LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1463										
Classification	Serious Incident		**Date**	3 December 2024			**Time**	1105Z			
Type of Operation	Commercial Airline Transport (Part 121)										
Location											
Place of Departure	Cape Town International Airport (FACT), Western Cape Province			Place of Intended Landing			Hoedspruit Airforce Base (FAHS), Limpopo Province				
Place of Occurrence	During landing on Runway 09 at Hoedspruit Airforce Base (FAHS)										
GPS Co-ordinates	Latitude	24° 22' 50.61" S		Longitude	031° 2' 40.43" E		Elevation	5510.4 ft			
Aircraft Information											
Registration	ZS-YZB										
Make; Model; S/N	Embraer; ERJ 190-100 LR; (Serial Number: 19000666)										
Damage to Aircraft	Minor				Total Aircraft Hours		22 304.27				
Pilot-in-command											
Licence Type	Airline Transport Pilot Licence (ATPL)				Gender	Male		Age	41		
Licence Type	Airline Transport Pilot Licence (ATPL)				Gender	Female		Age	37		
Licence Valid	Yes		Total Hours		12419	Total Hours on Type			3 870		
Licence Valid	Yes		Total Hours		5700.1	Total Hours on Type			812.3		
Total Hours 30 Days	61				Total Flying on Type Past 90 Days				184		
Total Hours 30 Days	50				Total Flying on Type Past 90 Days				151		
People On-board	2 +2+ 58	**Injuries**	0	**Fatalities**	0	**Other (on ground)**		5 Impalas			

What Happened

On Tuesday afternoon, 3 December 2024, two flight crew, two cabin crew and 58 passengers on-board an Embraer ERJ 190-100 LR aircraft with registration ZS-YZB and call sign (LNK 658) took off on a scheduled commercial passenger flight from Cape Town International Airport (FACT) in Western Cape province to Hoedspruit Airforce Military Base (FAHS AFB) in Limpopo province. The flight was conducted under instruments meteorological conditions (IMC) and under the provisions of Part 121 of the Civil Aviation Regulations (CAR) 2011 as amended.

According to the captain (CPT) who was the pilot flying (PF), during approach for FAHS, the first officer (FO) who was the pilot monitoring (PM) reported their estimated time of arrival (ETA) to the FAHS air traffic control (ATC) tower. The CPT stated that the FAHS tower intended to dispatch a vehicle to conduct a routine runway inspection before the aircraft landed in accordance with their standard operating procedures (SOP); however, the vehicle's two-way radio was unserviceable. Therefore, the crew elected to visually inspect Runway 09 during their approach for landing. The crew reported that they did not observe any movement of wildlife on or near the active runway whilst descending from 500 feet (ft) above ground level (AGL) to 200 ft AGL.

At 1104Z, the aircraft touched down on Runway (RWY) 09. During the landing roll whilst travelling at approximately 130 knots (kts), the CPT spotted a herd of impalas crossing the runway (from the left to the right of the runway). The CPT immediately disengaged the automatic braking system and applied maximum manual braking in an effort to stop the aircraft. However, the impalas stopped abruptly on the runway, facing the approaching aircraft. As the aircraft neared towards them, the herd fled to the right, however, the right main landing gear struck five impalas approximately 500 metres (m) from the touchdown point. The impact fatally injured the five impalas whilst the others ran and disappeared into the bush. The struck impala carcasses were found near the taxiway.

After the serious incident, the crew noticed that the wildlife monitoring vehicle (bakkie) was parked on the left side of the runway as per the norm after a (prior) runway inspection has been conducted. During taxi, the CPT stated that he overheard the tower asking the bakkie crew if they had experienced radio issues before the serious incident as no wildlife alert was received. After the aircraft had come to a stop, the crew disembarked from the aircraft to inspect the damage; they found out that the aircraft sustained minor damage to the No. 1 engine's lower cowling but remained operational. No person was injured during the serious incident. At 1124Z, the aircraft vacated the runway with no further incident.

