



CIVIL AVIATION AUTHORITY OF FIJI

# GUIDANCE MATERIAL

## Aeronautical Study and Safety Assessment

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## **PREFACE**

This Guidance Material (GM) is published by the Civil Aviation Authority of Fiji for purposes of promulgating supplementary material to that published in the Authority's Standards Documents.

This GM provides guidance to aerodrome operators and regulatory staff on the conduct and assessment of an Aeronautical Study and Safety Assessment.

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Chief Executive  
**Civil Aviation Authority of Fiji**

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## 1 Introduction

- 1.1 This GM provides guidance to operators/service providers and regulatory staff on Aeronautical Studies and Safety Assessments.
- 1.2 An **aeronautical study** is a study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety. It is conducted:-
  - (a) when an aerodrome operator is unable to meet the requirements of the standards/regulations and there is a need to identify alternative means to achieve an equivalent level of safety. Such a study is most frequently undertaken during the planning of a new airport or during the certification/registration approval of an existing aerodrome. The CAAF does not encourage the submission of aeronautical studies in cases of deviations from the standards/regulations that have not been specifically recommended in the SD-AD and Annex 14, Volume I. However, for existing aerodromes where physical constraints make it impossible for the aerodrome operator to meet the standards/regulations and implementation of mitigations is beyond the capability of the aerodrome operator, an aeronautical study may be conducted and submitted to support the request for an exemption from the CAAF. A list of applicable provisions where aeronautical studies are specifically recommended are contained in Appendix A to this GM.
  - (b) in Instrument Flight Procedure Design when an aeronautical study is specifically required to mitigate Visual Segment Surface penetration (ICAO Doc 8168 Volume I & II).
- 1.3 A **safety assessment** is an element of the risk management process of a Safety Management System (SMS) that is used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes or when any other safety concerns arise.
- 1.4 A safety assessment forms part of an operator/service provider's SMS used to assess the impact of implementation, change or removal of any equipment, facility, service, and procedure/process which could give rise to a safety concern, e.g. a design change or deviation in operational procedure. A safety assessment is also used to identify an alternative means of compliance when the service provider is unable to meet a particular standard/regulation.
- 1.5 The Fiji Air Navigation Regulations and Standards Documents allow in certain cases for the use of Aeronautical Studies and Safety Assessments as a means to identify alternative means to achieve an equivalent level of safety by means other than full compliance with a specific requirement. However, it is important to note that the preferred option must always be to seek compliance with the requirements.
- 1.6 In order to achieve an equivalent level of safety by other means, one must implement effective mitigating measures to ensure an acceptable level of safety is maintained at all times.
- 1.7 This document expands on the requirements of aeronautical studies and safety assessments as part of an operator/service provider's safety management system.

## **2. Aeronautical Study**

### **2.1 Purpose**

- 2.1.1 An aeronautical study is conducted to assess the impact of deviations from the aerodrome and PANS-Ops standards specified in Annex 14 Volume I and Doc 8168 Volume I & II and to present alternative means of ensuring the safety of aircraft operations, to estimate the effectiveness of each alternative and to recommend procedures to compensate for the deviation.
- 2.1.2 An aeronautical study may only be undertaken in respect of specific areas identified in the SD-AD, ICAO Annex 14 Volume I and ICAO Doc 8168 Volume I & II; namely taxiway minimum separation distances, penetration, lighting of certain obstacle limitation surfaces by existing objects, descend gradients for NPA with FAF, Noise abatement, VSS penetrations, NPA steep angle approaches etc. A detailed list is provided in Appendix A to this GM.
- 2.1.3 An aeronautical study may be used to identify and evaluate aerodrome service options, including service increases or decreases, or the introduction or termination of services (such as the introduction of a rapid exit taxiway or removal of a grass runway).
- 2.1.4 A comprehensive aeronautical study allows the aerodrome operator / applicant and the CAAF to ensure safety and to be assured that the regularity of operations of aircraft is not unnecessarily compromised in the event of a non-compliance. However, in some cases regularity of operations may need to be compromised in order to maintain and achieve the acceptable level of safety.
- 2.1.5 The study can be undertaken in a variety of ways using different analytical methods and various safety management tools that are appropriate to each specific aeronautical study requirement.
- 2.1.6 An aeronautical study may contain many elements; however, hazard identification, risk assessment, risk mitigation and risk elimination are key components. Additionally, there may be aviation system constraints.
- 2.1.7 The goal of risk management in an aeronautical study is to identify hazards and assess risks, then to take appropriate action to minimize risk as much as is reasonably practicable to achieve the acceptable level of safety, as if the full compliance were in place.
- 2.1.8 The objectives of an aeronautical study for an operator/applicant are as follows:
  - 1) To study the impact of deviations from the regulations;
  - 2) To present alternative solutions to ensure the level of safety remains acceptable;
  - 3) To estimate the effectiveness of each alternative;
  - 4) To recommend operating procedures / restrictions or other measures to compensate for the deviation;
  - 5) To check for any new hazards and their resulting risk arising from mitigation; and
  - 6) To indicate the timescale for removal or re-assessment of any non-compliance.

