airport environment may assist the observer in identifying vegetative attractants.

4.7.3.5 Water.

Water sources are wildlife attractants, especially fresh water sources in coastal areas. Reservoirs, streams, ponds, drainage basins, seep areas, and ephemeral water sources should be identified and mapped. Waterfowl, shorebirds, and marsh birds may be attracted to the airport because of abundant food or drinking and resting sites available in existing water resources.

4.7.3.6 Structures.

4.7.3.6.1 Buildings, areas adjacent to buildings, and equipment on airports are readily used by some wildlife species, such as Owls, pigeons, sparrows, crows, raptors, mice, rats, etc. Wildlife use of structures can present threats to human safety and aircraft, and may cause unsanitary working conditions or damage to structures.

4.7.3.6.2 The reasons for use of most structural features by wildlife are usually easily determined, while others are less obvious. For example, feral pigeons may loaf on just one ledge of a particular building because it provides shelter from the wind or protection from predators. The WLS should determine what features are attractive to problem species, and why. A strategy can then be developed to reduce or eliminate the problem.

4.7.3.7 Soil.

4.7.3.7.1 The type(s) and fertility of soils present on an airport is a general indicator of biological productivity. Habitat quality is directly related to soil fertility and other soil conditions. The nutritive value, quantity, and attractiveness of plant and animal food organisms varies widely with soil types and conditions. For example, sandy, well-drained soils that

dry quickly after rainfall generally produce less biomass and are less likely to harbor an abundant population of earthworms and other invertebrates.

- 4.7.3.7.2 It is recommended that identification and documentation of soil types and conditions on the airport and vicinity be an integral part of an overall assessment or study. Information on soil types and conditions can be acquired from the Guyana Geology and Mines Commission. However, on airports where large-scale soil disturbance, such as grading, leveling, and filling, have been conducted, soil maps may be of limited value.

4.7.3.8 Spot Mapping.

Because attractants may vary seasonally and following precipitation, spot mapping the location and date of features such as fruit and seed bearing vegetation, ephemeral pools and temporary ponding of water or puddles throughout the aerodrome will help identify food sources, drainage problems and grade deficiencies.

4.8 Evaluation of Airport and Aircraft Operations.

- 4.8.1 The assessment of airport and aircraft operational procedures is an essential part of an Assessment. Hazardous wildlife only present a risk to aviation if aircraft and wildlife occupy the airspace or movement areas at the same time and location. Persons conducting Assessments should gather general observation data and other information related to airport and aircraft operations regarding wildlife hazards. The GCAA recommends that WLSs monitor NOTAMs, ATIS advisories, and published Airport/Facilities Directory information to ensure that specific information and not blanket advisories are issued. It is recommended that WLSs assess ATC's involvement in identifying potential hazards or hazards relayed by pilots or airport operations personnel. The GCAA recommends that the Assessment also include a determination that wildlife dispersal is coordinated with ATC to ensure hazards are not inadvertently increased by dispersing wildlife into the path of aircraft movements. ATC permits wildlife control teams access to movement areas of the airfield and communicates with them during the implementation of mitigation measures to ensure dispersal paths are observed and de-conflicted with aircraft movements.

- 4.8.2 WLSs may also interview users of the airport to gather their inputs on wildlife observed on and around the airport. For example, pilots may be interviewed about their experience in the local area as they have a perspective not available to ground-based personnel. Congregations of towering raptors over off-airport facilities such as landfills and food-processing plants are often detected this way as are major roost sites of vultures, or crows. Fixed-base operators (FBOs) may also be visited and personnel interviewed for their experience with hazardous wildlife in the local area. Pilots, especially those operating non-commercial or private aircraft, must be aware that they have the discretion to delay take-offs or departures, ask for wildlife dispersal action, or requests alternate runways, departure or approach paths to avoid identified hazards.

- 4.8.3 Airline and private maintenance personnel may be interviewed for their perspective on local hazardous wildlife and their reporting procedures when strikes are detected on post- or pre-flight inspections of aircraft.
- 4.8.4 Other airport users may be interviewed and included in the Assessment process. Aircraft Rescue and Fire Fighting (ARFF) and Airport Security Personnel are always present on airports during operations and have a unique view of the airfield. It is recommended that they also be notified should major dispersal operations be conducted, such as with pyrotechnics, where the slight chance for grass fires or security concerns are present.

