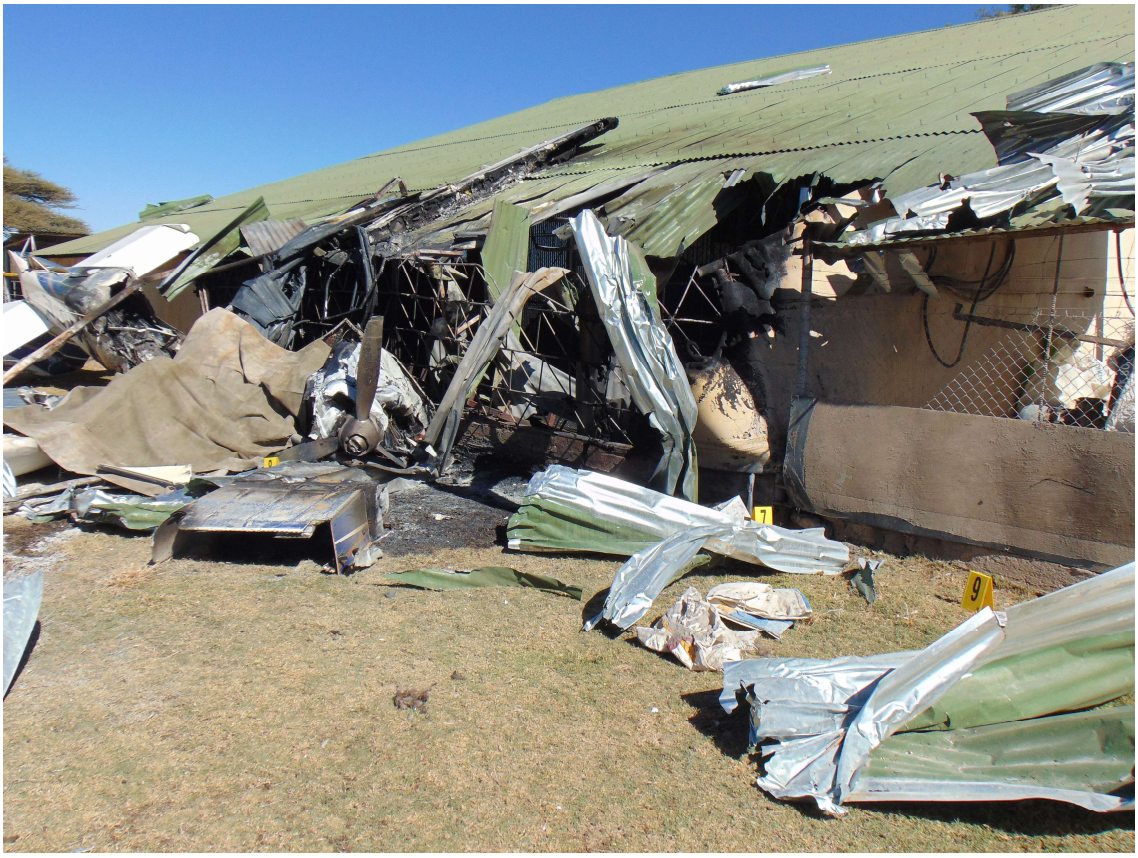
AIRCRAFT ACCIDENT INVESTIGATION FINAL REPORT

REPORT ON AN ACCIDENT INVESTIGATION INVOLVING A GIPPSLAND AEROSPACE (NOW MAHINDRA) GA – 8 AIRVAN REGISTERED A2 – MBE THAT OCCURRED AT OAKDENE AIRFIELD ON THE 29TH JUNE 2023.

REFERENCE: MTPW/AIG/14/23



Name of Operator:	Major Blue Air (Pty) Ltd
Aircraft Manufacturer:	Gippsland Aerospace (Mahindra)
Model & Serial #:	GA – 8 Airvan & Serial #: GA8 – 12 - 179
Nationality and registration marks:	A2 – MBE
Place of accident:	Oakdene airfield in Ghantsi
Date & time:	29 JUNE 2023 (0732 hrs Zulu)

All times given in this report are Coordinated Universal Time (UTC) or Zulu. (Botswana / local time equals UTC plus 2 hours.)

Contents

PURPOSE OF THE INVESTIGATION

This investigation has been conducted in accordance with the **Civil Aviation (Accident and Incident Investigation) Regulations of 2022** of the Republic of Botswana, that is in line with ICAO Annex 13 for the principal purpose of determining the circumstances and causes of the accident with a view to preserve life and avoid similar accidents in the future and not to ascribe blame to any persons.

The Civil Aviation Act of 2011 at Section 75 as amended stipulates that:

"The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents and not to apportion liability or blame."

Disclaimer: This report is circulated without prejudice to the rights of the investigating Authority, which are reserved.

Investigation process:

The Directorate of Accident Investigation (DAI) categorised this occurrence as an accident and appointed an Investigator-in-Charge (IIC). An accident investigation reference file number MTPW/AIG/14/23 was allocated for this investigation.

The Republic of Botswana as both the State of Registry, State of Operator as well as the State of Occurrence, investigated this accident. The victims' country of origin was notified of the accident.

Any person with new information that pertains to this accident should contact DAI or the IIC at jsebineng@gov.bw or mobile (+267) 73005766.

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BOTSWANA

In accordance with regulation 36(1)(b)(i) of the Civil Aviation (Accident and Incident Investigation) regulations of 2022, a draft final report was served to both person and entities of interest in order for them to make significant and substantiated comments. DAI received comments from the operator of the aircraft as feedback following their perusal of the draft final report.

In response to the operator submitted comments, DAI chose to adopt some of the comments to amend the report. *These will be noted by italic font style in the report.* The other comments have attracted clarification, where DAI offered to elaborate further on the issues raised in the comments. DAI's response to the aircraft operator's submitted comments form an annexure to this report. The remaining comments did not attract any response from DAI since they were deemed either complimentary or otherwise.

In view of the raised comments that were not responded to, DAI once more reiterates that the aim of the investigation is to present the analysis of all evidence that has been achieved during the investigation process in order for all those concerned with aviation safety to derive lessons from and enhance accident prevention.

It is most unfortunate that in most cases the reader(s), some not all, are more interested as to whether or not individual(s) or action(s) were the probable cause of the occurrence and if anyone was held responsible. That is not the case of this investigation (or any other air accident/incident investigation for that matter), the main intention of the investigation is to improve upon aviation safety generally in this country.

Investigation by its nature involves gathering, recording and analysing of evidence. The presented facts must not be construed to apportion blame but they serve to raise awareness.

Therefore, usage of this report (or any part thereof) for a purpose other than that which is consistent with the spirit of the Act and other relevant instruments and/or protocols might lead to erroneous interpretations and applications. Apportioning of liability and blame is not the purpose of this report.

SAFETY FACTORS

The findings of this DAI investigation report highlight the two aspects of safety factors and contributing factors. In the context of this report, safety factors are defined as events or conditions that have the potential to increase the operational risk.

Contributing factors are also part of the safety factors but are considered to carry more weight over other issues in terms of increasing operational risk factor related to the occurrence.

The discussion of contributing factors in this report is done separately from the other issues due to the very fact that they are ranked higher in terms of their net effect on the operational risk that have led to the occurrence.

Other issues that are considered worthwhile for the purpose of increasing awareness and enhancing safety are also discussed in the report. These factors do not fall into the category of contributing factors for this occurrence but it is observed that if they are left unattended, these factors may pose a risk leading to an occurrence in the future.

Organisational challenges and operational safety risks are typical examples of the other issues. Organisational challenges are deemed to be systemic issues which take into consideration the impact of organisational culture, policies and procedures on the effectiveness of safety risk controls. To this end organisations should identify hazards in systemic issues and mitigate the associated risk to manage safety.

Operational safety risks are the challenges or issues encountered during the delivery of service or conduct of an activity (e.g., operation of an aircraft, airports or air traffic control). The operational interaction between man, machine and use of technology has to be evaluated to identify performance limitations and hazards by the Operator.

It is intended through the investigation report to present immediate and underlying systemic causes and/or contributing factors to the occurrence. It must be noted also that in the process, other hazards or deficiencies within the aviation system not directly connected with the accident will be revealed. The ultimate objective of investigation report is for all those concerned or involved with the aviation safety to derive lessons from this particular occurrence and learn from it as part of the accident prevention.

These safety factors just like the entire report should not be interpreted to apportion blame or liability to any particular individual or organisation.

INTENTIONALLY LEFT BLANK

SYNOPSIS

A Safety Manager at Major Blue Air (Pty) Ltd telephonically notified DAI, at 0825hrs, of a suspicion that one of their aircraft might be involved in an accident. At the time of the call, the Safety Manager did not have the full details, but he alluded to the fact that one of their aircraft has left for Oakdene airfield around Ghantsi area hence the possibility.

CAAB PATCO called DAI a short while later at 0831hrs with further details, to the effect that ARCC platform in the Republic of South Africa, has alerted Botswana SPOC about an ELT distress signal originating in Botswana around the Ghantsi area. PATCO assured DAI that the matter is being followed up closely as there was an active flight plan for the same location made at Maun Area Control (AIM/ATM).

Major Blue Air (Pty) Ltd Safety Manager reverted to DAI at 0953hrs, reporting an accident that involved their aircraft registered A2 – MBE. The aircraft in question being a GA - 8 Airvan aircraft, has left Maun airport with two (2) crew-members to Oakdene airfield in the Ghantsi region. The purpose of the flight was to pick-up a couple (husband and wife) from Eaton farm to transport them to another location named Bottle Pan. The Safety Manager, further reported that the 2 crew-members were rescued from the flame engulfed aircraft wreckage and rushed to a local hospital with severe burns.

On the 29th June 2023 at 0604hrs, A2 - MBE started from Maun with only Major Blue Air (Pty) Ltd employees[1] onboard. This chartered flight was to embark on a three-leg flight, with Maun to Oakdene airfield as a first leg of the trip (Maun – Oakdene airfield; Oakdene airfield – Bottle Pan; Bottle Pan – Maun). At 0721hrs, A2 – MBE successfully landed at Oakdene airfield and was on the ground for a short period of time, enough to pick up the passengers and their luggage.

After loading at around 0730hrs, A2 – MBE prepared for take-off. The aircraft tracked back in a direction towards the point where it landed (runway – three zero, (30)). It was observed that the aircraft back

[1] It has emerged later that the other crew-member was not an employee of Major Blue Air but still being considered for employment.

tracked a short distance before it turned around to face its starting point (i.e., where it loaded the passengers). At the beginning of the take-off roll, A2 – MBE, did not make a full brake (static) engine run.

A2 – MBE opted for a very short field take-off though there was still plenty of runway space available to continue tracking back. The take-off attempt was not successfully as the length of the runway used for ground roll was critically short. This terminated with the aircraft encountering obstacles on its flight path at the runway end leading to an accident.

A2 – MBE ground run took it beyond the declared available runway suitable for take-off. The aircraft encroached on an area used for engine run-up, (where the passengers were loaded). Beyond the engine run-up exists an area of approximately 100meters from the runway centreline (runway end safety area). Proceeding the engine run-up on the east edge of the runway, the safety area terminates at around 80m by way of a tree (plant) and a shade structure for vehicles. These were the first obstacles that A2 – MBE collided with consecutively as the collision played out.

From the first points of impact on the left side, A2 – MBE collided with the farm shed structure and flipped over to end up resting with the main gear. The final rest position of A2 – MBE was such that its nose faced the starting point of the ground run whereas the aircraft tail faced the heading direction.

The right-wing broke off at the root of the fuselage and ended up resting on top of the farm shed. The remaining aircraft wreckage fell onto the ground by the farm shed. Fuel gushed out of the right-wing tanks and fuelled the post impact fire that engulfed the aircraft.

The 2 crew-members were rescued from the burning wreckage. The PIC was relatively less affected by the fire in comparison to the other crew member since the fire was less concentrated on the aircraft port side. Both passengers did not survive the inferno because the fire was heavily concentrated around their seating area.

The investigation report came up with safety recommendations relating to the effective AOC organisational management, the need to implement training (recurrent) so as to impart knowledge of standards, operational procedures and techniques as well as improve the crew performance proficiency.

The safety recommendations requiring the need to strengthen oversight functions by the regulator was also issued. It has been recommended that the airport operator also needs to improve on existing safety zone markings on the airfield as well as introduce more markings. Furthermore, safety recommendations are made to the effect that the emergency equipment needs to be increased and emergency drills/exercises conducted at set intervals.

GLOSSARY OF ABBREVIATIONS

AIG: Accident Investigation Group

AIM: Aeronautical Information Management

AM: Accountable Manager

AOC: Aircraft Operator Certificate

ARCC: Aeronautical Rescue Coordination Centre

ASDA: Accelerate - Stop Distance Available

ATC: Air Traffic Control

ATM: Air Traffic Management

ATS: Air Traffic Services

ATSL: Air Transport Service Licence

BE 58: Beechcraft Baron aircraft (also known as Baron 58 aircraft)

BPS: Botswana Police Services

C172: Cessna 172 aircraft

CAAB: Civil Aviation Authority of Botswana

CoA: Certificate of Airworthiness

CoR: Certificate of Registration

CoM: Certificate of Maintenance

CRS: Certificate of Release to Service

CPL: Commercial Pilot License

DAI: Directorate of Accident Investigation

ELT: Emergency Locator Transmitter

GA - 8: Gippsland Aerospace Airvan 8 aircraft

ICAO: International Civil Aviation Organisation

LDA: Landing Distance Available

METAR: Meteorological Aerodrome Report

MTPW: Ministry of Transport and Public Works

NM: Nautical Mile

OpSpecs: Operations Specifications

PATCO: Principal Air Traffic Control Officer

PIC: Pilot-In-Command

PNF: Pilot Not Flying

RCC: Rescue Coordination Centre

RESA: Runway End Safety Area

RSA: Runway Safety Area

SPOC: Search and Rescue Point of Contact

SOP: Standard Operating Procedure

SSKIA: Sir Seretse Khama International Airport

TODA: Take off Distance Available

TORA: Take off Run Available

TTSN: Total Time Since New

UTC: Universal Time Coordinated (i.e., Local time minus 2 hours) or Zulu time

1. FACTUAL INFORMATION

1.1 History of the Flight

1.1.1 On the 29th June 2023, a Gippsland Aerospace (GA – 8) Airvan, single engine aircraft registered A2 – MBE, belonging to Major Blue Air (Pty) Ltd left Maun airport at 0604hrs to Oakdene airfield.

1.1.2 A2 - MBE had two (2) crew members onboard. A pilot-in-command and an "observer" pilot were the only occupants of the aircraft heading to Oakdene airfield. The purpose of the flight was to pick up two (2) private passengers on a charter flight to a destination known as Bottle Pan.

1.1.3 A2 – MBE successfully landed at Oakdene airfield at 0721hrs after a one hour and seven-teen minutes (1hr 17min) flight from Maun airport. The landing and take-off attempt at Oakdene were witnessed by a considerable number of spectators as it was reported that during that particular day, a group of people was on tour from a nearby town. In addition, there was a lot of farm workers on site.

1.1.4 The crew positioned the aircraft well and guided the passengers onto the aircraft at the same time loading their baggage. Upon completion of loading, the aircraft started to back track in the direction it landed.

1.1.5 A2 – MBE did not track back a long distance before it turned around to use runway one – two (12) for take – off. It was observed that the aircraft did not apply a "static take-off procedure", whereby the aircraft builds up maximum engine power whilst static, specifically for short runway operation.

1.1.6 At exactly 0731hrs, A2 – MBE was in full swing (ground run) on its attempt to take off from Oakdene airfield. As this was unfolding, eye witnesses, some of them using their mobile phone cameras to record the event, expressed concern that the aircraft was not taking off quickly and risked running out

of runway space. They could be heard urging the aircraft to lift – off as they could foresee imminent danger.

1.1.7 A2 - MBE exhausted the runway space and ended up encroaching the runway end safety area, a cleared space not intended for aircraft take-off roll at the end of the engine run - up area.

1.1.8 A2 – MBE encountered obstacles obtaining on the path and did not manage to lift – off. Its left wing struck a tree, from there it collided with a structure used as vehicle shade and this led to a left-wing tip breaking off.

1.1.9 The aircraft momentum led it to collide with a farm shed. As a result, the aircraft flipped over and, in the process, broke its entire right wing. The right wing ended up resting on the shed roof whilst the rest of the aircraft crashed down onto the ground next to the shed.

1.1.10 Fuel gushed out of the right-wing fuel tanks above and combined with the sparks from the aircraft - farm shed metal structure collision resulting in an inferno.

1.2 Injuries to Persons

INJURIES	CREW	PASENGERS	OTHERS
FATAL	01	02	00
SERIOUS	01	00	00
MINOR/NONE	00	00	

1.3 Damage to Aircraft

1.3.1 The aircraft was totally destroyed due to impact forces and the subsequent post-crash fire.

1.3.2 The only parts or aircraft structures that were spared from the inferno were the wings, empennage and the components that detached due to collision before the aircraft came to its final rest position. The detached components comprised of nose gear and left-wing tip.

1.4 Other Damage

1.4.1 The structure for vehicle shade, grain milling equipment,

farm shed roof structure support members as well as almost half of the shed wall on the eastern side got damaged due to the collision with the aircraft and subsequent inferno.

1.4.2 A portion of animal feed that was inside the shed was affected by the fire extinguishing materials/components. Otherwise, the fire was contained in one small portion and was not able to spread over an extended area.

1.5 Personnel Information

1.5.1 Personal information – (Pilot – in – Command).

Nationality	Botswana	**Gender**	Male	**Age**	25
Total Hours Flown	778.9	**Licence Type**	CPL		
Total Hours on Type	105	**Total Hours flown in the last 28 days**	60.5 hrs		
Total Hours Flown in the Last 90 Days	121.9	**Total hours flown in the last 24 hours**	0 hrs		
Type Endorsed (date endorsed)	**C172:** (29th Jan 2020); **BE 58:** (11th July 2022) **GA – 8:** (3rd April 2023)				

1.5.2 The second **crew member** onboard the aircraft was also a qualified pilot, who was acting as an observer during the flight. According to the operator, Major Blue Air (Pty) Ltd, the task to observe is a pre-requisite for pilots who are being prepared to be handed command on a certain type of aircraft. In this case "the observer pilot" was being readied to be line checked on a GA – 8 Airvan aircraft.

1.6 Aircraft Information

1.6.1

Aircraft Type:	Gippsland Aerospace GA – 8 Airvan	Serial Number:	GA 8 -12- 179

Manufacturer:	Gippsland Aerospace (Mahindra)	Date of Manufacture:	24/05/2012
CoR # & Date of issue	1097 (12/09/2012)	Date of CoA issue	15/07/2022
CRS issue date	16/05/2022	Fitness for flight issue date	17/05/2022
Category	Commercial	Airframe total time (hours)	5126.3
Engine Make:	Lycoming IO - 540 – K1A5E	Serial Number	L– 30710 – 48E
Engine TTSN	5212.8hrs	Engine TTSOH	2216.4hrs
Propeller type & Part number	Hartzell metal constant speed (HC-3YR-1RF/F8068)	Prop TTSN & TTSOH	(3469.4 & 1069.3 Hrs)
ELT license #	BOCRA-ASL-RCL-4847-2022-6	ELT license issue date	01/01/2023
ELT make & model	Kannad RC 200	Frequency Band	121.5 – 406Mhz

1.6.2 A2 – MBE was in compliance with all CAAB airworthiness requirements.

1.7 Meteorological Information

1.7.1 According to the weather report and ground observations the weather was fine with clear skies. Weather conditions did not play a role in this occurrence.

1.8 Aids to Navigation

1.8.1 Oakdene airfield has a visual aid within the runway in the form of a wind sock that serves as a wind direction indicator.

1.8.2 The runway had some distance markings provided in white color paint. The demarcations are on the side of the runway and placed at increments of hundred meters.

1.9 Communication

1.9.1 The occurrence aircraft was equipped with serviceable VHF radios, but this was not relevant in this occurrence.

1.10 Aerodrome Information

1.10.1 Oakdene airfield is issued with a CAAB Aerodrome licence numbered B521. The aerodrome is designated category 2 for private domestic use.

1.10.2 The geographical location of the airfield is 21° 27′ 54″ South and 021° 48′ 17″ East. Its runway length is 1000 x 18 metres.

1.10.3 The airfield has an elevation of 3170 feet with 12/30 as runway magnetic track direction (QDM).

1.11 Flight Recorders

1.11.1 Not applicable.

1.12 Wreckage and Impact Information

1.12.1 The crash site was wholly contained inside Oakdene Airfield next to the farm shed.

1.12.2 The aircraft was totally destroyed by the force of impact and the resulting post impact fire. The empennage and the wings are the only aircraft structures that were spared from the fire.

1.13 Medical and Pathological Information

1.13.1 The post-mortem revealed that the deceased crew succumbed to *complications of thermal injuries*.

1.13.2 The post mortem results for the deceased female passenger revealed the cause of her death as being *cranio – cerebral (head) injuries* due to blunt force trauma.

1.13.3 The post mortem results for the deceased male passenger revealed that his cause of death was due to *smoke inhalation injuries* following flame burns.

1.13.4 The surviving crew member is still undergoing medical treatment.

1.14 Fire

1.14.1 There was post-impact fire caused by fuel leaking from the right-wing tanks and ignited by the sparks resulting from the crash.

1.15 Survival Aspect

1.15.1 The aircraft wreckage was within the airfield and it was easily accessible. The rescue exercise was immediate and prompt.

1.16 Test and Research

1.16.1 The heavily burnt aircraft engine was taken for an observed tear-down and examination.

1.16.2 The engine was intact but cooked up due to post impact fire. After test and analyses, the results proved that all internal moving components within the engine were serviceable at the time of the accident.

1.16.3 There was no evidence of breakage or mechanical failure within the engine. The crankshaft could not rotate due to the pistons that were stuck in the cylinders following the post impact fire that engulfed the aircraft.

1.16.4 Oil sump induction housing assembly was found to be clean without any sign of foreign debris though it was dry of oil due to the obvious reasons of post impact fire.

1.16.5 The top right engine mount bracket was found broken.

1.16.6 The intake pipes and air inlet housing were intact and clear of any obstructions.

1.16.7 The valve assembly and the related parts comprising of valve springs, plunger assembly and the rocker assembly were all in place and intact.

1.16.8 The crankshaft and fuel pump idler gears were all found to be operational. The magneto drives cushions and magneto gear retainer assembly were all in place and appeared

serviceable prior to the accident.

1.16.9 The port side main undercarriage wheel hub (disc) together with brake pads were found to be fully intact and in a brake position/mode. The brake pads were in full contact with the disc. (**Figure 7**)

1.16.10 The skid marks (braking tracks) similar to one made by a landing gear under brakes were observed on a concrete surface used as engine run-up area along the path that A2 – MBE took. (**Figures 5c, d,6**)

1.17 Organisational and Management Information

1.17.1 The occurrence aircraft belonged to Major Blue Air (Pty) Ltd. A CAAB approved AOC holder for both international non – scheduled air transport service licence (ATSL) as well as an Aerial Work Licence (AWL) holder.

1.17.2 Major Blue Air (Pty) Ltd holds an AOC number 11. The certificate was issued on the 18th November 2022 and is valid for a two (2) year period scheduled to expire on the 30th November 2024. The AOC operation specifications, lists seven-teen (17) aircraft as the operator's fleet.

1.17.3 Major Blue Air (Pty) Ltd has no history of accidents except one that was occasioned by an intrusion that happened in March 2019, where an individual (pilot) working for a different company stole an aircraft belonging to Major Blue Air. The aircraft was parked on an apron following maintenance when it got stolen. He intentionally flew the aircraft onto the structure housing a control tower of a local flying club resulting in the demise of both aircraft and himself (pilot).

1.17.4 Major Blue Air (Pty) Ltd management structure as obtaining in the Safety Management System manual (edition 1 of 2020 page 1-12) is headed by the Accountable Manager (AM). The post holders of Safety Manager and Quality Manager reports directly to the AM. The next management level under AM comprises of the Chief Pilot, Operations Manager and Maintenance Controller.

1.17.5 The Chief Pilot is responsible for line pilots whilst the Operations Manager is responsible for administration personnel and Handling personnel. (SMS manual, page 1-11)

1.17.6 Like any other aviation entity Major Blue Air (Pty) Ltd is still recovering from the impact of COVID – 19 during which period the organisation lost some of its personnel *(mainly pilots).*

1.17.7 Major Blue Air (Pty) Ltd records of the past internal operational safety meetings were reviewed. It was found that issues of non-compliance to company's standard operational procedures by staff was prevalent. The records of the meetings highlighted examples of non-conformance aspects, such as not completing technical logbook by crew. Furthermore, operational staff were found not to be providing safety reports as required.

1.17.8 The reviewed records of the safety meetings highlighted issues of human resources challenges in the form of staff retention and vacant posts that existed within Major Blue Air (Pty) Ltd.

1.18 Additional Information

1.18.1 As a way of clarifying the employment status of the late crew member, Accountable Manager stated that he was not yet a full-time employee of Major Blue Air (Pty) Ltd. It was explained that he was still undergoing training and therefore flew as an observer pilot on a route familiarization with Major Blue Air on that fateful day.

1.18.2 It must be noted though that the deceased crewmember was offered a two (2) year employment contract by Major Blue Air (Pty) Ltd which he signed on the 20th January 2023. *The employer was yet to sign off the same contract.*

2. ANALYSIS

2.1 There is no evidence to suggest that the aircraft engine had malfunctioned leading to power loss.

2.2 The observed main gear tracks on the compacted ground leading to the concrete surface (engine run-up area) are attributable to applied main landing gear brakes. During the take-off ground run, the main undercarriage was subjected to brake application at this critical phase towards the end of the runway.

2.3 The runway available used for the take-off was very short. The runway end had some features in the form of erected structures in close proximity. That led to the aircraft crashing onto stationery features comprising of a tree, vehicle shade structure and the farm shed.

2.4 From the submissions made by an eye-witness who participated in the rescue mission of the crew, the crew had a conversation amongst themselves as they were led to safety. The conversation had to do with the condition of the rudder pedals. The eye-witness overheard this exchange and understood it to be a complaint that the pedals seemed not to be properly functioning as they felt like they were already applied.

2.5 The eye witness statement further alleges that he overheard one crewmember rebuking the other that he warned him about the risk of this attempted take-off. This part of the exchange amongst the crew happened as they were taken to a safe area from the wreckage.

2.6 Presence of the crowd at the airfield during landing and take-off probably aroused some feelings within a relatively young pilot that could have adversely affected him leading to making erroneous decisions.

2.7 From the safety reports shared by Major Blue Air (Pty) Ltd the issue of non-compliance to the company SOPs by personnel when it came to reporting of safety issues as well as making required entries on the technical log has been ongoing for an extended period of time and has a bearing on the type of safety culture prevalent at the organisation.

2.8 Major Blue Air (Pty) Operations Manual (Part A), Revision 0

issued on the 1st June 2016, SOP 8.1.3.1(b) at page A-8-9 outlines procedure for obstacle clearance and minimum altitudes during take-off.

2.9 Major Blue Air (Pty) Operations Manual (Part A), Revision 0 issued on the 1st June 2016, SOP 8.3.0.4 at page A-8-33, outlines a procedure on sterile cockpit principle during the critical phase operations of flight (taxi, take-off and landing).

2.10 The Major Blue Air (Pty) Ltd Operations Manual (Part A), Revision 0 issued on the 1st June 2016, SOP 8.3.0.7 at page A-8-35 outlines the Departure Contingency Procedure for relevant phases of every departure primarily take – off and initial climb. Of key significance is the rejected take-off contingency contained therein.

2.11 Major Blue Air (Pty) Ltd Operations Manual (Part A), Revision 0 issued on the 1st June 2016, SOP 8.6.2(a) at page A-8-72 stipulates the conditions for non – revenue Flight Definitions and Procedures for training flight.

2.12 Major Blue Air (Pty) Operations Manual (Part C), Revision 0 issued on the 1st June 2016, SOP 1.1.11 at page C-1-9 outlines procedures for pilot proficiency training for varying classes of aerodromes (class A - C). It is stated that in such flight the PIC must be either a training pilot or a designated examiner.

3. CONCLUSIONS

3.1 Findings

3.1.1 A2 – MBE did not utilise the full length of the runway provided for take-off purposes. The aircraft tracked back and turned around at the 200meter mark of the 1000meter long airfield.

3.1.2 A2 - MBE utilised only a fifth (of a 1000m long runway) and left behind the remaining 800m unused.

3.1.3 The end of Oakdene airfield comprise of a compacted gravel measuring approximately 100m of which 10m (approx.) is concrete meant for engine run – up. Proceeding from the engine run-up area is a clear space (runway end safety area) with a length of approximately 100m.

3.1.4 A2 -MBE, did not execute a static take-off procedure during take-off in order to build up maximum engine power to shorten the ground roll.

3.1.5 A2 – MBE on its attempted take-off ended up encroaching on an area that is considered to be a runway end safety area. This is an area that is preceded by engine run-up space that A2 – MBE used as a ramp earlier for loading the passengers.

3.1.6 *Oakdene airfield has not put-up markings (safety/caution) to designate runway end safety area, engine run-up area and the obstacles around and nearer the runway, as a way to alert airfield users*.

3.1.7 A2 – MBE is certificated a single pilot aircraft; it has rudder pedals on both the starboard and port side of the cockpit. The starboard pedals are accessible to the PNF or any other individual (passenger) occupying the right seat.

3.1.7 There were distinct skid marks measuring a length of approximately 85 meters which resembled main gear under applied brakes. The marks were observed on both the compacted as well as the concrete surface path that A2 – MBE took. *This part of the area is towards the runway end*. The observed tracks were consistent with the applied brakes on subject aircraft main landing gear.

3.1.8 A2 – MBE PIC was not either a training pilot nor a designated examiner.

3.1.9 Major Blue Air (Pty) has been operating for an extended period without critical post holders in place such as a Safety and Quality Officers. Even at the time of the accident the vacancies were still in existence.

3.1.10 Major Blue Air (Pty) did not respond to the safety issues that were raised during the internal safety meetings within a reasonable timeframe as the issues were left unattended for prolonged periods.

3.2 Probable Cause(s)

3.2.1 The probable cause of this accident is found to be the use of a short end of the runway, leading to limited take-off distance which resulted in A2 – MBE running out of runway designated for take-off, and ending up plunging onto obstacles resulting in a mishap.

3.2.2 The effect of a shortened ground roll due to use of shorter runway as opposed to using the full length of the available runway was detrimental to A2 – MBE ability to take-off.

3.3 Contributory Factors

3.3.1 The possibility of contradicting aircraft control inputs contributed to the failed take-off. Application of brakes whilst A2 -MBE was at full power configured for take-off caused a delay in ground roll. The observed skid marks lend credence to the notion that an attempt was made to apply brakes on the aircraft at the critical phase, possibly with the intention to abort take-off.

3.3.2 The presence of the crew member (Pilot not flying) in the cock-pit purported to be undergoing "familiarisation or observer" exacerbated the situation. The PNF had unrestricted access to the rudder pedals and the opportunity of interfering in the control of the aircraft existed.

3.3.3 The above is a possible scenario following analysis of the evidence at *paragraph 2.4 and 2.5*.

3.4 SAFETY FACTORS

3.4.1 The apparent issues that constitutes operational safety risks within Major Blue Air (Pty) Ltd have been left to drag on over

an extended period without devising safety enhancement initiatives to counter and instil control over those issues.

3.4.2 The operational safety risks that are referred above relates to non-compliance by personnel to Major Blue Air SOP (refer to para 2.7 – 2.12). All the highlighted SOPs were not conformed to during this fateful flight.

3.4.3 Unavailability of critical management personnel at certain positions like that of Quality and Safety Officers compounded the systemic issues within Major Blue Air, as adequate monitoring of organisational challenges as well as the operational safety risks went on abated within the organisation due to lack of substantive post holders. Though the availability of the Safety Manager is noted, the work load due to vacant posts can lead to taking longer time of tasks execution.

3.4.4 Major Blue Air (Pty) Ltd top management responsiveness to deploying effective safety risk controls was not prompt. In the sampled minutes of safety meetings there was noticeable absence of top management (Accountable Manager) as a post holder who is responsible to take decisions and provide financial support within the organisation. In the absence of the AM no one was assigned to act on behalf of the key position holder hence the delay in addressing the arising issues.

3.4.5 CAAB in carrying out its safety oversight functions of approved aircraft operators, appears to not have optimally utilised avenues like the SMS at Major Blue Air to monitor the safety compliance and as well as enforce the requirements for timely rectification of non-deficiencies as obtained through safety data analysis. The regulator last audited the operator on the 8th March 2018 and thus a long period existed without a safety audit.

3.4.6 *Non markings of objects/structures that are in close proximity to the runway end as well as runway end safety area, lessen the alertness of the airport users to the looming hazards.*

4. SAFETY RECOMMENDATIONS

4.1 It is recommended that CAAB must make it a mandatory requirement that all Aerodrome operators shall have the fire emergency services on standby at all times during aircraft landings and take-offs. This will enhance the response time in the event of emergency. (More emphasis must be applied to the private aerodrome operators that render service to commercial/charter flights.)

4.2 It is recommended that the CAAB must devise a safety requirement calling for private airfield operators to regularly undertake scheduled emergency drills at their airfields, for the sole aim of ascertaining their operational readiness and identify deficiencies with the view to apply appropriate remedial measures.

4.3 *It is recommended that CAAB embark on a programme (Runway End Safety) specifically relevant to the private airfields. The roll out of this programme must aim to address safety risk and plan for future improvements by way of standardising required cleared out areas and further standardise the distance of structures/fixtures from the runway centreline and the runway end.*

4.4 *The aerodrome operator must always consider cutting the grass on the runway to a short length in order to enable use of the runway without hesitation. These must cover the full length of the runway*.

4.5 It is recommended that the CAAB must frequently conduct continuous monitoring through surveillance of aircraft operators, in order to detect possible compliance deficiencies in the aviation operation system and enforce compliance to the safety requirements as a way to mitigate the associated safety risks.

4.6 It is recommended that Major Blue Air (Pty) Ltd must use the collected safety information to complete the safety risk management as outlined in the SMS manual.

4.7 It is recommended that the safety issues[2] that arise during the Major Blue Air safety meetings must be resolved urgently at set time lines to avoid a scenario where the issues remain outstanding perpetually.

4.8 It is recommended that Major Blue Air (Pty) Ltd must come up with a clear induction/familiarization program for their newly employed pilots or pilots on probation. This training program must be performed on an aircraft that is not carrying passengers. The emphasis must be to separate induction/familiarization from commercial operations where a flight for fare-paying passengers is simultaneously utilised for training.

4.9 It is recommended that the Major Blue Air (Pty) induction program above, for the newly employed pilot(s) or pilot(s) on probation, must be conducted by pilot(s) with appropriate experience and also who are designated by the regulator as trainers or examiners.

4.10 It is recommended that Major Blue Air (Pty) Ltd must include in its pilot induction a training program aimed at instilling professionalism amongst staff to guard against cases of youthful exuberance given that the Operator employs relatively young professionals.

4.11 It is recommended that Major Blue Air (Pty) Ltd must develop a SOP that addresses the roles of pilot trainee or those on familiarization flight whilst in the cockpit. The SOP must outline what they are entitled to do and not what to do in terms of accessing aircraft controls during the critical phases of flight or at any other times during flight.

— — —

[2] A safety issue is a safety factor that can reasonably be regarded as having the potential to adversely affect the safety of future operations. The systemic safety issues will impact the effectiveness of safety risk controls within the organization (operator/regulator).

APPENDIX

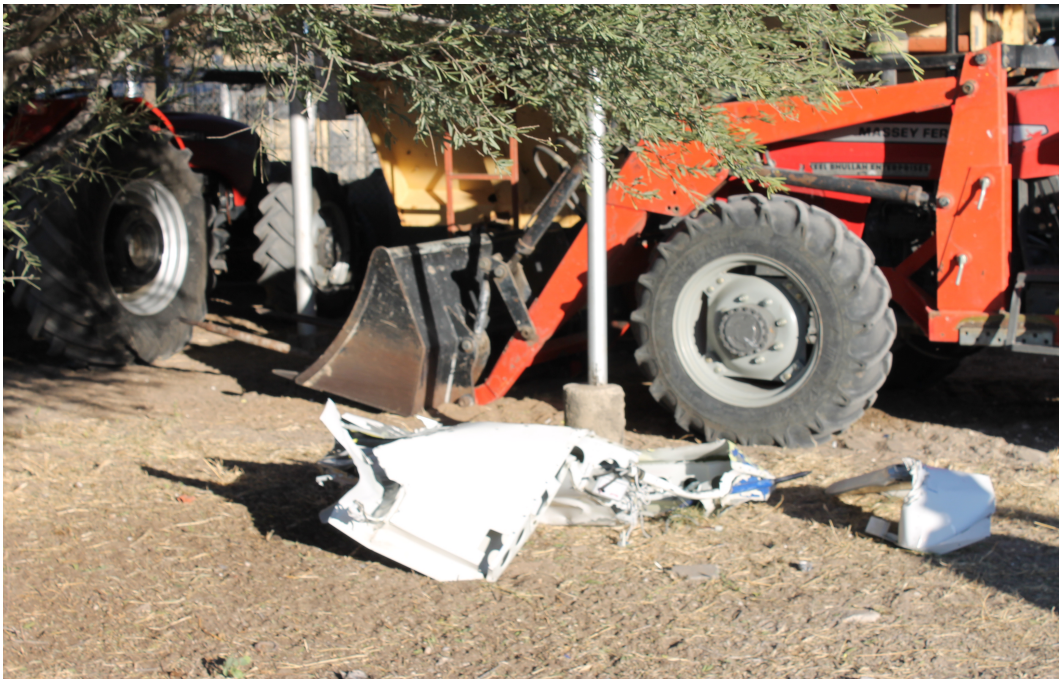

Figure 1: Images of the chopped off port wing tip that remained at the initial spot of collision.