- 2.1.9 Whilst this GM focuses on the safety outcomes, there may also be non-safety consequences, such as service level and commercial implication, or financial loss and operational loss of the aircraft, increased insurance costs, and damage to reputation. This GM outlines the trigger factors that may lead to an aeronautical study, the key aspects of safety risk management, the conduct of the study, and the sample activities that should be included in the study.
- 2.1.10 However, this GM does not, and cannot, include a formula that is guaranteed to give the correct solution, nor does it instruct the operator/applicant on what it should value. The appropriate constraints and goals are left to the judgement of those carrying out the study. The aeronautical study should be seen as a framework for effective decision- making, rather than as a guaranteed process to come up with the correct outcomes. *Occasionally, an aeronautical study may prove that the intended change is not viable.*
- 2.1.11 The framework contained in this GM for conducting aeronautical studies proposes a systematic method for analysing risk issues, that may be complex, to help the operator/applicant decide with confidence and, if necessary, to articulate these decisions for submission to the Authority.
- 2.1.12 It is the aeronautical study process that determines the site-specific need for services, and identifies and recommends a course of action, or presents options for the operator/applicant to act upon. In all cases, the aeronautical study should document and demonstrate the site-specific need and rationale for the level of services, procedure designs, or operational requirements to provide an equivalent level of safety as if the study had not been required.

## **2.2 Responsibility for and Participants in an Aeronautical Study**

- 2.2.1 If the aerodrome operator or other service provider cannot meet the requirements, it needs to propose, and have accepted, an alternative means of compliance or a deviation from the requirement, the burden of justifying an application by means of an Aeronautical Study rests solely with the aerodrome operator or service provider.
- 2.2.2 An aeronautical study may be initiated by the Authority, an aerodrome operator/applicant or another interested party, such as an air traffic service provider or air operators.
- 2.2.3 Depending on the area and complexity of the issue, aerodrome and flight operational expertise will be needed and in some cases ATS and/or PANS-OPS expertise. It is also recommended that Safety and Risk specialists in risk analysis be brought in to assess the degree of risk resulting from the aeronautical study and to propose acceptable mitigation measures.
- 2.2.4 Consultation with as wide a range of stakeholders as possible is essential when conducting the aeronautical study. The following may be included as applicable:
- 1) Aerodrome operator (including adjacent affected aerodrome operators);
  - 2) Aerodrome users;
  - 3) Airspace user groups;
  - 4) Aircraft operators and operator groups;
  - 5) Pilot organisations;
  - 6) Air traffic service providers; and
  - 7) The Civil Aviation Authority of Fiji (CAAF).

## **2.3 Aspects of the study**

- 2.3.1 The initial baseline study will be followed by a review of operational issues; this will typically involve an in-depth safety analysis based on quantifiable data, where available, and extensive consultation with aerodrome users and stakeholders using various interview and data gathering processes including a hazard identification workshop. This study may identify any changes that are required to ensure the safe, orderly, and efficient operation of the aerodrome.
- 2.3.2 The study will normally cover phases such as requirements definition, design evaluation, introduction to service, and routine operation. The aeronautical study can be presented in parts corresponding to these developing phases as information becomes available, but CAAF can only determine the acceptability of a study when it is complete.
- 2.3.3 Decisions made in respect of risks must balance the technical aspects of risk with the social and moral considerations that often accompany such issues. These decisions may have a significant impact on an aerodrome's operation. Therefore, for an effective outcome, there should be appropriate involvement, consultation and a level of consensus as to their acceptability among all key stakeholders. However, in the end, some effect on operations may be necessary.
- 2.3.4 A 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 in 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 means which offers both practical and reasonable solutions.
- 2.3.5 In conducting a technical analysis, the operator should draw upon its own practical experience and specialized knowledge and 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 applicable standards so that the intent of the regulations/standards is not circumvented.

### 3. The Aeronautical Study Contents

#### 3.1 Overview

- 3.1.1 The Authority will review submitted studies on a case by case basis and determine their acceptability.
- 3.1.2 An aeronautical study submitted to Authority for determination of acceptability should demonstrate that the objectives in section 2.1.8 have been fully met and should contain a recommendation for the acceptance or rejection of the study. The report structure should comprise the following parts:
- 1) Aim of the study;
  - 2) Background including system description;
  - 3) Hazard identification and safety assessment;
  - 4) Recommendations;
  - 5) Conclusion; and
  - 6) Monitoring of the deviation.

#### 3.2 Aim of the Study

- 3.2.1 The aim of the study should be explicitly stated. It should:
- 1) resolve the safety concerns;
  - 2) identify safety measures to be put in place to ensure safe aircraft operations in an aerodrome;
  - 3) make reference to the specific regulations which the study is meant to address; and
  - 4) indicate how the acceptable level of safety will be achieved and maintained.

- 3.2.2 An example to illustrate this would be as follow:

*"The aim of this aeronautical study is to address the operation of <name of aerodrome> with high ground on its north side that infringes the inner horizontal surface, and to put in place <list of safety measures> necessary to ensure safe operation of all aircraft at <name of aerodrome> with reference made to <reference to specific regulation>..."*

#### 3.3 Background

- 3.3.1 Information on the current situation faced by the aerodrome operator / applicant, current procedures that have been put in place and other relevant details should be clearly stated and explained in this sub-section. Clear explanation should be provided, particularly on the following:
- 1) What is the current situation? i.e. a system description
  - 2) Where are the areas that will be affected by the proposed deviation?
  - 3) When will the aerodrome operator / applicant be able to comply with the specific standard if it is due to development of the aerodrome?

