

Review of Aviation Safety Performance in Ireland

DURING 2019



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Foreword



Welcome to the IAAs' 2019 Annual Safety Performance Review (ASPR), its eleventh year of publication. Safety risk management is an integral component of the Irish State Safety Programme and the continuous monitoring of safety performance across the aviation industry undertaken by the IAA SRD on behalf the State informs this risk management process.

The ASPR provides an aggregated summary of the safety performance of organisations and persons, divided into aviation sectors, based on types of operation and level of activity. The IAA also conducts reviews of safety performance with approved organisations on an on-going basis to ensure that safety issues are being addressed.

The Irish civil aviation industry continued to grow and evolve in 2019. The IAA currently oversees over 1,300 registered aircraft, 16 air operators, 22 licensed aerodromes, 77 airworthiness organisations, 49 training organisations and over 17,000 licensed personnel. There are over 12,000 registered drones.

Globally the number of fatalities in 2019 were 50% lower than the previous year however the number of fatal accidents increased year on year and equated to one fatal accident per every two million flights worldwide. For European air carriers there were no fatal accidents with over 1.1 billion passengers transported.

The continued grounding of the Boeing B737-MAX8 pending investigation into the cause of the accidents and implementation of the required fix, impacted the industry and necessitated the implementation of robust management of change processes.

In Ireland, whereas the main statistics for accidents and serious incidents show reducing trends in many areas, sadly there were four fatal accidents in the general aviation sector, with the loss of six lives. The staff of the IAA would like to extend our sincerest sympathies to the families and friends of the deceased. The accidents are under investigation by the Air Accident Investigation Unit (AAIU).

This safety performance review highlights the need for continuous improvement in safety risk management processes at both State and organisational level. One of the key elements of safety management is safety occurrence reporting, without which the opportunity to learn from each other is lost. The tireless efforts of all stakeholders are required in order to improve safety. The IAA continues to promote and encourage persons involved in any aspect of civil aviation to report safety concerns to their organisation or to the IAA (<https://www.iaa.ie/safety/safety-reporting>).

Thank you for taking the time to read this review.



Maurice O'Connor, Acting Director Safety Regulation Division

Executive Summary

The Annual Safety Performance Review is compiled by the Safety Regulation Division (SRD) of the Irish Aviation Authority (IAA). This report examines the safety performance of Irish civil aviation and summarises the main safety issues identified by the IAA from this review, in conjunction with safety information provided at EU (e.g. EASA) and global (e.g. ICAO) level.

The safety performance review is divided into different sectors based on the types of operation and level of activity in the State. This review addresses the following four sectors of Irish civil aviation:

- The Irish Fixed-Wing Commercial Air Transport Sector
- The Irish Commercial Helicopter Sector
- Air Navigation Services and Aerodromes in Ireland
- General Aviation in Ireland

The following infographics provide a top-level summary of the main performance statistics in each of these sectors. Further details on these statistics, along with the safety issues that emerge from the analysis of safety performance, are provided in the body of this document.



Irish Air Fixed-Wing Commercial Air Transport Sector



Irish fixed-wing aircraft engaged in CAT were involved in 15 accidents between 2015 and 2019. During 2019 there was 1 non-fatal accident and no fatal accidents. The categories most commonly applied by the Safety Investigation Authority (SIA) over this 5 year period were:



Ground handling



Turbulence encounter



Ground collision



System failure of malfunction



Cabin safety



Medical

There were 73 serious incidents between 2015 and 2019, 10 of which occurred in 2019. The categories most commonly applied by investigating SIAs to serious incidents were:



System failure of malfunction



Airprox / near midair collision



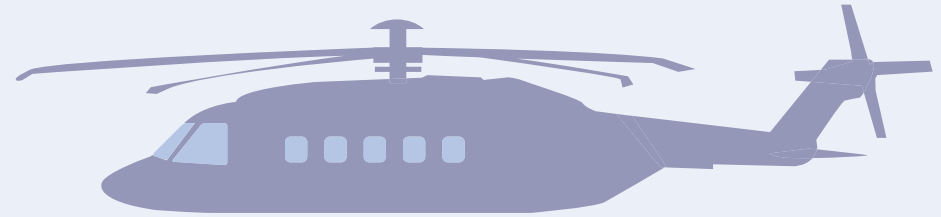
Runway Incursion (non-animal)

The Irish Commercial Helicopter Sector

The accident and serious figures provided cover helicopter operators who hold an AOC issued by the IAA and helicopter aviation activity carried out in Irish territory by Operators conducting CAT and declared activities. The IAA monitors the latter type of aviation activity in accordance with Regulation (EU) 965/2012 requirements.

Between 2015 and 2019 these operators experienced 1 fatal accident during 2017 and 1 non-fatal accident during 2015. The AAIU investigation is ongoing into the fatal accident which is presently categorised as 'Controlled flight into terrain'. The non-fatal accident was categorised as 'Abnormal runway contact' by the investigating Safety Investigation Authority (SIA).

Over the same timeframe there was 1 serious incident categorised as 'Other' by the investigating SIA.



During 2019 helicopter operators who hold an AOC issued by the IAA submitted 59 MORs, while between 2016 and 2019 there were 161 MORs submitted. The categories most commonly applied by SRD Inspectors to these MORs were:



System failure
of malfunction



Other



Security
Related

Air Navigation Services and Aerodromes in Ireland



Between 2015 and 2019 there were 4 non-fatal accidents and 15 serious incidents involving CAT aircraft at Irish certified/licenced aerodromes that provide ATC services. During 2019 there were 2 serious incidents and no accidents either fatal or non-fatal.

The ATS providers submitted 5,807 MORs between 2016 and 2019 with 1,682 MORs submitted during 2019. The three occurrences categories most commonly assigned to the MORs were:



Air traffic management



Navigation Errors



Other



Ground handling



Other



Aerodromes

Between 2016 and 2019 Aerodrome operators submitted 1,798 MORs, 544 of which were submitted during 2019. The three most commonly assigned occurrence categories were:

General Aviation in Ireland 2015 - 2019

8



Aeroplanes over 2,250 kg

2 Fatal Accidents
1 Non-Fatal Accident
0 Serious Incidents



Helicopters over 2,250 kg

0 Fatal Accidents
0 Non-Fatal Accidents
0 Serious Incidents



Sailplanes and Powered Sailplanes

0 Fatal Accidents
2 Non-Fatal Accidents
1 Serious Incident



Aeroplanes under 2,250 kg

5 Fatal Accidents (incl 2 homebuilt)
22 Non-Fatal Accidents (incl 5 homebuilt)
13 Serious Incidents (incl 1 homebuilt)



Microlight

2 Fatal Accidents
3 Non-Fatal Accidents
1 Serious Incident



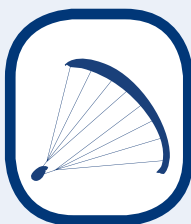
Gyrocopters

0 Fatal Accidents
0 Non-Fatal Accident
0 Serious Incidents



Helicopters under 2,250 kg

0 Fatal Accidents
6 Non-Fatal Accidents
1 Serious Incident



Paragliders, Powered Paragliders and Powered Parachutes

2 Fatal Accidents
1 Non-Fatal Accident
1 Serious Incidents



Hot Air Balloons

0 Fatal Accidents
0 Non-Fatal Accidents
0 Serious Incidents

SECTION A
INTRODUCTION



Introduction

Safety assurance is one of the four key pillars of the State Safety Programme and safety risk management is a fundamental element of this assurance process. The IAA Safety Regulatory Division conducts this safety risk management process. In addition to the regulatory oversight of the Irish civil aviation industry, SRD monitors safety performance of the industry through the collection, analysis and exchange of safety data. The collection and analysis of occurrence reports in accordance with Regulation (EU) No 376/2014 enables enhanced safety intelligence that allows for the identification and optimisation of safety measures that can target the areas of greatest risk.

This annual report presents an aggregated summary of the main safety intelligence derived from safety performance monitoring at State level. In addition, tailored reviews of pertinent safety issues are conducted with individual regulated organisations.

The data sources for this report include the independent Irish Air Accident Investigation Unit for accident and serious incident investigations as well as the analysis of occurrence reports submitted to the IAA. In accordance with regulations the statistical information is presented in an aggregated manner so that individuals involved are not identified.

Sadly, the report also addresses a small number of fatal accidents, and the IAA offers sincere sympathies to family and friends of the deceased in these cases. The IAA, in conjunction with all the stakeholders in the civil aviation sector in Ireland, has implemented safety risk management processes to try to prevent fatalities in aviation, and sharing the lessons learned from such tragic accidents is a vital part of the process.

Occurrence Reports

Aviation safety is supported by a robust regulatory framework that includes strict regulations on occurrence reporting. The purpose of occurrence reporting is to enable regulated organisations and regulatory authorities to continuously monitor safety performance and to take actions to address safety concerns. The regulations include mandatory provisions for who should report safety occurrence and the type of occurrences that must be reported. They also require organisations and States to establish appropriate systems to facilitate the collection and analysis of such reports and provide follow up details of the results of the investigation of these reports. The regulations also provide for voluntary reporting systems to enable any person to report occurrences to address any safety concern. For further details on how to report to the IAA see <https://www.iaa.ie/safety/safety-reporting>

Occurrence reports are subject to investigation and analysis by regulated organisations and the IAA and both entities are required to ensure that any safety concerns are addressed in a manner commensurate with the level of safety risk identified. To achieve this objective, each occurrence report is subjected to a risk classification that is used to target the higher risk occurrence for more immediate safety action. Only a very small proportion of occurrences reported to the IAA concern an accident or a serious incident. Occurrence reports mainly address the type of events that may be part of the causal chain of a previous accident but in the specific circumstances of the report were prevented from escalating to an accident by remaining layers of safety barriers (including human and technological). The risk classification scheme is designed to highlight those occurrences with fewer remaining barriers.

The IAA uses an EU developed aviation risk classification methodology, Airline Risk Management Solutions (ARMS), that is used to assign a risk score to each individual occurrence. The methodology includes a risk matrix with associated traffic light colour scheme, whereby green represents low risk, amber represents medium risk and red represents high risk. Where relevant, statistical charts on occurrences provided in this review include this risk classification colour scheme. The vast majority of occurrence reports to IAA were classified as low risk, however it remains important to monitor these events to ensure they remain under control.

The IAA, in common with all other aviation authorities across the world, receives thousands of occurrence reports each year that are subject to safety analysis. To support this analysis, ICAO has endorsed an occurrence reporting "Common Taxonomy" which facilitates the categorisation of events using standardised terminology to improve the aviation community's capacity worldwide to focus on common safety issues. The ICAO taxonomy for occurrence category is used throughout this report. The same occurrence category may be assigned to an occurrence involving an actual accident e.g. LOC-I (Loss of Control – Inflight) or to a precursor event that has been identified previously as part of the chain of events leading to a LOC-I accident, such as aircraft stall warning.

Independent Air Accident Investigation

As a completely independent function, the Irish Air Accident Investigation Unit is responsible for investigating the more serious occurrences that have resulted in an aviation accident or a serious incident as defined by Annex 13 of the Chicago Convention.

The AAIU investigates civil aviation accidents and serious incidents that take place in Ireland. Occurrences involving an Irish AOC holder or an Irish registered aircraft that took place outside of Ireland may be investigated by a foreign safety investigation authority (SIA) or that SIA may delegate the investigation fully or in part to the AAIU. The AAIU maintains a register of all accidents and serious incidents of concern to Ireland, including those investigated by AAIU and those investigated by a foreign SIA.

The statistics on accidents and serious incidents presented within this document have been compiled using the data provided by the AAIU. All accidents and serious incident investigations the AAIU have initiated, or have been notified of, are included in this report, even if the investigation itself is ongoing and the final investigation report has not been finalised. The classification of an occurrence (i.e. accident, serious incident, incident) is subject to change until the completion of the investigation, and consequently this may lead to minor differences in the details provided between consecutive Annual Safety Performance Reviews.

Layout of Annual Safety Performance Review

This report is divided into four sections to address:

- commercial air transport aeroplane operations
- commercial helicopter operations
- aerodromes and air navigation services
- general aviation

In each section the main statistics of safety performance of the Irish civil aviation system statistics are presented for accidents, serious incidents and occurrences. The report then focuses on identifying the main safety issues that emerge from the analysis of the data.

The vast majority of reports submitted to the IAA come from organisations who must investigate and analyse their own reports and identify risks and risk mitigating actions as part of their safety management systems. The role of the IAA, and this review in particular, is to share safety information and highlight the cross-sector safety issues that

emerge from analysis of the safety performance of multiple organisations operating within that sector.

Aviation is a global business and the IAA does not depend solely on the performance of the Irish civil aviation industry to identify safety issues. The European Aviation Safety Agency (EASA) produces an annual safety review of the safety performance of civil aviation across all EU Member States (including Ireland) and ICAO produces similar safety performance information on a global basis. The IAA takes due cognisance of the safety priorities identified at European and global level in the analysis of safety performance in this report.

As part of the risk management processes in the IAA, the safety issues are recorded in sector-based registers where they are subjected to a risk assessment to prioritise the areas of greater safety concern. A sector-based risk profile is then used to plan the relevant actions to mitigate the risk identified.