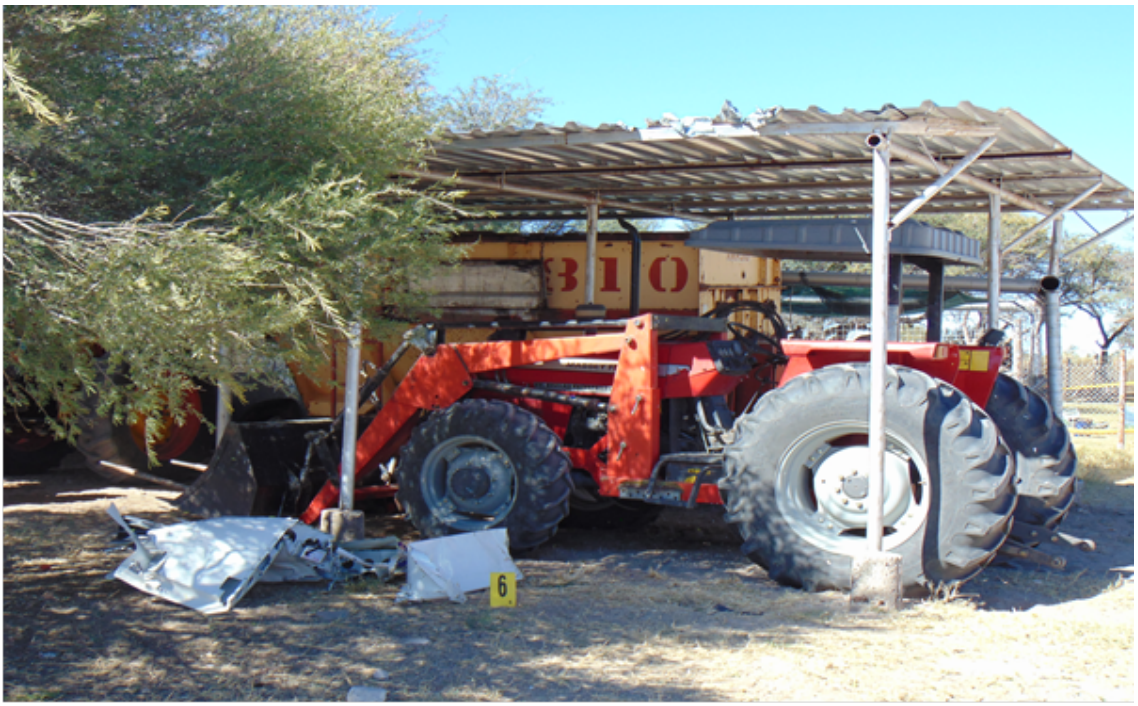

Figure 1b: View of the tree branch and the vehicle shade roof reflecting the impact from collision with port wing. (Initial points of collision).

Figure 1c: Close view of the resulting damage on the vehicle shade roof structure

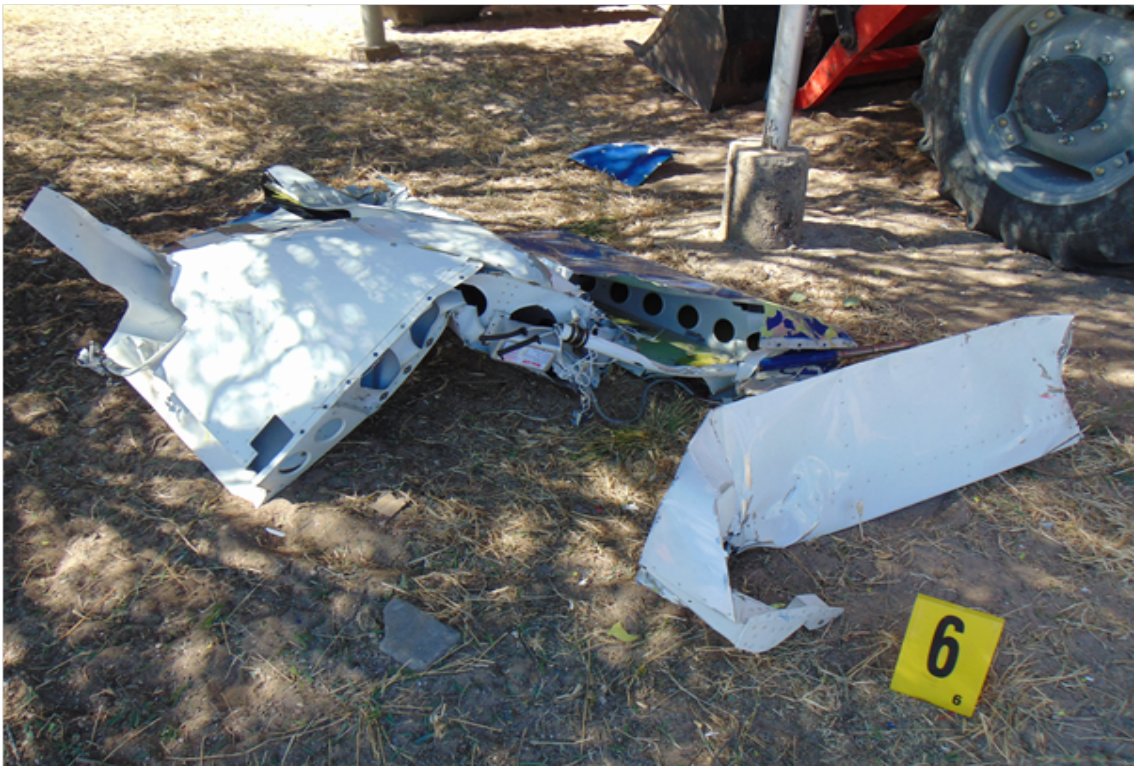

Figure 1d: Close view of the port wing tip that fell off at the spot of initial collision.

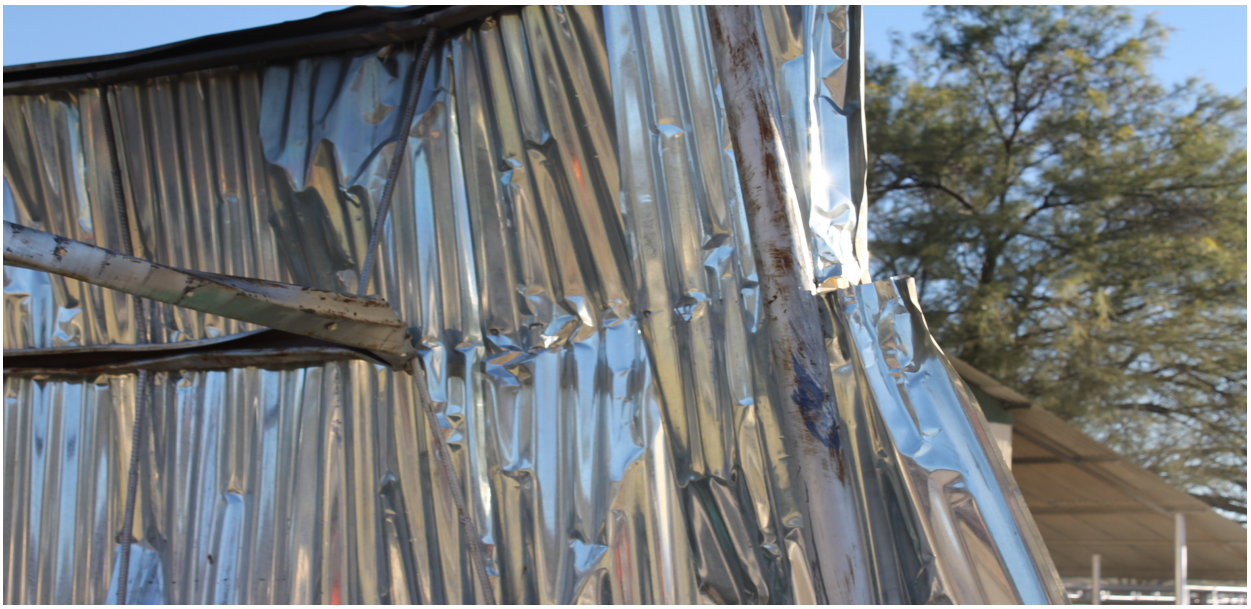

Figure 2: View of the next collision impact point after the vehicle shade which is a milling equipment roof next to the farm shed.

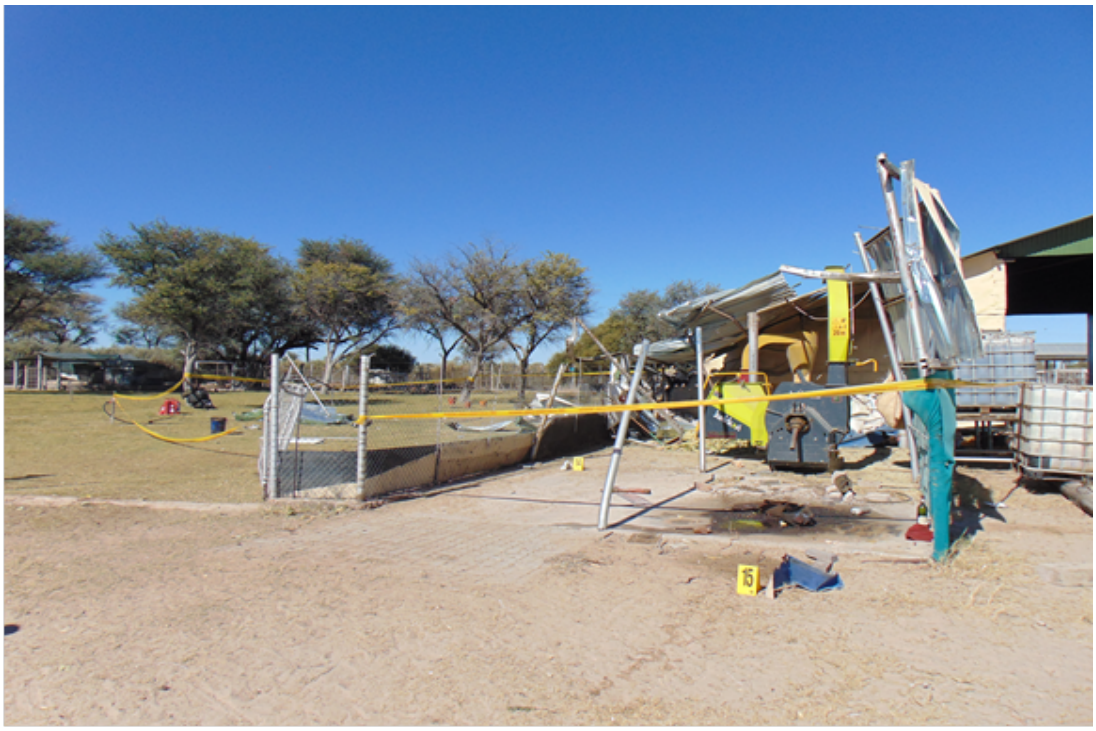

Figure 2b: Front view of the decimated roof of the milling shed next to the main farm shed.

Figure 2c: View of the roof beam structure that probably caused the aircraft to flip over.