- 4) Why is there a need to review the current processes and procedures?
- 5) How will the proposed deviation affect the operation of aircraft at the aerodrome?

3.3.2 An example to illustrate this would be as follows:

*"All aerodrome is required by the regulation to comply with specific obstacle limitation surfaces according to the operation of the aerodrome. Due to high ground to the north of <name of aerodrome>. This study is undertaken to ensure the safe and efficient operation of <name of aerodrome> by identifying the hazards of the high ground, assessing the safety risks and determining appropriate actions and procedures..."*

### 3.4 Hazard Identification and Safety Risk Assessment

- 3.4.1 There is no one-size-fits-all methodology to conduct a safety assessment and it is up to the operator/applicant to determine the appropriate methodology for each aeronautical study, depending on the size and complexity of the situation and the severity of the safety implications. However, the methodology adopted should be consistent with that established in the aerodrome operator's/applicant's SMS.
- 3.4.2 Additional information on hazard and risk identification is provided in Appendix D to this GM and the SD-SMS.

### 3.5 Recommendations

- 3.5.1 To allow the operator/applicant and the Authority to be assured that the proposed deviation will not pose a reduction in the level of safety, the operator/applicant should recommend operating procedures/restrictions or other measures that will address any safety concerns. In addition, the operator/applicant should estimate the effectiveness (through trials, surveys, simulations, etc.) of each recommendation listed to identify the best means to address the proposed deviation.
- 3.5.2 The operator/applicant 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 the Aeronautical Information Publication (AIP) in accordance with the AIRAC cycle, if applicable, and Notice to Airmen (NOTAM) should be included in the study.
- 3.5.3 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 aerodrome>:*  
*<Name of the operating procedures/restrictions or other measures and their corresponding measured effectiveness>*
- 3.5.4 *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>*

### 3.6 Conclusion

3.6.1 The operator/applicant, 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 operator/applicant 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, as well as stating the interim measures until all such safety measures are implemented.

3.6.2 An example to illustrate this would be as follow:

*"The results of this aeronautical study have concluded that <obstacle in the inner horizontal surface> would have posed a reduction in the level of safety. However, by adopting prohibition of flight on that side of the aerodrome, this reduction 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, the same level of safety can be achieved as if the <the cause of the study> had not occurred due to segregation of the hazard from the operation."*

### 3.7 Monitoring of the Deviation

3.7.1 After the completion of the aeronautical study, the operator/applicant 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.

3.7.2 An example to illustrate this would be as follow:

*"<Name of the aerodrome operator / applicant> will monitor the deviation's status <fixed period of time> and ensure the safety measure has been effectively carried out and the level of safety is not compromised at any time. <Name of the aerodrome operator / applicant> will review the safety assessment process, if required. Any inadvertent flight on the north side of the aerodrome shall be investigated and reported to CAAF, together with any necessary enhancement of procedures to avoid any repetition."*

3.7.3 For temporary deviations, the operator/applicant shall notify the Authority as soon as the deviation has been corrected.

## **4. Safety Assessments**

### **4.1 Overview**

- 4.1.1 The primary objective of a safety assessment is to assess the impact of implementation, change or removal of any equipment, facility, service, and procedure/process which could give rise to a safety concern. E.g. a design change or deviation in operational procedure.
- 4.1.2 Such a safety concern can often impact multiple stakeholders; therefore, safety assessments often need to be carried out in a cross-organizational manner, involving experts from all the involved stakeholders. Prior to the assessment, a preliminary identification of the required tasks and the organizations to be involved in the process is conducted.
- 4.1.3 This section provides guidance on procedures to be followed when undertaking a safety assessment. It includes a brief description of how a safety assessment fulfils an element of the operator/service provider's overall SMS.
- 4.1.4 The framework for the implementation and maintenance of an SMS consists of four components; i.e. safety policy and objectives, safety risk management, safety assurance and safety promotion.
- 4.1.5 A certified operator implements an SMS acceptable to the Authority that, as a minimum.
  - (a) identifies safety hazards;
  - (b) ensures that remedial action necessary to maintain safety is implemented;
  - (c) provides for continuous monitoring and regular assessment of the achieved safety; and
  - (d) aims to make continuous improvement to the overall safety of the aerodrome.
- 4.1.6 An operator/service provider's SMS should enable the operator/service provider to manage the safety risks it is exposed to as a consequence of the hazards it must face during operations.
- 4.1.7 The Authority may accept a deviation from the standards on the basis of an acceptable safety assessment and implementation of the appropriate mitigating actions/limitations.
- 4.1.8 This chapter describes how a safety assessment can be undertaken as part of the operator/service provider's SMS. By applying the methodology and procedures described here, the operator/service provider can demonstrate compliance with the minimum requirements described in 4.1.5.

## 4.2 Scope and Applicability

- 4.2.1 The following sections provide guidance on a general methodology for the conduct of safety assessments. Additional tools and particularly appropriate checklists can help identify hazards, assess safety risks and eliminate or mitigate those risks when necessary. The suitability of the mitigation proposed and the need for alternative measures, operational procedures or operating restrictions for the specific operations concerned should be comprehensively evaluated.
- 4.2.2 Section 5 details how the Authority will validate the conclusion of the safety assessment, when appropriate, to ensure safety is not compromised.
- 4.2.3 Section 5 describes procedures on the approval or acceptance of a safety assessment.
- 4.2.4 Section 5 specifies how to promulgate appropriate information for use by the various stakeholders and particularly by the pilots and aircraft operators.
- 4.2.5 The safety assessment process addresses the impact of a safety concern, including a change or deviation, on the safety of operations and takes into consideration the capacity and the efficiency of operations, as necessary.

## 4.3 Basic Considerations

- 4.3.1 A safety assessment is an element of the risk management process of an SMS that is used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes at an aerodrome or in operations or when any other safety concerns arise.

*Note - changes on an aerodrome or in operations can include changes to procedures, equipment, infrastructures, safety works, special operations, regulations, organization, etc.*

- 4.3.2 When a safety concern, change or a deviation has an impact on several stakeholders, consideration shall be given to the involvement of all stakeholders affected in the safety assessment process. In some cases, the stakeholders impacted by the change will need to conduct a separate safety assessment themselves in order to fulfil the requirements of their SMSs and coordinate with other relevant stakeholders. When a change has an impact on multiple stakeholders, a collaborative safety assessment should be conducted to ensure compatibility of the final solutions.
- 4.3.3 A safety assessment considers the impact of the safety concern on all relevant factors determined to be safety-significant. The list below provides a number of items that may need to be considered when conducting a safety assessment. The items in this list are not exhaustive and in no particular order:

(a) aerodrome layout, including runway configurations; runway length; taxiway, taxilane and apron configurations; gates; jet bridges; visual aids; and the RFF services infrastructure and capabilities;

(b) types of aircraft, and their dimensions and performance characteristics, intended to operate at the aerodrome;

- (c) traffic density and distribution;
- (d) aerodrome ground services;
- (e) air-ground communications and time parameters for voice and data link communications;
- (f) type and capabilities of surveillance systems and the availability of systems providing controller support and alert functions;
- (g) flight instrument procedures and related aerodrome equipment;
- (h) complex operational procedures, such as collaborative decision-making (CDM);
- (i) aerodrome technical installations, such as advanced surface movement guidance and control systems (A-SMGCS) or other air navigation aids;
- (j) obstacles or hazardous activities at or in the vicinity of the aerodrome;
- (k) planned construction or maintenance works at or in the vicinity of the aerodrome;
- (l) any local or regional hazardous meteorological conditions (such as wind shear); and
- (m) airspace complexity, ATS route structure and classification of the airspace, which may change the pattern of operations or the capacity of the same airspace.

4.3.4 Subsequent to the completion of the safety assessment, the operator/service provider is responsible for implementing and periodically monitoring the effectiveness of the identified mitigation measures.

4.3.5 The Authority reviews the safety assessment provided by the operator/service provider and its identified mitigation measures, operational procedures and operating restrictions, as required and is responsible for the subsequent regulatory oversight of their application.

*Note - A list of references to existing studies that may assist aerodrome operators in developing their safety assessments is available in Appendix B to Circular 305 — Operation of New Larger Aeroplanes at Existing Aerodromes. New and updated references will be included in other appropriate documents as they become available. However, it is to be noted that each study is specific to a particular deviation or change; hence, caution should be exercised in considering applicability to other situations and locations.*

#### 4.4 Management of change

- 4.4.1 As part of their SMS, operators/service providers should have in place procedures to identify changes and to examine the impact of those changes on operations.
- 4.4.2 A safety assessment will be carried out to identify hazards and propose mitigation actions for all changes that are found to have an impact on operations.

*Note 1 - Depending on the scope of the envisaged change as well as the level of the impact on operations, the methodology and level of detail required to carry out the required safety assessment may vary.*

#### 4.5 Need for a safety assessment according to the category of changes

- 4.5.1 **Routine tasks.** Changes related to routine tasks do not have to be assessed using the safety assessment methodology because these tasks are established and managed through specific procedures, training, feedback and reviews.

*Note - Routine tasks can be described as the actions related to an activity or service that are detailed in formal procedures, which are subject to periodic review, and for which the personnel in charge are adequately trained. These tasks may include movement area inspections, grass cutting on runway strips, sweeping of apron areas, regular and minor maintenance of runways, taxiways, visual aids, radio navigation and electrical systems.*

- 4.5.2 The actions resulting from the regular assessment, feedback and review process related to these tasks should ensure that any changes related to them are managed, thus ensuring the safety of the specific task. However, a change related to a routine task for which feedback is not yet sufficient cannot be considered as sufficiently mature. Therefore, a safety assessment should be carried out.

- 4.5.3 **Specific changes.** Impact on the safety of aerodrome operations may result from:

- (a) changes in the characteristics of infrastructures or the equipment;
- (b) changes in the characteristics of the facilities and systems located in the movement area;
- (c) changes in runway operations (e.g. type of approach, runway infrastructure, holding positions);
- (d) changes to the aerodrome networks (e.g. electrical and telecommunication);
- (e) changes that affect conditions as specified in the aerodrome's certificate;
- (f) long-term changes related to contracted third parties;
- (g) changes to the organizational structure of the aerodrome; and h) changes to the operating procedures of the aerodrome.

