

Aeronautical Study and Risk Assessments

**Revision 2.0
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GENERAL

Civil Aviation Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Advisory Circular.

An Advisory Circular may also include Guidance Material (GM) to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

PURPOSE

This Advisory Circular provides information and guidance to assist aerodrome operators and other parties to undertake an aeronautical study in accordance with Civil Aviation Rule 139.107.

RELATED CAR

This AC relates specifically to rule 139.107 of Part 139 Applicable 4 December 2019.

CHANGE NOTICE

This AC replaces AC139-15 Revision 1.0 of 16 August 2017, which was aligned with Part 139 Applicable 01 May 2017.

This AC139-11 Revision 2.0 is now aligned with Part 139 Applicable 4 December 2019.

Table of Contents

CHAPTER 1 — FUNCTION AND FORM	1
1.1 FUNCTION AND AUTHORITY OF THE AERONAUTICAL STUDY AND RISK ASSESSMENTS	1
1.2 APPLICABILITY	1
1.3 AERONAUTICAL STUDY	1
1.4 OBJECTIVES	2
CHAPTER 2 — A TYPICAL AERONAUTICAL STUDY & RISK ASSESSMENT	3
2.1 PARTS OF AN AERONAUTICAL STUDY	3
2.2 AIM OF THE STUDY	3
2.3 BACKGROUND	3
2.4 SAFETY ASSESSMENT	4
2.5 RECOMMENDATIONS.....	7
2.6 CONCLUSION	7
2.7 MONITORING OF THE DEVIATION	8
2.8 SUBMISSION OF AERONAUTICAL STUDY TO CASA PNG	8
CHAPTER 3 — PROCESS.....	9
3.1 INTRODUCTION	9
3.2 AERONAUTICAL STUDY METHODOLOGY	10
3.3 CONSULTATION	11
CHAPTER 4 — APPROVAL OR ACCEPTANCE OF A SAFETY ASSESSMENT	12
4.6 PROMULGATION OF SAFETY INFORMATION	12
APPENDIX A - CHECKLIST FOR AERONAUTICAL STUDY	13
APPENDIX B - HAZARD LOG	14
APPENDIX C – THE SEVEN STEP APPROACH	15
APPENDIX D – RELATED INFORMATION	16

CHAPTER 1 — FUNCTION AND FORM

1.1 Function and authority of the Aeronautical Study and Risk Assessments

1.1.1. In accordance with the requirements of Rule Part 139.107, the holder of an aerodrome-operating certificate must monitor operations and conduct an aeronautical study when a significant change in aerodrome operations occurs that may affect the safety of aircraft operations. These significant changes in aerodrome operations include a change in aerodrome aircraft traffic, a change in aircraft operations type, a change in the aerodrome physical characteristics, an increase in aerodrome accidents/incidents, or a change in airspace designation.

1.1.2. This Advisory Circular details how an aeronautical study is conducted to assess the impact of changes in aerodrome operations and deviations from the aerodrome standards specified in Appendices A to H Part 139 and Volume I to Annex 14 to the Convention on International Civil Aviation to present acceptable means of compliance.

1.1.3. An aeronautical study should estimate the effectiveness of each alternative and recommend procedures to compensate for the deviations from CAR Part 139 standards and requirements for aerodromes taking into account Papua New Guinea's aviation environment.

1.1.4. Aeronautical study justification may be either quantitative or qualitative.

1.2 Applicability

1.2.1. This AC 139-11 applies to all aerodrome operators¹ certificated under Part 139 of the PNG Civil Aviation Rules.

1.2.2. For the purposes of, but not limited to Rule 139.17, 139.55, 139.89 and 139.119, it is recommended that this AC 139-11 provides guidance to aerodrome operators when analysing aeronautical problems.

Notes

- *Aeronautical studies may not be conducted in cases of deviations from the standards, if not specifically recommended in Annex 14, Volume I.*
- ¹*Aerodrome operators include applicants applying for an aerodrome-operating certificate (ADOC).*

1.3 Aeronautical Study

1.3.1. ICAO Doc 9774 defines an aeronautical study as “a study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.

1.3.2. An aeronautical study is a study of an aeronautical problem to identify possible solutions, and to select a solution that is acceptable without degrading safety. A comprehensive aeronautical study allows both the aerodrome operator and CASA PNG to be convinced that safety and regularity of operations of aircraft are not compromised in any way.

1.3.3. An aeronautical study is most frequently undertaken during the planning of a new airport or new airport facility, or during the certification of an existing aerodrome or subsequently, when the aerodrome operator applies for an exemption, as a result of development or a change in the aerodrome operational conditions from a specific Standard or Recommended Practice (SARP) contained in CAR Part 139.

