NAMIBIAN CIVIL AVIATION AUTHORITY

Advisory Pamphlet (AP)

ANSSO-GEN-AP170/04

GUIDANCE ON SAFETY ASSESSMENT

1. Explanation of Advisory Pamphlets (AP) system. The Namibian Civil Aviation Authority (NCAA) issues advisory pamphlets to inform the aviation public in a systematic way of non-regulatory material. Unless incorporated into a regulation by reference, the contents of an advisory circular are not binding on the public. Advisory pamphlets are issued in a numbered-subject system corresponding to the subject areas of the Namibian Civil Aviation Regulations (NAMCARs).

   Advisory Pamphlets are intended to provide information and guidance to illustrate a means but not necessarily the only means of complying with the Regulations, or to explain certain Regulatory requirements by providing interpretative and explanatory material. Where an AP is referred to in a 'Note' below the regulation, the AP remains as guidance material.

   APs should always be read in conjunction with the referenced regulations

2. Reproduction of Advisory Pamphlets. Advisory pamphlets may be reproduced in their entirety or in part without permission from the Civil Aviation Authority.

3. Effective date: 13 May 2020

NAMIBIA CIVIL AVIATION AUTHORITY
NCAA
13 MAY 2020
PRIVATE BAG 13224
AUSSPANNPLATZ
WINDHOEK
OFFICE OF THE EXECUTIVE DIRECTOR

Mr. Reinhard Gärtner
Interim Executive Director of Civil Aviation

GUIDANE ON SAFETY ASSESSMENT

1. PURPOSE

This Advisory Pamphlet (AP) provides guidance and information to air navigation service providers on the conduct of safety assessment to meet the requirements of the NAM-CAR Part 170 and the ANS-related regulations.

2. BACKGROUND

(a) NAM-CAR, Part 170 requires an air navigation service provider to establish safety management system to ensure a systematic approach to managing safety including policies, procedures, and practices necessary to safely provide the air navigation services.

(b) NAM-CAR, Part 171 requires an ATEL service provider to ensure that a safety case, or equivalent, is conducted for critical systems before commissioning in accordance with prescribed standards.

(c) NAM-CATS-ATEL also requires that a safety case be prepared to support a proposed new service, or a proposed change to an existing service and that the safety risk assessment in a safety case identify all potential safety hazards, assess the safety risk of each hazard, and identify the means of mitigation of unacceptable safety risks.

(d) NAM-CAR, Part 172 requires an ATS provider to ensure that any significant safety-related change to the ATS system, including the implementation of a new procedure, be effected after a safety assessment has demonstrated that an acceptable level of safety will be achieved.

(e) NAM-CATS-ATS further requires that a safety assessment be carried out in respect of proposals for significant airspace reorganizations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the introduction of new equipment, systems or facilities.

(f) Below are the extracts from the regulations to which this Advisory Pamphlet apply.

3. EXTRACTS FROM NAMCAR PART 170

170.04.8 Safety Management System

(1) An air navigation service provider must establish a safety management system to ensure a systematic approach to managing safety including policies, procedures, and practices necessary to safely provide the air navigation services covered by its certificate.

(2) The safety management system must be implemented in accordance with the requirements prescribed in Part 140 and under Parts 171, 172, 174, 175 and 179.

4. EXTRACTS FROM NAMCAR PART 171

171.04.8 Safety case

(1) An aeronautical telecommunication service provider shall ensure that a safety case, or equivalent, is conducted for critical systems before commissioning in accordance with the requirements prescribed in NAM-CATS-ATEL.

5. EXTRACTS FROM NAM-CATS-ATEL

171.04.8 SAFETY CASE

1.1 The safety risk assessment in a safety case must:

(a) identify all potential safety hazards associated with the operation of each service, in normal and abnormal modes of operation;

(b) assess the safety risk of each hazard;

(c) identify the means of mitigation of unacceptable safety risks.

6. EXTRACTS FROM NAMCAR PART 172

172.04.29 Safety management

(1) An ATS provider must establish and maintain a safety management system acceptable to the Executive Director, for management of safety in accordance with the standards set out in Document NAM-CATS-ATS and the requirements prescribed in Parts 140 and 170.

7. EXTRACTS FROM NAM-CATS-ATS

172.04.29 Safety management

6. Safety assessments

6.1 Need for safety assessments

6.1.1 A safety assessment shall be carried out in respect of proposals for significant airspace reorganizations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the introduction of new equipment, systems or facilities .....

GUIDANCE ON SAFETY ASSESSMENT

1. INTRODUCTION

1.1 As required under the NAM-CAR Part 170, an ANS providers must establish a safety management system to ensure a systematic approach to managing safety including policies, procedures, and practices necessary to safely provide the air navigation services.The ANS provider should develop and maintain a formal process that ensures analysis, assessment and control of the safety risks of the consequences of hazards during the provision of its services.

1.2 This Advisory pumphlet provides guidelines to enable ANS providers to conduct safety assessment as part of their safety management system. The role of the ANS provider is to adopt a management approach that ensures hazards are identified and risks associated therewith are controlled before they result into serious incidents and/or accidents.

1.3 The ANS provider should develop and maintain a formal process to identify hazards that may contribute to aviation safety-related occurrences. Hazard identification should be based on a combination of reactive, proactive and predictive methods of safety data collection. The ANS provider should ensure that risks associated with such hazards are controlled through a safety risk mangement process.

1.4 The safety risk management process systematically identifies hazards that exist in the delivery of services. The corresponding safety risks are then assessed within the context of the potentially damaging consequences related to the hazard. Where the safety risks are assessed to be unacceptable, additional safety risk controls must be built into the system.

2. SAFETY ASSESSMENT CONSIDERATIONS FOR THE AERONAUTICAL TELECOMMUNICATION (ATEL) SERVICE PROVIDERS

2.1 The ATEL provider should ensure that the safety risk assessment conducted in a safety case identifies all potential safety hazards associated with the operation of each service, in normal and abnormal modes of operation. The risks associated with each hazard must be assessed and appropriate and acceptable mitigations identified.

2.2 Existing services and/or facilities with a demonstrated history of safe operation for more than two years at the date of initial certification do not need to be covered by a baseline safety case. However a safety case must be prepared to support a proposed new service, or a proposed change to an existing service, if the effect of the service or change would result in a significant change to the services provided prior to the change or the new service or proposed change requires prior notification to the Executive Director in accordance with the service provider's safety management system requirements.

2.3 The changes for which prior notification to the Executive Director are required and for which a safety case must be conducted include any new radio communication, navigation, or surveillance facility whether temporary or permanent.

2.4 A safety case must be submitted with the application for new services and should:

a) contain argument and evidence that the system meets or exceeds the appropriate standard of safety;
b) reflect one of two situations; the safety of the existing, on-going, operation or a change to the existing operation, such as a new project or procedure
c) be presented in a reasonable format as long as its scope is well defined and it provides the necessary arguments and evidence required for its purpose.

3. SAFETY ASSESSMENT CONSIDERATIONS FOR AIR TRAFFIC SERVICE PROVIDERS

3.1 An ATS provider is required to carry out a safety assessment in respect of proposals for significant airspace reorganizations, changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the

introduction of new equipment, systems or facilities. The changes for which a safety assessment is required include, but not limited to:

a) a reduction in separation minimum to be applied within an airspace or at an aerodrome;
b) a new operating procedure, including departure and arrival procedures, to be applied within an airspace or at an aerodrome;
c) a reorganization of the ATS route structure;
d) a re-sectorization of an airspace;
e) physical changes to the layout of runways and/or taxiways at an aerodrome; and
f) implementation of new communications, surveillance or other safety-significant systems and equipment, including those providing new functionality and/or capabilities.

Note. With respect to 3.1 a) a reduced separation minimum may refer to the reduction of a horizontal separation minimum, including a minimum based on required navigation performance (RNP), a reduced vertical separation minimum of 300 m (1 000 ft) between FL 290 and FL 410 inclusive (RVSM), the reduction of a separation minimum based on the use of an ATS surveillance system or a wake turbulence separation minimum or reduction of minima between landing and/or departing aircraft. Applicable minimum separation standards are described in Document NAM-CATS-ATS.

3.2 Proposals for changes in the ATS system should be implemented only when the safety assessment has shown that an acceptable level of safety will be met. The safety significant factors to be considered by an ATS providers in the safety assessment include:

a) types of aircraft and their performance characteristics, including aircraft navigation capabilities and navigation performance;
b) traffic density and distribution;
c) airspace complexity, ATS route structure and classification of the airspace;
d) aerodrome layout, including runway configurations, runway lengths and taxiway configurations;

e) type of air-ground communications and time parameters for communication dialogues, including controller intervention capability;

f) type and capabilities of surveillance system, and the availability of systems providing controller support and alert functions. Where ADS-B implementation envisages reliance upon a common source for surveillance and/or navigation, the safety assessment shall take account of adequate contingency measures to mitigate the risk of either degradation or loss of this common source (i.e. common mode failure);

g) any significant local or regional weather phenomena; and

h) reduction in separation minima when it is determined by the ATS Authority that :

(i) special electronic or other aids enable the pilot-in-command of an aircraft to determine accurately the aircraft's position and when adequate communication facilities exist for that position to be transmitted without delay to the appropriate air traffic control unit; or

(ii) in association with rapid and reliable communication facilities, information of an aircraft's position, derived from an ATS surveillance system, is available to the appropriate air traffic control unit; or

(iii) special electronic or other aids enable the air traffic controller to predict rapidly and accurately the flight paths of aircraft, and adequate facilities exist to verify frequently the actual aircraft positions with the predicted positions; or

(iv) RNAV-equipped aircraft operate within the coverage of electronic aids that provide the necessary updates to maintain navigation accuracy.

i) reduction in separation minima in accordance with regional air navigation agreements when:

(i) special electronic, area navigation or other aids enable the aircraft to closely adhere to their current flight plans; and

(ii) the air traffic situation is such that the conditions in h) i) above regarding communications between pilots and the appropriate

ATC unit or units need not necessarily be met to the degree specified therein.

3.3 Any actual or potential hazard related to the provision of ATS within an airspace or at an aerodrome, whether identified through an ATS safety management activity or by any other means, shall be assessed and classified by the appropriate ATS authority for its risk acceptability.

3.4 Except when the risk can be classified as acceptable, the ATS authority concerned shall, as a matter of priority and as far as practicable, implement appropriate measures to eliminate the risk or reduce the risk to a level that is acceptable.

3.5 If it becomes apparent that the level of safety applicable to an airspace or an aerodrome is not, or may not be achieved, the appropriate ATS authority shall, as a matter of priority and as far as practicable, implement appropriate remedial measures

3.6 Implementation of any remedial measure shall be followed by an evaluation of the effectiveness of the measure in eliminating or mitigating a risk

4. HAZARD IDENTIFICATION

4.1 A hazard is a condition or an object with the potential to cause death, injuries to personnel, damage to equipment or structures, loss of material, or reduction of the ability to perform a prescribed function.

4.2 Hazards may exist in ongoing aviation activities or be inadvertently introduced into an operation whenever changes are introduced to the aviation system. Hazard identification is an integral part of the change management processes.

4.3 Hazards may be the result of systems that are deficient in their design, technical function, human interface or interactions with other processes and systems.

They may also result from a failure of existing processes or systems to adapt to changes in the service provider's operating environment. Careful analysis of these factors during the planning, design and implementation phases can often identify potential hazards before the system becomes operational.

4.4 Conditions that require in-depth hazard identification include;

a) instances where the organization experiences an unexplained increase in aviation safety-related events or regulatory non-compliance;
b) significant operational changes, including anticipated changes to key personnel or other major system components; and
c) significant organizational changes, including anticipated growth and contraction, corporate mergers or acquisitions

4.5 Hazard identification is a prerequisite to the safety risk management process. A clear understanding of hazards and their related consequences is essential to the implementation of sound safety risk management.

4.6 For the purpose of aviation safety risk management, the term hazard should be focused on those conditions which could cause or contribute to unsafe operation of aircraft or aviation safety-related equipment, products and services.

***Example**: Consider a fifteen-knot wind, which is not necessarily a hazardous condition. However, a fifteen-knot wind blowing in a direction ninety degrees across a runway of intended take-off or landing creates a crosswind condition that may be hazardous due to its potential to contribute to an aircraft operational occurrence, such as a runway excursion.*

4.7 Hazards are an inevitable part of aviation activities. However, their manifestation and possible consequences can be addressed through various mitigation strategies to contain the potential for a hazard to result in unsafe aircraft or aviation equipment operations. A consequence is an outcome that can be triggered by a hazard. By first defining the hazard clearly, one can then project the proper consequence or outcome.

4.8 In the crosswind example above, an immediate outcome of the hazard could be loss of control by the pilot followed by a consequent runway excursion. The ultimate consequence could be an accident. The damaging potential of a hazard materializes through one or many consequences. It is therefore important for safety assessments to include a comprehensive account of all likely consequences, described accurately and in practical terms. The description of consequences according to their plausible outcomes will facilitate the development and implementation of effective mitigation strategies through proper prioritization and allocation of limited resources. Proper hazard identification leads to appropriate evaluation of their potential outcomes.

4.9 When conducting hazard identification, the ANS provider should consider the following:

a) design factors, including equipment and task design;

b) human performance limitations (e.g. physiological, psychological and cognitive);

c) procedures and operating practices, including their documentation and checklists and their validation under actual operating conditions;

d) communication factors, including media, terminology and language;

e) organizational factors, such as those related to the recruitment, training and retention of personnel, safety goals, the allocation of resources, operating pressures and the corporate safety culture;

f) factors related to the operational environment of the ANS system (e.g. ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing);

g) regulatory oversight factors, including the applicability and enforceability of regulations and the certification of equipment, personnel and procedures;

h) performance monitoring systems that can detect practical drift or operational deviations; and

i) human-machine interface factors.

4.10 Hazards should be differentiated from error, a normal and unavoidable component of human performance, which must be managed.

4.11 There are three methods of identifying hazards:

a) *Reactive*. This methodology involves analysis of past outcomes or events. Hazards are identified through investigation of safety occurrences. Incidents and accidents are clear indicators of system deficiencies and therefore can be used to determine the hazards that either contributed to the event or are latent.

b) *Proactive*. This methodology involves analysis of existing or real-time situations, which is the primary job of the safety assurance function with its audits, evaluations, employee reporting, and associated analysis and assessment processes. This involves actively seeking hazards in the existing processes.

c) *Predictive*. This methodology involves data gathering in order to identify possible negative future outcomes or events, analysing system processes and the environment to identify potential future hazards and initiating mitigating actions.

4.12 It is important to distinguish between aviation safety hazard and occupational safety, health and environment hazard (OSHE). Any hazard that can have an impact (whether directly or indirectly) on the operational safety of aircraft or aviation safety-related equipment, products and services should be deemed pertinent to an aviation safety. A hazard having purely OSHE consequences, that is, without any impact on aviation safety, should be addressed separately by the organization's OSHE system/procedures in accordance with the organizational OSHE requirements as appropriate.

4.13 The safety risk assessment and mitigation process starts with the identification of hazards and their potential consequences. The safety risks are then assessed in terms of probability and severity, to define the level of safety risk (safety risk index). If the assessed safety risks are deemed to be tolerable, appropriate action is taken and the operation continues.

c) How many personnel are following, or are subject to, the procedures in question?

d) What percentage of the time is the suspect equipment or the questionable procedure in use?

e) To what extent are there organizational, managerial or regulatory implications that might reflect larger threats to public safety?

5.1.2.2 Any factors underlying these questions will help in assessing the likelihood that a hazard may exist, taking into consideration all potentially valid scenarios. The determination of likelihood can then be used to assist in determining safety risk probability.

5.1.2.3 The Table below presents a five point ***safety risk probability table*** which should be used by the ANS provider to determine probability that an unsafe condition will occur. The table includes five categories to denote the probability related to an unsafe event or condition, the description of each category, and an assignment of a value to each category:

Likelihood	***Meaning***	***Value***
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

5.1.3 *Safety risk severity*

5.1.3.1 Once the probability assessment has been completed, the next step is to assess the safety risk severity, taking into account the potential consequences related to the hazard. Safety risk severity is defined as the extent of harm that might

reasonably occur as a consequence or outcome of the identified hazard. The severity assessment can be based upon:

a) *Fatalities/injury*. How many lives may be lost (employees, passengers, bystanders and the general public)?
b) *Damage*. What is the likely extent of aircraft, property or equipment damage?

5.1.3.2 The severity assessment should consider all possible consequences related to an unsafe condition or object, taking into account the worst foreseeable situation.

5.1.3.3 The Table below presents a typical ***safety risk severity table.*** It includes five categories to denote the level of severity, the description of each category, and the assignment of a value to each category:

Severity	***Meaning***	***Value***
Catastrophic	— Equipment destroyed — Multiple deaths	A
Hazardous	— A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely — Serious injury — Major equipment damage	B
Major	— A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency — Serious incident — Injury to persons	C
Minor	— Nuisance — Operating limitations — Use of emergency procedures — Minor incident	D

Negligible	— Few consequences	E

5.1.4 ***Safety risk tolerability***

5.1.4.1 The safety risk probability and severity assessment process should be used to derive a safety risk index. The index created through the methodology described above consists of an alphanumeric designator, indicating the combined results of the probability and severity assessments.

5.1.5 The Table below presents a ***safety risk assessment matrix*** that shows the respective severity/probability combinations:

Risk probability	**Risk Severity**				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely improbable 1	1A	1B	1C	1D	1E

5.1.6 The next step in the process is to determine the safety risk tolerability. First, it is necessary to obtain the indices in the safety risk assessment matrix. For example, consider a situation where a safety risk probability has been assessed as occasional (4), and safety risk severity has been assessed as hazardous (B).

The composite of probability and severity (4B) is the safety risk index of the consequence.

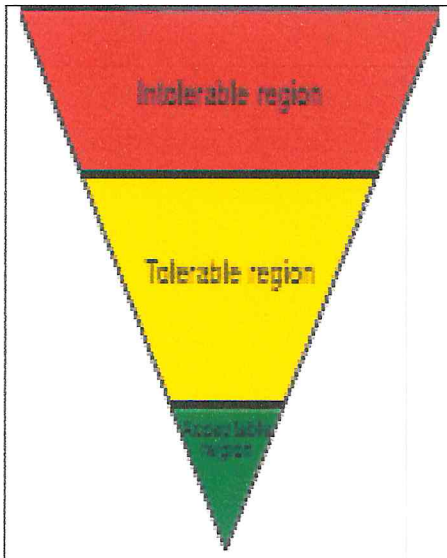
5.1.7 The index obtained from the safety risk assessment matrix must then be exported to a ***safety risk tolerability matrix*** (see figure in 5.1.9 below) that describes the tolerability criteria:

5.1.8 Using the example in 5.1.6 above, the criterion for safety risk assessed as 4B falls in the "unacceptable under the existing circumstances" category. In this case, the safety risk index of the consequence is unacceptable. The service provider organisation must therefore:

a) take measures to reduce the organization's exposure to the particular risk, i.e. reduce the likelihood component of the risk index;
b) take measures to reduce the severity of consequences related to the hazard, i.e. reduce the severity component of the risk index; or
c) cancel the operation if mitigation is not possible.

5.1.9 ***Safety risk tolerability matrix***

Tolerability description	Assessed risk index	Suggested criteria
	5A,5B,5C, 4A,4B,3A	Unacceptable under the existing circumstances
	5D,5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Acceptable based on risk mitigation. It may require management decision

	**3E, 2D, 2E, 1B, 1C, 1D, 1E**	Acceptable

Note. The inverted pyramid in the safety risk tolerability matrix reflects a constant effort to drive the risk index towards the bottom APEX of the pyramid.

5.1.10 Appendix 1 of this AP provides examples of Severity, Likelihood, Risk Index and Tolerability tables that can be used by an ANS provider to document the results its safety assessment.

5.2 Safety Risk Mitigation

5.2.1 The objective of safety risk management is to assess the risks associated with identified hazards and develop and implement effective and appropriate mitigations. Safety risks are conceptually assessed as acceptable, tolerable or intolerable. Risks assessed as initially falling in the intolerable region are unacceptable under any circumstances. The probability and/or severity of the consequences of the hazards are of such a magnitude, and the damaging potential of the hazard poses such a threat to safety, that immediate mitigation action is required.