*Note - When the change involves an aeroplane type/model new to the aerodrome, a compatibility study, as specified in Chapter 4 of Doc 9981 should be conducted.*

- 4.5.4 For any change in aerodrome operations as defined above, a safety assessment should be conducted.

4.5.5 Where alternative measures, operational procedures and operating restrictions have been developed arising from safety assessments, these should be reviewed periodically to assess their continued validity. The procedures in this GM do not substitute or circumvent the provisions contained in Annexes and Standards Documents.

#### **4.6 Safety Assessment Process**

4.6.1 A safety assessment is initially composed of four basic steps:

- (a) definition of a safety concern and identification of the regulatory compliance;
- (b) hazard identification and analysis;
- (c) risk assessment and development of mitigation measures; and
- (d) development of an implementation plan for the mitigation measures and conclusion of the assessment.

#### **STEP I- Definition of a safety concern and identification of the regulatory compliance**

Any perceived safety concerns are to be described in detail, including timescales, projected phases, location, stakeholders involved or affected as well as their potential influence on specific processes, procedures, systems and operations.

The perceived safety concern is first analysed to determine whether it is retained or rejected. If rejected, the justification for rejecting the safety concern is to be provided and documented.

An initial evaluation of compliance with the appropriate provisions in the regulations or standards applicable is conducted and documented.

The corresponding areas of concern are identified before proceeding with the remaining steps of the safety assessment, with all relevant stakeholders.

If a safety assessment was conducted previously for similar cases in the same context where similar characteristics and procedures exist, the operator may use some elements from that assessment as a basis for the assessment to be conducted. Nevertheless, as each assessment is specific to a particular safety concern at a given location the suitability for reusing specific elements of an existing assessment is to be carefully evaluated.

## **Step II - Hazard identification**

Hazards related to infrastructure, systems or operational procedures are initially identified using methods such as brain-storming sessions, expert opinions, industry knowledge, experience and operational judgement. The identification of hazards is conducted by considering:

- (a) accident causal factors and critical events based on a simple causal analysis of available accident and incident databases;
- (b) events that may have occurred in similar circumstances or that are subsequent to the resolution of a similar safety concern; and
- (c) potential new hazards that may emerge during or after implementation of the planned changes.

Following the previous steps, all potential outcomes or consequences for each identified hazard are identified.

The appropriate safety objective for each type of hazard should be defined and detailed. This can be done through:

- (a) reference to recognized standards and/or codes of practices;
- (b) reference to the safety performance of the existing system;
- (c) reference to the acceptance of a similar system elsewhere; and
- (d) application of explicit safety risk levels.

Safety objectives are specified in either quantitative terms (e.g. identification of a numerical probability) or qualitative terms (e.g. comparison with an existing situation). The selection of the safety objective is made according to the operator's policy with respect to safety improvement and is justified for the specific hazard.

## **Step III - Risk assessment and development of mitigation measures**

The level of risk of each identified potential consequence is estimated by conducting a risk assessment. This risk assessment will determine the severity of a consequence (effect on the safety of the considered operations) and the probability of the consequence occurring and will be based on experience as well as on any available data (e.g. accident database, occurrence reports).

Understanding the risks is the basis for the development of mitigation measures, operational procedures and operating restrictions that might be needed to ensure safe aerodrome operations.

The method for risk evaluation is strongly dependent on the nature of the hazards. The risk itself is evaluated by combining the two values for severity of its consequences and probability of occurrence.

*Note - A risk categorization tool in the form of a safety risk (index) assessment matrix is available in SD- SMS.*

Once each hazard has been identified and analysed in terms of causes, and assessed for severity and probability of its occurrence, it must be ascertained that all associated risks are appropriately managed. An initial identification of existing mitigation measures must be conducted prior to the development of any additional measures.

All risk mitigation measures, whether currently being applied or still under development, are evaluated for the effectiveness of their risk management capabilities.

*Note - The exposure to a given risk (e.g. duration of a change, time before implementation of corrective actions, traffic density) is taken into account in order to decide on its acceptability.*

In some cases, a quantitative approach may be possible, and numerical safety objectives can be used. In other instances such as changes to the operational environment or procedures, a qualitative analysis may be more relevant.

*Note 1 - An example of a qualitative approach is the objective of providing at least the same protection as the one offered by the infrastructure corresponding to the appropriate reference code for a specific aeroplane.*

*Note 2 - Risk assessment models are commonly built on the principle that there should be an inverse relationship between the severity of an incident and its probability.*

In some cases, the result of the risk assessment may be that the safety objectives will be met without any additional specific mitigation measures.

#### **Step IV - Development of an implementation plan and conclusion of the assessment**

The last phase of the safety assessment process is the development of a plan for the implementation of the identified mitigation measures.

The implementation plan includes time frames, responsibilities for mitigation measures as well as control measures that may be defined and implemented to monitor the effectiveness of the mitigation measures.

## **5. Approval/Acceptance**

### **5.1 Approval of the Authority**

- 5.1.1 Once submitted, the Authority will analyse the aeronautical study/safety assessment to verify 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 incidents and accidents);
  - (c) The proposed mitigation measures adequately addresses the risks; and
  - (d) The timeframe for planned implementation are acceptable.
- 5.1.2 The right to accept or reject the results of the Aeronautical Study/Safety assessment rests fully with the Authority.
- 5.1.3 On completion of the analysis of the safety assessment, the Authority:
- (a) either gives formal approval or acceptance of the aeronautical study/safety assessment to the operator/applicant; or
  - (b) if some risks have been underestimated or have not been identified, coordinates with the operator/applicant to reach an agreement on safety acceptance; or
  - (c) if no agreement can be reached, rejects the proposal for possible resubmission by the operator/applicant; or
  - (d) may choose to impose conditional measures to ensure safety.
- 5.4.1 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.
- 2.5.2 The determination to require caution will be primarily dependent on two considerations:
- 1) a pilot's need to be made aware of potentially hazardous conditions; and
  - 2) the responsibility of the Authority and the operator to publish deviations from standards that would otherwise be assumed under certificate status.
- 5.1.4 The Authority shall ensure that the mitigation or conditional measures are properly implemented and that they fulfil their purpose.

## **6. Promulgation of Safety Information**

- 6.1 The operator/service provider determines the most appropriate method for communicating safety information to the stakeholders and ensures that all safety- relevant conclusions of the aeronautical study/safety assessment are adequately communicated.
- 6.2 In order to ensure adequate dissemination of information to interested parties, information that affects the current aeronautical information package (AIP) or other relevant safety information is:
  - (a) promulgated in the relevant section of the AIP, NOTAM and automatic terminal information service (ATIS) as applicable;
  - (b) published in the relevant operational documents and information communications through the appropriate means;
  - (c) Listed on the aviation document issued by the CAAF, and
  - (d) Listed on the CAAF website.

## **7. Reference**

- CAAF Standards Document – Aerodromes (SD-AD)
- ICAO ANNEX 19
- ICAO ANNEX 14 – Volume I & Volume II
- ICAO Doc 8168 – Volume I & Volume II (Flight Procedures & Construction of Visual and Instrument Flight Procedures)
- ICAO Doc 9981 (PANS-Aerodrome)
- ICAO Doc 9774 (Manual on Certification of Aerodromes)
- ICAO Doc 9859 (ICAO Safety Management Manual)
- ICAO Doc 9157 Part II Chapter 1
- ICAO Cir 305 (Operation of New Larger Aeroplanes at Existing Aerodromes)

## **Appendix A - Aeronautical Study Applicability**

A1.1 The SD-AD, Annex 14, Volume I & Volume II, and ICAO Doc 8168 specifically provides for aeronautical studies to be conducted in respect of:

- (a) Objects outside the OLS (SD-AD 3.4.2)
- (b) Radio Altimeter Operating Area (SD- AD Appendix 3 para 7.3 which corresponds with Annex 14 Vol I para 3.8.3)
- (c) Taxiway minimum separation distances (SD- AD Appendix 3 para 8.8 which corresponds to Annex 14 Vol I para 3.9.7);
- (d) OLS requirements (SD-AD Appendix 4 para 3.1.3, 3.1.4, 3.1.5, 3.2.4, 3.2.5, 3.2.6, 3.3.7, 3.3.8, 3.4.6, 4.1, 4.2, 5.2 which corresponds with Annex 14 Vol I para 4.2.4, 4.2.5, 4.2.11, 4.2.12, 4.2.20, 4.2.21, 4.2.27, 4.3.1, 4.3.2, 4.4.2)
- (e) Visual Aids for Navigation (SD-AD Appendix 5 which corresponds with Annex 14 Vol I para 5.3.5.23, 5.3.5.40, 5.3.5.40, 5.3.5.46, 5.4.3.11);
- (f) Visual Aids for Denoting Obstacles (SD-AD Appendix 6 which corresponds with Annex 14 Vol I para 6.1.1.4, 6.1.1.6, 6.1.1.7, 6.1.1.9, 6.1.1.10, 6.1.2.2, 6.1.2.3, 6.2.3.28, 6.4.2, 6.2.4.3, 6.2.4.5 and 6.2.5.8);
- (g) Heliport safety areas, approach/take-off climb surface, OLS and touchdown position marking (Annex 14 Vol II para 3.1.23, 4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.10, 5.2.10.3, 5.2.10.4, 5.3.6.25 and 5.3.6.26), and.
- (h) Descend gradients for NPA with FAF, Noise abatement, VSS penetrations, NPA steep angle approaches and VPA (Doc 8168 para 5.2.2.3, 2.3, 5.4.6.4, 1.2 and 4.2.1.3).

A1.2 The CAAF does not encourage the submission of aeronautical studies in cases of deviations from the standards/regulations that have not been specifically recommended in the SD-AD and Annex 14, Volume I.

However, for existing aerodromes where physical constraints make it impossible for the aerodrome operator to meet the standards/regulations and implementation of mitigations is beyond the capability of the aerodrome operator, an aeronautical study may be conducted and submitted to support the request for an exemption from the CAAF.

CAAF will undertake an in depth analysis, which could include referral to the ICAO or internationally recognised experts in the area.

The right to accept or reject the results of the Aeronautical Study rests fully with the Authority.

**A1.2 Example of a specific Aeronautical Study - Taxiway Minimum separation distances**

It may be permissible to operate with lower separation distances at an existing aerodrome if an aeronautical study indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplane.

Hazard identification and analysis potential hazards associated with runway and parallel taxiway separation distances are:

- (a) risk of collision between an aircraft in flight and an object(fixed or mobile) on the aerodrome;
- (b) risk of collision between an aeroplane leaving the runway and an object on the aerodrome or the risk of collision of an aircraft that runs off the taxiway into the runway strip
- (c) ILS signal interference due to a taxiing or stopped aeroplane.

The first two hazards are potentially catastrophic and the third one is potentially major. Main causes and

accident factor:

- (a) human factors
- (b) weather conditions
- (c) aircraft mechanical failure
- (d) runway surface conditions
- (e) lateral veer off distance
- (f) aeroplane size and characteristics (wing span)

**Risk Assessment and possible mitigation measures**

Collision between an aircraft veering off the runway and an object (fixed or mobile) on the aerodrome the following options may be considered:

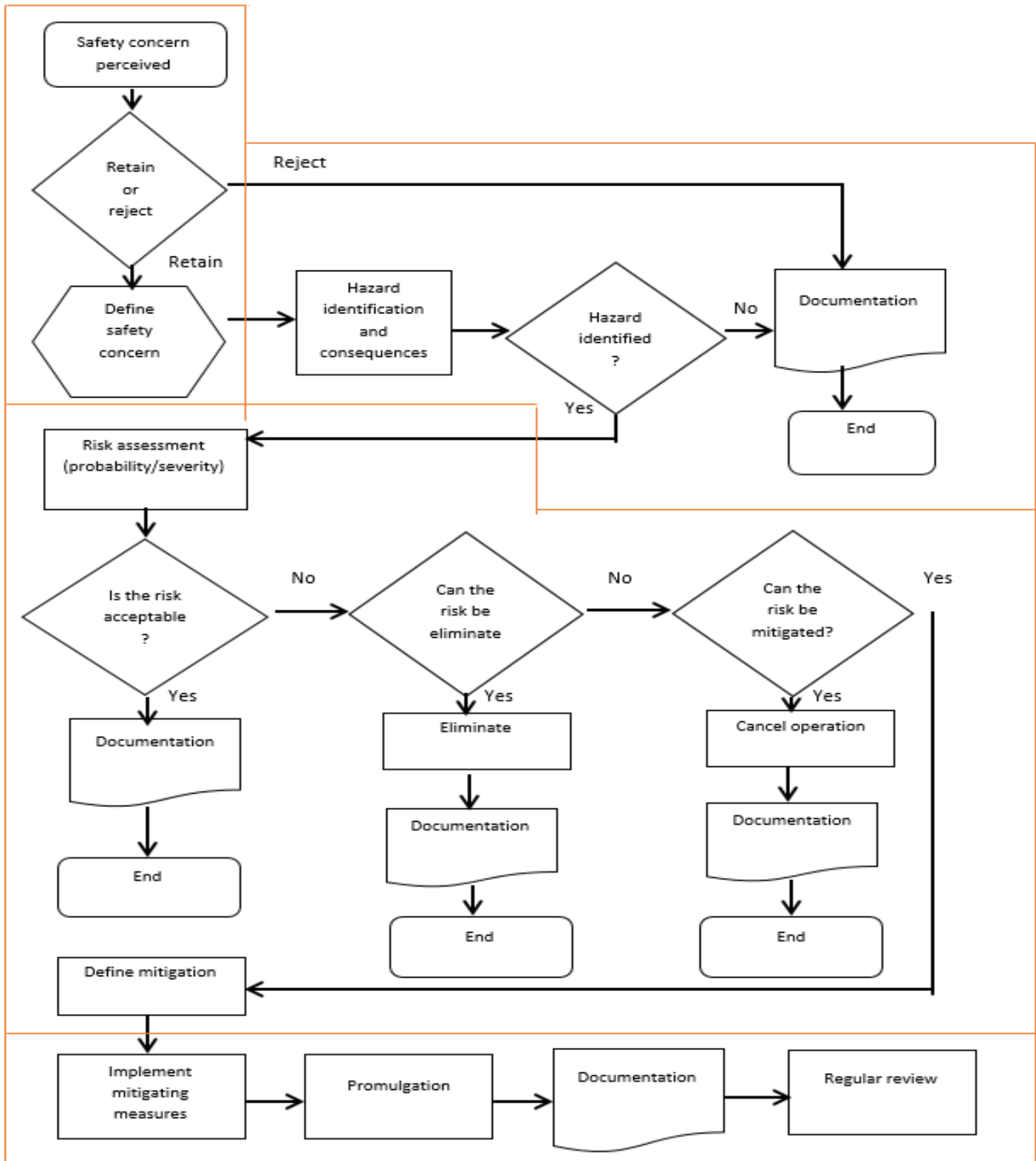
- (a) place a restriction on the wingspan of aircraft using the parallel taxiway if continued unrestricted runway operation is desired;
- (b) conduct a local study to determine the impact on ILS signals; and
- (c) in deciding whether to approve unrestricted operations, consider the expected frequency of potentially limiting the operation of new large aircrafts
- (d) A review of present taxi procedures and guidance technologies may be needed. Mitigating measures may require some surface movement restrictions, alternative operational procedures or additional guidance systems.