A summary of the actions that emerge from this process is provided in the State Plan for Aviation Safety (see www.iaa.ie/statesafetyplan)

SECTION B

THE IRISH FIXED WING COMMERCIAL AIR TRANSPORT SECTOR



Introduction

The Irish fixed-wing Commercial Air Transport (CAT) industry consists of two types of commercial organisations;

- operators who hold an Irish Air Operators Certificate (AOC) issued by the IAA (currently, there are 13)
- operators who operate an Irish registered aircraft on an AOC issued by a foreign State under Article 83 bis of the Chicago Convention, hereafter referred to as the 'Irish lease fleet'.

Between the Irish lease fleet and the Irish AOC holders there were 791 aeroplanes on the Irish aircraft register that were engaged in CAT operations on the 31st December 2019.

Nine aircraft operated in accordance with Part-NCC (non-commercial operations with complex aircraft) primarily for private business jet activities. Although such operations are not commercial, they are included within this section, as they are subject to similar risk exposure as commercial operators and both have commonalities in their safety issues and key risk areas.

Accidents and Serious Incidents

Over the last five years, aeroplanes operated by the Irish AOC holders or on the Irish lease fleet were involved in 14 accidents (1 in 2019) and 72 serious incidents (10 in 2019) as summarised in Table B.1 below.

Table B.1: Accidents and serious incidents involving Irish registered aeroplanes engaging in CAT

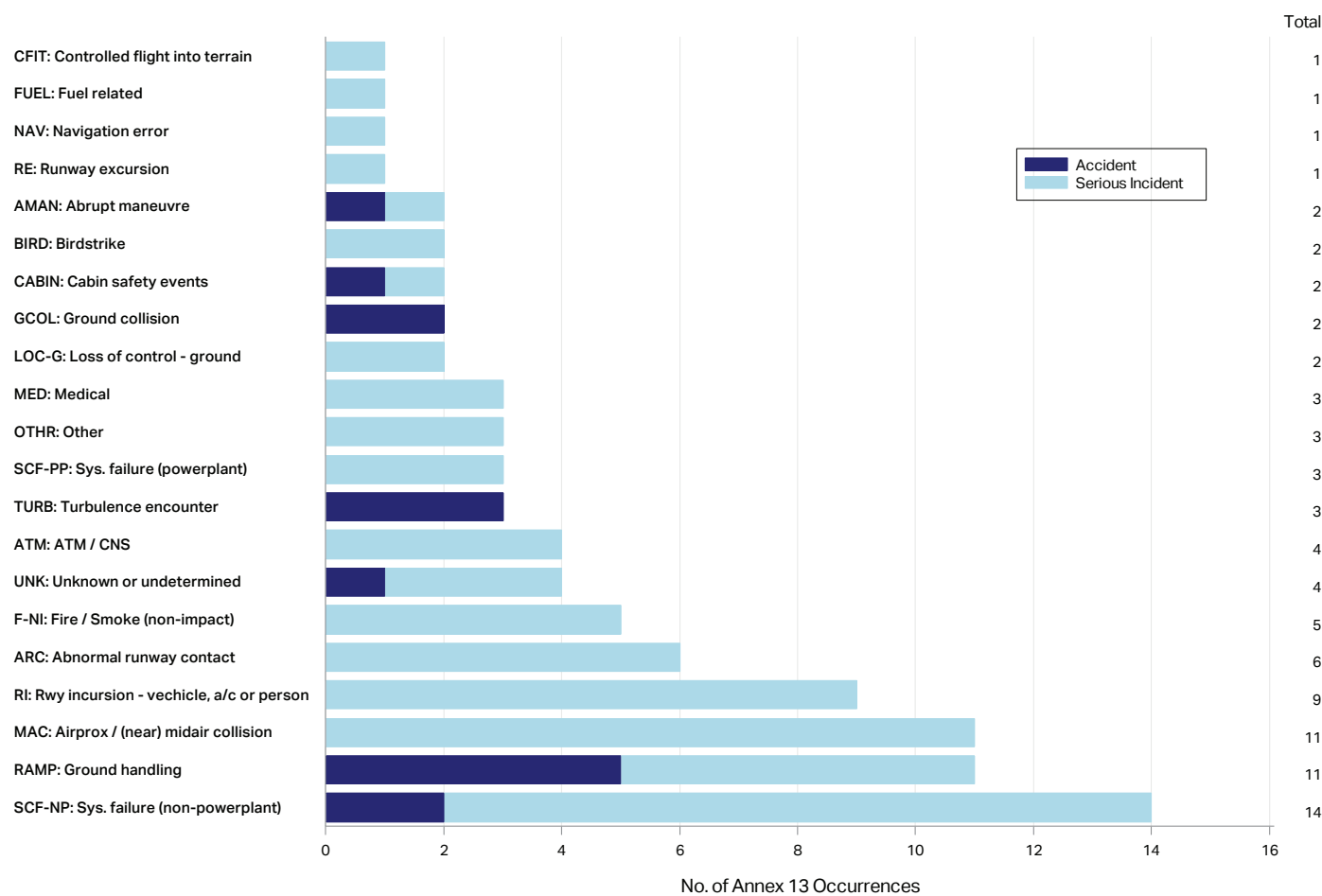
Year	No. on Irish aircraft register	Accidents			Serious incidents
		Non-fatal	Fatal	Total	
2015	740	3	1	4	20
2016	793	2	0	2	17
2017	881	5	0	5	11
2018	884	3	0	3	14
2019	791	1	0	1	10
Total	-	14	1	15	72

The fatal accident included in this table occurred during October 2015 and involved a foreign AOC holder operating an Irish registered aircraft which tragically resulted in the loss of 224 lives. It remains under investigation by the Egyptian Ministry of Civil Aviation who have advised that they are investigating suspected criminal activity as the cause of this accident.

There were no fatal accidents and only one non-fatal accident in 2019. The non-fatal accident related to a passenger who was injured while disembarking a flight.

The categories assigned to the accidents and serious incidents that occurred in the past five years are summarised in figure B.2 below and gives some insight into the type of occurrences involved.

Figure B.2: Categorisation assigned by the investigating SIA to the Annex 13 occurrences



Occurrences

Whilst the ability to learn from accidents and serious incidents is crucial, this is a purely reactive process and needs to be complemented by proactive and predictive systems that enable the timely detection of operational hazards and system deficiencies. The analysis of safety occurrences assesses safety performance and provides a much greater wealth of information to help identify safety hazards that can inform more effective improvements in aviation safety.

The chances of being involved in a flight operated by an Irish AOC Holder that is involved in a safety occurrence remains very low. The Irish AOC Holders flew over 1,100,000 flights in 2019 and reported close to 10,000 occurrences during this time. Therefore over 99% of these flights passed off without any safety occurrence that required reporting to the IAA and over 99.99% of these flights passed off without being involved in an accident or serious incident. In 2019 zero commercial flights resulted in fatalities.

The IAA categorises (groups) occurrences using the same common taxonomy as used by the AAIU, however in the case of reported mandatory occurrences the analysis is of events that could be considered precursors to accidents and/or serious incidents.

A breakdown of the top occurrences submitted by Irish AOC Holders involved in CAT operations by occurrence category and risk classification band (ref Section A) is shown in Figure B.3 below.

In addition to analysing the categories of occurrences, the IAA analyses the main event types that lie behind these figures. This analysis enables a deeper understanding of the actions involved that led to the occurrence report. Figure B.4 provides a list of the top event types reported to the IAA from the CAT aeroplane sector.

Figure B.3 Top Occurrence Categories: Irish AOC CAT Aeroplanes 2016-2019

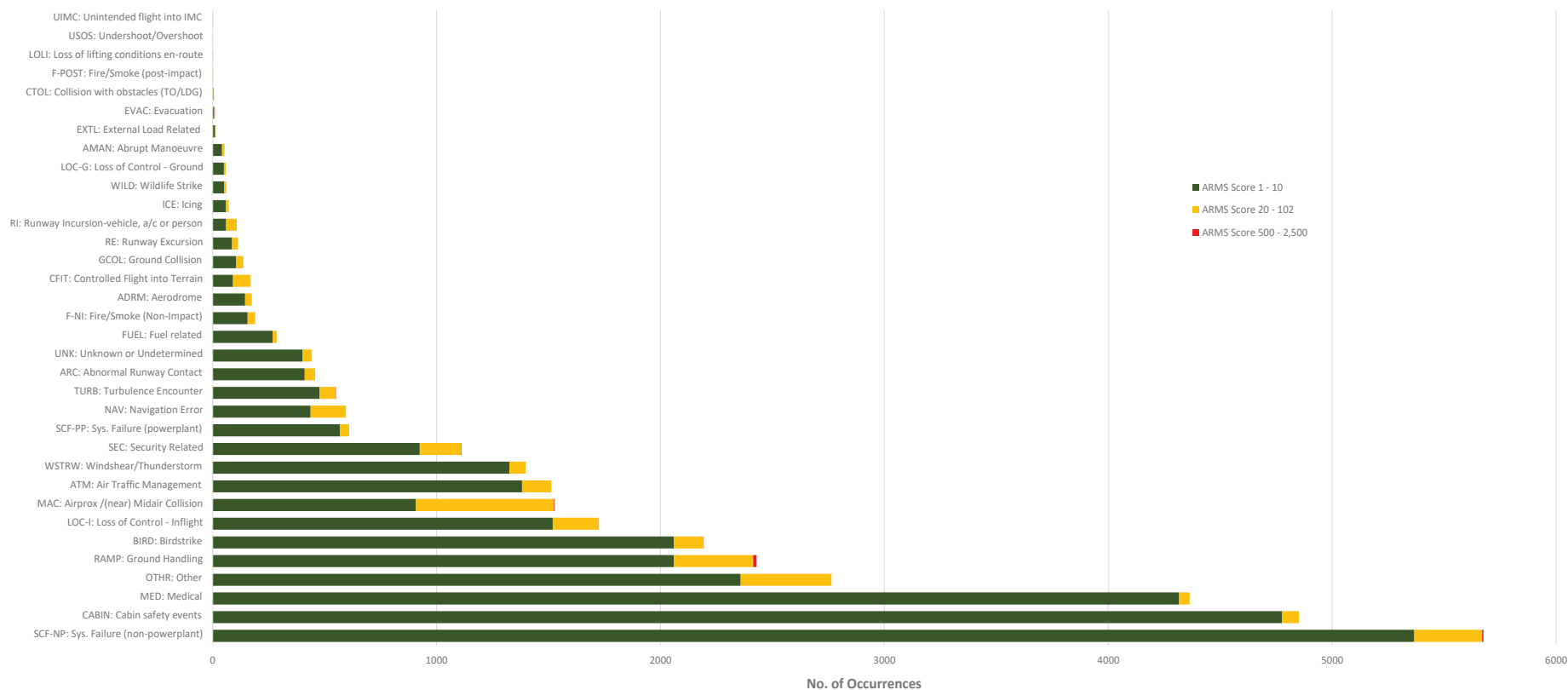
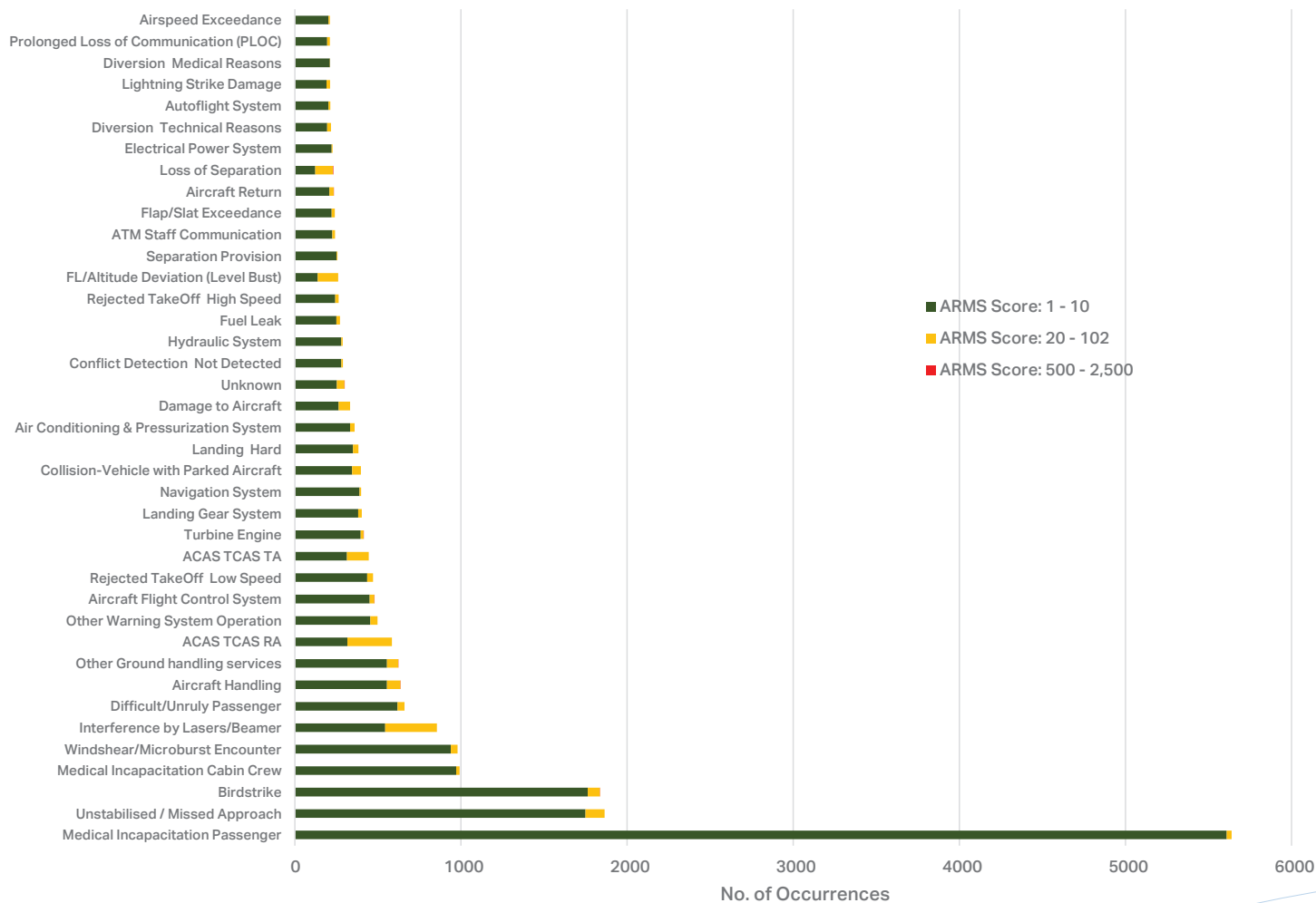
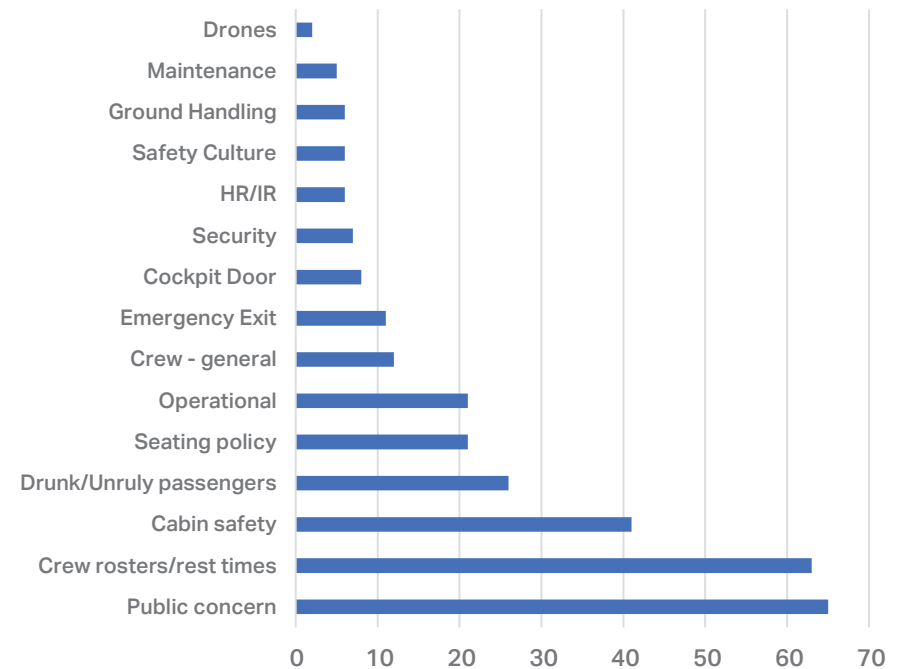