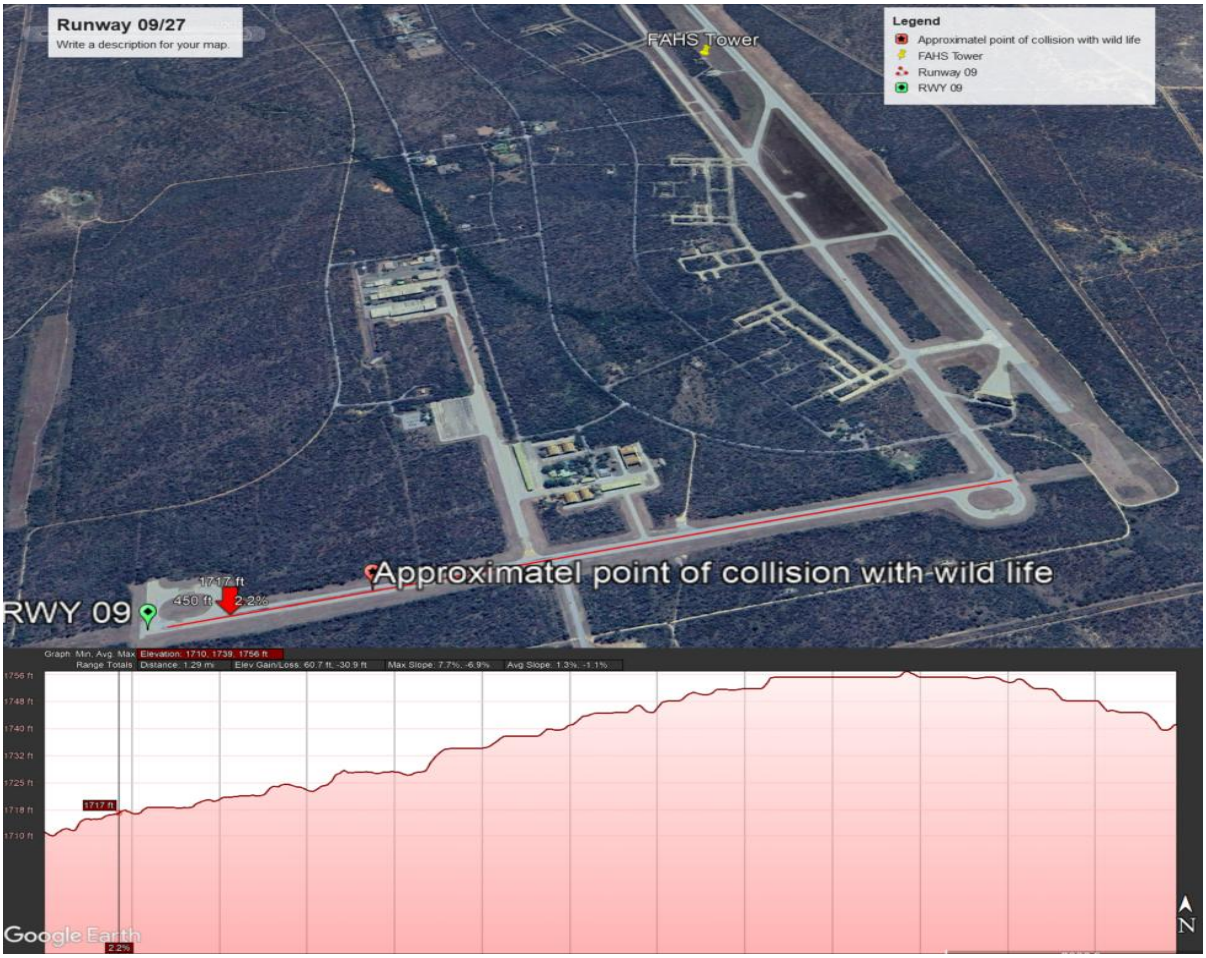

Figure 1: A view of the runway and the incident location. (Source: Google Earth Maps)