Approved by:


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Lt. Col. (Ret'd) Egbert Field, A.A.
Director-General
Guyana Civil Aviation Authority



APPENDIX A. AIRPORT WILDLIFE HAZARD SITE VISIT AND REPORT CHECKLISTS

Airport Wildlife Hazard Site Visit Checklist

Airport Name:		
Date of Site Visit:	Time:	
Airport Representative:		
Wildlife Specialist:		
	Y or NA	Comments
1.2 Applicable Airport Information		
Personnel and departments responsible for airport ops		
Type of airport/annual operations		
Recent construction or upgrades		
Strike records (in database and/or airport records)		
Wildlife hazard management efforts		
Description of current wildlife concerns		
Depredation permits		
Airport maps/aerial photographs		
1.3 Observations		
Birds (species, activity, location, type of habitat used, time and date of observations, status if listed species, and evidence of activity, i.e., fecal material, nests, tracks, etc.)		
Mammals (species, activity, location, type of habitat used, time and date of observations, status if listed species, and evidence of activity, i.e., scat, tracks, burrows, etc.)		
Reptiles (species, activity, location, type of habitat used, time and date of observations, status if listed species, and evidence of activity, i.e., tracks, etc.)		
Habitat attractants on movement and non-movement areas (assess both natural and man-made attractants)		
Habitat attractants within at different separation distances. (assess both natural and man-made attractants)		
1.4 Site Visit Report		
General airport information		
Strike data analysis		
List of bird, reptile/mammal species observed and times of observations		
Conservation status of species		
Description of habitat features (natural and man-made) that may attract wildlife within movement and non-movement areas		

Description of habitat features (natural and man-made) that may attract wildlife within the different separation distances.		
Map of airport with location of wildlife attractants within the movement and non-movement areas		
Map of airport with location of wildlife attractants within the different separation distances with the separation distances depicted		
Recommended actions for reducing identified wildlife hazards to air carrier operations		
Recommendation regarding whether a 12-month wildlife hazards assessment should be conducted or if an existing Wildlife Hazard Management Plan should be modified		

APPENDIX B. AIRPORT WILDLIFE HAZARD ASSESSMENT AND REPORT CHECKLISTS

Airport Wildlife Hazard Assessment Checklist

Airport Name:
Airport Representative:
Wildlife Specialist:
Assessment Dates (Initiation/Completion):
Assessment Report – Date Completed:
GCAA-Inspector:

	Y or NA	Comments
Analysis of the event or circumstances that prompted the assessment		
Personnel and departments responsible for airport ops		
Type of airport/annual operations		
Recent construction or upgrades		
Strike data analysis (in database and/or airport records)		
Permits		
Wildlife hazard management plan (if applicable)		
Review of current habitat management activities		
Review of current wildlife management activities		
Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences		
Assessment = Minimum of 12 consecutive months		
Locate standardized observation points on airport (observation points off airport are optional) to adequately observe wildlife and their movements		
Point count surveys conducted morning, midday and evening		
Avian surveys conducted a minimum of twice monthly		
Reptile surveys conducted a minimum of once per quarter (4 total)		
Mammal surveys conducted a minimum of once per quarter (4 total)		
Record results of point count surveys and all general wildlife observations. Include species, number of individuals, specific location, activity, direction of movement.		
Record presence conserved species		
Small mammal trapping (optional)		
Identification and location of features on airport that attract wildlife		
Identification and location of features near airport (within 5 miles) that attract wildlife		
Description and qualifications of the Wildlife Specialist(s) who conducted the Wildlife Hazard Assessment.		
Analysis of the event or circumstances that prompted the study		
Personnel and departments responsible for airport		

operations		
Type of airport/annual operations		
Description of recent construction or upgrades, if any		
Strike data analysis (in database and/or airport records)		
Wildlife Permits (do they have valid permit)		
Wildlife hazard management plan (if applicable)		
Description of current habitat management activities		
Description of current wildlife management activities		
<p>Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences:</p> <ul style="list-style-type: none"> • Description of methodologies used to collect data • Results of point count surveys and all general wildlife observations. Include species, number of individuals, specific location, activity, direction of movement and discuss the presence / absence of species with conservation status identified during Assessment • Results of mammal and reptile surveys. Include species, number of individuals, specific location, activity, direction of movement • Map of airport with location and description of observation points 		
<p>Identification and location of features on and near the airport that attract wildlife:</p> <ul style="list-style-type: none"> • Description of habitat features (natural and man- made) that may attract wildlife on the movement and non-movement areas 		
<ul style="list-style-type: none"> • Description of habitat features (natural and man- made) that may attract wildlife within the different separation distances. • Map of airport with location of wildlife attractants on movement and non-movement areas • Map of airport with location of wildlife attractants near airport within the different separation distances (include the location of the separation distances relative to the airport) 		
Description of the wildlife hazards to air carrier operations at the subject airport		
<p>Recommended actions for reducing identified wildlife hazards to air carrier operations:</p> <ul style="list-style-type: none"> • List of prioritized recommendations that are unique to this airport. 		