1.3.4. An aeronautical study is a study of an aeronautical problem carried out by an aerodrome operator to identify possible solutions and select a solution that is acceptable without degrading safety. The Aerodrome and ANS Regulation Division will review these studies on a case-by-case basis and determine their acceptability.

1.3.5. Aerodrome operators should consult their stakeholders, senior management and affected divisions/departments in their organisations prior to the conduct of an aeronautical study. These consultations would allow the proposed deviation to be viewed from different perspectives and the different parties involved would be aware of the proposed deviation. The aeronautical study should also be approved by the senior management of the organization before it is submitted to CASA PNG for consideration of acceptance.

1.3.6. Aerodrome operators should note that CASA PNG may choose to participate in the conduct of an aeronautical study as an observer where appropriate.

1.4 Objectives

1.4.1. The objectives of an aeronautical study are as follows:

- a) To study the impact of deviations from the SARPs contained in CAR Part 139;
- b) To present alternative solutions to ensure the level of safety remains acceptable;
- c) To estimate the effectiveness of each alternative; and
- d) To recommend operating procedures/restrictions or other measures to compensate for the deviation.

CHAPTER 2 — A TYPICAL AERONAUTICAL STUDY & RISK ASSESSMENT

2.1 Parts of an Aeronautical Study

- 2.1.1. An aeronautical study submitted to CASA PNG for determination of acceptability should comprise the following parts:
- Aim of the Study;
 - Background;
 - Safety Assessments;
 - Recommendations;
 - Conclusion; and
 - Monitoring of the Deviation.

2.2 Aim of the Study

- 2.2.1. The aim of the study should be explicitly stated. It should:
- Address the safety concerns;
 - Identify safety measures to be put in place to ensure safe aircraft operations in an aerodrome; and
 - Make reference to the specific SARP in CAR Part 139 which the study is meant to address.
- 2.2.2. An example to illustrate this would be as follows:

"The aim of this aeronautical study is to address the operation of Code D aircraft in a Code 3C airport, <name of airport> and to put in place <list of safety measures> necessary to ensure safe operation of Code D aircraft in <name of airport> with reference made to <reference to specific SARP in CAR Part 139> ... "

2.3 Background

- 2.3.1. Information on the current situation faced by the aerodrome operator, current procedures that have been put in place and other relevant details should be clearly stated and explained in this subsection.

Clear explanation should be provided, particularly on the following:

- What is the current situation?
- Where are the areas that will be affected by the proposed deviation?
- When will the operator be able to comply with the specific standard if it is due to development of the aerodrome?
- Why is there a need to review the current processes and procedures?
- How will the proposed deviation affect the operation of aircraft at the aerodrome?

- 2.3.2. An example to illustrate this would be as follow:

"Currently, <name of airport> is Code 4D airport with some Code 4E capabilities. These Code 4E capabilities includes <list of the Code 4E capabilities> ... <Name of airport> is required to handle Code E aircraft by <proposed date> and the following <list of affected areas> will be affected. Development of the <affected areas> is proposed to commence on <proposed date> and to be completed by <proposed date>. By then, <name of airport> will be upgraded to a Code 4E airport.

Upgrading <name of airport> from Code 4D to Code 4E airport requires the reviewing <name of processes and procedures that need to be reviewed> to ensure safe aircraft operation.

In addition, during this development, operation of aircraft at <name of airport> will be affected in the following ways ... "

2.4 Safety Assessment

2.4.1. Safety assessment is the identification, analysis and elimination, and/or mitigation of risks to an acceptable level of safety. This should be in accordance with the aerodrome Safety Management System (SMS) that is required to be put in place by the operator - a key aerodrome certification requirement. A safety assessment usually consists of the following:

- a) Identification of hazards and consequences; and
- b) Risk management.

2.4.2. Depending on the nature of the risk, three methodologies can be used to evaluate whether it is being appropriately managed. The methodology adopted should be consistent with that established in the aerodrome operator's SMS.

- a) **Method type "A"**. For certain hazards, the risk assessment strongly depends on specific aeroplane and/or system performance. The risk level is dependent upon aeroplane/system performance (e.g. more accurate navigation capabilities), handling qualities and infrastructure characteristics. Risk assessment, then, can be based on aeroplane/system design and validation, certification, simulation results and accident/incident analysis;
- b) **Method type "B"**. For other hazards, risk assessment is not really linked with specific aeroplane and/or system performance but can be derived from existing performance measurements. Risk assessment, then, can be based on statistics (e.g. deviations) from existing operations or on accident analysis; development of generic quantitative risk models can be well adapted;
- c) **Method type "C"**. In this case, a "risk assessment study" is not needed. A simple logical argument may be sufficient to specify the infrastructure, system or procedure requirements, without waiting for additional material, e.g. certification results for newly announced aeroplanes or using statistics from existing aeroplane operations.