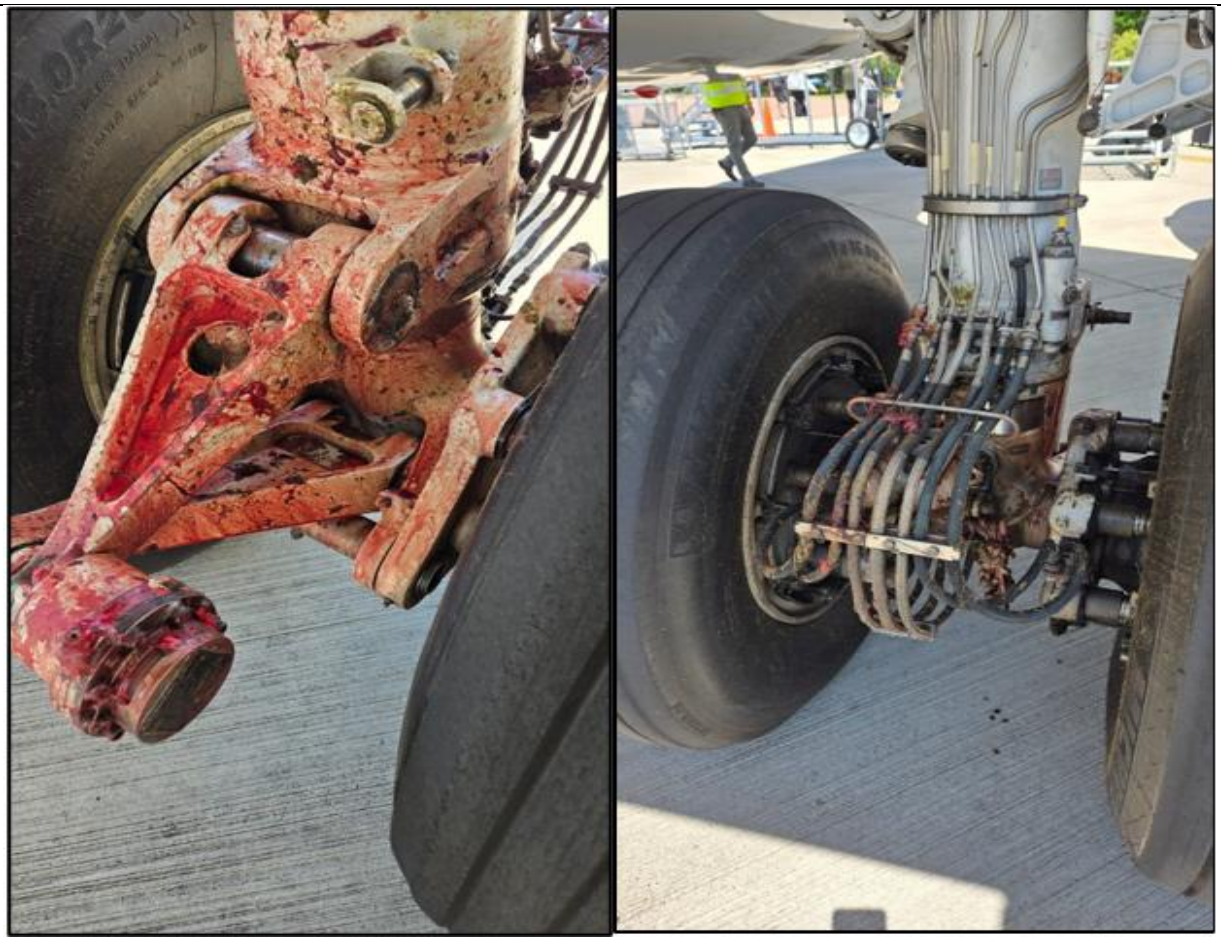

Figure 1: The left main landing gear that impacted the impalas. (Source: Operator)

Figure 2: The right-wing inboard trailing edge after the serious incident. (Source: Operator)

Aerodrome:

Aerodrome Location	Limpopo Province	
Aerodrome Status	Licensed	
Aerodrome GPS coordinates	24°21'17" South, 031°03'01" East	
Aerodrome Elevation	1 742 ft	
Runway Headings	09/27	18/36
Dimensions of Runway Used	(2 115 X 21) m	(3 094 X21) m
Heading of Runway Used	09	
Surface of Runway Used	Asphalt	
Approach Facilities	VOR; ILS	
Radio Frequency	115.2MHz	

Hoedspruit Airforce Base Aerodrome (FAHS) is a South African Airforce National Defense Force military airport located adjacent to Kruger National Park. In the late 1990's the unused portion of the airbase was converted into a civilian airport known as Eastgate Wing situated on the southern end of the aerodrome. The base is teeming with wildlife. Initially keeping the runway clear of animals was a challenge which led to the base introduction of three cheetahs on the field that encompassed wild animals and game resulting in a significant decrease of animal incursions. The same method is used on another Airforce base Makhado that has a similar adopted concept of wild animals in the base. Moreover, for every aircraft arrival, a runway patrol is conducted by an aerodrome fire rescue vehicle to keep the animals away from the runway. A similar procedure was carried out on the day of the incident, where the Tower contacted the runway patrol vehicle to patrol and monitor the animals for runway intrusions.

