SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10406				
Classification	Serious Incident	**Date**	20 December 2023	**Time**	1130Z
Type of Operation	Aerial Operation (Part 127)				
Location					
Place of Departure	Landing Zone T306 at Majuba Venus, KwaZulu-Natal Province	Place of Intended Landing	Landing Zone T306 at Majuba Venus, KwaZulu-Natal Province		
Place of Occurrence	T299 Majuba Venus, 20.2nm north of Ladysmith Airfield (FALY), in KwaZulu-Natal Province				
GPS Co-ordinates	Latitude	28°15'01.58" S	Longitude	29°50'11.00" E	Elevation	4 160 ft
Aircraft Information					
Registration	ZS-RXO				
Make; Model; S/N	Bell 407 (Serial Number: 53927)				
Damage to Aircraft	Minor	Total Aircraft Hours	8 092.3		
Pilot-in-command					
Licence Type	Commercial Pilot Licence (CPL)	Gender	Female	Age	34
Licence Valid	Yes	Total Hours	3 847.0	Total Hours on Type	1 368.3
Total Hours 30 Days	15.8	Total Flying on Type Past 90 Days	75.8		
People On-board	1+2	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Wednesday, 20 December 2023, a pilot and two transmission line workers on-board a Bell 407 helicopter with registration ZS-RXO took off from Majuba Venus Power Station landing zone (LZ) in KwaZulu-Natal province to conduct aerial work on the T299 mast (a section of Majuba Venus Power Station). The pilot intended to land back at the departure landing zone. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 127 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that after take-off they flew approximately 20 nautical miles south of Ladysmith in KwaZulu-Natal province to install the bird diverters on the earth conductor located near the T299 mast. The crew used headsets to communicate. The area where the bird diverters were to be installed was on a down slope. Upon arrival at the site, the pilot positioned the helicopter's nose to point away from the slope. Thereafter, the first transmission line worker began installing the bird diverters after confirming with the pilot via the headset that all was clear. The first worker who was installing the bird diverters wore a safety harness that was secured to the helicopter; he sat on the right skid gear whilst installing the diverters. The second worker sat inside the cabin behind the pilot, and had secured himself with a seatbelt. The second worker's task was to pass the bird diverters to

the first worker for installation. Whilst the first worker was installing the bird diverters, the pilot heard a ‘pop’ sound, but no vibrations were felt on the helicopter controls. Concerned with the anomaly, the pilot decided to abort the task. She landed the helicopter safely on the designated landing zone near the T299 mast. The occupants were not injured.

Post-landing, an inspection was conducted, and the pilot noticed that the main rotor blade tips were damaged; they had contacted the earth conductor during the bird diverters installation. As a result, the earth conductor wire strands protruded from the loom.

Figure 1: Illustration of how the operation is conducted. (Source: https://www.tdworld.com/overhead-transmission/article/21281770/birds-on-a-wire-the-perils-of-power-lines)

After the incident, the helicopter was loaded on a flatbed truck and recovered to an approved maintenance organisation (AMO) for thorough inspection. It was determined during the inspection that all four blade tips had sustained damage.

Figure 2: Overlay of the incident site. (Source: Google Earth)

Figure 3: The helicopter before the incident. (Source: Pilot)

Figure 4: The damaged rotor blade. (Source: Pilot)

Figure 5: A bird diverter. (Source: Pilot)

Figure 6: A typical bird diverter fitted on an earth conductor. (Source: https://issuu.com/travelnewsnamibia/docs/conservation_2022_digital_pre/s/17459810)