Identification of hazards and consequences

2.4.3. Hazards and its consequences should be identified and recorded in a hazard log. Aerodrome operators have to exercise caution when identifying the hazards and their consequences as stating a hazard as its consequence would disguise the nature of the hazard and at the same time, interfere with identifying other important consequences.

2.4.4. An example would be "*Operation of Code F aircraft in a Code 4E airport*" and "*Wingtip collision in parking bays*". The former is a hazard whereas the latter is one of its consequences. The associated risks and control/mitigation measures should also be recorded in the hazard log when information becomes available. This log should be constantly updated throughout the aeronautical study life-cycle.

2.4.5. Appendix B of this Advisory Circular contains a sample hazard log. The aerodrome operator may use this to formulate its own hazard log to suit the aeronautical study and risk assessments.

Risk management

2.4.6. The risk assessment takes into account the probability of occurrence of a hazard and the severity of its consequences; the risk is evaluated by combining the two values for severity and probability of occurrence.

2.4.7. Each identified hazard must be classified by probability of occurrence and severity of impact. This process of risk classification will allow the aerodrome to determine the level of risk posed by a particular hazard. The classification of probability and severity refers to potential events.

2.4.8. The severity classification includes five classes ranging from "catastrophic" (class A) to "not significant" (class E). The examples in Table - 1, adapted from Doc 9859 with aerodrome-specific examples, serve as a guide to better understand the definition.

2.4.9. The classification of the severity of an event should be based on a "credible case" but not on a "worst case" scenario. A credible case is expected to be possible under reasonable conditions (probable course of events). A worst case may be expected under extreme conditions and combinations of additional and improbable hazards. If worst cases are to be introduced implicitly, it is necessary to estimate appropriate low frequencies.

Table - 1. Severity classification scheme with examples (*adapted from Doc 9859 with aerodrome-specific examples*)

Severity	Meaning	Value	Example
Catastrophic	<ul style="list-style-type: none"> – Equipment destroyed – Multiple deaths 	A	<ul style="list-style-type: none"> – collision between aircraft and/or other object during take-off or landing
Hazardous	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – runway incursion, significant potential for an accident, extreme action to avoid collision – attempted take-off or landing on a closed or engaged runway – take-off/landing incidents, such as undershooting or overrunning
Major	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – runway incursion, ample time and distance (no potential for a collision) – collision with obstacle on apron/ parking position (hard collision) – person falling down from height – missed approach with ground contact of the wing ends during the touchdown – large fuel puddle near the aircraft while passengers are on-board
Minor	<ul style="list-style-type: none"> – Nuisance – Operating limitations – Use of emergency procedures – Minor incident 	D	<ul style="list-style-type: none"> – hard braking during landing or taxiing – damage due to jet blast (objects) – expendables are laying around the stands – collision between maintenance vehicles on service road – breakage of drawbar during pushback (damage to the aircraft) – slight excess of maximum take-off weight without safety consequences – aircraft rolling into passenger bridge with no damage to the aircraft needing immediate repair – forklift that is tilting – complex taxiing instructions/ procedures
Negligible	<ul style="list-style-type: none"> – Few consequences 	E	<ul style="list-style-type: none"> – slight increase in braking distance – temporary fencing collapsing because of strong winds – cart losing baggage

2.4.10. The probability classification includes five classes ranging from “extremely improbable” (class 1) to “frequent” (class 5) as shown in Table -2.

2.4.11. The probability classes presented in Table -2 are defined with quantitative limits. It is not the intention to assess frequencies quantitatively; the numerical value serves only to clarify the qualitative description and support a consistent expert judgement.

Table - 2. Probability classification scheme

Probability class		Meaning
5	Frequent	Likely to occur many times (has occurred frequently)
4	Reasonably probable	Likely to occur sometimes (has occurred infrequently)
3	Remote	Unlikely to occur (has occurred rarely)

2	Extremely remote	Very unlikely to occur (not known to have occurred)
1	Extremely improbable	Almost inconceivable that the event will occur

2.4.12. The classification refers to the probability of events per a period of time. This is reasoned through the following:

- a) many hazards at aerodromes are not directly related to aircraft movements; and
- b) the assessment of hazards occurrence probabilities can be based on expert judgement without any calculations.

2.4.13. The aim of the matrix is to provide a means of obtaining a safety risk index. The index can be used to determine tolerability of the risk and to enable the prioritization of relevant actions in order to decide about risk acceptance.

2.4.14. Given that the prioritization is dependent on both probability and severity of the events, the prioritization criteria will be two-dimensional. Three main classes of hazard mitigation priority are defined in Table -3:

- a) Hazards with high priority — intolerable;
- b) Hazards with mean priority — tolerable;
- c) Hazards with low priority — acceptable.