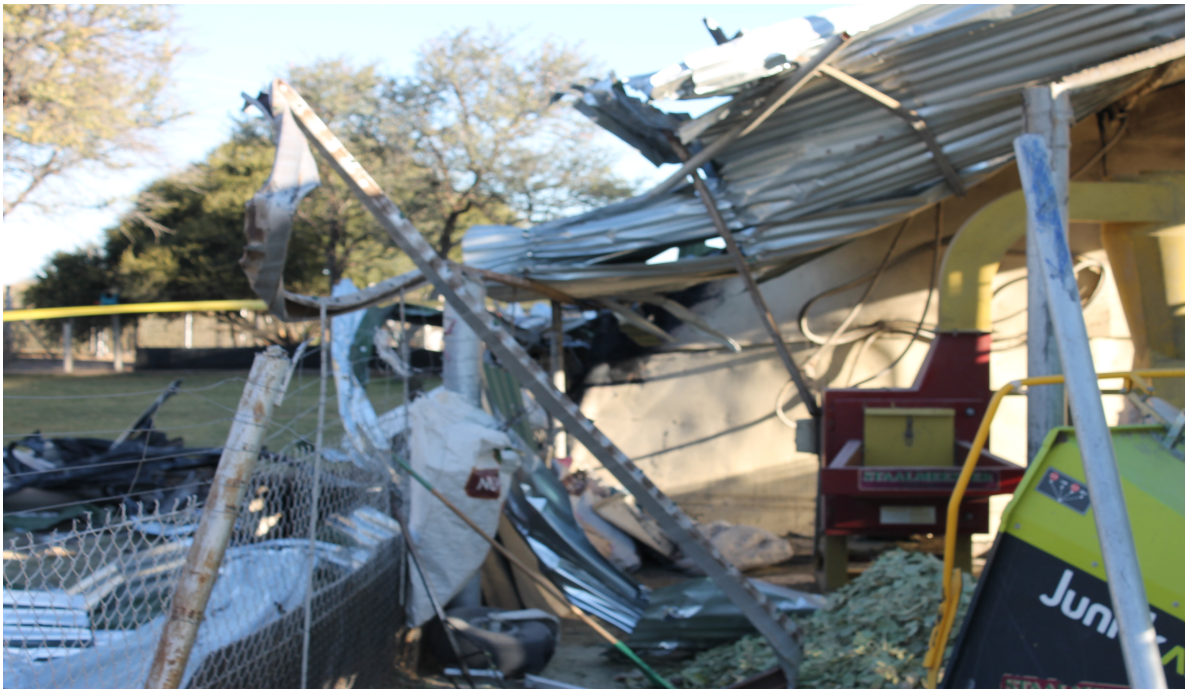

Figure 2d: The decimated roof truss of the milling equipment structure.

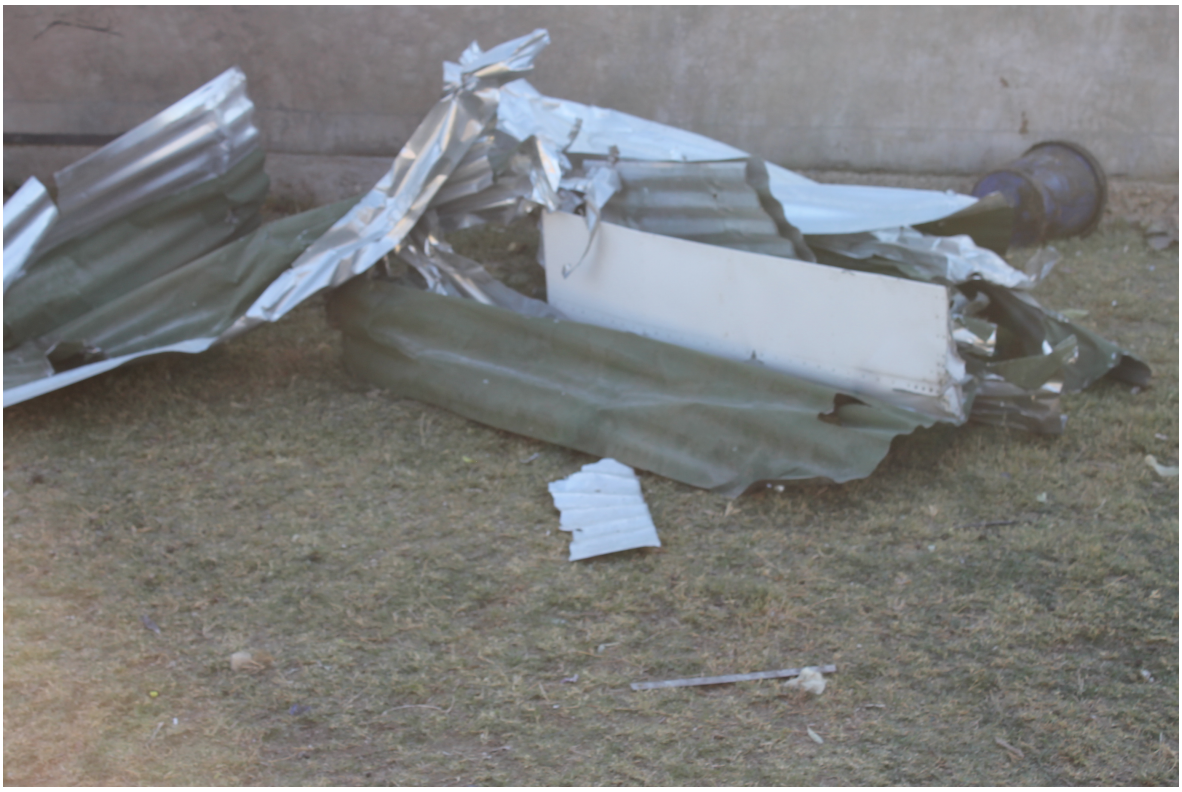

Figure 2e: Sheet metal following the collision left strewn by the farm shed.

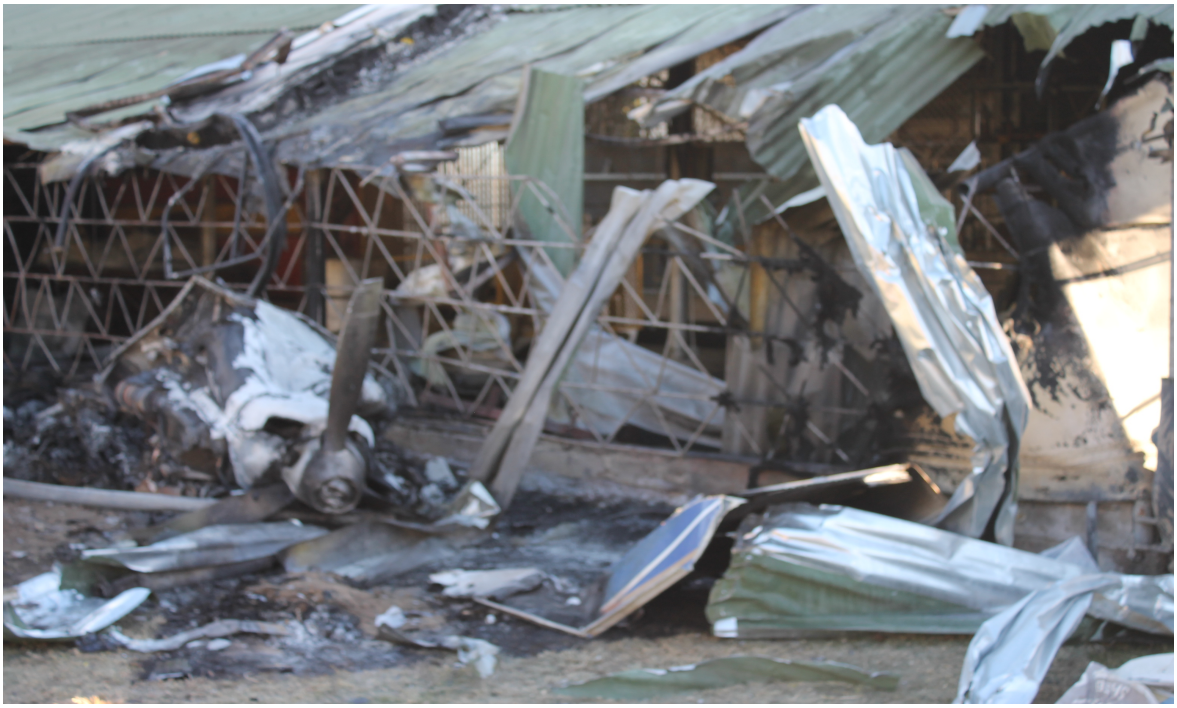

Figure 2f: View of aircraft nose with propeller blades next to damaged side wall of the farm shed.