Figure B.4 Top Event Types – CAT Aeroplanes 2016 – 2019



The IAA also provides an opportunity for members of the public to report safety concerns outside of the regulatory environment at <https://www.iaa.ie/safety/safety-reporting>. This site is mainly used by aircraft passengers and concerned citizens to report and it provides a very valuable source of information to the IAA. Although these reports are outside of the regulatory environment, the IAA applies the same protections of reporters, confidentiality of information and appropriate use of the data as contained in the occurrence reporting regulations. These reports are analysed to identify safety issues and are followed up with the organisations involved. Figure B.5 below provides a breakdown of the voluntary reports submitted to IAA between 2016 and 2019, concerning Irish AOC Holders.

Figure B.5 Voluntary Reports – Irish AOC Holders 2016 – 2019



Safety Issues

This section provides a summary of the main safety issues that emerge as a result of the analysis of these safety performance statistics for CAT aeroplane operations. The first sub-section focuses on the key safety areas identified across the globe as the main causes of fatalities in aviation, and the second sub-section focuses on the other safety areas where the likelihood of fatalities is low but where high severity occurrences could lead to costly damage to aircraft or major inconvenience to aircraft occupants.

Key Safety Areas

ICAO and EASA analysis of aviation safety data on a worldwide basis has identified the following categories; controlled flight into terrain (CFIT), loss of control-inflight (LOC-I), mid-air collision (MAC) and runway incursions (RI) and excursions (RE) as the main contributors to accidents with a high number of fatalities in commercial aeroplane operations. CFIT, MAC and LOC-I accidents often have catastrophic results with very few, if any, survivors. Although statistically very few runway incursions result in collisions, there is a high fatality risk associated with these events. Runway excursions remain predominant in terms of number of occurrences with the majority of runway excursions survivable, however the fatality risk remains significant.

Figure B.2 shows that there were no accidents in these categories in the past five years involving the Irish AOC holders and Irish lease fleet operators. In this period however, there were 22 serious incidents in these key safety areas; 11 categorised as MAC, 9 categorised as RI and 1 categorised as RE and CFIT. Although there were no accidents or serious incidents categorised as LOC-I, it is noted that there were 3 accidents due to turbulence encounters causing aircraft upset during flight.

Figure B.3 shows that occurrence reports of precursors events categorised as MAC and LOC-I are in the top 10 of the most reported occurrence categories in the past four years. This highlights the awareness of operators to these key safety risk areas and the maturation of good reporting cultures. Analysis of these reports highlights firstly that the majority were classified as being low risk (green band) and secondly enables the identification of weaknesses and trends in the sector that can be used to inform appropriate mitigations. The CFIT category has proportionally a lot fewer related occurrences and most of these relate to activation of TAWS alerts due to momentary breach of protection envelopes, which demonstrates the effectiveness of this technological mitigation. EASA's revised 'SIB No.: 2013-11R1 Issued: 20 January 2020 ACAS II – Manoeuvres Based on Visual Acquisition of Traffic' demonstrates the continued focus on this safety area. Similarly, there are fewer reports from CAT aeroplane operators in the high-risk occurrence categories of RI and RE. In addition to the insight gained from their analysis as a sector they highlight the need to address safety risks from a cross domain perspective, such as flight operations, aerodrome operators and air navigation services provision, in order to maximise the effectiveness of safety barriers.

Figure B.4 gives more insight into the events that led to occurrence reports in these categories and some of the “Public Concern” issues reported in Figure B.5 reflected passenger anxiety over perceived occurrences in these areas (e.g. aircraft upset, proximity of other traffic, hard landing).

Detailed analysis of these events in conjunction with follow-up information from the reporting organisation has identified the following safety issues that are included in the related sector-based risk register.

Key Safety Area	Safety Issues
Mid-Air Collision (MAC)	<ul style="list-style-type: none"> • Airborne conflict with non-transponder equipped aircraft (e.g. airspace infringement into controlled airspace or flight by CAT aircraft in un-controlled airspace) • Integration of drone operations into air traffic system
Aircraft Upset (LOC-I/AMAN)	<ul style="list-style-type: none"> • Monitoring of flight parameters to prevent loss of situational awareness, and/or warning system activation, and/or aircraft upset, and/or unstable approach. • Management of technical failures to prevent aircraft upset • Avoidance of flight into convective weather or icing conditions which could cause aircraft upset • Management of Birdstrike or laser attack to prevent aircraft upset • Recognition and recovery from aircraft upset • Optimum state of wellbeing and fitness for flight
Runway Excursion (RE)	<ul style="list-style-type: none"> • Management of approach path • Avoidance of flight into convective weather, microbursts or windshear • Management of crosswind landings and unstable approach • Recognition of runway condition for take-off or landing • Reliability of critical equipment (e.g. landing gear, wheels, brakes, thrust revers and spoilers)
Runway Incursion (RI)	<ul style="list-style-type: none"> • Awareness or response to the unauthorised presence of other aircraft or vehicles on the runway • Deviation from ATC clearances by Flight Crew
Controlled Flight into Terrain (CFIT)	<ul style="list-style-type: none"> • Implementation of APV approach procedures to replace Non-Precision Approach • Implementation of advanced ATS services in terminal maneuvering area (ref SESAR Solutions Catalogue) • Management and monitoring of altitude setting procedures, awareness of blunder error • Optimum state of wellbeing and fitness for flight

Additional Safety Areas:

The key safety areas discussed above address the main causes of fatalities in CAT operations, however there are other areas to consider, which although do not generally contribute to fatal accidents, can sometimes be associated with serious injury to persons or damage to aircraft. The areas of focus in this review are ground operations, fire, cabin safety and medical emergency.

Figure B.2 shows that ground operations related activities contributed to 7 accidents and 6 serious incidents during the past five years. Due to the nature of their operation i.e. slow speed whilst moving on the ramp or taxiway, the most credible accident outcome in this domain is less catastrophic than other categories such as mid-air collisions. However, there is still a potential risk of some casualties, the loss of revenue due to damaged aircraft and passenger anxiety due to delayed flights. Undetected errors in aircraft loading and non-reporting of aircraft damage by ground vehicles present a higher level of threat as they could lead to further difficulties for the operation of the flight once the aircraft becomes airborne.

There were 5 fire/smoke/fumes related serious incidents in the past five years all of which were resolved satisfactorily by the crews. On-board fire is an event that must be dealt with promptly and effectively, using aircraft design and operational procedures to prevent a fire from starting in the first instance or from escalating to a loss of control of the aircraft. The unique fire hazard characteristics of lithium ion batteries and their proliferation in commonly used electronic devices pose a significant safety risk that must be effectively mitigated and managed.

Figure B.2 shows that there was one accident and four serious incidents due to cabin safety or medical emergency. Figure B.3 shows that the RAMP (Ground Handling), CABIN (Cabin Safety) and MED (Medical) were numerically among the top five categories reported to IAA under the occurrence reporting system. Although there are far fewer FIRE related reports

they are highlighted in this report due to the potential severity of their intrinsic risk. The majority of these occurrences were classified as low risk, indicating that there were robust barriers preventing the occurrence from resulting in a severe outcome. In parallel, figure B.5 demonstrates that the third highest group of voluntary occurrence reports are comprised of cabin safety related events (e.g. passengers standing in the aisle while fasten seatbelt light was on, inaudible safety announcements, difficulties accessing safety equipment, minor injuries).

Figure B.4 gives more insight into the events that led to the occurrence reports in these categories. The top event type Medical Incapacitation Passenger is not something that should cause alarm to passengers. The number of reports is not significant relative to the overall numbers of passengers carried. It is also noted that these reports mainly relate to minor passenger illness or injury possibly involving use of first aid kits and passenger oxygen.

As outlined in last year's ASPR, disruptive and unruly passengers continue to feature as an area of concern from the data analysis of occurrence reports for 2019. The IAA launched a campaign to remind passengers of their responsibilities to fellow travelers and flight crew and to encourage passengers to be mindful of the negative impacts of unruly behaviour, in conjunction with EASA's "Not on my flight" initiative <https://www.easa.europa.eu/notonmy-flight>. As part of this campaign, Irish organisations (including aircraft and airport operators) signed a joint declaration, committing to tackle disruptive passenger behaviour on flights.

Just over one thousand reports were received from operators of the 'Irish lease fleet'. The main categories reported were similar to those reflected in the CAT Aeroplanes domain, with 'Significant component failure – non-powerplant' (SCF-NP) being the most common. As the State of Registry these were addressed by the Airworthiness Standards Department (AWS) inspectorate with operational issues being referred to the State of Operation in accordance with the ICAO Article 83 bis agreement. In the main, the same key safety areas and safety issues previously outlined are applicable to these operations.

A summary of the main safety issues identified from the analysis of the safety data in these safety areas is outlined below:

Safety Area	Safety Issues
Ground Operations	<ul style="list-style-type: none">• Adherence to aircraft loading procedures (e.g. passengers, baggage and cargo, fuel) and accurate calculation of mass and balance• Adherence to aircraft ground handling procedures (incl. towing, de-icing, refueling etc.)• Reporting of damage to aircraft during ground operations• Oversight of ground operations subcontracted activities
FIRE	<ul style="list-style-type: none">• Lithium batteries or other material presenting a fire hazard in cargo or cabin baggage• Placing of intended passenger carry-on baggage in the aircraft hold at the departure gate
CABIN/MED	<ul style="list-style-type: none">• Management of difficult/unruly passengers

Occurrence Reporting Rates

Recent EU studies have shown that the occurrence reporting culture among Irish AOC holders is amongst the highest in Europe. The occurrence reporting rate continued to improve in 2019 as demonstrated in table B.3 below which provides data on the number of sectors flown annually between 2015 and 2019 with the corresponding MOR rates.

Table B.3: Statistics on MORs submitted by the Irish AOC holders who operate aeroplanes (MOR rates were calculated per 10,000 flights)

Year	Sectors Flown	Total	
		Number	Rate
2015	762,855	5,731	75.13
2016	890,178	7,082	79.56
2017	1,018,688	6,693	65.70
2018	1,105,310	8,624	78.02
2019	1,128,326	9,945	88.14
Total	4,905,357	38,075	77.62

Part NCC

As there were only 9 aircraft engaged in NCC operations the level of activity does not support insightful independent statistical analysis, however some observations from the EASA ASR 2019 are worth noting. It states 'that during 2018, there was one fatal accident involving a European registered NCC aeroplane. This accident corresponds to the fatal explosive door opening during ground operation of a business jet aircraft. The number of non-fatal accidents and serious incidents have increased in comparison with the average of the previous 10-year period (2008-2017). This is the result of the more successful data collection process carried out during 2018 in the NCC Business domain.' It also notes that there is a negligible amount of lower risk occurrences, which is likely due to the low reporting in this domain, where only occurrences that are high risk, normally very visible and with severe outcome, are being reported and investigated.

SECTION C

THE IRISH COMMERCIAL HELICOPTER SECTOR



Introduction

This section addresses the commercial helicopter services sector in Ireland. This is a relatively small sector in Ireland that includes helicopter commercial air transport (CAT) operators, helicopter commercial specialised operators (SPO) and operations of non-commercial air operations with complex motor powered helicopters (NCC).

To undertake CAT flights a helicopter operator must hold an Air Operator Certificate (AOC), Ireland has four helicopter AOC holders operating 11 helicopters in CAT. One operator is approved to undertake helicopter emergency services (HEMS).

To undertake commercial SPO flights, such as surveying or photography, a helicopter operator must declare its capabilities to the Irish Aviation Authority. Two of the above helicopter operators have also declared their capabilities to undertake commercial SPO activities operating 8 of the above helicopters in the SPO role.

To undertake non-commercial air operations with complex motor-powered helicopter (NCC) flights a helicopter operator must declare its capabilities to the Irish Aviation Authority. Three operators have declared their capabilities to undertake NCC activities operating 1 foreign registered and 3 Irish registered helicopters.

The Irish lease fleet discussed in Section B above also includes 8 Irish registered helicopters that are operating on a foreign issued AOC using the provisions of Article 83 bis of the Chicago Convention.

NCC helicopter operations are assessed together in this section as they are exposed to many of the same risks, albeit different approval and oversight processes are involved.

Accidents and Serious Incidents

Over the last five years helicopter operators in this sector were involved in 2 accidents and 1 serious incident, none of which occurred in 2019. Table C.1 below provides the details.

Table C.1: No. of accidents, fatal accidents and serious incidents involving helicopters engaged in CAT, Part-NCC and Part-SPO operations.

Year	No. on Irish aircraft register	Accidents			Serious incidents
		Non-fatal	Fatal	Total	
2015	10	1	-	1	1
2016	11	-	-	-	-
2017	14	-	1	1	-
2018	18	-	-	-	-
2019	20	-	-	-	-
Total	-	1	1	2	1

The fatal accident involved the collision of the helicopter with terrain and the AAIU have published a preliminary report (Ref. No. 2017-006) and three interim statements which are publicly available on their website www.aaiu.ie.

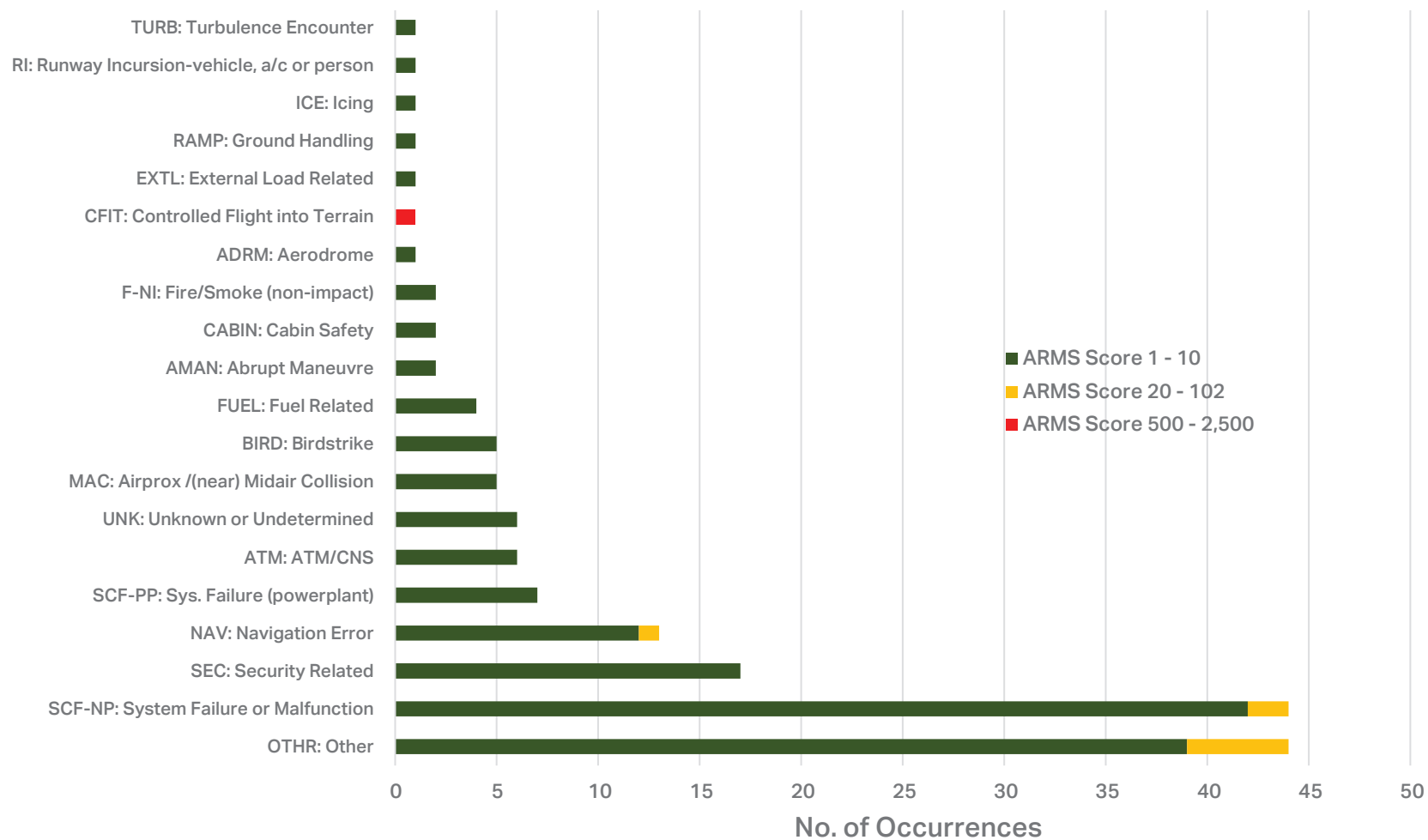
There was one non-fatal accident in 2015 where the helicopter involved was severely damaged following a heavy landing. The serious incident is related to an occurrence during winching operation.

Occurrences

The IAA categorises (groups) helicopter occurrences using the same common taxonomy discussed in Section B above. A breakdown of the top occurrences submitted by Irish Helicopter AOC holders and NCC/SPO declared operators between 2016 and 2019 by occurrence category and ARMS Risk Classification Band is shown in Figure C.2 below:

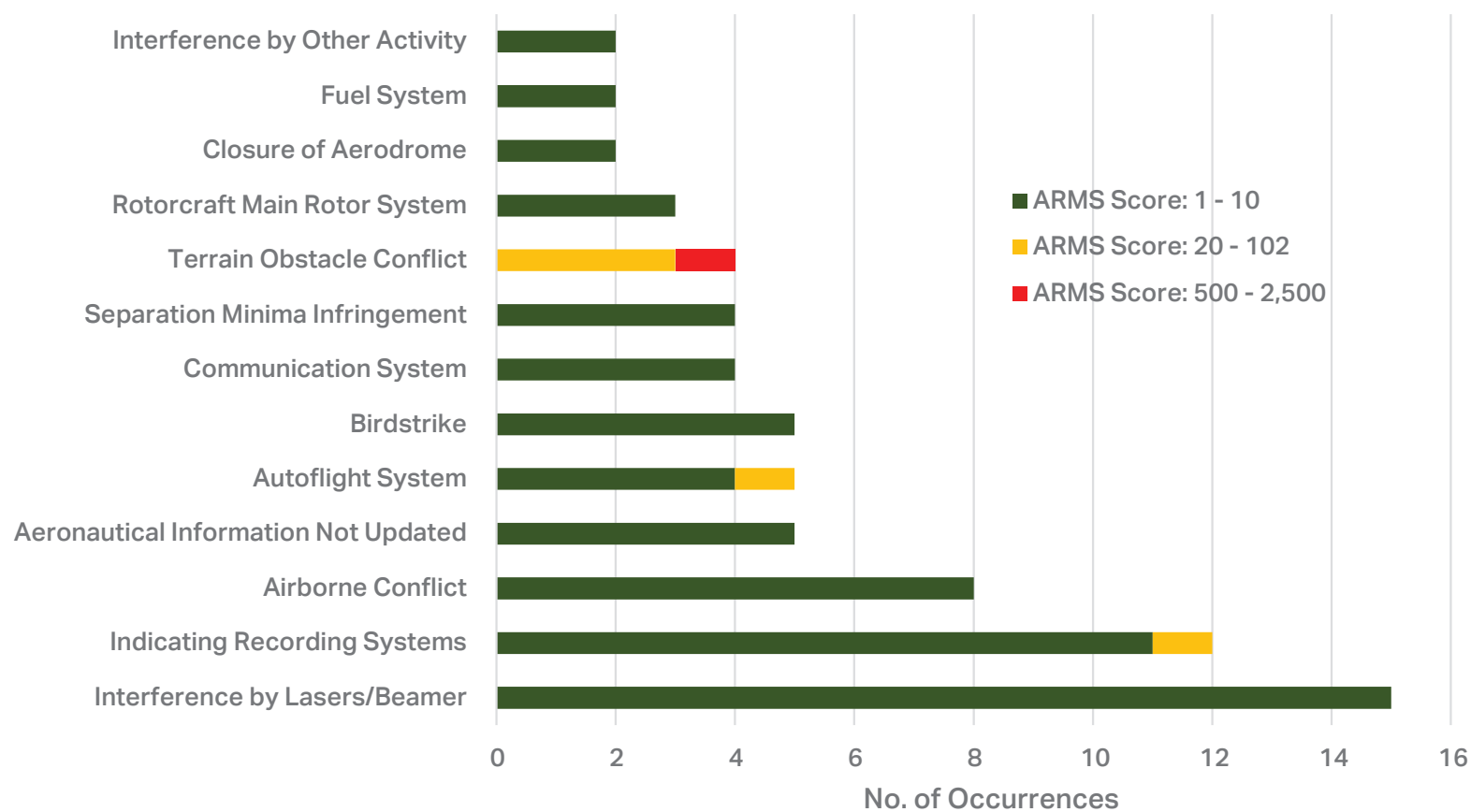
The top reported categories were “system failure or malfunction”, and “other”. The latter reflects the harsh environment in which helicopters operate which can affect on-board systems. Most of these occurrences were low risk which indicates minor failures or failure of redundant systems that had little effect on operations. The high usage of category “other” in the helicopter domain reflects the fact that the ADREP taxonomy does not fully account for helicopter low level SPO operations. Occurrences categorised as “other” include for example, failure of Part SPO role equipment and accuracy of aeronautical charts.

Figure C.2: Categorisation of MORs Commercial and Declared Helicopter Operations 2016-2019



The top event types that provide more information on the events that lie behind these categories is shown below.

Figure C.3 Top Event Types – Commercial and Declared Helicopter Operations 2016 – 2019



Safety Issues

This section provides a summary of the main safety issues that emerge as a result of the analysis of these safety performance statistics for commercial and declared helicopter operations. The first sub-section focuses on the key safety areas identified across Europe as the main causes of fatalities in helicopter operations, and the second sub-section focuses on the other safety areas where the likelihood of fatalities is low but where high severity occurrences could lead to injuries to occupants or damage to helicopters.

Key Safety Areas:

Due to the relatively low activity level of commercial and declared operations in Ireland and consequently the relatively low levels of safety occurrences reported, it is challenging to identify the key risk areas from the analysis of the Irish safety information alone. However, the analysis performed by EASA of the safety performance of this sector across the EU (including Ireland) can support the IAA efforts in this regard. EASA has identified the key risk areas based on analysis of helicopter accidents and serious incidents in this sector across Europe as aircraft upset and collision with obstacles or terrain.

There was one fatal accident in Ireland in the past five years involving collision into terrain. Figure C.2 shows that there was one aircraft upset related occurrences (i.e. abrupt manoeuvre) but no loss of control inflight related category events.

Figure C.4 gives more insight into the events that led to the occurrence reports and although the specific circumstances of these reports did not lead these events to be categorised in the key risk areas they could in other circumstances or in combination with other events, contribute to an aircraft upset or collision with terrain or obstacles (e.g. critical equipment failures, aeronautical chart errors, birdstrike, laser attack).

Detailed analysis of these events in conjunction with follow-up information from the reporting organisations has identified the following safety issues that are included in the sector-based risk register.

Key Safety Area	Safety Issues
Aircraft upset (e.g. LOC-I, AMAN)	<ul style="list-style-type: none"> • Monitoring of flight parameters to prevent loss of situational awareness, and/or warning system activation, and/or aircraft upset. • Management of flight path • Management of technical failures to prevent aircraft upset • Avoidance of flight into convective weather or icing conditions which could cause aircraft upset • Reaction to birdstrike or laser attack to prevent aircraft upset • Recognition and recovery from aircraft upset • Optimum state of wellbeing and fitness for flight
Collision with terrain or obstacle (e.g. CFIT, CTOL, LALT)	<ul style="list-style-type: none"> • Intentional low-level operations • Operations in degraded visual environments • Maintenance of situational awareness by crews • Use of helicopter see and avoid • Use of take-off and landing sites outside of airports/heliports • Accuracy and use of aeronautical charts and terrain and obstacle databases • Increased number of Windfarms • Optimum state of wellbeing and fitness for flight

The IAA works with Helicopter operators through oversight activities (eg SMS oversight) and safety promotion to ensure these safety issues are being addressed by helicopter operators, as appropriate to them. Refer also to the latest edition of the IAA State Plan for Aviation Safety, <https://www.iaa.ie/safety/state-safety-plan>.

Additional Safety Areas

The highest number of reports submitted by this sector concern system component failure. Thankfully most of these events were classified as low risk which means that the failures had little impact on the safe operation of the aircraft (e.g. due to built-in system redundancy). By its very nature, helicopter operations present a challenging environment for aircraft equipment, and EASA as competent authority for aircraft design in Europe, has identified a number of mitigating actions to address the main safety concerns arising from helicopter equipment failures in the European Plan for Aviation Safety.

(Refer to <https://www.easa.europa.eu/newsroom-and-events/news/european-plan-aviation-safety-2020-2024-published-for-more-details>)

The risk of mid-air collision is another safety area for helicopter operators, notwithstanding the fact that there are very few reports from this sector concerning this risk area (i.e. three low risk reports in three years). Many helicopter operations occur outside of controlled airspace where a wide variety of general aviation aircraft freely operate, and many of these aircraft are not equipped (nor required to be equipped) with transponder equipment.

Therefore, helicopter must rely on flight planning, situational awareness and see and avoid procedures to avoid airborne conflict. There is also the new threat of drone operations to consider, especially important for low level helicopter operations.

Safety Area	Safety Issues
Mid-Air Collision (MAC)	<ul style="list-style-type: none"> Potential conflict with non-transponder equipped general aviation aircraft Potential conflict with drones

Number and Rate of MORs

The following table provides data on the number of sectors flown annually over the last five years with the corresponding MOR rates per 1,000 flights. It is noted that the occurrence reporting rate in this sector shows a growing trend which is one of the indicators of a positive safety culture.

Table C.2: Statistics for MORs submitted by the Irish AOC holders operating helicopters
(MOR rates were calculated per 1,000 flights)

Year	Sectors Flown	Total	
		Number	Rate
2015	8,761	43	4.91
2016	7,117	26	3.65
2017	6,887	35	5.08
2018	7,206	41	5.69
2019	8,144	59	7.24
Total	38,115	204	5.35

SECTION D

AIR NAVIGATION SERVICES AND AERODROMES IN IRELAND



Introduction

Aerodromes within Ireland which are open to public use, serve commercial air transport and have a paved runway of 800m or more or exclusively serve helicopters with instrument procedures, are certified by the IAA in accordance with EU Regulation No. 139 of 2014. These are known as certified aerodromes.

Under national aviation law, those aerodromes which are not within the scope of the European regulation require licensing if landing or departure by aircraft carrying passengers or goods for hire or reward is being undertaken. Generally, these are known as nationally licensed – public aerodromes.

Additionally, under national aviation law, an aircraft shall not take-off from or land at any place in the State save at an aerodrome licensed under S.I. 355 of 2008 – Aerodromes and Visual Ground Aids Order. Generally, where flight training is being undertaken, there is a requirement for licensing and these are known as nationally licensed – private aerodromes.

Currently, there are 8 certified aerodromes within Ireland, 5 nationally licensed public aerodromes and 9 nationally licensed private aerodromes. Details of the current certificated and licensed aerodromes are published in AIP Ireland, AD Section 1.5 – Status of Certification of Aerodromes.

Accidents and Serious Incidents

This section discusses flight hours, flight movements, accidents and serious incidents involving aircraft engaged in Commercial Air Transport (CAT) at certified and licenced aerodromes in Ireland where there is an ATC service available. Those aerodromes are Dublin, Cork, Shannon, Ireland West, Kerry, Donegal, Sligo, Waterford and Weston. The aircraft involved may be registered in Ireland or abroad and hold an AOC issued by the IAA or a foreign NAA. Accidents and serious incidents involving aircraft engaged in General Aviation (GA) are not included unless there was a second aircraft involved in the same occurrence that was providing commercial services.

The number of flight hours rose in 2019. This includes traffic overflying Irish airspace as well as aircraft that land or depart from an Irish airport (terminal traffic). The number of flights describes the number of aircraft that land and depart at an Irish aerodrome. The number of flights fell slightly during 2019.

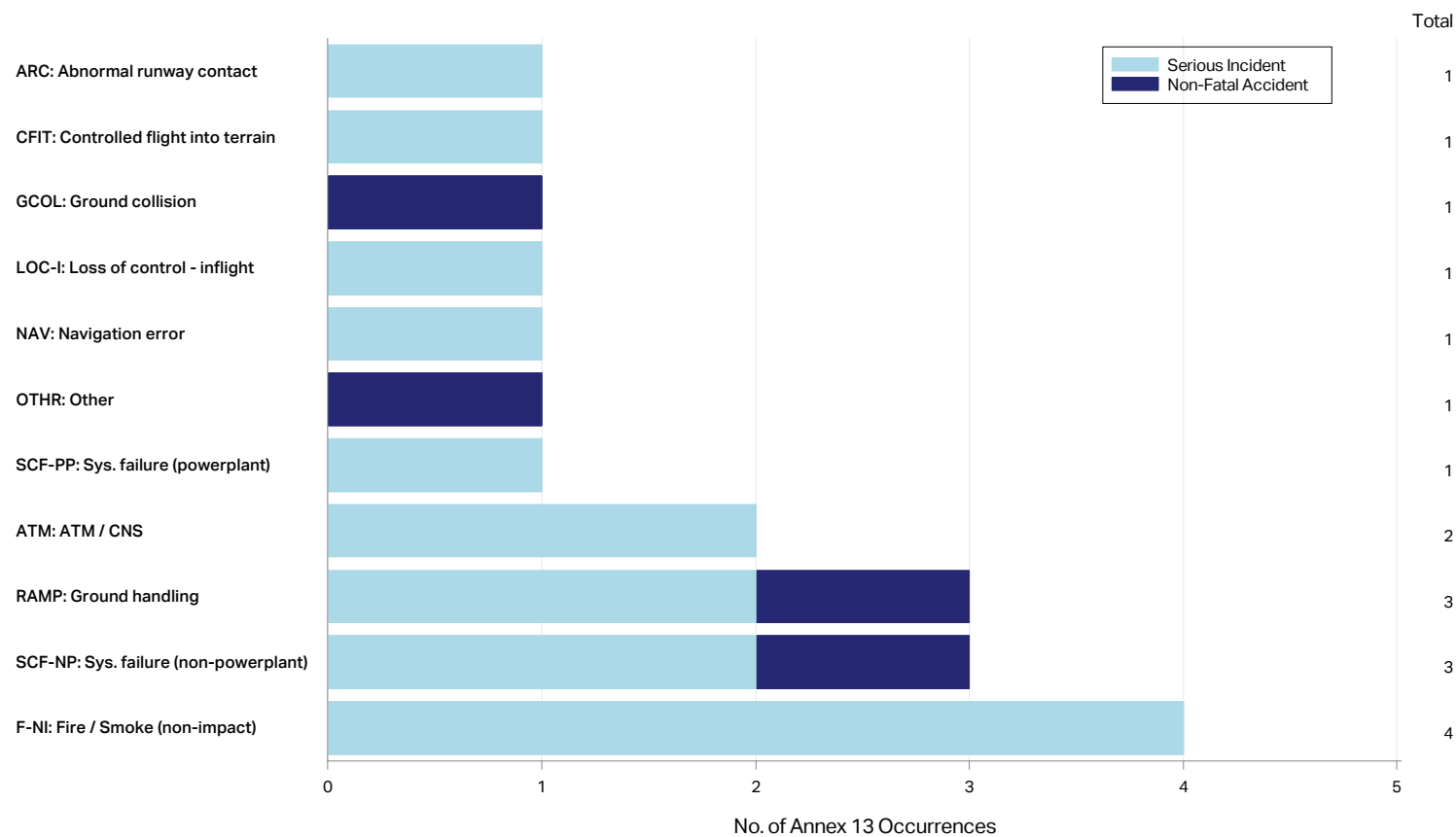
There were 4 accidents, none of which resulted in fatalities, and 15 serious incidents over the five-year period considered. The 2 serious incidents that occurred in 2019 involved an incident in the 'Abnormal runway contact' (ARC) category and an incident in the 'Fire/smoke (non-impact)' (F-NI) category.

Table D.1: Non-fatal accidents and serious incidents involving CAT at Irish certificated and licenced aerodromes which provide ATC services

Year	2015	2016	2017	2018	2019	Total
No. Flights at Irish Airports	253,223	274,058	273,440	293,961	279,799	1,374,481
No. Flight Hours in Irish	287,659	309,693	311,715	315,776	319,775	1,544,618
Non-fatal accidents	2	0	1	1	0	4
Serious incidents	5	2	4	2	2	15

Based on the findings of their investigation the AAIU assigns one of the CAST/ICAO common taxonomy categories (the same taxonomy as discussed in Sections B and C above) to the occurrence. Figure D.2 summarises the categories assigned to the 4 accidents and 15 serious incidents that took place between 2015 and 2019.

Figure D.2: Categorisations of Annex 13 occurrences involving CAT that occurred at Irish certificated/licenced aerodromes that provide ATC services



Occurrence Reports

This section reviews the occurrences reported by air navigation services providers and aerodrome operators. In many cases a single occurrence at an aerodrome may be reported by both the air navigation services provider and the aerodrome operator, however it is important to review and assess the occurrence in both domains separately, as the impact and available risk mitigation strategies will be different. Therefore, this section is broken into two sub-sections to address both domains.

Sub-section 1: Air Navigation Service Provision

The IAA received occurrence reports from ANS providers in respect of precursor events that occur in Irish airspace, including enroute operations, terminal operations and ground operations where ATC services are provided. A breakdown of the occurrences submitted between 2016 and 2019 by occurrence category and ARMS Risk Classification Band is shown in Figure D.3 below. Figure D.4 provides a breakdown of the top event types reported that lie behind these occurrence categories.

The top three occurrence categories include ATM occurrences (eg aircraft separation issues, aircraft go around, ATM equipment problems etc) , Navigation error (eg taxiway errors, level bust, ATC clearance issues) and Other (eg pilot initiated missed approach).

Figure D.3: ANS related occurrences by ARMS Risk Band 2016-2019

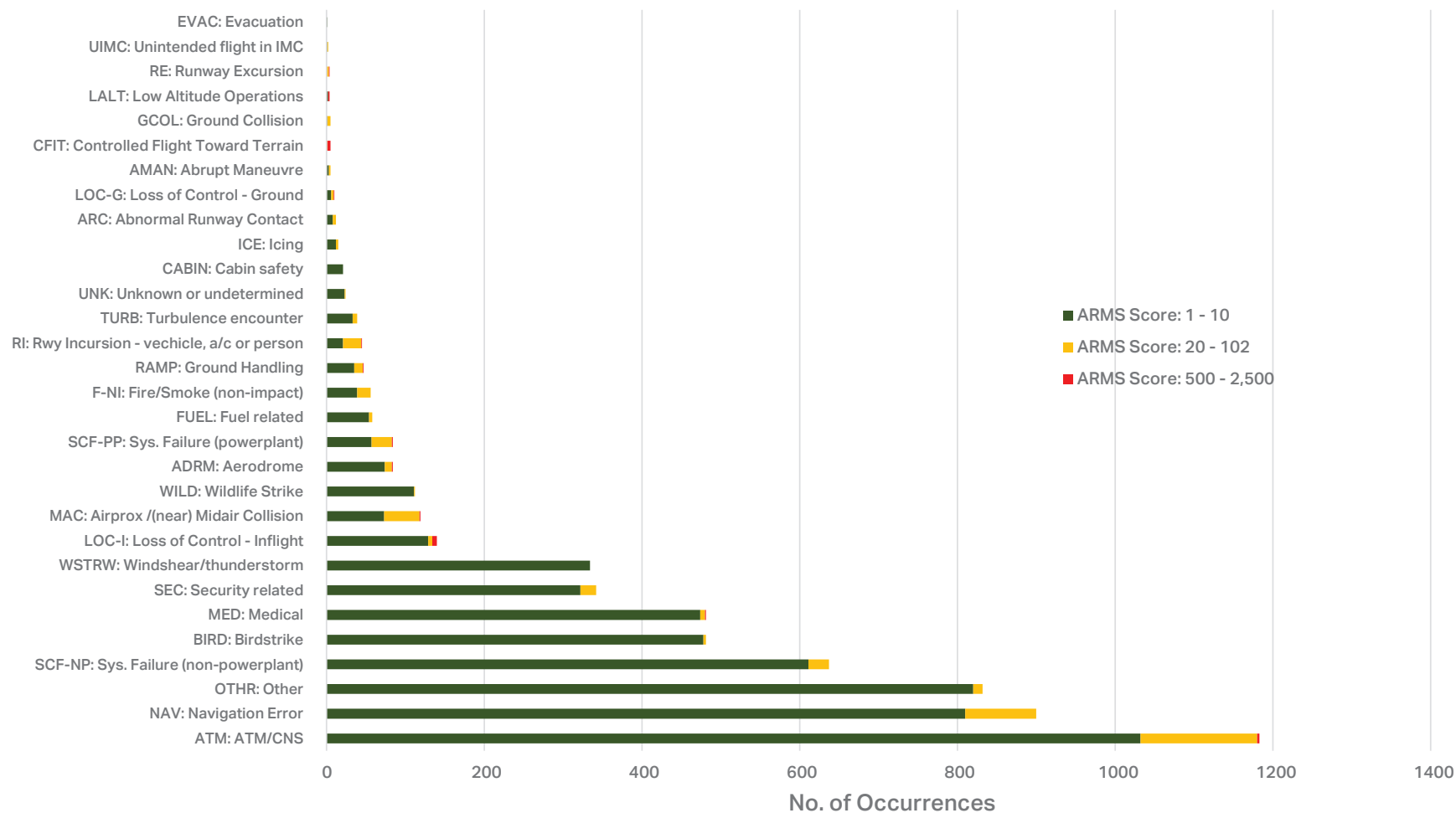
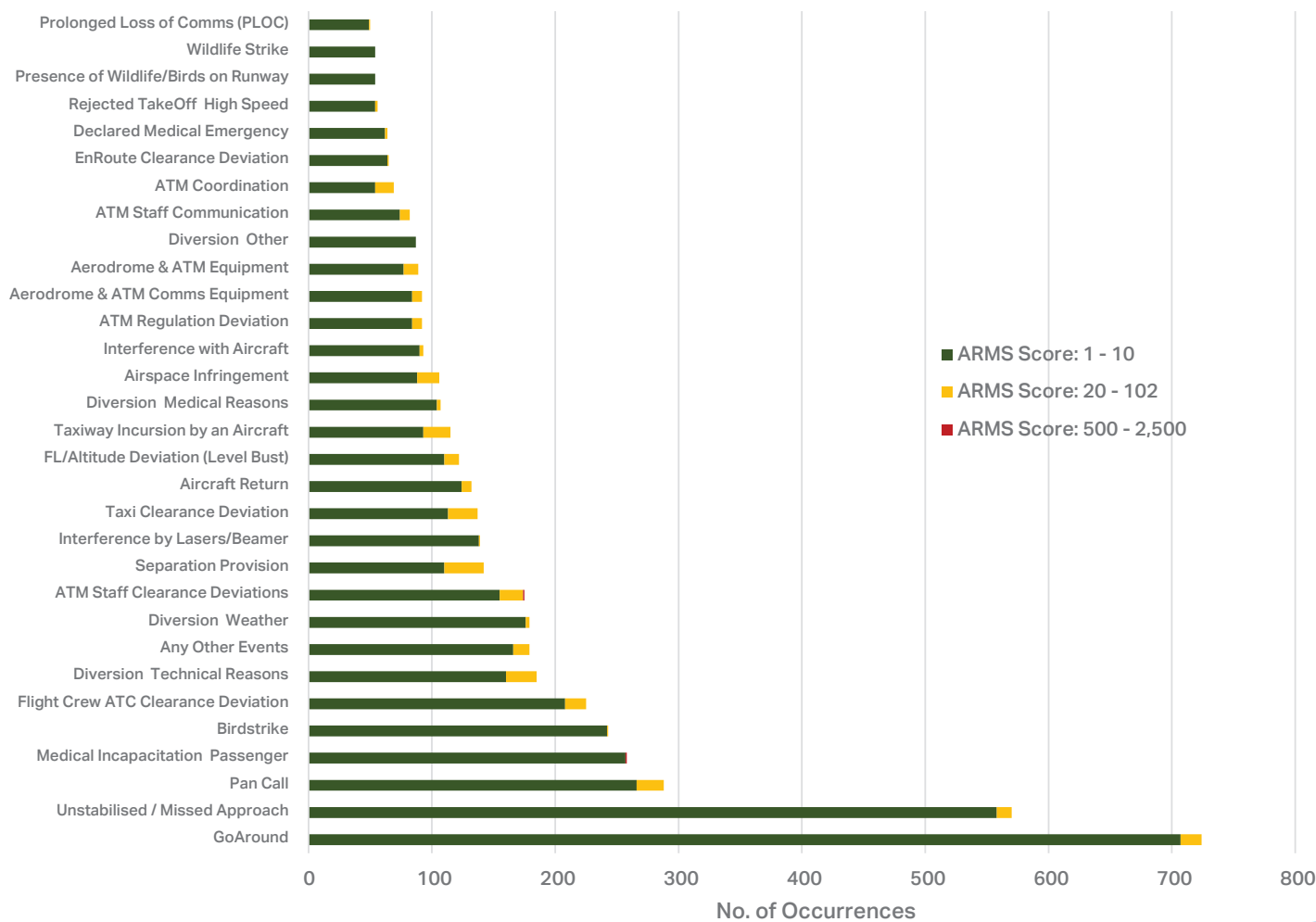


Figure D.4 Top Event Types – ATC 2016-2019



As part of the EU Single European Sky ATM performance scheme for air navigation service provision, and in support of European-wide initiatives on safety data reporting including Eurocontrol's Annual Summary Template process, the IAA monitors the national safety performance with respect to five Safety Performance Indicators (SPIs) that contribute largely to the top reported occurrences to the IAA.

These SPIs are:

- Separation Minima Infringements (SMI)
- Runway Incursions (RI)
- Deviations from ATC Clearance (AD)
- Level Busts (LB)
- Airspace Infringements (AI)

The occurrence rates for these SPI's in respect of all ANS providers in Ireland are shown in Table D.5 below.

Table D.5 ATM performance Monitoring Rates

Standardised Rates (SMI, AD, LB, AI rates per 100,000 flight hours) (RI rate per 100,000 movements)					
Year	Separation Minima Infringement	Runway Incursion	Deviation from ATC Clearance	Level Bust	Airspace Infringement
2015	4.85	5.79	51.25	15.58	9.70
2016	3.22	5.90	58.88	17.37	8.69
2017	2.88	5.46	44.49	16.00	10.24
2018	2.54	2.66	50.45	17.77	10.15
2019	4.00	3.80	80.10	21.10	8.40
5 Year Average Rate	3.50	4.72	57.03	17.56	9.43

Safety Issues – Air Navigation Service Provision

This section provides a summary of the main safety issues that emerge as a result of the analysis of these safety performance statistics for air navigation service provision

Key Safety Areas

ICAO and EASA analysis of aviation safety data on a worldwide basis has identified that two of the main contributors to accidents with a high number of fatalities in commercial aeroplane operations are mid-air collision (MAC) and runway incursions (RI). Whereas the ANS providers may not always contribute to the cause of these type of accidents, they can play an important role in their prevention.

Figure D.2 shows that there were no accidents or serious incidents in the key safety areas of MAC or RI. There were 2 serious incidents categorised as 'Air Traffic Management' (ATM) and Figure D.3 shows that in the past four years ANS providers reported 119 MAC related occurrences and 45 RI related occurrences. Table D.4 shows the 4-years rate trends for key ANS related safety performance indicators.

Separation minimum infringements, airspace infringements and level bust events could be part of the causal chain of events that could lead to a MAC related occurrence, albeit there are other safety nets available (e.g. collision avoidance systems, ATC intervention etc) that add further protections in this regard. Deviation from ATC clearance can be associated with a MAC occurrence or with a runway incursion. The 4-year average trends for these indicators from Irish ANS providers are generally reducing.

Over recent years the ECCAIRS reporting format in the ANS domain has improved data quality and enabled a more informed insight through the more transparent mapping that exists to event types. Detailed analysis of the safety information in conjunction with follow-up information from the reporting organisations has identified the following safety issues that are included in the ANS sector-based risk register.

Key Safety Area	Safety Issues
Mid-Air Collision (MAC)	<ul style="list-style-type: none"> • Identification and response to airspace infringement • Control of traffic flow to prevent separation minima infringement • Recognition and response to deviation from ATC clearance • Adherence to standard phraseology in ATC communications • Adherence to ATC communication procedures (e.g. readback/hearback) • Management of declared emergencies • Anticipation and response to aircraft go-around • Reaction to drone infringements into controlled airspace
Runway Incursion (RI)	<ul style="list-style-type: none"> • Protection of runway operations • Control of ground movements in low visibility operations • Recognition and response to deviation from ATC clearance by aircraft and ground vehicles • Adherence to standard phraseology in ATC communications • Adherence to ATC communication procedures (e.g. readback/hearback)

Additional Safety Areas

As shown by fig. D.4, there was a large increase in aircraft deviations from ATC clearance in 2019. Aircraft deviations from ATC clearance can be precursors to more significant occurrences, such as Separation Minima Infringements for airborne deviations, or Taxiway and Runway Incursions for ground-based deviations. This specific trend increase in 2019 was primarily attributable to occurrences at a specific aerodrome during taxi phase, drawing an equivalent spike of Taxiway Incursion reports. Safety issues identified include inadequate sharing of safety related information and ATM communication errors, including hear back errors and overly long or complex instructions.

Number and Rate of ANS MORs: 2016 to 2019

Table D.6 provides a comparison between the number of flight hours flown and the corresponding MOR rates per 10,000 flight hours from 2016 to 2019. This table shows an increasing reporting rate trend since 2016 which indicates an improving safety reporting culture in this domain.

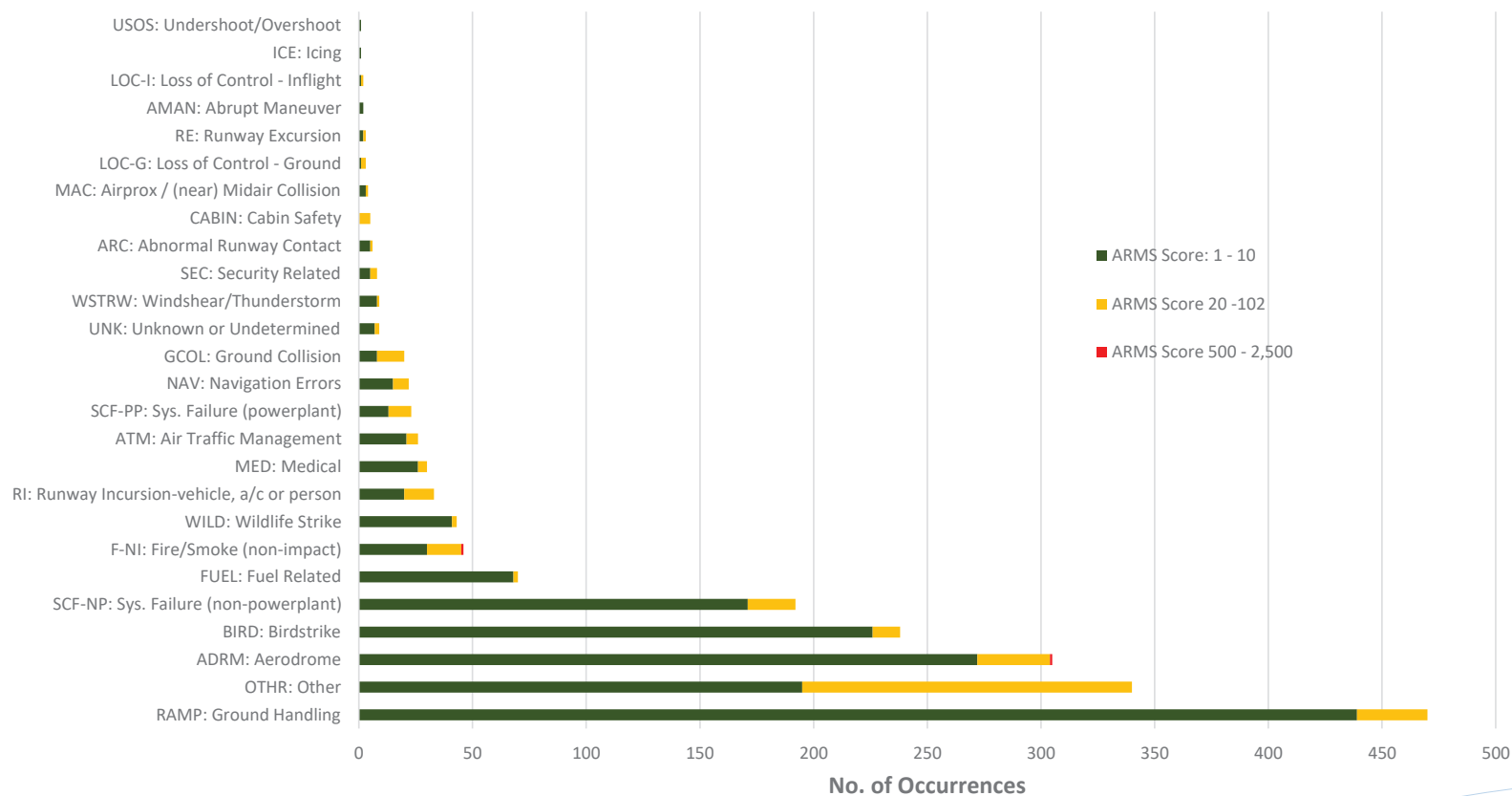
Table D.6: No. and rate of MORs according to flight hours from 2016 to 2019

Year	Flight Hours	Total	
		Number	Rate
2016	309,693	1,036	33.5
2017	311,715	1,348	43.25
2018	315,776	1,711	54.18
2019	319,775	1,720	53.79

Sub-section 2: Aerodrome Operations

The IAA also received occurrence reports from aerodrome operators mainly concerning ground operations involving aircraft and ground vehicles and equipment. A breakdown of the occurrences submitted between 2016 and 2019 by occurrence category and ARMS Risk Classification Band is shown in Figure D.7 below.

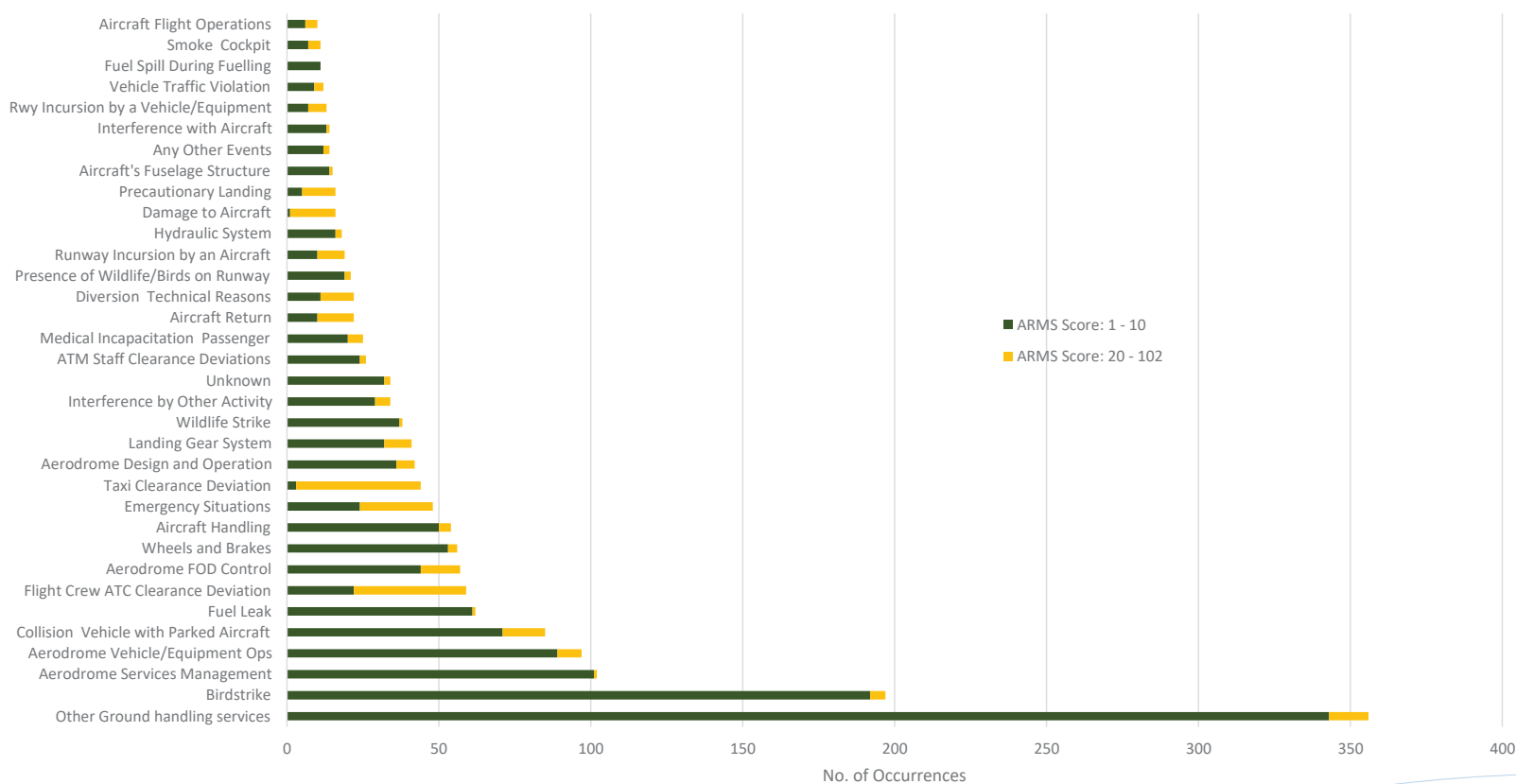
Figure D.7 Aerodrome related occurrences by ARMS Risk Band 2016-2019



The top occurrence categories were RAMP: Ground Handling (e.g. ground vehicle operations, aircraft pushback/towing etc), OTHR: Other (e.g. pilot/ATC ground operations issues) and ADRM: Aerodrome (e.g. aerodrome operations, FOD control).

Figure D.8 provides a list of the top event types that provide more information on the actions that lie behind these categories.

Figure D.8 Top Event Types – Aerodrome 2016- 2019



Aerodrome Operations

Safety Issues

This section provides a summary of the main safety issues that emerge as a result of the analysis of these safety performance statistics for aerodrome operations.

Key Safety Areas

Among the key safety areas identified globally where aerodrome operations could have an impact, are runway incursion (RI), runway excursion (RE) and aircraft upset/loss of control - inflight (LOC-I). Runway incursion events could be attributed to the unauthorised presence of ground vehicles on the runway, or the presence of wildlife, both of which could present a serious risk to an aircraft during take-off or landing. The condition of the runway surface itself, or failure to report this condition accurately, could contribute to the risk of a runway excursion. An aerodrome operator may also provide ground handling services some of which (e.g. aircraft loading or unreported aircraft damage) could in exceptional circumstances lead to flight control difficulties.

Figure D.2 shows that 1 accident and 2 serious incidents were attributed to ground handling activities in the past five years. Fig D.6 shows that the top two occurrence categories reported by aerodrome operators were ground handling (e.g. loading, towing, fuelling of aircraft etc) and aerodrome related (including occurrences relating to the design and servicing of aerodrome facilities and equipment). While there was no accident or serious incident categorised as runway incursion Fig D.6 shows that there were 33 runway incursions reported by aerodrome operators in the past four years, 13 of these were due to unauthorised presence of ground vehicles on the runway.

Figure D.7 shows that the top four event types reported were other ground handling services (i.e. ground handling services except aircraft marshalling), aerodrome services management, collision between ground vehicle and parked aircraft and aerodrome vehicle/equipment operations (such as removal of foreign objects from aerodrome). The second highest assigned occurrence category in Figure D.6 is 'Other', which is allocated when the precise classification is not known. Further analysis determined that this category included events such as interference by other activity, flight crew ATC clearance deviation and taxi clearance deviation.

Detailed analysis of the safety information in the Aerodrome domain in conjunction with follow-up information from the reporting organisations has identified the following safety issues that are included in the Aerodrome sector-based risk register.

Key Safety Area	Safety Issues
Runway Excursions (RE)	<ul style="list-style-type: none"> • Removal of runway contamination (e.g. snow, ice, foreign objects) • Maintenance of runway surface condition • Reporting on runway surface condition
Runway Incursion (RI)	<ul style="list-style-type: none"> • Management of ground movements in low visibility conditions • Deviation from ATC clearance by ground vehicles • Adherence to standard phraseology in ATC communications • Adherence to ATC communication procedures (e.g. readback/hearback)
Aircraft Upset (LOC-I)	<ul style="list-style-type: none"> • Adherence to aircraft loading procedures (e.g. passengers, baggage and cargo, fuel) and accurate completion of aircraft loadsheets when provided by aerodrome operator • Adherence to aircraft ground handling procedures (e.g. de-icing, dangerous goods) • Reporting of damage to aircraft during ground operations • Wildlife strike hazard management in the vicinity of airports • Awareness of LOC-I risk among ground handling agents

Additional Safety Areas

Many of the Ground Handling occurrences reported reflect events that do not affect the key safety areas but could nonetheless result in injury to passengers or aerodrome staff, and aircraft damage with potentially lengthy delays to passengers.

Aerodrome operators have primary responsibility for protection of the airport from drone infringements, including the temporary suspension of operations in case of an occurrence.

The following safety issues are also included in the Aerodrome sector-based risk register.

Safety Area	Safety Issues
Safety of persons on the apron	<ul style="list-style-type: none"> • Routing of passengers from gate to aircraft steps • Condition of aircraft steps • Movement of ground operations personnel on the apron • Management of ground vehicle traffic in proximity to aircraft • Protection of personnel from jet-blast or propeller wash • Perception and situational awareness, especially during bad weather conditions and at night time • Experience, training and competence of individuals
Prevention of aircraft damage	<ul style="list-style-type: none"> • Co-ordination and control of turnarounds between various agencies • Ground vehicles approaching and positioning around aircraft and different aircraft types • Adherence to aircraft marshalling, pushback and towing procedures • Management of ground movements in low visibility conditions • Adherence to positioning, securing and decongestion procedures for ground service equipment on the apron
Drone infringements	<ul style="list-style-type: none"> • Management of aerodromes operations in the event of drone infringement, including suspension and re-activation of flight operations as required • Prohibition of drone flying in close proximity to an aerodrome

Number and rate of aerodromes MORs from 2016 to 2019

The following table provides a comparison between the number of movements and the corresponding MOR rates per 10,000 movements from 2016 to 2019.

Table D.9: No. and rate of MORs according to movements from 2016 to 2019

Year	Movements	Total	
		Number	Rate
2016	274,058	316	11.53
2017	273,440	506	18.50
2018	293,961	462	15.72
2019	279,799	544	19.44

A vintage biplane with a large radial engine and a prominent propeller is parked on a grassy field. The aircraft has orange upper wings and yellow lower wings with a green star insignia. The background features a bright sun partially obscured by clouds, creating a dramatic sky. The plane is viewed from a low angle, emphasizing its size.

SECTION E

GENERAL AVIATION IN IRELAND

Introduction

General Aviation in Ireland is defined as any aviation activity not categorised as Commercial Air Transport. It includes aviation activities regulated under European law such as;

- non-commercial operations using complex aircraft (Part NCC);
- specialised operations (Part SPO) such as aerial photography, and parachute support operations; and
- non-commercial operations using non-complex aircraft (Part NCO) such as private flying, pilot training, introductory flights, and cost-sharing flights.

Additionally, it includes aviation activities subject to Irish national law such as private flying of microlights, homebuilt aircraft, and gyrocopters.

There is a diverse range of General Aviation activities in Ireland and this section reviews the safety performance of the sector using the following aircraft categories:

- Aeroplanes with a maximum take-off mass (MTOM) of 2,250 kg and above.
- Aeroplanes with an MTOM less than 2,250 kg,
- Homebuilts also referred to known as amateur-built aircraft or kit planes
- Microlight aircraft – typically aeroplanes with MTOM less than 450 kg and flex-wing aircraft.
- Helicopters – with an MTOM of 2,250 kg and above.
- Helicopters – with an MTOM of less than 2,250 kg.

- Gyrocopters.
- Sailplanes and powered sailplanes - with rigid wings and undercarriage.
- Paragliders, powered paragliders (paramotors) and powered parachutes.
- Hot Air Balloons.
- Specialised Operations e.g. Parachute support operations, banner towing, and aerial photography

Note:

Performance data for Part-NCC operations (ie involving complex aircraft) have been included in the commercial operations sections; refer to Section B: The Irish Fixed-wing Commercial Air Transport Sector and Section C: The Irish Commercial Helicopter Sector.

Accidents and Serious Incidents

Table E.1 provides a summary of the safety performance of this sector in respect of accidents and serious incidents. The accident and serious incidents include all General Aviation accidents and serious incidents that occurred in Ireland, whether the aircraft was registered in Ireland, or registered abroad (e.g. visiting aircraft or foreign registered aircraft based in Ireland).

Further details are provided in the table below.

GA Sub-Sector	No. of fatal accidents (fatalities) 2019	Total no. of fatal accidents (total fatalities) 2015-2019	No. of non-fatal accidents 2019	Total no. of non-fatal accidents 2015-2019	No of Serious Incidents 2019	Total no. of serious incidents 2015-2019
Aeroplanes ≥ 2250 kg	0 (0)	2 (2)	1	1	0	0
Aeroplanes < 2250 kg	1 (2)	3 (4)	2	17	2	12
Home-built < 2250 kg	1 (2)	2 (3)	2	5	1	1
Microlight aircraft	1 (1)	2 (2)	0	3	0	1
Helicopters > 2250 kg	0 (0)	0 (0)	0	0	0	0
Helicopters < 2250 kg	0 (0)	0 (0)	0	6	0	1
Gyrocopters	0 (0)	0 (0)	0	1	0	0
Sailplanes	0 (0)	0 (0)	1	3	1	1
Paragliders	1 (1)	2 (2)	1	1	0	1
Balloons	0 (0)	0 (0)	0	0	0	0
Specialised Operations	0 (0)	1 (2)	0	1	0	0

Aeroplanes - with an MTOM 2,250 kg and above

There were 7 aeroplanes on the Irish aircraft register at the end of 2019 in this sub-sector.

In 2019, there were no fatal accidents or serious incidents, however there was one accident involving an Irish registered aircraft categorised as 'Abnormal Runway Contact (ARC).

In addition, over the past five years foreign registered aircraft in this sub-sector were involved in 2 fatal accidents. A fatal accident occurred in 2018 with two fatalities which was categorised as 'Loss of Control - Inflight' while operating in accordance with Part-SPO (Specialised Operations). In 2015 a fatal accident with two fatalities occurred, categorised as 'Controlled flight into terrain' (CFIT).

Non-complex Aeroplanes - with an MTOM below 2,250 kg

There were 179 aeroplanes on the Irish aircraft register at end of 2019 in this sub-sector.