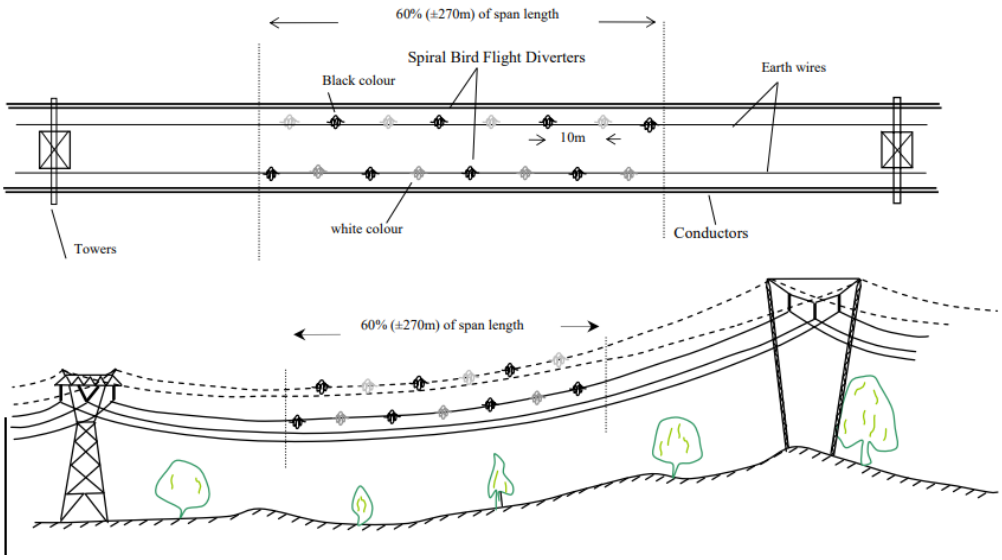

Diagram 1: A typical bird diverter.
(Source: file:///C:/Users/moroanet/Downloads/MIP%20Revised%20DEIR%20-%20App%20G%20(Avifauna)part2%20(2).pdf)

Birds' collision with power lines (Source: https://www.birdflightdiverter.com/2020/12/powerline-collisions-bird-flight.html)

Around the globe researchers well elaborated the said problems in multiple ways and also suggested the most suited line marking devices to reduce mortality due to collision with power lines. ***Bird Diverter*** *is the most common name used. Installing these bird diverters can be considered as the most effective as well as an economical solution when it comes to collision with powerlines.*

Researchers suggested the following scenarios for best results:-

- *Space between two Bird Diverters, fixed on power transmission lines near forests, water bodies, creeks, landfills, forest lands or areas which fall directly in-flight path of avians should not be more than 5 metres.*
- *Space between two Bird Diverters, fixed on power transmission lines, beyond 2 km of forests, water bodies, creeks, landfills, forest lands or areas which fall directly in-flight path of avians, gap may go up to maximum 10 metres.*

Findings

1. The pilot was initially issued a Commercial Pilot Licence (CPL) on 21 June 2010. The licence was reissued on 3 July 2023 with an expiry date of 31 July 2024. The pilot was issued a Class 1 aviation medical certificate on 9 March 2023 with an expiry date of 31 March 2024 with no medical restrictions.

2. The pilot was medically fit to conduct the flight under the provisions of Part 61.

3. The last mandatory periodic inspection (MPI) on the aircraft was conducted on 31 July 2023 at 8 014.3 airframe hours. The Certificate of Release to Service (CRS) was issued on 20 November 2023 with an expiry date of 19 November 2024 or at 8 114.3 airframe hours, whichever comes first. At the time of the incident, the helicopter had accrued 78 airframe hours.

4. The aircraft maintenance organisation (AMO) which conducted the last MPI had the AMO Certificate that was issued on 24 October 2023 with an expiry date of 30 November 2024.

5. The Certificate of Airworthiness (C of A) was initially issued on 17 July 2009. The latest C of A had an expiry date of 31 July 2024.

6. The aircraft was registered to the present owner on 15 May 2017.

7. The operator was issued an Air Operating Certificate (AOC) on 31 August 2023 with an expiry date of 31 August 2024.

8. The operator was issued the Operation Specifications on 31 August 2023. The helicopter type was endorsed to conduct commercial operations under G3 (aerial patrol, observation and survey), G4 (aerial recording by photographic or electronic means using the licensee's

equipment to produce pictorial end product), G15 (underslung and winching operations) and G16 (other general air service operations as specified on the licence).

9. During the hover out-of-ground effect whilst the transmission line worker was installing the bird diverter, the retreating main rotor blades contacted the earth conductor. The pilot had misjudged the distance between the rotor blades and the down-sloping earth conductor.

10. The weather at the time of the incident was not a factor.

Probable Cause(s)

The helicopter's main rotor blades in advertently contacted the earth conductor during installation of the bird diverters on the power lines.

Contributing Factor(s)

None.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

None.

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

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