The Runway Condition:

The crew used RWY 09 on the Eastgate side of FAHS. The FAHS tower is situated along RWY 18/36 and has a clear view of the runway. It was reported that RWY 18/36 had potholes, and thus, operators preferred to land on RWY 09/27 which runs perpendicular to Runway End Safe Area (RESA). The FAHS tower's view on RWY 09/27 is limited due to the thick vegetation and buildings. As such, the tower depends on the wildlife monitoring vehicle personnel to update the crew about the runway condition at any given time. The runway updates were conducted on the (serious incident) day before the aircraft landed. *RWY 09/27 is positioned on an uphill; There is a space of approximately 25m between each side of the runway and the vegetation (bush)*. The CPT stated that during the approach, they did not spot wildlife until touchdown.

Wildlife Monitoring During Operation

According to the air traffic control (ATC) statement, the personnel from the wildlife monitoring vehicle (bakkie) who were assigned to survey the area were contacted via radio and instructed to conduct a pre-arrival runway inspection to ensure that there was no wildlife in proximity to the runway as there was an inbound aircraft. Upon completing the inspection, the bakkie was repositioned to its designated standby

area near the runway, with the personnel continuing to be vigilant for any wildlife activity that could pose a risk during landing or take-off. Although there was adequate clearance between the runway and the surrounding vegetation, detecting wildlife remained a challenge as the animals could camouflage with nature (natural environment), and thus, make it difficult to spot until they had already entered the runway. Additionally, wildlife frequently traverses the runway, increasing the risk of sudden incursions during aircraft operations.

Standard operating procedures dictate that if wildlife is observed on the runway during an active aircraft's take-off or landing roll, the personnel on the bakkie are to immediately notify ATC who will then relay the hazard advisory to the flight crew. However, on the day of the serious incident, neither the personnel on the bakkie nor the ATC spotted wildlife on time to issue a warning or take mitigating action.

Service Level Agreement (Source: Operator)
There is an existing service level agreement between Eastgate management and the operator which was signed on 1 June 2018.

Risk Analysis for Hoedspruit Airport 2023 (Source: Operator)

A review of the active risk analysis for the specific aerodrome was conducted and documented in the hazard identification, safety, and risk analysis Hoedspruit (HDS) airport document by the operator. The identified risk relating to wildlife has been evaluated and calculated to maximum exposure, severity, and probability factors. These factors were categorized as medium risk with mitigation action required.

The preventative actions were identified as the removal of vegetation close to the runway that attracts wildlife including landscaping techniques to reduce food sources close to the runway. Conduct regular wildlife surveys to identify animal activity patterns. The use of vehicles to monitor activity at times when aircraft departures and arrivals are scheduled.

The corrective action will be the airport plate informing the crews of the possible wildlife. The crew shall brief about possible wildlife risks including risk mitigation actions when wildlife is identified. The FAHS Tower shall inform the crew when increased wildlife activity is identified or when wildlife is observed close to the active runway. The crew shall select an alternate runway, when possible, to minimize the risk.

Conclusion
The risk analysis indicated that the operator can safely continue to utilize the airport provided that the mitigation factors that were identified are mitigated as indicated as part of the risk analysis. There are sufficient mitigating procedures implemented over the past few years operating at the airport. Threats and error management and thorough crew briefings play a vital role for safe operation to and from the airport and a high level of safety shall always be promoted and maintained.

Findings

Man

1. The captain (CPT) had an Airline Transport Pilot Licence (ATPL) that was initially issued by the Regulator (SACAA) on 17 September 2012. The ATPL was reissued on 10 January 2024 with an expiry date of 31 January 2025. The CPT's Class 1 aviation medical certificate was issued on 15 July 2024 with an expiry date of 31 July 2025.

2. The CPT had a total of 12 419 hours of which 3 870 hours were accumulated on the aircraft type. The aircraft type was endorsed on his licence.

3. The first officer (FO) had an ATPL that was initially issued by the Regulator on 23 June 2011. The ATPL licence was reissued on 16 July 2024 with an expiry date of 30 April 2025. The FO's Class 1 medical certificate was issued on 1 February 2024 with an expiry date of 28 February 2025.