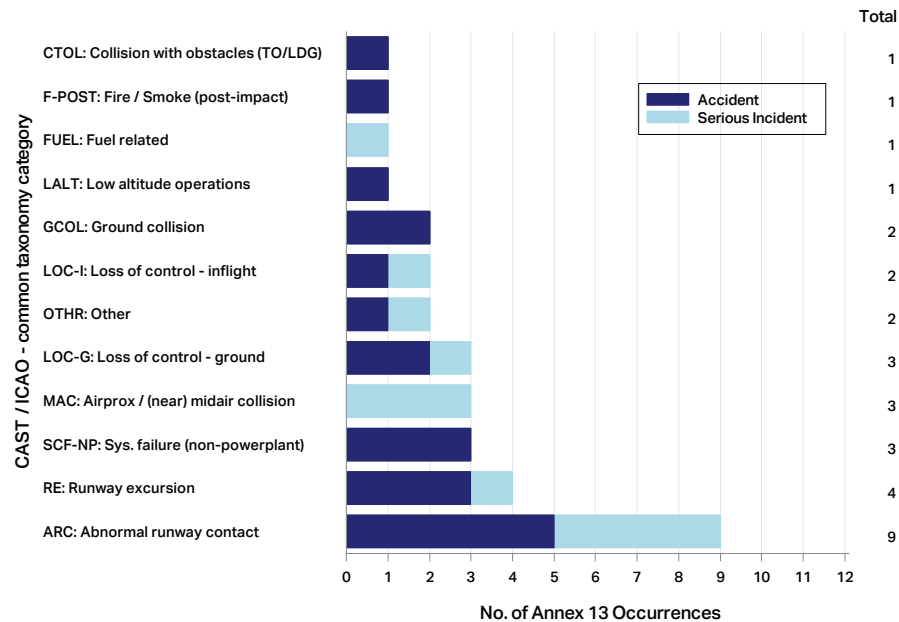
Over the past five years, aeroplanes in this sub-sector were involved in 3 fatal accidents resulting in 4 fatalities. Two of these fatal accidents involved Irish registered aircraft and one was foreign registered.

There was one fatal accident with two fatalities in 2019, initially categorised as 'Significant Component Failure - Non-Powerplant' (SCF-NP) The AAIU investigation of this accident is ongoing. There was 1 fatal accident in 2017 with 1 fatality, categorised as 'Ground Collision' (GCOL) and 1 fatal accident in 2016 with 1 fatality, categorised as 'Low Altitude Operations' (LALT).

During the past 5 years there were 17 non-fatal accidents, 5 of which involved aeroplanes on a foreign aircraft register and there were 12 serious incidents, 7 of which involved foreign registered aircraft.

The categories assigned by the AAIU to the accidents and serious incidents in this sub-sector is shown in Figure E.2 below.

Figure E.2: Categories of accidents and serious incidents involving GA aeroplanes with an MTOM below 2,250 kg (2015-2019)



Homebuilt Aircraft

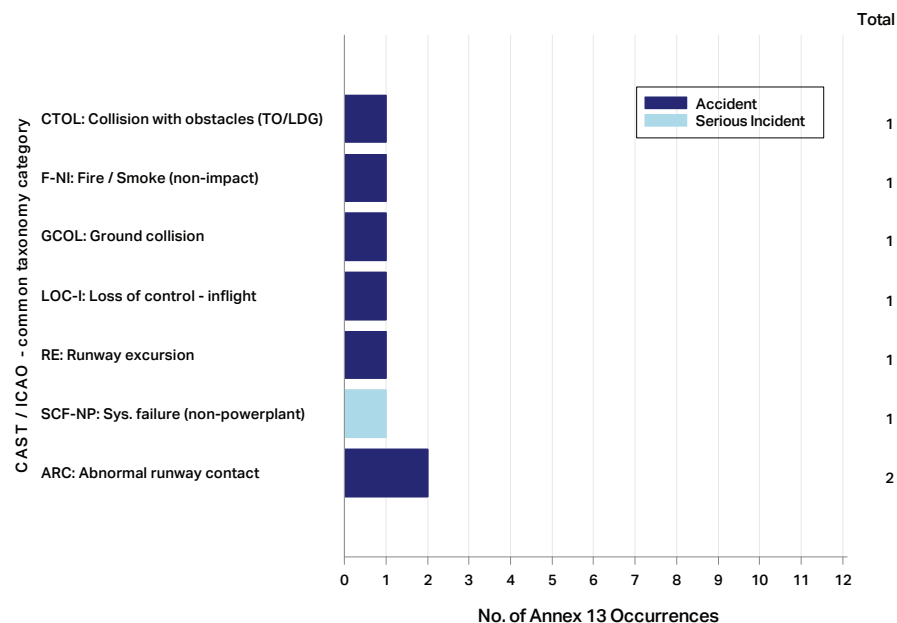
There were 49 aeroplanes on the Irish aircraft register at end of 2019 in this sub-sector.

In 2019, there was 1 fatal accident with 2 fatalities involving a foreign registered aircraft, initially categorised as 'Loss of Control- Inflight' (LOC-I). The AAIU investigation is ongoing. There were 2 non-fatal accidents involving Irish registered aircraft and 1 serious incident in 2019.

In addition, over the past five years there was 1 fatal accident with 1 fatality in 2015 categorised as Fire Non-Impact (F-NI) and 3 non-fatal accidents, involving 1 foreign and 2 Irish registered aircraft.

The categories assigned by the AAIU to the accidents and serious incidents in this sub-sector is shown in Figure E.3 below.

Figure E.3: Categories of accidents and serious incidents involving GA Fixed Wing Homebuilts with an MTOM below 2,250 kg (2015-2019)



Microlight Aircraft

There were 161 microlights on the Irish aircraft register at the end of 2019.

A fatal accident occurred in 2019 involving a foreign registered microlight with 1 fatality, initially categorised as 'Controlled Flight into Terrain' (CFIT). The AAIU investigation of this accident is ongoing.

In addition, over the past five years in this sub-sector, there was 1 fatal accident with 1 fatality involving an Irish registered microlight and 3 non-fatal accidents, 2 of which involved foreign registered microlights. There was 1 serious incident involving an Irish registered microlight. The categories assigned to these accidents were 'Abnormal Runway Contact' (ARC), 'Fuel Related' (FUEL), and 'Loss of Control – Inflight' (LOC-I). The serious incident was categorised as 'Engine Failure or Malfunction' (SCF-PP).

Rotorcraft

At the end of 2019 there were 7 complex helicopters and 19 non-complex helicopters registered in Ireland.

There were no fatal accidents involving GA helicopter operations in the past five years. During this period there were 6 accidents involving GA helicopters, all non-complex helicopters. There was 1 serious incident involving a non-complex helicopter. All the helicopters involved were foreign registered.

The accidents were categorised by the AAIU as 'Loss of control in flight' (LOC-I, 2 accidents), 'Loss of control on the ground' (LOC-G, 2 accidents), 'Collision with obstacles during take-off and landing' (CTOL, 1 accident), and Controlled Flight into Terrain (CFIT, 1 accident). The serious incident was categorised as 'Airprox / near midair collision' (MAC).

At the end of 2019 there were 21 gyrocopters, including 3 home-builts on the Irish aircraft register. There were no accidents or serious incidents involving Gyrocopters during the past five years.

Sailplanes

At the end of 2019 there were 29 sailplanes, including 2 powered sailplanes and 1 homebuilt sailplane on the Irish aircraft register. In 2019 there was 1 accident involving a foreign registered glider categorised as 'Collision with obstacles during take-off and landing' (CTOL) and 1 serious incident categorised as Abnormal Runway Contact (ARC). In addition, over the past 5 years there was 1 accident involving a collision between two gliders in 2018 categorised as 'Collision with obstacle(s) during take-off and landing on the runway' (CTOL).

Paragliders, powered paragliders and powered parachutes

There is no requirement in Ireland to register paragliders and powered parachutes, however powered paragliders are required to be registered since 2016. At the end of 2019 there were 15 powered paragliders registered in Ireland.

In 2019 there was 1 fatal accident with 1 fatality classified as Unknown (UNK) and 1 accident categorised as 'Collision with obstacle(s) during take-off and landing' (CTOL). In addition, over the past five years there was 1 fatal accident which resulted in 1 fatality, categorised as 'Loss of control in flight' (LOC-I) and 1 serious incident categorised as 'Controlled Flight into Terrain' (CFIT).

Non-complex Aircraft Specialised Operations

Over the past five years there was 1 fatal accident with 2 fatalities in 2018. This accident is addressed in the fixed wing > 2,250kg sub-section above.

It is worth noting from the EASA Annual Safety Review 2019 that the areas of SPO activity that have experienced the greatest number of fatal accidents and serious incidents are towing, parachute dropping, agriculture and air-shows.

Occurrence Reports

The regulations pertaining to mandatory occurrence reporting include general aircraft pilots flying type certified aircraft. Many of the aircraft involved in this sector are not type certified however the pilots of these aircraft may report occurrences on a voluntary basis using the same systems. The IAA website <https://www.iaa.ie/safety/safety-reporting> provides guidance on occurrence reporting requirements as well as the links necessary to submit reports to the IAA. The regulations include provisions concerning confidentiality, protection of reporters and appropriate use of information contained in occurrences.

The level of occurrence reporting from Flight Crew Training Organisations (FCTO) increased in 2019 such that it supported statistical analysis. Abnormal Runway Contact, Medical, System failure, Navigational errors and ATM were the top 5 categories identified in the submitted mandatory occurrence reports.

The level of occurrence reports received from those involved in general aviation for leisure flying is very low and does not currently support statistical analysis, which means that the opportunity to learn from past mistakes is limited to accidents and serious incidents. The occurrence reporting culture evident in commercial aviation is more difficult to achieve in general aviation, even though many of the personnel involved in general aviation are also involved in commercial aviation. This lack of a good reporting culture means that the lower level occurrences that could lead to accidents and serious incidents (in other circumstances) are not being reported by this sector.

The General Aviation Safety Council of Ireland (GASCI) was established in 2012 and its members include general aviation clubs, societies and training organisations representing many of the activities in this sector. The IAA and AAIU are also members of GASCI. GASCI hosts frequent safety evenings (typically 4 per year) around Ireland which gives the general aviation community an opportunity to review latest safety promotion material and discuss safety concerns. GASCI has established its own reporting site where those involved in GA activities can voluntarily share safety information <https://gasci.weebly.com/report-an-incidentcontact-us.html>

Safety Issues

The detailed analysis of the main causes of the accidents and serious incidents helps identify the main safety areas and related safety issues for general aviation. The IAA is greatly assisted in this regard by GASCI, which meets about four times per year to review and discuss latest safety concerns across the sector.

Conflict between GA aircraft with Commercial Air Traffic

From a risk perspective the greatest concern is that a GA aircraft may conflict with passenger carrying commercial aircraft. This may occur if GA aircraft enter controlled airspace without the necessary ATC clearance to do so. The problem is exacerbated if the GA aircraft involved is not fitted with transponder equipment, as the electronic safety nets that can alert pilots and ATC of their presence are not available. Airspace infringement is a key safety issue for GA.

GA Specific Safety Issues

The following table outlines the safety issues that emerge from the analysis of accidents and serious incidents which are included in the GA sector-based risk register.

Many of the risk mitigation actions for general aviation involve safety promotion to improve the awareness of the safety issues and provide guidance on how to avoid them. The State Plan for Aviation Safety in Ireland includes specific actions to develop safety promotion material for general aviation in conjunction with GASCI.

The following websites contain existing safety promotion guidance that may be of interest to those involved in general aviation:

<https://www.iaa.ie/general-aviation/safety-information>

<https://gasci.weebly.com/>

<https://www.easa.europa.eu/easa-and-you/safety-management/safety-promotion>

Safety Area	Safety Issues
Loss of Control -Inflight	<ul style="list-style-type: none"> • Recognition and recovery from aircraft upset • Awareness of flight attitude • Decision making and control of aircraft, following engine failure • Recognition of, and response to, carburetor icing • Operations of light aircraft within recommended mass and balance limits • Proficiency in practiced forced landings • Awareness of performance differences between different GA aircraft types
Collision with terrain or obstacle	<ul style="list-style-type: none"> • Inadvertent flight into degraded visual environments • Flight below minimum safe altitude (e.g. for weather avoidance) • Pre-flight planning • Situational awareness during flight • Use of advanced technologies • Use of aeronautical charts and terrain and obstacle databases
Mid-Air Collision	<ul style="list-style-type: none"> • Use of see and avoid • Good communications to aid in overall situational awareness • Safety Management at Club fly-ins and airshows • Conflict with Drones • Use of advanced technologies
Take-off and Landing	<ul style="list-style-type: none"> • Runway excursion or heavy landing following aircraft handling or environmental issues • Take-off and landing from hard/soft airstrips • Collision with obstacles
Specialised Operations	<ul style="list-style-type: none"> • Aircraft upset caused by system failure or a lapse in perception and situational awareness • The intrinsic risks of intentional low flying require mitigations such as training, experience and competence
Human Factors	<ul style="list-style-type: none"> • Threat and error management for GA • Decision Making
Other	<ul style="list-style-type: none"> • Safety of ground operations during club fly-ins • Overall an awareness of and mitigation against degraded proficiency after prolonged spells of inactivity such as the return to VFR flying after the winter

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Disclaimer

The data presented in this document is strictly for information purposes only. It is obtained from a number of different sources and, whilst every care has been taken to ensure the accuracy of the data and to avoid errors in the content, the IAA makes no warranty as to the accuracy, completeness or currency of the content.

Scope and Content of the Report

The Annual Safety Performance Review provides statistics on safety in the Irish aviation industry. Information relating to the safety activity the IAA has undertaken or intends to undertake is presented in the IAAs State Safety Plan. The IAAs intends to publish its 2020-2023 State Safety Plan during Q2 2020. Previous editions of the State safety Plan are available on the IAA website www.iaa.ie.

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