2.4.15. The risk assessment matrix has no fixed limits for tolerability but points to a floating assessment where risks are given risk priority defined in Table - 4 for their risk contribution to aircraft operations. For this reason, the priority classes are intentionally not edged along the probability and severity classes in order to take into account the imprecise assessm

Table - 3. Risk assessment matrix with prioritization classes

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

Table - 4. Risk Tolerability

Region and Risk Region Index	Suggested Criteria
Intolerable Region 5A, 5B, 5C, 4A,4B, 3A	Hazards with high priority. The consequence is unacceptable under the existing circumstances.
Tolerable Region 5D, 5E, 4C, 4D, 4E, 3B, 3C, 2A, 2B, 2C	Hazards with mean priority. Mitigating measures should be taken to reduce the probability or the severity of the consequence. This may often require senior management decision.
Acceptable Region 3D, 3E, 2D, 2E, 1A, 1B, 1C, 1D, 1E	Hazards with low priority. The consequence is extremely improbable or not severe enough to be of concern

2.4.16. Risk control/mitigation measures should be developed to address the potential hazard or to reduce the risk probability or severity of the consequence when the risk is classified to be tolerable to a level acceptable by the aerodrome operator. There are three broad categories for risk control/mitigation and they are as follows:

- a) **Avoidance** - the operation or activity is cancelled as the risks exceed the benefits of continuing the operation or activity;

An example to illustrate this would be as follow:

"To prohibit Code F aircraft to land or take-off from <name of airport>, which is a Code 4E airport with some Code 4F capabilities. "

- b) **Reduction** - The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the accepted risks;

An example to illustrate this would be as follow:

"To reduce the number of Code F aircraft to land or take-off from <name of airport>."

- c) **Segregation of exposure** - Action is taken to isolate the effects of the consequences of the hazard or build-in redundancy to protect against it.

An example to illustrate this would be as follow:

"To ensure <name of airport> staff liaise with the Aeronautical Information Services (AIS) on the promulgation of aerodrome circulars with the necessary aerodrome information to <names of aircraft operators> and <names of other airports> <fixed period of time> stated in their new process and/or new procedures. "

2.5 Recommendations

2.5.1. To allow the aerodrome operator and CASA PNG to be convinced and assured that the proposed deviation will not pose a drop in the level of safety and the aerodrome operator should recommend operating procedures/restrictions or other measures that will address any safety concerns. In addition, the aerodrome operator should estimate the effectiveness (through trials, surveys, simulations etc.) of each recommendation listed so as to identify the best means to address the proposed deviation.

2.5.2. The aerodrome operator should also ensure that the affected parties are well informed of such changes. The notification procedure including process flow, time frame and different means of notification such as the Aeronautical Information Publication (AIP) and Notice to Airmen (NOTAM) should be included in the study.

An example to illustrate this would be as follow:

"The following are some of the operating procedures/ restrictions or other measures as well as their measured effectiveness, which could be adopted to ensure safe aircraft operations in <name of airport>:

<Name of the operating procedures/ restrictions or other measures and their corresponding measured effectiveness>

The notification procedure to the affected parties is as follow:

<Description of the notification procedure including process flow, time frame and different means of notification>

2.6 Conclusion

2.6.1. The aerodrome operator, after taking into account all the necessary considerations listed above, should be able to summarise and conclude the results of the aeronautical study, and come to a decision on any safety measures that should be adopted. The aerodrome operator should also specify a date to put in place all the necessary safety measures and show how they maintain the same level of safety with the recommended safety measures mentioned in the aeronautical study.

An example to illustrate this would be as follow:

"The results of this aeronautical study have concluded that <the proposed deviation> will indeed pose a drop in the level of safety. However, by adopting <type of the safety measures>, this drop in the level of safety can be safely addressed ... These safety measures will be put in place on <proposed date> to address the proposed deviation. With these safety measures put in place, <to explain how to maintain the same level of safety> ... "

2.7 Monitoring of the Deviation

2.7.1. After the completion of the aeronautical study, the aerodrome operator should monitor the status of the deviation and ensure that the implemented recommendations have been effectively carried out, and that the level of safety is not compromised at any time. This assessment is to allow feedback into the safety assessment process, if required.

An example would be as follow:

"<Name of the aerodrome operator> will monitor the deviation's status <fixed period of time> and ensure the safety measures has been effectively carried out and the level of safety is not compromised at any time. <Name of the aerodrome operator> will review the safety assessment process, if required ..."

2.7.2. For temporary deviations, the aerodrome operator should also notify CASA PNG after the deviation has been corrected.

2.8 Submission of Aeronautical Study to CASA PNG

2.8.1. The aerodrome operator should note the guidance provided in this AC 139-11 and use the suggested checklist provided in Appendix A to ensure that any Aeronautical study submitted to CASA PNG for consideration of acceptance is thoroughly conducted and documented.

CHAPTER 3 — PROCESS

3.1 Introduction

3.1.1. The aeronautical study and risk assessment will identify and evaluate aerodrome service options, including service increases or decreases or the introduction or termination of services. The initial baseline study must be followed by a review of operational issues; this will typically involve an in-depth safety analysis based on quantifiable data and extensive consultation with customers and stakeholders using various interview and data gathering processes. This may identify any changes that are required to ensure the safe, orderly and efficient operation of the aerodrome.

3.1.2. Technical analysis will provide justification for a deviation on the grounds that an equivalent level of safety can be attained by other means. It is generally applicable on situations where the cost of correcting a problem that violates a standard is excessive but where the unsafe effects of the problem can be overcome by some procedural or other means which offer both practical and reasonable solutions.

3.1.3. In conducting a technical analysis, an aerodrome operator should draw upon their practical experience and specialized knowledge. The aerodrome operator may also consult other specialists in relevant areas. When considering alternative procedures in the deviation approval process, it is essential to bear in mind the safety objective of the aerodrome certification regulations and the applicable standards so that the intent of the regulations is not circumvented.

3.1.4. Larger projects may have distinct phases such as requirements definition, design evaluation, introduction to service and routine operation. The aeronautical study can be presented in parts corresponding to these phases as information becomes available; this is illustrated in the flow chart below.

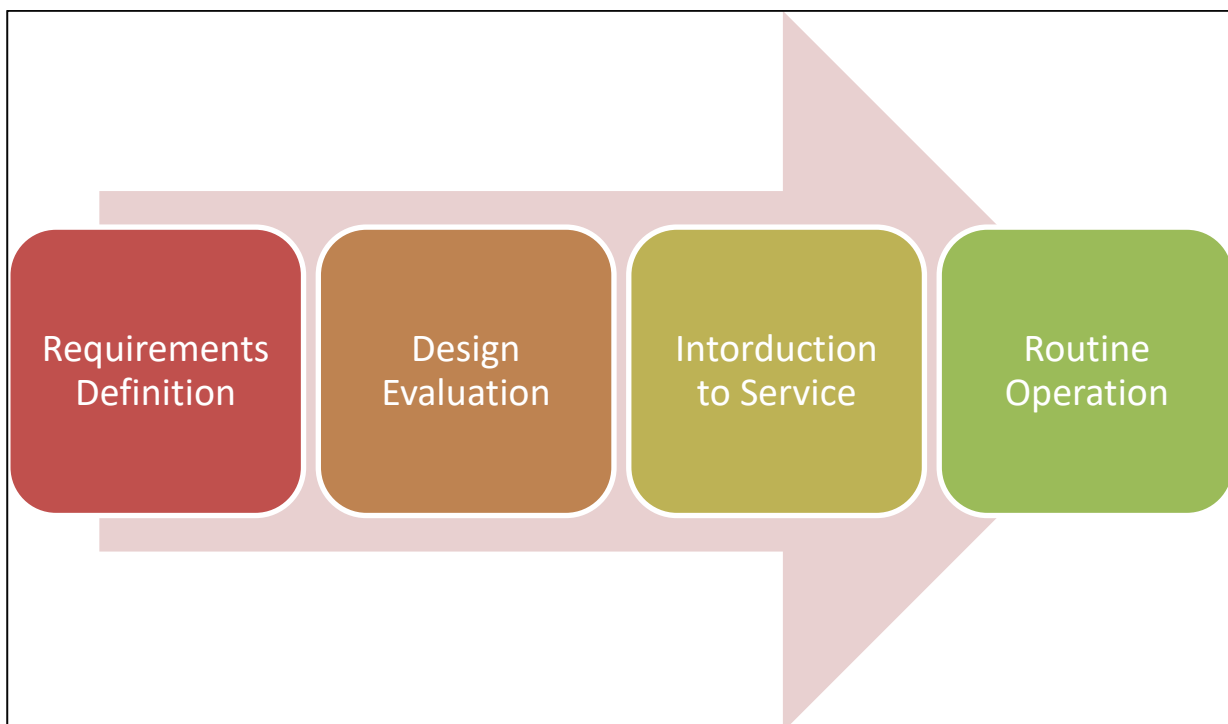


Figure 1 - Example of distinct phases for larger projects

3.1.5. In some instances, the only reasonable means of providing an equivalent level of safety is to adopt suitable procedures and to require, as a condition of certification, that cautionary advice be published in the appropriate AIS publications.