## Appendix B - Aeronautical Study Checklist

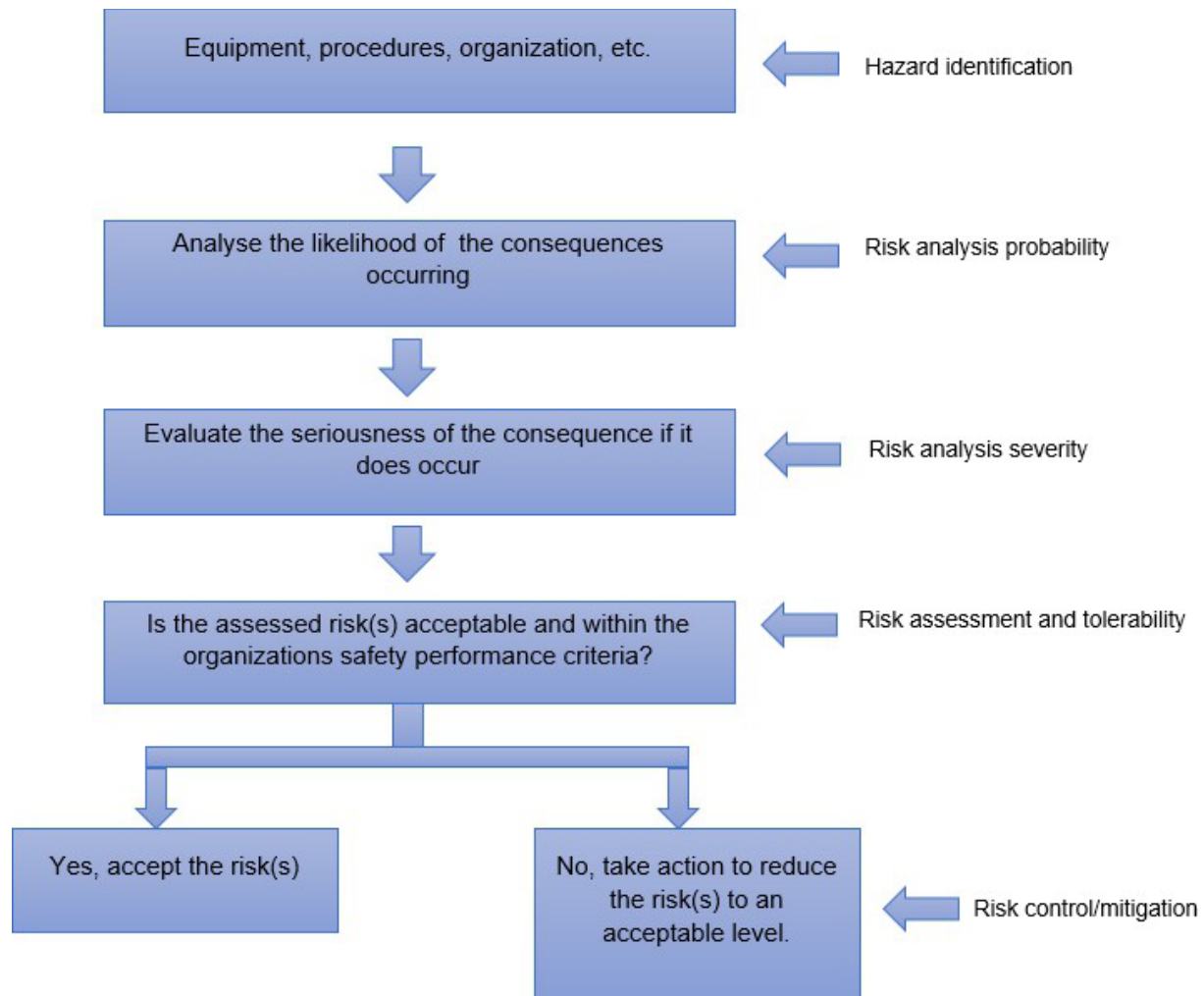
**NOTE:** The following is a generic checklist for requirements of an aeronautical study. Operator/Service Provider may use this checklist as a guide for developing an aeronautical study tailored to the specific situation.

AERONAUTICAL STUDY CHECKLIST			
Checklist for Aeronautical Study	Yes	No	Remarks
1. Aim of the study including: a) Address safety concerns; b) Identify safety measures; and c) Make reference to specific standards			
2. Consultation with stakeholders, senior management team, and divisions / departments affected.			
3. The study is approved by the accountable executive of the organization.			
4. Background information on the current situation.			
5. Proposed date for complying with the standards / requirements, if the deviation is due to development of the aerodrome.			
6. Safety assessment including: a) identification of hazards and consequences; and b) risk management.			
7. The safety assessment used in the study (e.g. hazard identification workshop, hazard log, risk probability and severity, risk assessment matrix, risk tolerability, risk control / mitigation, and re-assessment of the risk)			
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 reduction in the level of safety.			
9. Estimation of the effectiveness of each recommendation listed in the aeronautical study.			
10. Notification procedure including process flow, time frame, and the publication used to promulgate the deviation.			
11. Conclusion of the study.			
12. Monitoring of the deviation.			
13. Notification to the Civil Aviation Authority of Fiji once the (temporary) deviation has been corrected.			

## Appendix C - Safety Assessment Flow Chart



## Appendix D - Hazard Identification and Risk Management Process



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