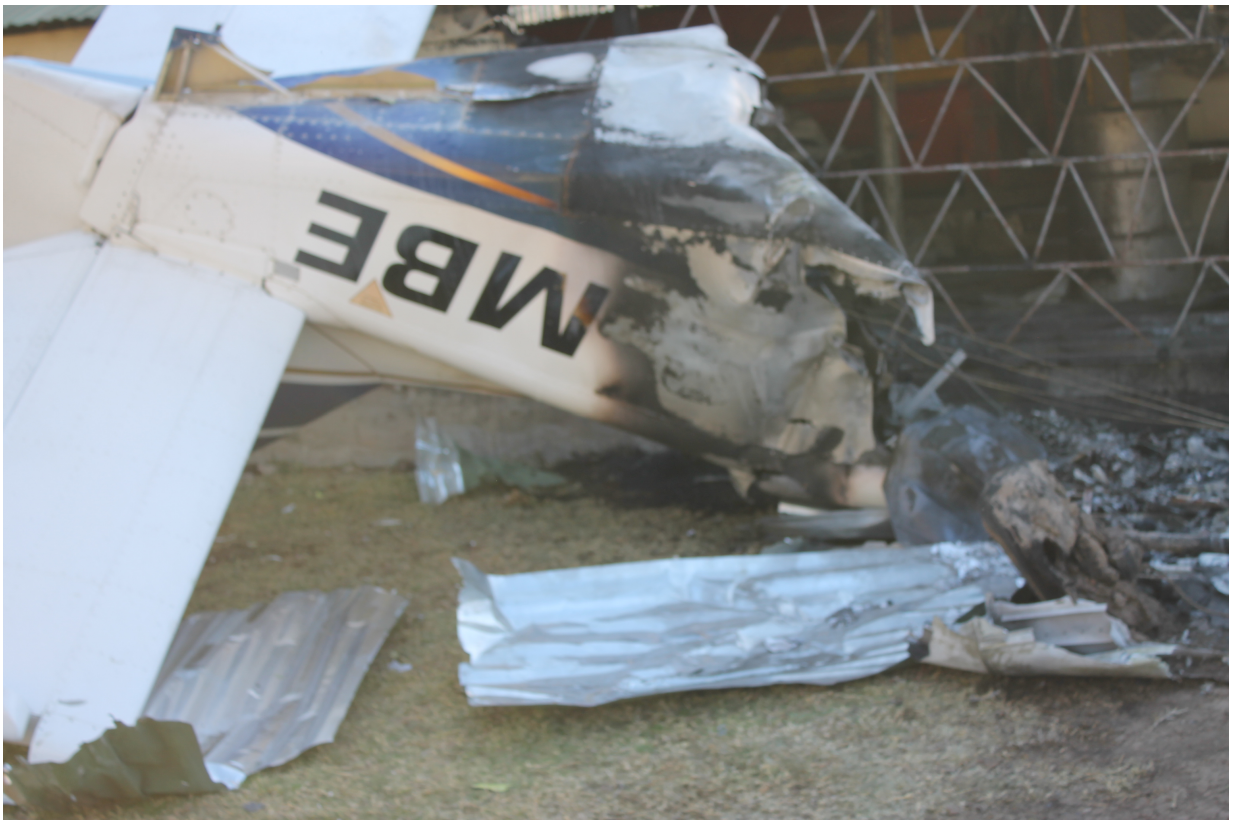

Figure 2g: View of a remaining aircraft empennage next to the farm shed**.**

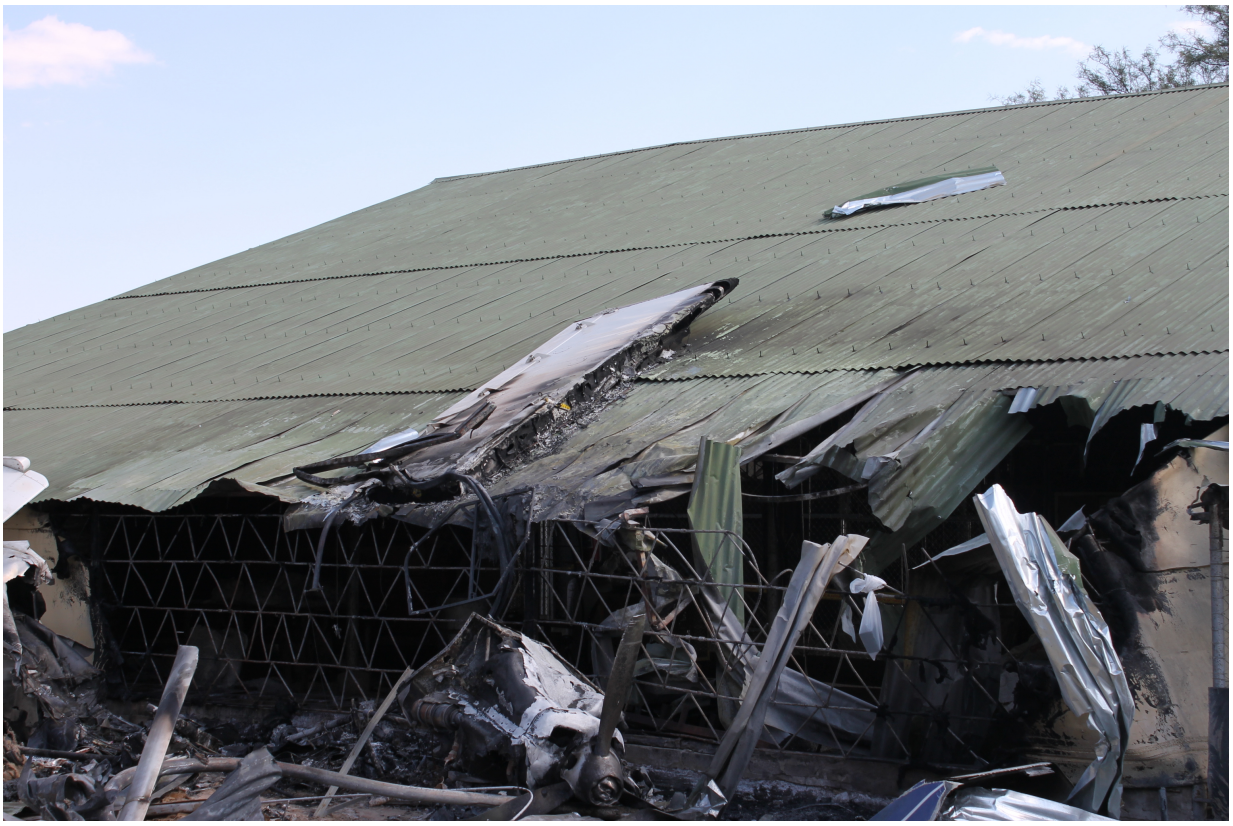

Figure 2h: The torn starboard wing resting on the farm shed roof.

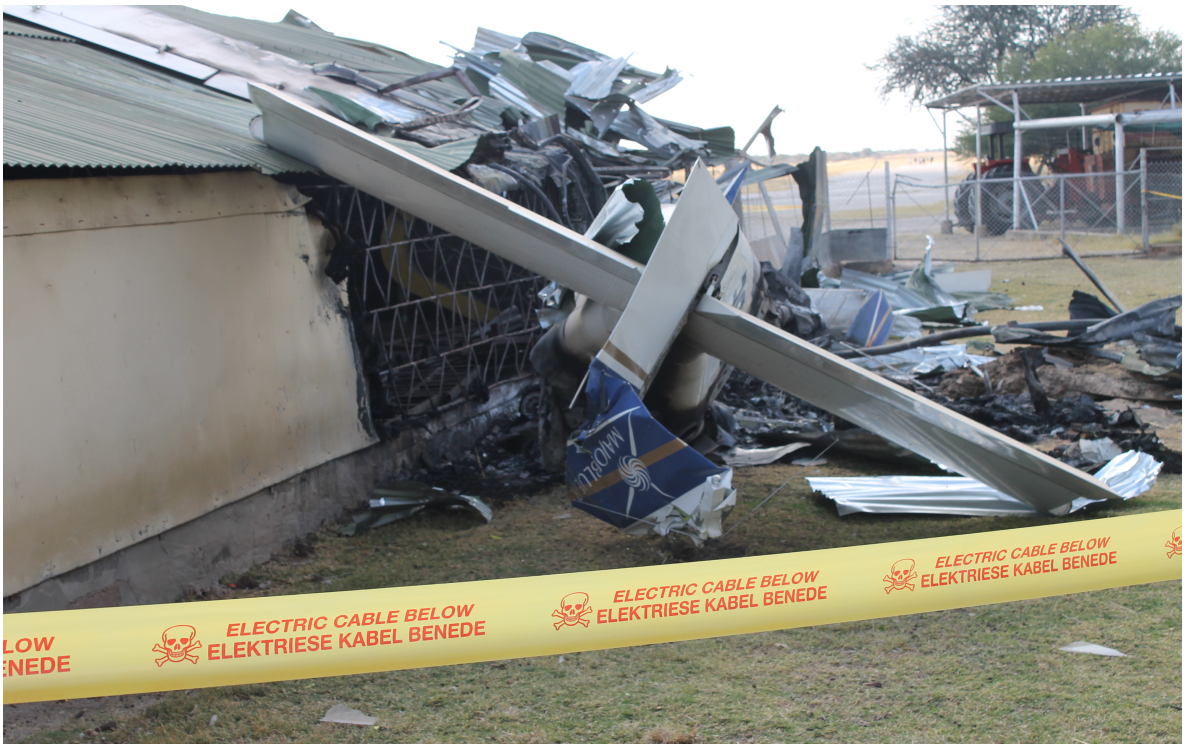

Figure 2i: View of the wreckage facing the runway.

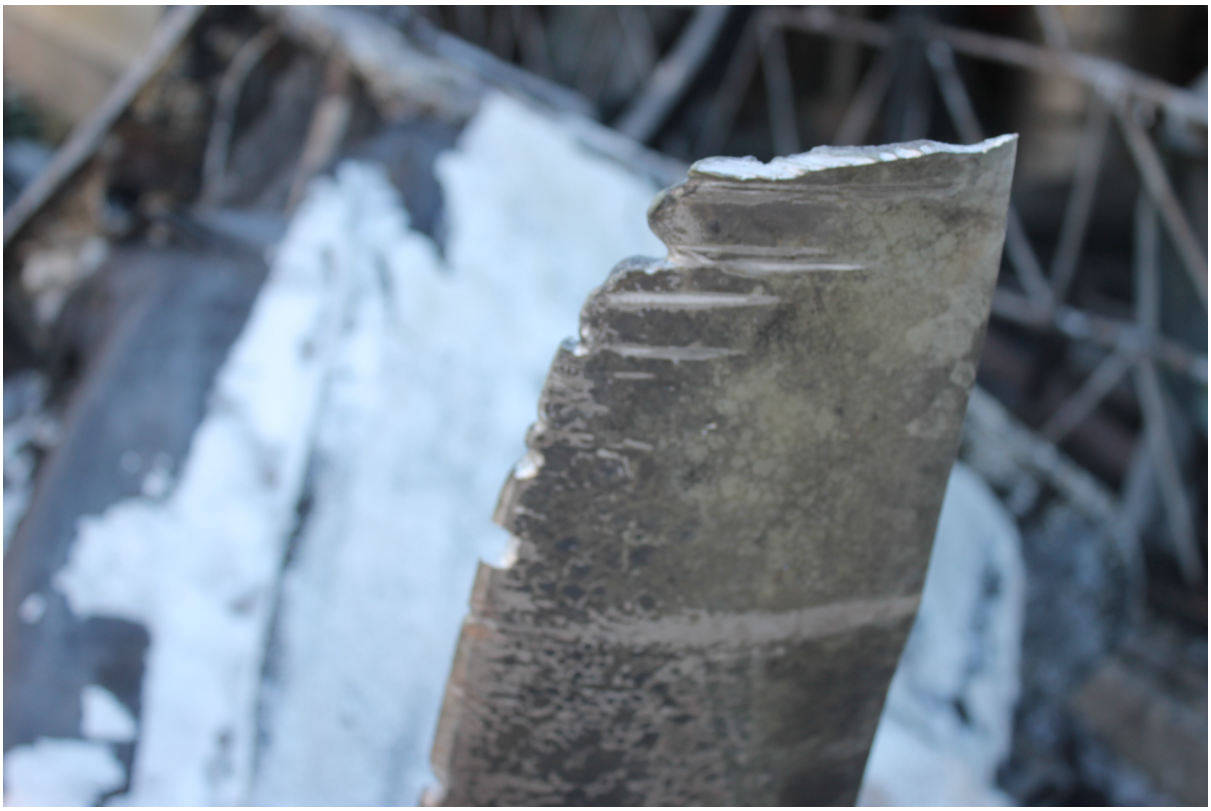

Figure 3: One of the 3 propeller blades with the tip cut off due to collision at maximum speed.

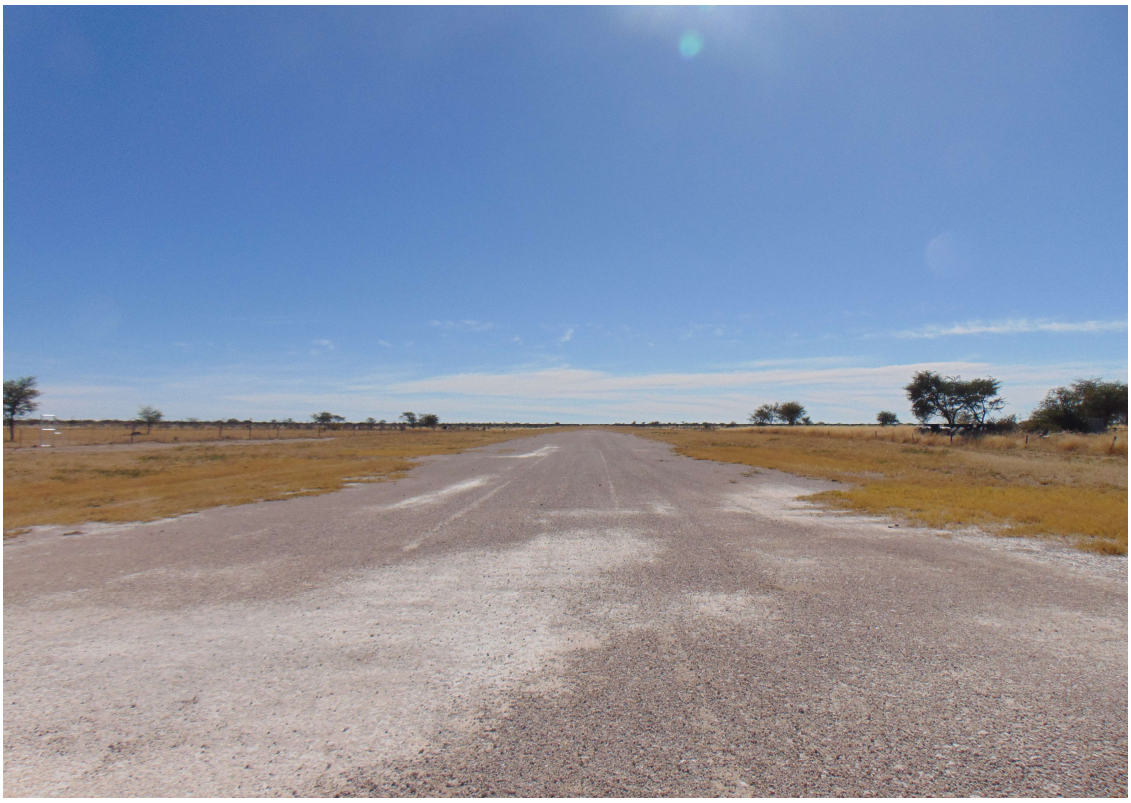

Figure 4: View of the runway (RWY 30) from the direction that A2 – MBE was heading. (looking at the ground run starting point)

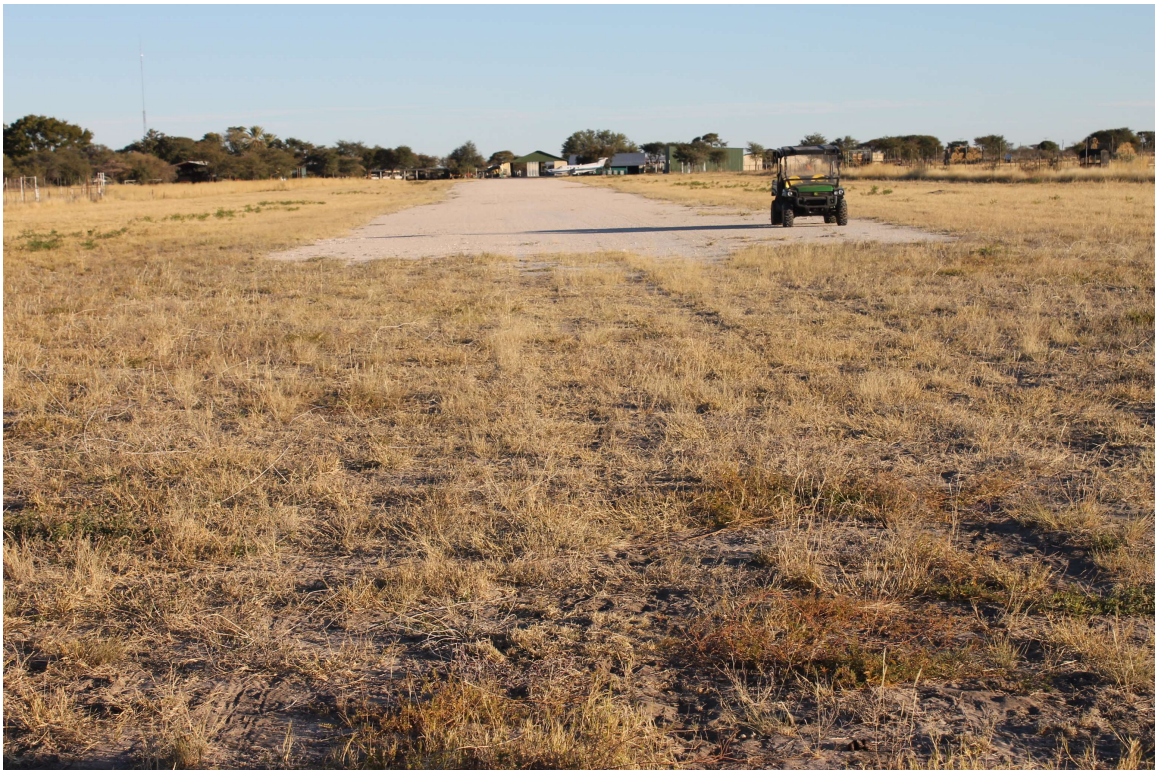

Figure 4b: View from the starting point of the aircraft ground run.

Figure 5: View of the A2 – MBE tracks as it was approaching the engine run-up area prior to encroaching onto runway end safety area.

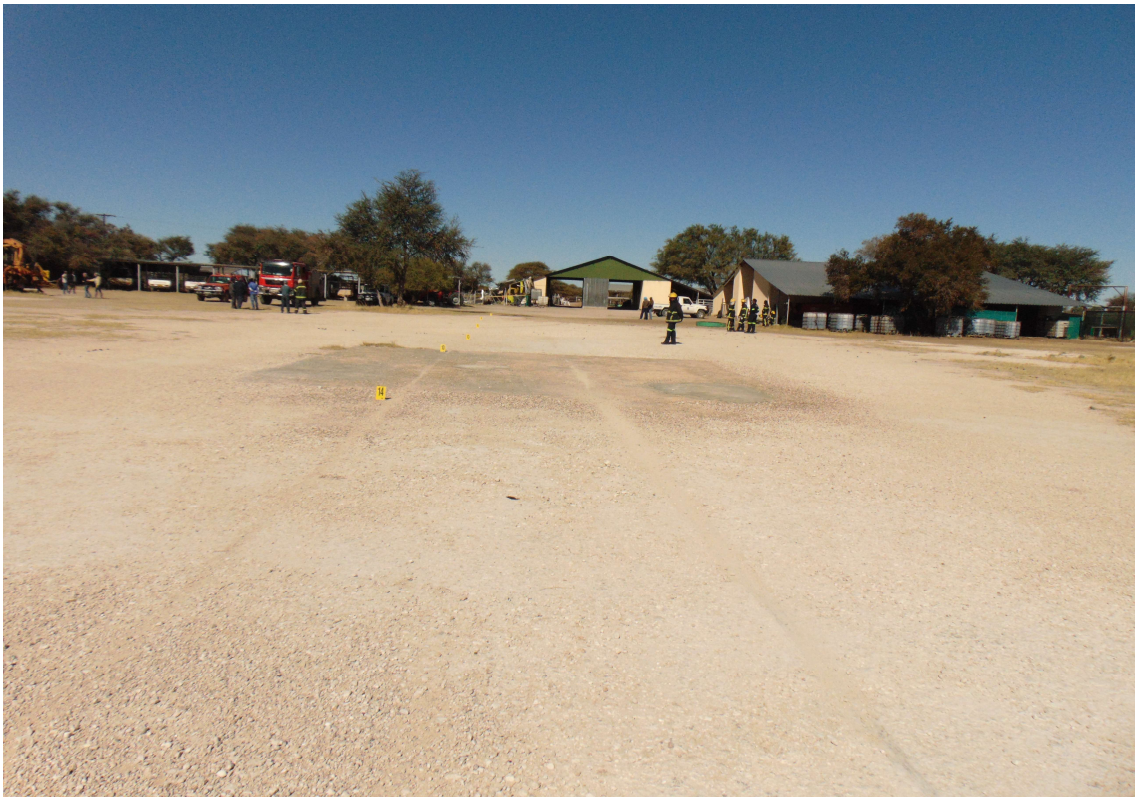

Figure 5b: Evidence of main landing gear under brakes at a critical stage

Figure 5c: Tracks of left main gear approaching the engine run-up area.

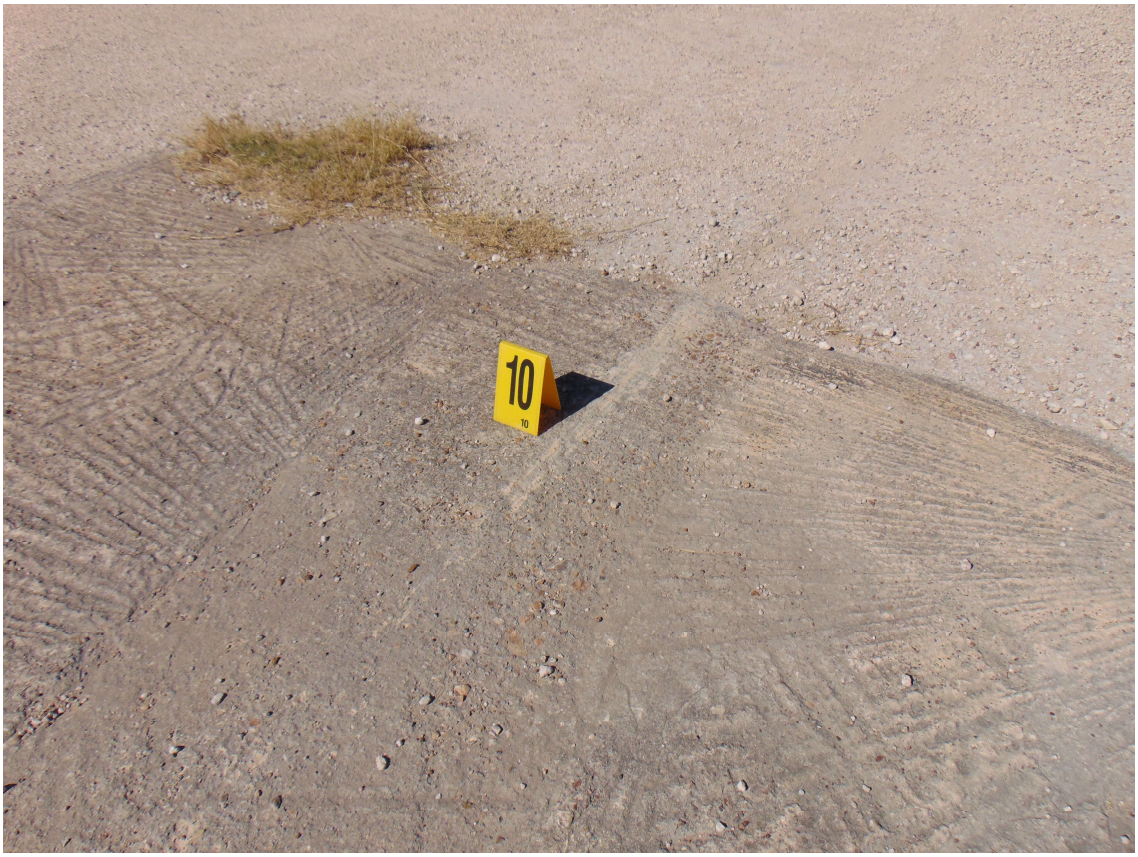

Figure 5d: Track of port side (left) main gear existing the engine run-up area.

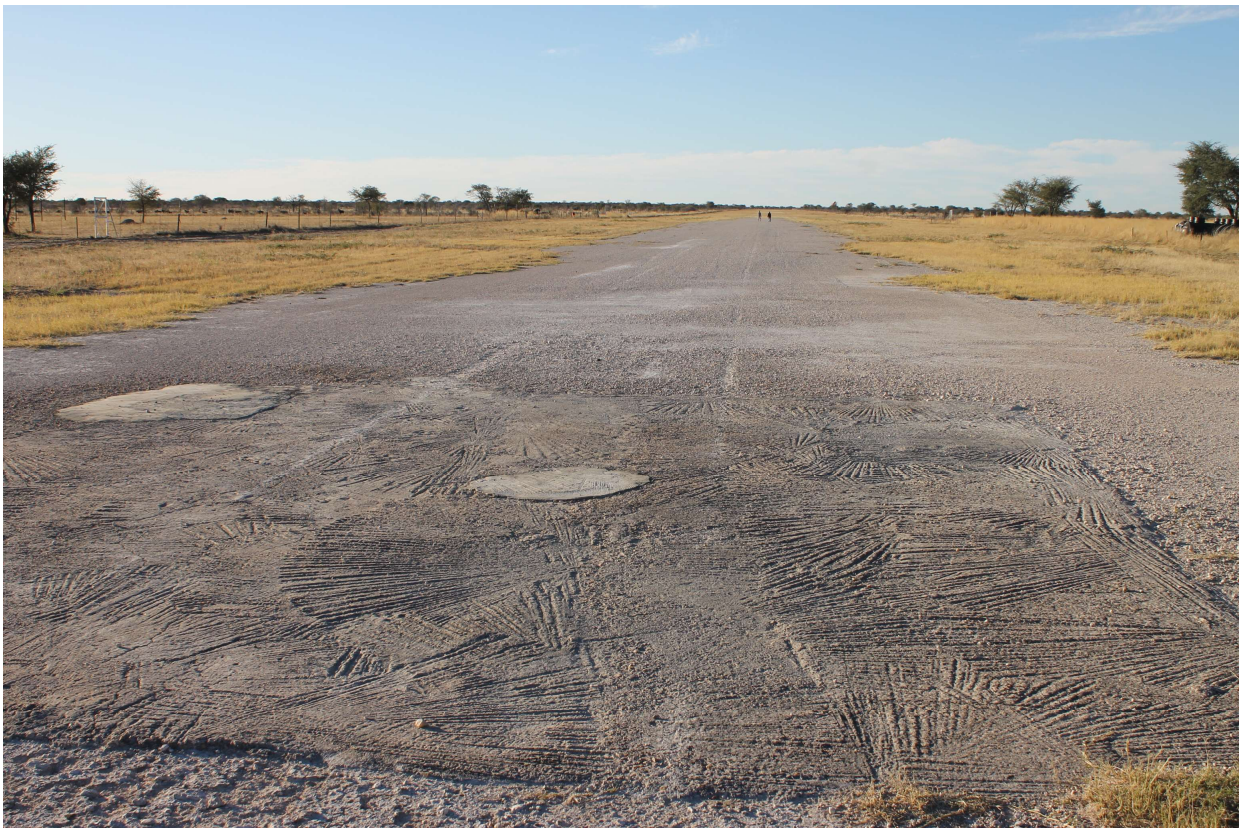

Figure 6: view of the main gear tracks over the engine run-up area.

Figure 6b: View of the starboard (right side) main gear tracks.