3.1.6. The determination to require caution will be primarily dependent on two considerations:

- i. a pilot's need to be made aware of potentially hazardous conditions; and

- ii. the responsibility of the Aerodrome and ANS Regulation Division to publish deviations from standards that would otherwise be assumed under the certificate status.

3.2 Aeronautical Study Methodology

3.2.1. A generic model of an Aeronautical Study methodology should consist of initiation, preliminary analysis, risk estimation, risk evaluation, risk control and action/monitoring and is related to the flow diagram in Appendix C.

Step 1: Initiation – System Description

3.2.2. This step consists of defining the opportunity or problem and the associated risk issues; setting up the risk management team; and beginning to identify potential users who may be affected by any change.

The key activities in Step 1 are to describe:

- a) the system/change;
- b) the purpose of the system;
- c) how the system will be used (concept of operation);
- d) the system functions (operational requirements);
- e) the boundaries of the system; and
- f) the environment including the interface with any larger system.

Step 2: Preliminary Analysis – Hazard and Consequence Identification

3.2.3. The second step consists of defining the basic dimensions of the risk problem and undertaking an initial identification, analysis and evaluation of potential risks. This preliminary evaluation will help determine:

- a) Whether a situation exists that requires immediate action; or
- b) Whether the matter requires further study prior to any action being taken; or
- c) Whether the analysis should be ended as the risk problem is determined not to be an issue.

3.2.4. The key activities in Step 2 are:

- a) create a hazard log;
- b) identify the hazards;
- c) identify the consequences of each hazard; and then
- d) update the hazard log.

Steps 3: Risk Estimation – Estimation of the Severity of the Hazard Consequences

3.2.5. These steps estimate the degree of risk. Step 3 estimates the severity of the consequences and step 4 estimates the probability of their occurrence.

3.2.6. The key activities in Step 3 are:

- a) assess the severity of each consequence; and
- b) record results in the Hazard Log.

Steps 4: Risk Estimation – Estimation/Assessment of the Likelihood of the Hazard Consequences Occurring

3.2.7. This step defines the structure of the Event Tree by starting with the initiating event and selecting related factors from the pool developed in the step above and putting them in the sequence they are likely to occur.

3.2.8. The key activities in Step 4 are:

- a) estimate the likelihood of hazard consequences occurring; and
- b) record the details in the Hazard Log.

Step 5: Risk Evaluation – Evaluation of the Risk

3.2.9. The benefits and operational costs of the activity are integrated into the analysis and the risk is evaluated in terms of the safety implications of the activity and of the needs, issues, and concerns of affected users.

3.2.10. The key activities in Step 5 are:

- a) decide whether the risk is acceptable or not; and
- b) record the details in Hazard Log.

Step 6: Risk Control – Risk Mitigation and Safety Requirements

3.2.11. This step identifies feasible risk controls and mitigations which will act to reduce either the probability of the event or the consequence of the event should it occur.

3.2.12. The key activities in Step 6 are:

- a) mitigate those risks identified as Unacceptable;
- b) apply ALARP principles generally; and
- c) generate Safety Requirements.

Step 7: Implementation of Mitigation Measures – Claims, Arguments and Evidence that the Safety Objectives and Safety Requirements Have Been Met and Documenting this in a Safety Case

3.2.13. This step entails implementing the chosen risk control options, evaluating the effectiveness of the risk management decision process, and implementing an ongoing monitoring program.

3.2.14. The key activities in Step 7 are:

- a) identifying all applicable Safety Objectives and Safety Requirements;
- b) developing Claim, Argument and Evidence statements; and
- c) documenting the results in a logical and complete manner.

3.3 Consultation

3.3.1. It is essential that, in conducting the aeronautical study, there is consultation with as wide a range of aerodrome users and other stakeholders as possible. Different users have different views of hazards and the corresponding threats, controls, mitigations and consequences. The following should be included in the consultation:

- Aerodrome operators (including adjacent affected aerodrome operators).
- Aerodrome users.
- Airspace user groups.
- Aircraft operators and operator groups.
- Pilot organisations.
- Air traffic service providers.

3.3.2. Experience has shown that consultation undertaken in open meetings, where ideas can be exchanged and debated, generally results in consensus being achieved. Individual consultation, on the other hand, tends to result in dissatisfaction for those whose proposals or viewpoints are not eventually accommodated.

CHAPTER 4 — APPROVAL OR ACCEPTANCE OF A SAFETY ASSESSMENT

- 4.1. CASA PNG has established the type of safety assessments that are subject to approval or acceptance and determines the approval/acceptance.
- 4.2. Where required a safety assessment subject to approval or acceptance by the Director, must be submitted by the aerodrome operator prior to implementation.
- 4.3. CASA PNG analyses the safety assessment and verifies that:
 - a) appropriate coordination has been performed between the concerned stakeholders;
 - b) the risks have been properly identified and assessed, based on documented arguments (e.g. physical or Human Factors studies, analysis of previous accidents and incidents);
 - c) the proposed mitigation measures adequately address the risk; and
 - d) the time frames for planned implementation are acceptable.
- 4.4. Upon completion of the analysis of the safety assessment, CASA PNG:
 - a) either gives formal approval or acceptance of the safety assessment to the aerodrome operator; or
 - b) if some risks have been underestimated or have not been identified, coordinates with the aerodrome operator to reach an agreement on safety acceptance;
 - c) if no agreement can be reached, rejects the proposal for possible resubmission by the aerodrome operator; or
 - d) may choose to impose conditional measures to ensure safety.
- 4.5. CASA PNG will ensure that the mitigation or conditional measures are properly implemented and that they fulfil their purpose.
- 4.6. Promulgation of Safety Information
 - 4.6.1. The aerodrome operator determines the most appropriate method for communicating safety information to the stakeholders and ensures that all safety relevant conclusions of the safety assessment are adequately communicated (e.g. through AIP, NOTAMs etc.)

Appendix A - Checklist for Aeronautical Study

The purpose of this Appendix A is to provide aerodrome operators with a suggested checklist for reviewing of an aeronautical study.

Aerodrome operators may use this checklist as a guide for developing an aeronautical study tailored to individual situation.

The suggested checklist for reviewing of an aeronautical study is as shown below:

CHECKLIST FOR AERONAUTICAL STUDY & RISK ASSESSMENTS	YES	NO	REMARKS
1. Aim of the study including (a) Address safety concerns, (b) Identify safety measures, and (c) Make reference to specific rule in CAR Part 139;	<input type="checkbox"/>	<input type="checkbox"/>	
2. Consultation with stakeholders, senior management team and divisions/departments affected;	<input type="checkbox"/>	<input type="checkbox"/>	
3. The study is approved by a senior executive of the organization;	<input type="checkbox"/>	<input type="checkbox"/>	
4. Background information on the current situation;	<input type="checkbox"/>	<input type="checkbox"/>	
5. Proposed date for complying with the CAR Rule Part, if the deviation is due to development of the aerodrome;	<input type="checkbox"/>	<input type="checkbox"/>	
6. Safety assessment including (a) identification of hazards and consequences and (b) risk management;	<input type="checkbox"/>	<input type="checkbox"/>	
7. The safety assessment used in the study (E.g. hazard log, risk probability and severity, risk assessment matrix, risk tolerability and risk control/mitigation);	<input type="checkbox"/>	<input type="checkbox"/>	
8. Recommendations (including operating procedures/ restrictions or other measures to address safety concern) of the aeronautical study and how the proposed deviation will not pose a drop in the level of safety;	<input type="checkbox"/>	<input type="checkbox"/>	
9. Estimation of the effectiveness of each recommendation listed in the aeronautical study;	<input type="checkbox"/>	<input type="checkbox"/>	
10. Notification procedure including process flow, time frame and the publication used to promulgate the deviation;	<input type="checkbox"/>	<input type="checkbox"/>	
11. Conclusion of the study;	<input type="checkbox"/>	<input type="checkbox"/>	
12. Monitoring of the deviation; and	<input type="checkbox"/>	<input type="checkbox"/>	
13. Notification to CASA PNG once the temporary deviation has been corrected.	<input type="checkbox"/>	<input type="checkbox"/>	

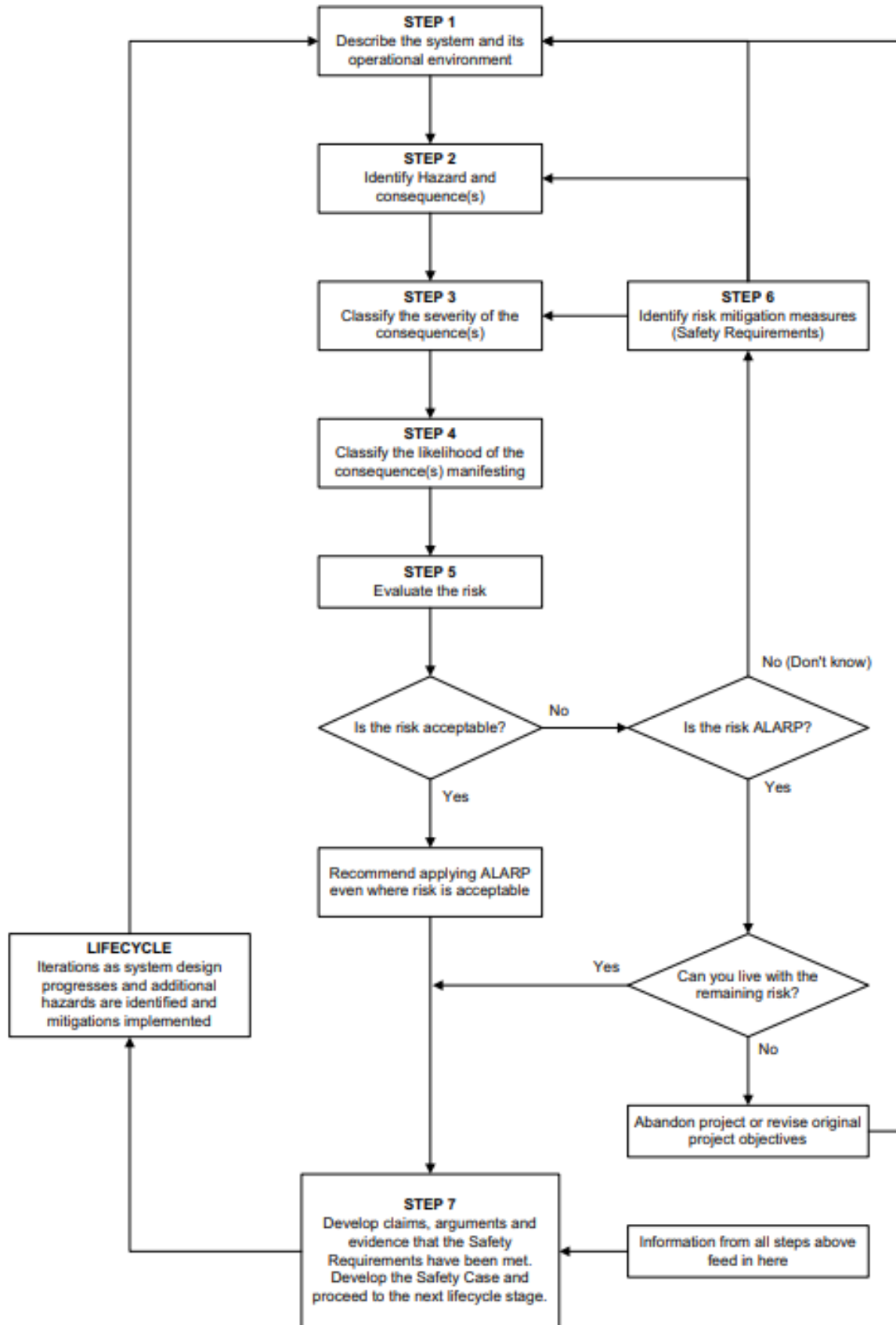
Appendix B - Hazard Log

The purpose of this Appendix B is to provide aerodrome operators with a suggested hazard log for safety assessment of an aeronautical study. Aerodrome operators may use this log as a guide to formulate his own log. This log should be constantly updated throughout the aeronautical study life cycle.

A sample hazard log for safety assessment of an aeronautical study is as shown below:

Type of operation or activity	Hazard and Description	Consequences Identified	Risk Index	Risk Tolerability	Risk Control/ Mitigation	Residual Risk Index	Residual Risk Tolerability	Action, if any to further reduce risk, the resulting risk index, and the residual risk tolerability.
Aircraft Operation	Operation of Code 4E aircraft in PMIA. Code E aircraft using runway for landing and take-off...	<ul style="list-style-type: none"> i. Wingtip collision at International Terminal Apron Parking bay 2 and Bay 1. ii. Loss of control of aircraft during pushback/ towing operations. 	3C	Tolerable	<ul style="list-style-type: none"> i. Use of wingtip walkers/ ushers. ii. Aircraft to taxi at <speed value>. iii. Training of staff for pushback/ towing operations. iv. Restrictions on other aircraft movements within parking bay 2. 	2D	Acceptable	<ul style="list-style-type: none"> i. Conduct trials to study the effectiveness of the implementation ii. Resulting risk: 2E iii. Residual risk tolerability: Acceptable

Appendix C – The Seven Step Approach



Appendix D – RELATED INFORMATION

D.1. Documents

ICAO

Annex 14 - Part 1 - Aerodrome Design and Operations

Doc 9859 - Safety Management Manual

Doc 9981 - Procedures for Air Navigation Services-Aerodromes

New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Operational Measures and Aeronautical Study (Cir 301)

New Larger Aeroplanes – Infringement of the Obstacle Free Zone: Collision Risk Model and Aeronautical Study (Cir 345)

Other States

CASA PNG

Advisory Circular AC139 Series (AC139-1 to AC 139-13)