5.2.2 Safety risks assessed in the tolerable region are acceptable provided that appropriate mitigation strategies are implemented by the organization. A safety risk initially assessed as intolerable may be mitigated and subsequently moved into the tolerable region provided that such risks remain controlled by

appropriate mitigation strategies. In both cases, a supplementary cost-benefit analysis may be performed if deemed appropriate.

5.2.3 If the safety risks are assessed as intolerable, the following questions become relevant:

a) Can the hazards and related safety risk(s) be eliminated? If the answer is yes, then action as appropriate is taken and documented. If the answer is no, the next question is:

b) Can the safety risk(s) be mitigated? If the answer is no, related activities must be cancelled. If the answer is yes, mitigation action as appropriate is taken and the next question is:

c) Do any residual safety risks exist? If the answer is yes, then the residual risks must be assessed to determine their level of tolerability as well as whether they can be eliminated or mitigated as necessary to ensure an acceptable level of safety performance.

5.2.4 Safety risks assessed as initially falling in the acceptable region are acceptable as they currently stand and require no action to bring or keep the probability and/or severity of the consequences of hazards under organizational control.

5.2.5 Each risk mitigation exercise will need to be documented as necessary. This may be done on a basic spreadsheet or table for risk mitigation involving non-complex operations, processes or systems. For hazard identification and risk mitigation involving complex processes, systems or operations, it may be necessary to utilize customized risk mitigation software to facilitate the documentation process. Completed risk mitigation documents should be approved by the appropriate level of management of the service provider before being submitted to the Executive Director where approval is required by regulations.

5.2.6 A ***safety risk mitigation worksheet*** that should be used by the ANS provider is illustrated in the Table in 5.2.7 below. For easier worksheet management, it is preferable to use a separate worksheet for each different Hazard/Unsafe event and Ultimate consequence combination:

5.2.7 Safety Risk Mitigation Worksheet

1) Hazard and consequence

Operation/process:	Describe the process/operation/equipment/system being subjected to this hazard identification and risk management (HIRM) exercise.
Hazard (H):	If there is more than one hazard to the operation/process, use a separate worksheet to address each hazard.
Unsafe event (UE)	If there is more than one UE to the hazard, use a separate worksheet to address each UE-UC combination.
Ultimate consequence (UC):	If there is more than one UC to the hazard, use a separate worksheet to address each UC.

2) Risk index and tolerability of consequence (See Appendix 1)

	Current risk tolerability (taking into consideration any existing PC/RM/EC				Resultant risk index and tolerability (taking into consideration any new PC/RM/EC)		
	Severity	Likelihood	Tolerability		Severity	Likelihood	Tolerability
Unsafe event							
Ultimate consequence							

3) Risk mitigation

Hazard (H)	PC	EF	EC		RM	EF	EC	
H	PC 1 (Existing)	EF (Existing)	EC1 (Existing)	UE	RM 1	EF (to RM 1)	EC (to EF)	UC
			EC 2 (New)					
	PC 2 (Existing)	EF 1 (New)	EC (New)		RM 2	EF (to RM 2)	EC (to EF)	
		EF 2 (New)	EC (New)					

	PC 3 (New)	EF (New)	EC (New)		RM 3	EF (to RM 3)	EC (to EF)	

Explanatory notes on the Worksheet –

1. Operation/process (Table 1)). Description of the operation or process which is being subjected to this hazard/risk mitigation exercise.
2. Hazard (H). An undesirable condition or situation which may lead to unsafe event(s) or occurrence(s). Sometimes the term "threat" (e.g. TEM) is used instead of "hazard".
3. *Unsafe event (UE)*. A possible intermediate unsafe event before any ultimate consequence, accident or most credible outcome. Identification of an unsafe event is applicable only where there is a need to distinguish and establish mitigating actions upstream and downstream of such an intermediate event (before the ultimate consequence/accident) (e.g. "over temperature event" before an "engine failure"). If this intermediate UE state is not applicable for a particular operation, then it may be excluded as appropriate.
4. *Ultimate consequence (UC)*. The most credible outcome, ultimate event or accident.
5. *Preventive control (PC)*. A mitigating action/mechanism/defence to block or prevent a hazard/threat from escalating into an unsafe event or ultimate consequence.
6. *Escalation factor (EF)*. A possible latent condition/factor which may weaken the effectiveness of a preventive control (or recovery measure). Use where applicable only. Itis possible that an escalation factor may sometimes be referred to as a "threat".
7. *Escalation control (EC)*. A mitigating action/mechanism to block or prevent an escalation factor from compromising or weakening a preventive control (or recovery measure). Use where applicable only.
8. *Current risk index and tolerability*. Risk mitigating action (Table 3)) is applicable whenever an unacceptable current tolerability level of an unsafe event or ultimate consequence is identified in Table 2). Current risk index and tolerability shall take into consideration existing preventive controls, where available.

9. Resultant risk index and tolerability. Resultant risk index and tolerability are based on the combined current preventive controls (if any) together with the new preventive controls/escalation controls/recovery measures put in place as a result of the completed risk mitigation exercise.

6. SAFETY ASSESSMENT DOCUMENTATION AND APPROVAL

6.1 The service provider's safety information management system should include safety assessment documentation that contains hazard descriptions, the related consequences, the assessed likelihood and severity of the safety risks, and required safety risk controls. Existing safety assessments should be reviewed whenever new hazards are identified and proposals for further safety risk controls are anticipated.

6.2 The ANS provider should ensure that the completed hazard identification and safety risk assessment and mitigation process is documented. The documented process will form part of the safety information management system of the ANS provider organisation.

6.3 Where the documented process forms part of an approval required in accordance with the regulations, the documented process must be submitted to the Executive Director for approval. The documented process may also be required by the Executive Director for the purpose of on-going safety oversight or surveillance activity.

APPENDIX 1 EXAMPLE SEVERITY, LIKELIHOOD, RISK INDEX AND TOLERABILITY TABLES

1. Severity Table

Level	*Descriptor*	*Severity description (customize according to the nature of the product or the service provider's operations)*
1	Insignificant	No significance to aircraft-related operational safety
2	Minor	Degrades or affects normal aircraft operational procedures or performance
3	Moderate	Partial loss of significant/major aircraft systems or results in abnormal application of flight operations procedures
4	Major	Complete failure of significant/major aircraft systems or results in emergency application of flight operations procedures
5	Catastrophic	Loss of aircraft or lives

2. Likelihood Table

Level	*Descriptor*	*Likelihood description*
A	Certain/frequent	Is expected to occur in most circumstances
B	Likely/occasional	Will probably occur at some time
C	Possible/remote	Might occur at some time
D	Unlikely/improbable	Could occur at some time
E	Exceptional	May occur only in exceptional circumstances

3. Risk index matrix (severity × likelihood)

Likelihood	*Severity*				
	1. Insignificant	2. Minor	3.Moderate	4. Major	5.Catastrophic
Certain/frequent	Moderate (1A)	Moderate (2A)	High (3A)	Extreme (4A)	Extreme (5A)
Likely/occasional	Low (1B)	Moderate (2B)	Moderate (3B)	High (4B)	Extreme (5B)
Possible/remote	Low (1C)	Low (2C)	Moderate (3C)	Moderate (4C)	High (5C)
Unlikely/improbable	Negligible (1D)	Low (2D)	Low (3D)	Moderate (4D)	Moderate (5D)
Exceptional	Negligible (1E)	Negligible (1E)	Low (3E)	Low (4E)	Moderate (5E)

4. Risk acceptability (tolerability) table

Risk Index	*Tolerability*	*Action required (customize as appropriate)*
5A, 5B, 4A	Extreme risk	Stop operation or process immediately. Unacceptable under the existing circumstances. Do not permit any operation until sufficient control measures have been implemented to reduce the risk to an acceptable level. Top management approval required
5C, 4B, 3A	High risk	Caution. Ensure that risk assessment has been satisfactorily completed and declared preventive controls are in place. Senior management approval of risk assessment before commencement of the operation or process.
1A, 2A, 2B, 3B, 3C, 4C, 4D, 5D, 5E	Moderate risk	Perform or review risk mitigation as necessary. Departmental approval of risk assessment.
1B, 1C, 2C, 2D, 3D, 3E, 4E,	Low risk	Risk mitigation or review is optional.
1D, 1E, 2E	Negligible risk	Acceptable as is. No risk mitigation required.