Figure 6c: Close up view of the starboard side main gear tracks

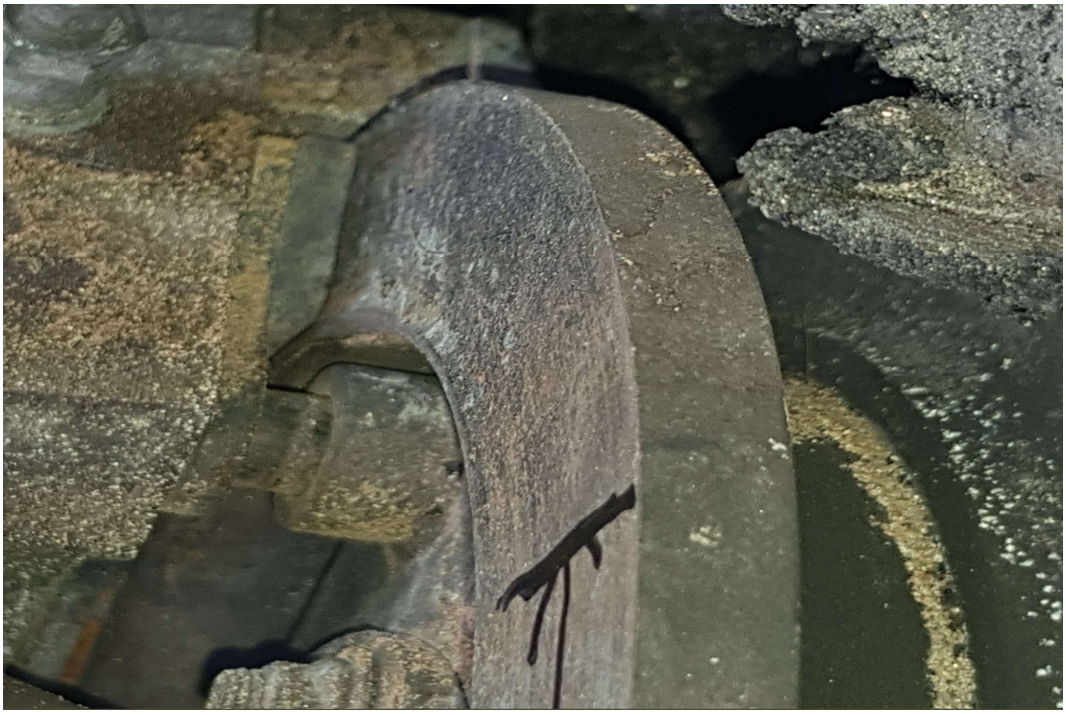

Figure 7: Picture showing main gear brake pads engaged on the disc. (Port)

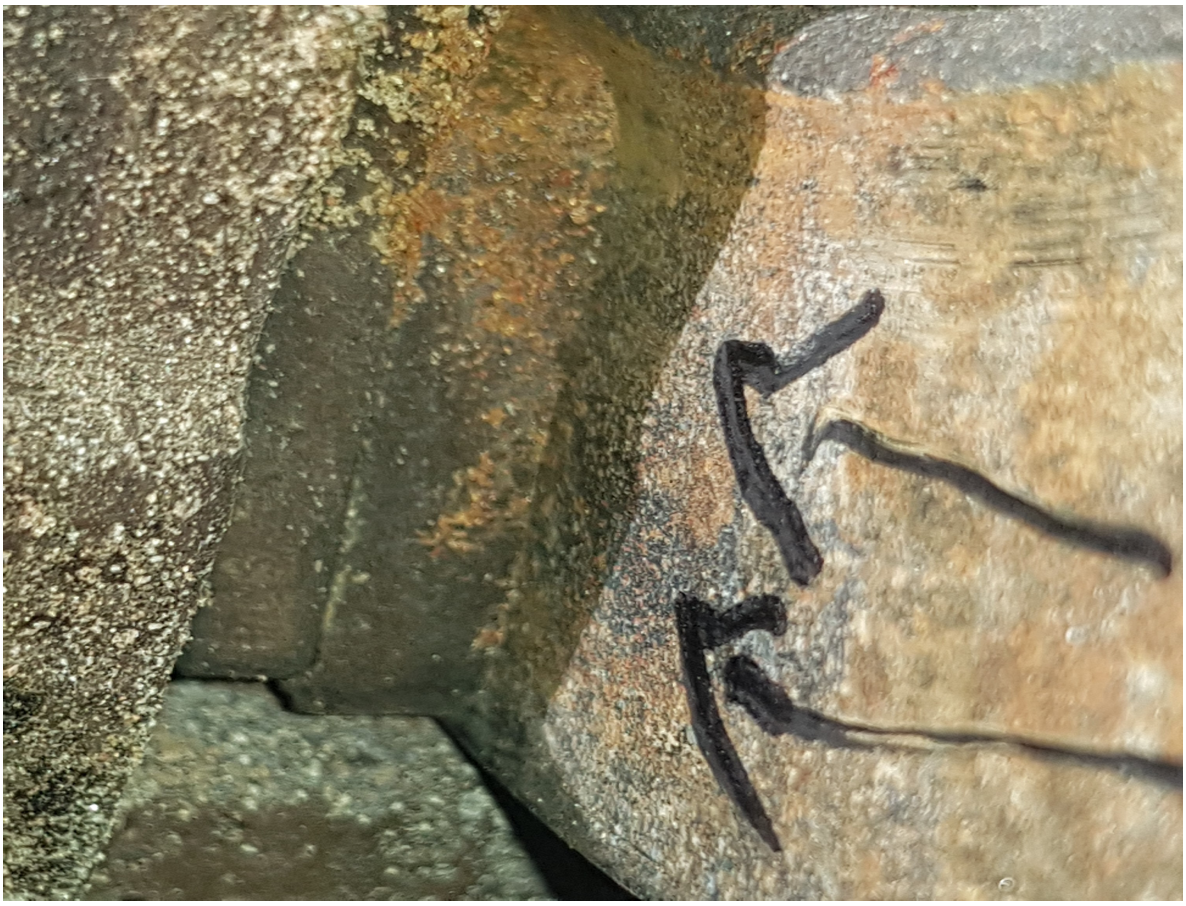

Figure 7a: Close view showing left main gear brakes pads engaged on the disc.

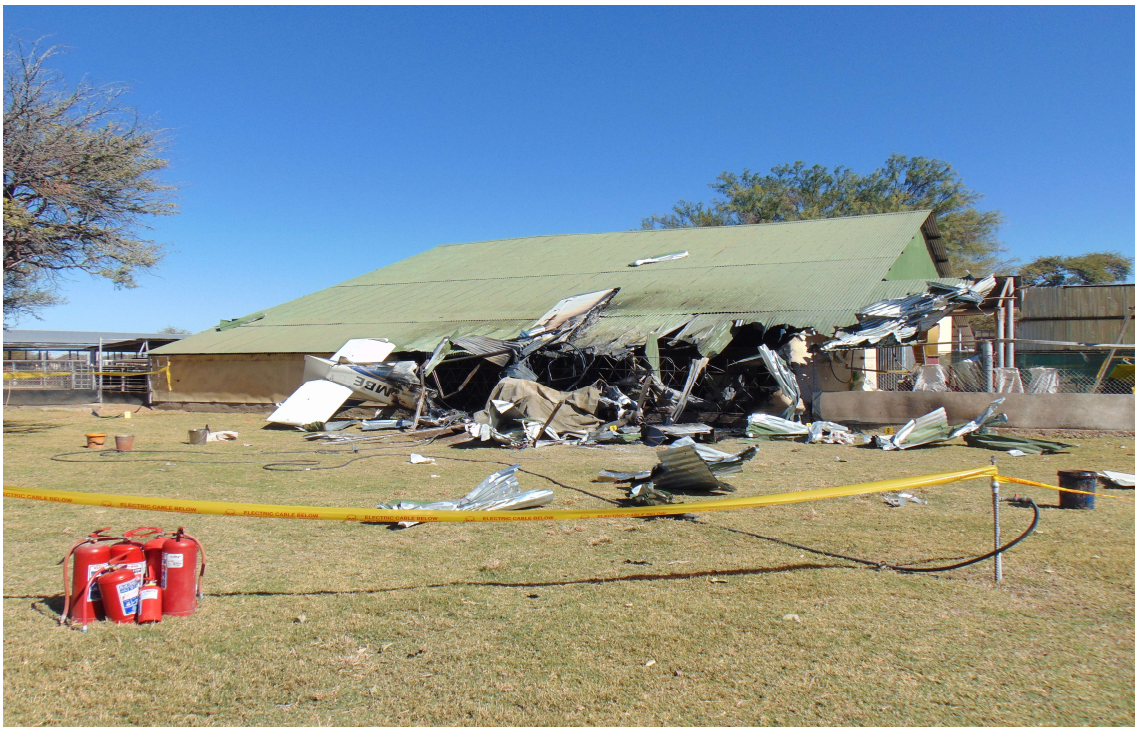

Figure 8: View of the final rest position of the wreckage and the destruction on the farm shed.

-END-

ANNEXURE TO THE FINAL REPORT

In accordance with regulation 36(1)(b) of the Republic of Botswana Civil Aviation (Accident and Incident Investigation) Regulations of 2022, a draft final report was served as notice to entities or person whom are directly affected by this report. This was done in order for the served party(s) to submit their significant and substantiated comments.

Following the circulation of the draft final report, the operator submitted their comments to the IIC. After a thorough consideration of the received comments, it was found necessary to offer clarification on some aspects of the draft final report that the operator's submissions touched on.

The IIC offered selective response to clarify some aspects of the report which the operator commented on. Not all the comments attracted a response as some queries were deemed to be complimentary as well as others were misconstrued to mean what is not intended.

1. In reference to paragraph 1.1.2 of the draft final report, the Operator's submitted comments stated that;

   ["the second person was not a crew member but an observer pilot, who was occupying the right-hand seat."]

IIC response - During the report compilation, the IIC relied on the operator provided documentation through a completed form - (Air Accident Primary Information Record) to state facts as found at para. 1.1.2. The form, which was completed on the 29/06/2024 contained information to the effect that **TOB** + Crew is 2 + 2. (Meaning that **Total on board** = 2 Crew and 2 passengers).

2. In reference to paragraphs 1.1.7, 1.1.8 and 1.1.9 of the draft final report, submitted comments referred to the obstacles that were in the flight path (space at the end of the runway) and the fact that no adequate markings or caution existed in order to alert the airfield users (pilots) of imminent hazard. The comments stated that the draft report did not mention the lack of safety features in relation to runway end and the looming obstacles.

IIC response - The comments are noted and would lead to the adoption in the final report.

3. In reference to paragraph 1.8.2, submitted comments read thus –

   ["The runway has two colour gravel and grass and it is anticipated that the grass portion should be having potholes. The portion covered with grass needs to be attended too with immediate effect. Pilot might have avoided grass surface to avoid potholes."]

IIC response - The comment on long grass will be considered for adoption in the final report. The issue of possibility of potholes if it was a concern, the PIC could have taken measures to ascertain whether the ground was in a such a state instead of making an assumption.

4. The submitted comments in reference to paragraph 1.16.9; 1.16.10; up until paragraph 2.5 touches on the principle or privileges of aviation accident investigation.

IIC response - The operator is drawn to the attention captured on pages 2 and 3 of the report.

5. Received comments in reference to paragraph 2.6, the operator queries;

   ["How did the presence of the crowd adversely affected the young pilot in leading to make an erroneous decision in landing and take-off?"]

IIC response - The operator's attention is drawn to the fact that flying/piloting is a stressful job without a doubt. Research has been conducted and paper(s) written about the "Effect of peer pressure on flight safety" It has been proved that multiple external factors come into play and can distract or take away the pilot's focus. Some of these factors come from unlikely sources, like a crowd of spectators. (Nadeem, n.d.)

Based on the above, it cannot be ruled out that the desire to impress or show-off in front of a crowd in order to make an impression especially by a younger person is a far-fetched idea. Since the response to external factors that exert pressure on individuals can happen in a variety of

ways, sometimes the response is unplanned and at other times it is well calculated.

6. This is a broad subject on its own but what is of significance is that the Operator must take cognisant of such aspects and incorporate them in crew training/briefing program so as to sensitise and bring awareness to the crew to emphasise that at all time they must stay alert and focussed on the job at hand.

7. The rest of Operator's comments are noted and have been deemed not to cause or effect amendment to the report.

References

Nadeem, T., n.d. *Linkedin.* [Online]
Available at: https://www.linkedin.com/pulse/effects-peer-pressure-flight-safety-tahir-nadeem/
[Accessed August 2023].

-END-