4. The FO had a total of 5700.1 hours of which 812.3 hours were accumulated on the aircraft type. The aircraft type was endorsed on her licence.

5. The crew was licensed, qualified and medically fit to operate the aircraft.

Machine

6. The aircraft had a valid Certificate of Airworthiness (C of A) that was issued by the Regulator on 4 March 2024 with an expiry date of 3 March 2026. The Certificate of Registration (C of R) was issued to the current owner on 18 December 2023.

7. The latest mandatory periodic inspection (MPI) of the aircraft was conducted and certified after which a Certificate of Release to Service (CRS) was issued on 13 September 2024 at 21 839.37 hours with an expiry date of 13 September 2026 or at 22 589.37 hours, whichever comes first. The aircraft had a total of 22 304.27 hours at the time of the accident. It had accumulated a total of 464.9 hours since the last MPI. The aircraft type had service intervals of 750 airframe hours or annual MPI, whichever comes first.

8. The aircraft was maintained by the aircraft maintenance organisation (AMO) with an approved AMO Certificate that was issued on 30 April 2024 with an expiry date of 30 April 2025. The aircraft type was endorsed on the AMO's operational specifications.

9. The operator had an Air Operating Certificate (AOC) that was issued by the Regulator on 23 April 2024 with an expiry date of 30 April 2025. The aircraft type was endorsed on their operational specifications under Part 121 of the CAR 2011 as amended.

Environment

10. During the approach for landing, the crew contacted FAHS tower and reported their position. As part of wildlife hazard prevention procedures, a monitoring vehicle inspected the runway before returning to its standby position to continue monitoring wildlife. No radio communication issues were reported between the vehicle and FAHS tower as this was the only means available to contact the monitoring vehicle. Despite the crew's claim of radio failure, the vehicle remained in its standby position. Upon detecting the wildlife incursion and collision during landing, the vehicle crew promptly informed the ATC tower personnel via the radio who, later, instructed them to remove the carcasses on the runway to restore operational safety.

11. As the aircraft approached to land, the crew did not spot wildlife on the runway. However, during the landing roll, they spotted impalas entering the runway about 500m ahead. The CPT swiftly switched to manual braking; however, the animals stopped abruptly on the runway, leaving no time to avoid the collision.

12. Furthermore, it was noted that the crew had limited ability to detect the animals before landing due to their natural camouflage with natural surroundings; the uphill runway position, and the FAHS tower which was far from the runway in use. The animals were only spotted once they had entered the runway.

Probable Cause(s)

Wildlife incursion on the runway during the aircraft's landing roll.

Contributing Factor(s)

- Unpredictable animal movement on the runway.
- Limited ATC visual range and runway slope affected the flight crew's visuals.

Safety Action(s)

- The operator must conduct a post-incident review with FAHS management and the wildlife control team to enhance wildlife hazard detection and mitigation measures.
- The operator should re-evaluate the aerodrome's wildlife risk categorisation in its Safety Management System (SMS) to determine if it requires escalation from medium to high risk, prompting further mitigation efforts.

Safety Message/ Safety Recommendation

Although FAHS has implemented wildlife mitigation measures, communication failure and terrain-induced visual limitations contributed to the inability to detect the impalas before landing. A more proactive and co-ordinated approach which includes improved communication, enhanced wildlife surveillance, and refined crew procedures, is essential to further reduce the risk of wildlife strikes. A continuous review of risk analysis and wildlife control strategies will be crucial in maintaining safe operations at the aerodrome by all stakeholders.

Safety Recommendation

It is recommended that the aerodrome facility controller, as well as the aerodrome owner and operators to install a wildlife barrier fence within the safe operational margins of the aerodrome to prevent recurring wildlife incursions that disrupt flight operations and pose collision risks. This proactive measure will significantly reduce go-arounds and enhance runway safety whilst aligning with the International Civil Aviation Organisation (ICAO) Annex 14 and the national aviation regulations regarding wildlife hazard management. Additionally, a structured monitoring and maintenance programme should be implemented to ensure the long-term effectiveness of the barrier. Regular wildlife assessments and collaboration with aviation stakeholders will further strengthen risk mitigation efforts. Investing in this preventive infrastructure will improve operational efficiency, minimise safety hazards and support the aerodrome's commitment to maintaining a secure airspace.

About this Report

The decision to conduct a limited investigation is based on factors, including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

Disclaimer

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa